







Operation and Maintenance Report
January 2020 to December 2020

McCormick and Baxter Superfund Site

Portland, Oregon
ECSI Site No. 74

Prepared for
Oregon Department of Environmental Quality

July 30, 2021
150-002-005/Task 3

HARTCROWSER
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GSI
Water Solutions, Inc.

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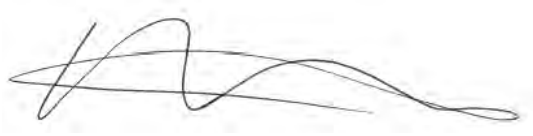
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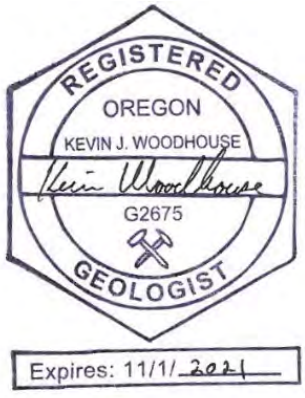
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Acronyms and Abbreviations

ACB	articulated concrete block
ALS	ALS Environmental
AWQC	ambient water quality criteria
bgs	below the ground surface
BaP	benzo(a)pyrene
BES	City of Portland, Bureau of Environmental Services
cPAHs	carcinogenic PAHs
CULs	Portland Harbor Superfund Site Cleanup Levels
DEQ	Oregon Department of Environmental Quality
Dive Team	EPA Region 10 Dive Team
DNAPL	dense non-aqueous phase liquid
EDL	estimated detection limit
EPA	U.S. Environmental Protection Agency
FWDA	Former Waste Disposal Area
GSI	GSI Water Solutions, Inc.
HPAH	high-molecular weight PAHs
ICs	institutional controls
IGA	Intergovernmental Agreement
LNAPL	light non-aqueous phase liquid
LPAH	low-molecular weight PAHs
Metro	Metro Regional Government
MCL	Maximum Contaminant Level
mg/kg	milligrams per kilogram
NAPL	non-aqueous phase liquid
NAVD88	North American Vertical Datum of 1988
NOAA	National Oceanic and Atmospheric Administration
ng/L	nanograms per liter
O&M	Operation and Maintenance
PAHs	polycyclic aromatic hydrocarbons
PCP	pentachlorophenol
PDMS	polydimethylsiloxane
PSD	passive sampling device
PVC	polyvinyl chloride
RCRA	Resource Conservation and Recovery Act
RM	River Mile
ROD	Record of Decision
SAP	Sampling and Analysis Plan
Site	McCormick and Baxter Superfund Site
SOP	standard operating procedure
TEQ	toxic equivalency
TFA	Tank Farm Area

Acronyms and Abbreviations Continued

TRM	turf-reinforced matting
TTU	Texas Tech University
µg/L	micrograms per liter
USGS	U.S. Geological Survey
WHO	World Health Organization

Operation and Maintenance Report
January 2020 to December 2020

McCormick and Baxter Superfund Site

Portland, Oregon

1.0 INTRODUCTION AND PURPOSE

This Operation and Maintenance (O&M) Report has been prepared for the Oregon Department of Environmental Quality (DEQ) to document the O&M activities implemented at the McCormick and Baxter Superfund Site (the "Site") located in Portland, Oregon, between January 1, 2020, and December 31, 2020.

O&M activities are identified in the Final O&M Plan prepared by DEQ and the U.S. Environmental Protection Agency (EPA) (DEQ and EPA 2014). The Final O&M Plan defines the administrative, financial, and technical details and requirements for inspecting, operating, and maintaining the remedial actions at the Site. DEQ and EPA reduced the scope and frequency of O&M activities conducted at the Site in 2010, from the frequency conducted at the Site from 2005 through 2010. The Final O&M Plan reflects that reduction. The O&M Manual specifies the Sampling and Analysis Plan (SAP) procedures, Quality Assurance (QA) and quality control, technical information, and data necessary for implementing O&M activities. The O&M Manual is a living document that is modified periodically to reflect necessary monitoring and maintenance needs at the Site. Haley & Aldrich (previously Hart Crowser) and GSI Water Solutions, Inc. (GSI) are in the process of updating the O&M manual, which was last updated in March 2018 (Hart Crowser and GSI 2018).

The purpose of this O&M Report is to document the operation, monitoring, and maintenance activities that occurred in calendar year 2020. Figure 1-1 shows the location of the Site; Figure 1-2 presents the Site layout and features; Figure 1-3 presents the Site capping components; Figure 1-4 presents the Site layout with surface elevations; Figure 1-5 presents the historical contaminant areas; and Figure 1-6 presents historical non-aqueous phase liquid (NAPL) distribution. This report has been prepared by DEQ's contractor team, Haley & Aldrich, and GSI.

The O&M performance standards and activities for the soil cap and sediment cap are discussed in Sections 2 and 3, respectively. The groundwater performance standards and activities are summarized in Section 4. Vegetation management is presented in Section 5. Section 6 discusses the remedy performance, and Section 7 presents recommendations for 2021. Section 8 provides references. Appendix A provides a photograph log of site activities and observations associated with O&M activities. Appendix B provides site activity documentation, including the field observation forms for the soil and sediment cap, site inspection meeting summaries, and the sign-in log. Appendix C provides the Subsidence Monitoring and Evaluation Technical Memorandum that was completed in 2020 for subsidence monitoring activities performed in 2019. Appendix D provides the EPA Dive Report for sediment cap performance monitoring sampling. Appendices E and F provide the porewater sampling chemical results and crayfish tissue chemical results, respectively. Appendix G provides the chemical results for groundwater sampling. Appendix H provides a photograph log for vegetation observations.

Routine operation, monitoring, and maintenance activities in 2020 were implemented primarily by DEQ's contractor, Haley & Aldrich, and its teaming partner GSI (under subcontract to Haley & Aldrich). O&M activities were also performed by American Backflow Services.

Key personnel for implementation of O&M activities include:

- Sarah Miller: DEQ Project Officer;
- Danielle Johnson: DEQ Contract Officer;
- Rick Ernst: Haley & Aldrich Program Manager;
- Kevin Woodhouse: Haley & Aldrich Site Manager;
- Ben Johnson: GSI Hydrogeology Manager; and
- Andrew Davidson: GSI Former Hydrogeology Manager.

2.0 SOIL CAP PERFORMANCE STANDARDS AND ACTIVITIES

This section presents a summary of soil cap performance standards, observations, and maintenance activities at the Site for the reporting period January 1, 2020, through December 31, 2020, and a summary of remedy performance as related to the performance standards. The Final O&M Plan provides a description of the remedial action objectives and the soil operable unit remedy. Table 2-1 provides the soil cap activities conducted in 2020.

2.1 Soil Cap Performance Standards

Contaminated surface soil was removed, and an upland soil cap was constructed on approximately 40 acres of the Site in September 2005. Institutional Controls (ICs) have not been completed for this portion of the Site. Soil beneath the soil cap remains contaminated with arsenic, pentachlorophenol (PCP), polycyclic aromatic hydrocarbons (PAHs), dioxins/furans, and NAPL and as such, the soil cap requires long-term monitoring and maintenance. The performance standards for the soil cap are as follows:

- Maintain contaminant concentrations in surface soil below the following risk-based cleanup goals, as specified in the Record of Decision (ROD) (EPA 1996):
  - Arsenic: 8 milligrams per kilogram (mg/kg)
  - PCP: 50 mg/kg
  - Total carcinogenic PAHs: 1 mg/kg
  - Dioxins/furans: 0.00004 mg/kg
- Maintain the topsoil layer to within 50 percent of its design specification as follows:
  - Maintain a topsoil thickness of at least 6 inches for the area over the impermeable geomembrane cap.
  - Maintain a topsoil thickness of at least 12 inches for all areas except over the impermeable geomembrane cap.

- Minimize infiltration of rainwater within the subsurface barrier wall by maintaining the subsurface stormwater conveyance system.
- Minimize stormwater erosion and ponding outside the barrier wall by maintaining site grading, surface stormwater conveyance, and native vegetation.
- Maintain native vegetation within the approximate 6-acre riparian zone for compliance with the National Marine Fisheries Service Biological Opinion (National Oceanic and Atmospheric Administration [NOAA] 2004).

2.2 Soil Cap Observations

Soil cap observations were conducted according to the Final O&M Plan. Routine quarterly site inspections were conducted on February 26, July 6, September 30, and December 17, 2020, by DEQ, Haley & Aldrich, and GSI. The second quarter inspection was delayed until the first week of July 2020 due to limitations from the State of Oregon's orders regarding COVID-19 restrictions. These inspections are documented on observation forms developed for the Site. Supporting documentation and pertinent details are included in Appendix B. Observations of interest from the routine inspections are summarized on Figure 2-1 and described below. Representative site photographs taken in 2020 are presented in Appendix A. As required for the Site administrative record, a log of all site visitors in 2020 was kept; however, high winds blew the visitor log binder from its storage shelf and into the secondary containment pad with standing water rendering it illegible. Entries were recreated based on knowledge of site visitors; however, it may not include all pre-existing entries. The recreated log is included in Appendix B. A document box will be installed on the storage building to contain the sign in sheets and prevent this from happening again.

2.2.1 Visual Inspection

The upland soil cap provides habitat for rabbits, ground squirrels, Canada geese, several other species of birds, and coyotes. Despite placing gravel to fill gaps under the fence around the upland portion of the Site, periodic burrowing continues to be observed under the fence and along the perimeter road. These burrows are filled as necessary (Appendix A, Photograph A13) and are not of major concern. Burrows were observed and filled sporadically during the second half of the year.

Ground squirrel activity continues to be observed at several locations throughout the upland soil cap. Ground squirrels are common to the area, and burrows typically extend to approximately 1 foot below the ground surface (bgs). The ground squirrels use the surplus articulated concrete block (ACB) stockpiled at the Site, paved roadway, and concrete well monuments as habitat. Observed burrows were generally less than 6 inches deep as determined by probing in the field and did not require repairs. The soil cap continues to isolate site contaminants from human and ecological receptors. Continued monitoring of the burrows will be performed; however, no action to remove burrowing animals or to fill in the burrows is planned or necessary at this time. If burrows deeper than 6 inches are observed, maintenance activities will be performed to fill them in.

A coyote was observed along the fence during the July 2020 site inspection and on the soil cap when field personnel arrived to perform maintenance activities in December 2020. Geese and crows were observed

foraging on the soil cap during the February 2020 site inspection. Goose scat observed throughout the soil cap indicates that geese periodically visit the Site throughout the year.

The gate at the top of North Edgewater Road marks the entrance to the Site and Willamette Cove property. This gate, which is secured with a series of locks and a chain, provides access for two railroads, Northwest Natural Gas, Metro Regional Government (Metro), DEQ, and other agencies. In 2020, DEQ's primary site access was switched from North Edgewater Road to the North Van Houten Place gate to improve site access.

The Union Pacific Railroad tracks, which run parallel to the northwest of the Site and neighboring properties, are often used by the public to access the area. Access to the area generally does not affect security because of the surrounding fence and lighting at the Site; however, periodic acts of trespassing or vandalism occur. Main gate locks to the Site were found cut upon arrival for quarterly inspections on February 26 and September 30, 2020, and on December 9, 2020, for O&M activities. Additionally, DEQ was notified by a University of Portland construction crew representative on December 22, 2020, that the Site gates were open, and the locks were cut. Cut locks and chains were replaced prior to field staff leaving the Site on each occasion.

In November 2020, DEQ notified Haley & Aldrich that two cuts in the fence were reported. Field staff were prepared to perform repairs on the two small cuts in the fence fabric during December O&M activities; however, when field staff arrived and performed a thorough assessment of the entire perimeter fence, the cuts were larger than anticipated and more of them were present (Figure 2-1). The larger scope of work required a fence repair subcontractor to complete. Efforts to procure a fence repair subcontractor were initiated in early 2021. Aside from the cuts in the fence itself, the soil cap has not been disturbed or damaged due to the fence vandalism, and no other signs of trespassing (e.g., theft, trash dumping, camping, etc.) have been observed to indicate reason for trespassing.

2.2.2 Soil Cap Subsidence

In June 2008, subsidence of the soil cap was observed near groundwater monitoring wells EW-1s and MW-23d. An upland site survey confirmed that the ground surface had subsided up to approximately 0.8 feet in a limited area around the wells between the time that the soil cap was installed in 2005 and 2008. A Subsidence in Upland Cap Memorandum (Hart Crowser and GSI 2008) and an Additional Subsidence Monitoring Memorandum (Hart Crowser and GSI 2010) present the results of the survey and additional investigation to determine the cause of the subsidence.

Based on elevated groundwater temperatures in well EW-1s (40°C) and the large amount of buried woody debris in the area, it was suspected that aerobic degradation of woody debris was occurring and causing the ground surface subsidence. Decreasing groundwater levels within the barrier wall also may have contributed by opening a larger unsaturated zone that allows compaction. In 2009, the shallow well EW-1s was sealed to reduce the amount of oxygen reaching the unsaturated zone. After the well was sealed, subsidence slowed with no additional subsidence being observed over the past 10 years (see below). The groundwater temperature dropped to approximately 21 to 23°C and has remained stable for the past 10 years. Current temperatures in the well are approximately 19 to 20°C. This temperature is still higher

than groundwater from surrounding wells (approximately 13°C) indicating that some heat is still being produced in the subsurface near well EW-1s. This may be caused by anaerobic degradation, which generates less heat than aerobic degradation.

Ground surface subsidence is monitored by measuring the inner polyvinyl chloride (PVC) casing at well MW-23d relative to the steel outer casing of the well. The inner casing extends to 182 feet bgs and is considered to be stable. In 2008, field staff noticed that the inner casing for MW-23d extended approximately 4 inches above the outer casing and interfered with the well monument lid closing correctly. In August 2008, the inner casing for MW-23d was trimmed down and the inner casing sat approximately 4 inches below the outer casing. The outer casing is representative of the ground surface and if the casing (or ground surface) subsides, then the distance between the inner and outer casing decreases. Between November 2008 (first periodic measurement conducted) and 2010, the total distance between the inner and outer casing decreased by approximately 1.35 inches to a total distance of approximately 2.75 inches. Most of the decrease between the inner and outer casing occurred in 2009, with 0.5 inches of decrease occurring between November 2008 and January 2009. Since 2010, the distance has not changed, being measured at approximately 2.75 inches. Slight differences in the distance measured have been observed, within 0.10 inch for all events, and are likely due to variability in measuring equipment and field personnel.

Prior to 2008, the Site was last surveyed in 2005. An evaluation of the difference in ground surface elevations between the 2005 and 2008 surveys indicated ground surface subsidence of up to 0.8 feet in areas where wood debris is present (Hart Crowser and GSI 2010). A topographic survey and storm sewer video inspection were performed in 2019 to collect data and evaluate if additional subsidence had occurred from a previous similar survey in 2008 (additional measurements were collected for EW-1s and MW-23d in 2009). The results of the 2019 subsidence monitoring activities were discussed in the 2019 O&M Report and are presented in the Technical Memorandum – Subsidence Monitoring and Evaluation (Hart Crowser 2020) that was finalized in January 2021. The final technical memorandum is included as Appendix C. Survey results indicated elevation decreases of 6.72 inches for EW-1s and 2.64 inches for MW-23d between 2009 and 2019. Two sags in the high-density polyethylene storm sewer pipe in the vicinity of EW-1s and MW-23d (between manholes SDMH-B and SDMH-C) were previously documented in 2008. The 2019 storm sewer inspection did not find any new sags or changes to the existing sags in the storm sewer pipe. No additional changes or impacts to the storm sewer pipe (e.g., cracking or root intrusion) were observed.

Subsidence monitoring was performed in 2020 to evaluate the continued effectiveness of EW-1s well sealing activities and to determine if additional settling had occurred since 2009. Measurements of the inner and outer well casing of MW-23d continue to remain at approximately 2.75 inches indicating additional subsidence has not occurred since 2012.

While not anticipated, significant additional settling in this area could affect performance of the stormwater conveyance system. The stormwater conveyance system is observed quarterly and continues to perform as designed with steady flow from the outfall during and immediately after rainfall events.

2.3 Soil Cap Maintenance Activities

Routine maintenance activities performed at the Site in 2020 included replacing cut locks and chains, filling animal burrows beneath the perimeter fence, and monitoring vegetation. Non-routine maintenance performed in 2020 included replacement of downed sign-posts for two perimeter signs.

Locks and/or chains on perimeter fence gates were found cut on February 26, September 30, December 9, and December 22, 2020. The cut locks and/or chains were replaced by field personnel to secure the Site prior to departure.

A vegetation assessment inspection was performed on August 5, 2020. The vegetation inspection results are described in further detail in Section 5.3.2. Trees and shrubs were healthy and did not show signs of drought stress; watering events were not necessary in 2020. The area burned in the 2018 grass fire fully rebounded during in the first half of 2019; and continued monitoring of the area was not required in 2020. The June 5, 2019, pesticide application event successfully reduced the population of noxious plants and weeds at the Site. Targeted weed removal and herbicide application was not necessary in 2020.

On September 28, 2020, American Backflow Services of Portland, Oregon, tested the Site's water supply line backflow prevention valve. The backflow prevention valve met state regulation standards.

On December 9, 2020, field staff performed O&M activities to fill ruts beneath the perimeter fence (Appendix A, Photograph A13) and to replace two downed signposts along the northern perimeter fence. Downed signposts were replaced with four by four-inch cedar posts anchored in concrete approximately 2 feet into the soil cap and above the delineation layer marking the top of contaminated soil (Appendix A, Photograph A17). The notification signs on the signposts were no longer legible from heavy weathering (Appendix A, Photograph A16). Field staff ordered new signs and mounted them on the posts in January 2021 to complete the signpost repair.

2.4 Summary of Soil Cap Remedy Performance

Overall, upland soil cap observations and inspections revealed no significant change in remedy performance or areas of concern. The soil cap continues to have a consistent layer of vegetative cover across the Site (Appendix A, Photographs A4 and A7). Future O&M activities will primarily consist of quarterly inspections and routine maintenance. Even though the locks are periodically cut and require replacement, there is no evidence that trespassers have damaged the integrity of the soil cap.

The upland soil cap subsidence near wells EW-1s and MW-23d is currently stable. Monitoring will continue in 2021 by taking inner and outer casing measurements at well MW-23d; by monitoring stormwater flow at the outfall during quarterly inspections; and by collecting and reviewing transducer data from EW-1s that measures groundwater temperature and elevation.

Institutional controls have not been fully implemented per the ROD (i.e., deed restrictions have not been implemented as the property has not transferred ownership yet). To date, no activities have occurred that could have damaged the soil cap or would have been prohibited by deed restrictions.

3.0 SEDIMENT CAP PERFORMANCE STANDARDS AND ACTIVITIES

This section summarizes sediment cap observation, sediment cap performance monitoring, and maintenance activities for the reporting period January 1, 2020, through December 31, 2020. Site observations and maintenance activities were conducted according to the O&M Plan. Sediment cap inspections were conducted in February, July, September, and November 2020 by DEQ, Haley & Aldrich, and GSI in conjunction with inspections for the entire site. Observations of interest from the routine inspections and site meetings are presented on Figure 2-1. Routine inspections are documented in observation forms developed and recorded for the Site and are presented in Appendix B. Table 3-1 provides a summary of sediment cap activities conducted in 2020. Table 3-2 provides sample location information for sediment cap performance monitoring. Tables 3-3 provides surface and porewater water sampling results and Table 3-4 provides comparison criteria for sample results. Table 3-5 provides the crayfish tissue sampling results and their comparison criteria.

3.1 Sediment Cap Performance Standards

The sediment remedy consists of a 23-acre cap over contaminated sediment within the Willamette River and includes ICs. The sediment cap remedy was completed in September 2005, and an Easement and Equitable Servitude was completed in 2006 to restrict sediment cap use and access. Sediment beneath the sediment cap remains contaminated with arsenic, PCP, PAHs, dioxins/furans, and NAPL. The performance standards for the sediment cap are as follows:

- Maintain contaminant concentrations in surface sediment below the following risk-based cleanup goals, as specified in the ROD (EPA 1996).
  - Arsenic: 12 mg/kg, dry weight
  - PCP: 100 mg/kg, dry weight
  - Total carcinogenic PAHs: 2 mg/kg, dry weight
  - Dioxins/furans toxic equivalency (TEQ): $8x10^{-5}$ mg/kg, dry weight
  - Protection of benthic organisms based on sediment bioassay tests, resulting in impaired survival and growth (i.e., weight)
- Minimize contaminant releases from sediment that might result in contamination of the Willamette River in excess of the following federal and state Ambient Water Quality Criteria (AWQC):
  - Arsenic (III): 190 micrograms per liter (µg/L)
  - Chromium (III): 210 µg/L
  - Copper: 12 µg/L
  - Zinc: 110 µg/L
  - PCP: 13 µg/L
  - Acenaphthene: 520 µg/L
  - Fluoranthene: 54 µg/L
  - Naphthalene: 620 µg/L

  - Total carcinogenic PAHs (cPAHs): 0.031 µg/L
  - Dioxins/furans: $1.4x10^{-5}$ nanograms per liter (ng/L)
- Maintain the armoring layer to within 50 percent of the design specification throughout the cap. The design specifications are as follows:
  - 6-inch rock armoring: maintain at least 6 inches thick
  - 12-inch rock armoring: maintain at least 7.5 inches thick
  - 24-inch rock armoring: maintain at least 12 inches thick
- Maintain uniformity and continuity of ACB armoring.
- Assess performance of organophilic clay to ensure it is preventing the release of mobile NAPL to the Willamette River (potential assessment parameters include sorption capacity, measure of NAPL currently sorbed, and permeability).

AWQCs listed above were the surface water criteria in effect at the time of the ROD (EPA 1996). Since completion of the ROD, additional recommended EPA water quality criteria were published in 2007, and more stringent AWQCs for human health were adopted by DEQ and approved by EPA in 2011. During meetings in August 2007 among stakeholders (DEQ, EPA, NOAA, Confederated Tribes of Warm Springs, and Yakama Nation), it was agreed that for comparison purposes, the following five criteria would be included in analytical results summary tables in Annual O&M Reports.

- Two AWQCs in effect at the time the ROD was issued:
  - 1996 criteria for chronic effects to aquatic life
  - 1996 criteria for human health based on fish consumption
- Two 2007 National Recommended Water Quality Criteria (NRWQCs):
  - 2007 criteria for chronic effects to aquatic life
  - 2007 criteria for human health (consumption of organisms)
- Current EPA maximum contaminant levels (MCLs)

The above comparison criteria are included in Table 3-4, with the 2015 NRWQCs and 2015 MCLs superseding the previously used 2007 and 2011 versions, respectively. The comparison criteria above are for comparison only; the 1996 AWQCs remain as the regulatory screening criteria for the Site. Comparison criteria include the EPA-approved 2011 AWQCs updated in 2017 for human health (DEQ 2017), and other applicable AWQCs at the time of sediment cap water sampling. These comparison criteria were used as comparison criteria for the fall 2020 passive surface water and sediment cap porewater sampling event. The next scheduled sediment cap water sampling event is in 2025.

3.2 Sediment Cap Observations

Routine sediment cap inspections were conducted on February 26, July 6, September 30, and December 17, 2020, during the four quarterly site inspections. Observations were made regarding habitat enhancement features, wildlife, vandalism, and/or trespassing. Representative site photographs of the Willamette Cove

and Willamette River shorelines taken in 2020 are presented in Appendix A. Sediment cap inspection documentation is included in Appendix B. In general, the sediment cap remains in good condition.

3.2.1 Shoreline Conditions

During the October 2018 site inspection, multiple 2- to 6-inch-wide voids were observed in the ACB along the shoreline in the Willamette Cove during seasonal and tidal low water. The gaps were not visible due to water levels during any site inspections conducted in 2019 and 2020 Photograph A1 (Appendix A). The gaps will be monitored (when possible) for signs of erosion or impairment of sediment cap armoring in the Willamette Cove.

During the October 2019 quarterly site inspection, a minor amount of erosion was observed at the northwestern end of the turf-reinforced matting (TRM) at the upper edge of the ACB, likely occurring only during very high-water conditions of the Willamette River. The erosional area was observed throughout 2020 for signs of additional erosion prior to repairs being completed in December 2020 (Photograph A18 (Appendix A). No additional erosion was observed, and repair activities are discussed in further detail in Section 3.5.

On July 18, 2018, a fire burned approximately 1 acre at the northwestern end of the riparian area between monitoring wells MW-39s and MW-43s. The fire was likely caused by human activities (i.e., camping on the shoreline) and primarily burned brush and grass undergrowth impacting the riparian area closer to the river. Grass regrowth along the shoreline was complete by July 2019 with remaining visible signs of the fire including only burned driftwood tree trunks and charred tree branches. Charred branches on trees and lingering fire damage recovered during the fall 2019 and spring 2020 growing seasons and visible evidence of the fire was no longer present. The burned area fully recovered in 2020 and will not be monitored separately beginning in 2021. Burned holes in the TRM from the fire were monitored throughout the year and appeared stable without increases in size. If holes increase in size in the future, repair activities for the TRM will be initiated.

Shoreline sheen and ebullition are monitored to determine if the sediment cap is performing as intended and if NAPL from creosote seeps is reaching the Willamette River. Shoreline sheen was not observed from the Willamette Cove or Willamette River shorelines during any of the Site inspections conducted in 2020. Ebullition was not observed during any of the Site inspections but was observed along the Willamette Cove shoreline by field staff deploying the passive sampling devices (PSDs) during the Five-Year Review sampling (discussed in Section 3.3). Ebullition is also monitored as a measure of granular organophilic clay integrity as testing performed in 2008 through 2010 determined that total organic carbon decay resulted in methane gas production and ebullition in those areas. Ebullition observed in 2020 during PSD deployment was in the granular organophilic clay emplacement area within Willamette Cove and did not contain sheen.

Separation and down-dropping of blocks along the ACB edge was observed at the northeastern end of the cap within Willamette Cove during the September 2020 site inspection. Individual blocks along a 10-foot section of the ACB edge had broken off and separated from the ACB mat and begun to sink into

the adjacent sand resulting in loose blocks and voids. O&M activities were performed in December 2020 to repair the separation and is described in further detail in Section 3.5.

3.2.2 Habitat Enhancement Features and Wildlife

Habitat enhancement features, such as boulder clusters and sand cover as a biotic layer, are design elements of the sediment cap. Driftwood also provides habitat enhancement along the shoreline and in the riparian area above the shoreline. The distribution of sand cover over the ACB is similar to previous years. Originally, sand was placed over a large portion of the shoreline and Willamette Cove ACB armoring, but high river flow conditions and wakes from passing boats had washed sand from the ACB where the bank slopes are steeper. Rounded 1.5-inch-minus gravel was placed within the ACB voids along a large portion of the shoreline and Willamette Cove in October 2012. Subsequent to gravel placement, some has washed down from the steeper, upslope shoreline areas and has settled onto lower ACB surfaces where it has largely remained in place through 2020 (Appendix A, Photograph A14).

Large pieces of driftwood are deposited along the shoreline at higher elevations during high river-stage events. The amount of driftwood moving through the Site appears to remain fairly consistent every year. Three areas of the shoreline appear to accumulate more woody debris than other areas:

- The south end of the shoreline near the City of Portland outfall.
- Along the shoreline near the former Tank Farm Area (TFA).
- The north end of the Site near the Burlington Northern Railroad bridge.

Boulder clusters placed during the sediment cap construction remained in place during 2020.

Numerous wildlife species continue to be observed Site-wide; birds seen most frequently include Canada geese, gulls, cormorants, crows, pigeons, blue herons, ospreys, and hawks.

3.2.3 Public Use

The shoreline along the Site and Willamette Cove is publicly accessible and used for various forms of recreation. A transient encampment was observed during the February 2020 site inspection along the Willamette River shoreline in the vicinity of MW-39 well cluster (Appendix A, Photograph A2). The encampment appeared to be abandoned during the July 2020 site inspection with trash and debris present around two abandoned tents (Appendix A, Photograph A5). DEQ notified Metro of the abandoned camps; however, due to budget and manpower limitations brought on by COVID-19, Metro was not able to perform trash cleanup activities of the abandoned encampments, and Haley & Aldrich completed this activity in January 2021.

Throughout 2020, miscellaneous trash and graffiti were observed along the shoreline, including beverage bottles and food containers, clothes, bags of household trash, and used hypodermic needles.

Numerous dilapidated boats (presumably used as dwellings) are consistently observed anchored in Willamette Cove during recent years and were again observed in Willamette Cove during the February and July site inspections. Environmental sampling activities at the adjacent Willamette Cove site were

performed by the City of Portland and their subcontractor in the summer and fall of 2020 and removed the vessels from the cove during that timeframe. A small, dilapidated sailboat and floating dock with a corrugated metal shack was observed anchored in Willamette Cove and a 25-foot derelict sailboat was observed on the Willamette River sediment cap during the December inspection. All boats observed in Willamette Cove throughout the year appeared to be anchored beyond the sediment cap, and we did not visually observe any damage to the sediment cap from moorage or physical contact by boats. The U.S. Coast Guard and Oregon State Marine Board rules prohibit anchoring on the sediment cap. The derelict sailboat was observed on the ACB during multiple site visits in December 2020. The vessel was anchored to a washed-up tree trunk in the vicinity of the stormwater outfall and was partially submerged. DEQ initiated inquiries with Oregon State Marine Board to get preliminary information on vessel removal requirements so planning for vessel removal could be performed in 2021.

3.2.4 Buoys

Five permanent buoys were installed in August 2011, along the perimeter of the sediment cap warning boaters of navigational hazards. Buoys were observed to be in place throughout 2020.

3.3 Surface Water, Inter-Armoring Porewater, and Sub-Armoring Porewater Sampling

This section summarizes the surface water, inter-armoring porewater, and sub-armoring porewater sampling activities conducted in August through September of 2020. This sampling was completed to assess sediment cap performance and inform the fifth Five-Year Review for the Site. Water samples were collected using custom fabricated PSDs. The sampling and analytical methods used are detailed in the Surface, Inter-armor, and Sub-armoring Water and Crayfish SAP (Hart Crowser and GSI 2020) developed for this sampling event, which will be included in the updated O&M Manual that is being prepared.

3.3.1 Sampling Approach

In 2020, DEQ and EPA elected to use passive sampling methods to characterize surface water and porewater at the Site because the sampling results represent the biologically available fraction of site contaminants. The methods used in 2020 utilized solid phase micro extraction fibers coated with a sorbent polydimethylsiloxane (PDMS) polymer media for PAH and PCP analysis. Dioxin/furan analysis was also evaluated for inclusion in the analytical program; however, the amount of sample media required to achieve the necessary detection limits far exceeded the capacity of the PSD cell and wasn't able to be included in the analytical program.

Diffusive membranes covering cells containing reference water were used to characterize dissolved metals (arsenic, chromium, copper, and zinc) concentrations. Select cells were spiked with bromide (Br^-) ions to allow for the assessment of equilibrium. Texas Tech University (TTU) developed and integrated these two passive sampling techniques into a PSD with discrete sampling intervals for surface water (6 inches above mudline), inter-armoring porewater (6 inches below armor surface), and sub-armoring porewater (18 inches below armor surface). Additional information regarding the field and analytical methods can be found in the SAP (Hart Crowser and GSI 2020).

The surface water and inter-armoring porewater samples will be used to assess the cap's compliance with the ROD. Compliance samples were collected from the inter-armoring depth (6 inches below armor surface) at 12 locations (A through L) to ensure the cap is functioning as intended. Compliance monitoring horizontal positions are statistically generated and change each event, as described in the DEQ- and EPA-approved technical memorandum, entitled O&M Sampling Approach for the McCormick & Baxter Sediment Cap (GSI 2013). Samples were collected at four early warning locations (5, 12, 13, and 16), which are monitored every five years at the sub-armoring layer (18 inches below armor surface). In 2020, additional sub-armor porewater was collected at all 12 locations (A through L). Results from the sub-armoring layer will be used as an early warning indicator to assess potential chemical breakthrough across the sediment cap area.
Two surface water reference locations (1 and 27) were sampled to assess background concentrations of contaminants in the surface water at the Site; however, the PSD for location 1 was not recovered. Compliance, early warning, and background sample location details are provided in Table 3-2 and the locations themselves are shown on Figure 3-1.

3.3.2 Sampling Overview

Twelve compliance monitoring, four early-warning, and upstream and downstream surface water reference locations were selected for assessment. PSDs were loaded at TTU and stored in an upland processing area (i.e., the onsite storage building) before being installed by field staff at onshore locations or transferred to the EPA Region 10 Dive Team (Dive Team) at offshore locations. All PSDs were fully loaded for the three sample intervals so that any PSD could be used at any given location.

The loaded PSDs were deployed between August 23 and 27, 2020. Locations C, 5, 12, and 13 were accessible by foot during low tide, and PSDs were deployed from shore. Offshore PSD samplers were deployed by the EPA Dive Team in accordance with the SAP and EPA Dive Plan. The PSDs were left in the sediment and overlying water for 32 to 34 days, allowing them to approach equilibrium with surface water and porewater conditions.

PSDs were retrieved from September 28 through 30, 2020, sample media was extracted and processed for transport to the TTU laboratory. At shallow shoreline locations, the PSDs were retrieved from shore by Haley & Aldrich and GSI field staff. During retrieval, EPA divers inspected offshore locations to confirm that the PSDs remained intact and had not been disturbed. The divers retrieved the PSDs from the cap and transported them to the surface. A copy of the EPA Dive Report detailing the installation and retrieval of the offshore PSDs is provided in Appendix D. During the retrieval of the PSDs, three issues were encountered:

- The PSD at compliance location G was broken at the mudline. This PSD was still considered representative since inter-armor and sub-armor intervals remained in place. The top portion of the PSD above the mudline remained connected and in the surface water target interval and was also still representative.
- The PSDs at compliance locations B and J became exposed during periods of low water. This exposure may have influenced the results for the surface water intervals at these locations.
- The PSD at background location 1 was not recovered.

Once retrieved, the PSDs were wrapped in tinfoil and transported to the upland processing area where sample media was unloaded from the PSDs and packaged for transport to the TTU laboratory in Lubbock, Texas. Two PSDs were stored in the processing area during the field deployment as field blank samples and were shipped back with the processed samples for analysis. Additional PDMS-coated fibers were collected from each interval of the PSD installed at compliance monitoring location C to serve as a duplicate. No duplicate samples for metals were run because additional diffusive cells were not prepared due to a miscommunication with TTU. The TTU laboratory team analyzed the PDMS-coated fibers and diffusive membrane cell water for PAHs, PCP, and dissolved metals (arsenic, chromium, copper, and zinc) in accordance with the TTU standard operating procedures (SOPs) in the O&M Manual.

3.3.3 Data Quality

Chemical analyses of the samples were completed at the TTU laboratory as described in the SOPs provided in the SAP (Hart Crowser and GSI 2020). The specific target analytes and analytical methods for this event included:

- PAHs by EPA Method 8270.
- PCP by EPA Method 8270.
- Dissolved metals (arsenic, chromium, copper, and zinc) by EPA Method 200.8.

Results of the analyses of the PDMS-coated fibers required the conversion of reported concentrations to water concentrations based on each chemical's partitioning coefficient. The results of the diffusive membrane cell analyses are direct representations of environmental concentrations. The TTU analytical summary report and raw data are included in Appendix E. The fully converted results used for screening purposes are provided in Table 3-3. Total low-molecular weight PAHs (LPAH), total high-molecular weight PAH (HPAH), and total PAH summations are reported in Table 3-3 using half the estimated detection limit (EDL) for non-detectable concentrations. Total cPAHs were calculated as benzo(a)pyrene (BaP) equivalents using the 2005 World Health Organization (WHO) TEQ factors and half the EDL for non-detectable concentrations.

Porewater data was validated to ensure it was of high quality and usable for the assessment of the remedy. No significant data quality issues were identified. The QA report of the porewater data is included in Appendix E.

3.3.4 Sampling Results

Analytical results for contaminants identified in the ROD (EPA 1996) were compared to the 1996 AWQC values. The 1996 AWQC values serve as the regulatory criteria for the assessment of the performance of the remedy at the Site. Additional comparison criteria were included for the Site and are listed below. These criteria are for comparison only as data are screened against the AWQCs only for the purpose of reporting exceedances.

- EPA National Recommended Water Quality Criteria (NRWQC) (EPA 2015).
- EPA National Primary Drinking Water Regulations (EPA 2015).

- DEQ 2011 EPA-approved Aquatic Water Quality Criteria for Aquatic Life (chronic) and Human Health (consumption of organism only), with 2017 updates.
- 2015 Maximum Contaminant Levels (MCLs) for groundwater.
- Portland Harbor Table 17 Surface Water CULs (EPA 2017 and 2020).

These comparison criteria and their sources are provided in Table 3-4.

The results of the data screening were used to assess remedy performance. The samples of surface water and inter-armoring porewater will be used to assess the cap's compliance with AWQC. Samples from the sub-armoring layer will be used as an early warning indicator to assess the potential for chemical breakthrough across the cap area.

In 2020, twelve compliance monitoring (samples A through L), four early warning (5, 12, 13, and 16), one background, and one duplicate sample for each depth interval were collected. All locations contained samples from the surface water, inter-armoring, and sub-armoring depths. All locations were located within the extent of the sediment cap with one (location 27) that was collected downstream of the cap to establish background concentrations (Figure 3-1). The upstream background sample at location 1 was not recovered. Table 3-3 lists the analytical results. The following sections provide a summary of the results by depth interval.

3.3.4.1 Surface Water

In 2020, seventeen surface water samples and one duplicate (location C) were collected from 6 inches above the sediment surface. Samples were deployed upstream (location 1) and downstream (location 27) to evaluate background surface water concentrations away from the cap (Figure 3-1). The upstream location PSD was not recovered and only the downstream location PSD was analyzed for background conditions. Table 3-3 provides the results of the surface water testing at each station. Metals analyses were not conducted on the duplicate sample. The following are summaries of the surface water (6 inches above surface) results for the different analytical groups. All surface water sample results were below the associated AWQCs.

Metals. While arsenic, chromium, copper, and zinc were detected in all samples, none of these metals were detected above the 1996 AWQC values in surface water. Metals results for compliance monitoring and early warning samples are described below with a comparison to the downstream location 27.

Arsenic concentrations were below the AQWQC of 0.19 mg/L and ranged from 0.0001 mg/L (location 13) to 0.0281 mg/L (location F). The average arsenic concentration within the compliance monitoring area was 0.0024 mg/L. The range of concentrations bracket the downstream sample result for location 27 (0.0165 mg/L).

Chromium concentrations were below the AQWC of 0.21 mg/L and ranged from 0.000006 mg/L (multiple locations) to 0.0003 mg/L (location C). The average chromium concentration within the compliance monitoring area was 0.0001 mg/L. These concentrations are higher than observed in the downstream sample result for location 27 (0.000005 mg/L).

Copper concentrations were below the AWQC of 0.012 mg/L and ranged from 0.00007 mg/L (location F) to 0.0031 mg/L (location K). The average copper concentration within the compliance monitoring area was 0.0007 mg/L. This average concentration is lower than observed in the downstream sample result for location 27 (0.0017 mg/L).

Zinc concentrations were below the AWQC of 0.11 mg/L and ranged from 0.0011 mg/L (locations 13 and F) to 0.0089 mg/L (location 16). The average zinc concentration within the compliance monitoring area was 0.0024 mg/L. This average concentration is lower than observed in the downstream sample result for location 27 (0.0025 mg/L).

PCP. PCP was not detected in the surface water. As outlined in in Appendix E, samples were analyzed in accordance with EPA Method 8270 for the presence of PCP. TTU conducted instrument maintenance prior to analysis to improve sensitivity and obtain lower detection limits. PCP was not detected in surface water or any other samples. The laboratory detection limit of 0.10952 µg/L was approximately two orders of magnitude lower than the AWQC of 13.0 µg/L.

PAHs. Acenaphthene, fluoranthene, naphthalene, and total cPAHs have AWQC for comparison. Results showed that these PAHs were below the 1996 AWQC in surface water. Results for compliance monitoring and early warning samples are summarized below with a comparison to the downstream location 27.

Acenaphthene was detected in all samples below the AWQC of 520 µg/L. Concentrations ranged from 0.032 µg/L (location H) to 0.697 µg/L (location J). The average detected acenaphthene concentration within the compliance monitoring area was 0.101 µg/L. This average concentration is similar to the downstream sample result for location 27 (0.131 µg/L).

Fluoranthene was detected in 14 samples below the AWQC of 54 µg/L. Concentrations within the compliance monitoring area ranged from 0.003 µg/L (location H) to 0.01966 µg/L (location K). The average detected fluoranthene concentration within the compliance monitoring area was 0.007 µg/L. The sample result for downstream location 27 was non-detect at a detection limit of 0.00313 µg/L.

Naphthalene was detected in nine samples below the AWQC of 620 µg/L. Concentrations ranged from 0.084 µg/L (location H) to 0.353 µg/L (location L). The average detected naphthalene concentration within the compliance monitoring area was 0.127 µg/L. The sample result for downstream location 27 was non-detect at a detection limit of 0. 0.0662 µg/L.

Total cPAHs were calculated for all samples and were below the AWQC of 0.031 µg/L. Concentrations ranged from 0.0011 µg/L (location 12) to 0.0049 µg/L (location L). The average cPAH concentration within the compliance monitoring area was 0.0021 µg/L. These concentrations bracket the downstream sample result for location 27 (0.0017 µg/L).

3.3.4.2 Inter-Armor Porewater

In 2020, seventeen inter-armor porewater samples and one duplicate (location C) were collected at a depth of 6 inches below the armoring surface. The samples were collected from the same locations as

surface water and sub-armor samples. Metals analysis was not conducted on the duplicate sample. The following are summaries of the inter-armoring sample results for the different analytical groups.

Metals. While arsenic, chromium, copper, and zinc were detected in all samples, none of these metals were detected above the 1996 AWQC values in the inter-armoring layer. Metals results for compliance monitoring and early warning samples are described below and compared to downstream location 27.

Arsenic concentrations were below the AWQC of 0.19 mg/L and ranged from 0.00002 mg/L (location L) to 0.0409 mg/L (location J). The average arsenic concentration within the compliance monitoring area was 0.0155 mg/L. These concentrations are similar to or lower than the downstream sample result for location 27 (0.0165 mg/L).

Chromium concentrations were below the AWQC of 0.21 mg/L and ranged from 0.00002 mg/L (location A) to 0.0003 mg/L (location 16). The average chromium concentration within the compliance monitoring area was 0.0001 mg/L. These concentrations similar to or lower than the downstream sample result for location 27 (0.0003 mg/L).

Copper concentrations were below the AWQC of 0.012 mg/L and ranged from 0.00003 mg/L (location F) to 0.0013 mg/L (location B). The average copper concentration was 0.0002 mg/L. This average concentration is higher than that observed in the downstream sample result for location 27 (0.00009 mg/L).

Zinc concentrations were below the AWQC of 0.11 mg/L and ranged from 0.0011 mg/L (locations 13 and F) to 0.0029 mg/L (location H). The average zinc concentration within the compliance monitoring area was 0.0017 mg/L. These concentrations are to the same as or lower than observed in the downstream sample result for location 27 (0.0034 mg/L).

PCP. PCP was not detected in the inter-armoring layer. The laboratory detection limit of 0.10952 µg/L was approximately two orders of magnitude lower than the AWQC of 13.0 µg/L.

PAHs. Acenaphthene, fluoranthene, naphthalene, and cPAHs have AWQC for comparison. Results showed that these PAHs were below the 1996 AWQC in the inter-armor layer. Results for compliance monitoring and early warning samples are summarized below with a comparison to the downstream location 27.

Acenaphthene was detected in all samples below the AWQC of 520 µg/L. Concentrations ranged from 0.0272 µg/L (location 13) to 59.77 µg/L (location 12). The average acenaphthene concentration within the compliance monitoring area was 4.599 µg/L. These concentrations bracket the downstream sample result for location 27 (1.170 µg/L).

Fluoranthene was detected in all samples except for location B and the duplicate from location C. All fluoranthene detections were below the AWQC of 54 µg/L. Concentrations ranged from 0.004 µg/L (location 16) to 0.137 µg/L (location 12). The average fluoranthene concentration within the compliance monitoring area was 0.17 µg/L. These concentrations are similar to or lower than observed in the downstream sample result for location 27 (0.106 µg/L).

Naphthalene was detected in 12 samples below the AWQC of 620 µg/L. Concentrations ranged from 0.072 µg/L (location 5) to 0.746 µg/L (location 12). The average detected naphthalene concentration within the compliance monitoring area was 0.201 µg/L. Concentrations were greater than the result for downstream location 27 (0.066 mg/L).

Total cPAHs concentrations ranged from 0.0013 µg/L (multiple locations) to 0.011 µg/L (locations D and E). These concentrations bracket the downstream sample result for location 27 (0.0032 µg/L). Locations D and E contained total cPAHs at 0.011 µg/L in inter-armor porewater which was a higher concentration than sub-armor porewater (0.0048 and 0.0011 µg/L, respectively). Several other locations contained cPAHs at higher concentrations in inter-armor samples compared to sub-armor samples; however, locations D and E were the only location where the inter-armor result was an order of magnitude higher. There were no instances of sub-armor layer cPAH concentrations that were significantly higher than the inter-armor layer concentrations.

3.3.4.3 Sub-Armor Porewater

In 2020, seventeen sub-armoring samples and one duplicate (location C) were collected at a depth of 18 inches below the surface. The samples were collected from the same locations as surface water and inter-armor samples. Metals analysis was not conducted on the duplicate sample. The following are summaries of the sub-armor porewater sample results for the different analytical groups.

Metals. Arsenic, chromium, and copper were detected in all samples. Zinc was detected in all but two samples (location 5 and 12). No metals were detected above the 1996 AWQCs in the sub-armor layer. Metals results for compliance monitoring and early warning locations are described below with a comparison to the downstream location 27.

Arsenic concentrations were below the AWQC of 0.19 mg/L and ranged from 0.0009 mg/L (location 13) to 0.0537 mg/L (location L). The average arsenic concentration within the compliance monitoring area was 0.024 mg/L. The concentration observed in the downstream sample result for location 27 was 0.008 mg/L.

Chromium concentrations were below the AWQC of 0.21 mg/L and ranged from 0.00002 mg/L (location 16) to 0.0005 mg/L (location 5). The average chromium concentration within the compliance monitoring area was 0.0002 mg/L. These concentrations are similar to or lower than the downstream sample result for location 27 (0.0005 mg/L).

Copper concentrations were below the AWQC and ranged from 0.00003 mg/L (multiple locations) to 0.0011 mg/L (location G). The average copper concentration within the compliance monitoring area was 0.0002 mg/L. The concentration observed in the downstream sample result for location 27 was the highest at 0.0016 mg/L.

Zinc was detected in 15 samples and was non-detect at locations 5 and 12. Detected zinc concentrations were below the AWQC of 0.11 mg/L and ranged from 0.001 mg/L (location D) to 0.0017 mg/L (location G). The average detected zinc concentration within the compliance monitoring area was 0.0012 mg/L. The concentration in the downstream sample result for location 27 was the highest at 0.0018 mg/L.

PCP. PCP was not detected in the sub-armor layer. The laboratory detection limit of 0.10952 µg/L was approximately two orders of magnitude lower than the AWQC of 13.0 µg/L.

PAHs: Acenaphthene, fluoranthene, naphthalene, and cPAHs have AWQCs for comparison. Results showed that these PAHs were below the 1996 AWQCs in the sub-armor layer. Results for compliance monitoring and early warning samples are summarized below with a comparison to downstream location 27.

Acenaphthene was detected in all samples except location E. Detected concentrations were below the AWQC of 520 µg/L and ranged from 0.0294 µg/L (location 13) to 75.0 µg/L (location 12). The average acenaphthene concentration within the compliance monitoring area was 5.78 µg/L. Detected concentrations bracket the downstream sample result at location 27 (40.1 µg/L).

Fluoranthene was detected in all samples except for the duplicate from location C. Detected concentrations were below the AWQC of 54 µg/L and ranged from 0.004 µg/L (location I) to 0.092 µg/L (location 12). The average fluoranthene concentration was 0.016 µg/L, all of which were lower than the downstream sample result of 0.294 µg/L for location 27.

Naphthalene was detected in 12 samples. Concentrations ranged from 0.084 µg/L (location H) to 0.773 µg/L (location 12). The average detected naphthalene concentration within the compliance monitoring area was 0.153 µg/L, which is only slightly higher than the average inter-armor depth. These concentrations bracket the downstream sample result for location 27 (0.639 µg/L).

Total cPAHs concentrations ranged from 0.0011 µg/L (location E) to 0.013 µg/L (location 12). The average total cPAH concentration within the compliance monitoring area was 0.0033 µg/L. Concentrations in the compliance monitoring area were lower than the downstream sample result for location 27 (0.012 µg/L) with the exception of location 12, which had the highest concentration.

3.3.5 Summary of Surface, Inter-Armoring, and Sub-Armoring Water Assessment

The collection of surface water, inter-armor porewater, and sub-armor porewater samples were conducted in accordance with the SAP (Hart Crowser and GSI 2020). No constituents of concern were detected in either the sub-armor, inter-armor, or surface water samples at concentrations exceeding their respective 1996 AWQC value. This indicates that the remedy is performing in accordance with the ROD.

Arsenic was present across the subject area at concentrations below the 1996 AWQC value adopted by the ROD. While arsenic is a site contaminant, it is also present naturally in soils and sediments in the Willamette Valley can be high due to their volcanic origin. DEQ has established a natural background concentration for arsenic in soil of 8.8 mg/kg for the region (DEQ 2013). Concentrations generally attenuated upward through the sample column. Most results were similar to those observed in the downstream background sample at location 27.

Overall, results of the analyses indicate the sediment cap is functioning as designed and is meeting the remedial action objectives. Concentrations of constituents of concern within the Site are also comparable to those at the downstream reference location (location 27). However, the concentrations of constituents

of concern at location 27 indicate that it may not be a suitable reference location since results in the sub-armor depth interval were comparable to locations within the cap. Overall, these results indicate that conditions below, within, and above the sediment cap are below ROD criteria and near background.

3.4 Crayfish Tissue Sampling

This section summarizes the crayfish whole body tissue sampling conducted in August and September of 2020. This sampling was done to assess sediment cap performance relative to bioaccumulation of site contaminants and to inform the fifth Five-Year Review for the Site. Dioxins/furans was included in the crayfish tissue analysis as it could not be performed in the surface water and porewater analysis due to volume limitations needed to achieve the requisite detection limits. Additionally, dioxin/furan chemical data has previously only been collected from crayfish tissue at the Site. As there are no cleanup levels established for dioxin/furans at the Site, collecting current crayfish tissue samples and comparing the results to historical data allows for long-term concentration trends to be monitored. The sampling and analytical methods used are detailed in the SAP developed for this work (Hart Crowser and GSI 2020).

3.4.1 Sampling Approach

Crayfish sampling was conducted in 2020 at five sample locations (01 through 05). These locations are shown on Figure 3-1. These locations were collocated with compliance monitoring locations used to assess sediment cap performance. Details for crayfish sample locations are presented in Table 3-2. The sampling targeted native crayfish species signal crayfish (*Pacifastacus leniusculus*) because they are endemic to the area, are often of sufficient age to have accumulated contaminants, and are consumed by humans. Sampling was performed in compliance with Section 4d of the Endangered Species Act. Crayfish collected for analyses were processed as whole-body samples. Tail-only samples were not run because sufficient sample volumes could not be obtained.

3.4.2 Sampling Overview

Two rounds of crayfish tissue collection were conducted in 2020 to ensure enough material. The first round of sampling occurred in late August 2020 during PSD deployment as described in Section 3.4.1. The second round of sampling occurred during PSD retrieval in September 2020.

During each collection event crayfish traps were baited with store-bought raw chicken and deployed at target locations. The traps were left in place overnight and retrieved the following morning. If a trap at a given station had enough crayfish to analyze, the samples were processed in accordance with the SAP (Hart Crowser and GSI 2020) and sent to the laboratory for analysis. Crayfish tissue sample locations are detailed in Table 3-1 and are shown on Figure 3-1.

3.4.3 Data Quality

Crayfish whole body tissue chemical analyses were completed by ALS Environmental (ALS) of Kelso, Washington with dioxin/furan analysis performed by their network laboratory in Burlington, Ontario, Canada. Analyses were performed as described in the SOPs provided in the SAP (Hart Crowser and GSI 2020). The specific target analytes and analytical methods for this event include:

- Dioxins/furans by EPA Method 1613B.
- PAHs by EPA Method 8270D.
- PCP by EPA Method 8270D-SIM.
- Total metals including arsenic, zinc, chromium, and copper by EPA Method 6020A.
- Percent lipid content by NOAA Lipid Method.

The ALS analytical reports are included in Appendix F. Crayfish whole body tissue chemical results are presented in Table 3-5. Total LPAHs, total HPAHs, and total PAH summations are reported in Table 3-5 using half the method detection limit for non-detectable concentrations. Total cPAHs were calculated as BaP equivalents and dioxin/furan TEQ were calculated using the 2005 WHO TEQ factors and half the EDL for non-detectable concentrations Crayfish tissue data was validated to ensure it was of high quality and usable for the assessment of the remedy. A summary of the data quality review results is also included in Appendix F. No significant issues were noted.

3.4.4 Sampling Results

The crayfish tissue analytical results for contaminants identified in the ROD (EPA 1996) and dioxin/furans can be compared to DEQ's general and subsistence tissue levels (DEQ 2020), Portland Harbor Table 17 tissue CULs (EPA 2017), and the 2018 Sediment Evaluation Framework tissue screening values (Northwest Regional Sediment Evaluation Team 2018). These comparison criteria are provided in Table 3-5. For the purposes of this annual report, a screening of these data was not performed. A comparative assessment to historical tissue concentrations will be completed as part of the Five-Year Review. The following are summaries of the crayfish tissue results for the different analytical groups.

Metals. Samples were analyzed for the presence of arsenic, chromium, copper, and zinc. All four metals were detected in each sample at concentrations above its respective laboratory detection limit. Arsenic was present in all the samples, including an estimated concentration in the bait sample. Arsenic concentrations ranged from 0.33 mg/kg (locations 03 and 04) to 0.85 mg/kg (location 01).

PCP. PCP was not detected in any of the samples at concentrations above the laboratory detection limit. A detection limit of 7.6 µg/kg was achieved in all the samples, except for the result for Station 02 (95 µg/kg).

PAHs. PAHs were detected in samples collected at all five locations at estimated concentrations (J flagged values). Total PAH values ranged from 8.6 µg/kg (location 03) to 31 µg/kg (location 05). The bait sample also contained total PAHs at similar concentrations (13 µg/kg). Concentrations of total cPAHs ranged from below laboratory detection limits to 4.1 µg/kg at location 05 within Willamette Cove.

Dioxin/Furan Congeners. Dioxin/furan congeners were detected in all the specimens analyzed. More congeners were detected in the duplicate sample collected at location 04 than those collected at the other locations. Detectable concentrations were generally present at values less than laboratory practical quantitation limits (J flag values). TCDD TEQ summation values were relatively similar across the Site and ranged from 0.34 ng/kg (location 01) to 0.54 ng/kg (Station 05), except for location 04 duplicate sample result which was 8.7 ng/kg.

3.4.5 Summary of Crayfish Tissue Sampling

The collection of crayfish tissue samples was conducted consistent with the SAP (Hart Crowser and GSI 2020). Results of the analyses will be used for a comparative assessment of historic tissue values in the Five-Year Review. Though arsenic was detected in specimens collected throughout the subject area, arsenic can be high in areas across the Willamette Valley due to the volcanic nature of the soils and sediments and may not represent anthropogenic sources.

3.5 Sediment Cap Maintenance Activities

The sediment cap was designed to be generally maintenance free. Water events for the riparian area were not completed during the summer months of 2020 as vegetation did not show signs of drought stress. Precipitation events occurred during those months eliminating the need for watering events. No signs of stressed vegetation were observed during site visits from June through October 2020.

Maintenance activities were performed on December 9, 2020, to repair the separated blocks of ACB in Willamette Cove and repair the erosional depression under the TRM along the Willamette River shoreline. Field staff repaired the 10-foot-long section of ACB edge by placing additional half-blocks into the voids and concreting the new blocks in place as shown in Appendix A, Photograph A15. Field staff repaired the approximate 1.5-foot erosional depression beneath the northern end of the TRM by lifting the upslope end of the TRM and placing sand from an onsite stockpile beneath the TRM to fill the depression (Appendix A, Photograph A18). The TRM was secured with additional landscape staples in between the existing anchor points.

3.6 Summary of Sediment Cap Remedy Performance

Overall, the sediment cap observations and inspections during 2020 revealed no significant change in remedy performance or areas of concern. Future O&M activities primarily will consist of quarterly inspections and routine maintenance. Previously, several voids in the ACB were observed along Willamette Cove in 2018 when the water level was at a seasonal and tidal low; however, these voids were not visible during subsequent inspections in 2019 and 2020. Buckling at the eastern end of the ACB in Willamette Cove was identified in September 2020 and repaired in December 2020.

Surface water, sediment cap porewater, and crayfish tissue sampling was conducted in 2020 to support the 2021 Fifth Five-Year Review Report. The sampling approach and methodology was developed in conjunction with DEQ, EPA, and TTU with assistance from GSI. Details of the sampling procedures were incorporated into a SAP, which will be included in an update to the O&M Manual. Results of the surface water and sediment cap porewater sampling indicate the sediment cap is meeting the remedial action objectives and performance standards.

Sand covers the shoreline at lower, less steep elevations, and significant amounts of large driftwood have accumulated to help create wildlife habitat. Numerous wildlife species continue to be observed; various birds including Canada geese, gulls, cormorants, crows, pigeons, blue herons, ospreys, and hawks were observed in 2020.

The public frequents the shoreline for recreation, most commonly for hiking or walking dogs, though an uptick in transient encampments and trash dumping occurred in 2020. Rounded gravel used to fill voids within the ACB created a more stable substrate for wildlife and a consistent, safer walking surface for public use, although much of the gravel has been eroded from the upper potions of the ACB and deposited on the lower portion.

4.0 GROUNDWATER PERFORMANCE STANDARDS AND ACTIVITIES

This section summarizes groundwater performance standards and activities for the reporting period January 1, 2020, through December 31, 2020. Groundwater remedy observations and maintenance activities were conducted according to the O&M Manual (Hart Crowser and GSI 2018). Manual measurements of NAPL and groundwater levels were collected during Site-wide semiannual monitoring events on June 17 and October 6, 2020.

4.1 Groundwater Flow Direction and Gradient Assessment

The current monitoring well network is shown on Figure 4-1. Ongoing groundwater monitoring consists of (1) semiannual Site-wide manual measurements of NAPL and groundwater levels; and (2) continuous water level measurements in 11 site wells that contain transducers. This section summarizes groundwater flow based on the 2020 water level measurements.

4.1.1 Horizontal Flow Direction and Gradients

Manual groundwater measurements were collected during the falling limb of the hydrograph or immediately following low tide in the Willamette River. The semiannual groundwater elevation data are included in Table 4-1 (June 17, 2020) and Table 4-2 (October 6, 2020).

Shallow groundwater elevation contour maps were developed for each semiannual event during what is typically the seasonal high (June) and low (October) river stage. As shown in Figures 4-2 and 4-3, the shallow horizontal groundwater gradient within the subsurface barrier wall is independent of the gradient outside the barrier wall. The groundwater gradient inside the barrier wall remains flat (ranging from approximately 0.001 to 0.006 feet per foot) compared with the steeper groundwater gradients (ranging from approximately 0.004 to 0.1 feet per foot) outside the barrier wall. On the southeastern side of the barrier wall, groundwater flows southwest toward the Willamette River; while on the northern side of the wall, the groundwater flows to the west toward Willamette Cove. This demonstrates that the barrier wall has effectively cut off the hydraulic connection between the shallow groundwater zone inside and outside of its boundaries. The hydraulic separation is further illustrated by the hydrograph on Figure 4-4 from the paired monitoring well cluster MW-52s and MW-53s, located at the northeastern edge of the barrier wall. This hydrograph shows groundwater levels outside of the barrier wall (MW-53s) are approximately 4 to 5 feet higher than inside the wall (MW-52s).

Comparison of the groundwater levels for interior monitoring wells EW-1s, MW-52s, MW-36s, and MW-44s (Figure 4-5) illustrate groundwater gradients within the barrier wall are typically southwesterly

(i.e., the water level in EW-1s is typically higher than MW-36s). However, during periods of peak flow in the Willamette River (e.g., February and June 2020), groundwater levels within the northwest corner of the barrier wall increase and cause a partial gradient reversal (i.e., the water level in MW-36s becomes higher than the levels in other interior wells; Figure 4-5). This partial reversal is caused by a deep hydraulic connection through sand at the base of the western edge of the barrier wall; when the river level exceeds the groundwater level within the barrier wall area, an upward vertical gradient results. Vertical gradients are further discussed in Section 4.1.2.

The hydrographs in Figures 4-4 through 4-7 compare groundwater level elevations for selected well pairs to river stage elevation and precipitation data. River stage data were recorded every 30 minutes from U.S. Geological Survey (USGS) Station number 14211720 (USGS 2021a). This Station is located on the upstream side of the Morrison Bridge (river mile [RM] 12.8). River stage elevation data reported by USGS are relative to the Portland River Datum at this location. The river stage data are corrected to the North American Vertical Datum of 1988 (NAVD88) at the Site (approximately RM 7) by adding 5.001 feet to the USGS reading. Precipitation data were obtained from the Astor Elementary School rain gauge located approximately 0.5 mile from the Site. Daily totals were obtained from the City of Portland Hydra Network available on the USGS website (USGS 2021b). Due to the failure of the onsite barometric pressure transducer, no Site-specific barometric pressure data are available from September 12, 2019, through February 27, 2020. During this period, barometric pressure data from the Portland International Airport weather station was used to correct the water levels in all wells with transducers.

4.1.2 Vertical Flow Direction and Gradients

The Willamette River stage directly influences groundwater elevations in the nearshore areas. Daily tidal fluctuations in river stage typically range from 2 to 5 feet during the late summer and fall months (July through September) when stage/discharge is lowest and from 1 to 2 feet during the spring months (April through June) when stage/discharge is highest.

Vertical gradients inside and outside the barrier wall along the Willamette River were assessed in monitoring well clusters MW-36/MW-37 and MW-44/MW-45 (Figure 4-1). Due to battery failure, no transducer data were available in 2020 for MW-37s and MW-44d. Transducer batteries are checked twice a year during the semiannual monitoring events in June and October 2020. The batteries were found dead upon arrival both times and replaced. The successive transducer failures after batteries were replaced was indicative of transducer malfunctions other than battery depletion and troubleshooting activities were initiated to determine the cause. Hydrographs for these wells (Figures 4-6 and 4-7) indicate the deep groundwater zone is in direct hydraulic connection with the river. The deep zone both inside (MW-36d) and outside (MW-37d and MW-45d) of the barrier wall closely mimics the river stage, both in elevation and timing, with small vertical gradient changes that occur in response to the daily tidal changes and seasonal river stage trends. The exterior shallow well MW-45s (Figure 4-7) is also in hydraulic connection with the river and shows about a quarter cycle-delay from river fluctuations and has a dampened amplitude in comparison with the deeper wells.

Shallow groundwater levels within the barrier wall at MW-36s respond to tidal effects observed in the river, but are muted in amplitude compared with the variations observed in the river stage. MW-44s shows a

negligible response to tidal effects and river levels (Figure 4-7). The muted amplitude or nonexistent response of interior shallow wells compared with the deep-zone wells indicates a hydraulic disconnect between the shallow aquifer within the barrier wall and the deeper water-bearing zones. This disconnect is due to (1) the presence of the barrier wall, which prevents horizontal flow across it and (2) the presence of a confining silt layer between the shallow and intermediate zones throughout the majority of the barrier wall area, including near the MW-44/MW-45 well cluster. The shallow interior response is greatest, but still significantly muted, in well MW-36s (Figure 4-6), where a hydraulic connection exists at the base of the barrier wall (which is completed in a sandy unit at depth). Historically, the timing of the groundwater oscillations in MW-37s (exterior shallow well) and MW-36s (interior shallow well) were closely linked, and the amplitude of the changes were muted inside the barrier wall. However, no time series data were available for MW-37s in 2020 due to transducer failure so a continuation of this pattern could not be confirmed.

The vertical gradient inside the barrier wall (MW-44s to MW-44d) was not determined in 2020 due to transducer failure in both wells. Historically the net downward gradient has been greater inside the barrier wall because the shallow groundwater elevation inside the barrier wall is slightly elevated when compared with the net river stage. The net vertical gradient outside the barrier wall on the river side (MW-45s to MW-45d) is typically smaller and varies upward and downward according to the trends of the Willamette River. Neutral or upward vertical gradients occur when the river stage is at a higher elevation for a prolonged period, which occurred several times between January and July 2020.

Although precipitation in the Willamette River watershed ultimately affects the stage of the river, direct precipitation near the Site appears to play a minor role in determining the water levels of wells within the barrier wall and along the river. The Resource Conservation and Recovery Act (RCRA)-type soil cap at the Site was designed to divert precipitation so that little infiltration occurs within the barrier wall. Although some infiltration occurs along the fringes of the soil cap and within the riparian zone, the volume of infiltration is minimal. Between the barrier wall and the river, precipitation inputs are vastly overshadowed by the response of groundwater to variations in river stage. The shallow zone upgradient or cross-gradient from the barrier wall appears to react subtly to precipitation and is less connected to the river because of its distance from the river and the presence of the barrier wall, which is sealed into the underlying silt. One location where infiltration may influence groundwater elevation and flow path is in the retention pond (Figure 1-3) that receives diverted runoff from the soil cap. Historical water level data indicates the groundwater gradient in this area is flat, and a slight groundwater mound east of the soil cap may be seasonally present.

4.2 NAPL Gauging and Monitoring Assessment

Between February 1993 and April 2011, approximately 6,550 gallons of NAPL were extracted from site wells. Because recovery was slow and there was uncertainty about the benefits of ongoing recovery, a NAPL investigation in the former waste disposal area (FWDA) outside the barrier wall (the remaining area with active NAPL recovery) was conducted in 2011. Based on the findings from the NAPL investigation (Hart Crowser and GSI 2011b) and extensive monitoring of the sediment cap (described in the Third Five-Year Review Report [DEQ and EPA 2011]), DEQ and EPA decided to discontinue NAPL extraction on April 20, 2011. Subsequent monitoring of the post-extraction NAPL thickness in the FWDA was conducted in 2011 (Hart Crowser and GSI 2011b). The results supported the regulatory decision and confirmed the

residual NAPL in the FWDA is isolated and stable and does not pose a risk to the Willamette River. To confirm that this remains the case and to continue to evaluate the functional performance of the barrier wall and soil cap, NAPL presence and thickness continues to be monitored during the semiannual monitoring events.

Semiannual monitoring events were performed on June 17 and October 6, 2020. Measurable thicknesses of NAPL were present in 12 site wells (EW-1s, EW-8s, EW-10s, EW-15s, EW-18s, EW-23s, MW-10r, MW-20i, MW-22i, MW-56s, MW-Ds, and MW-Gs). Figures 4-8 and 4-9 show the locations of wells with measurable quantities of light NAPL (LNAPL) and/or dense NAPL (DNAPL) during the June and October 2020 monitoring events, respectively (trace detection are not presented on the figures). Tables 4-1 and 4-2 provide semiannual NAPL gauging measurements. Figures 4-10 through 4-20 show the NAPL and groundwater elevations versus time in individual wells that regularly had NAPL detections. The screened interval elevations and the well depth are also shown. The thickness of LNAPL can be calculated by subtracting the LNAPL elevation (when LNAPL is present) from the groundwater elevation. Similarly, the DNAPL thickness is represented by the difference between the DNAPL elevation and the well depth elevation.

Given that NAPL within the barrier wall is constrained laterally, NAPL observations within and outside of the barrier wall are discussed separately below.

4.2.1 Outside the Barrier Wall

Historically, NAPL has primarily been observed outside the barrier wall next to the northwest corner that corresponds to the FWDA (Figure 1-5). During the June 2020 monitoring event, trace LNAPL was noted in one well (EW-10s) and measurable DNAPL was observed in four wells (EW-10s, MW-Gs, MW-20i, and MW-Ds) outside the northwestern corner of the barrier wall (Figure 4-8). During the October 2020 monitoring event, trace LNAPL was noted in two wells (MW-Ds and MW-Gs) outside the northwestern corner of the barrier wall and measurable DNAPL was observed in the same four wells as the June 2020 monitoring event (Figure 4-9).

As shown on Figures 4-10 through 4-13, the DNAPL thicknesses measured in wells EW-10s, MW-20i, MW-Ds, and MW-Gs in 2020 are generally consistent with measurements made since NAPL recovery was discontinued in April 2011. The October 2020 measurement at MW-20i did show a slight increase, although it is within the historical range of observed thicknesses (Figure 4-11). Overall, the 2020 observations are consistent with historical observations and support the conclusion that NAPL observed in the FWDA is localized and relatively stable. There is no evidence of NAPL mobility either across the barrier wall or to the Willamette River.

4.2.2 Inside the Barrier Wall

During the June 2020 monitoring event, measurable LNAPL was present in two wells (EW-15s and EW-23s) within the barrier wall (Figure 4-8). MW-56s had a trace detection of LNAPL. Measurable DNAPL was observed in four wells (EW-1s, EW-8s, EW-18s, and MW-22i) inside the barrier wall during the June monitoring event (Figure 4-8). During the October 2020 monitoring event, measurable LNAPL was observed in four wells (EW-15s, EW-23s, MW-23d, and MW-56s) within the barrier wall (Figure 4-9). MW-56s had a trace detection of LNAPL. Measurable DNAPL was observed in four wells (EW-1s, EW-8s, EW-18s, and MW-22i) inside the barrier wall (Figure 4-9), the same wells as during the June 2020 event.

Figures 4-14 through 4-17 show the elevations of LNAPL and shallow groundwater over time in wells EW-15s, EW-23s, MW-56s, and EW-1s, respectively. As shown in these figures, the LNAPL thickness is generally greater when the groundwater elevation is low. This is the result of gravity drainage of LNAPL through the unsaturated zone when the water table drops. This pattern has been consistent since mid-2006 when LNAPL ceased being recovered inside of the barrier wall (i.e., LNAPL thickness was not disturbed by recovery). Although the LNAPL thickness varies cyclically with changes in the groundwater elevation, the overall LNAPL thickness in these wells has remained relatively stable, with slight increases during low groundwater levels.

Measurable DNAPL was present during the 2020 semiannual monitoring events within the barrier wall near the former TFA (Figure 1-5) in wells EW-1s, MW-22i, EW-8s, and EW-18s, as shown on Figures 4-17 through 4-20, respectively. After termination of a temporary recovery period in April 2011, the DNAPL thickness in well EW-1s (Figure 4-17) increased to a thickness of approximately 8 feet by 2014; it has remained roughly the same, with the DNAPL thickness in EW-1s being 8.4 feet in October 2020. The DNAPL thickness in well MW-22i is 6.8 feet thick (Figure 4-18). Approximately 2 feet of DNAPL is consistently present within the sump of well EW-8s, with occasional spikes in the DNAPL thickness; a spike of approximately 6 feet was observed during the June 2020 monitoring event (Figure 4-19). The DNAPL thickness in EW-18s has been generally stable at around 2 feet since 2012 (Figure 4-20).

Overall, both LNAPL and DNAPL appear to be stable except for the DNAPL at EW-8s (Figure 4-19). The pattern in DNAPL thickness at EW-8s is consistent with historical patterns, which vary seasonally. Given these observations, mobilization of LNAPL or DNAPL across either the barrier wall or the Willamette River is unlikely.

4.3 Groundwater Quality Monitoring

This section summarizes groundwater quality monitoring activities for the reporting period January 1, 2020, through December 31, 2020. Two different groundwater quality monitoring programs were conducted in 2020 and include the following:

- Site-wide groundwater quality monitoring (May 2020).
- Infiltration Pond Assessment (October 2020).

All groundwater quality monitoring activities conducted in 2020 were done in accordance with the protocols detailed in the O&M Manual (Hart Crowser and GSI 2018).

4.3.1 Site-Wide Groundwater Quality

Groundwater sampling was conducted at the Site in May 2020 to document post-remedial action groundwater concentrations of site contaminants. The wells included in the water quality sampling event are shown on Figure 4-21. Groundwater samples were collected from 11 wells (EW-19s, MW-35r, MW-37s, MW-37i, MW-37d, MW-39s, MW-41s, MW-47s, MW-55s, MW-53s, and MW-58s) on May 26 and 27, 2020, and analyzed for total metals, PCP, and PAHs. The results of these analyses are presented in Table 4-3.

In general, the groundwater quality monitoring results from 2020 are consistent with historical data and show reductions or similar concentrations of contaminants when compared to the results from the 2010 sampling event. Results of the 2010 sampling event are presented in the 2010 O&M Report (Hart Crowser and GSI 2011). Arsenic concentrations were above the MCL at many locations including EW-19s, MW-37i, MW-47s, MW-53s, and MW-58s. Chromium was only detected at one location, MW-55s, and at an estimated concentration just above the detection limit. Copper was detected at two locations (MW-55s and MW-58s), also just above the detection limit. Zinc was detected in MW-58s. Two shallow wells (EW-19s and MW-37s, outside the barrier wall in the FWDA) and one intermediate well (MW-37i, outside the barrier wall in the FWDA) contained relatively high concentrations of total PAHs (greater than 50 µg/L) compared to other wells sampled that were less than 1.0 µg/L. There were no detections or exceedances of the BaP MCL at any of the locations. Detections of LPAHs were more frequent than for HPAHs. These detections are not unexpected given the presence of NAPL in the FWDA. PCP was detected above the MCL in shallow well MW-53s, located upgradient and to the east of the barrier wall. No other detections of PCP occurred. The MDLs for site contaminants were below the MCLs and sufficient for evaluation of chemical results.

4.3.2 Infiltration Pond Assessment

The soil cap remedy was completed in 2005. A component of the soil cap is the infiltration pond at the southwestern corner of the Site, which was constructed to collect surface water runoff from a portion of the upland cap. Groundwater monitoring well MW-59s (Figure 4-1) was installed downgradient from the infiltration pond in 2005. The intent of this well is to monitor changes in groundwater contaminant concentrations downgradient of the infiltration pond to assess the influence of infiltration on chemical migration.

Following the October 2015 sampling event, the O&M Plan prescribed sampling MW-59s every 5 years. For this reason, MW-59s was sampled on October 6, 2020, for PAHs, PCP, and total arsenic, chromium, copper, and zinc. The analyses results are presented in Table 4-3. Arsenic was the only site contaminant detected above the MCL in MW-59s. Arsenic concentrations in MW-59s have been gradually rising in concentration since 2006 (DEQ and EPA 2016). It is unclear whether the source of arsenic is natural background conditions or related to historical releases at the Site. Porewater results from locations A and B, which are downgradient of MW-59s and the infiltration pond, are below the AWQC and indicate that arsenic is not being mobilized into the Willamette River.

4.4 Groundwater Remedy Maintenance Activities

Table 4-4 provides the groundwater O&M activities conducted in 2020. The Site-specific barometric pressure transducer failed during the winter of 2019 and was replaced on February 28, 2020. Transducer data loggers were inspected during the semiannual monitoring events in 2020. During each semiannual monitoring event, transducers in wells MW-37s and MW-44d were found with dead batteries. Batteries were replaced after each event and both transducers were inspected in December 2020 to check for proper function. Both transducers were found with dead batteries and pulled from the wells and sent to the manufacturer for testing. The transducers were not repairable, and replacement transducers were ordered and deployed in February 2021.

4.5 Summary of Groundwater Remedy Performance

Hydraulic conditions are consistent with previous years, verifying that the remedy continues to function as designed. Groundwater monitoring data are used to understand groundwater flow conditions inside and outside of the barrier wall. This information is evaluated to determine whether the barrier wall and impermeable RCRA-type soil cap are functioning as designed.

There was trace LNAPL in one well outside the barrier wall. DNAPL was measured in four wells outside the barrier wall. The DNAPL in these wells has remained stable with some variation due to temperature and pressure (coincident with water level variation). Based on the findings from the DNAPL Data Gap Investigation (Hart Crowser and GSI 2011a), subsequent monitoring of the post-extraction NAPL thicknesses in wells in the FWDA, and extensive monitoring of the sediment cap and groundwater (described in the Third and Fourth Five-Year Review Reports [DEQ/EPA, 2011; DEQ/EPA, 2016]), the decision to discontinue NAPL recovery was justified, and residual NAPL remaining in the FWDA does not pose a threat to the Willamette River.

Based on the evaluation of groundwater data from 2005 through 2020, the barrier wall and impermeable soil cap are functioning as designed to divert groundwater flow around NAPL source areas, prevent rainwater infiltration into NAPL source areas contained within the barrier wall, and prohibit NAPL contained within the barrier wall from migrating to the Willamette River.

Groundwater quality conditions across the Site are consistent with previous years. These findings indicate the barrier wall is effective at retaining NAPL and dissolved phase contaminants, and that the infiltration pond is not creating conditions that are likely to mobilize site contamination.

5.0 VEGETATION MANAGEMENT

This section summarizes the vegetation management and monitoring activities for the reporting period from January 1, 2020, through December 31, 2020. Vegetation management activities on the upland cap were conducted in accordance with the McCormick and Baxter Vegetation Management Plan (Hart Crowser and GSI 2011c).

The upland cap was constructed during a 2-year period beginning in 2004 with the re-grading of the Willamette River riverbank. The 6-acre riparian area cap was installed and tied into the in-water sediment cap. In 2005, a 34-acre soil cap was constructed to complete the upland cap. The City of Portland Bureau of Environmental Services (BES) entered into an Intergovernmental Agreement (IGA) with DEQ to provide vegetation planning and vegetation management services for the upland cap from 2005 through 2010. In February 2006, the soil cap was planted with native grasses, plants, and trees, and an irrigation system was installed. After the fifth growing season, BES determined that the vegetation was fully established. The irrigation system was inactivated in 2009 and decommissioned in 2015. Overall, the planting and vegetation management goals have been met.

Semiannual noxious weed control activities, including herbicide application, were conducted from spring 2006 through spring 2013. Herbicide application was temporarily discontinued in June 2013 when nearby

desirable native vegetation was observed to be stressed and dying. No herbicide was applied in 2014 and 2015 but was resumed in 2016 after noxious weeds appeared to be spreading. Spot treatment occurred once each in 2017 and 2019. There was no herbicide application performed in 2018 and 2020.

Rodents that inhabit the cap have damaged vegetation in the past; however, with the exception of some earlier targeted damage to the grand fir (*Abies grandis*) seedlings (BES 2010), there has been insignificant damage to other plantings. Rodent activities are monitored during quarterly site inspections and were not observed to be causing significant damage during site visits in 2020.

On July 19, 2018, a fire burned approximately 1 acre at the north end of the riparian area. On September 24, 2018, another fire burned approximately 1 acre along the northeast side of the Site, approximately 200 feet southeast of the Site maintenance building and along the inside of the fence line. Both fires were likely caused by human activities. Vegetation recovered in these areas by July 2019.

5.1 Vegetation Management Components and Goals

The upland cap has five distinct components, each with corresponding goals and objectives for managing hydrology, soil, and wildlife habitat (Figure 5-1). These components are:

- Entrance Area
- Earthen Cap
- Stormwater Retention Pond and Drainage Swale
- Impermeable Cap
- Riparian Area

Performance standards to assess whether the planting goals in the DEQ/BES IGA for the entire upland cap are met include:

- Bare soil spaces are small and well dispersed.
- Soil movement, such as active rills or gullies and soil deposition around plants or in small basins, is absent or slight and local.
- Plant litter is well distributed and effective in protecting the soil with few or no litter dams present.
- Native woody and herbaceous vegetation and germination micro-sites are present and well distributed across the Site.
- Vegetation structure results in rooting throughout the available soil profile.
- Plants have normal, vigorous growth form and a high probability of remaining vigorous, healthy, and dominant over undesired competing vegetation.
- Stream banks have less than 5 percent exposed soil with margins anchored by deeply rooted vegetation or coarse-grained alluvial debris.
- A continuous corridor of shrubs and trees provides shade for the entire stream bank.

Specific goals were also set for planting the riparian area to create habitat, including elements such as large woody material, riparian vegetation for food, habitat cover and shelter, and shading (NOAA 2004).

5.2 Baseline Conditions in 2011

In 2010, BES determined that the vegetation had been fully established, as discussed in its final 2010 Vegetation Management Report (BES 2010). Hart Crowser (now Haley & Aldrich) assumed responsibility for the vegetation management at that time. On June 10, 2011, a Hart Crowser (now Haley & Aldrich) ecologist inspected the upland cap to confirm the vegetation conditions discussed in the report. The inspection included: visual observation of vegetation planting areas, species identification (native, non-native, and invasive), growth, density, general coverage, and relative health of vegetation throughout the Site. Photographs were taken to establish a baseline to evaluate the progress of the vegetation re-establishment and the qualitative observations at select Site locations. These locations or "Photograph Stations" are shown on Figure 5-1 and include Photograph Stations 1 through 9. The following sections summarize the initial conditions and observations made during the baseline visit in June 2011.

5.2.1 Riparian Area

The riparian area is divided into two components: upper and lower. Each component received similar vegetation treatments. The lower component is subject to Willamette River stage fluctuations, which influence vegetation conditions at its lower edge during high-water events. Vegetation, some weeds, and woody debris are present along the shoreline (Photograph Stations 7 and 9). Trees, shrubs, and herbaceous plants are present in the riparian area (Photograph Station 8).

Lower Component. The lower component originally was planted with a variety of native trees and shrubs including: Oregon ash (*Fraxinus latifolia*), Suksdorf's hawthorn (*Crataegus suksdorfii*), cascara (*Rhamnus purshiana*), hardhack (*Spiraea douglasii*), red-osier dogwood (*Cornus sericea*), Pacific ninebark (*Physocarpus capitatus*), swamp rose (*Rosa pisocarpa*), river willow (*Salix fluviatilis*), Sitka willow (*Salix sitchensis*), rigid willow (*Salix rigida*) [*sic:* taxonomic update -MacKenzie's willow (*S. prolixa)*], Piper's willow (*Salix piperi*) [*sic: S. hookeriana*], and black twinberry (*Lonicera involucrata*). Groundcover species planted in the lower component included: California brome (*Bromus carinatus*), blue wildrye (*Elymus glaucus*), meadow barley (*Hordeum brachyantherum*), slender hairgrass (*Deschampsia elongata*), spike bentgrass (*Agrostis exerata*), globe gilia (*Gilia capitata*), lupine (*Lupinus albicaulis*), and Canada goldenrod (*Solidago canadensis*). Tree plantings were not installed at lower elevations in the lower component of the riparian area because of the potential for late season inundation from high river levels. Instead, appropriate shrubs, primarily willows, were installed along the lower edge of this component to provide food and shade.

In 2011, trees and shrubs within the lower component were observed to be well established and growing both vertically and laterally. No indications of stress were noted. Localized areas of exposed TRM were observed along the length of the lower edge of the TRM, likely because of river fluctuations and movement of large woody debris along the shoreline. Canada thistle (*Cirsium arvense*) was the most common noxious weed with lesser quantities of knapweed (*Centaurea sp.*) and butterfly bush (*Buddleia davidii*) present. A significant quantity of large woody debris was also observed along the entire length of the lower edge.

Upper Component. The upper component was planted with native vegetation including: red alder (*Alnus rubra*), big-leaf maple (*Acer macrophyllum*), Western red cedar (*Thuja plicata*), madrone (*Arbutus menziesii*), grand fir, Garry oak (*Quercus garryana*), Oregon ash, black hawthorn, cascara, red elderberry (*Sambucus racemosa*), blue elderberry (*Sambucus cerulea*), Nootka rose (*Rosa nutkana*), tall Oregon-grape (*Mahonia aquifolium*), snowberry (*Symphoricarpos albus*), red-flowering currant (*Ribes sanguineum*), oceanspray (*Holodiscus discolor*), red-osier dogwood, black twinberry, and Pacific ninebark. Groundcover species in the upper component are identical to those in the lower component. Similar to the lower component, trees and shrubs were well established and appeared healthy. In 2011, trees were 6 to 12 feet tall. Few areas containing bare ground were observed. Thistle and knapweed were present in small quantities among the groundcover plantings throughout the upper component.

Summary. In general, the riparian area components appeared to be performing well in 2011, with the installed trees and shrubs looking healthy and spreading. Groundcover species provided relatively good coverage of the soil, with the exception of a few areas containing bare ground and observed TRM along the shoreline. In addition, large driftwood was present throughout the lower component and in smaller quantities within the upper component. Noxious weeds, including thistle, knapweed, and butterfly bush were present in small quantities within the riparian area.

5.2.2 Upland Area

The upland area is divided into three components: the earthen cap; the stormwater retention pond/ drainage swale; and the impermeable cap (Figure 5-1). A variety of native trees, shrubs, and herbaceous species are present on the earthen cap as shown in photographs captured at Photograph Stations 1, 2, 3, and 5 (Appendix H). Native shrubs and herbaceous species are present in the stormwater retention pond/ drainage swale (Photograph Station 4). Meadow grasses and herbs are present on the impermeable cap (Photograph Station 6).

Earthen Cap Component. Originally, this component was planted with a variety of native trees, shrubs, and grasses including: Garry oak, Ponderosa pine (*Pinus ponderosa*), black hawthorn (*Crataegus douglasii*), madrone, snowberry, blue elderberry (*Sambucus cerulea*), Oregon-grape, Nootka rose, red-flowering currant, oceanspray, serviceberry (*Amelanchier alnifolia*), and mock orange (*Philadelphus lewisii*). Herbaceous species installed on the earthen cap included: chewings fescue (*Festuca rubra* var. *comutata*), California brome, meadow barley, slender hairgrass, Spanish clover (*Lotus purshiana*), claria (*Clarkia amoena*), globe gilia, meadow checkermallow (*Sidalcea campestris*), large-leaved lupine (*Lupinus polyphyllus*), and Canada goldenrod. By 2011, nearly all of these plant varieties remained on the earthen cap and appear to be well established and growing both vertically and laterally. Nootka rose had dominated the northwest corner of the earthen cap component; however, some of the Nootka rose appeared to have been highly stressed or had died, and most were regenerating. The black hawthorn had grown to 6 to 8 feet tall. Localized areas of moss were observed within the grasses and herbaceous vegetation. Small quantities of knapweed and thistle were also present.

Stormwater Retention Pond/Drainage Swale Component. This component was planted with a native shrub overstory consisting of hardhack, Sitka willow, and Piper's willow (Photograph Station 4). By 2011, volunteer red alder and black cottonwood (*Populus balsamifera*) were observed among the shrub plantings.

Understory herbaceous species were planted in the pond and swale area based on anticipated inundation within the pond and swale area and included: water plantain (*Alisma plantago aquatica*), slough sedge (*Carex obnupta*), soft stem bulrush (*Schoenoplectus tabernaemontanii*), small-fruited bulrush (*Scirpus microcarpus*), Western sloughgrass (*Beckmania syzigachne*), Western mannagrass (*Glyeria occidentalis*), tufted hairgrass (*Deschapsia cespitosa*), slender hairgrass, meadow barley, spike bentgrass, meadow foxtail (*Alopecuris geniculatus*), self-heal (*Prunella vulgaris*), Spanish clover, and gumweed (*Grindelia integrifolia*). In 2011, the shrub plantings in the pond and swale area were well established and appeared healthy. Many of the grasses and herbs in the pond area did not survive because the infiltration of surface runoff limits moisture and the understory is dominated by sand and bare ground. Given that the shrubs were well established, the area is flat, and erosion generally was not occurring, replanting grasses and herbs was not recommended. No noxious weeds were observed in this component.

Impermeable Cap Component. This component was seeded with a grassland mixture including: chewings fescue, California brome, meadow barley, slender hairgrass, large-leaved collomia (*Collomia grandiflora*), globe gilia, large-leaved lupine, and Canada goldenrod. By 2011, these grassland species provided excellent cover of the impermeable cap. Moss was present in localized areas where grasses and herbs did not become established. Small quantities of knapweed, thistle, skeletonweed (*Chondrilla juncea*), and dandelion (*Taraxacum officinale*) were present within the southwestern portion of this component and did not appear to be encroaching on desirable vegetation.

Summary. In general, the upland area appeared to be performing well in 2011 (baseline conditions) with the installed trees and shrubs looking healthy and spreading on the earthen cap component, shrubs being well established within the stormwater retention pond/drainage swale component, and good soil coverage and vegetative diversity on the impermeable cap component. Groundcover species provided excellent coverage of the ground, except for a few sections containing bare ground and the relatively bare understory in the pond area. Limited quantities of noxious weeds were observed in the upland area and were primarily limited to the southwestern edge of the impermeable cap component.

5.3 Vegetation Observations in 2020

On August 5, 2020, Haley & Aldrich inspected the upland cap to assess the current conditions as compared to the baseline conditions observed in June 2011. Qualitative data were recorded on species composition, cover and density of vegetation, and effectiveness of previous noxious weed treatments. Photograph Stations during this inspection were paired with photographs from previous reports to provide an understanding of vegetation changes. Photograph Stations are shown on Figure 5-1. Species nomenclature and nativity follows U.S. Department of Agriculture standards (U.S. Department of Agriculture 2020). Baseline and current observations are summarized below.

5.3.1 Riparian Area

Lower Component. In 2020, dominant species were similar to 2011 conditions with Oregon ash, cascara, Pacific ninebark, black twinberry and several willow species growing well. Much of the herbaceous layer was characterized by wildrye, fescue (*Festuca pratensis*), downy brome (Bromus tectorum), and a variety of forbs that came up from the seed bank. A small portion of this lower area was accidentally burned in

2018. The fire top-killed many of the shrubs. The hawthorn, twinberry, elderberry, ninebark, snowberry, and cascara re-sprouted, and very little evidence of the initial burn damage is present. Many of the woody plants survived the fire. In 2019, the newly exposed soil of the burned area had a higher density of turnip (*Brassica rapa*). As expected, many of the perennial grasses have re-spouted and are now competing with the annual, non-native grasses. The turnip had primarily disappeared. No indications of stress were noted.

Small, localized areas of TRM are visible along the length of the lower edge of the TRM, but adventive vegetation is continuing to cover the areas since repairs were made in December 2015. A significant quantity of driftwood was observed along the entire length of the lower component of the riparian area. Large driftwood pieces continue to accumulate along the shoreline to the middle of the bank near the break between the upper and lower components. Canada thistle has been the most common noxious weed with some knapweed and butterfly bush also present.

In 2017, herbicide application was successful at treating the black mustard (*Brassica nigra*), scotch broom (*Cytisus scoparius*), knapweed, and Canada thistle; however, some thistle was still observed in the lower portion of the riparian area. No herbicide treatment was performed in 2018. In 2019, several noxious weeds in the area were sprayed including Canada and bull thistle (*Cirsium vulgare*), butterfly bush, and false indigo bush (*Amorpha fruticosa*). Shiny-leaf geranium (*Geranium lucidum*) was also noted within the articulated block of the riparian zone. After the 2019 herbicide application, the butterfly bush and false indigo were eliminated. The thistles still persist, but the herbicide did lessen their impact in 2020. Noxious weeds are discussed in more detail below.

Upper Component. In 2020, trees and shrubs in the upper component were well established and appeared healthy with trees being up to 15 feet tall. The area is fully vegetated, completely recovered from the fire. Invasive species have been reduced through periodic herbicide treatments.

Since 2016, the riparian area is watered once or twice in the summer if drought conditions or stressed vegetation is observed. Ponderosa pine, madrone, Nootka rose, snowberry, Oregon-grape, hawthorn, and blue elderberry appeared well established and performing best within this area. Approximately 80 to 90 percent of the grand fir perished during the 2015 summer drought. In July 2018, a fire burned approximately 1 acre at the north end of the riparian area and reduced the woody biomass but did not kill too many of the woody species. Following a period of dry weather and the fire in the riparian area, approximately 2,500 gallons of water was used on August 8, 2018, to avoid excessive late season drought stress that was experienced in 2015 and to a lesser degree in 2016.

In 2020, shrubby species like oceanspray, cascara, twinberry, and Pacific ninebark, all stump sprouted well and are surviving. Taller species like bigleaf maple and madrone had their lower branches burned by the fire and are doing well; however, coniferous species such as cedar and fir were a total loss. The area vacated by these species is quickly being invaded by other native species, especially snowberry, elderberry, and roses. The herbaceous species planted are doing well locally. In much of the area these species are being forced out by the native shrubs. Areas still dominated by herbaceous species are found in the more southern portion of this zone. Here checkermallow, large-leaved and sicklekeel lupine, horsetail (*Equisetum arvense*), self-heal, and many species of grasses are present. Overall, this zone is doing very

well and is completely covered by primarily native species. Many of these native species that came up from the seed bank like horsetail, gumweed, several species of cudweed (*Pseudognaphalium* sp.), and poison-oak (*Toxicodendron diversilobum*) provide good wildlife value.

Several B-list noxious weeds were also found within this zone that include Canada thistle, two knapweeds (*Centaurea diffusa* and *C. stoebe*), Scotch broom, common St. John's-wort (*Hypericum perfoliatum*), tansy ragwort (*Senecio jacobaea*), and a small amount of Himalayan blackberry (*Rubus armeniacus*). Also found was tansy (*Tanacetum vulgare*), an invasive species not found on the Oregon Noxious Plant List (Oregon Department of Agriculture 2020). Tansy was included in the Site list because it is invasive in character, has started to form large patches at the Site, and is included on other states' lists as a noxious plant. In 2020, a rudimentary survey of the 2019 herbicide application effectiveness showed mixed results. Scotch broom, Himalayan blackberry, tansy ragwort and the knapweeds were significantly decreased or eliminated. Other aggressive perennial species like the St. John's-wort, Canada thistle, and tansy were less effected by the treatment. Further discussion of noxious plants is described in Section 5.4.

5.3.2 Upland Area

The upland area is divided into three components: the earthen cap; the stormwater retention pond/ drainage swale; and the impermeable cap (Figure 5-1). A variety of native trees, shrubs, and herbaceous species are present on the earthen cap as shown in Photographs H1 through H6 (Appendix H). The stormwater retention pond/drainage swale and the vegetation coverage on the impermeable cap are shown on Photographs H7 and H8, and Photographs H11 and H12, respectively (Appendix H).

Earthen Cap Component. In 2020, the area is fully vegetated with sporadic patches of trees and shrubs with nearly all of the originally planted varieties present. Tree and shrub plantings on the earthen cap are healthy and growing well (Appendix H, Photographs H9 and H10). Ponderosa pine, Oregon grape, blue elderberry, lupine, rose and serviceberry continue to perform the best. Nootka rose dominates the northwest portion of the earthen cap. Trees and shrubs range in height from approximately 6 to 20 feet. Herbaceous species provide full coverage of the ground. During the June 2019 site visit, gumweed, three species of lupine, mullein (*Verbascum thapsus*), Canada goldenrod, and many species of grasses dominated the earthen cap. No indications of significant stress were observed.

Scattered areas of noxious weeds were located during 2020, including spotted knapweed, tree of heaven, Canada thistle, bull thistle, tansy ragwort, skeletonweed, Scotch broom, medusahead rye, and Himalayan blackberry. The latter three species becoming locally common at the Site. Most of these were treated through herbicide application in 2019. In 2020, the tree of heaven, bull thistle, Himalayan blackberry, and knapweed were greatly reduced in coverage. The Canada thistle is tough to control, but its dominance was reduced.

Stormwater Retention Pond/Drainage Swale Component. In 2020, dense shrub and tree thickets were found to the north and east of the pond. The shrub plantings established well, although many of the grasses and herbs in the pond area did not survive because the infiltration of surface runoff limits moisture and the understory is dominated by sand and bare ground. The pond depression is too dry for successful wetland vegetation that were previously planted. The depression is primarily vegetated by annual grasses:

silver hairgrass (*Aira caryopyllea*) and annual fescue (*Vulpia myuros*). A good shrubby edge around the pond and swale was present of Sitka and piper's willow up to 15-feet tall (Appendix H, Photographs H7 and H8), red-osier dogwood, black cottonwood, snowberry, and butterfly bush. The butterfly bush was sprayed in 2019. This was successfully eliminated from this area when checked in 2020.

Impermeable Cap Component. In 2020, barley, hair grass, and lupine have performed the best of the species seeded in 2011. A recent survey of this area found these dominant species along with gumweed, velvet grass (*Holcus lantana*), sweet vernal grass (*Anthroxanthum odoratum*), and downy brome. Small populations of noxious weeds were present, including spotted knapweed, Canada and bull thistle, and skeletonweed. Larger populations of the B-listed noxious weed, medusahead rye, was in the more disturbed areas of the cap and along paths. This annual would be hard to eliminate and would be best controlled by an increased dominance of perennials. Spot treatment of knapweed and the two thistles in 2019 were able to reduce their presence without creating bare ground areas.

5.4 Vegetation Maintenance Activities

The general planting goals continue to be met. A preventive control approach continues to be implemented as part of an ongoing effort to control the spread of noxious weed species. Spot spraying was last completed over the entire site in June 2019. This followed weed suppression efforts in spring and fall of 2016 and spot treatment of the Site in 2017. No herbicide was applied in 2018 and 2020.

Due to exceptionally dry summer conditions, irrigation water was applied in the riparian area to help alleviate stressed vegetation in 2015, 2016, and 2017. In 2018, as a precautionary measure and to encourage plant growth in areas damaged by the July 2018 fire, one watering event was completed in August 2018. No watering events were needed in 2019 and 2020 due to summer rainfall.

5.5 Vegetation Performance Summary

Overall, the tree, shrub, and herbaceous plantings are well established and are spreading throughout the Site. Most of the woody vegetation that was planted or that came in through natural corridors is native. Much of the stormwater retention pond remains vegetated by non-native annual grasses or is unvegetated. Native willow and black cottonwood are growing in and around the depression and are spreading. Herbaceous and woody species are providing excellent coverage for the rest of the Site. Noxious weed coverage was reduced by the 2017 spring herbicide application, and again in 2019. During 2019, more B-listed noxious species were identified and treated than in 2017. The vegetation has rebounded from the fires in 2018, and these areas have been observed to become fully vegetated in 2020 without the need for additional intervention. A vegetation inspection in June 2021 will document any changes to species composition of any of the regions and provide maintenance recommendations if necessary.

The exceptionally dry summer conditions in 2015 resulted in significant stress of the riparian community and other localized habitats across the Site. Vegetation recovered in 2016 and 2017, although many conifers in the upper riparian area died. As the surviving woody plants become well established, they will

have better means for withstanding drought conditions in the future. Vegetation monitoring will continue during summer 2021, and additional watering will be provided in the case of another severe drought.

6.0 SUMMARY OF OVERALL REMEDY PERFORMANCE

Overall, the 2020 soil and sediment cap observations and inspections, groundwater monitoring and sampling, sediment cap porewater and surface water sampling, and crayfish sampling revealed no significant change in remedy performance or areas of concern. Groundwater sampling and sediment cap performance sampling in 2020 documented contaminant concentrations at similar levels to previous sampling events. The remedy continues to perform as designed and is protective of human health and the environment.

7.0 SUMMARY OF PLANNED ACTIVITIES FOR 2021

The Final O&M Plan with descriptions and schedule of O&M activities was completed by DEQ with assistance from EPA, GSI, and Hart Crowser (now Haley & Aldrich) in March 2014.

Table 7-1 presents the soil cap O&M activities planned through 2025. Soil cap O&M activities in 2021 will consist primarily of quarterly inspections and routine maintenance. Semiannual inspections will be continued in 2021 to assess and monitor vegetation planting areas, species identification (native, non-native, and invasive), growth, density, and general coverage throughout the Site. The need for noxious weed control activities will be evaluated based on site and vegetation inspections. If the Site experiences drought conditions in 2021, woody species may be in danger of being lost. Due to their shallow rooting, the remaining conifers could show water stress earlier. Conditions will be monitored during the summer months and, if dry conditions are prevalent, a drought assessment survey will be conducted to determine if additional watering is needed. A water tank trailer and firehose has worked well in the past to apply water throughout the Site and this same technique will be used again, if needed.

Table 7-2 presents the sediment cap O&M activities planned through 2025. In 2021, routine activities will include quarterly inspections and routine maintenance, and cleanup of riparian area trash and dumpsites (if present). Sediment cap performance monitoring was performed in 2020 and will be used to inform the Five-Year Review in 2021.

Groundwater O&M activities through September 2025 are summarized in Table 7-3. Groundwater sampling was performed in 2020 and will be used to inform the Five-Year Review in 2021. Routine maintenance of the data logger transducers and barometric pressure transducers are also included as elements of groundwater O&M.

8.0 REFERENCES

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TABLES

Table 2-1: Soil Cap O&M Activities in 2020
2020 O&M Annual Report
McCormick & Baxter Superfund Site

O&M Activity	Frequency in 2020
Visual Inspections:	
Cap surface	February, July, September, December
Subsidence near EW-1s	February, July, September, December
Stormwater conveyance system	February, July, September, December
Security fencing	February, July, September, December
Warning signs	February, July, September, December
Abundance and survival of vegetation	February, July, August, September, December
Routine Maintenance and Monitoring:	
Manual removal of invasive plants	None
Targeted application of herbicides	None
Non-Routine Maintenance:	
Fire damage inspections	February, July, September, December
Fill burrows under fence	June and December
Replace cut locks	February, September, December
Repair of ACB edge, fill eroded spot under TRM, replace broken sign posts	December
Utilities Service:	
Water (Backflow Testing)	September

Table 3-1: Sediment Cap O&M Activities in 2020
2020 O&M Annual Report
McCormick & Baxter Superfund Site

O&M Activity	Frequency in 2020
Visual Inspections (from shore):	
Warning buoys	February, July, September, December
Cap surface	February, July, September, December
Habitat quality	February, July, September, December
Routine Monitoring:	
Surface Water, Inter-armor Porewater, and Sub-armor	August and September
Crayfish tissue sampling	August and September
Organoclay core sampling	None
Non-Routine Monitoring:	
Multibeam bathymetric surveys, side-scan sonar survey	None
Non-Routine Maintenance:	
Cut articulated concrete block cable loops	None

Table 3-2: Surface Water, Inter-armor Porewater, and Sub-armor Porewater Location Details
2020 O&M Annual Report
McCormick & Baxter Superfund Site

Sampling Location ID	Target Sample Coordinates (NAD83)				Actual Sample Coordinates (NAD83)				Sample Elevation (ft NAVD88)	Location within ACB	Colocated Crayfish Sampling Location	Number of Days Deployed
	Northing	Easting	Latitude	Longitude	Northing	Easting	Latitude	Longitude				
Compliance Sampling												
A	704151.8	7628801.0	45.57630	-122.73924	7628794.7	704139.5	45.57627	-122.73920	6.1	Yes	01	34
B	704369.2	7628482.9	45.57687	-122.74050	7628480.8	704372.3	45.57689	-122.74045	4.6	No	-	32
C	704556.6	7628058.5	45.57735	-122.74218	704556.6	7628058.5	45.57735	-122.74218	1.8	No	02	32
D	704693.1	7627598.7	45.57769	-122.74399	7627598.8	704693.6	45.57770	-122.74393	-17.2	No	03	35
E	704787.3	7627213.2	45.57792	-122.74550	7627213.1	704787.8	45.57793	-122.74545	-27.8	No	04	36
F	705220.9	7627179.7	45.57911	-122.74568	7627182.6	705220.1	45.57911	-122.74561	0.5	Yes	05	34
G	705263.6	7627011.2	45.57921	-122.74634	7627006.0	705262.1	45.57921	-122.74631	1.1	Yes	-	34
H	705118.3	7626983.2	45.57881	-122.74644	7626986.2	705122.8	45.57883	-122.74637	-8.9	No	-	35
I	704565.8	7627624.4	45.57734	-122.74387	7627626.1	704559.8	45.57733	-122.74381	-18.6	No	-	35
J	704511.5	7627800.2	45.57721	-122.74318	7627777.0	704505.0	45.57720	-122.74321	7.2	No	-	32
K	704219.7	7628010.5	45.57643	-122.74233	7628009.3	704220.0	45.57643	-122.74228	-20.9	No	-	36
L	704335.6	7628390.4	45.57677	-122.74086	7628387.3	704336.0	45.57678	-122.74081	4.5	No	-	34
Early Warning Sampling												
5	704576.3	7628007.4	45.57740	-122.74238	704576.3	7628007.4	45.57740	-122.74238	1.8	No	-	35
12	705197.2	7627236.8	45.57905	-122.74546	705197.2	7627236.8	45.57905	-122.74546	4.9	Yes	-	33
13	705303.9	7627321.8	45.57935	-122.74514	705303.9	7627321.8	45.57935	-122.74514	5.4	Yes	-	33
16	704293.9	7627812.9	45.57661	-122.74311	704308.0	7627821.1	45.57666	-122.74302	-28.6	No	-	36
Background Sampling												
1 (Upstream)	703730.7	7628583.6	45.57513	-122.74004	703730.6	7628585.6	45.57513	-122.73997	-31.5	No	-	NA
27 (Downstream)	705647.6	7626360.3	45.58021	-122.74893	705647.4	7626359.1	45.58022	-122.74887	-19.3	No	-	34

Notes:
Horizontal coordinate datum is North American Datum of 1983 (NAD83), Oregon State Plane North Zone, International Feet.
Elevation datum is North American Vertical Datum of 1988 (NAVD88) in feet.

Abbreviations and Acronyms:
ACB = Articulated concrete block
NA = Not applicable

Table 3-3: 2020 Surface Water, Inter-armor Porewater, and Sub-armor Porewater Chemical Results
2020 O&M Annual Report
McCormick & Baxter Superfund Site

Sample Location		Comparison Criteria		5			12			13		
Sample ID		1996 AWQCs[1]		ORG_P13_SW	ORG_P13_6	ORG_P13_18	ORG_P14_SW	ORG_P14_6	ORG_P14_18	ORG_P25_SWa	ORG_P25_6a	ORG_P25_18a
Sample Interval		Aquatic Life	Human Health	SW	6	18	SW	6	18	SW	6	18
Sample Date		(chronic)	(fish only)	09/29/2020	09/29/2020	09/29/2020	09/28/2020	09/28/2020	09/28/2020	09/28/2020	09/28/2020	09/28/2020
Metals (mg/L)												
Total Arsenic		0.19	--	**0.0005**	**0.031**	**0.0259**	**0.0005**	**0.0285**	**0.0397**	**0.0001 J**	**0.0009**	**0.0009**
Total Chromium		0.21	--	**0.00007 J**	**0.0002**	**0.0005**	**0.00006 J**	**0.0001**	**0.00007 J**	**0.000006**	**0.00009 J**	**0.00002**
Total Copper		0.012	--	**0.0006**	**0.00004**	**0.0001 J**	**0.0006**	**0.0002 J**	**0.00003**	**0.0002 J**	**0.0002 J**	**0.0003 J**
Total Zinc		0.11	--	**0.002**	**0.0014**	0.001 U	**0.0029**	**0.0016**	0.00075 U	**0.0011**	**0.0013**	**0.0012**
Pentachlorophenol (µg/L)												
Pentachlorophenol		13	--	0.10952 U	0.10952 U	0.10952 U	0.10952 U	0.10952 U	0.10952 U	0.10952 U	0.10952 U	0.10952 U
Polycyclic Aromatic Hydrocarbons (µg/L)												
1,2-Dimethylnaphthalene		--	--	0.00254 U	0.00254 U	**0.00475**	**0.01042**	**0.74318**	**0.82216**	0.00254 U	0.00254 U	0.00254 U
1,3-Dimethylnaphthalene		--	--	0.00949 U	0.00949 U	**0.02848**	**0.04158**	**1.32071**	**1.70655**	0.00949 U	0.00949 U	0.00949 U
1,8-Dimethylnaphthalene		--	--	0.00189 U	0.00189 U	0.00189 U	0.00189 U	**0.07743**	**0.0496**	0.00189 U	0.00189 U	0.00189 U
1-Ethylnaphthalene		--	--	0.00167 U	0.00167 U	**0.00407**	**0.002**	**0.63518**	**0.41042**	0.00167 U	0.00167 U	**0.0022**
1-Methylfluorene		--	--	0.00776 U	0.00776 U	**0.01331**	0.00776 U	**0.18749**	**0.08334**	0.00776 U	0.00776 U	0.00776 U
1-Methylnaphthalene		--	--	**0.01494**	**0.01556**	**0.03592**	0.00966 U	**0.11338**	**0.11797**	0.00966 U	**0.0139**	**0.01139**
1-Methylphenanthrene		--	--	**0.00215**	0.00178 U	**0.00345**	0.00178 U	**0.03605**	**0.01376**	0.00178 U	0.00178 U	0.00178 U
1-Methylpyrene		--	--	**0.0005**	0.00031 U	**0.0004**	0.00031 U	**0.00167**	**0.00134**	0.00031 U	0.00031 U	0.00031 U
2-(tert-Butyl)anthracene		--	--	**0.0001**	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U
2,3,5-Trimethylnaphthalene		--	--	0.00213 U	**0.00216**	**0.00513**	**0.00847**	**0.3463**	**0.15299**	0.00213 U	0.00213 U	0.00213 U
2,6-Dimethylnaphthalene		--	--	0.00775 U	0.00775 U	**0.02134**	**0.01609**	**0.02691**	**0.06156**	0.00775 U	0.00775 U	0.00775 U
2-Ethylanthracene		--	--	**0.001**	0.00084 U	**0.00203**	**0.00124**	**0.00273**	**0.0016**	0.00084 U	0.00084 U	0.00084 U
2-Ethylnaphthalene		--	--	0.00462 U	**0.01048**	**0.01426**	0.00462 U	**0.02208**	**0.05208**	0.00462 U	0.00462 U	**0.03031**
2-Isopropyl Naphthalene		--	--	0.00085 U	0.00085 U	0.00085 U	0.00085 U	**0.01033**	**0.0028**	0.00085 U	0.00085 U	0.00085 U
2-Methylanthracene		--	--	0.0014 U	0.0014 U	0.0014 U	0.0014 U	**0.03154**	**0.01167**	0.0014 U	0.0014 U	0.0014 U
2-Methylnaphthalene		--	--	**0.02592**	**0.02607**	**0.04909**	**0.01269**	**0.03741**	**0.04023**	**0.01413**	**0.02397**	**0.02056**
2-Methylphenanthrene		--	--	0.00605 U	0.00605 U	**0.01024**	0.00605 U	0.00605 U	0.00605 U	0.00605 U	0.00605 U	0.00605 U
9,10-Dimethylanthracene		--	--	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U
9-Methylanthracene		--	--	0.00124 U	0.00124 U	0.00124 U	0.00124 U	**0.00241**	0.00124 U	0.00124 U	0.00124 U	0.00124 U
Acenaphthene	L	520	--	**0.05024**	**0.06985**	**0.12916**	**0.22655**	**59.76684**	**75.01775**	**0.0555**	**0.02715**	**0.02937**
Acenaphthylene	L	--	--	0.00788 U	0.00788 U	0.00788 U	**0.01228**	**0.95056**	**1.04661**	0.00788 U	0.00788 U	0.00788 U
Anthracene	L	--	--	**0.00346**	**0.00371**	**0.00539**	**0.00454**	**0.19955**	**0.09095**	0.0023 U	0.0023 U	0.0023 U
Benz(a)anthracene	H,C	--	--	**0.0005**	0.00038 U	**0.0006**	0.00038 U	**0.00255**	**0.00434**	0.00038 U	0.00038 U	0.00038 U
Benzo(a)pyrene	H,C	--	--	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U
Benzo(e)pyrene	H	--	--	**0.0002**	0.00014 U	**0.0003**	0.00014 U	**0.0003**	**0.0008**	0.00014 U	0.00014 U	**0.0002**
Benzo(b)fluoranthene	H,C	--	--	**0.0002**	**0.00008**	**0.0002**	**0.0001**	**0.0003**	**0.0007**	0.00007 U	**0.0002**	**0.0002**
Benzo(k)fluoranthene	H,C	--	--	0.00013 U	0.00013 U	0.00013 U	0.00013 U	**0.0002**	**0.0005**	0.00013 U	**0.0002**	0.00013 U
Benzo(g,h,i)perylene	H	--	--	0.0003 U	0.0003 U	**0.0006**	0.0003 U	0.0003 U	0.0003 U	0.0003 U	0.0003 U	0.0003 U
Chrysene	H,C	--	--	**0.0006**	**0.0005**	**0.0016**	0.00043 U	**0.00429**	**0.00675**	**0.0005**	**0.0008**	**0.0009**
Dibenz(a,h)anthracene	H,C	--	--	0.00032 U	0.00032 U	0.00032 U	0.00032 U	0.00032 U	0.00032 U	0.00032 U	0.00032 U	0.00032 U
Fluoranthene	H	--	54	**0.00421**	**0.00534**	**0.01013**	0.00313 U	**0.13715**	**0.09163**	**0.00411**	**0.0058**	**0.00437**
Fluorene	L	--	--	**0.02582**	**0.03295**	**0.05909**	**0.14638**	**18.14856**	**6.97415**	**0.02378**	**0.01368**	**0.01559**
Indeno(1,2,3-cd)pyrene	H,C	--	--	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U
Naphthalene	L	620	--	**0.07754**	**0.07208**	**0.27569**	0.0662 U	**0.74602**	**0.77268**	0.0662 U	**0.12846**	0.0662 U
Perylene		--	--	**0.0002**	**0.0007**	**0.0008**	0.00014 U	0.00014 U	**0.0002**	0.00014 U	0.00014 U	0.00014 U
Phenanthrene	L	--	--	0.01307 U	0.01307 U	**0.02436**	0.01307 U	**0.01973**	**0.0137**	0.01307 U	0.01307 U	0.01307 U
Pyrene	H	--	--	0.01294 U	0.01294 U	**0.02724**	0.01294 U	**0.22456**	**0.14371**	0.01294 U	0.01294 U	0.01294 U

Please refere to notes at the end of the table.

Table 3-3: 2020 Surface Water, Inter-armor Porewater, and Sub-armor Porewater Chemical Results
2020 O&M Annual Report
McCormick & Baxter Superfund Site

Sample Location	Comparison Criteria		5			12			13		
Sample ID	1996 AWQCs[1]		ORG_P13_SW	ORG_P13_6	ORG_P13_18	ORG_P14_SW	ORG_P14_6	ORG_P14_18	ORG_P25_SWa	ORG_P25_6a	ORG_P25_18a
Sample Interval	Aquatic Life	Human Health	SW	6	18	SW	6	18	SW	6	18
Sample Date	(chronic)	(fish only)	09/29/2020	09/29/2020	09/29/2020	09/28/2020	09/28/2020	09/28/2020	09/28/2020	09/28/2020	09/28/2020
Total LPAHs (ND = 1/2 EDL)	--	--	**0.1675 T**	**0.18907 T**	**0.4976 T**	**0.4294 T**	**79.8313 T**	**83.9158 T**	**0.1240 T**	**0.1809 T**	**0.0897 T**
Total HPAHs (ND = 1/2 EDL)	--	--	**0.0129 T**	**0.01340 T**	**0.0413 T**	**0.0094 T**	**0.3700 T**	**0.2491 T**	**0.0121 T**	**0.0144 T**	**0.0131 T**
Total PAHs (ND = 1/2 EDL)	--	--	**0.1805 T**	**0.20246 T**	**0.5389 T**	**0.4387 T**	**80.2013 T**	**84.1650 T**	**0.1361 T**	**0.1953 T**	**0.1028 T**
Total cPAHs (ND = 1/2 EDL)	--	0.031	**0.0005 T**	**0.00050 T**	**0.0006 T**	**0.0005 T**	**0.0008 T**	**0.0010 T**	**0.0005 T**	**0.0005 T**	**0.0005 T**
Total cPAHs (No TEFs; ND = 1/2 EDL)	--	0.031	**0.0019 T**	**0.0014 T**	**0.003 T**	**0.0011 T**	**0.0079 T**	**0.013 T**	**0.0013 T**	**0.0019 T**	**0.0019 T**

Please refere to notes at the end of the table.

Table 3-3: 2020 Surface Water, Inter-armor Porewater, and Sub-armor Porewater Chemical Results
2020 O&M Annual Report
McCormick & Baxter Superfund Site

Sample Location		Comparison Criteria		16			A			B		
Sample ID		1996 AWQCs[1]		ORG_P27_SWa	ORG_P27_6a	ORG_P27_18a	ORG_P20_SW	ORG_P20_6	ORG_P20_18	ORG_P16_SW	ORG_P16_6	ORG_P16_18
Sample Interval		Aquatic Life	Human Health	SW	6	18	SW	6	18	SW	6	18
Sample Date		(chronic)	(fish only)	09/29/2020	09/29/2020	09/29/2020	09/28/2020	09/28/2020	09/28/2020	09/28/2020	09/28/2020	09/28/2020
Metals (mg/L)												
Total Arsenic		0.19	--	**0.0005**	**0.0156**	**0.0156**	**0.0004**	**0.0014**	**0.0097**	**0.0005**	**0.0005**	**0.0189**
Total Chromium		0.21	--	**0.00004**	**0.0003**	**0.0002**	**0.00009 J**	**0.00002**	**0.0001**	**0.0001**	**0.00005**	**0.0001**
Total Copper		0.012	--	**0.0005 J**	**0.00007 J**	**0.00008 J**	**0.0004 J**	**0.0002 J**	**0.0001 J**	**0.0012**	**0.0013**	**0.00004**
Total Zinc		0.11	--	**0.0089**	**0.0021**	**0.0015**	**0.0017**	**0.0023**	**0.0012**	**0.0022**	**0.0019**	**0.0012**
Pentachlorophenol (µg/L)												
Pentachlorophenol		13	--	0.10952 U	0.10952 U	0.10952 U	0.10952 U	0.10952 U	0.10952 U	0.10952 U	0.10952 U	0.10952 U
Polycyclic Aromatic Hydrocarbons (µg/L)												
1,2-Dimethylnaphthalene		--	--	0.00254 U	0.00254 U	**0.00649**	0.00254 U	**0.00406**	**0.0187**	0.00254 U	**0.00276**	0.00254 U
1,3-Dimethylnaphthalene		--	--	0.00949 U	**0.00953**	**0.01838**	0.00949 U	0.00949 U	**0.01554**	0.00949 U	**0.01085**	0.00949 U
1,8-Dimethylnaphthalene		--	--	0.00189 U	0.00189 U	0.00189 U	0.00189 U	0.00189 U	**0.00375**	0.00189 U	0.00189 U	0.00189 U
1-Ethylnaphthalene		--	--	0.00167 U	0.00167 U	**0.00324**	0.00167 U	**0.00422**	**0.02055**	0.00167 U	0.00167 U	0.00167 U
1-Methylfluorene		--	--	0.00776 U	0.00776 U	0.00776 U	0.00776 U	**0.01593**	**0.08326**	0.00776 U	0.00776 U	0.00776 U
1-Methylnaphthalene		--	--	**0.01627**	**0.0175**	**0.01781**	**0.01328**	0.00966 U	**0.01492**	**0.0107**	**0.01133**	**0.01203**
1-Methylphenanthrene		--	--	0.00178 U	0.00178 U	0.00178 U	**0.00182**	**0.00202**	**0.00356**	0.00178 U	0.00178 U	0.00178 U
1-Methylpyrene		--	--	0.00031 U	0.00031 U	0.00031 U	0.00031 U	**0.0003**	**0.0005**	0.00031 U	0.00031 U	**0.0004**
2-(tert-Butyl)anthracene		--	--	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U
2,3,5-Trimethylnaphthalene		--	--	0.00213 U	0.00213 U	0.00213 U	0.00213 U	**0.0057**	**0.01618**	0.00213 U	0.00213 U	**0.00209**
2,6-Dimethylnaphthalene		--	--	**0.00726**	**0.00956**	0.00775 U	0.00775 U	0.00775 U	**0.01043**	0.00775 U	0.00775 U	0.00775 U
2-Ethylanthracene		--	--	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U
2-Ethylnaphthalene		--	--	0.00462 U	**0.00822**	**0.00857**	0.00462 U	0.00462 U	**0.00656**	0.00462 U	0.00462 U	**0.00926**
2-Isopropyl Naphthalene		--	--	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U
2-Methylanthracene		--	--	0.0014 U	0.0014 U	0.0014 U	0.0014 U	0.0014 U	**0.00368**	0.0014 U	0.0014 U	0.0014 U
2-Methylnaphthalene		--	--	**0.03025**	**0.03358**	**0.0364**	**0.02197**	**0.01595**	**0.03144**	**0.01648**	**0.0186**	**0.02227**
2-Methylphenanthrene		--	--	0.00605 U	0.00605 U	0.00605 U	0.00605 U	0.00605 U	0.00605 U	0.00605 U	0.00605 U	0.00605 U
9,10-Dimethylanthracene		--	--	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U
9-Methylanthracene		--	--	0.00124 U	0.00124 U	0.00124 U	0.00124 U	0.00124 U	0.00124 U	0.00124 U	0.00124 U	0.00124 U
Acenaphthene	L	520	--	**0.05184**	**0.05852**	**0.44859**	**0.04534**	**0.12306**	**2.0472**	**0.07722**	**0.12985**	**0.09168**
Acenaphthylene	L	--	--	0.00788 U	0.00788 U	**0.01593**	0.00788 U	0.00788 U	**0.05892**	0.00788 U	0.00788 U	0.00788 U
Anthracene	L	--	--	0.0023 U	0.0023 U	**0.00365**	0.0023 U	**0.00881**	**0.0385**	0.0023 U	**0.00215**	**0.00591**
Benz(a)anthracene	H,C	--	--	0.00038 U	0.00038 U	0.00038 U	0.00038 U	**0.0004**	**0.0007**	**0.0004**	0.00038 U	**0.00102**
Benzo(a)pyrene	H,C	--	--	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U
Benzo(e)pyrene	H	--	--	0.00014 U	0.00014 U	**0.0002**	0.00014 U	0.00014 U	0.00014 U	0.00014 U	0.00014 U	**0.0003**
Benzo(b)fluoranthene	H,C	--	--	**0.00009**	**0.0001**	**0.0001**	0.00007 U	**0.00009**	**0.00009**	0.00007 U	**0.00007**	**0.0002**
Benzo(k)fluoranthene	H,C	--	--	0.00013 U	0.00013 U	0.00013 U	0.00013 U	0.00013 U	0.00013 U	0.00013 U	0.00013 U	**0.0002**
Benzo(g,h,i)perylene	H	--	--	0.0003 U	0.0003 U	0.0003 U	0.0003 U	0.0003 U	0.0003 U	0.0003 U	0.0003 U	0.0003 U
Chrysene	H,C	--	--	**0.0005**	**0.0005**	**0.0005**	**0.0005**	**0.0007**	**0.0011**	**0.0005**	**0.0004**	**0.00192**
Dibenz(a,h)anthracene	H,C	--	--	0.00032 U	0.00032 U	0.00032 U	0.00032 U	0.00032 U	0.00032 U	0.00032 U	0.00032 U	0.00032 U
Fluoranthene	H	--	54	0.00313 U	**0.00435**	**0.00606**	**0.00348**	**0.00742**	**0.0135**	**0.00402**	0.00313 U	**0.00784**
Fluorene	L	--	--	**0.02766**	**0.02817**	**0.0457**	**0.02073**	**0.03954**	**0.16117**	**0.03341**	**0.05021**	**0.03578**
Indeno(1,2,3-cd)pyrene	H,C	--	--	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U
Naphthalene	L	620	--	**0.06448001**	**0.08504**	**0.09583**	**0.10125**	0.0662 U	0.0662 U	0.0662 U	0.0662 U	0.0662 U
Perylene		--	--	**0.0001**	**0.0003**	**0.0004**	**0.0002**	**0.0002**	**0.0002**	**0.0002**	**0.0001**	**0.0006**
Phenanthrene	L	--	--	0.01307 U	0.01307 U	0.01307 U	0.01307 U	0.01307 U	**0.01634**	0.01307 U	0.01307 U	0.01307 U
Pyrene	H	--	--	0.01294 U	0.01294 U	0.01294 U	0.01294 U	**0.02498**	**0.07533**	0.01294 U	0.01294 U	**0.01555**

Please refere to notes at the end of the table.

Table 3-3: 2020 Surface Water, Inter-armor Porewater, and Sub-armor Porewater Chemical Results
2020 O&M Annual Report
McCormick & Baxter Superfund Site

Sample Location	Comparison Criteria		16			A			B		
Sample ID	1996 AWQCs[1]		ORG_P27_SWa	ORG_P27_6a	ORG_P27_18a	ORG_P20_SW	ORG_P20_6	ORG_P20_18	ORG_P16_SW	ORG_P16_6	ORG_P16_18
Sample Interval	Aquatic Life	Human Health	SW	6	18	SW	6	18	SW	6	18
Sample Date	(chronic)	(fish only)	09/29/2020	09/29/2020	09/29/2020	09/28/2020	09/28/2020	09/28/2020	09/28/2020	09/28/2020	09/28/2020
Total LPAHs (ND = 1/2 EDL)	--	--	**0.1556 T**	**0.1834 T**	**0.6162 T**	**0.1789 T**	**0.2150 T**	**2.3552 T**	**0.1554 T**	**0.2258 T**	**0.1769 T**
Total HPAHs (ND = 1/2 EDL)	--	--	**0.0096 T**	**0.0124 T**	**0.0143 T**	**0.0115 T**	**0.0344 T**	**0.0915 T**	**0.0122 T**	**0.0095 T**	**0.0277 T**
Total PAHs (ND = 1/2 EDL)	--	--	**0.1652 T**	**0.1958 T**	**0.6305 T**	**0.1904 T**	**0.2494 T**	**2.4468 T**	**0.1676 T**	**0.2353 T**	**0.2047 T**
Total cPAHs (ND = 1/2 EDL)	--	0.031	**0.0005 T**	**0.0005 T**	**0.0005 T**	**0.0005 T**	**0.0005 T**	**0.0006 T**	**0.0005 T**	**0.0005 T**	**0.0006 T**
Total cPAHs (No TEFs; ND = 1/2 EDL)	--	0.031	**0.0014 T**	**0.0014 T**	**0.0014 T**	**0.0013 T**	**0.0018 T**	**0.0025 T**	**0.0015 T**	**0.0013 T**	**0.0039 T**

Please refere to notes at the end of the table.

Table 3-3: 2020 Surface Water, Inter-armor Porewater, and Sub-armor Porewater Chemical Results
2020 O&M Annual Report
McCormick & Baxter Superfund Site

Sample Location		Comparison Criteria		C			Duplicate Station C			D		
Sample ID		1996 AWQCs[1]		ORG_P21a_SW	ORG_P21a_6	ORG_P21a_18	ORG_P21b_SW	ORG_P21b_6	ORG_P21b_18	ORG_P31_SWa	ORG_P31_6a	ORG_P31_18a
Sample Interval		Aquatic Life	Human Health	SW	6	18	SW	6	18	SW	6	18
Sample Date		(chronic)	(fish only)	09/28/2020	09/28/2020	09/28/2020	09/28/2020	09/28/2020	09/28/2020	09/28/2020	09/28/2020	09/28/2020
Metals (mg/L)												
Total Arsenic		0.19	--	**0.0006**	**0.0109**	**0.0196**	-	-	-	**0.0005**	**0.0271**	**0.0286**
Total Chromium		0.21	--	**0.0003**	**0.00007 J**	**0.00007 J**	-	-	-	**0.00004**	**0.0002**	**0.0001**
Total Copper		0.012	--	**0.0015**	**0.0002 J**	**0.00005 J**	-	-	-	**0.0004 J**	**0.00003 J**	**0.00003**
Total Zinc		0.11	--	**0.0027**	**0.0012**	**0.0011**	-	-	-	**0.0021**	**0.0012**	**0.001**
Pentachlorophenol (µg/L)												
Pentachlorophenol		13	--	0.10952 U	0.10952 U	0.10952 U	0.10952 U	0.10952 U	0.10952 U	0.10952 U	0.10952 U	0.10952 U
Polycyclic Aromatic Hydrocarbons (µg/L)												
1,2-Dimethylnaphthalene		--	--	0.00254 U	**0.00818**	**0.03405**	0.00254 U	**0.0063**	**0.04552**	0.00254 U	**0.00666**	**0.00302**
1,3-Dimethylnaphthalene		--	--	**0.01606**	**0.00958**	**0.03907**	0.00949 U	0.00949 U	**0.04681**	**0.01172**	**0.07396**	**0.02233**
1,8-Dimethylnaphthalene		--	--	0.00189 U	**0.00528**	**0.00408**	0.00189 U	**0.00268**	**0.00638**	0.00189 U	0.00189 U	**0.00218**
1-Ethylnaphthalene		--	--	0.00167 U	**0.00666**	**0.02067**	0.00167 U	**0.0057**	**0.02575**	0.00167 U	**0.00768**	**0.003**
1-Methylfluorene		--	--	0.00776 U	0.00776 U	0.00776 U	0.00776 U	0.00776 U	0.00776 U	0.00776 U	**0.03888**	**0.00965**
1-Methylnaphthalene		--	--	**0.02089**	**0.02034**	**0.01756**	**0.01415**	**0.02032**	**0.02229**	**0.01602**	**0.0767**	**0.02454**
1-Methylphenanthrene		--	--	**0.003**	0.00178 U	0.00178 U	0.00178 U	0.00178 U	**0.00435**	**0.00192**	**0.01201**	**0.00327**
1-Methylpyrene		--	--	0.00031 U	0.00031 U	0.00031 U	0.00031 U	0.00031 U	**0.0004**	0.00031 U	**0.00161**	**0.0006**
2-(tert-Butyl)anthracene		--	--	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	**0.0004**	**0.0002**
2,3,5-Trimethylnaphthalene		--	--	**0.00299**	0.00213 U	**0.00388**	0.00213 U	0.00213 U	**0.0062**	**0.00223**	**0.01106**	**0.00386**
2,6-Dimethylnaphthalene		--	--	**0.01302**	**0.00867**	**0.012**	0.00775 U	0.00775 U	**0.01367**	**0.01035**	**0.05835**	**0.01898**
2-Ethylanthracene		--	--	**0.001**	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	**0.00121**	**0.01126**	**0.00319**
2-Ethylnaphthalene		--	--	**0.00518**	**0.01197**	**0.02835**	0.00462 U	**0.01406**	**0.02308**	**0.00491**	**0.01886**	**0.01023**
2-Isopropyl Naphthalene		--	--	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	**0.00197**	0.00085 U
2-Methylanthracene		--	--	0.0014 U	0.0014 U	0.0014 U	0.0014 U	0.0014 U	**0.00345**	0.0014 U	**0.00365**	0.0014 U
2-Methylnaphthalene		--	--	**0.03298**	**0.02953**	**0.0279**	**0.02506**	**0.03188**	**0.035**	**0.0268**	**0.0996**	**0.03739**
2-Methylphenanthrene		--	--	0.00605 U	0.00605 U	0.00605 U	0.00605 U	0.00605 U	**0.00676**	0.00605 U	**0.04146**	**0.01083**
9,10-Dimethylanthracene		--	--	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U
9-Methylanthracene		--	--	0.00124 U	0.00124 U	0.00124 U	0.00124 U	0.00124 U	0.00124 U	0.00124 U	**0.00158**	0.00124 U
Acenaphthene	L	520	--	**0.0668**	**6.48272**	**4.535851**	**0.11472**	**5.52763**	**4.94116**	**0.04597**	**0.06507**	**0.18563**
Acenaphthylene	L	--	--	0.00788 U	**0.16174**	**0.13245**	0.00788 U	**0.13034**	**0.17846**	0.00788 U	**0.00793**	**0.00803**
Anthracene	L	--	--	**0.00339**	**0.00606**	**0.01632**	**0.00252**	**0.00516**	**0.03238**	0.0023 U	**0.0052**	**0.0048**
Benz(a)anthracene	H,C	--	--	**0.0004**	0.00038 U	**0.0004**	0.00038 U	0.00038 U	**0.00113**	**0.0005**	**0.00258**	**0.001**
Benzo(a)pyrene	H,C	--	--	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U
Benzo(e)pyrene	H	--	--	**0.0002**	0.00014 U	0.00014 U	0.00014 U	0.00014 U	0.00014 U	**0.0002**	**0.0007**	**0.0003**
Benzo(b)fluoranthene	H,C	--	--	**0.0001**	**0.0001**	**0.0001**	0.00007 U	0.00007 U	**0.0001**	**0.0001**	**0.0005**	**0.0002**
Benzo(k)fluoranthene	H,C	--	--	0.00013 U	0.00013 U	**0.0001**	0.00013 U	0.00013 U	0.00013 U	0.00013 U	**0.0002**	**0.0002**
Benzo(g,h,i)perylene	H	--	--	0.0003 U	0.0003 U	0.0003 U	0.0003 U	0.0003 U	0.0003 U	0.0003 U	**0.00122**	**0.0005**
Chrysene	H,C	--	--	**0.0007**	**0.0004**	**0.0007**	**0.0006**	0.00043 U	**0.00127**	**0.001**	**0.00673**	**0.00284**
Dibenz(a,h)anthracene	H,C	--	--	0.00032 U	0.00032 U	0.00032 U	0.00032 U	0.00032 U	0.00032 U	0.00032 U	0.00032 U	0.00032 U
Fluoranthene	H	--	54	**0.00458**	**0.00336**	**0.00892**	**0.00463**	0.00313 U	**0.03244**	**0.00702**	**0.04198**	**0.01749**
Fluorene	L	--	--	**0.04173**	**0.04191**	**0.11708**	**0.03848**	**0.03692**	**0.1857**	**0.02937**	**0.06871**	**0.03182**
Indeno(1,2,3-cd)pyrene	H,C	--	--	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U
Naphthalene	L	620	--	**0.12986**	**0.15646**	**0.0737**	0.0662 U	**0.14046**	**0.09034**	**0.09248**	**0.57863**	**0.2091**
Perylene		--	--	0.00014 U	**0.0002**	**0.0002**	0.00014 U	0.00014 U	**0.0002**	0.00014 U	**0.0004**	**0.0005**
Phenanthrene	L	--	--	**0.02169**	**0.01296**	**0.03187**	**0.01387**	0.01307 U	**0.10132**	**0.01414**	**0.08326**	**0.02508**
Pyrene	H	--	--	0.01294 U	0.01294 U	**0.03268**	0.01294 U	0.01294 U	**0.05593**	**0.01596**	**0.15061**	**0.05346**

Please refere to notes at the end of the table.

Table 3-3: 2020 Surface Water, Inter-armor Porewater, and Sub-armor Porewater Chemical Results
2020 O&M Annual Report
McCormick & Baxter Superfund Site

Sample Location	Comparison Criteria		C			Duplicate Station C			D		
Sample ID	1996 AWQCs[1]		ORG_P21a_SW	ORG_P21a_6	ORG_P21a_18	ORG_P21b_SW	ORG_P21b_6	ORG_P21b_18	ORG_P31_SWa	ORG_P31_6a	ORG_P31_18a
Sample Interval	Aquatic Life	Human Health	SW	6	18	SW	6	18	SW	6	18
Sample Date	(chronic)	(fish only)	09/28/2020	09/28/2020	09/28/2020	09/28/2020	09/28/2020	09/28/2020	09/28/2020	09/28/2020	09/28/2020
Total LPAHs (ND = 1/2 EDL)	--	--	**0.2674 T**	**6.8619 T**	**4.9073 T**	**0.2066 T**	**5.8470**	**5.5294 T**	**0.1871 T**	**0.8088 T**	**0.4645 T**
Total HPAHs (ND = 1/2 EDL)	--	--	**0.0132 T**	**0.0113 T**	**0.0437 T**	**0.0127 T**	0.0093 UT	**0.0917 T**	**0.0255 T**	**0.2051 T**	**0.0765 T**
Total PAHs (ND = 1/2 EDL)	--	--	**0.2806 T**	**6.8732 T**	**4.9509 T**	**0.2194 T**	**5.8563**	**5.6210 T**	**0.2126 T**	**1.0139 T**	**0.5410 T**
Total cPAHs (ND = 1/2 EDL)	--	0.031	**0.0005 T**	**0.0005 T**	**0.0005 T**	**0.0005 T**	0.0005 UT	**0.0006 T**	**0.0005 T**	**0.0008 T**	**0.0006 T**
Total cPAHs (No TEFs; ND = 1/2 EDL)	--	0.031	**0.0018 T**	**0.0013 T**	**0.0018 T**	**0.0014 T**	0.00062 UT	**0.0031 T**	**0.0022 T**	**0.011 T**	**0.0048 T**

Please refere to notes at the end of the table.

Table 3-3: 2020 Surface Water, Inter-armor Porewater, and Sub-armor Porewater Chemical Results
2020 O&M Annual Report
McCormick & Baxter Superfund Site

Sample Location		Comparison Criteria		E			F			G		
Sample ID		1996 AWQCs[1]		ORG_P30_SWa	ORG_P30_6a	ORG_P30_18a	ORG_P23_SW	ORG_P23_6	ORG_P23_18	ORG_P29_SWa	ORG_P29_6a	ORG_P29_18a
Sample Interval		Aquatic Life	Human Health	SW	6	18	SW	6	18	SW	6	18
Sample Date		(chronic)	(fish only)	09/30/2020	09/30/2020	09/30/2020	09/29/2020	09/29/2020	09/29/2020	09/29/2020	09/29/2020	09/29/2020
Metals (mg/L)												
Total Arsenic		0.19	--	**0.0005**	**0.0006**	**0.0192**	**0.0281**	**0.0257**	**0.0245**	**0.0028**	**0.0099**	**0.0212**
Total Chromium		0.21	--	**0.00006 J**	**0.00007 J**	**0.0001**	**0.0002**	**0.0002**	**0.0003**	**0.00002**	**0.0002**	**0.0002**
Total Copper		0.012	--	**0.0004 J**	**0.0004 J**	**0.0001 J**	**0.00007 J**	**0.00007 J**	**0.00006 J**	**0.0004 J**	**0.00009 J**	**0.0011**
Total Zinc		0.11	--	**0.0025**	**0.0021**	**0.0013**	**0.0011**	**0.0013**	**0.0015**	**0.002**	**0.0011**	**0.0017**
Pentachlorophenol (µg/L)												
Pentachlorophenol		13	--	0.10952 U	0.10952 U	0.10952 U	0.10952 U	0.10952 U	0.10952 U	0.10952 U	0.10952 U	0.10952 U
Polycyclic Aromatic Hydrocarbons (µg/L)												
1,2-Dimethylnaphthalene		--	--	0.00254 U	**0.0055**	0.00254 U	0.00254 U	0.00254 U	**0.00516**	**0.00357**	0.00254 U	**0.0027**
1,3-Dimethylnaphthalene		--	--	**0.01409**	**0.06576**	0.00949 U	0.00949 U	0.00949 U	**0.01421**	**0.03892**	0.00949 U	**0.01791**
1,8-Dimethylnaphthalene		--	--	0.00189 U	0.00189 U	0.00189 U	0.00189 U	0.00189 U	0.00189 U	0.00189 U	0.00189 U	0.00189 U
1-Ethylnaphthalene		--	--	0.00167 U	**0.0067**	0.00167 U	0.00167 U	0.00167 U	**0.00241**	**0.00407**	0.00167 U	**0.00208**
1-Methylfluorene		--	--	0.00776 U	**0.03426**	0.00776 U	0.00776 U	0.00776 U	0.00776 U	**0.01963**	0.00776 U	0.00776 U
1-Methylnaphthalene		--	--	**0.02365**	**0.07085**	0.00966 U	**0.01195**	0.00966 U	**0.01241**	**0.04521**	**0.01525**	**0.02146**
1-Methylphenanthrene		--	--	**0.0028**	**0.00976**	0.00178 U	0.00178 U	0.00178 U	**0.00212**	**0.00583**	0.00178 U	**0.00236**
1-Methylpyrene		--	--	**0.0003**	**0.00105**	0.00031 U	0.00031 U	0.00031 U	**0.0003**	**0.0006**	0.00031 U	**0.0004**
2-(tert-Butyl)anthracene		--	--	0.0001 U	**0.0003**	0.0001 U	0.0001 U	0.0001 U	0.0001 U	**0.0002**	0.0001 U	0.0001 U
2,3,5-Trimethylnaphthalene		--	--	**0.00229**	**0.0096**	0.00213 U	0.00213 U	0.00213 U	**0.00627**	**0.00631**	0.00213 U	**0.0035**
2,6-Dimethylnaphthalene		--	--	**0.01202**	**0.05169**	0.00775 U	0.00775 U	0.00775 U	**0.00908**	**0.03109**	**0.00842**	**0.01546**
2-Ethylanthracene		--	--	**0.00141**	**0.00744**	0.00084 U	0.00084 U	0.00084 U	**0.0009**	**0.00447**	0.00084 U	**0.00132**
2-Ethylnaphthalene		--	--	**0.0057**	**0.01496**	0.00462 U	**0.00752**	**0.00697**	**0.01373**	**0.01221**	0.00462 U	**0.01104**
2-Isopropyl Naphthalene		--	--	0.00085 U	**0.00168**	0.00085 U	0.00085 U	0.00085 U	0.00085 U	**0.0009**	0.00085 U	0.00085 U
2-Methylanthracene		--	--	0.0014 U	0.0014 U	0.0014 U	0.0014 U	0.0014 U	0.0014 U	0.0014 U	0.0014 U	0.0014 U
2-Methylnaphthalene		--	--	**0.03648**	**0.09578**	0.01161 U	**0.02201**	**0.01511**	**0.02288**	**0.06108**	**0.02855**	**0.0365**
2-Methylphenanthrene		--	--	0.00605 U	**0.03462**	0.00605 U	0.00605 U	0.00605 U	0.00605 U	**0.01805**	0.00605 U	0.00605 U
9,10-Dimethylanthracene		--	--	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U
9-Methylanthracene		--	--	0.00124 U	0.00124 U	0.00124 U	0.00124 U	0.00124 U	0.00124 U	0.00124 U	0.00124 U	0.00124 U
Acenaphthene	L	520	--	**0.03555**	**0.04105**	0.02031 U	**0.06019**	**0.05838**	**0.18347**	**0.04368**	**0.0543**	**0.07036**
Acenaphthylene	L	--	--	0.00788 U	0.00788 U	0.00788 U	0.00788 U	0.00788 U	0.00788 U	0.00788 U	0.00788 U	0.00788 U
Anthracene	L	--	--	**0.00267**	**0.01101**	0.0023 U	**0.00334**	0.0023 U	**0.00546**	**0.00425**	**0.00226**	**0.00542**
Benz(a)anthracene	H,C	--	--	0.00038 U	**0.0023**	0.00038 U	**0.0004**	**0.0004**	**0.0008**	**0.001**	**0.0006**	**0.0008**
Benzo(a)pyrene	H,C	--	--	0.00062 U	**0.0009**	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U
Benzo(e)pyrene	H	--	--	**0.0003**	**0.0008**	0.00014 U	0.00014 U	**0.0002**	0.00014 U	**0.0005**	**0.0002**	**0.0004**
Benzo(b)fluoranthene	H,C	--	--	**0.0002**	**0.0007**	**0.0001**	**0.0002**	**0.0002**	**0.0002**	**0.0002**	**0.0002**	**0.0003**
Benzo(k)fluoranthene	H,C	--	--	**0.0001**	**0.0004**	0.00013 U	0.00013 U	**0.0001**	**0.0001**	**0.0001**	**0.0001**	**0.0001**
Benzo(g,h,i)perylene	H	--	--	0.0003 U	**0.00129**	0.0003 U	0.0003 U	0.0003 U	0.0003 U	**0.0008**	0.0003 U	0.0003 U
Chrysene	H,C	--	--	**0.00104**	**0.00606**	0.00043 U	**0.0006**	**0.0007**	**0.00122**	**0.00277**	**0.0009**	**0.00146**
Dibenz(a,h)anthracene	H,C	--	--	0.00032 U	0.00032 U	0.00032 U	0.00032 U	0.00032 U	0.00032 U	0.00032 U	0.00032 U	0.00032 U
Fluoranthene	H	--	54	**0.00666**	**0.02683**	**0.00459**	**0.00712**	**0.00733**	**0.01764**	**0.01854**	**0.00717**	**0.01081**
Fluorene	L	--	--	**0.02576**	**0.05642**	**0.01248**	**0.03424**	**0.02971**	**0.04511**	**0.04683**	**0.03123**	**0.03477**
Indeno(1,2,3-cd)pyrene	H,C	--	--	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U
Naphthalene	L	620	--	**0.22577**	**0.54449**	0.0662 U	0.0662 U	0.0662 U	0.0662 U	**0.30635**	**0.0747**	**0.21075**
Perylene		--	--	0.00014 U	**0.0002**	**0.0001**	**0.0006**	**0.0006**	**0.0009**	**0.0002**	**0.0006**	**0.0009**
Phenanthrene	L	--	--	**0.01906**	**0.07136**	0.01307 U	**0.01406**	**0.01305**	**0.03288**	**0.04411**	0.01307 U	**0.02208**
Pyrene	H	--	--	**0.01753**	**0.09537**	0.01294 U	0.01294 U	0.01294 U	**0.0168**	**0.06362**	0.01294 U	**0.01923**

Please refere to notes at the end of the table.

Table 3-3: 2020 Surface Water, Inter-armor Porewater, and Sub-armor Porewater Chemical Results
2020 O&M Annual Report
McCormick & Baxter Superfund Site

Sample Location	Comparison Criteria		E			F			G		
Sample ID	1996 AWQCs[1]		ORG_P30_SWa	ORG_P30_6a	ORG_P30_18a	ORG_P23_SW	ORG_P23_6	ORG_P23_18	ORG_P29_SWa	ORG_P29_6a	ORG_P29_18a
Sample Interval	Aquatic Life	Human Health	SW	6	18	SW	6	18	SW	6	18
Sample Date	(chronic)	(fish only)	09/30/2020	09/30/2020	09/30/2020	09/29/2020	09/29/2020	09/29/2020	09/29/2020	09/29/2020	09/29/2020
Total LPAHs (ND = 1/2 EDL)	--	--	**0.3128 T**	**0.7283 T**	**0.0674 T**	**0.1489 T**	**0.1393 T**	**0.3040 T**	**0.4492 T**	**0.1730 T**	**0.3473 T**
Total HPAHs (ND = 1/2 EDL)	--	--	**0.0267 T**	**0.1349 T**	**0.0124 T**	**0.0156 T**	**0.0161 T**	**0.0375 T**	**0.0881 T**	**0.0163 T**	**0.0338 T**
Total PAHs (ND = 1/2 EDL)	--	--	**0.3395 T**	**0.8631 T**	**0.0797 T**	**0.1645 T**	**0.1554 T**	**0.3415 T**	**0.5372 T**	**0.1893 T**	**0.3811 T**
Total cPAHs (ND = 1/2 EDL)	--	0.031	**0.0005 T**	**0.0014 T**	**0.0005 T**	**0.0005 T**	**0.0005 T**	**0.0006 T**	**0.0006 T**	**0.0006 T**	**0.0006 T**
Total cPAHs (No TEFs; ND = 1/2 EDL)	--	0.031	**0.0021 T**	**0.011 T**	**0.0011 T**	**0.0018 T**	**0.0019 T**	**0.0028 T**	**0.0046 T**	**0.0023 T**	**0.0032 T**

Please refere to notes at the end of the table.

Table 3-3: 2020 Surface Water, Inter-armor Porewater, and Sub-armor Porewater Chemical Results
2020 O&M Annual Report
McCormick & Baxter Superfund Site

Sample Location		Comparison Criteria		H			I			J		
Sample ID		1996 AWQCs[1]		ORG_P19_SW	ORG_P19_6	ORG_P19_18	ORG_P32_SWa	ORG_P32_6	ORG_P32_18	ORG_P15_SW	ORG_P15_6	ORG_P15_18
Sample Interval		Aquatic Life	Human Health	SW	6	18	SW	6	18	SW	6	18
Sample Date		(chronic)	(fish only)	09/30/2020	09/30/2020	09/30/2020	09/28/2020	09/28/2020	09/28/2020	09/28/2020	09/28/2020	09/28/2020
Metals (mg/L)												
Total Arsenic		0.19	--	**0.0005**	**0.0128**	**0.0294**	**0.0005**	**0.0244**	**0.0212**	**0.0006**	**0.0409**	**0.0495**
Total Chromium		0.21	--	**0.00004**	**0.0001**	**0.0001**	**0.00006 J**	**0.0002**	**0.0001**	**0.00006 J**	**0.00007 J**	**0.00007 J**
Total Copper		0.012	--	**0.0003 J**	**0.0002 J**	**0.00005 J**	**0.0006**	**0.0001 J**	**0.00004**	**0.0006**	**0.00009 J**	**0.00007 J**
Total Zinc		0.11	--	**0.0017**	**0.0029**	**0.0014**	**0.0019**	**0.0012**	**0.001**	**0.0017**	**0.0019**	**0.0013**
Pentachlorophenol (µg/L)												
Pentachlorophenol		13	--	0.10952 U	0.10952 U	0.10952 U	0.10952 U	0.10952 U	0.10952 U	0.10952 U	0.10952 U	0.10952 U
Polycyclic Aromatic Hydrocarbons (µg/L)												
1,2-Dimethylnaphthalene		--	--	0.00254 U	0.00254 U	0.00254 U	0.00254 U	**0.00652**	**0.00415**	**0.01356**	**0.0286**	**0.04575**
1,3-Dimethylnaphthalene		--	--	0.00949 U	0.00949 U	0.00949 U	0.00949 U	**0.04385**	0.00949 U	**0.0286**	**0.01852**	**0.02297**
1,8-Dimethylnaphthalene		--	--	0.00189 U	0.00189 U	0.00189 U	0.00189 U	0.00189 U	**0.00188**	0.00189 U	**0.00515**	**0.00856**
1-Ethylnaphthalene		--	--	0.00167 U	0.00167 U	0.00167 U	0.00167 U	**0.00609**	**0.00348**	**0.00558**	**0.01511**	**0.02196**
1-Methylfluorene		--	--	0.00776 U	0.00776 U	0.00776 U	0.00776 U	**0.02046**	0.00776 U	0.00776 U	0.00776 U	0.00776 U
1-Methylnaphthalene		--	--	**0.01288**	**0.01126**	**0.01572**	**0.01105**	**0.04464**	**0.01118**	0.00966 U	**0.01268**	**0.01592**
1-Methylphenanthrene		--	--	0.00178 U	0.00178 U	0.00178 U	0.00178 U	**0.00602**	0.00178 U	0.00178 U	0.00178 U	0.00178 U
1-Methylpyrene		--	--	0.00031 U	0.00031 U	0.00031 U	0.00031 U	**0.0006**	0.00031 U	0.00031 U	0.00031 U	**0.00128**
2-(tert-Butyl)anthracene		--	--	0.0001 U	0.0001 U	0.0001 U	0.0001 U	**0.0001**	0.0001 U	0.0001 U	0.0001 U	0.0001 U
2,3,5-Trimethylnaphthalene		--	--	0.00213 U	0.00213 U	**0.00211**	0.00213 U	**0.00725**	**0.00241**	**0.0032**	**0.0029**	**0.00482**
2,6-Dimethylnaphthalene		--	--	0.00775 U	0.00775 U	0.00775 U	0.00775 U	**0.03341**	0.00775 U	0.00775 U	0.00775 U	**0.00882**
2-Ethylanthracene		--	--	0.00084 U	0.00084 U	0.00084 U	0.00084 U	**0.00359**	0.00084 U	0.00084 U	0.00084 U	**0.00164**
2-Ethylnaphthalene		--	--	0.00462 U	0.00462 U	**0.00601**	0.00462 U	**0.01438**	**0.00513**	0.00462 U	0.00462 U	**0.00577**
2-Isopropyl Naphthalene		--	--	0.00085 U	0.00085 U	0.00085 U	0.00085 U	**0.00113**	0.00085 U	0.00085 U	0.00085 U	0.00085 U
2-Methylanthracene		--	--	0.0014 U	0.0014 U	0.0014 U	0.0014 U	**0.00159**	0.0014 U	0.0014 U	0.0014 U	**0.00208**
2-Methylnaphthalene		--	--	**0.02486**	**0.02271**	**0.03173**	**0.02016**	**0.06158**	**0.02272**	0.01161 U	**0.02032**	**0.02321**
2-Methylphenanthrene		--	--	0.00605 U	0.00605 U	0.00605 U	0.00605 U	**0.02003**	0.00605 U	0.00605 U	0.00605 U	**0.00669**
9,10-Dimethylanthracene		--	--	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U
9-Methylanthracene		--	--	0.00124 U	0.00124 U	0.00124 U	0.00124 U	0.00124 U	0.00124 U	0.00124 U	0.00124 U	**0.00134**
Acenaphthene	L	520	--	**0.03237**	**0.03086**	**0.08198**	**0.03623**	**0.24215**	**0.65529**	**0.69706**	**5.443911**	**9.62275**
Acenaphthylene	L	--	--	0.00788 U	0.00788 U	0.00788 U	0.00788 U	**0.00825**	**0.02074**	**0.03421**	**0.14918**	**0.18425**
Anthracene	L	--	--	0.0023 U	0.0023 U	**0.00235**	0.0023 U	**0.00741**	**0.00888**	**0.00376**	**0.00567**	**0.01444**
Benz(a)anthracene	H,C	--	--	0.00038 U	**0.0005**	**0.0004**	0.00038 U	**0.0009**	**0.0005**	0.00038 U	**0.0005**	**0.00205**
Benzo(a)pyrene	H,C	--	--	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U
Benzo(e)pyrene	H	--	--	0.00014 U	0.00014 U	0.00014 U	0.00014 U	**0.0004**	**0.0002**	0.00014 U	**0.0002**	**0.0002**
Benzo(b)fluoranthene	H,C	--	--	0.00007 U	0.00007 U	**0.0001**	0.00007 U	**0.0003**	**0.0001**	0.00007 U	0.00007 U	**0.00008**
Benzo(k)fluoranthene	H,C	--	--	0.00013 U	0.00013 U	0.00013 U	0.00013 U	**0.0002**	0.00013 U	0.00013 U	**0.0002**	0.00013 U
Benzo(g,h,i)perylene	H	--	--	0.0003 U	0.0003 U	0.0003 U	0.0003 U	**0.0008**	0.0003 U	0.0003 U	0.0003 U	0.0003 U
Chrysene	H,C	--	--	**0.0006**	**0.0007**	**0.0007**	**0.0005**	**0.00243**	**0.0008**	**0.0005**	**0.0006**	**0.00243**
Dibenz(a,h)anthracene	H,C	--	--	0.00032 U	0.00032 U	0.00032 U	0.00032 U	0.00032 U	0.00032 U	0.00032 U	0.00032 U	0.00032 U
Fluoranthene	H	--	54	**0.00335**	**0.00761**	**0.0054**	0.00313 U	**0.01459**	**0.00399**	**0.00469**	**0.00702**	**0.01218**
Fluorene	L	--	--	**0.01862**	**0.01676**	**0.02445**	**0.02191**	**0.0547**	**0.03641**	**0.12504**	**0.04607**	**0.04065**
Indeno(1,2,3-cd)pyrene	H,C	--	--	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U
Naphthalene	L	620	--	0.0662 U	0.0662 U	**0.08408**	0.0662 U	**0.40042**	0.0662 U	0.0662 U	**0.10092**	0.0662 U
Perylene		--	--	**0.0002**	**0.0002**	**0.0003**	0.00014 U	**0.0003**	**0.0003**	**0.0002**	**0.0002**	**0.0002**
Phenanthrene	L	--	--	0.01307 U	0.01307 U	0.01307 U	0.01307 U	**0.04403**	0.01307 U	0.01307 U	0.01307 U	**0.02421**
Pyrene	H	--	--	0.01294 U	0.01294 U	0.01294 U	0.01294 U	**0.04518**	**0.01247**	0.01294 U	0.01294 U	**0.15444**

Please refere to notes at the end of the table.

Table 3-3: 2020 Surface Water, Inter-armor Porewater, and Sub-armor Porewater Chemical Results
2020 O&M Annual Report
McCormick & Baxter Superfund Site

Sample Location	Comparison Criteria		H			I			J		
Sample ID	1996 AWQCs[1]		ORG_P19_SW	ORG_P19_6	ORG_P19_18	ORG_P32_SWa	ORG_P32_6	ORG_P32_18	ORG_P15_SW	ORG_P15_6	ORG_P15_18
Sample Interval	Aquatic Life	Human Health	SW	6	18	SW	6	18	SW	6	18
Sample Date	(chronic)	(fish only)	09/30/2020	09/30/2020	09/30/2020	09/28/2020	09/28/2020	09/28/2020	09/28/2020	09/28/2020	09/28/2020
Total LPAHs (ND = 1/2 EDL)	--	--	**0.0957 T**	**0.0923 T**	**0.2033 T**	**0.1029 T**	**0.7570 T**	**0.7610 T**	**0.8997 T**	**5.7523 T**	**9.9194 T**
Total HPAHs (ND = 1/2 EDL)	--	--	**0.0115 T**	**0.0161 T**	**0.0139 T**	**0.0096 T**	**0.0653 T**	**0.0188 T**	**0.0127 T**	**0.0157 T**	**0.1721 T**
Total PAHs (ND = 1/2 EDL)	--	--	**0.1072 T**	**0.1085 T**	**0.2172 T**	**0.1124 T**	**0.8223 T**	**0.7798 T**	**0.9124 T**	**5.7680 T**	**10.0915 T**
Total cPAHs (ND = 1/2 EDL)	--	0.031	**0.0005 T**	**0.0005 T**	**0.0005 T**	**0.0005 T**	**0.0006 T**	**0.0005 T**	**0.0005 T**	**0.0005 T**	**0.0007 T**
Total cPAHs (No TEFs; ND = 1/2 EDL)	--	0.031	**0.0014 T**	**0.0018 T**	**0.0018 T**	**0.0013 T**	**0.0044 T**	**0.002 T**	**0.0013 T**	**0.0019 T**	**0.0052 T**

Please refere to notes at the end of the table.

Table 3-3: 2020 Surface Water, Inter-armor Porewater, and Sub-armor Porewater Chemical Results
2020 O&M Annual Report
McCormick & Baxter Superfund Site

Sample Location		Comparison Criteria		K			L			27 (Downstream)		
Sample ID		1996 AWQCs[1]		ORG_P18_SW	ORG_P18_6	ORG_P18_18	ORG_P28_SWa	ORG_P28_6a	ORG_P28_18a	ORG_P17_SW	ORG_P17_6	ORG_P17_18
Sample Interval		Aquatic Life	Human Health	SW	6	18	SW	6	18	SW	6	18
Sample Date		(chronic)	(fish only)	09/29/2020	09/29/2020	09/29/2020	09/28/2020	09/28/2020	09/28/2020	09/28/2020	09/28/2020	09/28/2020
Metals (mg/L)												
Total Arsenic		0.19	--	**0.0005**	**0.018**	**0.0056**	**0.0006**	**0.0005**	**0.0537**	**0.0005**	**0.0165**	**0.008**
Total Chromium		0.21	--	**0.00005**	**0.0002**	**0.0003**	**0.00007 J**	**0.00004**	**0.0002**	**0.00005 J**	**0.0003**	**0.0005**
Total Copper		0.012	--	**0.0031**	**0.00003**	**0.0003 J**	**0.0006**	**0.0004 J**	**0.00006 J**	**0.0017**	**0.00009 J**	**0.0016**
Total Zinc		0.11	--	**0.0018**	**0.0023**	**0.0013**	**0.0015**	**0.0019**	**0.0014**	**0.0025**	**0.0034**	**0.0018**
Pentachlorophenol (µg/L)												
Pentachlorophenol		13	--	0.10952 U	0.10952 U	0.10952 U	0.10952 U	0.10952 U	0.10952 U	0.10952 U	0.10952 U	0.10952 U
Polycyclic Aromatic Hydrocarbons (µg/L)												
1,2-Dimethylnaphthalene		--	--	**0.00353**	0.00254 U	0.00254 U	**0.0037**	0.00254 U	**0.00372**	**0.00456**	**0.03693**	**1.00835**
1,3-Dimethylnaphthalene		--	--	**0.03182**	0.00949 U	0.00949 U	**0.03991**	0.00949 U	**0.02841**	**0.02265**	**0.08271**	**4.59044**
1,8-Dimethylnaphthalene		--	--	0.00189 U	0.00189 U	0.00189 U	0.00189 U	0.00189 U	0.00189 U	0.00189 U	0.00189 U	**0.03202**
1-Ethylnaphthalene		--	--	**0.00343**	0.00167 U	0.00167 U	**0.00418**	0.00167 U	**0.00337**	**0.00193**	**0.01775**	**0.51556**
1-Methylfluorene		--	--	**0.01543**	0.00776 U	0.00776 U	**0.0191**	0.00776 U	**0.01306**	0.00776 U	**0.01932**	**0.17933**
1-Methylnaphthalene		--	--	**0.03825**	**0.01147**	**0.01165**	**0.04258**	**0.01063**	**0.033**	0.00966 U	**0.0103**	**0.06553**
1-Methylphenanthrene		--	--	**0.00493**	0.00178 U	0.00178 U	**0.00696**	**0.00218**	**0.00417**	**0.00198**	**0.00845**	**0.02095**
1-Methylpyrene		--	--	**0.0007**	0.00031 U	0.00031 U	**0.0006**	0.00031 U	**0.0004**	0.00031 U	**0.0008**	**0.00127**
2-(tert-Butyl)anthracene		--	--	**0.0002**	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	**0.0002**
2,3,5-Trimethylnaphthalene		--	--	**0.00529**	0.00213 U	0.00213 U	**0.00592**	0.00213 U	**0.00441**	0.00213 U	**0.02478**	**0.2672**
2,6-Dimethylnaphthalene		--	--	**0.02432**	0.00775 U	0.00775 U	**0.03216**	0.00775 U	**0.0217**	0.00775 U	**0.01036**	**0.02159**
2-Ethylanthracene		--	--	**0.00571**	**0.0008**	0.00084 U	**0.00501**	**0.00102**	**0.00239**	**0.0008**	**0.00251**	**0.00454**
2-Ethylnaphthalene		--	--	**0.00832**	0.00462 U	0.00462 U	**0.00933**	0.00462 U	**0.00996**	**0.00752**	**0.01832**	**0.27102**
2-Isopropyl Naphthalene		--	--	0.00085 U	0.00085 U	0.00085 U	**0.00112**	0.00085 U	0.00085 U	0.00085 U	0.00085 U	**0.01076**
2-Methylanthracene		--	--	0.0014 U	0.0014 U	0.0014 U	0.0014 U	0.0014 U	**0.00162**	0.0014 U	**0.00271**	**0.01106**
2-Methylnaphthalene		--	--	**0.05481**	**0.02125**	**0.02342**	**0.05501**	**0.01814**	**0.04646**	**0.01568**	**0.01909**	**0.07567**
2-Methylphenanthrene		--	--	**0.01277**	0.00605 U	0.00605 U	**0.01994**	0.00605 U	**0.01213**	0.00605 U	**0.0128**	**0.04774**
9,10-Dimethylanthracene		--	--	**0.00104**	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U
9-Methylanthracene		--	--	0.00124 U	0.00124 U	0.00124 U	0.00124 U	0.00124 U	0.00124 U	0.00124 U	0.00124 U	**0.00179**
Acenaphthene	L	520	--	**0.03798**	**0.03838**	**0.06031**	**0.0365**	**0.03399**	**0.0838**	**0.13142**	**1.16959**	**40.07554**
Acenaphthylene	L	--	--	0.00788 U	0.00788 U	0.00788 U	0.00788 U	0.00788 U	0.00788 U	0.00788 U	**0.03867**	**0.76996**
Anthracene	L	--	--	**0.00284**	0.0023 U	0.0023 U	**0.00538**	0.0023 U	**0.00406**	0.0023 U	**0.01882**	**0.47902**
Benz(a)anthracene	H,C	--	--	**0.0006**	0.00038 U	0.00038 U	**0.0009**	0.00038 U	**0.0009**	**0.0004**	**0.00252**	**0.00484**
Benzo(a)pyrene	H,C	--	--	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U
Benzo(e)pyrene	H	--	--	**0.0004**	0.00014 U	0.00014 U	**0.0004**	**0.0002**	**0.0006**	0.00014 U	**0.0002**	**0.0003**
Benzo(b)fluoranthene	H,C	--	--	**0.0001**	0.00007 U	0.00007 U	**0.0004**	**0.0001**	**0.0002**	**0.0001**	**0.0002**	**0.0004**
Benzo(k)fluoranthene	H,C	--	--	0.00013 U	0.00013 U	0.00013 U	**0.0001**	0.00013 U	**0.0003**	0.00013 U	**0.0001**	**0.0002**
Benzo(g,h,i)perylene	H	--	--	**0.0005**	0.0003 U	0.0003 U	**0.0009**	0.0003 U	**0.0007**	0.0003 U	0.0003 U	0.0003 U
Chrysene	H,C	--	--	**0.00221**	**0.0006**	**0.0005**	**0.00296**	**0.0007**	**0.00211**	**0.0006**	**0.00335**	**0.00572**
Dibenz(a,h)anthracene	H,C	--	--	0.00032 U	0.00032 U	0.00032 U	0.00032 U	0.00032 U	0.00032 U	0.00032 U	0.00032 U	0.00032 U
Fluoranthene	H	--	54	**0.01966**	**0.00502**	**0.00426**	**0.01777**	**0.00551**	**0.01404**	0.00313 U	**0.1059**	**0.29446**
Fluorene	L	--	--	**0.03688**	**0.0198**	**0.02337**	**0.03247**	**0.01689**	**0.03929**	**0.03472**	**0.33984**	**19.72239**
Indeno(1,2,3-cd)pyrene	H,C	--	--	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U
Naphthalene	L	620	--	**0.28101**	0.0662 U	0.0662 U	**0.35328**	0.0662 U	**0.26667**	0.0662 U	**0.06572**	**0.63862**
Perylene		--	--	**0.0003**	**0.0004**	**0.0005**	**0.0002**	**0.0003**	**0.0004**	**0.0002**	**0.0003**	**0.0004**
Phenanthrene	L	--	--	**0.03159**	0.01307 U	0.01307 U	**0.0418**	0.01307 U	**0.02851**	0.01307 U	**0.31454**	**3.79366**
Pyrene	H	--	--	**0.06922**	0.01294 U	0.01294 U	**0.06573**	0.01294 U	**0.03749**	0.01294 U	**0.085**	**0.11689**

Please refere to notes at the end of the table.

Table 3-3: 2020 Surface Water, Inter-armor Porewater, and Sub-armor Porewater Chemical Results
2020 O&M Annual Report
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Sample Location	Comparison Criteria		K			L			27 (Downstream)		
Sample ID	1996 AWQCs[1]		ORG_P18_SW	ORG_P18_6	ORG_P18_18	ORG_P28_SWa	ORG_P28_6a	ORG_P28_18a	ORG_P17_SW	ORG_P17_6	ORG_P17_18
Sample Interval	Aquatic Life	Human Health	SW	6	18	SW	6	18	SW	6	18
Sample Date	(chronic)	(fish only)	09/29/2020	09/29/2020	09/29/2020	09/28/2020	09/28/2020	09/28/2020	09/28/2020	09/28/2020	09/28/2020
Total LPAHs (ND = 1/2 EDL)	--	--	**0.3942 T**	**0.1029 T**	**0.1284 T**	**0.4734 T**	**0.0956 T**	**0.4263 T**	**0.2109 T**	**1.9472 T**	**65.4792 T**
Total HPAHs (ND = 1/2 EDL)	--	--	**0.0933 T**	**0.0131 T**	**0.0123 T**	**0.0897 T**	**0.0139 T**	**0.0569 T**	**0.0100 T**	**0.1980 T**	**0.4235 T**
Total PAHs (ND = 1/2 EDL)	--	--	**0.4875 T**	**0.1160 T**	**0.1407 T**	**0.5631 T**	**0.1095 T**	**0.4831 T**	**0.2208 T**	**2.1451 T**	**65.9027 T**
Total cPAHs (ND = 1/2 EDL)	--	0.031	**0.0005 T**	**0.0005 T**	**0.0005 T**	**0.0006 T**	**0.0005 T**	**0.0006 T**	**0.0005 T**	**0.0008 T**	**0.0010 T**
Total cPAHs (No TEFs; ND = 1/2 EDL)	--	0.031	**0.0035 T**	**0.0014 T**	**0.0013 T**	**0.0049 T**	**0.0016 T**	**0.004 T**	**0.0017 T**	**0.0067 T**	**0.012 T**

Please refere to notes at the end of the table.

Table 3-3: 2020 Surface Water, Inter-armor Porewater, and Sub-armor Porewater Chemical Results
2020 O&M Annual Report
McCormick & Baxter Superfund Site

Notes:

Calculations for PAH summations were performed using 1/2 the EDL for non-detect concentrations.

[1] The 1996 Record of Decision (ROD) specifies the remedial action objects of the sediment cap as: 1) preventing human and aquatic organisms from direct contact with contaminated sediment; and 2) minimizing releases of contaminants from sediment that might result in contamination of the Willamette River in excess of Ambient Water Quality Criteria (AWQCs).

Bold = Analyte detected at or above the laboratory detection limit

Abbreviations and Acronyms:

ACLs = Alternate Concentration Limits
AWQCs = Ambient Water Quality Criteria
C = Carcinogenic PAH (cPAH)
EDL = Estimated Detection Limit
H = High Molecular Weight PAH (HPAH)
L = Low Molecular Weight PAH (LPAH)
MCLs = Maximum Contaminant Levels
ND = Non-detect
NRWQCs = National Recommended Water Quality Criteria
PAH = Polycyclic Aromatic Hydrocarbon
T = Value is a calculated total

Qualifiers

J = Estimated result
U = Result not detected above the referenced laboratory detection limit
- = Not analyzed or not applicable

Table 3-4 Surface Water and Sediment Porewater Comparison Criteria
2020 O&M Annual Report
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Chemical		1996 AWQCs[1]		DEQ 2011 EPA--Approved AWQCs updated 2017[2]		2015 NRWQCs[3]		2011 MCLs updated 2015[4]
		Aquatic Life (chronic)	Human Health (fish consumption only)	Aquatic Life[5] (chronic)	Human Health (consumption of organism only)	Aquatic Life (chronic)	Human Health (consumption of organism only)	Maximum Contaminant Levels (MCLs)
Metals (mg/L)								
Total Arsenic		0.19	--	0.15	2.1	0.15	0.00014	0.01
Total Chromium		0.21	--	0.024	--	0.074	--	0.1
Total Copper		0.012	--	Note[6]	--	0.0049	--	1.3[7]
Total Zinc		0.11	--	0.036	2,600	0.12	26	5[8]
Pentachlorophenol (µg/L)								
Pentachlorophenol		13	--	Note[9]	0.3	15	0.04	1
Polycyclic Aromatic Hydrocarbons (µg/L)								
Acenaphthene	L	520	--	--	99	--	90	--
Acenaphthylene	L	--	--	--	--	--	--	--
Anthracene	L	--	--	--	4,000	--	400	--
Benz[a]anthracene	H, C	--	--	--	0.0018	--	0.0013	--
Benzo[a]pyrene	H, C	--	--	--	0.0018	--	0.00013	0.2
Benzo[b]fluoranthene	H, C	--	--	--	0.0018	--	0.0013	--
Benzo[g,h,i]perylene	H, C	--	--	--	--	--	--	--
Benzo[k]fluoranthene	H	--	--	--	0.0018	--	0.0013	--
Chrysene	H, C	--	--	--	0.0018	--	0.13	--
Dibenzo[a,h]anthracene	H, C	--	--	--	0.0018	--	0.00013	--
Fluoranthene	H	--	54	--	14	--	20	--
Fluorene	L	--	--	--	530	--	70	--
Ideno[1,2,3--cd]pyrene	H, C	--	--	--	0.0018	--	0.0013	--
Naphthalene	L	620	--	--	--	--	--	--
Phenanthrene	L	--	--	--	--	--	--	--
Pyrene	H	--	--	--	400	--	30	--
Total LPAHs		--	--	--	--	--	--	--
Total HPAHs		--	--	--	--	--	--	--
Total PAHs		--	--	--	--	--	--	--
Total cPAHs		--	0.031	--	--	--	--	--

Please refere to notes at the end of the table.

Table 3-4 Surface Water and Sediment Porewater Comparison Criteria
2020 O&M Annual Report
McCormick & Baxter Superfund Site

Notes:
[1] The 1996 Record of Decision (ROD) specifies the remedial action objects of the sediment cap as: 1) preventing human and aquatic organisms from direct contact with contaminated sediment; and 2) minimizing releases of contaminants from sediment that might result in contamination of the Willamette River in excess of Ambient Water Quality Criteria (AWQCs).
[2] Oregon's revised AWQCs for human health approved by EPA on October 17, 2011.
[3] National Recommended Water Quality Criteria (NRWQCs) published as of August 15, 2007, are included for comparison (see http://www.epa.gov/waterscience/criteria/wqcriteria.html).
[4] National Primary Drinking Water Regulations Maximum Contaminant Levels (MCLs) promulgated as of August 15, 2007, are included for comparison (see http://www.epa.gov/safewater/contaminants/index.html).
[5] Aquatic Life Water Quality Criteria (AWQCs) published as of 2011, and updated effective 2017, are included for comparison (see ORS 340-041-8033). Oregon default hardness of 25 mg/l used.
[6] Copper criteria is the Biotic Ligand Model and dependent concentration of ions, alkalinity, organic carbon, pH and temperature in water column. Please see Oregon Table 30 Aquatic Life Water Quality Criteria for Toxic Pollutants for procedures.
[7] Treatment technique action level
[8] National Secondary Drinking Water Regulation
[9] Pentachlorphenol criteria is pH dependent. Please see Oregon Table 30 Aquatic Life Water Quality Criteria for Toxic Pollutants for procedures. 6.7ug/l corresponds to a pH of 7.0. https://www.oregon.gov/deq/FilterDocs/EcoRiskTablesAppendices.pdf

Abbreviations and Acronyms:
ACLs = Alternate Concentration Limits
AWQCs = Aquatic Life Water Quality Criteria
C = Carcinogenic PAH (cPAH)
NRWQCs = National Recommended Water Quality Criteria
PAH = Polycyclic Aromatic Hydrocarbon
MCLs = Maximum Contaminant Levels
L = Low Molecular Weight PAH (LPAH)
H = High Molecular Weight PAH (HPAH)
mg/L = milligrams per liter
µg/L = micrograms per liter

Table 3-5: 2020 Crayfish Tissue Sampling Results
2020 O&M Annual Report
McCormick & Baxter Superfund Site

Analyte		MBCFGB1020						MBCFGB
		01	02	03	04		05	Bait
		MBCFGB1020-01	MBCFGB1020-02	MBCFGB1020-03	MBCFGB1020-04	MBCFGB1020-04 DUP	MBCFGB1020-05	MBCFGB-20-BAITCHICKEN
		09/29/2020	08/28/2020	09/29/2020	09/29/2020	09/29/2020	09/29/2020	09/29/2020
Metals (mg/kg)*								
Arsenic		**0.54**	**0.85**	**0.33**	**0.33**	**0.44**	**0.39**	**0.01 J**
Chromium		**0.194**	**0.74**	**0.214**	**0.218**	**0.185**	**0.297**	**0.093**
Copper		**22.8**	**37.3**	**21.8**	**20.6**	**25.3**	**23.7**	**0.796**
Zinc		**25.6**	**57**	**23.7**	**26.1**	**24.4**	**25.3**	**12.7**
Pentachlorophenol (µg/kg)*								
Pentachlorophenol		7.6 U	95 U	7.6 U	7.6 U	7.6 U	7.6 U	7.6 U
Polycyclic Aromatic Hydrocarbons (µg/kg)*								
2-Methylnaphthalene		**0.84 J**	4.9 U	0.39 U	**0.59 J**	**0.5 J**	**0.66 J**	**1.4 J**
Acenaphthene	L	**2.1 J**	4.9 U	0.76 U	**1.4 J**	**2.7 J**	**1.6 J**	0.76 U
Acenaphthylene	L	0.59 U	4.9 U	0.59 U	0.59 U	0.59 U	0.59 U	0.59 U
Anthracene	L	0.58 U	**0.45 J**	0.58 U	0.58 U	0.58 U	0.58 U	0.58 U
Benz(a)anthracene	H, C	0.72 U	**0.64 J**	0.72 U	**0.84 J**	0.72 U	**2.6 J**	**0.92 J**
Benzo(a)pyrene	H, C	0.76 U	0.38 U	0.76 U	0.76 U	0.76 U	**1.9 J**	0.76 U
Benzo(b)fluoranthene	H, C	0.92 U	0.29 U	0.92 U	0.92 U	0.92 U	**2 J**	**0.94 J**
Benzo(k)fluoranthene	H, C	0.87 U	0.24 U	0.87 U	0.87 U	0.87 U	**1.6 J**	0.87 U
Benzo(g,h,i)perylene	H	0.85 U	0.4 U	0.85 U	0.85 U	0.85 U	**1.7 J**	0.85 U
Chrysene	H, C	0.8 U	0.31 U	0.8 U	0.8 U	0.8 U	**2.2 J**	0.8 U
Dibenz(a,h)anthracene	H, C	0.8 U	0.23 U	0.8 U	0.8 U	0.8 U	**1.5 J**	0.8 U
Dibenzofuran		0.63 U	4.9 U	0.63 U	0.63 U	0.63 U	0.63 U	**0.78 J**
Fluoranthene	H	**1.4 J**	4.9 U	**1.1 J**	**1.8 J**	**1.1 J**	**4 J**	0.98 U
Fluorene	L	**1.1 J**	4.9 U	0.61 U	**0.71 J**	**0.73 J**	**1.2 J**	**0.72 J**
Indeno(1,2,3-cd)pyrene	H, C	0.87 U	0.36 U	0.87 U	0.87 U	0.87 U	**1.8 J**	0.87 U
Naphthalene	L	4.7 U	4.9 U	0.6 U	4.8 U	0.6 U	4.9 U	4.9 U
Phenanthrene	L	**1.7 J**	4.9 U	**1.7 J**	**2.2 J**	1.4 U	**2.5 J**	**1.7 J**
Pyrene	H	**0.93 J**	4.9 U	**0.77 J**	**1.2 J**	0.76 U	**3.1 J**	**0.85 J**
Total LPAHs (ND = 1/2 MDL)		**8.7 JT**	**15 JT**	**3.5 JT**	**7.9 JT**	**5.5 JT**	**9 JT**	**7.2 JT**
Total HPAHs (ND = 1/2 MDL)		**5.6 JT**	**6.6 JT**	**5.2 JT**	**6.8 JT**	**4.8 JT**	**22 JT**	**5.7 JT**
Total PAHs (ND = 1/2 MDL)		**14 JT**	**22 JT**	**8.6 JT**	**15 JT**	**10 JT**	**31 JT**	**13 JT**
Total cPAHs (No TEF, ND = 1/2 MDL)		2.9 UT	**1.5 JT**	2.87 UT	**3.4 JT**	2.87 UT	**13.6 JT**	**3.91 JT**
Total cPAHs (BaP Eq, ND = 1/2 MDL)		0.9 UT	**0.4 JT**	0.92 UT	**1.0 JT**	0.92 UT	**4.1 JT**	**1 JT**
Dioxins/Furans (ng/kg)*								
2,3,7,8-TCDD		0.354 U	0.11 U	0.557 U	0.472 U	0.632 U	0.582 U	0.353 U
1,2,3,7,8-PeCDD		0.148 U	**0.19 J**	0.122 U	0.147 U	**0.388 J**	0.186 U	0.104 U
1,2,3,4,7,8-HxCDD		0.0868 U	0.18 U	0.0873 U	0.108 U	**0.943 J**	0.242 U	0.11 U
1,2,3,6,7,8-HxCDD		0.0953 U	**0.42 J**	0.0992 U	0.123 U	**6.21**	0.28 U	0.124 U
1,2,3,7,8,9-HxCDD		0.0889 U	0.18 U	0.0909 U	0.112 U	**3.1**	0.254 U	0.114 U
1,2,3,4,6,7,8-HpCDD		2.42 U	**1.83 J**	2.49 U	2.37 U	**146**	**1.93 J**	2.44 U
OCDD		4.83 U	**12.7**	**5.62**	3.29 UJ	**1360**	**11**	**3.45 J**
2,3,7,8-TCDF (bird egg)		0.256 U	**0.33 J**	0.488 UJ	0.302 U	0.45 U	0.398 U	0.269 U
1,2,3,7,8-PeCDF		0.121 U	**0.228 J**	0.195 UJ	0.0969 U	0.218 U	0.17 U	0.108 U
2,3,4,7,8-PeCDF		0.124 UJ	**0.382 J**	**0.159 J**	0.0927 U	0.192 U	0.152 U	0.105 U
1,2,3,4,7,8-HxCDF		0.119 U	0.15 U	0.118 U	0.0978 U	0.435 UJ	0.201 U	0.0672 U
1,2,3,6,7,8-HxCDF		0.121 U	0.16 U	0.117 U	0.105 U	**22.4 J**	0.199 U	0.0718 U
2,3,4,6,7,8-HxCDF		0.128 U	0.15 U	0.132 U	0.12 U	0.315 U	0.224 U	0.0733 U

Please refere to notes at the end of the table.

Table 3-5: 2020 Crayfish Tissue Sampling Results
2020 O&M Annual Report
McCormick & Baxter Superfund Site

Analyte	MBCFGB1020						MBCFGB
	01	02	03	04		05	Bait
	MBCFGB1020-01	MBCFGB1020-02	MBCFGB1020-03	MBCFGB1020-04	MBCFGB1020-04 DUP	MBCFGB1020-05	MBCFGB-20-BAITCHICKEN
	09/29/2020	08/28/2020	09/29/2020	09/29/2020	09/29/2020	09/29/2020	09/29/2020
1,2,3,7,8,9-HxCDF	0.207 U	0.18 U	0.14 U	0.128 U	0.337 U	0.242 U	0.0802 U
1,2,3,4,6,7,8-HpCDF	**0.11 J**	0.21 UJ	**0.233 J**	**0.386 J**	**241 J**	0.842 UJ	**0.355 J**
1,2,3,4,7,8,9-HpCDF	0.108 U	0.11 U	0.101 U	0.0793 U	**3.21**	0.177 U	0.0935 U
OCDF	**1.56 J**	0.21 UJ	**2.23 J**	**2.48 J**	**901**	**5.9**	**3.31 J**
TCDD, 2,3,7,8-, TEQ (ND = 1/2 MDL)	**0.34**	**0.52**	**0.47**	**0.4**	**8.7**	**0.54**	**0.31**
General Chemistry (%)							
Lipids	**0.87**	**0.88**	**0.73**	**1.1**	**0.72**	**1.7**	**11**
Total Solids	**32.6**	**26.1**	**30**	**32.6**	**35.3**	**32.3**	**31.1**

Notes:
Tissue results are whole-body results. Insufficient material was obtained to perform whole-body and tail-only analyses.
* wet weight
Bold = Analyte detected at or above the laboratory detection limit

Abbreviations and Acronyms:
-- = Not analyzed or not applicable
µg/kg = micrograms per kilogram
C = Carcinogenic PAH (cPAH)
H = High Molecular Weight PAH (HPAH)
J = Estimated result
L = Low Molecular Weight PAH (LPAH)
mg/kg = milligrams per kilogram
ng/kg = nanograms per kilogram
PAH = Polycyclic Aromatic Hydrocarbon
U = Result not detected above the referenced laboratory detection limit

Table 4-1: Groundwater and NAPL Elevations: June 17, 2020
2020 O&M Annual Report
McCormick & Baxter Superfund Site

Well ID	Date	Time	Measuring Point Elevation (ft NAVD88)	Depth to LNAPL (ft below MP)	Depth to water (ft below MP)	Depth to DNAPL (ft below MP)	LNAPL Thickness (ft)	DNAPL Thickness (ft)	Groundwater Elevation LNAPL corrected (ft NAVD88)
EW-1s	6/17/20	11:24	39.54	-	27.40	38.79	-	8.63	12.14
EW-2s	6/17/20	12:12	42.40	-	29.54	-	-	-	12.85
EW-8s	6/17/20	9:32	40.55	-	28.43	48.58	-	6.20	12.12
EW-10s	6/17/20	12:25	29.59	17.13	17.13	41.61	Trace	1.18	12.47
EW-15s	6/17/20	13:19	43.00	30.71	31.46	-	0.75	-	12.28
EW-18s	6/17/20	14:05	40.79	-	28.70	42.23	-	2.48	12.09
EW-19s	6/17/20	13:35	25.97	-	13.46	-	-	-	12.51
EW-23s	6/17/20	13:25	37.64	24.33	27.84	-	3.50	-	13.24
MW-1r	6/17/20	10:31	37.81	-	24.92	-	-	-	12.89
MW-7 WC	6/17/20	9:06	36.69	-	22.99	-	-	-	13.70
MW-10r	6/17/20	11:15	41.85	-	29.75	-	-	-	12.10
MW-15s	6/17/20	14:30	43.41	-	31.10	-	-	-	12.31
MW-17s	6/17/20	14:31	41.34	-	29.11	-	-	-	12.23
MW-20i	6/17/20	12:56	41.72	-	29.29	69.42	-	5.56	12.43
MW-22i	6/17/20	11:07	42.34	-	30.00	54.54	-	4.48	12.34
MW-23d	6/17/20	14:59	40.81	-	28.51	-	-	-	12.30
MW-32i	6/17/20	8:10	39.45	-	26.68	-	-	-	12.77
MW-34i	6/17/20	14:45	32.82	-	20.71	-	-	-	12.11
MW-35r	6/17/20	10:48	32.27	-	19.33	-	-	-	12.94
MW-36d	6/17/20	10:35	30.59	-	18.36	-	-	-	12.23
MW-36i	6/17/20	10:32	30.30	-	18.04	-	-	-	12.26
MW-36s	6/17/20	10:42	30.62	-	18.39	-	-	-	12.23
MW-37d	6/17/20	11:03	26.19	-	14.07	-	-	-	12.12
MW-37i	6/17/20	11:00	26.07	-	13.84	-	-	-	12.23
MW-37s	6/17/20	10:53	24.98	-	12.46	-	-	-	12.52
MW-38d	6/17/20	11:21	31.96	-	19.73	-	-	-	12.23
MW-38i	6/17/20	11:18	32.15	-	19.84	-	-	-	12.31
MW-38s	6/17/20	11:15	32.41	-	20.03	-	-	-	12.38
MW-39d	6/17/20	11:32	29.93	-	17.75	-	-	-	12.18
MW-39i	6/17/20	11:29	30.18	-	18.02	-	-	-	12.16
MW-39s	6/17/20	11:26	29.88	-	17.32	-	-	-	12.56

Please refere to notes at the end of the table.

Table 4-1: Groundwater and NAPL Elevations: June 17, 2020
2020 O&M Annual Report
McCormick & Baxter Superfund Site

Well ID	Date	Time	Measuring Point Elevation (ft NAVD88)	Depth to LNAPL (ft below MP)	Depth to water (ft below MP)	Depth to DNAPL (ft below MP)	LNAPL Thickness (ft)	DNAPL Thickness (ft)	Groundwater Elevation LNAPL corrected (ft NAVD88)
MW-40d	6/17/20	11:53	28.81	-	16.67	-	-	-	12.14
MW-40i	6/17/20	11:50	28.92	-	16.60	-	-	-	12.32
MW-40s	6/17/20	11:47	28.53	-	16.16	-	-	-	12.37
MW-41d	6/17/20	11:43	27.56	-	15.42	-	-	-	12.14
MW-41i	6/17/20	11:40	27.22	-	15.05	-	-	-	12.17
MW-41s	6/17/20	11:38	27.96	-	15.37	-	-	-	12.59
MW-42d	6/17/20	12:07	32.26	-	20.25	-	-	-	12.01
MW-42i	6/17/20	12:04	32.67	-	20.64	-	-	-	12.03
MW-42s	6/17/20	12:01	32.42	-	20.30	-	-	-	12.12
MW-43d	6/17/20	12:19	28.57	-	16.35	-	-	-	12.22
MW-43i	6/17/20	12:16	30.49	-	18.33	-	-	-	12.16
MW-43s	6/17/20	12:12	31.24	-	18.75	-	-	-	12.49
MW-44d	6/17/20	12:41	29.55	-	17.31	-	-	-	12.24
MW-44i	6/17/20	12:37	29.47	-	17.45	-	-	-	12.02
MW-44s	6/17/20	12:34	29.90	-	17.62	-	-	-	12.28
MW-45d	6/17/20	12:58	28.12	-	15.90	-	-	-	12.22
MW-45i	6/17/20	12:53	28.05	-	15.90	-	-	-	12.15
MW-45s	6/17/20	12:50	28.20	-	15.76	-	-	-	12.44
MW-46s	6/17/20	0:00	35.51	-	23.47	-	-	-	12.04
MW-47s	6/17/20	13:06	35.56	-	23.00	-	-	-	12.56
MW-48s	6/17/20	13:37	38.58	-	26.41	-	-	-	12.17
MW-49s	6/17/20	13:29	37.61	-	20.61	-	-	-	17.00
MW-50s	6/17/20	13:48	39.12	-	26.93	-	-	-	12.19
MW-51s	6/17/20	13:59	39.54	-	22.82	-	-	-	16.72
MW-52s	6/17/20	13:09	40.70	-	28.62	-	-	-	12.08
MW-53s	6/17/20	13:17	40.42	-	24.32	-	-	-	16.10
MW-54s	6/17/20	16:05	41.78	-	28.75	-	-	-	13.03
MW-55s	6/17/20	14:45	41.09	-	26.37	-	-	-	14.72
MW-56s	6/17/20	11:42	43.45	31.04	31.04	-	Trace	-	12.41
MW-57s	6/17/20	14:35	42.01	-	29.01	-	-	-	13.00
MW-58d	6/17/20	10:13	41.43	-	29.17	-	-	-	12.26

Please refere to notes at the end of the table.

Table 4-1: Groundwater and NAPL Elevations: June 17, 2020
2020 O&M Annual Report
McCormick & Baxter Superfund Site

Well ID	Date	Time	Measuring Point Elevation (ft NAVD88)	Depth to LNAPL (ft below MP)	Depth to water (ft below MP)	Depth to DNAPL (ft below MP)	LNAPL Thickness (ft)	DNAPL Thickness (ft)	Groundwater Elevation LNAPL corrected (ft NAVD88)
MW-58i	6/17/20	9:50	40.99	-	28.86	-	-	-	12.13
MW-58s	6/17/20	10:03	41.51	-	29.02	-	-	-	12.49
MW-59s	6/17/20	13:19	35.85	-	20.25	-	-	-	15.60
MW-60d	6/17/20	10:16	40.18	-	27.93	-	-	-	12.25
MW-61s	6/17/20	11:18	43.65	-	28.95	-	-	-	14.70
MW-62i	6/17/20	14:20	42.73	-	30.68	-	-	-	12.05
MW-As	6/17/20	8:28	39.32	-	21.83	-	-	-	17.49
MW-Ds	6/17/20	13:46	43.26	-	30.13	36.17	-	2.85	13.13
MW-Gs	6/17/20	12:45	40.27	27.54	27.54	43.78	Trace	1.02	12.73
MW-Os	6/17/20	12:11	40.96	-	24.20	-	-	-	16.76
PW-1d	6/17/20	12:49	44.05	-	31.34	-	-	-	12.71
PW-2d	6/17/20	11:50	41.83	-	29.06	-	-	-	12.77

Notes:

LNAPL specific gravity estimated as 0.981 g/cm^3.
Corrected groundwater elevation = [LNAPL thickness * LNAPL specific gravity] + groundwater elevation

Abbreviations and Acronyms:

DNAPL = dense non-aqueous phase liquid
ft = foot or feet
g/cm^3 = gram per cubic centimeter
LNAPL = light non-aqueous phase liquid
MP = measuring point
NAVD88 = North American Vertical Datum of 1988
NM = not measured

Table 4-2: Groundwater and NAPL Elevations: October 6, 2020
2020 O&M Annual Report
McCormick & Baxter Superfund Site

Well ID	Date	Time	Measuring Point Elevation (ft NAVD88)	Depth to LNAPL (ft below MP)	Depth to water (ft below MP)	Depth to DNAPL (ft below MP)	LNAPL Thickness (ft)	DNAPL Thickness (ft)	Groundwater Elevation LNAPL corrected (ft NAVD88)
EW-1s	10/6/20	10:17	39.54	27.87	27.89	39.02	0.03	8.40	11.67
EW-2s	10/6/20	11:20	42.40	-	34.18	-	-	-	8.22
EW-8s	10/6/20	9:40	40.55	-	29.19	52.05	-	2.73	11.36
EW-10s	10/6/20	12:19	29.59	-	21.96	41.24	-	1.55	7.63
EW-15s	10/6/20	13:12	43.00	33.19	41.54	48.06	8.35	0.49	9.65
EW-18s	10/6/20	9:53	40.79	-	29.43	42.73	-	1.98	11.36
EW-19s	10/6/20	12:32	25.97	-	18.13	-	-	-	7.85
EW-23s	10/6/20	12:58	37.64	28.19	32.59	-	4.41	-	9.37
MW-1r	10/6/20	14:30	37.81	-	27.59	-	-	-	10.22
MW-7 WC	10/6/20	-	36.69	-	NM[a]	-	-	-	-
MW-10r	10/6/20	10:33	41.85	32.43	32.43	-	Trace	-	9.42
MW-15s	10/6/20	16:28	43.41	-	32.22	-	-	-	11.19
MW-17s	10/6/20	15:48	41.34	-	31.29	-	-	-	10.05
MW-20i	10/6/20	12:01	41.72	-	34.26	67.58	-	7.40	7.46
MW-22i	10/6/20	10:48	42.34	-	34.88	52.21	-	6.81	7.47
MW-23d	10/6/20	13:15	40.81	-	33.40	-	-	-	7.41
MW-32i	10/6/20	12:20	39.45	-	29.29	-	-	-	10.16
MW-34i	10/6/20	15:25	32.82	-	26.52	-	-	-	6.30
MW-35r	10/6/20	11:24	32.27	-	23.67	-	-	-	8.60
MW-36d	10/6/20	10:11	30.59	-	22.58	-	-	-	8.01
MW-36i	10/6/20	10:08	30.30	-	22.21	-	-	-	8.09
MW-36s	10/6/20	10:05	30.62	-	21.19	-	-	-	9.43
MW-37d	10/6/20	10:30	26.19	-	18.36	-	-	-	7.83
MW-37i	10/6/20	10:25	26.07	-	18.13	-	-	-	7.94
MW-37s	10/6/20	10:22	24.98	-	17.15	-	-	-	7.83
MW-38d	10/6/20	10:45	31.96	-	24.12	-	-	-	7.84
MW-38i	10/6/20	10:50	32.15	-	24.23	-	-	-	7.92
MW-38s	10/6/20	10:53	32.41	-	22.68	-	-	-	9.73
MW-39d	10/6/20	10:41	29.93	-	22.18	-	-	-	7.75
MW-39i	10/6/20	10:37	30.18	-	22.29	-	-	-	7.89
MW-39s	10/6/20	10:35	29.88	-	21.97	-	-	-	7.91

Please refere to notes at the end of the table.

Table 4-2: Groundwater and NAPL Elevations: October 6, 2020
2020 O&M Annual Report
McCormick & Baxter Superfund Site

Well ID	Date	Time	Measuring Point Elevation (ft NAVD88)	Depth to LNAPL (ft below MP)	Depth to water (ft below MP)	Depth to DNAPL (ft below MP)	LNAPL Thickness (ft)	DNAPL Thickness (ft)	Groundwater Elevation LNAPL corrected (ft NAVD88)
MW-40d	10/6/20	11:13	28.81	-	21.15	-	-	-	7.66
MW-40i	10/6/20	10:10	28.92	-	20.98	-	-	-	7.94
MW-40s	10/6/20	11:08	28.53	-	18.52	-	-	-	10.01
MW-41d	10/6/20	11:05	27.56	-	19.83	-	-	-	7.73
MW-41i	10/6/20	11:02	27.22	-	19.36	-	-	-	7.86
MW-41s	10/6/20	10:59	27.96	-	21.02	-	-	-	6.94
MW-42d	10/6/20	11:25	32.26	-	24.75	-	-	-	7.51
MW-42i	10/6/20	11:22	32.67	-	25.00	-	-	-	7.67
MW-42s	10/6/20	11:17	32.42	-	21.30	-	-	-	11.12
MW-43d	10/6/20	11:34	28.57	-	20.89	-	-	-	7.68
MW-43i	10/6/20	11:32	30.49	-	22.77	-	-	-	7.72
MW-43s	10/6/20	11:29	31.24	-	23.32	-	-	-	7.92
MW-44d	10/6/20	11:46	29.55	-	21.87	-	-	-	7.68
MW-44i	10/6/20	11:43	29.47	-	21.76	-	-	-	7.71
MW-44s	10/6/20	11:40	29.90	-	18.35	-	-	-	11.55
MW-45d	10/6/20	11:56	28.12	-	20.44	-	-	-	7.68
MW-45i	10/6/20	11:54	28.05	-	20.34	-	-	-	7.71
MW-45s	10/6/20	11:51	28.20	-	20.43	-	-	-	7.77
MW-46s	10/6/20	12:01	35.51	-	24.20	-	-	-	11.31
MW-47s	10/6/20	12:04	35.56	-	27.58	-	-	-	7.98
MW-48s	10/6/20	12:18	38.58	-	26.43	-	-	-	12.15
MW-49s	10/6/20	12:13	37.61	-	22.25	-	-	-	15.36
MW-50s	10/6/20	15:00	39.12	-	27.19	-	-	-	11.93
MW-51s	10/6/20	15:11	39.54	-	24.29	-	-	-	15.25
MW-52s	10/6/20	13:59	40.70	-	29.40	-	-	-	11.30
MW-53s	10/6/20	13:44	40.42	-	25.96	-	-	-	14.46
MW-54s	10/6/20	16:07	41.78	-	30.54	-	-	-	11.24
MW-55s	10/6/20	16:00	41.09	-	29.44	-	-	-	11.65
MW-56s	10/6/20	11:04	43.45	33.28	33.44	-	Trace	-	10.01
MW-57s	10/6/20	16:21	42.01	-	33.36	-	-	-	8.65
MW-58d	10/6/20	11:14	41.43	-	33.88	-	-	-	7.55

Please refere to notes at the end of the table.

Table 4-2: Groundwater and NAPL Elevations: October 6, 2020
2020 O&M Annual Report
McCormick & Baxter Superfund Site

Well ID	Date	Time	Measuring Point Elevation (ft NAVD88)	Depth to LNAPL (ft below MP)	Depth to water (ft below MP)	Depth to DNAPL (ft below MP)	LNAPL Thickness (ft)	DNAPL Thickness (ft)	Groundwater Elevation LNAPL corrected (ft NAVD88)
MW-58i	10/6/20	11:07	40.99	-	33.89	-	-	-	7.10
MW-58s	10/6/20	10:56	41.51	-	33.44	-	-	-	8.07
MW-59s	10/6/20	12:08	35.85	-	23.16	-	-	-	12.69
MW-60d	10/6/20	9:58	40.18	-	32.12	-	-	-	8.06
MW-61s	10/6/20	11:51	43.65	-	33.32	-	-	-	10.33
MW-62i	10/6/20	15:37	42.73	-	36.42	-	-	-	6.31
MW-As	10/6/20	12:27	39.32	-	23.37	-	-	-	15.95
MW-Ds	10/6/20	13:34	43.26	34.60	34.60	35.98	Trace	3.04	8.66
MW-Gs	10/6/20	11:50	40.27	32.88	32.88	43.56	Trace	1.23	7.40
MW-Os	10/6/20	14:45	40.96	-	25.66	-	-	-	15.30
PW-1d	10/6/20	12:41	44.05	-	33.99	-	-	-	10.06
PW-2d	10/6/20	12:55	41.83	-	31.69	-	-	-	10.14

Notes:

LNAPL specific gravity estimated as 0.981 g/cm^3.
Corrected groundwater elevation = [LNAPL thickness * LNAPL specific gravity] + groundwater elevation

[a] MW-7 WC was not monitored as the lock was changed on the monitoring well. MW-7 WC is an offsite well maintained by others.

Abbreviations and Acronyms:

DNAPL = dense non-aqueous phase liquid
ft = foot or feet
g/cm^3 = gram per cubic centimeter
LNAPL = light non-aqueous phase liquid
MP = measuring point
NAVD88 = North American Vertical Datum of 1988
NM = not measured

Table 4-3: Groundwater Chemical Results
2020 O&M Annual Report
McCormick & Baxter Superfund Site

Analyte		Screening Criteria (MCLs)	EW-19s Site-Wide 5/26/20 Shallow		EW-19s-DUP Site-Wide 5/26/20 Shallow		MW-35r Site-Wide 5/27/20 Shallow		MW-37d Site-Wide 5/26/20 Deep		MW-37i Site-Wide 5/26/20 Intermediate		MW-37s Site-Wide 5/26/20 Shallow		MW-39s Site-Wide 5/27/20 Shallow		MW-41s Site-Wide 5/27/20 Shallow		MW-47s Site-Wide 5/26/20 Shallow		MW-53s Site-Wide 5/26/20 Shallow	
Total Metals (µg/L)																						
Arsenic		10	**20.3**		**21.5**		**4.73**		**3.43**		**42.6**		**2.89**		**6.21**		0.735	U	**17.1**		**17.9**	
Chromium		100	1.49	U	1.49	U	1.49	U	1.49	U	1.49	U	1.49	U	1.49	U	1.49	U	1.49	U	1.49	U
Copper		--	2.50	U	2.50	U	2.50	U	2.50	U	2.50	U	2.50	U	2.50	U	2.50	U	2.50	U	2.50	U
Zinc		--	9.96	U	9.96	U	9.96	U	9.96	U	9.96	U	9.96	U	9.96	U	9.96	U	9.96	U	9.96	U
Pentachlorophenol (µg/L)																						
Pentachlorophenol		1	0.322	U	0.313	U	0.313	U	0.332	U	0.351	U	0.313	U	0.319	U	0.313	U	0.313	U	**110**	
Polyaromatic Hydrocarbons (µg/L)																						
Acenaphthene	L	--	**1.24**		**1.25**		0.019	U	**0.0507**		**24.8**		**19.5**		**0.0442**	**J**	**0.021**	**J**	**2.62**		0.019	U
Acenaphthylene	L	--	**2.15**		**2.09**		0.0171	U	0.0171	U	**0.116**		**0.272**		0.0171	U	0.0171	U	0.0171	U	0.0171	U
Anthracene	L	--	**33.8**		**33.1**		**0.0722**		**0.0544**		**0.056**		**0.574**		**0.0647**		**0.0497**	**J**	**0.034**	**J**	**0.145**	
Benzo(a)anthracene	H, C	--	**0.0442**	**J**	**0.0454**	**J**	0.0203	U	0.0203	U	0.0203	U	0.0203	U	0.0203	U	0.0203	U	0.0203	U	0.0203	U
Benzo(a)pyrene	H, C	0.2	0.0184	U	0.0184	U	0.0184	U	0.0184	U	0.0184	U	0.0184	U	0.0184	U	0.0184	U	0.0184	U	0.0184	U
Benzo(b)fluoranthene	H, C	--	0.0168	U	0.0168	U	0.0168	U	0.0168	U	0.0168	U	0.0168	U	0.0168	U	0.0168	U	0.0168	U	0.0168	U
Benzo(k)fluoranthene	H, C	--	0.0202	U	0.0202	U	0.0202	U	0.0202	U	0.0202	U	0.0202	U	0.0202	U	0.0202	U	0.0202	U	0.0202	U
Benzo(g,h,i)perylene	H	--	0.0184	U	0.0184	U	0.0184	U	0.0184	U	0.0184	U	0.0184	U	0.0184	U	0.0184	U	0.0184	U	0.0184	U
Chrysene	H, C	--	**0.0291**	**J**	**0.0286**	**J**	0.0179	U	0.0179	U	0.0179	U	0.0179	U	0.0179	U	0.0179	U	0.0179	U	0.0179	U
Dibenzo(a,h)anthracene	H, C	--	0.016	U	0.016	U	0.0160	U	0.0160	U	0.0160	U	0.0160	U	0.0160	U	0.0160	U	0.0160	U	0.0160	U
Fluoranthene	H	--	**1.38**		**1.34**		0.0270	U	0.0270	U	0.0270	U	**0.135**		0.0270	U	0.0270	U	0.0270	U	0.0270	U
Fluorene	L	--	**13.8**		**13.2**		0.0169	U	0.0169	U	**0.447**		**8.76**		0.0169	U	0.0169	U	0.0169	U	0.0169	U
Indeno(1,2,3-cd)pyrene	H, C	--	0.0158	U	0.0158	U	0.0158	U	0.0158	U	0.0158	U	0.0158	U	0.0158	U	0.0158	U	0.0158	U	0.0158	U
Naphthalene	L	--	**93.2**		**97.9**		0.0917	U	0.0917	U	**0.277**		**38.1**	**J**	0.0917	U	0.0917	U	0.0917	U	0.0917	U
Phenanthrene	L	--	**211**		**186**		0.018	U	0.018	U	**0.0366**	**J**	**0.537**		0.018	U	0.018	U	0.143		0.018	U
Pyrene	H	--	**0.645**		**0.625**		0.0169	U	0.0169	U	0.0169	U	**0.0731**		0.0169	U	0.0169	U	0.0169	U	0.0169	U
LPAHs (ND = 1/2 MDL)		--	**355**	**T**	**334**	**T**	**0.154**	**T**	**0.177**	**T**	**25.7**	**JT**	**67.7**	**JT**	**0.181**	**JT**	**0.143**	**JT**	**2.86**	**JT**	**0.226**	**T**
HPAHs (ND = 1/2 MDL)		--	**2.15**	**JT**	**2.09**	**JT**	0.0270	UT	0.0270	UT	0.0270	UT	**0.280**	**T**	0.0270	UT	0.0270	UT	0.0270	UT	0.0270	UT
Total PAHs (ND = 1/2 MDL)		--	**357**	**JT**	**336**	**JT**	**0.247**	**T**	**0.27**	**T**	**25.83**	**JT**	**68.02**	**JT**	**0.28**	**JT**	**0.24**	**JT**	**2.95**	**JT**	**0.32**	**T**
Total cPAHs (No TEFs, ND =1/2 MDL)		--	**0.1169**	**JT**	**0.118**	**JT**	0.0627	UT	0.0627	UT	0.0627	UT	0.0627	UT	0.0627	UT	0.0627	UT	0.0627	UT	0.0627	UT
Total cPAH (BaP Eq, ND = 1/2 MDL)		--	**0.023**	**JT**	**0.023**	**JT**	0.020	UT	0.020	UT	0.020	UT	0.020	UT	0.020	UT	0.020	UT	0.020	UT	0.020	UT
Field Parameters																						
Groundwater Elevation (feet NAVD 88)		--	11.85		11.85		18.35		12.06		11.98		10.83		15.62		--		21.18		24.43	
Temperature (°C)		--	16		16		13.6		15.2		14.9		14.1		14.2		14.3		15		15.1	
Oxidation-Reduction Potential (mV)		--	-117.3		-117.3		-120.3		-116.0		-131.7		-71.6		-72.8		3.0		-67.8		-111.9	
pH		--	6.61		6.61		6.93		7.08		7.01		6.42		6.52		6.54		6.15		6.57	
Specific Conductance (µS/cm)		--	678		678		672		683		767		504		618		618		728		673	
Turbidity (NTU)		--	0.0		0.0		31.6		3.6		3.0		2.0		19.9		14.0		0.0		0.0	
Dissolved Oxygen (mg/L)		--	0.0		0.0		0.0		0.31		0.35		0.25		0.45		0.83		0.00		0.07	

Table 4-3: Groundwater Chemical Results
2020 O&M Annual Report
McCormick & Baxter Superfund Site

Analyte		Screening Criteria (MCLs)	MW-55s Site-Wide 5/26/20 Shallow		MW-58s Site-Wide 5/27/20 Shallow		MW-59s Infiltration Pond 10/6/20 Shallow	
Total Metals (µg/L)								
Arsenic		10	**4.42**		**50.9**		**50.9**	
Chromium		100	**1.56**	**J**	1.49	U	1.49	U
Copper		--	**2.74**	**J**	**3.21**	**J**	2.5	U
Zinc		--	9.96	U	**86.0**		9.96	U
Pentachlorophenol (µg/L)								
Pentachlorophenol		1	0.313	U	0.329	U	0.313	U
Polyaromatic Hydrocarbons (µg/L)								
Acenaphthene	L	--	0.0190	U	**0.0267**	**J**	0.019	U
Acenaphthylene	L	--	0.0171	U	0.0171	U	0.0171	U
Anthracene	L	--	**0.0362**	**J**	**0.0289**	**J**	**0.0344**	**J**
Benzo(a)anthracene	H, C	--	0.0203	U	0.0203	U	0.0203	U
Benzo(a)pyrene	H, C	0.2	0.0184	U	0.0184	U	0.0184	U
Benzo(b)fluoranthene	H, C	--	0.0168	U	0.0168	U	0.0168	U
Benzo(k)fluoranthene	H, C	--	0.0202	U	0.0202	U	0.0202	U
Benzo(g,h,i)perylene	H	--	0.0184	U	0.0184	U	0.0184	U
Chrysene	H, C	--	0.0179	U	0.0179	U	0.0179	U
Dibenzo(a,h)anthracene	H, C	--	0.0160	U	0.0160	U	0.0160	U
Fluoranthene	H	--	0.0270	U	0.0270	U	0.0270	U
Fluorene	L	--	0.0169	U	0.0169	U	0.0169	U
Indeno(1,2,3-cd)pyrene	H, C	--	0.0158	U	0.0158	U	0.0158	U
Naphthalene	L	--	0.0917	U	0.0917	U	0.0917	U
Phenanthrene	L	--	0.018	U	0.018	U	0.018	U
Pyrene	H	--	0.0169	U	0.0169	U	0.0169	U
LPAHs (ND = 1/2 MDL)		--	**0.118**	**JT**	**0.127**	**JT**	**0.116**	**J**
HPAHs (ND = 1/2 MDL)		--	0.0270	UT	0.0270	UT	0.0270	UT
Total PAHs (ND = 1/2 MDL)		--	**0.21**	**JT**	**0.22**	**JT**	**0.21**	**JT**
Total cPAHs (No TEFs, ND =1/2 MDL)		--	0.0627	UT	0.0627	UT	0.0627	UT
Total cPAH (BaP Eq, ND = 1/2 MDL)		--	0.02	UT	0.02	UT	0.02	UT
Field Parameters								
Groundwater Elevation (feet NAVD 88)		--	26.61		27.65		23.16	
Temperature (°C)		--	13.7		13.9		16.8	
Oxidation-Reduction Potential (mV)		--	52.0		-158.4		-33.8	
pH		--	5.78		6.99		5.37	
Specific Conductance (µS/cm)		--	207		678		591	
Turbidity (NTU)		--	0.0		13.1		33.7	
Dissolved Oxygen (mg/L)		--	0.10		0.01		0.12	

Table 4-3: Table 4-3: Groundwater Chemical Results
2020 O&M Annual Report
McCormick & Baxter Superfund Site

Notes:
Bold = a chemical detected above the MDL
Bold and shaded = Indicates the analyte was detected in excess of MCL

Abbreviations:
J = Reported value is estimated.
°C = degrees Celsius
µg/L = micrograms per liter
µS/cm = microSiemens/centimeter
BaP Eq - Benzo(a)pyrene equivalents
C = carcinogenic PAH (cPAH)
Dioxin/Furan TEQ = 2,3,7,8-TCDD Eq
H = High Molecular Weight PAH (HPAH)
L = Low Molecular Weight PAH (LPAH)
MCL = Primary Drinking Water Standard Maximum Contaminant Level
MDL = method detection limit
mg/L = milligrams per liter
mV = millivolts
NAVD 88 = North American Vertical Datum of 1988
NTU = nephelometric turbidity unit
PAH = polycyclic aromatic hydrocarbon
T = Value is a mathematically derived total.
TEQ = Toxic Equivalency Quotient
U = Analyte was not detected above the MDL.

Table 4-4: Groundwater O&M Activities in 2020
2020 O&M Annual Report
McCormick & Baxter Superfund Site

O&M Activity	Frequency in 2020
NAPL Monitoring:	
Manual gauging of site wells	June, October
Groundwater Monitoring:	
Groundwater Sampling	May, October
Downloading continuous water level data from transducers	June, October
Manual water level measurements from site wells	June, October
Routine Maintenance of Equipment:	
Transducers	June, October
Non-Routine Maintenance:	
Changed batteries in transducers (as needed)	June, October

Note:
NAPL = non-aqueous phase liquid

Table 7-1: Soil Cap O&M Activities Planned through 2025
2020 O&M Annual Report
McCormick & Baxter Superfund Site

O&M Activity	Frequency
Visual Inspections:	
Cap surface	Quarterly
Subsidence near EW-1s	Quarterly
Stormwater conveyance system	Quarterly
Security fencing	Quarterly
Warning signs	Quarterly
Abundance and survival of vegetation	Quarterly
Routine Maintenance and Monitoring:	
Manual removal of invasive plants	Semiannually, if necessary
Targeted application of herbicides	Semiannually, if necessary
Non-Routine Maintenance:	
Repairs of fence	As needed
Replacement of warning signs	As needed
Repairs of gravel roads	As needed
Filling of potential animal burrow into the earthen cap	As needed
Removing sediments from manholes	As needed
Irrigation	As needed
Replanting unsuccessful trees and shrubs	As needed
Utilities Service:	
Water, electric, and solid waste	Continuous

Table 7-2: Sediment Cap O&M Activities Planned through 2025
2020 O&M Annual Report
McCormick & Baxter Superfund Site

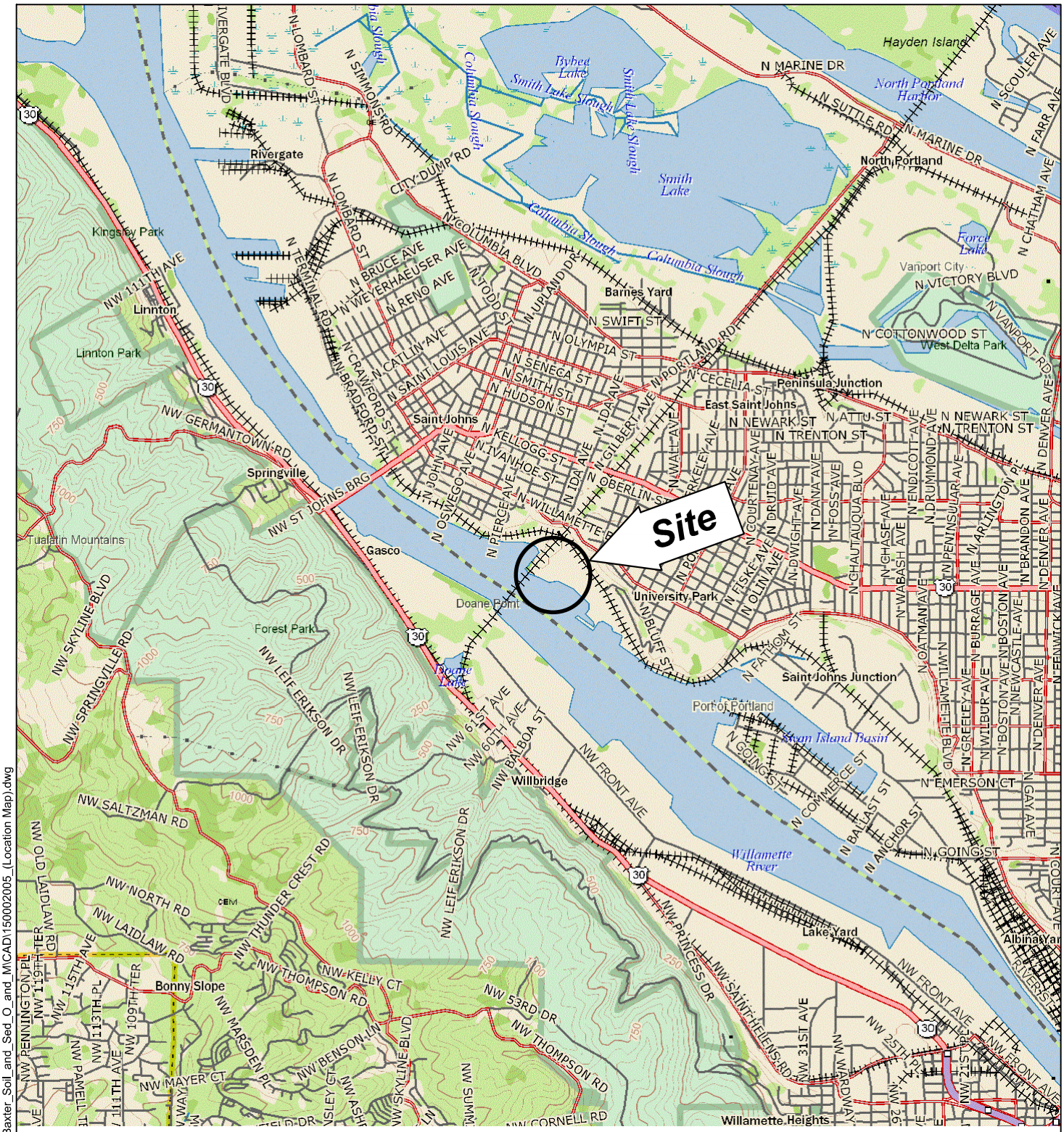
O&M Activity	Frequency
Visual Inspections (from shore):	
Warning buoys	Quarterly
Cap surface	Quarterly
Habitat quality	Annually
Routine Monitoring:	
Water column and inter-armoring water sampling	Every 5 years (next event in 2025)
Organoclay core sampling	Not performed in 2020; additional sampling will be reconsidered during subsequent Five Year Reviews.
Non-Routine Monitoring:	
Multibeam bathymetric surveys, side-scan sonar survey	After unforeseen natural event, if needed; Every 10 years, starting in 2020
Diver inspection	Every 10 years, starting in 2020; after bathymetry, if necessary
Non-Routine Maintenance:	
Replacement of buoys	As needed
Additional armoring placement	After unforeseen natural event, if needed; AS needed based on inspections
Additional organoclay capping	As needed
Articulated concrete block grouting or armoring void space maintenance (habitat gravel)	Every 5 years , or as needed based on site inspections

Table 7-3: Groundwater O&M Activities Planned through 2025
2020 O&M Annual Report
McCormick & Baxter Superfund Site

O&M Activity	Frequency
NAPL Monitoring:	
Manual gauging of site wells	Semiannually
Manual extraction from exterior wells	Not recommended
Groundwater Monitoring:	
Downloading continuous water level data from transducers	Semiannually
Manual water level measurements from site wells	Semiannually
Groundwater Sampling:	
Site-wide	Frequency to be determined
Infiltration pond (MW-59s)	Fall 2025 (every 5 years)
Routine Maintenance of Equipment:	
Interface probes, pumps, vehicle, data loggers / transducers, etc.	As needed

Note:
NAPL = non-aqueous phase liquid

FIGURES



Source: DeLorme Topo USA.

McCormick and Baxter Superfund Site
6900 N Edgewater Street, Portland, Oregon

Site Location Map

03/19

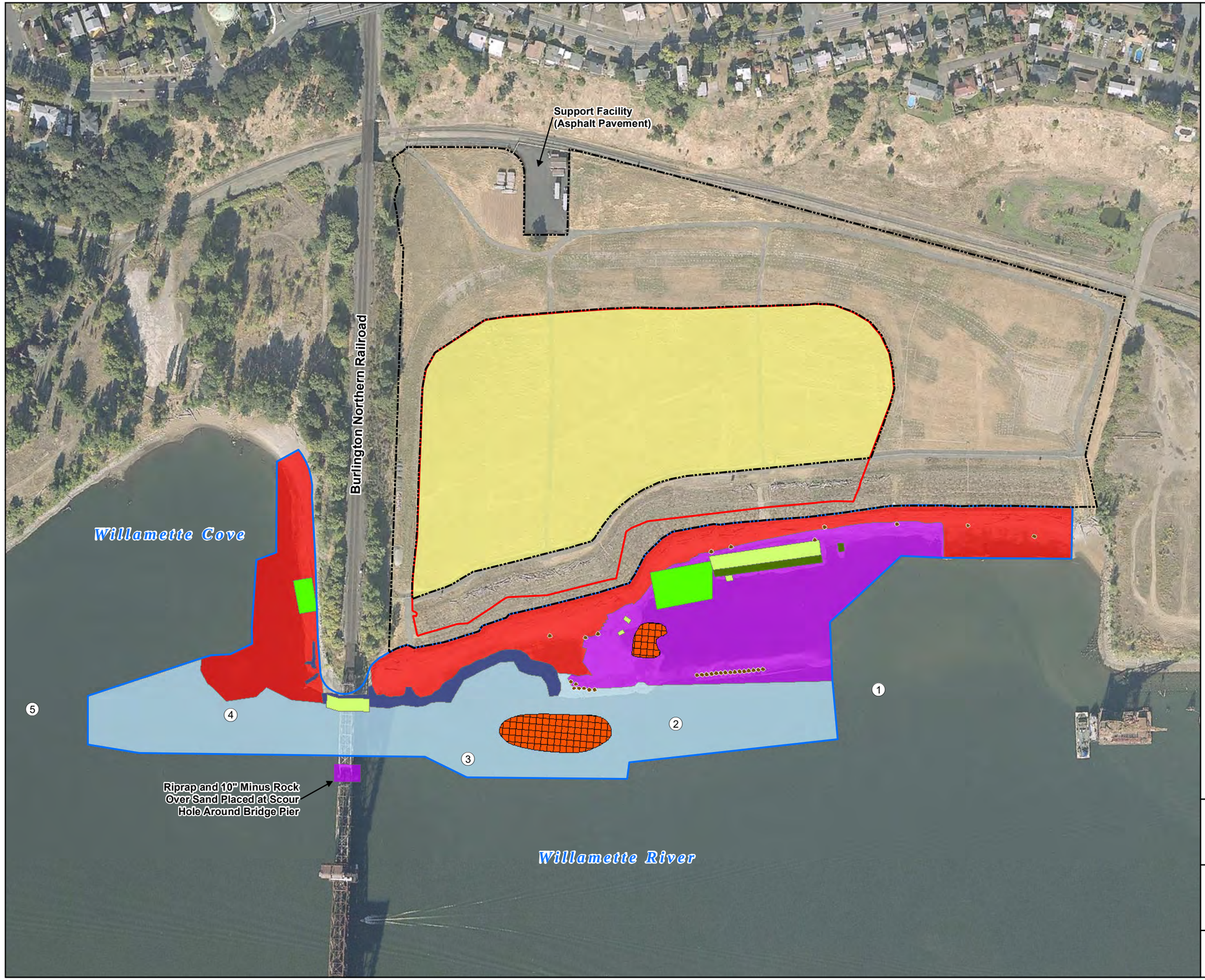
HARTCROWSER

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Figure
1-1

\\pdxsrv\data\Notebooks\150002005_DEQ_McCormick_and_Baxter_Soil_and_Sed_O_and_M\CAD\150002005_(Location Map).dwg

Document Path: \\pdxsrv\data\Notebooks\150002005_DEQ_McCormick_and_Baxter_Soil_and_Sed_O_and_M\GIS\150002005_Current_SP.mxd Date: 3/10/2020 User Name: melissaschweitzer



LEGEND

- Subsurface Barrier Wall
- Sediment Cap Boundary
- Granular Organophilic Clay
- Organoclay™ Reactive Core Mats (Double)
- Organoclay™ Reactive Core Mats (Single)
- Thickened Sand Layer
- Boulder Clusters
- Buoy Locations
- Riprap Armor
- Articulated Concrete Block
- 6-inch Minus Rock Armor
- 10-inch Minus Rock Armor
- Impermeable Cap
- Earthen Soil Cap Boundary

NOTE:
Aerial photo taken on September 22, 2006.

0 250 500
Scale in feet

McCormick & Baxter Superfund Site
Portland, Oregon

Current Site Layout and Features

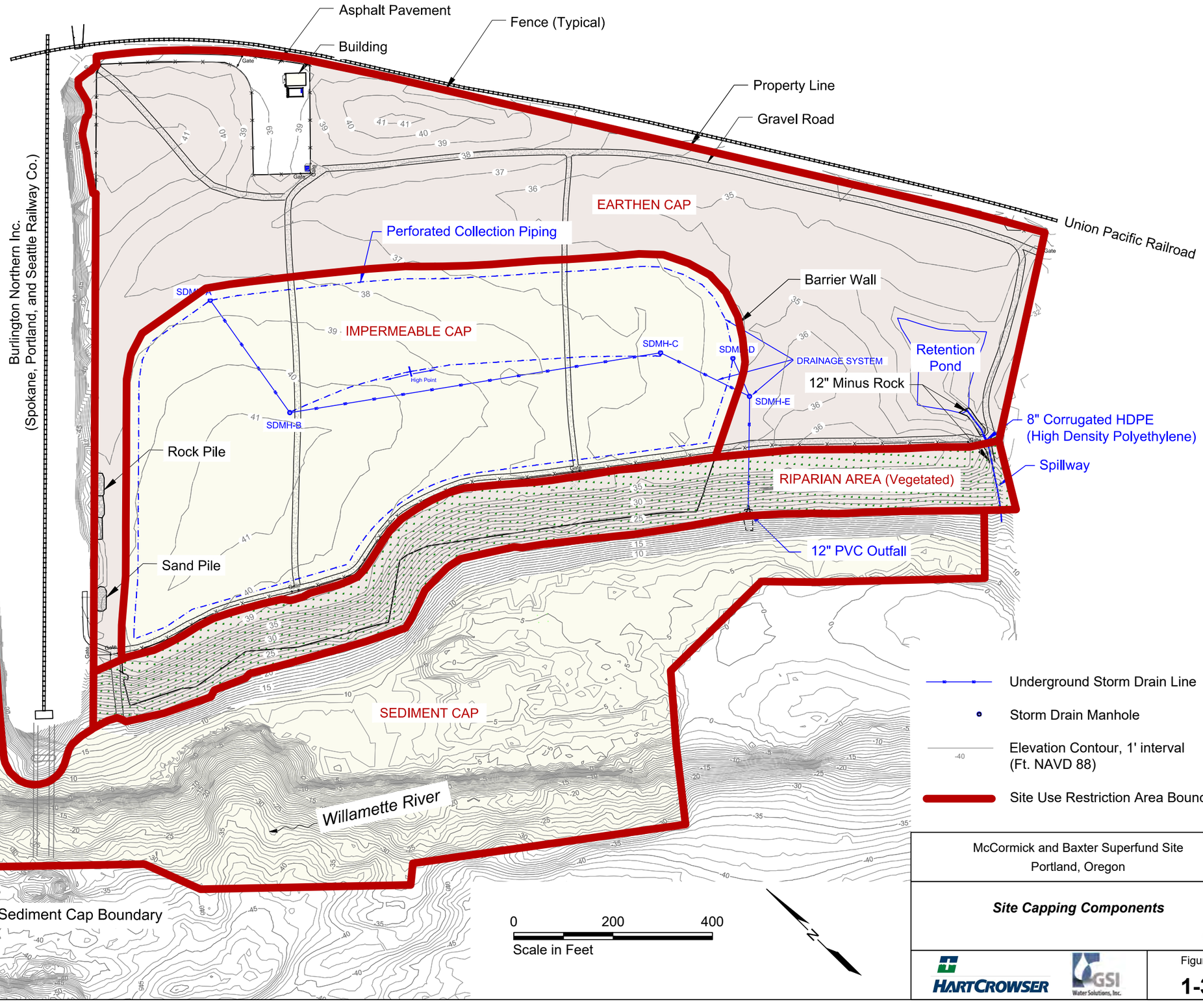
03/20

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Figure
1-2

NOTES:

1. Bathymetric survey conducted by David Evans and Associates, Inc., 04/26/2006.
2. Upland site survey resurveyed and replaced by Westlake Consultants, 09/18/2019.
3. Horizontal Datum: North American Datum of 1983 - 91 adj. (NAD83/91), State Plane Coordinate System, Oregon North Zone. Units: International Feet.
4. Vertical Datum: North American Vertical Datum of 1988 (NAVD 88)
5. Contour Interval: One-Foot. Bathymetric contours were derived from a Digital Terrain Model based on a 3-foot grid of multibeam data.
6. Additional rock was placed at the 6" minus rock placement areas on 06/26/2007. These areas have not been surveyed and the contours of this figure do not reflect the additional rock placement.



McCormick and Baxter Superfund Site
Portland, Oregon

Site Capping Components

03/20

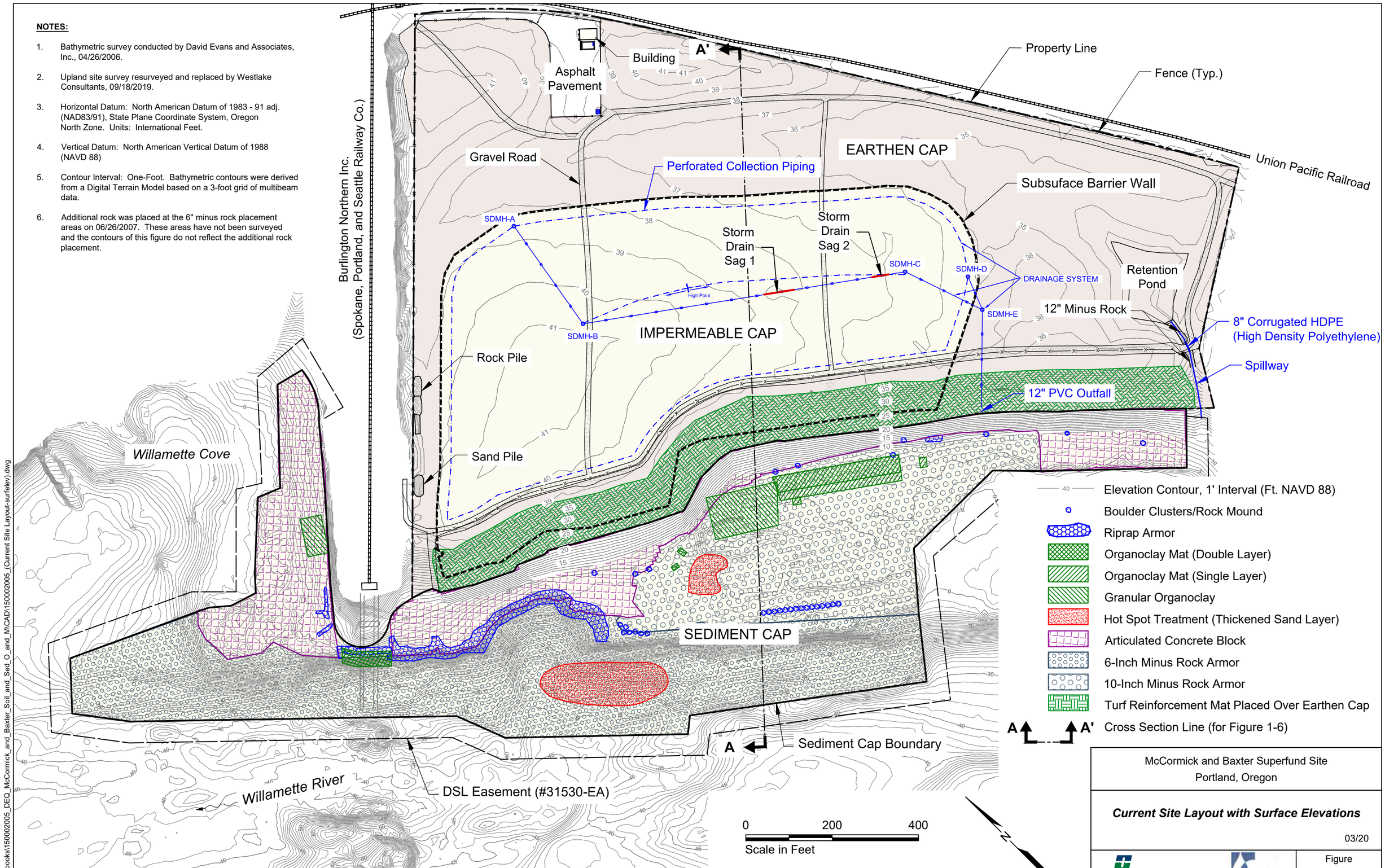
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Figure
1-3

F:\Notebooks\150002005_DEQ_McCormick_and_Baxter_Soil_and_Sed_O_and_M\CAD\150002005_(Capping Comp).dwg

NOTES:

1. Bathymetric survey conducted by David Evans and Associates, Inc., 04/26/2006.
2. Upland site survey resurveyed and replaced by Westlake Consultants, 09/18/2019.
3. Horizontal Datum: North American Datum of 1983 - 91 adj. (NAD83/91), State Plane Coordinate System, Oregon North Zone. Units: International Feet.
4. Vertical Datum: North American Vertical Datum of 1988 (NAVD 88)
5. Contour Interval: One-Foot. Bathymetric contours were derived from a Digital Terrain Model based on a 3-foot grid of multibeam data.
6. Additional rock was placed at the 6" minus rock placement areas on 06/26/2007. These areas have not been surveyed and the contours of this figure do not reflect the additional rock placement.



McCormick and Baxter Superfund Site
Portland, Oregon

Current Site Layout with Surface Elevations

03/20

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Figure
1-4

F:\Notebooks\150002005_DEQ_McCormick_and_Baxter_Soil_and_Sed_O_and_M\CAD\150002005_(Current Site Layout-surfelev).dwg

Residential Area

Site Entrance

Bunker Oil Area

Parking Lot

North Edgewater Street

Union Pacific Railroad

Treated Log Storage

Treated Log Storage

Office

Paint Shed

Gravel Driveway

Central Process Area

Water Treatment Plant

Lab

Retort 2 Pit

Retort 1 Pit

Former Tank Farm

Butt Tank 1

Southeast Disposal Trench Area

Stacker Shed

Retort 3 Pit

Butt Tank 1

Cellon Wash Area

Tank Farm Area (TFA)

Treated Log Storage

Framing Shed

Burlington Northern Railroad

Retort 4 Pit

PCP Mixing Shed

Former Creosote Tank 4

Former Disposal Location

OUTFALL 001 (Former Cooling Water)

OUTFALL 003 (Stormwater)

OUTFALL 004 (Stormwater)

Rail Spurs

Former Waste Disposal Area (FWDA)

WILLAMETTE RIVER

OUTFALL 002 (Stormwater Treated Water)

Sandy Beach

Creosote Dock

Historical Contaminant Source Area

Fence

Former Feature

Former Outfall

0 200 400

Scale in Feet

N

McCormick and Baxter Superfund Site
Portland, Oregon

Historical Contaminant Source Areas

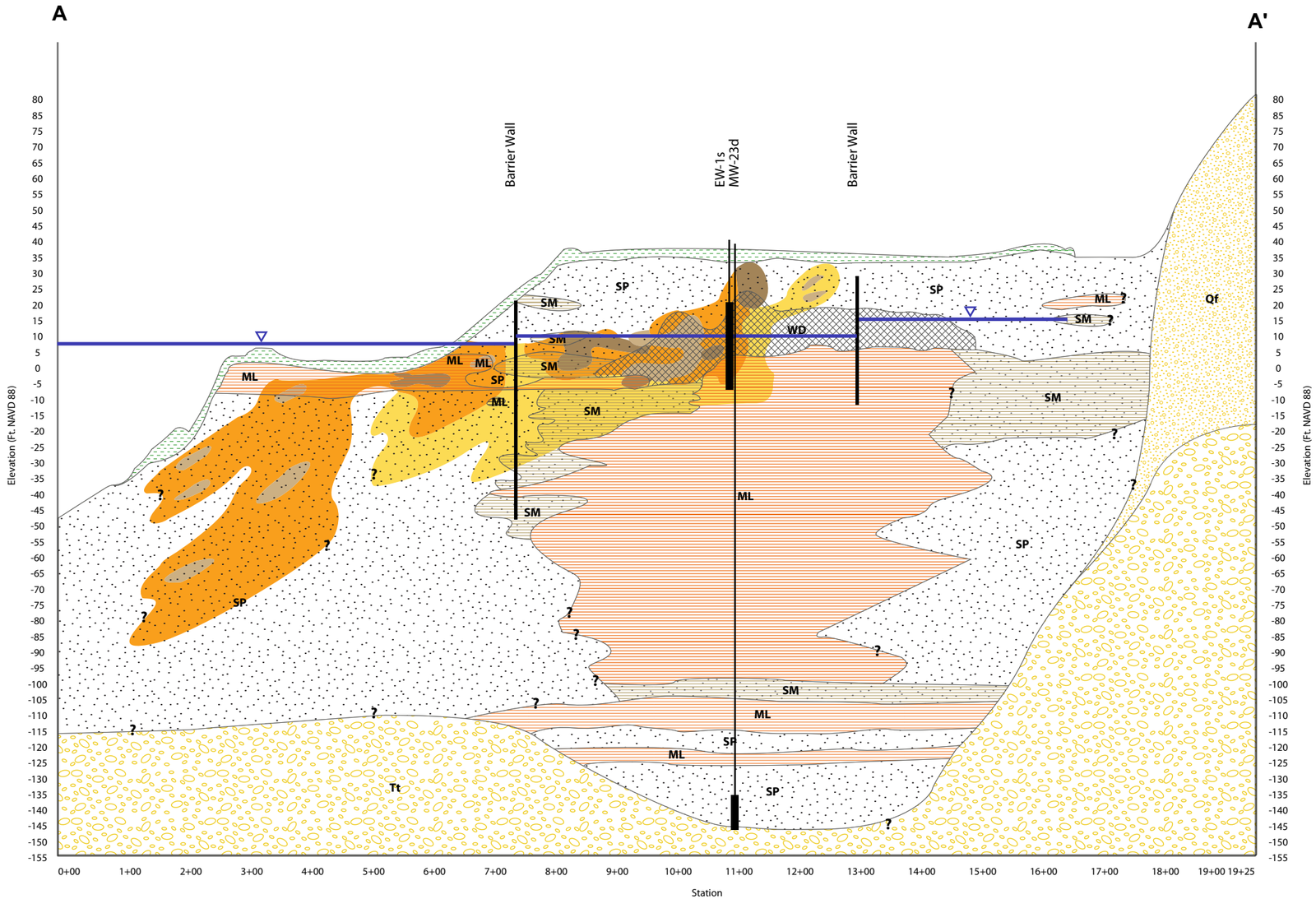
03/20

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Figure
1-5

F:\Notebooks\150002005_DEQ_McCormick_and_Baxter_Soil_and_Sed_O_and_M\CAD\150002005_(Historic Contamination).dwg



LEGEND

- SP- Sand, Fine to Medium, Poorly Graded
- SM- Silt Sand, or Thin Interbeds of Silt and Sand
- ML- Clayey Silt or Silty Clay
- WD- Wood Debris, Chips or Sawdust Occasionally
- Qf- Catastrophic Flood Deposits Consisteing of Gravels and Sands
- Tt- Troutdale Formation
- Sediment/Soil Cap
- Approximate Average Water Level 2008
- Creosote Odor
- Strong Creosote Odor
- Heavy Sheen
- Saturated

NOTE: Refer to Figure 1-4 for Plan View of Cross Section Location.

Horizontal Scale in Feet
0 200 400
0 40 80
Vertical Scale in Feet
Vertical Exaggeration = 5x

McCormick and Baxter Superfund Site
Portland, Oregon

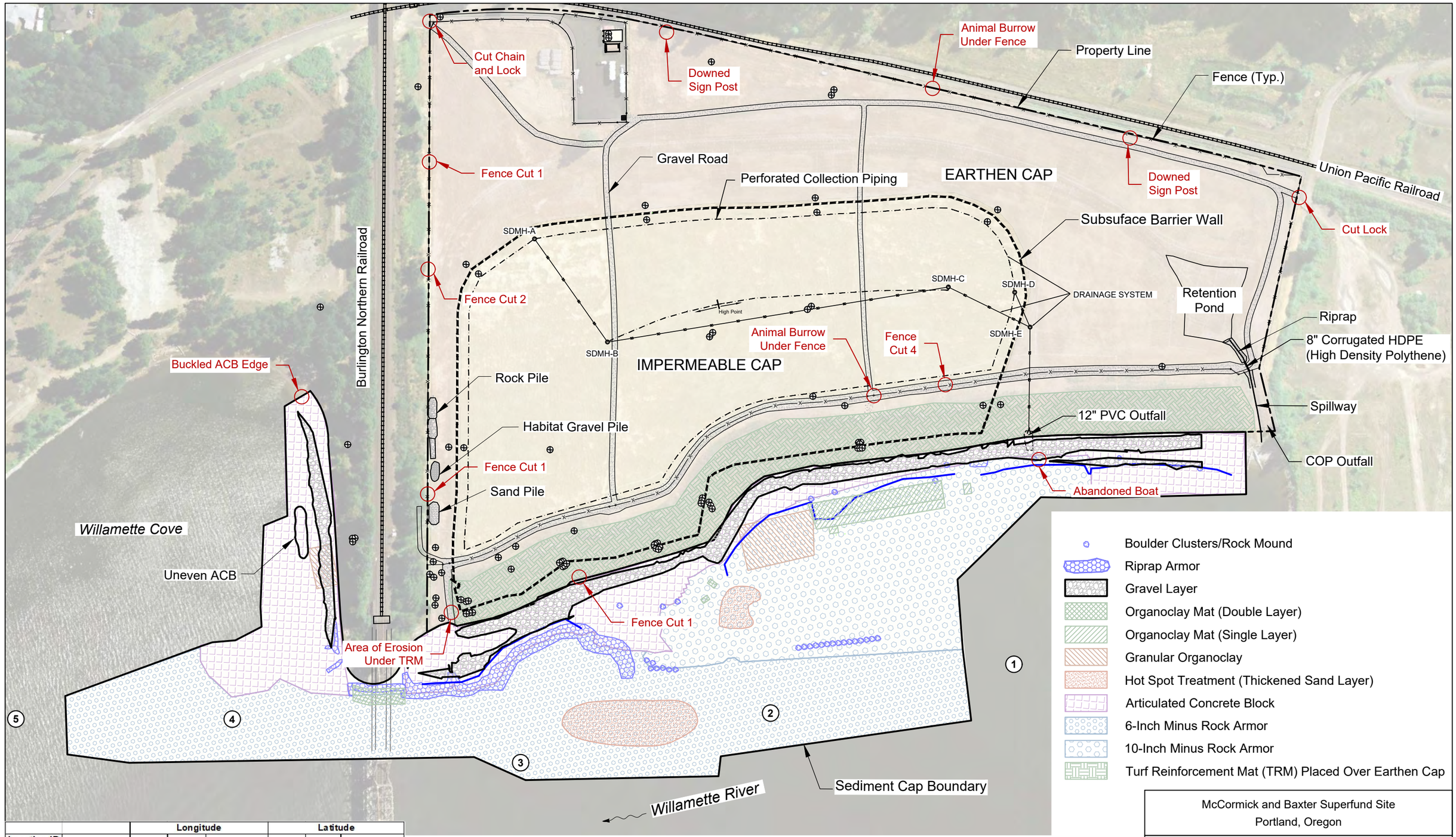
Historical NAPL Distribution Cross Section

03/20

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Figure
1-6

F:\Notebooks\1567010_DEQ McCormick & Baxter O&M\CAD\1567010_(NAPL X-Sect).pdf



Location ID Figure 2.5	Buoy Label	Longitude			Latitude		
		Degree	Minute	Second	Degree	Minute	Second
1	Danger Rocks	-122	44	27.9115188	45	34	33.7505887
2	Danger Rocks	-122	44	34.6730244	45	34	36.3603940
3	Danger Rocks	-122	44	41.5979124	45	34	39.0343156
4	Danger Rocks	-122	44	47.5345212	45	34	43.8265931
5	Danger Rocks	-122	44	53.2295880	45	34	47.1865397
Coordinate projection: GCS_North_American_1983							

McCormick and Baxter Superfund Site
Portland, Oregon

Site Observation Summary

04/21

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Figure **2-1**

File: \\haleyaldrich.com\share\pdx_data\Notebooks\150002005_DEQ_McCormick_and_Baxter_Soil_and_Sed_O_and_MCAD\150002005_(Site Observation).dwg Layout:Site Observation (ForInspections) (2021) Date: 05-28-2021 Author: ms

FIGURE 3-1

Surface, Inter-armor, Sub-armor, and Crayfish Sampling Locations

McCormick and Baxter Superfund Site
Portland, Oregon



LEGEND

O&M Sample Locations

- Crayfish Sample Location
- Compliance Monitoring Sample Location
- Early Warning Sample Location
- Background Sample Location
- Compliance Monitoring Area

All Other Features

- MW-37s; DGPS Reference Location
- Boulder Cluster
- Actual Willamette River Level (7.0 feet NAVD88)
- Sediment Cap Boundary
- Organoclay Mats (Single)
- Organoclay Mats (Double)
- Organoclay Granular
- Articulated Concrete Block (ACB)
- Hot Spot Treatment (thickened sand layer)
- Subsurface Barrier Wall

NOTE
Aerial photo taken Summer 2018.

Date: May 21, 2021
Data Sources: COP aerial photo

N

0 125 250 375
Feet

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Document Path: Y:\0205_OR_DEQ\Source_Figures\028_MB_OM_2018\003_Annual_OM_Report\SAP\Figure3-1_Surf_Inter_Sub_Armor_Crayfish_Sample_Locs.mxd



FIGURE 4-1

Groundwater Monitoring Well Location Map

McCormick and Baxter Superfund Site
Portland, Oregon

LEGEND

- Groundwater Monitoring Well
- Groundwater Monitoring Well with Transducer
- Subsurface Barrier Wall

Date: March 2, 2020
Data Sources: Aerial photo City of Portland, 2018

N

0 100 200 300
Feet

HARTCROWSER

GSI Water Solutions, Inc.

Document Path: Y:\0205_OR_DEQ\Source_Figures\003_003_M_B\2019_Annual_Report\Figure4-1_Monitoring_Well_Location_Map.mxd

FIGURE 4-2

Groundwater Contour Map for June 17, 2020 Sampling Event

McCormick and Baxter Superfund Site
Portland, Oregon



LEGEND

- Groundwater Monitoring Well
- Groundwater Monitoring Well with Transducer
- Groundwater Elevation Contour (dashed where inferred)
- Willamette River Water Level During Sampling Event (12.18 feet)
- Subsurface Barrier Wall

NOTES

1. Elevations shown in NAVD88.
2. Aerial photo taken summer of 2018.
3. Water levels measured between 9:30 a.m. and 4:00 p.m.
4. Willamette River low tide at 4:30 p.m. River elevation: 12.18 feet NAVD88
5. MW-Os and MW-54s was not included in the creation of the groundwater elevation contours due to anomalous readings.

Date: April 28, 2021
Data Sources: Aerial photo City of Portland, 2018

N

0 100 200 300
Feet

HARTCROWSER

GSI Water Solutions, Inc.

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Document Path: Y:\0205_OR_DEQ\Source_Figures\003_003_M_B\2020_Annual_Report\Figure4-3_GW_Elevations_Oct2020.mxd

FIGURE 4-3

Groundwater Contour Map for October 6, 2020 Sampling Event

McCormick and Baxter Superfund Site
Portland, Oregon

LEGEND

- Groundwater Monitoring Well
- Groundwater Monitoring Well with Transducer
- Groundwater Elevation Contour (dashed where inferred)
- Willamette River Water Level During Sampling Event (5.76 feet)
- Subsurface Barrier Wall

NOTES

1. Elevations shown in NAVD88.
2. Aerial photo taken summer of 2018.
3. Water levels measured between 9:30 a.m. and 4:30 p.m.
4. Willamette River low tide at 2:00 p.m. River elevation: 5.76 feet NAVD88
5. MW-Os was not included in the creation of the groundwater elevation contours due to anomalous reading.

NM = Not Measured

Date: April 28, 2021
Data Sources: Aerial photo City of Portland, 2018

N

0 100 200 300
Feet

HARTCROWSER

GSI Water Solutions, Inc.

Current Top of Wall elevation at 31.0 ft NAVD88

Elevation (feet NAVD88)

Daily Precipitation (inches)

35
30
25
20
15
10
5
0

10
8
6
4
2
0

10/1/2019
11/1/2019
12/1/2019
1/1/2020
2/1/2020
3/1/2020
4/1/2020
5/1/2020
6/1/2020
7/1/2020
8/1/2020
9/1/2020
10/1/2020

Legend

- MW-52s (Interior)
- MW-53s (Exterior)
- River
- Precipitation



Notes:
MW-52s is located inside the barrier wall and MW-53s is located outside the barrier wall.

Due to barometric pressure transducer failure, barometric pressure data from a weather station at Portland International Airport was used from 09/12/2019 - 02/27/2020.

McCormick and Baxter Superfund Site
Portland, Oregon

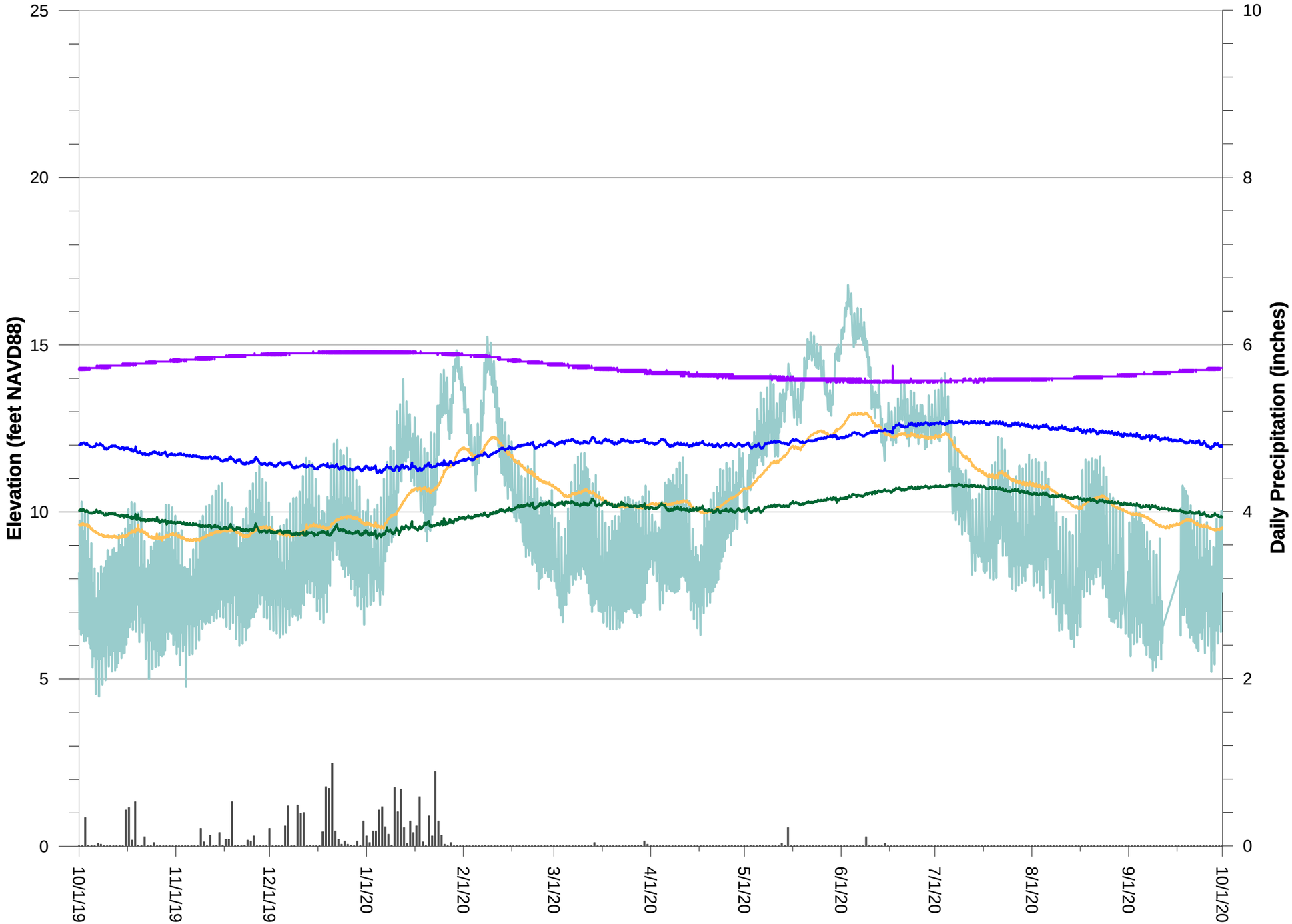
2020 Groundwater Elevations in Monitoring Wells MW-52s and MW-53s

HARTCROWSER

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Figure

4-4



Legend

- EW-1s
- MW-36s
- MW-44s
- MW-52s
- River
- Precipitation



Notes:
Monitoring wells EW-1s, MW-36s, MW-44s, and MW-52s are located inside the barrier wall.

Due to barometric pressure transducer failure, barometric pressure data from weather station at Portland International Airport was used from 09/12/2019 - 02/27/2020.

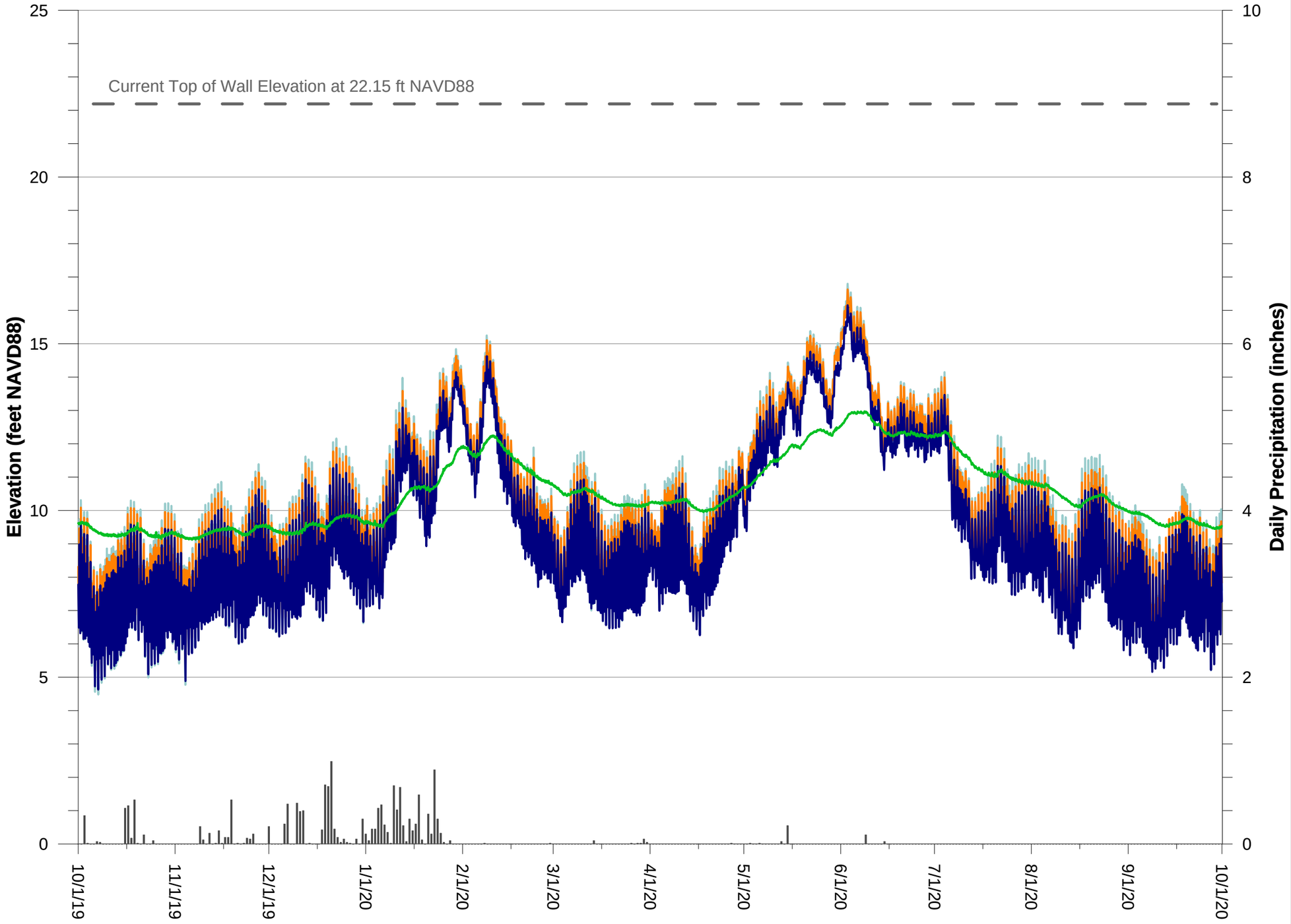
McCormick and Baxter Superfund Site
Portland, Oregon

2020 Groundwater Elevations within the Barrier Wall

HARTCROWSER

GSI Water Solutions, Inc.

Figure
4-5



Legend

- MW-36s (Interior)
- MW-36d (Interior)
- MW-37s (Exterior)*
- MW-37d (Exterior)
- River
- Precipitation



Notes:
MW-36 well cluster is located inside the barrier wall and MW-37 well cluster is located outside the barrier wall.

Due to barometric pressure transducer failure, barometric pressure data from a weather station at Portland International Airport was used from 09/12/2020 - 02/27/2020.

*No data at MW-37s due to battery failure.

McCormick and Baxter Superfund Site
Portland, Oregon

2020 Groundwater Elevations in Monitoring Wells MW-36 and MW-37

HARTCROWSER GSI Water Solutions, Inc.

Figure
4-6

Current Top of Wall elevation at 23.35 ft NAVD88

Elevation (feet NAVD88)

Daily Precipitation (inches)

25
20
15
10
5
0

10
8
6
4
2
0

10/1/19
11/1/19
12/1/19
1/1/20
2/1/20
3/1/20
4/1/20
5/1/20
6/1/20
7/1/20
8/1/20
9/1/20
10/1/20

Legend

- MW-44s (Interior)
- MW-44d (Interior)*
- MW-45s (Exterior)
- MW-45d (Exterior)
- River
- Precipitation



Notes:
MW-44 well cluster is located inside the barrier wall and MW-45 well cluster is located outside the barrier wall.

Breaks in transducer data are the result of removal for calibration, removal for well modification, or a transducer was not collecting accurate pressure readings.

Due to barometric pressure transducer failure, barometric pressure data from a weather station at Portland International Airport was used from 09/12/2019 - 02/27/2020.

*No data at MW-44d due to battery failure.

McCormick and Baxter Superfund Site
Portland, Oregon

2020 Groundwater Elevations in Monitoring Wells MW-44 and MW-45

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GSI Water Solutions, Inc.

Figure
4-7



FIGURE 4-8

Measureable LNAPL and DNAPL Distribution Map for June 17, 2020 Sampling Event

McCormick and Baxter Superfund Site
Portland, Oregon

LEGEND

- Subsurface Barrier Wall

Groundwater Monitoring Wells (Thickness, feet, of LNAPL or DNAPL)

- Well with Measureable LNAPL
- Well with Measureable DNAPL
- Well without Measureable LNAPL or DNAPL

NOTE

1. Trace LNAPL was identified in EW-10s and MW-56s.

Date: April 28, 2021
Data Sources: Aerial photo City of Portland, 2018

N

0 100 200 300
Feet

HARTCROWSER

GSI Water Solutions, Inc.

Document Path: Y:\0205_OR_DEQ\Source_Figures\003_003_M_B\2020_Annual_Report\Figure4-8_LNAPL_and_DNAPL_Map_June2020.mxd



FIGURE 4-9

Measureable LNAPL and DNAPL Distribution Map for October 6, 2020, Sampling Event

McCormick and Baxter Superfund Site
Portland, Oregon

LEGEND

- Subsurface Barrier Wall

Groundwater Monitoring Wells (Thickness, feet, of LNAPL or DNAPL)

- Well with Measureable LNAPL
- Well with Measureable DNAPL
- Well without Measureable LNAPL or DNAPL

NOTE

1. Trace LNAPL was identified in MW-Ds, MW-Gs, and MW-10r.

Date: April 28, 2021
Data Sources: Aerial photo City of Portland, 2018

N

0 100 200 300
Feet

HARTCROWSER

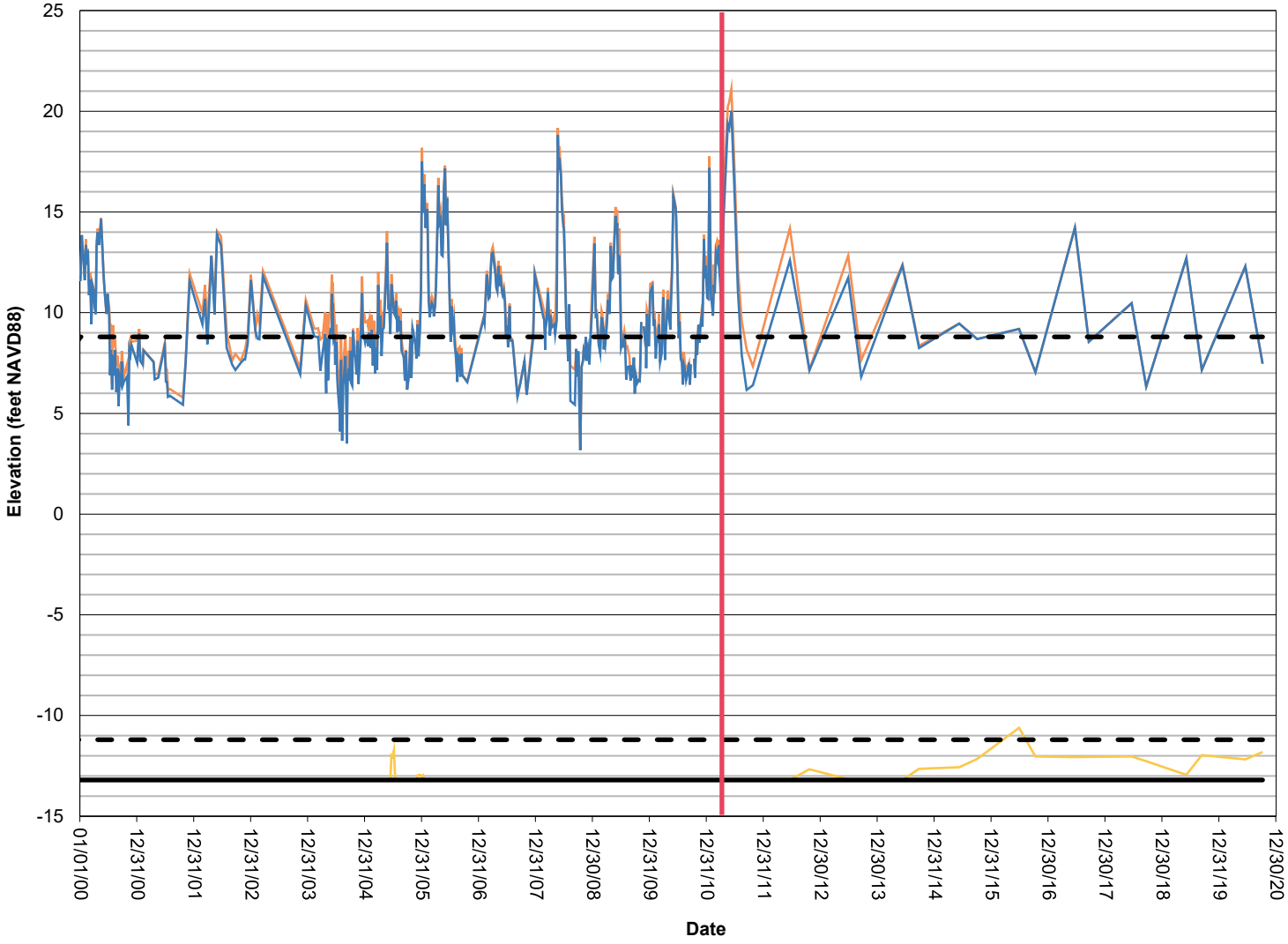
GSI Water Solutions, Inc.

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FIGURE 4-10

1999 to 2020 NAPL Thickness Plot for Well EW-10s

McCormick and Baxter Superfund Site
Portland, Oregon



LEGEND

- LNAPL
- Groundwater
- DNAPL
- Well Screen (Top and Bottom)[1]
- Well Depth[2]
- Stopped NAPL Recovery[3]

NOTES

- Barrier Wall Completed 06/30/03
- Grouting Completed 7/2004

1. Top of Well Screen at 8.80 ft NAVD88
   Bottom of Well Screen at -11.20 ft NAVD88
2. Existing Well Depth at -13.20 ft NAVD88
3. Stopped NAPL Recovery 4/21/11

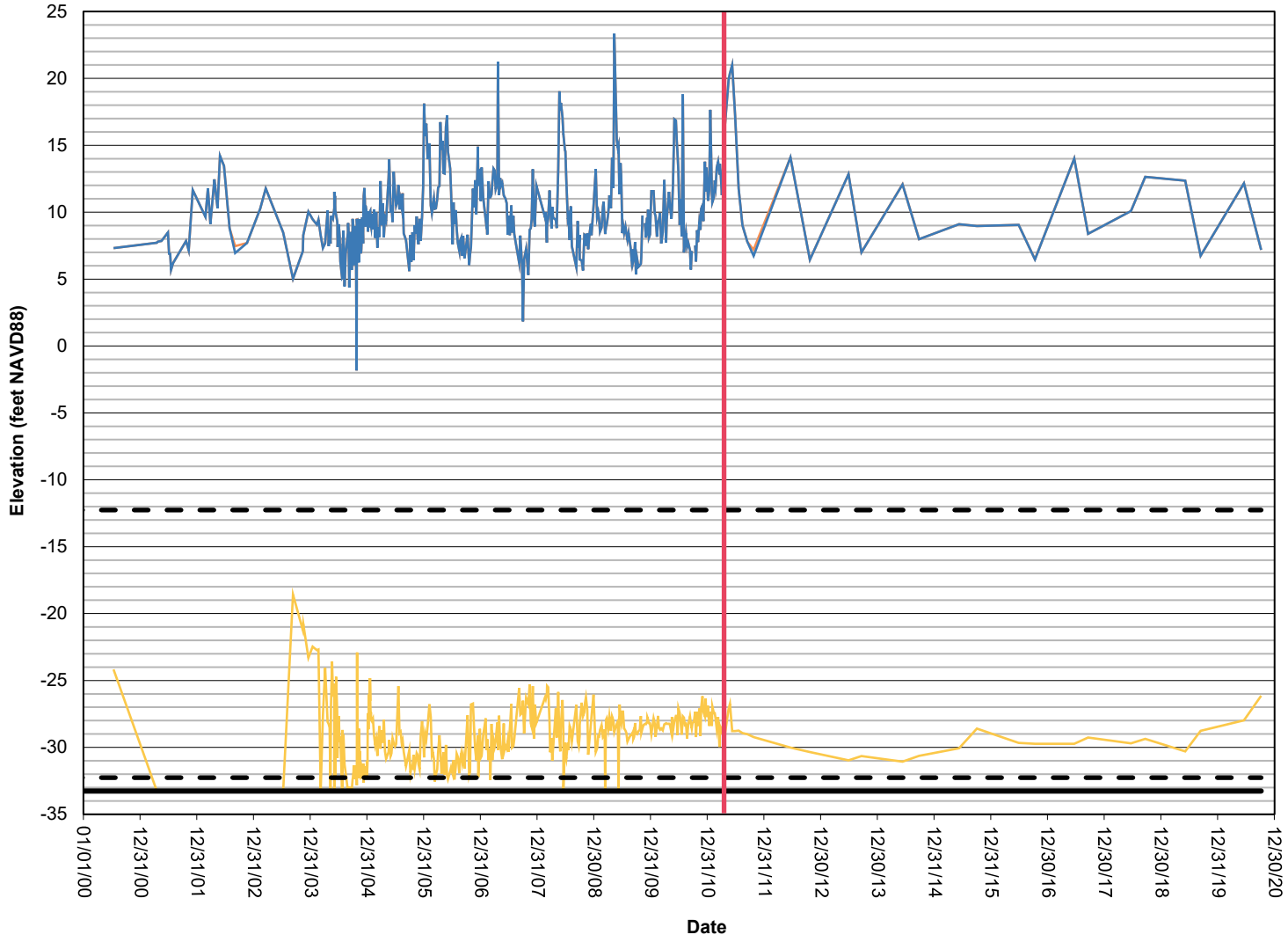
HARTCROWSER GSI Water Solutions, Inc.

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FIGURE 4-11

2001 to 2020 NAPL Thickness Plot for Well MW-20i

McCormick and Baxter Superfund Site
Portland, Oregon



LEGEND

- LNAPL
- Groundwater
- DNAPL
- Well Screen (Top and Bottom)[1]
- Well Depth[2]
- Stopped NAPL Recovery[3]

NOTES

- Barrier Wall Completed 06/30/03
- Grouting Completed 7/2004

1. Top of Well Screen at -12.26 ft NAVD88
   Bottom of Well Screen at -32.26 ft NAVD88
2. Existing Well Depth at -33.26 ft NAVD88
3. Stopped NAPL Recovery 4/21/11

DNAPL recovery was attempted in July 2007 but the extracted liquid appeared to be water with speck sized globules of DNAPL (with a creosote odor), rather than a distinct layer, suggesting that the DNAPL thicknesses measured may not accurately reflect the amount of DNAPL in the well.

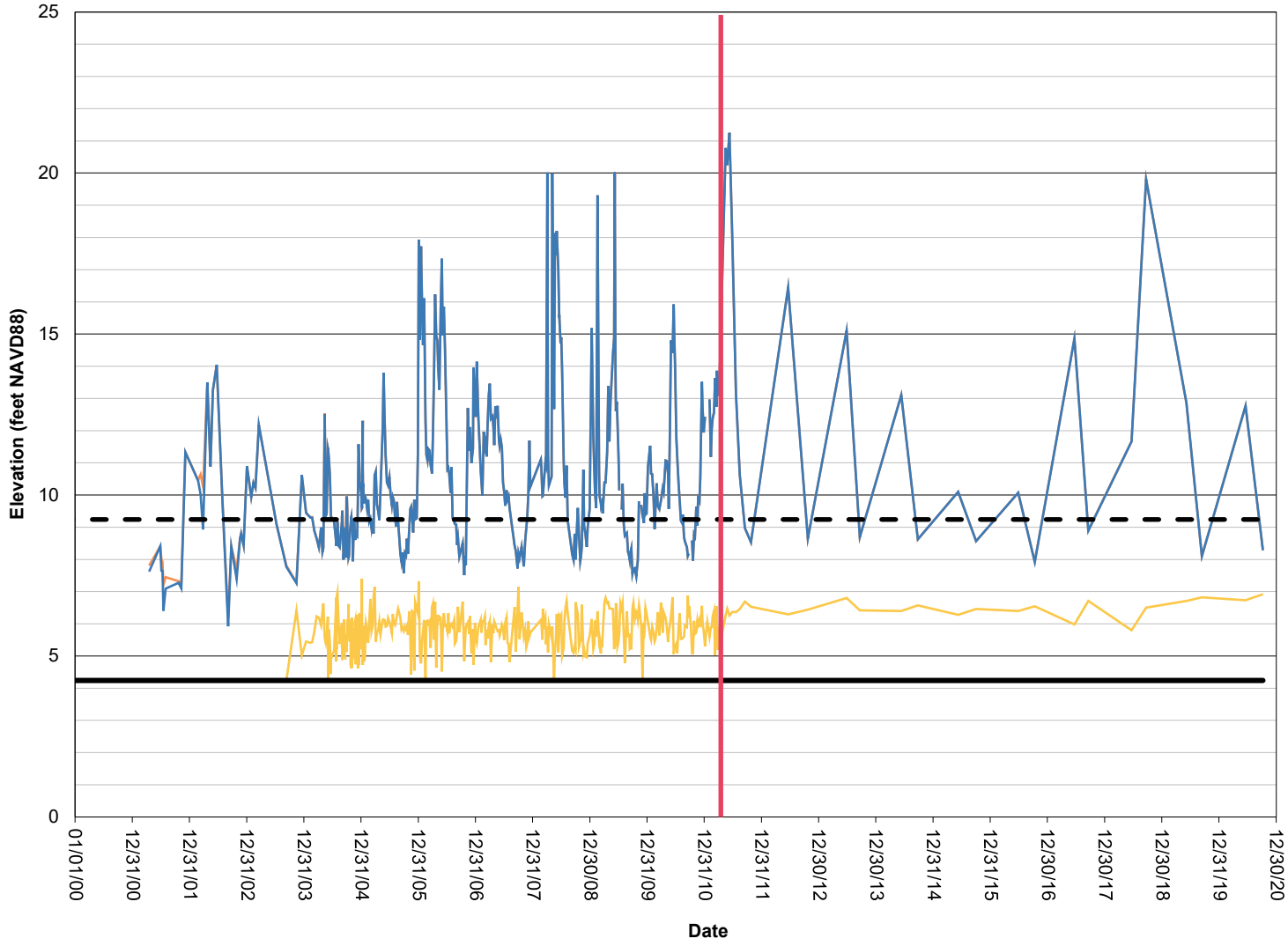
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FIGURE 4-12

2001 to 2020 NAPL Thickness Plot for Well MW-Ds

McCormick and Baxter Superfund Site
Portland, Oregon



LEGEND

- LNAPL
- Groundwater
- DNAPL
- Well Screen (Top and Bottom)[1]
- Well Depth[2]
- Stopped NAPL Recovery[3]

NOTES

- Barrier Wall Completed 06/30/03
- Grouting Completed 7/2004

1. Top of Well Screen at 9.24 ft NAVD88
   Bottom of Well Screen at 4.24 ft NAVD88
2. Existing Well Depth at 4.24 ft NAVD88
3. Stopped NAPL Recovery 4/21/11

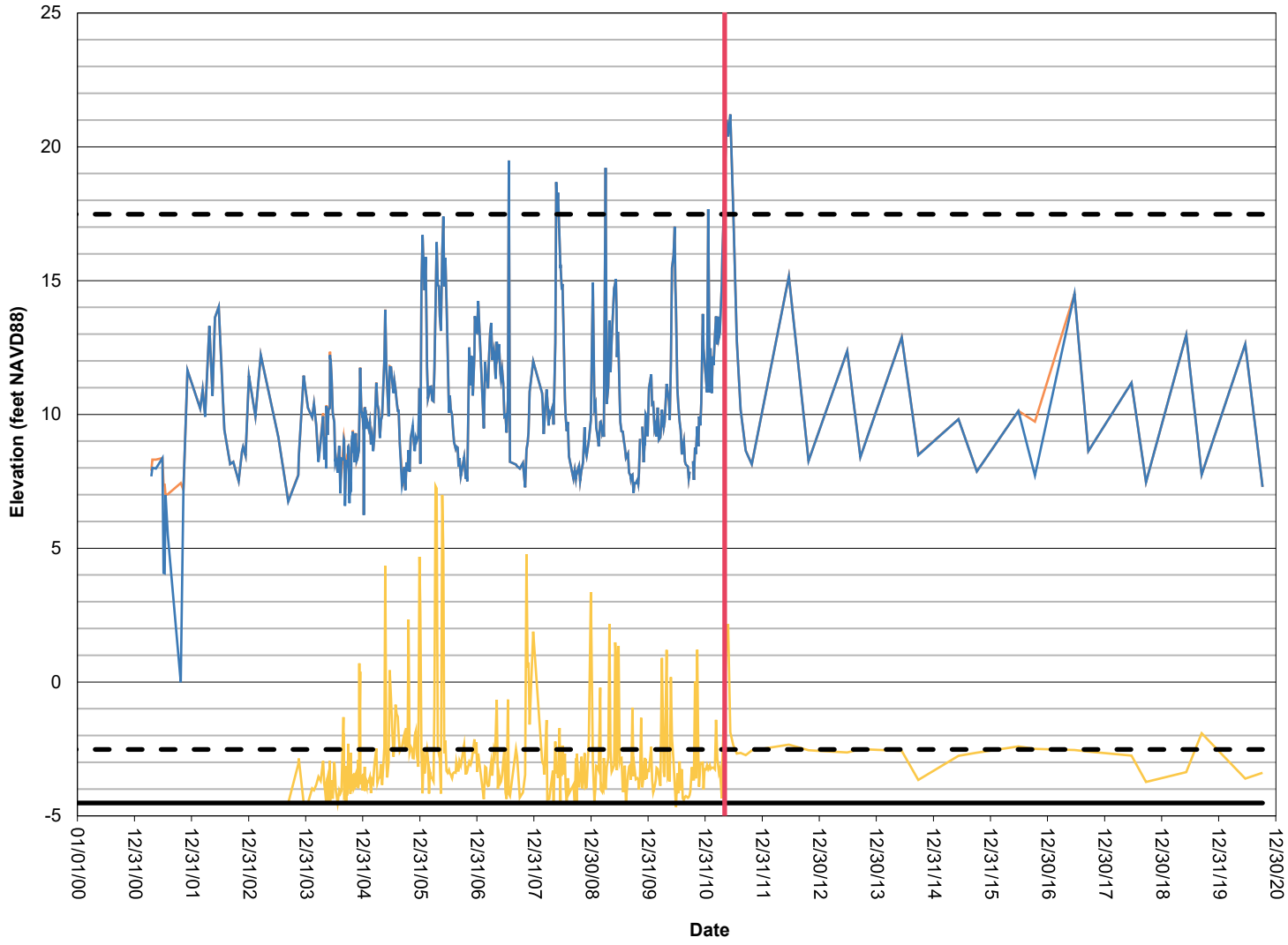
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FIGURE 4-13

2001 to 2020 NAPL Thickness Plot for Well MW-Gs

McCormick and Baxter Superfund Site
Portland, Oregon



LEGEND

- LNAPL
- Groundwater
- DNAPL
- Well Screen (Top and Bottom)[1]
- Well Depth[2]
- Stopped NAPL Recovery[3]

NOTES

- Barrier Wall Completed 06/30/03
- Grouting Completed 7/2004

1. Top of Well Screen at 17.48 ft NAVD88
   Bottom of Well Screen at -2.52 ft NAVD88
2. Existing Well Depth at -4.52 ft NAVD88
3. Stopped NAPL Recovery 4/21/11

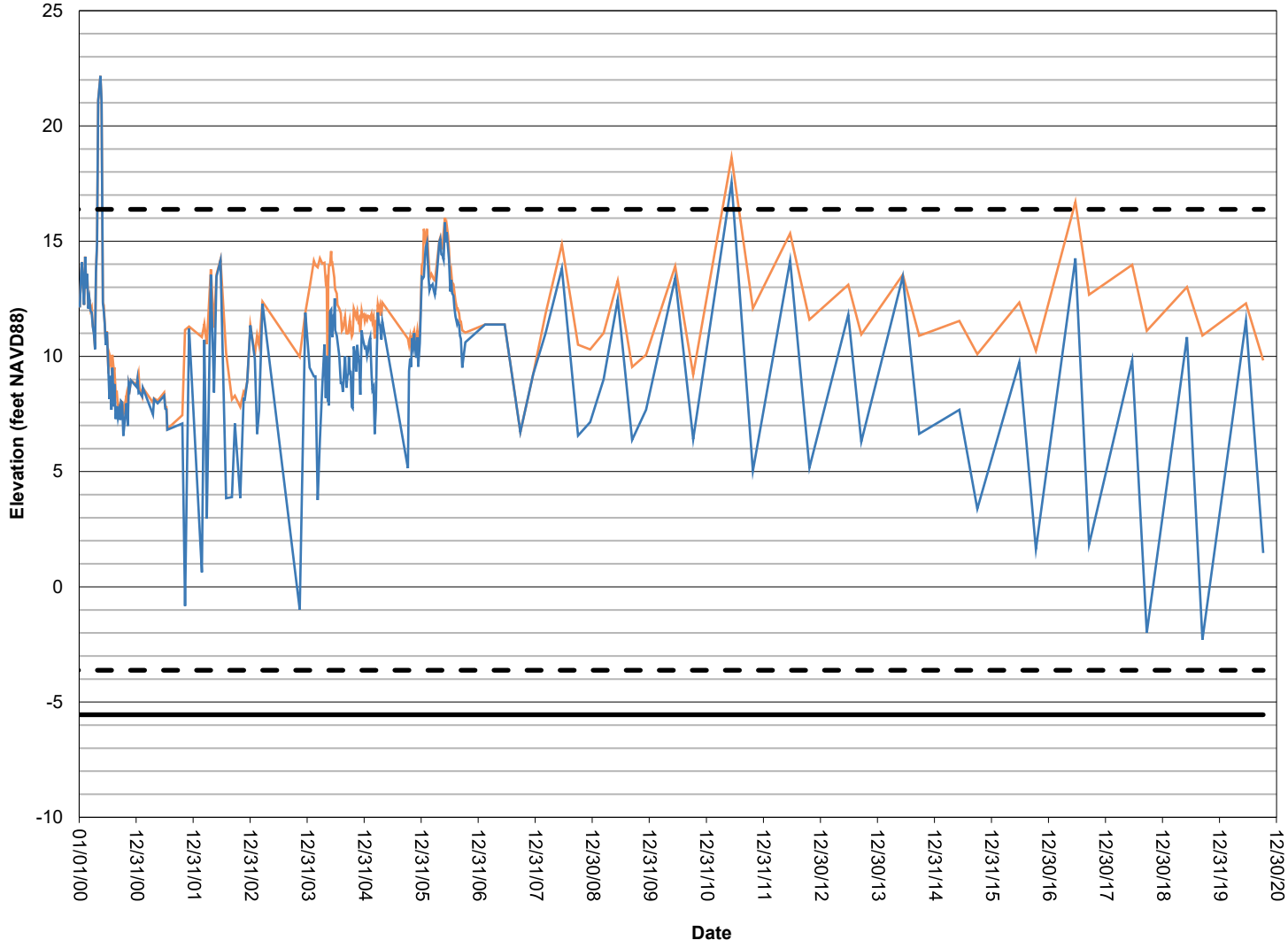
HARTCROWSER GSI Water Solutions, Inc.

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FIGURE 4-14

1999 to 2020 NAPL Thickness Plot for Well EW-15s

McCormick and Baxter Superfund Site
Portland, Oregon



LEGEND

- LNAPL
- Groundwater
- Well Screen (Top and Bottom)[1]
- Well Depth[2]

NOTES

- Barrier Wall Completed 06/30/03
- Grouting Completed 7/2004

1. Top of Well Screen at 16.38 ft NAVD88
   Bottom of Well Screen at -3.62 ft NAVD88
2. Existing Well Depth at -5.55 ft NAVD88

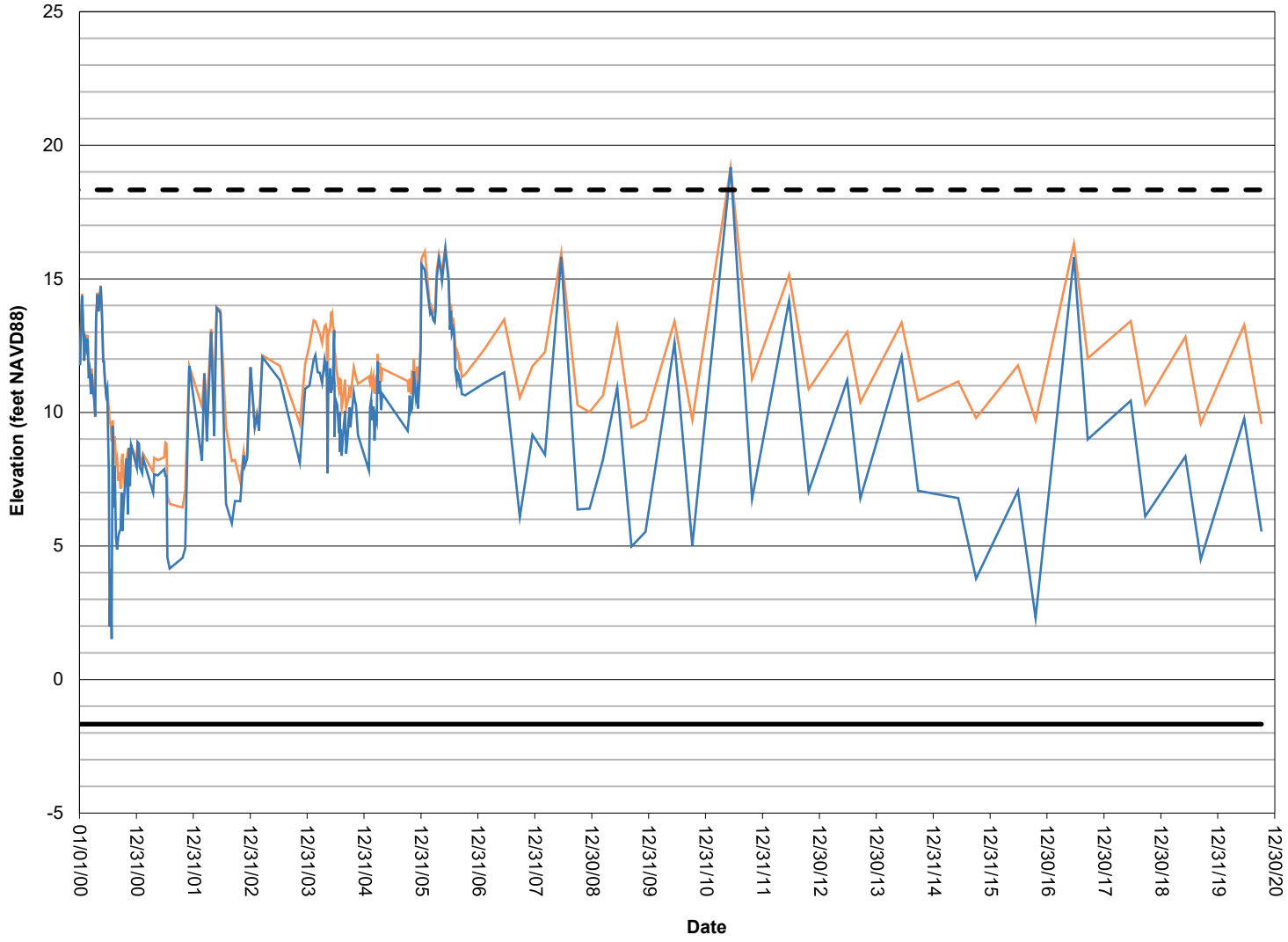
HARTCROWSER GSI Water Solutions, Inc.

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FIGURE 4-15

1999 to 2020 NAPL Thickness Plot for Well EW-23s

McCormick and Baxter Superfund Site
Portland, Oregon



LEGEND

- LNAPL
- Groundwater
- Well Screen (Top and Bottom)[1]
- Well Depth[2]

NOTES

- Barrier Wall Completed 06/30/03
- Grouting Completed 7/2004

1. Top of Well Screen at 18.33 ft NAVD88
   Bottom of Well Screen at -1.67 ft NAVD88
2. Existing Well Depth at -1.67 ft NAVD88

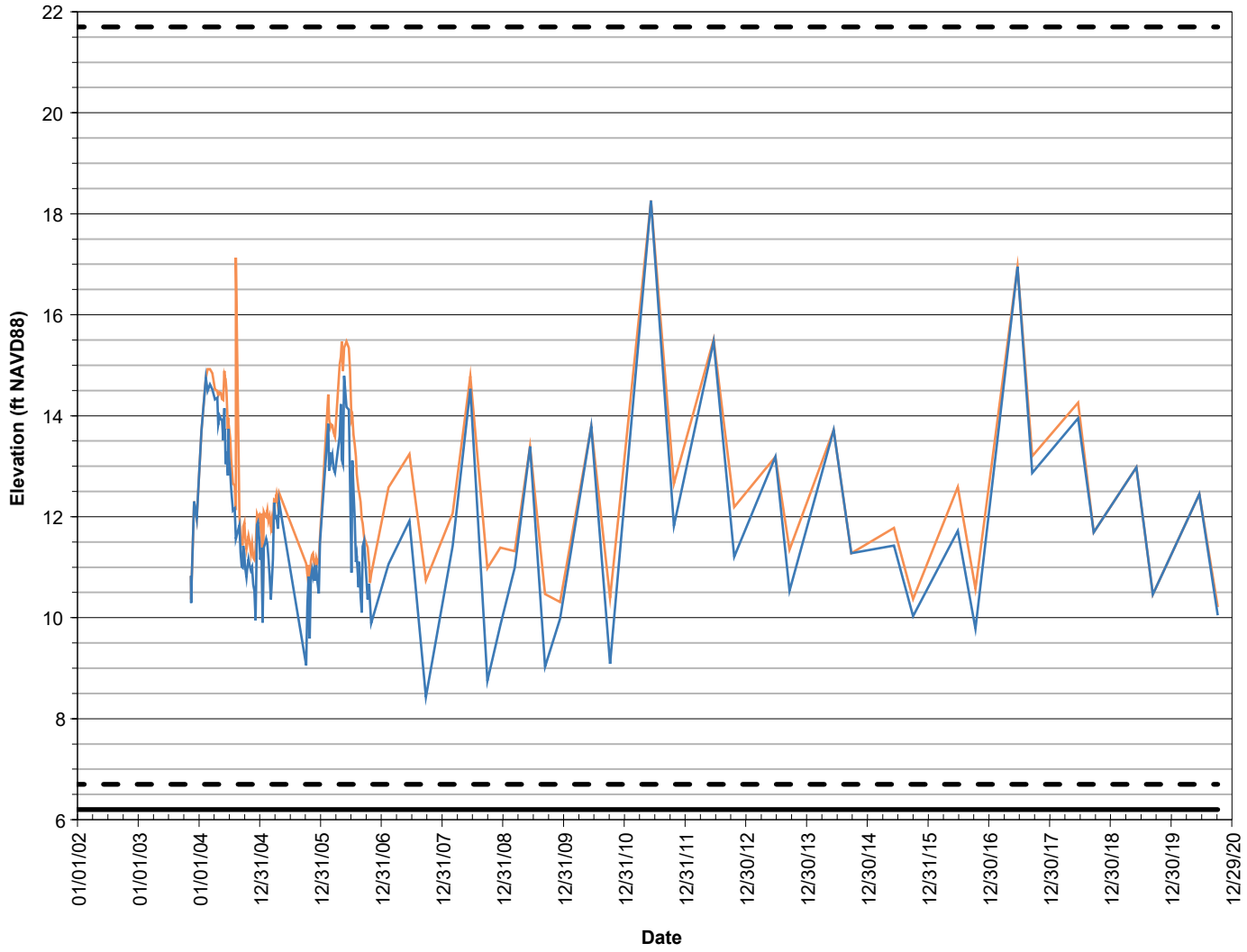
HARTCROWSER GSI Water Solutions, Inc.

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FIGURE 4-16

2003 to 2019 NAPL Thickness Plot for Well MW-56s

McCormick and Baxter Superfund Site
Portland, Oregon



LEGEND

- LNAPL
- Groundwater
- Well Screen (Top and Bottom)[1]
- Well Depth[2]

NOTES

- Barrier Wall Completed 06/30/03
- Grouting Completed 7/2004

1. Top of Well Screen at 21.70 ft NAVD88
   Bottom of Well Screen at 6.70 ft NAVD88
2. Existing Well Depth at 6.20 ft NAVD88

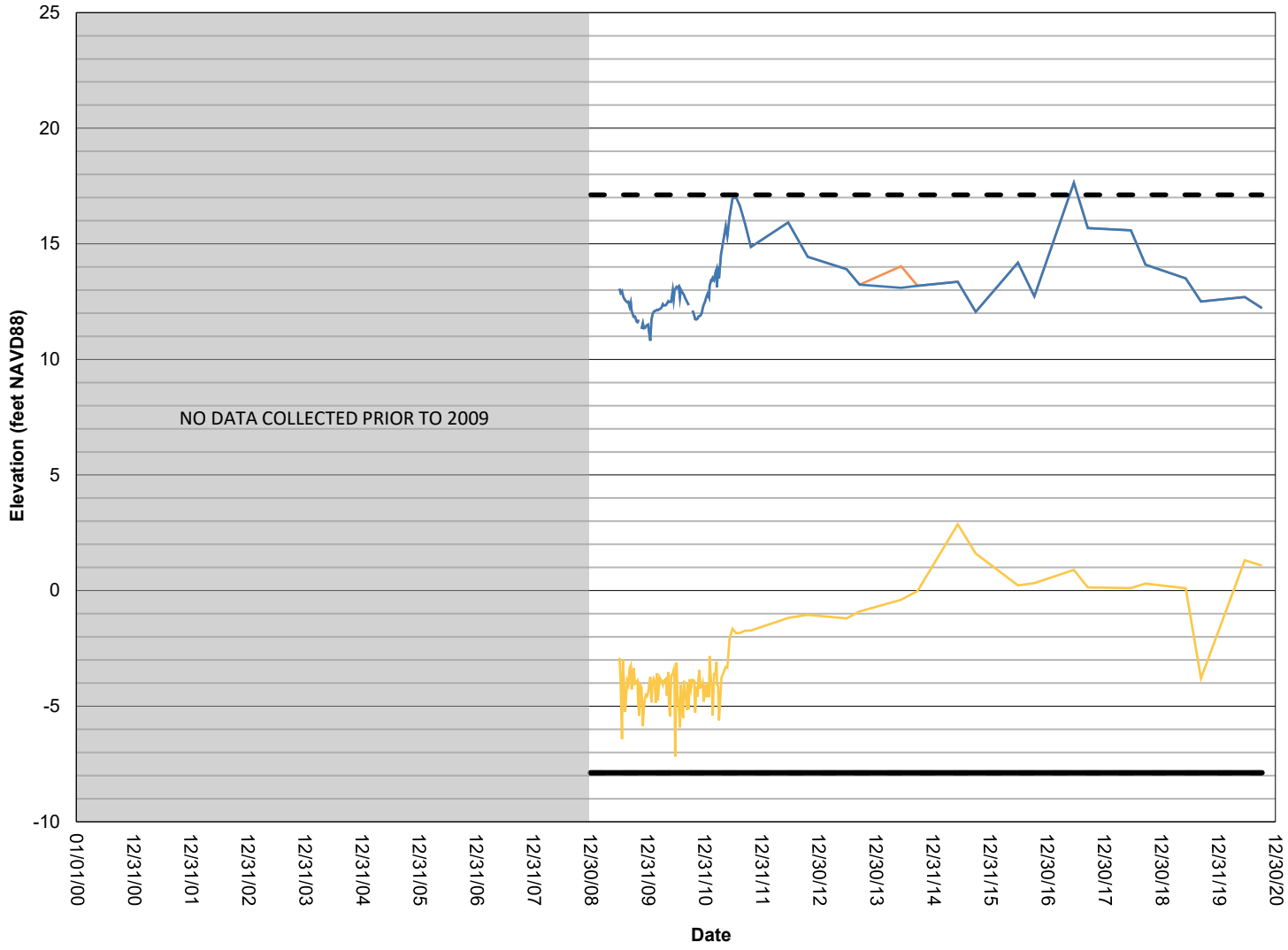
HARTCROWSER GSI Water Solutions, Inc.

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FIGURE 4-17

2009 to 2020 NAPL Thickness Plot for Well EW-1s

McCormick and Baxter Superfund Site
Portland, Oregon



LEGEND

- LNAPL
- Groundwater
- DNAPL
- Well Screen (Top and Bottom)[1]
- Well Depth[2]
- Stopped NAPL Recovery[3]

NOTES

1. Top of Well Screen at 17.12 ft NAVD88
   Bottom of Well Screen at -7.88 ft NAVD88
2. Existing Well Depth at -7.88 ft NAVD88
3. Stopped NAPL Recovery 4/21/11

Ground subsidence has been observed in the vicinity of EW-1s and the well casing has sunk over time. The screened interval and total well depth have been referenced to the most recent ground survey from September 2009. Given that the elevations are changing with time, the elevations shown are approximate.

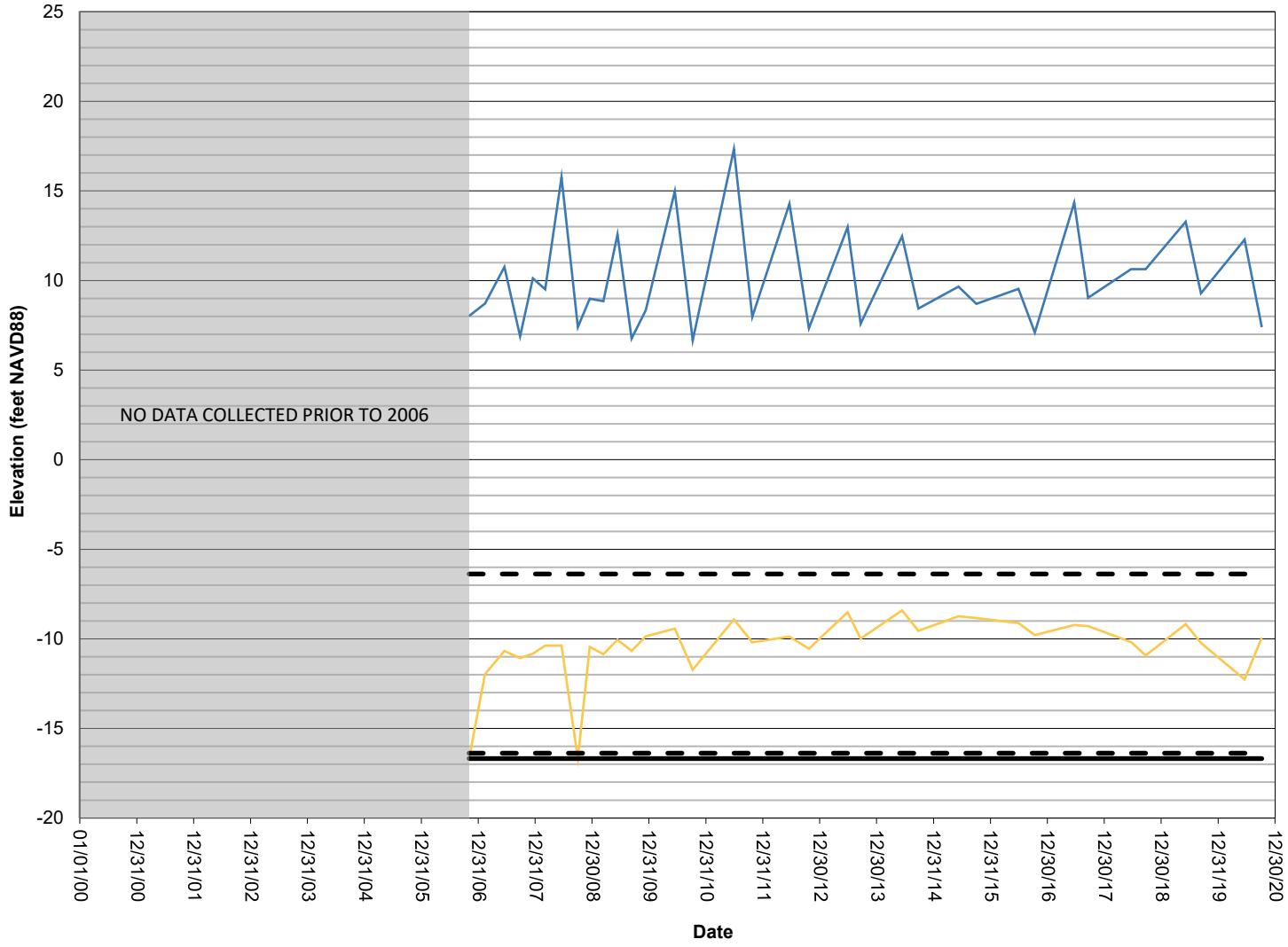
HARTCROWSER GSI Water Solutions, Inc.

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FIGURE 4-18

2006 to 2020 NAPL Thickness Plot for Well MW-22i

McCormick and Baxter Superfund Site
Portland, Oregon



LEGEND

- LNAPL
- Groundwater
- DNAPL
- Well Screen (Top and Bottom)[1]
- Well Depth[2]

NOTES

1. Top of Well Screen at -6.38 ft NAVD88
   Bottom of Well Screen at -16.38 ft NAVD88
2. Existing Well Depth at -16.68 ft NAVD88

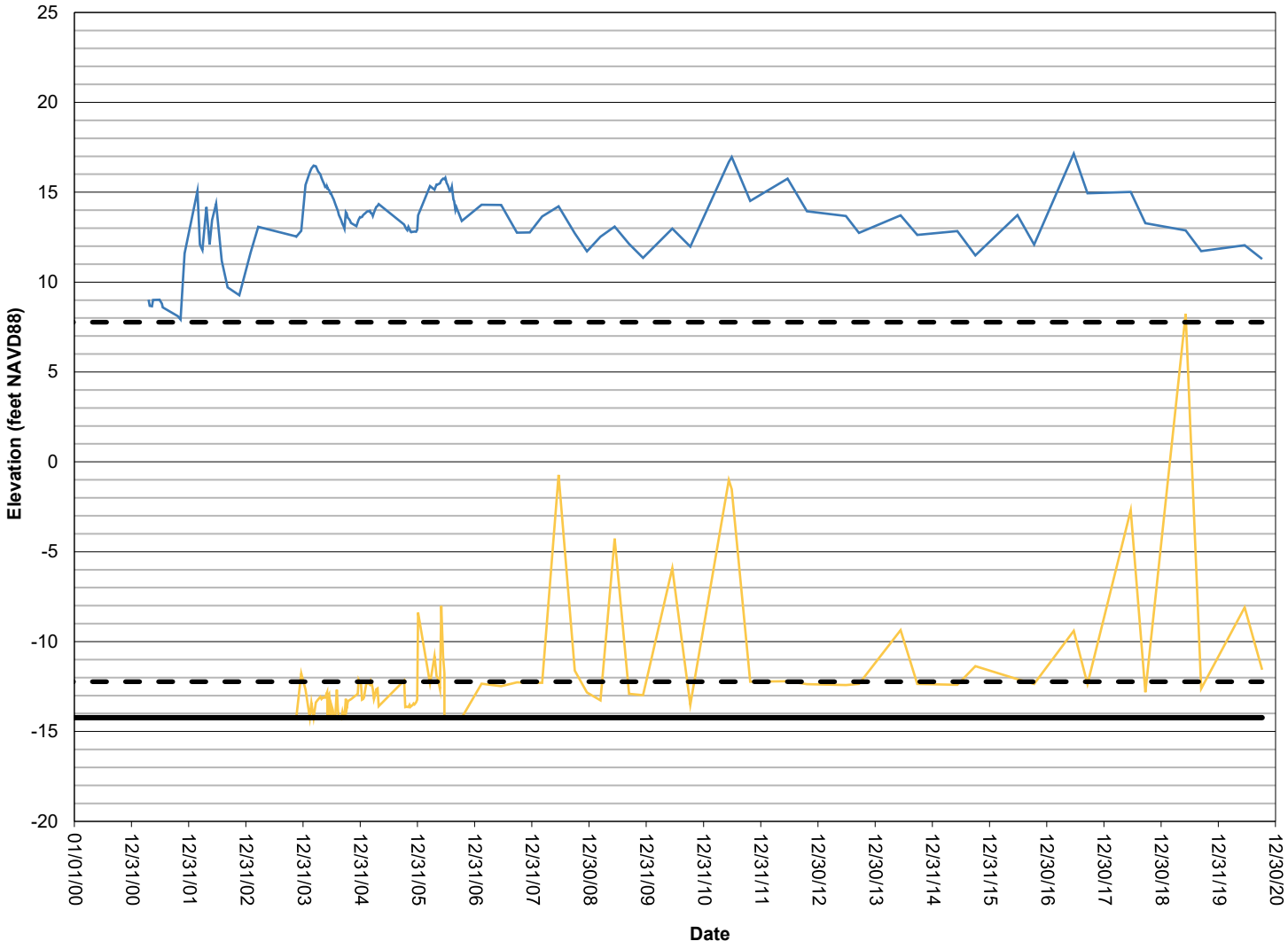
HARTCROWSER GSI Water Solutions, Inc.

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FIGURE 4-19

2001 to 2020 NAPL Thickness Plot for Well EW-8s

McCormick and Baxter Superfund Site
Portland, Oregon



LEGEND

- Groundwater
- DNAPL
- Well Screen (Top and Bottom)[1]
- Well Depth[2]

NOTES

- Barrier Wall Completed 06/30/03
- Grouting Completed 7/2004

1. Top of Well Screen at 7.77 ft NAVD88
   Bottom of Well Screen at -12.23 ft NAVD88
2. Existing Well Depth at -14.23 ft NAVD88

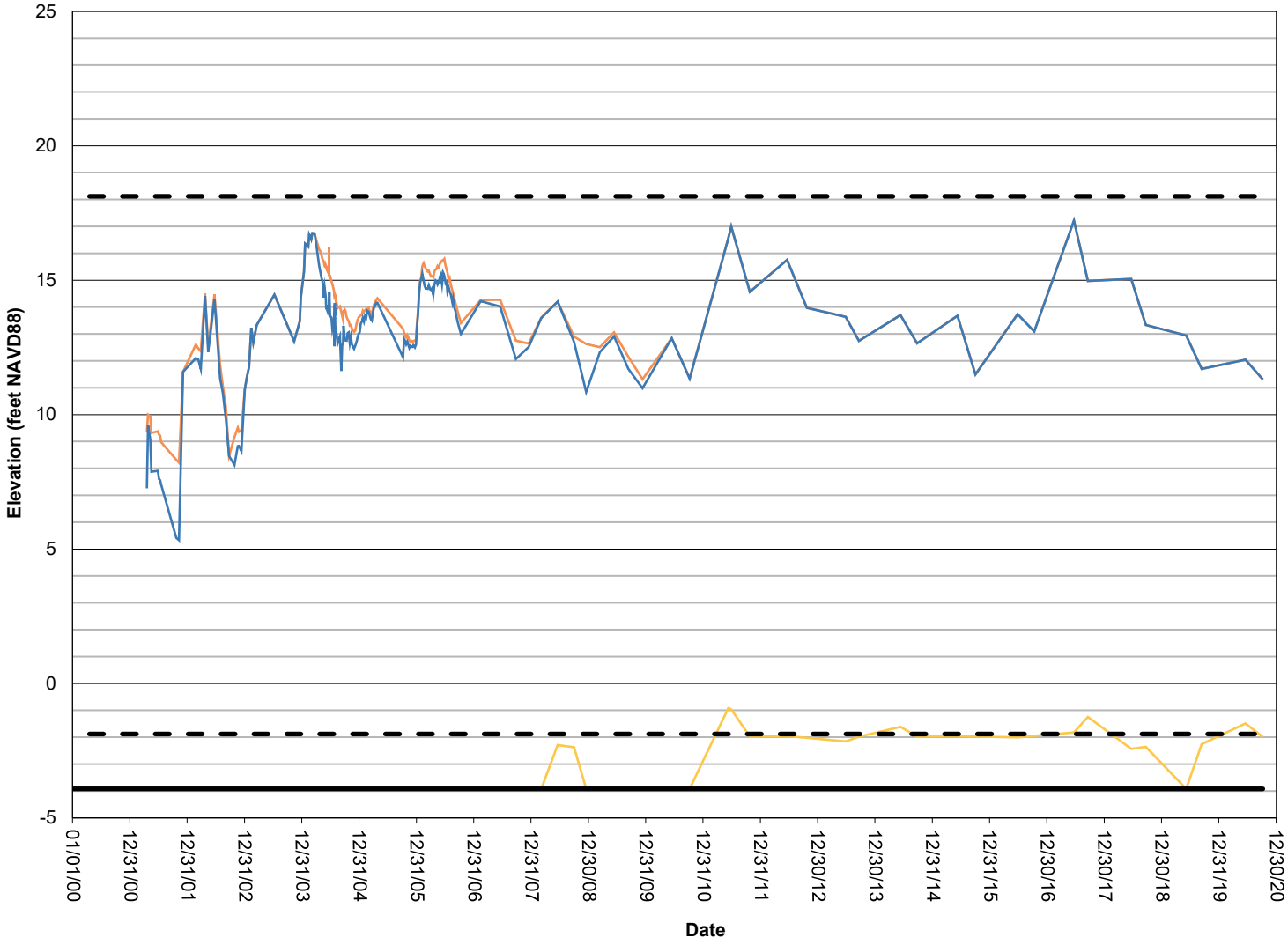
HARTCROWSER GSI Water Solutions, Inc.

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FIGURE 4-20

2001 to 2020 NAPL Thickness Plot for Well EW-18s

McCormick and Baxter Superfund Site
Portland, Oregon



LEGEND

- LNAPL
- Groundwater
- DNAPL
- Well Screen (Top and Bottom)[1]
- Well Depth[2]

NOTES

- Barrier Wall Completed 06/30/03
- Grouting Completed 7/2004

1. Top of Well Screen at 18.12 ft NAVD88
   Bottom of Well Screen at -1.88 ft NAVD88
2. Existing Well Depth at -3.92 ft NAVD88

HARTCROWSER GSI Water Solutions, Inc.

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FIGURE 4-21

Water Quality Sampling Wells

McCormick and Baxter Superfund Site
Portland, Oregon

LEGEND

- Site-Wide Groundwater Quality Sampling Well
- Infiltration Pond Assessment Sampling Well
- Groundwater Monitoring Well
- Swale
- Infiltration Pond
- Subsurface Barrier Wall

NOTE
Water quality samples were taken during the two monitoring events in 2020.

Date: April 14, 2021
Data Sources: Aerial photo City of Portland, 2018

N

0 100 200 300
Feet

HARTCROWSER

GSI Water Solutions, Inc.

Document Path: Y:\0205_OR_DEQ\Source_Figures\003_003_M_B\2020_Annual_Report\Figure4-21_Water_Quality_Samples.mxd

ENTRANCE AREA
Fence (Typ.)
Property Line
Gravel Road
Union Pacific Railroad
DRAINAGE SWALE
EARTHEN CAP
Barrier Wall
Stormwater Retention Pond
Riprap
IMPERMEABLE CAP
Rock Pile
RIPARIAN AREA
Sand Pile
SEDIMENT CAP
Burlington Northern Inc. (Spokane, Portland, and Seattle Railway Co.)
Willamette Cove
Willamette River
Gate
1
2
3
4
5
6
7
8
9

1 Photograph Station, Number, and Direction Taken

0 200 400
Scale in Feet

N

McCormick and Baxter Superfund Site
Portland, Oregon

Photograph Station Location Map

03/20

HARTCROWSER GSI Water Solutions, Inc.

Figure
5-1

File: \\pdxsrv\data\Notebooks\150002005_DEQ_McCormick_and_Baxter_Soil_and_Sed_O_and_M\CAD\150002005_(Site Plan).dwg Layout:SitePlan Date: 03-21-2020 Author: melissaschweitzer

APPENDIX A
Photograph Log – Site Activities and Observations



Photograph A1: View facing north of articulated concrete block (ACB) in Willamette Cove. No ebullition was observed at the time of this site visit (February 2020).



Photograph A2: Transient encampment on Willamette River shoreline, view facing east (February 2020).



Photograph A3: Shoreline conditions along the Willamette River, view facing north (February 2020).



Photograph A4: Impermeable cap and vegetative cover conditions with areas of grass disturbance from bird foraging, view facing southeast (February 2020).



Photograph A5: Debris and trash accumulation after abandonment of transient camp along Willamette River shoreline, view facing north (July 2020).



Photograph A6: Riparian area vegetation with site warning sign in background partially covered, view facing east (July 2020).



Photograph A7: Soil cap and vegetation conditions, view facing east (July 2020).



Photograph A8: Deployment of anchor and buoy marker for sediment porewater sampler deployment, view facing southeast (August 2020).



Photograph A9: EPA dive boat (R/V Monitor) setting up on station to install sediment porewater sampler on river bottom, view facing north (August 2020).



Photograph A10: Texas Tech University technician loading sample media into porewater sediment samplers (August 2020).



Photograph A11: Retrieval of sediment porewater sampler from shoreline, view facing north (September 2020).



Photograph A12: Deployed crayfish traps during sediment porewater retrieval field activities, view facing west (September 2020).



Photograph A13: Animal burrow underneath gate on western side of site, view facing west (September 2020).



Photograph A14: Shoreline conditions along the Willamette River shoreline at low tide, view facing north (September 2020).



Photograph A15: Stabilized edge of ACB in Willamette Cove after concreting in-place individual blocks, view facing south (December 2020).



Photograph A16: Downed signpost along eastern perimeter fence, view facing east (December 2020).



Photograph A17: Replacement of downed signpost along eastern perimeter fence (December 2020).



Photograph A18: Northern end of turf-reinforced matting near MW-37 well cluster after the erosional depression was filled (December 2020).

APPENDIX B
Site Activity Documentation

McCormick & Baxter Operational & Functional Determination Period Status Meeting Agenda

Wednesday 2/26/2020
9:00 A.M.
6900 N. Edgewater Street
Portland, OR 97203

Meeting called by:	Oregon Department of Environmental Quality (DEQ)	Type of Meeting:	Quarterly Progress Meeting
Facilitator:	Sarah Miller	Note Taker:	Kevin Woodhouse
Attendees:	Sarah Miller Kevin Woodhouse Ben Johnson	Project Officer Site Manager Hydrogeologist	DEQ Hart Crowser GSI

Meeting Summary

Site Walk and Inspection

Site Inspection participants met at Cathedral Coffee at 09:00 to discuss site inspection items and site related items including:

- Achieving M&B dioxin cleanup goals for fall sediment sampling
- Discuss 5YR SAP and updates from DEQ/EPA meeting
- Sampler design: anchor points for buoy/line attachment
- Staffing for sediment sampling
- Discussion: Long term data evaluation and database needs, update O&M Plan/Manual
- Replacement barometric transducer to arrive Wednesday and will be replaced at the site
- Potential cleaning of the storage building onsite

The discussion ended at 10:00 and participants departed Cathedral Coffee to enter site. The site inspection ended at 12:00 and Sarah Miller departed site. Kevin performed lock maintenance until 12:40 with Ben staying onsite for H&S support (buddy system).

Shoreline Inspection

The following items were inspected along the shoreline:
Shoreline:

- Willamette River and Willamette Cove shoreline conditions
- Gravel overlay on ACB
- Buoy locations
- Stormwater discharge
- Derelict boats
- Ebullition from sediment cap
- Shoreline vegetation
- Fire damage along Willamette River shoreline in the riparian area
- Debris and dumpsites
- Shoreline conditions at proposed sediment sampling locations
- Measure ACB void width/length.

The Willamette River tides at the time of inspection (between 10:00 and 12:00) were at 2.88 COP (7.98 NAVD88) and 2.46 feet COP (7.56 NAVD88). Daily low and high tides were at 03:30 and 07:15 with a tide of approximately 1.41 feet COP (6.51 NAVD88) and 3.72 COP (8.82 NAVD88), respectively. The five buoys were visible and appeared to be in good condition and functional.

Multiple derelict boats were observed to be anchored in Willamette Cove (photograph 1). None appeared to be anchored on the ACB shoreline of Willamette cove. Several items of trash were observed along the shoreline but no homeless encampments were observed in this area.

In preparation for the fall sediment sampling, the dimensions of the void space in the ACB was measured to provide measurements for which the sediment samplers will fit into. Dimensions of the openings were 2.5 by 8 inches. Depth dimensions of the Willamette Cove ACB are ~5 inches and ~10 inches for ACB in the Riparian Area.

The September 2017 shoreline ACB repairs continue to appear to be in good condition and will continue to be monitored throughout the year. Patches of river rock were present along the lower edge of the shoreline along the riparian area. Some small erosional depressions were observed at seams along the TRM during the last site inspection. Along the northern edge of the TRM along the dirt path from the cap area to the shoreline, an erosional depression was observed beneath the edge of the TRM during the October 2019 inspection. No change in the depression was observed during this inspection and it was agreed between DEQ and Hart Crowser that the repairs would be performed in the springtime during a period of dry weather.

Stormwater discharge was observed from the outfall during the site inspection at a consistent flow estimated to be between 5-10 gpm. The outfall is in good condition. No change to the outfall armoring was observed since the last inspection. No repairs are planned and the armoring will continue to be monitored during the rainy season for signs of additional scouring or erosion.

No ebullition was observed from the organoclay layers in Willamette Cove or the Willamette River.

A homeless encampment (photograph 3) was observed along the shoreline in the riparian area with three tents present. No activities are currently planned within the next month for the site, but personnel will look for the presence of the encampment during the next visit to the site. If the encampment is active, Hart Crowser will initiate removal activities with law enforcement assistance. If the encampment is abandoned, Hart Crowser will initiate trash removal activities.

Other debris items (e.g. an empty 55-gallon drum [photograph 4]) were observed along the shoreline in the vicinity of the homeless encampment. The remainder of the shoreline had minor amounts of trash and varying amounts of driftwood (photograph 5).

A brush fire in August 2018 burned approximately one acre in the riparian area. Groundcover in the area has recovered with grasses and some noxious weeds present (background of photograph 5). Charred limbs are still observable on brush and small trees.

Upland Inspection

The following items were inspected during the upland site walk and inspection:

- Site perimeter and fence, and drainage basin
- Subsurface drainage – Manholes and drainage
- Soil cap integrity (burrows, erosion, etc.)
- EW-1s and MW-23d area of subsidence
- Shrubs and trees to be removed
- Presence of crawfish traps in storage building

The site perimeter fence was intact, however no lock was observed on the gate in the northern corner of the site. A chain and replacement lock were put on the gate to secure it. Hart Crowser personnel attempted to change the combination on locks during a previous O&M visit however only the combination locks to the paved parking/storage area were able to be changed due to needing lock reset keys to change the lock combinations. The remaining gate locks were changed to the new site combination

The drainage basin was functioning properly during the site inspection and no standing water was observed in the basin (photograph 6).

The distance between the inner and outer casing of MW-23d was 2.75 inches, which is the same as recent measurements.

A gaggle of geese was observed on the earthen cap portion of the upland area and a murder of crows was observed on the impermeable cap portion of the upland area. Foraging activities from the crows gave the surface/ vegetative cover of the cap a tilled-like appearance (photograph 7).

The closed and properly fitting well box lid for MW-59s was observed. DEQ did not observe the well box after well casing trimming in August 2019 because the October 2019 inspection ended due to heavy rain before the well was observed.

No crawfish traps were observed in the storage building.

Several volunteer madrones were observed growing along the perimeter fence between the upland and riparian areas and in the immediate vicinity of wells.

Action Items and Schedule:	**Person Responsible**	**Deadline**
■ Check storage building for supplies that can be used during the Five-Year Review sampling	Kevin Woodhouse Sarah Miller Ben Johnson	February 2020
■ Site Maintenance – Replace locks if any found to be cut, fill-in burrows along the fence line, perform shop maintenance (e.g. mouse traps, check equipment).	Kevin Woodhouse	Quarterly
■ Prepare BAP/TO for both Soil/Sediment OUs and GW OU ■ Place material under TRM at northern end of riparian area.	Kevin Woodhouse	May 2020
■ Continue to Monitor MW-23d inner/outer casing relationship for movement.	Kevin Woodhouse	Quarterly
■ Monitor burned holes (approximately 3-inch diameter) in the TRM in brush fire area.	Kevin Woodhouse	Quarterly
■ Quarterly Site Inspections	Kevin Woodhouse	Quarterly
■ Plan activities for the Five-Year Review sampling activities.	Andrew Davidson Ben Johnson Kevin Woodhouse	Through March 2020

Site Activities / Miscellaneous Field Activities Performed Since Last Inspection

- Cleaning of the storage container was performed on January 22, 2020 to free up space for silt curtain storage to be brought in from offsite. Most items were cleaned from the storage container with the exception of a few chemicals in the flammable storage cabinet that will need to be disposed of as hazardous waste.

Deliverables

- The revised "Technical Memorandum – Subsidence Monitoring and Evaluation" was submitted on January 21, 2020.

Budget Status: Currently within the anticipated budget**.**

Photos:



Photograph 1: Derelict boats anchored in Willamette Cove.



Photograph 2: Trash and debris items observed along the shoreline in Willamette Cove.



Photograph 3: Homeless encampment along the riparian area shoreline at the upper edge of the ACB.



Photograph 4: Debris (empty 55-gallon drum) present along the riparian area shoreline.



Photograph 5: Driftwood present on the shoreline of the Riparian Area.



Photograph 6: View of the infiltration pond and drainage swale. No standing water present.



Photograph 7: Impermeable cap surface vegetation following crow foraging activities.



Photograph 8: Volunteer madrone tree growing along fence-line that needs to be removed.

McCormick & Baxter Operational & Functional Determination Period Status Meeting Summary

Monday 7/6/2020, 08:30
6900 N. Edgewater Street
Portland, OR 97203

Meeting called by:	Oregon Department of Environmental Quality (DEQ)	Type of Meeting:	Quarterly Progress Meeting
Facilitator:	Sarah Miller	Note Taker:	Kevin Woodhouse
Attendees:	Sarah Miller Kevin Woodhouse Andrew Davidson Trang Lam	Project Officer Site Manager Hydrogeologist Adjacent Property Representative	DEQ Hart Crowser GSI University of Portland

Meeting Summary

Site Walk and Inspection

The second quarter 2020 meeting was delayed until the first week of July due to limitations from State orders related to COVID-19.

Site Inspection participants met at the storage building onsite at 08:30 to perform the site inspection items and site related items including:

- Site access issues and plan for access during Five-Year Sampling
- Contracting status for Texas Tech University
- Discuss Five-Year Review SAP updates and any outstanding planning items for sampling event
- Discuss sediment porewater and crayfish sampling logistics
- Site maintenance needs

Shoreline Inspection

The following items were inspected along the shoreline:
Shoreline:

- Willamette River and Willamette Cove shoreline conditions
- Gravel overlay on ACB
- Buoy locations
- Stormwater discharge
- Derelict boats
- Ebullition from sediment cap
- Shoreline vegetation
- Debris and dumpsites
- Shoreline conditions at proposed sediment sampling locations

The Willamette River tides at the time of inspection (between 08:30 and 10:30) were at 4.07 COP (9.17 NAVD88) and 3.52 feet COP (8.62 NAVD88). Daily low tide was at 16:55 with heights of 6.92 feet NAVD88 and 1.82 feet COP. Daily high tide was at 06:45 with heights of 9.69 feet NAVD88 and 4.59 feet COP. The five buoys were visible and appeared to be in good condition and functional.

Multiple boats (some presumed derelict) were observed to be anchored in Willamette Cove. None appeared to be anchored on the ACB shoreline of Willamette cove. Several items of trash were observed along the shoreline and a portion of a floating dock was present (Photograph 1).

The September 2017 shoreline ACB repairs continue to appear to be in good condition and will continue to be monitored throughout the year. Patches of river rock were present along the lower edge of the shoreline along the riparian area.

Stormwater discharge was not observed from the outfall during the site inspection. The outfall is in good condition. No change to the outfall armoring was observed since the last inspection. No repairs are planned and the armoring will continue to be monitored during the rainy season for signs of additional scouring or erosion.

No ebullition was observed from the organoclay layers in Willamette Cove or the Willamette River.

A homeless encampment observed during the previous inspection was still present along the shoreline in the riparian area with two tents present. The encampment now appears derelict and abandoned. DEQ and Hart Crowser will check with Metro to initiate removal activities. Other new trash piles (Photograph 2) were observed along the shoreline.

A pedestrian was observed to be actively camping on the shoreline at the southern end of the site and had a smoldering fire going. We doused the fire and requested the pedestrian to abstain from further campfires due to the fire hazard at the site (Photograph 3).

Upland Inspection

The following items were inspected during the upland site walk and inspection:

- Site perimeter and fence, and drainage basin
- Subsurface drainage – Manholes and drainage
- Soil cap integrity (burrows, erosion, etc.)
- EW-1s and MW-23d area of subsidence

The site perimeter fence was intact and all locks and chains were present and working condition.

The drainage basin was functioning properly during the site inspection and no standing water was observed in the basin.

The soil cap was in good condition and no burrows or disturbances were observed (Photograph 4).

The distance between the inner and outer casing of MW-23d was 2.75 inches, which is the same as recent measurements.

A coyote was observed in the distance along the fence line, it was unclear if the coyote was inside or outside of the site due to the range.

Two small trash piles were observed along the exterior of the perimeter fence (one shown in Photograph 5).

Action Items and Schedule:	**Person Responsible**	**Deadline**
■ Site Maintenance – Replace locks if any found to be cut, fill-in burrows along the fence line, perform shop maintenance (e.g. mouse traps, check equipment).	Kevin Woodhouse	Quarterly
■ Prepare BAP/TO for both Soil/Sediment OUs and GW OU	Kevin Woodhouse	Fall/Winter 2020

■ Place material under TRM at northern end of riparian area.	Kevin Woodhouse	Fall 2020
■ Continue to Monitor MW-23d inner/outer casing relationship for movement.	Kevin Woodhouse	Quarterly
■ Monitor burned holes (approximately 3-inch diameter) in the TRM in brush fire area.	Kevin Woodhouse	Quarterly
■ Quarterly Site Inspections	Kevin Woodhouse	Quarterly
■ Coordinate and implement Five-Year Review sampling activities.	Kevin Woodhouse Ben Johnson	August through September 2020
■ Low tide monitoring	Kevin Woodhouse	October 2020

Site Activities / Miscellaneous Field Activities Performed Since Last Inspection

- No site visits or maintenance activities were performed since the last meeting due to COVID-19 restrictions.

Deliverables

- The draft 2019 Annual O&M Report was submitted on June 9, 2020.

Budget Status: Currently within the anticipated budget**.**

Photos:



Photograph 1: Section of floating dock washed up along Willamette Cove shoreline.



Photograph 2: Trash on Willamette River riverbank at base of access road down do shoreline.



Photograph 3: Pedestrian camping on shoreline on southern end of the site.



Photograph 4: Soil cap conditions and current vegetation state.



Photograph 5: Trash dumped along exterior of perimeter fence.

SITE VISIT LOG

VISITORS AND WORKERS MUST CHECK IN AND OUT

Date	Time IN	a.m./ p.m.?	Time OUT	a.m./ p.m.?	Name	Name of Company, Agency, or Organization	Comment (Purpose of Visit, etc.)
2/26/2020	9:00	am	12:40	pm	Kevin Woodhouse	Hart Crowser	Site Inspection
2/26/2020	9:00	am	12:40	pm	Ben Johnson	GSI	Site Inspection
2/26/2020	9:00	am	12:00	pm	Sarah Miller	DEQ	Site Inspection
5/26/2020	-		-		Kevin Woodhouse	Hart Crowser	GW sampling
5/26/2020	-		-		Tess Lydick	Hart Crowser	GW sampling
5/26/2020	-		-		Rodrigo Prugue	GSI	GW sampling
5/27/2020	-		-		Tess Lydick	Hart Crowser	GW sampling
5/27/2020	-		-		Rodrigo Prugue	GSI	GW sampling
6/17/2020	~07:30	am	-		Rodrigo Prugue	GSI	Low tide monitoring
6/17/2020	~07:30	am	-		Tess Lydick	Hart Crowser	Low tide monitoring
6/17/2020	~07:30	am	-		Kevin Woodhouse	Hart Crowser	Low tide monitoring
7/6/2020	8:30	am	~11:00	pm	Kevin Woodhouse	Hart Crowser	Site Inspection
7/6/2020	8:30	am	~11:00	pm	Andrew Davidson	GSI	Site Inspection
7/6/2020	8:30	am	~11:00	pm	Sarah Miller	DEQ	Site Inspection
7/6/2020	8:30	am	~11:00	pm	Trang Lam	University of Portland	Site Inspection
8/5/2020	-		-		Tim Walters	Hart Crowser	Vegetation assessment

SITE VISIT LOG

VISITORS AND WORKERS MUST CHECK IN AND OUT

Date	Time IN	a.m./ p.m.?	Time OUT	a.m./ p.m.?	Name	Name of Company, Agency, or Organization	Comment (Purpose of Visit, etc.)
8/24/2020	-		-		Kevin Woodhouse	Hart Crowser	PSD deployment
8/24/2020	-		-		Tess Lydick	Hart Crowser	PSD deployment
8/24/2020	-		-		Sarah Miller	DEQ	PSD deployment
8/24/2020	-		-		Rodrigo Prugue	GSI	PSD deployment
8/24/2020	-		-		Ben Johnson	GSI	PSD deployment
8/24/2020	-		-		Danny Reible	TTU	PSD deployment
8/24/2020	-		-		Cesar Gomez-Avila	TTU	PSD deployment
8/24/2020	-		-		Uriel Garza Rubalcava	TTU	PSD deployment
8/25/2020	-		-		Tess Lydick	Hart Crowser	PSD deployment
8/25/2020	-		-		Rodrigo Prugue	GSI	PSD deployment
8/25/2020	-		-		Sarah Miller	DEQ	PSD deployment
8/25/2020	-		-		Cesar Gomez-Avila	TTU	PSD deployment
8/25/2020	-		-		Danny Reible	TTU	PSD deployment
8/26/2020	-		-		Tess Lydick	Hart Crowser	PSD deployment
8/26/2020	-		-		Rodrigo Prugue	GSI	PSD deployment
8/26/2020	-		-		Sarah Miller	DEQ	PSD deployment
8/26/2020	-		-		Cesar Gomez-Avila	TTU	PSD deployment

SITE VISIT LOG

VISITORS AND WORKERS MUST CHECK IN AND OUT

Date	Time IN	a.m./ p.m.?	Time OUT	a.m./ p.m.?	Name	Name of Company, Agency, or Organization	Comment (Purpose of Visit, etc.)
8/27/2020	-		-		Rodrigo Prugue	GSI	PSD deployment
8/27/2020	-		-		Sarah Miller	DEQ	PSD deployment
8/27/2020	-		-		Cesar Gomez-Avila	TTU	PSD deployment
8/28/2020	-		-		Rodrigo Prugue	GSI	PSD deployment
8/28/2020	-		-		Sarah Miller	DEQ	PSD deployment
8/28/2020	-		-		Cesar Gomez-Avila	TTU	PSD deployment
9/28/2020	-		-		Kevin Woodhouse	Haley & Aldrich*	O&M/testing
9/28/2020	-		-		Owen Johnston	American Backflow Services	Backflow testing
9/28/2020	-		-		Jessica Blanchette	Haley & Aldrich*	PSD retrieval
9/28/2020	-		-		Danny Reible	TTU	PSD retrieval
9/28/2020	-		-		Cesar Gomez-Avila	TTU	PSD retrieval
9/28/2020	-		-		Rodrigo Prugue	GSI	PSD retrieval
9/28/2020	-		-		Sarah Miller	DEQ	PSD retrieval
9/29/2020	-		-		Jessica Blanchette	Haley & Aldrich*	PSD retrieval
9/29/2020	-		-		Danny Reible	TTU	PSD retrieval
9/29/2020	-		-		Cesar Gomez-Avila	TTU	PSD retrieval
9/29/2020	-		-		Rodrigo Prugue	GSI	PSD retrieval

SITE VISIT LOG

VISITORS AND WORKERS MUST CHECK IN AND OUT

Date	Time IN	a.m./ p.m.?	Time OUT	a.m./ p.m.?	Name	Name of Company, Agency, or Organization	Comment (Purpose of Visit, etc.)
9/29/2020	-		-		Sarah Miller	DEQ	PSD retrieval
9/30/2020	-		-		Jessica Blanchette	Haley & Aldrich*	PSD retrieval
9/30/2020	-		-		Danny Reible	TTU	PSD retrieval
9/30/2020	-		-		Cesar Gomez-Avila	TTU	PSD retrieval
9/30/2020	-		-		Rodrigo Prugue	GSI	PSD retrieval
9/30/2020	-		-		Sarah Miller	DEQ	PSD retrieval/Site inspection
9/30/2020	-		-		Kevin Woodhouse	Haley & Aldrich*	Site inspection
9/30/2020	-		-		Ben Johnson	GSI	Site inspection
10/6/2020	-		-		Kevin Woodhouse	Haley & Aldrich*	Low tide monitoring
10/6/2020	-		-		Dan Knapp	Haley & Aldrich*	Low tide monitoring
10/6/2020	-		-		Rodrigo Prugue	GSI	Low tide monitoring
12/9/2020	-		-		Kevin Woodhouse	Haley & Aldrich*	O&M
12/9/2020	-		-		Ryan Lewis	Haley & Aldrich*	O&M
12/10/2021	-		-		Sarah Miller	DEQ	Site visit
12/10/2021	-		-		Annie Christopher	DEPA	Site Visit
12/10/2021	-		-		Kat West	Skeo-EPA consultant	Site Visit
12/10/2021					Kat Bodin	Portland Botanical Garden	Site Visit

SITE VISIT LOG

VISITORS AND WORKERS MUST CHECK IN AND OUT

Date	Time IN	a.m./ p.m.?	Time OUT	a.m./ p.m.?	Name	Name of Company, Agency, or Organization	Comment (Purpose of Visit, etc.)
12/10/2021	-		-		Brendon Doyle	Portland Botanical Garden	Site Visit
12/10/2021	-		-		John Miller	Portland Botanical Garden	Site Visit
12/10/2021	-		-		Sean Hogan	Portland Botanical Garden	Site Visit
12/17/2020	-		-		Kevin Woodhouse	Haley & Aldrich*	Site inspection
12/17/2020	-		-		Sarah Miller	DEQ	Site inspection
12/17/2020	-		-		Ben Johnson	GSI	Site inspection
12/22/2020	-		-		Ryan Lewis	Haley & Aldrich*	Replace locks, close up site

McCormick & Baxter Operational & Functional Determination Period Status Meeting Summary

Wednesday 9/30/2020
08:30 A.M.
6900 N. Edgewater Street
Portland, OR 97203

Meeting called by:	Oregon Department of Environmental Quality (DEQ)	Type of Meeting:	Quarterly Progress Meeting
Facilitator:	Sarah Miller	Note Taker:	Kevin Woodhouse
Attendees:	Sarah Miller Kevin Woodhouse Ben Johnson	Project Officer Site Manager Hydrogeologist	DEQ Hart Crowser GSI

Meeting Summary

Site Walk and Inspection

Site Inspection participants met onsite at 08:30 at the paved parking area to discuss site inspection items and site related items including:

- Ongoing sediment porewater sampler (PSD) retrieval and crayfish sampling for the Five-Year Review
- Upcoming task order amendment for O&F work
- Task order amendment needed for O&M work
- Boom from Willamette Cove drifting into and pulling warning buoy #4. NRC (GSI subcontractor) scheduled to adjust boom anchoring later today.
- Cleanup services for abandoned transient encampment along shoreline.

The site inspection concluded at 10:30.

Shoreline Inspection

The following items were inspected along the shoreline:
Shoreline:

- Willamette River and Willamette Cove shoreline conditions
- Gravel overlay on ACB
- Buoy locations
- Stormwater discharge
- Ebullition from sediment cap
- Shoreline vegetation
- Fire damage along Willamette River shoreline in the riparian area
- Debris and dumpsites

The Willamette River tides at the time of inspection (between 08:30 and 10:30) were at 3.09 COP (8.19 NAVD88) and 2.43 feet COP (7.53 NAVD88). Daily low and high tides were at 13:55 and 05:10 with a tide of approximately 1.32 feet COP (6.42 NAVD88) and 4.86 COP (9.96 NAVD88), respectively. The five buoys were visible and four of the buoys were in good condition and functional. The boom around Willamette Cove drifted into buoy #4. To prevent the boom from potentially dragging the buoy and dislodging its anchor, GSI scheduled NRC to fix the boom's anchor. The anchor line for the boom also became entangled with the buoy line for the PSD sampler at Station G and caused it to break in half. The PSD ended up being useable but the damage and cause will be noted. It was also noted that the markings on some of the buoys are starting to appear faded. Hart Crowser will look into repainting options for the buoys and this maintenance may be performed at a later date.

The September 2017 shoreline ACB repairs continue to appear to be in good condition and will continue to be monitored throughout the year. Patches of river rock were present along the lower edge of the shoreline along the riparian area. An erosional depression along the northern edge of the TRM and the dirt path from the cap area to the shoreline during the October 2019 inspection. No change in the

depression was observed during this inspection. The depression was slated for filling in during the summer and will be performed on 10/6 during maintenance activities.

The eastern most edge of the ACB armoring was observed to be buckling/sagging. The suspected cause of the buckling is lack of support from the sand beneath the edge. Repair activities will be scheduled to place more consolidated base rock beneath the ACB edge and to grout the edge pieces in place.

No stormwater discharge was observed from the outfall during the site. The outfall is in good condition. No change to the outfall armoring was observed since the last inspection. No repairs are planned and the armoring will continue to be monitored during the rainy season for signs of scouring or erosion.

No ebullition was observed from the organoclay layers in Willamette Cove or the Willamette River. Danny Rieble (Texas Tech University) and his team noted ebullition from the Willamette cove shoreline during PSD retrieval on 9/28/2020.

An abandoned transient encampment that has been present since the first quarter inspection remains at the top of the ACB along the Willamette River shoreline (Photos 2 and 3). Metro is unable to provide cleanup assistance so Hart Crowser will look into costs and include in the upcoming BAP for the O&M project.

Small items of trash or debris were observed along the shoreline.

A brush fire in August 2018 burned approximately one acre in the riparian area. Some charred limbs are still observable on brush and small trees however the area has otherwise fully recovered from the fire.

Upland Inspection

The following items were inspected during the upland site walk and inspection:

- Site perimeter and fence, and drainage basin
- Subsurface drainage – Manholes and drainage
- Soil cap integrity (burrows, erosion, etc.)
- EW-1s and MW-23d area of subsidence
- Shrubs and trees to be removed
- Presence of crawfish traps in storage building

The site perimeter fence was intact, however the lock to the main entrance gate was found cut (photo 4). When attempting to open the gate, Hart Crowser found that the lock cutting efforts had bent the metal lock tab that allows the lock to secure the gate. Hart Crowser used a hammer to try and bend the tab back into place but was unsuccessful. Additional effort and a replacement lock will be brought on 10/6 during maintenance activities.

The drainage basin was functioning properly during the site inspection and no standing water was observed in the basin.

The distance between the inner and outer casing of MW-23d was 2.75 inches, which is the same as recent measurements.

Burrows under the fence gates were observed in two locations (photo 5). The burrows will be filled in during maintenance activities scheduled for 10/6.

A count of the number of volunteer trees growing along or through the perimeter fence was performed. A total of 46 trees predominantly in a range of 5-10 feet tall were counted and will be included as an activity in the vegetation maintenance request for bids to be prepared by Hart Crowser.

A site warning sign was found broken a short distance north of the Van Houton gate entrance (photo 5). Additional tools (power auger) are needed to reset sign-post and repair sign and will be scheduled for an upcoming day.

Action Items and Schedule:	Person Responsible	Deadline
■ Site Maintenance – Replace locks if any found to be cut, fill-in burrows along the fence line, perform shop maintenance (e.g. mouse traps, check equipment).	Kevin Woodhouse	Quarterly
■ Continue to Monitor MW-23d inner/outer casing relationship for movement.	Kevin Woodhouse	Quarterly
■ Monitor burned holes (approximately 3-inch diameter) in the TRM in brush fire area.	Kevin Woodhouse	Quarterly
■ Quarterly Site Inspections	Kevin Woodhouse	Quarterly
■ Low-tide monitoring, transducer data download, and MW-59s sampling	Kevin Woodhouse Dan Knapp Rodrigo Prugue	October 6, 2020
■ Maintenance Activities: Place material under TRM at northern end of riparian area and fill in burrows, fix gate and replace lock.	Kevin Woodhouse Dan Knapp Rodrigo Prugue	October 6, 2020
■ Maintenance to fix broken sign	Kevin Woodhouse Dan Knapp	Fall 2020
■ Five-Year Review data review and reporting.	Kevin Woodhouse Ben Johnson	Summer 2021

Site Activities / Miscellaneous Field Activities Performed Since Last Inspection

- Vegetation assessment performed on August 5, 2020.
- Deployment of sediment porewater samplers (PSDs) performed between August 24 through 27, 2020. Crayfish sampling was performed between August 26 through 28, 2020. Crayfish successfully collected from Station 2 (collocated with PSD station C) only.
- Retrieval of PSDS and crayfish sampling began on September 28, 2020 and is ongoing.
- Water service backflow preventer service testing performed on September 28, 2020. Backflow preventer passed.

Deliverables

- The Final 2019 O&M Annual Report was submitted to DEQ on July 22, 2020.

Budget Status: Currently within the anticipated budget**.**

Photos:



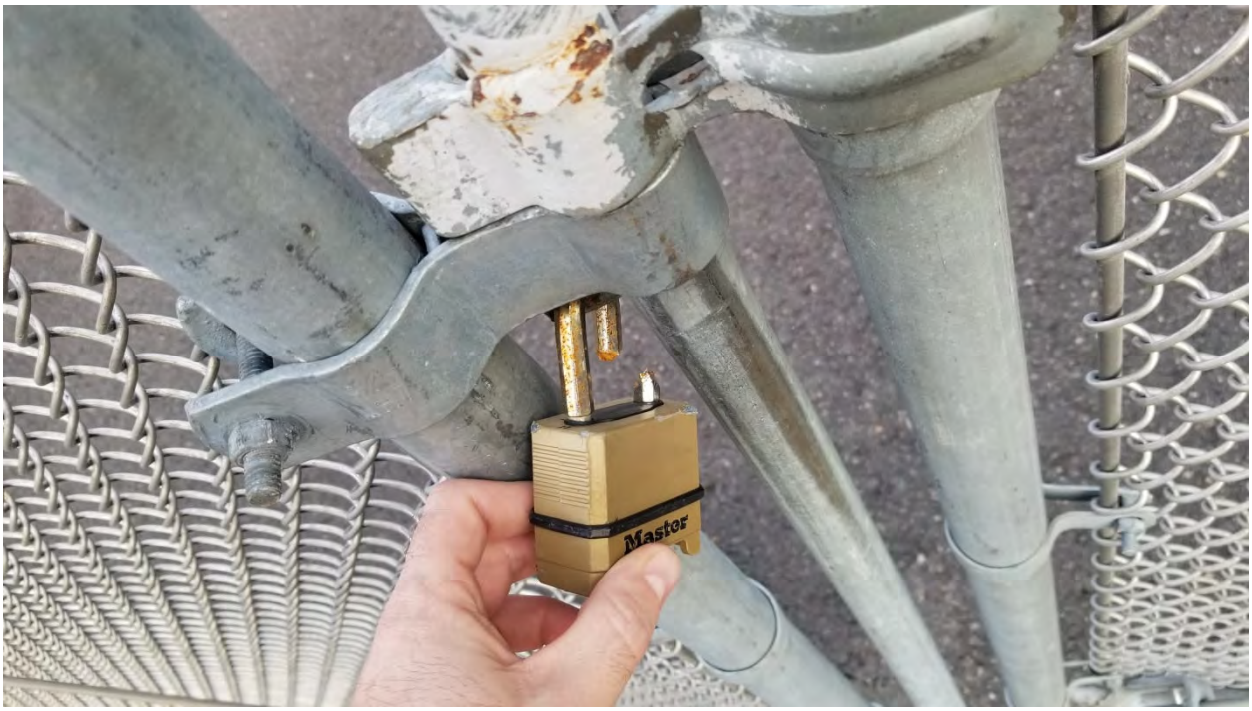
Photograph 1: Buckling and sagging of the ACB border on the eastern edge of the Willamette Cove ACB.



Photograph 2: Abandoned transient camp along shoreline of Willamette River.



Photograph 3: Abandoned transient camp along shoreline of Willamette River.



Photograph 4: Lock on main gate entrance found cut and metal tab bent so that gate can't open.

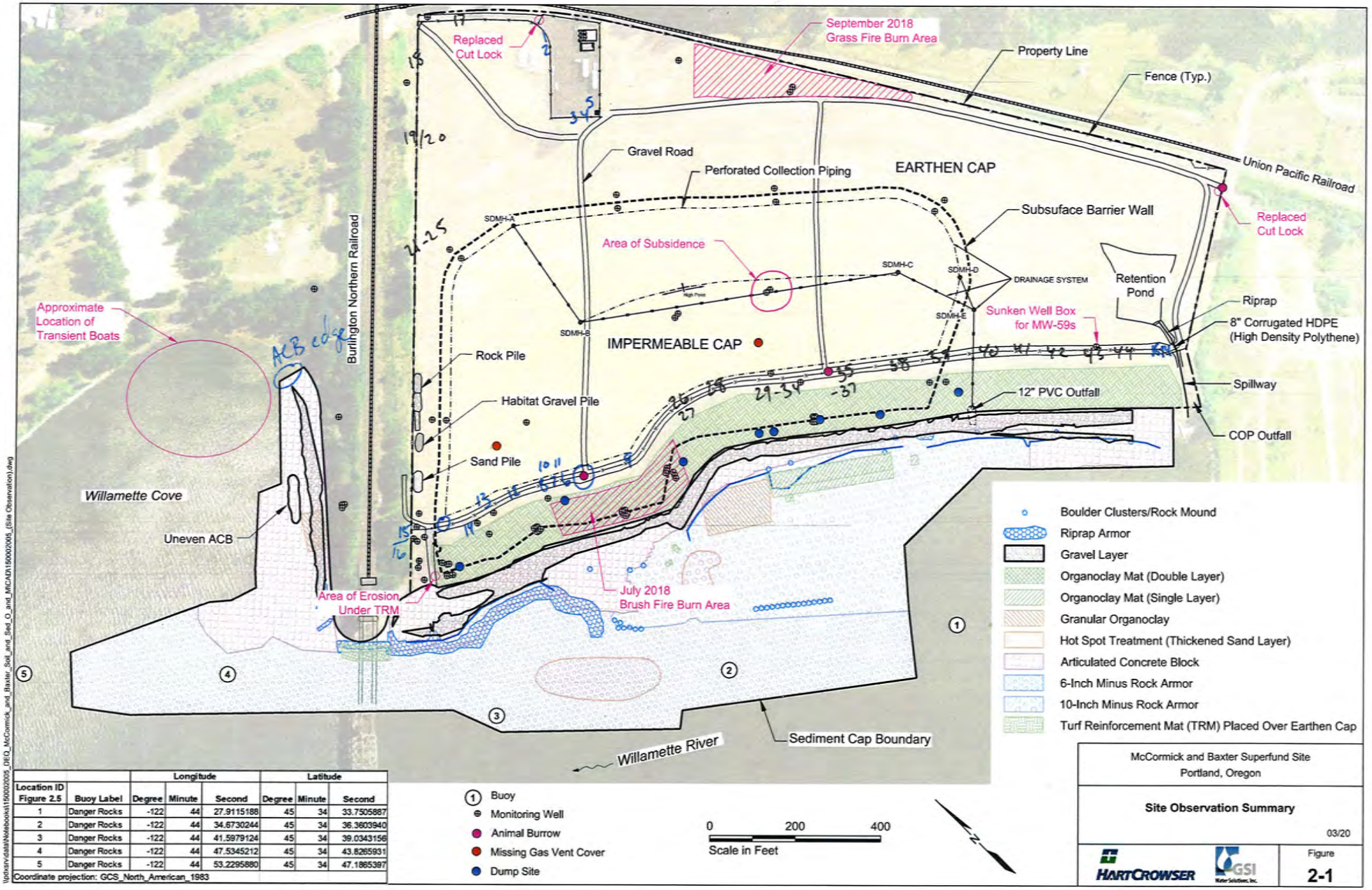


Photograph 5: Burrow underneath fence gate along southwest perimeter of site.



Photograph 6: Downed warning sign between gravel road and perimeter fence along railroad tracks.

39 = 12-18" base



Location ID Figure 2.5	Buoy Label	Longitude			Latitude		
		Degree	Minute	Second	Degree	Minute	Second
1	Danger Rocks	-122	44	27.9115188	45	34	33.7505887
2	Danger Rocks	-122	44	34.6730244	45	34	36.3603940
3	Danger Rocks	-122	44	41.5979124	45	34	39.0343156
4	Danger Rocks	-122	44	47.5345212	45	34	43.8265931
5	Danger Rocks	-122	44	53.2295880	45	34	47.1865397

Coordinate projection: GCS_North_American_1983

① Buoy
Monitoring Well
Animal Burrow
Missing Gas Vent Cover
Dump Site

0 200 400
Scale in Feet

McCormick and Baxter Superfund Site
Portland, Oregon

Site Observation Summary

03/20

HARTCROWSER GSI Water Solutions, Inc.

Figure
2-1

\\pdxsrvdata\Notebooks\150002005_DEQ_McCormick_and_Baxter_Soil_and_Sed_O_and_M\CAD\150002005_(Site Observation).dwg

McCormick & Baxter Operational & Functional Determination Period Status Meeting Summary

Thursday 12/17/2020, 09:00
6900 N. Edgewater Street
Portland, OR 97203

Meeting called by:	Oregon Department of Environmental Quality (DEQ)	Type of Meeting:	Quarterly Progress Meeting
Facilitator:	Sarah Miller	Note Taker:	Kevin Woodhouse
Attendees:	Sarah Miller Kevin Woodhouse Ben Johnson	Project Officer Site Manager Hydrogeologist	DEQ Hart Crowser GSI

Meeting Summary

Site Walk and Inspection

Site Inspection participants met onsite at 09:00 at the paved parking and storage building area to discuss site inspection items including:

- Fence repair and debris removal activities
- Transducer replacement
- Five-Year review data reporting and timeline
- Maintenance items performed on 12/9/20
- Site maintenance needs

The site inspection concluded at approximately 11:30.

Shoreline Inspection

The following items were inspected along the shoreline:
Shoreline:

- Willamette River and Willamette Cove shoreline conditions
- ACB condition
- Gravel overlay on ACB
- Buoy locations
- Stormwater discharge
- Ebullition from sediment cap
- Shoreline vegetation
- Debris and dumpsites

The Willamette River tides at the time of inspection (between 09:00 and 11:30) were at 8.28 feet NAVD88 (3.18 feet COP) and 7.49 feet NAVD88 (2.39 feet COP), respectively. The daily high tide was at 07:55 with elevations of 8.63 feet NAVD88 and 3.53 feet COP. The daily low tide was at 15:10 with elevations of 6.67 feet NAVD88 and 1.57 feet COP. Shoreline conditions are shown in Photograph 1.

The September 2017 shoreline ACB repairs continue to appear to be in good condition and will continue to be monitored throughout the year. Patches of river rock were present along the lower edge of the shoreline along the riparian area.

The repair to the erosional depression under the TRM is functioning and will be monitored for the next few inspections for signs of additional erosion.

The eastern most edge of the ACB armoring was observed to be buckling/sagging during the last inspection. Repairs were made to place more material under individual blocks and then they were concreted in place. The repair is functioning and will be monitored over the next few inspections to verify that the repair is holding.

Stormwater discharge (Photograph 2) was occurring from the outfall at an estimated 5-10 gallons per minute. The outfall is in good condition. No change to the outfall armoring was observed since the last inspection. No repairs are planned and the armoring will continue to be monitored during the rainy season for signs of scouring or erosion.

No ebullition was observed from the organoclay layers in Willamette Cove or the Willamette River.

The abandoned transient encampment that has been present since the first quarter inspection remains at the top of the ACB along the Willamette River shoreline. Metro is unable to provide cleanup assistance so Hart Crowser is including trash and debris removal costs for inclusion in the BAP being prepared and will begin preparing an RFB for those services. Small items of trash or debris were also observed along the shoreline.

A small burrow was observed at the top of the ACB and TRM. The burrow will be filled during the next maintenance activity event.

An abandoned boat (Photograph 4) was beached along the shoreline and tied up to a driftwood trunk in the vicinity of the stormwater outfall. Sarah Miller will inquire within DEQ on what procedures are needed for removal of the abandoned boat.

Upland Inspection

The following items were inspected during the upland site walk and inspection:

- Site perimeter and fence, and drainage basin
- Subsurface drainage – Manholes and drainage
- Soil cap integrity (burrows, erosion, etc.)
- EW-1s and MW-23d area of subsidence

The site perimeter fence was cut in four places, three spots in the northern fence and one spot in the western fence. Budget for fence repair activities will be included in the BAP being prepared and solicitation/subcontracting will be performed after the task order amendment has been issued. All locks and chains on site gates were intact after replacement of cut locks was performed on 12/9/20.

The drainage basin was functioning properly during the site inspection and no standing water was observed in the basin.

The distance between the inner and outer casing of MW-23d was 2.75 inches, which is the same as recent measurements.

A burrow under the fence on the eastern side of the site was observed. The burrow was previously filled but coyotes are re-digging the same spot to gain access to the site. During the next maintenance event, the spot will be filled with aggregate base and tamped to pack it down and prevent further digging.

The down sign-posts identified during the previous site inspection were replaced during maintenance activities performed on 12/9/20. The signs on the posts were very weathered, no longer legible, and unable to be reused. Hart Crowser is in the process of having replacement signs made and will attach them once completed.

Action Items and Schedule:	**Person Responsible**	**Deadline**
■ Site Maintenance – Replace locks if any found to be cut, fill-in burrows along the fence line, perform shop maintenance (e.g. mouse traps, check equipment).	Kevin Woodhouse	Quarterly

■ Continue to Monitor MW-23d inner/outer casing relationship for movement.	Kevin Woodhouse	Quarterly
■ Monitor burned holes (approximately 3-inch diameter) in the TRM in brush fire area.	Kevin Woodhouse	Quarterly
■ Quarterly Site Inspections	Kevin Woodhouse	Quarterly
■ Maintenance Activities: Replacement of weathered signs on replaced sign-posts	Kevin Woodhouse Ryan Lewis	January 2021
■ Trash and debris removal, tree removal, and fence repair	Kevin Woodhouse	January or February 2021
■ Low-tide monitoring and transducer data download,	Kevin Woodhouse Tess Lydick Rodrigo Prugue	June 2021
■ Five-Year Review data review and reporting.	Kevin Woodhouse Ben Johnson	Summer 2021

Site Activities / Miscellaneous Field Activities Performed Since Last Inspection

- Maintenance activities were performed on 12/9/20 and included concreting the gap along the ACB edge in Willamette cove where buckling was observed, filling in the erosional depression under the northern edge of the TRM mat alongside the access road down to the shoreline, replacing two fallen over sign posts, filling in ruts greater than 6 inches along the perimeter fence, and replacing cut chains and locks.

Deliverables

- None submitted

Budget Status: Currently within the anticipated budget**.** A BAP is in the process of being prepared and will be submitted in the next week.

Photos:



Photograph 1: Shoreline conditions with abandoned transient camp still present (visible in background).



Photograph 2: Stormwater outfall discharge at an estimated 5-10 gallons per minute.



Photograph 3: Abandoned transient camp along shoreline of Willamette River.



Photograph 4: Abandoned boat on the shoreline of the Willamette River.

APPENDIX C
Technical Memorandum-
Subsidence Monitoring and Evaluation

Technical Memorandum – Subsidence Monitoring and Evaluation

DATE: January 21, 2020

TO: Sarah Miller, Oregon Department of Environmental Quality

FROM: Kevin Woodhouse, RG

RE: Land Survey Subsidence Monitoring
McCormick and Baxter Superfund Site (ESCI No. 74)
Portland, Oregon
Task Order 72-18-5/Task 2

CC: Richard Ernst, RG

This technical memorandum documents the results of a 2019 land survey of the upland portion of the McCormick and Baxter Superfund site (the "site") and a video inspection of storm sewer system on the site. The land survey data are also compared to previous survey data collected in 2008 to assess for signs of subsidence in the upland cap portion of the Site. The work was performed in response to the *McCormick and Baxter Superfund Site: Additional Subsidence Monitoring* (GSI Water Solutions and Hart Crowser 2010), which recommends periodic monitoring to assess long-term settling rates.

Land Survey Activities

Westlake Consultants, Inc. (WCI), of Tigard, Oregon, performed land surveying activities at the site between August 13 and August 21, 2019. Data was collected using Trimble S10 GPS Receivers and S-7 total stations to perform a topographic survey of the building and paved parking area, upland cap area, and riparian area along the bank of the Willamette River. The topographic survey used a grid spacing of 25 feet with a focused 60-foot by 60-foot area centered on MW-23d where the greatest amount of subsidence has been observed visually. Surveying activities also collected site feature data for 69 monitoring wells, 5 manhole covers, and building/parking area features. Monitoring wells in Willamette Cove (northwest side of the Burlington Northern rail line) were not included in the survey.

The survey datum used for horizontal coordinates is North American Datum of 1983 (NAD 83), State Plane Coordinates Oregon North Zone. The survey datum used for vertical coordinates is North American Vertical Datum of 1988 (NAVD 88). Vertical survey data was referenced to National Geodetic Survey Benchmark E-718, PID No. RD1546 located approximately 200 feet north of the northern corner of the Site. Benchmark E-718 was referenced for vertical control during both the 2008 and 2019 surveys. The results of the 2019 land survey are included as Attachment 1 and used for the survey data comparison depicted on Figure 1.

Storm Sewer Video Inspection

Bravo Environmental, Inc., of Tukwila, Washington, performed a video inspection on October 4, 2019, of the storm sewer system between manholes SDMH-B to SMDH-C, SDMH-C to SDMH-E, and SDMH-E and the outfall along the Willamette River shoreline. The inspection was performed with a crawler-mounted camera to inspect the storm sewer piping for sags, cracks, fractures, breaks, or other signs of subsidence-related damage.

The video inspection observed two significant sags in the piping between manhole SDMH-B and SDMH-C. The sags occurred from approximately 425 to 495 feet and 680 to 720 feet downstream from SDMH-B. These sags are the same sags observed during the 2009 inspection; no new sags were observed during the inspection. The sags were identified by obvious bowing and pooling of water in those sections. No fracturing, cracking, or breaks in the piping were observed. Small deformations of the pipe were noted in two locations (178 feet downstream of SDMH-C and 19 feet downstream of SDMH-E); however, they were not indicative of subsidence or piping failure, and we were unable to be determine if they were noted during the 2009 inspection. The storm sewer inspection results are included as Attachment 2 with the two observed sags depicted on Figure 2.

2008 to 2019 Survey Data Comparison

Electronic survey data files were provided by WCI to Hart Crowser and imported into GIS software for comparison to the August 2008 data. The topographic elevations from each survey were used to create a raster layer within the GIS software, and the difference between the two elevation layers was calculated to generate Figure 1 depicting subsidence or uplift throughout the site in 0.5-foot intervals.

Top of casing elevation for monitoring wells were also compared between the two surveys (2008 and 2019) to evaluate the consistency between the data sets, as presented in Table 1. For wells EW-1s, MW-23d, and MW-50s, survey results from September 2009 are also listed. These wells were included as part of monthly hub surveys from July through September 2009 to monitor subsidence in the area; as the September 2009 elevations represent the most recent previous survey, they are used for this comparison in lieu of the 2008 elevations. The average absolute value for differences between monitoring well elevations (excluding EW-1s and MW-23d in known areas of subsidence) from 2008/2009 to 2019 is 0.086 feet. For wells EW-1 and MW-23d, elevation differences from September 2009 to August 2019 (a period of ten years) were 0.56 feet and 0.22 feet, respectively (for comparison, over the one-year period from August 2008 through September 2009, wells EW-1s and MW-23d showed a decrease of 0.31 and 0.034 feet, respectively, in elevation).

The results of the elevation comparison indicate a mix of slight subsidence and slight uplift throughout the site. The slight changes are shown as subsidence between 0 to 0.5 feet and uplift of 0 to 0.5 feet. These areas are indicated by yellow and light green areas on Figure 1. Areas of greater uplift are indicated by progressively darker green hues, and areas of greater subsidence are shown by progressively darker

red hues. Areas of greater subsidence include areas around wells EW-1s and MW-23d, adjacent to manhole SDMH-E, between the perimeter road and perimeter fence along the southeastern boundary of the site, and along the upper toe of the articulating-concrete-block (ACB).

Subsidence around EW-1s/MW-23d and SDMH-E is attributed to degradation of buried woody debris as described during the 2010 Subsidence Monitoring Technical Memorandum (GSI Water Solutions and Hart Crowser 2010). Elevated temperatures and dissolved gas concentrations in the well EW-1s indicated that aerobic degradation was occurring. The well was sealed to prevent air infiltration at the surface, and no additional subsidence has been observed at MW-23d since that time. Quarterly measurements of the height difference between the monitoring well casing and the steel outer casing at MW-23d have been recorded at 2.75 inches since 2012. The elevation difference of 0.22 feet for MW-23d is within the margin of error observed for all wells between the 2008 and 2019 survey data. The elevation difference for EW-1s indicates that some additional subsidence has occurred since 2009, though at a slower rate (0.31 feet from August 2008 to September 2009 compared to 0.056 feet per year from 2009 to 2019).

Subsidence along the upper edge of the ACB occurred up to 1.5 to 2.0 feet. The upper edge of the ACB generally forms a grade break along the slope of the riparian area and is covered by turf reinforcement mat (TRM) to protect against soil erosion at the transition from the riparian area to the ACB. The band of subsidence along this border is indicative of erosion of sandy material at this boundary. Quarterly inspections at the site have identified depressions in the ground surface along the boundary of the TRM where sandy material has been eroded during high river stages and these areas have undergone periodic maintenance to replace eroded material.

Figure 1 indicates areas of uplift up to 1.5 to 2.0 feet downslope of the ACB and riparian area transition. Following initial placement of the ACB, additional 1.5-inch minus, rounded gravel was placed on the ACB slope in July 2012 to fill voids. Some of the gravel has washed down the slope of the ACB; however, this surface layer is generally 2 to 3 inches thick and is not sufficient to account for up to 2 feet of uplift. The additional uplift may be indicative of slumping of the riparian area slope causing a bulge in the ground surface below the ACB.

Subsidence along the southeastern property boundary is indicated at up to 1.5 feet along the eastern half of the boundary and up to 2.5 feet along the western half that is adjacent to the drainage basin. The linear nature of the subsidence feature between the site perimeter road and the road south of the property line fence suggest that compaction of the soil material in this area may not have been as rigorous and that consolidation and compaction of the material has occurred since cap construction. There are no other known or suspected causes of subsidence in this area.

Recommendations

Hart Crowser recommends periodic surveying and storm sewer inspections to be performed at the site as a subsidence monitoring event. We recommend this event be performed on a 10-year interval and

the results incorporated into the annual or 5-year report for the site, whichever occurs first. We also recommend adding this subsidence monitoring event into the O&M plan to formalize a timeframe for completion of these activities and to specify procedures and protocols to be followed to produce consistent data between existing data and future events.

Temporary survey hubs were installed at the site in 2009 to gather monthly measurements at 16 locations. Survey hubs were not surveyed or evaluated for usability as part of this scope of work. The survey hubs were not designed for long-term use and are likely no longer in a usable condition, even if they are still present onsite. If periodic surveying of fixed reference points separate from the monitoring well network is desired by DEQ, permanent survey hubs are an option to replace the temporary survey hubs. If installed, placement of permanent survey hubs should be evaluated with respect to potential future site uses.

Limitations

Survey data collected in 2019 was performed using similar methods and equipment to the 2008 survey, though small differences in elevations are likely to be present between the data sets due to various factors including but not limited to: exact placement of survey rod on rims and well casings, differences in survey data corrections, and hinged well caps that seat onto well the casing were installed on select wells for transducers. These factors are estimated to generate a margin of error of approximately +/- 0.1 to 0.2 feet between the survey data sets.

Attachment:
Table 1 – Manhole and Monitoring Well Elevation Comparison
Figure 1 - Difference in Topography Upland Cap Survey 2008 vs 2019
Figure 2 – Current Site Layout with Surface Elevations
Attachment 1 – Surveying Data
Attachment 2 – Storm Sewer Inspection Reports

Table 1: Manhole and Monitoring Well Elevation Comparison
Subsidence Monitoring Survey Data
McCormick and Baxter Superfund Site

Feature	August 2008 Elevations (ft NAVD88)	September 2009 Elevations (ft NAVD88)	August 2019 Elevations (ft NAVD88)	Elevation Difference (ft)
Manhole				
SDMH-A (rim)	38.71	NS	38.56	-0.15
SDMH-B (rim)	40.87	NS	40.68	-0.19
SDMH-C (rim)	36.90	NS	36.51	-0.39
SDMH-D (rim)	35.50	NS	35.23	-0.27
SDMH-E (rim)	36.11	NS	35.79	-0.32
Monitoring Wells (Top of Casing)				
EW-1s	40.41	40.10	39.54	-0.56*
EW-2s	42.37	NS	42.40	0.03
EW-8s	40.48	NS	40.55	0.07
EW-10s	29.43	NS	29.59	0.16
EW-15s	43.01	NS	43.00	-0.01
EW-18s	40.74	NS	40.79	0.05
EW-19s	25.94	NS	25.97	0.03
EW-23s	37.61	NS	37.64	0.03
MW-1r	37.63	NS	37.81	0.18
MW-7 WC	36.69	NS	NS	--
MW-10r	41.85	NS	41.85	0.00
MW-15s	43.25	NS	43.41	0.16
MW-17s	41.25	NS	41.34	0.09
MW-20i	41.44	NS	41.72	0.28
MW-22i	42.28	NS	42.34	0.06
MW-23d	41.06	41.03	40.81	-0.22*
MW-32i	39.34	NS	39.45	0.11
MW-34i	32.66	NS	32.82	0.16
MW-35r	32.27	NS	NS	--
MW-36d	30.45	NS	30.59	0.14
MW-36i	30.18	NS	30.30	0.12
MW-36s	30.74	NS	30.62	-0.12
MW-37d	26.05	NS	26.19	0.14
MW-37i	25.88	NS	26.07	0.19
MW-37s	24.86	NS	24.98	0.12
MW-38d	31.84	NS	31.96	0.12
MW-38i	32.06	NS	32.15	0.09
MW-38s	32.31	NS	32.41	0.10
MW-39d	29.83	NS	29.93	0.10
MW-39i	30.08	NS	30.18	0.10
MW-39s	29.75	NS	29.88	0.13
MW-40d	28.67	NS	28.81	0.14
MW-40i	28.73	NS	28.92	0.19
MW-40s	28.33	NS	28.53	0.20
MW-41d	27.43	NS	27.56	0.13
MW-41i	27.10	NS	27.22	0.12
MW-41s	27.78	NS	27.96	0.18
MW-42d	32.20	NS	32.26	0.06
MW-42i	32.67	NS	32.67	0.00
MW-42s	32.37	NS	32.42	0.05
MW-43d	28.33	NS	28.57	0.24

Table 1: Manhole and Monitoring Well Elevation Comparison
Subsidence Monitoring Survey Data
McCormick and Baxter Superfund Site

Feature	August 2008 Elevations (ft NAVD88)	September 2009 Elevations (ft NAVD88)	August 2019 Elevations (ft NAVD88)	Elevation Difference (ft)
MW-43i	30.31	NS	30.49	0.18
MW-43s	31.05	NS	31.24	0.19
MW-44d	29.64	NS	29.55	-0.09
MW-44i	29.31	NS	29.47	0.16
MW-44s	29.57	NS	29.90	0.33
MW-45d	27.88	NS	28.12	0.24
MW-45i	27.99	NS	28.05	0.06
MW-45s	28.17	NS	28.20	0.03
MW-46s	35.51	NS	35.51	0.00
MW-47s	35.50	NS	35.56	0.06
MW-48s	38.68	NS	38.58	-0.10
MW-49s	37.55	NS	37.61	0.06
MW-50s	39.25	39.24	39.12	-0.12*
MW-51s	39.53	NS	39.54	0.01
MW-52s	40.70	NS	40.70	0.00
MW-53s	40.44	NS	40.42	-0.02
MW-54s	41.78	NS	41.78	0.00
MW-55s	41.04	NS	41.09	0.05
MW-56s	43.49	NS	43.45	-0.04
MW-57s	42.04	NS	42.01	-0.03
MW-58d	41.43	NS	NS	--
MW-58i	40.99	NS	NS	--
MW-58s	41.51	NS	NS	--
MW-59s	35.90	NS	35.85	-0.05
MW-60d	40.05	NS	40.18	0.13
MW-61s	43.61	NS	43.65	0.04
MW-62i	42.61	NS	42.73	0.12
MW-As	39.27	NS	39.32	0.05
MW-Ds	42.90	NS	43.26	0.36
MW-Gs	40.17	NS	40.27	0.10
MW-Os	40.93	NS	40.96	0.03
PW-1d	44.02	NS	44.05	0.03
PW-2d	41.79	NS	41.83	0.04
			Averge difference in well elevations **	0.086

Notes:

*Elevation differences for wells EW-1s, MW-23d, and MW-50s are calculated using September 2009 and August 2019 elevations.

** Excluding wells EW-1s and MW-23d in the know area of subsidence.

ft = Feet

NAVD 88 = North American Vertical Datum of 1988

NS = not surveyed

-- = not calculated



Legend

- Groundwater Monitoring Well
- Stormwater Discharge Manhole
- Stormwater Discharge Pipeline
- Subsurface Barrier Wall

Difference in Topography from 2008 to 2019 (feet)

2.5 to 3.0	
2.0 to 2.5	
1.5 to 2.0	
1.0 to 1.5	
0.5 to 1.0	
0 to 0.5	
-0.5 to 0	
-1.0 to -0.5	
-1.5 to -1.0	
-2.0 to -1.5	
-2.5 to -2.0	
-3.0 to -2.5	
-3.5 to -3.0	

Rise

Drop

0 100 200 400 Feet

N

Note: Feature locations are approximate.

McCormick and Baxter Superfund Site
Portland, Oregon

Difference in Topography
Upland Cap Survey 2008 vs 2019

150-002-005 11/19

HARTCROWSER

Figure
1

Document Path: \\pdxsrv\data\Notebooks\150002005_DEQ_McCormick_and_Baxter_Soil_and_Sed_O_and_M\GIS\150002005_AC_SP-TopoDiff.mxd Date: 11/7/2019 User Name: melissaschweitzer

NOTES:

1. Bathymetric survey conducted by David Evans and Associates, Inc., 4/26/06.
2. Upland site survey conducted by David Evans and Associates, Inc., 11/17/04 and 1/24/06.
3. Upland ground surface resurveyed and replaced by OTAK, Inc., 9/16/08.
4. Upland site survey resurveyed and replaced by Westlake Consultants, 9/18/2019.
5. Horizontal Datum: North American Datum of 1983 - 91 adj. (NAD83/91), State Plane Coordinate System, Oregon North Zone. Units: International Feet.
6. Vertical Datum: North American Vertical Datum of 1988 (NAVD 88)
7. Contour Interval: One-Foot. Bathymetric contours were derived from a Digital Terrain Model based on a 3-foot grid of multibeam data.
8. Additional rock was placed at the 6" minus rock placement areas on 6/26/07. These areas have not been surveyed and the contours of this figure do not reflect the additional rock placement.

Burlington Northern Inc.
(Spokane, Portland, and Seattle Railway Co.)

Property Line

Fence (Typ.)

Union Pacific Railroad

Building

Asphalt Pavement

Gravel Road

Perforated Collection Piping

EARTHEN CAP

Subsuface Barrier Wall

SDMH-A

SDMH-B

SDMH-C

SDMH-D

SDMH-E

Storm Drain Sag 1

Storm Drain Sag 2

High Point

DRAINAGE SYSTEM

Retention Pond

12" Minus Rock

8" Corrugated HDPE (High Density Polyethylene)

Spillway

IMPERMEABLE CAP

Rock Pile

12" PVC Outfall

Sand Pile

Willamette Cove

SEDIMENT CAP

Sediment Cap Boundary

DSL Easement (#31530-EA)

Willamette River

0 200 400

Scale in Feet

-40- Elevation Contour, 1' Interval (Ft. NAVD 88)

Boulder Clusters/Rock Mound

Riprap Armor

Organoclay Mat (Double Layer)

Organoclay Mat (Single Layer)

Granular Organoclay

Hot Spot Treatment (Thickened Sand Layer)

Articulated Concrete Block

6-Inch Minus Rock Armor

10-Inch Minus Rock Armor

Turf Reinforcement Mat Placed Over Earthen Cap

A A' Cross Section Line (for Figure 1-6)

McCormick and Baxter Superfund Site
Portland, Oregon

Current Site Layout with Surface Elevations

01/20

HARTCROWSER GSI Water Solutions, Inc.

Figure
2

\\pdxsrv\data\Notebooks\150002005_DEQ_McCormick_and_Baxter_Soil_and_Sed_O_and_M\CAD\150002005_(Current Site Layout-surfelev).dwg

60' 0 30' 60' 120'
SCALE: 1 INCH = 60 FEET

BASIS OF COORDINATES

THE BASIS OF COORDINATES FOR THIS SURVEY WERE ESTABLISHED AT PROJECT POINT #1, BEING A MAG NAIL. COORDINATES WERE ESTABLISHED BY A STATIC GPS OBSERVATION AND PROCESSING THE DATA THROUGH NATIONAL GEODETIC SURVEY (NGS) TO OBTAIN AN OPUS SOLUTION. THE STATIC OBSERVATION WAS OBTAINED UTILIZING TRIMBLE R-8(2) HEADS IN A BASE (STATIC) TO RTK (ROVER) CONFIGURATION.

DATUM: NAD83, OREGON NORTH ZONE (3601), EPOCH 2010, INTERNATIONAL FEET.
POINT #1
NORTHING: 705632.9590'
EASTING: 7628472.7290'
COMBINED SCALE FACTOR (C.F.): 0.99992206

DISTANCES ARE SCALED TO GROUND ABOUT PROJECT POINT #1.

TO OBTAIN GRID DISTANCE MULTIPLY THE GROUND DISTANCE BY THE COMBINED SCALE FACTOR:
GRID DIST. = GROUND DIST. X C.F.

BASIS OF ELEVATION:

THE BASIS OF ELEVATION FOR THIS SURVEY WAS ESTABLISHED FROM NGS BENCHMARK E-718, PID-RD1546.

FOR THE PURPOSE OF THIS SURVEY THE BENCHMARK WAS OBSERVED AT PROJECT POINT #1002.

STATION ELEVATION: 65.71 FEET (NAVD88)

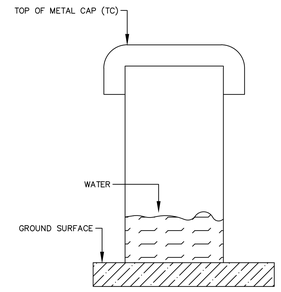
NOTES

1. FIELD WORK WAS FINISHED ON AUGUST 21, 2019
2. CONTOUR INTERVALS ARE 1-FOOT
3. THERE WERE SOME MONITORING WELLS THAT WERE REPORTED AS HAVING NO INNER CASING (PIPE) VISIBLE. THEREFORE THE MEASUREMENT WAS TAKEN AT THE EDGE OF THE INNER CASING. SEE MEASUREMENT DETAILS ON THIS SHEET.

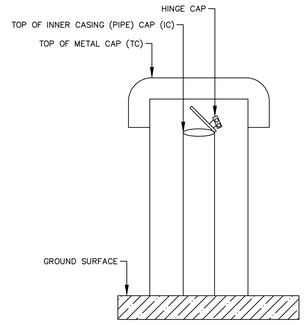
TOPOGRAPHY LEGEND:

- MW-## / RIM-## — MONITORING WELL
- STORM SEWER MANHOLE
- CATCH BASIN
- FIRE HYDRANT
- LIGHT POLE
- BOLLARD
- ELECTRIC RISER
- UTILITY VAULT
- UITILITY RISER
- GATE POST
- —X—X— FENCE AS NOTED
- EDGE OF PAVEMENT
- STORM FLOWLINE
- SD — UNDERGROUND STORM DRAIN LINE
- GRAVEL
- SDMH STORM DRAIN MANHOLE
- MW- MONITORING WELL
- TC TOP OF CAP
- IC INSIDE CASING
- CONC CONCRETE
- IE INVERT ELEVATION
- N/O NONE OBSERVED
- GRG GARAGE

MEASUREMENTS DETAIL (NO INNER CASING)

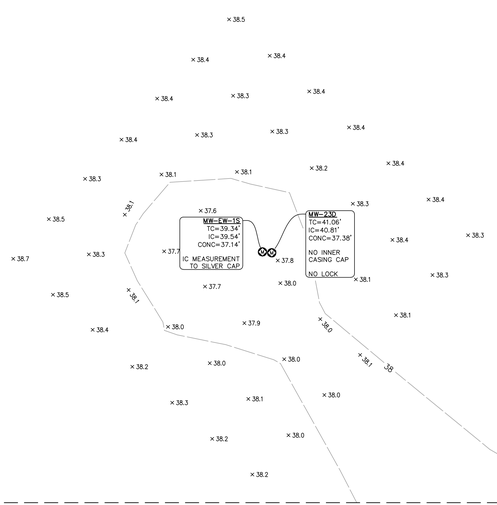


MEASUREMENTS DETAIL (INNER CASING)



DETAIL A

0 5' 10'
SCALE: 1"=10'



UTILITY STATEMENT

THE UNDERGROUND UTILITIES SHOWN HAVE BEEN MAPPED FROM FIELD SURVEY INFORMATION, OBSERVED ABOVE GROUND EVIDENCE AND GROUND MARKINGS BY OTHERS, AND EXISTING DRAWINGS SUPPLIED BY OTHERS. THE SURVEYOR MAKES NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH HE DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE. THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES.

WESTLAKE CONSULTANTS inc.
ENGINEERING ◆ SURVEYING ◆ PLANNING
PACIFIC CORPORATE CENTER:
15115 S.W. SEQUOIA PARKWAY, SUITE 150
TIGARD, OREGON 97224
(503) 684-0652
FAX (503) 624-0157

TOPOGRAPHIC SURVEY

HART CROWSER

IN SECTION 7, T. 1 N., R. 1 E., W.M.
CITY OF PORTLAND, COUNTY OF MULTNOMAH, STATE OF OREGON

THESE DRAWINGS ARE THE PROPERTY OF WESTLAKE CONSULTANTS INC. (WCI) AND ARE NOT TO BE REPRODUCED IN ANY MANNER EXCEPT WITH THE WRITTEN PERMISSION OF WCI

REVISIONS

NO.	DATE	DESCRIPTION	DRAFT BY	CHECK BY
1	11/27/2019	ADDED MISSING MON. WELLS	CA	CAJ
0	8/29/2019	INITIAL RELEASE	GRA	GRA

SHEET 1 OF 1

JOB NO. 2846-001

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DRAWING NAME: J:\2846-001\Fig_SURVEY\SURVEY\2846-001SVY.DWG DEC 05, 2019 - 2:57PM CAJ

Bravo Environmental
6437 S 144th
Tukwila, WA 98168
425-424-9000
425-424-9002

Inspection Report / Inspection: Hart Crowser Storm

Date	P/O. No.	Weather	Surveyor's Name	Pipe Segment Reference	Section No.
10/4/2019		**Damp**	**jOEL vASEY**		**1**
Certificate No.	Survey Customer	System Owner	Date Cleaned	Pre-Cleaning	Sewer Category
U-304-1198					

Street123	**Hart Crowser**	Use of Sewer	**Stormwater**	Upstream MH	**SDMH-B**
City	**PORTLAND**	Drainage Area		Dowstream MH	**SDMH-C**
Loc. details		Flow Control		Dir. of Survey	**Downstream**
Location Code		Length surveyed	**761.20 ft**	Section Length	**761.20 ft**

Purpose of Survey	**Maintenance Related**	Joint Length	
Year Laid		Dia./Height	**12 inch**
Year Rehabilitated		Material	**Polyethylene**
Tape / Media No.	**10-4-19**	Lining Method	

Add. Information :



1:1098 Position		Code	Observation	Grade
0.00		AMH	Manhole / SDMH-B	
0.00		MWL	Water Level, 5 %of cross sectional area	
88.55	**S1**	MWLS	Water Level, Sag in pipe, 10 %of cross sectional area, Start	S 2
99.55		MWL	Water Level, 10 %of cross sectional area	
112.40	**F1**	MWLS	Water Level, Sag in pipe, 10 %of cross sectional area, Finish	S 2
131.00	**S2**	MWLS	Water Level, Sag in pipe, 15 %of cross sectional area, Start	S 2
141.60		MWL	Water Level, 15 %of cross sectional area	
154.35	**F2**	MWLS	Water Level, Sag in pipe, 15 %of cross sectional area, Finish	S 2
172.55	**S3**	MWLS	Water Level, Sag in pipe, 10 %of cross sectional area, Start	S 2
184.65		MWL	Water Level, 15 %of cross sectional area	
194.20		MWL	Water Level, 10 %of cross sectional area	
212.00	**F3**	MWLS	Water Level, Sag in pipe, 10 %of cross sectional area, Finish	S 2
425.65	**S4**	MWLS	Water Level, Sag in pipe, 95 %of cross sectional area, Start	S 4
433.15		MWL	Water Level, 50 %of cross sectional area	

City : PORTLAND

Bravo Environmental
6437 S 144th
Tukwila, WA 98168
425-424-9000
425-424-9002

Inspection Report / Inspection: Hart Crowser Storm

Date :	Job number :	Weather : **Damp**	Operator : **jOEL vASEY**	Counter : **1**	Section name :
Present :	Vehicle :	Camera :	Preset :	Cleaned :	Rate :



1:1098 Position		Code	Observation	Rate
436.65	**S5**	MCU	Camera Underwater, Start	M 4
446.55		MWL	Water Level, 95 %of cross sectional area	
459.40	**F5**	MCU	Camera Underwater, Finish	M 4
459.40		MWL	Water Level, 50 %of cross sectional area	
470.95		MWL	Water Level, 20 %of cross sectional area	
493.50	**F4**	MWLS	Water Level, Sag in pipe, 95 %of cross sectional area, Finish	S 4
537.00	**S6**	MWLS	Water Level, Sag in pipe, 5 %of cross sectional area, Start	S 2
550.80		MWL	Water Level, 10 %of cross sectional area	
569.20	**F6**	MWLS	Water Level, Sag in pipe, 5 %of cross sectional area, Finish	S 2
576.35	**S7**	MWLS	Water Level, Sag in pipe, 10 %of cross sectional area, Start	S 2
594.85		MWL	Water Level, 15 %of cross sectional area	
618.65	**F7**	MWLS	Water Level, Sag in pipe, 10 %of cross sectional area, Finish	S 2
643.45	**S8**	MWLS	Water Level, Sag in pipe, 10 %of cross sectional area, Start	S 2
651.40		MWL	Water Level, 10 %of cross sectional area	
660.45	**F8**	MWLS	Water Level, Sag in pipe, 10 %of cross sectional area, Finish	S 2
680.45	**S9**	MWLS	Water Level, Sag in pipe, 15 %of cross sectional area, Start	S 2
695.80		MWL	Water Level, 15 %of cross sectional area	

City : PORTLAND

Bravo Environmental
6437 S 144th
Tukwila, WA 98168
425-424-9000
425-424-9002

Inspection Report / Inspection: Hart Crowser Storm

Date :	Job number :	Weather : **Damp**	Operator : **jOEL vASEY**	Counter : **1**	Section name :
Present :	Vehicle :	Camera :	Preset :	Cleaned :	Rate :

1:1098	Position		Code	Observation	Rate
	721.00	**F9**	MWLS	Water Level, Sag in pipe, 15 %of cross sectional area, Finish	S 2
SDMH-C	761.20		AMH	Manhole / SDMH-C	

QSR	QMR	SPR	MPR	OPR	SPRI	MPRI	OPRI
4B2H	**4500**	**142**	**20**	**162**	**2.49**	**4**	**2.61**

City : PORTLAND

Bravo Environmental
6437 S 144th
Tukwila, WA 98168
425-424-9000
425-424-9002

Inspection Report / Inspection: Hart Crowser Storm

Date	P/O. No.	Weather	Surveyor's Name	Pipe Segment Reference	Section No.
10/4/2019		**Damp**	**jOEL vASEY**		**2**
Certificate No.	Survey Customer	System Owner	Date Cleaned	Pre-Cleaning	Sewer Category
U-304-1198					

Street123	**Hart Crowser**	Use of Sewer	**Stormwater**	Upstream MH	**SDMH-C**
City	**PORTLAND**	Drainage Area		Dowstream MH	**SDMH-E**
Loc. details		Flow Control		Dir. of Survey	**Downstream**
Location Code		Length surveyed	**197.85 ft**	Section Length	**197.85 ft**

Purpose of Survey	**Maintenance Related**	Joint Length	
Year Laid		Dia./Height	**12 inch**
Year Rehabilitated		Material	**Polyethylene**
Tape / Media No.	**10-4-19**	Lining Method	

Add. Information :

1:504	Position		Observation
SDMH-C	0.00		Manhole / SDMH-C
	0.00		Water Level, 10 %of cross sectional area
	0.00	S1	Water Level, Sag in pipe, 10 %of cross sectional area, Start
	11.15	F1	Water Level, Sag in pipe, 10 %of cross sectional area, Finish
	65.50	S2	Water Level, Sag in pipe, 5 %of cross sectional area, Start
	77.85	F2	Water Level, Sag in pipe, 5 %of cross sectional area, Finish
	83.00	S3	Water Level, Sag in pipe, 10 %of cross sectional area, Start
	92.75		Water Level, 10 %of cross sectional area
	105.00		Water Level, 5 %of cross sectional area
	117.20	F3	Water Level, Sag in pipe, 10 %of cross sectional area, Finish
	178.65		Deformed, 5 % / SMALL BUMP @ 6:00
SDMH-E	197.85		Manhole / SDMH-E

QSR	QMR	SPR	MPR	OPR	SPRI	MPRI	OPRI
412A	**0000**	**26**	**0**	**26**	**2.17**	**0**	**2.17**

Bravo Environmental
6437 S 144th
Tukwila, WA 98168
425-424-9000
425-424-9002

Inspection Report / Inspection: Hart Crowser Storm

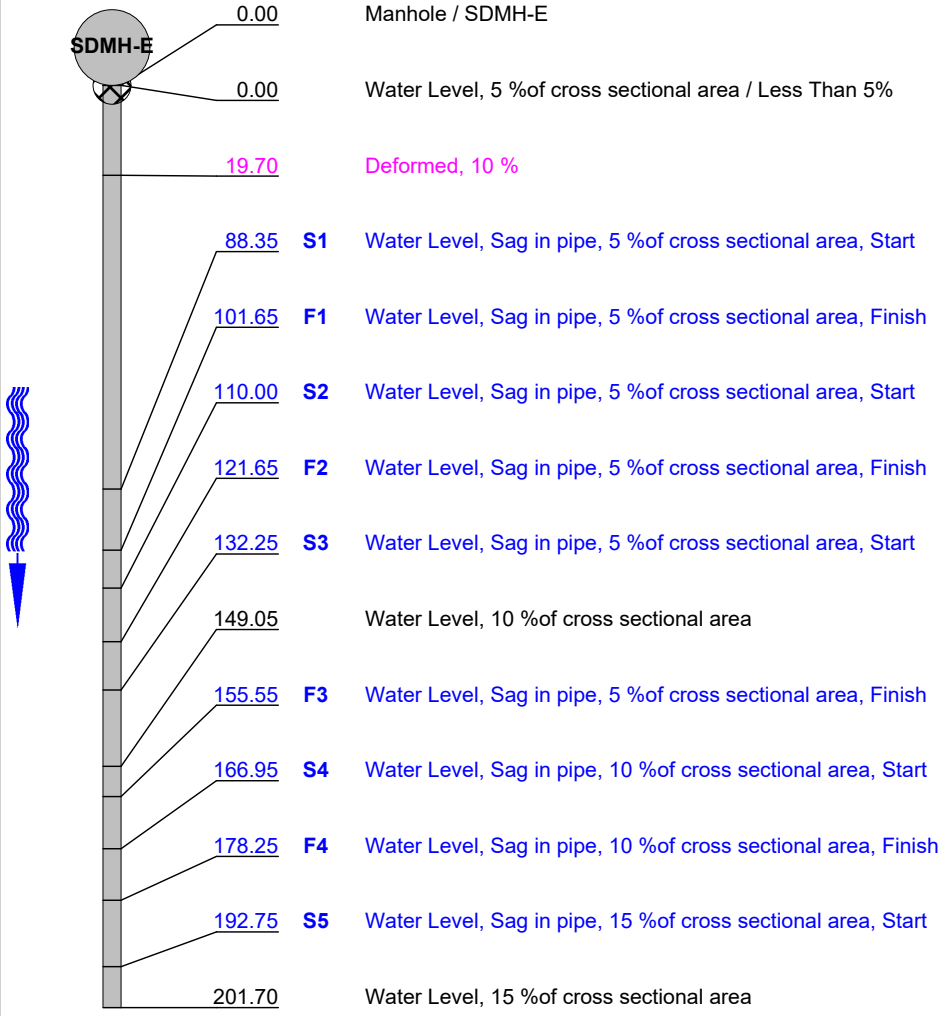
Date	P/O. No.	Weather	Surveyor's Name	Pipe Segment Reference	Section No.
10/4/2019		**Damp**	**jOEL vASEY**		**3**
Certificate No.	Survey Customer	System Owner	Date Cleaned	Pre-Cleaning	Sewer Category
U-304-1198					

Street123	**Hart Crowser**	Use of Sewer	**Stormwater**	Upstream MH	**SDMH-E**
City	**PORTLAND**	Drainage Area		Dowstream MH	**OUTFALL**
Loc. details		Flow Control		Dir. of Survey	**Downstream**
Location Code		Length surveyed	**225.00 ft**	Section Length	**225.00 ft**

Purpose of Survey	**Maintenance Related**	Joint Length	
Year Laid		Dia./Height	**12 inch**
Year Rehabilitated		Material	**Polyethylene**
Tape / Media No.	**10-4-19**	Lining Method	

Add. Information :

1:504 Position		Observation
0.00		Manhole / SDMH-E
0.00		Water Level, 5 %of cross sectional area / Less Than 5%
19.70		Deformed, 10 %
88.35	S1	Water Level, Sag in pipe, 5 %of cross sectional area, Start
101.65	F1	Water Level, Sag in pipe, 5 %of cross sectional area, Finish
110.00	S2	Water Level, Sag in pipe, 5 %of cross sectional area, Start
121.65	F2	Water Level, Sag in pipe, 5 %of cross sectional area, Finish
132.25	S3	Water Level, Sag in pipe, 5 %of cross sectional area, Start
149.05		Water Level, 10 %of cross sectional area
155.55	F3	Water Level, Sag in pipe, 5 %of cross sectional area, Finish
166.95	S4	Water Level, Sag in pipe, 10 %of cross sectional area, Start
178.25	F4	Water Level, Sag in pipe, 10 %of cross sectional area, Finish
192.75	S5	Water Level, Sag in pipe, 15 %of cross sectional area, Start
201.70		Water Level, 15 %of cross sectional area



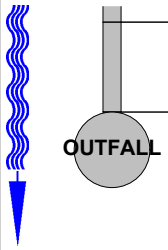
City : PORTLAND

Bravo Environmental
6437 S 144th
Tukwila, WA 98168
425-424-9000
425-424-9002

Inspection Report / Inspection: Hart Crowser Storm

Date :	Job number :	Weather : **Damp**	Operator : **jOEL vASEY**	Counter : **3**	Section name :
Present :	Vehicle :	Camera :	Preset :	Cleaned :	Rate :

1:504 **Position** **Observation**



205.40 **F5** Water Level, Sag in pipe, 15 %of cross sectional area, Finish

225.00 End of Pipe / DUCK BILL

QSR	QMR	SPR	MPR	OPR	SPRI	MPRI	OPRI
412B	**0000**	**34**	**0**	**34**	**2.13**	**0**	**2.13**

APPENDIX D
EPA Dive Report

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 155
Seattle, WA 98101-3123

LABORATORY SERVICES &
APPLIED SCIENCE
DIVISION

DIVE REPORT – April 12, 2021

From: **Anne Christopher, SEMD Remedial Project Manager, Diver**

Dates of dives: **August 23-28, 2020 Deployment; September 28-31, 2020 Retrieval**

Thru: **Kris Leefers, Unit Diving Officer**
Michael Szerlog, Dive Unit Manager Sponsor, LSASD
Linda Anderson-Carnahan, Director, LSASD

To: **Anne Christopher, SEMD Remedial Project Manager**
Sarah Miller, OR Department of Environmental Quality (DEQ), Project Manager

Project: **McCormick & Baxter Superfund Site 5 Year Review Sampling**

Requested by: **Anne Christopher, SEMD; Sarah Miller, OR DEQ**

Site Account Number: T 000DD2 10P9FE00 5-yr Review
Waterbody Location: Willamette River, Portland, OR
Latitude/Longitude: 45.57783, -122.74368

Scientific Diving Purpose:
The Region 10 Dive Unit supported the Superfund and Emergency Management Division (SEMD) and the Oregon Department of Environmental Quality (DEQ) by deploying and retrieving passive samplers (SPMEs) for the McCormick & Baxter Superfund Site 5 Year Review (5YR). The SPMEs were used to measure concentrations of contaminants of concern (COCs) in surface water, within the armoring of the sediment cap (interarmor) and within the sand layer of the sediment cap (subarmor).

Background:
The McCormick & Baxter Superfund Site is a former creosote wood treating facility located on the east bank of the Willamette River in Portland, Oregon. This site is located within the Portland Harbor Superfund Site but is not included in the January 2017 Portland Harbor Record of Decision. The site encompasses approximately 41 acres of land and an additional 23 acres of contaminated river sediments. The McCormick & Baxter Creosoting Company was founded in 1944 and continued operations until October 1991.

Site investigations confirmed releases of wood-treating chemical compounds to soils, groundwater, and sediments. Remedial investigations identified two non-aqueous phase liquid (NAPL) plumes migrating to the river and impacting surface water and sediments, and an additional NAPL plume migrating under the Burlington Northern Santa Fe railway right-of-way toward Willamette Cove.

Construction of the site remedies was completed in September 2005. Completed cleanup activities included demolition of the McCormick and Baxter plant, soil excavation, treatment, and disposal, upland soil capping, installation of a subsurface barrier wall, NAPL recovery, construction of a multi-layer sediment cap in the Willamette River, monitoring, and engineering and institutional controls.

Scientific Objectives:
The objectives of these scientific dives was to deploy and retrieve SPMEs to measure concentrations of COCs in surface water, within the interarmor and within the subarmor of the sediment cap. The data from the passive samplers will be part of the sediment cap performance monitoring to determine if the remedy is functional and

performing as designed (Record of Decision (ROD) criteria) and if the remedy is protective of current Human Health and Ecological Ambient Water Quality Criteria (AWQC).

Scientific Observations:
The 2020 Operation & Maintenance (O&M) sampling locations include (see Figure 1):

- 12 compliance monitoring locations in sampling areas A through L,
- Four fixed early-warning locations (at station numbers 5, 12, 13, and 16),
- Fixed upstream and downstream reference locations (stations 1 and 27, respectively), and
- Five crayfish sampling locations (01 through 05).

Surface water, inter-armoring, and sub-armor water were sampled using passive techniques (see Figure 2) at the 12 compliance monitoring locations and four early warning stations. Upstream and downstream reference locations were installed to assess background concentrations using passive techniques in surface water only; however, the upstream reference sampler went missing prior to retrieval. Crayfish were sampled at five locations collocated with compliance monitoring locations. The crayfish traps were deployed and retrieved by DEQ's contractor from their boat, so divers were not involved. Field duplicates were collected at each depth interval obtained from one passive sampler at three compliance monitoring locations and one crayfish sampling location to evaluate the precision of the sampling procedures.

The target sample coordinates, anticipated water depth, and number and type of sample(s) for each location were used to guide field installation (see Table 1). Table 2 lists the proposed sampling locations and the actual sampling locations. Nearshore samplers where water depths were less than approximately 2 feet were deployed and collected by field staff from the shore; divers installed and collected samplers in deeper water. Divers placed surface water sampling devices at the upstream and downstream reference locations, and one sampling device for surface water, inter-armoring and sub-armoring at the compliance monitoring locations and at the early warning stations (see Figures 1 and 2).

Sample locations were adjusted in the field based on actual water depths, accessibility, and substrate refusal (see Table 2). The steel tether cable attaching the sampler to the anchor allowed divers an area in which to choose a location to install the sampler. Compliance monitoring locations A, F, and G are located on the articulated concrete block (ACB). Samplers were successfully installed in the ACB and alternate locations were not necessary at these locations. Divers did encounter substrate refusal at Site 16, resulting in deployment of the sampler at an adjacent location (see Table 2).

Figure 1. 2020 sampling locations at McCormick & Baxter



Table 1: Proposed sample location, type, number, and analyte group

Table 1
Sample Location, Type, Number, and Analyte Groups

Sampling Location ID	Sample Location								Sampling Interval(s) and Deployment Methodology (S= Shore; D=Diver; B= Boat; -- No Sample)				Field Duplicate Collected?	Analytes [4]						
	Sample Coordinates (NAD83) [1]				Sample Elevation [2] (ft NAVD88)	Anticipated Water Depth [3] (ft NAVD88)	Location with ACB	Colocated Sampling Location	Mudline (ML)	urface Water (SW	ater-Armoring (IA	ub-Armoring (SA		D/Fs	PAHs	PCP	As	Cr	Cu	Zn
	Northing	Easting	Latitude	Longitude					At the sediment water interface	6-12 inches above the sediment cap	Centered 6 inches into the armoring layer	Approximately 18 inches below the top of the sediment cap								
Compliance Sampling Locations																				
A [5]	704151.8	7628801.0	45.57630	-122.73924	6.1	0.9	Yes	01	--	S	S	S	--	--	3	3	3	3	3	3
B	704369.2	7628482.9	45.57687	-122.74050	4.6	2.4	--	--	--	D*	D*	D*	--	--	3	3	3	3	3	3
C	704556.6	7628058.5	45.57735	-122.74218	1.8	5.2	--	02	--	D	D	D	IA	--	4	4	4	4	4	4
D	704693.1	7627598.7	45.57769	-122.74399	-17.2	24.2	--	03	--	D	D	D	--	--	3	3	3	3	3	3
E	704787.3	7627213.2	45.57792	-122.74550	-27.8	34.8	--	04	--	D	D	D	SW	--	4	4	4	4	4	4
F	705220.9	7627179.7	45.57911	-122.74568	0.5	6.5	Yes	05	--	D	D	D	SA	--	4	4	4	4	4	4
G [6]	705263.6	7627011.2	45.57921	-122.74634	1.1	5.9	Yes	--	--	D	D	D	--	--	3	3	3	3	3	3
H	705118.3	7626983.2	45.57881	-122.74644	-8.9	15.9	--	--	--	D	D	D	--	--	3	3	3	3	3	3
I	704565.8	7627624.4	45.57734	-122.74387	-18.6	25.6	--	--	--	D	D	D	--	--	3	3	3	3	3	3
J	704511.5	7627800.2	45.57721	-122.74318	7.2	-0.2	--	--	--	S	S	S	--	--	3	3	3	3	3	3
K	704219.7	7628010.5	45.57643	-122.74233	-20.9	27.9	--	--	--	D	D	D	--	--	3	3	3	3	3	3
L	704335.6	7628390.4	45.57677	-122.74086	4.5	2.5	--	--	--	D*	D*	D*	--	--	3	3	3	3	3	3
Early Warning Sampling Locations																				
5	704576.3	7628007.4	45.57740	-122.74238	1.8	5.2	--	--	--	D	D	D	--	--	3	3	--	--	--	--
12	705197.2	7627236.8	45.57905	-122.74546	4.9	2.1	Yes	--	--	D*	D*	D*	--	--	3	3	--	--	--	--
13	705303.9	7627321.8	45.57935	-122.74514	5.4	1.6	Yes	--	--	D*	D*	D*	--	--	3	3	--	--	--	--
16	704293.9	7627812.9	45.57661	-122.74311	-28.6	35.6	--	--	--	D	D	D	--	--	3	3	--	--	--	--
Background Sampling Locations																				
1 (Upstream)	703730.7	7628583.6	45.57513	-122.74004	-31.5	38.5	--	--	--	B	--	--	--	--	1	1	1	1	1	1
27 (Downstream	705647.6	7626360.3	45.58021	-122.74893	-19.3	26.3	--	--	--	B	--	--	--	--	1	1	1	1	1	1
Crayfish (CF) Sampling Locations																				
01	704151.8	7628801.0	45.57630	-122.73924	6.1	0.9	Yes	A	B	--	--	--	--	1	1	1	1	1	1	1
02	704556.6	7628058.5	45.57735	-122.74218	1.8	5.2	--	C	B	--	--	--	--	1	1	1	1	1	1	1
03	704693.1	7627598.7	45.57769	-122.74399	-17.2	24.2	--	D	B	--	--	--	CF	2	2	2	2	2	2	2
04	704787.3	7627213.2	45.57792	-122.74550	-27.8	34.8	--	E	B	--	--	--	--	1	1	1	1	1	1	1
05	705220.9	7627179.7	45.57911	-122.74568	0.5	6.5	Yes	F	B	--	--	--	--	1	1	1	1	1	1	1
						TOTAL COUNT			B=5; Total=5	D=14; S=2; B=2; Total=18	=14; S=2; Total=	=14; S=2; Total=	4	6	59	59	47	47	47	47
									D=42; S=6; B=7; Total=55											

Notes:

[1] Northing and easting coordinates exist in the following coordinate system: North American Datum of 1983 (NAD83), Oregon State Plane North Zone, International Feet.

[2] Elevations exist in the following coordinate system: North American Vertical Datum of 1988 (NAVD88) in units of feet.

[3] Assumes the Willamette River stage is at an elevation of 7.0 feet NAVD88. Note that sample locations with a negative value are anticipated to be out of water at the time of sampling. The locations will be adjusted to the waters edge when deployed to ensure that the samplers remain submerged throughout the deployment period.

[4] Analytes include the following dioxin/furan (D/Fs) congeners; polyaromatic hydrocarbons (PAHs): acenaphthene, acenaphthylene, anthracene, benzo (a) anthracene, benzo (a) pyrene, benzo (b) fluoranthene, benzo (ghi) perylene, benzo (k) fluoranthene, chrysene, dibenzo (a,h) anthracene, fluoranthene, fluorene, indeno (1,2,3-cd) pyrene, naphthalene, phenanthrene, pyrene; pentachlorophenol (PCP); and the following metals: arsenic (As), chromium (Cr), copper (Cu), and zinc (Zn.)

[5] Compliance monitoring location A is located on ACB. If installation of the passive sampling devices is challenging the nearest location without ACB within area A will be used. The coordinates for this location are N: 704245.0, E: 7628682.3; Lat: 45.576546, Long: -122.73971

[6] Compliance monitoring location G is located on ACB. If installation of the passive sampling devices is challenging the nearest location without ACB within area G will be used. The coordinates for this location are N: 705277.8 E: 7626983.2; Lat: 45.5788109435, Long: -122.746512

*Deployment methodology will depend upon river stage at the time of sampling.

ACB: Articulated concrete block

D/Fs: Dioxin/Furan congeners

PAHs: Polyaromatic hydrocarbons

Table 2: Actual sampling locations

Sampling Location ID	Target Sample Coordinates (NAD83)[1]				Actual Sample Coordinates (NAD83)[1]				Sample Elevation[2] (ft NAVD88)	Location with ACB	Colocated Crayfish Sampling Location	Number of Days Deployed
	Northing	Easting	Latitude	Longitude	Northing	Easting	Latitude	Longitude				
Compliance Sampling Locations												
A	704151.8	7628801.0	45.57630	-122.73924	7628794.7	704139.5	45.57627	-122.73920	6.1	Yes	01	34
B	704369.2	7628482.9	45.57687	-122.74050	7628480.8	704372.3	45.57689	-122.74045	4.6	--	--	32
C	704556.6	7628058.5	45.57735	-122.74218					1.8	--	02	32
D	704693.1	7627598.7	45.57769	-122.74399	7627598.8	704693.6	45.57770	-122.74393	-17.2	--	03	35
E	704787.3	7627213.2	45.57792	-122.74550	7627213.1	704787.8	45.57793	-122.74545	-27.8	--	04	36
F	705220.9	7627179.7	45.57911	-122.74568	7627182.6	705220.1	45.57911	-122.74561	0.5	Yes	05	34
G[4]	705263.6	7627011.2	45.57921	-122.74634	7627006.0	705262.1	45.57921	-122.74631	1.1	Yes	--	34
H	705118.3	7626983.2	45.57881	-122.74644	7626986.2	705122.8	45.57883	-122.74637	-8.9	--	--	35
I	704565.8	7627624.4	45.57734	-122.74387	7627626.1	704559.8	45.57733	-122.74381	-18.6	--	--	35
J	704511.5	7627800.2	45.57721	-122.74318	7627777.0	704505.0	45.57720	-122.74321	7.2	--	--	32
K	704219.7	7628010.5	45.57643	-122.74233	7628009.3	704220.0	45.57643	-122.74228	-20.9	--	--	36
L	704335.6	7628390.4	45.57677	-122.74086	7628387.3	704336.0	45.57678	-122.74081	4.5	--	--	34
Early Warning Sampling Locations												
5	704576.3	7628007.4	45.57740	-122.74238					1.8	--	--	35
12	705197.2	7627236.8	45.57905	-122.74546					4.9	Yes	--	33
13	705303.9	7627321.8	45.57935	-122.74514					5.4	Yes	--	33
16	704293.9	7627812.9	45.57661	-122.74311	704308.0	7627821.1	45.57666	-122.74302	-28.6	--	--	36
Background Sampling Locations												
1 (Upstream)[5]	703730.7	7628583.6	45.57513	-122.74004	703730.6	7628585.6	45.57513	-122.73997	-31.5	--	--	NA
27 (Downstream)	705647.6	7626360.3	45.58021	-122.74893	705647.4	7626359.1	45.58022	-122.74887	-19.3	--	--	34

Notes:

[1] Northing and easting coordinates exist in the following coordinate system: North American Datum of 1983 (NAD83), Oregon State Plane North Zone, International Feet.

[2] Elevations exist in the following coordinate system: North American Vertical Datum of 1988 (NAVD88) in units of feet and are based on survey data.

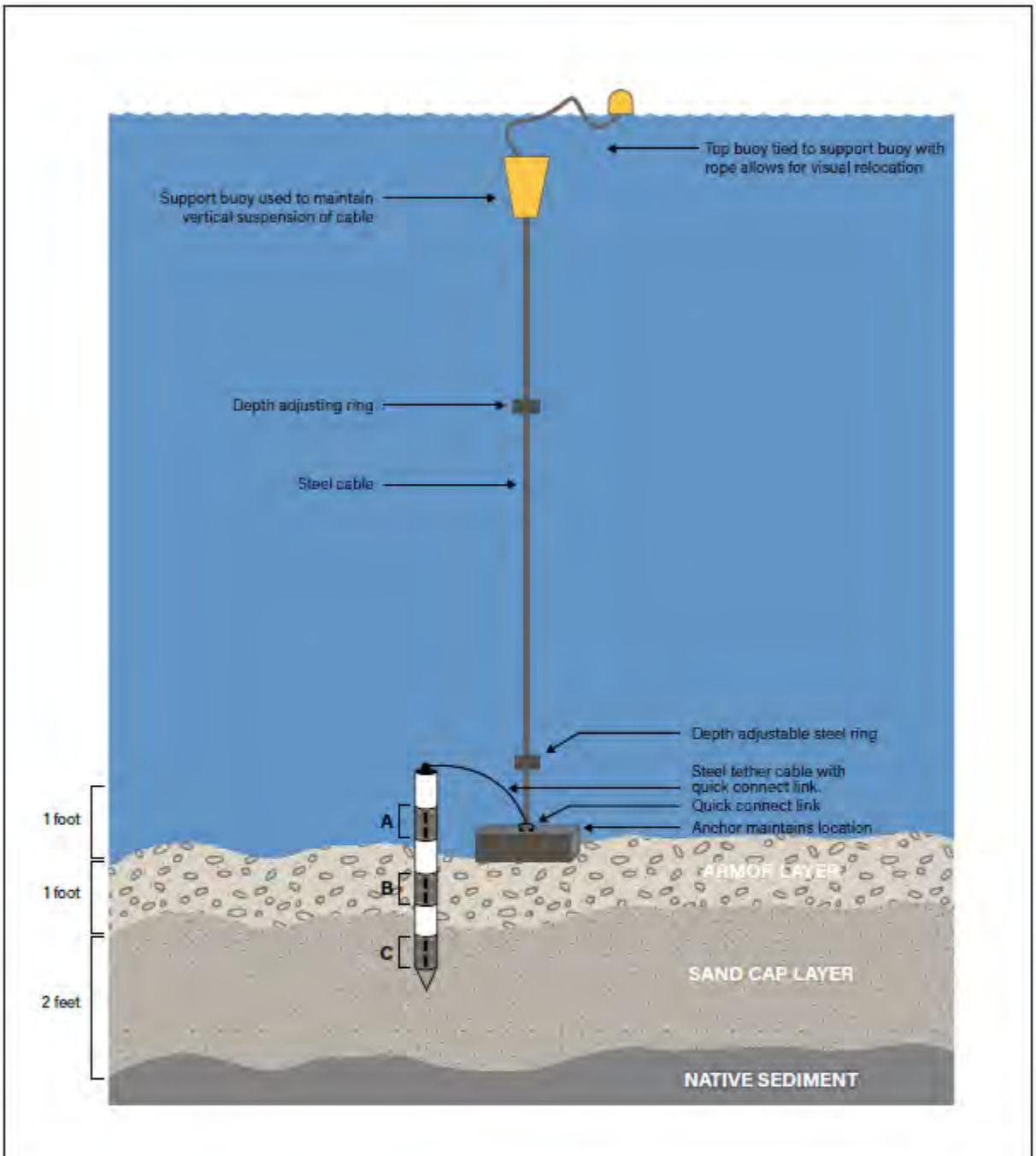
[3] Metals analyzed include arsenic, chromium, and copper.

[4] Sampler was found broken at the 5th cell.

[5] Sampler was lost during deployment.

ACB: Articulated concrete block

Figure 2: Passive Sampling Device Anchoring System



The Passive Sampling Device (PSD) anchoring system includes a top buoy attached by rope to a support buoy. The support buoy is attached to an adjustable steel cable fixed to an anchor which will rest on the riverbed immediately adjacent to the sampling location. Attached to the anchor will be a tether for connecting the PSD to the anchoring system once it is installed.

A. Surface Water Sample Depth: 12" above armoring
B. Armoring Layer Sample Depth: 3-9" below surface of armoring
C. Early Warning Sediment Cap Sample Depth: 15-21" below surface of armoring (which should be within the sand cap)

NOT TO SCALE

FIGURE X
Passive Sampling Device Anchoring System
McCormick and Baxter
Operation and Maintenance Manual

GSI Water Solutions, Inc.

Representative GoPro video from the M&B sampler deployment dives and still photographs from the M&B sampler retrieval dives will be available here: N:\APPS\DIVE_TEAM_SHARE\Dive Planning&Reporting\Dive Reports\M&B. Due to restricted access to the office during the pandemic, some GoPro videos are either still on thumbdrives or on diver Christopher's OneDrive. Access to the office is needed in order to organize the videos.

No unusual signs of erosion or accompanying depositional features were observed during any of the M&B dives. All samplers were deployed successfully. During the retrieval week, the upstream surface water sampler and buoy (Sample Location 1) were missing. Two attempts were made to circle search for the missing sampler in the hopes that the sampler could be located even with the buoy gone, but neither diver could locate the sampler. Sampler G was broken in half when retrieved. The buoy for Sampler G was entangled in the anchoring for boom that was installed to restrict boats from entering Willamette Cove. It is believed that the tension on the anchor line being pulled by the boom broke the sampler in half because the anchor was installed in the ACB. Texas Tech, a collaborator for research at the site, determined the samples could be analyzed.

Conclusions and Recommendations:
Deployment and retrieval of the samplers went smoothly. All logistics were well coordinated with the EPA Dive Team, DEQ, and DEQ's contractors. Texas Tech will be analyzing the surface water and porewater samples and the data will be used in the 5YR. It is unclear how the one upstream sampler (Location 1) went missing, but we don't believe its disappearance was related to any deployment issues. The new samplers and anchoring system designed by Texas Tech were relatively easy to install and were easy to retrieve.

Dive Details:
Dives were executed using surface supply. A total of five requalification dives, one training dive and 26 surface supply scientific dives were conducted during the 2-week dive operation, as summarized in Table 3. Requalification dives were necessary because regularly scheduled training and proficiency dives were not possible during pandemic restrictions.

Table 3: M&B Dive Summary

DATE	Dive Seq#	Diver	Max Depth (ft)	Start Time	End Time	Bottom Time (min)	Comments*all dives are scientific in purpose unless otherwise noted*
9/30/2020	3	AC	16	12:06	12:13	7	Training dive-test new face seal on primary suit
9/30/2020	2	SS	36	10:57	11:05	8	Site E@ Bridge. 4-6" diameter rock, shell hask, 1-2 mm silt, 5-10 degree angle on sampler off of perpendicular.
9/30/2020	1	SS	10	10:34	10:40	6	Site H: shell hash, 1/4" of silt, 4-6" diameter rock armor, sampler at 15 degree angle off of perpendicular.
9/29/2020	7	BR	6	14:41	15:03	22	Site G: buoy /anchor detached from sampler due to Willamette Cove boom dragging across the sample array. Sampler eventually located, broken, somewhat pulled out of mudline.
9/29/2020	6	BR	5	14:28	14:31	3	Site F: 6-8" of silt above ACB. Silt filled back in sample site.
9/29/2020	5	AC	31	11:54	12:15	21	Site 1: Searched for submerged (/) buoy/missing sampler but mask uncomfortable, dive aborted.
9/29/2020	4	AC	6	10:50	10:55	5	Site 5: At least 7" of silt with vegetation on top.
9/29/2020	3	KL	37	12:47	13:30	43	Site 1: Search for submerged(?) buoy/missing sampler unsuccessful. Abundant debris and pilings.
9/29/2020	2	KL	24	9:54	10:05	11	Site 16: 6" silt or more, no rock detected
9/29/2020	1	KL	25	9:27	9:44	17	Site K: 6 inches of silt, no rocks she could feel at sampler, baseball size rock at anchor.
9/28/2020	1	RS	23	15:15	15:43	38	Prior to conducting the scientific dive, the diver requalified for diving by demonstrating dive skills as determined by the divemaster, including buoyancy control, boat entry/exit, drysuit whip detach and reattach, and switching to emergency gas supply; Site D 45 degree angle on sampler, 1" silt over rocks, fist size rocks. Site J, 2" of silt over fist size rocks.
8/27/2020	1	AC	3	9:40	10:20	40	SITE B: Rock 10" minus with silt; 2" silt on top of rocks; hammered through gravel
8/27/2020	2	AC	21	11:44	12:05	21	SITE 5: 6" of silt on top of rocks; layer of gravel after digging

8/27/2020	1	AW	3	12:43	13:35	52	SITE J: 1cm silt and green algae on rocks; rocks 6-10" size; shell hash; digging to reach gravel; 3' of visibility
8/26/2020	1	BR	6	9:37	9:50	13	Prior to conducting the scientific dive, the diver requalified for diving by demonstrating dive skills as determined by the divemaster, including buoyancy control, boat entry/exit, drysuit whip detach and reattach, and switching to emergency gas supply; SITE F: 10" silt;
8/26/2020	2	BR	6	10:19	10:45	26	SITE G: Cobble over ACB; fist-size and finer gravel in the ACB gaps (had to move to clear of bottom anchor to boom)
8/26/2020	1	KL	12	12:33	13:40	67	SITE H: silt ~ 1cm; fist size cobble on top; golf ball sized cobble mixed; clams
8/26/2020	2	KL	3	14:31	15:30	59	SITE A: softball-sized (some larger) rock, a few clams
8/25/2020	1	SS	33	10:14	10:39	25	Prior to conducting the scientific dive, the diver requalified for diving by demonstrating dive skills as determined by the divemaster, including buoyancy control, boat entry/exit, drysuit whip detach and reattach, and switching to emergency gas supply; SITE 16 (alternate site): 6" silt and 18" sediment; easy install
8/25/2020	2	SS	26	10:55	11:03	8	SITE 27: sediment and silt, crayfish; installed @ 11:00
8/25/2020	1	AW	34	11:56	13:17	81	SITE E @ **BRIDGE**: 2cm silt; crayfish; 4-8" cobble rocky bottom with gravel; clams, shell hash; installed @ 1309
8/25/2020	2	AW	4	14:11	14:45	34	SITE L: 1cm sediment/silt; huge rocks (~10"+); intermixed 2" diameter rocks and smaller gravel
8/24/2020	1	KL	27	11:04	11:23	19	SITE 1: heavy silt, installed @ 11:19
8/24/2020	2	KL	37	11:43	11:51	8	SITE K: 5" silt, no site of rocks; install complete @ 11:50am
8/24/2020	3	KL	22	14:42	15:10	38	SITE i: large rocks; light silt covering; cobbles with gravel; installed at 15:04
8/24/2020	4	KL	21	15:41	16:04	23	SITE D: fine layer of silt on rock; cobble; crayfish; sponge on rock; installed at 1600
8/24/2020	1	AC	24	13:03	13:57	54	SITE 16 (first location): 5: silt on rock; refusal; when sampler was at 12", surface pulled out for redeployment
8/23/2020	1	KL	20	14:54	15:01	7	The diver requalified for diving by demonstrating dive skills as determined by the divemaster, including buoyancy control, boat entry/exit, drysuit whip detach and reattach, and switching to emergency gas supply
8/23/2020	1	AW	15	16:07	16:15	8	The diver requalified for diving by demonstrating dive skills as determined by the divemaster, including buoyancy control, boat entry/exit, drysuit whip detach and reattach, and switching to emergency gas supply
8/23/2020	1	AC	20	15:36	15:45	9	The diver requalified for diving by demonstrating dive skills as determined by the divemaster, including buoyancy control, boat entry/exit, drysuit whip detach and reattach, and switching to emergency gas supply

Personnel:
Divemaster: Sean Sheldrake (SS)
Divers: Kris Leefers (KL), Rachel Stephenson (RS), Brent Richmond (BR), Anne Christopher (AC), Annie Whitley (AW)
Boat Operator: BR
Other Field Support Personnel: n/a

Hazards and Hazard Management:

1. Boat traffic. Boat traffic was managed by use of dive flags, and boat positioning, and constant monitoring of VHF marine traffic channels. The Monitor's automatic identification system (AIS) was also used to relay the Monitor's real time position.
2. Entanglement with loose lines. The Divemaster went through hand and body positioning throughout the dive to emphasize ways to keep entanglement prone areas clear of entanglement hazards (e.g., tank yokes).
3. Nitrox Diving. The Divemaster briefed all divers on signs and symptoms of acute oxygen toxicity using mnemonic VENTID CON (Vision blurring, Ears ringing, Nausea, Tingling, Irritability, Dizziness, Convulsions). Divers tracked their dive time via the latest dive tables and/or via dive computers reflecting the exact oxygen percentage being dived. To mitigate exposure, the following measures were employed: use of

full face masks, light work, minimizing the duration of the exposure, and close diver monitoring for acute oxygen toxicity. MOD for XX% oxygen at 1.4 ATA is MOD FSW = 33 x ((PPO2/FO2)-1); e.g. MOD = 33 x ((1.4/0.32)-1)).

4. Bounce diving. No divers experienced repeated ascents and descents within a single dive.
5. Overhead hazards. No divers were diving where overhead hazards were present.
6. Current. A slight current was experienced during some of the dives. Divers were on surface supply and current impacts were managed by tenders.
7. Loading /unloading gear. Proper lifting techniques were used and teamwork was employed to lift and carry heavy items.
8. Travel to site with dive van. No hazards were encountered in driving to and from the dive site.
9. Transit in vessel to dive site. All personnel wore PFDs, and no hazards were encountered in transit to and from the dive site.
10. Tying up at site. The *Monitor* was anchored at each dive location, prior to divers entering the water.
11. COVID. All divers adhered to the "COVID 19 general HASP Addendum EPA dive program," dated August 12, 2020.

Exposures: None.

Diver /Equipment Issues:

1. Brent's wrist seal ripped
2. Sean's neck seal ripped
3. Surface supply box slid off counter during boat pull but no damage was noted

First Aid Supplies Expended: None.

Decontamination:
Divers were fully encapsulated and used only decontamination-compatible equipment. The vessel was divided into zones, and gross decontamination was conducted on the swim step using a freshwater rinse. No eating or drinking took place on the swim step and gloves were worn at all times in the contaminant reduction zone and the exclusion zone. Gloves were disposed upon exiting the contaminant reduction zone.

Follow-up to Issues/Post Dive Tasks:

1. DIN o-rings (in labeled bag) to DM kit- (pull out of o-rings bin above sink) - SS purchased, pickup from Underwater Sports when solas and AGA FFM arrive_____
2. Brent wrist seal on primary-repaired?
3. SS neck seal on primary-delivered to shop 10/2, repair completed back in dive ops 10/6/20.
4. Tank fills and service BR
5. Prep backup suit-BR
6. Test surface supply box (dropped during boat pull)-BR10/5/20 completed ok
7. AGA cleaning-RS, KL, SS completed 10/1/20
8. AGA reassemble - CS completed 10/11/20
9. Thank you to USCG- SS completed 10/1/20
10. Tending log entry into dive database-SS completed 9/30/20

Photos:
The photographs presented in this dive report are representative of site conditions. Complete photos and videos will be available here: N:\APPS\DIVE_TEAM_SHARE\Dive Planning&Reporting\Dive Reports\M&B.

Figure 3: Station K sampler before retrieval.



Figure 4: Station 16 sampler before retrieval.



Figure 5: Station 5.



Figure 6: Station F, silt filled in around the sampler.



Figure 7: Station G, sampler tangled with Willamette Cove boom anchor system.



Figure 8: Station G, bent sampler tangled with Willamette Cove boom anchor system.



Figure 9: Station H



Figure 10: Station E



APPENDIX E
Porewater Sampling QA Report and Texas Tech University Analytical Report

APPENDIX E
Quality Assurance Review and Analytical Laboratory Testing

This appendix documents the results of a quality assurance (QA) review of the analytical data for porewater samples collected during the Five-Year Review sampling event conducted in August through September 2020 at the McCormick & Baxter site. Field procedures used for sample collection are discussed in the Surface, Inter-armor, and Sub-armoring Water and Crayfish Sampling and Analysis Plan (SAP)(Hart Crowser and GSI Water Solutions, Inc. [GSI] 2020). Porewater samplers were processed in the field by Texas Tech University (TTU) sampling personnel, packed for transport, and shipped to the TTU laboratory in Lubbock, Texas. A copy of the laboratory report is included as part of this appendix. Upon review, the analytical data are valid with qualifications for their intended use.

The laboratories performed ongoing QA/ quality control (QC) reviews of laboratory procedures. Level II data packages were reviewed. Haley & Aldrich reviewed the data, using laboratory QC data to check that they met data quality objectives for the project. Data review followed the procedures described in the SAP. Validation of the analytical data was completed generally following Environmental Protection Agency (EPA) National Functional Guidelines for Superfund Organic Methods Data Review (EPA 2017a) and the National Functional Guidelines for Inorganic Superfund Data Review (EPA 2017b) modified to include criteria specific to the individual analytical methods and laboratory performance based control limits. The QA review included examination and validation of the laboratory's summary report, including:

- Case narratives
- Chain of custody (COC) documentation
- Sample receiving condition
- Holding times
- Analytical methods, detection limits, and reporting limits
- Method blanks
- Surrogate recoveries
- Laboratory control sample/laboratory control sample duplicate (LCS/LCSD) recoveries
- Matrix spike and matrix spike duplicate (MS/MSD) recoveries
- Laboratory duplicate relative percent difference (RPD), where applicable
- Calibration data, if provided

1.0 ANALYTICAL METHODS AND REPORTING LIMITS

This section describes the analytical method, method detection limits (MDLs) or estimated detection limits (EDLs), and method reporting limits (MRL) for the chemical analyses.

1.1 Analytical Methods

A total of 54 porewater samples, 51 primary and 3 field duplicate, were collected and submitted to TTU. Samples were analyzed for the following.

- Total metals (arsenic, chromium, copper, and zinc) by inductively-coupled plasma mass spectrometry (ICP-MS) based on EPA Method 200.8; and
- Polycyclic aromatic hydrocarbons (PAHs) and pentachlorophenol (PCP) by gas-chromatograph mass spectrometry (GC-MS) based on EPA Method 8270.

Samples were analyzed in accordance with the SAP (Hart Crowser and GSI 2020).

1.2 Method Detection and Reporting Limits

MDLs/EDLs are the minimum concentration of a chemical compound that can be measured and reported that the compound is present and is based on instrumentation abilities and sample matrix. MRLs/EDLs are set by the laboratory and are based on the low standard of the initial calibration curve or low-level calibration check standard and represent the concentration that can be accurately quantified. In some cases, the MDL/EDL and/or MRL is raised due to dilutions or matrix interferences.

The laboratory reported sample results to the MRL/EDL. Analytical results that fell between the MDL/EDL and MRL are estimated and qualified with J flags in the report tables. Non-detect results are reported at the associated MDL/EDL and are reported with a U flag in the report tables.

2.0 CHAIN OF CUSTODY AND SAMPLE RECEIVING CONDITION

The following provides a summary of the review of COC procedures and sample receiving conditions.

2.1 Chain of Custody

Samples collected were placed into appropriate laboratory supplied containers, placed into a cooler on ice, and logged onto a COC form. No COC discrepancies were noted.

2.2 Sample Receiving Conditions and Notes

The receiving temperatures were within the 2 to 6°C acceptance criteria. Samples were properly preserved in the appropriate containers.

3.0 CHEMICAL RESULTS

Data quality is indicated by assessing their completeness, representativeness, accuracy, precision, and comparability. An evaluation of the data follows.

3.1 Total Metals by ICP-MS

Holding times and reporting limits were acceptable. MB contamination was not detected. Field duplicate RPDs were within control limits. Field blank contamination was not detected with the following exceptions.

- Metals were present in loading water from field blanks collected during deployment. After equilibration, 1 percent of those concentrations are calculated to be part of final metal concentration. Concentrations include chromium at 0.002 ug/L, copper at 0.02 ug/L, zinc at 0.388 ug/L, and arsenic at

0.009 ug/L. Chromium, copper, and arsenic field blank results were below the MDL and results were not qualified. Zinc results were compared to 3 times or less than the field blank concentration for contamination effects. Sample results greater than 3 times the field blank detection were not qualified, results less than 3 times the field blank detection and above the PQL were qualified as ND with U flag; results less than 3 times the field blank detection and between the MDL and PQL were raised to the PQL and qualified as ND with U flag.

3.2 PCP and PAHs by GC-MS

Holding times and reporting limits were acceptable. MB contamination was not detected. Surrogate recoveries were within control limits. Field duplicate RPDs were within control limits. Field blank contamination was not detected.

4.0 REFERENCES

EPA. 2017a. National Functional Guidelines for Organic Superfund Methods Data Review. OLEM 9355.0-136, EPA-540-R-2017-002. Office of Superfund Remediation and Technology Innovation (OSRTI) United States Environmental Protection Agency (EPA) Washington, DC 20460. January.

EPA. 2017b. National Functional Guidelines for Inorganic Superfund Methods Data Review. OLEM 9355.0-135 EPA-540-R-2017-001. Office of Superfund Remediation and Technology Innovation (OSRTI) United States Environmental Protection Agency (EPA) Washington, DC 20460. January.

Hart Crowser and GSI 2020. Surface, Inter-armor, and Sub-armoring Water and Crayfish Sampling and Analysis Plan. July 3, 2020.

McCormick and Baxter Porewater Sampling Program Results

Danny Reible, W. Andrew Jackson, Cesar Gomez-Avila and Huayun Zhou, Texas Tech University

Sample Collection and Analysis

Passive samplers were deployed August 24-27, 2020 at various locations around the former McCormick and Baxter site in the Willamette River, Portland OR as shown in Figure 1 and Table 1 from the Field Sampling Plan (shown below). The samples were retrieved between September 28-30, 2020. After retrieval, the samples from surface water, 6" and -18" below sediment surface were immediately placed in solvent (organic samples) or in acid (aqueous metal samples). All Texas Tech (TTU) samples were referenced to the unique sampler number (P#) and elevation (SW, -6, -18). An example organic sample was ORG_P29_6a (sample a of elevation -6 from passive sampler P29 for organic analysis). An example metal sampler was P29-6 (sample from elevation -6 from passive sampler P29 for inorganic analysis). The sample designations are related to site sample location identifiers in Table 1.

Sampler P5 was stored in loading solution at deployment and then processed at retrieval as a field blank. A second sampler (designated as P24 in that it replaced the P24 sampler that was not retrieved) was initially identified as a second field blank but key properties (volume of polymer sampled and period of exposure during processing) were not recorded and the sample was discarded. All samples were shipped back to TTU on September 30 and maintained at 4 °C during shipment and prior to analysis. A description of the sampling and analysis approach is described below.



Figure 1 2020 M&B Sampling Locations

Table 1 Sample Locations and samplers with deployment and retrieval dates

Sample Location	TTU PSD ID	Deployment	Retrieval	Notes
Compliance Sampling Locations				
A	P20	8/25/20	9/28/20	
B	P16	8/27/20	9/28/20	Sampler partially exposed at low tide
C	P21	8/27/20	9/28/20	Field duplicate for PAHs/PCP only[1]
D	P31	8/24/20	9/28/20	
E	P30	8/25/20	9/30/20	Deployment incorrectly marked as TTU PSD 10
F	P23	8/26/20	9/29/20	
G	P29	8/26/20	9/29/20	
H	P19	8/26/20	9/30/20	
I	P32	8/24/20	9/28/20	
J	P15	8/27/20	9/28/20	Sampler partially exposed at low tide
K	P18	8/24/20	9/29/20	
L	P28	8/25/20	9/28/20	
Early Warning Sampling Locations				
5	P13	8/25/20	9/29/20	
12	P14	8/26/20	9/28/20	
13	P25	8/26/20	9/28/20	
16	P27	8/24/20	9/29/20	Deployment incorrectly marked as TTU PSD 17
Background Sampling Locations				
1 (Upstream)	P24	8/24/20	Lost	Sampler lost- sample # reused as field blank
27 (Downstream)	P17	8/25/20	9/28/20	
Field Blank	P5			
Field Blank	P24			Sampler # reused after original was lost. FB not useable and discarded.

[1] Sampler P21 at location C was deployed with duplicate passive organic samplers at all three sampling depths rather than duplicates at one depth at three locations. Metal duplicate samples were not possible with a single reservoir for sample collection at each sampling depth.

Metals

Passive sampling for metals was conducted via equilibration with a water reservoir cut into the body of the sampler. The water was extracted from these reservoirs for direct analysis. Trace metals were analyzed in the samples on 10/5/20 on ICP-MS based on EPA Method 200.8. A SOP for the analysis method was included in the Sampling and Analysis plan. Calibration samples yielded r^2=1.00 for each metal with a practical quantification limit defined by the lowest concentration within 20% of the calibration curve (ranging from 0.1 µg/L for Cr to 0.8 µg/L for Zn). Laboratory blanks and calibration check standards were analyzed every 20 samples. All laboratory blanks were below the practical quantification limit. All calibration checks were within 20% of the calibration curve at the check standard concentration. All samples were analyzed in a single batch. The method detection limit (MDL) was defined by the onset of proportional instrument response (i.e. response not due to instrument "noise") or background corrected concentration greater than zero. Due to standard background

correction by ICP-MS and nonzero intercepts of calibration curves, low concentrations (below the quantification limit) for some metals would be identified as negative.

The sampling reservoirs were initially loaded with an aqueous solution of deionized water containing bromide (195.9 ± 1.7 mg/L). The concentration of bromide in field samplers after retrieval had been reduced to an average of 1.8 mg/L indicating that the reservoirs had achieved an equilibration of > 99%. The field blank (TTU P5, discussed below) was stored on-site during deployment in the loading solution but contained significant Zn (~39 µg/L) and Cu (~2 µg/L), possibly due to trace metal contamination in the adhesive used to construct the storage container or metal contamination during sampler fabrication. Even if this contamination were present in the bromide loading solution, however, this would contribute less than 0.39 µg/L Zn and 0.02 µg/L Cu to the measured final concentrations in the field since the field samples were >99% equilibrated. All other metals in the loading solution were not elevated relative to the field samples or be expected to influence field measured concentrations.

Organics

General Approach

Passive sampling for organic contaminants was conducted with polydimethylsiloxane (PDMS) fibers located at the relevant depths on the back side of the sampler and protected by a coarse screen. The fibers were lengths of PDMS coated onto a 500 µm glass core with an outside diameter of 575 µm (PDMS volume of 0.633 µL/cm). During retrieval, the protective screen over the samplers was removed, the PDMS cut into smaller lengths, and then placed in an autosampling vial containing 1 mL of hexane solvent. The measured length of fibers placed into each sample averaged about 6.5 cm (total PDMS volume in each sample about 4 µL). All samples were shipped to TTU for PAH performance reference compound (PRC) analysis, and target PAH/PCP analysis. Duplicate samples were collected from the passive sampler at location C (TTU P21 a and b). Duplicate samples were intended to be collected from one depth at three different locations, but the duplicate polymeric samplers were placed in error at all three depths on the P21 sampler at location C during deployment. Thus, three duplicate samples were available at each of the sampling depths but from a single sampler.

Organic analysis was delayed due to COVID 19, the need for development of a PCP method for the GC-MS and instrument maintenance to improve sensitivity. Samples were extracted into solvent in the field which ensures no holding time limitations. Extraction of target contaminants from the PDMS has been demonstrated to be rapid and essentially complete. All samples were concentrated before analysis by reducing extract volume (to 50 µL) and analyzed via triple quadrapole high sensitivity GC-MS (Agilent 7890 GC/7000 MS). 36 PAHs and pentachlorophenol (PCP) and the PAH PRCs (C13 phenanthrene, C13 fluoranthene, C13 chrysene, C13 indeno(123-cd) pyrene) were analyzed via a method based upon EPA method 8270. The SOP for PAH analysis was included in the Sampling and Analysis Plan.

Analyses were conducted between 12/21/20 and 12/25/20 in one continuous batch with two laboratory blank samples and one or more calibration checks every 15 field samples. All calibration checks were within 20% of the defined concentration and all laboratory blanks were below the quantification limit except for blank 11b which run immediately after a high concentration sample (ORG P17_18). The blank 11b was followed by two calibration check samples and another blank and all were within quality control limits.

Estimated Detection Limits

The instrument quantification limit (QL) in the solvent extract was defined by the higher of the lowest calibration concentration with a relative error from the calibration curve of less than 20% (calibration QL) or the estimated instrument QL based upon laboratory solvent blanks. The instrument QL based upon laboratory blanks was estimated by the concentration that can be reported with 99% confidence that is distinguishable from the laboratory blanks as described in the standard method for detection limit determination [1].

$$instrument\ QL = \max(calibration\ QL, t_{1,0.01,7} * \sigma_{lab\,blank} + \overline{C}_{lab\,blank})$$
$$t_{1,0.01,7} = 3.0$$

The laboratory blanks led to a higher estimate of instrument QL in only a few compounds including benzo[a]pyrene (BaP). The instrument QL in the solvent extract for BaP based upon 20% deviation from the calibration curve was 2 µg/L (although instrument response was nonlinear until about 5 µg/L) while the 99% upper confidence limit on the laboratory blanks was 5.7 µg/L. The 5.7 µg/L in solvent extract for BaP corresponded to a nominal concentration in the porewater being sampled of 0.62 ng/L given the average length of analyzed fiber of 6.5 cm and a final solvent volume of 50 µL.

The field blank was also used to inform the estimation of an estimated detection limit (EDL) in the solvent extract from matrix samples (i.e. site samples). The field blank sampler (designated as P5) was stored in a sealed container during the deployment and was removed and processed in the same way as the deployed samplers by removal of the fibers, sectioning, measurement and placement into a solvent containing vial in the open air. The field blank concentrations may represent the lower limit of detections in matrix samples or could also represent adsorption of contaminants during the processing time of 45 minutes to 1 hour. The estimated detection limit of samples was defined as the greater of the instrument QL (as defined above) or a concentration that exhibited less than 5% probability of being within the distribution of the background defined by the field blank (or 95% probability of being outside that background). 5% probability was an effort to balance the possibility of quantifying samples that might simply be matrix interferences or noise (or field background) versus eliminating samples that might reflect field contamination.

$$EDL = \max(instrument\,QL, t_{1,0.05,3} * \sigma_{field\,blank} + \overline{C}_{field\,blank})$$
$$t_{1,0.05,3} = 2.35$$

In the more volatile lower molecular weight PAHs, the field blank defined the EDL with the remainder defined by the instrument QL (e.g. BaP). The EDL is defined on the basis of concentration in the solvent extract. The aqueous porewater concentration associated with the defined EDL is shown in the worksheets PAHsPCP porewater. Measured concentrations below the EDL could not be defined as being associated with sampling in the sediments at the site and were therefore identified as non-detects.

The estimated porewater concentration was calculated and recorded if C_{inst} >EDL, or identified as ND if C_{inst} <EDL . Recorded concentrations, C_{inst} >EDL, are further qualified where necessary by an “N” if the compound identification is tentative due to failure to meet all or most of the secondary confirmation criteria (i.e. S/N ratio and ratios of specific fragments in the second MS of the MS- MS system). This

qualifier was not normally required for PAH compounds in that PAHs were clearly identifiable even at concentrations near the EDL.

Extent of Equilibration

Extent of equilibration was defined by analysis of performance reference compounds (PRCs) that were pre-loaded on the PDMS. PRC analysis was conducted by evaluating the ratio of the PRCs after retrieval to the initial loading concentration (the fractional approach to steady state is 1 minus this ratio). The PRCs were then fit to a model [2], that allows estimation of the extent of equilibration for other similar compounds. The PAH PRCs were applied to PAHs and PCP. PAHs with a log Kow<6 were at 90% of equilibrium or higher. The variations across the site and with depth were small and similar to expected analytical method accuracy.

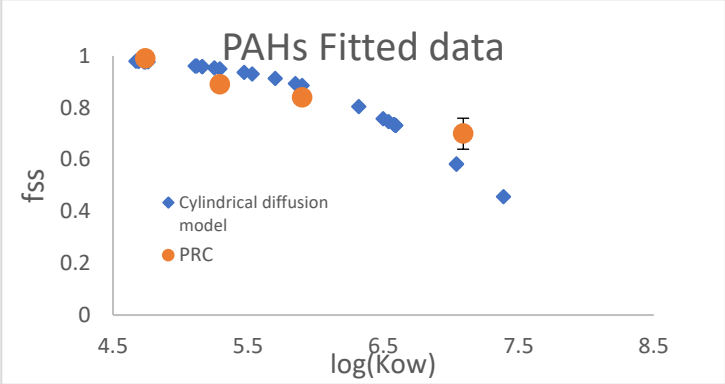


Figure 2 PRC models for PAHs/PCP

The porewater concentration is calculated by the formula

$$C_{pw} = \frac{C_{inst} V}{V_f K_{fw} f_{ss}}$$

Where C_{inst} is the measured concentration in sample extract and V is the volume of extract. V_f is the volume of the PDMS fiber (length x volume/length), K_{fw} is the fiber-water partition coefficient (from [3]) and f_{ss} is the fractional approach to steady state.

Results

The passive sampling results are included in the Excel spreadsheet "MB Samples Porewater Results_4_13_21". The worksheets include the following

- QAQC PAHs PRC – the analyses including blanks and calibration checks for PAH PRCs
- PAHs FSS- the fractional approach to steady state model fit to the PRCs
- RAW DATA PAHsPCP- this includes all raw data and primarily indicates the order and the time of each sample analysis
- QAQC PAHs Targets – the analyses including blanks and calibration checks for PAHs target compounds
- PAHs PCP Porewater – calculated porewater concentration (in ng/L) from measured extract concentrations. The tables also show the calculation parameters and EDL concentrations.

- Metals QAQC – Calibration checks and blanks for metals analyses
- Metals – Porewater concentrations (in µg/L) from sampler aqueous samples

A summary of concentrations is included below for each location for the purposes of identifying areas of elevated concentration. PCP was found in quantifiable levels only at one location, E, at -18" at 104 ng/L and is not included in the table. For other organic contaminants, the Table includes the sum of all alkylated and parent PAHs analyzed ($\sum_{36}$ PAHs), the sum of the low molecular weight parent PAHs (LMW priority PAHs, $\sum_{LMW}PAH_{16}$), the ratio of the alkylated to total PAHs, and the sum of BaP equivalent concentrations (benz(a)anthracene x 0.1 + chrysene x 0.001 + benzo(b)fluoranthene x 0.1 + benzo(k)fluoranthene x0.001 + benzo(a)pyrene x 1 + indeno(123-cd)pyrene x 0.1 + dibenzo(a,h)anthracene x 1). Note that all concentration sums and averages in the Table and in the spreadsheet do not include any numerical value assigned to "ND' values. Among the metals, only As is shown since it shows the most variation across the site and exhibits the only metal whose concentrations are routinely above the EDL. Note that the $\sum_{36}$ PAHs and $\sum_{LMW}PAH_{16}$ have limited usefulness except to identify areas of elevated concentration since the PAH properties, including toxicity and levels of concern, vary widely.

The results show two locations of elevated PAH concentrations, at the lower depths of location 12 on the eastern shore of Willamette Cove and at the deepest depth at location 27, which represents a downstream background sampling location west of Willamette Cove. The measured porewater $\sum_{36}$PAH concentrations at locations 12 and 27, approximately 73-88 µg/L, are dominated by acenaphthene and fluorene which might suggest a middle distillate fuel such as jet fuel, kerosene or diesel [4]. Both coal tar and creosote would be expected to have substantial levels of phenanthrene, fluoranthene and pyrene, none of which are present at location 12 and only phenanthrene is present at elevated but much lower concentrations than acenaphthene and fluorene at location. The lighter compounds would partition more into interstitial waters but that would not explain the minimal amounts of phenanthrene and pyrene if creosote or coal tar was the primary cause of the observed PAHs.

Other than these two locations, there are only minor variations in PAH levels across the site with somewhat elevated concentrations ($\sum_{36}$PAH>1µg/L) observed at depth immediately south of the main portion of the site (e.g. locations A, C, D, E, I and J). BaP equivalent concentration, $\sum BaP_{equiv,}$ was calculated as an overall indicator of high molecular weight and carcinogenic PAHs. $\sum BaP_{equiv}$ concentrations are typically less than 0.1 ng/L over much of the site with only a few locations exhibiting more elevated concentrations. Locations D, E and J off the southern end of the site exhibit a $\sum BaP_{equiv}$ concentration greater than 0.2 ng/L at depth that could represent trace contamination by coal tars or creosote.

Some of the lower PAH concentrations locations and depths are dominated by naphthalene (40% or more of $\sum_{LMW}PAH_{16}$) which poses difficulties with polymeric sampling due to much greater evaporation from the polymer or sorption from the atmosphere compared to other PAHs. The concentration of these areas should be viewed with caution although all such areas exhibit a total $\sum_{LMW}PAH_{16}$<<1 µg/L.

*Table 2 Summary of measured porewater concentrations as sums of specific compound classes and the metalloid As. Note sums and percentage alkylated are subject to error at low concentrations due to the presence of non-detects. * indicates that low molecular weight PAHs are dominated by naphthalene (40% or more) which poses difficulties with polymeric sampling due to evaporation from the polymer or sorption from the atmosphere compared to other PAHs.*

Location	Depth Inches	$\sum_{36}$PAH µg/L	$\sum_{LMW}$PAH$_{16}$ µg/L	$\sum_{alkyl}/\sum_{36}$PAH %	$\sum$BaP$_{equiv}$ ng/L	As µg/L
Compliance Sampling Locations						
A	SW	0.21	0.17*	18%	0.00	0.4
	-6	0.25	0.17	19%	0.05	1.4
	-18	2.64	2.32	9%	0.08	9.7
B	SW	0.14	0.11	19%	0.04	0.5
	-6	0.23	0.18	19%	0.01	0.5
	-18	0.21	0.13	22%	0.12	18.9
C	SW	0.36/0.21	0.26/0.17*	26%/18%	0.05/0.00	0.6
	-6	6.97/5.92	6.86/5.84	1%/1%	0.01/0.00	10.9
	-18	5.14/5.86	4.91/5.53	4%/4%	0.05/0.13	19.6
D	SW	0.28	0.18	27%	0.07	0.5
	-6	1.48	0.81	31%	0.32	27.1
	-18	0.69	0.46	22%	0.12	28.6
E	SW	0.43	0.31	23%	0.02	0.5
	-6	1.27	0.72	32%	1.19	0.6
	-18	0.02	0.01	-	0.01	19.2
F	SW	0.16	0.11	26%	0.06	28.1
	-6	0.13	0.10	17%	0.06	25.7
	-18	0.39	0.27	23%	0.10	24.5
G	SW	0.79	0.45*	32%	0.12	2.8
	-6	0.22	0.16*	23%	0.08	9.9
	-18	0.49	0.34*	23%	0.11	21.2
H	SW	0.09	0.05	41%	0.00	0.5
	-6	0.09	0.05	37%	0.05	12.8
	-18	0.26	0.19*	22%	0.05	29.4
I	SW	0.09	0.06	35%	0.00	0.5
	-6	1.09	0.76	25%	0.12	24.4
	-18	0.79	0.72	6%	0.06	21.2
J	SW	0.92	0.86	6%	0.00	0.6
	-6	5.86	5.75	2%	0.05	40.9
	-18	10.23	9.89	2%	0.22	49.5
K	SW	0.69	0.39*	30%	0.08	0.5
	-6	0.10	0.06	34%	0.00	18.0
	-18	0.12	0.08	28%	0.00	5.6
L	SW	0.80	0.47*	31%	0.13	0.6
	-6	0.09	0.05	36%	0.01	0.5
	-18	0.66	0.42*	28%	0.11	53.7

*Table 2 Summary of measured porewater concentrations as sums of specific compound classes and the metalloid As (Cont'd). Note sums and percentage alkylated are subject to error at low concentrations due to the presence of non-detects. * indicates that low molecular weight PAHs are dominated by naphthalene (40% or more) which poses difficulties with polymeric sampling due to evaporation from the polymer or sorption from the atmosphere compared to other PAHs.*

Location	Depth Inches	$\sum_{36}$PAH µg/L	$\sum_{LMW}$PAH$_{16}$ µg/L	$\sum_{alkyl}/\sum_{36}$PAH %	$\sum$BaP$_{equiv}$ ng/L	As µg/L
Early Warning Sampling Locations						
5	SW	0.21	0.16*	21%	0.06	0.5
	-6	0.24	0.18*	23%	0.01	31.0
	-18	0.73	0.49*	26%	0.08	25.9
12	SW	0.48	0.39	19%	0.01	0.5
	-6	83.80	79.83	4%	0.29	28.5
	-18	87.69	83.92	4%	0.51	39.7
13	SW	0.10	0.08	14%	0.00	0.1J
	-6	0.21	0.17*	18%	0.02	0.9
	-18	0.12	0.04	56%	0.02	0.9
16	SW	0.20	0.14*	27%	0.01	0.5
	-6	0.26	0.17*	31%	0.01	15.6
	-18	0.71	0.61	13%	0.01	15.6
Background Sampling Locations						
27	SW	0.22	0.17	25%	0.05	0.5
	-6	2.41	1.95	11%	0.27	16.5
	-18	73.03	65.48	10%	0.53	8.0

References

1. US EPA, *Definition and Procedure for the Determination of the Method Detection Limit, Revision 2* Office of Water, Editor. 2016.
2. Shen, X. and D. Reible, *An analytical model for the fate and transport of performance reference compounds and target compounds around cylindrical passive samplers.* Chemosphere, 2019. **232**: p. 489-495.
3. Ghosh, U., et al., *Passive sampling methods for contaminated sediments: Practical guidance for selection, calibration, and implementation.* Integrated Environmental Assessment and Management, 2014. **10**(2): p. 210-223.
4. Stogiannidis, E. and R. Laane, *Source characterization of polycyclic aromatic hydrocarbons by using their molecular indices: an overview of possibilities.* Reviews of environmental contamination and toxicology, 2015: p. 49-133.

APPENDIX F
Crayfish Tissue QA Report and Laboratory Analytical Report

APPENDIX F
Quality Assurance Review and Analytical Laboratory Testing

This appendix documents the results of a quality assurance (QA) review of the analytical data for crayfish tissue samples collected during the Five-Year Review sampling event conducted in August through September 2020 at the McCormick & Baxter site (the "site"). Field procedures used for sample collection are discussed in the 2008 Operations and Maintenance (O&M) Manual (Hart Crowser and GSI Water Solutions, Inc. [GSI] 2008). Haley & Aldrich submitted crayfish tissue samples to ALS Environmental (ALS), of Kelso, Washington, for chemical analyses. A copy of laboratory analytical reports K2007601 and K2008783 are included as part of this appendix. Upon review, the analytical data are valid with qualifications for their intended use.

The laboratories performed ongoing QA/ quality control (QC) reviews of laboratory procedures. Level II data packages were reviewed. Haley & Aldrich reviewed the data, using laboratory QC results summary sheets to check that they met data quality objectives for the project. Data review followed the procedures described in the SAP. Validation of the analytical data was completed generally following Environmental Protection Agency (EPA) National Functional Guidelines for Superfund Organic Methods Data Review (EPA 2017a) and the National Functional Guidelines for Inorganic Superfund Data Review (EPA 2017b) modified to include criteria specific to the individual analytical methods and laboratory performance based control limits. The QA review included examination and validation of the laboratory's summary report, including:

- Case narratives
- Chain of custody (COC) documentation
- Sample receiving condition
- Holding times
- Analytical methods, detection limits, and reporting limits
- Method blanks
- Surrogate recoveries
- Laboratory control sample/laboratory control sample duplicate (LCS/LCSD) recoveries
- Matrix spike and matrix spike duplicate (MS/MSD) recoveries
- Laboratory duplicate relative percent difference (RPD), where applicable
- Calibration data, if provided

1.0 ANALYTICAL METHODS AND REPORTING LIMITS

This section describes the analytical method and method detection limits (MDL) and method reporting limits (MRL) for the chemical analyses.

1.1 Analytical Methods

A total of six crayfish tissue samples, five primary and one field duplicate, and one bait sample were collected and submitted to ALS. Samples were analyzed for the following.

- Total lipids by National Oceanic and Atmospheric Administration (NOAA) lipid Method.
- Total metals (arsenic, chromium, copper, and zinc) by EPA Method 6020A.
- Pentachlorophenol (PCP) by EPA Method 8270D.
- Polycyclic aromatic hydrocarbons (PAHs) by EPA Method 8270D-SIM.
- Dioxins/furans by EPA Method 1613B.

Samples were analyzed in accordance with the O&M Manual (Hart Crowser and GSI 2018).

1.2 Method Detection and Reporting Limits

MDLs are the minimum concentration of a chemical compound that can be measured and reported that the compound is present and is based on instrumentation abilities and sample matrix. MRLs are set by the laboratory and are based on the low standard of the initial calibration curve or low-level calibration check standard and represent the concentration that can be accurately quantified. In some cases, the MDL and/or MRL is raised due to dilutions or matrix interferences.

The laboratory reported sample results to the MRL. Analytical results that fell between the MDL and MRL are estimated and qualified with J flags in the report tables. Non-detect results are reported at the associated MDL and are reported with a U flag in the report tables.

2.0 CHAIN OF CUSTODY AND SAMPLE RECEIVING CONDITION

The following provides a summary of the review of COC procedures and sample receiving conditions.

2.1 Chain of Custody

Samples collected were placed into appropriate laboratory supplied containers, placed into a cooler on ice, and logged onto a COC form. No COC discrepancies were noted.

2.2 Sample Receiving Conditions and Notes

The receiving temperatures were within the 2 to 6°C acceptance criteria. Samples were properly preserved in the appropriate containers.

3.0 CHEMICAL RESULTS

Data quality is indicated by assessing their completeness, representativeness, accuracy, precision, and comparability. An evaluation of the data follows.

3.1 Lipids by NOAA Lipid

Holding times and reporting limits were acceptable. MB contamination was not detected. LCS/LCSD recoveries and RPDs were within control limits.

3.2 Total Metals by EPA 6020A

Holding times and reporting limits were acceptable. MB contamination was not detected with the following exception.

- K2007601: Copper was detected in MB at 0.10 mg/kg. Associated sample result is greater than 10 times the MB concentration and sample result was not qualified.

LCS, standard reference material, and MS recoveries were within control limits. Laboratory and field duplicate RPDs were within control limits.

3.3 PCP and PAHs by EPA 8270D/-SIM

Holding times and reporting limits were acceptable. MB contamination was not detected with the following exceptions.

- K2007601: PCP detected at 13 µg/kg in MB between the MDL and MRL. Associated sample result is less than 10 times the MB detection; sample result was raised to the MRL and qualified as ND with U flag. MB surrogate (2,4,6-tribromophenol) recovery below control limits (biased low). Sample result is qualified as ND due to MB contamination, no further qualification.
- K2007601: 2-methylnaphthalene, acenaphthene, acenaphthylene, dibenzofuran, fluoranthene, fluorene, naphthalene, phenanthrene, and pyrene were detected in the MB between the MDL and MRL. Associated sample results were less than 10 times the MB detection. Sample results were raised to the MRL and qualified as ND with U flag.
- K2008783: Naphthalene was detected at 0.96 µg/kg in MB. Associated sample results for MBCFGB1020-01, MBCFGB1020-04, MBCFGB1020-05, and MBCFGB-20-Baitchicken were less than 10 times the MB detection; results were raised to the MRL and qualified as ND with U flag.

LCS/LCSD recoveries and RPDs were within control limits with the following exception.

- K2007601: Pyrene LCS/LCSD recoveries exceeded the control limit (biased high). Sample result is qualified as ND due to MB contamination, no further qualification.

Surrogate recoveries were within control limits. Field duplicate RPDs were within control limits.MS/MSD recoveries and RPDs were within control limits with the following exception.

- K2008783: MS/MSD recoveries were below control limits (biased low). Source samples are not part of this SDG and results were not qualified.

3.4 Dioxins/Furans by EPA 1613B

Holding times and reporting limits were acceptable. MB contamination was not detected with the following exceptions.

- K2007601: 1,2,3,4,6,7,8-HpCDD was detected at 0.0240 pg/g in MB between the EDL and MRL. The associated sample result is greater than 10 times the MB detection; sample result was not qualified.
- K2008783: 1,2,3,4,6,7,8-HpCDD at 0.110 ng/kg and OCDD at 0.234 ng/kg were detected in MB between the EDL and MRL. Associated sample results that were less than 10 times the MB detection were raised to the MRL and qualified as ND with U flag. Associated sample results that were greater than 10 times the MB detection were not qualified.

Labeled compound recoveries were within control limits. LCS/LCSD recoveries and RPDs were within control limits. Field duplicate RPDs were within control limits with the following exception.

- K2008783: Primary and field duplicate RPD is greater than 50 percent for 1,2,3,6,7,8-HxCDF and 1,2,3,4,6,7,8-HpCDF. Sample results for MBCFGB1020-04 Dup were qualified by laboratory with P flag (chorodiphenyl ether interference was present at the retention time of the target analyte. Reported result should be considered an estimate). Duplicate result biased by chorodiphenyl ether and RPD not applicable; duplicate result qualified as estimate with J flag.

Other criteria that were evaluated for this lab are as follows.

- K2007601: Several chemicals were qualified by the laboratory with M flag (indicates that a peak has been manually integrated). The qualifier doesn't indicate a QC failure and has been removed.
- K2007601: 1,2,3,4,6,7,8-HpCDF and OCDF were qualified by the laboratory with R flag (indicates that the ion abundance ratio for this compound did not meet the acceptance criterion). Associated sample results qualified as ND with UJ flags.
- K2008783: Multiple results between the EDL and MRL were qualified by laboratory with K flag (the ion abundance ratio between the primary and secondary ions were outside of the theoretical acceptance limits. The concentration of this analyte should be considered as an estimate). Sample results were qualified as ND with UJ flags.

4.0 REFERENCES

EPA. 2017a. National Functional Guidelines for Organic Superfund Methods Data Review. OLEM 9355.0-136, EPA-540-R-2017-002. Office of Superfund Remediation and Technology Innovation (OSRTI) United States Environmental Protection Agency (EPA) Washington, DC 20460. January.

EPA. 2017b. National Functional Guidelines for Inorganic Superfund Methods Data Review. OLEM 9355.0-135 EPA-540-R-2017-001. Office of Superfund Remediation and Technology Innovation (OSRTI) United States Environmental Protection Agency (EPA) Washington, DC 20460. January.

Hart Crowser and GSI 2008 Operation and Maintenance Manual McCormick and Baxter Creosoting Company Site Portland, Oregon. April 16, 2008.

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October 19, 2020

Analytical Report for Service Request No: K2007601

Kevin Woodhouse
Hart Crowser, Incorporated
6420 SW Macadam St
STE 100
Portland, OR 97239

RE: McCormick &Baxter / 150-002-005

Dear Kevin,

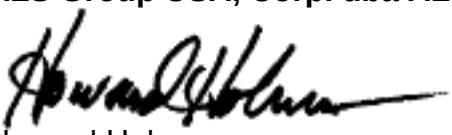
Enclosed are the results of the sample(s) submitted to our laboratory September 23, 2020
For your reference, these analyses have been assigned our service request number **K2007601.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3364. You may also contact me via email at howard.holmes@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental



Howard Holmes
Project Manager

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Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/EnvironmentalLabCertification/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.
Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

Case Narrative

ALS Environmental—Kelso Laboratory
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Phone (360)577-7222 Fax (360)636-1068
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Client: Hart Crowser, Incorporated
Project: McCormick &Baxter
Sample Matrix: Tissue, Water

Service Request: K2007601
Date Received: 09/03/2020 - 09/23/2020

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier level IV requested by the client.

Sample Receipt:

Three tissue, water samples were received for analysis at ALS Environmental on 09/03/2020 - 09/23/2020. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The samples were stored at minimum in accordance with the analytical method requirements.

Semivolatiles by GC/MS:

Method 8270D, 09/30/2020:The upper control criterion was exceeded for Pyrene in the Laboratory Control Sample and Duplicate Laboratory Control Sample (LCS/DLCS) KQ2014151-01,-02:. The analyte in question was not detected in the associated field samples. The error associated with elevated recovery indicated a high bias. The sample data was not significantly affected. No further corrective action was appropriate.

Method 8270D SIM, 10/08/2020:Insufficient sample volume was received to perform a Matrix Spike/Matrix Spike Duplicate (MS/MSD). A Laboratory Control Sample/Duplicate Laboratory Control Sample (LCS/DLCS) was analyzed and reported in lieu of the MS/MSD for these samples.

Method 8270D SIM, 10/08/2020:The control criteria were exceeded for the following surrogate in KQ2013849-03(Method Blank), KQ2013849-02 (Duplicate Laboratory Control Sample): 2,4,6-Tribromophenol. A reanalysis was not performed because insufficient sample was available. No further corrective action was possible.

Semivoa GC:

Method NOAA LIPID, 09/24/2020: Due to limited sample volume a LCS/DLCS were performed instead of a DUP/TRP

Metals:

No significant anomalies were noted with this analysis.

Subcontracted Analytical Parameters:

Dioxins and Furans by EPA Method 1613B
The analysis for Dioxins and Furans was performed at ALS Burlington, Ontario Laboratory. The data for this analysis is included in the corresponding section of this report.

Approved by  Date 10/19/2020

Chain of Custody

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CHAIN OF CUSTODY

SR# K2007601

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PAGE 1 OF 1 COC#

PROJECT NAME: McCormick + Baxter
PROJECT NUMBER: 150-002-005
PROJECT MANAGER: Kevin Woodhouse
COMPANY NAME: Hart Crowser
ADDRESS: 6420 S Macadam Ave, Suite 100
CITY/STATE/ZIP: Portland, OR
E-MAIL ADDRESS: Kevin.Woodhouse@hartcrowser.com
PHONE # FAX #
SAMPLER'S SIGNATURE: Kevin Woodhouse

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS	Semivolatile Organics by GC/MS 625☐ 8270☐ SIM PAH☒	Volatile Organics 624☐ 8260☐ 8270LL☐ 8021☐ BTEX☐	Hydrocarbons (*see below) Gas☐ Diesel☐ Oil☐ Oil & Grease/TRPH 1664 HEM☐ 1664 SGT☐	PCBs Aroclors☐ Congeners☐	Pesticides/Herbicides 608☐ 8081☐ 8141☐ 8151☐	Chlorophenolics - 8151M Tri☐ Tetra☐ PCP☐	Metals, Total or Dissolved (See List below)	Cyanide☐ Hex-Chrom☐	(circle) pH, Cond., Cl, SO_4, PO_4, F, NO_2, NO_3, BOD, TSS, TDS, Turb.	(circle) NH_3-N, COD, TKN, TOC, DOC, NO_2+NO_3, T-Phos	TOX 9020☐ AOX 1650☐ 506☐	Alkalinity☐ CO_3☐ HCO_3☐	Dioxins/Furans 1613☒ 8290☐	Dissolved Gases CO_2☐ Methane☐ Ethane☐ Ethene☐ RSK 175☐	PCB by 8270	Percent Lipid	REMARKS
MBCF-GB1020-02	8/28/20	1430		tissue	1		X					X							X			X	

REPORT REQUIREMENTS

___ I. Routine Report: Method Blank, Surrogate, as required
X II. Report Dup., MS, MSD as required
___ III. CLP Like Summary (no raw data)
___ IV. Data Validation Report
___ V. EDD

INVOICE INFORMATION

P.O. # _____
Bill To: _____

TURNAROUND REQUIREMENTS

___ 24 hr. ___ 48 hr.
___ 5 day
X Standard (15 working days)
___ Provide FAX Results
_____ Requested Report Date

Circle which metals are to be analyzed:

Total Metals: Al (As) Sb Ba Be B Ca Cd Co (Cr) (Cu) Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V (Zn) Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI NORTHWEST OTHER: _____ (CIRCLE ONE)

SPECIAL INSTRUCTIONS/COMMENTS:

Container Supply Number

111024

☐ Sample Shipment contains USDA regulated soil samples (check box if applicable)

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature: K. Woodhouse	Signature: K Morrow	Signature: K Morrow	Signature: K Morrow
Date/Time: 9/3/20 0938	Date/Time: 9/3/20 0938	Date/Time: 9/3/20 1140	Date/Time: 9/3/20 1140
Printed Name: Kevin Woodhouse	Printed Name: K Morrow	Printed Name: K Morrow	Printed Name: K Morrow
Firm: Hart Crowser	Firm: ALS	Firm: ALS	Firm: ALS

Copyright 2012 by ALS Group

PM HH

Cooler Receipt and Preservation Form

Client Hart Crowser Service Request K20 07601

Received: 9/3/20 Opened: 9/3/20 By: [illegible] Unloaded: 9/3/20 By: IR

1. Samples were received via? *USPS* *Fed Ex* *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) *Cooler* *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA Y N If yes, how many and where? _____
   If present, were custody seals intact? Y N If present, were they signed and dated? Y N
4. Was a Temperature Blank present in cooler? NA Y N If yes, notate the temperature in the appropriate column below:
   If no, take the temperature of a representative sample bottle contained within the cooler; notate in the column "Sample Temp":
5. Were samples received within the method specified temperature ranges? NA Y N
   If no, were they received on ice and same day as collected? If not, notate the cooler # below and notify the PM. NA Y ~~N~~ KM

If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*

Temp Blank	Sample Temp	IR Gun	Cooler #/COC ID / NA	Out of temp indicate with "X"	PM Notified If out of temp	Tracking Number NA	Filed
N/A	20.8	IR01	111024	X	X		

6. Packing material: *Inserts* *Baggies* *Bubble Wrap* *Gel Packs* *Wet Ice* *Dry Ice* *Sleeves* Alum. foil
7. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
8. Were samples received in good condition (unbroken) NA Y N
9. Were all sample labels complete (ie, analysis, preservation, etc.)? NA Y N
10. Did all sample labels and tags agree with custody papers? NA Y N
11. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
12. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
13. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
14. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC 8/28/2020	Identified by:
MBCF0820-C (8/28/2020)	MBCFG-B 1020-02	Notified PM. (1 sample.)
MBCF0820-C (8/27/20)	Not on CoC.	2 samples

Sample ID	Bottle Count Bottle Type	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, Resolutions: ~~Rec'd Samples KM~~ Rec'd in foil packaging.

Total Solids

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Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2007601
Project:	McCormick &Baxter/150-002-005	**Date Collected:**	08/28/20
Sample Matrix:	Tissue	**Date Received:**	09/3/20
Analysis Method:	Freeze Dry	**Units:**	Percent
Prep Method:	None	**Basis:**	Wet

Total Solids

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
MBCFGB1020-02	K2007601-001	**26.1**	-	-	1	10/08/20 14:26	

Metals

ALS Environmental—Kelso Laboratory
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www.alsglobal.com

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2007601
Project:	McCormick &Baxter/150-002-005	**Date Collected:**	08/28/20 14:30
Sample Matrix:	Tissue	**Date Received:**	09/03/20 11:40
Sample Name:	MBCFGB1020-02	**Basis:**	Wet
Lab Code:	K2007601-001		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	6020A	**0.85**	mg/Kg	0.50	0.02	5	10/16/20 16:56	10/15/20	
Chromium	6020A	**0.74**	mg/Kg	0.20	0.02	5	10/16/20 16:56	10/15/20	
Copper	6020A	**37.3**	mg/Kg	0.10	0.03	5	10/16/20 16:56	10/15/20	
Zinc	6020A	**57.0**	mg/Kg	0.50	0.08	5	10/16/20 16:56	10/15/20	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2007601
Project:	McCormick &Baxter/150-002-005	**Date Collected:**	NA
Sample Matrix:	Tissue	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	Wet
Lab Code:	KQ2015607-01		

Total Metals

Analyte Name	Analysis Method	Result		Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	6020A	ND	U	mg/Kg	0.50	0.02	5	10/16/20 16:46	10/15/20	
Chromium	6020A	ND	U	mg/Kg	0.20	0.02	5	10/16/20 16:46	10/15/20	
Copper	6020A	**0.10**		mg/Kg	0.10	0.03	5	10/16/20 16:46	10/15/20	
Zinc	6020A	ND	U	mg/Kg	0.50	0.08	5	10/16/20 16:46	10/15/20	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Hart Crowser, Incorporated
Project: McCormick &Baxter/150-002-005
Sample Matrix: Tissue

Service Request: K2007601
Date Analyzed: 10/16/20

Lab Control Sample Summary
Total Metals

Units:mg/Kg
Basis: Wet

Lab Control Sample
KQ2015607-02

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Arsenic	6020A	16.4	16.7	98	80-120
Chromium	6020A	18.9	20.0	94	80-120
Copper	6020A	23.5	25.0	94	80-120
Zinc	6020A	47.8	50.0	96	80-120

ALS Group USA, Corp.
dba ALS Environmental
QA/QC Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2007601
Project:	McCormick &Baxter/150-002-005	**Date Collected:**	NA
LCS Matrix:	Tissue	**Date Received:**	NA
		Date Extracted:	10/15/20
		Date Analyzed:	10/16/20

Standard Reference Material Summary
Total Metals

Sample Name:	Standard Reference Material	Units:	mg/Kg (ppm)
Lab Code:	KQ2015607-03	Basis:	Dry
Test Notes:	Dorm-4 Solids = 93.8%		

Source: N.R.C.C. Dorm-4

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	Control Limits	Result Notes
Arsenic	PSEP Tissue	6020A	6.87	6.63	97	5.14 - 8.77	
Chromium	PSEP Tissue	6020A	1.87	1.81	97	1.35 - 2.46	
Copper	PSEP Tissue	6020A	15.7	14.8	94	12.2 - 19.4	
Zinc	PSEP Tissue	6020A	51.6	49.8	97	39.0 - 65.3	

LCS/032295

ALS Group USA, Corp.
dba ALS Environmental
QA/QC Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2007601
Project:	McCormick &Baxter/150-002-005	**Date Collected:**	NA
LCS Matrix:	Tissue	**Date Received:**	NA
		Date Extracted:	10/15/20
		Date Analyzed:	10/16/20

Standard Reference Material Summary
Total Metals

Sample Name:	Standard Reference Material	Units:	mg/Kg (ppm)
Lab Code:	KQ2015607-04	Basis:	Dry
Test Notes:	Tort-3 Solids = 97.4%		

Source: N.R.C.C. Tort-3

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	Control Limits	Result Notes
Arsenic	PSEP Tissue	6020A	59.5	61.2	103	44.6-76.0	
Chromium	PSEP Tissue	6020A	1.95	1.74	89	1.37-2.63	
Copper	PSEP Tissue	6020A	497	456	92	380-623	
Zinc	PSEP Tissue	6020A	136	125	92	104-170	

Prep Summary Report

Client: Hart Crowser, Incorporated **Service Request:** K2007601
Project: McCormick &Baxter/150-002-005
Sample Matrix: Tissue

Metals

Prep Method: PSEP Metals **Extraction Lot:** 367776
Analytical Method: 6020A **Extraction Date:** 10/15/20 17:06

Sample Name	Lab Code	Date Collected	Date Received	Sample Amount	Final Amount	Percent Solids
MBCFGB1020-02	K2007601-001	8/28/20	9/3/20	0.30000 g	30 mL	
Method Blank	KQ2015607-01MB	NA	NA	0.30000 g	30 mL	
Lab Control Sample	KQ2015607-02LCS	NA	NA	0.30000 g	30 mL	

Client: Hart Crowser, Incorporated **Service Request:** K2007601
Project: McCormick &Baxter/150-002-005

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Concentration Units: ug/L

Sample ID / Analyte	Method	Analysis Batch:	Result	True Value	% Rec	% Rec. Limits
ICV 10/16/20 16:27						
Arsenic	6020A	699673	23.5	25.0	94	90-110
Chromium	6020A	699673	9.84	10.0	98	90-110
Copper	6020A	699673	12.0	12.5	96	90-110
Zinc	6020A	699673	24.0	25.0	96	90-110
CCV 10/16/20 16:29						
Arsenic	6020A	699673	25.0	25.0	100	90-110
Chromium	6020A	699673	25.5	25.0	102	90-110
Copper	6020A	699673	25.2	25.0	101	90-110
Zinc	6020A	699673	25.0	25.0	100	90-110
CCV 10/16/20 17:11						
Arsenic	6020A	699673	24.8	25.0	99	90-110
Chromium	6020A	699673	25.2	25.0	101	90-110
Copper	6020A	699673	25.0	25.0	100	90-110
Zinc	6020A	699673	25.2	25.0	101	90-110
CCV 10/16/20 17:20						
Arsenic	6020A	699673	24.8	25.0	99	90-110
Chromium	6020A	699673	25.4	25.0	101	90-110
Copper	6020A	699673	24.9	25.0	100	90-110
Zinc	6020A	699673	24.9	25.0	100	90-110

Client: Hart Crowser, Incorporated **Service Request:** K2007601
Project: McCormick &Baxter/150-002-005

INITIAL AND CONTINUING CALIBRATION BLANKS

Concentration Units: ug/L

Sample ID / Analyte	Method	Analysis Batch:	Result	C
ICB 10/16/20 16:32				
Arsenic	6020A	699673	0.04	U
Chromium	6020A	699673	0.04	U
Copper	6020A	699673	0.06	U
Zinc	6020A	699673	0.2	U
CCB 10/16/20 16:34				
Arsenic	6020A	699673	0.04	U
Chromium	6020A	699673	0.04	U
Copper	6020A	699673	0.06	U
Zinc	6020A	699673	0.2	U
CCB 10/16/20 17:13				
Arsenic	6020A	699673	0.04	U
Chromium	6020A	699673	0.04	U
Copper	6020A	699673	0.06	U
Zinc	6020A	699673	0.2	U
CCB 10/16/20 17:23				
Arsenic	6020A	699673	0.04	U
Chromium	6020A	699673	0.04	U
Copper	6020A	699673	0.06	U
Zinc	6020A	699673	0.2	U

Client: Hart Crowser, Incorporated **Service Request:** K2007601
Project: McCormick &Baxter/150-002-005

LOW LEVEL INITIAL AND LOW LEVEL CONTINUING CALIBRATION VERIFICATION

Concentration Units: ug/L

Sample ID / Analyte	Method	Analysis Batch:	Result	True Value	% Rec	% Rec. Limits	Analysis Date
LLICVT							
Arsenic	6020A	699673	0.98	1.0	98	70-130	10/16/20 16:36
Chromium	6020A	699673	0.36	0.4	90	70-130	10/16/20 16:36
Copper	6020A	699673	0.18	0.2	90	70-130	10/16/20 16:36
Zinc	6020A	699673	0.95	1.0	95	70-130	10/16/20 16:36
LLCCVT							
Arsenic	6020A	699673	0.95	1.0	95	70-130	10/16/20 17:25
Chromium	6020A	699673	0.40	0.4	101	70-130	10/16/20 17:25
Copper	6020A	699673	0.19	0.2	94	70-130	10/16/20 17:25
Zinc	6020A	699673	0.98	1.0	98	70-130	10/16/20 17:25

Client: Hart Crowser, Incorporated **Service Request:** K2007601
Project: McCormick &Baxter/150-002-005

ICP INTERFERENCE CHECK SAMPLE

Sample ID ICSA **Concentration Units:** ug/L

Analyte	Method	Analysis Batch:	Result	True Value	% Rec	% Rec. Limits	Analysis Date
Arsenic	6020A	699673	0.1	-	-	-	10/16/20 16:39
Chromium	6020A	699673	1.51	-	-	-	10/16/20 16:39
Copper	6020A	699673	1.01	-	-	-	10/16/20 16:39
Zinc	6020A	699673	0.7	-	-	-	10/16/20 16:39

Client: Hart Crowser, Incorporated **Service Request:** K2007601
Project: McCormick &Baxter/150-002-005

ICP INTERFERENCE CHECK SAMPLE

Sample ID ICSAB **Concentration Units:** ug/L

Analyte	Method	Analysis Batch:	Result	True Value	% Rec	% Rec. Limits	Analysis Date
Arsenic	6020A	699673	23.6	25.0	94	80-120	10/16/20 16:41
Chromium	6020A	699673	49.8	50.0	100	80-120	10/16/20 16:41
Copper	6020A	699673	46.1	50.0	92	80-120	10/16/20 16:41
Zinc	6020A	699673	24.1	25.0	96	80-120	10/16/20 16:41

Client: Hart Crowser, Incorporated **Service Request:** K2007601
Project: McCormick &Baxter/150-002-005

Detection Limits

Instrument: K-ICP-MS-06 **Matrix:** Tissue

Analyte	Mass	Units	MRL	MDL	Method
Arsenic	75	ug/L	1	0.04	6020A
Chromium	52	ug/L	0.4	0.04	6020A
Copper	65	ug/L	0.2	0.06	6020A
Zinc	66	ug/L	1	0.16	6020A

Client: Hart Crowser, Incorporated **Service Request:** K2007601
Project: McCormick &Baxter/150-002-005

ICP Linear Range (Quarterly)

Instrument: K-ICP-MS-06

Analyte	Concentration (ug/L)	Method
Arsenic 75	4500	6020A
Chromium 52	9000	6020A
Copper 65	4500	6020A
Zinc 66	9000	6020A

Client: Hart Crowser, Incorporated **Service Request:** K2007601
Project: McCormick &Baxter/150-002-005

Analysis Run Log

Instrument ID: **K-ICP-MS-06** **Analytical BatchID:** **699673**

Sample	Dilution Factor	Date/Time	As	Cr	Cu	Zn
ZZZZZZ	1	10/16/20 16:22				
ZZZZZZ	1	10/16/20 16:24				
ICV	1	10/16/20 16:27	X	X	X	X
CCV	1	10/16/20 16:29	X	X	X	X
ICB	1	10/16/20 16:32	X	X	X	X
CCB	1	10/16/20 16:34	X	X	X	X
LLICVT	1	10/16/20 16:36	X	X	X	X
ICSA	1	10/16/20 16:39	X	X	X	X
ICSAB	1	10/16/20 16:41	X	X	X	X
ZZZZZZ	1	10/16/20 16:44				
KQ2015607-01MB	5	10/16/20 16:46	X	X	X	X
KQ2015607-02LCS	5	10/16/20 16:49	X	X	X	X
ZZZZZZ	5	10/16/20 16:51				
ZZZZZZ	5	10/16/20 16:54				
K2007601-001	5	10/16/20 16:56	X	X	X	X
ZZZZZZ	5	10/16/20 16:58				
ZZZZZZ	5	10/16/20 17:01				
ZZZZZZ	25	10/16/20 17:03				
ZZZZZZ	5	10/16/20 17:06				
ZZZZZZ	5	10/16/20 17:08				
CCV	1	10/16/20 17:11	X	X	X	X
CCB	1	10/16/20 17:13	X	X	X	X
ZZZZZZ	5	10/16/20 17:16				
ZZZZZZ	5	10/16/20 17:18				
CCV	1	10/16/20 17:20	X	X	X	X
CCB	1	10/16/20 17:23	X	X	X	X
LLCCVT	1	10/16/20 17:25	X	X	X	X
ZZZZZZ	5	10/16/20 17:28				
ZZZZZZ	5	10/16/20 17:30				
ZZZZZZ	5	10/16/20 17:33				
ZZZZZZ	5	10/16/20 17:35				
ZZZZZZ	5	10/16/20 17:38				
ZZZZZZ	5	10/16/20 17:40				
ZZZZZZ	5	10/16/20 17:42				
ZZZZZZ	25	10/16/20 17:45				
ZZZZZZ	5	10/16/20 17:47				
ZZZZZZ	5	10/16/20 17:50				

Client: Hart Crowser, Incorporated **Service Request:** K2007601
Project: McCormick &Baxter/150-002-005

Analysis Run Log

Instrument ID: **K-ICP-MS-06** **Analytical BatchID:** **699673**

Sample	Dilution Factor	Date/Time	As	Cr	Cu	Zn
ZZZZZZ	1	10/16/20 17:52				
ZZZZZZ	1	10/16/20 17:55				
ZZZZZZ	5	10/16/20 17:57				
ZZZZZZ	5	10/16/20 18:00				
ZZZZZZ	5	10/16/20 18:02				
ZZZZZZ	5	10/16/20 18:04				
ZZZZZZ	5	10/16/20 18:07				
ZZZZZZ	5	10/16/20 18:09				
ZZZZZZ	5	10/16/20 18:12				
ZZZZZZ	5	10/16/20 18:14				
ZZZZZZ	5	10/16/20 18:17				
ZZZZZZ	5	10/16/20 18:19				
ZZZZZZ	1	10/16/20 18:22				
ZZZZZZ	1	10/16/20 18:24				
ZZZZZZ	5	10/16/20 18:26				
ZZZZZZ	5	10/16/20 18:29				
ZZZZZZ	5	10/16/20 18:31				
ZZZZZZ	5	10/16/20 18:34				
ZZZZZZ	5	10/16/20 18:36				
ZZZZZZ	5	10/16/20 18:39				
ZZZZZZ	5	10/16/20 18:41				
ZZZZZZ	5	10/16/20 18:44				
ZZZZZZ	1	10/16/20 18:46				
ZZZZZZ	1	10/16/20 18:48				
ZZZZZZ	1	10/16/20 18:51				
ZZZZZZ	1	10/16/20 18:53				
ZZZZZZ	1	10/16/20 18:56				
ZZZZZZ	5	10/16/20 18:58				
ZZZZZZ	5	10/16/20 19:01				
ZZZZZZ	5	10/16/20 19:03				
ZZZZZZ	5	10/16/20 19:06				
ZZZZZZ	5	10/16/20 19:08				
ZZZZZZ	5	10/16/20 19:10				
ZZZZZZ	5	10/16/20 19:13				
ZZZZZZ	25	10/16/20 19:15				
ZZZZZZ	5	10/16/20 19:18				
ZZZZZZ	5	10/16/20 19:20				

Client: Hart Crowser, Incorporated **Service Request:** K2007601
Project: McCormick &Baxter/150-002-005

Analysis Run Log

Instrument ID: **K-ICP-MS-06** **Analytical BatchID:** **699673**

Sample	Dilution Factor	Date/Time	As	Cr	Cu	Zn
ZZZZZZ	1	10/16/20 19:23				
ZZZZZZ	1	10/16/20 19:25				
ZZZZZZ	5	10/16/20 19:28				
ZZZZZZ	5	10/16/20 19:30				
ZZZZZZ	5	10/16/20 19:33				
ZZZZZZ	5	10/16/20 19:35				
ZZZZZZ	5	10/16/20 19:37				
ZZZZZZ	5	10/16/20 19:40				
ZZZZZZ	5	10/16/20 19:42				
ZZZZZZ	5	10/16/20 19:45				
ZZZZZZ	5	10/16/20 19:47				
ZZZZZZ	5	10/16/20 19:50				
ZZZZZZ	1	10/16/20 19:52				
ZZZZZZ	1	10/16/20 19:55				
ZZZZZZ	5	10/16/20 19:57				
ZZZZZZ	5	10/16/20 19:59				
ZZZZZZ	5	10/16/20 20:02				
ZZZZZZ	5	10/16/20 20:04				
ZZZZZZ	5	10/16/20 20:07				
ZZZZZZ	5	10/16/20 20:09				
ZZZZZZ	5	10/16/20 20:12				
ZZZZZZ	5	10/16/20 20:14				
ZZZZZZ	1	10/16/20 20:17				
ZZZZZZ	1	10/16/20 20:19				
ZZZZZZ	1	10/16/20 20:21				
ZZZZZZ	1	10/16/20 20:24				
ZZZZZZ	1	10/16/20 20:26				
ZZZZZZ	1	10/16/20 20:29				
ZZZZZZ	1	10/16/20 20:31				

Client: Hart Crowser, Incorporated **Service Request:** K2007601
Project: McCormick &Baxter/150-002-005

ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY

Instrument ID: **K-ICP-MS-06** **Analytical BatchID:** **699673**

Sample	Date/Time	Ge72H2	Ge72He	In115He	Lu175He
ZZZZZZ	10/16/20 16:22				
ZZZZZZ	10/16/20 16:24				
ICV	10/16/20 16:27	99	99	100	101
CCV	10/16/20 16:29	99	99	100	101
ICB	10/16/20 16:32	99	99	100	101
CCB	10/16/20 16:34	100	99	100	100
LLICVT	10/16/20 16:36	99	100	100	102
ICSA	10/16/20 16:39	94	95	95	98
ICSAB	10/16/20 16:41	95	95	95	98
ZZZZZZ	10/16/20 16:44				
KQ2015607-01MB	10/16/20 16:46	99	100	100	102
KQ2015607-02LCS	10/16/20 16:49	100	99	100	101
ZZZZZZ	10/16/20 16:51				
ZZZZZZ	10/16/20 16:54				
K2007601-001	10/16/20 16:56	99	99	98	101
ZZZZZZ	10/16/20 16:58				
ZZZZZZ	10/16/20 17:01				
ZZZZZZ	10/16/20 17:03				
ZZZZZZ	10/16/20 17:06				
ZZZZZZ	10/16/20 17:08				
CCV	10/16/20 17:11	103	101	101	103
CCB	10/16/20 17:13	101	101	102	103
ZZZZZZ	10/16/20 17:16				
ZZZZZZ	10/16/20 17:18				
CCV	10/16/20 17:20	103	103	101	101
CCB	10/16/20 17:23	102	104	102	102
LLCCVT	10/16/20 17:25	103	104	102	102
ZZZZZZ	10/16/20 17:28				
ZZZZZZ	10/16/20 17:30				
ZZZZZZ	10/16/20 17:33				
ZZZZZZ	10/16/20 17:35				
ZZZZZZ	10/16/20 17:38				
ZZZZZZ	10/16/20 17:40				
ZZZZZZ	10/16/20 17:42				
ZZZZZZ	10/16/20 17:45				
ZZZZZZ	10/16/20 17:47				
ZZZZZZ	10/16/20 17:50				

Client: Hart Crowser, Incorporated **Service Request:** K2007601
Project: McCormick &Baxter/150-002-005

ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY

Instrument ID: **K-ICP-MS-06** **Analytical BatchID:** **699673**

Sample	Date/Time	Ge72H2	Ge72He	In115He	Lu175He
ZZZZZZ	10/16/20 17:52				
ZZZZZZ	10/16/20 17:55				
ZZZZZZ	10/16/20 17:57				
ZZZZZZ	10/16/20 18:00				
ZZZZZZ	10/16/20 18:02				
ZZZZZZ	10/16/20 18:04				
ZZZZZZ	10/16/20 18:07				
ZZZZZZ	10/16/20 18:09				
ZZZZZZ	10/16/20 18:12				
ZZZZZZ	10/16/20 18:14				
ZZZZZZ	10/16/20 18:17				
ZZZZZZ	10/16/20 18:19				
ZZZZZZ	10/16/20 18:22				
ZZZZZZ	10/16/20 18:24				
ZZZZZZ	10/16/20 18:26				
ZZZZZZ	10/16/20 18:29				
ZZZZZZ	10/16/20 18:31				
ZZZZZZ	10/16/20 18:34				
ZZZZZZ	10/16/20 18:36				
ZZZZZZ	10/16/20 18:39				
ZZZZZZ	10/16/20 18:41				
ZZZZZZ	10/16/20 18:44				
ZZZZZZ	10/16/20 18:46				
ZZZZZZ	10/16/20 18:48				
ZZZZZZ	10/16/20 18:51				
ZZZZZZ	10/16/20 18:53				
ZZZZZZ	10/16/20 18:56				
ZZZZZZ	10/16/20 18:58				
ZZZZZZ	10/16/20 19:01				
ZZZZZZ	10/16/20 19:03				
ZZZZZZ	10/16/20 19:06				
ZZZZZZ	10/16/20 19:08				
ZZZZZZ	10/16/20 19:10				
ZZZZZZ	10/16/20 19:13				
ZZZZZZ	10/16/20 19:15				
ZZZZZZ	10/16/20 19:18				
ZZZZZZ	10/16/20 19:20				

Client: Hart Crowser, Incorporated **Service Request:** K2007601
Project: McCormick &Baxter/150-002-005

ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY

Instrument ID: **K-ICP-MS-06** **Analytical BatchID:** **699673**

Sample	Date/Time	Ge72H2	Ge72He	In115He	Lu175He
ZZZZZZ	10/16/20 19:23				
ZZZZZZ	10/16/20 19:25				
ZZZZZZ	10/16/20 19:28				
ZZZZZZ	10/16/20 19:30				
ZZZZZZ	10/16/20 19:33				
ZZZZZZ	10/16/20 19:35				
ZZZZZZ	10/16/20 19:37				
ZZZZZZ	10/16/20 19:40				
ZZZZZZ	10/16/20 19:42				
ZZZZZZ	10/16/20 19:45				
ZZZZZZ	10/16/20 19:47				
ZZZZZZ	10/16/20 19:50				
ZZZZZZ	10/16/20 19:52				
ZZZZZZ	10/16/20 19:55				
ZZZZZZ	10/16/20 19:57				
ZZZZZZ	10/16/20 19:59				
ZZZZZZ	10/16/20 20:02				
ZZZZZZ	10/16/20 20:04				
ZZZZZZ	10/16/20 20:07				
ZZZZZZ	10/16/20 20:09				
ZZZZZZ	10/16/20 20:12				
ZZZZZZ	10/16/20 20:14				
ZZZZZZ	10/16/20 20:17				
ZZZZZZ	10/16/20 20:19				
ZZZZZZ	10/16/20 20:21				
ZZZZZZ	10/16/20 20:24				
ZZZZZZ	10/16/20 20:26				
ZZZZZZ	10/16/20 20:29				
ZZZZZZ	10/16/20 20:31				

LIPIDS

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2007601
Project:	McCormick &Baxter/150-002-005	**Date Collected:**	08/28/20 14:30
Sample Matrix:	Tissue	**Date Received:**	09/03/20 11:40
Sample Name:	MBCFGB1020-02	**Units:**	Percent
Lab Code:	K2007601-001	**Basis:**	Wet

Lipids

Analysis Method: NOAA LIPID
Prep Method: EPA 3540C

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Lipids, Total	**0.88**	0.05	-	1	09/24/20 16:42	9/24/20	*

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2007601
Project:	McCormick &Baxter/150-002-005	**Date Collected:**	NA
Sample Matrix:	Tissue	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	Percent
Lab Code:	KQ2013847-03	**Basis:**	Wet

Lipids

Analysis Method: NOAA LIPID
Prep Method: EPA 3540C

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Lipids, Total	ND U	0.05	-	1	09/24/20 16:42	9/24/20	

Client:	Hart Crowser, Incorporated	**Service Request:**	K2007601
Project:	McCormick &Baxter/150-002-005	**Date Analyzed:**	09/24/20
Sample Matrix:	Tissue	**Date Extracted:**	09/24/20

Duplicate Lab Control Sample Summary
Lipids

Analysis Method:	NOAA LIPID	**Units:**	Percent
Prep Method:	EPA 3540C	**Basis:**	Wet
		Analysis Lot:	696902

	Lab Control Sample KQ2013847-01			Duplicate Lab Control Sample KQ2013847-02					
Analyte Name	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Lipids, Total	79.0	100	79	80.0	100.0	80	70-130	1	20

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2007601
Project:	McCormick &Baxter/150-002-005	**Date Analyzed:**	09/24/20 16:42
Sample Matrix:	Tissue	**Date Extracted:**	09/24/20

Method Blank Summary
Lipids

Sample Name:	Method Blank	**Instrument ID:**	K-Balance-40
Lab Code:	KQ2013847-03	**File ID:**	
Analysis Method:	NOAA LIPID	**Analysis Lot:**	696902
Prep Method:	EPA 3540C	**Extraction Lot:**	366282

This Method Blank applies to the following analyses.

Sample Name	Lab Code	File ID	Date Analyzed
MBCFGB1020-02	K2007601-001		09/24/20 16:42
Lab Control Sample	KQ2013847-01		09/24/20 16:42
Duplicate Lab Control Sample	KQ2013847-02		09/24/20 16:42

Client:	Hart Crowser, Incorporated	**Service Request:**	K2007601
Project:	McCormick &Baxter/150-002-005	**Date Analyzed:**	09/24/20 16:42
Sample Matrix:	Tissue	**Date Extracted:**	09/24/20

Lab Control Sample Summary
Lipids

Sample Name:	Lab Control Sample	**Instrument ID:**	K-Balance-40
Lab Code:	KQ2013847-01	**File ID:**	
Analysis Method:	NOAA LIPID	**Analysis Lot:**	696902
Prep Method:	EPA 3540C	**Extraction Lot:**	366282

This Lab Control Sample applies to the following analyses.

Sample Name	Lab Code	File ID	Date Analyzed
MBCFGB1020-02	K2007601-001		09/24/20 16:42
Duplicate Lab Control Sample	KQ2013847-02		09/24/20 16:42
Method Blank	KQ2013847-03		09/24/20 16:42

Client: Hart Crowser, Incorporated **Service Request:**K2007601
Project: McCormick &Baxter/150-002-005

Analysis Run Log
Lipids

Analysis Method: NOAA LIPID **Analysis Lot:**696902
Instrument ID:K-Balance-40

Raw Data File	Sample Name	Lab Code	Date Analyzed	Time Analyzed	Q
	MBCFGB1020-02	K2007601-001	9/24/2020	16:42	
	Duplicate Lab Control Sample	KQ2013847-02	9/24/2020	16:42	
	Method Blank	KQ2013847-03	9/24/2020	16:42	
	Lab Control Sample	KQ2013847-01	9/24/2020	16:42	

Prep Summary Report

Client: Hart Crowser, Incorporated **Service Request:** K2007601
Project: McCormick &Baxter/150-002-005
Sample Matrix: Tissue

Lipids

Prep Method: EPA 3540C **Extraction Lot:** 366282
Analytical Method: NOAA LIPID **Extraction Date:** 09/24/20 16:42

Sample Name	Lab Code	Date Collected	Date Received	Sample Amount	Final Amount	Percent Solids
MBCFGB1020-02	K2007601-001	8/28/20	9/3/20	2.0390 g		
Lab Control Sample	KQ2013847-01LCS	NA	NA	1.0090 g		
Duplicate Lab Control Sample	KQ2013847-02DLCS	NA	NA	1.0260 g		
Method Blank	KQ2013847-03MB	NA	NA	2.0390 g		

Polycyclic Aromatic Hydrocarbons by GC/MS SIM

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
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ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2007601
Project:	McCormick &Baxter/150-002-005	**Date Collected:**	08/28/20 14:30
Sample Matrix:	Tissue	**Date Received:**	09/03/20 11:40
Sample Name:	MBCFGB1020-02	**Units:**	ug/Kg
Lab Code:	K2007601-001	**Basis:**	Wet

Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Analysis Method: 8270D
Prep Method: EPA 3546

Analyte Name	Result		MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
2-Methylnaphthalene	**0.56**	**J**	4.9	0.37	1	09/30/20 07:41	9/28/20	
Acenaphthene	**0.95**	**J**	4.9	0.30	1	09/30/20 07:41	9/28/20	
Acenaphthylene	**0.28**	**J**	4.9	0.28	1	09/30/20 07:41	9/28/20	
Anthracene	**0.45**	**J**	4.9	0.29	1	09/30/20 07:41	9/28/20	
Benz(a)anthracene	**0.64**	**J**	4.9	0.23	1	09/30/20 07:41	9/28/20	
Benzo(a)pyrene	ND	U	4.9	0.38	1	09/30/20 07:41	9/28/20	
Benzo(b)fluoranthene	ND	U	4.9	0.29	1	09/30/20 07:41	9/28/20	
Benzo(g,h,i)perylene	ND	U	4.9	0.40	1	09/30/20 07:41	9/28/20	
Benzo(k)fluoranthene	ND	U	4.9	0.24	1	09/30/20 07:41	9/28/20	
Chrysene	ND	U	4.9	0.31	1	09/30/20 07:41	9/28/20	
Dibenz(a,h)anthracene	ND	U	4.9	0.23	1	09/30/20 07:41	9/28/20	
Dibenzofuran	**0.82**	**J**	4.9	0.60	1	09/30/20 07:41	9/28/20	
Fluoranthene	**1.9**	**J**	4.9	0.63	1	09/30/20 07:41	9/28/20	
Fluorene	**1.7**	**J**	4.9	0.57	1	09/30/20 07:41	9/28/20	
Indeno(1,2,3-cd)pyrene	ND	U	4.9	0.36	1	09/30/20 07:41	9/28/20	
Naphthalene	**0.69**	**J**	4.9	0.47	1	09/30/20 07:41	9/28/20	
Phenanthrene	**3.6**	**J**	4.9	0.59	1	09/30/20 07:41	9/28/20	
Pyrene	**1.5**	**J**	4.9	0.32	1	09/30/20 07:41	9/28/20	*

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
Fluoranthene-d10	57	39 - 109	09/30/20 07:41	
Fluorene-d10	54	38 - 104	09/30/20 07:41	
Terphenyl-d14	65	38 - 113	09/30/20 07:41	

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2007601
Project:	McCormick &Baxter/150-002-005	**Date Collected:**	NA
Sample Matrix:	Tissue	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	ug/Kg
Lab Code:	KQ2014151-03	**Basis:**	Wet

Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Analysis Method: 8270D
Prep Method: EPA 3546

Analyte Name	Result		MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
2-Methylnaphthalene	**0.63**	**J**	4.9	0.37	1	09/30/20 06:33	9/28/20	
Acenaphthene	**0.41**	**J**	4.9	0.30	1	09/30/20 06:33	9/28/20	
Acenaphthylene	**0.28**	**J**	4.9	0.28	1	09/30/20 06:33	9/28/20	
Anthracene	ND	U	4.9	0.29	1	09/30/20 06:33	9/28/20	
Benz(a)anthracene	ND	U	4.9	0.23	1	09/30/20 06:33	9/28/20	
Benzo(a)pyrene	ND	U	4.9	0.38	1	09/30/20 06:33	9/28/20	
Benzo(b)fluoranthene	ND	U	4.9	0.29	1	09/30/20 06:33	9/28/20	
Benzo(g,h,i)perylene	ND	U	4.9	0.40	1	09/30/20 06:33	9/28/20	
Benzo(k)fluoranthene	ND	U	4.9	0.24	1	09/30/20 06:33	9/28/20	
Chrysene	ND	U	4.9	0.31	1	09/30/20 06:33	9/28/20	
Dibenz(a,h)anthracene	ND	U	4.9	0.23	1	09/30/20 06:33	9/28/20	
Dibenzofuran	**0.81**	**J**	4.9	0.60	1	09/30/20 06:33	9/28/20	
Fluoranthene	**1.3**	**J**	4.9	0.63	1	09/30/20 06:33	9/28/20	
Fluorene	**0.73**	**J**	4.9	0.57	1	09/30/20 06:33	9/28/20	
Indeno(1,2,3-cd)pyrene	ND	U	4.9	0.36	1	09/30/20 06:33	9/28/20	
Naphthalene	**0.92**	**J**	4.9	0.47	1	09/30/20 06:33	9/28/20	
Phenanthrene	**3.2**	**J**	4.9	0.59	1	09/30/20 06:33	9/28/20	
Pyrene	**0.82**	**J**	4.9	0.32	1	09/30/20 06:33	9/28/20	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
Fluoranthene-d10	91	39 - 109	09/30/20 06:33	
Fluorene-d10	85	38 - 104	09/30/20 06:33	
Terphenyl-d14	102	38 - 113	09/30/20 06:33	

Client: Hart Crowser, Incorporated **Service Request:** K2007601
Project: McCormick &Baxter/150-002-005
Sample Matrix: Tissue

SURROGATE RECOVERY SUMMARY
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Analysis Method: 8270D
Extraction Method: EPA 3546

Sample Name	Lab Code	Fluoranthene-d10 39-109	Fluorene-d10 38-104	Terphenyl-d14 38-113
MBCFGB1020-02	K2007601-001	57	54	65
Method Blank	KQ2014151-03	91	85	102
Lab Control Sample	KQ2014151-01	92	89	104
Duplicate Lab Control Sample	KQ2014151-02	90	81	98

Client: Hart Crowser, Incorporated **Service Request:**K2007601
Project: McCormick &Baxter/150-002-005 **Date Analyzed:**09/30/20 06:03

Internal Standard Area and RT SUMMARY
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

File ID: J:\MS14\DATA\093020\0930F002.D\ **Lab Code:**KQ2014379-01
Instrument ID: K-MS-14 **Analysis Lot:**697391
Analysis Method: 8270D **Signal ID:**1

		Acenaphthene-d10		Chrysene-d12		Naphthalene-d8	
		Area	**RT**	**Area**	**RT**	**Area**	**RT**
	Result ==>	58,133	6.18	126,567	9.87	121,515	4.61
	Upper Limit ==>	116,266	6.68	253,134	10.37	243,030	5.11
	Lower Limit ==>	29,067	5.68	63,284	9.37	60,758	4.11
Associated Analyses							
Method Blank	KQ2014151-03	61149	6.17	106089	9.88	120890	4.61
MBCFGB1020-02	K2007601-001	64101	6.17	115103	9.87	124382	4.61
Lab Control Sample	KQ2014151-01	58240	6.17	109335	9.88	122036	4.61
Duplicate Lab Control Sample	KQ2014151-02	57996	6.17	109180	9.87	119888	4.60

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QA/QC Report

Client: Hart Crowser, Incorporated **Service Request:**K2007601
Project: McCormick &Baxter/150-002-005 **Date Analyzed:**09/30/20 06:03

Internal Standard Area and RT SUMMARY
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

File ID: J:\MS14\DATA\093020\0930F002.D\ **Lab Code:**KQ2014379-01
Instrument ID: K-MS-14 **Analysis Lot:**697391
Analysis Method: 8270D **Signal ID:**1

		Perylene-d12		Phenanthrene-d10	
		Area	**RT**	**Area**	**RT**
	Result ==>	137,955	12.75	120,601	7.41
	Upper Limit ==>	275,910	13.25	241,202	7.91
	Lower Limit ==>	68,978	12.25	60,301	6.91
Associated Analyses					
Method Blank	KQ2014151-03	114278	12.77	117654	7.41
MBCFGB1020-02	K2007601-001	125565	12.75	124650	7.41
Lab Control Sample	KQ2014151-01	127679	12.77	116300	7.41
Duplicate Lab Control Sample	KQ2014151-02	127095	12.75	116809	7.41

Client:	Hart Crowser, Incorporated	**Service Request:**	K2007601
Project:	McCormick &Baxter/150-002-005	**Date Analyzed:**	09/30/20
Sample Matrix:	Tissue	**Date Extracted:**	09/28/20

Duplicate Lab Control Sample Summary
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Analysis Method:	8270D	**Units:**	ug/Kg
Prep Method:	EPA 3546	**Basis:**	Wet
		Analysis Lot:	697391

	Lab Control Sample KQ2014151-01			Duplicate Lab Control Sample KQ2014151-02					
Analyte Name	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
2-Methylnaphthalene	388	500	78	390	500	78	43-92	<1	40
Acenaphthene	416	500	83	412	500	82	44-95	1	40
Acenaphthylene	431	500	86	424	500	85	44-93	2	40
Anthracene	473	500	95	470	500	94	46-100	<1	40
Benz(a)anthracene	454	500	91	468	500	94	52-105	3	40
Benzo(a)pyrene	474	500	95	485	500	97	52-111	2	40
Benzo(b)fluoranthene	432	500	86	457	500	91	52-114	5	40
Benzo(g,h,i)perylene	443	500	89	448	500	90	45-107	1	40
Benzo(k)fluoranthene	458	500	92	458	500	92	52-112	<1	40
Chrysene	467	500	93	470	500	94	51-110	<1	40
Dibenz(a,h)anthracene	440	500	88	440	500	88	44-110	<1	40
Dibenzofuran	446	500	89	440	500	88	44-96	1	40
Fluoranthene	443	500	89	465	500	93	49-102	5	40
Fluorene	448	500	90	440	500	88	45-98	2	40
Indeno(1,2,3-cd)pyrene	443	500	89	452	500	90	44-117	2	40
Naphthalene	372	500	74	371	500	74	42-88	<1	40
Phenanthrene	433	500	87	425	500	85	41-99	2	40
Pyrene	526	500	105 *	553	500	111 *	48-104	5	40

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QA/QC Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2007601
Project:	McCormick &Baxter/150-002-005	**Date Analyzed:**	09/30/20 06:33
Sample Matrix:	Tissue	**Date Extracted:**	09/28/20

Method Blank Summary
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Sample Name:	Method Blank	**Instrument ID:**	K-MS-14
Lab Code:	KQ2014151-03	**File ID:**	J:\MS14\DATA\093020\0930F003.D\
Analysis Method:	8270D	**Analysis Lot:**	697391
Prep Method:	EPA 3546	**Extraction Lot:**	366540

This Method Blank applies to the following analyses.

Sample Name	Lab Code	File ID	Date Analyzed
MBCFGB1020-02	K2007601-001	J:\MS14\DATA\093020\0930F005.D\	09/30/20 07:41
Lab Control Sample	KQ2014151-01	J:\MS14\DATA\093020\0930F006.D\	09/30/20 08:07
Duplicate Lab Control Sample	KQ2014151-02	J:\MS14\DATA\093020\0930F007.D\	09/30/20 08:34

Client:	Hart Crowser, Incorporated	**Service Request:**	K2007601
Project:	McCormick &Baxter/150-002-005	**Date Analyzed:**	09/30/20 08:07
Sample Matrix:	Tissue	**Date Extracted:**	09/28/20

Lab Control Sample Summary
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Sample Name:	Lab Control Sample	**Instrument ID:**	K-MS-14
Lab Code:	KQ2014151-01	**File ID:**	J:\MS14\DATA\093020\0930F006.D\
Analysis Method:	8270D	**Analysis Lot:**	697391
Prep Method:	EPA 3546	**Extraction Lot:**	366540

This Lab Control Sample applies to the following analyses.

Sample Name	Lab Code	File ID	Date Analyzed
Method Blank	KQ2014151-03	J:\MS14\DATA\093020\0930F003.D\	09/30/20 06:33
MBCFGB1020-02	K2007601-001	J:\MS14\DATA\093020\0930F005.D\	09/30/20 07:41
Duplicate Lab Control Sample	KQ2014151-02	J:\MS14\DATA\093020\0930F007.D\	09/30/20 08:34

Client: Hart Crowser, Incorporated **Service Request:**K2007601
Project: McCormick &Baxter/150-002-005 **Date Analyzed:**09/30/20 05:34

Tune Summary
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

File ID: J:\MS14\DATA\093020\0930F001.D\ **Analytical Method:** 8270D
Instrument ID: K-MS-14 **Analysis Lot:** 697391

Target Mass	Relative to Mass	Lower Limit %	Upper Limit %	Relative Abundance %	Raw Abundance	Result Pass/Fail
51	198	10	80	22.33	206515	Pass
68	69	0	2	1.90	4405	Pass
69	198	0	100	25.08	231884	Pass
70	69	0	2	0.54	1246	Pass
127	198	10	80	40.91	378305	Pass
197	198	0	2	0.37	3429	Pass
198	442	30	100	36.41	924629	Pass
199	198	5	9	6.75	62394	Pass
275	198	10	60	36.96	341781	Pass
365	442	1	50	2.36	59826	Pass
441	443	0.01	100	71.58	369450	Pass
442	442	30	100	100.00	2539178	Pass
443	442	15	24	20.33	516138	Pass

Sample Name	Lab Code	File ID:	Date Analyzed:	Q
Continuing Calibration Verification	KQ2014379-01	J:\MS14\DATA\093020\0930F002.D\	09/30/20 06:03	
Method Blank	KQ2014151-03	J:\MS14\DATA\093020\0930F003.D\	09/30/20 06:33	
MBCFGB1020-02	K2007601-001	J:\MS14\DATA\093020\0930F005.D\	09/30/20 07:41	
Lab Control Sample	KQ2014151-01	J:\MS14\DATA\093020\0930F006.D\	09/30/20 08:07	
Duplicate Lab Control Sample	KQ2014151-02	J:\MS14\DATA\093020\0930F007.D\	09/30/20 08:34	

Client: Hart Crowser, Incorporated **Service Request:** K2007601
Project: McCormick &Baxter **Calibration Date:** 5/14/2020

Initial Calibration Summary
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Calibration ID: KC2000246 **Signal ID:** 1
Instrument ID: K-MS-14

#	Lab Code	Sample Name	File Location	Acquisition Date
01	KC2000246-01	SIM-PAH ICAL @.002ug/mL SVM63-11A	J:\MS14\DATA\051420\0514F003.D	05/14/2020 10:30
02	KC2000246-02	SIM-PAH ICAL @.004ug/mL SVM63-11B	J:\MS14\DATA\051420\0514F004.D	05/14/2020 10:53
03	KC2000246-03	SIM-PAH ICAL @.008ug/mL SVM63-11C	J:\MS14\DATA\051420\0514F005.D	05/14/2020 11:16
04	KC2000246-04	SIM-PAH ICAL @0.02ug/mL SVM63-11D	J:\MS14\DATA\051420\0514F006.D	05/14/2020 11:39
05	KC2000246-05	SIM-PAH ICAL @0.1ug/mL SVM63 -11E	J:\MS14\DATA\051420\0514F007.D	05/14/2020 12:02
06	KC2000246-06	SIM-PAH ICAL @0.2ug/mL SVM63 -11F	J:\MS14\DATA\051420\0514F008.D	05/14/2020 12:25
07	KC2000246-07	SIM-PAH ICAL @0.4ug/mL SVM63 -11G	J:\MS14\DATA\051420\0514F009.D	05/14/2020 12:49
08	KC2000246-08	SIM-PAH ICAL @1.0ug/mL SVM63 -11H	J:\MS14\DATA\051420\0514F010.D	05/14/2020 13:13
09	KC2000246-09	SIM-PAH ICAL @1.6ug/mL SVM63 -11I	J:\MS14\DATA\051420\0514F011.D	05/14/2020 13:36
10	KC2000246-10	SIM-PAH ICAL @2.0ug/mL SVM63 -11J	J:\MS14\DATA\051420\0514F012.D	05/14/2020 13:59

Analyte

2-Methylnaphthalene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	0.8595	02	4.000	0.7749	03	8.000	0.7232	04	20.000	0.7404
05	100.000	0.7201	06	200.000	0.689	07	400.000	0.6333	08	1000.000	0.6024
09	1600.000	0.6044	10	2000.000	0.5929						

Acenaphthene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.422	02	4.000	1.276	03	8.000	1.22	04	20.000	1.282
05	100.000	1.306	06	200.000	1.263	07	400.000	1.21	08	1000.000	1.18
09	1600.000	1.165	10	2000.000	1.137						

Acenaphthylene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	2.233	02	4.000	2.003	03	8.000	1.936	04	20.000	2.027
05	100.000	2.103	06	200.000	2.062	07	400.000	1.971	08	1000.000	1.946
09	1600.000	1.901	10	2000.000	1.848						

Anthracene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.184	02	4.000	1.037	03	8.000	1	04	20.000	1.053
05	100.000	1.085	06	200.000	1.071	07	400.000	1.016	08	1000.000	1.001
09	1600.000	0.9781	10	2000.000	0.9458						

Benz(a)anthracene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.417	02	4.000	1.26	03	8.000	1.146	04	20.000	1.165
05	100.000	1.203	06	200.000	1.18	07	400.000	1.16	08	1000.000	1.191
09	1600.000	1.197	10	2000.000	1.173						

Client: Hart Crowser, Incorporated **Service Request:** K2007601
Project: McCormick &Baxter **Calibration Date:** 5/14/2020

Initial Calibration Summary
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Calibration ID: KC2000246 **Signal ID:** 1
Instrument ID: K-MS-14

Analyte

Benzo(a)pyrene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.018	02	4.000	0.9225	03	8.000	0.881	04	20.000	0.9408
05	100.000	1.015	06	200.000	1.012	07	400.000	1	08	1000.000	1.021
09	1600.000	1.037	10	2000.000	1.021						

Benzo(b)fluoranthene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.109	02	4.000	1.123	03	8.000	1.091	04	20.000	1.149
05	100.000	1.224	06	200.000	1.224	07	400.000	1.2	08	1000.000	1.198
09	1600.000	1.19	10	2000.000	1.164						

Benzo(g,h,i)perylene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.302	02	4.000	1.208	03	8.000	1.183	04	20.000	1.225
05	100.000	1.161	06	200.000	1.155	07	400.000	1.087	08	1000.000	1.022
09	1600.000	1.021	10	2000.000	0.9771						

Benzo(k)fluoranthene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.121	02	4.000	1.153	03	8.000	1.089	04	20.000	1.168
05	100.000	1.231	06	200.000	1.213	07	400.000	1.182	08	1000.000	1.16
09	1600.000	1.15	10	2000.000	1.133						

Chrysene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.229	02	4.000	1.184	03	8.000	1.14	04	20.000	1.194
05	100.000	1.206	06	200.000	1.178	07	400.000	1.128	08	1000.000	1.147
09	1600.000	1.16	10	2000.000	1.124						

Dibenz(a,h)anthracene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.118	02	4.000	1.065	03	8.000	1.09	04	20.000	1.16
05	100.000	1.087	06	200.000	1.066	07	400.000	1.015	08	1000.000	0.9893
09	1600.000	1.004	10	2000.000	0.9725						

Dibenzofuran

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	2.02	02	4.000	1.798	03	8.000	1.742	04	20.000	1.851
05	100.000	1.893	06	200.000	1.855	07	400.000	1.785	08	1000.000	1.753
09	1600.000	1.715	10	2000.000	1.662						

Fluoranthene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.476	02	4.000	1.24	03	8.000	1.181	04	20.000	1.281
05	100.000	1.311	06	200.000	1.287	07	400.000	1.197	08	1000.000	1.159
09	1600.000	1.063	10	2000.000	1.038						

Client: Hart Crowser, Incorporated **Service Request:** K2007601
Project: McCormick &Baxter **Calibration Date:** 5/14/2020

Initial Calibration Summary
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Calibration ID: KC2000246 **Signal ID:** 1
Instrument ID: K-MS-14

Analyte

Fluoranthene-d10

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.23	02	4.000	1.036	03	8.000	0.9911	04	20.000	1.064
05	100.000	1.113	06	200.000	1.098	07	400.000	1.045	08	1000.000	1.054
09	1600.000	0.9835	10	2000.000	0.9557						

Fluorene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.579	02	4.000	1.454	03	8.000	1.397	04	20.000	1.465
05	100.000	1.515	06	200.000	1.472	07	400.000	1.376	08	1000.000	1.347
09	1600.000	1.316	10	2000.000	1.27						

Fluorene-d10

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.429	02	4.000	1.239	03	8.000	1.151	04	20.000	1.176
05	100.000	1.202	06	200.000	1.182	07	400.000	1.124	08	1000.000	1.113
09	1600.000	1.09	10	2000.000	1.06						

Indeno(1,2,3-cd)pyrene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	0.9697	02	4.000	0.8644	03	8.000	0.8254	04	20.000	0.8855
05	100.000	0.9292	06	200.000	0.9393	07	400.000	0.9159	08	1000.000	0.8967
09	1600.000	0.915	10	2000.000	0.8882						

Naphthalene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.172	02	4.000	1.221	03	8.000	1.078	04	20.000	1.099
05	100.000	1.057	06	200.000	1.03	07	400.000	0.9844	08	1000.000	0.9612
09	1600.000	0.9702	10	2000.000	0.9483						

Phenanthrene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.309	02	4.000	1.162	03	8.000	1.111	04	20.000	1.16
05	100.000	1.168	06	200.000	1.13	07	400.000	1.065	08	1000.000	1.04
09	1600.000	1.019	10	2000.000	0.9842						

Pyrene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.252	02	4.000	1.153	03	8.000	1.071	04	20.000	1.128
05	100.000	1.166	06	200.000	1.173	07	400.000	1.095	08	1000.000	1.025
09	1600.000	1.097	10	2000.000	1.052						

Terphenyl-d14

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	0.9597	02	4.000	0.887	03	8.000	0.8333	04	20.000	0.8776
05	100.000	0.8905	06	200.000	0.8756	07	400.000	0.8022	08	1000.000	0.7686
09	1600.000	0.7634	10	2000.000	0.7381						

Client: Hart Crowser, Incorporated **Service Request:** K2007601
Project: McCormick &Baxter **Calibration Date:** 5/14/2020

Initial Calibration Summary
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Calibration ID: KC2000246 **Signal ID:** 1
Instrument ID: K-MS-14

		Calibration Evaluation				Calibration Evaluation	
Analyte Name	Compound Type	Fit Type	Eval	Eval Result	Control Criteria	Average RRF	Minimum RRF
2-Methylnaphthalene	TRG	Average RF	% RSD	12.5	≤20	0.694	0.40
Acenaphthene	TRG	Average RF	% RSD	6.7	≤20	1.246	0.90
Acenaphthylene	TRG	Average RF	% RSD	5.5	≤20	2.003	0.90
Anthracene	TRG	Average RF	% RSD	6.5	≤20	1.037	0.70
Benz(a)anthracene	TRG	Average RF	% RSD	6.6	≤20	1.209	0.80
Benzo(a)pyrene	TRG	Average RF	% RSD	5.3	≤20	0.9868	0.70
Benzo(b)fluoranthene	TRG	Average RF	% RSD	4.1	≤20	1.167	0.70
Benzo(g,h,i)perylene	TRG	Average RF	% RSD	9.2	≤20	1.134	0.50
Benzo(k)fluoranthene	TRG	Average RF	% RSD	3.6	≤20	1.16	0.70
Chrysene	TRG	Average RF	% RSD	3.0	≤20	1.169	0.70
Dibenz(a,h)anthracene	TRG	Average RF	% RSD	5.7	≤20	1.057	0.40
Dibenzofuran	TRG	Average RF	% RSD	5.7	≤20	1.807	0.80
Fluoranthene	TRG	Average RF	% RSD	10.4	≤20	1.223	0.60
Fluoranthene-d10	SURR	Average RF	% RSD	7.4	≤20	1.057	0.01
Fluorene	TRG	Average RF	% RSD	6.7	≤20	1.419	0.90
Fluorene-d10	SURR	Average RF	% RSD	8.8	≤20	1.177	0.01
Indeno(1,2,3-cd)pyrene	TRG	Average RF	% RSD	4.5	≤20	0.9029	0.50
Naphthalene	TRG	Average RF	% RSD	8.8	≤20	1.052	0.70
Phenanthrene	TRG	Average RF	% RSD	8.4	≤20	1.115	0.70
Pyrene	TRG	Average RF	% RSD	6.0	≤20	1.121	0.60
Terphenyl-d14	SURR	Average RF	% RSD	8.4	≤20	0.8396	0.01

QA/QC Report

Client: Hart Crowser, Incorporated **Service Request:** K2007601
Project: McCormick &Baxter **Calibration Date:** 5/14/2020

Initial Calibration Verification Summary
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Calibration ID: KC2000246 **Signal ID:** 1
Instrument ID: K-MS-14

#	Lab Code	Sample Name	File Location	Acquisition Date
11	KC2000246-11	SIM-PAH ICV @ 0.4ug/mL SVM63-85C	J:\MS14\DATA\051420\0514F013.D	05/14/2020 14:22

Analyte Name	Expected	Result	Average RF	SSV RF	% D	Criteria	Curve Fit
2-Methylnaphthalene	400	382	6.94E-1	6.62E-1	-4.610	±30	Average RF
Acenaphthene	400	374	1.246E0	1.165E0	-6.514	±30	Average RF
Acenaphthylene	400	406	2.003E0	2.031E0	1.38	±30	Average RF
Anthracene	400	402	1.037E0	1.041E0	0.376	±30	Average RF
Benz(a)anthracene	400	374	1.209E0	1.13E0	-6.529	±30	Average RF
Benzo(a)pyrene	400	408	9.868E-1	1.006E0	1.92	±30	Average RF
Benzo(b)fluoranthene	400	395	1.167E0	1.153E0	-1.262	±30	Average RF
Benzo(g,h,i)perylene	400	383	1.134E0	1.087E0	-4.193	±30	Average RF
Benzo(k)fluoranthene	400	397	1.16E0	1.151E0	-0.787	±30	Average RF
Chrysene	400	375	1.169E0	1.096E0	-6.245	±30	Average RF
Dibenz(a,h)anthracene	400	383	1.057E0	1.012E0	-4.248	±30	Average RF
Dibenzofuran	400	386	1.807E0	1.746E0	-3.420	±30	Average RF
Fluoranthene	400	373	1.223E0	1.139E0	-6.845	±30	Average RF
Fluorene	400	395	1.419E0	1.402E0	-1.207	±30	Average RF
Indeno(1,2,3-cd)pyrene	400	431	9.029E-1	9.733E-1	7.79	±30	Average RF
Naphthalene	400	403	1.052E0	1.061E0	0.850	±30	Average RF
Phenanthrene	400	378	1.115E0	1.053E0	-5.543	±30	Average RF
Pyrene	400	382	1.121E0	1.071E0	-4.523	±30	Average RF

Analyte Name	Expected	Result	Average RF	SSV RF	% D	Criteria	Curve Fit
Fluoranthene-d10	400	407	1.057E0	1.074E0	1.63	±30	Average RF
Fluorene-d10	400	411	1.177E0	1.208E0	2.64	±30	Average RF
Terphenyl-d14	400	412	8.396E-1	8.658E-1	3.12	±30	Average RF

Client:	Hart Crowser, Incorporated	**Service Request:**	K2007601
Project:	McCormick &Baxter/150-002-005	**Date Analyzed:**	09/30/20 06:03

Continuing Calibration Verification (CCV) Summary
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Analysis Method:	8270D	**Calibration Date:**	5/14/2020
File ID:	J:\MS14\DATA\093020\0930F002.D\	**Calibration ID:**	KC2000246
Signal ID:	1	**Analysis Lot:**	697391
		Units:	ng/mL

Analyte Name	Expected	Result	Average RF	CCV RF	% D	% Drift	Criteria	Curve Fit
2-Methylnaphthalene	400	339	0.694	0.5889	-15.1	NA	±20	Average RF
Acenaphthene	400	364	1.2462	1.1352	-8.9	NA	±20	Average RF
Acenaphthylene	400	367	2.003	1.8386	-8.2	NA	±20	Average RF
Anthracene	400	379	1.0372	0.9815	-5.4	NA	±20	Average RF
Benz(a)anthracene	400	371	1.2092	1.1227	-7.2	NA	±20	Average RF
Benzo(a)pyrene	400	406	0.9868	1.0018	1.5	NA	±20	Average RF
Benzo(b)fluoranthene	400	388	1.1672	1.1333	-2.9	NA	±20	Average RF
Benzo(g,h,i)perylene	400	350	1.1342	0.9921	-12.5	NA	±20	Average RF
Benzo(k)fluoranthene	400	390	1.16	1.1309	-2.5	NA	±20	Average RF
Chrysene	400	366	1.169	1.0706	-8.4	NA	±20	Average RF
Dibenz(a,h)anthracene	400	349	1.0568	0.9232	-12.6	NA	±20	Average RF
Dibenzofuran	400	382	1.8075	1.7273	-4.4	NA	±20	Average RF
Fluoranthene	400	385	1.2232	1.1775	-3.7	NA	±20	Average RF
Fluorene	400	377	1.419	1.337	-5.8	NA	±20	Average RF
Indeno(1,2,3-cd)pyrene	400	368	0.9029	0.8306	-8.0	NA	±20	Average RF
Naphthalene	400	345	1.0522	0.9087	-13.6	NA	±20	Average RF
Phenanthrene	400	357	1.1147	0.9958	-10.7	NA	±20	Average RF
Pyrene	400	431	1.1212	1.2091	7.8	NA	±20	Average RF

Analyte Name	Expected	Result	Average RF	CCV RF	% D	% Drift	Criteria	Curve Fit
Fluoranthene-d10	400	416	1.0569	1.0986	3.9	NA	±20	Average RF
Fluorene-d10	400	391	1.1766	1.1493	-2.3	NA	±20	Average RF
Terphenyl-d14	400	435	0.8396	0.9125	8.7	NA	±20	Average RF

Client: Hart Crowser, Incorporated **Service Request:**K2007601
Project: McCormick &Baxter/150-002-005

Analysis Run Log
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Analysis Method: **Analysis Lot:**697391
Instrument ID:K-MS-14

Raw Data File	Sample Name	Lab Code	Date Analyzed	Time Analyzed	Q
J:\MS14\DATA\093020\0930F001.D\	ZZZZZZZ	ZZZZZZZ	9/30/2020	05:34:00	
J:\MS14\DATA\093020\0930F001.D\	ZZZZZZZ	ZZZZZZZ	9/30/2020	05:34:00	
J:\MS14\DATA\093020\0930F002.D\	Continuing Calibration Verification	KQ2014379-01	9/30/2020	06:03:00	
J:\MS14\DATA\093020\0930F002.D\	ZZZZZZZ	ZZZZZZZ	9/30/2020	06:03:00	
J:\MS14\DATA\093020\0930F003.D\	Method Blank	KQ2014151-03	9/30/2020	06:33:00	
J:\MS14\DATA\093020\0930F005.D\	MBCFGB1020-02	K2007601-001	9/30/2020	07:41:00	
J:\MS14\DATA\093020\0930F006.D\	Lab Control Sample	KQ2014151-01	9/30/2020	08:07:00	
J:\MS14\DATA\093020\0930F007.D\	Duplicate Lab Control Sample	KQ2014151-02	9/30/2020	08:34:00	
J:\MS14\DATA\093020\0930F008.D\	ZZZZZZZ	ZZZZZZZ	9/30/2020	08:59:00	
J:\MS14\DATA\093020\0930F009.D\	ZZZZZZZ	ZZZZZZZ	9/30/2020	09:26:00	
J:\MS14\DATA\093020\0930F012.D\	ZZZZZZZ	ZZZZZZZ	9/30/2020	10:44:00	
J:\MS14\DATA\093020\0930F013.D\	ZZZZZZZ	ZZZZZZZ	9/30/2020	11:10:00	

Prep Summary Report

Client: Hart Crowser, Incorporated **Service Request:**K2007601
Project: McCormick &Baxter/150-002-005
Sample Matrix: Tissue

Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Prep Method: EPA 3546 **Extraction Lot:** 366540
Analytical Method: 8270D **Extraction Date:** 09/28/20 15:08

Sample Name	Lab Code	Date Collected	Date Received	Sample Amount	Final Amount	Percent Solids
MBCFGB1020-02	K2007601-001	8/28/20	9/3/20	10.200 g	10 mL	
Lab Control Sample	KQ2014151-01LCS	NA	NA	10 g	10 mL	
Duplicate Lab Control Sample	KQ2014151-02DLCS	NA	NA	10 g	10 mL	
Method Blank	KQ2014151-03MB	NA	NA	10.2000 g	10 mL	

Pentachlorophenol

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2007601
Project:	McCormick &Baxter/150-002-005	**Date Collected:**	08/28/20 14:30
Sample Matrix:	Tissue	**Date Received:**	09/03/20 11:40
Sample Name:	MBCFGB1020-02	**Units:**	ug/Kg
Lab Code:	K2007601-001	**Basis:**	Wet

Sim-Phenols tissue, Derivitized

Analysis Method: 8270D SIM
Prep Method: EPA 3541

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Pentachlorophenol	**23 J**	95	7.6	1	10/08/20 18:33	9/24/20	*

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
2,4,6-Tribromophenol	30	30 - 125	10/08/20 18:33	

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2007601
Project:	McCormick &Baxter/150-002-005	**Date Collected:**	NA
Sample Matrix:	Tissue	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	ug/Kg
Lab Code:	KQ2013849-03	**Basis:**	Wet

Sim-Phenols tissue, Derivitized

Analysis Method: 8270D SIM
Prep Method: EPA 3541

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Pentachlorophenol	**13 J**	95	7.6	1	10/08/20 17:25	9/24/20	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
2,4,6-Tribromophenol	11	30 - 125	10/08/20 17:25	*

Client: Hart Crowser, Incorporated **Service Request:** K2007601
Project: McCormick &Baxter/150-002-005
Sample Matrix: Tissue

SURROGATE RECOVERY SUMMARY
Sim-Phenols tissue, Derivitized

Analysis Method: 8270D SIM
Extraction Method: EPA 3541

Sample Name	Lab Code	2,4,6-Tribromophenol 30-125
MBCFGB1020-02	K2007601-001	30
Method Blank	KQ2013849-03	11*
Lab Control Sample	KQ2013849-01	30
Duplicate Lab Control Sample	KQ2013849-02	27*

Client: Hart Crowser, Incorporated **Service Request:** K2007601
Project: McCormick &Baxter/150-002-005 **Date Analyzed:** 10/08/20 17:02

Internal Standard Area and RT SUMMARY

Sim-Phenols tissue, Derivitized

File ID: J:\MS17\DATA\100820\100820F010.D\ **Lab Code:** KQ2015235-02
Instrument ID: K-MS-17 **Analysis Lot:** 698747
Analysis Method: 8270D SIM **Signal ID:** 1

		Phenanthrene-d10	
		Area	**RT**
	Result ==>	349,195	12.47
	Upper Limit ==>	698,390	12.97
	Lower Limit ==>	174,598	11.97
Associated Analyses			
Continuing Calibration Verification	KQ2015235-02	383815	12.35
Method Blank	KQ2013849-03	407949	12.35
Lab Control Sample	KQ2013849-01	407490	12.35
Duplicate Lab Control Sample	KQ2013849-02	406227	12.35
MBCFGB1020-02	K2007601-001	415736	12.35

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2007601
Project:	McCormick &Baxter/150-002-005	**Date Analyzed:**	10/08/20
Sample Matrix:	Tissue	**Date Extracted:**	09/24/20

Duplicate Lab Control Sample Summary
Sim-Phenols tissue, Derivitized

Analysis Method:	8270D SIM	**Units:**	ug/Kg
Prep Method:	EPA 3541	**Basis:**	Wet
		Analysis Lot:	698747

	Lab Control Sample KQ2013849-01			Duplicate Lab Control Sample KQ2013849-02					
Analyte Name	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Pentachlorophenol	738	3000	25	810	3000	27	25-134	9	40

Client:	Hart Crowser, Incorporated	**Service Request:**	K2007601
Project:	McCormick &Baxter/150-002-005	**Date Analyzed:**	10/08/20 17:25
Sample Matrix:	Tissue	**Date Extracted:**	09/24/20

Method Blank Summary
Sim-Phenols tissue, Derivitized

Sample Name:	Method Blank	**Instrument ID:**	K-MS-17
Lab Code:	KQ2013849-03	**File ID:**	J:\MS17\DATA\100820\100820F011.D\
Analysis Method:	8270D SIM	**Analysis Lot:**	698747
Prep Method:	EPA 3541	**Extraction Lot:**	366285

This Method Blank applies to the following analyses.

Sample Name	Lab Code	File ID	Date Analyzed
Lab Control Sample	KQ2013849-01	J:\MS17\DATA\100820\100820F012.D\	10/08/20 17:47
Duplicate Lab Control Sample	KQ2013849-02	J:\MS17\DATA\100820\100820F013.D\	10/08/20 18:10
MBCFGB1020-02	K2007601-001	J:\MS17\DATA\100820\100820F014.D\	10/08/20 18:33

Client:	Hart Crowser, Incorporated	**Service Request:**	K2007601
Project:	McCormick &Baxter/150-002-005	**Date Analyzed:**	10/08/20 17:47
Sample Matrix:	Tissue	**Date Extracted:**	09/24/20

Lab Control Sample Summary
Sim-Phenols tissue, Derivitized

Sample Name:	Lab Control Sample	**Instrument ID:**	K-MS-17
Lab Code:	KQ2013849-01	**File ID:**	J:\MS17\DATA\100820\100820F012.D\
Analysis Method:	8270D SIM	**Analysis Lot:**	698747
Prep Method:	EPA 3541	**Extraction Lot:**	366285

This Lab Control Sample applies to the following analyses.

Sample Name	Lab Code	File ID	Date Analyzed
Method Blank	KQ2013849-03	J:\MS17\DATA\100820\100820F011.D\	10/08/20 17:25
Duplicate Lab Control Sample	KQ2013849-02	J:\MS17\DATA\100820\100820F013.D\	10/08/20 18:10
MBCFGB1020-02	K2007601-001	J:\MS17\DATA\100820\100820F014.D\	10/08/20 18:33

Client: Hart Crowser, Incorporated **Service Request:**K2007601
Project: McCormick &Baxter/150-002-005 **Date Analyzed:**10/08/20 16:40

Tune Summary
Sim-Phenols tissue, Derivitized

File ID: J:\MS17\DATA\100820\100820F009.D\ **Analytical Method:** 8270D SIM
Instrument ID: K-MS-17 **Analysis Lot:** 698747

Target Mass	Relative to Mass	Lower Limit %	Upper Limit %	Relative Abundance %	Raw Abundance	Result Pass/Fail
442	442	30	100	100.00	2370730	Pass
443	442	15	24	19.46	461312	Pass
51	198	10	80	30.98	376106	Pass
69	198	0	100	32.95	400042	Pass
70	69	0	2	0.57	2275	Pass
198	442	30	100	51.21	1213952	Pass
197	198	0	2	0.00	0	Pass
441	443	0.01	100	77.82	358997	Pass
365	442	1	50	3.05	72224	Pass
199	198	5	9	6.69	81170	Pass
275	198	10	60	36.00	437056	Pass
68	69	0	2	0.63	2503	Pass
127	198	10	80	45.01	546453	Pass

Sample Name	Lab Code	File ID:	Date Analyzed:	Q
Continuing Calibration Verification	KQ2015235-02	J:\MS17\DATA\100820\100820F010.D\	10/08/20 17:02	
Method Blank	KQ2013849-03	J:\MS17\DATA\100820\100820F011.D\	10/08/20 17:25	
Lab Control Sample	KQ2013849-01	J:\MS17\DATA\100820\100820F012.D\	10/08/20 17:47	
Duplicate Lab Control Sample	KQ2013849-02	J:\MS17\DATA\100820\100820F013.D\	10/08/20 18:10	
MBCFGB1020-02	K2007601-001	J:\MS17\DATA\100820\100820F014.D\	10/08/20 18:33	

Client: Hart Crowser, Incorporated **Service Request:** K2007601
Project: McCormick &Baxter **Calibration Date:** 5/28/2020

Initial Calibration Summary
Sim-Phenols tissue, Derivitized

Calibration ID: KC2000271 **Signal ID:** 1
Instrument ID: K-MS-17

#	Lab Code	Sample Name	File Location	Acquisition Date
01	KC2000271-01	SIM PHENOL ICAL 20ng/mL SVM63-92A	J:\MS17\DATA\052820\052820F003.D	05/28/2020 09:07
02	KC2000271-02	SIM PHENOL ICAL 50ng/mL SVM63-92B	J:\MS17\DATA\052820\052820F004.D	05/28/2020 09:28
03	KC2000271-03	SIM PHENOL ICAL 100ng/mL SVM63-92C	J:\MS17\DATA\052820\052820F005.D	05/28/2020 09:49
04	KC2000271-04	SIM PHENOL ICAL 300ng/mL SVM63-92D	J:\MS17\DATA\052820\052820F006.D	05/28/2020 10:10
05	KC2000271-05	SIM PHENOL ICAL 500ng/mL SVM63-92E	J:\MS17\DATA\052820\052820F007.D	05/28/2020 10:31
06	KC2000271-06	SIM PHENOL ICAL 800ng/mL SVM63-92F	J:\MS17\DATA\052820\052820F008.D	05/28/2020 10:52
07	KC2000271-07	SIM PHENOL ICAL 1000ng/mL SVM63-92G	J:\MS17\DATA\052820\052820F009.D	05/28/2020 11:13
08	KC2000271-08	SIM PHENOL ICAL 1500ng/mL SVM63-92H	J:\MS17\DATA\052820\052820F010.D	05/28/2020 11:34
09	KC2000271-09	SIM PHENOL ICAL 2000ng/mL SVM63-92I	J:\MS17\DATA\052820\052820F011.D	05/28/2020 11:55

Analyte

2,4,6-Tribromophenol

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	20.000	0.158	02	50.000	0.1481	03	100.000	0.1541	04	300.000	0.1587
05	500.000	0.1718	06	800.000	0.1776	07	1000.000	0.1764	08	1500.000	0.1778
09	2000.000	0.1852									

Pentachlorophenol

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
02	50.000	0.3083	03	100.000	0.2561	04	300.000	0.2308	05	500.000	0.2415
06	800.000	0.2442	07	1000.000	0.2412	08	1500.000	0.2403	09	2000.000	0.2501

Client: Hart Crowser, Incorporated
Project: McCormick &Baxter

Service Request: K2007601
Calibration Date: 5/28/2020

Initial Calibration Summary
Sim-Phenols tissue, Derivitized

Calibration ID: KC2000271
Instrument ID: K-MS-17

Signal ID: 1

		Calibration Evaluation				Calibration Evaluation	
Analyte Name	Compound Type	Fit Type	Eval	Eval Result	Control Criteria	Average RRF	Minimum RRF
2,4,6-Tribromophenol	SURR	Average RF	% RSD	7.7	≤20	0.1675	0.05
Pentachlorophenol	TRG	Average RF	% RSD	9.6	≤20	0.2516	0.05

Client: Hart Crowser, Incorporated **Service Request:** K2007601
Project: McCormick &Baxter **Calibration Date:** 5/28/2020

Initial Calibration Verification Summary
Sim-Phenols tissue, Derivitized

Calibration ID: KC2000271 **Signal ID:** 1
Instrument ID: K-MS-17

#	Lab Code	Sample Name	File Location	Acquisition Date
10	KC2000271-10	SIM PHENOL ICV 1000ng/mL SVM63-92J	J:\MS17\DATA\052820\052820F012.D	05/28/2020 12:16

Analyte Name	Expected	Result	Average RF	SSV RF	Rec.	Criteria	Curve Fit
Pentachlorophenol	1000	1000	2.516E-1	2.522E-1	.272933829148 31023839		Average RF

Analyte Name	Expected	Result	Average RF	SSV RF	Rec.	Criteria	Curve Fit
2,4,6-Tribromophenol	1000	1100	1.675E-1	1.837E-1	9.63477536061 455671373		Average RF

Client:	Hart Crowser, Incorporated	**Service Request:**	K2007601
Project:	McCormick &Baxter/150-002-005	**Date Analyzed:**	10/08/20 17:02

Continuing Calibration Verification (CCV) Summary
Sim-Phenols tissue, Derivitized

Analysis Method:	8270D SIM	**Calibration Date:**	5/28/2020
File ID:	J:\MS17\DATA\100820\100820F010.D\	**Calibration ID:**	KC2000271
Signal ID:	1	**Analysis Lot:**	698747
		Units:	ng/mL

Analyte Name	Expected	Result	Average RF	CCV RF	% D	% Drift	Criteria	Curve Fit
Pentachlorophenol	1000	1160	0.2516	0.2924	16.2	NA	±20	Average RF

Analyte Name	Expected	Result	Average RF	CCV RF	% D	% Drift	Criteria	Curve Fit
2,4,6-Tribromophenol	1000	1110	0.1675	0.186	11.0	NA	±20	Average RF

Client: Hart Crowser, Incorporated **Service Request:**K2007601
Project: McCormick &Baxter/150-002-005

Analysis Run Log
Sim-Phenols tissue, Derivitized

Analysis Method: **Analysis Lot:**698747
Instrument ID:K-MS-17

Raw Data File	Sample Name	Lab Code	Date Analyzed	Time Analyzed	Q
J:\MS17\DATA\100820\100820F009.D\	ZZZZZZZ	ZZZZZZZ	10/8/2020	16:40:00	
J:\MS17\DATA\100820\100820F010.D\	Continuing Calibration Verification	KQ2015235-02	10/8/2020	17:02:00	
J:\MS17\DATA\100820\100820F011.D\	Method Blank	KQ2013849-03	10/8/2020	17:25:00	
J:\MS17\DATA\100820\100820F012.D\	Lab Control Sample	KQ2013849-01	10/8/2020	17:47:00	
J:\MS17\DATA\100820\100820F013.D\	Duplicate Lab Control Sample	KQ2013849-02	10/8/2020	18:10:00	
J:\MS17\DATA\100820\100820F014.D\	MBCFGB1020-02	K2007601-001	10/8/2020	18:33:00	

Prep Summary Report

Client: Hart Crowser, Incorporated **Service Request:**K2007601
Project: McCormick &Baxter/150-002-005
Sample Matrix: Tissue

Sim-Phenols tissue, Derivitized

Prep Method: EPA 3541 **Extraction Lot:** 366285
Analytical Method: 8270D SIM **Extraction Date:** 09/24/20 16:42

Sample Name	Lab Code	Date Collected	Date Received	Sample Amount	Final Amount	Percent Solids
MBCFGB1020-02	K2007601-001	8/28/20	9/3/20	5.245 g	10 mL	
Lab Control Sample	KQ2013849-01LCS	NA	NA	5 g	10 mL	
Duplicate Lab Control Sample	KQ2013849-02DLCS	NA	NA	5 g	10 mL	
Method Blank	KQ2013849-03MB	NA	NA	5.2450 g	10 mL	

Subcontract Lab Results

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

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Client Project Information

Project ID: K2007601
Project Description:
Contact: Howard Holmes

ALSE Project Information

Project ID: ALS880
Contact: Claire Kocharakkal
Submission ID(s): L2508739

Final Package Review by: _____

Date Reviewed: 16-Oct-20

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SECTION 1: PROJECT NARRATIVE

ALSE Project Information

Project ID: ALS880
Contact: Claire Kocharakkal
Submission ID(s): L2508739

Client Project Information

Project ID: K2007601
Project Description:
Contact: Howard Holmes

Analytical Method: PCDD/F by EPA 1613B via Isotope Dilution

ALS Sample ID	Client Sample Descriptions	Matrix	Date Sampled	Date Received	Date Extracted	Date Analyzed
L2508739-1	MBCFGB1020-02	Tissue	28-Aug-20	25-Sep-20	30-Sep-20	10-Oct-20
WG3406511-1	Method Blank	QC	n/a	n/a	30-Sep-20	10-Oct-20
WG3406511-2	Laboratory Control Sample	QC	n/a	n/a	30-Sep-20	10-Oct-20

Comments and Notes:
a) Sample Integrity:

The sample was received in good condition at 2.4 degrees C.

b) Instrumental Analysis:

All results have been reported on an as-received (wet weight) basis.

The measured mass resolutions are below 10,000 for select masses. However, there is no indication of increased interference or noise. No impact to the reported values is expected. The recoveries of all targets are in control for the laboratory control sample (LCS).

I certify that this data package is in compliance with the terms and condition of the contract , both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this data package (hardcopy and/or electronic version) has been authorized by the Laboratory Manager or his designee, as verified by the following signature.

Steve Kennedy, Technical Supervisor

16-Oct-20
Date

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SECTION 2: DATA SUMMARY REPORT

1435 Norjohn Court, Unit 1, Burlington, ON, Canada L7L 0E6
Phone: 905-331-3111, FAX: 905-331-4567

Certificate of Analysis

ALS Project Contact:	Claire Kocharakkal	**Client Name:**	ALS Environmental - Kelso
ALS Project ID:	ALS880	**Client Address:**	1317 South 13th Avenue
ALS WO#:	L2508739		Kelso, WA 98626
Date of Report	16-Oct-20		USA
Date of Sample Receipt	25-Sep-20	**Client Contact:**	Howard Holmes
		Client Project ID:	K2007601

COMMENTS: **PCDD/F by EPA 1613B via Isotope Dilution**

All results have been reported on an as-received (wet weight) basis.

Certified by:

Steve Kennedy, C.Chem.
Technical Supervisor

Results in this certificate relate only to the samples as submitted to the laboratory.
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Sample Analysis Summary Report

Sample Name	MBCFGB1020-02
ALS Sample ID	L2508739-1
Sample Size	10.24
Sample size units	g
Percent Moisture	n/a
Sample Matrix	Tissue
Sampling Date	28-Aug-20
Extraction Date	30-Sep-20

Target Analytes	pg/g wwt
2,3,7,8-TCDD	<0.11
1,2,3,7,8-PeCDD	0.190
1,2,3,4,7,8-HxCDD	<0.18
1,2,3,6,7,8-HxCDD	0.421
1,2,3,7,8,9-HxCDD	<0.18
1,2,3,4,6,7,8-HpCDD	1.83
OCDD	12.7
2,3,7,8-TCDF	0.326
1,2,3,7,8-PeCDF	0.228
2,3,4,7,8-PeCDF	0.382
1,2,3,4,7,8-HxCDF	<0.15
1,2,3,6,7,8-HxCDF	<0.16
2,3,4,6,7,8-HxCDF	<0.15
1,2,3,7,8,9-HxCDF	<0.18
1,2,3,4,6,7,8-HpCDF	<0.21
1,2,3,4,7,8,9-HpCDF	<0.11
OCDF	<0.21
Extraction Standards	**% Rec**
13C12-2,3,7,8-TCDD	67
13C12-1,2,3,7,8-PeCDD	80
13C12-1,2,3,4,7,8-HxCDD	72
13C12-1,2,3,6,7,8-HxCDD	70
13C12-1,2,3,4,6,7,8-HpCDD	66
13C12-OCDD	60
13C12-2,3,7,8-TCDF	66
13C12-1,2,3,7,8-PeCDF	63
13C12-2,3,4,7,8-PeCDF	65
13C12-1,2,3,4,7,8-HxCDF	69
13C12-1,2,3,6,7,8-HxCDF	69
13C12-2,3,4,6,7,8-HxCDF	73
13C12-1,2,3,7,8,9-HxCDF	70
13C12-1,2,3,4,6,7,8-HpCDF	64
13C12-1,2,3,4,7,8,9-HpCDF	57
Cleanup Standard	
37Cl4-2,3,7,8-TCDD (Cleanup)	64
Homologue Group Totals	**pg/g wwt**
Total-TCDD	<0.11
Total-PeCDD	0.190
Total-HxCDD	0.421
Total-HpCDD	1.83
Total-TCDF	0.326
Total-PeCDF	1.26
Total-HxCDF	1.02
Total-HpCDF	<0.11
Toxic Equivalency - (WHO 2005)	
Lower Bound PCDD/F TEQ (WHO 2005)	0.408
Mid Point PCDD/F TEQ (WHO 2005)	0.516
Upper Bound PCDD/F TEQ (WHO 2005)	0.622

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Quality Control Summary Report

Sample Name	Method Blank	Laboratory Control Sample
ALS Sample ID	WG3406511-1	WG3406511-2
Sample Size	20.00	1
Sample size units	g	n/a
Percent Moisture	n/a	n/a
Sample Matrix	QC	QC
Sampling Date	n/a	n/a
Extraction Date	30-Sep-20	30-Sep-20
Target Analytes	**pg/g wwt**	**% Rec**
2,3,7,8-TCDD	<0.038	88
1,2,3,7,8-PeCDD	<0.018	101
1,2,3,4,7,8-HxCDD	<0.027	96
1,2,3,6,7,8-HxCDD	<0.027	92
1,2,3,7,8,9-HxCDD	<0.028	106
1,2,3,4,6,7,8-HpCDD	0.0240	92
OCDD	<0.12	96
2,3,7,8-TCDF	<0.041	92
1,2,3,7,8-PeCDF	<0.019	96
2,3,4,7,8-PeCDF	<0.015	90
1,2,3,4,7,8-HxCDF	<0.027	93
1,2,3,6,7,8-HxCDF	<0.029	96
2,3,4,6,7,8-HxCDF	<0.028	92
1,2,3,7,8,9-HxCDF	<0.049	99
1,2,3,4,6,7,8-HpCDF	<0.011	93
1,2,3,4,7,8,9-HpCDF	<0.016	100
OCDF	<0.046	84
Extraction Standards	**% Rec**	**% Rec**
13C12-2,3,7,8-TCDD	61	66
13C12-1,2,3,7,8-PeCDD	72	81
13C12-1,2,3,4,7,8-HxCDD	74	79
13C12-1,2,3,6,7,8-HxCDD	72	76
13C12-1,2,3,4,6,7,8-HpCDD	75	87
13C12-OCDD	73	98
13C12-2,3,7,8-TCDF	58	62
13C12-1,2,3,7,8-PeCDF	58	67
13C12-2,3,4,7,8-PeCDF	63	71
13C12-1,2,3,4,7,8-HxCDF	66	69
13C12-1,2,3,6,7,8-HxCDF	65	71
13C12-2,3,4,6,7,8-HxCDF	69	76
13C12-1,2,3,7,8,9-HxCDF	63	73
13C12-1,2,3,4,6,7,8-HpCDF	70	78
13C12-1,2,3,4,7,8,9-HpCDF	63	75
Cleanup Standard		
37Cl4-2,3,7,8-TCDD (Cleanup)	53	63
Homologue Group Totals	**pg/g wwt**	
Total-TCDD	<0.038	
Total-PeCDD	<0.018	
Total-HxCDD	<0.028	
Total-HpCDD	0.0240	
Total-TCDF	<0.041	
Total-PeCDF	<0.019	
Total-HxCDF	<0.037	
Total-HpCDF	<0.016	
Toxic Equivalency - (WHO 2005)		
Lower Bound PCDD/F TEQ (WHO 2005)	0.000240	
Mid Point PCDD/F TEQ (WHO 2005)	0.0462	
Upper Bound PCDD/F TEQ (WHO 2005)	0.0872	

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Continuing Calibration Summary Report

Sample Name	CVS	CCV	CCV
ALS Sample ID	H7-20-RS1-1209	H7-20-CCV-1234	H7-20-CCV-1235
Sample Size	1	1	1
Sample size units	n/a	n/a	n/a
Percent Moisture	n/a	n/a	n/a
Sample Matrix	QC	QC	QC
Sampling Date	n/a	n/a	n/a
Extraction Date	n/a	n/a	n/a
Target Analytes	**% Rec**	**% Rec**	**% Rec**
2,3,7,8-TCDD	89	108	113
1,2,3,7,8-PeCDD	106	98	97
1,2,3,4,7,8-HxCDD	97	96	100
1,2,3,6,7,8-HxCDD	94	97	95
1,2,3,7,8,9-HxCDD	100	99	97
1,2,3,4,6,7,8-HpCDD	98	101	97
OCDD	100	97	97
2,3,7,8-TCDF	100	94	92
1,2,3,7,8-PeCDF	106	90	91
2,3,4,7,8-PeCDF	97	90	92
1,2,3,4,7,8-HxCDF	98	93	97
1,2,3,6,7,8-HxCDF	101	97	96
2,3,4,6,7,8-HxCDF	98	96	98
1,2,3,7,8,9-HxCDF	106	94	94
1,2,3,4,6,7,8-HpCDF	101	97	97
1,2,3,4,7,8,9-HpCDF	106	87	89
OCDF	102	84	87
Extraction Standards	**% Rec**	**% Rec**	**% Rec**
13C12-2,3,7,8-TCDD	101	86	87
13C12-1,2,3,7,8-PeCDD	94	100	103
13C12-1,2,3,4,7,8-HxCDD	98	110	113
13C12-1,2,3,6,7,8-HxCDD	94	107	107
13C12-1,2,3,4,6,7,8-HpCDD	102	121	115
13C12-OCDD	105	160	136
13C12-2,3,7,8-TCDF	97	102	104
13C12-1,2,3,7,8-PeCDF	93	99	102
13C12-2,3,4,7,8-PeCDF	92	104	107
13C12-1,2,3,4,7,8-HxCDF	94	106	107
13C12-1,2,3,6,7,8-HxCDF	93	103	107
13C12-2,3,4,6,7,8-HxCDF	95	107	110
13C12-1,2,3,7,8,9-HxCDF	95	113	114
13C12-1,2,3,4,6,7,8-HpCDF	95	111	111
13C12-1,2,3,4,7,8,9-HpCDF	97	131	123
Cleanup Standard			
37Cl4-2,3,7,8-TCDD (Cleanup)	109	104	109

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Sample Analysis Report

Sample Name	**MBCFGB1020-02**	Sampling Date	28-Aug-20		
ALS Sample ID	L2508739-1	Extraction Date	30-Sep-20		Approved:
Analysis Method	EPA 1613B	Sample Size	10.24	g	*N Ashtari*
Analysis Type	Sample	Percent Moisture	n/a		--e-signature--
Sample Matrix	Tissue	Split Ratio	1		13-Oct-2020

Run Information	**Run 1**
Filename	7-201010A16
Run Date	10-Oct-20 18:06
Final Volume	1 uL
Dilution Factor	20
Analysis Units	pg/g wwt
Instrument - Column	HRMS-7 DB5MSUS188441H

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg/g wwt**	**EDL pg/g wwt**	**Flags**	**EMPC pg/g wwt**	**LQL**
2,3,7,8-TCDD	1	NotFnd	<0.11	0.11	U		0.98
1,2,3,7,8-PeCDD	1	32.19	0.190	0.069	J		4.9
1,2,3,4,7,8-HxCDD	0.1	NotFnd	<0.18	0.18	U		4.9
1,2,3,6,7,8-HxCDD	0.1	34.36	0.421	0.17	J		4.9
1,2,3,7,8,9-HxCDD	0.1	NotFnd	<0.18	0.18	U		4.9
1,2,3,4,6,7,8-HpCDD	0.01	35.94	1.83	0.089	J		4.9
OCDD	0.0003	37.36	12.7	0.13			9.8
2,3,7,8-TCDF	0.1	26.77	0.326	0.11	M,J		0.98
1,2,3,7,8-PeCDF	0.03	31.19	0.228	0.084	J		4.9
2,3,4,7,8-PeCDF	0.3	31.97	0.382	0.067	J		4.9
1,2,3,4,7,8-HxCDF	0.1	33.81	<0.15	0.15	M,U		4.9
1,2,3,6,7,8-HxCDF	0.1	NotFnd	<0.16	0.16	U		4.9
2,3,4,6,7,8-HxCDF	0.1	34.23	<0.15	0.15	M,U	0.11	4.9
1,2,3,7,8,9-HxCDF	0.1	NotFnd	<0.18	0.18	U		4.9
1,2,3,4,6,7,8-HpCDF	0.01	35.39	<0.21	0.067	M,J,R	0.21	4.9
1,2,3,4,7,8,9-HpCDF	0.01	NotFnd	<0.11	0.11	U		4.9
OCDF	0.0003	37.44	<0.21	0.074	M,J,R	0.21	9.8

Extraction Standards	**pg**		**% Rec**	**Limits**
13C12-2,3,7,8-TCDD	2000	27.65	67	25-164
13C12-1,2,3,7,8-PeCDD	2000	32.18	80	25-181
13C12-1,2,3,4,7,8-HxCDD	2000	34.30	72	32-141
13C12-1,2,3,6,7,8-HxCDD	2000	34.35	70	28-130
13C12-1,2,3,4,6,7,8-HpCDD	2000	35.94	66	23-140
13C12-OCDD	4000	37.35	60	17-157
13C12-2,3,7,8-TCDF	2000	26.77	66	24-169
13C12-1,2,3,7,8-PeCDF	2000	31.18	63	24-185
13C12-2,3,4,7,8-PeCDF	2000	31.96	65	21-178
13C12-1,2,3,4,7,8-HxCDF	2000	33.79	69	26-152
13C12-1,2,3,6,7,8-HxCDF	2000	33.86	69	26-123
13C12-2,3,4,6,7,8-HxCDF	2000	34.21	73	28-136
13C12-1,2,3,7,8,9-HxCDF	2000	34.63	70	29-147
13C12-1,2,3,4,6,7,8-HpCDF	2000	35.39	64	28-143
13C12-1,2,3,4,7,8,9-HpCDF	2000	36.18	57	26-138

Cleanup Standard	**pg**						
37Cl4-2,3,7,8-TCDD (Cleanup)	40	27.68	64	35-197	M		

Homologue Group Totals	**# peaks**	**Conc. pg/g wwt**	**EDL pg/g wwt**			
Total-TCDD	0	<0.11	0.11	U		0.98
Total-PeCDD	1	0.190	0.069			4.9
Total-HxCDD	1	0.421	0.18			4.9
Total-HpCDD	1	1.83	0.089			4.9
Total-TCDF	1	0.326	0.11			0.98
Total-PeCDF	3	1.26	0.084			4.9
Total-HxCDF	3	1.02	0.18			4.9
Total-HpCDF	0	<0.11	0.11	U		4.9

Toxic Equivalency - (WHO 2005)	**pg/g wwt**
Lower Bound PCDD/F TEQ (WHO 2005)	0.408
Mid Point PCDD/F TEQ (WHO 2005)	0.516
Upper Bound PCDD/F TEQ (WHO 2005)	0.622

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF	Indicates the Toxic Equivalency Factor
TEQ	Indicates the Toxic Equivalency
M	Indicates that a peak has been manually integrated.
U	Indicates that this compound was not detected above the EDL.
J	Indicates that a target analyte was detected below the calibrated range.
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.
LQL	Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
EMPC	Estimated Maximum Possible Concentration – elevated detection limit due to interference or positive id criterion failure

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SECTION 3: METHOD SUMMARY

PCDD/F METHOD SUMMARY
Methods 23/0023A/1613B/8290/TO-9A

Introduction:

This summary is to provide ALSE Burlington PCDD/F method details in order to provide persons reviewing or validating this data package sufficient information to re-construct the sample calculation, data verification and review. It incorporates the analysis of PCDD/F via the following reference methods:

US EPA Office of Water, Method 1613B
US EPA Office of Solid Waste, SW846 Methods 8290A and 0023/8290A
US EPA Office of Research & Development Method TO-9A.
US EPA Office of Air Quality Planning & Standards Method 23.

Any deviations to what is listed herein would be listed in the project narrative.

To avoid the confusion and conflicting nomenclature within the methods, we have defined the labeled standards in terms relating to the time of addition to the sample or extract. Therefore;

The Field or Sampling Standards are added prior to field sampling
The Extraction Standards are added prior to extraction
The Clean-up Standards are added prior to extract clean-up
The Injection Standards are added prior to extract injection.

Calibration Standard Levels:

Six levels of standard are available for calibration as listed in Table 1. The low point (the CS0) is below method requirements and therefore is optional.

Table 1: Calibration Standards

		CS0	CS1	CS2	CS3	CS4	CS5
Natives	2,3,7,8-TCDD	0.1	0.5	2	10	40	200
	2,3,7,8-TCDF	0.1	0.5	2	10	40	200
	1,2,3,7,8-PeCDD	0.5	2.5	10	50	200	1000
	1,2,3,7,8-PeCDF	0.5	2.5	10	50	200	1000
	2,3,4,7,8-PeCDF	0.5	2.5	10	50	200	1000
	1,2,3,4,7,8-HxCDD	0.5	2.5	10	50	200	1000
	1,2,3,6,7,8-HxCDD	0.5	2.5	10	50	200	1000
	1,2,3,7,8,9-HxCDD	0.5	2.5	10	50	200	1000
	1,2,3,4,7,8-HxCDF	0.5	2.5	10	50	200	1000
	1,2,3,6,7,8-HxCDF	0.5	2.5	10	50	200	1000
	1,2,3,7,8,9-HxCDF	0.5	2.5	10	50	200	1000
	2,3,4,6,7,8-HxCDF	0.5	2.5	10	50	200	1000
	1,2,3,4,6,7,8-HpCDD	0.5	2.5	10	50	200	1000
	1,2,3,4,6,7,8-HpCDF	0.5	2.5	10	50	200	1000
	1,2,3,4,7,8,9-HpCDF	0.5	2.5	10	50	200	1000
	OCDD	1	5	20	100	400	2000
	OCDF	1	5	20	100	400	2000
Labeled	2,3,7,8-TCDD-$^{13}C_{12}$	100	100	100	100	100	100
	2,3,7,8-TCDF-$^{13}C_{12}$	100	100	100	100	100	100
	1,2,3,7,8-PeCDD-$^{13}C_{12}$	100	100	100	100	100	100
	1,2,3,7,8-PeCDF-$^{13}C_{12}$	100	100	100	100	100	100
	2,3,4,7,8-PeCDF-$^{13}C_{12}$	100	100	100	100	100	100
	1,2,3,4,7,8-HxCDD-$^{13}C_{12}$	100	100	100	100	100	100
	1,2,3,6,7,8-HxCDD-$^{13}C_{12}$	100	100	100	100	100	100
	1,2,3,4,7,8-HxCDF-$^{13}C_{12}$	100	100	100	100	100	100
	1,2,3,6,7,8-HxCDF-$^{13}C_{12}$	100	100	100	100	100	100
	1,2,3,7,8,9-HxCDF-$^{13}C_{12}$	100	100	100	100	100	100
	2,3,4,6,7,8-HxCDF-$^{13}C_{12}$	100	100	100	100	100	100
	1,2,3,4,6,7,8-HpCDD-$^{13}C_{12}$	100	100	100	100	100	100
	1,2,3,4,6,7,8-HpCDF-$^{13}C_{12}$	100	100	100	100	100	100
	1,2,3,4,7,8,9-HpCDF-$^{13}C_{12}$	100	100	100	100	100	100
	OCDD-$^{13}C_{12}$	200	200	200	200	200	200
	2,3,7,8-TCDD-$^{37}Cl_4$	0.1	0.5	2	10	40	200
Injection	1,2,3,4-TCDD-$^{13}C_{12}$	100	100	100	100	100	100
	1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	100	100	100	100	100	100

Calibration Control Limits

The initial and continuing calibration control limits for all methods are presented in Table 2 below. For the calibration CS1 and for each calibration verification CS3, the signal to noise ratio for each quantification ion for labelled and non-labelled analytes must be greater than or equal to 10:1

Table 2: Calibration Control Limits

	1613B		M23 & TO-9A		8290A	
	Initial Cal.	Cal. Ver.	Initial Cal.	Cal. Ver.	Initial Cal.	Cal. Ver.
	%RSD	ng/mL	%RSD	% Diff	%RSD	% Diff
Natives						
2,3,7,8-TCDD	20	7.8-12.9	25	25	20	20*
2,3,7,8-TCDF	20	8.4-12.0	25	25	20	20*
1,2,3,7,8-PeCDD	20	39-65	25	25	20	20*
1,2,3,7,8-PeCDF	20	41-60	25	25	20	20*
2,3,4,7,8-PeCDF	20	41-61	25	25	20	20*
1,2,3,4,7,8-HxCDD	20	39-64	25	25	20	20*
1,2,3,6,7,8-HxCDD	20	39-64	25	25	20	20*
1,2,3,7,8,9-HxCDD	35	41-61	25	25	20	20*
1,2,3,4,7,8-HxCDF	20	45-56	25	25	20	20*
1,2,3,6,7,8-HxCDF	20	44-57	25	25	20	20*
1,2,3,7,8,9-HxCDF	20	45-56	25	25	20	20*
2,3,4,6,7,8-HxCDF	20	44-57	25	25	20	20*
1,2,3,4,6,7,8-HpCDD	20	43-58	25	25	20	20*
1,2,3,4,6,7,8-HpCDF	20	45-55	25	25	20	20*
1,2,3,4,7,8,9-HpCDF	20	43-58	25	25	20	20*
OCDD	20	79-126	25	25	20	20*
OCDF	35	63-159	30	30	20	20*
Labels						
2,3,7,8-TCDD-$^{13}C_{12}$	35	82-121	25	25	30	30**
2,3,7,8-TCDF-$^{13}C_{12}$	35	71-140	30	30	30	30**
1,2,3,7,8-PeCDD-$^{13}C_{12}$	35	62-160	30	30	30	30**
1,2,3,7,8-PeCDF-$^{13}C_{12}$	35	76-130	30	30	30	30**
2,3,4,7,8-PeCDF-$^{13}C_{12}$	35	77-130	25	25	30	30**
1,2,3,4,7,8-HxCDD-$^{13}C_{12}$	35	85-117	25	25	30	30**
1,2,3,6,7,8-HxCDD-$^{13}C_{12}$	35	85-118	25	25	30	30**
1,2,3,4,7,8-HxCDF-$^{13}C_{12}$	35	76-131	25	25	30	30**
1,2,3,6,7,8-HxCDF-$^{13}C_{12}$	35	70-143	30	30	30	30**
1,2,3,7,8,9-HxCDF-$^{13}C_{12}$	35	74-135	-	-	-	-
2,3,4,6,7,8-HxCDF-$^{13}C_{12}$	35	73-137	30	30	30	30**
1,2,3,4,6,7,8-HpCDD-$^{13}C_{12}$	35	72-138	30	30	30	30**
1,2,3,4,6,7,8-HpCDF-$^{13}C_{12}$	35	78-129	30	30	30	30**
1,2,3,4,7,8,9-HpCDF-$^{13}C_{12}$	35	77-129	25	25	30	30**
OCDD-$^{13}C_{12}$	35	96-415	30	30	30	30**
2,3,7,8-TCDD-$^{37}Cl_4$	35	7.9-12.7	25	25	30	30**

* 25% is allowed for a post-run verification but when the value is above 20%, then the analyte quantification must be as per 8290A Section 8.3.2.4 and corrective action is required before more samples can be analyzed.
**35% is allowed for a post-run verification but when the value is above 30%, then the analyte quantification must be as per 8290A Section 8.3.2.4 and corrective action is required before more samples can be analyzed.

LCS Criteria:

The laboratory control sample (LCS) or the On-Going Precision and Accuracy (OPR) recovery criteria are listed in Table 3

Table 3: Acceptance Criteria for IPR and OPR[a]

	Test Conc.	IPR		OPR
		s[b]	X[c]	
	ng/L	ng/L	ng/L	ng/L
Natives				
2,3,7,8-TCDD	10	2.8	8.3-12.9	6.7-15.8
2,3,7,8-TCDF	10	2	8.7-13.7	7.5-15.8
1,2,3,7,8-PeCDD	50	7.5	38-66	35-71
1,2,3,7,8-PeCDF	50	7.5	43-62	40-67
2,3,4,7,8-PeCDF	50	8.6	36-75	34-80
1,2,3,4,7,8-HxCDD	50	9.4	39-76	35-82
1,2,3,6,7,8-HxCDD	50	7.7	42-62	38-67
1,2,3,7,8,9-HxCDD	50	11.1	37-71	32-81
1,2,3,4,7,8-HxCDF	50	8.7	41-59	36-67
1,2,3,6,7,8-HxCDF	50	6.7	46-60	42-65
1,2,3,7,8,9-HxCDF	50	6.4	42-61	39-65
2,3,4,6,7,8-HxCDF	50	7.4	37-74	35-78
1,2,3,4,6,7,8-HpCDD	50	7.7	38-65	35-70
1,2,3,4,6,7,8-HpCDF	50	6.3	45-56	41-61
1,2,3,4,7,8,9-HpCDF	50	8.1	43-63	39-69
OCDD	100	19	89-127	78-144
OCDF	100	27	74-146	63-170
Labels				
2,3,7,8-TCDD-$^{13}C_{12}$	100	37	28-134	20-175
2,3,7,8-TCDF-$^{13}C_{12}$	100	35	31-113	22-152
1,2,3,7,8-PeCDD-$^{13}C_{12}$	100	39	27-184	21-227
1,2,3,7,8-PeCDF-$^{13}C_{12}$	100	34	27-156	21-192
2,3,4,7,8-PeCDF-$^{13}C_{12}$	100	38	16-297	13-328
1,2,3,4,7,8-HxCDD-$^{13}C_{12}$	100	41	29-147	21-193
1,2,3,6,7,8-HxCDD-$^{13}C_{12}$	100	38	34-122	25-163
1,2,3,4,7,8-HxCDF-$^{13}C_{12}$	100	43	27-152	19-202
1,2,3,6,7,8-HxCDF-$^{13}C_{12}$	100	35	30-122	21-159
1,2,3,7,8,9-HxCDF-$^{13}C_{12}$	100	40	24-157	17-205
2,3,4,6,7,8-HxCDF-$^{13}C_{12}$	100	37	29-136	22-176
1,2,3,4,6,7,8-HpCDD-$^{13}C_{12}$	100	35	34-129	26-166
1,2,3,4,6,7,8-HpCDF-$^{13}C_{12}$	100	41	32-110	21-158
1,2,3,4,7,8,9-HpCDF-$^{13}C_{12}$	100	40	28-141	20-186
OCDD-$^{13}C_{12}$	200	95	41-276	26-397
2,3,7,8-TCDD-$^{37}Cl_4$	10	3.6	3.9-15.4	3.1-19.1

[a] Assuming a final volume of 20uL

[b] s = standard deviation

[c] X = Average Concentration

Extraction/Clean-up & Sampling Standard Recovery Limts:

Table 4: Extraction, Clean-up, Injection & Sampling Standard Recovery Limits

	1613B or 8290A (non Stack)		M23 or 0023A/8290A or TO-9A	
	(% Rec.)	Ref.	(% Rec.)	Ref.
Extraction Standard				
2,3,7,8-TCDD-$^{13}C_{12}$	25-164	a	40-130	b
2,3,7,8-TCDF-$^{13}C_{12}$	24-169	a	40-130	b
1,2,3,7,8-PeCDD-$^{13}C_{12}$	25-181	a	40-130	b
1,2,3,7,8-PeCDF-$^{13}C_{12}$	24-185	a	40-130	b
2,3,4,7,8-PeCDF-$^{13}C_{12}$	21-178	a	-	
1,2,3,4,7,8-HxCDD-$^{13}C_{12}$	32-141	a	-	
1,2,3,6,7,8-HxCDD-$^{13}C_{12}$	28-130	a	40-130	b
1,2,3,4,7,8-HxCDF-$^{13}C_{12}$	26-152	a	-	
1,2,3,6,7,8-HxCDF-$^{13}C_{12}$	26-123	a	40-130	b
1,2,3,7,8,9-HxCDF-$^{13}C_{12}$	29-147	a	-	
2,3,4,6,7,8-HxCDF-$^{13}C_{12}$	28-136	a	40-130	c,d
1,2,3,4,6,7,8-HpCDD-$^{13}C_{12}$	23-140	a	25-130	b
1,2,3,4,6,7,8-HpCDF-$^{13}C_{12}$	28-143	a	25-130	b
1,2,3,4,7,8,9-HpCDF-$^{13}C_{12}$	26-138	a	-	
OCDD-$^{13}C_{12}$	17-157	a	25-130	b
Clean-up Standard				
2,3,7,8-TCDD-$^{37}Cl_4$	35-197	a	-	
1,2,3,7,8,9-HxCDF-$^{13}C_{12}$	-		40-130	b
Injection Standard				
1,2,3,4-TCDD-$^{13}C_{12}$	30-300	d	30-300	d
1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	30-300	d	30-300	d
Sampling Standard				
2,3,7,8-TCDD-$^{37}Cl_4$	-		70-130	b
2,3,4,7,8-PeCDF-$^{13}C_{12}$	-		70-130	b
1,2,3,4,7,8-HxCDD-$^{13}C_{12}$	-		70-130	b
1,2,3,4,7,8-HxCDF-$^{13}C_{12}$	-		70-130	b
1,2,3,4,7,8,9-HpCDF-$^{13}C_{12}$	-		70-130	b

References & Notes

[a] from OW method 1613B

[b] from OAQPS method 23

[c] this extraction standard is not required in methods 23 and 0023A/8290A

[d] ALS In-house criteria

Reporting Limits:

Unless indicated in the otherwise, the PCDD/F data is reported down to 2.5:1 signal to noise for each isomer grouping for each extract injection. This is consistent to SW846 8290 defined protocols (i.e. EDL or Estimated Detection Limit) and is commonly applied throughout the industry to all the HRMS PCDD/F methods applicable to this method summary.

Method Blank:

The method blank levels must be below the response to the low calibration standard, CS0 or CS1, whichever low calibration point is being applied to the project.

MS/MSD:

The % relative difference between the MS and MSD spike recoveries should be less than or equal to 20%.

Instrument/Run Performance Criteria:

1 Elution windows must be defined by a 'Window Performance Mix' at the beginning of each 12-hour run sequence
2 GC performance criteria of 25% maximum valley between 2,3,7,8-TCDD and it's neared eluting isomers (DB5) or 2,3,7,8-TCDF and it's nearest eluting isomers (DB225).
3 At the beginning of and just following the end of each 12 hour run sequence, the instrument must be checked to demonstrate a resolution of 10,000 for each quantification window.
4 For method 1613B, the relative retention times (RRT) of the compounds in the daily CS3 calibration verification must fall into the ranges presented in Table 4.
5 For all calibrations, QC samples and field samples, the absolute retention time (RT) for 1,2,3,4-TCDD-13C12 must be >25.0 min on a DB5 column and >15.0 min on a DB225 column.
6 The RT in the daily CS3 verification standards must be within 15 seconds of the CS3 in the initial calibration run.
7 The maximum time between scans within a descriptor is 1 second.
8 Lock mass deviations to the average response must be less than or equal 20%.

Laboratory Duplicates:

The % relative difference between duplicates should be less than or equal to 25% but only where the response is greater than the low calibration standard.

Analyte Identification Criteria:

1 Ion ratio must be within 15% of theoretical or within 10% of the most recent CS3.
2 The retention time (RT) of the peak maxima for each pair of quantification ions must be no more than 2 seconds (i.e. 2 scans) difference.
3 The retention time (RT) of the peak maxima of all 2,3,7,8- substituted native analytes must be within -1 to +3 seconds of the RT of corresponding $^{13}C_{12}$-labelled isomer of that injection run.
4 For those native analytes without a corresponding labelled isomer, the relative retention time (RRT) must be within 0.005 of the relative retention time observed in the daily CS3 run.
5 When there is a significant PCDPE interference observed, then a peak in the PCDF channel is not confirmed to be PCDF. [Significant PCDPE interference is identified when there is a PCDPE parent ion peak 10% or more of the response of a peak at the same RT (i.e. within 2 seconds) in the corresponding PCDF channel.]
6 For any peak to be identified as a positive PCDD/F response, that peak must be within the retention time windows defined by the daily analysis of Window Performance Mixture.

Table 4: Quantitation References and Method 1613B RT References and RRT

Analyte	Stack/Ambient Quantitation Reference	Method 1613B RT Reference Solids/ Waters Quantitation Reference	Method 1613B RRT
Compounds using 1,2,3,4-TCDD-$^{13}C_{12}$ as injection standard			
2,3,7,8-TCDF	2,3,7,8-TCDF-$^{13}C_{12}$	2,3,7,8-TCDF-$^{13}C_{12}$	0.999-1.003
2,3,7,8-TCDD	2,3,7,8-TCDD-$^{13}C_{12}$	2,3,7,8-TCDD-$^{13}C_{12}$	0.999-1.002
1,2,3,7,8-PeCDF	1,2,3,7,8-PeCDF-$^{13}C_{12}$	1,2,3,7,8-PeCDF-$^{13}C_{12}$	0.999-1.002
2,3,4,7,8-PeCDF	1,2,3,7,8-PeCDF-$^{13}C_{12}$	2,3,4,7,8-PeCDF-$^{13}C_{12}$	0.999-1.002
1,2,3,7,8-PeCDD	1,2,3,7,8-PeCDD-$^{13}C_{12}$	1,2,3,7,8-PeCDD-$^{13}C_{12}$	0.999-1.002
2,3,7,8-TCDF-$^{13}C_{12}$	1,2,3,4-TCDD-$^{13}C_{12}$	1,2,3,4-TCDD-$^{13}C_{12}$	0.923-1.103
2,3,7,8-TCDD-$^{13}C_{12}$	1,2,3,4-TCDD-$^{13}C_{12}$	1,2,3,4-TCDD-$^{13}C_{12}$	0.976-1.043
2,3,7,8-TCDD-$^{37}Cl_4$	2,3,7,8-TCDD-$^{13}C_{12}$	1,2,3,4-TCDD-$^{13}C_{12}$	0.989-1.052
1,2,3,7,8-PeCDF-$^{13}C_{12}$	1,2,3,4-TCDD-$^{13}C_{12}$	1,2,3,4-TCDD-$^{13}C_{12}$	1.000-1.425
2,3,4,7,8-PeCDF-$^{13}C_{12}$	1,2,3,7,8-PeCDF-$^{13}C_{12}$	1,2,3,4-TCDD-$^{13}C_{12}$	1.011-1.526
1,2,3,7,8-PeCDD-$^{13}C_{12}$	1,2,3,4-TCDD-$^{13}C_{12}$	1,2,3,4-TCDD-$^{13}C_{12}$	1.000-1.567
Compounds using 1,2,3,7,8,9-HxCDD-$^{13}C_{12}$ as injection standard			
1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDF-$^{13}C_{12}$	1,2,3,4,7,8-HxCDF-$^{13}C_{12}$	0.999-1.001
1,2,3,6,7,8-HxCDF	1,2,3,6,7,8-HxCDF-$^{13}C_{12}$	1,2,3,6,7,8-HxCDF-$^{13}C_{12}$	0.997-1.005
1,2,3,7,8,9-HxCDF	1,2,3,6,7,8-HxCDF-$^{13}C_{12}$	1,2,3,7,8,9-HxCDF-$^{13}C_{12}$	0.999-1.001
2,3,4,6,7,8-HxCDF	2,3,4,6,7,8-HxCDF-$^{13}C_{12}$	2,3,4,6,7,8-HxCDF-$^{13}C_{12}$	0.999-1.001
1,2,3,4,7,8-HxCDD	1,2,3,6,7,8-HxCDD-$^{13}C_{12}$	1,2,3,4,7,8-HxCDD-$^{13}C_{12}$	0.999-1.001
1,2,3,6,7,8-HxCDD	1,2,3,6,7,8-HxCDD-$^{13}C_{12}$	1,2,3,6,7,8-HxCDD-$^{13}C_{12}$	0.998-1.004
1,2,3,7,8,9-HxCDD[a]	1,2,3,6,7,8-HxCDD-$^{13}C_{12}$	[a]	1.000-1.019
1,2,3,4,6,7,8-HpCDF	1,2,3,4,6,7,8-HpCDF-$^{13}C_{12}$	1,2,3,4,6,7,8-HpCDF-$^{13}C_{12}$	0.999-1.001
1,2,3,4,7,8,9-HpCDF	1,2,3,4,6,7,8-HpCDF-$^{13}C_{12}$	1,2,3,4,7,8,9-HpCDF-$^{13}C_{12}$	0.999-1.001
1,2,3,4,6,7,8-HpCDD	1,2,3,4,6,7,8-HpCDD-$^{13}C_{12}$	1,2,3,4,6,7,8-HpCDD-$^{13}C_{12}$	0.999-1.001
OCDF	OCDD-$^{13}C_{12}$	OCDD-$^{13}C_{12}$	0.999-1.008
OCDD	OCDD-$^{13}C_{12}$	OCDD-$^{13}C_{12}$	0.999-1.001
1,2,3,4,7,8-HxCDF-$^{13}C_{12}$	1,2,3,6,7,8-HxCDF-$^{13}C_{12}$	1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	0.944-0.970
1,2,3,6,7,8-HxCDF-$^{13}C_{12}$	1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	0.949-0.975
1,2,3,7,8,9-HxCDF-$^{13}C_{12}$	1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	0.977-1.047
2,3,4,6,7,8-HxCDF-$^{13}C_{12}$	1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	0.959-1.021
1,2,3,4,7,8-HxCDD-$^{13}C_{12}$	1,2,3,6,7,8-HxCDD-$^{13}C_{12}$	1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	0.977-1.000
1,2,3,6,7,8-HxCDD-$^{13}C_{12}$	1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	0.981-1.003
1,2,3,4,6,7,8-HpCDF-$^{13}C_{12}$	1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	1.043-1.085
1,2,3,4,7,8,9-HpCDF-$^{13}C_{12}$	1,2,3,4,6,7,8-HpCDF-$^{13}C_{12}$	1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	1.057-1.151
1,2,3,4,6,7,8-HpCDD-$^{13}C_{12}$	1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	1.086-1.110
OCDD-$^{13}C_{12}$	1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	1.032-1.311

[a] For solids/waters via 1612B, 1,2,3,7,8,9-HXCDD is quantified against the average responses of 1,2,3,4,7,8-HxCDD-$^{13}C_{12}$ and 1,2,3,6,7,8-HxCDD-$^{13}C_{12}$ while 1,2,3,6,7,8-HxCDD-$^{13}C_{12}$ is the RT reference.

Table 5: HRMS Instrumental Descriptor Parameters

Descriptor	Exact M/Z	M/Z Type	Elemental Composition	Substance	Type	Theoretical Ion Ratio	Ion Ratio QC Limits Upper	Lower
1	303.9016	M	$^{12}C_{12}$ $^{1}H_{4}$ $^{35}Cl_{4}$ ^{16}O	TCDF	Native	0.77	0.65	0.89
	305.8987	M+2	$^{12}C_{12}$ $^{1}H_{4}$ $^{35}Cl_{3}$ ^{37}Cl ^{16}O	TCDF	Native			
	315.9419	M	$^{13}C_{12}$ $^{1}H_{4}$ $^{35}Cl_{4}$ ^{16}O	TCDF	^{13}C	0.77	0.65	0.89
	317.9389	M+2	$^{13}C_{12}$ $^{1}H_{4}$ $^{35}Cl_{3}$ ^{37}Cl ^{16}O	TCDF	^{13}C			
	316.9824	Lock	$^{12}C_{9}$ $^{19}F_{11}$	PFK	Lock			
	319.8965	M	$^{12}C_{12}$ $^{1}H_{4}$ $^{35}Cl_{4}$ $^{16}O_{2}$	TCDD	Native	0.77	0.65	0.89
	321.8936	M+2	$^{12}C_{12}$ $^{1}H_{4}$ $^{35}Cl_{3}$ ^{37}Cl $^{16}O_{2}$	TCDD	Native			
	327.8847	M+8	$^{12}C_{12}$ $^{1}H_{4}$ $^{37}Cl_{4}$ $^{16}O_{2}$	TCDD	^{37}Cl			
	331.9368	M	$^{13}C_{12}$ $^{1}H_{4}$ $^{35}Cl_{4}$ $^{16}O_{2}$	TCDD	^{13}C	0.77	0.65	0.89
	333.9339	M+2	$^{13}C_{12}$ $^{1}H_{4}$ $^{35}Cl_{3}$ ^{37}Cl $^{16}O_{2}$	TCDD	^{13}C			
	339.8597	M+2	$^{12}C_{12}$ $^{1}H_{3}$ $^{35}Cl_{4}$ ^{37}Cl ^{16}O	PeCDF	Native	1.55	1.32	1.78
	341.8568	M+4	$^{12}C_{12}$ $^{1}H_{3}$ $^{35}Cl_{3}$ $^{37}Cl_{2}$ ^{16}O	PeCDF	Native			
	351.9	M+2	$^{13}C_{12}$ $^{1}H_{3}$ $^{35}Cl_{4}$ ^{37}Cl ^{16}O	PeCDF	^{13}C	1.55	1.32	1.78
	353.897	M+4	$^{13}C_{12}$ $^{1}H_{3}$ $^{35}Cl_{3}$ $^{37}Cl_{2}$ ^{16}O	PeCDF	^{13}C			
	375.8364	M+2	$^{12}C_{12}$ $^{1}H_{4}$ $^{35}Cl_{5}$ ^{37}Cl ^{16}O	HxCDPE	Cl-DPE			
	409.7974	M+2	$^{12}C_{12}$ $^{1}H_{3}$ $^{35}Cl_{6}$ ^{37}Cl ^{16}O	HpCDPE	Cl-DPE			
2	339.8597	M+2	$^{12}C_{12}$ $^{1}H_{3}$ $^{35}Cl_{4}$ ^{37}Cl ^{16}O	PeCDF	Native	1.55	1.32	1.78
	341.8568	M+4	$^{12}C_{12}$ $^{1}H_{3}$ $^{35}Cl_{3}$ $^{37}Cl_{2}$ ^{16}O	PeCDF	Native			
	351.9	M+2	$^{13}C_{12}$ $^{1}H_{3}$ $^{35}Cl_{4}$ ^{37}Cl ^{16}O	PeCDF	^{13}C	1.55	1.32	1.78
	353.897	M+4	$^{13}C_{12}$ $^{1}H_{3}$ $^{35}Cl_{3}$ $^{37}Cl_{2}$ ^{16}O	PeCDF	^{13}C			
	353.8576	M	$^{12}C_{12}$ $^{1}H_{3}$ $^{35}Cl_{5}$ $^{16}O_{2}$	PeCDD	Native	0.63	0.54	0.72
	355.8546	M+2	$^{12}C_{12}$ $^{1}H_{3}$ $^{35}Cl_{4}$ ^{37}Cl $^{16}O_{2}$	PeCDD	Native			
	366.9792	Lock	$^{12}C_{10}$ $^{19}F_{13}$	PFK	Lock			
	365.8978	M	$^{13}C_{12}$ $^{1}H_{3}$ $^{35}Cl_{5}$ $^{16}O_{2}$	PeCDD	^{13}C	0.63	0.54	0.72
	367.8949	M+2	$^{13}C_{12}$ $^{1}H_{3}$ $^{35}Cl_{4}$ ^{37} Cl $^{16}O_{2}$	PeCDD	^{13}C			
	409.7974	M+2	$^{12}C_{12}$ $^{1}H_{3}$ $^{35}Cl_{6}$ ^{37}Cl ^{16}O	HpCDPE	Cl-DPE			
3	373.8207	M+2	$^{12}C_{12}$ $^{1}H_{2}$ $^{35}Cl_{5}$ ^{37}Cl ^{16}O	HxCDF	Native	1.24	1.05	1.43
	375.8178	M+4	$^{12}C_{12}$ $^{1}H_{2}$ $^{35}Cl_{4}$ $^{37}Cl_{2}$ ^{16}O	HxCDF	Native			
	380.976	Lock	$^{12}C_{8}$ $^{19}F_{5}$	PFK	Lock			
	383.8639	M	$^{13}C_{12}$ $^{1}H_{2}$ $^{35}Cl_{6}$ ^{16}O	HxCDF	^{13}C	0.51	0.43	0.59
	385.861	M+2	$^{13}C_{12}$ $^{1}H_{2}$ $^{35}Cl_{5}$ ^{37}Cl ^{16}O	HxCDF	^{13}C			
	389.8156	M+2	$^{12}C_{12}$ $^{1}H_{2}$ $^{35}Cl_{5}$ ^{37}Cl $^{16}O_{2}$	HxCDD	Native	1.24	1.05	1.43
	391.8127	M+4	$^{12}C_{12}$ $^{1}H_{2}$ $^{35}Cl_{4}$ $^{37}Cl_{2}$ $^{16}O_{2}$	HxCDD	Native			
	401.8559	M+2	$^{13}C_{12}$ $^{1}H_{2}$ $^{35}Cl_{5}$ ^{37}Cl $^{16}O_{2}$	HxCDD	^{13}C	1.24	1.05	1.43
	403.853	M+4	$^{13}C_{12}$ $^{1}H_{2}$ $^{35}Cl_{4}$ $^{37}Cl_{2}$ $^{16}O_{2}$	HxCDD	^{13}C			
	445.7555	M+4	$^{12}C_{12}$ $^{1}H_{2}$ $^{35}Cl_{6}$ $^{37}Cl_{2}$ ^{16}O	OCDPE	Cl-DPE			
4	409.7789	M+4	$^{12}C_{12}$ ^{1}H $^{35}Cl_{5}$ $^{37}Cl_{2}$ ^{16}O	HpCDF	Native	1.88	1.60	2.16
	411.7759	M+6	$^{12}C_{12}$ ^{1}H $^{35}Cl_{4}$ $^{37}Cl_{3}$ ^{16}O	HpCDF	Native			
	417.8253	M	$^{13}C_{12}$ ^{1}H $^{35}Cl_{7}$ ^{16}O	HpCDF	^{13}C	0.44	0.37	0.51
	419.822	M+2	$^{13}C_{12}$ ^{1}H $^{35}Cl_{6}$ ^{37}Cl ^{16}O	HpCDF	^{13}C			
	423.7767	M+2	$^{12}C_{12}$ ^{1}H $^{35}Cl_{6}$ ^{37}Cl $^{16}O_{2}$	HpCDD	Native	1.04	0.88	1.20
	425.7737	M+4	$^{12}C_{12}$ ^{1}H $^{35}Cl_{5}$ $^{37}Cl_{2}$ $^{16}O_{2}$	HpCDD	Native			
	430.9728	Lock	$^{12}C_{9}$ $^{19}F_{17}$	PFK	Lock			
	435.8169	M+2	$^{13}C_{12}$ ^{1}H $^{35}Cl_{6}$ ^{37}Cl $^{16}O_{2}$	HpCDD	^{13}C	1.04	0.88	1.20
	437.814	M+4	$^{13}C_{12}$ ^{1}H $^{35}Cl_{5}$ $^{37}Cl_{2}$ $^{16}O_{2}$	HpCDD	^{13}C			
	479.7165	M+4	$^{12}C_{12}$ ^{1}H $^{35}Cl_{7}$ $^{37}Cl_{2}$ ^{16}O	NCDPE	Cl-DPE			
5	441.7428	M+2	$^{12}C_{12}$ $^{35}Cl_{7}$ ^{37}Cl ^{16}O	OCDF	Native	0.89	0.76	1.02
	443.7399	M+4	$^{12}C_{12}$ $^{35}Cl_{6}$ $^{37}Cl2$ ^{16}O	OCDF	Native			
	454.9728	Lock	$^{12}C_{11}$ $^{19}F_{17}$	PFK	Lock			
	457.7377	M+2	$^{12}C_{12}$ $^{35}Cl_{7}$ ^{37}Cl $^{16}O_{2}$	OCDD	Native	0.89	0.76	1.02
	459.7348	M+4	$^{12}C_{12}$ $^{35}Cl_{6}$ $^{37}Cl_{2}$ $^{16}O_{2}$	OCDD	Native			
	469.778	M+2	$^{13}C_{12}$ $^{35}Cl_{7}$ ^{37}Cl $^{16}O_{2}$	OCDD	^{13}C	0.89	0.76	1.02
	471.775	M+4	$^{13}C_{12}$ $^{35}Cl_{6}$ $^{37}Cl_{2}$ $^{16}O_{2}$	OCDD	^{13}C			
	513.6775	M+4	$^{12}C_{12}$ $^{35}Cl_{8}$ $^{37}Cl_{2}$ ^{16}O	DCDPE	Cl-DPE			

Data Calculations:

a) Analyte Concentrations:

The relative response factor of each target relative to the standard against which it is to be calculated is determined using the area responses of both quantification ions via equation 9.1.
In cases where a native target is calculated against an exact labelled analogue, the quantification will be considered to be by isotope dilution. In other cases, the quantification will be considered to be by internal standard.

$$RRF = \frac{(A1_t + A2_t)\ C_s}{(A1_s + A2_s)\ C_t} \qquad \text{Equ. 9.1}$$

Where,
$A1_t + A$: The areas of the two quantification ions for the target analyte
$A1_s + A2_s$ = The areas of the two quantification ions for the labelled compound against which the target analyte will be calculated.
C_t = The concentration in the calibration standard of the target analyte.
C_s = The concentration in the calibration standard of the labelled compound against which the target will be calculated.

For all analytes to be quantified and from the initial calibration series of standard injections, a table of RRFs is prepared. The relative standard deviation (%RSD, or the coefficient of variance) is checked to confirm that appropriate method criteria has been met as listed in Table 3. The average of the five or six levels of for each analyte, RRF_{av} is applied for quantification of samples according to Equations 9.2 and 9.3 below.

$$\text{Amount in sample (pg)} = \frac{(A1_n + A2_n)\ Q_l}{(A1_l + A2_l)\ (RRF_{av})} \qquad \text{Equ. 9.2}$$

$$\text{Concentration in sample (pg/g or pg/l)} = \frac{(A1_n + A2_n)\ Q_l}{(A1_l + A2_l)\ (RRF_{av})\ (W_s)} \qquad \text{Equ. 9.3}$$

Where,

Q_l = The amount (pg) of labelled compound added to the sample

W_s = The weight (g) or volume (l) of sample

b) Extraction, Clean-up, and Sampling Standard Recovery Calculation:

The extraction, clean-up, and sampling standard recoveries are determined by Equation 9.4 below.

% Recovery = (Amount in sample)/(Amount added to sample) X 100 Equ. 9.4

c) Estimated Detection Limit

$$EDL = \frac{2.5 \times H_x \times Q_{es}}{H_{es} \times W \times RFF_{av}} \qquad \text{Equ. 9.5}$$

Where,

EDL = estimated detection limit for homologous 2,3,7,8-Substituted PCDD/Fs

H_x = sum of the height of the noise level for each quantification ions for the unlabelled PCDD/Fs.

H_{es} = Sum of the heights of responses of both quantification ions for the labelled extraction standard.

W = weight of volume of sample

RRF_{av} = average relative response factor

Q_{es} = Amount of extraction standard added

Chromatogram Annotation Codes

All manually integrated peaks are expanded and reprinted with the following annotations:

* Analyst Initials	AA
* Date	YYMMDD
* integration code	CC

The Syntax is:	Example:
AAYYMMDDCC	SK111220MB

Code	Mnemonic	Description
MB	Manual Baseline	The peak was manually integrated because the initial baseline was determined incorrectly by the software
MS	Manual Split	The peak was manually integrated because the peak was incorrectly or not split by the software
MJ/MC	Manual Join/Manual Combine	The peak was manually integrated because the peak was split by the software and the peak should be integrated as a single peak
MA	Manual Add	The peak was manually integrated because the signal:noise ratio was judged to be >2.5
MD	Manual Delete	The peak was excluded because the signal:noise ratio was judged to be <2.5
MX	Manual Exclude	The peak was excluded due to an interference
NH	Noise Height	The noise height for detection limit calculation was manually defined, over-riding the software chosen value
MT	Manual Time	The peak retention time was manually chosen

The following explanatory annotation codes may appear on the chromatograms of peaks that have been reviewed:

Code	Mnemonic	Description
+	Detected Peak	A peak was detected at this mass and retention time that was above 2.5:1 signal to noise
<	Below Detection Limit	The signal at this mass and retention time was below 2.5:1 signal to noise
EMPC	Estimated Maximum Possible Concentration	The signal at this mass and retention time is an interference such that the target compound could not be confirmed
X-RT	Not Detected due to Retention Time non-conformance	The signal at this retention time could not be used to positively identify the target compound because of retention time non-conformance (apex of quantification and confirmation ions do not maximize within the same two seconds, or the retention time of the peak does not fall within the expected range with respect to its labeled analogue)
X-LOC	Not Detected due to interference from a higher level of chlorination	The signal at this retention time is attributable to a fragment from a co-eluting compound at a higher level of chlorination, and cannot be used to positively identify the target. The result is expressed as an Estimated Maximum Possible Concentration (EMPC)
X-DPE	Not Detected due to diphenyl ether interference	The signal at this retention time is attributable to interference from a chlorinated diphenyl ether, and cannot be used to positively identify the target. The result is expressed as an Estimated Maximum Possible Concentration (EMPC)
X-IF	Not Detected due to interference	The signal at this retention time is attributable to a co-eluting interference, and cannot be used to positively identify the target. The result is expressed as an Estimated Maximum Possible Concentration (EMPC)

Deviations from the Primary Reference Methods:

The following changes and clarifications apply:

1) The calibration standards as listed in Table 2 are applied appropriately to all of the reference methods listed above. Such an application of one standard calibration series to all of these methods is within the scope of each and every one of the methods. The calibration standard set CS1 through CS5 is consistent with the standards concentration listing in method 1613B Table 4. The CS0 extends the calibration range below what is required by all of the methods. Table 4 defines the use of each of the labelled standards relative to each of the methods.

a. Method 1613B lists a larger suite of labelled extraction standards than does method 8290A. Additional labelled extraction standards have been added into the 8290A analysis to enhance the method and the data quality. These additions to the method constitute performance based enhancements and are within the scope of SW846 Method 8290A.

b. The levels presented in the calibration table of method 8290A are recommended values only. Changes to these concentrations, especially to expand the range, are within the scope of the method. Therefore application of the 1613B calibration standards to method 8290A is compliant with the scope of the method.

c. TO-9A is also a performance based method. It specifically states that different extraction standards and different concentrations of standards from those listed in TO-9A Table 3 is acceptable (see Section 6.8 of reference method).

d. Although OAQPS reference method 23 is not a performance based method, application of the 1613B standards has been defined as within the scope of the method. (see Appendix B)

2) Chlorinated Diphenyl Ether interferences: Both methods 1613B and 8290A indicate that any instrumental response showing the presence of a chlorinated diphenyl ether response and that coelutes with a PCDF represents an interference on that analyte (see Sections 18.3 and 7.8.4.4 respectively). This apparent zero tolerance does not take into account that the response in the diphenyl ether channel may be trivial relative to the corresponding PCDF. For this 'Standard Method', we have defined a chlorinated diphenyl ether interference as the presence of a **significant** response within the chlorinated diphenyl ether channel (rather than zero response) and defined significant as a response equal to or greater than 10% of the peak response in the PCDF channel.

3) When the primary analysis is performed using a DB5MS GC column, 2,3,7,8-TCDF can be resolved to a valley height of 60% from the closest-eluting isomers for this column, providing good quantification of this target without further confirmation. Confirmation of 2,3,7,8-TCDF concentrations above the level of the lowest calibration standard are performed on a second column on a contract basis when requested. Confirmation of additional 2,3,7,8-subtituted PCDD/F isomers is also available when requested.

4) Although not categorically stated in all associated PCDD/F methods, we maintain that each and every individual clean-up procedure is, by definition, performance-based and optional. There is not an expectation within the industry to follow exactly the descriptions of clean-ups in reference methods. Adaptations which meet or exceed the required performance criteria are therefore acceptable within the scope of each reference method. The reference method descriptions are intended as guidelines or templates available to help the laboratory to define effective in-house clean-up methods. The objective within the laboratory is to provide quality clean extracts to the instrument for analysis. Each individual clean-up is part of the laboratory's 'arsenal' in order to achieve this objective.

5) There are differences within the individual reference methods as to the precise spiking protocols for adding extraction standards and native spikes (for LCS, MS and MSD). To ensure consistency within the laboratory between PCDD/F and related methods, the PCDD/F preparative 'Specific Method' requires solids (including stack and ambient sorbants/filters) to be spiked in the soxhlet thimble from a nonane solution and waters are spiked before filtering from an acetone solution. This is consistent with the 8290A approach.

6) Sub-sampling of solids and pre-extraction processing is done in a manner that minimizes potential for cross-contamination. These processes are designed around SW846 protocols rather than 1613B protocols. Solids are sub-sampled directly from the bottle as submitted to the laboratory wherever practical. If the sample is submitted such that homogenization in the bottle is impractical (eg. the bottle is too full or lumps cannot be broken down), then transferring the sample to a tray or another bottle maybe in order.

7) The concentrations of labelled and native spiking solutions are not consistent with those listed in all of the reference methods. These concentrations are prepared at levels convenient and expedient for accurate laboratory processing.

8) With respect to extraction standard recovery limits on non-stack samples analyzed via method 8290A, the limits are based upon the inter-laboratory performance limits defined in method 1613B rather than the relatively arbitrary limits of 35-140% suggested in Section 8.4 of method 8290A.

9) With respect to ions monitored for P5CDD and H7CDF:

a. The 358 ion has a potential for interference from PCB (hexachlorobiphenyls) dependent upon levels of PCBs in the sample and the instrument tuning. Of particular concern is PCB-169 which on a DB5MS column elutes very close to 1,2,3,7,8-P5CDD and which is not removed for the PCDD/F extracts even by carbon clean-up. To eliminate the potential of such interferences from PCB on the 358 mass, we choose to monitor the alternate ion pair of 354 and 356.

b. Similarly, the 408 ion of native H7CDF is prone to problematic interferences arising from 13C-labeled heptachlorinated biphenyls. To eliminate the potential of such interferences from PCB on the 358 mass, we choose to monitor the alternate ion pair of 410 and 412.

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SVOC DATA PACKAGE

SECTION 4: CALIBRATION DATA

Including:

for Multi-Point Calibration(s)

- Multi-Point Calibration Tables
- Individual Quantitation Reports

for Continuing Calibration(s)

- Individual Quantitation Reports

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Calibration Summary Report

Calibration Level	Filename	Run Date
CS-1	7-201001A03	01-Oct-2020 11:01
CS-2	7-201001A02	01-Oct-2020 10:19
CS-3	7-201001A01	01-Oct-2020 09:38
CS-4	7-201001A07	01-Oct-2020 13:51
CS-5	7-201001A06	01-Oct-2020 13:08

Approved: *N Ashtari*
--e-signature--
13-Oct-2020

Relative Response Factors

Target Analytes	CS-1	CS-2	CS-3	CS-4	CS-5	Mean	% RSD
2,3,7,8-TCDD	0.966	0.960	1.157	1.006	0.998	1.017	8%
1,2,3,7,8-PeCDD	0.861	0.913	0.899	0.926	0.902	0.900	3%
1,2,3,4,7,8-HxCDD	0.933	0.949	0.953	0.976	0.955	0.953	2%
1,2,3,6,7,8-HxCDD	0.988	0.942	0.959	0.967	0.947	0.961	2%
1,2,3,7,8,9-HxCDD	0.937	0.915	0.929	0.963	0.927	0.934	2%
1,2,3,4,6,7,8-HpCDD	0.893	0.878	0.952	0.947	0.925	0.919	4%
OCDD	1.008	0.968	0.923	0.994	0.924	0.963	4%
2,3,7,8-TCDF	0.873	0.873	0.916	0.934	0.933	0.906	3%
1,2,3,7,8-PeCDF	0.937	0.957	0.939	1.007	1.001	0.968	3%
2,3,4,7,8-PeCDF	1.045	1.064	1.041	1.110	1.098	1.072	3%
1,2,3,4,7,8-HxCDF	1.194	1.224	1.204	1.250	1.235	1.221	2%
1,2,3,6,7,8-HxCDF	1.133	1.140	1.188	1.172	1.150	1.157	2%
2,3,4,6,7,8-HxCDF	1.205	1.284	1.259	1.288	1.280	1.263	3%
1,2,3,7,8,9-HxCDF	1.130	1.168	1.181	1.220	1.177	1.175	3%
1,2,3,4,6,7,8-HpCDF	1.028	1.017	1.016	1.045	1.021	1.025	1%
1,2,3,4,7,8,9-HpCDF	1.004	1.055	0.951	1.084	1.070	1.033	5%
OCDF	1.246	1.299	1.233	1.351	1.215	1.269	4%
Extraction Standards							
13C12-2,3,7,8-TCDD	1.096	1.110	0.965	1.120	1.237	1.106	9%
13C12-1,2,3,7,8-PeCDD	0.719	0.730	0.787	0.769	0.918	0.785	10%
13C12-1,2,3,4,7,8-HxCDD	0.863	0.864	1.014	0.878	0.924	0.909	7%
13C12-1,2,3,6,7,8-HxCDD	0.978	1.002	1.149	1.009	0.979	1.023	7%
13C12-1,2,3,4,6,7,8-HpCDD	0.690	0.700	0.736	0.695	0.713	0.707	3%
13C12-OCDD	0.392	0.404	0.452	0.444	0.493	0.437	9%
13C12-2,3,7,8-TCDF	1.365	1.390	1.529	1.396	1.468	1.430	5%
13C12-1,2,3,7,8-PeCDF	0.992	1.012	1.127	1.061	1.229	1.084	9%
13C12-2,3,4,7,8-PeCDF	0.950	0.969	1.128	1.024	1.190	1.052	10%
13C12-1,2,3,4,7,8-HxCDF	1.069	1.109	1.294	1.076	1.059	1.121	9%
13C12-1,2,3,6,7,8-HxCDF	1.195	1.203	1.402	1.199	1.189	1.238	7%
13C12-2,3,4,6,7,8-HxCDF	0.995	0.984	1.172	1.006	0.994	1.030	8%
13C12-1,2,3,7,8,9-HxCDF	0.924	0.937	1.102	0.925	0.937	0.965	8%
13C12-1,2,3,4,6,7,8-HpCDF	0.779	0.800	0.929	0.814	0.823	0.829	7%
13C12-1,2,3,4,7,8,9-HpCDF	0.612	0.606	0.764	0.626	0.617	0.645	10%
Cleanup Standard							
37Cl4-2,3,7,8-TCDD (Cleanup)	1.056	1.147	1.280	1.111	1.272	1.173	8%

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Calibration Report

ALS Sample ID **H7-20-CS1-1209**
Analysis Method EPA 1613B
Analysis Type Calibration

Filename	Inst #	Column	Run Date	Approved:	*N Ashtari*
7-201001A03	HRMS-7	DB5MSUS188441H	01-Oct-2020 11:01		--e-signature--
					13-Oct-2020

Target Analytes	Ret. Time	Ion Ratio	Concentration ng/mL	Response	RRF
2,3,7,8-TCDD	27.85	0.81	0.50	1.02E+04	0.966
1,2,3,7,8-PeCDD	32.29	1.66	2.50	2.99E+04	0.861
1,2,3,4,7,8-HxCDD	34.38	1.22	2.50	2.71E+04	0.933
1,2,3,6,7,8-HxCDD	34.44	1.27	2.50	3.25E+04	0.988
1,2,3,7,8,9-HxCDD	34.56	1.22	2.50	2.90E+04	0.937
1,2,3,4,6,7,8-HpCDD	36	1.06	2.50	2.07E+04	0.893
OCDD	37.43	0.90	5.00	2.65E+04	1.008
2,3,7,8-TCDF	26.95	0.80	0.50	1.15E+04	0.873
1,2,3,7,8-PeCDF	31.29	1.54	2.50	4.49E+04	0.937
2,3,4,7,8-PeCDF	32.07	1.50	2.50	4.80E+04	1.045
1,2,3,4,7,8-HxCDF	33.88	1.26	2.50	4.28E+04	1.194
1,2,3,6,7,8-HxCDF	33.95	1.22	2.50	4.55E+04	1.133
2,3,4,6,7,8-HxCDF	34.29	1.25	2.50	4.02E+04	1.205
1,2,3,7,8,9-HxCDF	34.71	1.30	2.50	3.50E+04	1.130
1,2,3,4,6,7,8-HpCDF	35.47	2.03	2.50	2.69E+04	1.028
1,2,3,4,7,8,9-HpCDF	36.25	1.90	2.50	2.06E+04	1.004
OCDF	37.52	0.92	5.00	3.28E+04	1.246
Extraction Standards					
13C12-2,3,7,8-TCDD	27.82	0.78	100.00	2.12E+06	1.096
13C12-1,2,3,7,8-PeCDD	32.28	1.60	100.00	1.39E+06	0.719
13C12-1,2,3,4,7,8-HxCDD	34.38	1.28	100.00	1.16E+06	0.863
13C12-1,2,3,6,7,8-HxCDD	34.43	1.30	100.00	1.31E+06	0.978
13C12-1,2,3,4,6,7,8-HpCDD	36	1.06	100.00	9.27E+05	0.690
13C12-OCDD	37.42	0.88	200.00	1.05E+06	0.392
13C12-2,3,7,8-TCDF	26.93	0.76	100.00	2.64E+06	1.365
13C12-1,2,3,7,8-PeCDF	31.28	1.56	100.00	1.92E+06	0.992
13C12-2,3,4,7,8-PeCDF	32.05	1.51	100.00	1.84E+06	0.950
13C12-1,2,3,4,7,8-HxCDF	33.87	0.53	100.00	1.44E+06	1.069
13C12-1,2,3,6,7,8-HxCDF	33.94	0.52	100.00	1.60E+06	1.195
13C12-2,3,4,6,7,8-HxCDF	34.28	0.52	100.00	1.34E+06	0.995
13C12-1,2,3,7,8,9-HxCDF	34.7	0.52	100.00	1.24E+06	0.924
13C12-1,2,3,4,6,7,8-HpCDF	35.46	0.46	100.00	1.05E+06	0.779
13C12-1,2,3,4,7,8,9-HpCDF	36.25	0.44	100.00	8.22E+05	0.612
Cleanup Standard					
37Cl4-2,3,7,8-TCDD (Cleanup)	27.85		0.50	1.02E+04	1.056
Labeled Injection Standards					
13C12-1,2,3,4-TCDD	27.13	0.79	100.00	1.93E+06	19331.557
13C12-1,2,3,7,8,9-HxCDD	34.56	1.26	100.00	1.34E+06	13434.236

ALS Life Sciences

Calibration Report

ALS Sample ID **H7-20-CS2-1209**
Analysis Method EPA 1613B
Analysis Type Calibration

Filename	Inst #	Column	Run Date	Approved:	*N Ashtari*
7-201001A02	HRMS-7	DB5MSUS188441H	01-Oct-2020 10:19		--e-signature--
					13-Oct-2020

Target Analytes	Ret. Time	Ion Ratio	Concentration ng/mL	Response	RRF
2,3,7,8-TCDD	27.83	0.79	2.00	3.80E+04	0.960
1,2,3,7,8-PeCDD	32.28	1.61	10.00	1.19E+05	0.913
1,2,3,4,7,8-HxCDD	34.37	1.27	10.00	1.01E+05	0.949
1,2,3,6,7,8-HxCDD	34.43	1.33	10.00	1.17E+05	0.942
1,2,3,7,8,9-HxCDD	34.55	1.30	10.00	1.06E+05	0.915
1,2,3,4,6,7,8-HpCDD	35.99	1.02	10.00	7.60E+04	0.878
OCDD	37.42	0.87	20.00	9.66E+04	0.968
2,3,7,8-TCDF	26.95	0.80	2.00	4.33E+04	0.873
1,2,3,7,8-PeCDF	31.28	1.62	10.00	1.73E+05	0.957
2,3,4,7,8-PeCDF	32.06	1.58	10.00	1.84E+05	1.064
1,2,3,4,7,8-HxCDF	33.86	1.17	10.00	1.68E+05	1.224
1,2,3,6,7,8-HxCDF	33.94	1.14	10.00	1.70E+05	1.140
2,3,4,6,7,8-HxCDF	34.28	1.18	10.00	1.56E+05	1.284
1,2,3,7,8,9-HxCDF	34.7	1.18	10.00	1.35E+05	1.168
1,2,3,4,6,7,8-HpCDF	35.45	2.01	10.00	1.01E+05	1.017
1,2,3,4,7,8,9-HpCDF	36.23	1.99	10.00	7.91E+04	1.055
OCDF	37.5	0.90	20.00	1.30E+05	1.299
Extraction Standards					
13C12-2,3,7,8-TCDD	27.81	0.78	100.00	1.98E+06	1.110
13C12-1,2,3,7,8-PeCDD	32.26	1.61	100.00	1.30E+06	0.730
13C12-1,2,3,4,7,8-HxCDD	34.36	1.24	100.00	1.07E+06	0.864
13C12-1,2,3,6,7,8-HxCDD	34.42	1.25	100.00	1.24E+06	1.002
13C12-1,2,3,4,6,7,8-HpCDD	35.99	1.08	100.00	8.66E+05	0.700
13C12-OCDD	37.41	0.93	200.00	9.99E+05	0.404
13C12-2,3,7,8-TCDF	26.92	0.77	100.00	2.48E+06	1.390
13C12-1,2,3,7,8-PeCDF	31.27	1.56	100.00	1.80E+06	1.012
13C12-2,3,4,7,8-PeCDF	32.05	1.57	100.00	1.73E+06	0.969
13C12-1,2,3,4,7,8-HxCDF	33.86	0.53	100.00	1.37E+06	1.109
13C12-1,2,3,6,7,8-HxCDF	33.93	0.52	100.00	1.49E+06	1.203
13C12-2,3,4,6,7,8-HxCDF	34.27	0.52	100.00	1.22E+06	0.984
13C12-1,2,3,7,8,9-HxCDF	34.69	0.52	100.00	1.16E+06	0.937
13C12-1,2,3,4,6,7,8-HpCDF	35.45	0.45	100.00	9.89E+05	0.800
13C12-1,2,3,4,7,8,9-HpCDF	36.23	0.47	100.00	7.49E+05	0.606
Cleanup Standard					
37Cl4-2,3,7,8-TCDD (Cleanup)	27.83		2.00	4.09E+04	1.147
Labeled Injection Standards					
13C12-1,2,3,4-TCDD	27.11	0.79	100.00	1.78E+06	17841.348
13C12-1,2,3,7,8,9-HxCDD	34.54	1.24	100.00	1.24E+06	12368.686

ALS Life Sciences

Calibration Report

ALS Sample ID **H7-20-CCV-1209**
Analysis Method EPA 1613B
Analysis Type Calibration

Filename	Inst #	Column	Run Date	Approved:	*N Ashtari*
7-201001A01	HRMS-7	DB5MSUS188441H	01-Oct-2020 09:38		--e-signature--
					13-Oct-2020

Target Analytes	Ret. Time	Ion Ratio	Concentration ng/mL	Response	RRF
2,3,7,8-TCDD	27.87	0.77	10.00	1.68E+05	1.157
1,2,3,7,8-PeCDD	32.29	1.63	50.00	5.31E+05	0.899
1,2,3,4,7,8-HxCDD	34.38	1.23	50.00	4.59E+05	0.953
1,2,3,6,7,8-HxCDD	34.43	1.21	50.00	5.24E+05	0.959
1,2,3,7,8,9-HxCDD	34.55	1.21	50.00	4.77E+05	0.929
1,2,3,4,6,7,8-HpCDD	36	1.06	50.00	3.33E+05	0.952
OCDD	37.42	0.93	100.00	3.97E+05	0.923
2,3,7,8-TCDF	26.98	0.80	10.00	2.10E+05	0.916
1,2,3,7,8-PeCDF	31.29	1.59	50.00	7.95E+05	0.939
2,3,4,7,8-PeCDF	32.07	1.58	50.00	8.82E+05	1.041
1,2,3,4,7,8-HxCDF	33.88	1.21	50.00	7.41E+05	1.204
1,2,3,6,7,8-HxCDF	33.95	1.22	50.00	7.91E+05	1.188
2,3,4,6,7,8-HxCDF	34.28	1.20	50.00	7.02E+05	1.259
1,2,3,7,8,9-HxCDF	34.7	1.21	50.00	6.19E+05	1.181
1,2,3,4,6,7,8-HpCDF	35.46	1.97	50.00	4.49E+05	1.016
1,2,3,4,7,8,9-HpCDF	36.24	1.88	50.00	3.46E+05	0.951
OCDF	37.51	0.94	100.00	5.30E+05	1.233
Extraction Standards					
13C12-2,3,7,8-TCDD	27.84	0.79	100.00	1.45E+06	0.965
13C12-1,2,3,7,8-PeCDD	32.28	1.61	100.00	1.18E+06	0.787
13C12-1,2,3,4,7,8-HxCDD	34.37	1.25	100.00	9.64E+05	1.014
13C12-1,2,3,6,7,8-HxCDD	34.43	1.26	100.00	1.09E+06	1.149
13C12-1,2,3,4,6,7,8-HpCDD	36	1.03	100.00	7.00E+05	0.736
13C12-OCDD	37.42	0.86	200.00	8.60E+05	0.452
13C12-2,3,7,8-TCDF	26.95	0.77	100.00	2.30E+06	1.529
13C12-1,2,3,7,8-PeCDF	31.28	1.55	100.00	1.69E+06	1.127
13C12-2,3,4,7,8-PeCDF	32.06	1.54	100.00	1.69E+06	1.128
13C12-1,2,3,4,7,8-HxCDF	33.87	0.52	100.00	1.23E+06	1.294
13C12-1,2,3,6,7,8-HxCDF	33.94	0.52	100.00	1.33E+06	1.402
13C12-2,3,4,6,7,8-HxCDF	34.28	0.52	100.00	1.11E+06	1.172
13C12-1,2,3,7,8,9-HxCDF	34.7	0.53	100.00	1.05E+06	1.102
13C12-1,2,3,4,6,7,8-HpCDF	35.46	0.45	100.00	8.83E+05	0.929
13C12-1,2,3,4,7,8,9-HpCDF	36.24	0.46	100.00	7.27E+05	0.764
Cleanup Standard					
37Cl4-2,3,7,8-TCDD (Cleanup)	27.87		10.00	1.92E+05	1.280
Labeled Injection Standards					
13C12-1,2,3,4-TCDD	27.16	0.79	100.00	1.50E+06	15023.227
13C12-1,2,3,7,8,9-HxCDD	34.55	1.31	100.00	9.51E+05	9505.725

ALS Life Sciences

Calibration Report

ALS Sample ID **H7-20-CS4-1209**
Analysis Method EPA 1613B
Analysis Type Calibration

Filename	Inst #	Column	Run Date	Approved:	*N Ashtari*
7-201001A07	HRMS-7	DB5MSUS188441H	01-Oct-2020 13:51		--e-signature--
					13-Oct-2020

Target Analytes	Ret. Time	Ion Ratio	Concentration ng/mL	Response	RRF
2,3,7,8-TCDD	27.84	0.78	40.00	7.02E+05	1.006
1,2,3,7,8-PeCDD	32.28	1.63	200.00	2.22E+06	0.926
1,2,3,4,7,8-HxCDD	34.37	1.22	200.00	2.01E+06	0.976
1,2,3,6,7,8-HxCDD	34.43	1.23	200.00	2.29E+06	0.967
1,2,3,7,8,9-HxCDD	34.55	1.23	200.00	2.13E+06	0.963
1,2,3,4,6,7,8-HpCDD	36	1.05	200.00	1.55E+06	0.947
OCDD	37.42	0.89	400.00	2.07E+06	0.994
2,3,7,8-TCDF	26.95	0.78	40.00	8.12E+05	0.934
1,2,3,7,8-PeCDF	31.28	1.59	200.00	3.33E+06	1.007
2,3,4,7,8-PeCDF	32.06	1.57	200.00	3.54E+06	1.110
1,2,3,4,7,8-HxCDF	33.87	1.21	200.00	3.16E+06	1.250
1,2,3,6,7,8-HxCDF	33.94	1.21	200.00	3.30E+06	1.172
2,3,4,6,7,8-HxCDF	34.28	1.19	200.00	3.04E+06	1.288
1,2,3,7,8,9-HxCDF	34.7	1.22	200.00	2.65E+06	1.220
1,2,3,4,6,7,8-HpCDF	35.46	1.87	200.00	2.00E+06	1.045
1,2,3,4,7,8,9-HpCDF	36.24	1.90	200.00	1.59E+06	1.084
OCDF	37.51	0.91	400.00	2.82E+06	1.351
Extraction Standards					
13C12-2,3,7,8-TCDD	27.81	0.77	100.00	1.74E+06	1.120
13C12-1,2,3,7,8-PeCDD	32.27	1.59	100.00	1.20E+06	0.769
13C12-1,2,3,4,7,8-HxCDD	34.37	1.25	100.00	1.03E+06	0.878
13C12-1,2,3,6,7,8-HxCDD	34.43	1.23	100.00	1.18E+06	1.009
13C12-1,2,3,4,6,7,8-HpCDD	35.99	1.05	100.00	8.16E+05	0.695
13C12-OCDD	37.41	0.86	200.00	1.04E+06	0.444
13C12-2,3,7,8-TCDF	26.92	0.77	100.00	2.17E+06	1.396
13C12-1,2,3,7,8-PeCDF	31.27	1.56	100.00	1.65E+06	1.061
13C12-2,3,4,7,8-PeCDF	32.05	1.54	100.00	1.60E+06	1.024
13C12-1,2,3,4,7,8-HxCDF	33.86	0.53	100.00	1.26E+06	1.076
13C12-1,2,3,6,7,8-HxCDF	33.93	0.52	100.00	1.41E+06	1.199
13C12-2,3,4,6,7,8-HxCDF	34.27	0.52	100.00	1.18E+06	1.006
13C12-1,2,3,7,8,9-HxCDF	34.69	0.53	100.00	1.09E+06	0.925
13C12-1,2,3,4,6,7,8-HpCDF	35.44	0.44	100.00	9.56E+05	0.814
13C12-1,2,3,4,7,8,9-HpCDF	36.23	0.44	100.00	7.35E+05	0.626
Cleanup Standard					
37Cl4-2,3,7,8-TCDD (Cleanup)	27.84		40.00	6.92E+05	1.111
Labeled Injection Standards					
13C12-1,2,3,4-TCDD	27.13	0.77	100.00	1.56E+06	15575.364
13C12-1,2,3,7,8,9-HxCDD	34.55	1.23	100.00	1.17E+06	11743.281

ALS Life Sciences

Calibration Report

ALS Sample ID **H7-20-CS5-1209**
Analysis Method EPA 1613B
Analysis Type Calibration

Filename	Inst #	Column	Run Date	Approved:	*N Ashtari*
7-201001A06	HRMS-7	DB5MSUS188441H	01-Oct-2020 13:08		--e-signature--
					13-Oct-2020

Target Analytes	Ret. Time	Ion Ratio	Concentration ng/mL	Response	RRF
2,3,7,8-TCDD	27.84	0.78	200.00	4.45E+06	0.998
1,2,3,7,8-PeCDD	32.28	1.63	1000.00	1.49E+07	0.902
1,2,3,4,7,8-HxCDD	34.37	1.23	1000.00	1.42E+07	0.955
1,2,3,6,7,8-HxCDD	34.43	1.23	1000.00	1.49E+07	0.947
1,2,3,7,8,9-HxCDD	34.55	1.24	1000.00	1.42E+07	0.927
1,2,3,4,6,7,8-HpCDD	36	1.06	1000.00	1.06E+07	0.925
OCDD	37.43	0.89	2000.00	1.47E+07	0.924
2,3,7,8-TCDF	26.93	0.78	200.00	4.94E+06	0.933
1,2,3,7,8-PeCDF	31.29	1.58	1000.00	2.22E+07	1.001
2,3,4,7,8-PeCDF	32.06	1.57	1000.00	2.35E+07	1.098
1,2,3,4,7,8-HxCDF	33.88	1.21	1000.00	2.11E+07	1.235
1,2,3,6,7,8-HxCDF	33.95	1.22	1000.00	2.20E+07	1.150
2,3,4,6,7,8-HxCDF	34.28	1.20	1000.00	2.05E+07	1.280
1,2,3,7,8,9-HxCDF	34.7	1.22	1000.00	1.78E+07	1.177
1,2,3,4,6,7,8-HpCDF	35.46	1.89	1000.00	1.35E+07	1.021
1,2,3,4,7,8,9-HpCDF	36.24	1.90	1000.00	1.06E+07	1.070
OCDF	37.51	0.92	2000.00	1.93E+07	1.215
Extraction Standards					
13C12-2,3,7,8-TCDD	27.81	0.79	100.00	2.23E+06	1.237
13C12-1,2,3,7,8-PeCDD	32.27	1.62	100.00	1.65E+06	0.918
13C12-1,2,3,4,7,8-HxCDD	34.37	1.25	100.00	1.49E+06	0.924
13C12-1,2,3,6,7,8-HxCDD	34.43	1.25	100.00	1.58E+06	0.979
13C12-1,2,3,4,6,7,8-HpCDD	35.99	1.05	100.00	1.15E+06	0.713
13C12-OCDD	37.42	0.89	200.00	1.59E+06	0.493
13C12-2,3,7,8-TCDF	26.92	0.77	100.00	2.64E+06	1.468
13C12-1,2,3,7,8-PeCDF	31.28	1.55	100.00	2.21E+06	1.229
13C12-2,3,4,7,8-PeCDF	32.05	1.54	100.00	2.14E+06	1.190
13C12-1,2,3,4,7,8-HxCDF	33.86	0.52	100.00	1.71E+06	1.059
13C12-1,2,3,6,7,8-HxCDF	33.93	0.53	100.00	1.92E+06	1.189
13C12-2,3,4,6,7,8-HxCDF	34.28	0.53	100.00	1.60E+06	0.994
13C12-1,2,3,7,8,9-HxCDF	34.7	0.54	100.00	1.51E+06	0.937
13C12-1,2,3,4,6,7,8-HpCDF	35.46	0.46	100.00	1.32E+06	0.823
13C12-1,2,3,4,7,8,9-HpCDF	36.23	0.46	100.00	9.93E+05	0.617
Cleanup Standard					
37Cl4-2,3,7,8-TCDD (Cleanup)	27.83		200.00	4.58E+06	1.272
Labeled Injection Standards					
13C12-1,2,3,4-TCDD	27.13	0.79	100.00	1.80E+06	18014.266
13C12-1,2,3,7,8,9-HxCDD	34.55	1.23	100.00	1.61E+06	16108.986

ALS Life Sciences

Second Source Calibration Verification Report

Sample Name	**CVS**	Sampling Date	n/a		
ALS Sample ID	H7-20-RS1-1209	Extraction Date	n/a		Approved:
Analysis Method	EPA 1613B	Sample Size	1	n/a	*N Ashtari*
Analysis Type	CCV	Percent Moisture	n/a		--e-signature--
Sample Matrix	QC	Split Ratio	1		13-Oct-2020

Run Information	**Run 1**
Filename	7-201001A08
Run Date	01-Oct-20 14:33
Final Volume	1 uL
Dilution Factor	20
Analysis Units	%
Instrument - Column	HRMS-7 DB5MSUS188441H

Target Analytes	**pg/uL**	**Ret. Time**	**% Rec**	**Limits**	**Flags**
2,3,7,8-TCDD	10	27.84	89	78-129	
1,2,3,7,8-PeCDD	50	32.29	106	78-130	
1,2,3,4,7,8-HxCDD	50	34.39	97	78-128	
1,2,3,6,7,8-HxCDD	50	34.44	94	78-128	
1,2,3,7,8,9-HxCDD	50	34.56	100	82-122	
1,2,3,4,6,7,8-HpCDD	50	36.01	98	86-116	
OCDD	100	37.43	100	79-126	
2,3,7,8-TCDF	10	26.95	100	84-120	
1,2,3,7,8-PeCDF	50	31.29	106	82-120	
2,3,4,7,8-PeCDF	50	32.07	97	82-122	
1,2,3,4,7,8-HxCDF	50	33.88	98	90-112	
1,2,3,6,7,8-HxCDF	50	33.95	101	88-114	
2,3,4,6,7,8-HxCDF	50	34.29	98	88-114	
1,2,3,7,8,9-HxCDF	50	34.71	106	90-112	
1,2,3,4,6,7,8-HpCDF	50	35.47	101	90-110	
1,2,3,4,7,8,9-HpCDF	50	36.25	106	86-116	
OCDF	100	37.52	102	63-159	

Extraction Standards	**pg/uL**		**% Rec**	**Limits**
13C12-2,3,7,8-TCDD	100	27.81	101	82-121
13C12-1,2,3,7,8-PeCDD	100	32.28	94	62-160
13C12-1,2,3,4,7,8-HxCDD	100	34.37	98	85-117
13C12-1,2,3,6,7,8-HxCDD	100	34.43	94	85-118
13C12-1,2,3,4,6,7,8-HpCDD	100	36.00	102	72-138
13C12-OCDD	200	37.42	105	48-207
13C12-2,3,7,8-TCDF	100	26.92	97	71-140
13C12-1,2,3,7,8-PeCDF	100	31.28	93	76-130
13C12-2,3,4,7,8-PeCDF	100	32.06	92	77-130
13C12-1,2,3,4,7,8-HxCDF	100	33.87	94	76-131
13C12-1,2,3,6,7,8-HxCDF	100	33.94	93	70-143
13C12-2,3,4,6,7,8-HxCDF	100	34.28	95	73-137
13C12-1,2,3,7,8,9-HxCDF	100	34.70	95	74-135
13C12-1,2,3,4,6,7,8-HpCDF	100	35.46	95	78-129
13C12-1,2,3,4,7,8,9-HpCDF	100	36.24	97	77-129

Cleanup Standard	**pg/uL**			
37Cl4-2,3,7,8-TCDD (Cleanup)	10	27.84	109	31-191

ALS Life Sciences

Continuing Calibration Report

Sample Name	**CCV**	Sampling Date	n/a		
ALS Sample ID	H7-20-CCV-1234	Extraction Date	n/a		Approved:
Analysis Method	EPA 1613B	Sample Size	1	n/a	*N Ashtari*
Analysis Type	CCV	Percent Moisture	n/a		--e-signature--
Sample Matrix	QC	Split Ratio	1		13-Oct-2020

Run Information	**Run 1**
Filename	7-201010A01
Run Date	10-Oct-20 07:31
Final Volume	1 uL
Dilution Factor	20
Analysis Units	%
Instrument - Column	HRMS-7 DB5MSUS188441H

Target Analytes	**pg/uL**	**Ret. Time**	**% Rec**	**Limits**	**Flags**
2,3,7,8-TCDD	10	27.69	108	78-129	
1,2,3,7,8-PeCDD	50	32.20	98	78-130	
1,2,3,4,7,8-HxCDD	50	34.31	96	78-128	
1,2,3,6,7,8-HxCDD	50	34.36	97	78-128	
1,2,3,7,8,9-HxCDD	50	34.49	99	82-122	
1,2,3,4,6,7,8-HpCDD	50	35.94	101	86-116	
OCDD	100	37.36	97	79-126	
2,3,7,8-TCDF	10	26.80	94	84-120	
1,2,3,7,8-PeCDF	50	31.19	90	82-120	
2,3,4,7,8-PeCDF	50	31.98	90	82-122	
1,2,3,4,7,8-HxCDF	50	33.81	93	90-112	
1,2,3,6,7,8-HxCDF	50	33.88	97	88-114	
2,3,4,6,7,8-HxCDF	50	34.21	96	88-114	
1,2,3,7,8,9-HxCDF	50	34.63	94	90-112	
1,2,3,4,6,7,8-HpCDF	50	35.39	97	90-110	
1,2,3,4,7,8,9-HpCDF	50	36.18	87	86-116	
OCDF	100	37.44	84	63-159	

Extraction Standards	**pg/uL**		**% Rec**	**Limits**
13C12-2,3,7,8-TCDD	100	27.66	86	82-121
13C12-1,2,3,7,8-PeCDD	100	32.19	100	62-160
13C12-1,2,3,4,7,8-HxCDD	100	34.30	110	85-117
13C12-1,2,3,6,7,8-HxCDD	100	34.35	107	85-118
13C12-1,2,3,4,6,7,8-HpCDD	100	35.94	121	72-138
13C12-OCDD	200	37.35	160	48-207
13C12-2,3,7,8-TCDF	100	26.77	102	71-140
13C12-1,2,3,7,8-PeCDF	100	31.18	99	76-130
13C12-2,3,4,7,8-PeCDF	100	31.97	104	77-130
13C12-1,2,3,4,7,8-HxCDF	100	33.79	106	76-131
13C12-1,2,3,6,7,8-HxCDF	100	33.86	103	70-143
13C12-2,3,4,6,7,8-HxCDF	100	34.21	107	73-137
13C12-1,2,3,7,8,9-HxCDF	100	34.63	113	74-135
13C12-1,2,3,4,6,7,8-HpCDF	100	35.39	111	78-129
13C12-1,2,3,4,7,8,9-HpCDF	100	36.18	131	77-129

Cleanup Standard	**pg/uL**			
37Cl4-2,3,7,8-TCDD (Cleanup)	10	27.69	104	31-191

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Continuing Calibration Report

Sample Name	**CCV**	Sampling Date	n/a		
ALS Sample ID	H7-20-CCV-1235	Extraction Date	n/a		Approved:
Analysis Method	EPA 1613B	Sample Size	1	n/a	*N Ashtari*
Analysis Type	CCV	Percent Moisture	n/a		--e-signature--
Sample Matrix	QC	Split Ratio	1		13-Oct-2020

Run Information	**Run 1**
Filename	7-201010A17
Run Date	10-Oct-20 18:48
Final Volume	1 uL
Dilution Factor	20
Analysis Units	%
Instrument - Column	HRMS-7 DB5MSUS188441H

Target Analytes	**pg/uL**	**Ret. Time**	**% Rec**	**Limits**	**Flags**
2,3,7,8-TCDD	10	27.68	113	78-129	
1,2,3,7,8-PeCDD	50	32.20	97	78-130	
1,2,3,4,7,8-HxCDD	50	34.31	100	78-128	
1,2,3,6,7,8-HxCDD	50	34.37	95	78-128	
1,2,3,7,8,9-HxCDD	50	34.49	97	82-122	
1,2,3,4,6,7,8-HpCDD	50	35.94	97	86-116	
OCDD	100	37.36	97	79-126	
2,3,7,8-TCDF	10	26.78	92	84-120	
1,2,3,7,8-PeCDF	50	31.19	91	82-120	
2,3,4,7,8-PeCDF	50	31.98	92	82-122	
1,2,3,4,7,8-HxCDF	50	33.81	97	90-112	
1,2,3,6,7,8-HxCDF	50	33.88	96	88-114	
2,3,4,6,7,8-HxCDF	50	34.22	98	88-114	
1,2,3,7,8,9-HxCDF	50	34.64	94	90-112	
1,2,3,4,6,7,8-HpCDF	50	35.40	97	90-110	
1,2,3,4,7,8,9-HpCDF	50	36.18	89	86-116	
OCDF	100	37.45	87	63-159	

Extraction Standards	**pg/uL**		**% Rec**	**Limits**
13C12-2,3,7,8-TCDD	100	27.65	87	82-121
13C12-1,2,3,7,8-PeCDD	100	32.19	103	62-160
13C12-1,2,3,4,7,8-HxCDD	100	34.30	113	85-117
13C12-1,2,3,6,7,8-HxCDD	100	34.36	107	85-118
13C12-1,2,3,4,6,7,8-HpCDD	100	35.94	115	72-138
13C12-OCDD	200	37.35	136	48-207
13C12-2,3,7,8-TCDF	100	26.75	104	71-140
13C12-1,2,3,7,8-PeCDF	100	31.18	102	76-130
13C12-2,3,4,7,8-PeCDF	100	31.97	107	77-130
13C12-1,2,3,4,7,8-HxCDF	100	33.80	107	76-131
13C12-1,2,3,6,7,8-HxCDF	100	33.87	107	70-143
13C12-2,3,4,6,7,8-HxCDF	100	34.21	110	73-137
13C12-1,2,3,7,8,9-HxCDF	100	34.63	114	74-135
13C12-1,2,3,4,6,7,8-HpCDF	100	35.39	111	78-129
13C12-1,2,3,4,7,8,9-HpCDF	100	36.18	123	77-129

Cleanup Standard	**pg/uL**			
37Cl4-2,3,7,8-TCDD (Cleanup)	10	27.68	109	31-191

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SVOC DATA PACKAGE

SECTION 5: QC SAMPLE DATA

Including:

- Laboratory Method Blank Analysis Reports
- Laboratory Control Sample Analysis Reports
- Matrix Spike Analysis Reports
- Other QC Sample Analysis Reports (where applicable)

ALS Life Sciences

Laboratory Method Blank Analysis Report

Sample Name	**Method Blank**	Sampling Date	n/a		
ALS Sample ID	WG3406511-1	Extraction Date	30-Sep-20		Approved:
Analysis Method	EPA 1613B	Sample Size	20.00	g	*N Ashtari*
Analysis Type	Blank	Percent Moisture	n/a		--e-signature--
Sample Matrix	QC	Split Ratio	1		13-Oct-2020

Run Information	**Run 1**
Filename	7-201010A08
Run Date	10-Oct-20 12:27
Final Volume	1 uL
Dilution Factor	20
Analysis Units	pg/g wwt
Instrument - Column	HRMS-7 DB5MSUS188441H

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg/g wwt**	**EDL pg/g wwt**	**Flags**	**EMPC pg/g wwt**	**LQL**
2,3,7,8-TCDD	1	NotFnd	<0.038	0.038	U		0.50
1,2,3,7,8-PeCDD	1	NotFnd	<0.018	0.018	U		2.5
1,2,3,4,7,8-HxCDD	0.1	NotFnd	<0.027	0.027	U		2.5
1,2,3,6,7,8-HxCDD	0.1	NotFnd	<0.027	0.027	U		2.5
1,2,3,7,8,9-HxCDD	0.1	NotFnd	<0.028	0.028	U		2.5
1,2,3,4,6,7,8-HpCDD	0.01	35.94	0.0240	0.014	M,J		2.5
OCDD	0.0003	37.37	<0.12	0.029	M,J,R	0.12	5.0
2,3,7,8-TCDF	0.1	NotFnd	<0.041	0.041	U		0.50
1,2,3,7,8-PeCDF	0.03	NotFnd	<0.019	0.019	U		2.5
2,3,4,7,8-PeCDF	0.3	NotFnd	<0.015	0.015	U		2.5
1,2,3,4,7,8-HxCDF	0.1	NotFnd	<0.027	0.027	U		2.5
1,2,3,6,7,8-HxCDF	0.1	NotFnd	<0.029	0.029	U		2.5
2,3,4,6,7,8-HxCDF	0.1	34.21	<0.028	0.028	M,U	0.017	2.5
1,2,3,7,8,9-HxCDF	0.1	34.64	<0.049	0.037	M,J,R	0.049	2.5
1,2,3,4,6,7,8-HpCDF	0.01	NotFnd	<0.011	0.011	U		2.5
1,2,3,4,7,8,9-HpCDF	0.01	NotFnd	<0.016	0.016	U		2.5
OCDF	0.0003	37.45	<0.046	0.028	M,J,R	0.046	5.0

Extraction Standards	**pg**		**% Rec**	**Limits**
13C12-2,3,7,8-TCDD	2000	27.65	61	25-164
13C12-1,2,3,7,8-PeCDD	2000	32.18	72	25-181
13C12-1,2,3,4,7,8-HxCDD	2000	34.30	74	32-141
13C12-1,2,3,6,7,8-HxCDD	2000	34.35	72	28-130
13C12-1,2,3,4,6,7,8-HpCDD	2000	35.93	75	23-140
13C12-OCDD	4000	37.34	73	17-157
13C12-2,3,7,8-TCDF	2000	26.75	58	24-169
13C12-1,2,3,7,8-PeCDF	2000	31.17	58	24-185
13C12-2,3,4,7,8-PeCDF	2000	31.96	63	21-178
13C12-1,2,3,4,7,8-HxCDF	2000	33.79	66	26-152
13C12-1,2,3,6,7,8-HxCDF	2000	33.86	65	26-123
13C12-2,3,4,6,7,8-HxCDF	2000	34.20	69	28-136
13C12-1,2,3,7,8,9-HxCDF	2000	34.62	63	29-147
13C12-1,2,3,4,6,7,8-HpCDF	2000	35.38	70	28-143
13C12-1,2,3,4,7,8,9-HpCDF	2000	36.17	63	26-138

Cleanup Standard	**pg**			
37Cl4-2,3,7,8-TCDD (Cleanup)	40	27.66	53	35-197

Homologue Group Totals	**# peaks**	**Conc. pg/g wwt**	**EDL pg/g wwt**	**Flags**	**LQL**
Total-TCDD	0	<0.038	0.038	U	0.50
Total-PeCDD	0	<0.018	0.018	U	2.5
Total-HxCDD	0	<0.028	0.028	U	2.5
Total-HpCDD	1	0.0240	0.014		2.5
Total-TCDF	0	<0.041	0.041	U	0.50
Total-PeCDF	0	<0.019	0.019	U	2.5
Total-HxCDF	0	<0.037	0.037	U	2.5
Total-HpCDF	0	<0.016	0.016	U	2.5

Toxic Equivalency - (WHO 2005)	**pg/g wwt**
Lower Bound PCDD/F TEQ (WHO 2005)	0.000240
Mid Point PCDD/F TEQ (WHO 2005)	0.0462
Upper Bound PCDD/F TEQ (WHO 2005)	0.0872

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF	Indicates the Toxic Equivalency Factor
TEQ	Indicates the Toxic Equivalency
M	Indicates that a peak has been manually integrated.
U	Indicates that this compound was not detected above the EDL.
J	Indicates that a target analyte was detected below the calibrated range.
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.
LQL	Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
EMPC	Estimated Maximum Possible Concentration – elevated detection limit due to interference or positive id criterion failure

ALS Life Sciences

Laboratory Control Sample Analysis Report

Sample Name	**Laboratory Control Sample**	Sampling Date	n/a		
ALS Sample ID	WG3406511-2	Extraction Date	30-Sep-20		Approved:
Analysis Method	EPA 1613B	Sample Size	1	n/a	*N Ashtari*
Analysis Type	LCS	Percent Moisture	n/a		--e-signature--
Sample Matrix	QC	Split Ratio	1		13-Oct-2020

Run Information	**Run 1**
Filename	7-201010A03
Run Date	10-Oct-20 08:55
Final Volume	1 uL
Dilution Factor	20
Analysis Units	%
Instrument - Column	HRMS-7 DB5MSUS188441H

Target Analytes	**pg**	**Ret. Time**	**% Rec**	**Limits**	**Flags**
2,3,7,8-TCDD	200	27.68	88	67-158	
1,2,3,7,8-PeCDD	1000	32.20	101	70-142	
1,2,3,4,7,8-HxCDD	1000	34.31	96	70-164	
1,2,3,6,7,8-HxCDD	1000	34.36	92	76-134	
1,2,3,7,8,9-HxCDD	1000	34.49	106	64-162	
1,2,3,4,6,7,8-HpCDD	1000	35.94	92	70-140	
OCDD	2000	37.35	96	78-144	
2,3,7,8-TCDF	200	26.78	92	75-158	
1,2,3,7,8-PeCDF	1000	31.19	96	80-134	
2,3,4,7,8-PeCDF	1000	31.97	90	68-160	
1,2,3,4,7,8-HxCDF	1000	33.81	93	72-134	
1,2,3,6,7,8-HxCDF	1000	33.88	96	84-130	
2,3,4,6,7,8-HxCDF	1000	34.21	92	70-156	
1,2,3,7,8,9-HxCDF	1000	34.63	99	78-130	
1,2,3,4,6,7,8-HpCDF	1000	35.39	93	82-122	
1,2,3,4,7,8,9-HpCDF	1000	36.18	100	78-138	
OCDF	2000	37.44	84	63-170	

Extraction Standards	**pg**		**% Rec**	**Limits**
13C12-2,3,7,8-TCDD	2000	27.65	66	20-175
13C12-1,2,3,7,8-PeCDD	2000	32.18	81	21-227
13C12-1,2,3,4,7,8-HxCDD	2000	34.30	79	21-193
13C12-1,2,3,6,7,8-HxCDD	2000	34.35	76	25-163
13C12-1,2,3,4,6,7,8-HpCDD	2000	35.94	87	26-166
13C12-OCDD	4000	37.35	98	13-138
13C12-2,3,7,8-TCDF	2000	26.75	62	22-152
13C12-1,2,3,7,8-PeCDF	2000	31.18	67	21-192
13C12-2,3,4,7,8-PeCDF	2000	31.96	71	13-328
13C12-1,2,3,4,7,8-HxCDF	2000	33.79	69	19-202
13C12-1,2,3,6,7,8-HxCDF	2000	33.86	71	21-159
13C12-2,3,4,6,7,8-HxCDF	2000	34.21	76	22-176
13C12-1,2,3,7,8,9-HxCDF	2000	34.63	73	17-205
13C12-1,2,3,4,6,7,8-HpCDF	2000	35.39	78	21-158
13C12-1,2,3,4,7,8,9-HpCDF	2000	36.18	75	20-186

Cleanup Standard	**pg**			
37Cl4-2,3,7,8-TCDD (Cleanup)	40	27.68	63	31-191

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SECTION 6: INTERNAL RECORDS

Including:

- Prep Logs
- Independent calculation checks
- Others as listed below:

Extraction Workup Sheet

5

Batch ID:	WG3406511	Analysis:	DX1613 Tissues
Prep Procedure: BU-TM-1110 Overall HR Prep			
Analyst:	Saurin Patel	Date:	30-Sep-2020

SUBSAMPLING

Sample I.D.	Client I.D.	Wet Sub-sample (g)
WG3406511-1	Method Blank	20.21
WG3406511-2	Laboratory Control Sample	20.43
WG3406511-3	Extraction and Injection STD.	/
* L2508739-1	MBCFGB1020-02	10.24
	* Used 2/3 of Sample	
	Ensure that sample L2504347-1 has been homogenized	

BATCH TRACKING

Expected Level:	High/Low/Unknown	Unknown
Balance ID:		3985
Subsampling:	Chemist's Initials	SP
Client Labels Checked:	Chemist's Initials	SP
Soxhlet Start Time:	Date&Time	30-Sep-20 3:00pm SP
Soxhlets Reflux Properly:	Chemist's Initials	SP
Soxhlet End Time:	Date&Time	1-Oct-20 7:30am SP
Acid Silica Column:	Chemist's Initials	02Oct-2020 AP
Solvent Exchange	Chemist's Initials	5-OCT-20 KB
Carbon Column:	Chemist's Initials	5-OCT-20 KB
Microvial:	Chemist's Initials	5-OCT-20 KB

DX Extraction Standard:

Sample I.D.	Volume (ul)	(Checkmark) Spiked
WG3406511-1	20	✓
WG3406511-2	20	✓
WG3406511-3	20	✓
L2504347-1	20	✓
WG3406511-4	20	✓
L2508739-1	20	✓

Syringe ID: 377

Standard: 1613B-ES#1- 082C

Spike Date: 30-Sep-2020

Spike Witnessing

	Chemist's Initials
Chemist:	MM

	Witness's Initials
Witness:	[illegible]
Correct Syringe Obtained:	[illegible]
Correct Standard Obtained:	[illegible]
Correct Technique Followed:	[illegible]

DX Native Standard:

Sample I.D.	Volume (ul)	(Checkmark) Spiked
WG3406511-2	20	✓
WG3406511-3	20	✓

Syringe ID: 383

Standard: 1613B-NS#3- 029F

Date & Initials: 30-Sep-2020 MM

Batch ID:	WG3406511

DX Cleanup Standard:

Sample I.D.	Volume (ul)	Spiked (Checkmark)
WG3406511-1	20	✓
WG3406511-2	20	✓
WG3406511-3	N/A	N/A
L2504347-1	20	✓
WG3406511-4	20	✓
L2508739-1	20	✓

Syringe ID: 379

Standard: 1613B-CL#2-0700

Date & Initials: 02-Oct-2020 AP

Correct Syringe Obtained: AP (Chemist's Initials)

Correct Standard Obtained: AP (Chemist's Initials)

Correct Technique Followed: AP (Chemist's Initials)

DX Injection Standard:

Sample I.D.	Volume (ul)	Spiked (Checkmark)
WG3406511-1	20	✓
WG3406511-2	20	✓
WG3406511-3	20	✓
L2504347-1	20	✓
WG3406511-4	20	✓
L2508739-1	20	✓

Syringe ID: 342

Standard: 1613B-IS#1-0540

Date & Initials: 5-Oct-2020 KB

Correct Syringe Obtained: KB (Chemist's Initials)

Correct Standard Obtained: KB (Chemist's Initials)

Correct Technique Followed: KB (Chemist's Initials)

Batch ID:	WG3406511

Procedure:

- Subsample approximately 20g
- Mix well with sodium sulphate
- Place in to a Thimble.
- Spike appropriate standards
- Extract overnight in DCM

- Roto-Vap to ~2ml
- Transfer to c-tube with Hexane rinses, then reduce to **1ml**.
- Spike Cleanup Standard, then mix well.
- Acid Silica Column.
- Solvent Exchange to Hexane (Reduce to **Just Dry** then bulk back up to 1ml Hexane)
- DX Carbon Column:
  - Pre-elute Carbon with 5ml Hexane
  - Transfer with 3x1ml Hexane
  - F1 = 10mL 1:1 DCM:Hexane
  - After dripping has stopped Invert Column.
  - F2 = 14ml Toluene

- After the column has stopped dripping reduce the F2 portion down to ~1/2ml.
- Vortex well, then transfer to a micro-vial without rinses.
- Blow the micro-vial down to just-dry.
- Spike with Injection Standard, Cap the micro-vial, and Vortex. **FV=20ul**

Approval of Deviation from Standard Method

☐ Procedure does not deviate from Standard Method. **(Batch Writer):** _____

☐ Procedure does deviate from Standard Method. **Approved (Supervisor/Manager):** _____

Batch ID:	WG3406511

Reagent Lot Numbers:

Reagent	Lot#	Comment
Hexane	158437	
DCM	105733	
Acetone	105484	
Toluene	105743	
Nitrogen	ORG-NSI- 2397, 2400	
Acid Silica	ORG-ASI- 9775, 9776, 9770	
Neutral Silica		
Chroma-Carb	275	
Sand	—	
1:1 DCM:Hexane	643	
Thimble	1710818302	

Sodium Sulphate ORG-SSU- 2373, 2374, 2375

Comments: Corn oil ORG-CO-071

L2504347-1 & W-4 (dup.) required a fatty acid column, wouldn't reduce past ~5mL on NEVAP. 02-Oct2012 AP

WG:			Prep Analyst:		
Analysis:			Date:		
	Very Good	Meets Method Req	Some Outliers	Very Poor	Comments / Was spl/batch sent for rework? Why?
MB					
LCS					
DUP					
ES rec					

ALS Life Sciences

Sample Calculation Report

Approved: *N Ashtari* --e-signature-- 13-Oct-2020

CS3 RRF Check

$$RRF = \frac{\text{Response of 2,3,7,8-TCDD}}{\text{Response of 13C12-2,3,7,8-TCDD}} \times \frac{\text{Concentration of 13C12-2,3,7,8-TCDD}}{\text{Concentration of TCDD}}$$

		Calculated Value	Value from TargetLynx
RRF =	$\frac{167775.70}{1450364.20} \times \frac{100}{10}$ =	**1.157**	**1.157**

Calculation of OCDD amount in L2508739-1

$$pg/g\ wwt = \frac{\text{Response of OCDD}}{\text{Response of 13C12-OCDD}} \times \frac{\text{pg of 13C12-OCDD spiked}}{\text{Mean RRF} * \text{Sample Size}}$$

pg/g wwt =	$\frac{4918}{156678} \times \frac{4000}{0.96 * 10.24}$ =	**12.7**	**12.7**

Calculation of 13C12-2,3,7,8-TCDD Recovery in L2508739-1

$$\%\ Recovery = \frac{\text{Response of 13C12-2,3,7,8-TCDD}}{\text{Response of 13C12-1,2,3,4-TCDD}} \times \frac{\text{pg of 13C12-1,2,3,4-TCDD spiked} * 100}{\text{Mean RRF} * \text{Amount Spiked}}$$

% Recovery =	$\frac{343340.1}{465006.6} \times \frac{2000 * 100}{1.11 * 2000}$ =	**67**	**67**	**%**

1435 Norjohn Court, Unit 1, Burlington, ON, Canada L7L 0E6

SVOC DATA PACKAGE

SECTION 7: SHIPPING/RECEIVING DOCUMENTS

Including:

- Airbills
- Chain-of-Custody Records
- Sample Log-in Sheet(s) - where applicable
- Others as listed below:

ALS Environmental Chain of Custody

1317 South 13th Avenue • Kelso, WA 98626 • 1-360-577-7222 • FAX 1-360-636-1068

ALS Contact: Howard Holmes

Project Number: K2007601
Project Manager: Howard Holmes
QAP: LAB QAP

L2508739

Lab Code	Sample ID	# of Cont.	Matrix	Sample Date	Sample Time	Lab ID	Dioxins Furans 1613B
K2007601-001	MBCFGB1020-02	1	Tissue	8/28/20	1430	Burlington ALS	X

Test Comments
Dioxins Furans - 1613B K2007601-001 ALS Burlington - 20g

Folder Comments:
Limited Sample - do not use for QC

Report on wet weight basis

Special Instructions/Comments
Please provide the electronic (PDF and EDD) report to the following e-mail address: ALKLS.Data@alsglobal.com.

Please send report & EDD to Howard Holmes & ALKLS.Data

H - Test is On Hold P - Test is Authorized for Prep Only

Turnaround Requirements
____ **RUSH** (Surcharges Apply)
PLEASE CIRCLE WORK DAYS
1 2 3 4 5
____ **STANDARD**
Requested FAX Date: ____
Requested Report Date: 09/18/20 10/2/20

Report Requirements
____ I. Results Only
____ II. Results + QC Summaries
____ III. Results + QC and Calibration Summaries
X IV. Data Validation Report with Raw Data
PQL/MDL/J X Yes
EDD Y Send Sequest

Invoice Information
PO# 51K2007601
Bill to

Relinquished By: 9/23/2020 0800 Received By: ARRON BURTON

Airbill Number:

Page 1 of 1 9/24/2020 15:50 2.4°C

~~Pre-Prep Information Benchsheet~~

Prep Run #: NA **Container Lot No:** 081720-1TW **Prep Due Date:**

#	Lab Code	Bottle	Test Name	Weight	Sample Comments	Test Comments
1	K2007601-001	11	Dioxins Furans : 1613B	20.050g		CLUKKEN K-Balance-53

Relinquished By:	Date/Time: 9/22/20 14:00	Received By:	Date/Time:

Sample Receiving Log

Date/Time Received	Client ID	Number/Description of Containers	Temp. on Receipt*	Condition of Samples, Courier & Tracking Information	Receiver's Initials	Date/Time Login Completed	Submission ID	Sample ID Range
[redacted]								
25-Sept-2020 15:50	ALS Kelso	1x jar of tissue	2.4°C	Good FedEx 1355 2044 3588 1355 2044 3691	NJ	27-Sept-20 11:15	i2508739	-1
[redacted]								

*Temperatures were recorded using :

☑ VWR Traceable dedicated I.R. gun (model 36934-178 SN 192108143)

☐ Other (specify): _____

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December 11, 2020 **Analytical Report for Service Request No:** K2008783

Kevin Woodhouse
Hart Crowser, Incorporated
6420 SW Macadam St
STE 100
Portland, OR 97239

RE: M&B Sampling / 150-002-005/5

Dear Kevin,

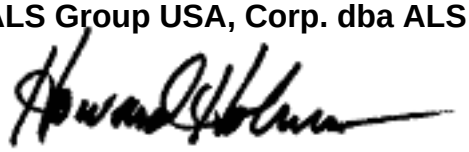
Enclosed are the results of the sample(s) submitted to our laboratory October 01, 2020
For your reference, these analyses have been assigned our service request number **K2008783.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3364. You may also contact me via email at howard.holmes@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental



Howard Holmes
Project Manager

ALS Environmental
ALS Group USA, Corp
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Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/EnvironmentalLabCertification/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.
Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

Case Narrative

ALS Environmental—Kelso Laboratory
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Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

1317 South 13th Ave, Kelso, WA 98626 | 1-360-577-7222 | www.alsglobal.com

Client: Hart Crowser, Incorporated
Project: M&B Sampling
Sample Matrix: Tissue

Service Request: K2008783
Date Received: 10/01/2020

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier level IV requested by the client.

Sample Receipt:

Six tissue samples were received for analysis at ALS Environmental on 10/01/2020. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The samples were stored at minimum in accordance with the analytical method requirements.

Semivolatiles by GC/MS:

No significant anomalies were noted with this analysis.

Semivoa GC:

No significant anomalies were noted with this analysis.

Metals:

No significant anomalies were noted with this analysis.

Subcontracted Analytical Parameters:

Dioxins and Furans by EPA Method 1613B

The analysis for Dioxins and Furans was performed at ALS Houston, Texas Laboratory. The data for this analysis is included in the corresponding section of this report.

Approved by  Date 12/11/2020

Chain of Custody

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1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

ALS Environmental

CHAIN OF CUSTODY
111024

001

SR# 12700 87283

COC Set 1 of 1

COC#

1317 South 13th Ave, Kelso, WA 98626 Phone (360) 577-7222 / 800-695-7222 / FAX (360) 636-1068
www.alsglobal.com

Project Name: M+B Sampling	Project Number: 150-002-005/5
Project Manager: Kevin Woodhouse	
Company: Hart Crowser	
Address: 6420 S Macadam Ave Suite 100, Portland, OR	
Phone #	email: Kevin.Woodhouse@Hartcrowser.com
Sampler Signature:	Sampler Printed Name: Jessica Blanchette

CLIENT SAMPLE ID	LABID	SAMPLING Date	Time	Matrix	NUMBER OF CONTAINERS	7D: 350.1M / NH3 Plumb	7D: PSEP Sulfide / PSEP Sulfide	7D: SM 2540 G / TS	14D: 8270D / PAH SIM ULL	14D: 8270D / SVO LL	14D: ALS SOP / BUTYLTINS	14D: ALS SOP / OC_Pest_MS	14D: NWTPH-Dx / NW_TPH	28D: 7471B / Hg	28D: 9060 / TOC	180D: 6020A / Metals	180D: ASTM D422M / PartSize	180D: ASTM D422M / Partsize	365D: 8082A / PCB LL	999D: Archive / Archive -20C	999D: Archive / Archive 4C	1 Dioxin/Furan (left)	2 %Lipid 8290	3	4	5	Remarks
1. ~~MBCFGB-20-Bait 1~~		~~9/29/20~~	~~0730~~	Tissue						X						X						X	X				JPB
2. MBCFGB1020-01		9/29/20	1250	Tissue						X						X						X	X				
3. MBCFGB1020-03		9/29/20	1015							X						X						X	X				
4. MBCFGB1020-04		9/29/20	0900							X						X						X	X				
5. MBCFGB1020-04 Dup		9/29/20	0900							X						X						X	X				
6. MBCFGB1020-05		9/29/20	1128							X						X						X	X				
7. MBCFGB-20-Baitchicken		9/29/20	0900							X						X						X	X				
8.																											
9.																											
10.																											

Report Requirements

- ___ I. Routine Report: Method Blank, Surrogate, as required
- X II. Report Dup., MS, MSD as required
- ___ III. CLP Like Summary (no raw data)
- ___ IV. Data Validation Report
- ___ V. EDD

Invoice Information

P.O.# 150-002-005/5

Bill To: Hart Crowser

Turnaround Requirements

___ 24 hr. ___ 48 hr.
___ 5 Day
X Standard

Requested Report Date

Circle which metals are to be analyzed

Total Metals: Al (As) Sb Ba Be B Ca Cd Co (Cr) (Cu) Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V (Zn) Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Special Instructions/Comments: PAHs + PCP only for 8270

*Indicate State Hydrocarbon Procedure: AK CA WI Northwest Other____(Circle One)

Relinquished By:	Received By:	Relinquished By:	Received By:	Relinquished By:	Received By:
Signature: Kevin Woodhouse	Signature: K Moore	Signature: K Moore	Signature: K Moore	Signature	Signature
Printed Name: Kevin Woodhouse	Printed Name: AES	Printed Name: AES	Printed Name: AES	Printed Name	Printed Name
Firm: Hart Crowser	Firm:	Firm:	Firm:	Firm	Firm
Date/Time: 10/1/20 1006	Date/Time: 10/1/20 1000	Date/Time: 10/1/20 1320	Date/Time: 10/1/20 1320	Date/Time	Date/Time

PM HH

Cooler Receipt and Preservation Form

Client Hart Crowser Service Request K20 98783

Received: 10/1/20 Opened: 10/1/20 By: [illegible] Unloaded: 10/1/20 By: [illegible]

1. Samples were received via? *USPS* *Fed Ex* *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) *Cooler* *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA Y N If yes, how many and where? _____
   If present, were custody seals intact? Y N If present, were they signed and dated? Y N
4. Was a Temperature Blank present in cooler? NA Y N If yes, notate the temperature in the appropriate column below:
   If no, take the temperature of a representative sample bottle contained within the cooler; notate in the column "Sample Temp":
5. Were samples received within the method specified temperature ranges? NA Y N
   If no, were they received on ice and same day as collected? If not, notate the cooler # below and notify the PM. NA Y N

If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*

Temp Blank	Sample Temp	IR Gun	Cooler #/COC ID / NA	Out of temp indicate with "X"	PM Notified If out of temp	Tracking Number NA	Filed
3.2	—	IR01	111024		—		

6. Packing material: *Inserts* *Baggies* *Bubble Wrap* *Gel Packs* *Wet Ice* *Dry Ice* *Sleeves* Alum Foil
7. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
8. Were samples received in good condition (unbroken) NA Y N
9. Were all sample labels complete (ie, analysis, preservation, etc.)? NA Y N
10. Did all sample labels and tags agree with custody papers? NA Y N
11. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
12. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
13. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
14. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, Resolutions: Rec'd 2 Containers for MBCFCB1020-04; 1 is on the COC

Total Solids

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20
Sample Matrix:	Tissue	**Date Received:**	10/1/20
Analysis Method:	Freeze Dry	**Units:**	Percent
Prep Method:	None	**Basis:**	Wet

Total Solids

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
MBCFGB1020-01	K2008783-001	**32.6**	-	-	1	11/06/20 16:15	
MBCFGB1020-03	K2008783-002	**30.0**	-	-	1	11/06/20 16:15	
MBCFGB1020-04	K2008783-003	**32.6**	-	-	1	11/06/20 16:15	
MBCFGB1020-04 Dup	K2008783-004	**35.3**	-	-	1	11/06/20 16:15	
MBCFGB1020-05	K2008783-005	**32.3**	-	-	1	11/06/20 16:15	
MBCFGB-20-Baitchicken	K2008783-006	**31.1**	-	-	1	11/06/20 16:15	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20
Sample Matrix:	Tissue	**Date Received:**	10/01/20
		Date Analyzed:	11/06/20

Replicate Sample Summary
Inorganic Parameters

Sample Name:	MBCFGB1020-04	**Units:**	Percent
Lab Code:	K2008783-003	**Basis:**	Wet

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate Sample K2008783-003DUP Result	Average	RPD	RPD Limit
Total Solids	Freeze Dry	-	-	32.6	32.1	32.4	2	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Metals

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 12:50
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-01	**Basis:**	Wet
Lab Code:	K2008783-001		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	6020A	**0.54**	mg/Kg	0.16	0.006	5	11/13/20 15:27	11/11/20	
Chromium	6020A	**0.194**	mg/Kg	0.064	0.006	5	11/13/20 15:27	11/11/20	
Copper	6020A	**22.8**	mg/Kg	0.032	0.010	5	11/13/20 15:27	11/11/20	
Zinc	6020A	**25.6**	mg/Kg	0.16	0.03	5	11/13/20 15:27	11/11/20	

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 10:15
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-03	**Basis:**	Wet
Lab Code:	K2008783-002		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	6020A	**0.33**	mg/Kg	0.14	0.006	5	11/13/20 15:33	11/11/20	
Chromium	6020A	**0.214**	mg/Kg	0.058	0.006	5	11/13/20 15:33	11/11/20	
Copper	6020A	**21.8**	mg/Kg	0.029	0.009	5	11/13/20 15:33	11/11/20	
Zinc	6020A	**23.7**	mg/Kg	0.14	0.02	5	11/13/20 15:33	11/11/20	

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 09:00
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-04	**Basis:**	Wet
Lab Code:	K2008783-003		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	6020A	**0.33**	mg/Kg	0.16	0.006	5	11/13/20 15:16	11/11/20	
Chromium	6020A	**0.218**	mg/Kg	0.065	0.006	5	11/13/20 15:16	11/11/20	
Copper	6020A	**20.6**	mg/Kg	0.032	0.010	5	11/13/20 15:16	11/11/20	
Zinc	6020A	**26.1**	mg/Kg	0.16	0.03	5	11/13/20 15:16	11/11/20	

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 09:00
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-04 Dup	**Basis:**	Wet
Lab Code:	K2008783-004		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	6020A	**0.44**	mg/Kg	0.17	0.007	5	11/13/20 15:36	11/11/20	
Chromium	6020A	**0.185**	mg/Kg	0.070	0.007	5	11/13/20 15:36	11/11/20	
Copper	6020A	**25.3**	mg/Kg	0.035	0.010	5	11/13/20 15:36	11/11/20	
Zinc	6020A	**24.4**	mg/Kg	0.17	0.03	5	11/13/20 15:36	11/11/20	

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 11:28
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-05	**Basis:**	Wet
Lab Code:	K2008783-005		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	6020A	**0.39**	mg/Kg	0.16	0.006	5	11/13/20 15:38	11/11/20	
Chromium	6020A	**0.297**	mg/Kg	0.062	0.006	5	11/13/20 15:38	11/11/20	
Copper	6020A	**23.7**	mg/Kg	0.031	0.009	5	11/13/20 15:38	11/11/20	
Zinc	6020A	**25.3**	mg/Kg	0.16	0.02	5	11/13/20 15:38	11/11/20	

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 09:00
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB-20-Baitchicken	**Basis:**	Wet
Lab Code:	K2008783-006		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	6020A	**0.01 J**	mg/Kg	0.15	0.006	5	11/13/20 15:40	11/11/20	
Chromium	6020A	**0.093**	mg/Kg	0.061	0.006	5	11/13/20 15:40	11/11/20	
Copper	6020A	**0.796**	mg/Kg	0.030	0.009	5	11/13/20 15:40	11/11/20	
Zinc	6020A	**12.7**	mg/Kg	0.15	0.02	5	11/13/20 15:40	11/11/20	

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	NA
Sample Matrix:	Tissue	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	Wet
Lab Code:	KQ2017747-01		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	6020A	ND U	mg/Kg	0.2	0.006	5	11/13/20 15:07	11/11/20	
Chromium	6020A	ND U	mg/Kg	0.06	0.006	5	11/13/20 15:07	11/11/20	
Copper	6020A	ND U	mg/Kg	0.03	0.009	5	11/13/20 15:07	11/11/20	
Zinc	6020A	ND U	mg/Kg	0.2	0.02	5	11/13/20 15:07	11/11/20	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20
Sample Matrix:	Tissue	**Date Received:**	10/01/20
		Date Analyzed:	11/13/20

Replicate Sample Summary

Total Metals

Sample Name:	MBCFGB1020-04	**Units:**	mg/Kg
Lab Code:	K2008783-003	**Basis:**	Wet

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate Sample KQ2017747-05 Result	Average	RPD	RPD Limit
Arsenic	6020A	0.16	0.006	0.33	0.34	0.34	4	20
Chromium	6020A	0.064	0.006	0.218	0.233	0.226	6	20
Copper	6020A	0.032	0.010	20.6	21.4	21.0	4	20
Zinc	6020A	0.16	0.03	26.1	26.6	26.4	2	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Printed 11/19/2020 5:02:17 PM Superset Reference:

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20
Sample Matrix:	Tissue	**Date Received:**	10/01/20
		Date Analyzed:	11/13/20
		Date Extracted:	11/11/20

Matrix Spike Summary
Total Metals

Sample Name:	MBCFGB1020-04	**Units:**	mg/Kg
Lab Code:	K2008783-003	**Basis:**	Wet
Analysis Method:	6020A		
Prep Method:	PSEP Metals		

Matrix Spike
KQ2017747-06

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Arsenic	0.33	5.90	5.22	107	75-125
Chromium	0.218	6.90	6.26	107	75-125
Copper	20.6	27.9	7.82	93	75-125
Zinc	26.1	39.9	15.7	88	75-125

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Matrix Spike and Matrix Spike Duplicate Data is presented for information purposes only. The matrix may or may not be relevant to samples reported in this report. The laboratory evaluates system performance based on the LCS and LCSD control limits.

ALS Group USA, Corp.
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QA/QC Report

Client: Hart Crowser, Incorporated
Project: M&B Sampling/150-002-005/5
Sample Matrix: Tissue

Service Request: K2008783
Date Analyzed: 11/13/20

Lab Control Sample Summary
Total Metals

Units:mg/Kg
Basis: Wet

Lab Control Sample
KQ2017747-02

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Arsenic	6020A	16.1	16.7	96	80-120
Chromium	6020A	19.5	20.0	97	80-120
Copper	6020A	23.7	25.0	95	80-120
Zinc	6020A	49.2	50.0	98	80-120

ALS Group USA, Corp.
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QA/QC Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	NA
LCS Matrix:	Tissue	**Date Received:**	NA
		Date Extracted:	11/11/2020
		Date Analyzed:	11/13/2020

Standard Reference Material Summary
Total Metals

Sample Name:	Standard Reference Material	Units:	mg/Kg (ppm)
Lab Code:	KQ2017747-03	Basis:	Dry
Test Notes:	Dorm-4 Solids = 93.8%		

Source: N.R.C.C. Dorm-4

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	Control Limits	Result Notes
Arsenic	PSEP Tissue	6020A	6.87	7.30	106	5.14 - 8.77	
Chromium	PSEP Tissue	6020A	1.87	1.77	95	1.35 - 2.46	
Copper	PSEP Tissue	6020A	15.7	14.9	95	12.2 - 19.4	
Zinc	PSEP Tissue	6020A	51.6	51.1	99	39.0 - 65.3	

ALS Group USA, Corp.
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QA/QC Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	NA
LCS Matrix:	Tissue	**Date Received:**	NA
		Date Extracted:	11/11/2020
		Date Analyzed:	11/13/2020

Standard Reference Material Summary
Total Metals

Sample Name:	Standard Reference Material	Units:	mg/Kg (ppm)
Lab Code:	KQ2017747-04	Basis:	Dry
Test Notes:	Tort-3 Solids = 97.4%		

Source: N.R.C.C. Tort-3

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	Control Limits	Result Notes
Arsenic	PSEP Tissue	6020A	59.5	66.7	112	44.6-76.0	
Chromium	PSEP Tissue	6020A	1.95	1.75	90	1.37-2.63	
Copper	PSEP Tissue	6020A	497	430	87	380-623	
Zinc	PSEP Tissue	6020A	136	129	95	104-170	

Prep Summary Report

Client: Hart Crowser, Incorporated **Service Request:** K2008783
Project: M&B Sampling/150-002-005/5
Sample Matrix: Tissue

Metals

Prep Method: PSEP Metals **Extraction Lot:** 369596
Analytical Method: 6020A **Extraction Date:** 11/11/20 13:20

Sample Name	Lab Code	Date Collected	Date Received	Sample Amount	Final Amount	Percent Solids
MBCFGB1020-01	K2008783-001	9/29/20	10/1/20	0.30500 g	30 mL	
MBCFGB1020-03	K2008783-002	9/29/20	10/1/20	0.31200 g	30 mL	
MBCFGB1020-04	K2008783-003	9/29/20	10/1/20	0.30200 g	30 mL	
MBCFGB1020-04 Dup	K2008783-004	9/29/20	10/1/20	0.30400 g	30 mL	
MBCFGB1020-05	K2008783-005	9/29/20	10/1/20	0.31100 g	30 mL	
MBCFGB-20-Baitchicken	K2008783-006	9/29/20	10/1/20	0.30600 g	30 mL	
Method Blank	KQ2017747-01MB	NA	NA	1.0000 g	30 mL	
Lab Control Sample	KQ2017747-02LCS	NA	NA	0.30000 g	30 mL	
Standard Reference Material	KQ2017747-03SRM	9/29/20	10/1/20	0.31700 g	30 mL	
Standard Reference Material	KQ2017747-04SRM	9/29/20	10/1/20	0.31200 g	30 mL	
Duplicate	KQ2017747-05DUP	9/29/20	10/1/20	0.30400 g	30 mL	
Matrix Spike	KQ2017747-06MS	9/29/20	10/1/20	0.31200 g	30 mL	

Client: Hart Crowser, Incorporated **Service Request:** K2008783
Project: M&B Sampling/150-002-005/5

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Concentration Units: ug/L

Sample ID / Analyte	Method	Analysis Batch:	Result	True Value	% Rec	% Rec. Limits
ICV 11/13/20 14:52						
Arsenic	6020A	703407	24.0	25.0	96	90-110
Chromium	6020A	703407	9.84	10.0	98	90-110
Copper	6020A	703407	12.1	12.5	97	90-110
Zinc	6020A	703407	24.9	25.0	100	90-110
CCV 11/13/20 14:54						
Arsenic	6020A	703407	25.1	25.0	101	90-110
Chromium	6020A	703407	25.3	25.0	101	90-110
Copper	6020A	703407	24.7	25.0	99	90-110
Zinc	6020A	703407	24.9	25.0	100	90-110
CCV 11/13/20 15:29						
Arsenic	6020A	703407	25.0	25.0	100	90-110
Chromium	6020A	703407	24.9	25.0	100	90-110
Copper	6020A	703407	23.8	25.0	95	90-110
Zinc	6020A	703407	24.4	25.0	97	90-110
CCV 11/13/20 15:42						
Arsenic	6020A	703407	24.9	25.0	100	90-110
Chromium	6020A	703407	24.6	25.0	98	90-110
Copper	6020A	703407	23.4	25.0	94	90-110
Zinc	6020A	703407	23.8	25.0	95	90-110

Client: Hart Crowser, Incorporated **Service Request:** K2008783
Project: M&B Sampling/150-002-005/5

INITIAL AND CONTINUING CALIBRATION BLANKS

Concentration Units: ug/L

Sample ID / Analyte	Method	Analysis Batch:	Result	C
ICB 11/13/20 14:56				
Arsenic	6020A	703407	0.04	U
Chromium	6020A	703407	0.04	U
Copper	6020A	703407	0.06	U
Zinc	6020A	703407	0.2	U
CCB 11/13/20 14:59				
Arsenic	6020A	703407	0.04	U
Chromium	6020A	703407	0.04	U
Copper	6020A	703407	0.06	U
Zinc	6020A	703407	0.2	U
CCB 11/13/20 15:31				
Arsenic	6020A	703407	0.04	U
Chromium	6020A	703407	0.04	U
Copper	6020A	703407	0.06	U
Zinc	6020A	703407	0.2	U
CCB 11/13/20 15:44				
Arsenic	6020A	703407	0.04	U
Chromium	6020A	703407	0.04	U
Copper	6020A	703407	0.06	U
Zinc	6020A	703407	0.2	U

Client: Hart Crowser, Incorporated **Service Request:** K2008783
Project: M&B Sampling/150-002-005/5

LOW LEVEL INITIAL AND LOW LEVEL CONTINUING CALIBRATION VERIFICATION

Concentration Units: ug/L

Sample ID / Analyte	Method	Analysis Batch:	Result	True Value	% Rec	% Rec. Limits	Analysis Date
LLICVT							
Arsenic	6020A	703407	1.0	1.0	103	70-130	11/13/20 15:01
Chromium	6020A	703407	0.45	0.4	113	70-130	11/13/20 15:01
Copper	6020A	703407	0.22	0.2	112	70-130	11/13/20 15:01
Zinc	6020A	703407	1.0	1.0	104	70-130	11/13/20 15:01
LLCCVT							
Arsenic	6020A	703407	0.97	1.0	97	70-130	11/13/20 15:46
Chromium	6020A	703407	0.46	0.4	116	70-130	11/13/20 15:46
Copper	6020A	703407	0.22	0.2	112	70-130	11/13/20 15:46
Zinc	6020A	703407	0.90	1.0	90	70-130	11/13/20 15:46

Client: Hart Crowser, Incorporated **Service Request:** K2008783
Project: M&B Sampling/150-002-005/5

ICP INTERFERENCE CHECK SAMPLE

Sample ID ICSA **Concentration Units:** ug/L

Analyte	Method	Analysis Batch:	Result	True Value	% Rec	% Rec. Limits	Analysis Date
Arsenic	6020A	703407	0.2	-	-	-	11/13/20 15:03
Chromium	6020A	703407	1.66	-	-	-	11/13/20 15:03
Copper	6020A	703407	1.00	-	-	-	11/13/20 15:03
Zinc	6020A	703407	0.8	-	-	-	11/13/20 15:03

Client: Hart Crowser, Incorporated **Service Request:** K2008783
Project: M&B Sampling/150-002-005/5

ICP INTERFERENCE CHECK SAMPLE

Sample ID ICSAB **Concentration Units:** ug/L

Analyte	Method	Analysis Batch:	Result	True Value	% Rec	% Rec. Limits	Analysis Date
Arsenic	6020A	703407	24.3	25.0	97	80-120	11/13/20 15:05
Chromium	6020A	703407	53.6	50.0	107	80-120	11/13/20 15:05
Copper	6020A	703407	45.0	50.0	90	80-120	11/13/20 15:05
Zinc	6020A	703407	24.0	25.0	96	80-120	11/13/20 15:05

Client: Hart Crowser, Incorporated **Service Request:** K2008783
Project: M&B Sampling/150-002-005/5

POST SPIKE SAMPLE RECOVERY

Concentration Units: ppb

Sample ID / Analyte	Method	Analysis Batch:	Initial Sample Result	Post Spike Result	True Value	% Rec	% Rec. Limits	Analysis Date
K2008783-003A								
Arsenic	6020A	703407	2.0	56.3	50.0	109	80-120	11/13/20 15:22
Chromium	6020A	703407	1.3	54.3	50.0	106	80-120	11/13/20 15:22
Copper	6020A	703407	127	168	50.0	81	80-120	11/13/20 15:22
Zinc	6020A	703407	161	203	50.0	82	80-120	11/13/20 15:22

Results flagged with a pound (#) indicate the control criteria is not applicable.

Client: Hart Crowser, Incorporated **Service Request:** K2008783
Project: M&B Sampling/150-002-005/5

ICP SERIAL DILUTIONS

Concentration Units: ppb

Sample ID / Analyte	Method	Analysis Batch:	Initial Sample Result	Serial Dillution Result	% Diff	% Diff. Limit	Analysis Date
K2008783-003SDL							
Arsenic	6020A	703407	10	10 J	2	10	11/13/20 15:20
Chromium	6020A	703407	7	6 J	13	10	11/13/20 15:20
Copper	6020A	703407	637	671	5	10	11/13/20 15:20
Zinc	6020A	703407	807	846	5	10	11/13/20 15:20

Client: Hart Crowser, Incorporated **Service Request:** K2008783
Project: M&B Sampling/150-002-005/5

Detection Limits

Instrument: K-ICP-MS-04 **Matrix:** Tissue

Analyte	Mass	Units	MRL	MDL	Method
Arsenic	75	ug/L	1	0.04	6020A
Chromium	52	ug/L	0.4	0.04	6020A
Copper	65	ug/L	0.2	0.06	6020A
Zinc	66	ug/L	1	0.16	6020A

Client: Hart Crowser, Incorporated **Service Request:** K2008783
Project: M&B Sampling/150-002-005/5

ICP Linear Range (Quarterly)

Instrument: K-ICP-MS-04

Analyte	Concentration (ug/L)	Method
Arsenic 75	3000	6020A
Chromium 52	3000	6020A
Copper 65	3000	6020A
Zinc 66	3000	6020A

Client: Hart Crowser, Incorporated **Service Request:** K2008783
Project: M&B Sampling/150-002-005/5

Analysis Run Log

Instrument ID: **K-ICP-MS-04** **Analytical BatchID:** **703407**

Sample	Dilution Factor	Date/Time	As	Cr	Cu	Zn
ZZZZZZ	1	11/13/20 14:48				
ZZZZZZ	1	11/13/20 14:50				
ICV	1	11/13/20 14:52	X	X	X	X
CCV	1	11/13/20 14:54	X	X	X	X
ICB	1	11/13/20 14:56	X	X	X	X
CCB	1	11/13/20 14:59	X	X	X	X
LLICVT	1	11/13/20 15:01	X	X	X	X
ICSA	1	11/13/20 15:03	X	X	X	X
ICSAB	1	11/13/20 15:05	X	X	X	X
KQ2017747-01MB	5	11/13/20 15:07	X	X	X	X
KQ2017747-02LCS	5	11/13/20 15:09	X	X	X	X
KQ2017747-03SRM	5	11/13/20 15:12	X	X	X	X
KQ2017747-04SRM	5	11/13/20 15:14	X	X	X	X
K2008783-003	5	11/13/20 15:16	X	X	X	X
K2008783-003DUP	5	11/13/20 15:18	X	X	X	X
K2008783-003SDL	25	11/13/20 15:20	X	X	X	X
K2008783-003PS	5	11/13/20 15:22	X	X	X	X
K2008783-003MS	5	11/13/20 15:25	X	X	X	X
K2008783-001	5	11/13/20 15:27	X	X	X	X
CCV	1	11/13/20 15:29	X	X	X	X
CCB	1	11/13/20 15:31	X	X	X	X
K2008783-002	5	11/13/20 15:33	X	X	X	X
K2008783-004	5	11/13/20 15:36	X	X	X	X
K2008783-005	5	11/13/20 15:38	X	X	X	X
K2008783-006	5	11/13/20 15:40	X	X	X	X
CCV	1	11/13/20 15:42	X	X	X	X
CCB	1	11/13/20 15:44	X	X	X	X
LLCCVT	1	11/13/20 15:46	X	X	X	X

Client: Hart Crowser, Incorporated **Service Request:** K2008783
Project: M&B Sampling/150-002-005/5

ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY

Instrument ID: **K-ICP-MS-04** **Analytical BatchID:** **703407**

Sample	Date/Time	GeKED3	GeKED2
ZZZZZZ	11/13/20 14:48		
ZZZZZZ	11/13/20 14:50		
ICV	11/13/20 14:52	100	100
CCV	11/13/20 14:54	99	99
ICB	11/13/20 14:56	101	100
CCB	11/13/20 14:59	101	100
LLICVT	11/13/20 15:01	101	100
ICSA	11/13/20 15:03	92	91
ICSAB	11/13/20 15:05	92	93
KQ2017747-01MB	11/13/20 15:07	101	99
KQ2017747-02LCS	11/13/20 15:09	102	102
KQ2017747-03SRM	11/13/20 15:12	97	97
KQ2017747-04SRM	11/13/20 15:14	98	98
K2008783-003	11/13/20 15:16	85	87
K2008783-003DUP	11/13/20 15:18	85	85
K2008783-003SDL	11/13/20 15:20	96	96
K2008783-003PS	11/13/20 15:22	87	86
K2008783-003MS	11/13/20 15:25	86	86
K2008783-001	11/13/20 15:27	89	88
CCV	11/13/20 15:29	100	97
CCB	11/13/20 15:31	99	96
K2008783-002	11/13/20 15:33	87	84
K2008783-004	11/13/20 15:36	88	88
K2008783-005	11/13/20 15:38	88	87
K2008783-006	11/13/20 15:40	106	107
CCV	11/13/20 15:42	101	99
CCB	11/13/20 15:44	102	100
LLCCVT	11/13/20 15:46	103	100

LIPIDS

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 12:50
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-01	**Units:**	Percent
Lab Code:	K2008783-001	**Basis:**	Wet

Lipids

Analysis Method: NOAA LIPID
Prep Method: EPA 3540C

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Lipids, Total	**0.87**	0.22	-	1	11/12/20 12:58	11/6/20	

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 10:15
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-03	**Units:**	Percent
Lab Code:	K2008783-002	**Basis:**	Wet

Lipids

Analysis Method: NOAA LIPID
Prep Method: EPA 3540C

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Lipids, Total	**0.73**	0.22	-	1	11/12/20 12:58	11/6/20	

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 09:00
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-04	**Units:**	Percent
Lab Code:	K2008783-003	**Basis:**	Wet

Lipids

Analysis Method: NOAA LIPID
Prep Method: EPA 3540C

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Lipids, Total	**1.1**	0.20	-	1	11/12/20 12:58	11/6/20	

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 09:00
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-04 Dup	**Units:**	Percent
Lab Code:	K2008783-004	**Basis:**	Wet

Lipids

Analysis Method: NOAA LIPID
Prep Method: EPA 3540C

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Lipids, Total	**0.72**	0.24	-	1	11/12/20 12:58	11/6/20	

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 11:28
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-05	**Units:**	Percent
Lab Code:	K2008783-005	**Basis:**	Wet

Lipids

Analysis Method: NOAA LIPID
Prep Method: EPA 3540C

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Lipids, Total	**1.7**	0.25	-	1	11/12/20 12:58	11/6/20	

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 09:00
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB-20-Baitchicken	**Units:**	Percent
Lab Code:	K2008783-006	**Basis:**	Wet

Lipids

Analysis Method: NOAA LIPID
Prep Method: EPA 3540C

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Lipids, Total	**11**	0.23	-	1	11/12/20 12:58	11/6/20	

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	NA
Sample Matrix:	Tissue	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	Percent
Lab Code:	KQ2017827-04	**Basis:**	Wet

Lipids

Analysis Method: NOAA LIPID
Prep Method: EPA 3540C

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Lipids, Total	ND U	0.05	-	1	11/12/20 12:58	11/6/20	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20
Sample Matrix:	Tissue	**Date Received:**	10/01/20
		Date Analyzed:	11/12/20

Triplicate Sample Summary
Lipids

Sample Name:	MBCFGB1020-04	**Units:**	Percent
Lab Code:	K2008783-003	**Basis:**	Wet
Analysis Method:	NOAA LIPID		
Prep Method:	EPA 3540C		

Analyte Name	MRL	MDL	Sample Result	Duplicate KQ2017827-01 Result	Triplicate KQ2017827-02 Result	Average	RSD	RSD Limit
Lipids, Total	0.04	-	1.1	0.80	0.99	0.963	16	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Analyzed:**	11/12/20
Sample Matrix:	Tissue	**Date Extracted:**	11/06/20

Lab Control Sample Summary
Lipids

Analysis Method:	NOAA LIPID	**Units:**	Percent
Prep Method:	EPA 3540C	**Basis:**	Wet
		Analysis Lot:	703386

Lab Control Sample
KQ2017827-03

Analyte Name	Result	Spike Amount	% Rec	% Rec Limits
Lipids, Total	83.0	100	83	70-130

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Analyzed:**	11/12/20 12:58
Sample Matrix:	Tissue	**Date Extracted:**	11/06/20

Method Blank Summary
Lipids

Sample Name:	Method Blank	**Instrument ID:**	K-Balance-40
Lab Code:	KQ2017827-04	**File ID:**	
Analysis Method:	NOAA LIPID	**Analysis Lot:**	703386
Prep Method:	EPA 3540C	**Extraction Lot:**	369305

This Method Blank applies to the following analyses.

Sample Name	Lab Code	File ID	Date Analyzed
MBCFGB1020-01	K2008783-001		11/12/20 12:58
MBCFGB1020-03	K2008783-002		11/12/20 12:58
MBCFGB1020-04	K2008783-003		11/12/20 12:58
MBCFGB1020-04 Dup	K2008783-004		11/12/20 12:58
MBCFGB1020-05	K2008783-005		11/12/20 12:58
MBCFGB-20-Baitchicken	K2008783-006		11/12/20 12:58
MBCFGB1020-04DUP	KQ2017827-01		11/12/20 12:58
MBCFGB1020-04TRP	KQ2017827-02		11/12/20 12:58
Lab Control Sample	KQ2017827-03		11/12/20 12:58

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Analyzed:**	11/12/20 12:58
Sample Matrix:	Tissue	**Date Extracted:**	11/06/20

Lab Control Sample Summary
Lipids

Sample Name:	Lab Control Sample	**Instrument ID:**	K-Balance-40
Lab Code:	KQ2017827-03	**File ID:**	
Analysis Method:	NOAA LIPID	**Analysis Lot:**	703386
Prep Method:	EPA 3540C	**Extraction Lot:**	369305

This Lab Control Sample applies to the following analyses.

Sample Name	Lab Code	File ID	Date Analyzed
MBCFGB1020-01	K2008783-001		11/12/20 12:58
MBCFGB1020-03	K2008783-002		11/12/20 12:58
MBCFGB1020-04	K2008783-003		11/12/20 12:58
MBCFGB1020-04 Dup	K2008783-004		11/12/20 12:58
MBCFGB1020-05	K2008783-005		11/12/20 12:58
MBCFGB-20-Baitchicken	K2008783-006		11/12/20 12:58
MBCFGB1020-04DUP	KQ2017827-01		11/12/20 12:58
MBCFGB1020-04TRP	KQ2017827-02		11/12/20 12:58
Method Blank	KQ2017827-04		11/12/20 12:58

Client: Hart Crowser, Incorporated **Service Request:**K2008783
Project: M&B Sampling/150-002-005/5

Analysis Run Log
Lipids

Analysis Method: NOAA LIPID **Analysis Lot:**703386
Instrument ID:K-Balance-40

Raw Data File	Sample Name	Lab Code	Date Analyzed	Time Analyzed	Q
	MBCFGB1020-03	K2008783-002	11/12/2020	12:58	
	Method Blank	KQ2017827-04	11/12/2020	12:58	
	MBCFGB1020-01	K2008783-001	11/12/2020	12:58	
	MBCFGB1020-04 DUP	KQ2017827-01	11/12/2020	12:58	
	Lab Control Sample	KQ2017827-03	11/12/2020	12:58	
	MBCFGB-20-Baitchicken	K2008783-006	11/12/2020	12:58	
	MBCFGB1020-04	KQ2017827-02	11/12/2020	12:58	
	MBCFGB1020-04	K2008783-003	11/12/2020	12:58	
	MBCFGB1020-04 Dup	K2008783-004	11/12/2020	12:58	
	MBCFGB1020-05	K2008783-005	11/12/2020	12:58	

Prep Summary Report

Client: Hart Crowser, Incorporated **Service Request:**K2008783
Project: M&B Sampling/150-002-005/5
Sample Matrix: Tissue

Lipids

Prep Method: EPA 3540C **Extraction Lot:** 369305
Analytical Method: NOAA LIPID **Extraction Date:** 11/06/20 07:16

Sample Name	Lab Code	Date Collected	Date Received	Sample Amount	Final Amount	Percent Solids
MBCFGB1020-01	K2008783-001	9/29/20	10/1/20	2.238 g		
MBCFGB1020-03	K2008783-002	9/29/20	10/1/20	2.251 g		
MBCFGB1020-04	K2008783-003	9/29/20	10/1/20	2.538 g		
MBCFGB1020-04 Dup	K2008783-004	9/29/20	10/1/20	2.071 g		
MBCFGB1020-05	K2008783-005	9/29/20	10/1/20	2.032 g		
MBCFGB-20-Baitchicken	K2008783-006	9/29/20	10/1/20	2.205 g		
Duplicate	KQ2017827-01DUP	9/29/20	10/1/20	2.692 g		
MBCFGB1020-04TRP	KQ2017827-02TRP	9/29/20	10/1/20	2.577 g		
Lab Control Sample	KQ2017827-03LCS	NA	NA	2.0 g		
Method Blank	KQ2017827-04MB	NA	NA	2.0 g		

Polycyclic Aromatic Hydrocarbons by GC/MS SIM

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 12:50
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-01	**Units:**	ug/Kg
Lab Code:	K2008783-001	**Basis:**	Wet

Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Analysis Method: 8270D
Prep Method: EPA 3541

Analyte Name	Result		MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
2-Methylnaphthalene	**0.84**	**J**	4.7	0.39	1	11/16/20 13:05	11/12/20	
Acenaphthene	**2.1**	**J**	4.7	0.76	1	11/16/20 13:05	11/12/20	
Acenaphthylene	ND	U	4.7	0.59	1	11/16/20 13:05	11/12/20	
Anthracene	ND	U	4.7	0.58	1	11/16/20 13:05	11/12/20	
Benz(a)anthracene	ND	U	4.7	0.72	1	11/16/20 13:05	11/12/20	
Benzo(a)pyrene	ND	U	4.7	0.76	1	11/16/20 13:05	11/12/20	
Benzo(b)fluoranthene	ND	U	4.7	0.92	1	11/16/20 13:05	11/12/20	
Benzo(g,h,i)perylene	ND	U	4.7	0.85	1	11/16/20 13:05	11/12/20	
Benzo(k)fluoranthene	ND	U	4.7	0.87	1	11/16/20 13:05	11/12/20	
Chrysene	ND	U	4.7	0.80	1	11/16/20 13:05	11/12/20	
Dibenz(a,h)anthracene	ND	U	4.7	0.80	1	11/16/20 13:05	11/12/20	
Dibenzofuran	ND	U	4.7	0.63	1	11/16/20 13:05	11/12/20	
Fluoranthene	**1.4**	**J**	4.7	0.98	1	11/16/20 13:05	11/12/20	
Fluorene	**1.1**	**J**	4.7	0.61	1	11/16/20 13:05	11/12/20	
Indeno(1,2,3-cd)pyrene	ND	U	4.7	0.87	1	11/16/20 13:05	11/12/20	
Naphthalene	**0.73**	**J**	4.7	0.60	1	11/16/20 13:05	11/12/20	
Phenanthrene	**1.7**	**J**	4.7	1.4	1	11/16/20 13:05	11/12/20	
Pyrene	**0.93**	**J**	4.7	0.76	1	11/16/20 13:05	11/12/20	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
Fluoranthene-d10	75	39 - 109	11/16/20 13:05	
Fluorene-d10	62	38 - 104	11/16/20 13:05	
Terphenyl-d14	73	38 - 113	11/16/20 13:05	

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 10:15
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-03	**Units:**	ug/Kg
Lab Code:	K2008783-002	**Basis:**	Wet

Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Analysis Method: 8270D
Prep Method: EPA 3541

Analyte Name	Result		MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
2-Methylnaphthalene	ND	U	4.7	0.39	1	11/16/20 13:42	11/12/20	
Acenaphthene	ND	U	4.7	0.76	1	11/16/20 13:42	11/12/20	
Acenaphthylene	ND	U	4.7	0.59	1	11/16/20 13:42	11/12/20	
Anthracene	ND	U	4.7	0.58	1	11/16/20 13:42	11/12/20	
Benz(a)anthracene	ND	U	4.7	0.72	1	11/16/20 13:42	11/12/20	
Benzo(a)pyrene	ND	U	4.7	0.76	1	11/16/20 13:42	11/12/20	
Benzo(b)fluoranthene	ND	U	4.7	0.92	1	11/16/20 13:42	11/12/20	
Benzo(g,h,i)perylene	ND	U	4.7	0.85	1	11/16/20 13:42	11/12/20	
Benzo(k)fluoranthene	ND	U	4.7	0.87	1	11/16/20 13:42	11/12/20	
Chrysene	ND	U	4.7	0.80	1	11/16/20 13:42	11/12/20	
Dibenz(a,h)anthracene	ND	U	4.7	0.80	1	11/16/20 13:42	11/12/20	
Dibenzofuran	ND	U	4.7	0.63	1	11/16/20 13:42	11/12/20	
Fluoranthene	**1.1**	**J**	4.7	0.98	1	11/16/20 13:42	11/12/20	
Fluorene	ND	U	4.7	0.61	1	11/16/20 13:42	11/12/20	
Indeno(1,2,3-cd)pyrene	ND	U	4.7	0.87	1	11/16/20 13:42	11/12/20	
Naphthalene	ND	U	4.7	0.60	1	11/16/20 13:42	11/12/20	
Phenanthrene	**1.7**	**J**	4.7	1.4	1	11/16/20 13:42	11/12/20	
Pyrene	**0.77**	**J**	4.7	0.76	1	11/16/20 13:42	11/12/20	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
Fluoranthene-d10	75	39 - 109	11/16/20 13:42	
Fluorene-d10	63	38 - 104	11/16/20 13:42	
Terphenyl-d14	72	38 - 113	11/16/20 13:42	

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 09:00
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-04	**Units:**	ug/Kg
Lab Code:	K2008783-003	**Basis:**	Wet

Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Analysis Method: 8270D
Prep Method: EPA 3541

Analyte Name	Result		MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
2-Methylnaphthalene	**0.59**	**J**	4.8	0.39	1	11/16/20 12:29	11/12/20	
Acenaphthene	**1.4**	**J**	4.8	0.76	1	11/16/20 12:29	11/12/20	
Acenaphthylene	ND	U	4.8	0.59	1	11/16/20 12:29	11/12/20	
Anthracene	ND	U	4.8	0.58	1	11/16/20 12:29	11/12/20	
Benz(a)anthracene	**0.84**	**J**	4.8	0.72	1	11/16/20 12:29	11/12/20	
Benzo(a)pyrene	ND	U	4.8	0.76	1	11/16/20 12:29	11/12/20	
Benzo(b)fluoranthene	ND	U	4.8	0.92	1	11/16/20 12:29	11/12/20	
Benzo(g,h,i)perylene	ND	U	4.8	0.85	1	11/16/20 12:29	11/12/20	
Benzo(k)fluoranthene	ND	U	4.8	0.87	1	11/16/20 12:29	11/12/20	
Chrysene	ND	U	4.8	0.80	1	11/16/20 12:29	11/12/20	
Dibenz(a,h)anthracene	ND	U	4.8	0.80	1	11/16/20 12:29	11/12/20	
Dibenzofuran	ND	U	4.8	0.63	1	11/16/20 12:29	11/12/20	
Fluoranthene	**1.8**	**J**	4.8	0.98	1	11/16/20 12:29	11/12/20	
Fluorene	**0.71**	**J**	4.8	0.61	1	11/16/20 12:29	11/12/20	
Indeno(1,2,3-cd)pyrene	ND	U	4.8	0.87	1	11/16/20 12:29	11/12/20	
Naphthalene	**0.63**	**J**	4.8	0.60	1	11/16/20 12:29	11/12/20	
Phenanthrene	**2.2**	**J**	4.8	1.4	1	11/16/20 12:29	11/12/20	
Pyrene	**1.2**	**J**	4.8	0.76	1	11/16/20 12:29	11/12/20	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
Fluoranthene-d10	83	39 - 109	11/16/20 12:29	
Fluorene-d10	68	38 - 104	11/16/20 12:29	
Terphenyl-d14	80	38 - 113	11/16/20 12:29	

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 09:00
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-04 Dup	**Units:**	ug/Kg
Lab Code:	K2008783-004	**Basis:**	Wet

Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Analysis Method: 8270D
Prep Method: EPA 3541

Analyte Name	Result		MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
2-Methylnaphthalene	**0.50**	**J**	4.8	0.39	1	11/16/20 15:32	11/12/20	
Acenaphthene	**2.7**	**J**	4.8	0.76	1	11/16/20 15:32	11/12/20	
Acenaphthylene	ND	U	4.8	0.59	1	11/16/20 15:32	11/12/20	
Anthracene	ND	U	4.8	0.58	1	11/16/20 15:32	11/12/20	
Benz(a)anthracene	ND	U	4.8	0.72	1	11/16/20 15:32	11/12/20	
Benzo(a)pyrene	ND	U	4.8	0.76	1	11/16/20 15:32	11/12/20	
Benzo(b)fluoranthene	ND	U	4.8	0.92	1	11/16/20 15:32	11/12/20	
Benzo(g,h,i)perylene	ND	U	4.8	0.85	1	11/16/20 15:32	11/12/20	
Benzo(k)fluoranthene	ND	U	4.8	0.87	1	11/16/20 15:32	11/12/20	
Chrysene	ND	U	4.8	0.80	1	11/16/20 15:32	11/12/20	
Dibenz(a,h)anthracene	ND	U	4.8	0.80	1	11/16/20 15:32	11/12/20	
Dibenzofuran	ND	U	4.8	0.63	1	11/16/20 15:32	11/12/20	
Fluoranthene	**1.1**	**J**	4.8	0.98	1	11/16/20 15:32	11/12/20	
Fluorene	**0.73**	**J**	4.8	0.61	1	11/16/20 15:32	11/12/20	
Indeno(1,2,3-cd)pyrene	ND	U	4.8	0.87	1	11/16/20 15:32	11/12/20	
Naphthalene	ND	U	4.8	0.60	1	11/16/20 15:32	11/12/20	
Phenanthrene	ND	U	4.8	1.4	1	11/16/20 15:32	11/12/20	
Pyrene	ND	U	4.8	0.76	1	11/16/20 15:32	11/12/20	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
Fluoranthene-d10	96	39 - 109	11/16/20 15:32	
Fluorene-d10	80	38 - 104	11/16/20 15:32	
Terphenyl-d14	89	38 - 113	11/16/20 15:32	

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 11:28
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-05	**Units:**	ug/Kg
Lab Code:	K2008783-005	**Basis:**	Wet

Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Analysis Method: 8270D
Prep Method: EPA 3541

Analyte Name	Result		MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
2-Methylnaphthalene	**0.66**	**J**	4.9	0.39	1	11/16/20 14:19	11/12/20	
Acenaphthene	**1.6**	**J**	4.9	0.76	1	11/16/20 14:19	11/12/20	
Acenaphthylene	ND	U	4.9	0.59	1	11/16/20 14:19	11/12/20	
Anthracene	ND	U	4.9	0.58	1	11/16/20 14:19	11/12/20	
Benz(a)anthracene	**2.6**	**J**	4.9	0.72	1	11/16/20 14:19	11/12/20	
Benzo(a)pyrene	**1.9**	**J**	4.9	0.76	1	11/16/20 14:19	11/12/20	
Benzo(b)fluoranthene	**2.0**	**J**	4.9	0.92	1	11/16/20 14:19	11/12/20	
Benzo(g,h,i)perylene	**1.7**	**J**	4.9	0.85	1	11/16/20 14:19	11/12/20	
Benzo(k)fluoranthene	**1.6**	**J**	4.9	0.87	1	11/16/20 14:19	11/12/20	
Chrysene	**2.2**	**J**	4.9	0.80	1	11/16/20 14:19	11/12/20	
Dibenz(a,h)anthracene	**1.5**	**J**	4.9	0.80	1	11/16/20 14:19	11/12/20	
Dibenzofuran	ND	U	4.9	0.63	1	11/16/20 14:19	11/12/20	
Fluoranthene	**4.0**	**J**	4.9	0.98	1	11/16/20 14:19	11/12/20	
Fluorene	**1.2**	**J**	4.9	0.61	1	11/16/20 14:19	11/12/20	
Indeno(1,2,3-cd)pyrene	**1.8**	**J**	4.9	0.87	1	11/16/20 14:19	11/12/20	
Naphthalene	**0.75**	**J**	4.9	0.60	1	11/16/20 14:19	11/12/20	
Phenanthrene	**2.5**	**J**	4.9	1.4	1	11/16/20 14:19	11/12/20	
Pyrene	**3.1**	**J**	4.9	0.76	1	11/16/20 14:19	11/12/20	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
Fluoranthene-d10	82	39 - 109	11/16/20 14:19	
Fluorene-d10	66	38 - 104	11/16/20 14:19	
Terphenyl-d14	78	38 - 113	11/16/20 14:19	

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 09:00
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB-20-Baitchicken	**Units:**	ug/Kg
Lab Code:	K2008783-006	**Basis:**	Wet

Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Analysis Method: 8270D
Prep Method: EPA 3541

Analyte Name	Result		MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
2-Methylnaphthalene	**1.4**	**J**	4.9	0.39	1	11/16/20 14:55	11/12/20	
Acenaphthene	ND	U	4.9	0.76	1	11/16/20 14:55	11/12/20	
Acenaphthylene	ND	U	4.9	0.59	1	11/16/20 14:55	11/12/20	
Anthracene	ND	U	4.9	0.58	1	11/16/20 14:55	11/12/20	
Benz(a)anthracene	**0.92**	**J**	4.9	0.72	1	11/16/20 14:55	11/12/20	
Benzo(a)pyrene	ND	U	4.9	0.76	1	11/16/20 14:55	11/12/20	
Benzo(b)fluoranthene	**0.94**	**J**	4.9	0.92	1	11/16/20 14:55	11/12/20	
Benzo(g,h,i)perylene	ND	U	4.9	0.85	1	11/16/20 14:55	11/12/20	
Benzo(k)fluoranthene	ND	U	4.9	0.87	1	11/16/20 14:55	11/12/20	
Chrysene	ND	U	4.9	0.80	1	11/16/20 14:55	11/12/20	
Dibenz(a,h)anthracene	ND	U	4.9	0.80	1	11/16/20 14:55	11/12/20	
Dibenzofuran	**0.78**	**J**	4.9	0.63	1	11/16/20 14:55	11/12/20	
Fluoranthene	ND	U	4.9	0.98	1	11/16/20 14:55	11/12/20	
Fluorene	**0.72**	**J**	4.9	0.61	1	11/16/20 14:55	11/12/20	
Indeno(1,2,3-cd)pyrene	ND	U	4.9	0.87	1	11/16/20 14:55	11/12/20	
Naphthalene	**1.7**	**J**	4.9	0.60	1	11/16/20 14:55	11/12/20	
Phenanthrene	**1.7**	**J**	4.9	1.4	1	11/16/20 14:55	11/12/20	
Pyrene	**0.85**	**J**	4.9	0.76	1	11/16/20 14:55	11/12/20	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
Fluoranthene-d10	88	39 - 109	11/16/20 14:55	
Fluorene-d10	76	38 - 104	11/16/20 14:55	
Terphenyl-d14	83	38 - 113	11/16/20 14:55	

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	NA
Sample Matrix:	Tissue	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	ug/Kg
Lab Code:	KQ2017836-04	**Basis:**	Wet

Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Analysis Method: 8270D
Prep Method: EPA 3541

Analyte Name	Result		MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
2-Methylnaphthalene	**0.58**	**J**	5.0	0.39	1	11/16/20 10:03	11/12/20	
Acenaphthene	ND	U	5.0	0.76	1	11/16/20 10:03	11/12/20	
Acenaphthylene	ND	U	5.0	0.59	1	11/16/20 10:03	11/12/20	
Anthracene	ND	U	5.0	0.58	1	11/16/20 10:03	11/12/20	
Benz(a)anthracene	ND	U	5.0	0.72	1	11/16/20 10:03	11/12/20	
Benzo(a)pyrene	ND	U	5.0	0.76	1	11/16/20 10:03	11/12/20	
Benzo(b)fluoranthene	ND	U	5.0	0.92	1	11/16/20 10:03	11/12/20	
Benzo(g,h,i)perylene	ND	U	5.0	0.85	1	11/16/20 10:03	11/12/20	
Benzo(k)fluoranthene	ND	U	5.0	0.87	1	11/16/20 10:03	11/12/20	
Chrysene	ND	U	5.0	0.80	1	11/16/20 10:03	11/12/20	
Dibenz(a,h)anthracene	ND	U	5.0	0.80	1	11/16/20 10:03	11/12/20	
Dibenzofuran	ND	U	5.0	0.63	1	11/16/20 10:03	11/12/20	
Fluoranthene	ND	U	5.0	0.98	1	11/16/20 10:03	11/12/20	
Fluorene	ND	U	5.0	0.61	1	11/16/20 10:03	11/12/20	
Indeno(1,2,3-cd)pyrene	ND	U	5.0	0.87	1	11/16/20 10:03	11/12/20	
Naphthalene	**0.96**	**J**	5.0	0.60	1	11/16/20 10:03	11/12/20	
Phenanthrene	ND	U	5.0	1.4	1	11/16/20 10:03	11/12/20	
Pyrene	ND	U	5.0	0.76	1	11/16/20 10:03	11/12/20	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
Fluoranthene-d10	104	39 - 109	11/16/20 10:03	
Fluorene-d10	87	38 - 104	11/16/20 10:03	
Terphenyl-d14	96	38 - 113	11/16/20 10:03	

Client: Hart Crowser, Incorporated **Service Request:** K2008783
Project: M&B Sampling/150-002-005/5
Sample Matrix: Tissue

SURROGATE RECOVERY SUMMARY
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Analysis Method: 8270D
Extraction Method: EPA 3541

Sample Name	Lab Code	Fluoranthene-d10 39-109	Fluorene-d10 38-104	Terphenyl-d14 38-113
MBCFGB1020-01	K2008783-001	75	62	73
MBCFGB1020-03	K2008783-002	75	63	72
MBCFGB1020-04	K2008783-003	83	68	80
MBCFGB1020-04 Dup	K2008783-004	96	80	89
MBCFGB1020-05	K2008783-005	82	66	78
MBCFGB-20-Baitchicken	K2008783-006	88	76	83
Method Blank	KQ2017836-04	104	87	96
Lab Control Sample	KQ2017836-03	92	73	90
MBCFGB1020-04	KQ2017836-01	77	61	81
MBCFGB1020-04	KQ2017836-02	81	68	76

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QA/QC Report

Client: Hart Crowser, Incorporated **Service Request:**K2008783
Project: M&B Sampling/150-002-005/5 **Date Analyzed:**11/16/20 08:50

Internal Standard Area and RT SUMMARY
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

File ID: J:\MS20\DATA\111620\1116F002.D\ **Lab Code:**KQ2018213-01
Instrument ID: K-MS-20 **Analysis Lot:**703877
Analysis Method: 8270D **Signal ID:**1

		Acenaphthene-d10		Chrysene-d12		Naphthalene-d8	
		Area	**RT**	**Area**	**RT**	**Area**	**RT**
	Result ==>	45,810	7.94	112,491	18.28	87,802	5.75
	Upper Limit ==>	91,620	8.44	224,982	18.78	175,604	6.25
	Lower Limit ==>	22,905	7.44	56,246	17.78	43,901	5.25
Associated Analyses							
Method Blank	KQ2017836-04	44124	7.94	104215	18.28	76584	5.75
Lab Control Sample	KQ2017836-03	41534	7.94	91945	18.28	77320	5.75
MBCFGB1020-04MS	KQ2017836-01	43846	7.94	98403	18.28	78936	5.75
MBCFGB1020-04DMS	KQ2017836-02	43798	7.94	105236	18.28	77391	5.75
MBCFGB1020-04	K2008783-003	45579	7.94	101891	18.28	78401	5.75
MBCFGB1020-01	K2008783-001	47151	7.94	103990	18.28	81765	5.75
MBCFGB1020-03	K2008783-002	46717	7.94	104302	18.28	80290	5.75
MBCFGB1020-05	K2008783-005	45762	7.94	102487	18.28	77752	5.75
MBCFGB-20-Baitchicken	K2008783-006	45149	7.94	103404	18.28	76584	5.75
MBCFGB1020-04 Dup	K2008783-004	45702	7.94	106583	18.28	79565	5.75

Client: Hart Crowser, Incorporated **Service Request:** K2008783
Project: M&B Sampling/150-002-005/5 **Date Analyzed:** 11/16/20 08:50

Internal Standard Area and RT SUMMARY
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

File ID: J:\MS20\DATA\111620\1116F002.D\ **Lab Code:** KQ2018213-01
Instrument ID: K-MS-20 **Analysis Lot:** 703877
Analysis Method: 8270D **Signal ID:** 1

		Perylene-d12		Phenanthrene-d10	
		Area	**RT**	**Area**	**RT**
	Result ==>	116,297	22.37	98,801	11.01
	Upper Limit ==>	232,594	22.87	197,602	11.51
	Lower Limit ==>	58,149	21.87	49,401	10.51
Associated Analyses					
Method Blank	KQ2017836-04	119641	22.36	90025	11.01
Lab Control Sample	KQ2017836-03	105898	22.37	87084	11.01
MBCFGB1020-04MS	KQ2017836-01	111787	22.37	93264	11.01
MBCFGB1020-04DMS	KQ2017836-02	117610	22.36	92809	11.01
MBCFGB1020-04	K2008783-003	112781	22.37	92210	11.01
MBCFGB1020-01	K2008783-001	113953	22.37	95612	11.01
MBCFGB1020-03	K2008783-002	115501	22.37	94904	11.01
MBCFGB1020-05	K2008783-005	114078	22.37	93312	11.01
MBCFGB-20-Baitchicken	K2008783-006	112592	22.37	92765	11.01
MBCFGB1020-04 Dup	K2008783-004	118701	22.37	92432	11.01

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20
Sample Matrix:	Tissue	**Date Received:**	10/01/20
		Date Analyzed:	11/16/20
		Date Extracted:	11/12/20

Duplicate Matrix Spike Summary
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Sample Name:	MBCFGB1020-04	**Units:**	ug/Kg
Lab Code:	K2008783-003	**Basis:**	Wet
Analysis Method:	8270D		
Prep Method:	EPA 3541		

		Matrix Spike KQ2017836-01			**Duplicate Matrix Spike** KQ2017836-02					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
2-Methylnaphthalene	0.59 J	272	473	57	323	494	65	28-98	17	40
Acenaphthene	1.4 J	272	473	57	309	494	62	30-101	12	40
Acenaphthylene	ND U	288	473	61	329	494	67	32-97	13	40
Anthracene	ND U	337	473	71	376	494	76	27-116	11	40
Benz(a)anthracene	0.84 J	351	473	74	398	494	80	27-127	12	40
Benzo(a)pyrene	ND U	324	473	68	361	494	73	25-129	11	40
Benzo(b)fluoranthene	ND U	294	473	62	346	494	70	21-130	16	40
Benzo(g,h,i)perylene	ND U	281	473	60	313	494	63	17-130	11	40
Benzo(k)fluoranthene	ND U	299	473	63	336	494	68	22-126	12	40
Chrysene	ND U	291	473	62	319	494	65	25-132	9	40
Dibenz(a,h)anthracene	ND U	340	473	72	378	494	76	32-116	10	40
Dibenzofuran	ND U	282	473	60	322	494	65	28-105	13	40
Fluoranthene	1.8 J	349	473	73	391	494	79	10-138	12	40
Fluorene	0.71 J	302	473	64	340	494	69	23-116	12	40
Indeno(1,2,3-cd)pyrene	ND U	342	473	72	388	494	79	17-138	13	40
Naphthalene	0.63 J	246	473	52	300	494	61	29-88	20	40
Phenanthrene	2.2 J	284	473	60	310	494	62	10-128	9	40
Pyrene	1.2 J	309	473	65	324	494	65	16-134	5	40

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Matrix Spike and Matrix Spike Duplicate Data is presented for information purposes only. The matrix may or may not be relevant to samples reported in this report. The laboratory evaluates system performance based on the LCS and LCSD control limits.

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Analyzed:**	11/16/20
Sample Matrix:	Tissue	**Date Extracted:**	11/12/20

Lab Control Sample Summary
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Analysis Method:	8270D	**Units:**	ug/Kg
Prep Method:	EPA 3541	**Basis:**	Wet
		Analysis Lot:	703877

Lab Control Sample
KQ2017836-03

Analyte Name	Result	Spike Amount	% Rec	% Rec Limits
2-Methylnaphthalene	355	500	71	43-92
Acenaphthene	337	500	67	44-95
Acenaphthylene	367	500	73	44-93
Anthracene	425	500	85	46-100
Benz(a)anthracene	457	500	91	52-105
Benzo(a)pyrene	415	500	83	52-111
Benzo(b)fluoranthene	377	500	75	52-114
Benzo(g,h,i)perylene	359	500	72	45-107
Benzo(k)fluoranthene	378	500	76	52-112
Chrysene	377	500	75	51-110
Dibenz(a,h)anthracene	432	500	86	44-110
Dibenzofuran	353	500	71	44-96
Fluoranthene	439	500	88	49-102
Fluorene	373	500	75	45-98
Indeno(1,2,3-cd)pyrene	436	500	87	44-117
Naphthalene	333	500	67	42-88
Phenanthrene	351	500	70	41-99
Pyrene	391	500	78	48-104

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QA/QC Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Analyzed:**	11/16/20 10:03
Sample Matrix:	Tissue	**Date Extracted:**	11/12/20

Method Blank Summary
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Sample Name:	Method Blank	**Instrument ID:**	K-MS-20
Lab Code:	KQ2017836-04	**File ID:**	J:\MS20\DATA\111620\1116F003.D\
Analysis Method:	8270D	**Analysis Lot:**	703877
Prep Method:	EPA 3541	**Extraction Lot:**	369669

This Method Blank applies to the following analyses.

Sample Name	Lab Code	File ID	Date Analyzed
Lab Control Sample	KQ2017836-03	J:\MS20\DATA\111620\1116F004.D\	11/16/20 10:39
MBCFGB1020-04MS	KQ2017836-01	J:\MS20\DATA\111620\1116F005.D\	11/16/20 11:16
MBCFGB1020-04DMS	KQ2017836-02	J:\MS20\DATA\111620\1116F006.D\	11/16/20 11:52
MBCFGB1020-04	K2008783-003	J:\MS20\DATA\111620\1116F007.D\	11/16/20 12:29
MBCFGB1020-01	K2008783-001	J:\MS20\DATA\111620\1116F008.D\	11/16/20 13:05
MBCFGB1020-03	K2008783-002	J:\MS20\DATA\111620\1116F009.D\	11/16/20 13:42
MBCFGB1020-05	K2008783-005	J:\MS20\DATA\111620\1116F010.D\	11/16/20 14:19
MBCFGB-20-Baitchicken	K2008783-006	J:\MS20\DATA\111620\1116F011.D\	11/16/20 14:55
MBCFGB1020-04 Dup	K2008783-004	J:\MS20\DATA\111620\1116F012.D\	11/16/20 15:32

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QA/QC Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Analyzed:**	11/16/20 10:39
Sample Matrix:	Tissue	**Date Extracted:**	11/12/20

Lab Control Sample Summary
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Sample Name:	Lab Control Sample	**Instrument ID:**	K-MS-20
Lab Code:	KQ2017836-03	**File ID:**	J:\MS20\DATA\111620\1116F004.D\
Analysis Method:	8270D	**Analysis Lot:**	703877
Prep Method:	EPA 3541	**Extraction Lot:**	369669

This Lab Control Sample applies to the following analyses.

Sample Name	Lab Code	File ID	Date Analyzed
Method Blank	KQ2017836-04	J:\MS20\DATA\111620\1116F003.D\	11/16/20 10:03
MBCFGB1020-04MS	KQ2017836-01	J:\MS20\DATA\111620\1116F005.D\	11/16/20 11:16
MBCFGB1020-04DMS	KQ2017836-02	J:\MS20\DATA\111620\1116F006.D\	11/16/20 11:52
MBCFGB1020-04	K2008783-003	J:\MS20\DATA\111620\1116F007.D\	11/16/20 12:29
MBCFGB1020-01	K2008783-001	J:\MS20\DATA\111620\1116F008.D\	11/16/20 13:05
MBCFGB1020-03	K2008783-002	J:\MS20\DATA\111620\1116F009.D\	11/16/20 13:42
MBCFGB1020-05	K2008783-005	J:\MS20\DATA\111620\1116F010.D\	11/16/20 14:19
MBCFGB-20-Baitchicken	K2008783-006	J:\MS20\DATA\111620\1116F011.D\	11/16/20 14:55
MBCFGB1020-04 Dup	K2008783-004	J:\MS20\DATA\111620\1116F012.D\	11/16/20 15:32

Client: Hart Crowser, Incorporated **Service Request:**K2008783
Project: M&B Sampling/150-002-005/5 **Date Analyzed:**11/16/20 08:14

Tune Summary
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

File ID: J:\MS20\DATA\111620\1116F001.D\ **Analytical Method:** 8270D
Instrument ID: K-MS-20 **Analysis Lot:** 703877

Target Mass	Relative to Mass	Lower Limit %	Upper Limit %	Relative Abundance %	Raw Abundance	Result Pass/Fail
51	198	10	80	19.48	56337	Pass
68	69	0	2	0.00	0	Pass
69	198	0	100	24.10	69701	Pass
70	69	0	2	0.62	430	Pass
127	198	10	80	38.11	110216	Pass
197	198	0	2	0.00	0	Pass
198	442	30	100	36.62	289173	Pass
199	198	5	9	6.74	19490	Pass
275	198	10	60	34.67	100261	Pass
365	442	1	50	1.81	14281	Pass
441	443	0.01	100	77.77	122842	Pass
442	442	30	100	100.00	789610	Pass
443	442	15	24	20.00	157952	Pass

Sample Name	Lab Code	File ID:	Date Analyzed:	Q
Continuing Calibration Verification	KQ2018213-01	J:\MS20\DATA\111620\1116F002.D\	11/16/20 08:50	
Method Blank	KQ2017836-04	J:\MS20\DATA\111620\1116F003.D\	11/16/20 10:03	
Lab Control Sample	KQ2017836-03	J:\MS20\DATA\111620\1116F004.D\	11/16/20 10:39	
MBCFGB1020-04	KQ2017836-01	J:\MS20\DATA\111620\1116F005.D\	11/16/20 11:16	
MBCFGB1020-04	KQ2017836-02	J:\MS20\DATA\111620\1116F006.D\	11/16/20 11:52	
MBCFGB1020-04	K2008783-003	J:\MS20\DATA\111620\1116F007.D\	11/16/20 12:29	
MBCFGB1020-01	K2008783-001	J:\MS20\DATA\111620\1116F008.D\	11/16/20 13:05	
MBCFGB1020-03	K2008783-002	J:\MS20\DATA\111620\1116F009.D\	11/16/20 13:42	
MBCFGB1020-05	K2008783-005	J:\MS20\DATA\111620\1116F010.D\	11/16/20 14:19	
MBCFGB-20-Baitchicken	K2008783-006	J:\MS20\DATA\111620\1116F011.D\	11/16/20 14:55	
MBCFGB1020-04 Dup	K2008783-004	J:\MS20\DATA\111620\1116F012.D\	11/16/20 15:32	

Client: Hart Crowser, Incorporated **Service Request:** K2008783
Project: M&B Sampling **Calibration Date:** 9/22/2020

Initial Calibration Summary
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Calibration ID: KC2000509 **Signal ID:** 1
Instrument ID: K-MS-20

#	Lab Code	Sample Name	File Location	Acquisition Date
01	KC2000509-01	SIM-PAH ICAL @.002 ug/mL | SVM64-75A	J:\MS20\DATA\092220\0922F003.D	09/22/2020 10:37
02	KC2000509-02	SIM-PAH ICAL @.004 ug/mL | SVM64-75A	J:\MS20\DATA\092220\0922F004.D	09/22/2020 11:13
03	KC2000509-03	SIM-PAH ICAL @.008 ug/mL | SVM64-75A	J:\MS20\DATA\092220\0922F005.D	09/22/2020 11:50
04	KC2000509-04	SIM-PAH ICAL @0.02 ug/mL | SVM64-75A	J:\MS20\DATA\092220\0922F006.D	09/22/2020 12:27
05	KC2000509-05	SIM-PAH ICAL @0.1 ug/mL | SVM64-75A	J:\MS20\DATA\092220\0922F007.D	09/22/2020 13:04
06	KC2000509-06	SIM-PAH ICAL @0.2 ug/mL | SVM64-75A	J:\MS20\DATA\092220\0922F008.D	09/22/2020 13:41
07	KC2000509-07	SIM-PAH ICAL @0.4 ug/mL | SVM64-75A	J:\MS20\DATA\092220\0922F009.D	09/22/2020 14:18
08	KC2000509-08	SIM-PAH ICAL @1.0 ug/mL | SVM64-75A	J:\MS20\DATA\092220\0922F010.D	09/22/2020 14:55
09	KC2000509-09	SIM-PAH ICAL @1.6 ug/mL | SVM64-75A	J:\MS20\DATA\092220\0922F011.D	09/22/2020 15:32
10	KC2000509-10	SIM-PAH ICAL @2.0 ug/mL | SVM64-75A	J:\MS20\DATA\092220\0922F012.D	09/22/2020 16:08

Analyte

2-Methylnaphthalene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	0.8565	02	4.000	0.7375	03	8.000	0.7062	04	20.000	0.7206
05	100.000	0.7618	06	200.000	0.7498	07	400.000	0.7123	08	1000.000	0.6828
09	1600.000	0.6409	10	2000.000	0.6237						

Acenaphthene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.422	02	4.000	1.336	03	8.000	1.281	04	20.000	1.354
05	100.000	1.349	06	200.000	1.329	07	400.000	1.285	08	1000.000	1.265
09	1600.000	1.272	10	2000.000	1.221						

Acenaphthylene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	2.157	02	4.000	1.953	03	8.000	1.855	04	20.000	1.931
05	100.000	1.996	06	200.000	1.961	07	400.000	1.954	08	1000.000	2.012
09	1600.000	1.998	10	2000.000	1.961						

Anthracene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.059	02	4.000	0.9216	03	8.000	0.8932	04	20.000	0.892
05	100.000	0.9918	06	200.000	1.001	07	400.000	0.9993	08	1000.000	1.033
09	1600.000	1.044	10	2000.000	1.01						

Benz(a)anthracene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.34	02	4.000	1.127	03	8.000	0.975	04	20.000	0.9407
05	100.000	1.014	06	200.000	1.028	07	400.000	1.049	08	1000.000	1.153
09	1600.000	1.182	10	2000.000	1.195						

Client: Hart Crowser, Incorporated **Service Request:** K2008783
Project: M&B Sampling **Calibration Date:** 9/22/2020

Initial Calibration Summary
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Calibration ID: KC2000509 **Signal ID:** 1
Instrument ID: K-MS-20

Analyte

Benzo(a)pyrene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.009	02	4.000	0.8543	03	8.000	0.788	04	20.000	0.8436
05	100.000	0.9665	06	200.000	1.019	07	400.000	1.056	08	1000.000	1.115
09	1600.000	1.135	10	2000.000	1.102						

Benzo(b)fluoranthene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.336	02	4.000	1.164	03	8.000	1.079	04	20.000	1.143
05	100.000	1.201	06	200.000	1.21	07	400.000	1.231	08	1000.000	1.291
09	1600.000	1.291	10	2000.000	1.253						

Benzo(g,h,i)perylene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.448	02	4.000	1.401	03	8.000	1.359	04	20.000	1.454
05	100.000	1.502	06	200.000	1.432	07	400.000	1.353	08	1000.000	1.293
09	1600.000	1.271	10	2000.000	1.215						

Benzo(k)fluoranthene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.334	02	4.000	1.126	03	8.000	1.061	04	20.000	1.182
05	100.000	1.324	06	200.000	1.346	07	400.000	1.352	08	1000.000	1.314
09	1600.000	1.316	10	2000.000	1.271						

Chrysene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.427	02	4.000	1.313	03	8.000	1.262	04	20.000	1.278
05	100.000	1.335	06	200.000	1.284	07	400.000	1.222	08	1000.000	1.209
09	1600.000	1.218	10	2000.000	1.17						

Dibenz(a,h)anthracene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.135	02	4.000	0.9982	03	8.000	0.9813	04	20.000	1.053
05	100.000	1.185	06	200.000	1.181	07	400.000	1.16	08	1000.000	1.171
09	1600.000	1.176	10	2000.000	1.138						

Dibenzofuran

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	2.105	02	4.000	1.984	03	8.000	1.88	04	20.000	1.982
05	100.000	2.055	06	200.000	1.995	07	400.000	1.932	08	1000.000	1.894
09	1600.000	1.875	10	2000.000	1.811						

Fluoranthene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.347	02	4.000	1.181	03	8.000	1.094	04	20.000	1.144
05	100.000	1.281	06	200.000	1.272	07	400.000	1.258	08	1000.000	1.236
09	1600.000	1.232	10	2000.000	1.189						

Client: Hart Crowser, Incorporated **Service Request:** K2008783
Project: M&B Sampling **Calibration Date:** 9/22/2020

Initial Calibration Summary
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Calibration ID: KC2000509 **Signal ID:** 1
Instrument ID: K-MS-20

Analyte

Fluoranthene-d10

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.077	02	4.000	0.9551	03	8.000	0.8986	04	20.000	0.9218
05	100.000	0.9958	06	200.000	0.974	07	400.000	0.9806	08	1000.000	1.011
09	1600.000	1.041	10	2000.000	1.014						

Fluorene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.664	02	4.000	1.495	03	8.000	1.415	04	20.000	1.498
05	100.000	1.57	06	200.000	1.522	07	400.000	1.488	08	1000.000	1.465
09	1600.000	1.451	10	2000.000	1.409						

Fluorene-d10

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.397	02	4.000	1.19	03	8.000	1.118	04	20.000	1.156
05	100.000	1.216	06	200.000	1.18	07	400.000	1.157	08	1000.000	1.143
09	1600.000	1.15	10	2000.000	1.108						

Indeno(1,2,3-cd)pyrene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.024	02	4.000	0.8903	03	8.000	0.8338	04	20.000	0.8859
05	100.000	0.9973	06	200.000	1.014	07	400.000	1.035	08	1000.000	1.076
09	1600.000	1.085	10	2000.000	1.05						

Naphthalene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.236	02	4.000	1.193	03	8.000	1.069	04	20.000	1.162
05	100.000	1.198	06	200.000	1.15	07	400.000	1.106	08	1000.000	1.055
09	1600.000	1.001	10	2000.000	0.9673						

Phenanthrene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.427	02	4.000	1.26	03	8.000	1.199	04	20.000	1.24
05	100.000	1.276	06	200.000	1.223	07	400.000	1.18	08	1000.000	1.155
09	1600.000	1.149	10	2000.000	1.108						

Pyrene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.508	02	4.000	1.349	03	8.000	1.29	04	20.000	1.307
05	100.000	1.398	06	200.000	1.363	07	400.000	1.334	08	1000.000	1.351
09	1600.000	1.351	10	2000.000	1.322						

Terphenyl-d14

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.051	02	4.000	0.9422	03	8.000	0.8886	04	20.000	0.8942
05	100.000	0.9426	06	200.000	0.9104	07	400.000	0.8656	08	1000.000	0.8842
09	1600.000	0.8936	10	2000.000	0.8801						

Client: Hart Crowser, Incorporated **Service Request:** K2008783
Project: M&B Sampling **Calibration Date:** 9/22/2020

Initial Calibration Summary
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Calibration ID: KC2000509 **Signal ID:** 1
Instrument ID: K-MS-20

		Calibration Evaluation				Calibration Evaluation	
Analyte Name	Compound Type	Fit Type	Eval	Eval Result	Control Criteria	Average RRF	Minimum RRF
2-Methylnaphthalene	TRG	Average RF	% RSD	9.1	≤20	0.7192	0.40
Acenaphthene	TRG	Average RF	% RSD	4.4	≤20	1.311	0.90
Acenaphthylene	TRG	Average RF	% RSD	3.9	≤20	1.978	0.90
Anthracene	TRG	Average RF	% RSD	6.2	≤20	0.9846	0.70
Benz(a)anthracene	TRG	Average RF	% RSD	11.1	≤20	1.1	0.80
Benzo(a)pyrene	TRG	Average RF	% RSD	12.4	≤20	0.9888	0.70
Benzo(b)fluoranthene	TRG	Average RF	% RSD	6.4	≤20	1.22	0.70
Benzo(g,h,i)perylene	TRG	Average RF	% RSD	6.7	≤20	1.373	0.50
Benzo(k)fluoranthene	TRG	Average RF	% RSD	8.1	≤20	1.263	0.70
Chrysene	TRG	Average RF	% RSD	5.8	≤20	1.272	0.70
Dibenz(a,h)anthracene	TRG	Average RF	% RSD	6.9	≤20	1.118	0.40
Dibenzofuran	TRG	Average RF	% RSD	4.6	≤20	1.951	0.80
Fluoranthene	TRG	Average RF	% RSD	6.0	≤20	1.224	0.60
Fluoranthene-d10	SURR	Average RF	% RSD	5.4	≤20	0.9869	0.01
Fluorene	TRG	Average RF	% RSD	5.1	≤20	1.498	0.90
Fluorene-d10	SURR	Average RF	% RSD	7.0	≤20	1.181	0.01
Indeno(1,2,3-cd)pyrene	TRG	Average RF	% RSD	8.9	≤20	0.9891	0.50
Naphthalene	TRG	Average RF	% RSD	8.0	≤20	1.114	0.70
Phenanthrene	TRG	Average RF	% RSD	7.3	≤20	1.222	0.70
Pyrene	TRG	Average RF	% RSD	4.5	≤20	1.357	0.60
Terphenyl-d14	SURR	Average RF	% RSD	5.9	≤20	0.9153	0.01

Client: Hart Crowser, Incorporated **Service Request:** K2008783
Project: M&B Sampling **Calibration Date:** 9/22/2020

Initial Calibration Verification Summary
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Calibration ID: KC2000509 **Signal ID:** 1
Instrument ID: K-MS-20

#	Lab Code	Sample Name	File Location	Acquisition Date
11	KC2000509-11	SIM-PAH ICV @ 0.4 ug/mL | SVM64-75K	J:\MS20\DATA\092220\0922F013.D	09/22/2020 16:45

Analyte Name	Expected	Result	Average RF	SSV RF	% D	Criteria	Curve Fit
2-Methylnaphthalene	0.00	395	7.192E-1	7.095E-1	-1.355	±30	Average RF
Acenaphthene	0.00	379	1.311E0	1.243E0	-5.249	±30	Average RF
Acenaphthylene	0.00	418	1.978E0	2.068E0	4.57	±30	Average RF
Anthracene	0.00	426	9.846E-1	1.049E0	6.50	±30	Average RF
Benz(a)anthracene	0.00	383	1.1E0	1.055E0	-4.153	±30	Average RF
Benzo(a)pyrene	0.00	432	9.888E-1	1.068E0	7.97	±30	Average RF
Benzo(b)fluoranthene	0.00	396	1.22E0	1.207E0	-1.026	±30	Average RF
Benzo(g,h,i)perylene	0.00	352	1.373E0	1.207E0	-12.087	±30	Average RF
Benzo(k)fluoranthene	0.00	422	1.263E0	1.334E0	5.62	±30	Average RF
Chrysene	0.00	372	1.272E0	1.183E0	-7.002	±30	Average RF
Dibenz(a,h)anthracene	0.00	384	1.118E0	1.072E0	-4.075	±30	Average RF
Dibenzofuran	0.00	391	1.951E0	1.91E0	-2.134	±30	Average RF
Fluoranthene	0.00	403	1.224E0	1.233E0	0.779	±30	Average RF
Fluorene	0.00	399	1.498E0	1.493E0	-0.322	±30	Average RF
Indeno(1,2,3-cd)pyrene	0.00	424	9.891E-1	1.05E0	6.12	±30	Average RF
Naphthalene	0.00	397	1.114E0	1.106E0	-0.705	±30	Average RF
Phenanthrene	0.00	381	1.222E0	1.164E0	-4.739	±30	Average RF
Pyrene	0.00	374	1.357E0	1.27E0	-6.405	±30	Average RF

Analyte Name	Expected	Result	Average RF	SSV RF	% D	Criteria	Curve Fit
Fluoranthene-d10	0.00	427	9.869E-1	1.054E0	6.79	±30	Average RF
Fluorene-d10	0.00	420	1.181E0	1.24E0	4.99	±30	Average RF
Terphenyl-d14	0.00	404	9.153E-1	9.245E-1	1.01	±30	Average RF

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Analyzed:**	11/16/20 08:50

Continuing Calibration Verification (CCV) Summary
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Analysis Method:	8270D	**Calibration Date:**	9/22/2020
File ID:	J:\MS20\DATA\111620\1116F002.D\	**Calibration ID:**	KC2000509
Signal ID:	1	**Analysis Lot:**	703877
		Units:	ng/mL

Analyte Name	Expected	Result	Average RF	CCV RF	% D	% Drift	Criteria	Curve Fit
2-Methylnaphthalene	400	391	0.7192	0.7032	-2.2	NA	±20	Average RF
Acenaphthene	400	380	1.3115	1.2466	-4.9	NA	±20	Average RF
Acenaphthylene	400	398	1.9777	1.9678	-0.5	NA	±20	Average RF
Anthracene	400	370	0.9846	0.9116	-7.4	NA	±20	Average RF
Benz(a)anthracene	400	419	1.1004	1.152	4.7	NA	±20	Average RF
Benzo(a)pyrene	400	450	0.9888	1.1127	12.5	NA	±20	Average RF
Benzo(b)fluoranthene	400	404	1.2198	1.231	0.9	NA	±20	Average RF
Benzo(g,h,i)perylene	400	373	1.3728	1.2792	-6.8	NA	±20	Average RF
Benzo(k)fluoranthene	400	415	1.2627	1.3094	3.7	NA	±20	Average RF
Chrysene	400	353	1.2718	1.1222	-11.8	NA	±20	Average RF
Dibenz(a,h)anthracene	400	446	1.1179	1.2467	11.5	NA	±20	Average RF
Dibenzofuran	400	399	1.9514	1.9461	-0.3	NA	±20	Average RF
Fluoranthene	400	422	1.2235	1.2893	5.4	NA	±20	Average RF
Fluorene	400	399	1.4977	1.4934	-0.3	NA	±20	Average RF
Indeno(1,2,3-cd)pyrene	400	463	0.9891	1.1446	15.7	NA	±20	Average RF
Naphthalene	400	396	1.1137	1.1022	-1.0	NA	±20	Average RF
Phenanthrene	400	361	1.2217	1.1016	-9.8	NA	±20	Average RF
Pyrene	400	353	1.3572	1.1986	-11.7	NA	±20	Average RF

Analyte Name	Expected	Result	Average RF	CCV RF	% D	% Drift	Criteria	Curve Fit
Fluoranthene-d10	400	478	0.9869	1.1782	19.4	NA	±20	Average RF
Fluorene-d10	400	430	1.1814	1.2689	7.4	NA	±20	Average RF
Terphenyl-d14	400	441	0.9153	1.0081	10.1	NA	±20	Average RF

Client: Hart Crowser, Incorporated **Service Request:**K2008783
Project: M&B Sampling/150-002-005/5

Analysis Run Log
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Analysis Method: **Analysis Lot:**703877
Instrument ID:K-MS-20

Raw Data File	Sample Name	Lab Code	Date Analyzed	Time Analyzed	Q
J:\MS20\DATA\111620\1116F001.D\	ZZZZZZZ	ZZZZZZZ	11/16/2020	08:14:00	
J:\MS20\DATA\111620\1116F002.D\	Continuing Calibration Verification	KQ2018213-01	11/16/2020	08:50:00	
J:\MS20\DATA\111620\1116F003.D\	Method Blank	KQ2017836-04	11/16/2020	10:03:00	
J:\MS20\DATA\111620\1116F004.D\	Lab Control Sample	KQ2017836-03	11/16/2020	10:39:00	
J:\MS20\DATA\111620\1116F005.D\	MBCFGB1020-04 MS	KQ2017836-01	11/16/2020	11:16:00	
J:\MS20\DATA\111620\1116F006.D\	MBCFGB1020-04 DMS	KQ2017836-02	11/16/2020	11:52:00	
J:\MS20\DATA\111620\1116F007.D\	MBCFGB1020-04	K2008783-003	11/16/2020	12:29:00	
J:\MS20\DATA\111620\1116F008.D\	MBCFGB1020-01	K2008783-001	11/16/2020	13:05:00	
J:\MS20\DATA\111620\1116F009.D\	MBCFGB1020-03	K2008783-002	11/16/2020	13:42:00	
J:\MS20\DATA\111620\1116F010.D\	MBCFGB1020-05	K2008783-005	11/16/2020	14:19:00	
J:\MS20\DATA\111620\1116F011.D\	MBCFGB-20-Baitchicken	K2008783-006	11/16/2020	14:55:00	
J:\MS20\DATA\111620\1116F012.D\	MBCFGB1020-04 Dup	K2008783-004	11/16/2020	15:32:00	

Prep Summary Report

Client: Hart Crowser, Incorporated **Service Request:**K2008783
Project: M&B Sampling/150-002-005/5
Sample Matrix: Tissue

Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Prep Method: EPA 3541 **Extraction Lot:** 369669
Analytical Method: 8270D **Extraction Date:** 11/12/20 09:31

Sample Name	Lab Code	Date Collected	Date Received	Sample Amount	Final Amount	Percent Solids
MBCFGB1020-01	K2008783-001	9/29/20	10/1/20	10.591 g	10 mL	
MBCFGB1020-03	K2008783-002	9/29/20	10/1/20	10.576 g	10 mL	
MBCFGB1020-04	K2008783-003	9/29/20	10/1/20	10.402 g	10 mL	
MBCFGB1020-04 Dup	K2008783-004	9/29/20	10/1/20	10.429 g	10 mL	
MBCFGB1020-05	K2008783-005	9/29/20	10/1/20	10.259 g	10 mL	
MBCFGB-20-Baitchicken	K2008783-006	9/29/20	10/1/20	10.189 g	10 mL	
Matrix Spike	KQ2017836-01MS	9/29/20	10/1/20	10.577 g	10 mL	
Duplicate Matrix Spike	KQ2017836-02DMS	9/29/20	10/1/20	10.120 g	10 mL	
Lab Control Sample	KQ2017836-03LCS	NA	NA	10 g	10 mL	
Method Blank	KQ2017836-04MB	NA	NA	10 g	10 mL	

Pentachlorophenol

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 12:50
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-01	**Units:**	ug/Kg
Lab Code:	K2008783-001	**Basis:**	Wet

Sim-Phenols tissue, Derivitized

Analysis Method: 8270D SIM
Prep Method: EPA 3541

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Pentachlorophenol	ND U	98	7.6	1	12/08/20 21:38	11/12/20	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
2,4,6-Tribromophenol	68	30 - 125	12/08/20 21:38	

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 10:15
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-03	**Units:**	ug/Kg
Lab Code:	K2008783-002	**Basis:**	Wet

Sim-Phenols tissue, Derivitized

Analysis Method: 8270D SIM
Prep Method: EPA 3541

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Pentachlorophenol	ND U	96	7.6	1	12/08/20 22:04	11/12/20	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
2,4,6-Tribromophenol	40	30 - 125	12/08/20 22:04	

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 09:00
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-04	**Units:**	ug/Kg
Lab Code:	K2008783-003	**Basis:**	Wet

Sim-Phenols tissue, Derivitized

Analysis Method: 8270D SIM
Prep Method: EPA 3541

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Pentachlorophenol	ND U	90	7.6	1	12/08/20 22:29	11/12/20	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
2,4,6-Tribromophenol	68	30 - 125	12/08/20 22:29	

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 09:00
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-04 Dup	**Units:**	ug/Kg
Lab Code:	K2008783-004	**Basis:**	Wet

Sim-Phenols tissue, Derivitized

Analysis Method: 8270D SIM
Prep Method: EPA 3541

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Pentachlorophenol	ND U	98	7.6	1	12/08/20 22:54	11/12/20	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
2,4,6-Tribromophenol	74	30 - 125	12/08/20 22:54	

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 11:28
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-05	**Units:**	ug/Kg
Lab Code:	K2008783-005	**Basis:**	Wet

Sim-Phenols tissue, Derivitized

Analysis Method: 8270D SIM
Prep Method: EPA 3541

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Pentachlorophenol	ND U	96	7.6	1	12/08/20 23:20	11/12/20	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
2,4,6-Tribromophenol	72	30 - 125	12/08/20 23:20	

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 09:00
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB-20-Baitchicken	**Units:**	ug/Kg
Lab Code:	K2008783-006	**Basis:**	Wet

Sim-Phenols tissue, Derivitized

Analysis Method: 8270D SIM
Prep Method: EPA 3541

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Pentachlorophenol	ND U	96	7.6	1	12/08/20 23:45	11/12/20	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
2,4,6-Tribromophenol	72	30 - 125	12/08/20 23:45	

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	NA
Sample Matrix:	Tissue	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	ug/Kg
Lab Code:	KQ2017834-04	**Basis:**	Wet

Sim-Phenols tissue, Derivitized

Analysis Method: 8270D SIM
Prep Method: EPA 3541

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Pentachlorophenol	ND U	90	7.6	1	12/08/20 19:57	11/12/20	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
2,4,6-Tribromophenol	59	30 - 125	12/08/20 19:57	

Client: Hart Crowser, Incorporated **Service Request:** K2008783
Project: M&B Sampling/150-002-005/5
Sample Matrix: Tissue

SURROGATE RECOVERY SUMMARY
Sim-Phenols tissue, Derivitized

Analysis Method: 8270D SIM
Extraction Method: EPA 3541

Sample Name	Lab Code	2,4,6-Tribromophenol 30-125
MBCFGB1020-01	K2008783-001	68
MBCFGB1020-03	K2008783-002	40
MBCFGB1020-04	K2008783-003	68
MBCFGB1020-04 Dup	K2008783-004	74
MBCFGB1020-05	K2008783-005	72
MBCFGB-20-Baitchicken	K2008783-006	72
Method Blank	KQ2017834-04	59
Lab Control Sample	KQ2017834-03	96
MBCFGB1020-04	KQ2017834-01	66
MBCFGB1020-04	KQ2017834-02	79

Client: Hart Crowser, Incorporated **Service Request:** K2008783
Project: M&B Sampling/150-002-005/5 **Date Analyzed:** 12/08/20 15:46

Internal Standard Area and RT SUMMARY

Sim-Phenols tissue, Derivitized

File ID: J:\MS17\DATA\120820\120820F014.D\ **Lab Code:** KQ2019848-02
Instrument ID: K-MS-17 **Analysis Lot:** 706558
Analysis Method: 8270D SIM **Signal ID:** 1

		Phenanthrene-d10	
		Area	**RT**
	Result ==>	370,212	13.02
	Upper Limit ==>	740,424	13.52
	Lower Limit ==>	185,106	12.52
Associated Analyses			
Continuing Calibration Verification	KQ2019848-02	363995	13.03
Method Blank	KQ2017834-04	718277	13.03
Lab Control Sample	KQ2017834-03	452397	13.03
MBCFGB1020-04MS	KQ2017834-01	448821	13.03
MBCFGB1020-04DMS	KQ2017834-02	478116	13.03
MBCFGB1020-01	K2008783-001	519775	13.03
MBCFGB1020-03	K2008783-002	515318	13.03
MBCFGB1020-04	K2008783-003	560424	13.03
MBCFGB1020-04 Dup	K2008783-004	565564	13.03
MBCFGB1020-05	K2008783-005	618909	13.03
MBCFGB-20-Baitchicken	K2008783-006	633176	13.02

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20
Sample Matrix:	Tissue	**Date Received:**	10/01/20
		Date Analyzed:	12/8/20
		Date Extracted:	11/12/20

Duplicate Matrix Spike Summary
Sim-Phenols tissue, Derivitized

Sample Name:	MBCFGB1020-04	**Units:**	ug/Kg
Lab Code:	K2008783-003	**Basis:**	Wet
Analysis Method:	8270D SIM		
Prep Method:	EPA 3541		

		Matrix Spike			**Duplicate Matrix Spike**					
		KQ2017834-01			KQ2017834-02					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Pentachlorophenol	ND U	326	2950	11 *	378	2950	13 *	25-134	15	40

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Matrix Spike and Matrix Spike Duplicate Data is presented for information purposes only. The matrix may or may not be relevant to samples reported in this report. The laboratory evaluates system performance based on the LCS and LCSD control limits.

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Analyzed:**	12/08/20
Sample Matrix:	Tissue	**Date Extracted:**	11/12/20

Lab Control Sample Summary
Sim-Phenols tissue, Derivitized

Analysis Method:	8270D SIM	**Units:**	ug/Kg
Prep Method:	EPA 3541	**Basis:**	Wet
		Analysis Lot:	706558

Lab Control Sample
KQ2017834-03

Analyte Name	Result	Spike Amount	% Rec	% Rec Limits
Pentachlorophenol	2710	3000	90	25-134

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Analyzed:**	12/08/20 19:57
Sample Matrix:	Tissue	**Date Extracted:**	11/12/20

Method Blank Summary
Sim-Phenols tissue, Derivitized

Sample Name:	Method Blank	**Instrument ID:**	K-MS-17
Lab Code:	KQ2017834-04	**File ID:**	J:\MS17\DATA\120820\120820F024.D\
Analysis Method:	8270D SIM	**Analysis Lot:**	706558
Prep Method:	EPA 3541	**Extraction Lot:**	369666

This Method Blank applies to the following analyses.

Sample Name	Lab Code	File ID	Date Analyzed
Lab Control Sample	KQ2017834-03	J:\MS17\DATA\120820\120820F025.D\	12/08/20 20:23
MBCFGB1020-04MS	KQ2017834-01	J:\MS17\DATA\120820\120820F026.D\	12/08/20 20:48
MBCFGB1020-04DMS	KQ2017834-02	J:\MS17\DATA\120820\120820F027.D\	12/08/20 21:13
MBCFGB1020-01	K2008783-001	J:\MS17\DATA\120820\120820F028.D\	12/08/20 21:38
MBCFGB1020-03	K2008783-002	J:\MS17\DATA\120820\120820F029.D\	12/08/20 22:04
MBCFGB1020-04	K2008783-003	J:\MS17\DATA\120820\120820F030.D\	12/08/20 22:29
MBCFGB1020-04 Dup	K2008783-004	J:\MS17\DATA\120820\120820F031.D\	12/08/20 22:54
MBCFGB1020-05	K2008783-005	J:\MS17\DATA\120820\120820F032.D\	12/08/20 23:20
MBCFGB-20-Baitchicken	K2008783-006	J:\MS17\DATA\120820\120820F033.D\	12/08/20 23:45

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Analyzed:**	12/08/20 20:23
Sample Matrix:	Tissue	**Date Extracted:**	11/12/20

Lab Control Sample Summary
Sim-Phenols tissue, Derivitized

Sample Name:	Lab Control Sample	**Instrument ID:**	K-MS-17
Lab Code:	KQ2017834-03	**File ID:**	J:\MS17\DATA\120820\120820F025.D\
Analysis Method:	8270D SIM	**Analysis Lot:**	706558
Prep Method:	EPA 3541	**Extraction Lot:**	369666

This Lab Control Sample applies to the following analyses.

Sample Name	Lab Code	File ID	Date Analyzed
Method Blank	KQ2017834-04	J:\MS17\DATA\120820\120820F024.D\	12/08/20 19:57
MBCFGB1020-04MS	KQ2017834-01	J:\MS17\DATA\120820\120820F026.D\	12/08/20 20:48
MBCFGB1020-04DMS	KQ2017834-02	J:\MS17\DATA\120820\120820F027.D\	12/08/20 21:13
MBCFGB1020-01	K2008783-001	J:\MS17\DATA\120820\120820F028.D\	12/08/20 21:38
MBCFGB1020-03	K2008783-002	J:\MS17\DATA\120820\120820F029.D\	12/08/20 22:04
MBCFGB1020-04	K2008783-003	J:\MS17\DATA\120820\120820F030.D\	12/08/20 22:29
MBCFGB1020-04 Dup	K2008783-004	J:\MS17\DATA\120820\120820F031.D\	12/08/20 22:54
MBCFGB1020-05	K2008783-005	J:\MS17\DATA\120820\120820F032.D\	12/08/20 23:20
MBCFGB-20-Baitchicken	K2008783-006	J:\MS17\DATA\120820\120820F033.D\	12/08/20 23:45

Client: Hart Crowser, Incorporated **Service Request:**K2008783
Project: M&B Sampling/150-002-005/5 **Date Analyzed:**12/08/20 15:21

Tune Summary
Sim-Phenols tissue, Derivitized

File ID: J:\MS17\DATA\120820\120820F013.D\ **Analytical Method:** 8270D SIM
Instrument ID: K-MS-17 **Analysis Lot:** 706558

Target Mass	Relative to Mass	Lower Limit %	Upper Limit %	Relative Abundance %	Raw Abundance	Result Pass/Fail
442	442	30	100	100.00	1351168	Pass
443	442	15	24	19.55	264149	Pass
51	198	10	80	63.89	480149	Pass
69	198	0	100	57.26	430357	Pass
70	69	0	2	0.55	2356	Pass
198	442	30	100	55.62	751530	Pass
197	198	0	2	0.00	0	Pass
441	443	0.01	100	80.45	212501	Pass
365	442	1	50	3.20	43272	Pass
199	198	5	9	6.84	51373	Pass
275	198	10	60	34.60	260032	Pass
68	69	0	2	0.00	0	Pass
127	198	10	80	56.52	424789	Pass

Sample Name	Lab Code	File ID:	Date Analyzed:	Q
Continuing Calibration Verification	KQ2019848-02	J:\MS17\DATA\120820\120820F014.D\	12/08/20 15:46	
Method Blank	KQ2017834-04	J:\MS17\DATA\120820\120820F024.D\	12/08/20 19:57	
Lab Control Sample	KQ2017834-03	J:\MS17\DATA\120820\120820F025.D\	12/08/20 20:23	
MBCFGB1020-04	KQ2017834-01	J:\MS17\DATA\120820\120820F026.D\	12/08/20 20:48	
MBCFGB1020-04	KQ2017834-02	J:\MS17\DATA\120820\120820F027.D\	12/08/20 21:13	
MBCFGB1020-01	K2008783-001	J:\MS17\DATA\120820\120820F028.D\	12/08/20 21:38	
MBCFGB1020-03	K2008783-002	J:\MS17\DATA\120820\120820F029.D\	12/08/20 22:04	
MBCFGB1020-04	K2008783-003	J:\MS17\DATA\120820\120820F030.D\	12/08/20 22:29	
MBCFGB1020-04 Dup	K2008783-004	J:\MS17\DATA\120820\120820F031.D\	12/08/20 22:54	
MBCFGB1020-05	K2008783-005	J:\MS17\DATA\120820\120820F032.D\	12/08/20 23:20	
MBCFGB-20-Baitchicken	K2008783-006	J:\MS17\DATA\120820\120820F033.D\	12/08/20 23:45	

Client: Hart Crowser, Incorporated **Service Request:** K2008783
Project: M&B Sampling **Calibration Date:** 12/8/2020

Initial Calibration Summary
Sim-Phenols tissue, Derivitized

Calibration ID: KC2000645 **Signal ID:** 1
Instrument ID: K-MS-17

#	Lab Code	Sample Name	File Location	Acquisition Date
01	KC2000645-01	SIM PHENOL ICAL 20ng/mL SVM65-14A	J:\MS17\DATA\120820\120820F003.D	12/08/2020 11:05
02	KC2000645-02	SIM PHENOL ICAL 50ng/mL SVM65-14B	J:\MS17\DATA\120820\120820F004.D	12/08/2020 11:30
03	KC2000645-03	SIM PHENOL ICAL 100ng/mL SVM65-14C	J:\MS17\DATA\120820\120820F005.D	12/08/2020 11:55
04	KC2000645-04	SIM PHENOL ICAL 300ng/mL SVM65-14D	J:\MS17\DATA\120820\120820F006.D	12/08/2020 12:20
05	KC2000645-05	SIM PHENOL ICAL 500ng/mL SVM65-14E	J:\MS17\DATA\120820\120820F007.D	12/08/2020 12:45
06	KC2000645-06	SIM PHENOL ICAL 800ng/mL SVM65-14F	J:\MS17\DATA\120820\120820F008.D	12/08/2020 13:10
07	KC2000645-07	SIM PHENOL ICAL 1000ng/mL SVM65-14G	J:\MS17\DATA\120820\120820F009.D	12/08/2020 13:35
08	KC2000645-08	SIM PHENOL ICAL 1500ng/mL SVM65-14H	J:\MS17\DATA\120820\120820F010.D	12/08/2020 14:01
09	KC2000645-09	SIM PHENOL ICAL 2000ng/mL SVM65-14I	J:\MS17\DATA\120820\120820F011.D	12/08/2020 14:26

Analyte

2,4,6-Tribromophenol

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	20.000	0.09775	02	50.000	0.1009	03	100.000	0.1052	04	300.000	0.1152
05	500.000	0.1224	06	800.000	0.1285	07	1000.000	0.1329	08	1500.000	0.1357
09	2000.000	0.141									

Pentachlorophenol

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
02	50.000	0.2365	03	100.000	0.234	04	300.000	0.2423	05	500.000	0.2594
06	800.000	0.2669	07	1000.000	0.2739	08	1500.000	0.2775	09	2000.000	0.2913

Client: Hart Crowser, Incorporated
Project: M&B Sampling

Service Request: K2008783
Calibration Date: 12/8/2020

Initial Calibration Summary
Sim-Phenols tissue, Derivitized

Calibration ID: KC2000645
Instrument ID: K-MS-17

Signal ID: 1

		Calibration Evaluation				Calibration Evaluation	
Analyte Name	Compound Type	Fit Type	Eval	Eval Result	Control Criteria	Average RRF	Minimum RRF
2,4,6-Tribromophenol	SURR	Average RF	% RSD	13.3	≤20	0.12	0.05
Pentachlorophenol	TRG	Average RF	% RSD	8.0	≤20	0.2602	0.05

Client: Hart Crowser, Incorporated **Service Request:** K2008783
Project: M&B Sampling **Calibration Date:** 12/8/2020

Initial Calibration Verification Summary
Sim-Phenols tissue, Derivitized

Calibration ID: KC2000645 **Signal ID:** 1
Instrument ID: K-MS-17

#	Lab Code	Sample Name	File Location	Acquisition Date
10	KC2000645-10	SIM PHENOL ICV 1000ng/mL SVM65-14J	J:\MS17\DATA\120820\120820F012.D	12/08/2020 14:51

Analyte Name	Expected	Result	Average RF	SSV RF	Rec.	Criteria	Curve Fit
Pentachlorophenol	1000	923	2.602E-1	2.402E-1	-7.715527276879766 00479		Average RF

Analyte Name	Expected	Result	Average RF	SSV RF	Rec.	Criteria	Curve Fit
2,4,6-Tribromophenol	1000	1120	1.2E-1	1.347E-1	12.267346845427 42330936		Average RF

Client: Hart Crowser, Incorporated
Project: M&B Sampling/150-002-005/5
Service Request: K2008783
Date Analyzed: 12/08/20 15:46

Continuing Calibration Verification (CCV) Summary
Sim-Phenols tissue, Derivitized

Analysis Method: 8270D SIM
File ID: J:\MS17\DATA\120820\120820F014.D\
Signal ID: 1
Calibration Date: 12/8/2020
Calibration ID: KC2000645
Analysis Lot: 706558
Units: ng/mL

Analyte Name	Expected	Result	Average RF	CCV RF	% D	% Drift	Criteria	Curve Fit
Pentachlorophenol	1000	955	0.2602	0.2485	-4.5	NA	±20	Average RF

Analyte Name	Expected	Result	Average RF	CCV RF	% D	% Drift	Criteria	Curve Fit
2,4,6-Tribromophenol	1000	1140	0.12	0.1363	13.6	NA	±20	Average RF

Client: Hart Crowser, Incorporated **Service Request:**K2008783
Project: M&B Sampling/150-002-005/5

Analysis Run Log
Sim-Phenols tissue, Derivitized

Analysis Method: **Analysis Lot:**706558
Instrument ID:K-MS-17

Raw Data File	Sample Name	Lab Code	Date Analyzed	Time Analyzed	Q
J:\MS17\DATA\120820\120820F013.D\	ZZZZZZZ	ZZZZZZZ	12/8/2020	15:21:00	
J:\MS17\DATA\120820\120820F014.D\	Continuing Calibration Verification	KQ2019848-02	12/8/2020	15:46:00	
J:\MS17\DATA\120820\120820F015.D\	ZZZZZZZ	ZZZZZZZ	12/8/2020	16:11:00	
J:\MS17\DATA\120820\120820F016.D\	ZZZZZZZ	ZZZZZZZ	12/8/2020	16:36:00	
J:\MS17\DATA\120820\120820F017.D\	ZZZZZZZ	ZZZZZZZ	12/8/2020	17:01:00	
J:\MS17\DATA\120820\120820F018.D\	ZZZZZZZ	ZZZZZZZ	12/8/2020	17:26:00	
J:\MS17\DATA\120820\120820F019.D\	ZZZZZZZ	ZZZZZZZ	12/8/2020	17:52:00	
J:\MS17\DATA\120820\120820F020.D\	ZZZZZZZ	ZZZZZZZ	12/8/2020	18:17:00	
J:\MS17\DATA\120820\120820F021.D\	ZZZZZZZ	ZZZZZZZ	12/8/2020	18:42:00	
J:\MS17\DATA\120820\120820F022.D\	ZZZZZZZ	ZZZZZZZ	12/8/2020	19:07:00	
J:\MS17\DATA\120820\120820F023.D\	ZZZZZZZ	ZZZZZZZ	12/8/2020	19:32:00	
J:\MS17\DATA\120820\120820F024.D\	Method Blank	KQ2017834-04	12/8/2020	19:57:00	
J:\MS17\DATA\120820\120820F025.D\	Lab Control Sample	KQ2017834-03	12/8/2020	20:23:00	
J:\MS17\DATA\120820\120820F026.D\	MBCFGB1020-04 MS	KQ2017834-01	12/8/2020	20:48:00	
J:\MS17\DATA\120820\120820F027.D\	MBCFGB1020-04 DMS	KQ2017834-02	12/8/2020	21:13:00	
J:\MS17\DATA\120820\120820F028.D\	MBCFGB1020-01	K2008783-001	12/8/2020	21:38:00	
J:\MS17\DATA\120820\120820F029.D\	MBCFGB1020-03	K2008783-002	12/8/2020	22:04:00	
J:\MS17\DATA\120820\120820F030.D\	MBCFGB1020-04	K2008783-003	12/8/2020	22:29:00	
J:\MS17\DATA\120820\120820F031.D\	MBCFGB1020-04 Dup	K2008783-004	12/8/2020	22:54:00	
J:\MS17\DATA\120820\120820F032.D\	MBCFGB1020-05	K2008783-005	12/8/2020	23:20:00	
J:\MS17\DATA\120820\120820F033.D\	MBCFGB-20-Baitchicken	K2008783-006	12/8/2020	23:45:00	
J:\MS17\DATA\120820\120820F034.D\	ZZZZZZZ	ZZZZZZZ	12/9/2020	00:10:00	
J:\MS17\DATA\120820\120820F035.D\	ZZZZZZZ	ZZZZZZZ	12/9/2020	00:36:00	
J:\MS17\DATA\120820\120820F036.D\	ZZZZZZZ	ZZZZZZZ	12/9/2020	01:01:00	
J:\MS17\DATA\120820\120820F037.D\	ZZZZZZZ	ZZZZZZZ	12/9/2020	01:27:00	
J:\MS17\DATA\120820\120820F038.D\	ZZZZZZZ	ZZZZZZZ	12/9/2020	01:52:00	
J:\MS17\DATA\120820\120820F039.D\	ZZZZZZZ	ZZZZZZZ	12/9/2020	02:18:00	
J:\MS17\DATA\120820\120820F040.D\	ZZZZZZZ	ZZZZZZZ	12/9/2020	02:43:00	
J:\MS17\DATA\120820\120820F041.D\	ZZZZZZZ	ZZZZZZZ	12/9/2020	03:08:00	

Prep Summary Report

Client: Hart Crowser, Incorporated **Service Request:**K2008783
Project: M&B Sampling/150-002-005/5
Sample Matrix: Tissue

Sim-Phenols tissue, Derivitized

Prep Method: EPA 3541 **Extraction Lot:** 369666
Analytical Method: 8270D SIM **Extraction Date:** 11/12/20 09:29

Sample Name	Lab Code	Date Collected	Date Received	Sample Amount	Final Amount	Percent Solids
MBCFGB1020-01	K2008783-001	9/29/20	10/1/20	5.107 g	10 mL	
MBCFGB1020-03	K2008783-002	9/29/20	10/1/20	5.188 g	10 mL	
MBCFGB1020-04	K2008783-003	9/29/20	10/1/20	5.539 g	10 mL	
MBCFGB1020-04 Dup	K2008783-004	9/29/20	10/1/20	5.081 g	10 mL	
MBCFGB1020-05	K2008783-005	9/29/20	10/1/20	5.220 g	10 mL	
MBCFGB-20-Baitchicken	K2008783-006	9/29/20	10/1/20	5.188 g	10 mL	
Matrix Spike	KQ2017834-01MS	9/29/20	10/1/20	5.078 g	10 mL	
Duplicate Matrix Spike	KQ2017834-02DMS	9/29/20	10/1/20	5.082 g	10 mL	
Lab Control Sample	KQ2017834-03LCS	NA	NA	5 g	10 mL	
Method Blank	KQ2017834-04MB	NA	NA	5.5390 g	10 mL	

Subcontract Lab Results

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1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

November 30, 2020. Service Request No K2008783

Howard Holmes.
ALS Group USA, Corp.
1317 South 13th Avenue
Kelso, WA 98626

Laboratory Results for: Hart Crowser, Incorporated.

Dear Howard,

Enclosed are the results of the samples submitted to our laboratory November 11, 2020.
For your reference these analyses have been assigned our service request number **K2008783.**

Analyses were performed according to our laboratory's NELAP approved quality assurance program The test results meet requirements of the current TNI standards where applicable and except as noted in the laboratory case narrative provided All results are intended to be considered in their entirety and ALS Environmental is not responsible for use of less than the final complete report Results apply only to the items submitted to the laboratory for analysis and individual items samples analyzed as listed in the report In accordance to the TNI 2009 Standard, a statement on the estimated uncertainty of measurement of any quantitative analysis will be supplied upon request

Respectfully submitted

ALS Group USA Corp dba ALS Environmental

Corey Grandits
Project Manager

ADDRESS Stancliff Rd Suite Houston TX
PHONE 281 530 5656 |
ALS Group USA Corp
dba ALS Environmental

Certificate of Analysis

ALS Environmental - Houston HRMS
10450 Stancliff Rd, Suite 210, Houston TX 77099
Phone (713)266-1599 Fax (713)266-0130
www.alsglobal.com

ALS Environmental

Client:	Hart Crowser	**Service Request No.:**	K2008783
Project:	M&B Sampling	**Date Received:**	11/11/20
Sample Matrix:	T		

CASE NARRATIVE

All analyses were performed in adherence to the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier IV. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Six samples were received for analysis at ALS Environmental in Houston on 11/11/20.

The samples were received in good condition and are consistent with the accompanying chain of custody form. The samples were stored in a freezer at -20°C upon receipt at the laboratory.

Data Validation Notes and Discussion

Precision and Accuracy:

EQ2000594: Laboratory Control Spike/Duplicate Laboratory Control Spike (LCS/DLCS) samples were analyzed and reported in lieu of a MS/MSD for this extraction batch. The LCS and DLCS recoveries are within QC limits.

B flags – Method Blanks

The Method Blank EQ2000594-01 contained low levels of 1234678-HpCDD and OCDD above the EDL however below the Method Reporting Limit (MRL). The associated compounds in the samples are flagged with 'B' flags where the sample result is less than ten times the level detected in the method blank.

Y flags – Labeled Standards

Quantification of the native 2,3,7,8-substituted congeners is based on isotopic dilution, which automatically corrects for variation in extraction efficiency and provides accurate values even with poor recovery. Samples that had recoveries of labeled standards outside the acceptance limits are qualified with 'Y' flags on the Labeled Compound summary pages. In all cases, the signal-to-noise ratios are greater than 10:1 and detection limits were below the Method Reporting Limits.

K flags

EMPC - When the ion abundance ratios associated with a particular compound are outside the QC limits, samples are flagged with a 'K' flag. A 'K' flag indicates an estimated maximum possible concentration for the associated compound.

2378-TCDF

Samples analyzed on the DB-5MSUI column were analyzed under conditions where sufficient separation between 2,3,7,8-TCDF and its closest eluter was achieved. Confirmation of this result was not required.

Detection Limits

Detection limits are calculated for each analyte in each sample by measuring the height of the noise level for each quantitation ion for the associated labeled standard. The concentration equivalent to 2.5 times the height of the noise is then calculated using the appropriate response factor and the weight of the sample. The calculated concentration equals the detection limit.

The TEQ Summary results for each sample have been calculated by ALS/Houston to include:

- WHO-2005 TEFs, The 2005 World Health Organization Reevaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-Like Compounds (M. Van den Berg et al., Toxicological Sciences 93(2):223-241, 2006)
- 2378-TCDF from the DB-225 column, when confirmation required
- Non-detected compounds are not included in the 'Total'

The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and ALS Environmental (ALS) is not responsible for utilization of less than the complete report.

Use of ALS group USA Corp dba ALS Environmental (ALS)'s Name. Client shall not use ALS's name or trademark in any marketing or reporting materials, press releases or in any other manner ("Materials") whatsoever and shall not attribute to ALS any test result, tolerance or specification derived from ALS's data ("Attribution") without ALS's prior written consent, which may be withheld by ALS for any reason in its sole discretion. To request ALS's consent, Client shall provide copies of the proposed Materials or Attribution and describe in writing Client's proposed use of such Materials or Attribution. If ALS has not provided written approval of the Materials or Attribution within ten (10) days of receipt from Client, Client's request to use ALS's name or trademark in any Materials or Attribution shall be deemed denied. ALS may, in its discretion, reasonably charge Client for its time in reviewing Materials or Attribution requests. Client acknowledges and agrees that the unauthorized use of ALS's name or trademark may cause ALS to incur irreparable harm for which the recovery of money damages will be inadequate. Accordingly, Client acknowledges and agrees that a violation shall justify preliminary injunctive relief. For questions contact the laboratory.

Client: Hart Crowser, Incorporated **Service Request:**K2008783
Project: M&B Sampling/150-002-005/5

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
K2008783-001	MBCFGB1020-01	9/29/2020	1250
K2008783-002	MBCFGB1020-03	9/29/2020	1015
K2008783-003	MBCFGB1020-04	9/29/2020	0900
K2008783-004	MBCFGB1020-04 Dup	9/29/2020	0900
K2008783-005	MBCFGB1020-05	9/29/2020	1128
K2008783-006	MBCFGB-20-Baitchicken	9/29/2020	0900

Service Request Summary

Folder #: **K2008783**
Client Name: Hart Crowser, Incorporated
Project Name: M&B Sampling
Project Number: 150-002-005/5

Report To: Kevin Woodhouse
Hart Crowser, Incorporated
6420 SW Macadam St
Portland, OR 97239
USA
Phone Number: 971-808-5178
Cell Number: 530-220-4012
Fax Number:
E-mail: kevin.woodhouse@hartcrowser.com

Project Chemist: Howard Holmes
Originating Lab: KELSO
Logged By: FADAIR
Date Received: 10/01/20 - 11/11/20
Internal Due Date: 10/30/2020
QAP: LAB QAP
Qualifier Set: Lab Standard
Formset: Lab Standard
Merged?: Y
Report to MDL?: Y
P.O. Number: 150-002-005/5
EDD: BASIC_WQC

6 8 oz-Glass Jar WM CLEAR Teflon Liner Unpreserved
7 1 Gal-Plastic Bag Ziplock - Gallon Unpreserved
4 1000 ml-Glass Bottle NM AMBER Teflon Liner Unpreserved
2 250 mL-Plastic Bottle NM CLEAR HNO3

Location: EHRMS-Freezer2B, K-TOGO-Freezer, K-SVEXT, K-METALS, In Lab

Pressure Gas:

				KELSO		KELSO	KELSO			HOUSTON
Lab Samp No.	**Client Samp No**	**Matrix**	**Collected**	Frz Dry/Frz Dry	Metals T/6020A	LIPIDS/NOAA LIPID	PAH SIM/8270D	SVO BN/8270D SIM	SVO Phenols/8270D SIM	Dioxins Furans/1613B
K2008783-001	MBCFGB1020-01	Tissue	09/29/20 1250	**IV**	**IV**	**IV**	**IV**	**IV**	**IV**	**IV**
K2008783-002	MBCFGB1020-03	Tissue	09/29/20 1015	**IV**	**IV**	**IV**	**IV**	**IV**	**IV**	**IV**
K2008783-003	MBCFGB1020-04	Tissue	09/29/20 0900	**IV**	**IV**	**IV**	**IV**	**IV**	**IV**	**IV**
K2008783-004	MBCFGB1020-04 Dup	Tissue	09/29/20 0900	**IV**	**IV**	**IV**	**IV**	**IV**	**IV**	**IV**
K2008783-005	MBCFGB1020-05	Tissue	09/29/20 1128	**IV**	**IV**	**IV**	**IV**	**IV**	**IV**	**IV**
K2008783-006	MBCFGB-20-Baitchicken	Tissue	09/29/20 0900	**IV**	**IV**	**IV**	**IV**	**IV**	**IV**	**IV**

Service Request Summary

Folder #: **K2008783**
Client Name: Hart Crowser, Incorporated
Project Name: M&B Sampling
Project Number: 150-002-005/5

Report To: Kevin Woodhouse
Hart Crowser, Incorporated
6420 SW Macadam St
Portland, OR 97239
USA
Phone Number: 971-808-5178
Cell Number: 530-220-4012
Fax Number:
E-mail: kevin.woodhouse@hartcrowser.com

Project Chemist: Howard Holmes
Originating Lab: KELSO
Logged By: FADAIR
Date Received: 10/01/20 - 11/11/20
Internal Due Date: 10/30/2020
QAP: LAB QAP
Qualifier Set: Lab Standard
Formset: Lab Standard
Merged?: Y
Report to MDL?: Y
P.O. Number: 150-002-005/5
EDD: BASIC_WQC

6 8 oz-Glass Jar WM CLEAR Teflon Liner Unpreserved
7 1 Gal-Plastic Bag Ziplock - Gallon Unpreserved
4 1000 ml-Glass Bottle NM AMBER Teflon Liner Unpreserved
2 250 mL-Plastic Bottle NM CLEAR HNO3

Location: EHRMS-Freezer2B, K-TOGO-Freezer, K-SVEXT, K-METALS, In Lab

Pressure Gas:

Test Comments:

Group	Test/Method	Samples	Comments
Metals	Metals T/6020A	6	As,Cr,Cu,Zn - 5g
Metals	Sub Sample/Subsample	6	Subsample 20g for Dioxins to Burlington
Semivoa GC	LIPIDS/NOAA LIPID	6	5g
Semivoa GCMS	PAH SIM/8270D	6	10g
Semivoa GCMS	Dioxins Furans/1613B	6	ALS Houston - 20g
Semivoa GCMS	SVO Phenols/8270D SIM	6	Pentachlorophenol only - 5g

Superset Summary

Service Request: K2008783 **SuperSet Reference:** 20-0000569450 rev 00

Analytical Method: **1613B**

Calibrations: 09/02/20

Data Files:

Raw Data	Begin CCAL	Method Blank	Lab ID
P623551	P623548	P623551	EQ2000594-01
P623434	P623422	P623551	EQ2000594-02
P623435	P623422	P623551	EQ2000594-03
P623552	P623548	P623551	K2008783-001
P623427	P623422	P623551	K2008783-002
P623428	P623422	P623551	K2008783-003
P623429	P623422	P623551	K2008783-004
P623430	P623422	P623551	K2008783-005
P623431	P623422	P623551	K2008783-006

Data Qualifiers

HRMS Qualifier Set

B Indicates the associated analyte was found in the method blank at >1/10th the reported value.

E Estimated value. The reported concentration is above the calibration range of the instrument.

H Sample extracted and/or analyzed out of suggested holding time.

J Estimated value. The reported concentration is below the MRL.

K The ion abundance ratio between the primary and secondary ions were outside of theoretical acceptance limits.The concentration of this analyte should be considered as an estimate.

P Chlorodiphenyl ether interference was present at the retention time of the target analyte. Reported result should be considered an estimate.

Q Monitored lock-mass indicates matrix-interference. Reported result is estimated.

S Signal saturated detector. Result reported from dilution.

U Compound was analyzed for, but was not detected (ND).

X See Case Narrative.

Y Isotopically Labeled Standard recovery outside of acceptance limits. In all cases, the signal-to-nois ratios are greater than 10:1, making the recoveries acceptable.

i The MDL/MRL have been elevated due to a matrix interference.

ALS Laboratory Group

Acronyms

Cal	Calibration
Conc	CONCentration
Dioxin(s)	Polychlorinated dibenzo-p-dioxin(s)
EDL	Estimated Detection Limit
EMPC	Estimated Maximum Possible Concentration
Flags	Data qualifiers
Furan(s)	Polychlorinated dibenzofuran(s)
g	Grams
ICAL	Initial CALibration
ID	IDentifier
Ions	Masses monitored for the analyte during data acquisition
L	Liter (s)
LCS	Laboratory Control Sample
DLCS	Duplicate Laboratory Control Sample
MB	Method Blank
MCL	Method Calibration Limit
MDL	Method Detection Limit
mL	Milliliters
MS	Matrix Spiked sample
DMS	Duplicate Matrix Spiked sample
NO	Number of peaks meeting all identification criteria
PCDD(s)	Polychlorinated dibenzo-p-dioxin(s)
PCDF(s)	Polychlorinated dibenzofuran(s)
ppb	Parts per billion
ppm	Parts per million
ppq	Parts per quadrillion
ppt	Parts per trillion
QA	Quality Assurance
QC	Quality Control
Ratio	Ratio of areas from monitored ions for an analyte
% Rec.	Percent recovery
RPD	Relative Percent Difference
RRF	Relative Response Factor
RT	Retention Time
SDG	Sample Delivery Group
S/N	Signal-to-noise ratio
TEF	Toxicity Equivalence Factor
TEQ	Toxicity Equivalence Quotient

State Certifications, Accreditations, and Licenses

Agency	Number	Expire Date
American Association for Laboratory Accreditation	2897.01 2020	11/30/2021
Arizona Department of Health Services	AZ0793-2020	5/27/2021
Arkansas Department of Environmental Quality	20-030-0	3/26/2021
California Department of Health Services	2919-2020	4/30/2021
Department of Defense	A2LA 2897.01	11/30/2021
Florida Department of Health	E87611-2020	6/30/2021
Hawaii Department of Health	2020	4/30/2021
Illinois Environmental Protection Agency	2000322020-4	5/9/2021
Kansas Department of Health and Environment	E-10352-2020	7/31/2021
Louisiana Department of Environmental Quality	03087-2020	6/30/2021
Louisiana Department of Health and Hospitals	LA028-2020	12/31/2020
Maine Department of Health and Human Services	2020016	6/5/2022
Maryland Department of the Environment	343-2020	6/30/2021
Michigan Depratment of Environmental Quality	9971-2020	4/30/2021
Minnesota Department of Health	1785988	12/31/2020
Nebraska Department of Health and Human Services	NE-OS-25-13 (2020)	4/30/2021
Nevada Department of Concervation and Natural Resources	TX026932021-1	7/31/2021
New Hampshire Environmental Laboratory Accreditation Program	209420	4/24/2021
New Jersey Department of Environmental Protection	TX008	6/30/2021
New York Department of Health	11707	3/31/2021
Oklahoma Department of Environmental Quality	2020-123	8/31/2021
Pennsylvania Department of Environmental Protection	014	6/30/2021
Tennessee Department of Environment and Concervation	04016-2020	4/30/2021
Texas Commision on Environmental Quality	T104704231-20-26	4/30/2021
United States Department of Agriculture	P330-19-00299	10/10/2022

ALS ENVIRONMENTAL – Houston
Data Processing/Form Production and Peer Review Signatures

SR# Unique ID: K2008783 (DB-5MSUI) SPB-Octyl

First Level - Data Processing - to be filled by person generating the forms

Date: 11/30/20 Analyst: YC Samples: 001

Second Level - Data Review – to be filled by person doing peer review

Date: 11/30/20 Analyst: KW Samples: 001

ALS ENVIRONMENTAL – Houston
Data Processing/Form Production and Peer Review Signatures

SR# Unique ID: K2008783 (DB-5MSUI) SPB-Octyl

First Level - Data Processing - to be filled by person generating the forms

Date:	Analyst:	Samples:
11/23/20	JC	002-006

Second Level - Data Review – to be filled by person doing peer review

Date:	Analyst:	Samples:
11/24/20	LKL	002_006

Chain of Custody

ALS Environmental - Houston HRMS
10450 Stancliff Rd, Suite 210, Houston TX 77099
Phone (713)266-1599 Fax (713)266-0130
www.alsglobal.com

Intra-Network Chain of Custody

1317 South 13th Avenue • Kelso, WA 98626 • 1-360-577-7222 • FAX 1-360-636-1068

ALS Contact: Howard Holmes

Project Name: M&B Sampling
Project Number: 150-002-005/5
Project Manager: Kevin Woodhouse
Company: Hart Crowser, Incorporated
QAP: LAB QAP

K2008783 5
Hart Crowser, Incorporated
M&B Sampling

Lab Code	Client Sample ID	# of Cont.	Matrix	Sample Date	Sample Time	Date Received	Send To	Dioxins Furans 1613B
K2008783-001	MBCFGB1020-01	1	Tissue	9/29/20	1250	10/1/20	HOUSTON	IV
K2008783-002	MBCFGB1020-03		Tissue	9/29/20	1015	10/1/20	HOUSTON	IV
K2008783-003	MBCFGB1020-04		Tissue	9/29/20	0900	10/1/20	HOUSTON	IV
K2008783-004	MBCFGB1020-04 Dup		Tissue	9/29/20	0900	10/1/20	HOUSTON	IV
K2008783-005	MBCFGB1020-05		Tissue	9/29/20	1128	10/1/20	HOUSTON	IV
K2008783-006	MBCFGB-20-Baitchicken		Tissue	9/29/20	0900	10/1/20	HOUSTON	IV

Test Comments
Dioxins Furans - 1613B K2008783-001,2,3,4,5,6 ALS Houston - 20g

Folder Comments:
Report Wet Weight basis

Special Instructions/Comments
Please provide the electronic (PDF and EDD) report to the following e-mail address:
ALKLS.Data@alsglobal.com.

Blue dic. -11-10. -H 25 c 1r-0.

pH Checked _____

Turnaround Requirements
_____ **RUSH** (Surcharges Apply)
PLEASE CIRCLE WORK DAYS
1 2 3 4 5
_____ **STANDARD**
Requested FAX Date: _____
Requested Report Date: 10/30/20 11/1/20

Report Requirements
____ I. Results Only
____ II. Results + QC Summaries
____ III. Results + QC and Calibration Summaries
X IV. Data Validation Report with Raw Data
PQL/MDL/J Y
EDD Y

Invoice Information
PO# 51K2008783
Bill to

Relinquished By: 11/10/2020 1000 Received By: JM 11/11/2020 10:20 Airbill Number: _____

Cooler Receipt Form

ALS Environmental

Project Chemist CG

Client/Project ALS-H

Thermometer ID IR25

Date/Time Received: 11/11/20 Initials: JM Date/Time Logged in: 11/11/20 Initials CG

1. Method of delivery: ○ US Mail ◇ Fed Ex ○ UPS ○ DHL ○ Courier ○ Client

2. Samples received in: ◇ Cooler ○ Box ○ Envelope ○ Other

3. Were custody seals on coolers? ◇ Yes ○ No
   Were they intact? ◇ Yes ○ No ○ N/A
   Were they signed and dated? ◇ Yes ○ No ○ N/A
   If yes, how many and where? 1-F

4. Packing Material: ○ Inserts ○ Baggies ◇ Bubble Wrap ◇ Gel Packs ○ Wet Ice ○ Sleeves ◇ Other DRY ICE

5. Foreign or Regulated Soil? ○ Yes ○ No Location of Sampling:

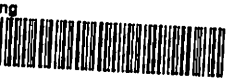
Cooler Tracking Number	COC ID	Date Opened	Time Opened	Opened By	Temp. °C	Temp Blank?
9346 2492 1530		11/11/20	1020	JM	-11.1	☐
						☐
						☐
						☐

6. Were custody papers properly filled out (ink, signed, dated, etc)? ◇ Yes ○ No
7. Did all bottles arrive in good condition (not broken, no signs of leakage)? ◇ Yes ○ No
8. Were all sample labels complete (i.e., sample ID, analysis, preservation, etc)? ◇ Yes ○ No
9. Were appropriate bottles/containers and volumes received for the requested tests? ◇ Yes ○ No
10. Did sample labels and tags agree with custody documents? ◇ Yes ○ No

Notes, Discrepancies, & Resolutions:

Service request Label:

K2008783 5
Hart Crowser, Incorporated
M&B Sampling



HS-HRMSCoolerReceipt R1.0

ALS Environmental - Houston HRMS

10450 Stancliff Rd., Suite 210
Houston, TX 77099
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www.alsglobal.com

SAMPLE ACCEPTANCE POLICY

This policy outlines the criteria samples must meet to be accepted by ALS Environmental – Houston HRMS.

Cooler Custody Seals (desirable, mandatory if specified in SAP):

- ✓ Intact on outside of cooler, signed and dated

Chain-of-Custody (COC) documentation (mandatory):

The following is required on each COC:

- ✓ Sample ID, the location, date and time of collection, collector's name, preservation type, sample type, and any other special remarks concerning the sampleThe COC must be completed in ink.
- ✓ Signature and date of relinquishing party.

In the absence of a COC at sample receipt, the COC will be requested from the client.

Sample Integrity (mandatory):

Samples are inspected upon arrival to ensure that sample integrity was not compromised during transfer to the laboratory.

- ✓ Sample containers must arrive in good condition (not broken or leaking).
- ✓ Samples must be labeled appropriately, including Sample IDs, and requested test using durable labels and indelible ink.
- ✓ The correct type of sample bottle must be used for the method requested.
- ✓ An appropriate sample volume, or weight, must be received.
- ✓ Sample IDs and number of containers must reconcile with the COC.
- ✓ Samples must be received within the method defined holding time.

Temperature Requirement (varies by sample matrix):

- ✓ Aqueous and Non-aqueous samples must be shipped and stored cold, at 0 to 6ºC.
- ✓ Tissue samples must be shipped and stored frozen, at -20 to -10ºC.
- ✓ Air samples are shipped and stored cold, at 0 to 6ºC
- ✓ The sample temperature must be recorded on the COC

All cooler inspections are documented on the Cooler Receipt Form (CRF). A separate CRF is completed for each service request. Any samples not meeting the above criteria are noted on the CRF and the Project Manager notified. The Project Manager must resolve any sample integrity issues with the client prior to proceeding with the analysis. Such resolutions are documented in writing and filed with the project folder. Data associated with samples received outside of this acceptance policy will be qualified on the case narrative of the final report

Preparation Information Benchsheets

ALS Environmental - Houston HRMS
10450 Stancliff Rd., Suite 210, Houston, TX 77099
Phone (713)266-1599 Fax (713)266-0130
www.alsglobal.com

Preparation Information Benchsheet

Prep Run#: 369798 **Prep WorkFlow:** OrgExtT(365) **Status:** Prepped
Team: Semivoa GCMS/TWOODS **Prep Method:** Method Soxhlet **Prep Date/Time:** 11/14/20 14:37

#	Lab Code	Client ID	B#	Method /Test	pH	Cl	Matrix	Amt. Ext.	Sample Description
1	EQ2000594-01	MB		1613B/Dioxins Furans			Tissue	10.003g	
2	EQ2000594-02	LCS		1613B/Dioxins Furans			Tissue	10.115g	
3	EQ2000594-03	DLCS		1613B/Dioxins Furans			Tissue	10.044g	
4	K2008783-001	MBCFGB1020-01	.02	1613B/Dioxins Furans			Tissue	10.349g	CLUKKEN K-Balance-53
5	K2008783-002	MBCFGB1020-03	.02	1613B/Dioxins Furans			Tissue	10.029g	CLUKKEN K-Balance-53
6	K2008783-003	MBCFGB1020-04	.03	1613B/Dioxins Furans			Tissue	10.558g	CLUKKEN K-Balance-53
7	K2008783-004	MBCFGB1020-04 Dup	.02	1613B/Dioxins Furans			Tissue	10.410g	CLUKKEN K-Balance-53
8	K2008783-005	MBCFGB1020-05	.02	1613B/Dioxins Furans			Tissue	10.149g	CLUKKEN K-Balance-53
9	K2008783-006	MBCFGB-20-Baitchicken	.02	1613B/Dioxins Furans			Tissue	10.260g	CLUKKEN K-Balance-53

Spiking Solutions

Name: 8290/1613B Cleanup Working Standard Inventory ID 213644 Logbook Ref: 213644 tw 10/6/20 8ng/ml Expires On: 02/24/2021

EQ2000594-01	100.00µL	EQ2000594-02	100.00µL	EQ2000594-03	100.00µL	K2008783-001	100.00µL	K2008783-002	100.00µL	K2008783-003	100.00µL
K2008783-004	100.00µL	K2008783-005	100.00µL	K2008783-006	100.00µL						

Name: 1613B Matrix Working Standard Inventory ID 213766 Logbook Ref: tw 213766 2-20ng/ml 11/12/20 Expires On: 02/24/2021

EQ2000594-02	100.00µL	EQ2000594-03	100.00µL

Name: 1613B Labeled Working Standard Inventory ID 213774 Logbook Ref: tw 11/13/20 2-4ng/ml 213774 Expires On: 12/31/2020

EQ2000594-01	1,000.00µL	EQ2000594-02	1,000.00µL	EQ2000594-03	1,000.00µL	K2008783-001	1,000.00µL	K2008783-002	1,000.00µL	K2008783-003	1,000.00µL
K2008783-004	1,000.00µL	K2008783-005	1,000.00µL	K2008783-006	1,000.00µL						

Preparation Steps

Step:	Extraction	Step:	Acid Clean	Step:	Silica Gel Clean	Step:	Final Volume
Started:	11/14/20 14:37	Started:	11/16/20 10:00	Started:	11/16/20 13:00	Started:	11/17/20 09:00
Finished:	11/15/20 09:00	Finished:	11/16/20 11:00	Finished:	11/16/20 16:00	Finished:	11/17/20 12:00
By:	TWOODS	By:	TWOODS	By:	TWOODS	By:	TWOODS
Comments		Comments		Comments		Comments	

Comments: _____

Reviewed By: LKL Date: 11/30/2020

Preparation Information Benchsheet

Prep Run#: 369798
Team: Semivoa GCMS/TWOODS

Prep WorkFlow: OrgExtT(365)
Prep Method: Method Soxhlet

Status: Prepped
Prep Date/Time: 11/14/20 14:37

Chain of Custody

Relinquished By: _____ Date: _____

Received By: _____ Date: _____

Extracts Examined
Yes No

Analytical Results

ALS Environmental - Houston HRMS
10450 Stancliff Rd., Suite 210, Houston, TX 77099
Phone (713)266-1599 Fax (713)266-0130
www.alsglobal.com

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 12:50
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-01	**Units:**	ng/Kg
Lab Code:	K2008783-001	**Basis:**	Wet

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method:	1613B	**Date Analyzed:**	11/28/20 15:39
Prep Method:	Method Soxhlet	**Date Extracted:**	11/14/20
Sample Amount:	10.349g	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623552	**Blank File Name:**	P623551
ICAL Date:	09/02/20	**Cal Ver. File Name:**	P623548

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
2,3,7,8-TCDD	ND	U	0.354	0.483			1
1,2,3,7,8-PeCDD	ND	U	0.148	2.42			1
1,2,3,4,7,8-HxCDD	ND	U	0.0868	2.42			1
1,2,3,6,7,8-HxCDD	ND	U	0.0953	2.42			1
1,2,3,7,8,9-HxCDD	ND	U	0.0889	2.42			1
1,2,3,4,6,7,8-HpCDD	0.489**BJK**		0.172	2.42	1.33	1.000	1
OCDD	2.20**BJ**		0.312	4.83	1.02	1.000	1
2,3,7,8-TCDF	ND	U	0.256	0.483			1
1,2,3,7,8-PeCDF	ND	U	0.121	2.42			1
2,3,4,7,8-PeCDF	0.124**JK**		0.105	2.42	0.82	1.000	1
1,2,3,4,7,8-HxCDF	ND	U	0.119	2.42			1
1,2,3,6,7,8-HxCDF	ND	U	0.121	2.42			1
1,2,3,7,8,9-HxCDF	ND	U	0.207	2.42			1
2,3,4,6,7,8-HxCDF	ND	U	0.128	2.42			1
1,2,3,4,6,7,8-HpCDF	0.110**J**		0.0812	2.42	0.89	1.000	1
1,2,3,4,7,8,9-HpCDF	ND	U	0.108	2.42			1
OCDF	1.56**J**		0.322	4.83	0.93	1.005	1

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 12:50
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-01	**Units:**	ng/Kg
Lab Code:	K2008783-001	**Basis:**	Wet

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method:	1613B	**Date Analyzed:**	11/28/20 15:39
Prep Method:	Method Soxhlet	**Date Extracted:**	11/14/20
Sample Amount:	10.349g	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623552	**Blank File Name:**	P623551
ICAL Date:	09/02/20	**Cal Ver. File Name:**	P623548

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
Total Tetra-Dioxins	ND	U	0.354	0.483			1
Total Penta-Dioxins	ND	U	0.148	2.42			1
Total Hexa-Dioxins	ND	U	0.0905	2.42			1
Total Hepta-Dioxins	ND	U	0.172	2.42			1
Total Tetra-Furans	ND	U	0.256	0.483			1
Total Penta-Furans	0.393**J**		0.112	2.42	1.38		1
Total Hexa-Furans	ND	U	0.139	2.42			1
Total Hepta-Furans	0.110**J**		0.0936	2.42	0.89		1

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 12:50
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-01	**Units:**	Percent
Lab Code:	K2008783-001	**Basis:**	Wet

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method:	1613B	**Date Analyzed:**	11/28/20 15:39
Prep Method:	Method Soxhlet	**Date Extracted:**	11/14/20
Sample Amount:	10.349g	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623552	**Blank File Name:**	P623551
ICAL Date:	09/02/20	**Cal Ver. File Name:**	P623548

Labeled Standard Results

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	% Rec	Q	Control Limits	Ion Ratio	RRT
13C-2,3,7,8-TCDD	2000	583.427	29		25-164	0.77	1.018
13C-1,2,3,7,8-PeCDD	2000	746.832	37		25-181	1.59	1.167
13C-1,2,3,4,7,8-HxCDD	2000	816.419	41		32-141	1.26	0.992
13C-1,2,3,6,7,8-HxCDD	2000	875.208	44		28-130	1.24	0.994
13C-1,2,3,4,6,7,8-HpCDD	2000	723.246	36		23-140	1.03	1.065
13C-OCDD	4000	1238.149	31		17-157	0.86	1.142
13C-2,3,7,8-TCDF	2000	566.719	28		24-169	0.77	0.994
13C-1,2,3,7,8-PeCDF	2000	626.534	31		24-185	1.58	1.129
13C-2,3,4,7,8-PeCDF	2000	722.643	36		21-178	1.57	1.158
13C-1,2,3,4,7,8-HxCDF	2000	666.704	33		26-152	0.52	0.972
13C-1,2,3,6,7,8-HxCDF	2000	724.719	36		26-123	0.51	0.975
13C-1,2,3,7,8,9-HxCDF	2000	535.721	27	**Y**	29-147	0.51	1.008
13C-2,3,4,6,7,8-HxCDF	2000	664.265	33		28-136	0.50	0.988
13C-1,2,3,4,6,7,8-HpCDF	2000	600.826	30		28-143	0.43	1.040
13C-1,2,3,4,7,8,9-HpCDF	2000	622.635	31		26-138	0.42	1.079
37Cl-2,3,7,8-TCDD	800	393.415	49		35-197	NA	1.019

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 12:50
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-01	**Units:**	ng/Kg
Lab Code:	K2008783-001	**Basis:**	Wet

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method: 1613B
Prep Method: Method Soxhlet

Toxicity Equivalency Quotient

Analyte Name	Result	DL	MRL	Dilution Factor	TEF	TEF - Adjusted Concentration
2,3,7,8-TCDD	ND	0.354	0.483	1	1	
1,2,3,7,8-PeCDD	ND	0.148	2.42	1	1	
1,2,3,4,7,8-HxCDD	ND	0.0868	2.42	1	0.1	
1,2,3,6,7,8-HxCDD	ND	0.0953	2.42	1	0.1	
1,2,3,7,8,9-HxCDD	ND	0.0889	2.42	1	0.1	
1,2,3,4,6,7,8-HpCDD	**0.489**	0.172	2.42	1	0.01	0.00489
OCDD	**2.20**	0.312	4.83	1	0.0003	0.000660
2,3,7,8-TCDF	ND	0.256	0.483	1	0.1	
1,2,3,7,8-PeCDF	ND	0.121	2.42	1	0.03	
2,3,4,7,8-PeCDF	**0.124**	0.105	2.42	1	0.3	0.0372
1,2,3,4,7,8-HxCDF	ND	0.119	2.42	1	0.1	
1,2,3,6,7,8-HxCDF	ND	0.121	2.42	1	0.1	
1,2,3,7,8,9-HxCDF	ND	0.207	2.42	1	0.1	
2,3,4,6,7,8-HxCDF	ND	0.128	2.42	1	0.1	
1,2,3,4,6,7,8-HpCDF	**0.110**	0.0812	2.42	1	0.01	0.00110
1,2,3,4,7,8,9-HpCDF	ND	0.108	2.42	1	0.01	
OCDF	**1.56**	0.322	4.83	1	0.0003	0.000468
		Total TEQ				0.0443

2005 WHO TEFs, ND = 0

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 10:15
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-03	**Units:**	ng/Kg
Lab Code:	K2008783-002	**Basis:**	Wet

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method:	1613B	**Date Analyzed:**	11/21/20 08:34
Prep Method:	Method Soxhlet	**Date Extracted:**	11/14/20
Sample Amount:	10.029g	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623427	**Blank File Name:**	P623551
ICAL Date:	09/02/20	**Cal Ver. File Name:**	P623422

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
2,3,7,8-TCDD	ND	U	0.557	0.557			1
1,2,3,7,8-PeCDD	ND	U	0.122	2.49			1
1,2,3,4,7,8-HxCDD	ND	U	0.0873	2.49			1
1,2,3,6,7,8-HxCDD	ND	U	0.0992	2.49			1
1,2,3,7,8,9-HxCDD	ND	U	0.0909	2.49			1
1,2,3,4,6,7,8-HpCDD	0.536**BJ**		0.135	2.49	1.04	1.000	1
OCDD	5.62		0.226	4.99	0.79	1.000	1
2,3,7,8-TCDF	0.488**JK**		0.355	0.499	0.59	1.001	1
1,2,3,7,8-PeCDF	0.195**JK**		0.123	2.49	1.05	1.000	1
2,3,4,7,8-PeCDF	0.159**J**		0.116	2.49	1.46	1.001	1
1,2,3,4,7,8-HxCDF	ND	U	0.118	2.49			1
1,2,3,6,7,8-HxCDF	ND	U	0.117	2.49			1
1,2,3,7,8,9-HxCDF	ND	U	0.140	2.49			1
2,3,4,6,7,8-HxCDF	ND	U	0.132	2.49			1
1,2,3,4,6,7,8-HpCDF	0.233**J**		0.0994	2.49	1.19	1.000	1
1,2,3,4,7,8,9-HpCDF	ND	U	0.101	2.49			1
OCDF	2.23**J**		0.307	4.99	0.77	1.005	1

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 10:15
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-03	**Units:**	ng/Kg
Lab Code:	K2008783-002	**Basis:**	Wet

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method:	1613B	**Date Analyzed:**	11/21/20 08:34
Prep Method:	Method Soxhlet	**Date Extracted:**	11/14/20
Sample Amount:	10.029g	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623427	**Blank File Name:**	P623551
ICAL Date:	09/02/20	**Cal Ver. File Name:**	P623422

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
Total Tetra-Dioxins	ND	U	0.557	0.557			1
Total Penta-Dioxins	ND	U	0.122	2.49			1
Total Hexa-Dioxins	ND	U	0.0925	2.49			1
Total Hepta-Dioxins	1.40**J**		0.135	2.49	0.96		1
Total Tetra-Furans	ND	U	0.355	0.499			1
Total Penta-Furans	0.159**J**		0.120	2.49	1.46		1
Total Hexa-Furans	ND	U	0.126	2.49			1
Total Hepta-Furans	0.233**J**		0.0997	2.49	1.19		1

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 10:15
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-03	**Units:**	Percent
Lab Code:	K2008783-002	**Basis:**	Wet

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method:	1613B	**Date Analyzed:**	11/21/20 08:34
Prep Method:	Method Soxhlet	**Date Extracted:**	11/14/20
Sample Amount:	10.029g	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623427	**Blank File Name:**	P623551
ICAL Date:	09/02/20	**Cal Ver. File Name:**	P623422

Labeled Standard Results

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	% Rec	Q	Control Limits	Ion Ratio	RRT
13C-2,3,7,8-TCDD	2000	767.450	38		25-164	0.79	1.029
13C-1,2,3,7,8-PeCDD	2000	942.662	47		25-181	1.58	1.238
13C-1,2,3,4,7,8-HxCDD	2000	934.457	47		32-141	1.26	0.991
13C-1,2,3,6,7,8-HxCDD	2000	918.898	46		28-130	1.28	0.993
13C-1,2,3,4,6,7,8-HpCDD	2000	822.900	41		23-140	1.04	1.070
13C-OCDD	4000	1490.976	37		17-157	0.91	1.140
13C-2,3,7,8-TCDF	2000	768.303	38		24-169	0.78	0.990
13C-1,2,3,7,8-PeCDF	2000	894.920	45		24-185	1.58	1.186
13C-2,3,4,7,8-PeCDF	2000	898.737	45		21-178	1.58	1.226
13C-1,2,3,4,7,8-HxCDF	2000	759.674	38		26-152	0.50	0.968
13C-1,2,3,6,7,8-HxCDF	2000	769.693	38		26-123	0.51	0.972
13C-1,2,3,7,8,9-HxCDF	2000	701.316	35		29-147	0.50	1.008
13C-2,3,4,6,7,8-HxCDF	2000	666.495	33		28-136	0.53	0.987
13C-1,2,3,4,6,7,8-HpCDF	2000	649.326	32		28-143	0.41	1.045
13C-1,2,3,4,7,8,9-HpCDF	2000	760.512	38		26-138	0.42	1.082
37Cl-2,3,7,8-TCDD	800	471.905	59		35-197	NA	1.030

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 10:15
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-03	**Units:**	ng/Kg
Lab Code:	K2008783-002	**Basis:**	Wet

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method: 1613B
Prep Method: Method Soxhlet

Toxicity Equivalency Quotient

Analyte Name	Result	DL	MRL	Dilution Factor	TEF	TEF - Adjusted Concentration
2,3,7,8-TCDD	ND	0.557	0.557	1	1	
1,2,3,7,8-PeCDD	ND	0.122	2.49	1	1	
1,2,3,4,7,8-HxCDD	ND	0.0873	2.49	1	0.1	
1,2,3,6,7,8-HxCDD	ND	0.0992	2.49	1	0.1	
1,2,3,7,8,9-HxCDD	ND	0.0909	2.49	1	0.1	
1,2,3,4,6,7,8-HpCDD	**0.536**	0.135	2.49	1	0.01	0.00536
OCDD	**5.62**	0.226	4.99	1	0.0003	0.00169
2,3,7,8-TCDF	**0.488**	0.355	0.499	1	0.1	0.0488
1,2,3,7,8-PeCDF	**0.195**	0.123	2.49	1	0.03	0.00585
2,3,4,7,8-PeCDF	**0.159**	0.116	2.49	1	0.3	0.0477
1,2,3,4,7,8-HxCDF	ND	0.118	2.49	1	0.1	
1,2,3,6,7,8-HxCDF	ND	0.117	2.49	1	0.1	
1,2,3,7,8,9-HxCDF	ND	0.140	2.49	1	0.1	
2,3,4,6,7,8-HxCDF	ND	0.132	2.49	1	0.1	
1,2,3,4,6,7,8-HpCDF	**0.233**	0.0994	2.49	1	0.01	0.00233
1,2,3,4,7,8,9-HpCDF	ND	0.101	2.49	1	0.01	
OCDF	**2.23**	0.307	4.99	1	0.0003	0.000669
		Total TEQ				0.112

2005 WHO TEFs, ND = 0

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 09:00
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-04	**Units:**	ng/Kg
Lab Code:	K2008783-003	**Basis:**	Wet

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method:	1613B	**Date Analyzed:**	11/21/20 09:24
Prep Method:	Method Soxhlet	**Date Extracted:**	11/14/20
Sample Amount:	10.558g	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623428	**Blank File Name:**	P623551
ICAL Date:	09/02/20	**Cal Ver. File Name:**	P623422

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
2,3,7,8-TCDD	ND	U	0.472	0.474			1
1,2,3,7,8-PeCDD	ND	U	0.147	2.37			1
1,2,3,4,7,8-HxCDD	ND	U	0.108	2.37			1
1,2,3,6,7,8-HxCDD	ND	U	0.123	2.37			1
1,2,3,7,8,9-HxCDD	ND	U	0.112	2.37			1
1,2,3,4,6,7,8-HpCDD	0.812**BJ**		0.152	2.37	1.13	1.000	1
OCDD	3.29**JK**		0.274	4.74	1.07	1.000	1
2,3,7,8-TCDF	ND	U	0.302	0.474			1
1,2,3,7,8-PeCDF	ND	U	0.0969	2.37			1
2,3,4,7,8-PeCDF	ND	U	0.0927	2.37			1
1,2,3,4,7,8-HxCDF	ND	U	0.0978	2.37			1
1,2,3,6,7,8-HxCDF	ND	U	0.105	2.37			1
1,2,3,7,8,9-HxCDF	ND	U	0.128	2.37			1
2,3,4,6,7,8-HxCDF	ND	U	0.120	2.37			1
1,2,3,4,6,7,8-HpCDF	0.386**J**		0.0827	2.37	1.19	1.000	1
1,2,3,4,7,8,9-HpCDF	ND	U	0.0793	2.37			1
OCDF	2.48**J**		0.308	4.74	0.90	1.005	1

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 09:00
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-04	**Units:**	ng/Kg
Lab Code:	K2008783-003	**Basis:**	Wet

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method:	1613B	**Date Analyzed:**	11/21/20 09:24
Prep Method:	Method Soxhlet	**Date Extracted:**	11/14/20
Sample Amount:	10.558g	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623428	**Blank File Name:**	P623551
ICAL Date:	09/02/20	**Cal Ver. File Name:**	P623422

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
Total Tetra-Dioxins	ND	U	0.472	0.474			1
Total Penta-Dioxins	ND	U	0.147	2.37			1
Total Hexa-Dioxins	0.335**J**		0.114	2.37	1.21		1
Total Hepta-Dioxins	1.73**J**		0.152	2.37	1.16		1
Total Tetra-Furans	ND	U	0.302	0.474			1
Total Penta-Furans	ND	U	0.0949	2.37			1
Total Hexa-Furans	ND	U	0.112	2.37			1
Total Hepta-Furans	0.878**J**		0.0807	2.37	1.19		1

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 09:00
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-04	**Units:**	Percent
Lab Code:	K2008783-003	**Basis:**	Wet

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method:	1613B	**Date Analyzed:**	11/21/20 09:24
Prep Method:	Method Soxhlet	**Date Extracted:**	11/14/20
Sample Amount:	10.558g	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623428	**Blank File Name:**	P623551
ICAL Date:	09/02/20	**Cal Ver. File Name:**	P623422

Labeled Standard Results

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	% Rec	Q	Control Limits	Ion Ratio	RRT
13C-2,3,7,8-TCDD	2000	839.410	42		25-164	0.80	1.029
13C-1,2,3,7,8-PeCDD	2000	989.933	49		25-181	1.57	1.237
13C-1,2,3,4,7,8-HxCDD	2000	1083.770	54		32-141	1.27	0.991
13C-1,2,3,6,7,8-HxCDD	2000	1032.660	52		28-130	1.27	0.993
13C-1,2,3,4,6,7,8-HpCDD	2000	841.652	42		23-140	1.06	1.070
13C-OCDD	4000	1493.323	37		17-157	0.89	1.139
13C-2,3,7,8-TCDF	2000	836.156	42		24-169	0.78	0.990
13C-1,2,3,7,8-PeCDF	2000	952.902	48		24-185	1.57	1.185
13C-2,3,4,7,8-PeCDF	2000	960.856	48		21-178	1.57	1.226
13C-1,2,3,4,7,8-HxCDF	2000	891.956	45		26-152	0.52	0.968
13C-1,2,3,6,7,8-HxCDF	2000	860.363	43		26-123	0.51	0.971
13C-1,2,3,7,8,9-HxCDF	2000	800.439	40		29-147	0.51	1.008
13C-2,3,4,6,7,8-HxCDF	2000	745.639	37		28-136	0.51	0.986
13C-1,2,3,4,6,7,8-HpCDF	2000	677.474	34		28-143	0.44	1.045
13C-1,2,3,4,7,8,9-HpCDF	2000	839.132	42		26-138	0.43	1.082
37Cl-2,3,7,8-TCDD	800	447.144	56		35-197	NA	1.030

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 09:00
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-04	**Units:**	ng/Kg
Lab Code:	K2008783-003	**Basis:**	Wet

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method: 1613B
Prep Method: Method Soxhlet

Toxicity Equivalency Quotient

Analyte Name	Result	DL	MRL	Dilution Factor	TEF	TEF - Adjusted Concentration
2,3,7,8-TCDD	ND	0.472	0.474	1	1	
1,2,3,7,8-PeCDD	ND	0.147	2.37	1	1	
1,2,3,4,7,8-HxCDD	ND	0.108	2.37	1	0.1	
1,2,3,6,7,8-HxCDD	ND	0.123	2.37	1	0.1	
1,2,3,7,8,9-HxCDD	ND	0.112	2.37	1	0.1	
1,2,3,4,6,7,8-HpCDD	**0.812**	0.152	2.37	1	0.01	0.00812
OCDD	**3.29**	0.274	4.74	1	0.0003	0.000987
2,3,7,8-TCDF	ND	0.302	0.474	1	0.1	
1,2,3,7,8-PeCDF	ND	0.0969	2.37	1	0.03	
2,3,4,7,8-PeCDF	ND	0.0927	2.37	1	0.3	
1,2,3,4,7,8-HxCDF	ND	0.0978	2.37	1	0.1	
1,2,3,6,7,8-HxCDF	ND	0.105	2.37	1	0.1	
1,2,3,7,8,9-HxCDF	ND	0.128	2.37	1	0.1	
2,3,4,6,7,8-HxCDF	ND	0.120	2.37	1	0.1	
1,2,3,4,6,7,8-HpCDF	**0.386**	0.0827	2.37	1	0.01	0.00386
1,2,3,4,7,8,9-HpCDF	ND	0.0793	2.37	1	0.01	
OCDF	**2.48**	0.308	4.74	1	0.0003	0.000744
		Total TEQ				0.0137

2005 WHO TEFs, ND = 0

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 09:00
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-04 Dup	**Units:**	ng/Kg
Lab Code:	K2008783-004	**Basis:**	Wet

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method:	1613B	**Date Analyzed:**	11/21/20 10:13
Prep Method:	Method Soxhlet	**Date Extracted:**	11/14/20
Sample Amount:	10.410g	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623429	**Blank File Name:**	P623551
ICAL Date:	09/02/20	**Cal Ver. File Name:**	P623422

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
2,3,7,8-TCDD	ND	U	0.632	0.632			1
1,2,3,7,8-PeCDD	0.388**J**		0.189	2.40	1.71	1.001	1
1,2,3,4,7,8-HxCDD	0.943**J**		0.198	2.40	1.37	1.000	1
1,2,3,6,7,8-HxCDD	6.21		0.226	2.40	1.28	1.000	1
1,2,3,7,8,9-HxCDD	3.10		0.206	2.40	1.19	1.007	1
1,2,3,4,6,7,8-HpCDD	146		1.53	2.40	1.02	1.000	1
OCDD	1360		49.8	49.8	0.89	1.000	1
2,3,7,8-TCDF	ND	U	0.450	0.480			1
1,2,3,7,8-PeCDF	ND	U	0.218	2.40			1
2,3,4,7,8-PeCDF	ND	U	0.192	2.40			1
1,2,3,4,7,8-HxCDF	0.435**JK**		0.286	2.40	0.69	1.000	1
1,2,3,6,7,8-HxCDF	22.4**P**		0.290	2.40	1.18	1.000	1
1,2,3,7,8,9-HxCDF	ND	U	0.337	2.40			1
2,3,4,6,7,8-HxCDF	ND	U	0.315	2.40			1
1,2,3,4,6,7,8-HpCDF	241**P**		0.555	2.40	0.99	1.000	1
1,2,3,4,7,8,9-HpCDF	3.21		0.520	2.40	1.13	1.000	1
OCDF	901		0.525	4.80	0.84	1.004	1

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 09:00
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-04 Dup	**Units:**	ng/Kg
Lab Code:	K2008783-004	**Basis:**	Wet

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method:	1613B	**Date Analyzed:**	11/21/20 10:13
Prep Method:	Method Soxhlet	**Date Extracted:**	11/14/20
Sample Amount:	10.410g	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623429	**Blank File Name:**	P623551
ICAL Date:	09/02/20	**Cal Ver. File Name:**	P623422

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
Total Tetra-Dioxins	ND	U	0.632	0.632			1
Total Penta-Dioxins	0.671**J**		0.189	2.40	1.71		1
Total Hexa-Dioxins	23.7		0.210	2.40	1.43		1
Total Hepta-Dioxins	243		1.53	2.40	1.02		1
Total Tetra-Furans	ND	U	0.450	0.480			1
Total Penta-Furans	72.9		0.205	2.40	1.36		1
Total Hexa-Furans	139		0.306	2.40	1.10		1
Total Hepta-Furans	517		0.535	2.40	0.99		1

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 09:00
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-04 Dup	**Units:**	Percent
Lab Code:	K2008783-004	**Basis:**	Wet

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method:	1613B	**Date Analyzed:**	11/21/20 10:13
Prep Method:	Method Soxhlet	**Date Extracted:**	11/14/20
Sample Amount:	10.410g	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623429	**Blank File Name:**	P623551
ICAL Date:	09/02/20	**Cal Ver. File Name:**	P623422

Labeled Standard Results

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	% Rec	Q	Control Limits	Ion Ratio	RRT
13C-2,3,7,8-TCDD	2000	487.975	24	**Y**	25-164	0.79	1.029
13C-1,2,3,7,8-PeCDD	2000	606.193	30		25-181	1.59	1.237
13C-1,2,3,4,7,8-HxCDD	2000	728.806	36		32-141	1.27	0.991
13C-1,2,3,6,7,8-HxCDD	2000	653.589	33		28-130	1.22	0.993
13C-1,2,3,4,6,7,8-HpCDD	2000	541.879	27		23-140	1.05	1.070
13C-OCDD	4000	870.492	22		17-157	0.92	1.140
13C-2,3,7,8-TCDF	2000	470.987	24		24-169	0.78	0.990
13C-1,2,3,7,8-PeCDF	2000	555.911	28		24-185	1.57	1.185
13C-2,3,4,7,8-PeCDF	2000	589.445	29		21-178	1.58	1.226
13C-1,2,3,4,7,8-HxCDF	2000	566.517	28		26-152	0.53	0.969
13C-1,2,3,6,7,8-HxCDF	2000	550.762	28		26-123	0.51	0.972
13C-1,2,3,7,8,9-HxCDF	2000	532.676	27	**Y**	29-147	0.51	1.008
13C-2,3,4,6,7,8-HxCDF	2000	513.023	26	**Y**	28-136	0.52	0.987
13C-1,2,3,4,6,7,8-HpCDF	2000	427.160	21	**Y**	28-143	0.43	1.045
13C-1,2,3,4,7,8,9-HpCDF	2000	543.728	27		26-138	0.43	1.082
37Cl-2,3,7,8-TCDD	800	382.038	48		35-197	NA	1.030

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 09:00
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-04 Dup	**Units:**	ng/Kg
Lab Code:	K2008783-004	**Basis:**	Wet

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method: 1613B
Prep Method: Method Soxhlet

Toxicity Equivalency Quotient

Analyte Name	Result	DL	MRL	Dilution Factor	TEF	TEF - Adjusted Concentration
2,3,7,8-TCDD	ND	0.632	0.632	1	1	
1,2,3,7,8-PeCDD	**0.388**	0.189	2.40	1	1	0.388
1,2,3,4,7,8-HxCDD	**0.943**	0.198	2.40	1	0.1	0.0943
1,2,3,6,7,8-HxCDD	**6.21**	0.226	2.40	1	0.1	0.621
1,2,3,7,8,9-HxCDD	**3.10**	0.206	2.40	1	0.1	0.310
1,2,3,4,6,7,8-HpCDD	**146**	1.53	2.40	1	0.01	1.46
OCDD	**1360**	49.8	49.8	1	0.0003	0.408
2,3,7,8-TCDF	ND	0.450	0.480	1	0.1	
1,2,3,7,8-PeCDF	ND	0.218	2.40	1	0.03	
2,3,4,7,8-PeCDF	ND	0.192	2.40	1	0.3	
1,2,3,4,7,8-HxCDF	**0.435**	0.286	2.40	1	0.1	0.0435
1,2,3,6,7,8-HxCDF	**22.4**	0.290	2.40	1	0.1	2.24
1,2,3,7,8,9-HxCDF	ND	0.337	2.40	1	0.1	
2,3,4,6,7,8-HxCDF	ND	0.315	2.40	1	0.1	
1,2,3,4,6,7,8-HpCDF	**241**	0.555	2.40	1	0.01	2.41
1,2,3,4,7,8,9-HpCDF	**3.21**	0.520	2.40	1	0.01	0.0321
OCDF	**901**	0.525	4.80	1	0.0003	0.270
		Total TEQ				8.28

2005 WHO TEFs, ND = 0

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 11:28
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-05	**Units:**	ng/Kg
Lab Code:	K2008783-005	**Basis:**	Wet

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method:	1613B	**Date Analyzed:**	11/21/20 11:03
Prep Method:	Method Soxhlet	**Date Extracted:**	11/14/20
Sample Amount:	10.149g	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623430	**Blank File Name:**	P623551
ICAL Date:	09/02/20	**Cal Ver. File Name:**	P623422

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
2,3,7,8-TCDD	ND	U	0.582	0.582			1
1,2,3,7,8-PeCDD	ND	U	0.186	2.46			1
1,2,3,4,7,8-HxCDD	ND	U	0.242	2.46			1
1,2,3,6,7,8-HxCDD	ND	U	0.280	2.46			1
1,2,3,7,8,9-HxCDD	ND	U	0.254	2.46			1
1,2,3,4,6,7,8-HpCDD	1.93**J**		0.370	2.46	1.01	1.000	1
OCDD	11.0		1.09	4.93	0.79	1.000	1
2,3,7,8-TCDF	ND	U	0.398	0.493			1
1,2,3,7,8-PeCDF	ND	U	0.170	2.46			1
2,3,4,7,8-PeCDF	ND	U	0.152	2.46			1
1,2,3,4,7,8-HxCDF	ND	U	0.201	2.46			1
1,2,3,6,7,8-HxCDF	ND	U	0.199	2.46			1
1,2,3,7,8,9-HxCDF	ND	U	0.242	2.46			1
2,3,4,6,7,8-HxCDF	ND	U	0.224	2.46			1
1,2,3,4,6,7,8-HpCDF	0.842**JK**		0.176	2.46	1.28	1.000	1
1,2,3,4,7,8,9-HpCDF	ND	U	0.177	2.46			1
OCDF	5.90		0.395	4.93	0.87	1.005	1

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 11:28
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-05	**Units:**	ng/Kg
Lab Code:	K2008783-005	**Basis:**	Wet

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method:	1613B	**Date Analyzed:**	11/21/20 11:03
Prep Method:	Method Soxhlet	**Date Extracted:**	11/14/20
Sample Amount:	10.149g	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623430	**Blank File Name:**	P623551
ICAL Date:	09/02/20	**Cal Ver. File Name:**	P623422

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
Total Tetra-Dioxins	ND	U	0.582	0.582			1
Total Penta-Dioxins	ND	U	0.186	2.46			1
Total Hexa-Dioxins	ND	U	0.258	2.46			1
Total Hepta-Dioxins	1.93**J**		0.370	2.46	1.01		1
Total Tetra-Furans	ND	U	0.398	0.493			1
Total Penta-Furans	ND	U	0.161	2.46			1
Total Hexa-Furans	0.402**J**		0.215	2.46	1.08		1
Total Hepta-Furans	1.02**J**		0.176	2.46	0.96		1

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 11:28
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-05	**Units:**	Percent
Lab Code:	K2008783-005	**Basis:**	Wet

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method:	1613B	**Date Analyzed:**	11/21/20 11:03
Prep Method:	Method Soxhlet	**Date Extracted:**	11/14/20
Sample Amount:	10.149g	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623430	**Blank File Name:**	P623551
ICAL Date:	09/02/20	**Cal Ver. File Name:**	P623422

Labeled Standard Results

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	% Rec	Q	Control Limits	Ion Ratio	RRT
13C-2,3,7,8-TCDD	2000	601.340	30		25-164	0.77	1.030
13C-1,2,3,7,8-PeCDD	2000	733.383	37		25-181	1.58	1.238
13C-1,2,3,4,7,8-HxCDD	2000	872.187	44		32-141	1.34	0.991
13C-1,2,3,6,7,8-HxCDD	2000	807.718	40		28-130	1.18	0.993
13C-1,2,3,4,6,7,8-HpCDD	2000	709.600	35		23-140	1.05	1.070
13C-OCDD	4000	1214.214	30		17-157	0.88	1.139
13C-2,3,7,8-TCDF	2000	579.969	29		24-169	0.76	0.990
13C-1,2,3,7,8-PeCDF	2000	664.156	33		24-185	1.59	1.186
13C-2,3,4,7,8-PeCDF	2000	709.284	35		21-178	1.57	1.226
13C-1,2,3,4,7,8-HxCDF	2000	694.585	35		26-152	0.51	0.969
13C-1,2,3,6,7,8-HxCDF	2000	694.419	35		26-123	0.50	0.971
13C-1,2,3,7,8,9-HxCDF	2000	624.013	31		29-147	0.49	1.008
13C-2,3,4,6,7,8-HxCDF	2000	606.158	30		28-136	0.51	0.986
13C-1,2,3,4,6,7,8-HpCDF	2000	570.544	29		28-143	0.44	1.045
13C-1,2,3,4,7,8,9-HpCDF	2000	664.803	33		26-138	0.43	1.082
37Cl-2,3,7,8-TCDD	800	403.746	50		35-197	NA	1.030

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 11:28
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB1020-05	**Units:**	ng/Kg
Lab Code:	K2008783-005	**Basis:**	Wet

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method: 1613B
Prep Method: Method Soxhlet

Toxicity Equivalency Quotient

Analyte Name	Result	DL	MRL	Dilution Factor	TEF	TEF - Adjusted Concentration
2,3,7,8-TCDD	ND	0.582	0.582	1	1	
1,2,3,7,8-PeCDD	ND	0.186	2.46	1	1	
1,2,3,4,7,8-HxCDD	ND	0.242	2.46	1	0.1	
1,2,3,6,7,8-HxCDD	ND	0.280	2.46	1	0.1	
1,2,3,7,8,9-HxCDD	ND	0.254	2.46	1	0.1	
1,2,3,4,6,7,8-HpCDD	**1.93**	0.370	2.46	1	0.01	0.0193
OCDD	**11.0**	1.09	4.93	1	0.0003	0.00330
2,3,7,8-TCDF	ND	0.398	0.493	1	0.1	
1,2,3,7,8-PeCDF	ND	0.170	2.46	1	0.03	
2,3,4,7,8-PeCDF	ND	0.152	2.46	1	0.3	
1,2,3,4,7,8-HxCDF	ND	0.201	2.46	1	0.1	
1,2,3,6,7,8-HxCDF	ND	0.199	2.46	1	0.1	
1,2,3,7,8,9-HxCDF	ND	0.242	2.46	1	0.1	
2,3,4,6,7,8-HxCDF	ND	0.224	2.46	1	0.1	
1,2,3,4,6,7,8-HpCDF	**0.842**	0.176	2.46	1	0.01	0.00842
1,2,3,4,7,8,9-HpCDF	ND	0.177	2.46	1	0.01	
OCDF	**5.90**	0.395	4.93	1	0.0003	0.00177
		Total TEQ				0.0328

2005 WHO TEFs, ND = 0

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 09:00
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB-20-Baitchicken	**Units:**	ng/Kg
Lab Code:	K2008783-006	**Basis:**	Wet

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method:	1613B	**Date Analyzed:**	11/21/20 11:53
Prep Method:	Method Soxhlet	**Date Extracted:**	11/14/20
Sample Amount:	10.260g	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623431	**Blank File Name:**	P623551
ICAL Date:	09/02/20	**Cal Ver. File Name:**	P623422

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
2,3,7,8-TCDD	ND	U	0.353	0.487			1
1,2,3,7,8-PeCDD	ND	U	0.104	2.44			1
1,2,3,4,7,8-HxCDD	ND	U	0.110	2.44			1
1,2,3,6,7,8-HxCDD	ND	U	0.124	2.44			1
1,2,3,7,8,9-HxCDD	ND	U	0.114	2.44			1
1,2,3,4,6,7,8-HpCDD	0.534**BJ**		0.215	2.44	0.88	1.000	1
OCDD	3.45**J**		0.479	4.87	0.83	1.000	1
2,3,7,8-TCDF	ND	U	0.269	0.487			1
1,2,3,7,8-PeCDF	ND	U	0.108	2.44			1
2,3,4,7,8-PeCDF	ND	U	0.105	2.44			1
1,2,3,4,7,8-HxCDF	ND	U	0.0672	2.44			1
1,2,3,6,7,8-HxCDF	ND	U	0.0718	2.44			1
1,2,3,7,8,9-HxCDF	ND	U	0.0802	2.44			1
2,3,4,6,7,8-HxCDF	ND	U	0.0733	2.44			1
1,2,3,4,6,7,8-HpCDF	0.355**J**		0.0926	2.44	1.17	1.000	1
1,2,3,4,7,8,9-HpCDF	ND	U	0.0935	2.44			1
OCDF	3.31**J**		0.255	4.87	0.87	1.005	1

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 09:00
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB-20-Baitchicken	**Units:**	ng/Kg
Lab Code:	K2008783-006	**Basis:**	Wet

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method:	1613B	**Date Analyzed:**	11/21/20 11:53
Prep Method:	Method Soxhlet	**Date Extracted:**	11/14/20
Sample Amount:	10.260g	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623431	**Blank File Name:**	P623551
ICAL Date:	09/02/20	**Cal Ver. File Name:**	P623422

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
Total Tetra-Dioxins	ND	U	0.353	0.487			1
Total Penta-Dioxins	ND	U	0.104	2.44			1
Total Hexa-Dioxins	ND	U	0.116	2.44			1
Total Hepta-Dioxins	ND	U	0.215	2.44			1
Total Tetra-Furans	ND	U	0.269	0.487			1
Total Penta-Furans	ND	U	0.107	2.44			1
Total Hexa-Furans	ND	U	0.0730	2.44			1
Total Hepta-Furans	0.355**J**		0.0929	2.44	1.17		1

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 09:00
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB-20-Baitchicken	**Units:**	Percent
Lab Code:	K2008783-006	**Basis:**	Wet

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method:	1613B	**Date Analyzed:**	11/21/20 11:53
Prep Method:	Method Soxhlet	**Date Extracted:**	11/14/20
Sample Amount:	10.260g	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623431	**Blank File Name:**	P623551
ICAL Date:	09/02/20	**Cal Ver. File Name:**	P623422

Labeled Standard Results

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	% Rec	Q	Control Limits	Ion Ratio	RRT
13C-2,3,7,8-TCDD	2000	925.380	46		25-164	0.78	1.029
13C-1,2,3,7,8-PeCDD	2000	1056.274	53		25-181	1.59	1.238
13C-1,2,3,4,7,8-HxCDD	2000	1236.259	62		32-141	1.28	0.991
13C-1,2,3,6,7,8-HxCDD	2000	1185.202	59		28-130	1.28	0.993
13C-1,2,3,4,6,7,8-HpCDD	2000	1015.443	51		23-140	1.09	1.070
13C-OCDD	4000	1769.678	44		17-157	0.90	1.139
13C-2,3,7,8-TCDF	2000	879.432	44		24-169	0.78	0.990
13C-1,2,3,7,8-PeCDF	2000	972.084	49		24-185	1.57	1.185
13C-2,3,4,7,8-PeCDF	2000	979.033	49		21-178	1.57	1.226
13C-1,2,3,4,7,8-HxCDF	2000	1003.527	50		26-152	0.51	0.968
13C-1,2,3,6,7,8-HxCDF	2000	933.624	47		26-123	0.50	0.971
13C-1,2,3,7,8,9-HxCDF	2000	923.970	46		29-147	0.54	1.008
13C-2,3,4,6,7,8-HxCDF	2000	894.212	45		28-136	0.51	0.986
13C-1,2,3,4,6,7,8-HpCDF	2000	837.525	42		28-143	0.42	1.045
13C-1,2,3,4,7,8,9-HpCDF	2000	981.294	49		26-138	0.44	1.082
37Cl-2,3,7,8-TCDD	800	389.173	49		35-197	NA	1.030

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	09/29/20 09:00
Sample Matrix:	Tissue	**Date Received:**	10/01/20 13:00
Sample Name:	MBCFGB-20-Baitchicken	**Units:**	ng/Kg
Lab Code:	K2008783-006	**Basis:**	Wet

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method: 1613B
Prep Method: Method Soxhlet

Toxicity Equivalency Quotient

Analyte Name	Result	DL	MRL	Dilution Factor	TEF	TEF - Adjusted Concentration
2,3,7,8-TCDD	ND	0.353	0.487	1	1	
1,2,3,7,8-PeCDD	ND	0.104	2.44	1	1	
1,2,3,4,7,8-HxCDD	ND	0.110	2.44	1	0.1	
1,2,3,6,7,8-HxCDD	ND	0.124	2.44	1	0.1	
1,2,3,7,8,9-HxCDD	ND	0.114	2.44	1	0.1	
1,2,3,4,6,7,8-HpCDD	**0.534**	0.215	2.44	1	0.01	0.00534
OCDD	**3.45**	0.479	4.87	1	0.0003	0.00104
2,3,7,8-TCDF	ND	0.269	0.487	1	0.1	
1,2,3,7,8-PeCDF	ND	0.108	2.44	1	0.03	
2,3,4,7,8-PeCDF	ND	0.105	2.44	1	0.3	
1,2,3,4,7,8-HxCDF	ND	0.0672	2.44	1	0.1	
1,2,3,6,7,8-HxCDF	ND	0.0718	2.44	1	0.1	
1,2,3,7,8,9-HxCDF	ND	0.0802	2.44	1	0.1	
2,3,4,6,7,8-HxCDF	ND	0.0733	2.44	1	0.1	
1,2,3,4,6,7,8-HpCDF	**0.355**	0.0926	2.44	1	0.01	0.00355
1,2,3,4,7,8,9-HpCDF	ND	0.0935	2.44	1	0.01	
OCDF	**3.31**	0.255	4.87	1	0.0003	0.000993
		Total TEQ				0.0109

2005 WHO TEFs, ND = 0

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Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	NA
Sample Matrix:	Tissue	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	ng/Kg
Lab Code:	EQ2000594-01	**Basis:**	Wet

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method:	1613B	**Date Analyzed:**	11/28/20 14:49
Prep Method:	Method Soxhlet	**Date Extracted:**	11/14/20
Sample Amount:	10.003g	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623551	**Blank File Name:**	P623551
ICAL Date:	09/02/20	**Cal Ver. File Name:**	P623548

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
2,3,7,8-TCDD	ND	U	0.237	0.500			1
1,2,3,7,8-PeCDD	ND	U	0.102	2.50			1
1,2,3,4,7,8-HxCDD	ND	U	0.0838	2.50			1
1,2,3,6,7,8-HxCDD	ND	U	0.0846	2.50			1
1,2,3,7,8,9-HxCDD	ND	U	0.0821	2.50			1
1,2,3,4,6,7,8-HpCDD	0.110**JK**		0.0980	2.50	0.73	1.000	1
OCDD	0.234**JK**		0.124	5.00	1.15	1.001	1
2,3,7,8-TCDF	ND	U	0.214	0.500			1
1,2,3,7,8-PeCDF	ND	U	0.0877	2.50			1
2,3,4,7,8-PeCDF	ND	U	0.0813	2.50			1
1,2,3,4,7,8-HxCDF	ND	U	0.0863	2.50			1
1,2,3,6,7,8-HxCDF	ND	U	0.0826	2.50			1
1,2,3,7,8,9-HxCDF	ND	U	0.127	2.50			1
2,3,4,6,7,8-HxCDF	ND	U	0.0890	2.50			1
1,2,3,4,6,7,8-HpCDF	ND	U	0.0699	2.50			1
1,2,3,4,7,8,9-HpCDF	ND	U	0.103	2.50			1
OCDF	ND	U	0.224	5.00			1

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Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	NA
Sample Matrix:	Tissue	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	ng/Kg
Lab Code:	EQ2000594-01	**Basis:**	Wet

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method:	1613B	**Date Analyzed:**	11/28/20 14:49
Prep Method:	Method Soxhlet	**Date Extracted:**	11/14/20
Sample Amount:	10.003g	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623551	**Blank File Name:**	P623551
ICAL Date:	09/02/20	**Cal Ver. File Name:**	P623548

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
Total Tetra-Dioxins	ND	U	0.237	0.500			1
Total Penta-Dioxins	ND	U	0.102	2.50			1
Total Hexa-Dioxins	ND	U	0.0835	2.50			1
Total Hepta-Dioxins	ND	U	0.0980	2.50			1
Total Tetra-Furans	ND	U	0.214	0.500			1
Total Penta-Furans	ND	U	0.0843	2.50			1
Total Hexa-Furans	ND	U	0.0938	2.50			1
Total Hepta-Furans	ND	U	0.0845	2.50			1

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	NA
Sample Matrix:	Tissue	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	Percent
Lab Code:	EQ2000594-01	**Basis:**	Wet

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method:	1613B	**Date Analyzed:**	11/28/20 14:49
Prep Method:	Method Soxhlet	**Date Extracted:**	11/14/20
Sample Amount:	10.003g	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623551	**Blank File Name:**	P623551
ICAL Date:	09/02/20	**Cal Ver. File Name:**	P623548

Labeled Standard Results

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	% Rec	Q	Control Limits	Ion Ratio	RRT
13C-2,3,7,8-TCDD	2000	929.704	46		25-164	0.79	1.018
13C-1,2,3,7,8-PeCDD	2000	1128.021	56		25-181	1.59	1.167
13C-1,2,3,4,7,8-HxCDD	2000	1180.217	59		32-141	1.24	0.992
13C-1,2,3,6,7,8-HxCDD	2000	1514.087	76		28-130	1.25	0.994
13C-1,2,3,4,6,7,8-HpCDD	2000	1181.425	59		23-140	1.13	1.065
13C-OCDD	4000	2521.836	63		17-157	0.90	1.141
13C-2,3,7,8-TCDF	2000	842.994	42		24-169	0.78	0.993
13C-1,2,3,7,8-PeCDF	2000	957.279	48		24-185	1.55	1.128
13C-2,3,4,7,8-PeCDF	2000	1037.695	52		21-178	1.57	1.158
13C-1,2,3,4,7,8-HxCDF	2000	999.205	50		26-152	0.53	0.972
13C-1,2,3,6,7,8-HxCDF	2000	1232.994	62		26-123	0.50	0.975
13C-1,2,3,7,8,9-HxCDF	2000	900.626	45		29-147	0.51	1.008
13C-2,3,4,6,7,8-HxCDF	2000	1099.503	55		28-136	0.50	0.988
13C-1,2,3,4,6,7,8-HpCDF	2000	1099.987	55		28-143	0.42	1.040
13C-1,2,3,4,7,8,9-HpCDF	2000	995.594	50		26-138	0.41	1.079
37Cl-2,3,7,8-TCDD	800	390.354	49		35-197	NA	1.019

Accuracy & Precision

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QA/QC Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Analyzed:**	11/21/20
Sample Matrix:	Tissue	**Date Extracted:**	11/14/20

Duplicate Lab Control Sample Summary
Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method:	1613B	**Units:**	ng/Kg
Prep Method:	Method Soxhlet	**Basis:**	Wet
		Analysis Lot:	705162

	Lab Control Sample EQ2000594-02			Duplicate Lab Control Sample EQ2000594-03					
Analyte Name	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
1,2,3,4,6,7,8-HpCDD	106	98.9	107	93.2	99.6	94	70-140	12	50
1,2,3,4,7,8-HxCDD	88.1	98.9	89	79.1	99.6	79	70-164	11	50
1,2,3,6,7,8-HxCDD	99.2	98.9	100	90.7	99.6	91	76-134	9	50
1,2,3,7,8,9-HxCDD	97.8	98.9	99	88.5	99.6	89	64-162	10	50
1,2,3,7,8-PeCDD	114	98.9	115	101	99.6	101	70-142	12	50
2,3,7,8-TCDD	21.1	19.8	107	18.4	19.9	92	67-158	14	50
OCDD	221	198	112	199	199	100	78-144	10	50
1,2,3,4,6,7,8-HpCDF	95.1	98.9	96	83.3	99.6	84	82-122	13	50
1,2,3,4,7,8,9-HpCDF	93.1	98.9	94	82.9	99.6	83	78-138	12	50
1,2,3,4,7,8-HxCDF	92.8	98.9	94	81.5	99.6	82	72-134	13	50
1,2,3,6,7,8-HxCDF	98.1	98.9	99	87.4	99.6	88	84-130	11	50
1,2,3,7,8,9-HxCDF	93.2	98.9	94	82.5	99.6	83	78-130	12	50
1,2,3,7,8-PeCDF	99.6	98.9	101	84.8	99.6	85	80-134	16	50
2,3,4,6,7,8-HxCDF	98.9	98.9	100	88.1	99.6	88	70-156	12	50
2,3,4,7,8-PeCDF	100	98.9	102	90.3	99.6	91	68-160	11	50
2,3,7,8-TCDF	20.9	19.8	106	18.3	19.9	92	75-158	13	50
OCDF	198	198	100	173	199	87	63-170	13	50

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Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	NA
Sample Matrix:	Tissue	**Date Received:**	NA
Sample Name:	Lab Control Sample	**Units:**	ng/Kg
Lab Code:	EQ2000594-02	**Basis:**	Wet

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method:	1613B	**Date Analyzed:**	11/21/20 14:22
Prep Method:	Method Soxhlet	**Date Extracted:**	11/14/20
Sample Amount:	10.115g	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623434	**Blank File Name:**	P623551
ICAL Date:	09/02/20	**Cal Ver. File Name:**	P623422

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
2,3,7,8-TCDD	21.1		0.374	0.494	0.83	1.001	1
1,2,3,7,8-PeCDD	114		0.117	2.47	1.58	1.001	1
1,2,3,4,7,8-HxCDD	88.1		0.0719	2.47	1.22	1.000	1
1,2,3,6,7,8-HxCDD	99.2		0.0828	2.47	1.24	1.000	1
1,2,3,7,8,9-HxCDD	97.8		0.0754	2.47	1.25	1.008	1
1,2,3,4,6,7,8-HpCDD	106		0.113	2.47	1.01	1.000	1
OCDD	221		0.468	4.94	0.90	1.000	1
2,3,7,8-TCDF	20.9		0.311	0.494	0.75	1.001	1
1,2,3,7,8-PeCDF	99.6		0.0959	2.47	1.52	1.001	1
2,3,4,7,8-PeCDF	100		0.0891	2.47	1.52	1.001	1
1,2,3,4,7,8-HxCDF	92.8		0.128	2.47	1.18	1.000	1
1,2,3,6,7,8-HxCDF	98.1		0.133	2.47	1.18	1.000	1
1,2,3,7,8,9-HxCDF	93.2		0.152	2.47	1.20	1.000	1
2,3,4,6,7,8-HxCDF	98.9		0.135	2.47	1.19	1.000	1
1,2,3,4,6,7,8-HpCDF	95.1		0.359	2.47	1.00	1.000	1
1,2,3,4,7,8,9-HpCDF	93.1		0.408	2.47	1.00	1.000	1
OCDF	198		0.383	4.94	0.87	1.005	1

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	NA
Sample Matrix:	Tissue	**Date Received:**	NA
Sample Name:	Lab Control Sample	**Units:**	ng/Kg
Lab Code:	EQ2000594-02	**Basis:**	Wet

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method:	1613B	**Date Analyzed:**	11/21/20 14:22
Prep Method:	Method Soxhlet	**Date Extracted:**	11/14/20
Sample Amount:	10.115g	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623434	**Blank File Name:**	P623551
ICAL Date:	09/02/20	**Cal Ver. File Name:**	P623422

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
Total Tetra-Dioxins	21.1		0.374	0.494	0.83		1
Total Penta-Dioxins	114		0.117	2.47	1.58		1
Total Hexa-Dioxins	285		0.0768	2.47	1.22		1
Total Hepta-Dioxins	106		0.113	2.47	1.01		1
Total Tetra-Furans	20.9		0.311	0.494	0.75		1
Total Penta-Furans	200		0.0925	2.47	1.55		1
Total Hexa-Furans	383		0.137	2.47	1.18		1
Total Hepta-Furans	188		0.382	2.47	1.00		1

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	NA
Sample Matrix:	Tissue	**Date Received:**	NA
Sample Name:	Lab Control Sample	**Units:**	Percent
Lab Code:	EQ2000594-02	**Basis:**	Wet

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method:	1613B	**Date Analyzed:**	11/21/20 14:22
Prep Method:	Method Soxhlet	**Date Extracted:**	11/14/20
Sample Amount:	10.115g	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623434	**Blank File Name:**	P623551
ICAL Date:	09/02/20	**Cal Ver. File Name:**	P623422

Labeled Standard Results

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	% Rec	Q	Control Limits	Ion Ratio	RRT
13C-2,3,7,8-TCDD	2000	1053.339	53		25-164	0.77	1.029
13C-1,2,3,7,8-PeCDD	2000	1360.168	68		25-181	1.60	1.237
13C-1,2,3,4,7,8-HxCDD	2000	1371.814	69		32-141	1.25	0.991
13C-1,2,3,6,7,8-HxCDD	2000	1351.386	68		28-130	1.25	0.993
13C-1,2,3,4,6,7,8-HpCDD	2000	1274.894	64		23-140	1.05	1.070
13C-OCDD	4000	2693.569	67		17-157	0.90	1.139
13C-2,3,7,8-TCDF	2000	987.006	49		24-169	0.79	0.990
13C-1,2,3,7,8-PeCDF	2000	1231.920	62		24-185	1.58	1.185
13C-2,3,4,7,8-PeCDF	2000	1293.256	65		21-178	1.59	1.226
13C-1,2,3,4,7,8-HxCDF	2000	1103.691	55		26-152	0.52	0.968
13C-1,2,3,6,7,8-HxCDF	2000	1087.958	54		26-123	0.50	0.971
13C-1,2,3,7,8,9-HxCDF	2000	1070.741	54		29-147	0.51	1.008
13C-2,3,4,6,7,8-HxCDF	2000	1035.306	52		28-136	0.52	0.986
13C-1,2,3,4,6,7,8-HpCDF	2000	1087.506	54		28-143	0.43	1.045
13C-1,2,3,4,7,8,9-HpCDF	2000	1122.936	56		26-138	0.44	1.082
37Cl-2,3,7,8-TCDD	800	440.343	55		35-197	NA	1.030

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	NA
Sample Matrix:	Tissue	**Date Received:**	NA
Sample Name:	Duplicate Lab Control Sample	**Units:**	ng/Kg
Lab Code:	EQ2000594-03	**Basis:**	Wet

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method:	1613B	**Date Analyzed:**	11/21/20 15:30
Prep Method:	Method Soxhlet	**Date Extracted:**	11/14/20
Sample Amount:	10.044g	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623435	**Blank File Name:**	P623551
ICAL Date:	09/02/20	**Cal Ver. File Name:**	P623422

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
2,3,7,8-TCDD	18.4		2.08	2.08	0.82	1.001	1
1,2,3,7,8-PeCDD	101		0.429	2.49	1.59	1.001	1
1,2,3,4,7,8-HxCDD	79.1		0.179	2.49	1.27	1.000	1
1,2,3,6,7,8-HxCDD	90.7		0.200	2.49	1.23	1.000	1
1,2,3,7,8,9-HxCDD	88.5		0.185	2.49	1.25	1.008	1
1,2,3,4,6,7,8-HpCDD	93.2		0.285	2.49	0.99	1.000	1
OCDD	199		0.874	4.98	0.87	1.000	1
2,3,7,8-TCDF	18.3		1.72	1.72	0.81	1.001	1
1,2,3,7,8-PeCDF	84.8		0.417	2.49	1.50	1.001	1
2,3,4,7,8-PeCDF	90.3		0.350	2.49	1.47	1.001	1
1,2,3,4,7,8-HxCDF	81.5		0.205	2.49	1.20	1.000	1
1,2,3,6,7,8-HxCDF	87.4		0.219	2.49	1.20	1.000	1
1,2,3,7,8,9-HxCDF	82.5		0.226	2.49	1.21	1.000	1
2,3,4,6,7,8-HxCDF	88.1		0.210	2.49	1.18	1.000	1
1,2,3,4,6,7,8-HpCDF	83.3		0.507	2.49	1.00	1.000	1
1,2,3,4,7,8,9-HpCDF	82.9		0.565	2.49	1.00	1.000	1
OCDF	173		0.367	4.98	0.88	1.005	1

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	NA
Sample Matrix:	Tissue	**Date Received:**	NA
Sample Name:	Duplicate Lab Control Sample	**Units:**	ng/Kg
Lab Code:	EQ2000594-03	**Basis:**	Wet

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method:	1613B	**Date Analyzed:**	11/21/20 15:30
Prep Method:	Method Soxhlet	**Date Extracted:**	11/14/20
Sample Amount:	10.044g	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623435	**Blank File Name:**	P623551
ICAL Date:	09/02/20	**Cal Ver. File Name:**	P623422

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
Total Tetra-Dioxins	18.4		2.08	2.08	0.82		1
Total Penta-Dioxins	101		0.429	2.49	1.59		1
Total Hexa-Dioxins	258		0.188	2.49	1.27		1
Total Hepta-Dioxins	93.2		0.285	2.49	0.99		1
Total Tetra-Furans	18.3		1.72	1.72	0.81		1
Total Penta-Furans	176		0.382	2.49	1.50		1
Total Hexa-Furans	340		0.215	2.49	1.20		1
Total Hepta-Furans	166		0.535	2.49	1.00		1

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Hart Crowser, Incorporated	**Service Request:**	K2008783
Project:	M&B Sampling/150-002-005/5	**Date Collected:**	NA
Sample Matrix:	Tissue	**Date Received:**	NA
Sample Name:	Duplicate Lab Control Sample	**Units:**	Percent
Lab Code:	EQ2000594-03	**Basis:**	Wet

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method:	1613B	**Date Analyzed:**	11/21/20 15:30
Prep Method:	Method Soxhlet	**Date Extracted:**	11/14/20
Sample Amount:	10.044g	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623435	**Blank File Name:**	P623551
ICAL Date:	09/02/20	**Cal Ver. File Name:**	P623422

Labeled Standard Results

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	% Rec	Q	Control Limits	Ion Ratio	RRT
13C-2,3,7,8-TCDD	2000	815.076	41		25-164	0.73	1.029
13C-1,2,3,7,8-PeCDD	2000	1586.134	79		25-181	1.56	1.237
13C-1,2,3,4,7,8-HxCDD	2000	1353.157	68		32-141	1.25	0.991
13C-1,2,3,6,7,8-HxCDD	2000	1357.192	68		28-130	1.26	0.993
13C-1,2,3,4,6,7,8-HpCDD	2000	1483.601	74		23-140	1.06	1.070
13C-OCDD	4000	3478.865	87		17-157	0.92	1.139
13C-2,3,7,8-TCDF	2000	717.020	36		24-169	0.79	0.990
13C-1,2,3,7,8-PeCDF	2000	1267.880	63		24-185	1.56	1.185
13C-2,3,4,7,8-PeCDF	2000	1451.280	73		21-178	1.63	1.225
13C-1,2,3,4,7,8-HxCDF	2000	1030.464	52		26-152	0.52	0.968
13C-1,2,3,6,7,8-HxCDF	2000	1012.880	51		26-123	0.50	0.971
13C-1,2,3,7,8,9-HxCDF	2000	1072.168	54		29-147	0.50	1.008
13C-2,3,4,6,7,8-HxCDF	2000	1012.736	51		28-136	0.52	0.986
13C-1,2,3,4,6,7,8-HpCDF	2000	1186.484	59		28-143	0.43	1.045
13C-1,2,3,4,7,8,9-HpCDF	2000	1299.314	65		26-138	0.43	1.082
37Cl-2,3,7,8-TCDD	800	302.555	38		35-197	NA	1.030

APPENDIX G
Groundwater QA Report and Laboratory Analytical Reports

APPENDIX G
Quality Assurance Review and Analytical Laboratory Testing

This appendix documents the results of a quality assurance (QA) review of the analytical data for groundwater samples collected during the Five-Year Review sampling event conducted in May and October 2020 at the McCormick & Baxter site (the "Site"). Field procedures used for sample collection are discussed in the 2018 Operations and Maintenance (O&M) Manual (Hart Crowser and GSI Water Solutions, Inc. [GSI] 2018). Haley & Aldrich submitted groundwater samples to Pace Analytical National (Pace), of Mt. Juliet, Tennessee, for chemical analyses. A copy of the laboratory analytical reports L1223488 and L1272268 are included as part of this appendix. Upon review, the analytical data are valid with qualifications for their intended use.

The laboratories performed ongoing QA/ quality control (QC) reviews of laboratory procedures. Level II data packages were reviewed. Haley & Aldrich reviewed the data, using laboratory QC results summary sheets to check that they met data quality objectives for the project. Data review followed the procedures described in the SAP. Validation of the analytical data was completed generally following Environmental Protection Agency (EPA) National Functional Guidelines for Superfund Organic Methods Data Review (EPA 2017a) and the National Functional Guidelines for Inorganic Superfund Data Review (EPA 2017b) modified to include criteria specific to the individual analytical methods and laboratory performance based control limits. The QA review included examination and validation of the laboratory's summary report, including:

- Case narratives
- Chain of custody (COC) documentation
- Sample receiving condition
- Holding times
- Analytical methods, detection limits, and reporting limits
- Method blanks
- Surrogate recoveries
- Laboratory control sample/laboratory control sample duplicate (LCS/LCSD) recoveries
- Matrix spike and matrix spike duplicate (MS/MSD) recoveries
- Laboratory duplicate relative percent difference (RPD), where applicable
- Calibration data, if provided

1.0 ANALYTICAL METHODS AND REPORTING LIMITS

This section describes the analytical method and method detection limits (MDL) and method reporting limits (MRL) for the chemical analyses.

1.1 Analytical Methods

A total of 13 groundwater samples, 12 primary and one field duplicate (one per 20 samples collected) were collected and submitted to Pace. Samples were analyzed for the following.

- Total metals (arsenic, chromium, copper, and zinc) by EPA Method 6020B;
- Pentachlorophenol (PCP) by EPA Method 8270E; and
- Polycyclic aromatic hydrocarbons (PAHs) by EPA Method 8270E-SIM.

Samples were analyzed in accordance with the O&M Manual (2018).

1.2 Method Detection and Reporting Limits

MDLs are the minimum concentration of a chemical compound that can be measured and reported that the compound is present and is based on instrumentation abilities and sample matrix. MRLs are set by the laboratory and are based on the low standard of the initial calibration curve or low-level calibration check standard and represent the concentration that can be accurately quantified. In some cases, the MDL and/or MRL is raised due to dilutions or matrix interferences.

The laboratory reported sample results to the MRL. Analytical results that fell between the MDL and MRL are estimated and qualified with J flags in the report tables. Non-detect results are reported at the associated MDL and are reported with a U flag in the report tables.

2.0 CHAIN OF CUSTODY AND SAMPLE RECEIVING CONDITION

The following provides a summary of the review of COC procedures and sample receiving conditions.

2.1 Chain of Custody

Samples collected were placed into appropriate laboratory supplied containers, placed into a cooler on ice, and logged onto a COC form. No COC discrepancies were noted.

2.2 Sample Receiving Conditions and Notes

The receiving temperatures were within the 2 to 6°C acceptance criteria. Samples were properly preserved in the appropriate containers.

3.0 CHEMICAL RESULTS

Data quality is indicated by assessing their completeness, representativeness, accuracy, precision, and comparability. An evaluation of the data follows.

3.1 Total Metals by EPA 6020B

Holding times and reporting limits were acceptable. MB contamination was not detected. LCS recoveries were within control limits. MS/MSD recoveries and RPDs were within control limits. Field duplicate RPDs were within control limits.

3.2 PCP and PAHs by EPA 8270E/-SIM

Holding times and reporting limits were acceptable. MB contamination was not detected. Surrogate and LCS recoveries were within control limits. Field duplicate RPDs were within control limits.

MS/MSD recoveries and RPDs were within control limits with the following exceptions.

- L1223488, WG1484976:
  - Acenaphthene and naphthalene recoveries were below control limits. MSD recoveries were within control limits. Sample results were qualified by the laboratory with V flag (sample concentration is too high to evaluate accurate spike recoveries). V flags were removed, and sample results were not qualified.
  - Naphthalene and 1-/2-mehtylnaphthalene in MSD were qualified by the laboratory with J3 flag (Associated batch QC was outside the established quality control precision). MS and MSD for naphthalene failed QC criteria and result is estimated. J3 flag replaced with J flag.
- L1272268, WG1557903: MS/MSD surrogate recovery for nitrobenzene-d5 exceeded control limits. All other surrogates were within control limits and no results were qualified.

4.0 REFERENCES

EPA. 2017a. National Functional Guidelines for Organic Superfund Methods Data Review. OLEM 9355.0-136, EPA-540-R-2017-002. Office of Superfund Remediation and Technology Innovation (OSRTI) United States Environmental Protection Agency (EPA) Washington, DC 20460. January.

EPA. 2017b. National Functional Guidelines for Inorganic Superfund Methods Data Review. OLEM 9355.0-135 EPA-540-R-2017-001. Office of Superfund Remediation and Technology Innovation (OSRTI) United States Environmental Protection Agency (EPA) Washington, DC 20460. January.

Hart Crowser and GSI 2018 Operation and Maintenance Manual McCormick and Baxter Creosoting Company Site Portland, Oregon. March 28, 2018.

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

June 05, 2020

Oregon Dept. of Env. Quality - ODEQ

Sample Delivery Group:	L1223488
Samples Received:	05/29/2020
Project Number:	150-002-019/TASK 2
Description:	McCormick and Baxter

Report To: Sarah Miller
700 NE Multnoma St, Suite 600
Portland, OR 97232

Entire Report Reviewed By:

Jared Starkey
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.



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MW55S-052620 L1223488-01 GW

Collected by: KW/TL | Collected date/time: 05/26/20 12:00 | Received date/time: 05/29/20 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Metals (ICPMS) by Method 6020B	WG1485008	1	06/01/20 23:17	06/02/20 14:24	LD	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270E	WG1484984	1	06/02/20 15:57	06/03/20 04:10	ADF	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM	WG1484976	1	06/02/20 15:58	06/03/20 03:51	AAT	Mt. Juliet, TN

MW53S-052620 L1223488-02 GW

Collected by: KW/TL | Collected date/time: 05/26/20 12:55 | Received date/time: 05/29/20 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Metals (ICPMS) by Method 6020B	WG1485008	1	06/01/20 23:17	06/02/20 14:27	LD	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270E	WG1484984	1	06/02/20 15:57	06/03/20 04:32	ADF	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM	WG1484976	1	06/02/20 15:58	06/03/20 04:12	AAT	Mt. Juliet, TN

MW47S-052620 L1223488-03 GW

Collected by: KW/TL | Collected date/time: 05/26/20 14:20 | Received date/time: 05/29/20 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Metals (ICPMS) by Method 6020B	WG1485008	1	06/01/20 23:17	06/02/20 14:31	LD	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270E	WG1484984	1	06/02/20 15:57	06/03/20 04:53	ADF	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM	WG1484976	1	06/02/20 15:58	06/03/20 04:33	AAT	Mt. Juliet, TN

EW19-052620 L1223488-04 GW

Collected by: KW/TL | Collected date/time: 05/26/20 17:00 | Received date/time: 05/29/20 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Metals (ICPMS) by Method 6020B	WG1485008	1	06/01/20 23:17	06/02/20 14:41	LD	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270E	WG1484984	1.03	06/02/20 15:57	06/03/20 05:15	ADF	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM	WG1484976	1	06/02/20 15:58	06/03/20 04:54	AAT	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM	WG1484976	10	06/02/20 15:58	06/03/20 08:58	AAT	Mt. Juliet, TN

MW37D-052620 L1223488-05 GW

Collected by: KW/TL | Collected date/time: 05/26/20 12:40 | Received date/time: 05/29/20 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Metals (ICPMS) by Method 6020B	WG1485008	1	06/01/20 23:17	06/02/20 14:44	LD	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270E	WG1484984	1.06	06/02/20 15:57	06/03/20 05:36	ADF	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM	WG1484976	1	06/02/20 15:58	06/03/20 05:15	AAT	Mt. Juliet, TN

MW37I-052620 L1223488-06 GW

Collected by: KW/TL | Collected date/time: 05/26/20 13:50 | Received date/time: 05/29/20 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Metals (ICPMS) by Method 6020B	WG1485008	1	06/01/20 23:17	06/02/20 14:48	LD	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270E	WG1484984	1.12	06/02/20 15:57	06/03/20 05:58	ADF	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM	WG1484976	1	06/02/20 15:58	06/03/20 05:36	AAT	Mt. Juliet, TN

MW41S-052720 L1223488-07 GW

Collected by: KW/TL | Collected date/time: 05/27/20 09:50 | Received date/time: 05/29/20 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Metals (ICPMS) by Method 6020B	WG1485008	1	06/01/20 23:17	06/02/20 14:51	LD	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270E	WG1485335	1	06/03/20 06:07	06/03/20 22:54	JNJ	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM	WG1485327	1	06/03/20 09:46	06/03/20 20:34	LEA	Mt. Juliet, TN

MW35R-052720 L1223488-08 GW

Collected by: KW/TL | Collected date/time: 05/27/20 12:30 | Received date/time: 05/29/20 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Metals (ICPMS) by Method 6020B	WG1485008	1	06/01/20 23:17	06/02/20 14:55	LD	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270E	WG1485335	1	06/03/20 06:07	06/03/20 23:15	JNJ	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM	WG1485327	1	06/03/20 09:46	06/03/20 20:57	LEA	Mt. Juliet, TN

MW58S-052720 L1223488-09 GW

Collected by: KW/TL | Collected date/time: 05/27/20 14:15 | Received date/time: 05/29/20 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Metals (ICPMS) by Method 6020B	WG1485287	1	06/01/20 20:58	06/02/20 13:09	LAT	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270E	WG1485335	1.05	06/03/20 06:07	06/03/20 23:36	JNJ	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM	WG1485328	1	06/03/20 15:06	06/04/20 00:01	AAT	Mt. Juliet, TN

MW39S-052720 L1223488-10 GW

Collected by: KW/TL | Collected date/time: 05/27/20 10:10 | Received date/time: 05/29/20 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Metals (ICPMS) by Method 6020B	WG1485287	1	06/01/20 20:58	06/02/20 13:13	LAT	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270E	WG1485335	1.02	06/03/20 06:07	06/03/20 23:56	JNJ	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM	WG1485328	1	06/03/20 15:06	06/04/20 00:22	AAT	Mt. Juliet, TN

MW37S-052620 L1223488-11 GW

Collected by: KW/TL | Collected date/time: 05/26/20 17:00 | Received date/time: 05/29/20 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Metals (ICPMS) by Method 6020B	WG1485287	1	06/01/20 20:58	06/02/20 00:01	LAT	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270E	WG1484984	1	06/02/20 15:57	06/03/20 06:40	ADF	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM	WG1484976	1	06/02/20 15:58	06/03/20 05:56	AAT	Mt. Juliet, TN

EW19S-052620DUP L1223488-12 GW

Collected by: KW/TL | Collected date/time: 05/26/20 17:00 | Received date/time: 05/29/20 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Metals (ICPMS) by Method 6020B	WG1485287	1	06/01/20 20:58	06/02/20 13:16	LAT	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270E	WG1484984	1	06/02/20 15:57	06/03/20 06:19	ADF	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM	WG1484976	1	06/02/20 15:58	06/03/20 06:59	AAT	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM	WG1484976	10	06/02/20 15:58	06/03/20 09:18	AAT	Mt. Juliet, TN

MW58S-052720R L1223488-13 GW

Collected by	Collected date/time	Received date/time
KW/TL	05/27/20 15:20	05/29/20 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Metals (ICPMS) by Method 6020B	WG1485287	1	06/01/20 20:58	06/02/20 13:19	LAT	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270E	WG1485335	1.11	06/03/20 06:07	06/04/20 00:17	JNJ	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM	WG1485328	1	06/03/20 15:06	06/04/20 00:43	AAT	Mt. Juliet, TN

IDW L1223488-14 GW

Collected by	Collected date/time	Received date/time
KW/TL	05/27/20 14:50	05/29/20 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Metals (ICPMS) by Method 6020B	WG1485287	1	06/01/20 20:58	06/02/20 13:22	LAT	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270E	WG1485335	1	06/03/20 06:07	06/04/20 00:37	JNJ	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM	WG1485328	1	06/03/20 15:06	06/04/20 01:04	AAT	Mt. Juliet, TN

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.



Jared Starkey
Project Manager

Metals (ICPMS) by Method 6020B

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Arsenic	4.42		0.735	2.00	1	06/02/2020 14:24	WG1485008
Chromium	1.56	J	1.49	2.00	1	06/02/2020 14:24	WG1485008
Copper	2.74	J	2.50	5.00	1	06/02/2020 14:24	WG1485008
Zinc	U		9.96	25.0	1	06/02/2020 14:24	WG1485008

Semi Volatile Organic Compounds (GC/MS) by Method 8270E

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Pentachlorophenol	U		0.313	1.00	1	06/03/2020 04:10	WG1484984
(S) 2-Fluorophenol	*38.6*			*10.0-120*		*06/03/2020 04:10*	WG1484984
(S) Phenol-d5	*25.3*			*10.0-120*		*06/03/2020 04:10*	WG1484984
(S) 2,4,6-Tribromophenol	*70.0*			*10.0-155*		*06/03/2020 04:10*	WG1484984

Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Anthracene	0.0362	J	0.0190	0.0500	1	06/03/2020 03:51	WG1484976
Acenaphthene	U		0.0190	0.0500	1	06/03/2020 03:51	WG1484976
Acenaphthylene	U		0.0171	0.0500	1	06/03/2020 03:51	WG1484976
Benzo(a)anthracene	U		0.0203	0.0500	1	06/03/2020 03:51	WG1484976
Benzo(a)pyrene	U		0.0184	0.0500	1	06/03/2020 03:51	WG1484976
Benzo(b)fluoranthene	U		0.0168	0.0500	1	06/03/2020 03:51	WG1484976
Benzo(g,h,i)perylene	U		0.0184	0.0500	1	06/03/2020 03:51	WG1484976
Benzo(k)fluoranthene	U		0.0202	0.0500	1	06/03/2020 03:51	WG1484976
Chrysene	U		0.0179	0.0500	1	06/03/2020 03:51	WG1484976
Dibenz(a,h)anthracene	U		0.0160	0.0500	1	06/03/2020 03:51	WG1484976
Fluoranthene	U		0.0270	0.100	1	06/03/2020 03:51	WG1484976
Fluorene	U		0.0169	0.0500	1	06/03/2020 03:51	WG1484976
Indeno(1,2,3-cd)pyrene	U		0.0158	0.0500	1	06/03/2020 03:51	WG1484976
Naphthalene	U		0.0917	0.250	1	06/03/2020 03:51	WG1484976
Phenanthrene	U		0.0180	0.0500	1	06/03/2020 03:51	WG1484976
Pyrene	U		0.0169	0.0500	1	06/03/2020 03:51	WG1484976
1-Methylnaphthalene	U		0.0687	0.250	1	06/03/2020 03:51	WG1484976
2-Methylnaphthalene	U		0.0674	0.250	1	06/03/2020 03:51	WG1484976
2-Chloronaphthalene	U		0.0682	0.250	1	06/03/2020 03:51	WG1484976
(S) Nitrobenzene-d5	*89.5*			*31.0-160*		*06/03/2020 03:51*	WG1484976
(S) 2-Fluorobiphenyl	*91.6*			*48.0-148*		*06/03/2020 03:51*	WG1484976
(S) p-Terphenyl-d14	*81.1*			*37.0-146*		*06/03/2020 03:51*	WG1484976

Metals (ICPMS) by Method 6020B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Arsenic	17.9		0.735	2.00	1	06/02/2020 14:27	WG1485008
Chromium	U		1.49	2.00	1	06/02/2020 14:27	WG1485008
Copper	U		2.50	5.00	1	06/02/2020 14:27	WG1485008
Zinc	U		9.96	25.0	1	06/02/2020 14:27	WG1485008

Semi Volatile Organic Compounds (GC/MS) by Method 8270E

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Pentachlorophenol	110		0.313	1.00	1	06/03/2020 04:32	WG1484984
(S) 2-Fluorophenol	*34.7*			*10.0-120*		*06/03/2020 04:32*	WG1484984
(S) Phenol-d5	*21.9*			*10.0-120*		*06/03/2020 04:32*	WG1484984
(S) 2,4,6-Tribromophenol	*66.5*			*10.0-155*		*06/03/2020 04:32*	WG1484984

Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Anthracene	0.145		0.0190	0.0500	1	06/03/2020 04:12	WG1484976
Acenaphthene	U		0.0190	0.0500	1	06/03/2020 04:12	WG1484976
Acenaphthylene	U		0.0171	0.0500	1	06/03/2020 04:12	WG1484976
Benzo(a)anthracene	U		0.0203	0.0500	1	06/03/2020 04:12	WG1484976
Benzo(a)pyrene	U		0.0184	0.0500	1	06/03/2020 04:12	WG1484976
Benzo(b)fluoranthene	U		0.0168	0.0500	1	06/03/2020 04:12	WG1484976
Benzo(g,h,i)perylene	U		0.0184	0.0500	1	06/03/2020 04:12	WG1484976
Benzo(k)fluoranthene	U		0.0202	0.0500	1	06/03/2020 04:12	WG1484976
Chrysene	U		0.0179	0.0500	1	06/03/2020 04:12	WG1484976
Dibenz(a,h)anthracene	U		0.0160	0.0500	1	06/03/2020 04:12	WG1484976
Fluoranthene	U		0.0270	0.100	1	06/03/2020 04:12	WG1484976
Fluorene	U		0.0169	0.0500	1	06/03/2020 04:12	WG1484976
Indeno(1,2,3-cd)pyrene	U		0.0158	0.0500	1	06/03/2020 04:12	WG1484976
Naphthalene	U		0.0917	0.250	1	06/03/2020 04:12	WG1484976
Phenanthrene	U		0.0180	0.0500	1	06/03/2020 04:12	WG1484976
Pyrene	U		0.0169	0.0500	1	06/03/2020 04:12	WG1484976
1-Methylnaphthalene	U		0.0687	0.250	1	06/03/2020 04:12	WG1484976
2-Methylnaphthalene	U		0.0674	0.250	1	06/03/2020 04:12	WG1484976
2-Chloronaphthalene	U		0.0682	0.250	1	06/03/2020 04:12	WG1484976
(S) Nitrobenzene-d5	*94.2*			*31.0-160*		*06/03/2020 04:12*	WG1484976
(S) 2-Fluorobiphenyl	*95.8*			*48.0-148*		*06/03/2020 04:12*	WG1484976
(S) p-Terphenyl-d14	*88.4*			*37.0-146*		*06/03/2020 04:12*	WG1484976

Metals (ICPMS) by Method 6020B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Arsenic	17.1		0.735	2.00	1	06/02/2020 14:31	WG1485008
Chromium	U		1.49	2.00	1	06/02/2020 14:31	WG1485008
Copper	U		2.50	5.00	1	06/02/2020 14:31	WG1485008
Zinc	U		9.96	25.0	1	06/02/2020 14:31	WG1485008

Semi Volatile Organic Compounds (GC/MS) by Method 8270E

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Pentachlorophenol	U		0.313	1.00	1	06/03/2020 04:53	WG1484984
(S) 2-Fluorophenol	*36.3*			*10.0-120*		*06/03/2020 04:53*	WG1484984
(S) Phenol-d5	*24.0*			*10.0-120*		*06/03/2020 04:53*	WG1484984
(S) 2,4,6-Tribromophenol	*72.0*			*10.0-155*		*06/03/2020 04:53*	WG1484984

Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Anthracene	0.0340	J	0.0190	0.0500	1	06/03/2020 04:33	WG1484976
Acenaphthene	2.62		0.0190	0.0500	1	06/03/2020 04:33	WG1484976
Acenaphthylene	U		0.0171	0.0500	1	06/03/2020 04:33	WG1484976
Benzo(a)anthracene	U		0.0203	0.0500	1	06/03/2020 04:33	WG1484976
Benzo(a)pyrene	U		0.0184	0.0500	1	06/03/2020 04:33	WG1484976
Benzo(b)fluoranthene	U		0.0168	0.0500	1	06/03/2020 04:33	WG1484976
Benzo(g,h,i)perylene	U		0.0184	0.0500	1	06/03/2020 04:33	WG1484976
Benzo(k)fluoranthene	U		0.0202	0.0500	1	06/03/2020 04:33	WG1484976
Chrysene	U		0.0179	0.0500	1	06/03/2020 04:33	WG1484976
Dibenz(a,h)anthracene	U		0.0160	0.0500	1	06/03/2020 04:33	WG1484976
Fluoranthene	U		0.0270	0.100	1	06/03/2020 04:33	WG1484976
Fluorene	U		0.0169	0.0500	1	06/03/2020 04:33	WG1484976
Indeno(1,2,3-cd)pyrene	U		0.0158	0.0500	1	06/03/2020 04:33	WG1484976
Naphthalene	U		0.0917	0.250	1	06/03/2020 04:33	WG1484976
Phenanthrene	0.143		0.0180	0.0500	1	06/03/2020 04:33	WG1484976
Pyrene	U		0.0169	0.0500	1	06/03/2020 04:33	WG1484976
1-Methylnaphthalene	U		0.0687	0.250	1	06/03/2020 04:33	WG1484976
2-Methylnaphthalene	U		0.0674	0.250	1	06/03/2020 04:33	WG1484976
2-Chloronaphthalene	U		0.0682	0.250	1	06/03/2020 04:33	WG1484976
(S) Nitrobenzene-d5	*93.2*			*31.0-160*		*06/03/2020 04:33*	WG1484976
(S) 2-Fluorobiphenyl	*93.2*			*48.0-148*		*06/03/2020 04:33*	WG1484976
(S) p-Terphenyl-d14	*84.7*			*37.0-146*		*06/03/2020 04:33*	WG1484976

Metals (ICPMS) by Method 6020B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Arsenic	20.3		0.735	2.00	1	06/02/2020 14:41	WG1485008
Chromium	U		1.49	2.00	1	06/02/2020 14:41	WG1485008
Copper	U		2.50	5.00	1	06/02/2020 14:41	WG1485008
Zinc	U		9.96	25.0	1	06/02/2020 14:41	WG1485008

Semi Volatile Organic Compounds (GC/MS) by Method 8270E

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Pentachlorophenol	U		0.322	1.03	1.03	06/03/2020 05:15	WG1484984
(S) 2-Fluorophenol	*39.9*			*10.0-120*		*06/03/2020 05:15*	WG1484984
(S) Phenol-d5	*26.2*			*10.0-120*		*06/03/2020 05:15*	WG1484984
(S) 2,4,6-Tribromophenol	*81.6*			*10.0-155*		*06/03/2020 05:15*	WG1484984

Sample Narrative:

L1223488-04 WG1484984: Dilution due to sample volume.

Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Anthracene	2.15		0.0190	0.0500	1	06/03/2020 04:54	WG1484976
Acenaphthene	93.2		0.190	0.500	10	06/03/2020 08:58	WG1484976
Acenaphthylene	1.24		0.0171	0.0500	1	06/03/2020 04:54	WG1484976
Benzo(a)anthracene	0.0442	J	0.0203	0.0500	1	06/03/2020 04:54	WG1484976
Benzo(a)pyrene	U		0.0184	0.0500	1	06/03/2020 04:54	WG1484976
Benzo(b)fluoranthene	U		0.0168	0.0500	1	06/03/2020 04:54	WG1484976
Benzo(g,h,i)perylene	U		0.0184	0.0500	1	06/03/2020 04:54	WG1484976
Benzo(k)fluoranthene	U		0.0202	0.0500	1	06/03/2020 04:54	WG1484976
Chrysene	0.0291	J	0.0179	0.0500	1	06/03/2020 04:54	WG1484976
Dibenz(a,h)anthracene	U		0.0160	0.0500	1	06/03/2020 04:54	WG1484976
Fluoranthene	1.38		0.0270	0.100	1	06/03/2020 04:54	WG1484976
Fluorene	33.8		0.0169	0.0500	1	06/03/2020 04:54	WG1484976
Indeno(1,2,3-cd)pyrene	U		0.0158	0.0500	1	06/03/2020 04:54	WG1484976
Naphthalene	211		0.917	2.50	10	06/03/2020 08:58	WG1484976
Phenanthrene	13.8		0.0180	0.0500	1	06/03/2020 04:54	WG1484976
Pyrene	0.645		0.0169	0.0500	1	06/03/2020 04:54	WG1484976
1-Methylnaphthalene	87.1		0.0687	0.250	1	06/03/2020 04:54	WG1484976
2-Methylnaphthalene	66.3		0.0674	0.250	1	06/03/2020 04:54	WG1484976
2-Chloronaphthalene	U		0.0682	0.250	1	06/03/2020 04:54	WG1484976
(S) Nitrobenzene-d5	*111*			*31.0-160*		*06/03/2020 04:54*	WG1484976
(S) Nitrobenzene-d5	*107*			*31.0-160*		*06/03/2020 08:58*	WG1484976
(S) 2-Fluorobiphenyl	*87.9*			*48.0-148*		*06/03/2020 04:54*	WG1484976
(S) 2-Fluorobiphenyl	*94.2*			*48.0-148*		*06/03/2020 08:58*	WG1484976
(S) p-Terphenyl-d14	*82.1*			*37.0-146*		*06/03/2020 04:54*	WG1484976
(S) p-Terphenyl-d14	*86.3*			*37.0-146*		*06/03/2020 08:58*	WG1484976

Metals (ICPMS) by Method 6020B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Arsenic	3.43		0.735	2.00	1	06/02/2020 14:44	WG1485008
Chromium	U		1.49	2.00	1	06/02/2020 14:44	WG1485008
Copper	U		2.50	5.00	1	06/02/2020 14:44	WG1485008
Zinc	U		9.96	25.0	1	06/02/2020 14:44	WG1485008

Semi Volatile Organic Compounds (GC/MS) by Method 8270E

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Pentachlorophenol	U		0.332	1.06	1.06	06/03/2020 05:36	WG1484984
(S) 2-Fluorophenol	*45.5*			*10.0-120*		*06/03/2020 05:36*	WG1484984
(S) Phenol-d5	*30.2*			*10.0-120*		*06/03/2020 05:36*	WG1484984
(S) 2,4,6-Tribromophenol	*84.5*			*10.0-155*		*06/03/2020 05:36*	WG1484984

Sample Narrative:

L1223488-05 WG1484984: Dilution due to sample volume.

Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Anthracene	0.0544		0.0190	0.0500	1	06/03/2020 05:15	WG1484976
Acenaphthene	0.0507		0.0190	0.0500	1	06/03/2020 05:15	WG1484976
Acenaphthylene	U		0.0171	0.0500	1	06/03/2020 05:15	WG1484976
Benzo(a)anthracene	U		0.0203	0.0500	1	06/03/2020 05:15	WG1484976
Benzo(a)pyrene	U		0.0184	0.0500	1	06/03/2020 05:15	WG1484976
Benzo(b)fluoranthene	U		0.0168	0.0500	1	06/03/2020 05:15	WG1484976
Benzo(g,h,i)perylene	U		0.0184	0.0500	1	06/03/2020 05:15	WG1484976
Benzo(k)fluoranthene	U		0.0202	0.0500	1	06/03/2020 05:15	WG1484976
Chrysene	U		0.0179	0.0500	1	06/03/2020 05:15	WG1484976
Dibenz(a,h)anthracene	U		0.0160	0.0500	1	06/03/2020 05:15	WG1484976
Fluoranthene	U		0.0270	0.100	1	06/03/2020 05:15	WG1484976
Fluorene	U		0.0169	0.0500	1	06/03/2020 05:15	WG1484976
Indeno(1,2,3-cd)pyrene	U		0.0158	0.0500	1	06/03/2020 05:15	WG1484976
Naphthalene	U		0.0917	0.250	1	06/03/2020 05:15	WG1484976
Phenanthrene	U		0.0180	0.0500	1	06/03/2020 05:15	WG1484976
Pyrene	U		0.0169	0.0500	1	06/03/2020 05:15	WG1484976
1-Methylnaphthalene	U		0.0687	0.250	1	06/03/2020 05:15	WG1484976
2-Methylnaphthalene	U		0.0674	0.250	1	06/03/2020 05:15	WG1484976
2-Chloronaphthalene	U		0.0682	0.250	1	06/03/2020 05:15	WG1484976
(S) Nitrobenzene-d5	*86.8*			*31.0-160*		*06/03/2020 05:15*	WG1484976
(S) 2-Fluorobiphenyl	*88.4*			*48.0-148*		*06/03/2020 05:15*	WG1484976
(S) p-Terphenyl-d14	*79.5*			*37.0-146*		*06/03/2020 05:15*	WG1484976

Metals (ICPMS) by Method 6020B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Arsenic	42.6		0.735	2.00	1	06/02/2020 14:48	WG1485008
Chromium	U		1.49	2.00	1	06/02/2020 14:48	WG1485008
Copper	U		2.50	5.00	1	06/02/2020 14:48	WG1485008
Zinc	U		9.96	25.0	1	06/02/2020 14:48	WG1485008

Semi Volatile Organic Compounds (GC/MS) by Method 8270E

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Pentachlorophenol	U		0.351	1.12	1.12	06/03/2020 05:58	WG1484984
(S) 2-Fluorophenol	*41.4*			*10.0-120*		*06/03/2020 05:58*	WG1484984
(S) Phenol-d5	*27.5*			*10.0-120*		*06/03/2020 05:58*	WG1484984
(S) 2,4,6-Tribromophenol	*80.4*			*10.0-155*		*06/03/2020 05:58*	WG1484984

Sample Narrative:

L1223488-06 WG1484984: Dilution due to sample volume.

Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Anthracene	0.0560		0.0190	0.0500	1	06/03/2020 05:36	WG1484976
Acenaphthene	24.8		0.0190	0.0500	1	06/03/2020 05:36	WG1484976
Acenaphthylene	0.116		0.0171	0.0500	1	06/03/2020 05:36	WG1484976
Benzo(a)anthracene	U		0.0203	0.0500	1	06/03/2020 05:36	WG1484976
Benzo(a)pyrene	U		0.0184	0.0500	1	06/03/2020 05:36	WG1484976
Benzo(b)fluoranthene	U		0.0168	0.0500	1	06/03/2020 05:36	WG1484976
Benzo(g,h,i)perylene	U		0.0184	0.0500	1	06/03/2020 05:36	WG1484976
Benzo(k)fluoranthene	U		0.0202	0.0500	1	06/03/2020 05:36	WG1484976
Chrysene	U		0.0179	0.0500	1	06/03/2020 05:36	WG1484976
Dibenz(a,h)anthracene	U		0.0160	0.0500	1	06/03/2020 05:36	WG1484976
Fluoranthene	U		0.0270	0.100	1	06/03/2020 05:36	WG1484976
Fluorene	0.447		0.0169	0.0500	1	06/03/2020 05:36	WG1484976
Indeno(1,2,3-cd)pyrene	U		0.0158	0.0500	1	06/03/2020 05:36	WG1484976
Naphthalene	0.277		0.0917	0.250	1	06/03/2020 05:36	WG1484976
Phenanthrene	0.0366	J	0.0180	0.0500	1	06/03/2020 05:36	WG1484976
Pyrene	U		0.0169	0.0500	1	06/03/2020 05:36	WG1484976
1-Methylnaphthalene	0.783		0.0687	0.250	1	06/03/2020 05:36	WG1484976
2-Methylnaphthalene	U		0.0674	0.250	1	06/03/2020 05:36	WG1484976
2-Chloronaphthalene	U		0.0682	0.250	1	06/03/2020 05:36	WG1484976
(S) Nitrobenzene-d5	*103*			*31.0-160*		*06/03/2020 05:36*	WG1484976
(S) 2-Fluorobiphenyl	*91.6*			*48.0-148*		*06/03/2020 05:36*	WG1484976
(S) p-Terphenyl-d14	*86.3*			*37.0-146*		*06/03/2020 05:36*	WG1484976

Metals (ICPMS) by Method 6020B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Arsenic	U		0.735	2.00	1	06/02/2020 14:51	WG1485008
Chromium	U		1.49	2.00	1	06/02/2020 14:51	WG1485008
Copper	U		2.50	5.00	1	06/02/2020 14:51	WG1485008
Zinc	U		9.96	25.0	1	06/02/2020 14:51	WG1485008

Semi Volatile Organic Compounds (GC/MS) by Method 8270E

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Pentachlorophenol	U		0.313	1.00	1	06/03/2020 22:54	WG1485335
(S) 2-Fluorophenol	*48.7*			*10.0-120*		*06/03/2020 22:54*	WG1485335
(S) Phenol-d5	*30.8*			*10.0-120*		*06/03/2020 22:54*	WG1485335
(S) 2,4,6-Tribromophenol	*81.6*			*10.0-155*		*06/03/2020 22:54*	WG1485335

Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Anthracene	0.0497	J	0.0190	0.0500	1	06/03/2020 20:34	WG1485327
Acenaphthene	0.0210	J	0.0190	0.0500	1	06/03/2020 20:34	WG1485327
Acenaphthylene	U		0.0171	0.0500	1	06/03/2020 20:34	WG1485327
Benzo(a)anthracene	U		0.0203	0.0500	1	06/03/2020 20:34	WG1485327
Benzo(a)pyrene	U		0.0184	0.0500	1	06/03/2020 20:34	WG1485327
Benzo(b)fluoranthene	U		0.0168	0.0500	1	06/03/2020 20:34	WG1485327
Benzo(g,h,i)perylene	U		0.0184	0.0500	1	06/03/2020 20:34	WG1485327
Benzo(k)fluoranthene	U		0.0202	0.0500	1	06/03/2020 20:34	WG1485327
Chrysene	U		0.0179	0.0500	1	06/03/2020 20:34	WG1485327
Dibenz(a,h)anthracene	U		0.0160	0.0500	1	06/03/2020 20:34	WG1485327
Fluoranthene	U		0.0270	0.100	1	06/03/2020 20:34	WG1485327
Fluorene	U		0.0169	0.0500	1	06/03/2020 20:34	WG1485327
Indeno(1,2,3-cd)pyrene	U		0.0158	0.0500	1	06/03/2020 20:34	WG1485327
Naphthalene	U		0.0917	0.250	1	06/03/2020 20:34	WG1485327
Phenanthrene	U		0.0180	0.0500	1	06/03/2020 20:34	WG1485327
Pyrene	U		0.0169	0.0500	1	06/03/2020 20:34	WG1485327
1-Methylnaphthalene	U		0.0687	0.250	1	06/03/2020 20:34	WG1485327
2-Methylnaphthalene	U		0.0674	0.250	1	06/03/2020 20:34	WG1485327
2-Chloronaphthalene	U		0.0682	0.250	1	06/03/2020 20:34	WG1485327
(S) Nitrobenzene-d5	*122*			*31.0-160*		*06/03/2020 20:34*	WG1485327
(S) 2-Fluorobiphenyl	*107*			*48.0-148*		*06/03/2020 20:34*	WG1485327
(S) p-Terphenyl-d14	*103*			*37.0-146*		*06/03/2020 20:34*	WG1485327

Metals (ICPMS) by Method 6020B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Arsenic	4.73		0.735	2.00	1	06/02/2020 14:55	WG1485008
Chromium	U		1.49	2.00	1	06/02/2020 14:55	WG1485008
Copper	U		2.50	5.00	1	06/02/2020 14:55	WG1485008
Zinc	U		9.96	25.0	1	06/02/2020 14:55	WG1485008

Semi Volatile Organic Compounds (GC/MS) by Method 8270E

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Pentachlorophenol	U		0.313	1.00	1	06/03/2020 23:15	WG1485335
(S) 2-Fluorophenol	*46.8*			*10.0-120*		*06/03/2020 23:15*	WG1485335
(S) Phenol-d5	*30.4*			*10.0-120*		*06/03/2020 23:15*	WG1485335
(S) 2,4,6-Tribromophenol	*78.5*			*10.0-155*		*06/03/2020 23:15*	WG1485335

Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Anthracene	0.0722		0.0190	0.0500	1	06/03/2020 20:57	WG1485327
Acenaphthene	U		0.0190	0.0500	1	06/03/2020 20:57	WG1485327
Acenaphthylene	U		0.0171	0.0500	1	06/03/2020 20:57	WG1485327
Benzo(a)anthracene	U		0.0203	0.0500	1	06/03/2020 20:57	WG1485327
Benzo(a)pyrene	U		0.0184	0.0500	1	06/03/2020 20:57	WG1485327
Benzo(b)fluoranthene	U		0.0168	0.0500	1	06/03/2020 20:57	WG1485327
Benzo(g,h,i)perylene	U		0.0184	0.0500	1	06/03/2020 20:57	WG1485327
Benzo(k)fluoranthene	U		0.0202	0.0500	1	06/03/2020 20:57	WG1485327
Chrysene	U		0.0179	0.0500	1	06/03/2020 20:57	WG1485327
Dibenz(a,h)anthracene	U		0.0160	0.0500	1	06/03/2020 20:57	WG1485327
Fluoranthene	U		0.0270	0.100	1	06/03/2020 20:57	WG1485327
Fluorene	U		0.0169	0.0500	1	06/03/2020 20:57	WG1485327
Indeno(1,2,3-cd)pyrene	U		0.0158	0.0500	1	06/03/2020 20:57	WG1485327
Naphthalene	U		0.0917	0.250	1	06/03/2020 20:57	WG1485327
Phenanthrene	U		0.0180	0.0500	1	06/03/2020 20:57	WG1485327
Pyrene	U		0.0169	0.0500	1	06/03/2020 20:57	WG1485327
1-Methylnaphthalene	U		0.0687	0.250	1	06/03/2020 20:57	WG1485327
2-Methylnaphthalene	U		0.0674	0.250	1	06/03/2020 20:57	WG1485327
2-Chloronaphthalene	U		0.0682	0.250	1	06/03/2020 20:57	WG1485327
(S) Nitrobenzene-d5	*131*			*31.0-160*		*06/03/2020 20:57*	WG1485327
(S) 2-Fluorobiphenyl	*111*			*48.0-148*		*06/03/2020 20:57*	WG1485327
(S) p-Terphenyl-d14	*110*			*37.0-146*		*06/03/2020 20:57*	WG1485327

Metals (ICPMS) by Method 6020B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Arsenic	50.9		0.735	2.00	1	06/02/2020 13:09	WG1485287
Chromium	U		1.49	2.00	1	06/02/2020 13:09	WG1485287
Copper	3.21	J	2.50	5.00	1	06/02/2020 13:09	WG1485287
Zinc	86.0		9.96	25.0	1	06/02/2020 13:09	WG1485287

Semi Volatile Organic Compounds (GC/MS) by Method 8270E

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Pentachlorophenol	U		0.329	1.05	1.05	06/03/2020 23:36	WG1485335
(S) 2-Fluorophenol	*51.9*			*10.0-120*		*06/03/2020 23:36*	WG1485335
(S) Phenol-d5	*33.1*			*10.0-120*		*06/03/2020 23:36*	WG1485335
(S) 2,4,6-Tribromophenol	*82.9*			*10.0-155*		*06/03/2020 23:36*	WG1485335

Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Anthracene	0.0289	J	0.0190	0.0500	1	06/04/2020 00:01	WG1485328
Acenaphthene	0.0267	J	0.0190	0.0500	1	06/04/2020 00:01	WG1485328
Acenaphthylene	U		0.0171	0.0500	1	06/04/2020 00:01	WG1485328
Benzo(a)anthracene	U		0.0203	0.0500	1	06/04/2020 00:01	WG1485328
Benzo(a)pyrene	U		0.0184	0.0500	1	06/04/2020 00:01	WG1485328
Benzo(b)fluoranthene	U		0.0168	0.0500	1	06/04/2020 00:01	WG1485328
Benzo(g,h,i)perylene	U		0.0184	0.0500	1	06/04/2020 00:01	WG1485328
Benzo(k)fluoranthene	U		0.0202	0.0500	1	06/04/2020 00:01	WG1485328
Chrysene	U		0.0179	0.0500	1	06/04/2020 00:01	WG1485328
Dibenz(a,h)anthracene	U		0.0160	0.0500	1	06/04/2020 00:01	WG1485328
Fluoranthene	U		0.0270	0.100	1	06/04/2020 00:01	WG1485328
Fluorene	U		0.0169	0.0500	1	06/04/2020 00:01	WG1485328
Indeno(1,2,3-cd)pyrene	U		0.0158	0.0500	1	06/04/2020 00:01	WG1485328
Naphthalene	U		0.0917	0.250	1	06/04/2020 00:01	WG1485328
Phenanthrene	U		0.0180	0.0500	1	06/04/2020 00:01	WG1485328
Pyrene	U		0.0169	0.0500	1	06/04/2020 00:01	WG1485328
1-Methylnaphthalene	U		0.0687	0.250	1	06/04/2020 00:01	WG1485328
2-Methylnaphthalene	U		0.0674	0.250	1	06/04/2020 00:01	WG1485328
2-Chloronaphthalene	U		0.0682	0.250	1	06/04/2020 00:01	WG1485328
(S) Nitrobenzene-d5	*94.2*			*31.0-160*		*06/04/2020 00:01*	WG1485328
(S) 2-Fluorobiphenyl	*95.8*			*48.0-148*		*06/04/2020 00:01*	WG1485328
(S) p-Terphenyl-d14	*86.3*			*37.0-146*		*06/04/2020 00:01*	WG1485328

Metals (ICPMS) by Method 6020B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Arsenic	6.21		0.735	2.00	1	06/02/2020 13:13	WG1485287
Chromium	U		1.49	2.00	1	06/02/2020 13:13	WG1485287
Copper	U		2.50	5.00	1	06/02/2020 13:13	WG1485287
Zinc	U		9.96	25.0	1	06/02/2020 13:13	WG1485287

Semi Volatile Organic Compounds (GC/MS) by Method 8270E

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Pentachlorophenol	U		0.319	1.02	1.02	06/03/2020 23:56	WG1485335
(S) 2-Fluorophenol	*48.1*			*10.0-120*		*06/03/2020 23:56*	WG1485335
(S) Phenol-d5	*30.7*			*10.0-120*		*06/03/2020 23:56*	WG1485335
(S) 2,4,6-Tribromophenol	*78.9*			*10.0-155*		*06/03/2020 23:56*	WG1485335

Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Anthracene	0.0647		0.0190	0.0500	1	06/04/2020 00:22	WG1485328
Acenaphthene	0.0442	J	0.0190	0.0500	1	06/04/2020 00:22	WG1485328
Acenaphthylene	U		0.0171	0.0500	1	06/04/2020 00:22	WG1485328
Benzo(a)anthracene	U		0.0203	0.0500	1	06/04/2020 00:22	WG1485328
Benzo(a)pyrene	U		0.0184	0.0500	1	06/04/2020 00:22	WG1485328
Benzo(b)fluoranthene	U		0.0168	0.0500	1	06/04/2020 00:22	WG1485328
Benzo(g,h,i)perylene	U		0.0184	0.0500	1	06/04/2020 00:22	WG1485328
Benzo(k)fluoranthene	U		0.0202	0.0500	1	06/04/2020 00:22	WG1485328
Chrysene	U		0.0179	0.0500	1	06/04/2020 00:22	WG1485328
Dibenz(a,h)anthracene	U		0.0160	0.0500	1	06/04/2020 00:22	WG1485328
Fluoranthene	U		0.0270	0.100	1	06/04/2020 00:22	WG1485328
Fluorene	U		0.0169	0.0500	1	06/04/2020 00:22	WG1485328
Indeno(1,2,3-cd)pyrene	U		0.0158	0.0500	1	06/04/2020 00:22	WG1485328
Naphthalene	U		0.0917	0.250	1	06/04/2020 00:22	WG1485328
Phenanthrene	U		0.0180	0.0500	1	06/04/2020 00:22	WG1485328
Pyrene	U		0.0169	0.0500	1	06/04/2020 00:22	WG1485328
1-Methylnaphthalene	U		0.0687	0.250	1	06/04/2020 00:22	WG1485328
2-Methylnaphthalene	U		0.0674	0.250	1	06/04/2020 00:22	WG1485328
2-Chloronaphthalene	U		0.0682	0.250	1	06/04/2020 00:22	WG1485328
(S) Nitrobenzene-d5	*93.2*			*31.0-160*		*06/04/2020 00:22*	WG1485328
(S) 2-Fluorobiphenyl	*95.3*			*48.0-148*		*06/04/2020 00:22*	WG1485328
(S) p-Terphenyl-d14	*86.3*			*37.0-146*		*06/04/2020 00:22*	WG1485328

Metals (ICPMS) by Method 6020B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Arsenic	2.89		0.735	2.00	1	06/02/2020 00:01	WG1485287
Chromium	U		1.49	2.00	1	06/02/2020 00:01	WG1485287
Copper	U		2.50	5.00	1	06/02/2020 00:01	WG1485287
Zinc	U		9.96	25.0	1	06/02/2020 00:01	WG1485287

Semi Volatile Organic Compounds (GC/MS) by Method 8270E

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Pentachlorophenol	U		0.313	1.00	1	06/03/2020 06:40	WG1484984
(S) 2-Fluorophenol	*41.1*			*10.0-120*		*06/03/2020 06:40*	WG1484984
(S) Phenol-d5	*26.5*			*10.0-120*		*06/03/2020 06:40*	WG1484984
(S) 2,4,6-Tribromophenol	*82.0*			*10.0-155*		*06/03/2020 06:40*	WG1484984

Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Anthracene	0.574		0.0190	0.0500	1	06/03/2020 05:56	WG1484976
Acenaphthene	19.5	V	0.0190	0.0500	1	06/03/2020 05:56	WG1484976
Acenaphthylene	0.272		0.0171	0.0500	1	06/03/2020 05:56	WG1484976
Benzo(a)anthracene	U		0.0203	0.0500	1	06/03/2020 05:56	WG1484976
Benzo(a)pyrene	U		0.0184	0.0500	1	06/03/2020 05:56	WG1484976
Benzo(b)fluoranthene	U		0.0168	0.0500	1	06/03/2020 05:56	WG1484976
Benzo(g,h,i)perylene	U		0.0184	0.0500	1	06/03/2020 05:56	WG1484976
Benzo(k)fluoranthene	U		0.0202	0.0500	1	06/03/2020 05:56	WG1484976
Chrysene	U		0.0179	0.0500	1	06/03/2020 05:56	WG1484976
Dibenz(a,h)anthracene	U		0.0160	0.0500	1	06/03/2020 05:56	WG1484976
Fluoranthene	0.135		0.0270	0.100	1	06/03/2020 05:56	WG1484976
Fluorene	8.76		0.0169	0.0500	1	06/03/2020 05:56	WG1484976
Indeno(1,2,3-cd)pyrene	U		0.0158	0.0500	1	06/03/2020 05:56	WG1484976
Naphthalene	38.1	J3 V	0.0917	0.250	1	06/03/2020 05:56	WG1484976
Phenanthrene	0.537		0.0180	0.0500	1	06/03/2020 05:56	WG1484976
Pyrene	0.0731		0.0169	0.0500	1	06/03/2020 05:56	WG1484976
1-Methylnaphthalene	4.23	J3	0.0687	0.250	1	06/03/2020 05:56	WG1484976
2-Methylnaphthalene	2.96	J3	0.0674	0.250	1	06/03/2020 05:56	WG1484976
2-Chloronaphthalene	U		0.0682	0.250	1	06/03/2020 05:56	WG1484976
(S) Nitrobenzene-d5	*105*			*31.0-160*		*06/03/2020 05:56*	WG1484976
(S) 2-Fluorobiphenyl	*93.7*			*48.0-148*		*06/03/2020 05:56*	WG1484976
(S) p-Terphenyl-d14	*86.8*			*37.0-146*		*06/03/2020 05:56*	WG1484976

Metals (ICPMS) by Method 6020B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Arsenic	21.5		0.735	2.00	1	06/02/2020 13:16	WG1485287
Chromium	U		1.49	2.00	1	06/02/2020 13:16	WG1485287
Copper	U		2.50	5.00	1	06/02/2020 13:16	WG1485287
Zinc	U		9.96	25.0	1	06/02/2020 13:16	WG1485287

Semi Volatile Organic Compounds (GC/MS) by Method 8270E

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Pentachlorophenol	U		0.313	1.00	1	06/03/2020 06:19	WG1484984
(S) 2-Fluorophenol	*45.2*			*10.0-120*		*06/03/2020 06:19*	WG1484984
(S) Phenol-d5	*28.9*			*10.0-120*		*06/03/2020 06:19*	WG1484984
(S) 2,4,6-Tribromophenol	*88.0*			*10.0-155*		*06/03/2020 06:19*	WG1484984

Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Anthracene	2.09		0.0190	0.0500	1	06/03/2020 06:59	WG1484976
Acenaphthene	97.9		0.190	0.500	10	06/03/2020 09:18	WG1484976
Acenaphthylene	1.25		0.0171	0.0500	1	06/03/2020 06:59	WG1484976
Benzo(a)anthracene	0.0454	J	0.0203	0.0500	1	06/03/2020 06:59	WG1484976
Benzo(a)pyrene	U		0.0184	0.0500	1	06/03/2020 06:59	WG1484976
Benzo(b)fluoranthene	U		0.0168	0.0500	1	06/03/2020 06:59	WG1484976
Benzo(g,h,i)perylene	U		0.0184	0.0500	1	06/03/2020 06:59	WG1484976
Benzo(k)fluoranthene	U		0.0202	0.0500	1	06/03/2020 06:59	WG1484976
Chrysene	0.0286	J	0.0179	0.0500	1	06/03/2020 06:59	WG1484976
Dibenz(a,h)anthracene	U		0.0160	0.0500	1	06/03/2020 06:59	WG1484976
Fluoranthene	1.34		0.0270	0.100	1	06/03/2020 06:59	WG1484976
Fluorene	33.1		0.0169	0.0500	1	06/03/2020 06:59	WG1484976
Indeno(1,2,3-cd)pyrene	U		0.0158	0.0500	1	06/03/2020 06:59	WG1484976
Naphthalene	186		0.917	2.50	10	06/03/2020 09:18	WG1484976
Phenanthrene	13.2		0.0180	0.0500	1	06/03/2020 06:59	WG1484976
Pyrene	0.625		0.0169	0.0500	1	06/03/2020 06:59	WG1484976
1-Methylnaphthalene	83.1		0.0687	0.250	1	06/03/2020 06:59	WG1484976
2-Methylnaphthalene	60.8		0.0674	0.250	1	06/03/2020 06:59	WG1484976
2-Chloronaphthalene	U		0.0682	0.250	1	06/03/2020 06:59	WG1484976
(S) Nitrobenzene-d5	*113*			*31.0-160*		*06/03/2020 09:18*	WG1484976
(S) Nitrobenzene-d5	*114*			*31.0-160*		*06/03/2020 06:59*	WG1484976
(S) 2-Fluorobiphenyl	*100*			*48.0-148*		*06/03/2020 09:18*	WG1484976
(S) 2-Fluorobiphenyl	*89.5*			*48.0-148*		*06/03/2020 06:59*	WG1484976
(S) p-Terphenyl-d14	*83.7*			*37.0-146*		*06/03/2020 06:59*	WG1484976
(S) p-Terphenyl-d14	*92.1*			*37.0-146*		*06/03/2020 09:18*	WG1484976

Metals (ICPMS) by Method 6020B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Arsenic	U		0.735	2.00	1	06/02/2020 13:19	WG1485287
Chromium	U		1.49	2.00	1	06/02/2020 13:19	WG1485287
Copper	U		2.50	5.00	1	06/02/2020 13:19	WG1485287
Zinc	U		9.96	25.0	1	06/02/2020 13:19	WG1485287

Semi Volatile Organic Compounds (GC/MS) by Method 8270E

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Pentachlorophenol	U		0.347	1.11	1.11	06/04/2020 00:17	WG1485335
(S) 2-Fluorophenol	*51.8*			*10.0-120*		*06/04/2020 00:17*	WG1485335
(S) Phenol-d5	*34.6*			*10.0-120*		*06/04/2020 00:17*	WG1485335
(S) 2,4,6-Tribromophenol	*84.7*			*10.0-155*		*06/04/2020 00:17*	WG1485335

Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Anthracene	U		0.0190	0.0500	1	06/04/2020 00:43	WG1485328
Acenaphthene	U		0.0190	0.0500	1	06/04/2020 00:43	WG1485328
Acenaphthylene	U		0.0171	0.0500	1	06/04/2020 00:43	WG1485328
Benzo(a)anthracene	U		0.0203	0.0500	1	06/04/2020 00:43	WG1485328
Benzo(a)pyrene	U		0.0184	0.0500	1	06/04/2020 00:43	WG1485328
Benzo(b)fluoranthene	U		0.0168	0.0500	1	06/04/2020 00:43	WG1485328
Benzo(g,h,i)perylene	U		0.0184	0.0500	1	06/04/2020 00:43	WG1485328
Benzo(k)fluoranthene	U		0.0202	0.0500	1	06/04/2020 00:43	WG1485328
Chrysene	U		0.0179	0.0500	1	06/04/2020 00:43	WG1485328
Dibenz(a,h)anthracene	U		0.0160	0.0500	1	06/04/2020 00:43	WG1485328
Fluoranthene	U		0.0270	0.100	1	06/04/2020 00:43	WG1485328
Fluorene	U		0.0169	0.0500	1	06/04/2020 00:43	WG1485328
Indeno(1,2,3-cd)pyrene	U		0.0158	0.0500	1	06/04/2020 00:43	WG1485328
Naphthalene	U		0.0917	0.250	1	06/04/2020 00:43	WG1485328
Phenanthrene	U		0.0180	0.0500	1	06/04/2020 00:43	WG1485328
Pyrene	U		0.0169	0.0500	1	06/04/2020 00:43	WG1485328
1-Methylnaphthalene	U		0.0687	0.250	1	06/04/2020 00:43	WG1485328
2-Methylnaphthalene	U		0.0674	0.250	1	06/04/2020 00:43	WG1485328
2-Chloronaphthalene	U		0.0682	0.250	1	06/04/2020 00:43	WG1485328
(S) Nitrobenzene-d5	*98.4*			*31.0-160*		*06/04/2020 00:43*	WG1485328
(S) 2-Fluorobiphenyl	*93.7*			*48.0-148*		*06/04/2020 00:43*	WG1485328
(S) p-Terphenyl-d14	*86.3*			*37.0-146*		*06/04/2020 00:43*	WG1485328

Metals (ICPMS) by Method 6020B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Arsenic	10.5		0.735	2.00	1	06/02/2020 13:22	WG1485287
Chromium	U		1.49	2.00	1	06/02/2020 13:22	WG1485287
Copper	5.19		2.50	5.00	1	06/02/2020 13:22	WG1485287
Zinc	61.2		9.96	25.0	1	06/02/2020 13:22	WG1485287

Semi Volatile Organic Compounds (GC/MS) by Method 8270E

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Pentachlorophenol	14.1		0.313	1.00	1	06/04/2020 00:37	WG1485335
(S) 2-Fluorophenol	*43.1*			*10.0-120*		*06/04/2020 00:37*	WG1485335
(S) Phenol-d5	*27.4*			*10.0-120*		*06/04/2020 00:37*	WG1485335
(S) 2,4,6-Tribromophenol	*87.9*			*10.0-155*		*06/04/2020 00:37*	WG1485335

Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Anthracene	0.105		0.0190	0.0500	1	06/04/2020 01:04	WG1485328
Acenaphthene	2.33		0.0190	0.0500	1	06/04/2020 01:04	WG1485328
Acenaphthylene	0.0403	J	0.0171	0.0500	1	06/04/2020 01:04	WG1485328
Benzo(a)anthracene	U		0.0203	0.0500	1	06/04/2020 01:04	WG1485328
Benzo(a)pyrene	U		0.0184	0.0500	1	06/04/2020 01:04	WG1485328
Benzo(b)fluoranthene	U		0.0168	0.0500	1	06/04/2020 01:04	WG1485328
Benzo(g,h,i)perylene	U		0.0184	0.0500	1	06/04/2020 01:04	WG1485328
Benzo(k)fluoranthene	U		0.0202	0.0500	1	06/04/2020 01:04	WG1485328
Chrysene	U		0.0179	0.0500	1	06/04/2020 01:04	WG1485328
Dibenz(a,h)anthracene	U		0.0160	0.0500	1	06/04/2020 01:04	WG1485328
Fluoranthene	U		0.0270	0.100	1	06/04/2020 01:04	WG1485328
Fluorene	0.856		0.0169	0.0500	1	06/04/2020 01:04	WG1485328
Indeno(1,2,3-cd)pyrene	U		0.0158	0.0500	1	06/04/2020 01:04	WG1485328
Naphthalene	3.68		0.0917	0.250	1	06/04/2020 01:04	WG1485328
Phenanthrene	0.229		0.0180	0.0500	1	06/04/2020 01:04	WG1485328
Pyrene	U		0.0169	0.0500	1	06/04/2020 01:04	WG1485328
1-Methylnaphthalene	1.35		0.0687	0.250	1	06/04/2020 01:04	WG1485328
2-Methylnaphthalene	0.717		0.0674	0.250	1	06/04/2020 01:04	WG1485328
2-Chloronaphthalene	U		0.0682	0.250	1	06/04/2020 01:04	WG1485328
(S) Nitrobenzene-d5	*91.1*			*31.0-160*		*06/04/2020 01:04*	WG1485328
(S) 2-Fluorobiphenyl	*93.7*			*48.0-148*		*06/04/2020 01:04*	WG1485328
(S) p-Terphenyl-d14	*82.6*			*37.0-146*		*06/04/2020 01:04*	WG1485328

Method Blank (MB)

(MB) R3534263-1 06/02/20 12:52

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Arsenic	U		0.735	2.00
Chromium	U		1.49	2.00
Copper	U		2.50	5.00
Zinc	U		9.96	25.0

Laboratory Control Sample (LCS)

(LCS) R3534263-2 06/02/20 12:55

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Arsenic	50.0	45.2	90.3	80.0-120	
Chromium	50.0	48.1	96.1	80.0-120	
Copper	50.0	50.8	102	80.0-120	
Zinc	500	461	92.2	80.0-120	

Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) • (MS) R3534263-4 06/02/20 13:06 • (MSD) R3534263-5 06/02/20 13:09

Analyte	Spike Amount ug/l	Original Result	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Arsenic	50.0		46.8	47.8	93.7	95.6	1	75.0-125			2.06	20
Chromium	50.0		49.1	48.9	98.3	97.8	1	75.0-125			0.427	20
Copper	50.0		51.8	51.1	104	102	1	75.0-125			1.29	20
Zinc	500		480	487	94.0	95.5	1	75.0-125			1.59	20

Method Blank (MB)

(MB) R3533999-1 06/01/20 23:54

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Arsenic	U		0.735	2.00
Chromium	U		1.49	2.00
Copper	U		2.50	5.00
Zinc	U		9.96	25.0

Laboratory Control Sample (LCS)

(LCS) R3533999-2 06/01/20 23:58

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Arsenic	50.0	45.9	91.8	80.0-120	
Chromium	50.0	46.3	92.6	80.0-120	
Copper	50.0	48.7	97.3	80.0-120	
Zinc	500	459	91.8	80.0-120	

L1223488-11 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1223488-11 06/02/20 00:01 • (MS) R3533999-4 06/02/20 00:08 • (MSD) R3533999-5 06/02/20 00:12

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Arsenic	50.0	2.89	48.0	47.0	90.2	88.3	1	75.0-125			2.07	20
Chromium	50.0	U	45.6	45.2	91.2	90.4	1	75.0-125			0.886	20
Copper	50.0	U	48.0	47.3	96.0	94.5	1	75.0-125			1.59	20
Zinc	500	U	439	437	87.7	87.4	1	75.0-125			0.345	20

Method Blank (MB)

(MB) R3534620-2 06/03/20 01:40

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Pentachlorophenol	U		0.313	1.00
(S) Phenol-d5	*14.9*			*10.0-120*
(S) 2-Fluorophenol	*24.4*			*10.0-120*
(S) 2,4,6-Tribromophenol	*53.0*			*10.0-155*

Laboratory Control Sample (LCS)

(LCS) R3534620-1 06/03/20 01:19

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Pentachlorophenol	50.0	39.6	79.2	23.0-120	
(S) Phenol-d5			*24.3*	*10.0-120*	
(S) 2-Fluorophenol			*36.9*	*10.0-120*	
(S) 2,4,6-Tribromophenol			*73.0*	*10.0-155*	

L1223488-11 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1223488-11 06/03/20 06:40 • (MS) R3534620-3 06/03/20 07:02 • (MSD) R3534620-4 06/03/20 07:23

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Pentachlorophenol	50.0	U	43.4	42.5	86.8	85.0	1	10.0-128			2.10	37
(S) Phenol-d5					*27.1*	*24.7*		*10.0-120*				
(S) 2-Fluorophenol					*40.3*	*37.6*		*10.0-120*				
(S) 2,4,6-Tribromophenol					*78.5*	*79.0*		*10.0-155*				

Method Blank (MB)

(MB) R3535172-2 06/03/20 21:32

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Pentachlorophenol	U		0.313	1.00
(S) Phenol-d5	*26.6*			*10.0-120*
(S) 2-Fluorophenol	*43.6*			*10.0-120*
(S) 2,4,6-Tribromophenol	*76.0*			*10.0-155*

Laboratory Control Sample (LCS)

(LCS) R3535172-1 06/03/20 21:11

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Pentachlorophenol	50.0	48.6	97.2	23.0-120	
(S) Phenol-d5			*30.4*	*10.0-120*	
(S) 2-Fluorophenol			*47.3*	*10.0-120*	
(S) 2,4,6-Tribromophenol			*90.5*	*10.0-155*	

L1223540-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1223540-01 06/04/20 00:58 • (MS) R3535172-3 06/04/20 01:19 • (MSD) R3535172-4 06/04/20 01:39

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Pentachlorophenol	45.5	U	43.6	44.8	95.8	98.5	1	10.0-128			2.71	37
(S) Phenol-d5					*26.6*	*26.4*		*10.0-120*				
(S) 2-Fluorophenol					*41.6*	*42.3*		*10.0-120*				
(S) 2,4,6-Tribromophenol					*86.3*	*88.5*		*10.0-155*				

Method Blank (MB)

(MB) R3534362-2 06/02/20 22:15

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Anthracene	U		0.0190	0.0500
Acenaphthene	U		0.0190	0.0500
Acenaphthylene	U		0.0171	0.0500
Benzo(a)anthracene	U		0.0203	0.0500
Benzo(a)pyrene	U		0.0184	0.0500
Benzo(b)fluoranthene	U		0.0168	0.0500
Benzo(g,h,i)perylene	U		0.0184	0.0500
Benzo(k)fluoranthene	U		0.0202	0.0500
Chrysene	U		0.0179	0.0500
Dibenz(a,h)anthracene	U		0.0160	0.0500
Fluoranthene	U		0.0270	0.100
Fluorene	U		0.0169	0.0500
Indeno(1,2,3-cd)pyrene	U		0.0158	0.0500
Naphthalene	U		0.0917	0.250
Phenanthrene	U		0.0180	0.0500
Pyrene	U		0.0169	0.0500
1-Methylnaphthalene	U		0.0687	0.250
2-Methylnaphthalene	U		0.0674	0.250
2-Chloronaphthalene	U		0.0682	0.250
(S) Nitrobenzene-d5	*93.0*			*31.0-160*
(S) 2-Fluorobiphenyl	*96.0*			*48.0-148*
(S) p-Terphenyl-d14	*87.0*			*37.0-146*

Laboratory Control Sample (LCS)

(LCS) R3534362-1 06/02/20 21:54

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Anthracene	2.00	2.09	105	67.0-150	
Acenaphthene	2.00	1.98	99.0	65.0-138	
Acenaphthylene	2.00	2.11	105	66.0-140	
Benzo(a)anthracene	2.00	1.96	98.0	61.0-140	
Benzo(a)pyrene	2.00	2.01	100	60.0-143	
Benzo(b)fluoranthene	2.00	1.89	94.5	58.0-141	
Benzo(g,h,i)perylene	2.00	1.93	96.5	52.0-153	
Benzo(k)fluoranthene	2.00	2.10	105	58.0-148	
Chrysene	2.00	1.87	93.5	64.0-144	
Dibenz(a,h)anthracene	2.00	2.16	108	52.0-155	
Fluoranthene	2.00	2.11	105	69.0-153	

Laboratory Control Sample (LCS)

(LCS) R3534362-1 06/02/20 21:54

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Fluorene	2.00	2.01	100	64.0-136	
Indeno(1,2,3-cd)pyrene	2.00	2.06	103	54.0-153	
Naphthalene	2.00	1.95	97.5	61.0-137	
Phenanthrene	2.00	1.95	97.5	62.0-137	
Pyrene	2.00	1.76	88.0	60.0-142	
1-Methylnaphthalene	2.00	1.99	99.5	66.0-142	
2-Methylnaphthalene	2.00	1.96	98.0	62.0-136	
2-Chloronaphthalene	2.00	1.98	99.0	64.0-140	
(S) Nitrobenzene-d5			*92.5*	*31.0-160*	
(S) 2-Fluorobiphenyl			*98.5*	*48.0-148*	
(S) p-Terphenyl-d14			*87.5*	*37.0-146*	

L1223488-11 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1223488-11 06/03/20 05:56 • (MS) R3534362-3 06/03/20 06:17 • (MSD) R3534362-4 06/03/20 06:38

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Anthracene	1.90	0.574	2.55	2.54	104	103	1	56.0-156			0.393	20
Acenaphthene	1.90	19.5	19.6	21.6	5.26	111	1	44.0-153	V		9.71	20
Acenaphthylene	1.90	0.272	2.28	2.30	106	107	1	53.0-150			0.873	20
Benzo(a)anthracene	1.90	U	1.92	1.93	101	102	1	47.0-151			0.519	20
Benzo(a)pyrene	1.90	U	1.84	1.86	96.8	97.9	1	45.0-146			1.08	20
Benzo(b)fluoranthene	1.90	U	1.73	1.74	91.1	91.6	1	43.0-142			0.576	20
Benzo(g,h,i)perylene	1.90	U	1.72	1.71	90.5	90.0	1	40.0-147			0.583	20
Benzo(k)fluoranthene	1.90	U	1.88	1.87	98.9	98.4	1	43.0-148			0.533	21
Chrysene	1.90	U	1.76	1.76	92.6	92.6	1	50.0-148			0.000	20
Dibenz(a,h)anthracene	1.90	U	1.87	1.87	98.4	98.4	1	37.0-151			0.000	20
Fluoranthene	1.90	0.135	2.15	2.11	106	104	1	56.0-157			1.88	20
Fluorene	1.90	8.76	10.2	11.1	75.8	123	1	48.0-148			8.45	20
Indeno(1,2,3-cd)pyrene	1.90	U	1.82	1.81	95.8	95.3	1	41.0-148			0.551	20
Naphthalene	1.90	38.1	25.2	40.5	0.000	126	1	10.0-160	V	J3	46.6	20
Phenanthrene	1.90	0.537	2.27	2.35	91.2	95.4	1	47.0-147			3.46	20
Pyrene	1.90	0.0731	1.76	1.76	88.8	88.8	1	51.0-148			0.000	20
1-Methylnaphthalene	1.90	4.23	5.08	6.25	44.7	106	1	21.0-160		J3	20.7	20
2-Methylnaphthalene	1.90	2.96	3.83	5.04	45.8	109	1	31.0-160		J3	27.3	20
2-Chloronaphthalene	1.90	U	1.84	1.81	96.8	95.3	1	52.0-148			1.64	20
(S) Nitrobenzene-d5					*105*	*106*		*31.0-160*				
(S) 2-Fluorobiphenyl					*96.8*	*95.8*		*48.0-148*				
(S) p-Terphenyl-d14					*85.8*	*85.8*		*37.0-146*				

Method Blank (MB)

(MB) R3534799-3 06/03/20 13:13

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Anthracene	U		0.0190	0.0500
Acenaphthene	U		0.0190	0.0500
Acenaphthylene	U		0.0171	0.0500
Benzo(a)anthracene	U		0.0203	0.0500
Benzo(a)pyrene	U		0.0184	0.0500
Benzo(b)fluoranthene	U		0.0168	0.0500
Benzo(g,h,i)perylene	U		0.0184	0.0500
Benzo(k)fluoranthene	U		0.0202	0.0500
Chrysene	U		0.0179	0.0500
Dibenz(a,h)anthracene	U		0.0160	0.0500
Fluoranthene	U		0.0270	0.100
Fluorene	U		0.0169	0.0500
Indeno(1,2,3-cd)pyrene	U		0.0158	0.0500
Naphthalene	U		0.0917	0.250
Phenanthrene	U		0.0180	0.0500
Pyrene	U		0.0169	0.0500
1-Methylnaphthalene	U		0.0687	0.250
2-Methylnaphthalene	U		0.0674	0.250
2-Chloronaphthalene	U		0.0682	0.250
(S) Nitrobenzene-d5	*156*			*31.0-160*
(S) 2-Fluorobiphenyl	*139*			*48.0-148*
(S) p-Terphenyl-d14	*142*			*37.0-146*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3534799-1 06/03/20 12:27 • (LCSD) R3534799-2 06/03/20 12:50

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Anthracene	2.00	2.32	2.28	116	114	67.0-150			1.74	20
Acenaphthene	2.00	2.09	2.06	105	103	65.0-138			1.45	20
Acenaphthylene	2.00	2.18	2.16	109	108	66.0-140			0.922	20
Benzo(a)anthracene	2.00	2.13	2.10	106	105	61.0-140			1.42	20
Benzo(a)pyrene	2.00	2.16	2.11	108	105	60.0-143			2.34	20
Benzo(b)fluoranthene	2.00	2.10	2.05	105	102	58.0-141			2.41	20
Benzo(g,h,i)perylene	2.00	2.22	2.19	111	109	52.0-153			1.36	20
Benzo(k)fluoranthene	2.00	2.15	2.15	108	108	58.0-148			0.000	20
Chrysene	2.00	2.18	2.11	109	105	64.0-144			3.26	20
Dibenz(a,h)anthracene	2.00	2.15	2.12	108	106	52.0-155			1.41	20
Fluoranthene	2.00	2.29	2.22	114	111	69.0-153			3.10	20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3534799-1 06/03/20 12:27 • (LCSD) R3534799-2 06/03/20 12:50

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Fluorene	2.00	2.10	2.07	105	103	64.0-136			1.44	20
Indeno(1,2,3-cd)pyrene	2.00	2.20	2.17	110	108	54.0-153			1.37	20
Naphthalene	2.00	2.13	2.05	106	102	61.0-137			3.83	20
Phenanthrene	2.00	2.11	2.05	105	102	62.0-137			2.88	20
Pyrene	2.00	2.12	2.07	106	103	60.0-142			2.39	20
1-Methylnaphthalene	2.00	2.18	2.17	109	108	66.0-142			0.460	20
2-Methylnaphthalene	2.00	2.11	2.09	105	105	62.0-136			0.952	20
2-Chloronaphthalene	2.00	2.06	2.03	103	102	64.0-140			1.47	20
(S) Nitrobenzene-d5				*118*	*115*	*31.0-160*				
(S) 2-Fluorobiphenyl				*108*	*103*	*48.0-148*				
(S) p-Terphenyl-d14				*107*	*103*	*37.0-146*				

Method Blank (MB)

(MB) R3534818-2 06/03/20 20:31

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Anthracene	U		0.0190	0.0500
Acenaphthene	U		0.0190	0.0500
Acenaphthylene	U		0.0171	0.0500
Benzo(a)anthracene	U		0.0203	0.0500
Benzo(a)pyrene	U		0.0184	0.0500
Benzo(b)fluoranthene	U		0.0168	0.0500
Benzo(g,h,i)perylene	U		0.0184	0.0500
Benzo(k)fluoranthene	U		0.0202	0.0500
Chrysene	U		0.0179	0.0500
Dibenz(a,h)anthracene	U		0.0160	0.0500
Fluoranthene	U		0.0270	0.100
Fluorene	U		0.0169	0.0500
Indeno(1,2,3-cd)pyrene	U		0.0158	0.0500
Naphthalene	U		0.0917	0.250
Phenanthrene	U		0.0180	0.0500
Pyrene	U		0.0169	0.0500
1-Methylnaphthalene	U		0.0687	0.250
2-Methylnaphthalene	U		0.0674	0.250
2-Chloronaphthalene	U		0.0682	0.250
(S) Nitrobenzene-d5	*102*			*31.0-160*
(S) 2-Fluorobiphenyl	*103*			*48.0-148*
(S) p-Terphenyl-d14	*94.5*			*37.0-146*

Laboratory Control Sample (LCS)

(LCS) R3534818-1 06/03/20 20:10

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Anthracene	2.00	2.07	103	67.0-150	
Acenaphthene	2.00	2.03	102	65.0-138	
Acenaphthylene	2.00	2.14	107	66.0-140	
Benzo(a)anthracene	2.00	1.95	97.5	61.0-140	
Benzo(a)pyrene	2.00	2.04	102	60.0-143	
Benzo(b)fluoranthene	2.00	1.86	93.0	58.0-141	
Benzo(g,h,i)perylene	2.00	1.97	98.5	52.0-153	
Benzo(k)fluoranthene	2.00	2.13	106	58.0-148	
Chrysene	2.00	1.89	94.5	64.0-144	
Dibenz(a,h)anthracene	2.00	2.14	107	52.0-155	
Fluoranthene	2.00	2.13	106	69.0-153	

Laboratory Control Sample (LCS)

(LCS) R3534818-1 06/03/20 20:10

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Fluorene	2.00	2.04	102	64.0-136	
Indeno(1,2,3-cd)pyrene	2.00	2.08	104	54.0-153	
Naphthalene	2.00	1.98	99.0	61.0-137	
Phenanthrene	2.00	1.93	96.5	62.0-137	
Pyrene	2.00	1.78	89.0	60.0-142	
1-Methylnaphthalene	2.00	2.03	102	66.0-142	
2-Methylnaphthalene	2.00	1.98	99.0	62.0-136	
2-Chloronaphthalene	2.00	2.01	100	64.0-140	
(S) Nitrobenzene-d5			*97.5*	*31.0-160*	
(S) 2-Fluorobiphenyl			*101*	*48.0-148*	
(S) p-Terphenyl-d14			*90.0*	*37.0-146*	

Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) • (MS) R3534818-3 06/03/20 21:55 • (MSD) R3534818-4 06/03/20 22:16

Analyte	Spike Amount ug/l	Original Result	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Anthracene	1.90		1.93	1.98	102	104	1	56.0-156			2.56	20
Acenaphthene	1.90		1.88	1.90	98.9	100	1	44.0-153			1.06	20
Acenaphthylene	1.90		1.98	2.00	104	105	1	53.0-150			1.01	20
Benzo(a)anthracene	1.90		1.75	1.79	92.1	94.2	1	47.0-151			2.26	20
Benzo(a)pyrene	1.90		1.80	1.82	94.7	95.8	1	45.0-146			1.10	20
Benzo(b)fluoranthene	1.90		1.67	1.72	87.9	90.5	1	43.0-142			2.95	20
Benzo(g,h,i)perylene	1.90		1.70	1.70	89.5	89.5	1	40.0-147			0.000	20
Benzo(k)fluoranthene	1.90		1.89	1.86	99.5	97.9	1	43.0-148			1.60	21
Chrysene	1.90		1.74	1.75	91.6	92.1	1	50.0-148			0.573	20
Dibenz(a,h)anthracene	1.90		1.79	1.78	94.2	93.7	1	37.0-151			0.560	20
Fluoranthene	1.90		1.98	2.02	104	106	1	56.0-157			2.00	20
Fluorene	1.90		1.87	1.92	98.4	101	1	48.0-148			2.64	20
Indeno(1,2,3-cd)pyrene	1.90		1.77	1.77	93.2	93.2	1	41.0-148			0.000	20
Naphthalene	1.90		1.84	1.85	96.8	97.4	1	10.0-160			0.542	20
Phenanthrene	1.90		1.81	1.81	95.3	95.3	1	47.0-147			0.000	20
Pyrene	1.90		1.64	1.64	86.3	86.3	1	51.0-148			0.000	20
1-Methylnaphthalene	1.90		1.89	1.89	99.5	99.5	1	21.0-160			0.000	20
2-Methylnaphthalene	1.90		1.85	1.85	97.4	97.4	1	31.0-160			0.000	20
2-Chloronaphthalene	1.90		1.85	1.87	97.4	98.4	1	52.0-148			1.08	20
(S) Nitrobenzene-d5					*95.8*	*95.3*		*31.0-160*				
(S) 2-Fluorobiphenyl					*99.5*	*99.5*		*48.0-148*				
(S) p-Terphenyl-d14					*85.8*	*85.3*		*37.0-146*				

Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM L1223488-09,10,13,14

Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) • (MS) R3534818-5 06/04/20 04:34 • (MSD) R3534818-6 06/04/20 04:55

Analyte	Spike Amount ug/l	Original Result	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Anthracene	1.90		1.94	1.85	102	97.4	1	56.0-156			4.75	20
Acenaphthene	1.90		1.91	1.83	101	96.3	1	44.0-153			4.28	20
Acenaphthylene	1.90		1.98	1.94	104	102	1	53.0-150			2.04	20
Benzo(a)anthracene	1.90		1.79	1.71	94.2	90.0	1	47.0-151			4.57	20
Benzo(a)pyrene	1.90		1.84	1.75	96.8	92.1	1	45.0-146			5.01	20
Benzo(b)fluoranthene	1.90		1.73	1.61	91.1	84.7	1	43.0-142			7.19	20
Benzo(g,h,i)perylene	1.90		1.72	1.61	90.5	84.7	1	40.0-147			6.61	20
Benzo(k)fluoranthene	1.90		1.89	1.84	99.5	96.8	1	43.0-148			2.68	21
Chrysene	1.90		1.77	1.71	93.2	90.0	1	50.0-148			3.45	20
Dibenz(a,h)anthracene	1.90		1.81	1.68	95.3	88.4	1	37.0-151			7.45	20
Fluoranthene	1.90		2.08	2.00	109	105	1	56.0-157			3.92	20
Fluorene	1.90		1.93	1.84	102	96.8	1	48.0-148			4.77	20
Indeno(1,2,3-cd)pyrene	1.90		1.78	1.67	93.7	87.9	1	41.0-148			6.38	20
Naphthalene	1.90		1.88	1.84	98.9	96.8	1	10.0-160			2.15	20
Phenanthrene	1.90		1.85	1.74	97.4	91.6	1	47.0-147			6.13	20
Pyrene	1.90		1.69	1.41	88.9	74.2	1	51.0-148			18.1	20
1-Methylnaphthalene	1.90		2.08	1.93	109	102	1	21.0-160			7.48	20
2-Methylnaphthalene	1.90		2.00	1.84	105	96.8	1	31.0-160			8.33	20
2-Chloronaphthalene	1.90		1.76	1.80	92.6	94.7	1	52.0-148			2.25	20
(S) Nitrobenzene-d5					*93.7*	*87.4*		*31.0-160*				
(S) 2-Fluorobiphenyl					*93.7*	*96.3*		*48.0-148*				
(S) p-Terphenyl-d14					*87.4*	*78.9*		*37.0-146*				

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J	The identification of the analyte is acceptable; the reported value is an estimate.
J3	The associated batch QC was outside the established quality control range for precision.
V	The sample concentration is too high to evaluate accurate spike recoveries.

Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.
* Not all certifications held by the laboratory are applicable to the results reported in the attached report.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1 6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana [1]	LA180010	Texas	T104704245-18-15
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

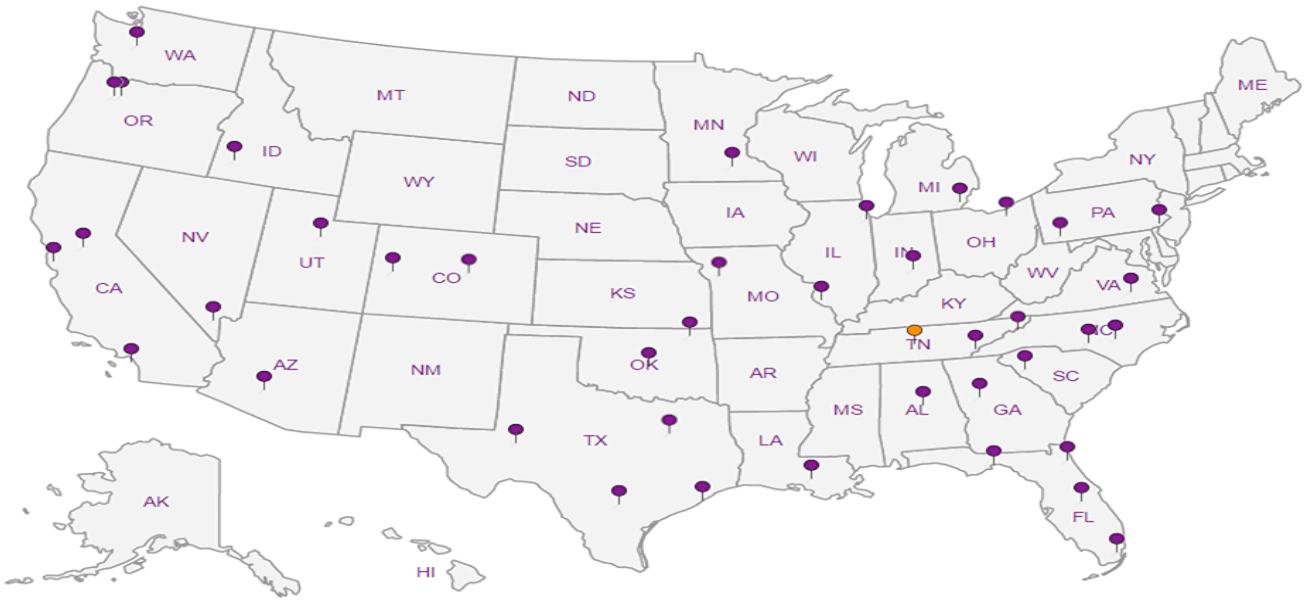
Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.



State of Oregon Sample Chain of Custody

L1223488 Pg 1/3

Agency, Authorized Purchaser or Agent: Hart Crowser for ODEQ	**Contract Laboratory Name:** Pace Analytical **Lab Batch #:**	**Lab Selection Criteria:** ☐ Proximity (if TAT < 48 hrs) ☐ Prior work on same project ☒ Cost (for anticipated analyses) ☐ Other labs disqualified or unable to perform requested services ☐ Emergency work	**Turn Around Time:** ☒ 10 days (std.) ☐ 5 days ☐ 72 hours ☐ 48 hours ☐ 24 hours ☐ Other
Send Lab Report To: Sarah Miller Address: 700 NE Multnomah Street, Suite 600 Portland, OR 97232-4100 Tel. #: (503) 229-5040 E-mail: Sarah.MILLER@state.or.us	**Invoice To:** Address: ODEQ/Business Office 811 SW 6th Ave Portland, OR 97204 Tel. #: (800) 452-4011		
Project Name: McCormick and Baxter Project #: 150-002-019/Task 2 Sampler Name: Kevin Woodhouse/Tess Lydick	**Sample Preservative:** None / HNO3 / None		1071

Sample ID#	Collection Date/Time	Matrix	# of Containers	PAHs by 8270-SIM	Metals (As, Cu, Cr, Zn) by 6010/6020	PCP by 8270D	Comments
MW55s-052620	05/26/20 1200	W	5	X	X	X	-01
MW53s-052620	05/26/20 1255	W	5	X	X	X	-02
MW47s-052620	05/26/20 1420	W	5	X	X	X	-03
EW19-052620	05/26/20 1700	W	5	X	X	X	-04
MW37d-052620	05/26/20 1240	W	5	X	X	X	-05
MW37i-052620	05/26/20 1350	W	5	X	X	X	-06
MW41s-052720	05/27/20 0950	W	5	X	X	X	-07
MW35r-052720	05/27/20 1230	W	5	X	X	X	-08
MW58s-052720	05/27/20 1415	W	5	X	X	X	-09
MW39s-052720	05/27/20 1010	W	5	X	X	X	-10

Copy lab report to: Kevin.woodhouse@hartcrowser.com

Relinquished By: Tess Lydick	Agency/Agent: Hart Crowser	Received By: Reid Kenner	Agency/Agent: PNPOR
Signature:	Time & Date: 1302 5/28/20	Signature:	Time & Date: 1302 5/28/20
Relinquished By: Reid Kenner	Agency/Agent: ~~PACE~~ PNPOR	Received By: Paul Minnich	Agency/Agent: PACE
Signature:	Time & Date: 1400 5/28/20	Signature:	Time & Date: 5/29/20 0900

THIS PURCHASE IS SUBMITTED PURSUANT TO STATE OF OREGON SOLICITATION #**102-1098-07** AND PRICE AGREEMENT # 8903. THE PRICE AGREEMENT INCLUDING CONTRACT TERMS AND CONDITIONS AND SPECIAL CONTRACT TERMS AND CONDITIONS (T'S &C'S) CONTAINED IN THE PRICE AGREEMENT ARE HEREBY INCORPORATED BY REFERENCE AND SHALL APPLY TO THIS PURCHASE AND SHALL TAKE PRECEDENCE OVER ALL OTHER CONFLICTING T'S AND C'S, EXPRESS OR IMPLIED.

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1.1-.1=1.0 uM A7

RAD SCREEN: <0.5 mR/hr

State of Oregon Sample Chain of Custody

L1223488 Pg 2/3

Agency, Authorized Purchaser or Agent: Hart Crowser for ODEQ

Send Lab Report To: Sarah Miller
Address: 700 NE Multnomah Street, Suite 600, Portland, OR 97232-4100
Tel. #: (503) 229-5040
E-mail: Sarah.MILLER@state.or.us

Contract Laboratory Name: Pace Analytical
Lab Batch #:

Invoice To:
Address: ODEQ/Business Office, 811 SW 6th Ave, Portland, OR 97204
Tel. #: (800) 452-4011

Lab Selection Criteria:
- ☐ Proximity (if TAT < 48 hrs)
- ☐ Prior work on same project
- ☒ Cost (for anticipated analyses)
- ☐ Other labs disqualified or unable to perform requested services
- ☐ Emergency work

Turn Around Time:
- ☒ 10 days (std.)
- ☐ 5 days
- ☐ 72 hours
- ☐ 48 hours
- ☐ 24 hours
- ☐ Other

Project Name: McCormick and Baxter
Project #: 150-002-019/Task 2
Sampler Name: Kevin Woodhouse/Tess Lydick

Sample Preservative

None	HNO3	None				

Requested Analyses

Sample ID#	Collection Date/Time	Matrix	# of Containers	PAHs by 8270-SIM	Metals (As, Cu, Cr, Zn) by 6010/6020	PCP by 8270D					Comments
MW37s-052620MS/MSD	05/26/20 1700	W	10	X	X	X					-11
EW19s-052620dup	05/26/20 1700	W	5	X	X	X					-12
MW58s-052720R	05/27/20 1520	W	5	X	X	X					-13

Relinquished By	Agency/Agent	Received By	Agency/Agent
Tess Lydick	Hart Crowser	Reid Kenner	PNPOR
Signature:	Time & Date: 1302 5/28/20	Signature:	Time & Date: 1302 5/28/20
Relinquished By: Reid Kenner	Agency/Agent: PNPOR	Received By: Paul Minnich	Agency/Agent: PACE
Signature:	Time & Date: 1400 5/28/20	Signature:	Time & Date: 5/29/20 0900

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1.1-.1=1.0 WM A7

RAD SCREEN: <0.5 mR/hr

State of Oregon Sample Chain of Custody

L123488

pg 3 / 3

Agency, Authorized Purchaser or Agent: Hart Crowser for ODEQ	**Contract Laboratory Name:** Pace Analytical **Lab Batch #:**	**Lab Selection Criteria:** ☐ Proximity (if TAT < 48 hrs) ☐ Prior work on same project ☒ Cost (for anticipated analyses) ☐ Other labs disqualified or unable to perform requested services ☐ Emergency work	**Turn Around Time:** ☒ 10 days (std.) ☐ 5 days ☐ 72 hours ☐ 48 hours ☐ 24 hours ☐ Other
Send Lab Report To: Sarah Miller Address: 700 NE Multnomah Street, Suite 600 Portland, OR 97232-4100 Tel. #: (503) 229-5040 E-mail: Sarah.MILLER@state.or.us	**Invoice To:** Address: ODEQ/Business Office 811 SW 6th Ave Portland, OR 97204 Tel. #: (800) 452-4011		

Project Name: McCormick and Baxter
Project #: 150-002-019/Task 2
Sampler Name: Kevin Woodhouse/Tess Lydick

Sample ID#	Collection Date/Time	Matrix	# of Containers	Sample Preservative: HNO3	Requested Analyses: PAHs by 8270-SIM	Metals (As, Cu, Cr, Zn) by 6010/6020	PCP by 8270D					Comments
IDW	05/27/20 1450	W	5		X	X	X					-14

Relinquished By: Tess Lydick	Agency/Agent: Hart Crowser	Received By: Reid Kenner	Agency/Agent: PNPOR
Signature:	Time & Date: 1302 5/28/20	Signature:	Time & Date: 1302 5/28/20
Relinquished By: Reid Kenner	Agency/Agent: PNPOR	Received By:	Agency/Agent: ACE
Signature:	Time & Date: 1400 5/28/20	Signature:	Time & Date: 5/29/20 0900

THIS PURCHASE IS SUBMITTED PURSUANT TO STATE OF OREGON SOLICITATION #**102-1098-07** AND PRICE AGREEMENT # 8903. THE PRICE AGREEMENT INCLUDING CONTRACT TERMS AND CONDITIONS AND SPECIAL CONTRACT TERMS AND CONDITIONS (T'S &C'S) CONTAINED IN THE PRICE AGREEMENT ARE HEREBY INCORPORATED BY REFERENCE AND SHALL APPLY TO THIS PURCHASE AND SHALL TAKE PRECEDENCE OVER ALL OTHER CONFLICTING T'S AND C'S, EXPRESS OR IMPLIED.

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1,1-,1=1.0 WW AT

RAD SCREEN: <0.5 mR/hr

Pace Analytical National Center for Testing & Innovation
Cooler Receipt Form

Client: OREGONDEQ	L1223488	
Cooler Received/Opened On: 5 /29 / 20 Temperature:	1.0	
Received By: Paul Minnich		
Signature: Paul Minnich		

Receipt Check List	NP	Yes	No
COC Seal Present / Intact?	✓		
COC Signed / Accurate?		✓	
Bottles arrive intact?		✓	
Correct bottles used?		✓	
Sufficient volume sent?		✓	
If Applicable			
VOA Zero headspace?		✓	
Preservation Correct / Checked?		✓	

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

October 15, 2020

Oregon Dept. of Env. Quality - ODEQ

Sample Delivery Group:	L1272268
Samples Received:	10/10/2020
Project Number:	150-002-019/TASK 3
Description:	McCormick and Baxter GW Sampling

Report To: Sara Miller (ODEQ)
700 NE Multnoma St, Suite 600
Portland, OR 97232

Entire Report Reviewed By:

Brian Ford
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.



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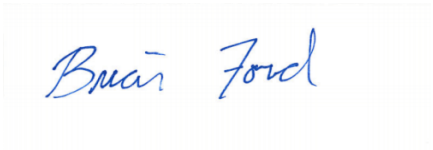
Sc: Sample Chain of Custody 12

MW-59S L1272268-01 GW

Collected by	Collected date/time	Received date/time
KW/DK	10/06/20 16:26	10/10/20 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Metals (ICPMS) by Method 6020B	WG1558115	1	10/13/20 17:51	10/14/20 19:51	LD	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270E	WG1557912	1	10/13/20 00:11	10/13/20 12:23	AO	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM	WG1557903	1	10/13/20 12:09	10/13/20 23:46	AAT	Mt. Juliet, TN

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.



Brian Ford
Project Manager

Metals (ICPMS) by Method 6020B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Arsenic	50.9		0.735	2.00	1	10/14/2020 19:51	WG1558115
Chromium	U		1.49	2.00	1	10/14/2020 19:51	WG1558115
Copper	U		2.50	5.00	1	10/14/2020 19:51	WG1558115
Zinc	U		9.96	25.0	1	10/14/2020 19:51	WG1558115

Semi Volatile Organic Compounds (GC/MS) by Method 8270E

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Pentachlorophenol	U		0.313	10.0	1	10/13/2020 12:23	WG1557912
(S) 2-Fluorophenol	*42.9*			*10.0-120*		*10/13/2020 12:23*	WG1557912
(S) Phenol-d5	*37.7*			*10.0-120*		*10/13/2020 12:23*	WG1557912
(S) 2,4,6-Tribromophenol	*49.2*			*10.0-155*		*10/13/2020 12:23*	WG1557912

Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Anthracene	0.0344	J	0.0190	0.0500	1	10/13/2020 23:46	WG1557903
Acenaphthene	U		0.0190	0.0500	1	10/13/2020 23:46	WG1557903
Acenaphthylene	U		0.0171	0.0500	1	10/13/2020 23:46	WG1557903
Benzo(a)anthracene	U		0.0203	0.0500	1	10/13/2020 23:46	WG1557903
Benzo(a)pyrene	U		0.0184	0.0500	1	10/13/2020 23:46	WG1557903
Benzo(b)fluoranthene	U		0.0168	0.0500	1	10/13/2020 23:46	WG1557903
Benzo(g,h,i)perylene	U		0.0184	0.0500	1	10/13/2020 23:46	WG1557903
Benzo(k)fluoranthene	U		0.0202	0.0500	1	10/13/2020 23:46	WG1557903
Chrysene	U		0.0179	0.0500	1	10/13/2020 23:46	WG1557903
Dibenz(a,h)anthracene	U		0.0160	0.0500	1	10/13/2020 23:46	WG1557903
Fluoranthene	U		0.0270	0.100	1	10/13/2020 23:46	WG1557903
Fluorene	U		0.0169	0.0500	1	10/13/2020 23:46	WG1557903
Indeno(1,2,3-cd)pyrene	U		0.0158	0.0500	1	10/13/2020 23:46	WG1557903
Naphthalene	U		0.0917	0.250	1	10/13/2020 23:46	WG1557903
Phenanthrene	U		0.0180	0.0500	1	10/13/2020 23:46	WG1557903
Pyrene	U		0.0169	0.0500	1	10/13/2020 23:46	WG1557903
1-Methylnaphthalene	U		0.0687	0.250	1	10/13/2020 23:46	WG1557903
2-Methylnaphthalene	U		0.0674	0.250	1	10/13/2020 23:46	WG1557903
2-Chloronaphthalene	U		0.0682	0.250	1	10/13/2020 23:46	WG1557903
(S) Nitrobenzene-d5	*120*			*31.0-160*		*10/13/2020 23:46*	WG1557903
(S) 2-Fluorobiphenyl	*109*			*48.0-148*		*10/13/2020 23:46*	WG1557903
(S) p-Terphenyl-d14	*93.2*			*37.0-146*		*10/13/2020 23:46*	WG1557903

Method Blank (MB)

(MB) R3581570-1 10/14/20 18:46

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Arsenic	U		0.735	2.00
Chromium	U		1.49	2.00
Copper	U		2.50	5.00
Zinc	U		9.96	25.0

Laboratory Control Sample (LCS)

(LCS) R3581570-2 10/14/20 18:49

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Arsenic	50.0	48.2	96.4	80.0-120	
Chromium	50.0	50.7	101	80.0-120	
Copper	50.0	49.2	98.5	80.0-120	
Zinc	500	481	96.3	80.0-120	

Method Blank (MB)

(MB) R3581343-2 10/13/20 09:13

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Pentachlorophenol	U		0.313	10.0
(S) Phenol-d5	*18.2*			*10.0-120*
(S) 2-Fluorophenol	*25.7*			*10.0-120*
(S) 2,4,6-Tribromophenol	*41.5*			*10.0-155*

Laboratory Control Sample (LCS)

(LCS) R3581343-1 10/13/20 08:52

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Pentachlorophenol	50.0	22.5	45.0	23.0-120	
(S) Phenol-d5			*16.0*	*10.0-120*	
(S) 2-Fluorophenol			*21.0*	*10.0-120*	
(S) 2,4,6-Tribromophenol			*40.9*	*10.0-155*	

Method Blank (MB)

(MB) R3581373-3 10/13/20 15:47

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Anthracene	U		0.0190	0.0500
Acenaphthene	U		0.0190	0.0500
Acenaphthylene	U		0.0171	0.0500
Benzo(a)anthracene	U		0.0203	0.0500
Benzo(a)pyrene	U		0.0184	0.0500
Benzo(b)fluoranthene	U		0.0168	0.0500
Benzo(g,h,i)perylene	U		0.0184	0.0500
Benzo(k)fluoranthene	U		0.0202	0.0500
Chrysene	U		0.0179	0.0500
Dibenz(a,h)anthracene	U		0.0160	0.0500
Fluoranthene	U		0.0270	0.100
Fluorene	U		0.0169	0.0500
Indeno(1,2,3-cd)pyrene	U		0.0158	0.0500
Naphthalene	U		0.0917	0.250
Phenanthrene	U		0.0180	0.0500
Pyrene	U		0.0169	0.0500
1-Methylnaphthalene	U		0.0687	0.250
2-Methylnaphthalene	U		0.0674	0.250
2-Chloronaphthalene	U		0.0682	0.250
(S) Nitrobenzene-d5	*122*			*31.0-160*
(S) 2-Fluorobiphenyl	*106*			*48.0-148*
(S) p-Terphenyl-d14	*95.5*			*37.0-146*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3581373-1 10/13/20 15:05 • (LCSD) R3581373-2 10/13/20 15:26

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Anthracene	2.00	2.02	2.02	101	101	67.0-150			0.000	20
Acenaphthene	2.00	2.07	2.07	103	103	65.0-138			0.000	20
Acenaphthylene	2.00	1.90	1.87	95.0	93.5	66.0-140			1.59	20
Benzo(a)anthracene	2.00	1.95	1.94	97.5	97.0	61.0-140			0.514	20
Benzo(a)pyrene	2.00	1.91	1.90	95.5	95.0	60.0-143			0.525	20
Benzo(b)fluoranthene	2.00	1.93	1.98	96.5	99.0	58.0-141			2.56	20
Benzo(g,h,i)perylene	2.00	2.25	2.24	112	112	52.0-153			0.445	20
Benzo(k)fluoranthene	2.00	1.89	1.79	94.5	89.5	58.0-148			5.43	20
Chrysene	2.00	1.96	1.93	98.0	96.5	64.0-144			1.54	20
Dibenz(a,h)anthracene	2.00	2.12	2.12	106	106	52.0-155			0.000	20
Fluoranthene	2.00	2.04	2.06	102	103	69.0-153			0.976	20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3581373-1 10/13/20 15:05 • (LCSD) R3581373-2 10/13/20 15:26

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Fluorene	2.00	2.03	2.01	102	100	64.0-136			0.990	20
Indeno(1,2,3-cd)pyrene	2.00	2.16	2.17	108	108	54.0-153			0.462	20
Naphthalene	2.00	2.02	2.03	101	102	61.0-137			0.494	20
Phenanthrene	2.00	1.98	1.99	99.0	99.5	62.0-137			0.504	20
Pyrene	2.00	1.94	1.95	97.0	97.5	60.0-142			0.514	20
1-Methylnaphthalene	2.00	2.03	2.03	102	102	66.0-142			0.000	20
2-Methylnaphthalene	2.00	2.00	1.99	100	99.5	62.0-136			0.501	20
2-Chloronaphthalene	2.00	2.07	2.06	103	103	64.0-140			0.484	20
(S) Nitrobenzene-d5				*121*	*112*	*31.0-160*				
(S) 2-Fluorobiphenyl				*105*	*103*	*48.0-148*				
(S) p-Terphenyl-d14				*94.5*	*94.0*	*37.0-146*				

L1271888-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1271888-02 10/13/20 18:12 • (MS) R3581373-4 10/13/20 18:33 • (MSD) R3581373-5 10/13/20 18:54

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Anthracene	1.90	U	1.96	1.98	103	104	1	56.0-156			1.02	20
Acenaphthene	1.90	U	1.84	1.90	96.8	100	1	44.0-153			3.21	20
Acenaphthylene	1.90	U	1.67	1.68	87.9	88.4	1	53.0-150			0.597	20
Benzo(a)anthracene	1.90	U	1.85	1.85	97.4	97.4	1	47.0-151			0.000	20
Benzo(a)pyrene	1.90	U	1.70	1.73	89.5	91.1	1	45.0-146			1.75	20
Benzo(b)fluoranthene	1.90	U	1.66	1.74	87.4	91.6	1	43.0-142			4.71	20
Benzo(g,h,i)perylene	1.90	U	2.06	2.11	108	111	1	40.0-147			2.40	20
Benzo(k)fluoranthene	1.90	U	1.70	1.66	89.5	87.4	1	43.0-148			2.38	21
Chrysene	1.90	U	1.82	1.85	95.8	97.4	1	50.0-148			1.63	20
Dibenz(a,h)anthracene	1.90	U	1.91	1.97	101	104	1	37.0-151			3.09	20
Fluoranthene	1.90	U	1.90	1.94	100	102	1	56.0-157			2.08	20
Fluorene	1.90	U	1.83	1.87	96.3	98.4	1	48.0-148			2.16	20
Indeno(1,2,3-cd)pyrene	1.90	U	1.94	2.00	102	105	1	41.0-148			3.05	20
Naphthalene	1.90	U	2.43	2.47	128	130	1	10.0-160			1.63	20
Phenanthrene	1.90	U	1.89	1.90	99.5	100	1	47.0-147			0.528	20
Pyrene	1.90	U	1.88	1.90	98.9	100	1	51.0-148			1.06	20
1-Methylnaphthalene	1.90	U	2.42	2.39	127	126	1	21.0-160			1.25	20
2-Methylnaphthalene	1.90	U	2.29	2.28	121	120	1	31.0-160			0.438	20
2-Chloronaphthalene	1.90	U	1.88	1.89	98.9	99.5	1	52.0-148			0.531	20
(S) Nitrobenzene-d5					*182*	*173*		*31.0-160*	J1	J1		
(S) 2-Fluorobiphenyl					*96.8*	*97.4*		*48.0-148*				
(S) p-Terphenyl-d14					*93.7*	*93.7*		*37.0-146*				

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J	The identification of the analyte is acceptable; the reported value is an estimate.
J1	Surrogate recovery limits have been exceeded; values are outside upper control limits.

Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.
* Not all certifications held by the laboratory are applicable to the results reported in the attached report.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1 6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana [1]	LA180010	Texas	T104704245-18-15
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

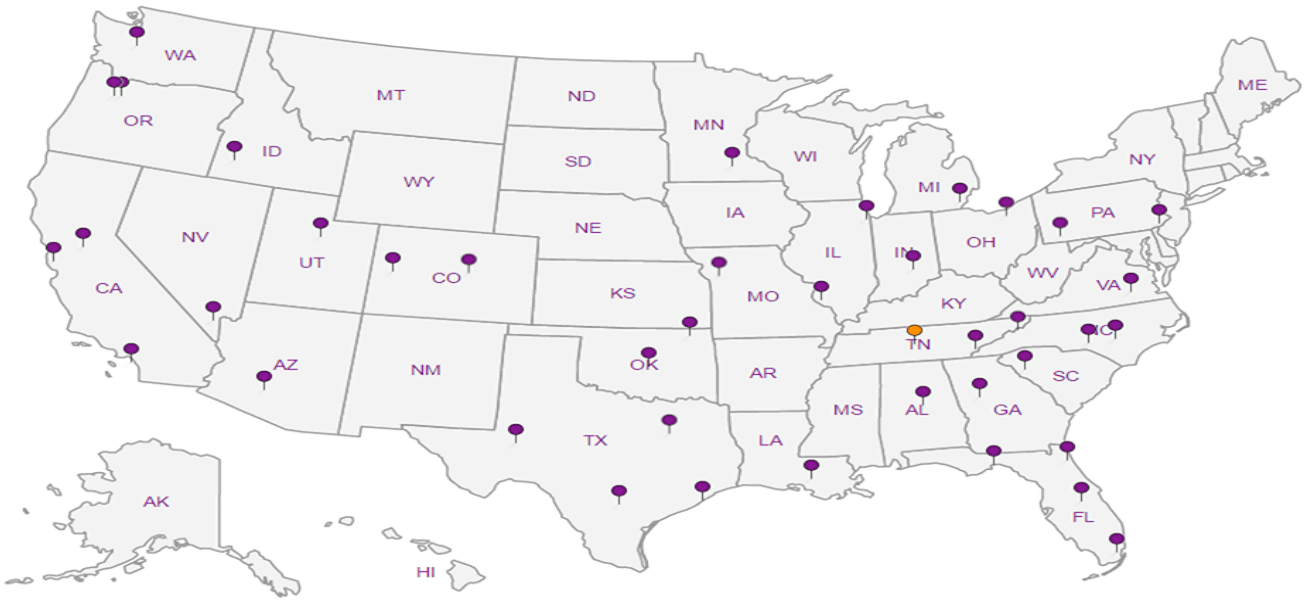
Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.



State of Oregon Sample Chain of Custody

Agency, Authorized Purchaser or Agent:
Hart Crowser for ODEQ

Send Lab Report To: Sarah Miller
Address: 700 NE Multnomah Street, Suite 600
Portland, OR 97232-4100
Tel. #: 503.229.5040
E-mail: Sarah.MILLER@state.or.us

Contract Laboratory Name:
Pace Analytical

Lab Batch #:

Invoice To:
Address: ODEQ/Business Office
811 SW 6th Ave
Portland, OR 97204
Tel. #: (800) 452-4011

Lab Selection Criteria:
- ☐ Proximity (if TAT < 48 hrs)
- ☐ Prior work on same project
- ☒ Cost (for anticipated analyses)
- ☐ Other labs disqualified or unable to perform requested services
- ☐ Emergency work

Turn Around Time:
- ☒ 10 days (std.)
- ☐ 5 days
- ☐ 72 hours
- ☐ 48 hours
- ☐ 24 hours
- ☐ Other ____

Project Name: McCormick and Baxter GW Sampling
Project #: 150-002-019/Task 3
Sampler Name: Kevin Woodhouse/Dan Knapp

Sample ID#	Collection Date/Time	Matrix	Number of Containers	Sample Bottle/Preservative: 2x Unpres. 40 ml VOA	2x Unpres. 100 ml bottle	1x HNO3 250 mL poly				Comments
				Requested Analyses: PAHs by 8270-SIM	PCP by 8270D	Metals (As, Cr, Cu, Zn) by 6020 <2				
MW-59s	10/6/2020 16:26	W	5	X	X	X				L1272268-01

Sample Receipt Checklist
COC Seal Present/Intact: __Y__N
COC Signed/Accurate: ✓Y__N
Bottles arrive intact: ✓Y__N
Correct bottles used: ✓Y__N
Sufficient volume sent: ✓Y__N
RAD Screen <0.5 mR/hr: ✓Y N
If Applicable
VOA Zero Headspace: __Y__N
Pres.Correct/Check: ✓Y__N

Relinquished By: Kevin Woodhouse	Agency/Agent: Hart Crowser	Received By: Reid Kenner	Agency/Agent: PNPOR
Signature: Kevin Woodhouse	Time & Date: 10/8/20 1600	Signature: RFK	Time & Date: 1600 10/8/20
Relinquished By: Reid Kenner	Agency/Agent: PNPOR	Received By: Gisely Quiles	Agency/Agent: Pace Analytical
Signature: RFK	Time & Date: 1200 10/9/20	Signature: Gisely Quiles	Time & Date: 09:00 10/10/2020

THIS PURCHASE IS SUBMITTED PURSUANT TO STATE OF OREGON SOLICITATION #102-1098-07 AND PRICE AGREEMENT # 8903. THE PRICE AGREEMENT INCLUDING CONTRACT TERMS AND CONDITIONS AND SPECIAL CONTRACT TERMS AND CONDITIONS (T'S &C'S) CONTAINED IN THE PRICE AGREEMENT ARE HEREBY INCORPORATED BY REFERENCE AND SHALL APPLY TO THIS PURCHASE AND SHALL TAKE PRECEDENCE OVER ALL OTHER CONFLICTING T'S AND C'S, EXPRESS OR IMPLIED.

1037

A2 3.3±.1≤ 3.4 BP

9159 8782 1769

APPENDIX H
Photograph Log – Vegetation Observations



Photograph H1: Earthen cap and drainage swale in the foreground with the impermeable cap in the background. Taken looking south from Photograph Station 1 comparing baseline and conditions in 2014. (Left - June 2011, Right – June 2014).



Photograph H2: Tree and shrub plantings on the earthen cap. Taken looking southeast from Photograph Station 2 (August 2020).



Photograph H3: Tree and shrub plantings on the earthen cap are healthy and spreading. Taken from Photograph Station 2 looking southeast (October 2012).



Photograph H4: Tree and shrub plantings on the earthen cap are healthy and spreading. Taken from Photograph Station 2 looking southeast (August 2020).



Photograph H5: Eastern edge of the earthen cap with perimeter road in foreground. Taken from Photograph Station 3 looking west (October 2012).



Photograph H6: Eastern edge of the earthen cap with perimeter road in foreground. Taken from Photograph Station 3 looking west (August 2020).



Photograph H7: Stormwater pond dominated by willow and alder. Taken from Photograph Station 4 looking northeast (October 2012).



Photograph H8: Stormwater pond dominated by willow and alder. Taken from Photograph Station 4 looking northeast (August 2020).



Photograph H9: Willow plantings on the earthen cap. Taken from Photograph Station 5 looking northeast (October 2012).



Photograph H10: Willow plantings on the earthen cap. Taken from Photograph Station 5 looking northeast (August 2020).



Photograph H11: Impermeable cap dominated by grasses and herbaceous vegetation in the early summer (left) and fall (right). Taken from Photograph Station 6 looking east (Left – May 2012; right – October 2012).



Photograph H12: Impermeable cap dominated by grasses and herbaceous vegetation. Taken from Photograph Station 6 looking east (August 2020).



Photograph H13: Vegetation growth within the lower riparian component. Taken from Photograph Station 7 looking south (May 2012).



Photograph H14: Vegetation growth and wood debris within the lower riparian component and along the shoreline. Taken from Photograph Station 7 looking southeast (August 2020).



Photograph H15: Upper riparian component with trees, shrubs, and herbaceous plants. Taken from Photograph Station 8 looking southwest (Left – May 2012; right – October 2012).



Photograph H16: Upper riparian component with trees, shrubs, and herbaceous plants. Taken from Photograph Station 8 looking southwest (August 2020).



Photograph H17: Lower riparian component with large wood along the edge. Taken from Photograph Station 9 looking northwest (Left – May 2012; right – October 2012).



Photograph H18: Lower riparian component with large wood along the edge. Taken from Photograph Station 9 looking northwest (August 2020).