SUBMITTED TO:
Earle M. Jorgensen
10650 S. Alameda Street
Lynwood, CA 90262

BY:
Shannon & Wilson
400 N. 34th Street, Suite 100
Seattle, WA 98103

(206) 632-8020
www.shannonwilson.com

DRAFT

PER- AND POLYFLUOROALKYL SUBSTANCES INVESTIGATION REPORT

Jorgensen Forge Corporation Property

TUKWILA, WASHINGTON

SHANNON & WILSON

March 10, 2025

Shannon & Wilson No: 21-1-12596-025

DRAFT FOR PUBLIC COMMENT

Submitted To: Earle M. Jorgensen
10650 S. Alameda Street
Lynwood, CA 90262

Subject: DRAFT PER- AND POLYFLUOROALKYL SUBSTANCES INVESTIGATION REPORT, JORGENSEN FORGE CORPORATION PROPERTY, TUKWILA, WASHINGTON

This Per- and Polyfluoroalkyl Substances (PFAS) Investigation Report has been prepared to document PFAS investigation activities completed at the Jorgensen Forge Corporation (JFC) property located at 8531 East Marginal Way South, City of Tukwila, Washington (the Site) between September 2022 and February 2023. The PFAS investigation was completed in accordance with the PFAS work plan (Shannon & Wilson, 2022) and supplements the findings from the Remedial Investigation (RI) completed between October 2020 and December 2021 and reported within the Draft for Public Comment RI Report (Shannon & Wilson, 2024).

This report has been prepared on behalf of Earle M. Jorgensen (EMJ) for submission to the Washington State Department of Ecology (Ecology). Shannon & Wilson participated in this project as a consultant to EMJ under an Environmental Services Agreement dated February 17, 2017. EMJ is undertaking activities at the Site under Agreed Order number DE14143, issued by Ecology and dated July 28, 2017.

Sincerely,

SHANNON & WILSON

Ryan Peterson, PE
Senior Engineer

Meg Strong, LG, LHG
Senior Consultant

SKH:MJS/skh:rbp

EXECUTIVE SUMMARY

During Remedial Investigation (RI) activities completed in 2021, limited groundwater sampling for per- and polyfluoroalkyl substances (PFAS) was completed to evaluate the presence of PFAS within groundwater at the Site. PFAS was confirmed to be present. This PFAS investigation was completed to address data gaps identified within the RI and to provide a better understanding of the extent of PFAS in soil and groundwater at the Site.

Aqueous film forming foam (AFFF) fire suppression systems at the Site served the 660-ton, 1,250-ton, and 2,500-ton presses and the Quench Tanks 1, 2, and 3 (Q1/Q2/Q3) vault. According to an affidavit from a former employee supplied by Star Forge, the current owner of the Site, the 1,250-ton press AFFF system was activated on at least one occasion. Star Forge also provided documentation that in 2022, the 660-ton and 2,500-ton press AFFF tanks were disposed of in an environmentally prudent manner. However, no documentation concerning approach to the removal, management, and disposal of the 1,250-ton press AFFF tank, contents, and associated piping (sometime between 2019 and 2022) has been identified. Accordingly, it is not known what, if any, steps were taken to minimize impact to the environment and prevent a release from the tank and/or piping during the removal activity.

This PFAS investigation was conducted in accordance with the approved work plan. The work was completed in a phased manner, divided into four tasks completed between September 2022 and February 2023. The activities included groundwater sampling from existing groundwater monitoring wells that had not previously been sampled for PFAS (15 wells), installation of new wells and collection of soil and groundwater samples from these locations (three wells), collection of soil samples from unsaturated soil near potential source areas (three borings), and groundwater sampling from existing and new wells (28 wells).

The soil and groundwater PFAS samples collected at the Site indicate that one or more releases have likely occurred from the 1,250-ton press AFFF system, from the 660-ton press AFFF system or a surface release in the area, and potentially from the Q1/Q2/Q3 vault AFFF system. Of the eighteen PFAS compounds analyzed for during this investigation, perfluorooctanesulfonic acid (PFOS) in soil and groundwater and perfluorooctanoic acid (PFOA) in soil were the only compounds detected at concentrations above its relevant screening levels (Lower Duwamish Waterway [LDW] Preliminary Cleanup Levels [PCULs] and ecological receptor-based screening levels).

The area of the Site where PFOS and PFOA are in soil and groundwater at concentrations that exceed screening levels is currently limited in extent (within the vicinity of the 1,250-ton and 660-ton press AFFF systems at the east end of the Site) and is over 800 feet from the

LDW. Based on analysis of groundwater from monitoring wells, concentrations of PFOS in groundwater above the screening levels extend to the southern boundary of the Site, but the concentrations of PFAS at the property boundary are below the screening levels based on samples collected at MW-37, MW-38, and MW-77. PFAS compounds were detected in groundwater samples taken from upgradient monitoring wells. Though concentrations were typically low within these wells, one eastern monitoring well (approximately aligned with the northern edge of the Site building), contained higher concentrations that may indicate a separate more localized upgradient source.

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Important Information

ACRONYMS

µg/kg	micrograms per kilogram
AFFF	aqueous film forming foam
ARAR	applicable or relevant appropriate requirements
bgs	below ground surface
City	City of Tukwila
DOH	Department of Health
Ecology	Washington State Department of Ecology
EMJ	Earle M. Jorgensen
EPA	U.S. Environmental Protection Agency
GenX chemicals	HFPO dimer acid and its ammonium salt
HA	Health Advisory
HFPO	hexafluoropropylene oxide
J	Estimated concentration, detected greater than the detection limit and less than the reporting limit. Flag applied by the laboratory.
J*	Estimated concentration due to quality control failures. Flag applied by Shannon & Wilson.
JFC	Jorgensen Forge Corporation
JH*	Estimated concentration, biased high due to quality control failures. Flag applied by Shannon & Wilson.
LDW	Lower Duwamish Waterway
LNAPL	light nonaqueous phase liquid
MCL	Maximum Contaminant Level
mg/L	milligrams per liter
ng/L	nanogram per liter
No.	number
PCUL	Preliminary Cleanup Level
PFAS	per- and polyfluoroalkyl substances
PFBS	perflurobutane sulfonic acid and potassium perfluorobutane sulfonate
PFHpa	perfluoroheptanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
Q1/Q2/Q3	Quench Tanks 1, 2, and 3
RI	Remedial Investigation
SAL	State Action Level
TEE	Terrestrial Ecological Evaluation
UCMR	Unregulated Contaminant Monitoring Rule

1 INTRODUCTION

This PFAS investigation report has been prepared to document PFAS investigation activities completed at the Jorgensen Forge Corporation (JFC) property located at 8531 East Marginal Way South, City of Tukwila, Washington (the Site) between September 2022 and February 2023. The Site location is shown in Figure 1.

Earle M. Jorgensen (EMJ) owned the Site property from 1965 to 1992. EMJ has assumed responsibility for completing the RI, feasibility study, and draft cleanup action plan preparation activities for the uplands portion of the Site pursuant to Agreed Order No. DE 14143 with the Washington State Department of Ecology (Ecology, 2017). Between October 2020 and December 2021, Shannon & Wilson completed RI activities at the Site. Shannon & Wilson documented findings from the RI within the RI Report (Shannon & Wilson, 2024). During the RI, limited groundwater sampling identified the presence of PFAS within groundwater at the Site. Accordingly, Ecology requested that a PFAS work plan be developed to investigate the extent of PFAS in soil and groundwater at the Site.

The PFAS investigation was completed in accordance with the PFAS work plan (Shannon & Wilson, 2022), which was approved by Ecology on July 28, 2022. This report supplements the RI Report.

1.1 Per- and Polyfluoroalkyl Substances Emergence

PFAS compounds are a group of manmade fluorinated organic chemicals that have been used since the 1950s. PFOS and PFOA are the two PFAS compounds that were produced in the largest amounts in the U.S. and are the most studied PFAS compounds. They are stable compounds that have been used in a variety of products, including (but not limited to) nonstick coatings on cookware, waterproof membranes for clothing, electrical wire casing, fire and chemical resistant clothing, and historical AFFF, which was used to fight liquid hydrocarbon fires (U.S. Environmental Protection Agency [EPA], 2017).

In the early 2000s, regulators began to identify PFAS compounds as contaminants of emerging concern. By the mid-2000s, PFOS and PFOA were phased out of most products and compounds were developed to replace them. These newer compounds include hexafluoropropylene oxide (HFPO) dimer acid and its ammonium salt (together referred to as GenX chemicals) and perfluorobutane sulfonic acid and its related compound potassium perfluorobutane sulfonate (together referred to as PFBS) (EPA, 2022).

1.2 Available Screening Levels

Cleanup levels for PFAS compounds are being developed and the regulatory environment is evolving.

1.2.1 Federal Screening Levels

Until recently, the primary value used to evaluate PFAS data was the EPA Lifetime Health Advisory (HA) Level for PFOS and PFOA (either separately or combined) of 70 nanograms per liter (ng/L) for drinking water. HA Levels are defined as concentrations of drinking water contaminants at which adverse health effects are not anticipated to occur over specific exposure durations. In June 2022, EPA issued updated and significantly more stringent interim HA values for PFOS (0.004 ng/L) and PFOA (0.02 ng/L) and introduced final HAs for GenX chemicals (10 ng/L) and PFBS (2,000 ng/L).

In April 2024, EPA announced the final enforceable Maximum Contaminant Levels (MCLs) for six PFAS, including PFOA, PFOS, PFHxS, PFNA, and GenX Chemicals. Additionally, a Hazard Index of no more than 1 was established for mixtures of two or more of PFHxS, PFNA, GenX Chemicals, and PFBS to consider the additive effects of the four PFAS compounds occurring together. MCLs are protective of the human health ingestion pathway.

1.2.2 Washington State Screening Levels

In August 2021, the Washington State Department of Health (DOH) issued drinking water State Action Levels (SALs) for PFOS (15 ng/L), PFOA (10 ng/L), PFNA (9 ng/L), PFHxS (65 ng/L), and PFBS (345 ng/L). The SALs, which became effective in January 2022, are defined by DOH as a level in daily drinking water expected to be without appreciable health effects, even in sensitive populations.

In July 2022, Ecology published a PFAS Cleanup Levels focus sheet (Ecology Publication No. 22-09-075) that provides preliminary soil and groundwater cleanup levels for the same five PFAS compounds for which the DOH promulgated SALs, as well as cleanup levels for HFPO dimer acid. The PFAS focus sheet serves as interim guidance until comprehensive guidance is finalized.

In December 2022, Ecology issued draft guidance for investigating and remediating PFAS contamination in Washington State; the document was finalized in June 2023 (referred to as the Ecology 2023 PFAS Guidance) (Ecology, 2023). The guidance includes a robust selection of cleanup levels, established for a variety of exposure routes. Those cleanup levels are intended to be protective of human health or ecological exposure routeways including

surface water ecological health (marine and fresh water), soil ecological health, soil human health direct contact, and soil leaching protective of drinking water. The direct contact cleanup levels in the Ecology 2023 PFAS Guidance are the same as those adopted by Ecology in the PFAS focus sheet.

1.2.3 Lower Duwamish Waterway Preliminary Cleanup Levels

The Site is located on the east bank of the LDW. Ecology has developed a PCUL Workbook and Supplemental Information paper (the LDW PCUL Workbook) for sites that may have transport pathways to the LDW. Within the LDW PCUL Workbook, Ecology provides soil and groundwater screening levels for an extensive list of chemicals via the various environmental transport and exposure pathways.

The LDW PCUL Workbook is a living document that is updated regularly. During a LDW PCUL Workbook update completed in August 2022, Ecology added screening levels for six PFAS compounds. The LDW PCUL Workbook has been subsequently updated in February 2023, March 2024, and July 2024. The LDW PCUL Workbook now includes eight PFAS compounds (Ecology, 2024). The basis of the PFAS PCULs for soil and groundwater is to protect human health by direct contact and to protect ecological receptors.

The PCUL values in the LDW PCUL Workbook were calculated using applicable or relevant appropriate requirements (ARARs), including the Model Toxics Control Act, Sediment Management Standards, and associated guidance. Some LDW PCULs differ from values presented in Ecology's Cleanup Levels and Risk Calculator website due to site-specific assumptions or slight differences in rounding.

1.2.4 Screening Levels for the Site

Groundwater at the Site and surface water in the LDW has been established as not potable (Ecology, 2018 and 2021). For this reason, the EPA HAs, EPA MCLs, DOH SALs, and Ecology 2023 PFAS Guidance values for human ingestion, which all pertain to drinking water, are not appropriate screening levels for PFAS data collected at the Site. Relevant screening levels include those established for sites with non-potable groundwater, including the screening levels discussed in Section 1.2.3.

The Model Toxics Control Act requires consideration of ARARs when establishing screening levels for a site. The screening levels in the LDW PCUL Workbook are site-specific; therefore, they take precedence over the screening levels presented in Ecology's 2023 PFAS Guidance, which are calculated with standard parameter assumptions. The LDW PCUL Workbook uses marine ecological screening levels from the Ecology 2023 PFAS Guidance. Three PFAS (PFDA, PFDoA, and PFUnA) that are listed with marine or

freshwater ecological screening levels in Ecology's 2023 PFAS Guidance but do not have screening levels in the LDW PCUL Workbook. For these three analytes (PFDA, PFDoA, and PFUnA), the freshwater and marine ecological screening levels in Ecology's 2023 PFAS Guidance are selected as applicable screening levels for the Site.

Table 1 provides a summary of the relevant PFAS screening levels for the Site. For the groundwater media, the values consist of:

- The most stringent PCULs for non-potable groundwater presented in the LDW PCUL Workbook (GW #s 2-5) (Ecology, 2024). The PCULs are currently set at levels protective of surface water for human receptors via direct contact and ingestion and ecological receptors.
- For six analytes (PFBA, PFDA, PFDoA, PFHxS, PFHxA, and PFUnA) without GW #2-5 screening levels in the LDW PCUL Workbook, screening levels are obtained from Table 6 of Ecology's 2023 PFAS Guidance that are protective of ecological receptors (invertebrates, fish, and other receptors) in surface waters (freshwater and marine). The LDW is classified as marine water. The marine screening level takes precedence over the freshwater screening level if both were available. In cases where a freshwater screening level was available but not a marine screening level, the freshwater screening level was selected.

For the soil media, the values include:

- The most stringent PCULs for saturated zone soils and non-potable groundwater presented in the LDW PCUL Workbook (SL #s 1, 6-10) (Ecology, 2024). The PFAS PCULs are currently set at levels protective of human receptors via direct contact with soil or via direct contact or ingestion of sediment (leaching to groundwater and partition to sediment) and protective of ecological receptors.
- For three analytes (PFDA, PFDoA, and PFUnA) without screening levels in the LDW PCUL Workbook, values protective of upland ecological receptors (plants, soil biota, and wildlife) are used from Table 6 of Ecology's 2023 PFAS Guidance.
- Regarding ecological screening levels, the Site qualifies for a Simplified Terrestrial Ecological Evaluation (TEE) assessment using values protective of wildlife exposure for industrial/commercial properties. PFAS screening levels protective of industrial/commercial properties are not available at this time; therefore, the site-specific soil ecological screening levels for unrestricted land use (SL-9 in the LDW PCUL Workbook and Table 6 of the Ecology 2023 PFAS Guidance) are used, when available. Further details regarding the Site Simplified TEE are provided in Section 6.3 of the RI Report.
- The three analytes PFDA, PFDoA, and PFUnA are not listed in the LDW PCUL Workbook. Additionally, soil screening levels protective of ecological receptors in surface waters via leaching to groundwater are not provided within the Ecology 2023

PFAS Guidance. Accordingly, Shannon & Wilson calculated these values (i.e., soil screening levels protective of ecological receptors in surface waters via leaching to groundwater) using the surface water screening levels per Equation 747-1 of the Model Toxics Control Act. The calculations are summarized in Appendix A. The selected media-specific screening levels for each compound in are highlighted in Table 1.

1.3 History of Aqueous Film-Forming Foam Use at the Site

Based on Shannon & Wilson's observations, an interview of a former employee at the Site (Wayne Turk), and information provided by the current owner based on an affidavit of a former employee at the Site (Michael Lewis), three AFFF fire suppression systems were formerly installed at the Site to serve the 660-ton, 1,250-ton, and 2,500-ton presses, respectively. The system for the 2,500-ton press also appears to have served the vertical furnace within the Q1/Q2/Q3 vault. AFFF solution/water has at least once been stored in the Used Oil Storage Building in the northwest corner of the Site (observed by Ecology in 2015, discussed in Section 1.3.3). AFFF system and storage area locations are shown in Figure 2.

1.3.1 System Descriptions

Each of the three AFFF fire suppression systems at the Site included an AFFF tank. The tanks were located on top of the 660-ton, 1,250-ton, and 2,500-ton press pump room structures. During a September 2018 facility walk-through, Shannon & Wilson observed the tanks to be present. During subsequent visits conducted in November 2021 and January 2022, Shannon & Wilson had the opportunity to more closely observe the 660-ton and 2,500-ton press AFFF tanks. The 1,250-ton press AFFF system was not present during the 2021 and 2022 visits.

Shannon & Wilson observed the 660-ton press AFFF tank to have one discharge pipe which led down into the 660-ton press pump room. The 2,500-ton press AFFF tank was observed to have three discharge pipes, one to the 2,500-ton press pump room, one to the 2,500-ton press pit, and one labeled as "V2". Based on AFFF placards noted on the wall next to the Q1/Q2/Q3 vault, it appears that the "V2" label likely referred to the vertical furnace within the Q1/Q2/Q3 vault.

Metal placards affixed to the 660-ton and 2,500-ton press AFFF tanks stated that the tanks were built in 1982. The date of install is not known; however, inspection tags indicated that the tanks were inspected as early as April 1995. More recent service labels affixed to the tanks stated that the foam was tested annually between 2014 and 2017 by a company called The Safety Team. According to Mr. Andrew Saechao of The Safety Team, tanks are serviced based on the configuration and he had no records stating how testing of the tanks at the JFC property was undertaken. He indicated that the testing records were submitted to the City

of Tukwila (City) Fire Marshall's office. A freedom of information request was submitted to the City Fire Marshall's office in November 2021. The City-supplied records did not provide any relevant information related to the AFFF systems or annual testing at the Site. It is not known if the annual servicing required the foam to be dispensed at the facility.

Placards, inspections tags, and service labels for the 1,250-ton press AFFF tank could not be reviewed during the visits conducted in 2021 and 2022 (because the system was no longer present at the Site), but it is likely that the tank was of a similar age and maintained in a similar manner to the other AFFF tanks.

1.3.2 System Removal Activities

The 660-ton, 1,250-ton, and 2,500-ton presses were sold and removed from the Site by Star Forge in 2019 (Marten Law, 2022). The 660-ton press pump room structure and much of the 2,500-ton press pump room structure were demolished by Star Forge during 2023 and 2024. The 1,250-ton press pump room structure was removed by Star Forge between 2019 and 2022.

In June 2022, the 660-ton and 2,500-ton press AFFF tanks and their contents were removed by DH Environmental on behalf of Star Forge. Based on a field report generated by DH Environmental, it appears that the 660-ton and 2,500-ton press AFFF system removals were conducted in a manner that would minimize the chance for impact to the Site (DH Environmental, 2022a, attached as Appendix B). The 600-ton and 2,500-ton AFFF systems were removed by draining the AFFF to metal drums. After draining, a bag of diatomaceous earth granular adsorbent was added to each vessel to absorb any liquid residue, and the lids were secured back to the AFFF vessels. Absorbent pads were inserted into any open pipe ends. Plastic sheeting and absorbent pads were placed beneath the work area. Reportedly, no product dripped from the piping or vessel. The piping, vessels, personal protective equipment, and absorbent pads were placed into a roll-off container. The roll-off container and the metal drums of liquid were transported for disposal at Chemical Waste Management in Arlington, Oregon.

The tank for the 1,250-ton press was present in 2018 but was removed sometime prior to November 2021. According to a letter from Marten Law (Marten Law, 2022), prepared on behalf of Star Forge, Star Forge does not know if the 1,250-ton press's "AFFF system was taken by the purchaser of that press or if it was removed separately," and Star Forge had "only recently discovered that the AFFF vessels currently on-site still contained AFFF product" (Marten Law, 2022). Due to the lack of documentation associated with the removal of the 1,250-ton press AFFF system, and the acknowledgement by Marten Law that they and Star Forge were not aware that AFFF remained present on the Site before removal of the press and demolition activities (Marten Law, 2022), it is not known if the tank or

associated piping were handled in a way that would protect against releases of AFFF to the Site.

Photographs showing the locations of the AFFF tanks at the Site and relevant details are included in Appendix C.

1.3.3 Used Oil Storage Area

During an October 2015 hazardous waste facility inspection, Ecology observed a 55-gallon drum containing "AFFF Solution/Water" within the Used Oil Storage Building. The drum indicated that it contained "above 25K pump rm AFFF" with an accumulation start date of May 19, 2015.

The presence of the drum within this area suggests that this building was used for temporary storage of waste AFFF Solution/Water prior to offsite disposal. It is not clear how often this building was used for this purpose. Photographs showing the drum observed within the Used Oil Storage Building are included in Appendix C.

1.3.4 Evidence Provided by Facility Employees

During an interview conducted by Shannon & Wilson in April 2020, Wayne Turk, a long-time facility employee, confirmed that AFFF fire suppression systems serviced the presses and Q1/Q2/Q3 vault, and indicated that the AFFF systems were serviced annually. He stated that he was not aware of the systems ever being activated, either in response to a fire or inadvertently, and that he had not observed leaks from the systems. When asked about fires at the facility, Mr. Turk recalled a fire that occurred around 1976 or 1977. His recollection was that a large ladle had spilled some molten metal in the Melt Shop (adjacent to the Heat Shop). The molten metal was against the north wall and caused a fire on the other side of the wall in the ground floor office and second floor metal laboratory. He did not recall other significant fires at the facility, although he indicated that occasional small fires would occur when molten metal breached a furnace wall or sparks from metal processing would ignite nearby cardboard.

According to the letter from Marten Law (Marten Law, 2022), there was a discharge from the 1,250-ton press AFFF system sometime before Star Forge took ownership of the Site property in 2016. This information was documented within an affidavit from Michael Lewis, a former employee who worked at the Site between 1983 and 2019 (attached to the Marten Law 2022 letter in Appendix D). According to Mr. Lewis, the 1,250-ton press fire suppression system was "…inadvertently activated by an outside contractor. The activation resulted in the discharge of a combined mixture of AFFF solution and water which filled the enclosed area of the 1,250-ton press." After the discharge, the tank was reportedly refilled

with new AFFF product. The affidavit did not indicate when the discharge occurred or how the released mixture was cleaned up. Mr. Lewis indicated that the product within the 660-ton and 2,500-ton press AFFF systems was also replaced after the discharge, though it isn't clear if that changeout coincided with the refill at the 1,250-ton press AFFF tank or was completed sometime later.

1.3.5 Purchase and Disposal Records

According to the 2022 Marten Law letter (Appendix D), "the most recent purchase order for AFFF is from March 2009; the AFFF purchased at that time was from a supplier that exclusively provides non-fluorinated AFFF" (Marten Law, 2022). Marten Law also indicated that the most recent AFFF disposal occurred in 2015. Within a letter to Ecology, DH Environmental provided AFFF purchase and disposal documentation (DH Environmental, 2022b), including:

- April 2022 email communications from Denko, Inc. to DH Environmental confirming that Denko, Inc. shipped 55 gallons of their 3% AFFF foam to Jorgensen Corporation on two occasions: March 7, 2008, and March 6, 2009. Within the emails, Denko indicated that it has never used fluorocarbons within its products. The email did not mention supplying AFFF foam prior to 2008 or later than 2009.
- A 2009 purchase order for new foam solution (Denkofoam #854 3% AFFF). This 2009 purchase matches the purchase on March 6, 2009, mentioned by Denko.
- A waste manifest from September 2015 for disposal of 165 gallons of AFFF with fluorosurfactants (within three drums).
- A waste manifest from November 2015 for disposal of 55 gallons of AFFF with fluorosurfactants (within one drum). This drum likely corresponds to the drum observed by Ecology during its inspection in October 2015 (Section 1.3.3), which was labeled as containing AFFF from the 2,500-ton press AFFF tank.

DH Environmental removed the 660-ton and 2,500-ton press AFFF systems in 2022. During the removal activity, 80 gallons of AFFF product was drained from the tanks for disposal (DH Environmental, 2022a). According to the waste designation package generated by DH Environmental (DH Environmental, 2022c), samples were collected from each AFFF tank and analyzed for halogenated organic compounds (including chloride, fluoride, and bromide) and for adsorbable organic fluorine. Chloride, fluoride, and adsorbable organic fluorine were detected within both samples at concentrations of up to 270 milligrams per liter (mg/L), 57 mg/L, and 5,200 mg/L, respectively. The samples were not analyzed for PFAS. The material was disposed of as dangerous waste under the persistent criteria (WP02) for total halogenated compounds (due to total halogenated compounds at concentrations over 100 mg/L). Based on the fluoride and adsorbable organic fluorine

detections within the samples, it appears that the product remaining in the tanks at the time of disposal in 2022 contained residual PFAS.

Based on the volume of AFFF disposed of in 2022 by DH Environmental (80 gallons from two tanks), the three tanks likely contained approximately 120 gallons in total. As evidenced within the documents provided by DH Environmental, 220 gallons (four drums) of AFFF (with fluorosurfactants) was disposed of in 2015 over two pickups. AFFF purchase documentation from 2015 has not been provided. Accordingly, it is not clear what type of AFFF foam replaced the product within the AFFF tanks following the 2015 disposal.

1.3.6 Summary of Aqueous Film-Forming Foam Use at the Site

A timeline of the available AFFF documentation and relevant observations is summarized in Exhibit 1-1.

Exhibit 1-1: AFFF Documentation Timeline

Year	AFFF Documentation	Source of Information
1982	AFFF tanks constructed.	Metal placards on 660-ton and 2,500-ton press AFFF tanks (see Appendix C).
April 1995 – October 2002	AFFF tank inspections documented for April 1995 through June 1997, August and September 2000, May 2002, and August through October 2002.	Inspection tags on 660-ton and 2,500-ton press AFFF tanks (see Appendix C).
March 2008 March 2009	Purchase of non-fluorinated AFFF product from Denko (55 gallons per purchase).	2009 purchase order and email from Denko (DH Environmental, 2022b).
September 2014 – October 2017	Annual AFFF foam tests by The Safety Team.	Annual foam test labels affixed to the 660-ton and 2,500-ton press AFFF tanks (see Appendix C).
September 2015	Disposal of three drums of "AFFF with fluorosurfactants" (165 gallons).	Waste manifest (DH Environmental, 2022b).
October 2015	One drum of AFFF Solution/Water observed within the Hazardous Waste Storage area.	Ecology 2015 inspection report (Ecology, 2015). Photograph of drum included in Appendix C.
November 2015	Disposal of one drum of "AFFF with fluorosurfactants" (55 gallons).	Waste manifest (DH Environmental, 2022b).
Unknown date before November 2016	Discharge of AFFF from 1,250-ton press AFFF system.	Michael Lewis affidavit (Marten Law, 2022).
September 2018	The 660-ton, 1,250-ton, and 2,500-ton press AFFF tanks observed to be present at the Site.	Shannon & Wilson walk-through (photographs included in Appendix C).
2019	660-ton, 1,250-ton, and 2,500-ton presses auctioned and removed.	Marten Law letter (Marten Law, 2022).
Unknown date between September 2018 and November 2021	1,250-ton press AFFF system (tank and piping) removed from the Site by unknown persons.	Maten Law letter (Marten Law, 2022).
November 2021 and January 2022	660-ton and 2,500-ton press AFFF tanks observed at the Site. 1,250-ton press AFFF tank observed to have been removed.	Shannon & Wilson Site visits (photographs included in Appendix C).
June 2022	660-ton and 2,500-ton press AFFF tanks removed from the Site. Disposal of two drums of WP02 dangerous waste (80 gallons).	DH Environmental field report (DH Environmental, 2022a and 2022c).

Based on the information provided to us, the AFFF tanks found at the Site were constructed in 1982. The first evidence that AFFF fire suppression systems were operational at the Site is from 1995 (the date on the AFFF tank inspection tags). There is also evidence that the 1,250-ton press AFFF system was activated on at least one occasion. The activation purportedly resulted in a discharge of AFFF foam to the "enclosed area of the 1,250-ton press" (Marten

Law, 2022). It not clear when the discharge occurred and how the discharged product was cleaned up. Other discharges were not identified by former employees.

Purchase records indicate that fluorinated-free product was purchased in 2008 and 2009, but records for product purchased before 2008 and after 2009 were not provided. The AFFF product that was removed from the 660-ton and 2,500-ton press AFFF tanks in 2022 contained detectable concentrations of fluoride and adsorbable organic fluorine, indicating that the product contained PFAS.

Though the 660-ton and 2,500-ton press AFFF tanks and their contents were disposed of in an environmentally prudent manner, the removal and management of the 1,250-ton press AFFF tank and associated piping is not documented. It is not clear if care was taken to minimize impact to the environment and a release from the tank and/or piping during the removal activity remains a possibility.

1.4 Site Geologic and Hydrogeologic Conditions

Site geologic and hydrogeologic conditions are discussed in detail within the RI Report and are supported by cross sections and groundwater contours. Groundwater contour maps from the RI Report using "A" zone wells and "B" zone wells for March, May, August, and November 2021 are included as Figures 5A/B, 6A/B, 7A/B, and 8A/B (respectively). The discussion herein consists of a high-level summary with emphasis on concepts considered pertinent to the conceptual site model for PFAS at the Site.

The shallow subsurface geology of the Site generally consists of a mixture of silty sand, sand, and gravel, classified as fill (Hf), to depths of 2 to 24 feet below ground surface (bgs) with the thickest fill occurring in the northwest portion of the Site adjacent to the LDW and within the former embayment area. Alluvial sediment comprised of sand, silt, and clay underlie the fill to depths of at least 81.5 feet bgs. Discontinuous silt and clay deposits generally occur from 8 to 14 feet bgs and may have also been deposited through estuarine or tide flat processes. Below approximately 14 feet, the alluvial sediment consists of interbedded sandy silt, silty sand, and sand with an occasional silt interbed.

Groundwater is observed perched above the silt and clay layers and locally confined beneath these layers at some of the borings or monitoring well locations. Because the silt and clay layers are discontinuous, groundwater interacts above and below these layers. The entire unconfined shallow water-bearing zone beneath the Site is considered a single aquifer system and is first encountered at depths ranging from 9 to 13 feet bgs. Most of the wells at the Site are screened within the upper 20 to 25 feet of the aquifer and are screened to include the free water surface (typically 9 to 10 feet bgs) within layers of silty sand, sandy silt, and poorly graded sand. These wells are referred to herein as "A" zone wells. A subset of the

wells at the Site are screened at greater depths; these "B" zone wells are screened within the lower portion of the upper aquifer (varying screen intervals starting as shallow as 30 feet bgs and extending as deep as 60 feet bgs).

Groundwater elevation gauging was completed during the RI identified higher groundwater elevations in the eastern (upland) portion of the site and lower elevations toward the LDW, with transient groundwater flow near the LDW. Seasonal variation in groundwater elevations were highest during the wet season monitoring event (March 2021) and lowest during the dry season event (August 2021). A variable degree of groundwater mounding was observed to occur approximately near the former Machine Shop area, which generally overlies the western portion of the Area 1 light nonaqueous phase liquid (LNAPL) plume and extends to areas to the northwest, south, and southeast of the plume. The mounding is postulated to be generated by the LNAPL presence within the aquifer matrix (and subsequent biofouling via natural LNAPL decay) that would effectively decrease aquifer porosity and associated hydraulic conductivity within the LNAPL plume. This localized decrease in hydraulic conductivity would restrict the otherwise natural groundwater movement through this portion of the aquifer, leading to the observed mounding to overcome the greater resistance. Mounding in areas to the northwest and southeast suggest increased groundwater flow to the north and south of the plume, potentially circumventing the areas with decreased hydraulic conductivity.

Due to the mounding and many potential groundwater flow paths, a range of "bulk" or "net" groundwater flow directions were calculated for the Site during each of the 2021 quarterly groundwater gauging events. The calculated net groundwater flow directions across the Site persistently include a southwesterly flow component, which is consistent with previous reporting. During the wetter season events (March and May 2021), the range in net groundwater flow direction includes a northwesterly flow component. This northwesterly flow component, and overall range in groundwater flow direction, was not present during the drier season events (August and November 2021). During the drier seasons, groundwater flow direction is apparently more directly toward the river (west to southwest).

Two deep vaults are present within the main building. The 5,000-ton press vault extends to a depth of approximately 35 feet bgs and is located directly west of the 1,250-ton press pump room and pit. The Q1/Q2/Q3 vault extends to approximately 30 feet bgs and is located northwest of the 5,000-ton press vault. Both deep vaults are considered potential sources to the deeper groundwater zone as the vaults may act as a conduit for contaminated groundwater to flow downward; they may also act as barriers around which groundwater may deflect.

Groundwater depth measurements collected during this PFAS investigation are summarized in Table 2.

1.5 Previous Per- and Polyfluoroalkyl Substances Testing

Limited groundwater sampling for PFAS was completed during the RI first and fourth quarter 2021 groundwater monitoring events to evaluate for the presence of PFAS within groundwater at the Site. During the first quarter event (February 2021), samples were collected from upgradient wells MW-8, MW 71, and MW-72; wells MW-60, MW-63, and MW-64, located within the vicinity of the AFFF fire suppression systems; and downgradient wells MW-43 and MW-68. Locations of soil and groundwater testing for PFAS during 2021 (this section) and 2022 and 2023 (Section 2) are shown in Figure 2.

Based on the analytical results from the February 2021 groundwater samples, the same monitoring wells and an additional two monitoring wells were sampled and analyzed in November/December 2021. The additional wells included MW-36 (south of the 660-ton and 1,250-ton press pump rooms) and MW-74 (southwest of the 660-ton and 1,250-ton press pump rooms).

Of the ten sampled wells, eight are screened within the shallower "A" zone (screened from approximately 5 to 20 feet bgs) and two are screened within the deeper "B" zone (MW-43 was screened from 30 to 40 feet bgs and MW-64 from 45 to 60 ft bgs).

The samples were analyzed for the Unregulated Contaminant Monitoring Rule 3 (UCMR 3) list of six perfluorinated compounds, including PFOS, PFOA, PFBS PFHxS, Perfluoroheptanoic acid (PFHpA), and PFNA.

Analytical results from the 2021 sampling activities are summarized in Table 3, and exceedances are shown in Figure 3. All six analyzed PFAS compounds were detected within at least one sample, with PFOS, PFOA, and PFHxS detected the most frequently and at elevated concentrations. The highest concentrations were measured within monitoring wells MW-60 and MW-74, which are located downgradient of the 660-ton and 1,250-ton press pump rooms. The observed concentrations were consistent with a release or releases of AFFF from within the vicinity of the 660-ton and/or 1,250-ton press pump rooms. Two primary data gaps were identified following review of the analytical data:

- Due to the limited nature of the groundwater PFAS sampling events in 2021, there were no PFAS data near to or downgradient of the 2,500-ton press pump room or the Q1/Q2/Q3 vault. Therefore, it was unknown if a release occurred within the vicinity of these two features.

- Of the monitoring wells sampled for PFAS in 2021, MW-74 contained the highest groundwater concentrations. The monitoring wells downgradient and crossgradient of MW-74 were not sampled at that time. Therefore, it was unknown if PFAS-impacted groundwater had reached the southern property boundary, which is close to MW-74.

This PFAS investigation has been completed to address the above data gaps and provide a better understanding of the extent of PFAS in soil and groundwater at the Site.

2 FIELD ACTIVITIES

The PFAS investigation was conducted in a phased manner, divided into four tasks completed between September 2022 and February 2023, including:

- Task 1 – Analysis of Groundwater from Existing Monitoring Wells
- Task 2 – Installation of Monitoring Wells, and Soil and Groundwater Analysis
- Task 3 – Analysis of Unsaturated Soil Near Potential Source Areas
- Task 4 – Groundwater Sampling of PFAS Monitoring Wells

The work was completed in accordance with the PFAS WP (Shannon & Wilson, 2022). Field methods used during the PFAS investigation are consistent with the methods detailed within Appendix E of the RI Report (Shannon & Wilson, 2024) and are not repeated herein. Boring logs for monitoring wells and borings completed as part of the PFAS work are provided in Appendix E of this report.

2.1 Task 1 – Analysis of Groundwater from Existing Monitoring Wells

The PFAS investigation began with the collection of groundwater samples from 15 existing monitoring wells that had not been previously analyzed for PFAS. The wells sampled during Task 1 and the rationale for sampling each is summarized in Exhibit 2-1.

Exhibit 2-1: Wells Sampled During Task 1

Task 1 Wells	Rationale
MW-23	Additional spatial coverage; evaluate upgradient and crossgradient impacts to the Site
MW-32	Delineate crossgradient of the 1,250-ton press pit and upgradient of the 660-ton press pit
MW-37	Delineate crossgradient of impacts detected at MW-74 (highest PFAS values in groundwater)
MW-38/MW-67	Delineate impacts downgradient of MW-74 and along south property boundary
MW-40/MW-41	Delineate two aquifer depths downgradient of 1,250-ton press pit
MW-46/MW-54	Delineate crossgradient and downgradient of Q1/Q2/Q3 vault and the 2,500-ton press pit
MW-50	Adjacent to the hazardous waste storage area
MW-52/MW-69	Delineate downgradient (dependent on tide condition) of any impacts from the hazardous waste storage area
MW-53/MW-70	Delineate groundwater potentially migrating on or off the property
MW-61	Evaluate potential source for impacts detected at MW-74

On September 13, 2022, the groundwater sampling event began with the collection of depth to water measurements at each of the 15 monitoring wells and was followed by the collection of groundwater samples between September 13 and 15, 2022. Two equipment blank samples were collected during the event, including (a) lab-supplied PFAS-free water after flowing through new peristaltic tubing and (b) lab-supplied PFAS-free water poured over a decontaminated water-level indicator. A field duplicate was also collected during the event from monitoring well MW-37.

During the sampling event, high turbidity was noted at MW-32 and sediment accumulation was noted at MW-67.

2.2 Task 2 – Installation of Monitoring Wells, and Soil and Groundwater Analysis

Task 2 included installation of three new monitoring wells (MW-77, MW-78, and MW-79), collection of soil samples during the drilling effort, and development and sampling of the newly installed wells. The wells installed during Task 2 and the rationale for installing each is summarized in Exhibit 2-2.

Exhibit 2-2: Wells Installed During Task 2

Task 2 Wells	Rationale
MW-77	Delineate downgradient of impacts detected at MW-74 and at southern property boundary
MW-78	Delineate downgradient of impacts from any releases(s) near the 2,500-ton press pit
MW-79	Delineate downgradient of impacts from any release(s) near the Q1/Q2/Q3 vault and along alignment of AFFF piping

Prior to completing the drilling activities, Shannon & Wilson visited the Site to mark proposed exploration locations (for Task 2 and Task 3 explorations) on November 1, 2022. Applied Professional Services, a private utility locating company, was subcontracted to assess each proposed exploration location for buried utilities. The Washington One Call utility notification was completed on November 2, 2022.

Wells MW-77, MW-78, and MW-79 were installed on November 4 and 7, 2022 using hollow-stem auger drilling methods. Holt Services, under subcontract to Shannon & Wilson, provided drilling services. At MW-79, concrete coring was completed prior to drilling by Evergreen Concrete Cutting under subcontract to Holt Services. In accordance with the Inadvertent Discovery Plan (Stell, 2020), an archaeologist from Stell was onsite to monitor for cultural resources during the drilling activities.

Shannon & Wilson observed the drilling activities, logged each boring, and collected soil samples for laboratory analysis. Soil samples were collected from each boring from depths of 2, 5, and 10 feet bgs. A field duplicate was collected for the 2 feet bgs sample taken at MW-77. An equipment blank, consisting of lab-supplied water poured over a decontaminated stainless steel sampling spoon, was collected during the event.

Wells MW-77 and MW-78 were completed to depths of 21.5 feet bgs, with screens placed between 10 and 19.4 feet bgs. No field indication of contamination was observed during drilling at these locations. MW-79, completed near the Q1/Q2/Q3 vault, was drilled to a greater depth of 42 feet bgs. A slight petroleum odor was noted between depths of 15 and 30 feet bgs within the boring, but not at greater depths. The well was screened between 23 and 32.4 feet bgs. The screen was (a) placed below the water table interface to miss the depth at which petroleum hydrocarbon concentrations (which could mask PFAS detections) were anticipated to be highest and (b) placed to align with the base of the vault which extends to approximately 30 feet bgs.

On November 9, 2022, Holt developed newly installed wells MW-77, MW-78, and M-79 and redeveloped existing wells MW-32 and MW-69. MW-32 was redeveloped because high turbidity was noted within the well during the September 2022 sampling event. MW-67 was redeveloped because sediment accumulation was noted within the well during the September 2022 sampling event.

Shannon & Wilson measured depth to groundwater and collected groundwater samples from the newly installed wells on November 11, 2022.

2.3 Task 3 – Analysis of Unsaturated Soil Near Potential Source Areas

Task 3, completed on December 20, 2022, included advancement of three direct-push borings (SB-2022-001, SB-2022-002, and SB-2022-003) to collect soil shallow soil samples from locations near potential AFFF release source areas. The rationale for each boring is detailed in Exhibit 2-3.

Exhibit 2-3: Borings Completed During Task 3

Task 2 Wells	Rationale
SB-2022-001	Delineate downgradient extent of any release(s) from the 1,250-ton press pit. Placed outside of the area with known hydrocarbons in soil.
SB-2022-002	Delineate downgradient extent of any release(s) from the 1,250-ton press pit, and west of the 660-ton press pit. Placed outside of the area with known hydrocarbons in soil.
SB-2022-003	Adjacent to MW-74 where highest concentration of PFAS in groundwater detected

Drilling was completed by Holt Services. Evergreen Concrete Cutting, under subcontract to Holt Services, completed concrete coring prior to drilling at each location. An archaeologist from Stell was onsite to monitor for cultural resources during the drilling activities. Shannon & Wilson observed the drilling activities, logged each boring, and collected soil samples for laboratory analysis. Three soil samples were collected from each boring from the unsaturated zone.

2.4 Task 4 – Groundwater Sampling of Selected Monitoring Wells

Task 4 of the PFAS investigation included collection of groundwater samples from 28 monitoring wells, including the 10 wells that were sampled during the RI in 2021, the 15 wells sampled during Task 1 of the PFAS investigation, and the three wells installed during Task 2 of the PFAS investigation.

On February 16, 2023, the groundwater sampling event began with the collection of depth to water measurements at each of the 28 monitoring wells and was followed by the collection of groundwater samples between February 21 and 27, 2023. During the event, field duplicates were collected from wells MW-23 and MW-46.

3 LABORATORY TESTING

The soil and groundwater samples collected during the investigation were placed within laboratory-supplied glassware and submitted under standard chain of custody procedures to Eurofins Test America in West Sacramento, California. Eurofins Test America is a National Environmental Laboratory Accreditation Program certified laboratory.

The samples were analyzed by EPA Method 537 (modified) (18 analytes). This method and list were selected to provide a range of short- and long-chain PFAS compounds, including those which regulatory agencies have started to establish screening levels for and compounds historically detected in AFFF-impacted media. Laboratory analytical reports are provided in Appendix F.

4 RESULTS AND DISCUSSION

Between February 2021 and February 2023, 64 groundwater samples (not including duplicates) were collected from 28 wells and analyzed for PFAS compounds. Of these, 18 were analyzed for the UCMR 3 list of six compounds (samples taken during the RI) and 46 samples were analyzed for the list of 18 compounds (samples collected during the PFAS investigation). Groundwater PFAS analytical results are summarized in Table 3. As shown in the table, nine PFAS compounds were detected within at least one sample. The detected PFAS compounds were generally co-located. Of the nine detected compounds, PFOS, PFOA, and PFHxS were detected most frequently. PFOS and PFHxS were detected at the highest concentrations, with PFHpA and perfluorohexanoic acid (PFHxA) detected at the next highest levels. As shown in Table 3, only PFOS was measured at concentrations above the screening level of 1,100 ng/L. PFOS was detected at up to 15,000 ng/L. A map of the exceedances of the PFOS groundwater screening level is provided as Figure 3.

In November and December 2022, 18 soil samples (not including duplicates) were collected from six explorations and analyzed for PFAS compounds (18 analyte list). Soil PFAS analytical results are summarized in Table 4. As shown in the table, ten PFAS compounds were detected in at least one sample. The detected PFAS compounds were generally co-located. Of the ten compounds, PFOS, PFOA, PFHxS, and PFHxA were detected most frequently. Only PFOS and PFOA were detected above their screening levels. PFOS was detected at up to 370 J* micrograms per kilogram (µg/kg) with a screening level of 0.72 µg/kg (the J* indicates the result is less than the reporting limit and greater than the detection limit and the result is an estimate). PFOA was detected up to 2.3 J* with a screening level of 0.034 µg/kg. A map of the analytical results for PFOS and PFOA in soil is provided as Figure 4.

The soil and groundwater PFOS detections are discussed in the following subsections. Each subsection addresses an area of the Site or a potential source feature.

4.1 Upgradient Conditions

Groundwater samples were collected from upgradient wells to assess for PFAS-impacted groundwater coming into the Site from offsite sources. These upgradient wells included

MW-8, MW-23, MW-71, and MW-72. As shown in Figure 2, these wells are located along the northern and eastern side of the Site.

PFOS was detected within groundwater samples taken from these wells at concentrations ranging from 3.6 to 140 ng/L. None of the PFOS detections within these wells exceed the screening level of 1,100 ng/L. The samples taken from MW-23 (northeast corner of the Site), MW-71 (center of northern boundary of the Site), and MW-72 (southeast corner of the Site) contained the lowest PFOS concentrations (below 15 ng/L). The samples taken from MW-8 (center of eastern boundary of the Site) contained higher PFOS concentrations of up to 140 ng/L.

Based on the PFAS detections within upgradient wells, it is apparent that impacted groundwater (at concentrations below screening levels) is migrating onto the Site from upgradient sources. The higher detections at MW-8 suggest that a source may be present on the King County Airport property to the east.

4.2 1,250-Ton and 660-Ton Press Pump Rooms and Pits

As shown in Figure 2, the 1,250-ton and 660-ton press pump rooms and pits are located less than 50 feet apart from each other, with the 1,250-ton press to the north-northeast of the 660-ton press. Free-phase petroleum hydrocarbons are present within soil in the area of the 1,250-ton press and pit (the Area 2 LNAPL plume). Because the PFAS screening levels are very stringent, hydrocarbon impacts can mask PFAS detections; therefore, explorations completed in this area were placed to avoid areas where the RI identified LNAPL in soil.

Direct-push borings SB-2022-001 and SB-2022-002 were completed within the vicinity of the 1,250-ton and 660-ton press pump rooms and pits. SB-2022-001 was completed to the west of and between the two press features and SB-2022-002 was completed directly west of the 660-ton press pump room (south-southeast of SB-2022-001). SB-2022-003 was completed further to the southwest and adjacent to MW-74, the well which had contained the highest PFOS concentration at the Site. PFOS was detected within soil samples taken from all three borings:

- Soil samples collected from depths of 1.5, 6, and 10 feet bgs from boring SB-2022-001 contained PFOS at concentrations of 0.063 J µg/kg, 88 µg/kg, and 18 µg/kg, respectively.
- Soil samples collected from depths of 2, 4.5, and 8 feet bgs from boring SB-2022-002 contained PFOS at concentrations of 4.1 JH* µg/kg[1], 370 J* µg/kg[2], and 200 µg/kg, respectively.

[1] The JH* flag indicates that the value is estimated and biased high due to quality control failures.
[2] The J* flag indicates that the value is estimated without a bias due to quality control failures.

- Soil samples were taken from depths of 2, 5, and 8.5 feet bgs from boring SB-2022-003. The shallowest sample did not contain PFOS at concentrations above laboratory detection limits. The 5 and 8.5 feet bgs samples contained PFOS at 0.073 JH* µg/kg and 54 µg/kg, respectively.

At borings SB-2022-001, SB-2022-002, and SB-2022-003, PFOS was detected above the screening level (0.72 µg/kg). PFOA was detected in the samples where PFOS was above the screening level. The detected concentrations of PFOS and PFOA were higher within the middle sample depths at SB-2022-001 and SB-2022-002, suggesting that a release or releases have occurred within the vicinity of these borings. Given the lack of elevated concentrations within the shallower samples at SB-2022-003, it appears that the elevated deeper soil detection at this location may be associated with groundwater impacts rather than suggestive of a source in the vicinity of the well.

As shown in Figure 2, monitoring wells MW-61, MW-60, and MW-32 are respectively located to the west (downgradient), west-southwest (downgradient), and southeast (cross-gradient) of the 1,250-ton press pump room and pit, with MW-61 situated closest to the features. Monitoring wells MW-36 and MW-74 are respectively located to the south (down/cross-gradient) and southwest (downgradient) of the 660-ton press pump room; these wells are downgradient but further from the 1,250-ton press pump room and pit.

Groundwater samples taken from MW-61 and MW-60 contained PFOS at concentrations of up to 5,100 ng/L and 4,200 ng/L, respectively, above the screening level of 1,100 ng/L. Samples taken from MW-32, located upgradient from MW-60 and MW-61, contained significantly lower concentrations of PFOS (up to 27 ng/L). Groundwater samples taken from MW-36 and MW-74 contained PFOS at concentrations of up to 68 ng/L and 15,000 ng/L, respectively.

The identity of the source(s) of the soil and groundwater impacts in this area is ambiguous given the available data. Based on the PFOS concentrations measured within groundwater samples taken from MW-61 and MW-60, it is apparent that a release has occurred from the 1,250-ton press AFFF system. This is supported by the recollection of a discharge of AFFF at this location by former employee Michael Lewis. However, based on the higher soil detections at SB-2022-002, when compared to SB-2022-001, coupled with the highest groundwater detections occurring at MW-74, it appears that a second source is present at the Site. This second source may be a release from the 660-ton press AFFF system or a surface release close to the 660-ton press.

4.3 Downgradient of the 1,250-Ton and 660-Ton Presses

Soil and groundwater impacts are present in the vicinity of the 1,250-ton and 660-ton press AFFF systems. The impacts appear to be associated with a release from the 1,250-ton press AFFF system and a second source, potentially the 660-ton press AFFF system or a surface release in the area. Groundwater impacts appear to extend to the southern property line, but at concentrations below screening levels (Section 4.4). Monitoring well pairs MW-40/MW-41 and MW-63/MW-64 are located approximately 200 and 300 feet west of the press systems, respectively. Groundwater samples taken from MW-40, MW-41, MW-63, and MW-64 have contained PFOS at concentrations of up to 800 ng/L, 1,100 ng/L, 190 ng/L, and 230 ng/L, respectively. For both well pairs, higher concentrations were measured within the deeper wells. The samples taken from these well pairs demonstrate a decrease in concentration with distance from the AFFF systems. The higher detections within the deeper "B" zone wells may be associated with the nearby 5,000-ton press vault (located near the 1,250-ton press features), which could be acting as a conduit for downward migration of impacted groundwater, or may be related to downward migration of PFAS.

4.4 Well MW-74 and the Southern Property Line

As previously stated, monitoring well MW-74 is the well at the Site with the highest PFOS concentrations to date. PFOS has been detected within samples taken from the well at concentrations of up to 15,000 ng/L, above the screening level of 1,100 ng/L. The well is located less than 100 feet from the southern property line and groundwater flow within the area is generally to the southwest. Previously installed monitoring wells MW-37 and MW-38 are located closer to the southern property line, but not directly southwest of MW-74. For this reason, monitoring well MW-77 was installed between MW-37 and MW-38 and more directly downgradient of MW-74 to determine if PFAS-impacted groundwater extends to the southern property line.

Soil samples were taken from the boring for well MW-77 from depths of 2, 5, and 10 feet bgs. PFOS was detected within the 2 and 5 feet bgs samples taken from the boring, but at concentrations below the screening level of 0.72 µg/kg.

Groundwater samples taken from wells MW-37, MW-38, and MW-77 contained PFOS at concentrations of up to 21 ng/L, 41 ng/L, and 700 ng/L, respectively. The detections at well MW-77 suggest that PFOS-impacted groundwater extends to the southern property line, but at concentrations below the screening level of 1,100 ng/L. It should be noted that well MW-77 was sampled on two occasions with a high level of variability between detected PFOS concentrations (700 ng/L in November 2022 [shortly after the well was installed] and 18 ng/L in February 2023). The higher concentration measured in November 2022 may have

been a temporarily increased concentration associated with PFAS mobilized by the disturbance during well installation activities.

4.5 2,500-Ton Press Pump Room and Pit

The 2,500-ton press AFFF system included lines to the pump room and press pit (and to the Q1/Q2/Q3 vault, discussed in Section 4.6). MW-78 was installed to the northwest of the 2,500-ton press pump room. Monitoring wells MW-63 and MW-64 ("A" zone and "B" zone well pair) are located adjacent to the south of the 2,500-ton press pit.

Soil samples were taken from the boring for MW-78 from depths of 2, 5, and 10 feet bgs. PFOS was detected within the 2 and 10 feet bgs samples at concentrations of 0.15 J µg/kg and 0.22 J µg/kg, respectively. Both detections are below the screening level of 0.72 µg/kg.

PFOA was detected in a sample collected at 10 feet bgs from MW-78 at a concentration of 0.078 J µg/L (J means estimated concentration less than the limit of detection) above the screening level of 0.034 µg/L. Concentrations of PFOA in groundwater collected from MW-78 were below the screening level.

Groundwater samples collected from wells MW-78, MW-63, and MW-64 contained PFOS at concentrations of up to 180 ng/L, 190 ng/L, and 230 ng/L, respectively, below the screening level of 1,100 ng/L. Based on the soil and groundwater detections at MW-78 and the groundwater detections at MW-63 and MW-64, it does not appear that a significant release of AFFF occurred from the 2,500-ton press pump room or pit.

4.6 Q1/Q2/Q3 Vault

MW-79 was installed adjacent to the west of the Q1/Q2/Q3 vault. Soil samples taken from the boring for MW-79 ("B" zone) from depths of 2, 5, and 10 feet bgs did not contain detectable concentrations of any PFAS compounds. Groundwater samples collected from the well contained PFOS at up to 990 ng/L, below the screening level of 1,100 ng/L.

Similar concentrations were measured within groundwater samples taken from "B" zone monitoring well MW-41 to the southeast. The groundwater impacts measured at MW-79 may be associated with a release of AFFF from the Q1/Q2/Q3 vault; however, it is also possible that the impacts at this location could be coming from the same source as impacts at MW-41, believed to be associated with downward migration of impacted groundwater through the 5,000-ton press vault that is located near the 1,250-ton press features.

4.7 Downgradient Conditions

As shown in Figure 2, monitoring wells MW-43, MW-46, MW-53, MW-54, MW-67, and MW-68 are located at the western end of the Site. PFOS was detected within groundwater samples taken from these wells at concentrations ranging from 15 to 120 ng/L, below the screening level of 1,100 ng/L. The highest detections were measured within samples taken from MW-43 (up to 120 ng/L) and MW-46 (up to 120 ng/L). At the other wells, concentrations were at or below 67 JH* ng/L.

4.8 Hazardous Waste Storage Area

MW-50 was installed adjacent to the location where a drum of "AFFF Solution/Water" was observed to be stored in 2015. Samples taken from MW-50 contained PFOS at concentrations of up to 450 ng/L. Soil samples were not taken from this area.

Depending on tidal conditions, wells MW-52, MW-69, and MW-70 are considered potentially downgradient of this area. These wells contained PFOS at concentrations of up to 92 ng/L, 35 ng/L, and 110 ng/L respectively.

The groundwater PFOS detections at MW-50 and in the downgradient wells suggest that a release may have occurred in this area; however, the detections are below the screening level of 1,100 ng/L.

5 QUALITY ASSURANCE/QUALITY CONTROL

Data validation was performed to assess the data quality and usability for samples collected during the PFAS investigation. The validation is documented within a quality assurance/quality control narrative provided in Appendix G. The narrative is supported by laboratory data review checklists. Overall, the data validation process deemed the project data acceptable for use with minor exceptions that resulted in qualification of the data. A summary of analytical flags applied during the validation is included with the narrative. None of the analytical results were rejected due to failures with laboratory quality control samples, sample handling, or other issues. The validation concluded that the data may be used, as qualified, for the purposes of the project.

6 CONCLUSIONS

Though only one discharge of AFFF has been confirmed by a former employee (at the 1,25-ton press AFFF system), the soil and groundwater PFAS samples collected at the Site

indicate that releases have likely occurred from the 1,250-ton press AFFF system, from the 660-ton press AFFF system or a surface release in the area, and potentially from the Q1/Q2/Q3 vault AFFF system.

PFOS in soil and groundwater, and PFOA in soil only, were detected at concentrations exceeding relevant screening levels. Soil and groundwater at concentrations above screening levels are located at the eastern end of the Site building within the vicinity of the 660-ton and 1,250-ton press AFFF systems. Specifically, groundwater at MW-60, MW-61, and MW-74 contains PFOS at concentrations above the screening level of 1,100 ng/L. Soil samples taken from SB-2022-001, SB-2022-002, and SB-2022-003 contained PFOS at concentrations above the screening level of 0.72 µg/kg.

The area of the Site with PFOS in soil and groundwater at concentrations exceeding screening levels is currently limited in extent and over 800 feet from the LDW. PFOS-impacted groundwater extends to the southern property boundary, but the concentrations in groundwater at the boundary are not above the screening level. PFAS was detected in groundwater samples taken from upgradient monitoring wells. Though concentrations were typically low within these wells, one upgradient monitoring well (MW-8), contained higher concentrations that may indicate a separate more localized upgradient source.

7 LIMITATIONS

Within the limitations of scope, schedule, and budget, Shannon & Wilson has prepared this report in a professional manner, using the level of skill and care normally exercised for similar projects under similar conditions by reputable and competent environmental consultants currently practicing in this area.

The data presented in this report are based on limited research and sampling at the Site and should be considered representative at the time of our observations. Other areas of contamination could be present at the Site. Shannon & Wilson is not responsible for conditions or consequences arising from relevant facts that were concealed, withheld, or not fully disclosed at the time the report was prepared. We also note that the facts and conditions referenced in this report may change over time, and that the conclusions and recommendations set forth here are applicable to the facts and conditions as described only at the time of this report. Shannon & Wilson believes that the conclusions stated here are factual, but no guarantee is made or implied.

Enclosed is a document titled "Important Information About Your Geotechnical/ Environmental Report," to assist you and others in understanding the use and limitations of this report.

8 REFERENCES

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Washington State Department of Ecology (Ecology), 2023, Guidance for investigating and remediating PFAS contamination in Washington state: Prepared by the Ecology Toxics Cleanup Program, Publication No. 22-09-058, June.

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Table 1: Human and Ecological Screening Levels

Compound	Groundwater Screening Levels (ng/L)			Soil Screening Levels (µg/kg)		
	LDW PCUL Workbook, Most Stringent PCUL for Nonpotable Groundwater (GW #s 2-5)[1]	Ecology 2023 PFAS Guidance, Protective of Ecological Receptors in Surface Water (Invertebrates, Fish, and Other)[2]		LDW PCUL Workbook, Most Stringent PCUL for Saturated Zone and Nonpotable Groundwater (SL #s 1, 6-10)[1]	Ecology 2023 PFAS Guidance, Protective of Terrestrial Ecological Receptors (Plants, Soil Biota, and Wildlife)[2]	MTCA Equation 747-1, Protective of Ecological Receptors in Surface Water via Leaching to Groundwater[3]
		Marine	Freshwater			
PFOS	1,100	--[4]	--[4]	0.72	--[4]	--[4]
PFOA	120,000	--[4]	--[4]	0.034	--[4]	--[4]
HFPO-DA	-	-	-	240	--[4]	--[4]
PFBA	-	-	830,000	80,000	--[4]	--[4]
PFBS	130,000,000	--[4]	--[4]	20,000	--[4]	--[4]
PFDA	-	78,000	10,000	-	137	53
PFDoA	-	-	20,000	-	178	1,708
PFHpA	-	-	-	-	-	-
PFHxS	-	-	10,000	35	--[4]	--[4]
PFHxA	-	-	6,380,000	40,000	--[4]	--[4]
PFNA	11,000	--[4]	--[4]	5.5	--[4]	--[4]
PFTeA	-	-	-	-	-	-
PFTriA	-	-	-	-	-	-
PFUnA	-	-	10,000	-	-	169

NOTES:

Shaded cells indicate the selected screening level. The LDW PCUL Workbook values take precedence over the Ecology 2023 PFAS Guidance because they are calculated using site-specific parameters, even if the Ecology 2023 PFAS Guidance values are lower. The LDW classified as marine water; therefore marine values take precedence over freshwater values, even if the freshwater values are lower.

1. Values provided within the Lower Duwamish Waterway preliminary cleanup level workbook and supplemental information paper (LDW PCUL Workbook), prepared by the Washington State Department of Ecology (Ecology), July 2024. The values are intended to protect human receptors via direct contact and ingestion of sediment and protect ecological receptors.

2. Total protection values from Table 6 of *Guidance for Investigating and Remediating PFAS Contamination in Washington State* , prepared by Ecology, publication no. 22-09-058, June 2023 (Ecology 2023 PFAS Guidance). The LDW is classified as marine; therefore, the marine values take precedence over the freshwater values if both are available. The freshwater values were used when marine values were not available.

3. Calculated using MTCA Equation 747-1 and the Ecology 2023 PFAS Guidance groundwater screening values protective of ecological receptors (marine). If a marine value was not available, then a freshwater value was used.

4. The screening levels in the LDW PCUL Workbook are site-specific; therefore, they take precedence over the screening levels presented in Ecology's 2023 PCUL Guidance, which are calculated with standard parameter assumptions.

µg/kg = microgram per kilogram; HFPO-DA = Hexafluoropropylene oxide dimer acid (also known as GenX); MTCA = Model Toxics Control Act; ng/L = nanogram per liter; PCUL = preliminary cleanup level; PFBS = Perfluorobutanesulfonic acid; PFDA = Perfluorodecanoic acid; PFDoA = Perfluorododecanoic acid; PFHpA = Perfluoroheptanoic acid; PFHxA = Perfluorohexanoic acid; PFHxS = Perfluorohexanesulfonic acid; PFNA = Perfluorononanoic acid; PFOA = Perfluorooctanoic acid; PFOS = Perfluorooctanesulfonic acid; PFTeA = Perfluorotetradecanoic acid; PFTriA = Perfluorotridecanoic acid; PFUnA = Perfluoroundecanoic acid

Table 2: Groundwater Level Measurements

Well No.	Hydro-Stratigraphic Unit	Elevation (feet NAVD88)[1]	Screened Interval (feet bgs)	Date	Depth to Water (feet below Top of Casing)
MW-8	A	17.66	5-20	2/16/2023	9.63
MW-23	A	17.78	6-15.75	9/13/2022	11.83
				2/16/2023	10.61
MW-32	A	13.62	5-20	9/13/2022	11.35
				2/16/2023	10.10
MW-36	A	17.38	Unknown	2/16/2023	10.45
MW-37	A	17.50	10-25	9/13/2022	11.79
				2/16/2023	10.61
MW-38	A	17.38	5-20	9/13/2022	11.72
				2/16/2023	10.73
MW-40	A	17.15	10-25	9/13/2022	11.34
				2/16/2023	10.25
MW-41	B	17.33	30-40	9/13/2022	11.55
				2/16/2023	10.44
MW-43	B	17.44	30-40	2/16/2023	10.17
MW-46	A	17.67	5-20	9/13/2022	11.93
				2/16/2023	11.12
MW-50	A	17.64	23-27	9/13/2022	11.77
				2/16/2023	10.65
MW-52	A	17.59	23-27	9/13/2022	11.75
				2/16/2023	10.31
MW-53	A	17.53	5-20	9/13/2022	11.08
				2/16/2023	10.75
MW-54	A	17.84	5-20	9/13/2022	11.02
				2/16/2023	11.15
MW-60	A	17.56	3.75-19	2/16/2023	10.07
MW-61	A	17.91	5-20	9/13/2022	11.71
				2/16/2023	10.20
MW-63	A	17.76	5-20	2/16/2023	10.65
MW-64	B	17.77	45-60	2/16/2023	10.61
MW-67	A	17.33	5-20	9/13/2022	8.52*
				2/16/2023	9.39
MW-68	A	18.30	5-18	2/16/2023	10.80
MW-69	A	17.99	5-20	9/13/2022	11.81
				2/16/2023	10.59
MW-70	B	17.81	45-60	9/13/2022	11.54
				2/16/2023	10.45

Table 2: Groundwater Level Measurements

Well No.	Hydro-Stratigraphic Unit	Elevation (feet NAVD88)[1]	Screened Interval (feet bgs)	Date	Depth to Water (feet below Top of Casing)
MW-71	A	18.08	4.5-19.5	2/16/2023	10.90
MW-72	A	18.20	4.5-19.5	2/16/2023	10.68
MW-74	A	17.89	4-19	2/16/2023	10.54
MW-77	A	Not surveyed	10-19.4	2/16/2023	10.90
MW-78	A	Not surveyed	10-19.4	2/16/2023	10.62
MW-79	A	Not surveyed	23-32.4	2/16/2023	10.36

NOTES:

* Measurement likely the depth of saturated sediment in the casing and should not be considered representative of groundwater level.

1 Elevation of top of casing in feet relative to NAVD88, surveyed by True North Land Surveying, Inc., Seattle, Washington, August 2017 and April 20, 2021, Bench Mark: 2" Brass Disc City of Seattle "3773-5101", located at the northeast corner of South 87th Street and East Marginal Way, Elevation 18.499 feet.

2017 and 2021 surveys did not include decommissioned or inaccessible wells (MW-1, MW-2, MW-5, MW-10, MW-12, MW-13, MW-22, MW-33, PL2-JF01A, PL2-JF01AR, PL2-JF01B, PL2-JF01C, PL2-JF02A, PL2-JF03A, and PLW-JF04A); MW-20; and MW-32. Elevations for these locations surveyed by PLS, Inc., Issaquah, Washington, August 2003 and March 2009, City of Seattle Benchmark No. SNV-5293.

bgs = below ground surface; NAVD88 = North American Vertical Datum (1988)

Table 3: Per- and Polyfluoroalkyl Substances in Groundwater

Sample Location	Sample Date	PFOS	PFOA	HFPO-DA	PFBS	PFDA	PFDoA	PFHpA	PFHxS	PFHxA	PFNA	PFTeA	PFTriA	PFUnA	F-53B Major	F-53B Minor	DONA	NEtFOSAA	NMeFOSAA
	Screening Level	1,100	120,000	-	130,000,000	78,000	20,000	**	10,000	6,380,000	10,000	-	-	10,000	-	**	-	-	-
MW-8	02/16/21	46	3.2	-	2.2	-	-	1.2 J	27	-	<1.8	-	-	-	-	-	-	-	-
MW-8	11/17/21	140	3.7 J	-	2.6 J	-	-	<1.1	32	-	<1.2	-	-	-	-	-	-	-	-
MW-8	02/27/23	59	4.4	<1.4	2.1	<0.28	<0.50	2.0	46	6.0	0.27 J	<0.66	<1.2	<1.0	<0.22	<0.29	<0.36	<1.2	<1.1
MW-23	09/13/22	7.3 J*	<0.83	<1.5	0.60 J	<1.9 J*	<1.9 J*	<0.24	0.67 J	<0.56	<0.26	<1.9 J*	<1.9 J*	<1.9 J*	<1.9 J*	<1.9 J*	<1.9 J*	<4.9 J*	<4.9 J*
MW-23	02/27/23	6.8	<0.73	<1.3	0.98 J	<0.27	<0.47	<0.22	1.5 J	<0.50	<0.23	<0.63	<1.1	<0.95	<0.21	<0.28	<0.34	<1.1	<1.0
MW-23 (Duplicate)	02/27/23	8.3	0.87 J	<1.3	1.1 J	<0.28	<0.49	<0.22	1.8	<0.52	<0.24	<0.66	<1.2	<0.99	<0.22	<0.29	<0.36	<1.2	<1.1
MW-32	09/14/22	25	6.2	<1.3	<0.18	<0.28	<0.49	6.2	64	9.7	<0.24	<0.65	<1.2	<0.98	<0.21	<0.29	<0.36	<1.2	<1.1
MW-32	02/23/23	27	18	<1.3	<18 G	<0.28	<0.49	11	97	29	0.51 J	<0.65	<1.2	<0.99	<0.22	<0.29	<0.36	<1.2	<1.1
MW-36	12/03/21	52	6.7	-	15	-	-	10	110	-	<0.26	-	-	-	-	-	-	-	-
MW-36 (Duplicate)	12/03/21	60	7.1	-	16	-	-	9.5	110	-	<0.26	-	-	-	-	-	-	-	-
MW-36	02/22/23	68	37	<1.4	42	<0.28	<0.50	110	470	270	0.25 J	<0.66	<1.2	<1.0	<0.22	<0.29	<0.36	<1.2	<1.1
MW-37	09/14/22	21	7.1	<1.3	1.5 J	<0.27	<0.48	2.4	7.7	9.1	0.79 J	<0.64	<1.1	<0.97	<0.21	<0.28	<0.35	<1.1	<1.1
MW-37 (Duplicate)	09/14/22	21	7.5	<1.4	1.5 J	<0.28	<0.50	2.5	7.0	9.4	0.94 J	<0.66	<1.2	<0.99	<0.22	<0.29	<0.36	<1.2	<1.1
MW-37	02/23/23	11	4.0	<1.4	0.91 J	0.31 J	<0.52	0.95 J	3.9	2.0	0.69 J	<0.69	<1.2	<1.0	<0.23	<0.30	<0.38	<1.2	<1.1
MW-38	09/14/22	41	2.7	<1.3	3.3	<0.28	<0.49	0.85 J	19	3.8	<0.24	<0.65	<1.2	<0.98	<0.21	<0.29	<0.36	<1.2	<1.1
MW-38	02/23/23	12	2.3	<1.4	0.61 J	<0.29	<0.51	0.75 J	8.6	1.3 J	0.62 J	<0.68	<1.2	<1.0	<0.22	<0.30	<0.37	<1.2	<1.1
MW-40	09/15/22	800	30	<1.4	23	<0.30	<0.53	48	410	200	0.62 J	<0.70	<1.2	<1.1	<0.23	<0.31	<0.38	<1.2	<1.1
MW-40	02/22/23	630	22	<1.5	13	<0.31	<0.55	33	200	120	0.61 J	<0.73	<1.3	<1.1	<0.24	<0.32	<0.40	<1.3	<1.2
MW-41	09/15/22	1,000	47	<1.4	47	<0.28	<0.50	52	470	270	1.4 J	<0.66	<1.2	<0.99	<0.22	<0.29	<0.36	<1.2	<1.1
MW-41	02/22/23	1,100	45	<1.3	57	<0.28	<0.49 J*	72	470	410	1.6 J	<0.66 J*	<1.2 J*	<0.99	<0.22	<0.29	<0.36	<1.2	<1.1
MW-43	02/17/21	79	50	-	190	-	-	31	730	-	<1.8	-	-	-	-	-	-	-	-
MW-43	11/16/21	60	65	-	170	-	-	36	860	-	<0.25	-	-	-	-	-	-	-	-
MW-43	02/24/23	120	67	<1.4	160	<0.30	<0.53	40	670 JH*	190	0.28 J	<0.70	<1.3	<1.1	<0.23	<0.31	<0.39	<1.3	<1.2
MW-46	09/15/22	120	10	<1.4	4.2	<0.29	<0.52	5.4	46	23	0.33 J	<0.69	<1.2	<1.0	<0.23	<0.30	<0.38	<1.2	<1.1
MW-46	02/21/23	52	4.3	<1.3	2.3	<0.28	<0.49	2.1	28	12	<0.24	<0.65	<1.2	<0.99	<0.22	<0.29	<0.36	<1.2	<1.1
MW-46 (Duplicate)	02/21/23	46	4.6	<1.3	2.0	<0.27	<0.48	2.1	29	11	0.26 J	<0.63	<1.1	<0.95	<0.21	<0.28	<0.35	<1.1	<1.0
MW-50	09/13/22	450	44	<1.3	40	<0.28	<0.49	52	310	320	1.7 J	<0.66	<1.2	<0.99	<0.22	<0.29	<0.36	<1.2	<1.1
MW-50	02/21/23	270	26	<1.4	17	<0.28	<0.50	27	190	150	1.4 J	<0.66	<1.2	<1.0	<0.22	<0.29	<0.36	<1.2	<1.1
MW-52	09/13/22	92	5.7	<1.3	2.2	<0.28	<0.49	3.0	32	8.7	0.53 J	<0.65	<1.2	<0.98	<0.21	<0.28	<0.36	<1.2	<1.1
MW-52	02/21/23	76	5.1	<1.3	2.4	0.37 J	<0.48	3.5	28	10	0.72 J	<0.63	<1.1	<0.96	<0.21	<0.28	<0.35	<1.1	<1.0
MW-53	09/14/22	24 JH*	3.1	<1.4	1.8	<0.28	<0.50	0.98 J	19	3.2	<0.24	<0.66	<1.2	<0.99	<0.22	<0.29	<0.36	<1.2	<1.1
MW-53	02/24/23	26 JH*	3.4	<1.3	2.6	<0.28	<0.49	2.3	37	4.4	<0.24	<0.66	<1.2	<0.99	<0.22	<0.29	<0.36	<1.2	<1.1
MW-54	09/14/22	15	4.5	<1.4	4.5	<0.29	<0.52	7.1	19	17	0.39 J	<0.68	<1.2	<1.0	<0.23	<0.30	<0.38	<1.2	<1.1
MW-54	02/24/23	13	4.1	<1.3	1.5 J	<0.27	<0.47	2.2	7.8	3.7	0.45 J	<0.63	<1.1	<0.94	<0.21	<0.27	<0.34	<1.1	<1.0
MW-60	02/17/21	4,100	180	-	110	-	-	190	2,100	-	<1.8	-	-	-	-	-	-	-	-
MW-60	11/17/21	1,200	61	-	56	-	-	39	840	-	<2.6	-	-	-	-	-	-	-	-
MW-60	02/22/23	4,200	170	<1.4	85	<0.28	<0.50	110	1,400	350	1.1 J	<0.66	<1.2	<1.0	<0.22	<0.29	<0.36	<1.2	<1.1
MW-61	09/14/22	5,100	200	<1.4	440	<0.28	<0.50	130	2,900	700	0.84 JH*	<0.66	<1.2	<0.99	<0.22	<0.29	<0.36	<1.2	<1.1
MW-61	02/22/23	1,900	220	<1.4	130	0.44 J	<0.50	250	3,200	1,000	3.2	<0.66	<1.2	<1.0	<0.22	<0.29	<0.36	<1.2	<1.1
MW-63	02/17/21	190	18	-	6.4			6.4	150	-	<1.8	-	-	-	-	-	-	-	-
MW-63 (Duplicate)	02/17/21	190	19	-	6.4			5.9	160	-	<1.8	-	-	-	-	-	-	-	-
MW-63	11/16/21	54	10	-	6.2			5.7	76	-	<0.25	-	-	-	-	-	-	-	-
MW-63	02/22/23	230	17	<1.4	5.2	<0.29	<0.51	5.3	59	22	1.1 J	<0.68	<1.2	<1.0	<0.22	<0.30	<0.37	<1.2	<1.1

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Table 3: Per- and Polyfluoroalkyl Substances in Groundwater

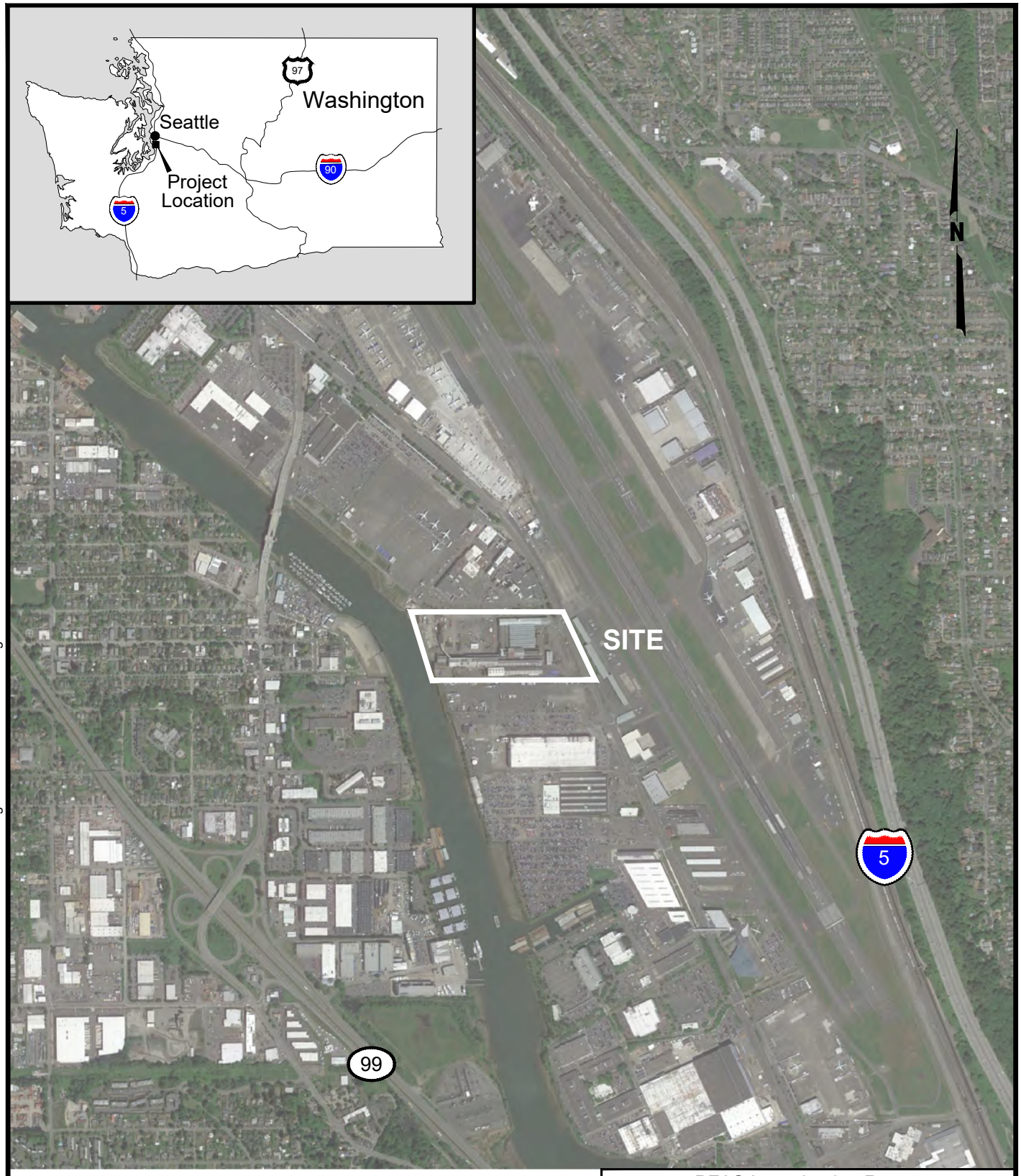
Sample Location	Sample Date	PFOS	PFOA	HFPO-DA	PFBS	PFDA	PFDoA	PFHpA	PFHxS	PFHxA	PFNA	PFTeA	PFTriA	PFUnA	F-53B Major	F-53B Minor	DONA	NEtFOSAA	NMeFOSAA
	Screening Level	1,100	120,000	-	130,000,000	78,000	20,000	**	10,000	6,380,000	10,000	-	-	10,000	-	**	-	-	-
MW-64	02/16/21	730	14	-	14	-	-	11	150	-	0.48 J	-	-	-	-	-	-	-	-
MW-64	11/16/21	700	13	-	10	-	-	6.5 J	140	-	<1.3	-	-	-	-	-	-	-	-
MW-64	02/22/23	480	18	<1.3	15	<0.28	<0.49 J*	11	150	73	<0.24	<0.65 J*	<1.2 J*	<0.98	<0.21	<0.29	<0.36	<1.2	<1.1
MW-67	09/15/22	36	8.2	<1.3	<0.18	0.46 J	<0.48	1.0 J	7.6	1.5 J	1.5 J	<0.64	<1.1	<0.97	<0.21	<0.28	<0.35	<1.1	<1.1
MW-67	02/23/23	22	2.6	<1.4	0.76 J	0.31 J	<0.50	0.51 J	6.9	<0.53	0.68 J	<0.66	<1.2	<1.0	<0.22	<0.29	<0.36	<1.2	<1.1
MW-68	02/16/21	67 JH*	22	-	3.7	-	-	3.7	3.7	-	2.3	-	-	-	-	-	-	-	-
MW-68	11/17/21	8.0	2.2	-	<0.18	-	-	<0.18	<0.18	-	<0.24	-	-	-	-	-	-	-	-
MW-68	02/23/23	<160 G	26	<1.3	<0.18	0.46 J	<0.49	2.7	31	9.6	2.7	<0.65 J*	<1.2	<0.98	<0.21	<0.29	<0.36	<1.2	<1.1
MW-69	09/13/22	31	3.5	<1.3	0.84 J	<0.27	<0.48	1.6 J	11	2.7	1.2 J	<0.64	<1.1	<0.96	<0.21	<0.28	<0.35	<1.1	<1.0
MW-69	02/21/23	35	5.7	<1.5	<7.7 G	0.57 J	<0.53	2.0	19	4.2	1.4 J	<0.71	<1.3	<1.1	<0.23	<0.31	<0.39	<1.3	<1.2
MW-70	09/13/22	110	10	<1.4	9.6	<0.28	<0.50	6.4	75	34	0.57 J	<0.66	<1.2	<1.0	<0.22	<0.29	<0.36	<1.2	<1.1
MW-70	02/21/23	72	10	<1.3	17	<0.28	<0.49	4.7	130	22	0.53 J	<0.65	<1.2	<0.98	<0.21	<0.28	<0.36	<1.2	<1.1
MW-71	02/17/21	7.5	2.7	-	1.1 J	-	-	1.3 J	2.4	-	0.47 J	-	-	-	-	-	-	-	-
MW-71	11/16/21	5.5	3.4	-	0.82 J	-	-	1.7	2.2	-	<0.23	-	-	-	-	-	-	-	-
MW-71	02/21/23	5.6	4.2	<1.3	1.3 J	<0.26	<0.47	1.8	3.0	3.4	0.41 J	<0.62	<1.1	<0.94	<0.20	<0.27	<0.34	<1.1	<1.0
MW-72	02/16/21	3.6	2	-	0.67 J	-	-	0.45 J	3	-	<1.8	-	-	-	-	-	-	-	-
MW-72	11/17/21	6.8	3.0	-	1.3 J	-	-	0.67 J	4.7	-	<0.24	-	-	-	-	-	-	-	-
MW-72	02/27/23	5.1	1.3 J	<1.4	0.80 J	<0.29	<0.52	0.26 J	3.4	<0.54	<0.25	<0.68	<1.2	<1.0	<0.22	<0.30	<0.37	<1.2	<1.1
MW-74	12/03/21	15,000	350	-	380	-	-	140	3,800	-	0.49 J	-	-	-	-	-	-	-	-
MW-74	02/22/23	14,000	230	<1.3	58	<0.28	<0.49	150	1,500	410	1.8	<0.65	<1.2	<0.98	<0.21	<0.29	<0.36	<1.2	<1.1
MW-77	11/11/22	700	18	<7.5	23	<1.6	<2.8	6.3 J	180	42	<10 B*	<3.7	<6.5	<5.5	<10 B*	1.6 J	<2.0	<6.5	<6.0
MW-77	02/23/23	18	0.94 J	<1.4	0.79 J	<0.29	<0.51	<0.23	3.4	0.88 J	<0.25	<0.67	<1.2	<1.0	<0.22	<0.29	<0.37	<1.2	<1.1
MW-78	11/11/22	180	5.9	<1.4	3.7	<0.29	<0.51	4.4	28	12	<1.9 B*	<0.68	<1.2	<1.0	<1.9 B*	<0.30	<0.37	<1.2	<1.1
MW-78	02/24/23	18	4.5	<1.4	1.7 J	<0.29	<0.51	3.8	9.0	6.7	<0.25	<0.68	<1.2	<1.0	<0.22	<0.30	<0.37	<1.2	<1.1
MW-79	11/16/22	990	41	<1.4	100	<0.29	<0.51	41	790	200	2.2	<0.67	<1.2	<1.0	<0.22	<0.30	<0.37	<1.2	<1.1
MW-79	02/24/23	940 J*	65	<1.4	130	<0.28	<0.50	50	940 J*	240	1.8	<0.66	<1.2	<0.99	<0.22	<0.29	<0.36	<1.2	<1.1

NOTES:
Units are nanograms per liter (ng/L).
Orange shading indicates the analyte was detected above the ecological receptor-based screening level.
** = Analyte was detected in one or more sample; no screening level available.
- = Analyte not detected; no screening level available.
< = Analyte not detected above laboratory detection limit shown.
B = Compound was found in the lab blank and sample. Flag applied by Shannon & Wilson (*).
G = The reported quantitation limit has been raised due to an exhibited elevated noise or matrix interference. Flag applied by the laboratory.
J = Result is less than the reporting level but greater than or equal to the method detection limit and the concentration is an approximate value. Flag applied by the laboratory.
J* = Result is reported as an estimated value, no direction of bias, due to a quality control failure. Flag applied by Shannon & Wilson (*).
JH* = Estimated concentration, biased high due to quality control failures. Flag applied by Shannon & Wilson (*).
* = Flag applied by Shannon & Wilson.
DONA = 4,8-Dioxa-3H-perfluorononanoic acid; F-53B Major = 9Cl-PF3ONS; F-53B Minor = 11CL-PF3OUdS; HFPO-DA = Hexafluoropropylene oxide dimer acid (also known as GenX); NEtFOSAA = N-ethylperfluorooctanesulfonamidoacetic acid; NMeFOSAA = N-methylperfluorooctanesulfonamidoacetic acid; PCUL = preliminary cleanup level; PFBS = Perfluorobutanesulfonic acid; PFDA = Perfluorodecanoic acid; PFDoA = Perfluorododecanoic acid; PFHpA = Perfluoroheptanoic acid; PFHxA = Perfluorohexanoic acid; PFHxS = Perfluorohexanesulfonic acid; PFNA = Perfluorononanoic acid; PFOA = Perfluorooctanoic acid; PFOS = Perfluorooctanesulfonic acid; PFTeA = Perfluorotetradecanoic acid; PFTriA = Perfluorotridecanoic acid; PFUnA = Perfluoroundecanoic acid

Table 4: Per- and Polyfluoroalkyl Substances in Soil

Sample Location	Sample Date	Sample Depth (feet bgs)	PFOS	PFOA	HFPO-DA	PFBS	PFDA	PFDoA	PFHpA	PFHxS	PFHxA	PFNA	PFTeA	PFTriA	PFUnA	F-53B Major	F-53B Minor	DONA	NEtFOSAA	NMeFOSAA
		Screening Level	0.72	0.034	240	20,000	53	178	-	35	40,000	5.5	-	-	169	-	-	-	**	**
MW-77	11/04/22	2	0.055 J	<0.059	<0.046	<0.043	<0.054	<0.034	<0.043	<0.032	<0.035	<0.025	<0.041	<0.023	<0.047	<0.039	<0.035	<0.044	<0.054	<0.026
		2 (Duplicate)	0.057 J*	<0.053	<0.041	<0.038	<0.048	<0.030	<0.038	<0.029	<0.031	<0.022	<0.037	<0.021	<0.042	<0.035	<0.031	<0.039	<0.048	<0.036
		5	0.22	0.11 J	<0.044	<0.041	<0.052	<0.032	<0.041	<0.031	0.060 J	0.059 J	<0.040	<0.023	<0.045	<0.038	<0.034	<0.042	<0.052	<0.033
		10	<0.048	<0.059	<0.046	<0.042	<0.054	<0.033	<0.042	<0.032	<0.035	<0.025	<0.041	<0.023	<0.047	<0.039	<0.035	<0.044	<0.054	<0.032
MW-78	11/04/22	2	0.15 J	<0.060	<0.047	<0.043	<0.055	<0.034	<0.043	0.19 J	0.072 J	<0.025	<0.042	<0.024	<0.048	<0.040	<0.035	<0.044	<0.055	<0.024
		5	<0.067	<0.083	<0.064	<0.060	<0.075	<0.047	<0.060	0.24 J	<0.049	<0.034	<0.058	<0.033	<0.066	<0.055	<0.049	<0.061	<0.075	<0.031
		10	0.22 J	0.078 J	<0.059	<0.054	<0.069	<0.043	<0.054	0.29	0.11 J	<0.031	<0.053	<0.030	<0.060	<0.050	<0.044	<0.056	<0.069	<0.024
MW-79	11/07/22	2	<0.059	<0.073	<0.056	<0.052	<0.066	<0.041	<0.052	<0.040	<0.043	<0.030	<0.051	<0.029	<0.058	<0.048	<0.043	<0.054	<0.066	<0.023
		5	<0.045	<0.055	<0.043	<0.039	<0.050	<0.031	<0.039	<0.030	<0.032	<0.023	<0.038	<0.022	<0.044	<0.036	<0.032	<0.041	<0.050	<0.027
		10	<0.058	<0.072	<0.055	<0.051	<0.065	<0.041	<0.051	<0.039	<0.042	<0.030	<0.050	<0.028	<0.057	<0.27 J*	<0.042	<0.053	<0.065	<0.022
SB-2022-001	12/20/22	1.5	0.063 J	<0.055	<0.042	<0.039	<0.050	<0.031	<0.039	0.12 J	0.058 J	<0.023	<0.038	<0.022	<0.043	<0.036	<0.032	<0.040	<0.050	0.025 J
		6	88	0.22	<0.041	<0.038	<0.048	<0.030	<0.038	1.1	0.060 J	<0.022	<0.037	<0.021	<0.042	<0.035	<0.031	<0.039	<0.048	<0.023
		10	18	0.065 J	<0.049	<0.045	<0.057	<0.036	0.073 J	0.43	0.20 J	<0.026	<0.044	<0.025	<0.050	<0.041	<0.037	<0.046	<0.057	<0.026
SB-2022-002	12/20/22	2	4.1 JH*	0.50	<0.039	<0.036	<0.046	<0.029	0.49	1.6	0.62	<0.021	<0.035	<0.020	<0.040	<0.033	<0.030	<0.037	<0.046	<0.027
		4.5	370 J*	2.3 J*	<0.043	<0.040	<0.050	<0.031	0.42	13 J*	0.67	0.044 J	<0.039	<0.022	<0.044	<0.036	<0.032	<0.041	0.050 J	<0.028
		4.5 (Duplicate)	160 J*	0.50 J*	<0.041	<0.038	<0.048	<0.030	0.84	3.8 J*	0.64	<0.022	<0.037	<0.021	<0.042	<0.035	<0.031	<0.039	<0.048	<0.028
		8	200	2.0	<0.046	0.45	<0.054	<0.034	1.7	11	3.5	0.11 J	<0.041	<0.023	<0.047	<0.039	<0.035	<0.044	<0.054	<0.026
SB-2022-003	12/20/22	2	<0.050	<0.062	<0.048	<0.044	<0.056	<0.035	<0.044	<0.034	<0.036	<0.026	<0.043	<0.025	<0.049	<0.041	<0.036	<0.046	<0.056	<0.027
		5	0.073 JH*	<0.064	<0.049	<0.046	<0.058	<0.036	<0.046	<0.035	<0.037	<0.026	<0.045	<0.025	<0.051	<0.042	<0.037	<0.047	<0.058	<0.028
		8.5	54	0.28	<0.049	<0.046	<0.058	<0.036	0.15 J	1.6	0.37	<0.026	<0.044	<0.025	<0.050	<0.042	<0.037	<0.047	0.066 J	<0.028

NOTES:
Units are micrograms per kilogram (µg/kg).
Orange shading indicates the analyte was detected above the ecological receptor-based screening level or the PCUL.
** = Analyte was detected in one or more sample; no screening level available.
- = Analyte not detected; no screening level available.
< = Analyte not detected above laboratory detection limit shown.
J = Result is less than the reporting level but greater than or equal to the method detection limit and the concentration is an approximate value. Flag applied by the laboratory.
J* = Result is reported as an estimated value, no direction of bias, due to a quality control failure. Flag applied by Shannon & Wilson (*).
JH* = Estimated concentration, biased high due to quality control failures. Flag applied by Shannon & Wilson (*).
bgs = below ground surface; DONA = 4,8-Dioxa-3H-perfluorononanoic acid; F-53B Major = 9Cl-PF3ONS; F-53B Minor = 11CL-PF3OUdS; HFPO-DA = Hexafluoropropylene oxide dimer acid (also known as GenX); NEtFOSAA = N-ethylperfluorooctanesulfonamidoacetic acid; NMeFOSAA = N-methylperfluorooctanesulfonamidoacetic acid; PCUL = preliminary cleanup level; PFBS = Perfluorobutanesulfonic acid; PFDA = Perfluorodecanoic acid; PFDoA = Perfluorododecanoic acid; PFHpA = Perfluoroheptanoic acid; PFHxA = Perfluorohexanoic acid; PFHxS = Perfluorohexanesulfonic acid; PFNA = Perfluorononanoic acid; PFOA = Perfluorooctanoic acid; PFOS = Perfluorooctanesulfonic acid; PFTeA = Perfluorotetradecanoic acid; PFTriA = Perfluorotridecanoic acid; PFUnA = Perfluoroundecanoic acid



0 0.5 1

Approximate Scale in Mile

PFAS Investigation Report
Jorgensen Forge Corporation Property
Tukwila, Washington

SITE LOCATION MAP

August 2024 21-1-12596-040

SHANNON & WILSON, INC. FIG. 1

DRAFT FOR PUBLIC COMMENT

Filename: C:\Users\jrs\CAD Group Dropbox\JDrive\211\12596\040\21-1-12596-040 Site Location.dwg Date: 07-18-2024 Login: JRS

Boeing Plant 2 Facility

Approximate Area of JFOS Removal Action

PL2-JF01B

PL2-JF01AR

PL2-JF04A

2-66 Area

6-Inch Diameter Lateral

12-Inch Diameter Lateral

12-Inch Diameter Property Line Pipe

15-Inch Diameter Lateral

South Yard Area

15-Inch Diameter Lateral

Office Building Lateral

24-Inch Diameter Property Line Pipe

4-Inch Diameter Lateral

N

MW-70

MW-69

MW-51

PL2-JF01C

MW-5

MW-50

Used Oil Storage Building

MW-52

PL2-JF02A

MW-66

Bethlehem Steel 12-Inch Diameter Lateral

MW-71

MW-24

MW-49

MW-59

MW-23

MW-55

MW-21

MW-25

MW-20

MW-26

MW-19

MW-28

MW-27

MW-29

MW-58

MW-18

MW-17

Shipping Area

MW-9

MW-48

Hollowbore Area

MW-16

MW-22R

MW-56

MW-30

Area 1 LNAPL Plume

MW-76

Machine Shop Area

MW-4

MW-65

MW-31

MW-57

MW-8

MW-3

MW-53

MW-75

MW-45

MW-10R

MW-47

MW-46

MW-62

MW-11

PL2-JF03A

Heat Treat Area

5,000-Ton Press and Pump Room

MW-79

2,500-Ton Press Pump Room

Q1/Q2/Q3 Vaults

1,250-Ton Press Pump Room

MW-14

MW-15

MW-54

MW-6

MW-78

MW-13R

MW-44

MW-43

MW-42

Former Melt Shop Area

MW-40

MW-41

MW-61

MW-73

MW-72

MW-63

MW-64

MW-35

MW-34

MW-60

SB-2022-001

Area 2 LNAPL Plume

SB-2022-002

MW-39

Forge Shop Area

MW-32

MW-36

660-Ton Press Pump Room

SB-2022-003

MW-74

Former Metals Storage Area

MW-68

MW-67

MW-38

MW-77

MW-37

MW-7

Boeing/Isaacson Property

WATERWAY

-5

-10

-15

Explanation

- Approximate Property Boundary
- Estimated Extent of LNAPL-Saturated Soil (Shannon & Wilson, Draft RI Report, June 30, 2022)
- MW-23 Monitoring Well Location (Various)
- MW-68 Locations with Groundwater Analyzed for PFAS
- SB-2022-001 Locations with Soil Analyzed for PFAS
- MW-68 Locations with Groundwater and Soil Analyzed for PFAS
- Features Where AFFF Fire Suppression Components Have Been Observed or AFFF Has Been Stored

NOTE

Except where surveyed, locations are approximate.

0 100 200

Scale in Feet

PFAS Investigation Report
Jorgensen Forge Corporation Property
Tukwila, Washington

PFAS INVESTIGATION LOCATIONS

August 2024 21-1-12596-040

SHANNON & WILSON, INC. FIG. 2

DRAFT FOR PUBLIC COMMENT

Figure 2 Date: 07-19-2024 Login: JRS Layout: Figure 2 Filename: C:\Users\jrs\CAD Group Dropbox\JDrive\21\12596\040\21-1-12596-040 PFAS Investigations.dwg

Boeing Plant 2 Facility

Approximate Area of JFOS Removal Action

PL2-JF01B

PL2-JF04A

2-66 Area

PL2-JF01AR

6-Inch Diameter Lateral

12-Inch Diameter Lateral

12-Inch Diameter Property Line Pipe

15-Inch Diameter Lateral

South Yard Area

15-Inch Diameter Lateral

Office Building Lateral

24-Inch Diameter Property Line Pipe

4-Inch Diameter Lateral

MW-51

MW-70

MW-69

PL2-JF01C

MW-5

MW-50

Used Oil Storage Building

MW-52

PL2-JF02A

MW-66

Bethlehem Steel 12-Inch Diameter Lateral

MW-71

MW-24

MW-49

MW-59

MW-23

MW-55

MW-25

MW-21

MW-20

MW-26

MW-19

MW-28

MW-27

MW-29

MW-58

MW-48

MW-18

MW-17

Hollowbore Area

Shipping Area

MW-9

MW-22R

MW-16

MW-56

MW-30

Area 1 LNAPL Plume

Machine Shop Area

MW-4

MW-76

MW-65

MW-31

MW-57

MW-8

MW-3

MW-53

MW-75

MW-10R

MW-45

MW-62

MW-11

MW-47

MW-46

PL2-JF03A

Heat Treat Area

5,000-Ton Press and Pump Room

MW-79

2,500-Ton Press Pump Room

Q1/Q2/Q3 Vaults

1,250-Ton Press Pump Room

MW-14

MW-15

MW-13R

MW-54

MW-6

MW-78

MW-40

MW-44

MW-61

MW-73

MW-72

MW-44

MW-43

MW-42

Former Melt Shop Area

MW-63

MW-64

MW-35

MW-34

MW-60

Area 2 LNAPL Plume

MW-39

Shipping Area

MW-32

MW-36

660-Ton Press Pump Room

MW-74

Former Metals Storage Area

MW-68

MW-67

MW-38

MW-77

MW-37

MW-7

0 100 200

Scale in Feet

Boeing/Isaacson Property

MW-61

	09/14/22	02/22/23
PFOS	5,000	1,900

MW-60

	02/17/21	11/17/21	02/22/23
PFOS	4,100	1,200	4,200

MW-74

	12/03/21	02/22/23
PFOS	15,000	14,000

Explanation

- Approximate Property Boundary
- Estimated Extent of LNAPL-Saturated Soil (Shannon & Wilson, Draft RI Report, June 30, 2022)
- MW-23 Monitoring Well Location (Various)
- MW-68 Locations with Groundwater Analyzed for PFAS
- Features Where AFFF Fire Suppression Components Have Been Observed or AFFF Has Been Stored

NOTE

Except where surveyed, locations are approximate.

TABLE EXPLANATION

Analyte	Screening Level
PFOS	1,100 ng/L

PFAS Investigation Report
Jorgensen Forge Corporation Property
Tukwila, Washington

PFAS GROUNDWATER SAMPLING LOCATIONS AND EXCEEDANCES

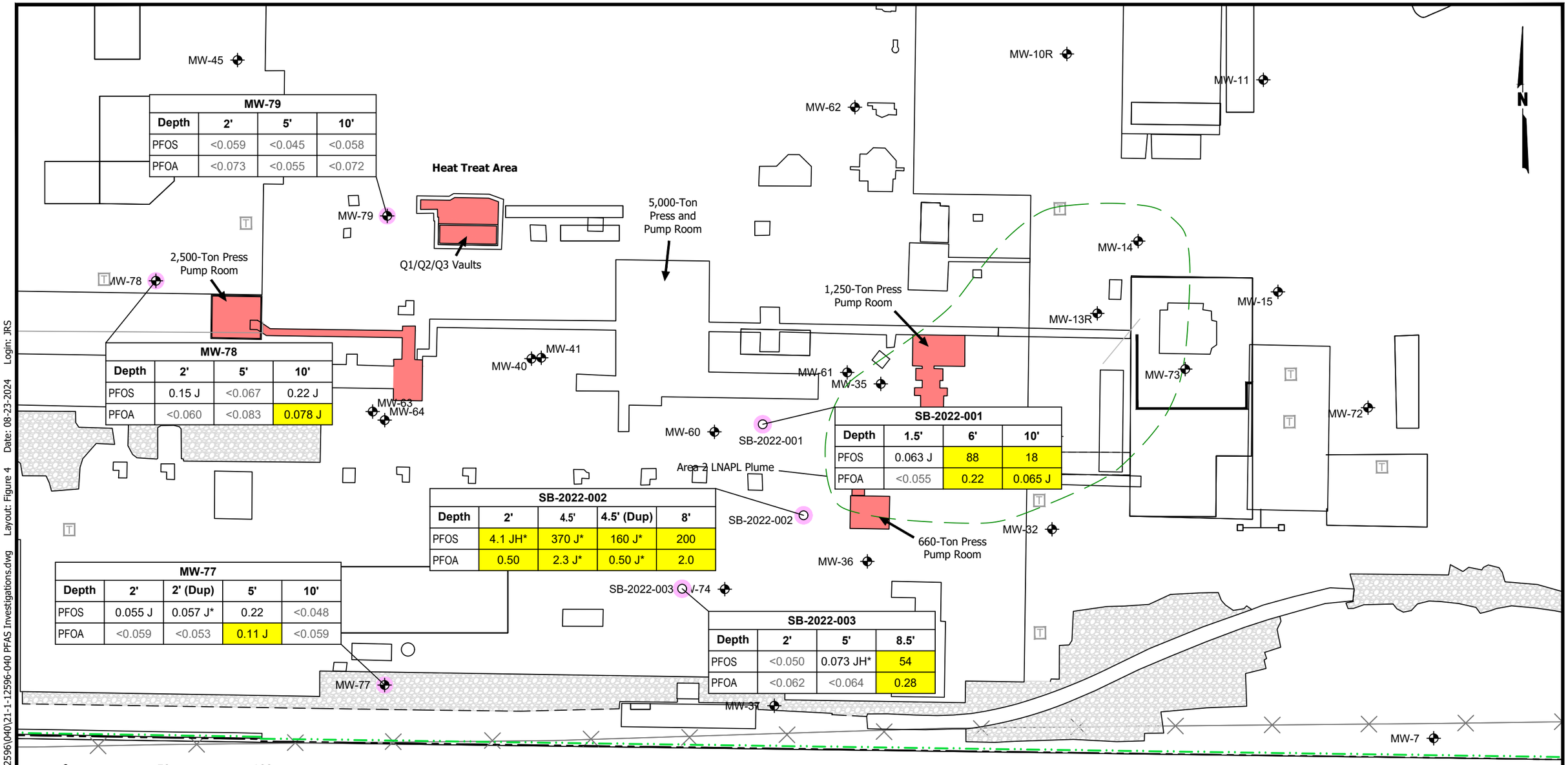
August 2024 21-1-12596-040

SHANNON & WILSON, INC. FIG. 3

DRAFT FOR PUBLIC COMMENT

Figure 3 Date: 08-23-2024 Login: JRS

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MW-79			
Depth	2'	5'	10'
PFOS	<0.059	<0.045	<0.058
PFOA	<0.073	<0.055	<0.072

MW-78			
Depth	2'	5'	10'
PFOS	0.15 J	<0.067	0.22 J
PFOA	<0.060	<0.083	0.078 J

SB-2022-001			
Depth	1.5'	6'	10'
PFOS	0.063 J	88	18
PFOA	<0.055	0.22	0.065 J

SB-2022-002				
Depth	2'	4.5'	4.5' (Dup)	8'
PFOS	4.1 JH*	370 J*	160 J*	200
PFOA	0.50	2.3 J*	0.50 J*	2.0

MW-77				
Depth	2'	2' (Dup)	5'	10'
PFOS	0.055 J	0.057 J*	0.22	<0.048
PFOA	<0.059	<0.053	0.11 J	<0.059

SB-2022-003			
Depth	2'	5'	8.5'
PFOS	<0.050	0.073 JH*	54
PFOA	<0.062	<0.064	0.28

Explanation

- Approximate Property Boundary
- Estimated Extent of LNAPL-Saturated Soil (Shannon & Wilson, Draft RI Report, June 30, 2022)
- MW-23 Monitoring Well Location (Various)
- SB-2022-001 Locations with Soil Analyzed for PFAS
- Features Where AFFF Fire Suppression Components Have Been Observed or AFFF Has Been Stored

NOTES

J = Result is less than the reporting level but greater than or equal to the method detection limit and the concentration is an approximate value. Flag applied by the laboratory.
J* = Result is reported as an estimated value, no direction of bias, due to a quality control failure. Flag applied by Shannon & Wilson (*).
'JH* = Estimated concentration, biased high due to quality control failures. Flag applied by Shannon & Wilson (*)
bgs = below ground surface

1. Except where surveyed, locations are approximate.

TABLE EXPLANATION	
Analyte	Screening Level
PFOS	0.72 µg/kg
PFOA	0.034 µg/kg

Screening levels are shown above.

PFAS Investigation Report
Jorgensen Forge Corporation Property
Tukwila, Washington

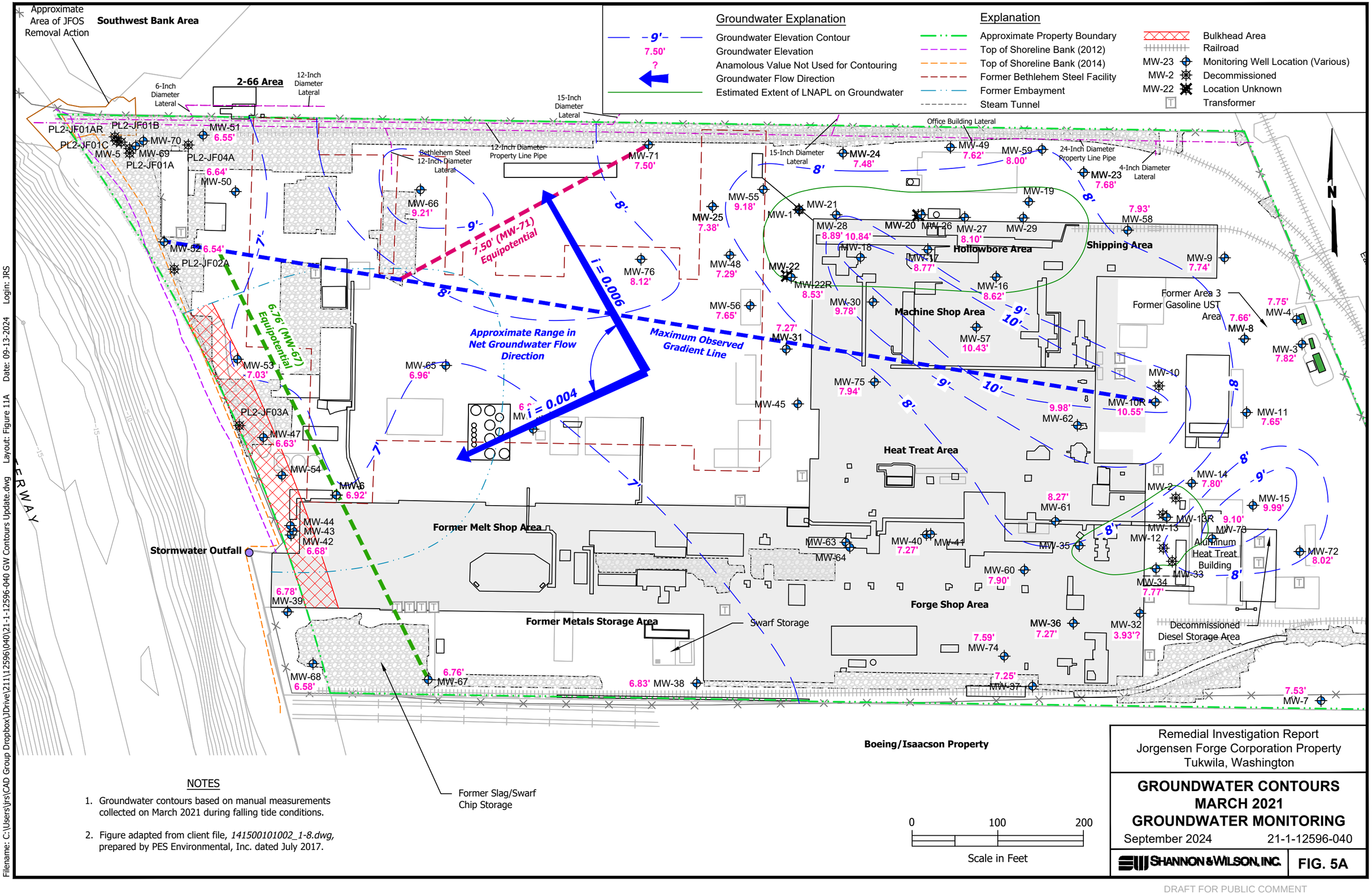
PFAS SOIL SAMPLING LOCATIONS AND EXCEEDANCES

August 2024 21-1-12596-040

SHANNON & WILSON, INC. FIG. 4

Filename: C:\Users\jrs\CAD Group Dropbox\JDrive\211\12596\040\21-1-12596-040 PFAS Investigations.dwg Layout: Figure 4 Date: 08-23-2024 Login: JRS

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NOTES

1. Groundwater contours based on manual measurements collected on March 2021 during falling tide conditions.
2. Figure adapted from client file, *141500101002_1-8.dwg*, prepared by PES Environmental, Inc. dated July 2017.

Remedial Investigation Report
Jorgensen Forge Corporation Property
Tukwila, Washington

GROUNDWATER CONTOURS MARCH 2021 GROUNDWATER MONITORING

September 2024 21-1-12596-040

SHANNON & WILSON, INC. **FIG. 5A**

DRAFT FOR PUBLIC COMMENT

Filename: C:\Users\jrs\CAD Group Dropbox\JDrive\211\12596\040\21-1-12596-040 GW Contours Update.dwg Layout: Figure 11A Date: 09-13-2024 Login: JRS

Groundwater Explanation

- Groundwater Elevation Contour
- Groundwater Elevation
- Anamolous Value Not Used for Contouring
- Groundwater Flow Direction

Explanation

- Approximate Property Boundary
- Top of Shoreline Bank (2012)
- Top of Shoreline Bank (2014)
- Former Bethlehem Steel Facility
- Former Embayment
- Steam Tunnel
- Bulkhead Area
- Railroad
- Monitoring Well Location (Various)
- Decommissioned
- Location Unknown
- Transformer

Approximate Area of JFOS Removal Action

Southwest Bank Area

2-66 Area

6-Inch Diameter Lateral

12-Inch Diameter Lateral

15-Inch Diameter Lateral

Office Building Lateral

15-Inch Diameter Lateral

24-Inch Diameter Property Line Pipe

4-Inch Diameter Lateral

Bethlehem Steel 12-Inch Diameter Lateral

12-Inch Diameter Property Line Pipe

PL2-JF01AR

PL2-JF01B

PL2-JF01C

PL2-JF01A

PL2-JF02A

PL2-JF03A

PL2-JF04A

6.61'

MW-5

MW-69

MW-70

MW-51

MW-50

MW-52

MW-53

MW-54

MW-66

MW-71

MW-24

MW-49

MW-59

MW-23

MW-55

MW-1

MW-21

MW-25

MW-28

MW-20

MW-26

MW-27

MW-29

MW-19

MW-58

MW-18

MW-17

Hollowbore Area

Shipping Area

MW-9

MW-48

MW-76

MW-22

MW-22R

MW-16

MW-56

MW-30

Machine Shop Area

MW-57

Former Area 3 Former Gasoline UST Area

MW-4

MW-8

MW-3

MW-31

MW-65

MW-75

MW-10

MW-10R

MW-11

MW-45

7.24'

MW-62

MW-46

Heat Treat Area

MW-14

MW-2

MW-15

MW-61

MW-13R

MW-13

MW-78

MW-12

Aluminum Heat Treat Building

MW-72

MW-33

MW-34

MW-63

MW-40

MW-41

7.24'

MW-35

MW-64

7.56'

MW-60

Forge Shop Area

MW-36

MW-32

Decommissioned Diesel Storage Area

MW-74

MW-37

MW-7

MW-38

MW-67

MW-68

MW-39

MW-42

MW-43

6.29'

MW-44

6.03'

MW-6

Former Melt Shop Area

Former Metals Storage Area

Swarf Storage

Former Slag/Swarf Chip Storage

Stormwater Outfall

6.76' (MW-67) Equipotential

6'

7'

N

WATERWAY

Boeing/Isaacson Property

NOTES

1. Groundwater contours based on manual measurements collected on March 2021 during falling tide conditions.
2. Figure adapted from client file, *141500101002_1-8.dwg*, prepared by PES Environmental, Inc. dated July 2017.

0 100 200

Scale in Feet

Remedial Investigation Report
Jorgensen Forge Corporation Property
Tukwila, Washington

ZONE B
GROUNDWATER CONTOURS
MARCH 2021
GROUNDWATER MONITORING

September 2024 21-1-12596-040

SHANNON & WILSON, INC. **FIG. 5B**

DRAFT FOR PUBLIC COMMENT

Filename: C:\Users\jrs\CAD Group Dropbox\JDrive\21\12596\040\21-1-12596-040 GW Contours.dwg Layout: Figure 11B Date: 08-28-2024 Login: JRS

Groundwater Explanation

- 9' — Groundwater Elevation Contour
- 6.48' — Groundwater Elevation
- ? — Anamolous Value Not Used for Contouring
- Groundwater Flow Direction
- Estimated Extent of LNAPL on Groundwater

Explanation

- Approximate Property Boundary
- Top of Shoreline Bank (2012)
- Top of Shoreline Bank (2014)
- Former Bethlehem Steel Facility
- Former Embayment
- Steam Tunnel
- Bulkhead Area
- Railroad
- MW-23 — Monitoring Well Location (Various)
- MW-2 — Decommissioned
- MW-22 — Location Unknown
- T — Transformer

Approximate Area of JFOS Removal Action

Southwest Bank Area

2-66 Area

6-Inch Diameter Lateral

12-Inch Diameter Lateral

15-Inch Diameter Lateral

Office Building Lateral

Bethlehem Steel 12-Inch Diameter Lateral

12-Inch Diameter Property Line Pipe

15-Inch Diameter Lateral

24-Inch Diameter Property Line Pipe

4-Inch Diameter Lateral

PL2-JF01AR, PL2-JF01B, PL2-JF01C, PL2-JF01A, PL2-JF02A, PL2-JF03A, PL2-JF04A

MW-1, MW-2, MW-3, MW-4, MW-5, MW-6, MW-7, MW-8, MW-9, MW-10, MW-10R, MW-11, MW-12, MW-13, MW-13R, MW-14, MW-15, MW-16, MW-17, MW-18, MW-19, MW-20, MW-21, MW-22, MW-22R, MW-23, MW-24, MW-25, MW-26, MW-27, MW-28, MW-29, MW-30, MW-31, MW-32, MW-33, MW-34, MW-35, MW-36, MW-37, MW-38, MW-39, MW-40, MW-41, MW-42, MW-43, MW-44, MW-45, MW-46, MW-47, MW-48, MW-49, MW-50, MW-51, MW-52, MW-53, MW-54, MW-55, MW-56, MW-57, MW-58, MW-59, MW-60, MW-61, MW-62, MW-63, MW-64, MW-65, MW-66, MW-67, MW-68, MW-69, MW-70, MW-71, MW-72, MW-73, MW-74, MW-75, MW-76

6.48' (MW-71) Equipotential

5.43' (MW-67) Equipotential

Maximum Observed Gradient Line

i = 0.006

i = 0.005

Approximate Range in Net Groundwater Flow Direction

Hollowbore Area

Shipping Area

Machine Shop Area

Former Area 3 Former Gasoline UST Area

Heat Treat Area

Former Melt Shop Area

Aluminum Heat Treat Building

Forge Shop Area

Former Metals Storage Area

Swarf Storage

Former Slag/Swarf Chip Storage

Decommissioned Diesel Storage Area

Stormwater Outfall

Boeing/Isaacson Property

N

0 100 200

Scale in Feet

NOTES

1. Groundwater contours based on manual measurements collected on May 2021 during falling tide conditions.
2. Figure adapted from client file, *141500101002_1-8.dwg*, prepared by PES Environmental, Inc. dated July 2017.

Remedial Investigation Report
Jorgensen Forge Corporation Property
Tukwila, Washington

GROUNDWATER CONTOURS
MAY 2021
GROUNDWATER MONITORING

September 2024 21-1-12596-040

SHANNON & WILSON, INC. **FIG. 6A**

DRAFT FOR PUBLIC COMMENT

Filename: C:\Users\jrs\CAD Group Dropbox\JDrive\211\12596\040\21-1-12596-040 GW Contours Update.dwg Layout: Figure 12A Date: 09-13-2024 Login: JRS

Approximate Area of JFOS Removal Action

Southwest Bank Area

2-66 Area

6-Inch Diameter Lateral

12-Inch Diameter Lateral

15-Inch Diameter Lateral

Office Building Lateral

Bethlehem Steel 12-Inch Diameter Lateral

12-Inch Diameter Property Line Pipe

15-Inch Diameter Lateral

24-Inch Diameter Property Line Pipe

4-Inch Diameter Lateral

Groundwater Explanation

- Groundwater Elevation Contour
- Groundwater Elevation
- Anamolous Value Not Used for Contouring
- Groundwater Flow Direction

Explanation

- Approximate Property Boundary
- Top of Shoreline Bank (2012)
- Top of Shoreline Bank (2014)
- Former Bethlehem Steel Facility
- Former Embayment
- Steam Tunnel
- Bulkhead Area
- Railroad
- MW-23 Monitoring Well Location (Various)
- MW-2 Decommissioned
- MW-22 Location Unknown
- Transformer

PL2-JF01AR
PL2-JF01B
PL2-JF01C
PL2-JF01A
PL2-JF02A
PL2-JF03A
PL2-JF04A
MW-5
MW-69
MW-70
MW-51
MW-50
MW-52
MW-53
MW-54
MW-47
MW-6
MW-44
MW-43
MW-42
MW-39
MW-68
MW-67
MW-65
MW-66
MW-76
MW-71
MW-46
MW-38
MW-55
MW-25
MW-48
MW-56
MW-31
MW-45
MW-1
MW-21
MW-24
MW-28
MW-20
MW-26
MW-27
MW-29
MW-49
MW-59
MW-23
MW-19
MW-58
MW-18
MW-17
MW-22
MW-22R
MW-16
MW-30
MW-57
MW-75
MW-62
MW-9
MW-4
MW-8
MW-3
MW-10
MW-10R
MW-11
MW-14
MW-2
MW-15
MW-61
MW-13R
MW-13
MW-78
MW-12
MW-63
MW-64
MW-40
MW-41
MW-35
MW-60
MW-33
MW-34
MW-72
MW-36
MW-32
MW-74
MW-37
MW-7

5.09'
4.37'
4.46'
6.48'
6.24'
6.32'
6.62'

5'
6'
?

Former Melt Shop Area

Former Metals Storage Area

Heat Treat Area

Machine Shop Area

Hollowbore Area

Shipping Area

Forge Shop Area

Aluminum Heat Treat Building

Former Area 3 Former Gasoline UST Area

Decommissioned Diesel Storage Area

Swarf Storage

Former Slag/Swarf Chip Storage

Stormwater Outfall

Boeing/Isaacson Property

N

0 100 200

Scale in Feet

NOTES

1. Groundwater contours based on manual measurements collected on May 2021 during falling tide conditions.
2. Figure adapted from client file, *141500101002_1-8.dwg,* prepared by PES Environmental, Inc. dated July 2017.

Remedial Investigation Report
Jorgensen Forge Corporation Property
Tukwila, Washington

ZONE B
GROUNDWATER CONTOURS
MAY 2021
GROUNDWATER MONITORING

September 2024 21-1-12596-040

SHANNON & WILSON, INC. **FIG. 6B**

DRAFT FOR PUBLIC COMMENT

Filename: C:\Users\jrs\CAD Group Dropbox\JDrive\211\12596\040\21-1-12596-040 GW Contours.dwg Layout: Figure 12B Date: 08-28-2024 Login: JRS

Approximate Area of JFOS Removal Action

Southwest Bank Area

2-66 Area

6-Inch Diameter Lateral

12-Inch Diameter Lateral

15-Inch Diameter Lateral

Bethlehem Steel 12-Inch Diameter Lateral

12-Inch Diameter Property Line Pipe

15-Inch Diameter Lateral

Office Building Lateral

24-Inch Diameter Property Line Pipe

4-Inch Diameter Lateral

Groundwater Explanation

- 9' — Groundwater Elevation Contour
- 6.18' — Groundwater Elevation
- ? — Anamolous Value Not Used for Contouring
- Groundwater Flow Direction
- Estimated Extent of LNAPL on Groundwater

Explanation

- Approximate Property Boundary
- Top of Shoreline Bank (2012)
- Top of Shoreline Bank (2014)
- Former Bethlehem Steel Facility
- Former Embayment
- Steam Tunnel
- Bulkhead Area
- Railroad
- MW-23 — Monitoring Well Location (Various)
- MW-2 — Decommissioned
- MW-22 — Location Unknown
- T — Transformer

PL2-JF01AR, PL2-JF01B, PL2-JF01C, PL2-JF01A, PL2-JF02A, PL2-JF03A, PL2-JF04A

MW-5, MW-6 5.79', MW-7 6.05', MW-8 6.12', MW-9 6.15', MW-10 9.47', MW-11 6.10', MW-12, MW-13, MW-13R 6.34', MW-14 6.05', MW-15 6.09', MW-19 6.79', MW-20, MW-21, MW-22 7.20', MW-22R, MW-23 6.13', MW-24 5.96', MW-25 5.91', MW-26, MW-27 6.39', MW-28 6.77' - 8.59', MW-29, MW-30 8.66', MW-31 5.86', MW-32 2.43'?, MW-33, MW-34 6.06', MW-35, MW-36 5.89', MW-37 5.88', MW-38 5.71', MW-39 6.85', MW-40 5.92', MW-41, MW-42 5.87', MW-43, MW-44, MW-45, MW-46 5.59', MW-47 5.78'?, MW-48 5.86', MW-49 6.06', MW-50 6.51', MW-51 6.49', MW-52 7.00', MW-53 6.18', MW-54, MW-55 6.60', MW-56 6.24', MW-57 7.81', MW-58 6.38', MW-59 6.44', MW-60 6.21', MW-61 6.24', MW-62 7.89', MW-63, MW-64, MW-65 5.90', MW-66 8.01', MW-67, MW-68 6.92', MW-69, MW-70, MW-71 6.18', MW-72 6.42', MW-73, MW-74 6.20', MW-75 6.94', MW-76 6.18'

6.18' (MW-71) Equipotential

5.71' (MW-38) Equipotential

i = 0.005

i = 0.006

Approximate Range in Net Groundwater Flow Direction

Maximum Observed Gradient Line (Tide Coming In)

Former Melt Shop Area

Former Metals Storage Area

Hollowbore Area

Machine Shop Area

Heat Treat Area

Shipping Area

Former Area 3 Former Gasoline UST Area

Aluminum Heat Treat Building

Forge Shop Area

Decommissioned Diesel Storage Area

Swarf Storage

Former Slag/Swarf Chip Storage

Stormwater Outfall

Boeing/Isaacson Property

FAIRWAY

N

0 100 200

Scale in Feet

NOTES

1. Groundwater contours based on manual measurements collected on August 2021 during falling tide conditions.
2. Figure adapted from client file, *141500101002_1-8.dwg,* prepared by PES Environmental, Inc. dated July 2017.

Remedial Investigation Report
Jorgensen Forge Corporation Property
Tukwila, Washington

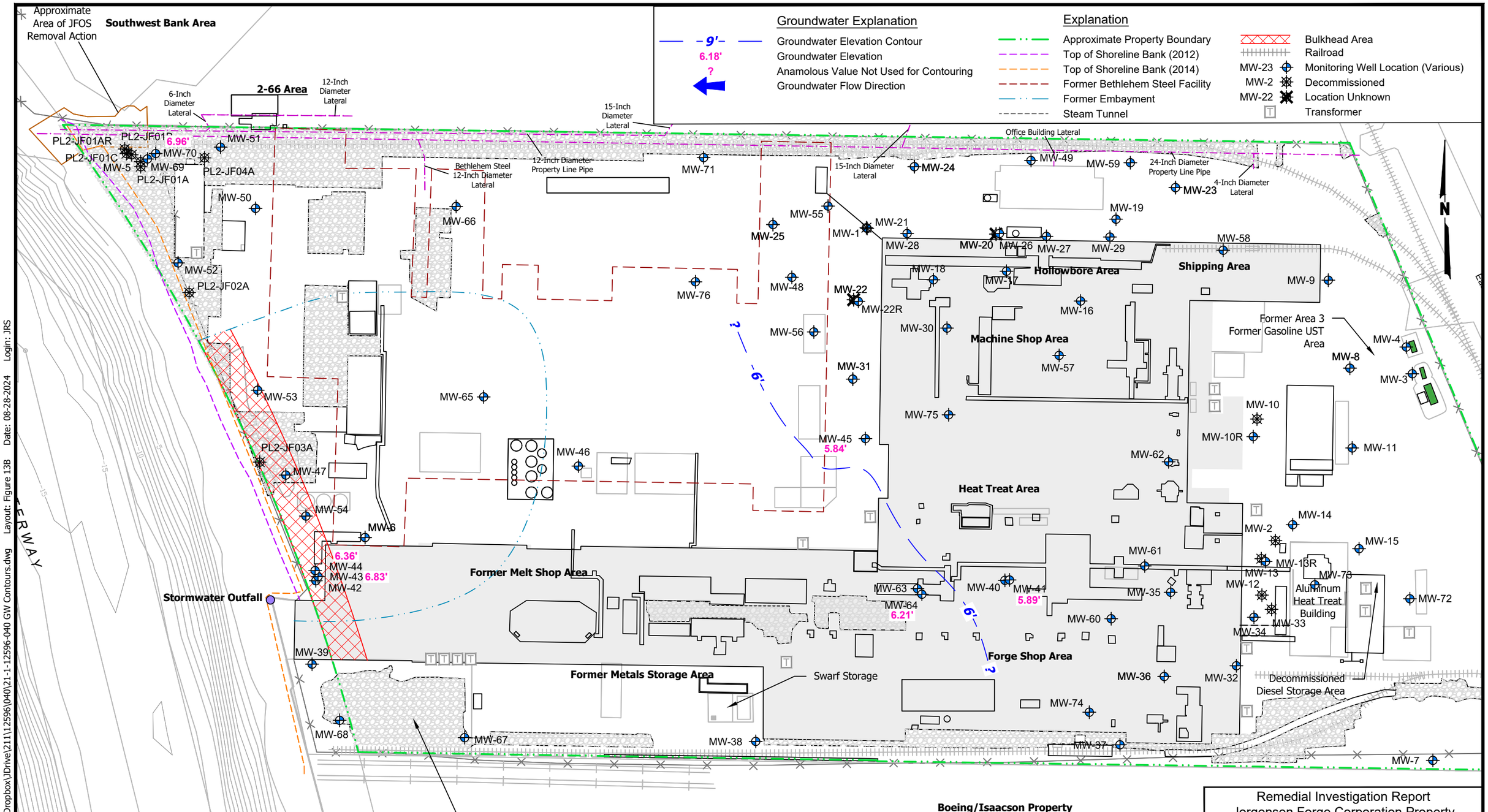
GROUNDWATER CONTOURS
AUGUST 2021
GROUNDWATER MONITORING

September 2024 21-1-12596-040

SHANNON & WILSON, INC. **FIG. 7A**

DRAFT FOR PUBLIC COMMENT

Filename: C:\Users\jrs\CAD Group Dropbox\JDrive\211\12596\040\21-1-12596-040 GW Contours Update.dwg Layout: Figure 13A Date: 09-13-2024 Login: JRS



NOTES

1. Groundwater contours based on manual measurements collected on August 2021 during falling tide conditions.
2. Figure adapted from client file, *141500101002_1-8.dwg*, prepared by PES Environmental, Inc. dated July 2017.

0 100 200

Scale in Feet

Remedial Investigation Report
Jorgensen Forge Corporation Property
Tukwila, Washington

ZONE B
GROUNDWATER CONTOURS
AUGUST 2021
GROUNDWATER MONITORING

September 2024 21-1-12596-040

SHANNON & WILSON, INC. **FIG. 7B**

DRAFT FOR PUBLIC COMMENT

Filename: C:\Users\jrs\CAD Group Dropbox\JDrive\211\12596\040\21-1-12596-040 GW Contours.dwg Layout: Figure 13B Date: 08-28-2024 Login: JRS

Groundwater Explanation

- 9' — Groundwater Elevation Contour
- 6.48' — Groundwater Elevation
- ? — Anamolous Value Not Used for Contouring
- Groundwater Flow Direction
- Estimated Extent of LNAPL on Groundwater

Explanation

- Approximate Property Boundary
- Top of Shoreline Bank (2012)
- Top of Shoreline Bank (2014)
- Former Bethlehem Steel Facility
- Former Embayment
- Steam Tunnel
- Bulkhead Area
- Railroad
- MW-23 — Monitoring Well Location (Various)
- MW-2 — Decommissioned
- MW-22 — Location Unknown
- T — Transformer

Approximate Area of JFOS Removal Action

Southwest Bank Area

2-66 Area

6-Inch Diameter Lateral

12-Inch Diameter Lateral

15-Inch Diameter Lateral

Office Building Lateral

Bethlehem Steel 12-Inch Diameter Lateral

12-Inch Diameter Property Line Pipe

15-Inch Diameter Lateral

24-Inch Diameter Property Line Pipe

4-Inch Diameter Lateral

PL2-JF01AR, PL2-JF01B, PL2-JF01C, PL2-JF01A, PL2-JF02A, PL2-JF03A, PL2-JF04A

MW-1, MW-2, MW-3 7.23', MW-4 7.17', MW-5, MW-6 7.32', MW-7 7.15', MW-8 7.15', MW-9 7.22', MW-10, MW-10R 9.78', MW-11 7.15', MW-12, MW-13, MW-13R 7.49', MW-14 7.10', MW-15 7.13', MW-16, MW-17, MW-18, MW-19, MW-20, MW-21, MW-22, MW-22R, MW-23 7.22', MW-24 7.15', MW-25 7.14', MW-26, MW-27, MW-28, MW-29, MW-30 9.19', MW-31 7.04', MW-32 3.53', MW-33, MW-34 7.23', MW-35, MW-36 7.05', MW-37 7.03', MW-38 6.87', MW-39 7.26', MW-40 7.05', MW-41, MW-42 7.65', MW-43, MW-44, MW-45, MW-46 6.94', MW-47 7.01', MW-48 7.07', MW-49 7.21', MW-50, MW-51 6.56', MW-52, MW-53, MW-54, MW-55 8.28', MW-56 7.42', MW-57 8.85', MW-58 7.47', MW-59 7.54', MW-60 7.32', MW-61 7.55', MW-62 7.89', MW-63, MW-64, MW-65 7.43', MW-66 8.84', MW-67 5.71', MW-68 6.68', MW-69, MW-70, MW-71 7.36', MW-72 7.50', MW-73, MW-74 7.34', MW-75 7.55', MW-76 7.27'

7.36' (MW-71) Equipotential

6.87' (MW-38) Equipotential

Approximate Range in Net Groundwater Flow Direction

Maximum Observed Gradient Line

i = 0.005

i = 0.005

Stormwater Outfall

Former Melt Shop Area

Former Metals Storage Area

Swarf Storage

Former Slag/Swarf Chip Storage

Hollowbore Area

Shipping Area

Machine Shop Area

Heat Treat Area

Forge Shop Area

Former Area 3 Former Gasoline UST Area

Aluminum Heat Treat Building

Decommissioned Diesel Storage Area

Boeing/Isaacson Property

FAIRWAY

N

0 100 200

Scale in Feet

NOTES

1. Groundwater contours based on manual measurements collected on November 2021 during falling tide conditions.
2. Figure adapted from client file, *141500101002_1-8.dwg*, prepared by PES Environmental, Inc. dated July 2017.

Remedial Investigation Report
Jorgensen Forge Corporation Property
Tukwila, Washington

GROUNDWATER CONTOURS
NOVEMBER 2021
GROUNDWATER MONITORING

September 2024 21-1-12596-040

SHANNON & WILSON, INC. FIG. 8A

DRAFT FOR PUBLIC COMMENT

Filename: C:\Users\jrs\CAD Group Dropbox\JDrive\211\12596\040\21-1-12596-040 GW Contours Update.dwg Layout: Figure 14A Date: 09-13-2024 Login: JRS

Groundwater Explanation

- Groundwater Elevation Contour
- Groundwater Elevation
- Anamolous Value Not Used for Contouring
- Groundwater Flow Direction

Explanation

- Approximate Property Boundary
- Top of Shoreline Bank (2012)
- Top of Shoreline Bank (2014)
- Former Bethlehem Steel Facility
- Former Embayment
- Steam Tunnel
- Bulkhead Area
- Railroad
- Monitoring Well Location (Various)
- Decommissioned
- Location Unknown
- Transformer

Approximate Area of JFOS Removal Action

Southwest Bank Area

2-66 Area

6-Inch Diameter Lateral

12-Inch Diameter Lateral

15-Inch Diameter Lateral

Office Building Lateral

15-Inch Diameter Lateral

24-Inch Diameter Property Line Pipe

4-Inch Diameter Lateral

Bethlehem Steel 12-Inch Diameter Lateral

12-Inch Diameter Property Line Pipe

PL2-JF01AR

PL2-JF01B

PL2-JF01C

PL2-JF01A

PL2-JF02A

PL2-JF03A

PL2-JF04A

6.83'

MW-1 MW-2 MW-3 MW-4 MW-5 MW-6 MW-7 MW-8 MW-9 MW-10 MW-10R MW-11 MW-12 MW-13 MW-13R MW-14 MW-15 MW-16 MW-17 MW-18 MW-19 MW-20 MW-21 MW-22 MW-22R MW-23 MW-24 MW-25 MW-26 MW-27 MW-28 MW-29 MW-30 MW-31 MW-32 MW-33 MW-34 MW-35 MW-36 MW-37 MW-38 MW-39 MW-40 MW-41 MW-42 MW-43 MW-44 MW-45 MW-46 MW-47 MW-48 MW-49 MW-50 MW-51 MW-52 MW-53 MW-54 MW-55 MW-56 MW-57 MW-58 MW-59 MW-60 MW-61 MW-62 MW-63 MW-64 MW-65 MW-66 MW-67 MW-68 MW-69 MW-70 MW-71 MW-72 MW-73 MW-74 MW-75 MW-76

6.01'

6.33'

7.43'

7.02'

7.02'

Hollowbore Area

Shipping Area

Machine Shop Area

Heat Treat Area

Former Melt Shop Area

Forge Shop Area

Former Metals Storage Area

Former Area 3 Former Gasoline UST Area

Aluminum Heat Treat Building

Decommissioned Diesel Storage Area

Swarf Storage

Former Slag/Swarf Chip Storage

Stormwater Outfall

FERRY

Boeing/Isaacson Property

N

0 100 200

Scale in Feet

NOTES

1. Groundwater contours based on manual measurements collected on November 2021 during falling tide conditions.
2. Figure adapted from client file, *141500101002_1-8.dwg,* prepared by PES Environmental, Inc. dated July 2017.

Remedial Investigation Report
Jorgensen Forge Corporation Property
Tukwila, Washington

ZONE B
GROUNDWATER CONTOURS
NOVEMBER 2021
GROUNDWATER MONITORING

September 2024 21-1-12596-040

SHANNON & WILSON, INC. **FIG. 8B**

DRAFT FOR PUBLIC COMMENT

Filename: C:\Users\jrs\CAD Group Dropbox\JDrive\211\12596\040\21-1-12596-040 GW Contours.dwg Layout: Figure 14B Date: 08-28-2024 Login: JRS

APPENDIX A: CALCULATIONS OF PROTECTIVE SOIL CONCENTRATIONS

Appendix A

Calculations of Protective Soil Concentrations

CONTENTS

A.1 Calculation Description A-1

Equations

Equation A-1: Three-Phase Partitioning Equilibrium Equation A-1
Equation A-2: Distribution Coefficient Equation A-2
Equation A-3: Equation to Convert to Dimensionless Henry's Law Constant A-2

Table

Table A-1: Calculated Protective Soil Concentrations

APPENDIX A: CALCULATIONS OF PROTECTIVE SOIL CONCENTRATIONS

A.1 CALCULATION DESCRIPTION

This appendix summarizes the calculations to estimate per- and polyfluoroalkyl substances (PFAS) concentrations in soil that are protective of the leaching pathway to surface water.

The three-phase partitioning equilibrium equation was undertaken using Equation 747-1 in Washington State Department of Ecology's Model Toxics Control Act (MTCA) Cleanup Regulation[1]. The equation was used to calculate the PFAS concentration in soil (C_s) that is estimated to be protective of the leaching pathway to surface water. The equation is presented in Equation A-1 below.

Equation A-1: Three-Phase Partitioning Equilibrium Equation (Model Toxics Control Act Equation 747-1)

Equation	Variable and Definition	
$C_S = C_W * UCF * DF * \left[K_d + \frac{\theta_w + \theta_a + H_{cc}}{\rho_b}\right]$	C_s	Soil Concentration (mg/kg)
	C_w	Groundwater Cleanup Level (ug/L)
	UCF	Unit Conversion Factor (1x10-3 mg/ug)
	DF	Dilution Factor (20 unitless)
	K_d	Distribution Coefficient (L/kg)
	Θ_w	Water-Filled Soil Porosity (0.43 unitless)
	Θ_a	Air-Filled Soil Porosity (0 unitless)
	H_{cc}	Henry's Law Constant (unitless)
	ρ_b	Dry Soil Bulk Density (1.5 kg/L)

ug = microgram; kg = kilogram; L = liter; mg = milligram

The default values for non-chemical-specific parameters were used as shown in Equation A-1. Chemical-specific parameters K_d and H_{cc} were obtained from Ecology's Cleanup Levels and Risk Calculator (CLARC)[2]. When values for K_d and H_{cc} were not established in CLARC, they were calculated based on values obtained from the U.S. Environmental Protection Agency's CompTox Chemicals Dashboard[3]. Equations A-2 and A-3 present the derivations for chemical-specific parameters K_d and H_{cc}.

[1] Washington Administrative Code, Chapter 173-340, Model Toxics Control Act, last updated October 12, 2007, accessed May 16, 2023, available: https://app.leg.wa.gov/WAC/default.aspx?cite=173-340
[2] Washington State Department of Ecology, 2024, Cleanup Levels and Risk Calculator: updated July 2024, accessed August 23, 2024, available: https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Contamination-clean-up-tools/CLARC
[3] U.S. Environmental Protection Agency, website: CompTox Chemicals Dashboard v2.2.1, accessed May 16, 2023, available: https://comptox.epa.gov/dashboard/

Equation A-2: Distribution Coefficient Equation (Model Toxics Control Act Equation 747-2)

Equation	Variable and Definition	
$K_d = K_{oc} * f_{oc}$	K_d	Distribution Coefficient (L/kg)
	K_{oc}	Soil Organic Carbon-Water Partitioning Coefficient (L/kg)
	f_{oc}	Soil Fraction of Organic Carbon (0.001 unitless)

Equation A-3: Equation to Convert to Dimensionless Henry's Law Constant

Equation	Variable and Definition	
$H_{cc} = \frac{H'_{cc}}{RT}$	H_{cc}	Henry's Law Constant (unitless)
	H'_{cc}	Henry's Law Constant (atm-m^3/mole)
	R	Ideal Gas Law Constant (8.2×10^{-5} atm-m^3/mole-K)
	T	Water Temperature (298.15 °K = 25 °C)

Source: Katyal and others, 2007[4]

Chemical-specific parameters and the calculated values are provided in Table A-1. Soil protective values were not calculated for perfluoroheptanoic acid (PFHpA), N-Ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA), or N-methyl perfluorooctane-sulfonamidoacetic acid (NMeFOSAA) because there were no water screening levels to use in the calculation.

[4] Katyal, Ashok and Morrison, Robert, 2007, Forensic Applications of Contaminant Transport Models in the Subsurface: Introduction to Environmental Forensics (Second Edition), available: https://www.sciencedirect.com/topics/chemistry/henrys-law#:~:text=Values%20for%20Henry's%20law%20constants,gas%20constant%20(8.20575%20%C3%97%2010

Table A-1: Calculated Protective Soil Concentrations

Symbol Units Source	Selected Water Concentration C_w		Chemical-Specific Parameters						Soil Concentration (Calculated) C_s	
			Distribution Coefficient (K_d)			Henry's Law Constant (H_{cc})				
	ng/L	µg/L	K_d L/kg CLARC	K_{oc} L/kg CompTox	K_d L/kg Equation A-2	H_{cc} unitless CLARC	H_{cc} atm-m3/mole CompTox	H_{cc} unitless Equation A-3	mg/kg	µg/kg
PFOS	1,100	1.1	0.372			1.77E-05			0.00072	0.72
PFOA	119,000	119	0.115			1.46E-04			0.048	48
PFBS	127,000,000	127,000	0.0617				2.95E-10	1.21E-08	44	44,243
PFDA	78,000	78		398	0.40		1.51E-10	6.18E-09	0.053	53
PFDoA	20,000	20		8.51E+04	85.10		3.39E-10	1.39E-08	1.7	1,708
PFHpA	NA	NA		2.09E+03	2.09		2.09E-10	8.55E-09	--	--
PFHxS	10,000	10	0.112				1.95E-10	7.98E-09	0.0040	4.0
PFHxA	638,000,000	638,000	0.0204			9.61E-09			196	196,000
PFNA	8,000	8	0.246				1.17E-09	4.79E-08	0.0043	4.3
PFUnA	10,000	10		1.66E+04	16.60		3.31E-10	1.35E-08	0.169	169
NEtFOSAA	NA	NA		8.13E+04	81.30		2.95E-10	1.21E-08	--	--
NMeFOSAA	NA	NA		1.48E+04	14.80		2.95E-10	1.21E-08	--	--

NOTES:

1 Chemical-specific parameters Kd and Hcc were obtained from Ecology's Cleanup Levels and Risk Calculator (CLARC) (Note 2) . When values for Kd and Hcc were not established in CLARC, they were calculated based on values obtained from the U.S. Environmental Protection Agency's CompTox Chemicals Dashboard (Note 3).

2 Washington State Department of Ecology, 2024, Cleanup Levels and Risk Calculator: updated July 2024, accessed August 23, 2024, available: https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Contamination-clean-up-tools/CLARC

3 U.S. Environmental Protection Agency, website: CompTox Chemicals Dashboard v2.2.1, accessed May 16, 2023, available: https://comptox.epa.gov/dashboard/

-- = not able to calculate because water value unavailable.

µg = microgram; atm = atmosphere; Cs = soil concentration; Cw = groundwater cleanup level; kg = kilogram; Koc = soil organic carbon-water partitioning coefficient; L = liter; mg/kg = milligrams per kilogram; m3 = cubic meters; NA = not available; NEtFOSAA = N-ethylperfluorooctanesulfonamidoacetic acid; ng = nanogram; NMeFOSAA = N-methylperfluorooctanesulfonamidoacetic acid; PFBS = Perfluorobutanesulfonic acid; PFHpA = Perfluoroheptanoic acid; PFHxA = Perfluorohexanoic acid; PFHxS = Perfluorohexanesulfonic acid; PFNA = Perfluorononanoic acid; PFOA = perfluorooctanoic acid; PFOS = perfluorooctanesulfonic acid

APPENDIX B: DISPOSAL OF AFFF SYSTEMS, FIELD REPORT, JUNE 2022

Appendix B

Disposal of AFFF Systems, Field Report, June 2022

CONTENTS

- DH Environmental, June 2022, Field Report, Disposal of AFFF Systems, 10 pages

DH Environmental Inc 1011 SW Klickitat Way, #107 Seattle, Washington 98134 (206) 293-3126	**FIELD REPORT**		File Name: FR Star Forge - AFFF Disposal 06142022
	Project: Star Forge AFFF System Disposal		Date: 06/14 and 6/15, 2022
	Owner: Star Forge	Time of Arrival: 0800	Report Number: 1
Prepared by: Nathan Moxley, LHG	Location: Former 660-ton & 2,500-ton presses	Time of Departure: 1600	Page: Page 1 of 2
Purpose of Site Visit: Disposal of AFFF Systems	Weather: Indoors	Travel/Prep. Time: 4 hr.	Project/Contract Number:

Upon arrival to the site, I assessed personal safety hazards: ☒ Yes or ☒ Referred to Site Safety Plan and Safety Tailgate if applicable
Safety Hazards Were Addressed by: ☒ Performing toolbox safety meeting ☒ Donning PPE, and observing safety standards

Site Visit Purpose and Details:

Drain AFFF liquids and dispose of the AFFF vessels and associated piping near the former 660-ton and 2,500-ton presses.

Summary of Field Activities:

DH crew arrived on site approximately 0800 on 6/14. Crew consisted of Nathan Moxley, Dave Hill, Brian Johnson, Jacob Briere, and Al Leiataua. Travis Forslund was also on-site fueling light stands and performing maintenance of stormwater BMPs.

660-ton AFFF Vessel:

Following a tailgate safety meeting, the 660-ton AFFF vessel was drained. Plastic sheeting and spill pads were placed below the drain valve, and a male NPT x hose barb fitting was threaded into the drain valve with plumber's tape. A hose was clamped to the fitting, which ran down to an empty drum which was also placed on plastic sheeting. A small amount of defoaming agent was added to the drum to prevent potential foaming of the AFFF product as it was drained from the vessel. The upper valves on the vessel were opened to provide venting, the drain valve was opened on the vessel, and the contents drained into the drum. All valves above the drain valve were then opened allow any potential liquids still in the pipes to drain out. Once all liquid had been drained from the vessel, the drain valve was closed. Piping was then disconnected from the top of the vessel.

No product dripped from the piping and absorbent pads were stuffed into the piping lines to absorb any potential liquids that might still be present. The inside of the vessel was inspected with a flashlight to confirm the vessels were empty, and no product was visible. Three diaphragms were present inside the vessel. The diaphragms appeared to be a light-colored rubber type membrane, arranged in a triangle around the perimeter of the vessel. The diaphragms appeared to be partially air filled and were easily compressed with pressure. A bag of diatomaceous earth granular absorbent was added to the vessel to absorb any liquid residue that might still be present, and the lid was secured back to the vessel. A long-reach forklift was extended above the vessel, and rigging chains were hooked to the lifting eyes. The bolts securing the vessel to the mounts were seized and could not be removed, so the four mounting legs were cut using a reciprocating saw. The vessel was then hoisted down and secured to a pallet which had been placed over a plastic liner. The vessel top was removed, and the entire vessel was filled with diatomaceous earth granular absorbent at the request of the disposal facility (they cannot place empty vessels into a landfill due to concerns about settling). The lid was resecured to the vessel, and the vessel was placed into a lined roll-off box for disposal. The remaining pieces of piping were then lowered onto the plastic sheeting using the same forklift, before also being placed into the roll-off with the vessels. The drum of AFFF product was loaded onto a truck for transport to the disposal facility. All plastic sheeting was bundled up with the PPE, and also placed into the roll-off.

2,500-ton AFFF vessel:

Once the 660-ton AFFF vessel was removed, the crew mobilized to the 2,500-ton AFFF vessel. The same steps outlined above were performed at the 2,500-ton vessel. The vessel was drained and inspected, and it appeared to be exactly the same configuration as the 660-ton vessel. After inspection, a bag of diatomaceous earth granular absorbent was added to the vessel to absorb any potential liquid residues, and the lid was secured to the vessel. Absorbent pads were secured with plastic and tape to any open piping ends, and the crew packed up for the day. All associated debris was placed into the roll-off, and the two drums of AFFF product were transported to Chemical Waste Management for disposal.

Crews were offsite at approximately 1600.

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The following day, 6/15, the same crew returned to the site to finish removing the empty AFFF vessel and piping from the former 2,500-ton press room. The vessel was unbolted from the floor and lowered to the ground on top of plastic sheeting using the forklift. The lid was removed from the vessel and the vessel was filled with granular absorbent before securing the lid back on. The vessel was then strapped to a pallet and placed inside the lined roll-off container. The remaining piping pieces were then removed in the same manner. No liquids were present in the piping, and absorbent pads were secured inside the open ends of each pipe segment prior to loading it in the roll-off. The piping was disconnected in sections so they would fit inside the roll-off. All piping from the vessel to the sprinkler distribution lines was removed. Once complete, all plastic sheeting and PPE was packaged up and placed into the roll-off for disposal.

The roll-off was removed from the site by Chemical Waste Management on 6/16/2022, for disposal at Chemical Waste Management in Arlington, OR (a permitted RCRA Part B Facility - ORD 089452353).

Photos are included in the attached photo log, along with copies of the manifests.

☐ **THIS FIELD REPORT IS FINAL** This report presents observations and/or a record of field activities of the work performed. The Field Representative certifies the report was prepared with the intent to portray a true and accurate representation of the work performed or the observations made.	**FIELD REPRESENTATIVE:** Nathan Moxley, LHG	**DATE:** 06/16/2022
☒ **THIS FIELD REPORT IS FINAL** This report presents observations and/or a record of field activities of the work performed. The Reviewer certifies the report has been reviewed and is ready for release to the Client to support work product and/or deliverables without exception.	**REVIEWED BY:** David J. Hill, PE, CHMM, CPEA; Principal	**DATE:** 6/24/2022

This report presents observations and a record of field activities relating to our services only. Other work may have been performed on this project that was not under the direction or guidance of DH Environmental, Inc. Our work did not include supervision or direction of the work of others. DH Environmental, Inc. is not responsible for job or site safety of others on this project. DISCLAIMER: Any electronic form, facsimile, or hard copy of the original document (email, text, table, and/or figure), if provided, and any attachments are only a copy of the original document. The original document is stored by DH Environmental, Inc. and will serve as the official document of record.

ATTACHMENTS:

☒Site Photos ☐Sketch ☐Chain of Custody ☒Other: Manifests
☐Sample Log ☐Drawing(s) ☐Calibration Records

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Photo Log
AFFF Tank Draining and Disposal
6/14 and 6/15, 2022
Former Jorgensen Forge Facility, Tukwila, WA



Photo 1: Drain setup for the 660-ton AFFF tank. View to the east.



Photo 2: Drain hose connected to the 660-ton AFFF tank. View to the north.

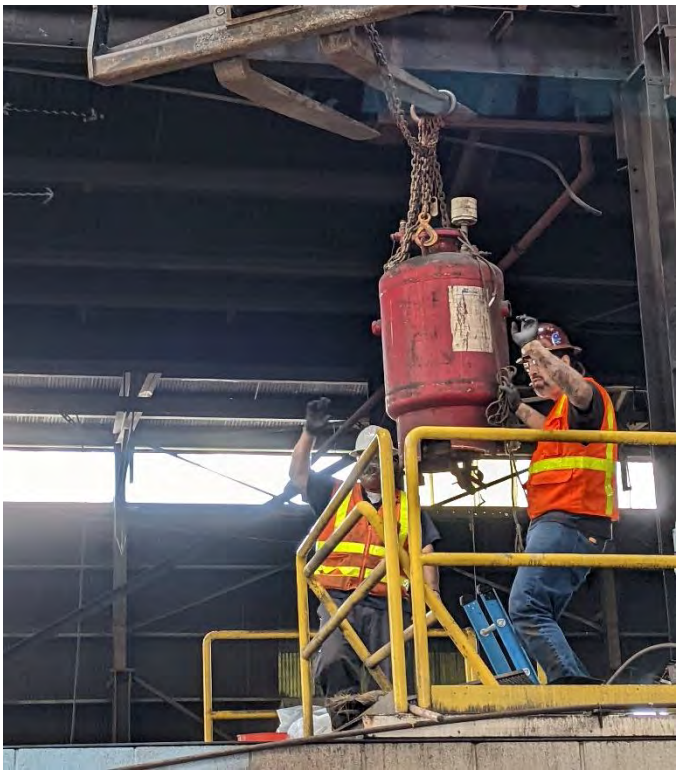


Photo 3: Lowering the 660-ton AFFF vessel to the ground. View to the south.



Photo 4: Diatomaceous earth granular absorbent inside the AFFF vessel from the 660-ton press. View to the southeast.



Photo 5: Former location of the 660-ton AFFF vessel. The legs had to be cut from the base of the vessel because the bolts securing it to the floor were seized and could not be removed. View to the north.



Photo 6: 660-ton AFFF vessel prior to loading into the roll-off. View to the west.



Photo 7: Drain hose connected to the 2,500-ton AFFF tank. View to the east.



Photo 8: Draining the 2,500-ton AFFF vessel. View to the southeast.



Photo 9: Former location of the 2,500-ton AFFF vessel. View to the east.



Photo 10: Drums of AFFF product secured to the truck for transport to Chemical Waste Management. View to the southwest.



Photo 11: AFFF vessels and piping inside the roll-off. View to the north.



Photo 12: Roll-off secured prior to transport. View to the southwest.

Please print or type.

Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Manifest Tracking Number
WAD000602813	1	800-337-7455	023708603 JJK

GENERATOR

5. Generator's Name and Mailing Address
Star Forge LLC DBA Jorgensen Forge
8531 E Marginal Way S
Seattle WA 98108
Att: Wayne R Turk
Generator's Phone: 206 255-8177

Generator's Site Address (if different than mailing address)

6. Transporter 1 Company Name
Chemical Waste Management RTransport
U.S. EPA ID Number: ORD089452353

7. Transporter 2 Company Name
U.S. EPA ID Number:

8. Designated Facility Name and Site Address
CHEMICAL WASTE MANAGEMENT, INC
17629 CEDAR SPRINGS LANE
ARLINGTON OR 97812
Facility's Phone: 541 454-2643
U.S. EPA ID Number: ORD089452353

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
	1. Material Not Regulated by DOT (Washington State Dangerous Waste Only, Persistant)	01	CM	4	Y	WP02
	2.					
	3.					
	4.					

14. Special Handling Instructions and Additional Information
1) Profile# OR350789

15. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: David H. Hill on behalf of Star Forge LLC
Signature: David S. Hill
Month: 06 Day: 16 Year: 22

INT'L

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

TRANSPORTER

17. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: Nick Watkins
Signature:
Month: 06 Day: 16 Year: 22

Transporter 2 Printed/Typed Name:
Signature:
Month: Day: Year:

DESIGNATED FACILITY

18. Discrepancy

18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

18b. Alternate Facility (or Generator)
U.S. EPA ID Number:
Facility's Phone:

18c. Signature of Alternate Facility (or Generator)
Month: Day: Year:

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)

1.	2.	3.	4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a

Printed/Typed Name:
Signature:
Month: Day: Year:

EPA Form 8700-22 (Rev. 12-17) Previous editions are obsolete.

GENERATOR'S INITIAL COPY

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Please print or type.

Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number: WAD000602813
2. Page 1 of: 1
3. Emergency Response Phone: 800-337-7455
4. Manifest Tracking Number: 023708599 JJK

GENERATOR

5. Generator's Name and Mailing Address
Att: Wayne R Turk
Star Forge LLC DBA Jorgensen Forge
8531 E Marginal Way S
Seattle WA 98108
Generator's Phone: 206 255-8177

Generator's Site Address (if different than mailing address)

6. Transporter 1 Company Name: DH Environmental Inc.
U.S. EPA ID Number: WAH000017217

7. Transporter 2 Company Name: Chemical Waste Management
U.S. EPA ID Number: ORD089452353

8. Designated Facility Name and Site Address
CHEMICAL WASTE MANAGEMENT, INC
17629 CEDAR SPRINGS LANE
ARLINGTON OR 97812
Facility's Phone: 541 454-2043
U.S. EPA ID Number: ORD089452353

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
	1. Material Not Regulated by DOT (Washington State Dangerous Waste Only, Persistant)	002	DM	80	G	WP02
	2.					
	3.					
	4.					

14. Special Handling Instructions and Additional Information
1) Profile# OR38U784

15. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: David H. on behalf of Star Forge LLC
Signature: David S. Hill
Month: 6 Day: 14 Year: 22

INT'L

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

TRANSPORTER

17. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: Jacob Brice
Signature:
Month: 6 Day: 14 Year: 22

Transporter 2 Printed/Typed Name: RECEIVED
Signature:
Month: 6 Day: 14 Year: 22

DESIGNATED FACILITY

18. Discrepancy

18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

18b. Alternate Facility (or Generator)
U.S. EPA ID Number
Facility's Phone:

18c. Signature of Alternate Facility (or Generator)
Month: Day: Year:

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)

1.	2.	3.	4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a

Printed/Typed Name
Signature
Month: Day: Year:

EPA Form 8700-22 (Rev. 12-17) Previous editions are obsolete.

GENERATOR'S INITIAL COPY

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APPENDIX C: PHOTOS OF AFFF FIRE SUPPRESSION SYSTEMS AND STORAGE

Appendix C

Photos of AFFF Fire Suppression Systems and Storage Areas

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APPENDIX C: PHOTOS OF AFFF FIRE SUPPRESSION SYSTEMS AND STORAGE



Exhibit C-1: 660-Ton Press AFFF System (November 2021) (Tank Above Pump Room Structure)



Exhibit C-2: 660-Ton Press AFFF System Tank (November 2021)

APPENDIX C: PHOTOS OF AFFF FIRE SUPPRESSION SYSTEMS AND STORAGE

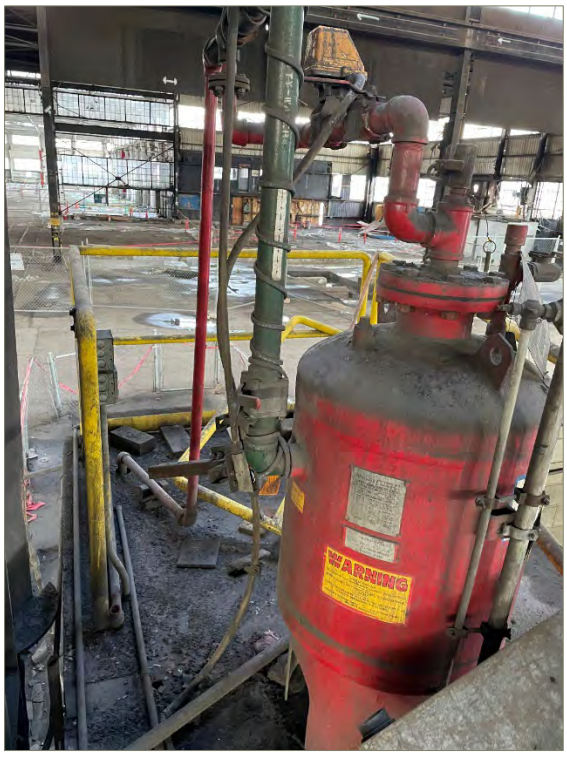


Exhibit C-3: 660-Ton Press AFFF System Tank (November 2021)



Exhibit C-4: 660-Ton Press AFFF System (November 2021) (Metal Placard)



Exhibit C-5: 660-Ton Press AFFF System (November 2021) (Service Tags)



Exhibit C-6: 660-Ton Press AFFF System (November 2021) (Service Tags)



Exhibit C-7: 660-Ton Press AFFF System (November 2021) (Service Labels)



Exhibit C-8: 1,250-Ton Press AFFF System (September 2018) (Tank Above Pump Room Structure)



Exhibit C-9: 1,250-Ton Press AFFF System (November 2021) (Press and AFFF System Removed)



Exhibit C-10: 2,500-Ton Press AFFF System (January 2022) (Tank Above Pump Room Structure)



Exhibit C-11: 2,500-Ton Press AFFF System Tank (January 2022)



Exhibit C-12: 2,500-Ton Press AFFF System Tank (November 2021) (Metal Placard)



Exhibit C-13: 2,500-Ton Press AFFF System Tank (January 2022) (Tank and Discharge Pipes)



Exhibit C-14: 2,500-Ton Press AFFF System (January 2022) (Discharge to V2)



Exhibit C-15: AFFF Placard on Wall Adjacent to Q1/Q2/Q3 Vault (January 2022)

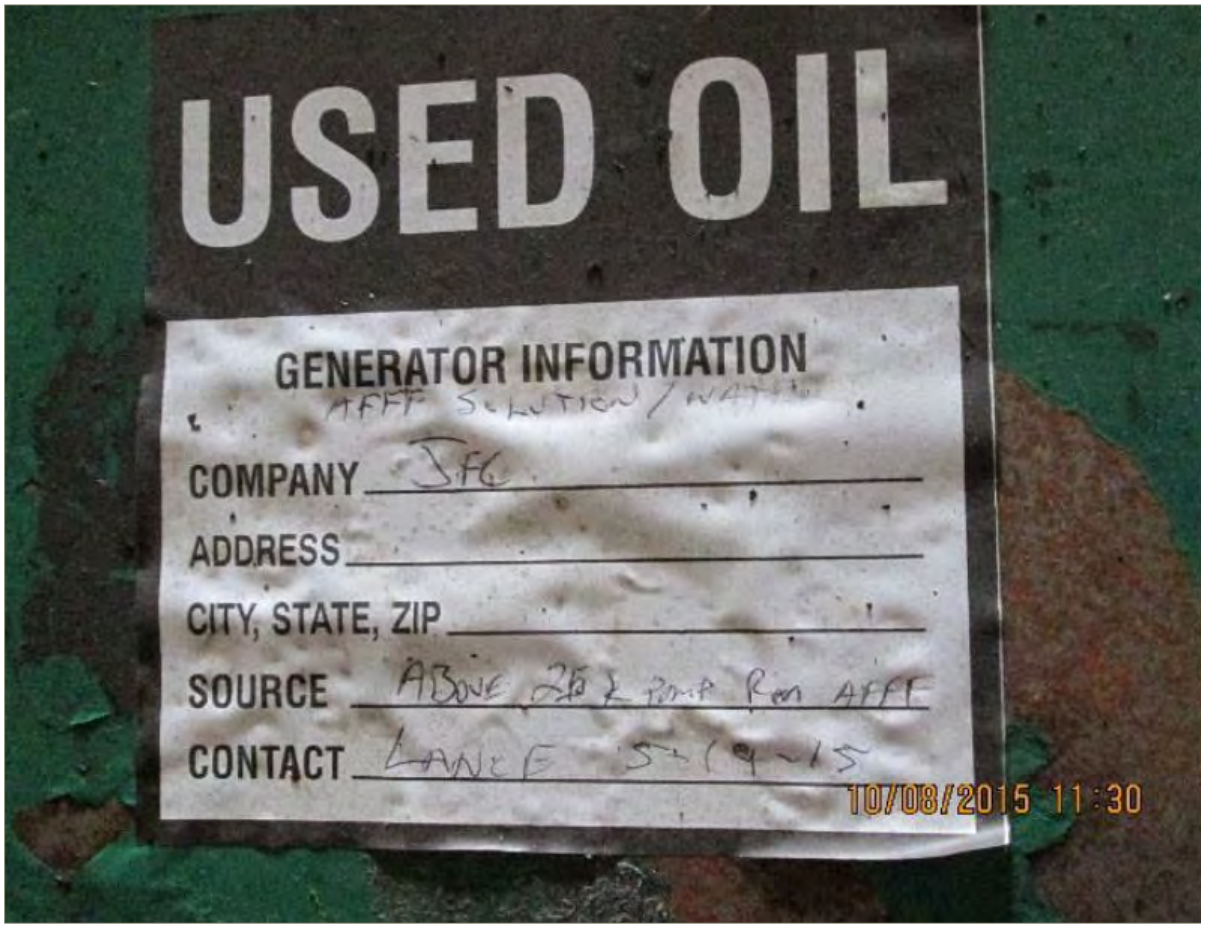


Exhibit C-16: Drum Label for AFFF Solution/Water Drum (October 2015) (Used Oil Storage Building)

APPENDIX D: STAR FORGE RESPONSE TO AFFF QUESTIONS, MARTEN LAW, JUNE

Appendix D

Star Forge Response to AFFF Questions, Marten Law, June 2022

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- Star Forge Response to AFFF Questions, Letter prepared by Marten Law, Portland, Ore., to Washington Department of Ecology, Shoreline, Wash., June 3, 2022, 7 pages

MARTEN LAW

June 3, 2022

Via Email

Maureen Sanchez
Washington Department of Ecology
5700 Dayton Ave. N.
Shoreline, WA 98133

Re: Star Forge Response to AFFF Questions

Dear Ms. Sanchez:

I am writing on behalf of our client, Star Forge, LLC (Star Forge), in response to your email to David Hill, dated May 18, 2022, requesting responses to a series of questions about aqueous film forming foam (AFFF) systems at the former Jorgensen Forge facility in Tukwila, Washington. This letter provides additional information supporting DH Environmental's response by letter dated June 1, 2022.

Star Forge is not aware of any release of AFFF during its ownership of the facility and we have not been presented with any evidence of such a release during its ownership. As discussed below in our responses, and in the attached declaration, at least one release of AFFF occurred at the facility prior to Star Forge's ownership.

As I believe you know, Star Forge acquired the facility after liability issues for past contamination were addressed in a settlement agreement in U.S. Bankruptcy Court. Under the terms of that settlement, the State of Washington and a former owner, Earle M. Jorgensen company (EMJ), agreed to negotiate and enter into an Agreed Order pursuant to which EMJ took over a facility-wide Model Toxics Control Act (MTCA) investigation and cleanup for which the bankrupt owner, Jorgensen Forge Corporation, had been responsible under an enforcement order issued by Ecology on March 16, 2015. Settling insurers agreed to fund the cleanup work by EMJ under that Agreed Order. The State of Washington agreed that "upon written acknowledgment that EMJ has completed all actions required under the Ecology-EMJ Order," the State would provide a covenant not to sue Star Forge under MTCA. In other words, pre-existing contamination was to be cleaned up by a prior owner, funded by the insurers for prior owners.

Your email of May 18 indicates that "regardless of the outcome of sampling of the AFFF system contents, that concrete potentially exposed to PFAS-containing

D - 503 . 241 . 2643 | E - rallan@martenlaw.com | 1050 SW Sixth Ave, Suite 2150, Portland, OR 97204

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foam and or standing water must be sampled and addressed (removed and disposed) appropriately." We do not believe there is a regulatory basis on which concrete potentially exposed to per- and polyfluoroalkyl substances (PFAS) would have to be removed by Star Forge under the Interim Action Work Plan (IAWP). The regulatory connection for the current three elements of the IAWP is clear. As the owner of the underground storage tanks (USTs) at the facility, Star Forge is removing the USTs to achieve compliance with Ecology's UST regulations. Similarly, Star Forge must achieve clean closure of the dangerous waste management units (DWMUs) to comply with Ecology's Dangerous Waste regulations. Any soil removal to facilitate paving is included under the IAWP because the entire facility is a MTCA cleanup site and Ecology has indicated that soil removal on a MTCA cleanup site, preceding implementation of a Cleanup Action Plan, must be addressed as an interim action.

It was only recently discovered that the AFFF vessels currently on-site still contained AFFF product. Prior to 2020, Star Forge had commenced with Clean Closure activities and it was believed that these vessels had been drained and the product appropriately managed at that time. It was always understood that the vessels and associated piping would be disposed of as part of the demolition work, similar to all other scrap metal and piping at the facility, and which is entirely separate from the work proposed in the IAWP.

Even if the AFFF designates as dangerous waste, there is no regulatory basis under Clean Closure or other scope covered under the proposed IAWP, for requiring Star Forge to sample and possibly remove concrete if there is no evidence of a release of AFFF during Star Forge's ownership. The only planned removal of concrete by Star Forge is in connection with the slabs for the DWMUs, pursuant to the IAWP. Work under the IAWP would not compromise or interfere with future testing of concrete in the vicinity of the AFFF systems. If Ecology believes that future testing of the concrete is necessary, that testing can and should proceed independently of the work under the IAWP. Furthermore, that testing should be conducted as part of the Site investigation activities under the Agreed Order with EMJ.

Questions regarding purchase, disposal and use of AFFF at the facility prior to Star Forge's ownership should be directed to EMJ, the prior owner of the site. To assist Ecology with its investigation, we have included what information we have learned about potential AFFF releases preceding Star Forge's ownership. In support of our responses, we provide the attached declaration from Michael Lewis, a former employee who worked at the Jorgensen Forge facility from 1983 until 2019. We cannot speculate, however, regarding how and when the AFFF fire suppression systems were otherwise used during the decades when EMJ and its successor, Jorgensen Forge Corporation, owned and operated the facility.

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- ***Describe the activities Star Forge has already conducted to decommission the AFFF vessels, fire suppression lines, conveyance systems, etc., and the timing of such activities.***

There were four fire suppression systems associated with the presses at Jorgensen Forge, one for each of the four presses. The systems were not connected with each other. Three of the systems used AFFF solution: the systems for the 2,500-ton press, the 1,250-ton press, and the 660-ton press. In these systems, the AFFF solution was stored in tanks and connected to the system with pipes. The 5,000-ton press originally used carbon dioxide; it was altered in the 1980s to use water only. Lewis Declaration ¶¶ 5-7.

Although the presses were auctioned and removed in 2019, the AFFF systems and some associated piping formerly serving the 660-ton press and the 2,500-ton press remain. DH Environmental photographed both systems; the photo logs are attached to DH Environmental's June 1, 2022 letter as Attachments 1 and 2. Both systems are concentrate control supply (CCS) systems manufactured by Arrow Tank and Engineering Co.: http://www.arrowtank.com/fire-protection.html

When the 2,500-ton press was removed from the Jorgensen Forge facility in 2019, the pipes associated with its fire suppression system were cut. When the pipes were cut, the valves that allow AFFF solution to leave the tank were in the closed position and the water supply needed to disperse the foam was turned off. The tank holding the AFFF solution was not disturbed, the pipes were dry when cut, and no liquid escaped. Lewis Declaration ¶¶ 13-14. That is consistent with the manufacturer's description of its CCS systems. The webpage provided above indicates that "only flowing water under pressure is required for delivery of foam solution." Without a pressurized source of flowing water, AFFF is not discharged.

We have not located Star Forge employees who witnessed the removal of the 660-ton press. As noted above, the AFFF system for the 1,250-ton press is no longer present. We have not yet been able to confirm that the AFFF system was taken by the purchaser of that press or if it was removed separately. We did learn, however, that the AFFF system for the 1,250-ton press was activated at some time prior to Star Forge's ownership of the facility. Lewis Declaration ¶ 8.

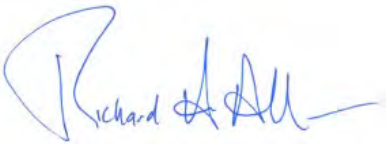
- ***Were the AFFF vessels drained, rinsed, and/or purged prior to Star Forge adding AFFF product, and, if so, how were the liquids in the system disposed?***

Response: AFFF solution was not purged from or replaced in the three AFFF fire suppression systems after Star Forge took ownership of the facility in late 2016. Lewis Declaration ¶ 12. The most recent disposal records for AFFF are from 2015, prior to Star Forge's ownership. Those manifests are attached to the DH Environmental letter as Attachment 6. As discussed in the letter from DH

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Environmental, the most recent purchase order for AFFF is from March 2009; the AFFF purchased at that time was from a supplier that exclusively provides non-fluorinated AFFF.

Sincerely,



Richard H. Allan

cc: (by email)
Katy Harvey
Chris Kelley
John Level
Andrew Imke
Erik Snyder
Kelsey Ketcheson

Attachment: Declaration of Michael Lewis

DRAFT FOR PUBLIC COMMENT

DECLARATION OF MICHAEL LEWIS

STATE OF TEXAS §
§
COUNTY OF HARRIS §

I, Michael Lewis, declare as follows:

1. I reside at 30807 Berkshire Downs Dr., Tomball, TX 77375.

2. I am of sound mind, over the age of eighteen, and competent to swear to the facts stated herein.

3. I worked at Jorgensen Forge in Tukwila, Washington from 1983 until 2019. My work at the Jorgensen Forge facility generally involved maintenance of equipment, including the fire suppression systems associated with the facility's forging presses. I make this declaration to the best of my memory and did not review any records in recalling the facts contained herein.

4. I was employed by owners of the Jorgensen Forge facility during the entirety of the events described herein. All of my own associated actions were undertaken in the scope of my employment at Jorgensen Forge.

5. There were four presses at the Jorgensen Forge facility until they were sold and removed in 2019: a 5,000 ton press, a 2,500 ton press, a 1,250 ton press, and a 660 ton press. Each press had a separate enclosed fire suppression system.

6. The 5,000 ton press fire suppression system originally had a carbon dioxide fire suppression system, which was changed to a water sprinkler system in the 1980s. It did not use Aqueous Film Forming Foam ("AFFF").

7. The 2,500 ton press, the 1,250 ton press, and the 660 ton press fire suppression systems all used a mix of AFFF solution and water. In general, these systems would mix AFFF solution with water and send the combined mixture through sprinkler heads into the enclosed

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area of each press. The AFFF solution was stored in tanks and connected to the system with pipes.

8. Before Star Forge purchased the Jorgensen Forge facility, there was an incident where the 1,250 ton press fire suppression system was inadvertently activated by an outside contractor. The activation resulted in the discharge of a combined mixture of AFFF solution and water which filled the enclosed area of the 1,250 ton press.

9. To the best of my knowledge, none of the other fire suppression systems were ever activated or discharged during my employment at Jorgensen Forge. No activation occurred after Star Forge purchased the Jorgensen Forge facility.

10. Following the activation of the 1,250 ton press fire suppression system, it was refilled with new AFFF solution.

11. The AFFF solution for the 2,500 ton and 660 ton press fire suppression systems were also replaced with new AFFF solution after the activation of the 1,250 ton press fire suppression system. The old AFFF solution would be removed and stored in 55 gallon drums. An outside contractor would then haul those 55 gallon drums full of old AFFF solution away.

12. No AFFF solution was removed from or replaced in any of the fire suppression systems after Star Forge took ownership of the Jorgensen Forge facility.

13. In 2019, the 2,500 ton press was purchased by my current employer, Forged Components, who I was moving to Texas to work for. After it was sold, the 2,500 ton press was removed from the Jorgensen Forge facility. I witnessed the removal of the 2,500 ton press. The fire suppression system for the 2,500 ton press was left behind.

14. To remove the 2,500 ton press, certain downstream pipes associated with its fire suppression system needed to be cut. Prior to cutting those pipes, the valves which prevented

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AFFF solution from leaving the tank were in the closed position. The system required pressure from the water supply to disperse foam; the water supply was turned off. The tank which held the AFFF solution was not disturbed. The pipes were dry when they were cut, and no liquid escaped.

15. I was only present for the removal of the 2,500 ton press, as this was the only press that was purchased by my current employer, Forged Components. I did not witness the removal of the 1,250 ton press or the 660 ton press, or any concurrent work to remove or alter the fire suppression systems associated with those presses.

I declare under penalty of perjury that this declaration is true and correct.

Michael Lewis

Michael Lewis

6-2-2022

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APPENDIX E: BORING LOGS

Appendix E

Boring Logs

CONTENTS

- Figure E-1: Log of Boring MW-77
- Figure E-2: Log of Boring MW-78
- Figure E-3: Log of Boring MW-79
- Figure E-4: Log of Geoprobe SB-2022-001
- Figure E-5: Log of Geoprobe SB-2022-002

Figure E-6: Log of Geoprobe SB-2022-003

SOIL DESCRIPTION AND LOG KEY

Jorgensen Forge Corporation Property
PFAS Investigation Report
Tukwila, Washington

Shannon & Wilson uses a soil identification system modified from the Unified Soil Classification System (USCS). Elements of the USCS and other definitions are provided on this and the following page. Soil descriptions are based on visual-manual procedures (ASTM D2488) and laboratory testing procedures (ASTM D2487), if performed.

Structure[1]

Interbedded	Alternating layers of varying material or color with layers at least 1/4-inch-thick; singular: bed.
Laminated	Alternating layers of varying material or color with layers less than 1/4-inch-thick; singular: lamination.
Fissured	Breaks along definite planes or fractures with little resistance.
Slickensided	Fracture planes appear polished or glossy; sometimes striated.
Blocky	Cohesive soil that can be broken down into small angular lumps that resist further breakdown.
Lensed	Inclusion of small pockets of different soils, such as small lenses of sand scattered through a mass of clay.
Homogeneous	Same color and appearance throughout.

Angularity and Shape[1]

Angular	Sharp edges and unpolished planar surfaces.
Subangular	Similar to angular, but with rounded edges.
Subrounded	Nearly planar sides with well-rounded edges.
Rounded	Smoothly curved sides with no edges.
Flat	Width/thickness ratio > 3.
Elongated	Length/width ratio > 3.

Standard Penetration Test (SPT)[3]

Hammer	140 pounds with a 30-inch free fall. Rope on 6- to 10-inch-diameter cathead 2-1/4 rope turns, > 100 rpm. If automatic hammers are used, blow counts shown on boring logs should be adjusted to account for efficiency of hammer.
Sampler	10 to 30 inches long Shoe I.D. = 1.375 inches Barrel I.D. = 1.5 inches Barrel O.D. = 2 inches
N-Value	Sum blow counts for second and third 6-inch increments. Refusal: 50 blows for 6 inches or less or 10 blows for 0 inch.

Moisture Content

Dry	Absence of moisture, dusty, dry to the touch.
Moist	Damp but no visible water.
Wet	Visible free water, from below water table.

Gradation

Poorly Graded	Narrow range of grain sizes present or, within the range of grain sizes present, one or more sizes are missing (Gap Graded). Meets criteria in ASTM D2487, if tested.
Well-Graded	Full range and even distribution of grain sizes present. Meets criteria in ASTM D2487, if tested.

Cementation[1]

Weak	Crumbles/breaks with handling or slight finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

Plasticity[2]

Nonplastic	Cannot roll a 1/8-in. thread at any water content.	PI < 4
Low	A thread can barely be rolled and a lump cannot be formed when drier than the plastic limit.	4 < PI < 10
Medium	A thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. A lump crumbles when drier than the plastic limit.	10 < PI < 20
High	It takes considerable time rolling and kneading to reach the plastic limit. A thread can be rerolled several times after reaching the plastic limit. A lump can be formed without crumbling when drier than the plastic limit.	PI > 21

Additional Terms

Mottled	Irregular patches of different colors.
Bioturbated	Soil disturbance or mixing by plants or animals.
Diamict	Nonsorted sediment; sand and gravel in silt and/or clay matrix.
Cuttings	Material brought to surface by drilling.
Slough	Material that caved from sides of borehole.
Sheared	Disturbed texture, mix of strengths.

Notes:

[1]Reprinted, with permission, from ASTM D2488 - 09a Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428. A copy of the complete standard may be obtained from ASTM International, www.astm.org.

[2]Adapted, with permission, from ASTM D2488 - 09a Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428. A copy of the complete standard may be obtained from ASTM International, www.astm.org.

[3]Penetration resistances (N-values) shown on boring logs are as recorded in the field and have not been corrected for hammer efficiency, overburden, or other factors.

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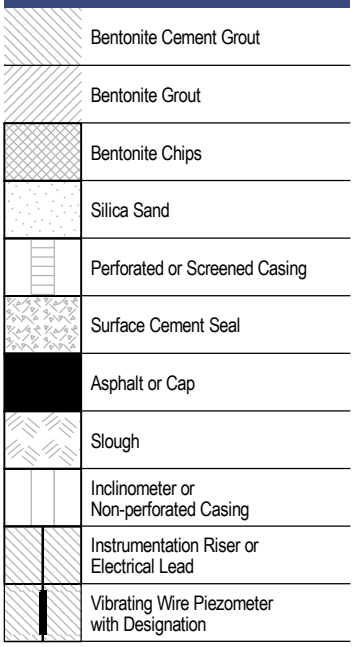
Unified Soil Classification System (USCS)
Modified From USACE Tech Memo 3-357, ASTM D2487, and ASTM D2488

Major Divisions			Symbol	Typical Identifications
Coarse-Grained Soils (more than 50% retained on No. 200 sieve)	Gravels (more than 50% of coarse fraction retained on No. 4 sieve)	Gravel (less than 5% fines)	GW	Well-graded Gravel; Well-graded Gravel with Sand
			GP	Poorly Graded Gravel; Poorly Graded Gravel with Sand
		Silty or Clayey Gravel (more than 12% fines)	GM	Silty Gravel; Silty Gravel with Sand
			GC	Clayey Gravel; Clayey Gravel with Sand
	Sands (50% or more of coarse fraction passes the No. 4 sieve)	Sand (less than 5% fines)	SW	Well-graded Sand; Well-graded Sand with Gravel
			SP	Poorly Graded Sand; Poorly Graded Sand with Gravel
		Silty or Clayey Sand (more than 12% fines)	SM	Silty Sand; Silty Sand with Gravel
			SC	Clayey Sand; Clayey Sand with Gravel
Fine-Grained Soils (50% or more passes the No. 200 sieve)	Silts and Clays (liquid limit less than 50)	Inorganic	ML	Silt; Silt with Sand or Gravel; Sandy or Gravelly Silt
			CL	Lean Clay; Lean Clay with Sand or Gravel; Sandy or Gravelly Lean Clay
		Organic	OL	Organic Silt or Clay; Organic Silt or Clay with Sand or Gravel; Sandy or Gravelly Organic Silt or Clay
	Silts and Clays (liquid limit 50 or more)	Inorganic	MH	Elastic Silt; Elastic Silt with Sand or Gravel; Sandy or Gravelly Elastic Silt
			CH	Fat Clay; Fat Clay with Sand or Gravel; Sandy or Gravelly Fat Clay
		Organic	OH	Organic Silt or Clay; Organic Silt or Clay with Sand or Gravel; Sandy or Gravelly Organic Silt or Clay
Highly Organic Soils	Primarily organic matter, dark in color, and organic odor		PT	Peat or other highly organic soils (see ASTM D4427)

Acronyms and Abbreviations

ATD	At Time of Drilling	MgO	Magnesium Oxide	psi	Pounds per Square Inch
Diam.	Diameter	mm	Millimeter	PVC	Polyvinyl Chloride
Elev.	Elevation	MnO	Manganese Oxide	rpm	Rotations per Minute
ft	Feet	NA	Not Applicable or Not Available	SPT	Standard Penetration Test
FeO	Iron Oxide	NP	Nonplastic	USCS	Unified Soil Classification System
gal	Gallons	O.D.	Outside Diameter	q_u	Unconfined Compressive Strength
Horiz.	Horizontal	OW	Observation Well	VWP	Vibrating Wire Piezometer
HSA	Hollow-Stem Auger	pcf	Pounds per Cubic Foot	Vert.	Vertical
I.D.	Inside Diameter	PID	Photoionization Detector	WOH	Weight of Hammer
in	Inches	PMT	Pressuremeter Test	WOR	Weight of Rods
lbs	Pounds	ppm	Parts per Million	Wt	Weight

Well and Backfill Symbols



Relative Density
Cohesionless Soils

N, SPT, Blows/ft	Relative Density
< 4	Very loose
4 - 10	Loose
10 - 30	Medium dense
30 - 50	Dense
> 50	Very dense

Relative Consistency
Cohesive Soils

N, SPT, Blows/ft	Relative Consistency
< 2	Very soft
2 - 4	Soft
4 - 8	Medium stiff
8 - 15	Stiff
15 - 30	Very stiff
> 30	Hard

Percentages[1, 2]

Trace	< 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

Notes:

Dual symbols *(symbols separated by a hyphen, i.e., SP-SM, Sand with Silt)* are used for soils with between 5% and 12% fines or when the liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart. Graphics shown on the logs for these soil types are a combination of the two graphic symbols (e.g., SP and SM).

Borderline symbols *(symbols separated by a slash, i.e., CL/ML, Lean Clay to Silt; SP-SM/SM, Sand with Silt to Silty Sand)* indicate that the soil properties are close to the defining boundary between two groups.

No. 4 size = 4.75 mm = 0.187 in.; No. 200 size = 0.075 mm = 0.003 in.

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Total Depth:	*21.5 ft.*	Northing:		Drilling Method:	*Hollow Stem Auger*	Hole Diam.:	*10 in.*
Top Elevation:	*~*	Easting:		Drilling Company:	*Holt Services*	Rod Diam.:	*NWJ*
Vert. Datum:	*NAVD 88*	Station:		Drill Rig Equipment:	*Truck Mobile Drill B-58*	Hammer Type:	*Automatic*
Horiz. Datum:	*WA-N NAD83/11*	Offset:		Other Comments:	*Ecology well tag ID BPL-579.*		

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.

Depth, ft. | Symbol | Samples | Ground Water | Depth, ft.

PENETRATION RESISTANCE (blows/foot)

▲ Hammer Wt. & Drop: *140 lbs / 30 inches*

Brown, *Silty Sand (SM)*; moist; predominantly coarse sand; more silt with depth.

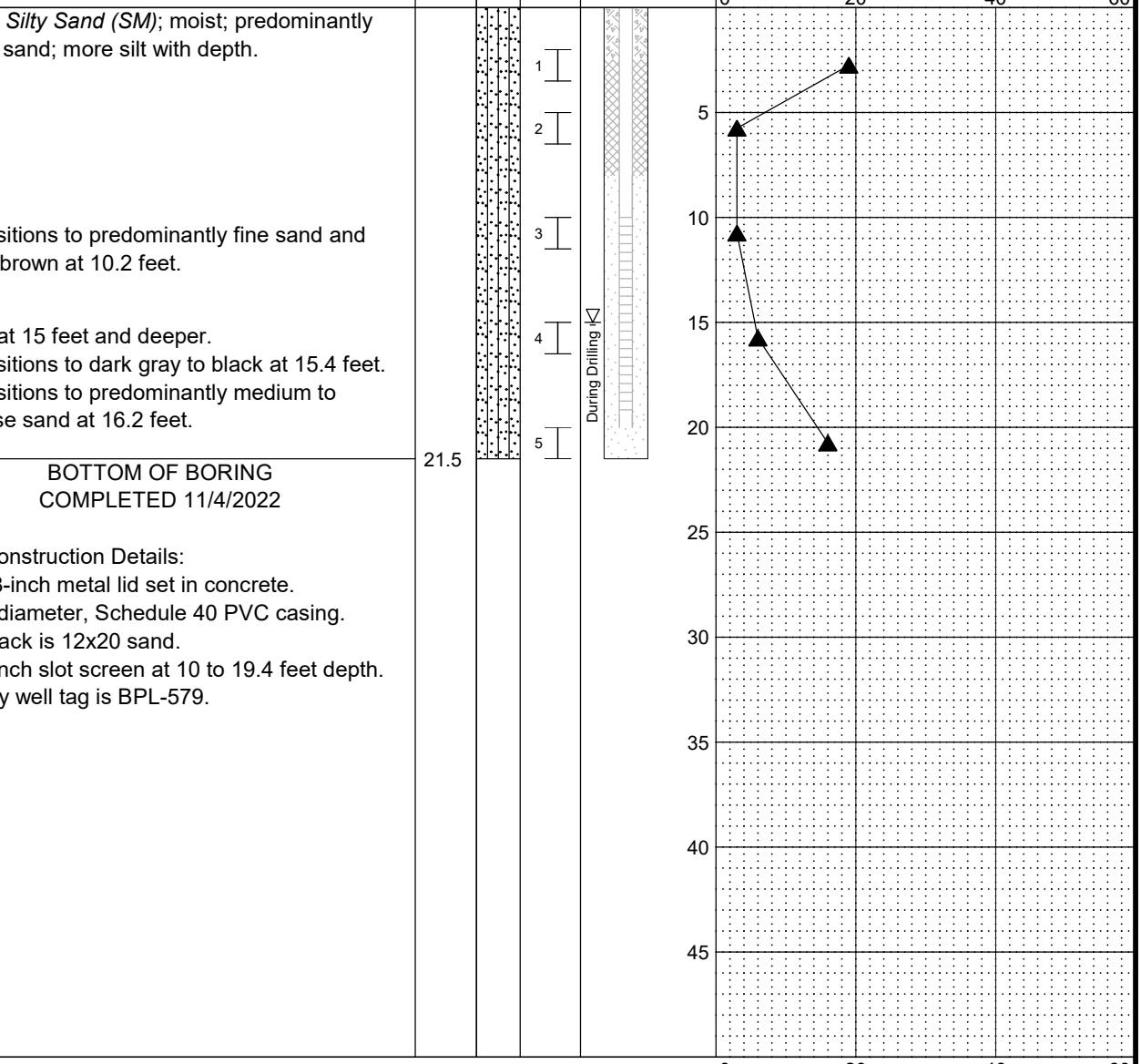
- Transitions to predominantly fine sand and dark brown at 10.2 feet.

- Wet at 15 feet and deeper.
- Transitions to dark gray to black at 15.4 feet.
- Transitions to predominantly medium to coarse sand at 16.2 feet.

21.5

BOTTOM OF BORING
COMPLETED 11/4/2022

Well Construction Details:
Flush 8-inch metal lid set in concrete.
2-inch diameter, Schedule 40 PVC casing.
Filter pack is 12x20 sand.
0.010 inch slot screen at 10 to 19.4 feet depth.
Ecology well tag is BPL-579.



LEGEND

* Sample Not Recovered	Well Screen and Sand Filter
E Environmental Sample Obtained	Bentonite-Cement Grout
2.0" O.D. Split Spoon Sample	Bentonite Chips/Pellets
	Bentonite Grout
	Ground Water Level ATD

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.

Jorgensen Forge Corporation Property
PFAS Investigation Report
Tukwila, Washington

LOG OF BORING MW-77

September 2024 | 21-1-12596

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. E-1

Log: RBP Rev: JXS Typ: LKN

MASTER LOG E 21-12596.GPJ SHAN WIL.GDT 8/23/24

VERSION 1
FINAL

DRAFT FOR PUBLIC COMMENT

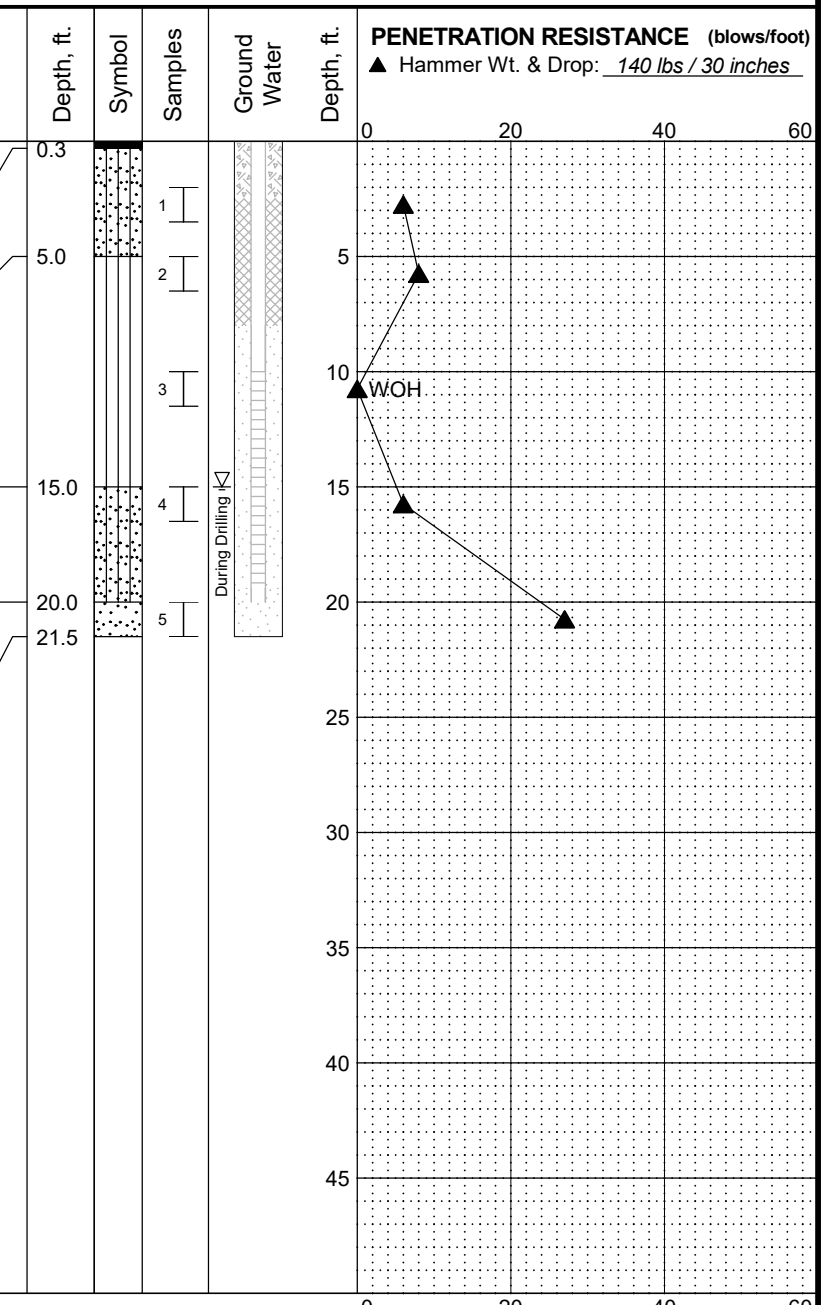
Total Depth:	21.5 ft.	Northing:		Drilling Method:	Hollow Stem Auger	Hole Diam.:	10 in.
Top Elevation:	~	Easting:		Drilling Company:	Holt Services	Rod Diam.:	NWJ
Vert. Datum:	NAVD 88	Station:		Drill Rig Equipment:	Truck Mobile Drill B-58	Hammer Type:	Automatic
Horiz. Datum:	WA-N NAD83/11	Offset:		Other Comments:	Ecology well tag ID BPL-578.		

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.

Depth, ft.	Soil Description
0.3	Asphalt pavement.
	Brown, *Silty Sand (SM)*; moist; fine to medium sand; areas of iron oxide staining.
5.0	- Transitions to dark gray color at 2.9 feet.
	Dark gray *Silt (ML)*; moist; pieces of black wood.
	- Lenses of coarse sand with iron oxide staining at 5.5, 6.3, and 10.2 feet.
	- Some organics (roots) at 10.5 feet.
15.0	Dark gray to dark brown gray, *Silty Sand (SM)*; wet; predominantly fine sand.
20.0	Dark gray, *Poorly Graded Sand (SP)*; wet;
21.5	predominantly coarse sand.
	BOTTOM OF BORING
	COMPLETED 11/4/2022

Well Construction Details:
Flush 8-inch metal lid set in concrete.
2-inch diameter, Schedule 40 PVC casing.
Filter pack is 12x20 sand.
0.010 inch slot screen at 10 to 19.4 feet depth.
Ecology well tag is BPL-578.



LEGEND

*	Sample Not Recovered		Well Screen and Sand Filter
E	Environmental Sample Obtained		Bentonite-Cement Grout
	2.0" O.D. Split Spoon Sample		Bentonite Chips/Pellets
			Bentonite Grout
		▽	Ground Water Level ATD

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.

Jorgensen Forge Corporation Property
PFAS Investigation Report
Tukwila, Washington

LOG OF BORING MW-78

September 2024 | 21-1-12596

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. E-2

Log: RBP Rev: JXS Typ: LKN

MASTER LOG E 21-12596.GPJ SHAN WIL.GDT 8/23/24

VERSION 1
FINAL

DRAFT FOR PUBLIC COMMENT

Total Depth:	41.5 ft.	Northing:		Drilling Method:	Hollow Stem Auger	Hole Diam.:	10 in.
Top Elevation:	~	Easting:		Drilling Company:	Holt Services	Rod Diam.:	NWJ
Vert. Datum:	NAVD 88	Station:		Drill Rig Equipment:	Truck Mobile Drill B-58	Hammer Type:	Automatic
Horiz. Datum:	WA-N NAD83/11	Offset:		Other Comments:	Ecology well tag ID BPL-580.		

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.

Depth, ft. | Symbol | Samples | Ground Water | Depth, ft.

PENETRATION RESISTANCE (blows/foot)

▲ Hammer Wt. & Drop: 140 lbs / 30 inches

0 | 20 | 40 | 60

Brown, *Poorly Graded Sand (SP)*; moist; predominantly fine sand; trace silt; some iron oxide staining. — 2.4

Dark gray, *Lean Clay (CL)*; moist. — 2.7

Dark brown, *Poorly Graded Sand (SP)*; moist; predominantly medium to coarse sand.

Gray *Silt (ML)*; moist; trace fine sand; trace black organics (roots); slight petroleum odor. — 10.0

- Wet at 15 feet and deeper. — 15.6

Dark gray to black, *Poorly Graded Sand (SP)*; wet; predominantly medium sand; trace silt; slight petroleum odor.

- No petroleum odor at 30 feet and deeper.

50/4"

41.5

BOTTOM OF BORING
COMPLETED 11/7/2022

During Drilling

5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45

0 | 20 | 40 | 60

◇ % Fines (<0.075mm)
● % Water Content

CONTINUED NEXT SHEET

LEGEND

* Sample Not Recovered
2.0" O.D. Split Spoon Sample
Well Screen and Sand Filter
Bentonite-Cement Grout
Bentonite Chips/Pellets
Bentonite Grout
Ground Water Level ATD

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.

Jorgensen Forge Corporation Property
PFAS Investigation Report
Tukwila, Washington

LOG OF BORING MW-79

September 2024 — 21-1-12596

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. E-3
Sheet 1 of 2

Log: RBP Rev: JXS Typ: LKN

MASTER LOG E 21-12596.GPJ SHAN WIL.GDT 8/23/24

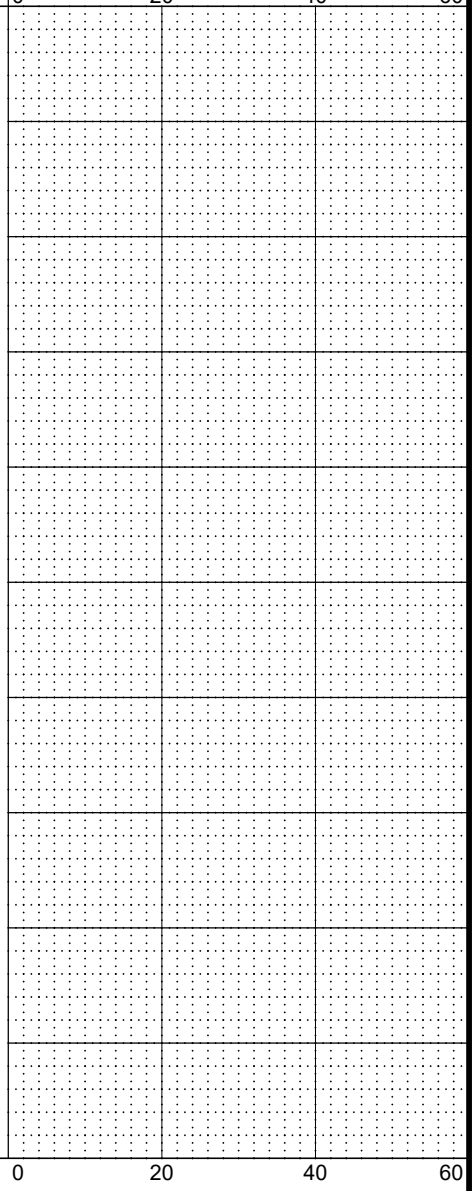
VERSION 1
FINAL

DRAFT FOR PUBLIC COMMENT

Total Depth:	*41.5 ft.*	Northing:		Drilling Method:	*Hollow Stem Auger*	Hole Diam.:	*10 in.*
Top Elevation:	*~*	Easting:		Drilling Company:	*Holt Services*	Rod Diam.:	*NWJ*
Vert. Datum:	*NAVD 88*	Station:		Drill Rig Equipment:	*Truck Mobile Drill B-58*	Hammer Type:	*Automatic*
Horiz. Datum:	*WA-N NAD83/11*	Offset:		Other Comments:	*Ecology well tag ID BPL-580.*		

SOIL DESCRIPTION	Depth, ft.	Symbol	Samples	Ground Water Depth, ft.	PENETRATION RESISTANCE (blows/foot)
Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.					▲ Hammer Wt. & Drop: *140 lbs / 30 inches*

Well Construction Details:
Flush 8-inch metal lid set in concrete.
2-inch diameter, Schedule 40 PVC casing.
Filter pack is 12x20 sand.
0.010 inch slot screen at 23 to 32.4 feet depth.
Ecology well tag is BPL-580.



LEGEND

* Sample Not Recovered	Well Screen and Sand Filter
2.0" O.D. Split Spoon Sample	Bentonite-Cement Grout
	Bentonite Chips/Pellets
	Bentonite Grout
	Ground Water Level ATD

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.

Jorgensen Forge Corporation Property
PFAS Investigation Report
Tukwila, Washington

LOG OF BORING MW-79

September 2024 | 21-1-12596

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. E-3
Sheet 2 of 2

Log: RBP Rev: JXS Typ: LKN
MASTER LOG E 21-12596.GPJ SHAN_WIL.GDT 8/23/24

VERSION 1
FINAL

DRAFT FOR PUBLIC COMMENT

LOG OF GEOPROBE

Date Started *12/20/22*	**Location** *8531 E Marginal Way South Tukwila, WA 98108*	**Ground Elevation:** *Approx. 18.0 feet*	
Date Completed *12/20/22*		**Typical Run Length** *5 feet*	
Total Depth (ft) *11.0*	**Drilling Company:** *Holt Services*	**Hole Diameter:** *2.25 inches*	

Depth (ft)	Probe Run	Soil Description	Depth, ft.	Symbol	PID, ppm	Ground Water	Sample Number, Description, and Results	Depth (ft)
		Refer to the report text for a proper understanding of the subsurface materials and probing methods. The stratification lines indicated below represent the approximate boundaries between soil types. Actual boundaries may be different if soil shifted inside sample tubes during extraction.						
		Concrete floor slab.	1.1					
	R-1	Brown, *Silty Sand (SM)*; moist; trace fine gravel; fine to medium sand.				Water Level Not Determined	SB-2022-001:1.5-12202022	
5	R-2		6.8				SB-2022-001:6.0-12202022	5
		Dark brown, *Poorly Graded Sand with Silt (SP-SM)*; moist; fine to coarse sand.	8.6					
10		Gray, *Clayey Silt (ML)*; moist; trace fine sand.	10.1				SB-2022-001:10-12202022	10
	R-3	Dark gray, *Poorly Graded Sand with Silt (SP-SM)*; moist to wet.	11.0					
		BOTTOM OF GEOPROBE COMPLETED 12/20/2022						
15								15
20								20
25								25
30								30
35								35
40								40
45								45

NOTES

1. In some cases where recovery was low in the upper part of the run, the soil sample may have slid down in the tube prior to removal from the ground.
2. Groundwater level, if indicated above, was estimated during probing and should be considered approximate.
3. Refer to KEY for definitions and explanation of symbols.
4. CT = corrosion test sample; TR = thermal resistivity sample; EN = environmental sample; GE = geotechnical sample; AR = archeological sample.

LEGEND



2" Plastic Tube - No Soil Recovery
2" Plastic Tube with Soil Recovery
Run No.

Jorgensen Forge Corporation Property
PFAS Investigation Report
Tukwila, Washington

LOG OF GEOPROBE SB-2022-001

September 2024 21-1-12596

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. E-4

GEOPROBE WELL 21-12596.GPJ 21-20447.GPJ 8/23/24 Log: CTC Rev: JXS Typ: LKN

VERSION 1
FINAL

DRAFT FOR PUBLIC COMMENT

LOG OF GEOPROBE

Date Started *12/20/22*	**Location** *8531 E Marginal Way South Tukwila, WA 98108*	**Ground Elevation:** *Approx. 18.0 feet*	
Date Completed *12/20/22*		**Typical Run Length** *2 feet*	
Total Depth (ft) *10.0*	**Drilling Company:** *Holt Services*	**Hole Diameter:** *2.25 inches*	

Depth (ft)	Probe Run	Soil Description	Depth, ft.	Symbol	PID, ppm	Ground Water	Sample Number, Description, and Results	Depth (ft)
		Concrete floor slab.						
	R-1	Dark brown, *Poorly Graded Sand with Silt (SP-SM)*; moist; trace fine gravel; fine to coarse sand.	1.5				SB-2022-002:2.0-12202022	
5	R-2						SB-2022-002:4.5-12202022 SB-2022-100:4.5-12202022 (duplicate)	5
	R-3	Dark gray *Silt (ML)*; moist; trace fine sand.	7.5				SB-2022-002:8.0-12202022	
10		BOTTOM OF GEOPROBE COMPLETED 12/20/2022	10.0					10
15								15
20								20
25								25
30								30
35								35
40								40
45								45

Soil Description

Refer to the report text for a proper understanding of the subsurface materials and probing methods. The stratification lines indicated below represent the approximate boundaries between soil types. Actual boundaries may be different if soil shifted inside sample tubes during extraction.

Water Level Not Determined

NOTES

1. In some cases where recovery was low in the upper part of the run, the soil sample may have slid down in the tube prior to removal from the ground.
2. Groundwater level, if indicated above, was estimated during probing and should be considered approximate.
3. Refer to KEY for definitions and explanation of symbols.
4. CT = corrosion test sample; TR = thermal resistivity sample; EN = environmental sample; GE = geotechnical sample; AR = archeological sample.

LEGEND



2" Plastic Tube - No Soil Recovery
2" Plastic Tube with Soil Recovery
Run No.

Jorgensen Forge Corporation Property
PFAS Investigation Report
Tukwila, Washington

LOG OF GEOPROBE SB-2022-002

September 2024 21-1-12596

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. E-5

GEOPROBE WELL 21-12596.GPJ 21-20447.GPJ 8/23/24 Log: CTC Rev: JXS Typ: LKN

VERSION 1
FINAL

DRAFT FOR PUBLIC COMMENT

LOG OF GEOPROBE

Date Started *12/20/22*	**Location** *8531 E Marginal Way South Tukwila, WA 98108*	**Ground Elevation:** *Approx. 18.0 feet*	
Date Completed *12/20/22*		**Typical Run Length** *5 feet*	
Total Depth (ft) *10.0*	**Drilling Company:** *Holt Services*	**Hole Diameter:** *2.25 inches*	

Depth (ft)	Probe Run	Soil Description	Depth, ft.	Symbol	PID, ppm	Ground Water	Sample Number, Description, and Results	Depth (ft)
		Refer to the report text for a proper understanding of the subsurface materials and probing methods. The stratification lines indicated below represent the approximate boundaries between soil types. Actual boundaries may be different if soil shifted inside sample tubes during extraction.						
		Concrete floor slab.	0.7					
	R-1	Dark brown, *Poorly Graded Sand with Silt and Gravel (SP-SM)*; moist; fine sand, subrounded gravel.	2.2			Water Level Not Determined	SB-2020-003:2.0-12202022	
5		Dark gray, *Silty Sand (SM)*; moist; fine sand.	5.5				SB-2020-003:5.0-12202022	5
	R-2	Dark brown, *Poorly Graded Sand (SP)*; moist; medium to coarse sand; trace silt.	8.2				SB-2020-033:8.5-12202022	
10		Gray *Silt with Sand (ML)*; moist; fine sand.	10.0					10
		BOTTOM OF GEOPROBE COMPLETED 12/20/2022						
15								15
20								20
25								25
30								30
35								35
40								40
45								45

NOTES

1. In some cases where recovery was low in the upper part of the run, the soil sample may have slid down in the tube prior to removal from the ground.
2. Groundwater level, if indicated above, was estimated during probing and should be considered approximate.
3. Refer to KEY for definitions and explanation of symbols.
4. CT = corrosion test sample; TR = thermal resistivity sample; EN = environmental sample; GE = geotechnical sample; AR = archeological sample.

LEGEND



2" Plastic Tube - No Soil Recovery
2" Plastic Tube with Soil Recovery
Run No.

Jorgensen Forge Corporation Property
PFAS Investigation Report
Tukwila, Washington

LOG OF GEOPROBE SB-2022-003

September 2024 21-1-12596

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. E-6

GEOPROBE WELL 21-12596.GPJ 21-20447.GPJ 8/23/24 Log: CTC Rev: JXS Typ: LKN

VERSION 1
FINAL

DRAFT FOR PUBLIC COMMENT

APPENDIX F: LABORATORY ANALYTICAL REPORTS

Appendix F

Laboratory Analytical Reports

CONTENTS

- Eurofins Analytical Report, Laboratory Job ID: 320-92176-1, September 30, 2022
- Eurofins Analytical Report, Laboratory Job ID: 320-94316-1, December 14, 2022
- Eurofins Analytical Report, Laboratory Job ID: 320-94486-1, December 13, 2022
- Eurofins Analytical Report, Laboratory Job ID: 320-95531-1, February 3, 2023
- Eurofins Analytical Report, Laboratory Job ID: 320-97138-1, March 28, 2023
- Eurofins Analytical Report, Laboratory Job ID: 320-97185-1, March 30, 2023

eurofins | Environment Testing America



ANALYTICAL REPORT

Eurofins Sacramento
880 Riverside Parkway
West Sacramento, CA 95605
Tel: (916)373-5600

Laboratory Job ID: 320-92176-1
Client Project/Site: EMJ

For:
Shannon & Wilson, Inc
400 N. 34th Suite 100
PO BOX 300303
Seattle, Washington 98103

Attn: Shoshana Howard

Authorized for release by:
9/30/2022 3:00:00 PM

David Alltucker, Project Manager I
(916)374-4383
David.Alltucker@et.eurofinsus.com

LINKS

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The test results in this report meet all 2003 NELAC, 2009 TNI, and 2016 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

DRAFT FOR PUBLIC COMMENT

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DRAFT FOR PUBLIC COMMENT

Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-92176-1

Qualifiers

LCMS

Qualifier	Qualifier Description
*5-	Isotope dilution analyte is outside acceptance limits, low biased.
I	Value is EMPC (estimated maximum possible concentration).
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Job ID: 320-92176-1

Laboratory: Eurofins Sacramento

Narrative

Job Narrative
320-92176-1

Receipt
The samples were received on 9/17/2022 9:25 AM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 1.2º C.

LCMS
Method EPA 537(Mod): The "I" qualifier means the transition mass ratio for the indicated analyte was above/below the established ratio limits. The qualitative identification of the analyte has some degree of uncertainty, and the reported value may have some high bias. However, analyst judgment was used to positively identify the analyte. MW-53-09142022 (320-92176-11) and MW-61-09142022 (320-92176-14)

Method EPA 537(Mod): Results for samples MW-50-09132022 (320-92176-6), MW-61-09142022 (320-92176-14), MW-40-09152022 (320-92176-15) and MW-41-09152022 (320-92176-16) were reported from the analysis of a diluted extract due to high concentration of the target analyte in the analysis of the undiluted extract. The dilution factor was applied to the labeled internal standard area counts and these area counts were within acceptance limits

Method EPA 537(Mod): The Isotope Dilution Analyte (IDA) recovery associated with the following sample is below the method recommended limit: MW-23-09132022 (320-92176-1). Generally, data quality is not considered affected if the IDA signal-to-noise ratio is greater than 10:1, which is achieved for all IDA in the sample(s).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Organic Prep
Method 3535: During the solid phase extraction process, the following samples contained non-settable particulates which clogged the solid phase extraction column: MW-23-09132022 (320-92176-1), MW-69-09132022 (320-92176-5), MW-32-09142022 (320-92176-8), MW-61-09142022 (320-92176-14), MW-41-09152022 (320-92176-16), MW-46-09152022 (320-92176-17) and MW-67-09152022 (320-92176-18). preparation batch 320-619355

Method 3535: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-619355.

Method 3535: The following samples in preparation batch 320-619355 were observed to have a thin layer of sediment present in the bottom of the bottle prior to extraction. MW-23-09132022 (320-92176-1) and MW-41-09152022 (320-92176-16)

Method 3535: The following sample in preparation batch 320-619355 was light brown in color prior to extraction. MW-23-09132022 (320-92176-1)

Method 3535: The following samples in preparation batch 320-619355 were light yellow prior to extraction. MW-69-09132022 (320-92176-5), MW-50-09132022 (320-92176-6), MW-52-09132022 (320-92176-7), MW-32-09142022 (320-92176-8), MW-61-09142022 (320-92176-14) and MW-40-09152022 (320-92176-15)

Method 3535: The following sample in preparation batch 320-619355 was dark orange prior to extraction. MW-46-09152022 (320-92176-17)

Method 3535: The following samples in preparation batch 320-619355 were observed to have a thin layer of sediment present in the bottom of the bottle prior to extraction. MW-50-09132022 (320-92176-6), MW-61-09142022 (320-92176-14), MW-40-09152022 (320-92176-15), MW-41-09152022 (320-92176-16) and MW-67-09152022 (320-92176-18)

Method 3535: The following samples in preparation batch 320-619355 were light yellow in color following extraction. MW-61-09142022 (320-92176-14) and MW-40-09152022 (320-92176-15)

Job ID: 320-92176-1 (Continued)

Laboratory: Eurofins Sacramento (Continued)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-92176-1

Client Sample ID: MW-23-09132022 — Lab Sample ID: 320-92176-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	0.60	J	1.9	0.19	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	0.67	J	1.9	0.55	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	7.3		1.9	0.53	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: EB-2-09132022 — Lab Sample ID: 320-92176-2

No Detections.

Client Sample ID: MW-70-09132022 — Lab Sample ID: 320-92176-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	34		1.8	0.53	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	6.4		1.8	0.23	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	10		1.8	0.77	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	0.57	J	1.8	0.24	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	9.6		1.8	0.18	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	75		1.8	0.52	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	110		1.8	0.49	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: EB-1-09132022 — Lab Sample ID: 320-92176-4

No Detections.

Client Sample ID: MW-69-09132022 — Lab Sample ID: 320-92176-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	2.7		1.7	0.51	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.6	J	1.7	0.22	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	3.5		1.7	0.74	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	1.2	J	1.7	0.24	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.84	J	1.7	0.17	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	11		1.7	0.50	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	31		1.7	0.47	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-50-09132022 — Lab Sample ID: 320-92176-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	320		1.8	0.52	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	52		1.8	0.22	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	44		1.8	0.76	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	1.7	J	1.8	0.24	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	40		1.8	0.18	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	310		1.8	0.51	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	450		9.0	2.4	ng/L	5		EPA 537(Mod)	Total/NA

Client Sample ID: MW-52-09132022 — Lab Sample ID: 320-92176-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	8.7		1.8	0.52	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	3.0		1.8	0.22	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	5.7		1.8	0.76	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	0.53	J	1.8	0.24	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	2.2		1.8	0.18	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	32		1.8	0.51	ng/L	1		EPA 537(Mod)	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins Sacramento

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Client Sample ID: MW-52-09132022 (Continued) — Lab Sample ID: 320-92176-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanesulfonic acid (PFOS)	92		1.8	0.48	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-32-09142022 — Lab Sample ID: 320-92176-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	9.7		1.8	0.52	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	6.2		1.8	0.22	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	6.2		1.8	0.76	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	64		1.8	0.51	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	25		1.8	0.48	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-38-09142022 — Lab Sample ID: 320-92176-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	3.8		1.8	0.52	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.85	J	1.8	0.22	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	2.7		1.8	0.76	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	3.3		1.8	0.18	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	19		1.8	0.51	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	41		1.8	0.48	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-37-09142022 — Lab Sample ID: 320-92176-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	9.1		1.8	0.51	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.4		1.8	0.22	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	7.1		1.8	0.75	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	0.79	J	1.8	0.24	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	1.5	J	1.8	0.18	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	7.7		1.8	0.50	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	21		1.8	0.47	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-53-09142022 — Lab Sample ID: 320-92176-11

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	3.2		1.8	0.52	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.98	J	1.8	0.23	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	3.1		1.8	0.77	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	1.8		1.8	0.18	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	19		1.8	0.51	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	24	I	1.8	0.49	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-54-09142022 — Lab Sample ID: 320-92176-12

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	17		1.9	0.54	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	7.1		1.9	0.23	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	4.5		1.9	0.80	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	0.39	J	1.9	0.25	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	4.5		1.9	0.19	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	19		1.9	0.53	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	15		1.9	0.51	ng/L	1		EPA 537(Mod)	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-92176-1

Client Sample ID: MW-100-09142022 — Lab Sample ID: 320-92176-13

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	9.4		1.8	0.52	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.5		1.8	0.23	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	7.5		1.8	0.77	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	0.94	J	1.8	0.24	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	1.5	J	1.8	0.18	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	7.0		1.8	0.51	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	21		1.8	0.49	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-61-09142022 — Lab Sample ID: 320-92176-14

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluoroheptanoic acid (PFHpA)	130		1.8	0.23	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	200		1.8	0.77	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	0.84	J I	1.8	0.24	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanoic acid (PFHxA) - DL	700		90	26	ng/L	50		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS) - DL	440		90	9.0	ng/L	50		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS) - DL	2900		90	26	ng/L	50		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	5100		90	24	ng/L	50		EPA 537(Mod)	Total/NA

Client Sample ID: MW-40-09152022 — Lab Sample ID: 320-92176-15

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	200		1.9	0.55	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	48		1.9	0.24	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	30		1.9	0.81	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	0.62	J	1.9	0.26	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	23		1.9	0.19	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS) - DL	410		9.6	2.7	ng/L	5		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	800		9.6	2.6	ng/L	5		EPA 537(Mod)	Total/NA

Client Sample ID: MW-41-09152022 — Lab Sample ID: 320-92176-16

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	270		1.8	0.52	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	52		1.8	0.23	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	47		1.8	0.77	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	1.4	J	1.8	0.24	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	47		1.8	0.18	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS) - DL	470		18	5.1	ng/L	10		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	1000		18	4.9	ng/L	10		EPA 537(Mod)	Total/NA

Client Sample ID: MW-46-09152022 — Lab Sample ID: 320-92176-17

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	23		1.9	0.55	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	5.4		1.9	0.24	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	10		1.9	0.80	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	0.33	J	1.9	0.25	ng/L	1		EPA 537(Mod)	Total/NA

This Detection Summary does not include radiochemical test results.

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Client Sample ID: MW-46-09152022 (Continued)

Lab Sample ID: 320-92176-17

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	4.2		1.9	0.19	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	46		1.9	0.54	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	120		1.9	0.51	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-67-09152022

Lab Sample ID: 320-92176-18

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	1.5	J	1.8	0.51	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.0	J	1.8	0.22	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	8.2		1.8	0.75	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	1.5	J	1.8	0.24	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorodecanoic acid (PFDA)	0.46	J	1.8	0.27	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	7.6		1.8	0.50	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	36		1.8	0.48	ng/L	1		EPA 537(Mod)	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-92176-1

Client Sample ID: MW-23-09132022

Date Collected: 09/13/22 12:20
Date Received: 09/17/22 09:25

Lab Sample ID: 320-92176-1

Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		1.9	0.56	ng/L		09/23/22 12:11	09/25/22 21:17	1
Perfluoroheptanoic acid (PFHpA)	ND		1.9	0.24	ng/L		09/23/22 12:11	09/25/22 21:17	1
Perfluorooctanoic acid (PFOA)	ND		1.9	0.83	ng/L		09/23/22 12:11	09/25/22 21:17	1
Perfluorononanoic acid (PFNA)	ND		1.9	0.26	ng/L		09/23/22 12:11	09/25/22 21:17	1
Perfluorodecanoic acid (PFDA)	ND		1.9	0.30	ng/L		09/23/22 12:11	09/25/22 21:17	1
Perfluoroundecanoic acid (PFUnA)	ND		1.9	1.1	ng/L		09/23/22 12:11	09/25/22 21:17	1
Perfluorododecanoic acid (PFDoA)	ND		1.9	0.54	ng/L		09/23/22 12:11	09/25/22 21:17	1
Perfluorotridecanoic acid (PFTriA)	ND		1.9	1.3	ng/L		09/23/22 12:11	09/25/22 21:17	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.9	0.71	ng/L		09/23/22 12:11	09/25/22 21:17	1
Perfluorobutanesulfonic acid (PFBS)	**0.60**	**J**	1.9	0.19	ng/L		09/23/22 12:11	09/25/22 21:17	1
Perfluorohexanesulfonic acid (PFHxS)	**0.67**	**J**	1.9	0.55	ng/L		09/23/22 12:11	09/25/22 21:17	1
Perfluorooctanesulfonic acid (PFOS)	**7.3**		1.9	0.53	ng/L		09/23/22 12:11	09/25/22 21:17	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.9	1.2	ng/L		09/23/22 12:11	09/25/22 21:17	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.9	1.3	ng/L		09/23/22 12:11	09/25/22 21:17	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.9	0.23	ng/L		09/23/22 12:11	09/25/22 21:17	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.9	1.5	ng/L		09/23/22 12:11	09/25/22 21:17	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.9	0.31	ng/L		09/23/22 12:11	09/25/22 21:17	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.9	0.39	ng/L		09/23/22 12:11	09/25/22 21:17	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*53*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:17*	*1*
13C4 PFHpA	*54*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:17*	*1*
13C4 PFOA	*52*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:17*	*1*
13C5 PFNA	*53*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:17*	*1*
13C2 PFDA	*46*	**5-*	*50 - 150*	*09/23/22 12:11*	*09/25/22 21:17*	*1*
13C2 PFUnA	*44*	**5-*	*50 - 150*	*09/23/22 12:11*	*09/25/22 21:17*	*1*
13C2 PFDoA	*44*	**5-*	*50 - 150*	*09/23/22 12:11*	*09/25/22 21:17*	*1*
13C2 PFTeDA	*43*	**5-*	*50 - 150*	*09/23/22 12:11*	*09/25/22 21:17*	*1*
13C3 PFBS	*54*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:17*	*1*
18O2 PFHxS	*54*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:17*	*1*
13C4 PFOS	*49*	**5-*	*50 - 150*	*09/23/22 12:11*	*09/25/22 21:17*	*1*
d3-NMeFOSAA	*48*	**5-*	*50 - 150*	*09/23/22 12:11*	*09/25/22 21:17*	*1*
d5-NEtFOSAA	*48*	**5-*	*50 - 150*	*09/23/22 12:11*	*09/25/22 21:17*	*1*
13C3 HFPO-DA	*53*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:17*	*1*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-92176-1

Client Sample ID: EB-2-09132022

Date Collected: 09/13/22 13:00
Date Received: 09/17/22 09:25

Lab Sample ID: 320-92176-2

Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		1.9	0.54	ng/L		09/23/22 12:11	09/25/22 21:27	1
Perfluoroheptanoic acid (PFHpA)	ND		1.9	0.23	ng/L		09/23/22 12:11	09/25/22 21:27	1
Perfluorooctanoic acid (PFOA)	ND		1.9	0.79	ng/L		09/23/22 12:11	09/25/22 21:27	1
Perfluorononanoic acid (PFNA)	ND		1.9	0.25	ng/L		09/23/22 12:11	09/25/22 21:27	1
Perfluorodecanoic acid (PFDA)	ND		1.9	0.29	ng/L		09/23/22 12:11	09/25/22 21:27	1
Perfluoroundecanoic acid (PFUnA)	ND		1.9	1.0	ng/L		09/23/22 12:11	09/25/22 21:27	1
Perfluorododecanoic acid (PFDoA)	ND		1.9	0.51	ng/L		09/23/22 12:11	09/25/22 21:27	1
Perfluorotridecanoic acid (PFTriA)	ND		1.9	1.2	ng/L		09/23/22 12:11	09/25/22 21:27	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.9	0.68	ng/L		09/23/22 12:11	09/25/22 21:27	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.9	0.19	ng/L		09/23/22 12:11	09/25/22 21:27	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.9	0.53	ng/L		09/23/22 12:11	09/25/22 21:27	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.9	0.50	ng/L		09/23/22 12:11	09/25/22 21:27	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.7	1.1	ng/L		09/23/22 12:11	09/25/22 21:27	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.7	1.2	ng/L		09/23/22 12:11	09/25/22 21:27	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.9	0.22	ng/L		09/23/22 12:11	09/25/22 21:27	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.7	1.4	ng/L		09/23/22 12:11	09/25/22 21:27	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.9	0.30	ng/L		09/23/22 12:11	09/25/22 21:27	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.9	0.37	ng/L		09/23/22 12:11	09/25/22 21:27	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*92*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:27*	*1*
13C4 PFHpA	*92*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:27*	*1*
13C4 PFOA	*93*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:27*	*1*
13C5 PFNA	*91*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:27*	*1*
13C2 PFDA	*88*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:27*	*1*
13C2 PFUnA	*93*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:27*	*1*
13C2 PFDoA	*85*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:27*	*1*
13C2 PFTeDA	*82*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:27*	*1*
13C3 PFBS	*92*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:27*	*1*
18O2 PFHxS	*92*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:27*	*1*
13C4 PFOS	*87*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:27*	*1*
d3-NMeFOSAA	*99*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:27*	*1*
d5-NEtFOSAA	*97*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:27*	*1*
13C3 HFPO-DA	*91*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:27*	*1*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-92176-1

Client Sample ID: MW-70-09132022
Date Collected: 09/13/22 13:10
Date Received: 09/17/22 09:25

Lab Sample ID: 320-92176-3
Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**34**		1.8	0.53	ng/L		09/23/22 12:11	09/25/22 21:37	1
Perfluoroheptanoic acid (PFHpA)	**6.4**		1.8	0.23	ng/L		09/23/22 12:11	09/25/22 21:37	1
Perfluorooctanoic acid (PFOA)	**10**		1.8	0.77	ng/L		09/23/22 12:11	09/25/22 21:37	1
Perfluorononanoic acid (PFNA)	**0.57**	**J**	1.8	0.24	ng/L		09/23/22 12:11	09/25/22 21:37	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		09/23/22 12:11	09/25/22 21:37	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	1.0	ng/L		09/23/22 12:11	09/25/22 21:37	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.50	ng/L		09/23/22 12:11	09/25/22 21:37	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		09/23/22 12:11	09/25/22 21:37	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.66	ng/L		09/23/22 12:11	09/25/22 21:37	1
Perfluorobutanesulfonic acid (PFBS)	**9.6**		1.8	0.18	ng/L		09/23/22 12:11	09/25/22 21:37	1
Perfluorohexanesulfonic acid (PFHxS)	**75**		1.8	0.52	ng/L		09/23/22 12:11	09/25/22 21:37	1
Perfluorooctanesulfonic acid (PFOS)	**110**		1.8	0.49	ng/L		09/23/22 12:11	09/25/22 21:37	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.5	1.1	ng/L		09/23/22 12:11	09/25/22 21:37	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.5	1.2	ng/L		09/23/22 12:11	09/25/22 21:37	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		09/23/22 12:11	09/25/22 21:37	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.4	ng/L		09/23/22 12:11	09/25/22 21:37	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		09/23/22 12:11	09/25/22 21:37	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		09/23/22 12:11	09/25/22 21:37	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*84*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:37*	*1*
13C4 PFHpA	*91*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:37*	*1*
13C4 PFOA	*93*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:37*	*1*
13C5 PFNA	*94*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:37*	*1*
13C2 PFDA	*89*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:37*	*1*
13C2 PFUnA	*87*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:37*	*1*
13C2 PFDoA	*76*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:37*	*1*
13C2 PFTeDA	*72*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:37*	*1*
13C3 PFBS	*91*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:37*	*1*
18O2 PFHxS	*93*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:37*	*1*
13C4 PFOS	*86*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:37*	*1*
d3-NMeFOSAA	*92*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:37*	*1*
d5-NEtFOSAA	*89*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:37*	*1*
13C3 HFPO-DA	*83*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:37*	*1*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-92176-1

Client Sample ID: EB-1-09132022

Date Collected: 09/13/22 13:30
Date Received: 09/17/22 09:25

Lab Sample ID: 320-92176-4

Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		1.8	0.53	ng/L		09/23/22 12:11	09/25/22 21:47	1
Perfluoroheptanoic acid (PFHpA)	ND		1.8	0.23	ng/L		09/23/22 12:11	09/25/22 21:47	1
Perfluorooctanoic acid (PFOA)	ND		1.8	0.78	ng/L		09/23/22 12:11	09/25/22 21:47	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.25	ng/L		09/23/22 12:11	09/25/22 21:47	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		09/23/22 12:11	09/25/22 21:47	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	1.0	ng/L		09/23/22 12:11	09/25/22 21:47	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.51	ng/L		09/23/22 12:11	09/25/22 21:47	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		09/23/22 12:11	09/25/22 21:47	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.67	ng/L		09/23/22 12:11	09/25/22 21:47	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.8	0.18	ng/L		09/23/22 12:11	09/25/22 21:47	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.8	0.52	ng/L		09/23/22 12:11	09/25/22 21:47	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.8	0.50	ng/L		09/23/22 12:11	09/25/22 21:47	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.6	1.1	ng/L		09/23/22 12:11	09/25/22 21:47	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.6	1.2	ng/L		09/23/22 12:11	09/25/22 21:47	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		09/23/22 12:11	09/25/22 21:47	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.7	1.4	ng/L		09/23/22 12:11	09/25/22 21:47	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		09/23/22 12:11	09/25/22 21:47	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.37	ng/L		09/23/22 12:11	09/25/22 21:47	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*101*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:47*	*1*
13C4 PFHpA	*99*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:47*	*1*
13C4 PFOA	*98*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:47*	*1*
13C5 PFNA	*96*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:47*	*1*
13C2 PFDA	*94*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:47*	*1*
13C2 PFUnA	*97*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:47*	*1*
13C2 PFDoA	*91*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:47*	*1*
13C2 PFTeDA	*96*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:47*	*1*
13C3 PFBS	*103*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:47*	*1*
18O2 PFHxS	*101*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:47*	*1*
13C4 PFOS	*92*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:47*	*1*
d3-NMeFOSAA	*107*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:47*	*1*
d5-NEtFOSAA	*107*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:47*	*1*
13C3 HFPO-DA	*93*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:47*	*1*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-92176-1

Client Sample ID: MW-69-09132022

Date Collected: 09/13/22 14:20
Date Received: 09/17/22 09:25

Lab Sample ID: 320-92176-5

Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**2.7**		1.7	0.51	ng/L		09/23/22 12:11	09/25/22 21:57	1
Perfluoroheptanoic acid (PFHpA)	**1.6**	**J**	1.7	0.22	ng/L		09/23/22 12:11	09/25/22 21:57	1
Perfluorooctanoic acid (PFOA)	**3.5**		1.7	0.74	ng/L		09/23/22 12:11	09/25/22 21:57	1
Perfluorononanoic acid (PFNA)	**1.2**	**J**	1.7	0.24	ng/L		09/23/22 12:11	09/25/22 21:57	1
Perfluorodecanoic acid (PFDA)	ND		1.7	0.27	ng/L		09/23/22 12:11	09/25/22 21:57	1
Perfluoroundecanoic acid (PFUnA)	ND		1.7	0.96	ng/L		09/23/22 12:11	09/25/22 21:57	1
Perfluorododecanoic acid (PFDoA)	ND		1.7	0.48	ng/L		09/23/22 12:11	09/25/22 21:57	1
Perfluorotridecanoic acid (PFTriA)	ND		1.7	1.1	ng/L		09/23/22 12:11	09/25/22 21:57	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.7	0.64	ng/L		09/23/22 12:11	09/25/22 21:57	1
Perfluorobutanesulfonic acid (PFBS)	**0.84**	**J**	1.7	0.17	ng/L		09/23/22 12:11	09/25/22 21:57	1
Perfluorohexanesulfonic acid (PFHxS)	**11**		1.7	0.50	ng/L		09/23/22 12:11	09/25/22 21:57	1
Perfluorooctanesulfonic acid (PFOS)	**31**		1.7	0.47	ng/L		09/23/22 12:11	09/25/22 21:57	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.4	1.0	ng/L		09/23/22 12:11	09/25/22 21:57	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.4	1.1	ng/L		09/23/22 12:11	09/25/22 21:57	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.7	0.21	ng/L		09/23/22 12:11	09/25/22 21:57	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.5	1.3	ng/L		09/23/22 12:11	09/25/22 21:57	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.7	0.28	ng/L		09/23/22 12:11	09/25/22 21:57	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.7	0.35	ng/L		09/23/22 12:11	09/25/22 21:57	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*65*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:57*	*1*
13C4 PFHpA	*74*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:57*	*1*
13C4 PFOA	*77*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:57*	*1*
13C5 PFNA	*80*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:57*	*1*
13C2 PFDA	*79*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:57*	*1*
13C2 PFUnA	*84*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:57*	*1*
13C2 PFDoA	*75*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:57*	*1*
13C2 PFTeDA	*66*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:57*	*1*
13C3 PFBS	*71*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:57*	*1*
18O2 PFHxS	*76*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:57*	*1*
13C4 PFOS	*74*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:57*	*1*
d3-NMeFOSAA	*84*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:57*	*1*
d5-NEtFOSAA	*86*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:57*	*1*
13C3 HFPO-DA	*65*		*50 - 150*	*09/23/22 12:11*	*09/25/22 21:57*	*1*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-92176-1

Client Sample ID: MW-50-09132022

Date Collected: 09/13/22 15:10
Date Received: 09/17/22 09:25

Lab Sample ID: 320-92176-6

Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**320**		1.8	0.52	ng/L		09/23/22 12:11	09/25/22 22:07	1
Perfluoroheptanoic acid (PFHpA)	**52**		1.8	0.22	ng/L		09/23/22 12:11	09/25/22 22:07	1
Perfluorooctanoic acid (PFOA)	**44**		1.8	0.76	ng/L		09/23/22 12:11	09/25/22 22:07	1
Perfluorononanoic acid (PFNA)	**1.7**	**J**	1.8	0.24	ng/L		09/23/22 12:11	09/25/22 22:07	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		09/23/22 12:11	09/25/22 22:07	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.99	ng/L		09/23/22 12:11	09/25/22 22:07	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.49	ng/L		09/23/22 12:11	09/25/22 22:07	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		09/23/22 12:11	09/25/22 22:07	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.66	ng/L		09/23/22 12:11	09/25/22 22:07	1
Perfluorobutanesulfonic acid (PFBS)	**40**		1.8	0.18	ng/L		09/23/22 12:11	09/25/22 22:07	1
Perfluorohexanesulfonic acid (PFHxS)	**310**		1.8	0.51	ng/L		09/23/22 12:11	09/25/22 22:07	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.5	1.1	ng/L		09/23/22 12:11	09/25/22 22:07	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.5	1.2	ng/L		09/23/22 12:11	09/25/22 22:07	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		09/23/22 12:11	09/25/22 22:07	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.3	ng/L		09/23/22 12:11	09/25/22 22:07	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		09/23/22 12:11	09/25/22 22:07	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		09/23/22 12:11	09/25/22 22:07	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*86*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:07*	*1*
13C4 PFHpA	*94*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:07*	*1*
13C4 PFOA	*91*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:07*	*1*
13C5 PFNA	*92*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:07*	*1*
13C2 PFDA	*91*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:07*	*1*
13C2 PFUnA	*93*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:07*	*1*
13C2 PFDoA	*86*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:07*	*1*
13C2 PFTeDA	*84*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:07*	*1*
13C3 PFBS	*83*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:07*	*1*
18O2 PFHxS	*87*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:07*	*1*
13C4 PFOS	*83*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:07*	*1*
d3-NMeFOSAA	*98*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:07*	*1*
d5-NEtFOSAA	*99*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:07*	*1*
13C3 HFPO-DA	*87*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:07*	*1*

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	**450**		9.0	2.4	ng/L		09/23/22 12:11	09/27/22 16:32	5

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*82*		*50 - 150*	*09/23/22 12:11*	*09/27/22 16:32*	*5*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-92176-1

Client Sample ID: MW-52-09132022
Date Collected: 09/13/22 16:20
Date Received: 09/17/22 09:25

Lab Sample ID: 320-92176-7
Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**8.7**		1.8	0.52	ng/L		09/23/22 12:11	09/25/22 22:17	1
Perfluoroheptanoic acid (PFHpA)	**3.0**		1.8	0.22	ng/L		09/23/22 12:11	09/25/22 22:17	1
Perfluorooctanoic acid (PFOA)	**5.7**		1.8	0.76	ng/L		09/23/22 12:11	09/25/22 22:17	1
Perfluorononanoic acid (PFNA)	**0.53**	**J**	1.8	0.24	ng/L		09/23/22 12:11	09/25/22 22:17	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		09/23/22 12:11	09/25/22 22:17	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.98	ng/L		09/23/22 12:11	09/25/22 22:17	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.49	ng/L		09/23/22 12:11	09/25/22 22:17	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		09/23/22 12:11	09/25/22 22:17	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.65	ng/L		09/23/22 12:11	09/25/22 22:17	1
Perfluorobutanesulfonic acid (PFBS)	**2.2**		1.8	0.18	ng/L		09/23/22 12:11	09/25/22 22:17	1
Perfluorohexanesulfonic acid (PFHxS)	**32**		1.8	0.51	ng/L		09/23/22 12:11	09/25/22 22:17	1
Perfluorooctanesulfonic acid (PFOS)	**92**		1.8	0.48	ng/L		09/23/22 12:11	09/25/22 22:17	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.4	1.1	ng/L		09/23/22 12:11	09/25/22 22:17	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.4	1.2	ng/L		09/23/22 12:11	09/25/22 22:17	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.21	ng/L		09/23/22 12:11	09/25/22 22:17	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.3	ng/L		09/23/22 12:11	09/25/22 22:17	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.28	ng/L		09/23/22 12:11	09/25/22 22:17	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		09/23/22 12:11	09/25/22 22:17	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*87*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:17*	*1*
13C4 PFHpA	*90*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:17*	*1*
13C4 PFOA	*93*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:17*	*1*
13C5 PFNA	*94*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:17*	*1*
13C2 PFDA	*93*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:17*	*1*
13C2 PFUnA	*94*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:17*	*1*
13C2 PFDoA	*88*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:17*	*1*
13C2 PFTeDA	*81*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:17*	*1*
13C3 PFBS	*83*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:17*	*1*
18O2 PFHxS	*88*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:17*	*1*
13C4 PFOS	*85*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:17*	*1*
d3-NMeFOSAA	*100*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:17*	*1*
d5-NEtFOSAA	*100*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:17*	*1*
13C3 HFPO-DA	*80*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:17*	*1*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-92176-1

Client Sample ID: MW-32-09142022

Date Collected: 09/14/22 09:48
Date Received: 09/17/22 09:25

Lab Sample ID: 320-92176-8

Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**9.7**		1.8	0.52	ng/L		09/23/22 12:11	09/25/22 22:48	1
Perfluoroheptanoic acid (PFHpA)	**6.2**		1.8	0.22	ng/L		09/23/22 12:11	09/25/22 22:48	1
Perfluorooctanoic acid (PFOA)	**6.2**		1.8	0.76	ng/L		09/23/22 12:11	09/25/22 22:48	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.24	ng/L		09/23/22 12:11	09/25/22 22:48	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		09/23/22 12:11	09/25/22 22:48	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.98	ng/L		09/23/22 12:11	09/25/22 22:48	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.49	ng/L		09/23/22 12:11	09/25/22 22:48	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		09/23/22 12:11	09/25/22 22:48	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.65	ng/L		09/23/22 12:11	09/25/22 22:48	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.8	0.18	ng/L		09/23/22 12:11	09/25/22 22:48	1
Perfluorohexanesulfonic acid (PFHxS)	**64**		1.8	0.51	ng/L		09/23/22 12:11	09/25/22 22:48	1
Perfluorooctanesulfonic acid (PFOS)	**25**		1.8	0.48	ng/L		09/23/22 12:11	09/25/22 22:48	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.5	1.1	ng/L		09/23/22 12:11	09/25/22 22:48	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.5	1.2	ng/L		09/23/22 12:11	09/25/22 22:48	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.21	ng/L		09/23/22 12:11	09/25/22 22:48	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.3	ng/L		09/23/22 12:11	09/25/22 22:48	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		09/23/22 12:11	09/25/22 22:48	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		09/23/22 12:11	09/25/22 22:48	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*67*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:48*	*1*
13C4 PFHpA	*76*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:48*	*1*
13C4 PFOA	*78*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:48*	*1*
13C5 PFNA	*79*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:48*	*1*
13C2 PFDA	*78*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:48*	*1*
13C2 PFUnA	*76*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:48*	*1*
13C2 PFDoA	*74*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:48*	*1*
13C2 PFTeDA	*75*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:48*	*1*
13C3 PFBS	*79*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:48*	*1*
18O2 PFHxS	*80*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:48*	*1*
13C4 PFOS	*74*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:48*	*1*
d3-NMeFOSAA	*84*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:48*	*1*
d5-NEtFOSAA	*86*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:48*	*1*
13C3 HFPO-DA	*64*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:48*	*1*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-92176-1

Client Sample ID: MW-38-09142022

Date Collected: 09/14/22 12:00
Date Received: 09/17/22 09:25

Lab Sample ID: 320-92176-9

Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**3.8**		1.8	0.52	ng/L		09/23/22 12:11	09/25/22 22:58	1
Perfluoroheptanoic acid (PFHpA)	**0.85**	**J**	1.8	0.22	ng/L		09/23/22 12:11	09/25/22 22:58	1
Perfluorooctanoic acid (PFOA)	**2.7**		1.8	0.76	ng/L		09/23/22 12:11	09/25/22 22:58	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.24	ng/L		09/23/22 12:11	09/25/22 22:58	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		09/23/22 12:11	09/25/22 22:58	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.98	ng/L		09/23/22 12:11	09/25/22 22:58	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.49	ng/L		09/23/22 12:11	09/25/22 22:58	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		09/23/22 12:11	09/25/22 22:58	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.65	ng/L		09/23/22 12:11	09/25/22 22:58	1
Perfluorobutanesulfonic acid (PFBS)	**3.3**		1.8	0.18	ng/L		09/23/22 12:11	09/25/22 22:58	1
Perfluorohexanesulfonic acid (PFHxS)	**19**		1.8	0.51	ng/L		09/23/22 12:11	09/25/22 22:58	1
Perfluorooctanesulfonic acid (PFOS)	**41**		1.8	0.48	ng/L		09/23/22 12:11	09/25/22 22:58	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.5	1.1	ng/L		09/23/22 12:11	09/25/22 22:58	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.5	1.2	ng/L		09/23/22 12:11	09/25/22 22:58	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.21	ng/L		09/23/22 12:11	09/25/22 22:58	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.3	ng/L		09/23/22 12:11	09/25/22 22:58	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		09/23/22 12:11	09/25/22 22:58	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		09/23/22 12:11	09/25/22 22:58	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*88*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:58*	*1*
13C4 PFHpA	*92*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:58*	*1*
13C4 PFOA	*92*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:58*	*1*
13C5 PFNA	*91*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:58*	*1*
13C2 PFDA	*87*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:58*	*1*
13C2 PFUnA	*88*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:58*	*1*
13C2 PFDoA	*81*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:58*	*1*
13C2 PFTeDA	*82*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:58*	*1*
13C3 PFBS	*93*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:58*	*1*
18O2 PFHxS	*96*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:58*	*1*
13C4 PFOS	*88*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:58*	*1*
d3-NMeFOSAA	*97*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:58*	*1*
d5-NEtFOSAA	*96*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:58*	*1*
13C3 HFPO-DA	*83*		*50 - 150*	*09/23/22 12:11*	*09/25/22 22:58*	*1*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-92176-1

Client Sample ID: MW-37-09142022

Date Collected: 09/14/22 12:40
Date Received: 09/17/22 09:25

Lab Sample ID: 320-92176-10

Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**9.1**		1.8	0.51	ng/L		09/23/22 12:11	09/25/22 23:08	1
Perfluoroheptanoic acid (PFHpA)	**2.4**		1.8	0.22	ng/L		09/23/22 12:11	09/25/22 23:08	1
Perfluorooctanoic acid (PFOA)	**7.1**		1.8	0.75	ng/L		09/23/22 12:11	09/25/22 23:08	1
Perfluorononanoic acid (PFNA)	**0.79**	**J**	1.8	0.24	ng/L		09/23/22 12:11	09/25/22 23:08	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.27	ng/L		09/23/22 12:11	09/25/22 23:08	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.97	ng/L		09/23/22 12:11	09/25/22 23:08	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.48	ng/L		09/23/22 12:11	09/25/22 23:08	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.1	ng/L		09/23/22 12:11	09/25/22 23:08	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.64	ng/L		09/23/22 12:11	09/25/22 23:08	1
Perfluorobutanesulfonic acid (PFBS)	**1.5**	**J**	1.8	0.18	ng/L		09/23/22 12:11	09/25/22 23:08	1
Perfluorohexanesulfonic acid (PFHxS)	**7.7**		1.8	0.50	ng/L		09/23/22 12:11	09/25/22 23:08	1
Perfluorooctanesulfonic acid (PFOS)	**21**		1.8	0.47	ng/L		09/23/22 12:11	09/25/22 23:08	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.4	1.1	ng/L		09/23/22 12:11	09/25/22 23:08	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.4	1.1	ng/L		09/23/22 12:11	09/25/22 23:08	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.21	ng/L		09/23/22 12:11	09/25/22 23:08	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.5	1.3	ng/L		09/23/22 12:11	09/25/22 23:08	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.28	ng/L		09/23/22 12:11	09/25/22 23:08	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.35	ng/L		09/23/22 12:11	09/25/22 23:08	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*87*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:08*	*1*
13C4 PFHpA	*87*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:08*	*1*
13C4 PFOA	*90*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:08*	*1*
13C5 PFNA	*87*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:08*	*1*
13C2 PFDA	*82*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:08*	*1*
13C2 PFUnA	*82*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:08*	*1*
13C2 PFDoA	*78*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:08*	*1*
13C2 PFTeDA	*78*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:08*	*1*
13C3 PFBS	*87*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:08*	*1*
18O2 PFHxS	*87*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:08*	*1*
13C4 PFOS	*76*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:08*	*1*
d3-NMeFOSAA	*92*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:08*	*1*
d5-NEtFOSAA	*95*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:08*	*1*
13C3 HFPO-DA	*86*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:08*	*1*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-92176-1

Client Sample ID: MW-53-09142022
Date Collected: 09/14/22 13:30
Date Received: 09/17/22 09:25

Lab Sample ID: 320-92176-11
Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**3.2**		1.8	0.52	ng/L		09/23/22 12:11	09/25/22 23:18	1
Perfluoroheptanoic acid (PFHpA)	**0.98**	**J**	1.8	0.23	ng/L		09/23/22 12:11	09/25/22 23:18	1
Perfluorooctanoic acid (PFOA)	**3.1**		1.8	0.77	ng/L		09/23/22 12:11	09/25/22 23:18	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.24	ng/L		09/23/22 12:11	09/25/22 23:18	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		09/23/22 12:11	09/25/22 23:18	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.99	ng/L		09/23/22 12:11	09/25/22 23:18	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.50	ng/L		09/23/22 12:11	09/25/22 23:18	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		09/23/22 12:11	09/25/22 23:18	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.66	ng/L		09/23/22 12:11	09/25/22 23:18	1
Perfluorobutanesulfonic acid (PFBS)	**1.8**		1.8	0.18	ng/L		09/23/22 12:11	09/25/22 23:18	1
Perfluorohexanesulfonic acid (PFHxS)	**19**		1.8	0.51	ng/L		09/23/22 12:11	09/25/22 23:18	1
Perfluorooctanesulfonic acid (PFOS)	**24**	**I**	1.8	0.49	ng/L		09/23/22 12:11	09/25/22 23:18	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.5	1.1	ng/L		09/23/22 12:11	09/25/22 23:18	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.5	1.2	ng/L		09/23/22 12:11	09/25/22 23:18	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		09/23/22 12:11	09/25/22 23:18	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.4	ng/L		09/23/22 12:11	09/25/22 23:18	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		09/23/22 12:11	09/25/22 23:18	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		09/23/22 12:11	09/25/22 23:18	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*90*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:18*	*1*
13C4 PFHpA	*94*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:18*	*1*
13C4 PFOA	*92*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:18*	*1*
13C5 PFNA	*90*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:18*	*1*
13C2 PFDA	*88*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:18*	*1*
13C2 PFUnA	*89*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:18*	*1*
13C2 PFDoA	*82*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:18*	*1*
13C2 PFTeDA	*83*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:18*	*1*
13C3 PFBS	*90*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:18*	*1*
18O2 PFHxS	*92*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:18*	*1*
13C4 PFOS	*80*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:18*	*1*
d3-NMeFOSAA	*98*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:18*	*1*
d5-NEtFOSAA	*95*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:18*	*1*
13C3 HFPO-DA	*87*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:18*	*1*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-92176-1

Client Sample ID: MW-54-09142022
Date Collected: 09/14/22 15:14
Date Received: 09/17/22 09:25

Lab Sample ID: 320-92176-12
Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**17**		1.9	0.54	ng/L		09/23/22 12:11	09/25/22 23:28	1
Perfluoroheptanoic acid (PFHpA)	**7.1**		1.9	0.23	ng/L		09/23/22 12:11	09/25/22 23:28	1
Perfluorooctanoic acid (PFOA)	**4.5**		1.9	0.80	ng/L		09/23/22 12:11	09/25/22 23:28	1
Perfluorononanoic acid (PFNA)	**0.39**	**J**	1.9	0.25	ng/L		09/23/22 12:11	09/25/22 23:28	1
Perfluorodecanoic acid (PFDA)	ND		1.9	0.29	ng/L		09/23/22 12:11	09/25/22 23:28	1
Perfluoroundecanoic acid (PFUnA)	ND		1.9	1.0	ng/L		09/23/22 12:11	09/25/22 23:28	1
Perfluorododecanoic acid (PFDoA)	ND		1.9	0.52	ng/L		09/23/22 12:11	09/25/22 23:28	1
Perfluorotridecanoic acid (PFTriA)	ND		1.9	1.2	ng/L		09/23/22 12:11	09/25/22 23:28	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.9	0.68	ng/L		09/23/22 12:11	09/25/22 23:28	1
Perfluorobutanesulfonic acid (PFBS)	**4.5**		1.9	0.19	ng/L		09/23/22 12:11	09/25/22 23:28	1
Perfluorohexanesulfonic acid (PFHxS)	**19**		1.9	0.53	ng/L		09/23/22 12:11	09/25/22 23:28	1
Perfluorooctanesulfonic acid (PFOS)	**15**		1.9	0.51	ng/L		09/23/22 12:11	09/25/22 23:28	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.7	1.1	ng/L		09/23/22 12:11	09/25/22 23:28	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.7	1.2	ng/L		09/23/22 12:11	09/25/22 23:28	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.9	0.23	ng/L		09/23/22 12:11	09/25/22 23:28	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.8	1.4	ng/L		09/23/22 12:11	09/25/22 23:28	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.9	0.30	ng/L		09/23/22 12:11	09/25/22 23:28	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.9	0.38	ng/L		09/23/22 12:11	09/25/22 23:28	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*91*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:28*	*1*
13C4 PFHpA	*93*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:28*	*1*
13C4 PFOA	*90*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:28*	*1*
13C5 PFNA	*91*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:28*	*1*
13C2 PFDA	*81*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:28*	*1*
13C2 PFUnA	*77*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:28*	*1*
13C2 PFDoA	*69*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:28*	*1*
13C2 PFTeDA	*70*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:28*	*1*
13C3 PFBS	*94*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:28*	*1*
18O2 PFHxS	*93*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:28*	*1*
13C4 PFOS	*79*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:28*	*1*
d3-NMeFOSAA	*85*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:28*	*1*
d5-NEtFOSAA	*81*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:28*	*1*
13C3 HFPO-DA	*87*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:28*	*1*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-92176-1

Client Sample ID: MW-100-09142022
Date Collected: 09/14/22 16:00
Date Received: 09/17/22 09:25

Lab Sample ID: 320-92176-13
Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**9.4**		1.8	0.52	ng/L		09/23/22 12:11	09/25/22 23:38	1
Perfluoroheptanoic acid (PFHpA)	**2.5**		1.8	0.23	ng/L		09/23/22 12:11	09/25/22 23:38	1
Perfluorooctanoic acid (PFOA)	**7.5**		1.8	0.77	ng/L		09/23/22 12:11	09/25/22 23:38	1
Perfluorononanoic acid (PFNA)	**0.94**	**J**	1.8	0.24	ng/L		09/23/22 12:11	09/25/22 23:38	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		09/23/22 12:11	09/25/22 23:38	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.99	ng/L		09/23/22 12:11	09/25/22 23:38	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.50	ng/L		09/23/22 12:11	09/25/22 23:38	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		09/23/22 12:11	09/25/22 23:38	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.66	ng/L		09/23/22 12:11	09/25/22 23:38	1
Perfluorobutanesulfonic acid (PFBS)	**1.5**	**J**	1.8	0.18	ng/L		09/23/22 12:11	09/25/22 23:38	1
Perfluorohexanesulfonic acid (PFHxS)	**7.0**		1.8	0.51	ng/L		09/23/22 12:11	09/25/22 23:38	1
Perfluorooctanesulfonic acid (PFOS)	**21**		1.8	0.49	ng/L		09/23/22 12:11	09/25/22 23:38	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.5	1.1	ng/L		09/23/22 12:11	09/25/22 23:38	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.5	1.2	ng/L		09/23/22 12:11	09/25/22 23:38	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		09/23/22 12:11	09/25/22 23:38	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.4	ng/L		09/23/22 12:11	09/25/22 23:38	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		09/23/22 12:11	09/25/22 23:38	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		09/23/22 12:11	09/25/22 23:38	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*91*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:38*	*1*
13C4 PFHpA	*91*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:38*	*1*
13C4 PFOA	*93*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:38*	*1*
13C5 PFNA	*87*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:38*	*1*
13C2 PFDA	*87*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:38*	*1*
13C2 PFUnA	*83*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:38*	*1*
13C2 PFDoA	*76*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:38*	*1*
13C2 PFTeDA	*76*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:38*	*1*
13C3 PFBS	*90*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:38*	*1*
18O2 PFHxS	*94*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:38*	*1*
13C4 PFOS	*82*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:38*	*1*
d3-NMeFOSAA	*93*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:38*	*1*
d5-NEtFOSAA	*90*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:38*	*1*
13C3 HFPO-DA	*86*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:38*	*1*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-92176-1

Client Sample ID: MW-61-09142022

Date Collected: 09/14/22 16:25
Date Received: 09/17/22 09:25

Lab Sample ID: 320-92176-14

Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoroheptanoic acid (PFHpA)	**130**		1.8	0.23	ng/L		09/23/22 12:11	09/25/22 23:48	1
Perfluorooctanoic acid (PFOA)	**200**		1.8	0.77	ng/L		09/23/22 12:11	09/25/22 23:48	1
Perfluorononanoic acid (PFNA)	**0.84**	**J I**	1.8	0.24	ng/L		09/23/22 12:11	09/25/22 23:48	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		09/23/22 12:11	09/25/22 23:48	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.99	ng/L		09/23/22 12:11	09/25/22 23:48	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.50	ng/L		09/23/22 12:11	09/25/22 23:48	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		09/23/22 12:11	09/25/22 23:48	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.66	ng/L		09/23/22 12:11	09/25/22 23:48	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.5	1.1	ng/L		09/23/22 12:11	09/25/22 23:48	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.5	1.2	ng/L		09/23/22 12:11	09/25/22 23:48	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		09/23/22 12:11	09/25/22 23:48	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.4	ng/L		09/23/22 12:11	09/25/22 23:48	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		09/23/22 12:11	09/25/22 23:48	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		09/23/22 12:11	09/25/22 23:48	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*51*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:48*	*1*
13C4 PFHpA	*62*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:48*	*1*
13C4 PFOA	*73*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:48*	*1*
13C5 PFNA	*73*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:48*	*1*
13C2 PFDA	*92*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:48*	*1*
13C2 PFUnA	*97*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:48*	*1*
13C2 PFDoA	*90*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:48*	*1*
13C2 PFTeDA	*84*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:48*	*1*
13C3 PFBS	*68*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:48*	*1*
18O2 PFHxS	*80*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:48*	*1*
13C4 PFOS	*73*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:48*	*1*
d3-NMeFOSAA	*86*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:48*	*1*
d5-NEtFOSAA	*101*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:48*	*1*
13C3 HFPO-DA	*62*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:48*	*1*

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**700**		90	26	ng/L		09/23/22 12:11	09/27/22 17:03	50
Perfluorobutanesulfonic acid (PFBS)	**440**		90	9.0	ng/L		09/23/22 12:11	09/27/22 17:03	50
Perfluorohexanesulfonic acid (PFHxS)	**2900**		90	26	ng/L		09/23/22 12:11	09/27/22 17:03	50
Perfluorooctanesulfonic acid (PFOS)	**5100**		90	24	ng/L		09/23/22 12:11	09/27/22 17:03	50

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*82*		*50 - 150*	*09/23/22 12:11*	*09/27/22 17:03*	*50*
13C3 PFBS	*73*		*50 - 150*	*09/23/22 12:11*	*09/27/22 17:03*	*50*
18O2 PFHxS	*80*		*50 - 150*	*09/23/22 12:11*	*09/27/22 17:03*	*50*
13C4 PFOS	*82*		*50 - 150*	*09/23/22 12:11*	*09/27/22 17:03*	*50*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-92176-1

Client Sample ID: MW-40-09152022

Date Collected: 09/15/22 09:47
Date Received: 09/17/22 09:25

Lab Sample ID: 320-92176-15

Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**200**		1.9	0.55	ng/L		09/23/22 12:11	09/25/22 23:58	1
Perfluoroheptanoic acid (PFHpA)	**48**		1.9	0.24	ng/L		09/23/22 12:11	09/25/22 23:58	1
Perfluorooctanoic acid (PFOA)	**30**		1.9	0.81	ng/L		09/23/22 12:11	09/25/22 23:58	1
Perfluorononanoic acid (PFNA)	**0.62**	**J**	1.9	0.26	ng/L		09/23/22 12:11	09/25/22 23:58	1
Perfluorodecanoic acid (PFDA)	ND		1.9	0.30	ng/L		09/23/22 12:11	09/25/22 23:58	1
Perfluoroundecanoic acid (PFUnA)	ND		1.9	1.1	ng/L		09/23/22 12:11	09/25/22 23:58	1
Perfluorododecanoic acid (PFDoA)	ND		1.9	0.53	ng/L		09/23/22 12:11	09/25/22 23:58	1
Perfluorotridecanoic acid (PFTriA)	ND		1.9	1.2	ng/L		09/23/22 12:11	09/25/22 23:58	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.9	0.70	ng/L		09/23/22 12:11	09/25/22 23:58	1
Perfluorobutanesulfonic acid (PFBS)	**23**		1.9	0.19	ng/L		09/23/22 12:11	09/25/22 23:58	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.8	1.1	ng/L		09/23/22 12:11	09/25/22 23:58	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.8	1.2	ng/L		09/23/22 12:11	09/25/22 23:58	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.9	0.23	ng/L		09/23/22 12:11	09/25/22 23:58	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.8	1.4	ng/L		09/23/22 12:11	09/25/22 23:58	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.9	0.31	ng/L		09/23/22 12:11	09/25/22 23:58	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.9	0.38	ng/L		09/23/22 12:11	09/25/22 23:58	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*74*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:58*	*1*
13C4 PFHpA	*90*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:58*	*1*
13C4 PFOA	*92*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:58*	*1*
13C5 PFNA	*93*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:58*	*1*
13C2 PFDA	*99*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:58*	*1*
13C2 PFUnA	*99*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:58*	*1*
13C2 PFDoA	*92*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:58*	*1*
13C2 PFTeDA	*89*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:58*	*1*
13C3 PFBS	*79*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:58*	*1*
18O2 PFHxS	*94*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:58*	*1*
13C4 PFOS	*92*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:58*	*1*
d3-NMeFOSAA	*100*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:58*	*1*
d5-NEtFOSAA	*103*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:58*	*1*
13C3 HFPO-DA	*77*		*50 - 150*	*09/23/22 12:11*	*09/25/22 23:58*	*1*

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanesulfonic acid (PFHxS)	**410**		9.6	2.7	ng/L		09/23/22 12:11	09/27/22 16:43	5
Perfluorooctanesulfonic acid (PFOS)	**800**		9.6	2.6	ng/L		09/23/22 12:11	09/27/22 16:43	5

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*98*		*50 - 150*	*09/23/22 12:11*	*09/27/22 16:43*	*5*
13C4 PFOS	*93*		*50 - 150*	*09/23/22 12:11*	*09/27/22 16:43*	*5*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-92176-1

Client Sample ID: MW-41-09152022

Date Collected: 09/15/22 11:10
Date Received: 09/17/22 09:25

Lab Sample ID: 320-92176-16

Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**270**		1.8	0.52	ng/L		09/23/22 12:11	09/26/22 00:09	1
Perfluoroheptanoic acid (PFHpA)	**52**		1.8	0.23	ng/L		09/23/22 12:11	09/26/22 00:09	1
Perfluorooctanoic acid (PFOA)	**47**		1.8	0.77	ng/L		09/23/22 12:11	09/26/22 00:09	1
Perfluorononanoic acid (PFNA)	**1.4**	**J**	1.8	0.24	ng/L		09/23/22 12:11	09/26/22 00:09	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		09/23/22 12:11	09/26/22 00:09	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.99	ng/L		09/23/22 12:11	09/26/22 00:09	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.50	ng/L		09/23/22 12:11	09/26/22 00:09	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		09/23/22 12:11	09/26/22 00:09	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.66	ng/L		09/23/22 12:11	09/26/22 00:09	1
Perfluorobutanesulfonic acid (PFBS)	**47**		1.8	0.18	ng/L		09/23/22 12:11	09/26/22 00:09	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.5	1.1	ng/L		09/23/22 12:11	09/26/22 00:09	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.5	1.2	ng/L		09/23/22 12:11	09/26/22 00:09	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		09/23/22 12:11	09/26/22 00:09	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.4	ng/L		09/23/22 12:11	09/26/22 00:09	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		09/23/22 12:11	09/26/22 00:09	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		09/23/22 12:11	09/26/22 00:09	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*82*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:09*	*1*
13C4 PFHpA	*92*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:09*	*1*
13C4 PFOA	*89*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:09*	*1*
13C5 PFNA	*88*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:09*	*1*
13C2 PFDA	*90*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:09*	*1*
13C2 PFUnA	*91*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:09*	*1*
13C2 PFDoA	*83*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:09*	*1*
13C2 PFTeDA	*81*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:09*	*1*
13C3 PFBS	*87*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:09*	*1*
18O2 PFHxS	*92*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:09*	*1*
13C4 PFOS	*85*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:09*	*1*
d3-NMeFOSAA	*97*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:09*	*1*
d5-NEtFOSAA	*93*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:09*	*1*
13C3 HFPO-DA	*79*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:09*	*1*

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanesulfonic acid (PFHxS)	**470**		18	5.1	ng/L		09/23/22 12:11	09/27/22 16:53	10
Perfluorooctanesulfonic acid (PFOS)	**1000**		18	4.9	ng/L		09/23/22 12:11	09/27/22 16:53	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*84*		*50 - 150*	*09/23/22 12:11*	*09/27/22 16:53*	*10*
13C4 PFOS	*84*		*50 - 150*	*09/23/22 12:11*	*09/27/22 16:53*	*10*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-92176-1

Client Sample ID: MW-46-09152022
Date Collected: 09/15/22 13:48
Date Received: 09/17/22 09:25

Lab Sample ID: 320-92176-17
Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**23**		1.9	0.55	ng/L		09/23/22 12:11	09/26/22 00:19	1
Perfluoroheptanoic acid (PFHpA)	**5.4**		1.9	0.24	ng/L		09/23/22 12:11	09/26/22 00:19	1
Perfluorooctanoic acid (PFOA)	**10**		1.9	0.80	ng/L		09/23/22 12:11	09/26/22 00:19	1
Perfluorononanoic acid (PFNA)	**0.33**	**J**	1.9	0.25	ng/L		09/23/22 12:11	09/26/22 00:19	1
Perfluorodecanoic acid (PFDA)	ND		1.9	0.29	ng/L		09/23/22 12:11	09/26/22 00:19	1
Perfluoroundecanoic acid (PFUnA)	ND		1.9	1.0	ng/L		09/23/22 12:11	09/26/22 00:19	1
Perfluorododecanoic acid (PFDoA)	ND		1.9	0.52	ng/L		09/23/22 12:11	09/26/22 00:19	1
Perfluorotridecanoic acid (PFTriA)	ND		1.9	1.2	ng/L		09/23/22 12:11	09/26/22 00:19	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.9	0.69	ng/L		09/23/22 12:11	09/26/22 00:19	1
Perfluorobutanesulfonic acid (PFBS)	**4.2**		1.9	0.19	ng/L		09/23/22 12:11	09/26/22 00:19	1
Perfluorohexanesulfonic acid (PFHxS)	**46**		1.9	0.54	ng/L		09/23/22 12:11	09/26/22 00:19	1
Perfluorooctanesulfonic acid (PFOS)	**120**		1.9	0.51	ng/L		09/23/22 12:11	09/26/22 00:19	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.7	1.1	ng/L		09/23/22 12:11	09/26/22 00:19	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.7	1.2	ng/L		09/23/22 12:11	09/26/22 00:19	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.9	0.23	ng/L		09/23/22 12:11	09/26/22 00:19	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.8	1.4	ng/L		09/23/22 12:11	09/26/22 00:19	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.9	0.30	ng/L		09/23/22 12:11	09/26/22 00:19	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.9	0.38	ng/L		09/23/22 12:11	09/26/22 00:19	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*60*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:19*	*1*
13C4 PFHpA	*60*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:19*	*1*
13C4 PFOA	*60*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:19*	*1*
13C5 PFNA	*59*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:19*	*1*
13C2 PFDA	*61*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:19*	*1*
13C2 PFUnA	*64*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:19*	*1*
13C2 PFDoA	*59*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:19*	*1*
13C2 PFTeDA	*55*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:19*	*1*
13C3 PFBS	*64*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:19*	*1*
18O2 PFHxS	*61*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:19*	*1*
13C4 PFOS	*59*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:19*	*1*
d3-NMeFOSAA	*66*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:19*	*1*
d5-NEtFOSAA	*67*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:19*	*1*
13C3 HFPO-DA	*58*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:19*	*1*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-92176-1

Client Sample ID: MW-67-09152022
Date Collected: 09/15/22 15:30
Date Received: 09/17/22 09:25

Lab Sample ID: 320-92176-18
Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**1.5**	**J**	1.8	0.51	ng/L		09/23/22 12:11	09/26/22 00:49	1
Perfluoroheptanoic acid (PFHpA)	**1.0**	**J**	1.8	0.22	ng/L		09/23/22 12:11	09/26/22 00:49	1
Perfluorooctanoic acid (PFOA)	**8.2**		1.8	0.75	ng/L		09/23/22 12:11	09/26/22 00:49	1
Perfluorononanoic acid (PFNA)	**1.5**	**J**	1.8	0.24	ng/L		09/23/22 12:11	09/26/22 00:49	1
Perfluorodecanoic acid (PFDA)	**0.46**	**J**	1.8	0.27	ng/L		09/23/22 12:11	09/26/22 00:49	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.97	ng/L		09/23/22 12:11	09/26/22 00:49	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.48	ng/L		09/23/22 12:11	09/26/22 00:49	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.1	ng/L		09/23/22 12:11	09/26/22 00:49	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.64	ng/L		09/23/22 12:11	09/26/22 00:49	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.8	0.18	ng/L		09/23/22 12:11	09/26/22 00:49	1
Perfluorohexanesulfonic acid (PFHxS)	**7.6**		1.8	0.50	ng/L		09/23/22 12:11	09/26/22 00:49	1
Perfluorooctanesulfonic acid (PFOS)	**36**		1.8	0.48	ng/L		09/23/22 12:11	09/26/22 00:49	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.4	1.1	ng/L		09/23/22 12:11	09/26/22 00:49	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.4	1.1	ng/L		09/23/22 12:11	09/26/22 00:49	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.21	ng/L		09/23/22 12:11	09/26/22 00:49	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.5	1.3	ng/L		09/23/22 12:11	09/26/22 00:49	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.28	ng/L		09/23/22 12:11	09/26/22 00:49	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.35	ng/L		09/23/22 12:11	09/26/22 00:49	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*67*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:49*	*1*
13C4 PFHpA	*74*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:49*	*1*
13C4 PFOA	*72*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:49*	*1*
13C5 PFNA	*75*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:49*	*1*
13C2 PFDA	*70*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:49*	*1*
13C2 PFUnA	*63*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:49*	*1*
13C2 PFDoA	*54*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:49*	*1*
13C2 PFTeDA	*56*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:49*	*1*
13C3 PFBS	*71*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:49*	*1*
18O2 PFHxS	*75*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:49*	*1*
13C4 PFOS	*70*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:49*	*1*
d3-NMeFOSAA	*70*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:49*	*1*
d5-NEtFOSAA	*68*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:49*	*1*
13C3 HFPO-DA	*62*		*50 - 150*	*09/23/22 12:11*	*09/26/22 00:49*	*1*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-92176-1

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Matrix: Water

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFHxA (50-150)	C4PFHA (50-150)	PFOA (50-150)	PFNA (50-150)	PFDA (50-150)	PFUnA (50-150)	PFDoA (50-150)	PFTDA (50-150)
320-92176-1	MW-23-09132022	53	54	52	53	46 *5-	44 *5-	44 *5-	43 *5-
320-92176-2	EB-2-09132022	92	92	93	91	88	93	85	82
320-92176-3	MW-70-09132022	84	91	93	94	89	87	76	72
320-92176-4	EB-1-09132022	101	99	98	96	94	97	91	96
320-92176-5	MW-69-09132022	65	74	77	80	79	84	75	66
320-92176-6	MW-50-09132022	86	94	91	92	91	93	86	84
320-92176-6 - DL	MW-50-09132022								
320-92176-7	MW-52-09132022	87	90	93	94	93	94	88	81
320-92176-8	MW-32-09142022	67	76	78	79	78	76	74	75
320-92176-9	MW-38-09142022	88	92	92	91	87	88	81	82
320-92176-10	MW-37-09142022	87	87	90	87	82	82	78	78
320-92176-11	MW-53-09142022	90	94	92	90	88	89	82	83
320-92176-12	MW-54-09142022	91	93	90	91	81	77	69	70
320-92176-13	MW-100-09142022	91	91	93	87	87	83	76	76
320-92176-14	MW-61-09142022	51	62	73	73	92	97	90	84
320-92176-14 - DL	MW-61-09142022	82							
320-92176-15	MW-40-09152022	74	90	92	93	99	99	92	89
320-92176-15 - DL	MW-40-09152022								
320-92176-16	MW-41-09152022	82	92	89	88	90	91	83	81
320-92176-16 - DL	MW-41-09152022								
320-92176-17	MW-46-09152022	60	60	60	59	61	64	59	55
320-92176-18	MW-67-09152022	67	74	72	75	70	63	54	56
LCS 320-619355/2-A	Lab Control Sample	94	95	93	97	92	95	92	87
LCSD 320-619355/3-A	Lab Control Sample Dup	97	97	96	97	93	99	93	92
MB 320-619355/1-A	Method Blank	94	94	92	92	92	94	88	86

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	C3PFBS (50-150)	PFHxS (50-150)	PFOS (50-150)	d3NMFOS (50-150)	d5NEFOS (50-150)	HFPODA (50-150)		
320-92176-1	MW-23-09132022	54	54	49 *5-	48 *5-	48 *5-	53		
320-92176-2	EB-2-09132022	92	92	87	99	97	91		
320-92176-3	MW-70-09132022	91	93	86	92	89	83		
320-92176-4	EB-1-09132022	103	101	92	107	107	93		
320-92176-5	MW-69-09132022	71	76	74	84	86	65		
320-92176-6	MW-50-09132022	83	87	83	98	99	87		
320-92176-6 - DL	MW-50-09132022			82					
320-92176-7	MW-52-09132022	83	88	85	100	100	80		
320-92176-8	MW-32-09142022	79	80	74	84	86	64		
320-92176-9	MW-38-09142022	93	96	88	97	96	83		
320-92176-10	MW-37-09142022	87	87	76	92	95	86		
320-92176-11	MW-53-09142022	90	92	80	98	95	87		
320-92176-12	MW-54-09142022	94	93	79	85	81	87		
320-92176-13	MW-100-09142022	90	94	82	93	90	86		
320-92176-14	MW-61-09142022	68	80	73	86	101	62		
320-92176-14 - DL	MW-61-09142022	73	80	82					
320-92176-15	MW-40-09152022	79	94	92	100	103	77		
320-92176-15 - DL	MW-40-09152022		98	93					
320-92176-16	MW-41-09152022	87	92	85	97	93	79		
320-92176-16 - DL	MW-41-09152022		84	84					
320-92176-17	MW-46-09152022	64	61	59	66	67	58		

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-92176-1

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Matrix: Water

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	C3PFBS (50-150)	PFHxS (50-150)	PFOS (50-150)	d3NMFOS (50-150)	d5NEFOS (50-150)	HFPODA (50-150)		
320-92176-18	MW-67-09152022	71	75	70	70	68	62		
LCS 320-619355/2-A	Lab Control Sample	99	92	88	105	103	96		
LCSD 320-619355/3-A	Lab Control Sample Dup	98	96	90	106	103	95		
MB 320-619355/1-A	Method Blank	96	94	88	101	102	96		

Surrogate Legend

PFHxA = 13C2 PFHxA
C4PFHA = 13C4 PFHpA
PFOA = 13C4 PFOA
PFNA = 13C5 PFNA
PFDA = 13C2 PFDA
PFUnA = 13C2 PFUnA
PFDoA = 13C2 PFDoA
PFTDA = 13C2 PFTeDA
C3PFBS = 13C3 PFBS
PFHxS = 18O2 PFHxS
PFOS = 13C4 PFOS
d3NMFOS = d3-NMeFOSAA
d5NEFOS = d5-NEtFOSAA
HFPODA = 13C3 HFPO-DA

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Lab Sample ID: MB 320-619355/1-A
Matrix: Water
Analysis Batch: 619954

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 619355

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		09/23/22 12:11	09/25/22 20:47	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		09/23/22 12:11	09/25/22 20:47	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		09/23/22 12:11	09/25/22 20:47	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		09/23/22 12:11	09/25/22 20:47	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		09/23/22 12:11	09/25/22 20:47	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		09/23/22 12:11	09/25/22 20:47	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		09/23/22 12:11	09/25/22 20:47	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		09/23/22 12:11	09/25/22 20:47	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.73	ng/L		09/23/22 12:11	09/25/22 20:47	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		09/23/22 12:11	09/25/22 20:47	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.57	ng/L		09/23/22 12:11	09/25/22 20:47	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		09/23/22 12:11	09/25/22 20:47	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		5.0	1.2	ng/L		09/23/22 12:11	09/25/22 20:47	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		5.0	1.3	ng/L		09/23/22 12:11	09/25/22 20:47	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.0	0.24	ng/L		09/23/22 12:11	09/25/22 20:47	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		4.0	1.5	ng/L		09/23/22 12:11	09/25/22 20:47	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.0	0.32	ng/L		09/23/22 12:11	09/25/22 20:47	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.40	ng/L		09/23/22 12:11	09/25/22 20:47	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*94*		*50 - 150*	*09/23/22 12:11*	*09/25/22 20:47*	*1*
13C4 PFHpA	*94*		*50 - 150*	*09/23/22 12:11*	*09/25/22 20:47*	*1*
13C4 PFOA	*92*		*50 - 150*	*09/23/22 12:11*	*09/25/22 20:47*	*1*
13C5 PFNA	*92*		*50 - 150*	*09/23/22 12:11*	*09/25/22 20:47*	*1*
13C2 PFDA	*92*		*50 - 150*	*09/23/22 12:11*	*09/25/22 20:47*	*1*
13C2 PFUnA	*94*		*50 - 150*	*09/23/22 12:11*	*09/25/22 20:47*	*1*
13C2 PFDoA	*88*		*50 - 150*	*09/23/22 12:11*	*09/25/22 20:47*	*1*
13C2 PFTeDA	*86*		*50 - 150*	*09/23/22 12:11*	*09/25/22 20:47*	*1*
13C3 PFBS	*96*		*50 - 150*	*09/23/22 12:11*	*09/25/22 20:47*	*1*
18O2 PFHxS	*94*		*50 - 150*	*09/23/22 12:11*	*09/25/22 20:47*	*1*
13C4 PFOS	*88*		*50 - 150*	*09/23/22 12:11*	*09/25/22 20:47*	*1*
d3-NMeFOSAA	*101*		*50 - 150*	*09/23/22 12:11*	*09/25/22 20:47*	*1*
d5-NEtFOSAA	*102*		*50 - 150*	*09/23/22 12:11*	*09/25/22 20:47*	*1*
13C3 HFPO-DA	*96*		*50 - 150*	*09/23/22 12:11*	*09/25/22 20:47*	*1*

Lab Sample ID: LCS 320-619355/2-A
Matrix: Water
Analysis Batch: 619954

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 619355

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorohexanoic acid (PFHxA)	40.0	43.1		ng/L		108	72 - 129
Perfluoroheptanoic acid (PFHpA)	40.0	42.8		ng/L		107	72 - 130
Perfluorooctanoic acid (PFOA)	40.0	45.5		ng/L		114	71 - 133
Perfluorononanoic acid (PFNA)	40.0	41.3		ng/L		103	69 - 130

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: LCS 320-619355/2-A
Matrix: Water
Analysis Batch: 619954

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 619355

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorodecanoic acid (PFDA)	40.0	39.9		ng/L		100	71 - 129
Perfluoroundecanoic acid (PFUnA)	40.0	43.6		ng/L		109	69 - 133
Perfluorododecanoic acid (PFDoA)	40.0	42.4		ng/L		106	72 - 134
Perfluorotridecanoic acid (PFTriA)	40.0	38.8		ng/L		97	65 - 144
Perfluorotetradecanoic acid (PFTeA)	40.0	39.5		ng/L		99	71 - 132
Perfluorobutanesulfonic acid (PFBS)	35.5	36.7		ng/L		103	72 - 130
Perfluorohexanesulfonic acid (PFHxS)	36.5	37.4		ng/L		102	68 - 131
Perfluorooctanesulfonic acid (PFOS)	37.2	40.7		ng/L		109	65 - 140
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	40.0	40.9		ng/L		102	65 - 136
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	40.0	42.5		ng/L		106	61 - 135
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	37.4	39.3		ng/L		105	77 - 137
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	40.0	40.3		ng/L		101	72 - 132
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	37.8	39.8		ng/L		105	76 - 136
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.8	44.3		ng/L		117	81 - 141

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*94*		*50 - 150*
13C4 PFHpA	*95*		*50 - 150*
13C4 PFOA	*93*		*50 - 150*
13C5 PFNA	*97*		*50 - 150*
13C2 PFDA	*92*		*50 - 150*
13C2 PFUnA	*95*		*50 - 150*
13C2 PFDoA	*92*		*50 - 150*
13C2 PFTeDA	*87*		*50 - 150*
13C3 PFBS	*99*		*50 - 150*
18O2 PFHxS	*92*		*50 - 150*
13C4 PFOS	*88*		*50 - 150*
d3-NMeFOSAA	*105*		*50 - 150*
d5-NEtFOSAA	*103*		*50 - 150*
13C3 HFPO-DA	*96*		*50 - 150*

Lab Sample ID: LCSD 320-619355/3-A
Matrix: Water
Analysis Batch: 619954

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 619355

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)	40.0	43.7		ng/L		109	72 - 129	1	30
Perfluoroheptanoic acid (PFHpA)	40.0	44.3		ng/L		111	72 - 130	3	30
Perfluorooctanoic acid (PFOA)	40.0	43.7		ng/L		109	71 - 133	4	30

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-92176-1

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: LCSD 320-619355/3-A
Matrix: Water
Analysis Batch: 619954

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 619355

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorononanoic acid (PFNA)			40.0	43.1		ng/L		108	69 - 130	4	30
Perfluorodecanoic acid (PFDA)			40.0	41.9		ng/L		105	71 - 129	5	30
Perfluoroundecanoic acid (PFUnA)			40.0	41.6		ng/L		104	69 - 133	5	30
Perfluorododecanoic acid (PFDoA)			40.0	43.0		ng/L		108	72 - 134	1	30
Perfluorotridecanoic acid (PFTriA)			40.0	39.6		ng/L		99	65 - 144	2	30
Perfluorotetradecanoic acid (PFTeA)			40.0	39.2		ng/L		98	71 - 132	1	30
Perfluorobutanesulfonic acid (PFBS)			35.5	38.3		ng/L		108	72 - 130	4	30
Perfluorohexanesulfonic acid (PFHxS)			36.5	36.1		ng/L		99	68 - 131	3	30
Perfluorooctanesulfonic acid (PFOS)			37.2	41.1		ng/L		111	65 - 140	1	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)			40.0	41.6		ng/L		104	65 - 136	2	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)			40.0	44.5		ng/L		111	61 - 135	5	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid			37.4	40.9		ng/L		110	77 - 137	4	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)			40.0	41.2		ng/L		103	72 - 132	2	30
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid			37.8	41.6		ng/L		110	76 - 136	4	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			37.8	45.5		ng/L		120	81 - 141	2	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFHxA	*97*		*50 - 150*
13C4 PFHpA	*97*		*50 - 150*
13C4 PFOA	*96*		*50 - 150*
13C5 PFNA	*97*		*50 - 150*
13C2 PFDA	*93*		*50 - 150*
13C2 PFUnA	*99*		*50 - 150*
13C2 PFDoA	*93*		*50 - 150*
13C2 PFTeDA	*92*		*50 - 150*
13C3 PFBS	*98*		*50 - 150*
18O2 PFHxS	*96*		*50 - 150*
13C4 PFOS	*90*		*50 - 150*
d3-NMeFOSAA	*106*		*50 - 150*
d5-NEtFOSAA	*103*		*50 - 150*
13C3 HFPO-DA	*95*		*50 - 150*

LCMS

Prep Batch: 619355

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-92176-1	MW-23-09132022	Total/NA	Water	3535	
320-92176-2	EB-2-09132022	Total/NA	Water	3535	
320-92176-3	MW-70-09132022	Total/NA	Water	3535	
320-92176-4	EB-1-09132022	Total/NA	Water	3535	
320-92176-5	MW-69-09132022	Total/NA	Water	3535	
320-92176-6 - DL	MW-50-09132022	Total/NA	Water	3535	
320-92176-6	MW-50-09132022	Total/NA	Water	3535	
320-92176-7	MW-52-09132022	Total/NA	Water	3535	
320-92176-8	MW-32-09142022	Total/NA	Water	3535	
320-92176-9	MW-38-09142022	Total/NA	Water	3535	
320-92176-10	MW-37-09142022	Total/NA	Water	3535	
320-92176-11	MW-53-09142022	Total/NA	Water	3535	
320-92176-12	MW-54-09142022	Total/NA	Water	3535	
320-92176-13	MW-100-09142022	Total/NA	Water	3535	
320-92176-14 - DL	MW-61-09142022	Total/NA	Water	3535	
320-92176-14	MW-61-09142022	Total/NA	Water	3535	
320-92176-15	MW-40-09152022	Total/NA	Water	3535	
320-92176-15 - DL	MW-40-09152022	Total/NA	Water	3535	
320-92176-16 - DL	MW-41-09152022	Total/NA	Water	3535	
320-92176-16	MW-41-09152022	Total/NA	Water	3535	
320-92176-17	MW-46-09152022	Total/NA	Water	3535	
320-92176-18	MW-67-09152022	Total/NA	Water	3535	
MB 320-619355/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-619355/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-619355/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

Analysis Batch: 619954

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-92176-1	MW-23-09132022	Total/NA	Water	EPA 537(Mod)	619355
320-92176-2	EB-2-09132022	Total/NA	Water	EPA 537(Mod)	619355
320-92176-3	MW-70-09132022	Total/NA	Water	EPA 537(Mod)	619355
320-92176-4	EB-1-09132022	Total/NA	Water	EPA 537(Mod)	619355
320-92176-5	MW-69-09132022	Total/NA	Water	EPA 537(Mod)	619355
320-92176-6	MW-50-09132022	Total/NA	Water	EPA 537(Mod)	619355
320-92176-7	MW-52-09132022	Total/NA	Water	EPA 537(Mod)	619355
320-92176-8	MW-32-09142022	Total/NA	Water	EPA 537(Mod)	619355
320-92176-9	MW-38-09142022	Total/NA	Water	EPA 537(Mod)	619355
320-92176-10	MW-37-09142022	Total/NA	Water	EPA 537(Mod)	619355
320-92176-11	MW-53-09142022	Total/NA	Water	EPA 537(Mod)	619355
320-92176-12	MW-54-09142022	Total/NA	Water	EPA 537(Mod)	619355
320-92176-13	MW-100-09142022	Total/NA	Water	EPA 537(Mod)	619355
320-92176-14	MW-61-09142022	Total/NA	Water	EPA 537(Mod)	619355
320-92176-15	MW-40-09152022	Total/NA	Water	EPA 537(Mod)	619355
320-92176-16	MW-41-09152022	Total/NA	Water	EPA 537(Mod)	619355
320-92176-17	MW-46-09152022	Total/NA	Water	EPA 537(Mod)	619355
320-92176-18	MW-67-09152022	Total/NA	Water	EPA 537(Mod)	619355
MB 320-619355/1-A	Method Blank	Total/NA	Water	EPA 537(Mod)	619355
LCS 320-619355/2-A	Lab Control Sample	Total/NA	Water	EPA 537(Mod)	619355
LCSD 320-619355/3-A	Lab Control Sample Dup	Total/NA	Water	EPA 537(Mod)	619355

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-92176-1

LCMS

Analysis Batch: 620527

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-92176-6 - DL	MW-50-09132022	Total/NA	Water	EPA 537(Mod)	619355
320-92176-14 - DL	MW-61-09142022	Total/NA	Water	EPA 537(Mod)	619355
320-92176-15 - DL	MW-40-09152022	Total/NA	Water	EPA 537(Mod)	619355
320-92176-16 - DL	MW-41-09152022	Total/NA	Water	EPA 537(Mod)	619355

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-92176-1

Client Sample ID: MW-23-09132022
Date Collected: 09/13/22 12:20
Date Received: 09/17/22 09:25

Lab Sample ID: 320-92176-1
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			256.9 mL	10.0 mL	619355	09/23/22 12:11	MRP	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	619954	09/25/22 21:17	K1S	EET SAC

Client Sample ID: EB-2-09132022
Date Collected: 09/13/22 13:00
Date Received: 09/17/22 09:25

Lab Sample ID: 320-92176-2
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			268.5 mL	10.0 mL	619355	09/23/22 12:11	MRP	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	619954	09/25/22 21:27	K1S	EET SAC

Client Sample ID: MW-70-09132022
Date Collected: 09/13/22 13:10
Date Received: 09/17/22 09:25

Lab Sample ID: 320-92176-3
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			275.8 mL	10.0 mL	619355	09/23/22 12:11	MRP	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	619954	09/25/22 21:37	K1S	EET SAC

Client Sample ID: EB-1-09132022
Date Collected: 09/13/22 13:30
Date Received: 09/17/22 09:25

Lab Sample ID: 320-92176-4
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			272 mL	10.0 mL	619355	09/23/22 12:11	MRP	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	619954	09/25/22 21:47	K1S	EET SAC

Client Sample ID: MW-69-09132022
Date Collected: 09/13/22 14:20
Date Received: 09/17/22 09:25

Lab Sample ID: 320-92176-5
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			286.8 mL	10.0 mL	619355	09/23/22 12:11	MRP	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	619954	09/25/22 21:57	K1S	EET SAC

Client Sample ID: MW-50-09132022
Date Collected: 09/13/22 15:10
Date Received: 09/17/22 09:25

Lab Sample ID: 320-92176-6
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			277.9 mL	10.0 mL	619355	09/23/22 12:11	MRP	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	619954	09/25/22 22:07	K1S	EET SAC
Total/NA	Prep	3535	DL		277.9 mL	10.0 mL	619355	09/23/22 12:11	MRP	EET SAC
Total/NA	Analysis	EPA 537(Mod)	DL	5	1 mL	1 mL	620527	09/27/22 16:32	K1S	EET SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-92176-1

Client Sample ID: MW-52-09132022
Lab Sample ID: 320-92176-7
Date Collected: 09/13/22 16:20
Matrix: Water
Date Received: 09/17/22 09:25

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			281.3 mL	10.0 mL	619355	09/23/22 12:11	MRP	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	619954	09/25/22 22:17	K1S	EET SAC

Client Sample ID: MW-32-09142022
Lab Sample ID: 320-92176-8
Date Collected: 09/14/22 09:48
Matrix: Water
Date Received: 09/17/22 09:25

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			280.1 mL	10.0 mL	619355	09/23/22 12:11	MRP	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	619954	09/25/22 22:48	K1S	EET SAC

Client Sample ID: MW-38-09142022
Lab Sample ID: 320-92176-9
Date Collected: 09/14/22 12:00
Matrix: Water
Date Received: 09/17/22 09:25

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			279.5 mL	10.0 mL	619355	09/23/22 12:11	MRP	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	619954	09/25/22 22:58	K1S	EET SAC

Client Sample ID: MW-37-09142022
Lab Sample ID: 320-92176-10
Date Collected: 09/14/22 12:40
Matrix: Water
Date Received: 09/17/22 09:25

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			284.5 mL	10.0 mL	619355	09/23/22 12:11	MRP	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	619954	09/25/22 23:08	K1S	EET SAC

Client Sample ID: MW-53-09142022
Lab Sample ID: 320-92176-11
Date Collected: 09/14/22 13:30
Matrix: Water
Date Received: 09/17/22 09:25

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			276.7 mL	10.0 mL	619355	09/23/22 12:11	MRP	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	619954	09/25/22 23:18	K1S	EET SAC

Client Sample ID: MW-54-09142022
Lab Sample ID: 320-92176-12
Date Collected: 09/14/22 15:14
Matrix: Water
Date Received: 09/17/22 09:25

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			266.6 mL	10.0 mL	619355	09/23/22 12:11	MRP	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	619954	09/25/22 23:28	K1S	EET SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-92176-1

Client Sample ID: MW-100-09142022
Lab Sample ID: 320-92176-13
Date Collected: 09/14/22 16:00
Matrix: Water
Date Received: 09/17/22 09:25

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			277.5 mL	10.0 mL	619355	09/23/22 12:11	MRP	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	619954	09/25/22 23:38	K1S	EET SAC

Client Sample ID: MW-61-09142022
Lab Sample ID: 320-92176-14
Date Collected: 09/14/22 16:25
Matrix: Water
Date Received: 09/17/22 09:25

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			277.4 mL	10.0 mL	619355	09/23/22 12:11	MRP	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	619954	09/25/22 23:48	K1S	EET SAC
Total/NA	Prep	3535	DL		277.4 mL	10.0 mL	619355	09/23/22 12:11	MRP	EET SAC
Total/NA	Analysis	EPA 537(Mod)	DL	50	1 mL	1 mL	620527	09/27/22 17:03	K1S	EET SAC

Client Sample ID: MW-40-09152022
Lab Sample ID: 320-92176-15
Date Collected: 09/15/22 09:47
Matrix: Water
Date Received: 09/17/22 09:25

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			261.3 mL	10.0 mL	619355	09/23/22 12:11	MRP	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	619954	09/25/22 23:58	K1S	EET SAC
Total/NA	Prep	3535	DL		261.3 mL	10.0 mL	619355	09/23/22 12:11	MRP	EET SAC
Total/NA	Analysis	EPA 537(Mod)	DL	5	1 mL	1 mL	620527	09/27/22 16:43	K1S	EET SAC

Client Sample ID: MW-41-09152022
Lab Sample ID: 320-92176-16
Date Collected: 09/15/22 11:10
Matrix: Water
Date Received: 09/17/22 09:25

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			277.6 mL	10.0 mL	619355	09/23/22 12:11	MRP	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	619954	09/26/22 00:09	K1S	EET SAC
Total/NA	Prep	3535	DL		277.6 mL	10.0 mL	619355	09/23/22 12:11	MRP	EET SAC
Total/NA	Analysis	EPA 537(Mod)	DL	10	1 mL	1 mL	620527	09/27/22 16:53	K1S	EET SAC

Client Sample ID: MW-46-09152022
Lab Sample ID: 320-92176-17
Date Collected: 09/15/22 13:48
Matrix: Water
Date Received: 09/17/22 09:25

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			265.2 mL	10.0 mL	619355	09/23/22 12:11	MRP	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	619954	09/26/22 00:19	K1S	EET SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-92176-1

Client Sample ID: MW-67-09152022

Date Collected: 09/15/22 15:30
Date Received: 09/17/22 09:25

Lab Sample ID: 320-92176-18

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			283.6 mL	10.0 mL	619355	09/23/22 12:11	MRP	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	619954	09/26/22 00:49	K1S	EET SAC

Laboratory References:

EET SAC = Eurofins Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-92176-1

Laboratory: Eurofins Sacramento

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	17-020	02-20-24

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-92176-1

Method	Method Description	Protocol	Laboratory
EPA 537(Mod)	PFAS for QSM 5.3, Table B-15	EPA	EET SAC
3535	Solid-Phase Extraction (SPE)	SW846	EET SAC

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

EET SAC = Eurofins Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-92176-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-92176-1	MW-23-09132022	Water	09/13/22 12:20	09/17/22 09:25
320-92176-2	EB-2-09132022	Water	09/13/22 13:00	09/17/22 09:25
320-92176-3	MW-70-09132022	Water	09/13/22 13:10	09/17/22 09:25
320-92176-4	EB-1-09132022	Water	09/13/22 13:30	09/17/22 09:25
320-92176-5	MW-69-09132022	Water	09/13/22 14:20	09/17/22 09:25
320-92176-6	MW-50-09132022	Water	09/13/22 15:10	09/17/22 09:25
320-92176-7	MW-52-09132022	Water	09/13/22 16:20	09/17/22 09:25
320-92176-8	MW-32-09142022	Water	09/14/22 09:48	09/17/22 09:25
320-92176-9	MW-38-09142022	Water	09/14/22 12:00	09/17/22 09:25
320-92176-10	MW-37-09142022	Water	09/14/22 12:40	09/17/22 09:25
320-92176-11	MW-53-09142022	Water	09/14/22 13:30	09/17/22 09:25
320-92176-12	MW-54-09142022	Water	09/14/22 15:14	09/17/22 09:25
320-92176-13	MW-100-09142022	Water	09/14/22 16:00	09/17/22 09:25
320-92176-14	MW-61-09142022	Water	09/14/22 16:25	09/17/22 09:25
320-92176-15	MW-40-09152022	Water	09/15/22 09:47	09/17/22 09:25
320-92176-16	MW-41-09152022	Water	09/15/22 11:10	09/17/22 09:25
320-92176-17	MW-46-09152022	Water	09/15/22 13:48	09/17/22 09:25
320-92176-18	MW-67-09152022	Water	09/15/22 15:30	09/17/22 09:25

Chain of Custody Record 591735

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Address:

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

TAL-8210

Client Contact	Project Manager: Shoshana Howard	Site Contact: Ryan Peterson	Date: 9/16/22	COC No:
Company Name: Shannon & Wilson	Tel/Email: Shoshana.Howard@shannonwilson	Lab Contact: David Althuser	Carrier:	1 of 2 COCs
Address: 400 N. 34th St. Suite 100	Analysis Turnaround Time			Sampler: Ryan Peterson
City/State/Zip: Seattle, WA 98103	☐ CALENDAR DAYS ☐ WORKING DAYS			For Lab Use Only:
Phone:	TAT if different from Below			Walk-in Client:
Fax:	☐ 2 weeks (Standard 15 day TAT)			Lab Sampling:
Project Name: EMJ	☐ 1 week			
Site: Tukwila, WA	☐ 2 days			Job / SDG No.:
PO# 21-1-12596	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	18 analytes plus 537.1 mod	Sample Specific Notes:
MW-23-09132022	9/13/22	1220	G	W	2	N	N	X	
EB-2-09132022		1300						X	
MW-70-09132022		1310						X	
EB-1-09132022		1330						X	
MW-69-09132022		1420						X	
MW-50-09132022		1510						X	
MW-52-09132022		1620						X	
MW-32-09142022	9/14/22	0948						X	
MW-38-09142022		1200						X	
MW-37-09142022		1240						X	
MW-53-09142022		1330						X	
MW-54-09142022		1514						X	

320-92176 Chain of Custody

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☒ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☒ Disposal by Lab ☐ Archive for ____ Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No	Custody Seal No.: 1841678	Cooler Temp. (°C): Obs'd: 1.2	Corr'd: 1.2	Therm ID No.: CC9

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Ryan Peterson	Shannon & Wilson	0850 9/16/22		EETSA	9/17/22 - 925
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

DNR-TOP PUBLIC COMMENT 9/30/2022

Chain of Custody Record 591736

eurofins | Environment Testing TestAmerica

Address: _____

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other: TAL-8210

Client Contact	Project Manager: Shoshana Howard	Site Contact: Ryan Peterson	Date: 9/16/22	COC No:
Company Name: Shannon & Wilson	Tel/Email:	Lab Contact: David Althaker	Carrier:	2 of 2 COCs
Address: 900 N. 34th Street, Suite 100	Analysis Turnaround Time			Sampler: Ryan Peterson
City/State/Zip: Seattle, WA 98103	☐ CALENDAR DAYS ☐ WORKING DAYS			For Lab Use Only:
Phone:	TAT if different from Below			Walk-in Client:
Fax:	☐ 2 weeks ☐ 1 week ☐ 2 days ☐ 1 day	Standard 15 day TAT		Lab Sampling:
Project Name: EMS				Job / SDG No.:
Site:				
PO# 21-1-12546				

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	18 Analytes PFAS 537.1 mod	Sample Specific Notes:
MW-100-09142022	9/14/22	1600	G	W	2	N	N	X	
MW-61-09142022	↓	1625	↓	↓	↓	↓	↓	X	
MW-40-09152022	9/15/22	0947						X	
MW-41-09152022	↓	11.10						X	
MW-46-09152022	↓	13.48						X	
MW-67-09152022	↓	15.30	↓	↓	↓	↓	↓	X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☒ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return to Client ☒ Disposal by Lab ☐ Archive for _____ Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No | Custody Seal No.: 1848679 | Cooler Temp. (°C): Obs'd: 12 Corr'd: 12 | Therm ID No.: 09

Relinquished by	Company	Date/Time	Received by	Company	Date/Time
RYAN PETERSON	Shannon & Wilson	0850 9/16/22		EETSA	9/17/22 - 925
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

DRAFT FOR PUBLIC COMMENT 9/30/2022

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-92176-1

Login Number: 92176
List Number: 1
Creator: Oropeza, Salvador

List Source: Eurofins Sacramento

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	1848678
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

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ANALYTICAL REPORT

PREPARED FOR

Attn: Ryan Peterson
Shannon & Wilson, Inc
400 N. 34th Suite 100
PO BOX 300303
Seattle, Washington 98103

Generated 12/14/2022 2:30:41 PM

JOB DESCRIPTION

EMJ

JOB NUMBER

320-94316-1

Eurofins Sacramento
880 Riverside Parkway
West Sacramento CA 95605

See page two for job notes and contact information.

DRAFT FOR PUBLIC COMMENT

my EOL

Job Notes

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The data in the report relate to the field sample(s) as received by the laboratory and associated QC. All results have been reviewed and have been found to be compliant with laboratory and accreditation requirements, with the exception of the noted deviation(s). For questions, please contact the Project Manager.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing Northern California, LLC Project Manager.

Authorization



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12/14/2022 2:30:41 PM

Authorized for release by
David Alltucker, Project Manager I
David.Alltucker@et.eurofinsus.com
(916)374-4383

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DRAFT FOR PUBLIC COMMENT

Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-94316-1

Qualifiers

LCMS

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.
B	Compound was found in the blank and sample.
F2	MS/MSD RPD exceeds control limits
I	Value is EMPC (estimated maximum possible concentration).
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Job ID: 320-94316-1

Laboratory: Eurofins Sacramento

Narrative

Job Narrative
320-94316-1

Receipt
The samples were received on 11/12/2022 8:55 AM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 1.0º C.

LCMS
Method EPA 537(Mod): The "I" qualifier means the transition mass ratio for the indicated analyte was below the established ratio limits. The qualitative identification of the analyte has some degree of uncertainty. However, analyst judgment was used to positively identify the analyte. MW-101:2.0 (320-94316-7)

Method EPA 537(Mod): The Isotope Dilution Analyte (IDA) recovery associated with the following samples is below the method recommended limit: (MB 320-633024/1-A). Generally, data quality is not considered affected if the IDA signal-to-noise ratio is greater than 10:1, which is achieved for all IDA in the samples.

Method EPA 537(Mod): The matrix spike / matrix spike duplicate (MS/MSD) precision for 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid of preparation batch 320-633024 and analytical batch 320-636249 was outside control limits. Sample matrix interference is suspected.

Method EPA 537(Mod): Results for samples (320-94290-A-1-E MS) and (320-94290-A-1-F MSD) were reported from the analysis of a diluted extract due to high concentration of the target analyte in the analysis of the undiluted extract. The dilution factor was applied to the labeled internal standard area counts and these area counts were within acceptance limits.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

General Chemistry
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Organic Prep
Method 3535: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-633302.

Method 3535: The following samples in preparation batch 320-634646 were observed to have a small amount of floating sediment present in the bottle prior to extraction. MW-78-11112022 (320-94316-13)
preparation batch 320-634646

Method 3535: During the solid phase extraction process, the following samples contained non-settable sediment which clogged the solid phase extraction column: MW-78-11112022 (320-94316-13).
preparation batch 320-634646

Method 3535: Due to the samples being foamy, the initial volumes used for the following samples deviated from the standard procedure: MW-77-11112022 (320-94316-12). A 5x dilution was made on the samples, then fortified with IDA and extracted. The reporting limits (RLs) have been adjusted proportionately.
preparation batch 320-634646

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-94316-1

Client Sample ID: MW-78:2.0 — Lab Sample ID: 320-94316-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	0.072	J	0.23	0.035	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	0.19	J	0.23	0.033	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	0.15	J	0.23	0.049	ug/Kg	1	☼	EPA 537(Mod)	Total/NA

Client Sample ID: MW-78:5.0 — Lab Sample ID: 320-94316-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	0.24	J	0.31	0.045	ug/Kg	1	☼	EPA 537(Mod)	Total/NA

Client Sample ID: MW-78:10.0 — Lab Sample ID: 320-94316-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	0.11	J	0.29	0.044	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	0.078	J	0.29	0.076	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	0.29		0.29	0.041	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	0.22	J	0.29	0.061	ug/Kg	1	☼	EPA 537(Mod)	Total/NA

Client Sample ID: MW-77:2.0 — Lab Sample ID: 320-94316-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanesulfonic acid (PFOS)	0.055	J	0.22	0.048	ug/Kg	1	☼	EPA 537(Mod)	Total/NA

Client Sample ID: MW-77:5.0 — Lab Sample ID: 320-94316-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	0.060	J	0.22	0.034	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	0.11	J	0.22	0.057	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	0.059	J	0.22	0.024	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	0.22		0.22	0.047	ug/Kg	1	☼	EPA 537(Mod)	Total/NA

Client Sample ID: MW-77:10.0 — Lab Sample ID: 320-94316-6

No Detections.

Client Sample ID: MW-101:2.0 — Lab Sample ID: 320-94316-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanesulfonic acid (PFOS)	0.057	J I	0.20	0.043	ug/Kg	1	☼	EPA 537(Mod)	Total/NA

Client Sample ID: MW-79:2.0 — Lab Sample ID: 320-94316-8

No Detections.

Client Sample ID: MW-79:5.0 — Lab Sample ID: 320-94316-9

No Detections.

Client Sample ID: MW-79:10.0 — Lab Sample ID: 320-94316-10

No Detections.

Client Sample ID: EB-3-11072022 — Lab Sample ID: 320-94316-11

No Detections.

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-94316-1

Client Sample ID: MW-77-11112022 — Lab Sample ID: 320-94316-12

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	42		10	2.9	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	6.3	J B	10	1.3	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	18		10	4.3	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	1.4	J B	10	1.4	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	23	B	10	1.0	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	180		10	2.9	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	700		10	2.7	ng/L	1		EPA 537(Mod)	Total/NA
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	1.5	J B	10	1.2	ng/L	1		EPA 537(Mod)	Total/NA
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	1.6	J	10	1.6	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-78-11112022 — Lab Sample ID: 320-94316-13

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	12		1.9	0.54	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	4.4	B	1.9	0.23	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	5.9		1.9	0.79	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	0.68	J B	1.9	0.25	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	3.7	B	1.9	0.19	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	28		1.9	0.53	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	180		1.9	0.50	ng/L	1		EPA 537(Mod)	Total/NA
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	0.35	J B	1.9	0.22	ng/L	1		EPA 537(Mod)	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-94316-1

Client Sample ID: MW-78:2.0

Date Collected: 11/04/22 09:00
Date Received: 11/12/22 08:55

Lab Sample ID: 320-94316-1

Matrix: Solid
Percent Solids: 79.6

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**0.072**	**J**	0.23	0.035	ug/Kg	☼	11/14/22 19:37	11/29/22 02:53	1
Perfluoroheptanoic acid (PFHpA)	ND		0.23	0.043	ug/Kg	☼	11/14/22 19:37	11/29/22 02:53	1
Perfluorooctanoic acid (PFOA)	ND		0.23	0.060	ug/Kg	☼	11/14/22 19:37	11/29/22 02:53	1
Perfluorononanoic acid (PFNA)	ND		0.23	0.025	ug/Kg	☼	11/14/22 19:37	11/29/22 02:53	1
Perfluorodecanoic acid (PFDA)	ND		0.23	0.055	ug/Kg	☼	11/14/22 19:37	11/29/22 02:53	1
Perfluoroundecanoic acid (PFUnA)	ND		0.23	0.048	ug/Kg	☼	11/14/22 19:37	11/29/22 02:53	1
Perfluorododecanoic acid (PFDoA)	ND		0.23	0.034	ug/Kg	☼	11/14/22 19:37	11/29/22 02:53	1
Perfluorotridecanoic acid (PFTriA)	ND		0.23	0.024	ug/Kg	☼	11/14/22 19:37	11/29/22 02:53	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.23	0.042	ug/Kg	☼	11/14/22 19:37	11/29/22 02:53	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.23	0.043	ug/Kg	☼	11/14/22 19:37	11/29/22 02:53	1
Perfluorohexanesulfonic acid (PFHxS)	**0.19**	**J**	0.23	0.033	ug/Kg	☼	11/14/22 19:37	11/29/22 02:53	1
Perfluorooctanesulfonic acid (PFOS)	**0.15**	**J**	0.23	0.049	ug/Kg	☼	11/14/22 19:37	11/29/22 02:53	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		0.23	0.026	ug/Kg	☼	11/14/22 19:37	11/29/22 02:53	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		0.23	0.055	ug/Kg	☼	11/14/22 19:37	11/29/22 02:53	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.23	0.040	ug/Kg	☼	11/14/22 19:37	11/29/22 02:53	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.23	0.047	ug/Kg	☼	11/14/22 19:37	11/29/22 02:53	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.23	0.035	ug/Kg	☼	11/14/22 19:37	11/29/22 02:53	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.23	0.044	ug/Kg	☼	11/14/22 19:37	11/29/22 02:53	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*83*		*50 - 150*	*11/14/22 19:37*	*11/29/22 02:53*	*1*
13C4 PFHpA	*81*		*50 - 150*	*11/14/22 19:37*	*11/29/22 02:53*	*1*
13C4 PFOA	*89*		*50 - 150*	*11/14/22 19:37*	*11/29/22 02:53*	*1*
13C5 PFNA	*93*		*50 - 150*	*11/14/22 19:37*	*11/29/22 02:53*	*1*
13C2 PFDA	*91*		*50 - 150*	*11/14/22 19:37*	*11/29/22 02:53*	*1*
13C2 PFUnA	*103*		*50 - 150*	*11/14/22 19:37*	*11/29/22 02:53*	*1*
13C2 PFDoA	*90*		*50 - 150*	*11/14/22 19:37*	*11/29/22 02:53*	*1*
13C2 PFTeDA	*105*		*50 - 150*	*11/14/22 19:37*	*11/29/22 02:53*	*1*
13C3 PFBS	*90*		*50 - 150*	*11/14/22 19:37*	*11/29/22 02:53*	*1*
18O2 PFHxS	*92*		*50 - 150*	*11/14/22 19:37*	*11/29/22 02:53*	*1*
13C4 PFOS	*100*		*50 - 150*	*11/14/22 19:37*	*11/29/22 02:53*	*1*
d3-NMeFOSAA	*103*		*50 - 150*	*11/14/22 19:37*	*11/29/22 02:53*	*1*
d5-NEtFOSAA	*114*		*50 - 150*	*11/14/22 19:37*	*11/29/22 02:53*	*1*
13C3 HFPO-DA	*86*		*50 - 150*	*11/14/22 19:37*	*11/29/22 02:53*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture (ASTM D 2216)	**20.4**		0.1	0.1	%			11/14/22 16:52	1
Percent Solids (ASTM D 2216)	**79.6**		0.1	0.1	%			11/14/22 16:52	1

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-94316-1

Client Sample ID: MW-78:5.0
Date Collected: 11/04/22 09:09
Date Received: 11/12/22 08:55

Lab Sample ID: 320-94316-2
Matrix: Solid
Percent Solids: 59.6

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		0.31	0.049	ug/Kg	☼	11/14/22 19:37	11/29/22 03:03	1
Perfluoroheptanoic acid (PFHpA)	ND		0.31	0.060	ug/Kg	☼	11/14/22 19:37	11/29/22 03:03	1
Perfluorooctanoic acid (PFOA)	ND		0.31	0.083	ug/Kg	☼	11/14/22 19:37	11/29/22 03:03	1
Perfluorononanoic acid (PFNA)	ND		0.31	0.034	ug/Kg	☼	11/14/22 19:37	11/29/22 03:03	1
Perfluorodecanoic acid (PFDA)	ND		0.31	0.075	ug/Kg	☼	11/14/22 19:37	11/29/22 03:03	1
Perfluoroundecanoic acid (PFUnA)	ND		0.31	0.066	ug/Kg	☼	11/14/22 19:37	11/29/22 03:03	1
Perfluorododecanoic acid (PFDoA)	ND		0.31	0.047	ug/Kg	☼	11/14/22 19:37	11/29/22 03:03	1
Perfluorotridecanoic acid (PFTriA)	ND		0.31	0.033	ug/Kg	☼	11/14/22 19:37	11/29/22 03:03	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.31	0.058	ug/Kg	☼	11/14/22 19:37	11/29/22 03:03	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.31	0.060	ug/Kg	☼	11/14/22 19:37	11/29/22 03:03	1
Perfluorohexanesulfonic acid (PFHxS)	**0.24**	**J**	0.31	0.045	ug/Kg	☼	11/14/22 19:37	11/29/22 03:03	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.31	0.067	ug/Kg	☼	11/14/22 19:37	11/29/22 03:03	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		0.31	0.036	ug/Kg	☼	11/14/22 19:37	11/29/22 03:03	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		0.31	0.075	ug/Kg	☼	11/14/22 19:37	11/29/22 03:03	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.31	0.055	ug/Kg	☼	11/14/22 19:37	11/29/22 03:03	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.31	0.064	ug/Kg	☼	11/14/22 19:37	11/29/22 03:03	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.31	0.049	ug/Kg	☼	11/14/22 19:37	11/29/22 03:03	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.31	0.061	ug/Kg	☼	11/14/22 19:37	11/29/22 03:03	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*81*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:03*	*1*
13C4 PFHpA	*80*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:03*	*1*
13C4 PFOA	*84*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:03*	*1*
13C5 PFNA	*89*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:03*	*1*
13C2 PFDA	*89*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:03*	*1*
13C2 PFUnA	*100*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:03*	*1*
13C2 PFDoA	*91*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:03*	*1*
13C2 PFTeDA	*99*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:03*	*1*
13C3 PFBS	*87*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:03*	*1*
18O2 PFHxS	*85*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:03*	*1*
13C4 PFOS	*93*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:03*	*1*
d3-NMeFOSAA	*108*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:03*	*1*
d5-NEtFOSAA	*121*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:03*	*1*
13C3 HFPO-DA	*81*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:03*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture (ASTM D 2216)	**40.4**		0.1	0.1	%			11/14/22 16:52	1
Percent Solids (ASTM D 2216)	**59.6**		0.1	0.1	%			11/14/22 16:52	1

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-94316-1

Client Sample ID: MW-78:10.0

Date Collected: 11/04/22 09:15
Date Received: 11/12/22 08:55

Lab Sample ID: 320-94316-3

Matrix: Solid
Percent Solids: 66.7

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**0.11**	**J**	0.29	0.044	ug/Kg	☼	11/14/22 19:37	11/29/22 03:13	1
Perfluoroheptanoic acid (PFHpA)	ND		0.29	0.054	ug/Kg	☼	11/14/22 19:37	11/29/22 03:13	1
Perfluorooctanoic acid (PFOA)	**0.078**	**J**	0.29	0.076	ug/Kg	☼	11/14/22 19:37	11/29/22 03:13	1
Perfluorononanoic acid (PFNA)	ND		0.29	0.031	ug/Kg	☼	11/14/22 19:37	11/29/22 03:13	1
Perfluorodecanoic acid (PFDA)	ND		0.29	0.069	ug/Kg	☼	11/14/22 19:37	11/29/22 03:13	1
Perfluoroundecanoic acid (PFUnA)	ND		0.29	0.060	ug/Kg	☼	11/14/22 19:37	11/29/22 03:13	1
Perfluorododecanoic acid (PFDoA)	ND		0.29	0.043	ug/Kg	☼	11/14/22 19:37	11/29/22 03:13	1
Perfluorotridecanoic acid (PFTriA)	ND		0.29	0.030	ug/Kg	☼	11/14/22 19:37	11/29/22 03:13	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.29	0.053	ug/Kg	☼	11/14/22 19:37	11/29/22 03:13	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.29	0.054	ug/Kg	☼	11/14/22 19:37	11/29/22 03:13	1
Perfluorohexanesulfonic acid (PFHxS)	**0.29**		0.29	0.041	ug/Kg	☼	11/14/22 19:37	11/29/22 03:13	1
Perfluorooctanesulfonic acid (PFOS)	**0.22**	**J**	0.29	0.061	ug/Kg	☼	11/14/22 19:37	11/29/22 03:13	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		0.29	0.033	ug/Kg	☼	11/14/22 19:37	11/29/22 03:13	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		0.29	0.069	ug/Kg	☼	11/14/22 19:37	11/29/22 03:13	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.29	0.050	ug/Kg	☼	11/14/22 19:37	11/29/22 03:13	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.29	0.059	ug/Kg	☼	11/14/22 19:37	11/29/22 03:13	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.29	0.044	ug/Kg	☼	11/14/22 19:37	11/29/22 03:13	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.29	0.056	ug/Kg	☼	11/14/22 19:37	11/29/22 03:13	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*83*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:13*	*1*
13C4 PFHpA	*80*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:13*	*1*
13C4 PFOA	*86*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:13*	*1*
13C5 PFNA	*92*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:13*	*1*
13C2 PFDA	*92*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:13*	*1*
13C2 PFUnA	*101*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:13*	*1*
13C2 PFDoA	*94*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:13*	*1*
13C2 PFTeDA	*104*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:13*	*1*
13C3 PFBS	*85*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:13*	*1*
18O2 PFHxS	*86*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:13*	*1*
13C4 PFOS	*96*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:13*	*1*
d3-NMeFOSAA	*101*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:13*	*1*
d5-NEtFOSAA	*113*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:13*	*1*
13C3 HFPO-DA	*87*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:13*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture (ASTM D 2216)	**33.3**		0.1	0.1	%			11/14/22 16:52	1
Percent Solids (ASTM D 2216)	**66.7**		0.1	0.1	%			11/14/22 16:52	1

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-94316-1

Client Sample ID: MW-77:2.0

Date Collected: 11/04/22 11:20
Date Received: 11/12/22 08:55

Lab Sample ID: 320-94316-4

Matrix: Solid
Percent Solids: 85.9

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		0.22	0.035	ug/Kg	☼	11/14/22 19:37	11/29/22 03:23	1
Perfluoroheptanoic acid (PFHpA)	ND		0.22	0.043	ug/Kg	☼	11/14/22 19:37	11/29/22 03:23	1
Perfluorooctanoic acid (PFOA)	ND		0.22	0.059	ug/Kg	☼	11/14/22 19:37	11/29/22 03:23	1
Perfluorononanoic acid (PFNA)	ND		0.22	0.025	ug/Kg	☼	11/14/22 19:37	11/29/22 03:23	1
Perfluorodecanoic acid (PFDA)	ND		0.22	0.054	ug/Kg	☼	11/14/22 19:37	11/29/22 03:23	1
Perfluoroundecanoic acid (PFUnA)	ND		0.22	0.047	ug/Kg	☼	11/14/22 19:37	11/29/22 03:23	1
Perfluorododecanoic acid (PFDoA)	ND		0.22	0.034	ug/Kg	☼	11/14/22 19:37	11/29/22 03:23	1
Perfluorotridecanoic acid (PFTriA)	ND		0.22	0.023	ug/Kg	☼	11/14/22 19:37	11/29/22 03:23	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.22	0.041	ug/Kg	☼	11/14/22 19:37	11/29/22 03:23	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.22	0.043	ug/Kg	☼	11/14/22 19:37	11/29/22 03:23	1
Perfluorohexanesulfonic acid (PFHxS)	ND		0.22	0.032	ug/Kg	☼	11/14/22 19:37	11/29/22 03:23	1
Perfluorooctanesulfonic acid (PFOS)	**0.055**	**J**	0.22	0.048	ug/Kg	☼	11/14/22 19:37	11/29/22 03:23	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		0.22	0.026	ug/Kg	☼	11/14/22 19:37	11/29/22 03:23	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		0.22	0.054	ug/Kg	☼	11/14/22 19:37	11/29/22 03:23	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.22	0.039	ug/Kg	☼	11/14/22 19:37	11/29/22 03:23	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.22	0.046	ug/Kg	☼	11/14/22 19:37	11/29/22 03:23	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.22	0.035	ug/Kg	☼	11/14/22 19:37	11/29/22 03:23	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.22	0.044	ug/Kg	☼	11/14/22 19:37	11/29/22 03:23	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*85*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:23*	*1*
13C4 PFHpA	*81*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:23*	*1*
13C4 PFOA	*87*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:23*	*1*
13C5 PFNA	*89*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:23*	*1*
13C2 PFDA	*83*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:23*	*1*
13C2 PFUnA	*94*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:23*	*1*
13C2 PFDoA	*110*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:23*	*1*
13C2 PFTeDA	*99*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:23*	*1*
13C3 PFBS	*88*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:23*	*1*
18O2 PFHxS	*85*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:23*	*1*
13C4 PFOS	*92*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:23*	*1*
d3-NMeFOSAA	*86*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:23*	*1*
d5-NEtFOSAA	*103*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:23*	*1*
13C3 HFPO-DA	*87*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:23*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture (ASTM D 2216)	**14.1**		0.1	0.1	%			11/14/22 16:52	1
Percent Solids (ASTM D 2216)	**85.9**		0.1	0.1	%			11/14/22 16:52	1

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-94316-1

Client Sample ID: MW-77:5.0

Date Collected: 11/04/22 11:25
Date Received: 11/12/22 08:55

Lab Sample ID: 320-94316-5

Matrix: Solid
Percent Solids: 90.9

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**0.060**	**J**	0.22	0.034	ug/Kg	☼	11/14/22 19:37	11/29/22 03:34	1
Perfluoroheptanoic acid (PFHpA)	ND		0.22	0.041	ug/Kg	☼	11/14/22 19:37	11/29/22 03:34	1
Perfluorooctanoic acid (PFOA)	**0.11**	**J**	0.22	0.057	ug/Kg	☼	11/14/22 19:37	11/29/22 03:34	1
Perfluorononanoic acid (PFNA)	**0.059**	**J**	0.22	0.024	ug/Kg	☼	11/14/22 19:37	11/29/22 03:34	1
Perfluorodecanoic acid (PFDA)	ND		0.22	0.052	ug/Kg	☼	11/14/22 19:37	11/29/22 03:34	1
Perfluoroundecanoic acid (PFUnA)	ND		0.22	0.045	ug/Kg	☼	11/14/22 19:37	11/29/22 03:34	1
Perfluorododecanoic acid (PFDoA)	ND		0.22	0.032	ug/Kg	☼	11/14/22 19:37	11/29/22 03:34	1
Perfluorotridecanoic acid (PFTriA)	ND		0.22	0.023	ug/Kg	☼	11/14/22 19:37	11/29/22 03:34	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.22	0.040	ug/Kg	☼	11/14/22 19:37	11/29/22 03:34	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.22	0.041	ug/Kg	☼	11/14/22 19:37	11/29/22 03:34	1
Perfluorohexanesulfonic acid (PFHxS)	ND		0.22	0.031	ug/Kg	☼	11/14/22 19:37	11/29/22 03:34	1
Perfluorooctanesulfonic acid (PFOS)	**0.22**		0.22	0.047	ug/Kg	☼	11/14/22 19:37	11/29/22 03:34	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		0.22	0.025	ug/Kg	☼	11/14/22 19:37	11/29/22 03:34	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		0.22	0.052	ug/Kg	☼	11/14/22 19:37	11/29/22 03:34	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.22	0.038	ug/Kg	☼	11/14/22 19:37	11/29/22 03:34	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.22	0.044	ug/Kg	☼	11/14/22 19:37	11/29/22 03:34	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.22	0.034	ug/Kg	☼	11/14/22 19:37	11/29/22 03:34	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.22	0.042	ug/Kg	☼	11/14/22 19:37	11/29/22 03:34	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*86*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:34*	*1*
13C4 PFHpA	*81*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:34*	*1*
13C4 PFOA	*82*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:34*	*1*
13C5 PFNA	*86*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:34*	*1*
13C2 PFDA	*84*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:34*	*1*
13C2 PFUnA	*91*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:34*	*1*
13C2 PFDoA	*90*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:34*	*1*
13C2 PFTeDA	*99*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:34*	*1*
13C3 PFBS	*81*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:34*	*1*
18O2 PFHxS	*83*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:34*	*1*
13C4 PFOS	*92*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:34*	*1*
d3-NMeFOSAA	*95*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:34*	*1*
d5-NEtFOSAA	*103*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:34*	*1*
13C3 HFPO-DA	*86*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:34*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture (ASTM D 2216)	**9.1**		0.1	0.1	%			11/14/22 16:52	1
Percent Solids (ASTM D 2216)	**90.9**		0.1	0.1	%			11/14/22 16:52	1

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-94316-1

Client Sample ID: MW-77:10.0

Date Collected: 11/04/22 11:30
Date Received: 11/12/22 08:55

Lab Sample ID: 320-94316-6

Matrix: Solid
Percent Solids: 84.0

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		0.22	0.035	ug/Kg	☼	11/14/22 19:37	11/29/22 03:44	1
Perfluoroheptanoic acid (PFHpA)	ND		0.22	0.042	ug/Kg	☼	11/14/22 19:37	11/29/22 03:44	1
Perfluorooctanoic acid (PFOA)	ND		0.22	0.059	ug/Kg	☼	11/14/22 19:37	11/29/22 03:44	1
Perfluorononanoic acid (PFNA)	ND		0.22	0.025	ug/Kg	☼	11/14/22 19:37	11/29/22 03:44	1
Perfluorodecanoic acid (PFDA)	ND		0.22	0.054	ug/Kg	☼	11/14/22 19:37	11/29/22 03:44	1
Perfluoroundecanoic acid (PFUnA)	ND		0.22	0.047	ug/Kg	☼	11/14/22 19:37	11/29/22 03:44	1
Perfluorododecanoic acid (PFDoA)	ND		0.22	0.033	ug/Kg	☼	11/14/22 19:37	11/29/22 03:44	1
Perfluorotridecanoic acid (PFTriA)	ND		0.22	0.023	ug/Kg	☼	11/14/22 19:37	11/29/22 03:44	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.22	0.041	ug/Kg	☼	11/14/22 19:37	11/29/22 03:44	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.22	0.042	ug/Kg	☼	11/14/22 19:37	11/29/22 03:44	1
Perfluorohexanesulfonic acid (PFHxS)	ND		0.22	0.032	ug/Kg	☼	11/14/22 19:37	11/29/22 03:44	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.22	0.048	ug/Kg	☼	11/14/22 19:37	11/29/22 03:44	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		0.22	0.026	ug/Kg	☼	11/14/22 19:37	11/29/22 03:44	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		0.22	0.054	ug/Kg	☼	11/14/22 19:37	11/29/22 03:44	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.22	0.039	ug/Kg	☼	11/14/22 19:37	11/29/22 03:44	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.22	0.046	ug/Kg	☼	11/14/22 19:37	11/29/22 03:44	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.22	0.035	ug/Kg	☼	11/14/22 19:37	11/29/22 03:44	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.22	0.044	ug/Kg	☼	11/14/22 19:37	11/29/22 03:44	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*85*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:44*	*1*
13C4 PFHpA	*86*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:44*	*1*
13C4 PFOA	*87*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:44*	*1*
13C5 PFNA	*90*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:44*	*1*
13C2 PFDA	*85*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:44*	*1*
13C2 PFUnA	*96*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:44*	*1*
13C2 PFDoA	*92*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:44*	*1*
13C2 PFTeDA	*102*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:44*	*1*
13C3 PFBS	*84*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:44*	*1*
18O2 PFHxS	*91*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:44*	*1*
13C4 PFOS	*91*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:44*	*1*
d3-NMeFOSAA	*96*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:44*	*1*
d5-NEtFOSAA	*103*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:44*	*1*
13C3 HFPO-DA	*71*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:44*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture (ASTM D 2216)	**16.0**		0.1	0.1	%			11/14/22 16:52	1
Percent Solids (ASTM D 2216)	**84.0**		0.1	0.1	%			11/14/22 16:52	1

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-94316-1

Client Sample ID: MW-101:2.0

Date Collected: 11/04/22 16:00
Date Received: 11/12/22 08:55

Lab Sample ID: 320-94316-7

Matrix: Solid
Percent Solids: 91.7

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		0.20	0.031	ug/Kg	☼	11/14/22 19:37	11/29/22 03:54	1
Perfluoroheptanoic acid (PFHpA)	ND		0.20	0.038	ug/Kg	☼	11/14/22 19:37	11/29/22 03:54	1
Perfluorooctanoic acid (PFOA)	ND		0.20	0.053	ug/Kg	☼	11/14/22 19:37	11/29/22 03:54	1
Perfluorononanoic acid (PFNA)	ND		0.20	0.022	ug/Kg	☼	11/14/22 19:37	11/29/22 03:54	1
Perfluorodecanoic acid (PFDA)	ND		0.20	0.048	ug/Kg	☼	11/14/22 19:37	11/29/22 03:54	1
Perfluoroundecanoic acid (PFUnA)	ND		0.20	0.042	ug/Kg	☼	11/14/22 19:37	11/29/22 03:54	1
Perfluorododecanoic acid (PFDoA)	ND		0.20	0.030	ug/Kg	☼	11/14/22 19:37	11/29/22 03:54	1
Perfluorotridecanoic acid (PFTriA)	ND		0.20	0.021	ug/Kg	☼	11/14/22 19:37	11/29/22 03:54	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.20	0.037	ug/Kg	☼	11/14/22 19:37	11/29/22 03:54	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.20	0.038	ug/Kg	☼	11/14/22 19:37	11/29/22 03:54	1
Perfluorohexanesulfonic acid (PFHxS)	ND		0.20	0.029	ug/Kg	☼	11/14/22 19:37	11/29/22 03:54	1
Perfluorooctanesulfonic acid (PFOS)	**0.057**	**J I**	0.20	0.043	ug/Kg	☼	11/14/22 19:37	11/29/22 03:54	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		0.20	0.023	ug/Kg	☼	11/14/22 19:37	11/29/22 03:54	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		0.20	0.048	ug/Kg	☼	11/14/22 19:37	11/29/22 03:54	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.20	0.035	ug/Kg	☼	11/14/22 19:37	11/29/22 03:54	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.20	0.041	ug/Kg	☼	11/14/22 19:37	11/29/22 03:54	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.20	0.031	ug/Kg	☼	11/14/22 19:37	11/29/22 03:54	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.20	0.039	ug/Kg	☼	11/14/22 19:37	11/29/22 03:54	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*88*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:54*	*1*
13C4 PFHpA	*85*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:54*	*1*
13C4 PFOA	*90*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:54*	*1*
13C5 PFNA	*94*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:54*	*1*
13C2 PFDA	*91*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:54*	*1*
13C2 PFUnA	*97*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:54*	*1*
13C2 PFDoA	*93*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:54*	*1*
13C2 PFTeDA	*101*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:54*	*1*
13C3 PFBS	*92*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:54*	*1*
18O2 PFHxS	*89*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:54*	*1*
13C4 PFOS	*93*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:54*	*1*
d3-NMeFOSAA	*99*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:54*	*1*
d5-NEtFOSAA	*100*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:54*	*1*
13C3 HFPO-DA	*91*		*50 - 150*	*11/14/22 19:37*	*11/29/22 03:54*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture (ASTM D 2216)	**8.3**		0.1	0.1	%			11/14/22 16:52	1
Percent Solids (ASTM D 2216)	**91.7**		0.1	0.1	%			11/14/22 16:52	1

Client Sample ID: MW-79:2.0

Date Collected: 11/07/22 08:44
Date Received: 11/12/22 08:55

Lab Sample ID: 320-94316-8

Matrix: Solid
Percent Solids: 70.2

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		0.28	0.043	ug/Kg	☼	11/14/22 19:37	11/29/22 04:04	1
Perfluoroheptanoic acid (PFHpA)	ND		0.28	0.052	ug/Kg	☼	11/14/22 19:37	11/29/22 04:04	1
Perfluorooctanoic acid (PFOA)	ND		0.28	0.073	ug/Kg	☼	11/14/22 19:37	11/29/22 04:04	1
Perfluorononanoic acid (PFNA)	ND		0.28	0.030	ug/Kg	☼	11/14/22 19:37	11/29/22 04:04	1
Perfluorodecanoic acid (PFDA)	ND		0.28	0.066	ug/Kg	☼	11/14/22 19:37	11/29/22 04:04	1
Perfluoroundecanoic acid (PFUnA)	ND		0.28	0.058	ug/Kg	☼	11/14/22 19:37	11/29/22 04:04	1
Perfluorododecanoic acid (PFDoA)	ND		0.28	0.041	ug/Kg	☼	11/14/22 19:37	11/29/22 04:04	1
Perfluorotridecanoic acid (PFTriA)	ND		0.28	0.029	ug/Kg	☼	11/14/22 19:37	11/29/22 04:04	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.28	0.051	ug/Kg	☼	11/14/22 19:37	11/29/22 04:04	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.28	0.052	ug/Kg	☼	11/14/22 19:37	11/29/22 04:04	1
Perfluorohexanesulfonic acid (PFHxS)	ND		0.28	0.040	ug/Kg	☼	11/14/22 19:37	11/29/22 04:04	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.28	0.059	ug/Kg	☼	11/14/22 19:37	11/29/22 04:04	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		0.28	0.032	ug/Kg	☼	11/14/22 19:37	11/29/22 04:04	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		0.28	0.066	ug/Kg	☼	11/14/22 19:37	11/29/22 04:04	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.28	0.048	ug/Kg	☼	11/14/22 19:37	11/29/22 04:04	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.28	0.056	ug/Kg	☼	11/14/22 19:37	11/29/22 04:04	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.28	0.043	ug/Kg	☼	11/14/22 19:37	11/29/22 04:04	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.28	0.054	ug/Kg	☼	11/14/22 19:37	11/29/22 04:04	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*83*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:04*	*1*
13C4 PFHpA	*80*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:04*	*1*
13C4 PFOA	*85*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:04*	*1*
13C5 PFNA	*88*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:04*	*1*
13C2 PFDA	*87*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:04*	*1*
13C2 PFUnA	*93*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:04*	*1*
13C2 PFDoA	*90*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:04*	*1*
13C2 PFTeDA	*98*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:04*	*1*
13C3 PFBS	*84*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:04*	*1*
18O2 PFHxS	*83*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:04*	*1*
13C4 PFOS	*94*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:04*	*1*
d3-NMeFOSAA	*96*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:04*	*1*
d5-NEtFOSAA	*108*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:04*	*1*
13C3 HFPO-DA	*85*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:04*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture (ASTM D 2216)	**29.8**		0.1	0.1	%			11/14/22 16:52	1
Percent Solids (ASTM D 2216)	**70.2**		0.1	0.1	%			11/14/22 16:52	1

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-94316-1

Client Sample ID: MW-79:5.0

Date Collected: 11/07/22 08:48
Date Received: 11/12/22 08:55

Lab Sample ID: 320-94316-9

Matrix: Solid
Percent Solids: 93.8

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		0.21	0.032	ug/Kg	☼	11/14/22 19:37	11/29/22 04:14	1
Perfluoroheptanoic acid (PFHpA)	ND		0.21	0.039	ug/Kg	☼	11/14/22 19:37	11/29/22 04:14	1
Perfluorooctanoic acid (PFOA)	ND		0.21	0.055	ug/Kg	☼	11/14/22 19:37	11/29/22 04:14	1
Perfluorononanoic acid (PFNA)	ND		0.21	0.023	ug/Kg	☼	11/14/22 19:37	11/29/22 04:14	1
Perfluorodecanoic acid (PFDA)	ND		0.21	0.050	ug/Kg	☼	11/14/22 19:37	11/29/22 04:14	1
Perfluoroundecanoic acid (PFUnA)	ND		0.21	0.044	ug/Kg	☼	11/14/22 19:37	11/29/22 04:14	1
Perfluorododecanoic acid (PFDoA)	ND		0.21	0.031	ug/Kg	☼	11/14/22 19:37	11/29/22 04:14	1
Perfluorotridecanoic acid (PFTriA)	ND		0.21	0.022	ug/Kg	☼	11/14/22 19:37	11/29/22 04:14	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.21	0.038	ug/Kg	☼	11/14/22 19:37	11/29/22 04:14	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.21	0.039	ug/Kg	☼	11/14/22 19:37	11/29/22 04:14	1
Perfluorohexanesulfonic acid (PFHxS)	ND		0.21	0.030	ug/Kg	☼	11/14/22 19:37	11/29/22 04:14	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.21	0.045	ug/Kg	☼	11/14/22 19:37	11/29/22 04:14	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		0.21	0.024	ug/Kg	☼	11/14/22 19:37	11/29/22 04:14	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		0.21	0.050	ug/Kg	☼	11/14/22 19:37	11/29/22 04:14	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.21	0.036	ug/Kg	☼	11/14/22 19:37	11/29/22 04:14	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.21	0.043	ug/Kg	☼	11/14/22 19:37	11/29/22 04:14	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.21	0.032	ug/Kg	☼	11/14/22 19:37	11/29/22 04:14	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.21	0.041	ug/Kg	☼	11/14/22 19:37	11/29/22 04:14	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*83*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:14*	*1*
13C4 PFHpA	*79*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:14*	*1*
13C4 PFOA	*84*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:14*	*1*
13C5 PFNA	*89*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:14*	*1*
13C2 PFDA	*85*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:14*	*1*
13C2 PFUnA	*94*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:14*	*1*
13C2 PFDoA	*90*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:14*	*1*
13C2 PFTeDA	*103*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:14*	*1*
13C3 PFBS	*81*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:14*	*1*
18O2 PFHxS	*84*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:14*	*1*
13C4 PFOS	*92*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:14*	*1*
d3-NMeFOSAA	*95*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:14*	*1*
d5-NEtFOSAA	*105*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:14*	*1*
13C3 HFPO-DA	*81*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:14*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture (ASTM D 2216)	**6.2**		0.1	0.1	%			11/14/22 16:52	1
Percent Solids (ASTM D 2216)	**93.8**		0.1	0.1	%			11/14/22 16:52	1

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-94316-1

Client Sample ID: MW-79:10.0

Date Collected: 11/07/22 08:55
Date Received: 11/12/22 08:55

Lab Sample ID: 320-94316-10

Matrix: Solid
Percent Solids: 71.4

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		0.27	0.042	ug/Kg	☼	11/14/22 19:37	11/29/22 04:45	1
Perfluoroheptanoic acid (PFHpA)	ND		0.27	0.051	ug/Kg	☼	11/14/22 19:37	11/29/22 04:45	1
Perfluorooctanoic acid (PFOA)	ND		0.27	0.072	ug/Kg	☼	11/14/22 19:37	11/29/22 04:45	1
Perfluorononanoic acid (PFNA)	ND		0.27	0.030	ug/Kg	☼	11/14/22 19:37	11/29/22 04:45	1
Perfluorodecanoic acid (PFDA)	ND		0.27	0.065	ug/Kg	☼	11/14/22 19:37	11/29/22 04:45	1
Perfluoroundecanoic acid (PFUnA)	ND		0.27	0.057	ug/Kg	☼	11/14/22 19:37	11/29/22 04:45	1
Perfluorododecanoic acid (PFDoA)	ND		0.27	0.041	ug/Kg	☼	11/14/22 19:37	11/29/22 04:45	1
Perfluorotridecanoic acid (PFTriA)	ND		0.27	0.028	ug/Kg	☼	11/14/22 19:37	11/29/22 04:45	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.27	0.050	ug/Kg	☼	11/14/22 19:37	11/29/22 04:45	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.27	0.051	ug/Kg	☼	11/14/22 19:37	11/29/22 04:45	1
Perfluorohexanesulfonic acid (PFHxS)	ND		0.27	0.039	ug/Kg	☼	11/14/22 19:37	11/29/22 04:45	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.27	0.058	ug/Kg	☼	11/14/22 19:37	11/29/22 04:45	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		0.27	0.031	ug/Kg	☼	11/14/22 19:37	11/29/22 04:45	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		0.27	0.065	ug/Kg	☼	11/14/22 19:37	11/29/22 04:45	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND	F2	0.27	0.047	ug/Kg	☼	11/14/22 19:37	11/29/22 04:45	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.27	0.055	ug/Kg	☼	11/14/22 19:37	11/29/22 04:45	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.27	0.042	ug/Kg	☼	11/14/22 19:37	11/29/22 04:45	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.27	0.053	ug/Kg	☼	11/14/22 19:37	11/29/22 04:45	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*102*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:45*	*1*
13C4 PFHpA	*95*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:45*	*1*
13C4 PFOA	*93*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:45*	*1*
13C5 PFNA	*98*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:45*	*1*
13C2 PFDA	*92*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:45*	*1*
13C2 PFUnA	*106*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:45*	*1*
13C2 PFDoA	*97*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:45*	*1*
13C2 PFTeDA	*114*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:45*	*1*
13C3 PFBS	*96*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:45*	*1*
18O2 PFHxS	*98*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:45*	*1*
13C4 PFOS	*103*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:45*	*1*
d3-NMeFOSAA	*106*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:45*	*1*
d5-NEtFOSAA	*125*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:45*	*1*
13C3 HFPO-DA	*84*		*50 - 150*	*11/14/22 19:37*	*11/29/22 04:45*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture (ASTM D 2216)	**28.6**		0.1	0.1	%			11/14/22 16:52	1
Percent Solids (ASTM D 2216)	**71.4**		0.1	0.1	%			11/14/22 16:52	1

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-94316-1

Client Sample ID: EB-3-11072022

Date Collected: 11/07/22 10:00
Date Received: 11/12/22 08:55

Lab Sample ID: 320-94316-11

Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		1.8	0.52	ng/L		11/16/22 05:56	11/18/22 20:40	1
Perfluoroheptanoic acid (PFHpA)	ND		1.8	0.23	ng/L		11/16/22 05:56	11/18/22 20:40	1
Perfluorooctanoic acid (PFOA)	ND		1.8	0.77	ng/L		11/16/22 05:56	11/18/22 20:40	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.24	ng/L		11/16/22 05:56	11/18/22 20:40	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		11/16/22 05:56	11/18/22 20:40	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.99	ng/L		11/16/22 05:56	11/18/22 20:40	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.50	ng/L		11/16/22 05:56	11/18/22 20:40	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		11/16/22 05:56	11/18/22 20:40	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.66	ng/L		11/16/22 05:56	11/18/22 20:40	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.8	0.18	ng/L		11/16/22 05:56	11/18/22 20:40	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.8	0.51	ng/L		11/16/22 05:56	11/18/22 20:40	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.8	0.49	ng/L		11/16/22 05:56	11/18/22 20:40	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.5	1.1	ng/L		11/16/22 05:56	11/18/22 20:40	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.5	1.2	ng/L		11/16/22 05:56	11/18/22 20:40	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		11/16/22 05:56	11/18/22 20:40	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.4	ng/L		11/16/22 05:56	11/18/22 20:40	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		11/16/22 05:56	11/18/22 20:40	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		11/16/22 05:56	11/18/22 20:40	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*94*		*50 - 150*	*11/16/22 05:56*	*11/18/22 20:40*	*1*
13C4 PFHpA	*92*		*50 - 150*	*11/16/22 05:56*	*11/18/22 20:40*	*1*
13C4 PFOA	*92*		*50 - 150*	*11/16/22 05:56*	*11/18/22 20:40*	*1*
13C5 PFNA	*94*		*50 - 150*	*11/16/22 05:56*	*11/18/22 20:40*	*1*
13C2 PFDA	*99*		*50 - 150*	*11/16/22 05:56*	*11/18/22 20:40*	*1*
13C2 PFUnA	*93*		*50 - 150*	*11/16/22 05:56*	*11/18/22 20:40*	*1*
13C2 PFDoA	*94*		*50 - 150*	*11/16/22 05:56*	*11/18/22 20:40*	*1*
13C2 PFTeDA	*87*		*50 - 150*	*11/16/22 05:56*	*11/18/22 20:40*	*1*
13C3 PFBS	*91*		*50 - 150*	*11/16/22 05:56*	*11/18/22 20:40*	*1*
18O2 PFHxS	*86*		*50 - 150*	*11/16/22 05:56*	*11/18/22 20:40*	*1*
13C4 PFOS	*89*		*50 - 150*	*11/16/22 05:56*	*11/18/22 20:40*	*1*
d3-NMeFOSAA	*88*		*50 - 150*	*11/16/22 05:56*	*11/18/22 20:40*	*1*
d5-NEtFOSAA	*89*		*50 - 150*	*11/16/22 05:56*	*11/18/22 20:40*	*1*
13C3 HFPO-DA	*100*		*50 - 150*	*11/16/22 05:56*	*11/18/22 20:40*	*1*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-94316-1

Client Sample ID: MW-77-11112022

Date Collected: 11/11/22 11:40
Date Received: 11/12/22 08:55

Lab Sample ID: 320-94316-12

Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**42**		10	2.9	ng/L		11/22/22 05:11	11/27/22 03:13	1
Perfluoroheptanoic acid (PFHpA)	**6.3**	**J B**	10	1.3	ng/L		11/22/22 05:11	11/27/22 03:13	1
Perfluorooctanoic acid (PFOA)	**18**		10	4.3	ng/L		11/22/22 05:11	11/27/22 03:13	1
Perfluorononanoic acid (PFNA)	**1.4**	**J B**	10	1.4	ng/L		11/22/22 05:11	11/27/22 03:13	1
Perfluorodecanoic acid (PFDA)	ND		10	1.6	ng/L		11/22/22 05:11	11/27/22 03:13	1
Perfluoroundecanoic acid (PFUnA)	ND		10	5.5	ng/L		11/22/22 05:11	11/27/22 03:13	1
Perfluorododecanoic acid (PFDoA)	ND		10	2.8	ng/L		11/22/22 05:11	11/27/22 03:13	1
Perfluorotridecanoic acid (PFTriA)	ND		10	6.5	ng/L		11/22/22 05:11	11/27/22 03:13	1
Perfluorotetradecanoic acid (PFTeA)	ND		10	3.7	ng/L		11/22/22 05:11	11/27/22 03:13	1
Perfluorobutanesulfonic acid (PFBS)	**23**	**B**	10	1.0	ng/L		11/22/22 05:11	11/27/22 03:13	1
Perfluorohexanesulfonic acid (PFHxS)	**180**		10	2.9	ng/L		11/22/22 05:11	11/27/22 03:13	1
Perfluorooctanesulfonic acid (PFOS)	**700**		10	2.7	ng/L		11/22/22 05:11	11/27/22 03:13	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		25	6.0	ng/L		11/22/22 05:11	11/27/22 03:13	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		25	6.5	ng/L		11/22/22 05:11	11/27/22 03:13	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	**1.5**	**J B**	10	1.2	ng/L		11/22/22 05:11	11/27/22 03:13	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		20	7.5	ng/L		11/22/22 05:11	11/27/22 03:13	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	**1.6**	**J**	10	1.6	ng/L		11/22/22 05:11	11/27/22 03:13	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		10	2.0	ng/L		11/22/22 05:11	11/27/22 03:13	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*95*		*50 - 150*	*11/22/22 05:11*	*11/27/22 03:13*	*1*
13C4 PFHpA	*97*		*50 - 150*	*11/22/22 05:11*	*11/27/22 03:13*	*1*
13C4 PFOA	*94*		*50 - 150*	*11/22/22 05:11*	*11/27/22 03:13*	*1*
13C5 PFNA	*93*		*50 - 150*	*11/22/22 05:11*	*11/27/22 03:13*	*1*
13C2 PFDA	*98*		*50 - 150*	*11/22/22 05:11*	*11/27/22 03:13*	*1*
13C2 PFUnA	*106*		*50 - 150*	*11/22/22 05:11*	*11/27/22 03:13*	*1*
13C2 PFDoA	*94*		*50 - 150*	*11/22/22 05:11*	*11/27/22 03:13*	*1*
13C2 PFTeDA	*110*		*50 - 150*	*11/22/22 05:11*	*11/27/22 03:13*	*1*
13C3 PFBS	*97*		*50 - 150*	*11/22/22 05:11*	*11/27/22 03:13*	*1*
18O2 PFHxS	*92*		*50 - 150*	*11/22/22 05:11*	*11/27/22 03:13*	*1*
13C4 PFOS	*95*		*50 - 150*	*11/22/22 05:11*	*11/27/22 03:13*	*1*
d3-NMeFOSAA	*116*		*50 - 150*	*11/22/22 05:11*	*11/27/22 03:13*	*1*
d5-NEtFOSAA	*114*		*50 - 150*	*11/22/22 05:11*	*11/27/22 03:13*	*1*
13C3 HFPO-DA	*89*		*50 - 150*	*11/22/22 05:11*	*11/27/22 03:13*	*1*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-94316-1

Client Sample ID: MW-78-11112022

Date Collected: 11/11/22 13:55
Date Received: 11/12/22 08:55

Lab Sample ID: 320-94316-13

Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**12**		1.9	0.54	ng/L		11/22/22 05:33	11/27/22 03:23	1
Perfluoroheptanoic acid (PFHpA)	**4.4**	**B**	1.9	0.23	ng/L		11/22/22 05:33	11/27/22 03:23	1
Perfluorooctanoic acid (PFOA)	**5.9**		1.9	0.79	ng/L		11/22/22 05:33	11/27/22 03:23	1
Perfluorononanoic acid (PFNA)	**0.68**	**J B**	1.9	0.25	ng/L		11/22/22 05:33	11/27/22 03:23	1
Perfluorodecanoic acid (PFDA)	ND		1.9	0.29	ng/L		11/22/22 05:33	11/27/22 03:23	1
Perfluoroundecanoic acid (PFUnA)	ND		1.9	1.0	ng/L		11/22/22 05:33	11/27/22 03:23	1
Perfluorododecanoic acid (PFDoA)	ND		1.9	0.51	ng/L		11/22/22 05:33	11/27/22 03:23	1
Perfluorotridecanoic acid (PFTriA)	ND		1.9	1.2	ng/L		11/22/22 05:33	11/27/22 03:23	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.9	0.68	ng/L		11/22/22 05:33	11/27/22 03:23	1
Perfluorobutanesulfonic acid (PFBS)	**3.7**	**B**	1.9	0.19	ng/L		11/22/22 05:33	11/27/22 03:23	1
Perfluorohexanesulfonic acid (PFHxS)	**28**		1.9	0.53	ng/L		11/22/22 05:33	11/27/22 03:23	1
Perfluorooctanesulfonic acid (PFOS)	**180**		1.9	0.50	ng/L		11/22/22 05:33	11/27/22 03:23	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.7	1.1	ng/L		11/22/22 05:33	11/27/22 03:23	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.7	1.2	ng/L		11/22/22 05:33	11/27/22 03:23	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	**0.35**	**J B**	1.9	0.22	ng/L		11/22/22 05:33	11/27/22 03:23	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.7	1.4	ng/L		11/22/22 05:33	11/27/22 03:23	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.9	0.30	ng/L		11/22/22 05:33	11/27/22 03:23	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.9	0.37	ng/L		11/22/22 05:33	11/27/22 03:23	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*82*		*50 - 150*	*11/22/22 05:33*	*11/27/22 03:23*	*1*
13C4 PFHpA	*81*		*50 - 150*	*11/22/22 05:33*	*11/27/22 03:23*	*1*
13C4 PFOA	*80*		*50 - 150*	*11/22/22 05:33*	*11/27/22 03:23*	*1*
13C5 PFNA	*85*		*50 - 150*	*11/22/22 05:33*	*11/27/22 03:23*	*1*
13C2 PFDA	*83*		*50 - 150*	*11/22/22 05:33*	*11/27/22 03:23*	*1*
13C2 PFUnA	*86*		*50 - 150*	*11/22/22 05:33*	*11/27/22 03:23*	*1*
13C2 PFDoA	*81*		*50 - 150*	*11/22/22 05:33*	*11/27/22 03:23*	*1*
13C2 PFTeDA	*74*		*50 - 150*	*11/22/22 05:33*	*11/27/22 03:23*	*1*
13C3 PFBS	*80*		*50 - 150*	*11/22/22 05:33*	*11/27/22 03:23*	*1*
18O2 PFHxS	*82*		*50 - 150*	*11/22/22 05:33*	*11/27/22 03:23*	*1*
13C4 PFOS	*83*		*50 - 150*	*11/22/22 05:33*	*11/27/22 03:23*	*1*
d3-NMeFOSAA	*95*		*50 - 150*	*11/22/22 05:33*	*11/27/22 03:23*	*1*
d5-NEtFOSAA	*96*		*50 - 150*	*11/22/22 05:33*	*11/27/22 03:23*	*1*
13C3 HFPO-DA	*71*		*50 - 150*	*11/22/22 05:33*	*11/27/22 03:23*	*1*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-94316-1

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Matrix: Solid

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFHxA (50-150)	C4PFHA (50-150)	PFOA (50-150)	PFNA (50-150)	PFDA (50-150)	PFUnA (50-150)	PFDoA (50-150)	PFTDA (50-150)
320-94316-1	MW-78:2.0	83	81	89	93	91	103	90	105
320-94316-2	MW-78:5.0	81	80	84	89	89	100	91	99
320-94316-3	MW-78:10.0	83	80	86	92	92	101	94	104
320-94316-4	MW-77:2.0	85	81	87	89	83	94	110	99
320-94316-5	MW-77:5.0	86	81	82	86	84	91	90	99
320-94316-6	MW-77:10.0	85	86	87	90	85	96	92	102
320-94316-7	MW-101:2.0	88	85	90	94	91	97	93	101
320-94316-8	MW-79:2.0	83	80	85	88	87	93	90	98
320-94316-9	MW-79:5.0	83	79	84	89	85	94	90	103
320-94316-10	MW-79:10.0	102	95	93	98	92	106	97	114
320-94316-10 MS	MW-79:10.0	92	92	94	78	95	101	98	105
320-94316-10 MSD	MW-79:10.0	79	76	85	87	81	85	82	95
LCS 320-633024/2-A	Lab Control Sample	81	79	89	86	85	93	86	94
MB 320-633024/1-A	Method Blank	86	79	88	89	85	95	89	94

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	C3PFBS (50-150)	PFHxS (50-150)	PFOS (50-150)	d3NMFOS (50-150)	d5NEFOS (50-150)	HFPODA (50-150)		
320-94316-1	MW-78:2.0	90	92	100	103	114	86		
320-94316-2	MW-78:5.0	87	85	93	108	121	81		
320-94316-3	MW-78:10.0	85	86	96	101	113	87		
320-94316-4	MW-77:2.0	88	85	92	86	103	87		
320-94316-5	MW-77:5.0	81	83	92	95	103	86		
320-94316-6	MW-77:10.0	84	91	91	96	103	71		
320-94316-7	MW-101:2.0	92	89	93	99	100	91		
320-94316-8	MW-79:2.0	84	83	94	96	108	85		
320-94316-9	MW-79:5.0	81	84	92	95	105	81		
320-94316-10	MW-79:10.0	96	98	103	106	125	84		
320-94316-10 MS	MW-79:10.0	93	96	90	112	118	82		
320-94316-10 MSD	MW-79:10.0	80	79	88	96	103	82		
LCS 320-633024/2-A	Lab Control Sample	83	91	94	93	105	85		
MB 320-633024/1-A	Method Blank	85	86	93	93	105	88		

Surrogate Legend

PFHxA = 13C2 PFHxA
C4PFHA = 13C4 PFHpA
PFOA = 13C4 PFOA
PFNA = 13C5 PFNA
PFDA = 13C2 PFDA
PFUnA = 13C2 PFUnA
PFDoA = 13C2 PFDoA
PFTDA = 13C2 PFTeDA
C3PFBS = 13C3 PFBS
PFHxS = 18O2 PFHxS
PFOS = 13C4 PFOS
d3NMFOS = d3-NMeFOSAA
d5NEFOS = d5-NEtFOSAA
HFPODA = 13C3 HFPO-DA

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-94316-1

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Matrix: Water

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFHxA (50-150)	C4PFHA (50-150)	PFOA (50-150)	PFNA (50-150)	PFDA (50-150)	PFUnA (50-150)	PFDoA (50-150)	PFTDA (50-150)
320-94290-A-1-E MS	Matrix Spike	99	98	99	96	102	102	90	101
320-94290-A-1-E MS - DL	Matrix Spike								
320-94290-A-1-F MSD	Matrix Spike Duplicate	102	102	102	99	103	107	96	103
320-94290-A-1-F MSD - DL	Matrix Spike Duplicate								
320-94316-11	EB-3-11072022	94	92	92	94	99	93	94	87
320-94316-12	MW-77-11112022	95	97	94	93	98	106	94	110
320-94316-13	MW-78-11112022	82	81	80	85	83	86	81	74
LCS 320-633302/2-A	Lab Control Sample	96	96	95	101	102	98	98	91
LCS 320-634646/2-A	Lab Control Sample	100	100	96	100	102	106	92	113
LCSD 320-633302/3-A	Lab Control Sample Dup	98	97	93	97	97	98	97	91
LCSD 320-634646/3-A	Lab Control Sample Dup	96	94	97	99	101	105	93	102
MB 320-633302/1-A	Method Blank	93	93	93	99	96	94	88	84
MB 320-634646/1-A	Method Blank	97	96	96	103	98	107	98	114

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	C3PFBS (50-150)	PFHxS (50-150)	PFOS (50-150)	d3NMFOS (50-150)	d5NEFOS (50-150)	HFPODA (50-150)		
320-94290-A-1-E MS	Matrix Spike	100	99	91	119	111	96		
320-94290-A-1-E MS - DL	Matrix Spike			97					
320-94290-A-1-F MSD	Matrix Spike Duplicate	102	100	95	118	118	95		
320-94290-A-1-F MSD - DL	Matrix Spike Duplicate			91					
320-94316-11	EB-3-11072022	91	86	89	88	89	100		
320-94316-12	MW-77-11112022	97	92	95	116	114	89		
320-94316-13	MW-78-11112022	80	82	83	95	96	71		
LCS 320-633302/2-A	Lab Control Sample	97	91	93	90	86	108		
LCS 320-634646/2-A	Lab Control Sample	93	93	94	109	104	93		
LCSD 320-633302/3-A	Lab Control Sample Dup	99	89	92	89	88	111		
LCSD 320-634646/3-A	Lab Control Sample Dup	90	94	96	119	106	93		
MB 320-633302/1-A	Method Blank	92	90	89	82	86	107		
MB 320-634646/1-A	Method Blank	89	95	99	111	110	92		

Surrogate Legend

PFHxA = 13C2 PFHxA
C4PFHA = 13C4 PFHpA
PFOA = 13C4 PFOA
PFNA = 13C5 PFNA
PFDA = 13C2 PFDA
PFUnA = 13C2 PFUnA
PFDoA = 13C2 PFDoA
PFTDA = 13C2 PFTeDA
C3PFBS = 13C3 PFBS
PFHxS = 18O2 PFHxS
PFOS = 13C4 PFOS
d3NMFOS = d3-NMeFOSAA
d5NEFOS = d5-NEtFOSAA
HFPODA = 13C3 HFPO-DA

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Lab Sample ID: MB 320-633024/1-A
Matrix: Solid
Analysis Batch: 636249

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 633024

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		0.20	0.031	ug/Kg		11/14/22 19:37	11/29/22 00:41	1
Perfluoroheptanoic acid (PFHpA)	ND		0.20	0.038	ug/Kg		11/14/22 19:37	11/29/22 00:41	1
Perfluorooctanoic acid (PFOA)	ND		0.20	0.053	ug/Kg		11/14/22 19:37	11/29/22 00:41	1
Perfluorononanoic acid (PFNA)	ND		0.20	0.022	ug/Kg		11/14/22 19:37	11/29/22 00:41	1
Perfluorodecanoic acid (PFDA)	ND		0.20	0.048	ug/Kg		11/14/22 19:37	11/29/22 00:41	1
Perfluoroundecanoic acid (PFUnA)	ND		0.20	0.042	ug/Kg		11/14/22 19:37	11/29/22 00:41	1
Perfluorododecanoic acid (PFDoA)	ND		0.20	0.030	ug/Kg		11/14/22 19:37	11/29/22 00:41	1
Perfluorotridecanoic acid (PFTriA)	ND		0.20	0.021	ug/Kg		11/14/22 19:37	11/29/22 00:41	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.20	0.037	ug/Kg		11/14/22 19:37	11/29/22 00:41	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.20	0.038	ug/Kg		11/14/22 19:37	11/29/22 00:41	1
Perfluorohexanesulfonic acid (PFHxS)	ND		0.20	0.029	ug/Kg		11/14/22 19:37	11/29/22 00:41	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.20	0.043	ug/Kg		11/14/22 19:37	11/29/22 00:41	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		0.20	0.023	ug/Kg		11/14/22 19:37	11/29/22 00:41	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		0.20	0.048	ug/Kg		11/14/22 19:37	11/29/22 00:41	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.20	0.035	ug/Kg		11/14/22 19:37	11/29/22 00:41	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.20	0.041	ug/Kg		11/14/22 19:37	11/29/22 00:41	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.20	0.031	ug/Kg		11/14/22 19:37	11/29/22 00:41	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.20	0.039	ug/Kg		11/14/22 19:37	11/29/22 00:41	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*86*		*50 - 150*	*11/14/22 19:37*	*11/29/22 00:41*	*1*
13C4 PFHpA	*79*		*50 - 150*	*11/14/22 19:37*	*11/29/22 00:41*	*1*
13C4 PFOA	*88*		*50 - 150*	*11/14/22 19:37*	*11/29/22 00:41*	*1*
13C5 PFNA	*89*		*50 - 150*	*11/14/22 19:37*	*11/29/22 00:41*	*1*
13C2 PFDA	*85*		*50 - 150*	*11/14/22 19:37*	*11/29/22 00:41*	*1*
13C2 PFUnA	*95*		*50 - 150*	*11/14/22 19:37*	*11/29/22 00:41*	*1*
13C2 PFDoA	*89*		*50 - 150*	*11/14/22 19:37*	*11/29/22 00:41*	*1*
13C2 PFTeDA	*94*		*50 - 150*	*11/14/22 19:37*	*11/29/22 00:41*	*1*
13C3 PFBS	*85*		*50 - 150*	*11/14/22 19:37*	*11/29/22 00:41*	*1*
18O2 PFHxS	*86*		*50 - 150*	*11/14/22 19:37*	*11/29/22 00:41*	*1*
13C4 PFOS	*93*		*50 - 150*	*11/14/22 19:37*	*11/29/22 00:41*	*1*
d3-NMeFOSAA	*93*		*50 - 150*	*11/14/22 19:37*	*11/29/22 00:41*	*1*
d5-NEtFOSAA	*105*		*50 - 150*	*11/14/22 19:37*	*11/29/22 00:41*	*1*
13C3 HFPO-DA	*88*		*50 - 150*	*11/14/22 19:37*	*11/29/22 00:41*	*1*

Lab Sample ID: LCS 320-633024/2-A
Matrix: Solid
Analysis Batch: 636249

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 633024

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorohexanoic acid (PFHxA)	2.00	2.06		ug/Kg		103	70 - 132
Perfluoroheptanoic acid (PFHpA)	2.00	2.15		ug/Kg		108	71 - 131
Perfluorooctanoic acid (PFOA)	2.00	2.04		ug/Kg		102	69 - 133
Perfluorononanoic acid (PFNA)	2.00	2.27		ug/Kg		113	72 - 129

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: LCS 320-633024/2-A
Matrix: Solid
Analysis Batch: 636249

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 633024

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorodecanoic acid (PFDA)	2.00	2.00		ug/Kg		100	69 - 133
Perfluoroundecanoic acid (PFUnA)	2.00	2.05		ug/Kg		103	64 - 136
Perfluorododecanoic acid (PFDoA)	2.00	2.40		ug/Kg		120	69 - 135
Perfluorotridecanoic acid (PFTriA)	2.00	2.14		ug/Kg		107	66 - 139
Perfluorotetradecanoic acid (PFTeA)	2.00	1.98		ug/Kg		99	69 - 133
Perfluorobutanesulfonic acid (PFBS)	1.78	1.82		ug/Kg		102	72 - 128
Perfluorohexanesulfonic acid (PFHxS)	1.82	1.67		ug/Kg		92	67 - 130
Perfluorooctanesulfonic acid (PFOS)	1.86	2.03		ug/Kg		109	68 - 136
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	2.00	1.75		ug/Kg		87	63 - 144
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	2.00	1.99		ug/Kg		99	61 - 139
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	1.87	1.93		ug/Kg		103	75 - 135
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	2.00	1.98		ug/Kg		99	77 - 137
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	1.89	1.94		ug/Kg		103	76 - 136
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	1.89	1.77		ug/Kg		94	79 - 139

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*81*		*50 - 150*
13C4 PFHpA	*79*		*50 - 150*
13C4 PFOA	*89*		*50 - 150*
13C5 PFNA	*86*		*50 - 150*
13C2 PFDA	*85*		*50 - 150*
13C2 PFUnA	*93*		*50 - 150*
13C2 PFDoA	*86*		*50 - 150*
13C2 PFTeDA	*94*		*50 - 150*
13C3 PFBS	*83*		*50 - 150*
18O2 PFHxS	*91*		*50 - 150*
13C4 PFOS	*94*		*50 - 150*
d3-NMeFOSAA	*93*		*50 - 150*
d5-NEtFOSAA	*105*		*50 - 150*
13C3 HFPO-DA	*85*		*50 - 150*

Lab Sample ID: 320-94316-10 MS
Matrix: Solid
Analysis Batch: 636249

Client Sample ID: MW-79:10.0
Prep Type: Total/NA
Prep Batch: 633024

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorohexanoic acid (PFHxA)	ND		2.72	2.70		ug/Kg	☼	99	70 - 132
Perfluoroheptanoic acid (PFHpA)	ND		2.72	2.86		ug/Kg	☼	105	71 - 131
Perfluorooctanoic acid (PFOA)	ND		2.72	3.00		ug/Kg	☼	110	69 - 133

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: 320-94316-10 MS
Matrix: Solid
Analysis Batch: 636249

Client Sample ID: MW-79:10.0
Prep Type: Total/NA
Prep Batch: 633024

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorononanoic acid (PFNA)	ND		2.72	2.90		ug/Kg	☼	106	72 - 129
Perfluorodecanoic acid (PFDA)	ND		2.72	2.63		ug/Kg	☼	97	69 - 133
Perfluoroundecanoic acid (PFUnA)	ND		2.72	2.74		ug/Kg	☼	101	64 - 136
Perfluorododecanoic acid (PFDoA)	ND		2.72	3.00		ug/Kg	☼	110	69 - 135
Perfluorotridecanoic acid (PFTriA)	ND		2.72	2.94		ug/Kg	☼	108	66 - 139
Perfluorotetradecanoic acid (PFTeA)	ND		2.72	2.76		ug/Kg	☼	101	69 - 133
Perfluorobutanesulfonic acid (PFBS)	ND		2.42	2.70		ug/Kg	☼	112	72 - 128
Perfluorohexanesulfonic acid (PFHxS)	ND		2.48	2.21		ug/Kg	☼	89	67 - 130
Perfluorooctanesulfonic acid (PFOS)	ND		2.53	2.52		ug/Kg	☼	100	68 - 136
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		2.72	2.10		ug/Kg	☼	77	63 - 144
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		2.72	2.75		ug/Kg	☼	101	61 - 139
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND	F2	2.54	2.91		ug/Kg	☼	115	75 - 135
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		2.72	2.63		ug/Kg	☼	97	77 - 137
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.57	3.05		ug/Kg	☼	119	76 - 136
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.57	2.82		ug/Kg	☼	110	79 - 139

Isotope Dilution	*MS %Recovery*	*MS Qualifier*	*Limits*
13C2 PFHxA	*92*		*50 - 150*
13C4 PFHpA	*92*		*50 - 150*
13C4 PFOA	*94*		*50 - 150*
13C5 PFNA	*78*		*50 - 150*
13C2 PFDA	*95*		*50 - 150*
13C2 PFUnA	*101*		*50 - 150*
13C2 PFDoA	*98*		*50 - 150*
13C2 PFTeDA	*105*		*50 - 150*
13C3 PFBS	*93*		*50 - 150*
18O2 PFHxS	*96*		*50 - 150*
13C4 PFOS	*90*		*50 - 150*
d3-NMeFOSAA	*112*		*50 - 150*
d5-NEtFOSAA	*118*		*50 - 150*
13C3 HFPO-DA	*82*		*50 - 150*

Lab Sample ID: 320-94316-10 MSD
Matrix: Solid
Analysis Batch: 636249

Client Sample ID: MW-79:10.0
Prep Type: Total/NA
Prep Batch: 633024

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)	ND		2.57	2.66		ug/Kg	☼	104	70 - 132	1	30
Perfluoroheptanoic acid (PFHpA)	ND		2.57	2.58		ug/Kg	☼	100	71 - 131	10	30

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: 320-94316-10 MSD
Matrix: Solid
Analysis Batch: 636249

Client Sample ID: MW-79:10.0
Prep Type: Total/NA
Prep Batch: 633024

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorooctanoic acid (PFOA)	ND		2.57	2.53		ug/Kg	☼	99	69 - 133	17	30
Perfluorononanoic acid (PFNA)	ND		2.57	2.76		ug/Kg	☼	107	72 - 129	5	30
Perfluorodecanoic acid (PFDA)	ND		2.57	2.41		ug/Kg	☼	94	69 - 133	9	30
Perfluoroundecanoic acid (PFUnA)	ND		2.57	2.66		ug/Kg	☼	104	64 - 136	3	30
Perfluorododecanoic acid (PFDoA)	ND		2.57	2.75		ug/Kg	☼	107	69 - 135	9	30
Perfluorotridecanoic acid (PFTriA)	ND		2.57	2.65		ug/Kg	☼	103	66 - 139	10	30
Perfluorotetradecanoic acid (PFTeA)	ND		2.57	2.40		ug/Kg	☼	94	69 - 133	14	30
Perfluorobutanesulfonic acid (PFBS)	ND		2.28	2.28		ug/Kg	☼	100	72 - 128	17	30
Perfluorohexanesulfonic acid (PFHxS)	ND		2.34	2.20		ug/Kg	☼	94	67 - 130	0	30
Perfluorooctanesulfonic acid (PFOS)	ND		2.39	2.48		ug/Kg	☼	104	68 - 136	2	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		2.57	1.94		ug/Kg	☼	76	63 - 144	8	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		2.57	2.67		ug/Kg	☼	104	61 - 139	3	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND	F2	2.40	1.96	F2	ug/Kg	☼	82	75 - 135	39	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		2.57	2.52		ug/Kg	☼	98	77 - 137	4	30
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.42	2.46		ug/Kg	☼	102	76 - 136	22	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.42	2.18		ug/Kg	☼	90	79 - 139	25	30

Isotope Dilution	*MSD %Recovery*	*MSD Qualifier*	*Limits*
13C2 PFHxA	*79*		*50 - 150*
13C4 PFHpA	*76*		*50 - 150*
13C4 PFOA	*85*		*50 - 150*
13C5 PFNA	*87*		*50 - 150*
13C2 PFDA	*81*		*50 - 150*
13C2 PFUnA	*85*		*50 - 150*
13C2 PFDoA	*82*		*50 - 150*
13C2 PFTeDA	*95*		*50 - 150*
13C3 PFBS	*80*		*50 - 150*
18O2 PFHxS	*79*		*50 - 150*
13C4 PFOS	*88*		*50 - 150*
d3-NMeFOSAA	*96*		*50 - 150*
d5-NEtFOSAA	*103*		*50 - 150*
13C3 HFPO-DA	*82*		*50 - 150*

Lab Sample ID: MB 320-633302/1-A
Matrix: Water
Analysis Batch: 634142

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 633302

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		11/16/22 05:55	11/18/22 20:10	1

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: MB 320-633302/1-A
Matrix: Water
Analysis Batch: 634142

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 633302

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		11/16/22 05:55	11/18/22 20:10	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		11/16/22 05:55	11/18/22 20:10	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		11/16/22 05:55	11/18/22 20:10	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		11/16/22 05:55	11/18/22 20:10	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		11/16/22 05:55	11/18/22 20:10	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		11/16/22 05:55	11/18/22 20:10	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		11/16/22 05:55	11/18/22 20:10	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.73	ng/L		11/16/22 05:55	11/18/22 20:10	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		11/16/22 05:55	11/18/22 20:10	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.57	ng/L		11/16/22 05:55	11/18/22 20:10	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		11/16/22 05:55	11/18/22 20:10	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		5.0	1.2	ng/L		11/16/22 05:55	11/18/22 20:10	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		5.0	1.3	ng/L		11/16/22 05:55	11/18/22 20:10	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.0	0.24	ng/L		11/16/22 05:55	11/18/22 20:10	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		4.0	1.5	ng/L		11/16/22 05:55	11/18/22 20:10	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.0	0.32	ng/L		11/16/22 05:55	11/18/22 20:10	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.40	ng/L		11/16/22 05:55	11/18/22 20:10	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*93*		*50 - 150*	*11/16/22 05:55*	*11/18/22 20:10*	*1*
13C4 PFHpA	*93*		*50 - 150*	*11/16/22 05:55*	*11/18/22 20:10*	*1*
13C4 PFOA	*93*		*50 - 150*	*11/16/22 05:55*	*11/18/22 20:10*	*1*
13C5 PFNA	*99*		*50 - 150*	*11/16/22 05:55*	*11/18/22 20:10*	*1*
13C2 PFDA	*96*		*50 - 150*	*11/16/22 05:55*	*11/18/22 20:10*	*1*
13C2 PFUnA	*94*		*50 - 150*	*11/16/22 05:55*	*11/18/22 20:10*	*1*
13C2 PFDoA	*88*		*50 - 150*	*11/16/22 05:55*	*11/18/22 20:10*	*1*
13C2 PFTeDA	*84*		*50 - 150*	*11/16/22 05:55*	*11/18/22 20:10*	*1*
13C3 PFBS	*92*		*50 - 150*	*11/16/22 05:55*	*11/18/22 20:10*	*1*
18O2 PFHxS	*90*		*50 - 150*	*11/16/22 05:55*	*11/18/22 20:10*	*1*
13C4 PFOS	*89*		*50 - 150*	*11/16/22 05:55*	*11/18/22 20:10*	*1*
d3-NMeFOSAA	*82*		*50 - 150*	*11/16/22 05:55*	*11/18/22 20:10*	*1*
d5-NEtFOSAA	*86*		*50 - 150*	*11/16/22 05:55*	*11/18/22 20:10*	*1*
13C3 HFPO-DA	*107*		*50 - 150*	*11/16/22 05:55*	*11/18/22 20:10*	*1*

Lab Sample ID: LCS 320-633302/2-A
Matrix: Water
Analysis Batch: 634142

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 633302

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorohexanoic acid (PFHxA)	40.0	41.8		ng/L		104	72 - 129
Perfluoroheptanoic acid (PFHpA)	40.0	44.3		ng/L		111	72 - 130
Perfluorooctanoic acid (PFOA)	40.0	41.9		ng/L		105	71 - 133
Perfluorononanoic acid (PFNA)	40.0	41.8		ng/L		104	69 - 130
Perfluorodecanoic acid (PFDA)	40.0	40.8		ng/L		102	71 - 129

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: LCS 320-633302/2-A
Matrix: Water
Analysis Batch: 634142

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 633302

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluoroundecanoic acid (PFUnA)	40.0	42.7		ng/L		107	69 - 133
Perfluorododecanoic acid (PFDoA)	40.0	42.4		ng/L		106	72 - 134
Perfluorotridecanoic acid (PFTriA)	40.0	41.2		ng/L		103	65 - 144
Perfluorotetradecanoic acid (PFTeA)	40.0	42.3		ng/L		106	71 - 132
Perfluorobutanesulfonic acid (PFBS)	35.5	35.4		ng/L		100	72 - 130
Perfluorohexanesulfonic acid (PFHxS)	36.5	37.6		ng/L		103	68 - 131
Perfluorooctanesulfonic acid (PFOS)	37.2	39.6		ng/L		107	65 - 140
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	40.0	40.5		ng/L		101	65 - 136
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	40.0	43.6		ng/L		109	61 - 135
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	37.4	41.1		ng/L		110	77 - 137
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	40.0	39.3		ng/L		98	72 - 132
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	37.8	40.6		ng/L		107	76 - 136
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.8	39.7		ng/L		105	81 - 141

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*96*		*50 - 150*
13C4 PFHpA	*96*		*50 - 150*
13C4 PFOA	*95*		*50 - 150*
13C5 PFNA	*101*		*50 - 150*
13C2 PFDA	*102*		*50 - 150*
13C2 PFUnA	*98*		*50 - 150*
13C2 PFDoA	*98*		*50 - 150*
13C2 PFTeDA	*91*		*50 - 150*
13C3 PFBS	*97*		*50 - 150*
18O2 PFHxS	*91*		*50 - 150*
13C4 PFOS	*93*		*50 - 150*
d3-NMeFOSAA	*90*		*50 - 150*
d5-NEtFOSAA	*86*		*50 - 150*
13C3 HFPO-DA	*108*		*50 - 150*

Lab Sample ID: LCSD 320-633302/3-A
Matrix: Water
Analysis Batch: 634142

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 633302

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)	40.0	40.4		ng/L		101	72 - 129	3	30
Perfluoroheptanoic acid (PFHpA)	40.0	41.9		ng/L		105	72 - 130	6	30
Perfluorooctanoic acid (PFOA)	40.0	43.1		ng/L		108	71 - 133	3	30
Perfluorononanoic acid (PFNA)	40.0	42.0		ng/L		105	69 - 130	1	30

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: LCSD 320-633302/3-A
Matrix: Water
Analysis Batch: 634142

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 633302

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorodecanoic acid (PFDA)	40.0	41.9		ng/L		105	71 - 129	2	30
Perfluoroundecanoic acid (PFUnA)	40.0	41.1		ng/L		103	69 - 133	4	30
Perfluorododecanoic acid (PFDoA)	40.0	43.3		ng/L		108	72 - 134	2	30
Perfluorotridecanoic acid (PFTriA)	40.0	42.0		ng/L		105	65 - 144	2	30
Perfluorotetradecanoic acid (PFTeA)	40.0	42.7		ng/L		107	71 - 132	1	30
Perfluorobutanesulfonic acid (PFBS)	35.5	34.5		ng/L		97	72 - 130	3	30
Perfluorohexanesulfonic acid (PFHxS)	36.5	37.9		ng/L		104	68 - 131	1	30
Perfluorooctanesulfonic acid (PFOS)	37.2	38.2		ng/L		103	65 - 140	4	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	40.0	41.2		ng/L		103	65 - 136	2	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	40.0	42.3		ng/L		106	61 - 135	3	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	37.4	43.4		ng/L		116	77 - 137	6	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	40.0	38.9		ng/L		97	72 - 132	1	30
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	37.8	40.6		ng/L		108	76 - 136	0	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.8	41.5		ng/L		110	81 - 141	4	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFHxA	*98*		*50 - 150*
13C4 PFHpA	*97*		*50 - 150*
13C4 PFOA	*93*		*50 - 150*
13C5 PFNA	*97*		*50 - 150*
13C2 PFDA	*97*		*50 - 150*
13C2 PFUnA	*98*		*50 - 150*
13C2 PFDoA	*97*		*50 - 150*
13C2 PFTeDA	*91*		*50 - 150*
13C3 PFBS	*99*		*50 - 150*
18O2 PFHxS	*89*		*50 - 150*
13C4 PFOS	*92*		*50 - 150*
d3-NMeFOSAA	*89*		*50 - 150*
d5-NEtFOSAA	*88*		*50 - 150*
13C3 HFPO-DA	*111*		*50 - 150*

Lab Sample ID: MB 320-634646/1-A
Matrix: Water
Analysis Batch: 635501

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 634646

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		11/22/22 05:10	11/26/22 22:40	1
Perfluoroheptanoic acid (PFHpA)	0.374	J	2.0	0.25	ng/L		11/22/22 05:10	11/26/22 22:40	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		11/22/22 05:10	11/26/22 22:40	1

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: MB 320-634646/1-A
Matrix: Water
Analysis Batch: 635501

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 634646

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorononanoic acid (PFNA)	0.316	J	2.0	0.27	ng/L		11/22/22 05:10	11/26/22 22:40	1
Perfluorodecanoic acid (PFDA)	0.313	J	2.0	0.31	ng/L		11/22/22 05:10	11/26/22 22:40	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		11/22/22 05:10	11/26/22 22:40	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		11/22/22 05:10	11/26/22 22:40	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		11/22/22 05:10	11/26/22 22:40	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.73	ng/L		11/22/22 05:10	11/26/22 22:40	1
Perfluorobutanesulfonic acid (PFBS)	0.228	J	2.0	0.20	ng/L		11/22/22 05:10	11/26/22 22:40	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.57	ng/L		11/22/22 05:10	11/26/22 22:40	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		11/22/22 05:10	11/26/22 22:40	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		5.0	1.2	ng/L		11/22/22 05:10	11/26/22 22:40	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		5.0	1.3	ng/L		11/22/22 05:10	11/26/22 22:40	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	0.331	J	2.0	0.24	ng/L		11/22/22 05:10	11/26/22 22:40	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		4.0	1.5	ng/L		11/22/22 05:10	11/26/22 22:40	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.0	0.32	ng/L		11/22/22 05:10	11/26/22 22:40	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.40	ng/L		11/22/22 05:10	11/26/22 22:40	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*97*		*50 - 150*	*11/22/22 05:10*	*11/26/22 22:40*	*1*
13C4 PFHpA	*96*		*50 - 150*	*11/22/22 05:10*	*11/26/22 22:40*	*1*
13C4 PFOA	*96*		*50 - 150*	*11/22/22 05:10*	*11/26/22 22:40*	*1*
13C5 PFNA	*103*		*50 - 150*	*11/22/22 05:10*	*11/26/22 22:40*	*1*
13C2 PFDA	*98*		*50 - 150*	*11/22/22 05:10*	*11/26/22 22:40*	*1*
13C2 PFUnA	*107*		*50 - 150*	*11/22/22 05:10*	*11/26/22 22:40*	*1*
13C2 PFDoA	*98*		*50 - 150*	*11/22/22 05:10*	*11/26/22 22:40*	*1*
13C2 PFTeDA	*114*		*50 - 150*	*11/22/22 05:10*	*11/26/22 22:40*	*1*
13C3 PFBS	*89*		*50 - 150*	*11/22/22 05:10*	*11/26/22 22:40*	*1*
18O2 PFHxS	*95*		*50 - 150*	*11/22/22 05:10*	*11/26/22 22:40*	*1*
13C4 PFOS	*99*		*50 - 150*	*11/22/22 05:10*	*11/26/22 22:40*	*1*
d3-NMeFOSAA	*111*		*50 - 150*	*11/22/22 05:10*	*11/26/22 22:40*	*1*
d5-NEtFOSAA	*110*		*50 - 150*	*11/22/22 05:10*	*11/26/22 22:40*	*1*
13C3 HFPO-DA	*92*		*50 - 150*	*11/22/22 05:10*	*11/26/22 22:40*	*1*

Lab Sample ID: LCS 320-634646/2-A
Matrix: Water
Analysis Batch: 635501

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 634646

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorohexanoic acid (PFHxA)	40.0	39.2		ng/L		98	72 - 129
Perfluoroheptanoic acid (PFHpA)	40.0	38.8		ng/L		97	72 - 130
Perfluorooctanoic acid (PFOA)	40.0	43.4		ng/L		108	71 - 133
Perfluorononanoic acid (PFNA)	40.0	42.2		ng/L		106	69 - 130
Perfluorodecanoic acid (PFDA)	40.0	42.1		ng/L		105	71 - 129
Perfluoroundecanoic acid (PFUnA)	40.0	41.7		ng/L		104	69 - 133

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: LCS 320-634646/2-A
Matrix: Water
Analysis Batch: 635501

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 634646

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorododecanoic acid (PFDoA)	40.0	47.3		ng/L		118	72 - 134
Perfluorotridecanoic acid (PFTriA)	40.0	51.1		ng/L		128	65 - 144
Perfluorotetradecanoic acid (PFTeA)	40.0	37.1		ng/L		93	71 - 132
Perfluorobutanesulfonic acid (PFBS)	35.5	36.5		ng/L		103	72 - 130
Perfluorohexanesulfonic acid (PFHxS)	36.5	36.5		ng/L		100	68 - 131
Perfluorooctanesulfonic acid (PFOS)	37.2	38.4		ng/L		103	65 - 140
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	40.0	41.1		ng/L		103	65 - 136
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	40.0	40.5		ng/L		101	61 - 135
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	37.4	40.8		ng/L		109	77 - 137
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	40.0	40.7		ng/L		102	72 - 132
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	37.8	43.5		ng/L		115	76 - 136
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.8	41.2		ng/L		109	81 - 141

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*100*		*50 - 150*
13C4 PFHpA	*100*		*50 - 150*
13C4 PFOA	*96*		*50 - 150*
13C5 PFNA	*100*		*50 - 150*
13C2 PFDA	*102*		*50 - 150*
13C2 PFUnA	*106*		*50 - 150*
13C2 PFDoA	*92*		*50 - 150*
13C2 PFTeDA	*113*		*50 - 150*
13C3 PFBS	*93*		*50 - 150*
18O2 PFHxS	*93*		*50 - 150*
13C4 PFOS	*94*		*50 - 150*
d3-NMeFOSAA	*109*		*50 - 150*
d5-NEtFOSAA	*104*		*50 - 150*
13C3 HFPO-DA	*93*		*50 - 150*

Lab Sample ID: LCSD 320-634646/3-A
Matrix: Water
Analysis Batch: 635501

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 634646

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)	40.0	40.4		ng/L		101	72 - 129	3	30
Perfluoroheptanoic acid (PFHpA)	40.0	40.0		ng/L		100	72 - 130	3	30
Perfluorooctanoic acid (PFOA)	40.0	40.1		ng/L		100	71 - 133	8	30
Perfluorononanoic acid (PFNA)	40.0	41.4		ng/L		104	69 - 130	2	30
Perfluorodecanoic acid (PFDA)	40.0	38.8		ng/L		97	71 - 129	8	30

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: LCSD 320-634646/3-A
Matrix: Water
Analysis Batch: 635501

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 634646

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluoroundecanoic acid (PFUnA)			40.0	41.7		ng/L		104	69 - 133	0	30
Perfluorododecanoic acid (PFDoA)			40.0	46.3		ng/L		116	72 - 134	2	30
Perfluorotridecanoic acid (PFTriA)			40.0	46.0		ng/L		115	65 - 144	11	30
Perfluorotetradecanoic acid (PFTeA)			40.0	40.3		ng/L		101	71 - 132	8	30
Perfluorobutanesulfonic acid (PFBS)			35.5	37.1		ng/L		104	72 - 130	2	30
Perfluorohexanesulfonic acid (PFHxS)			36.5	36.8		ng/L		101	68 - 131	1	30
Perfluorooctanesulfonic acid (PFOS)			37.2	36.5		ng/L		98	65 - 140	5	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)			40.0	40.4		ng/L		101	65 - 136	2	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)			40.0	38.1		ng/L		95	61 - 135	6	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid			37.4	41.0		ng/L		110	77 - 137	0	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)			40.0	40.7		ng/L		102	72 - 132	0	30
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid			37.8	42.3		ng/L		112	76 - 136	3	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			37.8	40.6		ng/L		107	81 - 141	2	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFHxA	*96*		*50 - 150*
13C4 PFHpA	*94*		*50 - 150*
13C4 PFOA	*97*		*50 - 150*
13C5 PFNA	*99*		*50 - 150*
13C2 PFDA	*101*		*50 - 150*
13C2 PFUnA	*105*		*50 - 150*
13C2 PFDoA	*93*		*50 - 150*
13C2 PFTeDA	*102*		*50 - 150*
13C3 PFBS	*90*		*50 - 150*
18O2 PFHxS	*94*		*50 - 150*
13C4 PFOS	*96*		*50 - 150*
d3-NMeFOSAA	*119*		*50 - 150*
d5-NEtFOSAA	*106*		*50 - 150*
13C3 HFPO-DA	*93*		*50 - 150*

Lab Sample ID: 320-94290-A-1-E MS
Matrix: Water
Analysis Batch: 635501

Client Sample ID: Matrix Spike
Prep Type: Total/NA
Prep Batch: 634646

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorohexanoic acid (PFHxA)	17		36.2	53.9		ng/L		101	72 - 129
Perfluoroheptanoic acid (PFHpA)	2.5	B	36.2	38.1		ng/L		99	72 - 130
Perfluorooctanoic acid (PFOA)	14		36.2	52.0		ng/L		105	71 - 133
Perfluorononanoic acid (PFNA)	9.3	B	36.2	46.4		ng/L		103	69 - 130

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: 320-94290-A-1-E MS
Matrix: Water
Analysis Batch: 635501

Client Sample ID: Matrix Spike
Prep Type: Total/NA
Prep Batch: 634646

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorodecanoic acid (PFDA)	11	B	36.2	46.6		ng/L		99	71 - 129
Perfluoroundecanoic acid (PFUnA)	1.9		36.2	40.6		ng/L		107	69 - 133
Perfluorododecanoic acid (PFDoA)	2.4		36.2	44.1		ng/L		115	72 - 134
Perfluorotridecanoic acid (PFTriA)	ND		36.2	42.9		ng/L		118	65 - 144
Perfluorotetradecanoic acid (PFTeA)	ND		36.2	34.8		ng/L		96	71 - 132
Perfluorobutanesulfonic acid (PFBS)	2.2	B	32.1	35.3		ng/L		103	72 - 130
Perfluorohexanesulfonic acid (PFHxS)	25		33.0	56.5		ng/L		96	68 - 131
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		36.2	38.9		ng/L		107	65 - 136
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		36.2	37.3		ng/L		103	61 - 135
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	0.30	J B	33.8	37.6		ng/L		110	77 - 137
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		36.2	36.1		ng/L		100	72 - 132
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		34.1	38.0		ng/L		111	76 - 136
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		34.1	38.8		ng/L		114	81 - 141

Isotope Dilution	*MS %Recovery*	*MS Qualifier*	*Limits*
13C2 PFHxA	*99*		*50 - 150*
13C4 PFHpA	*98*		*50 - 150*
13C4 PFOA	*99*		*50 - 150*
13C5 PFNA	*96*		*50 - 150*
13C2 PFDA	*102*		*50 - 150*
13C2 PFUnA	*102*		*50 - 150*
13C2 PFDoA	*90*		*50 - 150*
13C2 PFTeDA	*101*		*50 - 150*
13C3 PFBS	*100*		*50 - 150*
18O2 PFHxS	*99*		*50 - 150*
13C4 PFOS	*91*		*50 - 150*
d3-NMeFOSAA	*119*		*50 - 150*
d5-NEtFOSAA	*111*		*50 - 150*
13C3 HFPO-DA	*96*		*50 - 150*

Lab Sample ID: 320-94290-A-1-F MSD
Matrix: Water
Analysis Batch: 635501

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA
Prep Batch: 634646

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)	17		36.1	54.6		ng/L		103	72 - 129	1	30
Perfluoroheptanoic acid (PFHpA)	2.5	B	36.1	38.2		ng/L		99	72 - 130	0	30
Perfluorooctanoic acid (PFOA)	14		36.1	52.2		ng/L		106	71 - 133	1	30
Perfluorononanoic acid (PFNA)	9.3	B	36.1	45.8		ng/L		101	69 - 130	1	30
Perfluorodecanoic acid (PFDA)	11	B	36.1	50.6		ng/L		111	71 - 129	8	30

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: 320-94290-A-1-F MSD
Matrix: Water
Analysis Batch: 635501

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA
Prep Batch: 634646

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluoroundecanoic acid (PFUnA)	1.9		36.1	38.4		ng/L		101	69 - 133	6	30
Perfluorododecanoic acid (PFDoA)	2.4		36.1	43.5		ng/L		114	72 - 134	1	30
Perfluorotridecanoic acid (PFTriA)	ND		36.1	45.9		ng/L		127	65 - 144	7	30
Perfluorotetradecanoic acid (PFTeA)	ND		36.1	37.7		ng/L		104	71 - 132	8	30
Perfluorobutanesulfonic acid (PFBS)	2.2	B	32.1	35.6		ng/L		104	72 - 130	1	30
Perfluorohexanesulfonic acid (PFHxS)	25		32.9	58.4		ng/L		102	68 - 131	3	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		36.1	36.7		ng/L		102	65 - 136	6	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		36.1	35.5		ng/L		98	61 - 135	5	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	0.30	J B	33.7	38.2		ng/L		112	77 - 137	2	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		36.1	36.8		ng/L		102	72 - 132	2	30
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		34.1	37.6		ng/L		110	76 - 136	1	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		34.1	39.9		ng/L		117	81 - 141	3	30

Isotope Dilution	*MSD %Recovery*	*MSD Qualifier*	*Limits*
13C2 PFHxA	*102*		*50 - 150*
13C4 PFHpA	*102*		*50 - 150*
13C4 PFOA	*102*		*50 - 150*
13C5 PFNA	*99*		*50 - 150*
13C2 PFDA	*103*		*50 - 150*
13C2 PFUnA	*107*		*50 - 150*
13C2 PFDoA	*96*		*50 - 150*
13C2 PFTeDA	*103*		*50 - 150*
13C3 PFBS	*102*		*50 - 150*
18O2 PFHxS	*100*		*50 - 150*
13C4 PFOS	*95*		*50 - 150*
d3-NMeFOSAA	*118*		*50 - 150*
d5-NEtFOSAA	*118*		*50 - 150*
13C3 HFPO-DA	*95*		*50 - 150*

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 - DL

Lab Sample ID: 320-94290-A-1-E MS
Matrix: Water
Analysis Batch: 636230

Client Sample ID: Matrix Spike
Prep Type: Total/NA
Prep Batch: 634646

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorooctanesulfonic acid (PFOS) - DL	970		33.6	973	4	ng/L		6	65 - 140

DRAFT FOR PUBLIC COMMENT

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 - DL (Continued)

Isotope Dilution	MS %Recovery	MS Qualifier	Limits
13C4 PFOS - DL	97		50 - 150

Lab Sample ID: 320-94290-A-1-F MSD — **Client Sample ID: Matrix Spike Duplicate**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 636230 — **Prep Batch: 634646**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorooctanesulfonic acid (PFOS) - DL	970		33.6	1040	4	ng/L		202	65 - 140	7	30

Isotope Dilution	MSD %Recovery	MSD Qualifier	Limits
13C4 PFOS - DL	91		50 - 150

Method: D 2216 - Percent Moisture

Lab Sample ID: 320-94316-1 DU — **Client Sample ID: MW-78:2.0**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 632961

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Percent Moisture	20.4		21.1		%		3	20
Percent Solids	79.6		78.9		%		0.8	20

LCMS

Prep Batch: 633024

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-94316-1	MW-78:2.0	Total/NA	Solid	SHAKE	
320-94316-2	MW-78:5.0	Total/NA	Solid	SHAKE	
320-94316-3	MW-78:10.0	Total/NA	Solid	SHAKE	
320-94316-4	MW-77:2.0	Total/NA	Solid	SHAKE	
320-94316-5	MW-77:5.0	Total/NA	Solid	SHAKE	
320-94316-6	MW-77:10.0	Total/NA	Solid	SHAKE	
320-94316-7	MW-101:2.0	Total/NA	Solid	SHAKE	
320-94316-8	MW-79:2.0	Total/NA	Solid	SHAKE	
320-94316-9	MW-79:5.0	Total/NA	Solid	SHAKE	
320-94316-10	MW-79:10.0	Total/NA	Solid	SHAKE	
MB 320-633024/1-A	Method Blank	Total/NA	Solid	SHAKE	
LCS 320-633024/2-A	Lab Control Sample	Total/NA	Solid	SHAKE	
320-94316-10 MS	MW-79:10.0	Total/NA	Solid	SHAKE	
320-94316-10 MSD	MW-79:10.0	Total/NA	Solid	SHAKE	

Prep Batch: 633302

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-94316-11	EB-3-11072022	Total/NA	Water	3535	
MB 320-633302/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-633302/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-633302/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

Analysis Batch: 634142

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-94316-11	EB-3-11072022	Total/NA	Water	EPA 537(Mod)	633302
MB 320-633302/1-A	Method Blank	Total/NA	Water	EPA 537(Mod)	633302
LCS 320-633302/2-A	Lab Control Sample	Total/NA	Water	EPA 537(Mod)	633302
LCSD 320-633302/3-A	Lab Control Sample Dup	Total/NA	Water	EPA 537(Mod)	633302

Prep Batch: 634646

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-94316-12	MW-77-11112022	Total/NA	Water	3535	
320-94316-13	MW-78-11112022	Total/NA	Water	3535	
MB 320-634646/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-634646/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-634646/3-A	Lab Control Sample Dup	Total/NA	Water	3535	
320-94290-A-1-E MS - DL	Matrix Spike	Total/NA	Water	3535	
320-94290-A-1-E MS	Matrix Spike	Total/NA	Water	3535	
320-94290-A-1-F MSD - DL	Matrix Spike Duplicate	Total/NA	Water	3535	
320-94290-A-1-F MSD	Matrix Spike Duplicate	Total/NA	Water	3535	

Analysis Batch: 635501

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-94316-12	MW-77-11112022	Total/NA	Water	EPA 537(Mod)	634646
320-94316-13	MW-78-11112022	Total/NA	Water	EPA 537(Mod)	634646
MB 320-634646/1-A	Method Blank	Total/NA	Water	EPA 537(Mod)	634646
LCS 320-634646/2-A	Lab Control Sample	Total/NA	Water	EPA 537(Mod)	634646
LCSD 320-634646/3-A	Lab Control Sample Dup	Total/NA	Water	EPA 537(Mod)	634646
320-94290-A-1-E MS	Matrix Spike	Total/NA	Water	EPA 537(Mod)	634646
320-94290-A-1-F MSD	Matrix Spike Duplicate	Total/NA	Water	EPA 537(Mod)	634646

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-94316-1

LCMS

Analysis Batch: 636230

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-94290-A-1-E MS - DL	Matrix Spike	Total/NA	Water	EPA 537(Mod)	634646
320-94290-A-1-F MSD - DL	Matrix Spike Duplicate	Total/NA	Water	EPA 537(Mod)	634646

Analysis Batch: 636249

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-94316-1	MW-78:2.0	Total/NA	Solid	EPA 537(Mod)	633024
320-94316-2	MW-78:5.0	Total/NA	Solid	EPA 537(Mod)	633024
320-94316-3	MW-78:10.0	Total/NA	Solid	EPA 537(Mod)	633024
320-94316-4	MW-77:2.0	Total/NA	Solid	EPA 537(Mod)	633024
320-94316-5	MW-77:5.0	Total/NA	Solid	EPA 537(Mod)	633024
320-94316-6	MW-77:10.0	Total/NA	Solid	EPA 537(Mod)	633024
320-94316-7	MW-101:2.0	Total/NA	Solid	EPA 537(Mod)	633024
320-94316-8	MW-79:2.0	Total/NA	Solid	EPA 537(Mod)	633024
320-94316-9	MW-79:5.0	Total/NA	Solid	EPA 537(Mod)	633024
320-94316-10	MW-79:10.0	Total/NA	Solid	EPA 537(Mod)	633024
MB 320-633024/1-A	Method Blank	Total/NA	Solid	EPA 537(Mod)	633024
LCS 320-633024/2-A	Lab Control Sample	Total/NA	Solid	EPA 537(Mod)	633024
320-94316-10 MS	MW-79:10.0	Total/NA	Solid	EPA 537(Mod)	633024
320-94316-10 MSD	MW-79:10.0	Total/NA	Solid	EPA 537(Mod)	633024

General Chemistry

Analysis Batch: 632961

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-94316-1	MW-78:2.0	Total/NA	Solid	D 2216	
320-94316-2	MW-78:5.0	Total/NA	Solid	D 2216	
320-94316-3	MW-78:10.0	Total/NA	Solid	D 2216	
320-94316-4	MW-77:2.0	Total/NA	Solid	D 2216	
320-94316-5	MW-77:5.0	Total/NA	Solid	D 2216	
320-94316-6	MW-77:10.0	Total/NA	Solid	D 2216	
320-94316-7	MW-101:2.0	Total/NA	Solid	D 2216	
320-94316-8	MW-79:2.0	Total/NA	Solid	D 2216	
320-94316-9	MW-79:5.0	Total/NA	Solid	D 2216	
320-94316-10	MW-79:10.0	Total/NA	Solid	D 2216	
320-94316-1 DU	MW-78:2.0	Total/NA	Solid	D 2216	

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-94316-1

Client Sample ID: MW-78:2.0
Date Collected: 11/04/22 09:00
Date Received: 11/12/22 08:55

Lab Sample ID: 320-94316-1
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			632961	11/14/22 16:52	TCS	EET SAC

Client Sample ID: MW-78:2.0
Date Collected: 11/04/22 09:00
Date Received: 11/12/22 08:55

Lab Sample ID: 320-94316-1
Matrix: Solid
Percent Solids: 79.6

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.53 g	10.0 mL	633024	11/14/22 19:37	AM	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	636249	11/29/22 02:53	K1S	EET SAC

Client Sample ID: MW-78:5.0
Date Collected: 11/04/22 09:09
Date Received: 11/12/22 08:55

Lab Sample ID: 320-94316-2
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			632961	11/14/22 16:52	TCS	EET SAC

Client Sample ID: MW-78:5.0
Date Collected: 11/04/22 09:09
Date Received: 11/12/22 08:55

Lab Sample ID: 320-94316-2
Matrix: Solid
Percent Solids: 59.6

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.35 g	10.0 mL	633024	11/14/22 19:37	AM	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	636249	11/29/22 03:03	K1S	EET SAC

Client Sample ID: MW-78:10.0
Date Collected: 11/04/22 09:15
Date Received: 11/12/22 08:55

Lab Sample ID: 320-94316-3
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			632961	11/14/22 16:52	TCS	EET SAC

Client Sample ID: MW-78:10.0
Date Collected: 11/04/22 09:15
Date Received: 11/12/22 08:55

Lab Sample ID: 320-94316-3
Matrix: Solid
Percent Solids: 66.7

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.24 g	10.0 mL	633024	11/14/22 19:37	AM	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	636249	11/29/22 03:13	K1S	EET SAC

Client Sample ID: MW-77:2.0
Date Collected: 11/04/22 11:20
Date Received: 11/12/22 08:55

Lab Sample ID: 320-94316-4
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			632961	11/14/22 16:52	TCS	EET SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-94316-1

Client Sample ID: MW-77:2.0
Lab Sample ID: 320-94316-4
Date Collected: 11/04/22 11:20
Matrix: Solid
Date Received: 11/12/22 08:55
Percent Solids: 85.9

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.20 g	10.0 mL	633024	11/14/22 19:37	AM	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	636249	11/29/22 03:23	K1S	EET SAC

Client Sample ID: MW-77:5.0
Lab Sample ID: 320-94316-5
Date Collected: 11/04/22 11:25
Matrix: Solid
Date Received: 11/12/22 08:55

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			632961	11/14/22 16:52	TCS	EET SAC

Client Sample ID: MW-77:5.0
Lab Sample ID: 320-94316-5
Date Collected: 11/04/22 11:25
Matrix: Solid
Date Received: 11/12/22 08:55
Percent Solids: 90.9

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.08 g	10.0 mL	633024	11/14/22 19:37	AM	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	636249	11/29/22 03:34	K1S	EET SAC

Client Sample ID: MW-77:10.0
Lab Sample ID: 320-94316-6
Date Collected: 11/04/22 11:30
Matrix: Solid
Date Received: 11/12/22 08:55

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			632961	11/14/22 16:52	TCS	EET SAC

Client Sample ID: MW-77:10.0
Lab Sample ID: 320-94316-6
Date Collected: 11/04/22 11:30
Matrix: Solid
Date Received: 11/12/22 08:55
Percent Solids: 84.0

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.33 g	10.0 mL	633024	11/14/22 19:37	AM	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	636249	11/29/22 03:44	K1S	EET SAC

Client Sample ID: MW-101:2.0
Lab Sample ID: 320-94316-7
Date Collected: 11/04/22 16:00
Matrix: Solid
Date Received: 11/12/22 08:55

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			632961	11/14/22 16:52	TCS	EET SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-94316-1

Client Sample ID: MW-101:2.0
Lab Sample ID: 320-94316-7
Date Collected: 11/04/22 16:00
Matrix: Solid
Date Received: 11/12/22 08:55
Percent Solids: 91.7

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.48 g	10.0 mL	633024	11/14/22 19:37	AM	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	636249	11/29/22 03:54	K1S	EET SAC

Client Sample ID: MW-79:2.0
Lab Sample ID: 320-94316-8
Date Collected: 11/07/22 08:44
Matrix: Solid
Date Received: 11/12/22 08:55

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			632961	11/14/22 16:52	TCS	EET SAC

Client Sample ID: MW-79:2.0
Lab Sample ID: 320-94316-8
Date Collected: 11/07/22 08:44
Matrix: Solid
Date Received: 11/12/22 08:55
Percent Solids: 70.2

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.17 g	10.0 mL	633024	11/14/22 19:37	AM	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	636249	11/29/22 04:04	K1S	EET SAC

Client Sample ID: MW-79:5.0
Lab Sample ID: 320-94316-9
Date Collected: 11/07/22 08:48
Matrix: Solid
Date Received: 11/12/22 08:55

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			632961	11/14/22 16:52	TCS	EET SAC

Client Sample ID: MW-79:5.0
Lab Sample ID: 320-94316-9
Date Collected: 11/07/22 08:48
Matrix: Solid
Date Received: 11/12/22 08:55
Percent Solids: 93.8

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.13 g	10.0 mL	633024	11/14/22 19:37	AM	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	636249	11/29/22 04:14	K1S	EET SAC

Client Sample ID: MW-79:10.0
Lab Sample ID: 320-94316-10
Date Collected: 11/07/22 08:55
Matrix: Solid
Date Received: 11/12/22 08:55

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			632961	11/14/22 16:52	TCS	EET SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-94316-1

Client Sample ID: MW-79:10.0

Lab Sample ID: 320-94316-10
Date Collected: 11/07/22 08:55
Matrix: Solid
Date Received: 11/12/22 08:55
Percent Solids: 71.4

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.18 g	10.0 mL	633024	11/14/22 19:37	AM	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	636249	11/29/22 04:45	K1S	EET SAC

Client Sample ID: EB-3-11072022

Lab Sample ID: 320-94316-11
Date Collected: 11/07/22 10:00
Matrix: Water
Date Received: 11/12/22 08:55

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			277.1 mL	10.0 mL	633302	11/16/22 05:56	EFG	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	634142	11/18/22 20:40	K1S	EET SAC

Client Sample ID: MW-77-11112022

Lab Sample ID: 320-94316-12
Date Collected: 11/11/22 11:40
Matrix: Water
Date Received: 11/12/22 08:55

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			50.0 mL	10.0 mL	634646	11/22/22 05:11	EFG	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	635501	11/27/22 03:13	S1M	EET SAC

Client Sample ID: MW-78-11112022

Lab Sample ID: 320-94316-13
Date Collected: 11/11/22 13:55
Matrix: Water
Date Received: 11/12/22 08:55

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			267.5 mL	10.0 mL	634646	11/22/22 05:33	EFG	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	635501	11/27/22 03:23	S1M	EET SAC

Laboratory References:

EET SAC = Eurofins Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-94316-1

Laboratory: Eurofins Sacramento

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	17-020	02-20-24

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
D 2216		Solid	Percent Moisture
D 2216		Solid	Percent Solids

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-94316-1

Method	Method Description	Protocol	Laboratory
EPA 537(Mod)	PFAS for QSM 5.3, Table B-15	EPA	EET SAC
D 2216	Percent Moisture	ASTM	EET SAC
3535	Solid-Phase Extraction (SPE)	SW846	EET SAC
SHAKE	Shake Extraction with Ultrasonic Bath Extraction	SW846	EET SAC

Protocol References:

ASTM = ASTM International

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

EET SAC = Eurofins Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

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Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-94316-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-94316-1	MW-78:2.0	Solid	11/04/22 09:00	11/12/22 08:55
320-94316-2	MW-78:5.0	Solid	11/04/22 09:09	11/12/22 08:55
320-94316-3	MW-78:10.0	Solid	11/04/22 09:15	11/12/22 08:55
320-94316-4	MW-77:2.0	Solid	11/04/22 11:20	11/12/22 08:55
320-94316-5	MW-77:5.0	Solid	11/04/22 11:25	11/12/22 08:55
320-94316-6	MW-77:10.0	Solid	11/04/22 11:30	11/12/22 08:55
320-94316-7	MW-101:2.0	Solid	11/04/22 16:00	11/12/22 08:55
320-94316-8	MW-79:2.0	Solid	11/07/22 08:44	11/12/22 08:55
320-94316-9	MW-79:5.0	Solid	11/07/22 08:48	11/12/22 08:55
320-94316-10	MW-79:10.0	Solid	11/07/22 08:55	11/12/22 08:55
320-94316-11	EB-3-11072022	Water	11/07/22 10:00	11/12/22 08:55
320-94316-12	MW-77-11112022	Water	11/11/22 11:40	11/12/22 08:55
320-94316-13	MW-78-11112022	Water	11/11/22 13:55	11/12/22 08:55

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Chain of Custody Record

606454 eurofins | Environment Testing TestAmerica

Address: _____

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☒ Other: WA State Dept Ecology

TAL-8210

Client Contact	Project Manager: Ryan Peterson	Site Contact: Shoshana Howard	Date: ~~11/2~~ 11/11/22	COC No:
Company Name: Shannon & Wilson	Tel/Email: 206-695-6811	Lab Contact: David Alltucker	Carrier:	1 of 2 COCs
Address: 400 N. 34th St Suite 100	Analysis Turnaround Time			Sampler: Ryan Peterson
City/State/Zip: Seattle, WA 98103	☐ CALENDAR DAYS ☐ WORKING DAYS			For Lab Use Only:
Phone:	TAT if different from Below			Walk-in Client:
Fax:	☐ 2 weeks ☐ 1 week ☐ 2 days ☐ 1 day — Standard			Lab Sampling:
Project Name: EMJ				Job / SDG No.:
Site:				
PO # 21-1-12596				

320-94316 Chain of Custody

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	PFAS 18 Analytes (537.1 Mod)	Sample Specific Notes:
MW-78:2.0	11/4/22	0900	G	S	1			X	
MW-78:5.0		0909			1			X	
MW-78:10.0		0915			1			X	
MW-77:2.0		1120			1			X	
MW-77:5.0		1125			1			X	
MW-77:10.0		1130			1			X	
MW-101:2.0		1600			1			X	
MW-79:2.0	11/7/22	0844			1			X	
MW-79:5.0		0848			1			X	
MW-79:10.0		0855			1			X	
EB-3-11072022		1000		W	2	N	N	X	
MW-77-11112022	11/11/22	1140		W	2	N	N	X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☒ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☒ Disposal by Lab ☐ Archive for _____ Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No	Custody Seal No.: 1848677	Cooler Temp. (°C): Obs'd: 1.0	Corr'd: 1.0	Therm ID No.: 1-10

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Ryan Peterson	SHN	11/11/22 1600		[illegible]	11-10-22 0855
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

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Chain of Custody Record

606455 eurofins | Environment Testing TestAmerica

Address: _____

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☒ Other: WA State Dept Ecology

TAL-8210

Client Contact	Project Manager: Shoshana Howard	Site Contact: Ryan Peterson	Date: 11/11/22	COC No:
Company Name: Shannon & Wilson	Tel/Email: 206-695-6811	Lab Contact: David Alltucker	Carrier:	2 of 2 COCs
Address: 400 N. 34th St., Suite 100	Analysis Turnaround Time			Sampler: Ryan Peterson
City/State/Zip: Seattle, WA 98103	☐ CALENDAR DAYS ☐ WORKING DAYS			For Lab Use Only:
Phone:	TAT if different from Below			Walk-in Client:
Fax:	☐ 2 weeks ☐ 1 week ☐ 2 days ☐ 1 day (Standard)			Lab Sampling:
Project Name: EMS				Job / SDG No.:
Site:				
P O # 21-1-12596				

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	PFAS 18 Analytes 537.1 Mod	Sample Specific Notes:
MW-78-11112022	11/11/22	1355	G	W	2	N	N	X	
~~MW-79-11112022~~	~~11/11/22~~		G	W	2 RBP	N	N	X 11/11/2022	NO

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☒ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☒ Disposal by Lab ☐ Archive for _____ Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No	Custody Seal No.: 1848677	Cooler Temp. (°C): Obs'd: 1.0	Corr'd: 1.0	Therm ID No.: 210

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
RYAN PETERSON	S&W	11/11/22 1605		BSRC	11.10.22 855
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

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Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-94316-1

Login Number: 94316
List Number: 1
Creator: Oropeza, Salvador

List Source: Eurofins Sacramento

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	1848677
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

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1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

ANALYTICAL REPORT

PREPARED FOR

Attn: Shoshana Howard
Shannon & Wilson, Inc
400 N. 34th Suite 100
PO BOX 300303
Seattle, Washington 98103

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JOB DESCRIPTION

EMJ

JOB NUMBER

320-94486-1

Eurofins Sacramento
880 Riverside Parkway
West Sacramento CA 95605

See page two for job notes and contact information.

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Job Notes

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The data in the report relate to the field sample(s) as received by the laboratory and associated QC. All results have been reviewed and have been found to be compliant with laboratory and accreditation requirements, with the exception of the noted deviation(s). For questions, please contact the Project Manager.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing Northern California, LLC Project Manager.

Authorization



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Authorized for release by
David Alltucker, Project Manager I
David.Alltucker@et.eurofinsus.com
(916)374-4383

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Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-94486-1

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Case Narrative

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-94486-1

Job ID: 320-94486-1

Laboratory: Eurofins Sacramento

Narrative

Job Narrative
320-94486-1

Receipt
The sample was received on 11/17/2022 9:35 AM. Unless otherwise noted below, the sample arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 2.1º C.

LCMS
Method EPA 537(Mod): Results for samples MW-79-11162022 (320-94486-1) were reported from the analysis of a diluted extract due to high concentration of the target analyte in the analysis of the undiluted extract. The dilution factor was applied to the labeled internal standard area counts and these area counts were within acceptance limits.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Organic Prep
Method 3535: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-635838.

Method 3535: The following samples in preparation batch 320-635838 were observed to have a thin layer of sediment present in the bottom of the bottle prior to extraction. MW-79-11162022 (320-94486-1)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-94486-1

Client Sample ID: MW-79-11162022

Lab Sample ID: 320-94486-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	200		1.8	0.54	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	41		1.8	0.23	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	41		1.8	0.79	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	2.2		1.8	0.25	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	100		1.8	0.18	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS) - DL	790		9.2	2.6	ng/L	5		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	990		9.2	2.5	ng/L	5		EPA 537(Mod)	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-94486-1

Client Sample ID: MW-79-11162022

Date Collected: 11/16/22 12:20
Date Received: 11/17/22 09:35

Lab Sample ID: 320-94486-1

Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**200**		1.8	0.54	ng/L		11/29/22 05:21	12/02/22 05:46	1
Perfluoroheptanoic acid (PFHpA)	**41**		1.8	0.23	ng/L		11/29/22 05:21	12/02/22 05:46	1
Perfluorooctanoic acid (PFOA)	**41**		1.8	0.79	ng/L		11/29/22 05:21	12/02/22 05:46	1
Perfluorononanoic acid (PFNA)	**2.2**		1.8	0.25	ng/L		11/29/22 05:21	12/02/22 05:46	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.29	ng/L		11/29/22 05:21	12/02/22 05:46	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	1.0	ng/L		11/29/22 05:21	12/02/22 05:46	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.51	ng/L		11/29/22 05:21	12/02/22 05:46	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		11/29/22 05:21	12/02/22 05:46	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.67	ng/L		11/29/22 05:21	12/02/22 05:46	1
Perfluorobutanesulfonic acid (PFBS)	**100**		1.8	0.18	ng/L		11/29/22 05:21	12/02/22 05:46	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.6	1.1	ng/L		11/29/22 05:21	12/02/22 05:46	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.6	1.2	ng/L		11/29/22 05:21	12/02/22 05:46	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		11/29/22 05:21	12/02/22 05:46	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.7	1.4	ng/L		11/29/22 05:21	12/02/22 05:46	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.30	ng/L		11/29/22 05:21	12/02/22 05:46	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.37	ng/L		11/29/22 05:21	12/02/22 05:46	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*97*		*50 - 150*	*11/29/22 05:21*	*12/02/22 05:46*	*1*
13C4 PFHpA	*97*		*50 - 150*	*11/29/22 05:21*	*12/02/22 05:46*	*1*
13C4 PFOA	*100*		*50 - 150*	*11/29/22 05:21*	*12/02/22 05:46*	*1*
13C5 PFNA	*90*		*50 - 150*	*11/29/22 05:21*	*12/02/22 05:46*	*1*
13C2 PFDA	*100*		*50 - 150*	*11/29/22 05:21*	*12/02/22 05:46*	*1*
13C2 PFUnA	*100*		*50 - 150*	*11/29/22 05:21*	*12/02/22 05:46*	*1*
13C2 PFDoA	*92*		*50 - 150*	*11/29/22 05:21*	*12/02/22 05:46*	*1*
13C2 PFTeDA	*97*		*50 - 150*	*11/29/22 05:21*	*12/02/22 05:46*	*1*
13C3 PFBS	*91*		*50 - 150*	*11/29/22 05:21*	*12/02/22 05:46*	*1*
13C4 PFOS	*91*		*50 - 150*	*11/29/22 05:21*	*12/02/22 05:46*	*1*
d3-NMeFOSAA	*108*		*50 - 150*	*11/29/22 05:21*	*12/02/22 05:46*	*1*
d5-NEtFOSAA	*109*		*50 - 150*	*11/29/22 05:21*	*12/02/22 05:46*	*1*
13C3 HFPO-DA	*89*		*50 - 150*	*11/29/22 05:21*	*12/02/22 05:46*	*1*

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanesulfonic acid (PFHxS)	**790**		9.2	2.6	ng/L		11/29/22 05:21	12/03/22 11:57	5
Perfluorooctanesulfonic acid (PFOS)	**990**		9.2	2.5	ng/L		11/29/22 05:21	12/03/22 11:57	5

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*94*		*50 - 150*	*11/29/22 05:21*	*12/03/22 11:57*	*5*
13C4 PFOS	*84*		*50 - 150*	*11/29/22 05:21*	*12/03/22 11:57*	*5*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-94486-1

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Matrix: Water

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)							
		PFHxA	C4PFHA	PFOA	PFNA	PFDA	PFUnA	PFDoA	PFTDA
Lab Sample ID	Client Sample ID	(50-150)	(50-150)	(50-150)	(50-150)	(50-150)	(50-150)	(50-150)	(50-150)
LCS 320-635838/2-A	Lab Control Sample	97	89	95	92	96	98	90	94
LCSD 320-635838/3-A	Lab Control Sample Dup	94	99	94	88	94	95	86	90
MB 320-635838/1-A	Method Blank	99	96	99	95	101	96	87	85

		Percent Isotope Dilution Recovery (Acceptance Limits)							
		C3PFBS	PFHxS	PFOS	d3NMFOS	d5NEFOS	HFPODA		
Lab Sample ID	Client Sample ID	(50-150)	(50-150)	(50-150)	(50-150)	(50-150)	(50-150)		
LCS 320-635838/2-A	Lab Control Sample	93	96	92	106	101	89		
LCSD 320-635838/3-A	Lab Control Sample Dup	95	96	90	102	100	91		
MB 320-635838/1-A	Method Blank	98	101	94	104	89	91		

Surrogate Legend

PFHxA = 13C2 PFHxA
C4PFHA = 13C4 PFHpA
PFOA = 13C4 PFOA
PFNA = 13C5 PFNA
PFDA = 13C2 PFDA
PFUnA = 13C2 PFUnA
PFDoA = 13C2 PFDoA
PFTDA = 13C2 PFTeDA
C3PFBS = 13C3 PFBS
PFHxS = 18O2 PFHxS
PFOS = 13C4 PFOS
d3NMFOS = d3-NMeFOSAA
d5NEFOS = d5-NEtFOSAA
HFPODA = 13C3 HFPO-DA

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Lab Sample ID: MB 320-635838/1-A
Matrix: Water
Analysis Batch: 636783

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 635838

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		11/29/22 05:21	12/02/22 03:15	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		11/29/22 05:21	12/02/22 03:15	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		11/29/22 05:21	12/02/22 03:15	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		11/29/22 05:21	12/02/22 03:15	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		11/29/22 05:21	12/02/22 03:15	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		11/29/22 05:21	12/02/22 03:15	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		11/29/22 05:21	12/02/22 03:15	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		11/29/22 05:21	12/02/22 03:15	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.73	ng/L		11/29/22 05:21	12/02/22 03:15	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		11/29/22 05:21	12/02/22 03:15	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.57	ng/L		11/29/22 05:21	12/02/22 03:15	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		11/29/22 05:21	12/02/22 03:15	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		5.0	1.2	ng/L		11/29/22 05:21	12/02/22 03:15	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		5.0	1.3	ng/L		11/29/22 05:21	12/02/22 03:15	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.0	0.24	ng/L		11/29/22 05:21	12/02/22 03:15	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		4.0	1.5	ng/L		11/29/22 05:21	12/02/22 03:15	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.0	0.32	ng/L		11/29/22 05:21	12/02/22 03:15	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.40	ng/L		11/29/22 05:21	12/02/22 03:15	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*99*		*50 - 150*	*11/29/22 05:21*	*12/02/22 03:15*	*1*
13C4 PFHpA	*96*		*50 - 150*	*11/29/22 05:21*	*12/02/22 03:15*	*1*
13C4 PFOA	*99*		*50 - 150*	*11/29/22 05:21*	*12/02/22 03:15*	*1*
13C5 PFNA	*95*		*50 - 150*	*11/29/22 05:21*	*12/02/22 03:15*	*1*
13C2 PFDA	*101*		*50 - 150*	*11/29/22 05:21*	*12/02/22 03:15*	*1*
13C2 PFUnA	*96*		*50 - 150*	*11/29/22 05:21*	*12/02/22 03:15*	*1*
13C2 PFDoA	*87*		*50 - 150*	*11/29/22 05:21*	*12/02/22 03:15*	*1*
13C2 PFTeDA	*85*		*50 - 150*	*11/29/22 05:21*	*12/02/22 03:15*	*1*
13C3 PFBS	*98*		*50 - 150*	*11/29/22 05:21*	*12/02/22 03:15*	*1*
18O2 PFHxS	*101*		*50 - 150*	*11/29/22 05:21*	*12/02/22 03:15*	*1*
13C4 PFOS	*94*		*50 - 150*	*11/29/22 05:21*	*12/02/22 03:15*	*1*
d3-NMeFOSAA	*104*		*50 - 150*	*11/29/22 05:21*	*12/02/22 03:15*	*1*
d5-NEtFOSAA	*89*		*50 - 150*	*11/29/22 05:21*	*12/02/22 03:15*	*1*
13C3 HFPO-DA	*91*		*50 - 150*	*11/29/22 05:21*	*12/02/22 03:15*	*1*

Lab Sample ID: LCS 320-635838/2-A
Matrix: Water
Analysis Batch: 636783

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 635838

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorohexanoic acid (PFHxA)	40.0	40.9		ng/L		102	72 - 129
Perfluoroheptanoic acid (PFHpA)	40.0	43.0		ng/L		107	72 - 130
Perfluorooctanoic acid (PFOA)	40.0	43.3		ng/L		108	71 - 133
Perfluorononanoic acid (PFNA)	40.0	42.1		ng/L		105	69 - 130

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: LCS 320-635838/2-A
Matrix: Water
Analysis Batch: 636783

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 635838

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorodecanoic acid (PFDA)	40.0	40.0		ng/L		100	71 - 129
Perfluoroundecanoic acid (PFUnA)	40.0	43.3		ng/L		108	69 - 133
Perfluorododecanoic acid (PFDoA)	40.0	49.0		ng/L		122	72 - 134
Perfluorotridecanoic acid (PFTriA)	40.0	45.5		ng/L		114	65 - 144
Perfluorotetradecanoic acid (PFTeA)	40.0	41.7		ng/L		104	71 - 132
Perfluorobutanesulfonic acid (PFBS)	35.5	37.3		ng/L		105	72 - 130
Perfluorohexanesulfonic acid (PFHxS)	36.5	36.7		ng/L		101	68 - 131
Perfluorooctanesulfonic acid (PFOS)	37.2	39.1		ng/L		105	65 - 140
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	40.0	45.7		ng/L		114	65 - 136
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	40.0	40.6		ng/L		102	61 - 135
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	37.4	40.6		ng/L		109	77 - 137
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	40.0	39.6		ng/L		99	72 - 132
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	37.8	45.0		ng/L		119	76 - 136
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.8	44.8		ng/L		119	81 - 141

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*97*		*50 - 150*
13C4 PFHpA	*89*		*50 - 150*
13C4 PFOA	*95*		*50 - 150*
13C5 PFNA	*92*		*50 - 150*
13C2 PFDA	*96*		*50 - 150*
13C2 PFUnA	*98*		*50 - 150*
13C2 PFDoA	*90*		*50 - 150*
13C2 PFTeDA	*94*		*50 - 150*
13C3 PFBS	*93*		*50 - 150*
18O2 PFHxS	*96*		*50 - 150*
13C4 PFOS	*92*		*50 - 150*
d3-NMeFOSAA	*106*		*50 - 150*
d5-NEtFOSAA	*101*		*50 - 150*
13C3 HFPO-DA	*89*		*50 - 150*

Lab Sample ID: LCSD 320-635838/3-A
Matrix: Water
Analysis Batch: 636783

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 635838

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)	40.0	40.9		ng/L		102	72 - 129	0	30
Perfluoroheptanoic acid (PFHpA)	40.0	41.9		ng/L		105	72 - 130	3	30
Perfluorooctanoic acid (PFOA)	40.0	43.5		ng/L		109	71 - 133	0	30

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: LCSD 320-635838/3-A
Matrix: Water
Analysis Batch: 636783

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 635838

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorononanoic acid (PFNA)			40.0	45.7		ng/L		114	69 - 130	8	30
Perfluorodecanoic acid (PFDA)			40.0	41.2		ng/L		103	71 - 129	3	30
Perfluoroundecanoic acid (PFUnA)			40.0	44.4		ng/L		111	69 - 133	2	30
Perfluorododecanoic acid (PFDoA)			40.0	48.7		ng/L		122	72 - 134	1	30
Perfluorotridecanoic acid (PFTriA)			40.0	45.0		ng/L		113	65 - 144	1	30
Perfluorotetradecanoic acid (PFTeA)			40.0	42.6		ng/L		107	71 - 132	2	30
Perfluorobutanesulfonic acid (PFBS)			35.5	38.7		ng/L		109	72 - 130	4	30
Perfluorohexanesulfonic acid (PFHxS)			36.5	36.8		ng/L		101	68 - 131	0	30
Perfluorooctanesulfonic acid (PFOS)			37.2	41.2		ng/L		111	65 - 140	5	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)			40.0	45.4		ng/L		113	65 - 136	1	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)			40.0	41.9		ng/L		105	61 - 135	3	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid			37.4	41.9		ng/L		112	77 - 137	3	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)			40.0	40.1		ng/L		100	72 - 132	1	30
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid			37.8	44.7		ng/L		118	76 - 136	1	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			37.8	46.8		ng/L		124	81 - 141	4	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFHxA	*94*		*50 - 150*
13C4 PFHpA	*99*		*50 - 150*
13C4 PFOA	*94*		*50 - 150*
13C5 PFNA	*88*		*50 - 150*
13C2 PFDA	*94*		*50 - 150*
13C2 PFUnA	*95*		*50 - 150*
13C2 PFDoA	*86*		*50 - 150*
13C2 PFTeDA	*90*		*50 - 150*
13C3 PFBS	*95*		*50 - 150*
18O2 PFHxS	*96*		*50 - 150*
13C4 PFOS	*90*		*50 - 150*
d3-NMeFOSAA	*102*		*50 - 150*
d5-NEtFOSAA	*100*		*50 - 150*
13C3 HFPO-DA	*91*		*50 - 150*

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-94486-1

LCMS

Prep Batch: 635838

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-94486-1	MW-79-11162022	Total/NA	Water	3535	
320-94486-1 - DL	MW-79-11162022	Total/NA	Water	3535	
MB 320-635838/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-635838/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-635838/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

Analysis Batch: 636783

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-94486-1	MW-79-11162022	Total/NA	Water	EPA 537(Mod)	635838
MB 320-635838/1-A	Method Blank	Total/NA	Water	EPA 537(Mod)	635838
LCS 320-635838/2-A	Lab Control Sample	Total/NA	Water	EPA 537(Mod)	635838
LCSD 320-635838/3-A	Lab Control Sample Dup	Total/NA	Water	EPA 537(Mod)	635838

Analysis Batch: 637026

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-94486-1 - DL	MW-79-11162022	Total/NA	Water	EPA 537(Mod)	635838

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-94486-1

Client Sample ID: MW-79-11162022

Date Collected: 11/16/22 12:20
Date Received: 11/17/22 09:35

Lab Sample ID: 320-94486-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			270.5 mL	10.0 mL	635838	11/29/22 05:21	RLT	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	636783	12/02/22 05:46	RS1	EET SAC
Total/NA	Prep	3535	DL		270.5 mL	10.0 mL	635838	11/29/22 05:21	RLT	EET SAC
Total/NA	Analysis	EPA 537(Mod)	DL	5	1 mL	1 mL	637026	12/03/22 11:57	S1M	EET SAC

Laboratory References:

EET SAC = Eurofins Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-94486-1

Laboratory: Eurofins Sacramento

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	17-020	02-20-24

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Method Summary

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-94486-1

Method	Method Description	Protocol	Laboratory
EPA 537(Mod)	PFAS for QSM 5.3, Table B-15	EPA	EET SAC
3535	Solid-Phase Extraction (SPE)	SW846	EET SAC

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

EET SAC = Eurofins Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

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Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-94486-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-94486-1	MW-79-11162022	Water	11/16/22 12:20	11/17/22 09:35

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Chain of Custody Record

606456

eurofins | Environment Testing TestAmerica

Address: _____

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☒ Other: WA State Dept of Ecology

TAL-8210

Client Contact	Project Manager: Shoshana Howard	Site Contact: Ryan Peterson	Date: 11/16/22	COC No:
Company Name: Shannon & Wilson	Tel/Email: 206-695-6811	Lab Contact: David Alltucker	Carrier:	1 of 1 COCs
Address: 400 N. 34th St, Suite 100	Analysis Turnaround Time			Sampler: Ryan Peterson
City/State/Zip: Seattle, WA 98103	☐ CALENDAR DAYS ☐ WORKING DAYS			For Lab Use Only:
Phone:	TAT if different from Below _____			Walk-in Client:
Fax:	☐ 2 weeks ☐ 1 week (Standard) ☐ 2 days ☐ 1 day			Lab Sampling:
Project Name: EMJ				Job / SDG No.:
Site:				
PO# 21-1-12596-025				

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS/MSD (Y/N)	PFAS, 18 Analytes, SS21 mod	Sample Specific Notes:
MW-79-11162022	11/16/22	1220	G	W	2	N	N	X	

320-94486 Chain of Custody

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☒ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☒ Disposal by Lab ☐ Archive for _____ Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No	Custody Seal No.: 1838231	Cooler Temp. (°C): Obs'd: 2.1	Corr'd: 2.1	Therm ID No.: 4-03

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
RYAN PETERSON	Shannon & Wilson	11/16/22			11/17/22 955
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

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Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-94486-1

Login Number: 94486
List Number: 1
Creator: Maldonado, Letzi A

List Source: Eurofins Sacramento

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	1838231
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

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ANALYTICAL REPORT

PREPARED FOR

Attn: Shoshana Howard
Shannon & Wilson, Inc
400 N. 34th Suite 100
PO BOX 300303
Seattle, Washington 98103

Generated 2/3/2023 10:21:03 AM

JOB DESCRIPTION

LDW

JOB NUMBER

320-95531-1

Eurofins Sacramento
880 Riverside Parkway
West Sacramento CA 95605

See page two for job notes and contact information.

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Job Notes

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The data in the report relate to the field sample(s) as received by the laboratory and associated QC. All results have been reviewed and have been found to be compliant with laboratory and accreditation requirements, with the exception of the noted deviation(s). For questions, please contact the Project Manager.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing Northern California, LLC Project Manager.

Authorization



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Authorized for release by
David Alltucker, Project Manager I
David.Alltucker@et.eurofinsus.com
(916)374-4383

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Qualifiers

LCMS

Qualifier	Qualifier Description
*5+	Isotope dilution analyte is outside acceptance limits, high biased.
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.
F1	MS and/or MSD recovery exceeds control limits.
I	Value is EMPC (estimated maximum possible concentration).
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Job ID: 320-95531-1

Laboratory: Eurofins Sacramento

Narrative

Job Narrative
320-95531-1

Receipt
The samples were received on 12/22/2022 9:50 AM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 4.4º C.

LCMS
Method EPA 537(Mod): The "I" qualifier means the transition mass ratio for the indicated analyte was above the established ratio limits. The qualitative identification of the analyte has some degree of uncertainty, and the reported value may have some high bias. However, analyst judgment was used to positively identify the analyte. SB-2022-002:2.0-12202022 (320-95531-4) and SB-2022-003:5.0-12202022 (320-95531-8)

Method EPA 537(Mod): The "I" qualifier means the transition mass ratio for the indicated analyte was below the established ratio limits. The qualitative identification of the analyte has some degree of uncertainty. However, analyst judgment was used to positively identify the analyte. SB-2022-003:5.0-12202022 (320-95531-8)

Method EPA 537(Mod): Isotope Dilution Analyte (IDA) recovery is above the method recommended limit for the following sample: SB-2022-001:1.5-12202022 (320-95531-1). Quantitation by isotope dilution generally precludes any adverse effect on data quality due to elevated IDA recoveries.

Method EPA 537(Mod): Results for samples SB-2022-001:6.0-12202022 (320-95531-2) and SB-2022-002:4.5-12202022 (320-95531-5) were reported from the analysis of a diluted extract due to high concentration of the target analyte in the analysis of the undiluted extract. The dilution factor was applied to the labeled internal standard area counts and these area counts were within acceptance limits

Method EPA 537(Mod): Results for samples SB-2022-002:8.0-12202022 (320-95531-6), SB-2022-003:8.5-12202022 (320-95531-9), SB-2022-100:4.5-12202022 (320-95531-10), (320-95531-A-10-B MS) and (320-95531-A-10-C MSD) were reported from the analysis of a diluted extract due to high concentration of the target analyte in the analysis of the undiluted extract. The dilution factor was applied to the labeled internal standard area counts and these area counts were within acceptance limits

Method EPA 537(Mod): The matrix spike duplicate (MSD) recoveries for Perfluorohexanesulfonic acid (PFHxS) of preparation batch 320-644098 and analytical batch 320-650197 were outside control limits. Sample matrix interference is suspected because the associated laboratory control sample (LCS) recovery was within acceptance limits.

Method EPA 537(Mod): Due to the high concentration of Perfluorooctanesulfonic acid (PFOS), the matrix spike / matrix spike duplicate (MS/MSD) for preparation batch 320-644098 and analytical batch 320-650927 could not be evaluated for accuracy and precision. The associated laboratory control sample (LCS) met acceptance criteria.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

General Chemistry
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Organic Prep
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

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Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: LDW

Job ID: 320-95531-1

Client Sample ID: SB-2022-001:1.5-12202022 — Lab Sample ID: 320-95531-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	0.058	J	0.21	0.032	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	0.12	J	0.21	0.030	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	0.063	J	0.21	0.045	ug/Kg	1	☼	EPA 537(Mod)	Total/NA

Client Sample ID: SB-2022-001:6.0-12202022 — Lab Sample ID: 320-95531-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	0.060	J	0.20	0.031	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	0.22		0.20	0.053	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	1.1		0.20	0.029	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	88		2.0	0.43	ug/Kg	10	☼	EPA 537(Mod)	Total/NA

Client Sample ID: SB-2022-001:10.0-12202022 — Lab Sample ID: 320-95531-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	0.20	J	0.24	0.037	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.073	J	0.24	0.045	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	0.065	J	0.24	0.063	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	0.43		0.24	0.034	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	18		0.24	0.051	ug/Kg	1	☼	EPA 537(Mod)	Total/NA

Client Sample ID: SB-2022-002:2.0-12202022 — Lab Sample ID: 320-95531-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	0.62		0.19	0.030	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.49		0.19	0.036	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	0.50		0.19	0.051	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	1.6		0.19	0.028	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	4.1	I	0.19	0.041	ug/Kg	1	☼	EPA 537(Mod)	Total/NA

Client Sample ID: SB-2022-002:4.5-12202022 — Lab Sample ID: 320-95531-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	0.67		0.21	0.032	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.42		0.21	0.040	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	2.3		0.21	0.055	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	0.044	J	0.21	0.023	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	13		0.21	0.030	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	0.025	J	0.21	0.024	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	0.050	J	0.21	0.050	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	370		10	2.2	ug/Kg	50	☼	EPA 537(Mod)	Total/NA

Client Sample ID: SB-2022-002:8.0-12202022 — Lab Sample ID: 320-95531-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	3.5		0.22	0.035	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.7		0.22	0.042	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	2.0		0.22	0.059	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	0.11	J	0.22	0.025	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.45		0.22	0.042	ug/Kg	1	☼	EPA 537(Mod)	Total/NA

This Detection Summary does not include radiochemical test results.

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Client Sample ID: SB-2022-002:8.0-12202022 (Continued) — Lab Sample ID: 320-95531-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	11		0.22	0.032	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	200		4.5	0.96	ug/Kg	20	☼	EPA 537(Mod)	Total/NA

Client Sample ID: SB-2022-003:2.0-12202022 — Lab Sample ID: 320-95531-7

No Detections.

Client Sample ID: SB-2022-003:5.0-12202022 — Lab Sample ID: 320-95531-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanesulfonic acid (PFOS)	0.073	J I	0.24	0.052	ug/Kg	1	☼	EPA 537(Mod)	Total/NA

Client Sample ID: SB-2022-003:8.5-12202022 — Lab Sample ID: 320-95531-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	0.37		0.24	0.037	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.15	J	0.24	0.046	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	0.28		0.24	0.064	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	1.6		0.24	0.035	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	0.066	J	0.24	0.058	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	54		2.4	0.52	ug/Kg	10	☼	EPA 537(Mod)	Total/NA

Client Sample ID: SB-2022-100:4.5-12202022 — Lab Sample ID: 320-95531-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	0.64		0.20	0.031	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.84		0.20	0.038	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	0.50		0.20	0.054	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	3.8	F1	0.20	0.029	ug/Kg	1	☼	EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	160		4.0	0.87	ug/Kg	20	☼	EPA 537(Mod)	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Shannon & Wilson, Inc
Project/Site: LDW

Job ID: 320-95531-1

Client Sample ID: SB-2022-001:1.5-12202022

Date Collected: 12/20/22 11:05
Date Received: 12/22/22 09:50

Lab Sample ID: 320-95531-1

Matrix: Solid
Percent Solids: 94.4

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**0.058**	**J**	0.21	0.032	ug/Kg	☼	01/01/23 13:22	01/28/23 14:31	1
Perfluoroheptanoic acid (PFHpA)	ND		0.21	0.039	ug/Kg	☼	01/01/23 13:22	01/28/23 14:31	1
Perfluorooctanoic acid (PFOA)	ND		0.21	0.055	ug/Kg	☼	01/01/23 13:22	01/28/23 14:31	1
Perfluorononanoic acid (PFNA)	ND		0.21	0.023	ug/Kg	☼	01/01/23 13:22	01/28/23 14:31	1
Perfluorodecanoic acid (PFDA)	ND		0.21	0.050	ug/Kg	☼	01/01/23 13:22	01/28/23 14:31	1
Perfluoroundecanoic acid (PFUnA)	ND		0.21	0.043	ug/Kg	☼	01/01/23 13:22	01/28/23 14:31	1
Perfluorododecanoic acid (PFDoA)	ND		0.21	0.031	ug/Kg	☼	01/01/23 13:22	01/28/23 14:31	1
Perfluorotridecanoic acid (PFTriA)	ND		0.21	0.022	ug/Kg	☼	01/01/23 13:22	01/28/23 14:31	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.21	0.038	ug/Kg	☼	01/01/23 13:22	01/28/23 14:31	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.21	0.039	ug/Kg	☼	01/01/23 13:22	01/28/23 14:31	1
Perfluorohexanesulfonic acid (PFHxS)	**0.12**	**J**	0.21	0.030	ug/Kg	☼	01/01/23 13:22	01/28/23 14:31	1
Perfluorooctanesulfonic acid (PFOS)	**0.063**	**J**	0.21	0.045	ug/Kg	☼	01/01/23 13:22	01/28/23 14:31	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		0.21	0.024	ug/Kg	☼	01/01/23 13:22	01/28/23 14:31	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		0.21	0.050	ug/Kg	☼	01/01/23 13:22	01/28/23 14:31	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.21	0.036	ug/Kg	☼	01/01/23 13:22	01/28/23 14:31	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.21	0.042	ug/Kg	☼	01/01/23 13:22	01/28/23 14:31	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.21	0.032	ug/Kg	☼	01/01/23 13:22	01/28/23 14:31	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.21	0.040	ug/Kg	☼	01/01/23 13:22	01/28/23 14:31	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*68*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:31*	*1*
13C4 PFHpA	*104*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:31*	*1*
13C4 PFOA	*84*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:31*	*1*
13C5 PFNA	*83*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:31*	*1*
13C2 PFDA	*111*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:31*	*1*
13C2 PFUnA	*109*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:31*	*1*
13C2 PFDoA	*109*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:31*	*1*
13C2 PFTeDA	*98*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:31*	*1*
13C3 PFBS	*85*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:31*	*1*
18O2 PFHxS	*91*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:31*	*1*
13C4 PFOS	*77*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:31*	*1*
d3-NMeFOSAA	*154*	**5+*	*50 - 150*	*01/01/23 13:22*	*01/28/23 14:31*	*1*
d5-NEtFOSAA	*99*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:31*	*1*
13C3 HFPO-DA	*87*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:31*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture (ASTM D 2216)	**5.6**		0.1	0.1	%			12/27/22 11:47	1
Percent Solids (ASTM D 2216)	**94.4**		0.1	0.1	%			12/27/22 11:47	1

Client Sample ID: SB-2022-001:6.0-12202022

Date Collected: 12/20/22 11:10
Date Received: 12/22/22 09:50

Lab Sample ID: 320-95531-2

Matrix: Solid
Percent Solids: 95.2

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**0.060**	**J**	0.20	0.031	ug/Kg	☼	01/01/23 13:22	01/28/23 14:41	1
Perfluoroheptanoic acid (PFHpA)	ND		0.20	0.038	ug/Kg	☼	01/01/23 13:22	01/28/23 14:41	1
Perfluorooctanoic acid (PFOA)	**0.22**		0.20	0.053	ug/Kg	☼	01/01/23 13:22	01/28/23 14:41	1
Perfluorononanoic acid (PFNA)	ND		0.20	0.022	ug/Kg	☼	01/01/23 13:22	01/28/23 14:41	1
Perfluorodecanoic acid (PFDA)	ND		0.20	0.048	ug/Kg	☼	01/01/23 13:22	01/28/23 14:41	1
Perfluoroundecanoic acid (PFUnA)	ND		0.20	0.042	ug/Kg	☼	01/01/23 13:22	01/28/23 14:41	1
Perfluorododecanoic acid (PFDoA)	ND		0.20	0.030	ug/Kg	☼	01/01/23 13:22	01/28/23 14:41	1
Perfluorotridecanoic acid (PFTriA)	ND		0.20	0.021	ug/Kg	☼	01/01/23 13:22	01/28/23 14:41	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.20	0.037	ug/Kg	☼	01/01/23 13:22	01/28/23 14:41	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.20	0.038	ug/Kg	☼	01/01/23 13:22	01/28/23 14:41	1
Perfluorohexanesulfonic acid (PFHxS)	**1.1**		0.20	0.029	ug/Kg	☼	01/01/23 13:22	01/28/23 14:41	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		0.20	0.023	ug/Kg	☼	01/01/23 13:22	01/28/23 14:41	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		0.20	0.048	ug/Kg	☼	01/01/23 13:22	01/28/23 14:41	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.20	0.035	ug/Kg	☼	01/01/23 13:22	01/28/23 14:41	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.20	0.041	ug/Kg	☼	01/01/23 13:22	01/28/23 14:41	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.20	0.031	ug/Kg	☼	01/01/23 13:22	01/28/23 14:41	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.20	0.039	ug/Kg	☼	01/01/23 13:22	01/28/23 14:41	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*82*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:41*	*1*
13C4 PFHpA	*84*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:41*	*1*
13C4 PFOA	*85*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:41*	*1*
13C5 PFNA	*73*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:41*	*1*
13C2 PFDA	*82*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:41*	*1*
13C2 PFUnA	*83*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:41*	*1*
13C2 PFDoA	*79*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:41*	*1*
13C2 PFTeDA	*82*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:41*	*1*
13C3 PFBS	*82*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:41*	*1*
18O2 PFHxS	*83*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:41*	*1*
13C4 PFOS	*75*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:41*	*1*
d3-NMeFOSAA	*60*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:41*	*1*
d5-NEtFOSAA	*62*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:41*	*1*
13C3 HFPO-DA	*86*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:41*	*1*

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	**88**		2.0	0.43	ug/Kg	☼	01/01/23 13:22	01/30/23 23:25	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*71*		*50 - 150*	*01/01/23 13:22*	*01/30/23 23:25*	*10*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture (ASTM D 2216)	**4.8**		0.1	0.1	%			12/27/22 11:47	1
Percent Solids (ASTM D 2216)	**95.2**		0.1	0.1	%			12/27/22 11:47	1

Client: Shannon & Wilson, Inc
Project/Site: LDW

Job ID: 320-95531-1

Client Sample ID: SB-2022-001:10.0-12202022
Date Collected: 12/20/22 11:15
Date Received: 12/22/22 09:50

Lab Sample ID: 320-95531-3
Matrix: Solid
Percent Solids: 82.4

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**0.20**	**J**	0.24	0.037	ug/Kg	☼	01/01/23 13:22	01/28/23 14:51	1
Perfluoroheptanoic acid (PFHpA)	**0.073**	**J**	0.24	0.045	ug/Kg	☼	01/01/23 13:22	01/28/23 14:51	1
Perfluorooctanoic acid (PFOA)	**0.065**	**J**	0.24	0.063	ug/Kg	☼	01/01/23 13:22	01/28/23 14:51	1
Perfluorononanoic acid (PFNA)	ND		0.24	0.026	ug/Kg	☼	01/01/23 13:22	01/28/23 14:51	1
Perfluorodecanoic acid (PFDA)	ND		0.24	0.057	ug/Kg	☼	01/01/23 13:22	01/28/23 14:51	1
Perfluoroundecanoic acid (PFUnA)	ND		0.24	0.050	ug/Kg	☼	01/01/23 13:22	01/28/23 14:51	1
Perfluorododecanoic acid (PFDoA)	ND		0.24	0.036	ug/Kg	☼	01/01/23 13:22	01/28/23 14:51	1
Perfluorotridecanoic acid (PFTriA)	ND		0.24	0.025	ug/Kg	☼	01/01/23 13:22	01/28/23 14:51	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.24	0.044	ug/Kg	☼	01/01/23 13:22	01/28/23 14:51	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.24	0.045	ug/Kg	☼	01/01/23 13:22	01/28/23 14:51	1
Perfluorohexanesulfonic acid (PFHxS)	**0.43**		0.24	0.034	ug/Kg	☼	01/01/23 13:22	01/28/23 14:51	1
Perfluorooctanesulfonic acid (PFOS)	**18**		0.24	0.051	ug/Kg	☼	01/01/23 13:22	01/28/23 14:51	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		0.24	0.027	ug/Kg	☼	01/01/23 13:22	01/28/23 14:51	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		0.24	0.057	ug/Kg	☼	01/01/23 13:22	01/28/23 14:51	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.24	0.041	ug/Kg	☼	01/01/23 13:22	01/28/23 14:51	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.24	0.049	ug/Kg	☼	01/01/23 13:22	01/28/23 14:51	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.24	0.037	ug/Kg	☼	01/01/23 13:22	01/28/23 14:51	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.24	0.046	ug/Kg	☼	01/01/23 13:22	01/28/23 14:51	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*80*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:51*	*1*
13C4 PFHpA	*86*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:51*	*1*
13C4 PFOA	*86*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:51*	*1*
13C5 PFNA	*92*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:51*	*1*
13C2 PFDA	*95*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:51*	*1*
13C2 PFUnA	*104*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:51*	*1*
13C2 PFDoA	*101*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:51*	*1*
13C2 PFTeDA	*97*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:51*	*1*
13C3 PFBS	*87*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:51*	*1*
18O2 PFHxS	*87*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:51*	*1*
13C4 PFOS	*85*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:51*	*1*
d3-NMeFOSAA	*92*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:51*	*1*
d5-NEtFOSAA	*81*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:51*	*1*
13C3 HFPO-DA	*88*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:51*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture (ASTM D 2216)	**17.6**		0.1	0.1	%			12/27/22 11:47	1
Percent Solids (ASTM D 2216)	**82.4**		0.1	0.1	%			12/27/22 11:47	1

Client: Shannon & Wilson, Inc
Project/Site: LDW

Job ID: 320-95531-1

Client Sample ID: SB-2022-002:2.0-12202022

Date Collected: 12/20/22 10:45
Date Received: 12/22/22 09:50

Lab Sample ID: 320-95531-4

Matrix: Solid
Percent Solids: 95.3

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**0.62**		0.19	0.030	ug/Kg	☼	01/01/23 13:22	01/28/23 15:01	1
Perfluoroheptanoic acid (PFHpA)	**0.49**		0.19	0.036	ug/Kg	☼	01/01/23 13:22	01/28/23 15:01	1
Perfluorooctanoic acid (PFOA)	**0.50**		0.19	0.051	ug/Kg	☼	01/01/23 13:22	01/28/23 15:01	1
Perfluorononanoic acid (PFNA)	ND		0.19	0.021	ug/Kg	☼	01/01/23 13:22	01/28/23 15:01	1
Perfluorodecanoic acid (PFDA)	ND		0.19	0.046	ug/Kg	☼	01/01/23 13:22	01/28/23 15:01	1
Perfluoroundecanoic acid (PFUnA)	ND		0.19	0.040	ug/Kg	☼	01/01/23 13:22	01/28/23 15:01	1
Perfluorododecanoic acid (PFDoA)	ND		0.19	0.029	ug/Kg	☼	01/01/23 13:22	01/28/23 15:01	1
Perfluorotridecanoic acid (PFTriA)	ND		0.19	0.020	ug/Kg	☼	01/01/23 13:22	01/28/23 15:01	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.19	0.035	ug/Kg	☼	01/01/23 13:22	01/28/23 15:01	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.19	0.036	ug/Kg	☼	01/01/23 13:22	01/28/23 15:01	1
Perfluorohexanesulfonic acid (PFHxS)	**1.6**		0.19	0.028	ug/Kg	☼	01/01/23 13:22	01/28/23 15:01	1
Perfluorooctanesulfonic acid (PFOS)	**4.1**	**I**	0.19	0.041	ug/Kg	☼	01/01/23 13:22	01/28/23 15:01	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		0.19	0.022	ug/Kg	☼	01/01/23 13:22	01/28/23 15:01	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		0.19	0.046	ug/Kg	☼	01/01/23 13:22	01/28/23 15:01	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.19	0.033	ug/Kg	☼	01/01/23 13:22	01/28/23 15:01	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.19	0.039	ug/Kg	☼	01/01/23 13:22	01/28/23 15:01	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.19	0.030	ug/Kg	☼	01/01/23 13:22	01/28/23 15:01	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.19	0.037	ug/Kg	☼	01/01/23 13:22	01/28/23 15:01	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*89*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:01*	*1*
13C4 PFHpA	*88*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:01*	*1*
13C4 PFOA	*87*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:01*	*1*
13C5 PFNA	*85*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:01*	*1*
13C2 PFDA	*89*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:01*	*1*
13C2 PFUnA	*87*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:01*	*1*
13C2 PFDoA	*81*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:01*	*1*
13C2 PFTeDA	*90*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:01*	*1*
13C3 PFBS	*84*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:01*	*1*
18O2 PFHxS	*85*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:01*	*1*
13C4 PFOS	*86*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:01*	*1*
d3-NMeFOSAA	*62*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:01*	*1*
d5-NEtFOSAA	*66*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:01*	*1*
13C3 HFPO-DA	*91*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:01*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture (ASTM D 2216)	**4.7**		0.1	0.1	%			12/27/22 11:47	1
Percent Solids (ASTM D 2216)	**95.3**		0.1	0.1	%			12/27/22 11:47	1

Client Sample ID: SB-2022-002:4.5-12202022

Date Collected: 12/20/22 10:50
Date Received: 12/22/22 09:50

Lab Sample ID: 320-95531-5

Matrix: Solid
Percent Solids: 95.7

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**0.67**		0.21	0.032	ug/Kg	☼	01/01/23 13:22	01/28/23 15:11	1
Perfluoroheptanoic acid (PFHpA)	**0.42**		0.21	0.040	ug/Kg	☼	01/01/23 13:22	01/28/23 15:11	1
Perfluorooctanoic acid (PFOA)	**2.3**		0.21	0.055	ug/Kg	☼	01/01/23 13:22	01/28/23 15:11	1
Perfluorononanoic acid (PFNA)	**0.044**	**J**	0.21	0.023	ug/Kg	☼	01/01/23 13:22	01/28/23 15:11	1
Perfluorodecanoic acid (PFDA)	ND		0.21	0.050	ug/Kg	☼	01/01/23 13:22	01/28/23 15:11	1
Perfluoroundecanoic acid (PFUnA)	ND		0.21	0.044	ug/Kg	☼	01/01/23 13:22	01/28/23 15:11	1
Perfluorododecanoic acid (PFDoA)	ND		0.21	0.031	ug/Kg	☼	01/01/23 13:22	01/28/23 15:11	1
Perfluorotridecanoic acid (PFTriA)	ND		0.21	0.022	ug/Kg	☼	01/01/23 13:22	01/28/23 15:11	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.21	0.039	ug/Kg	☼	01/01/23 13:22	01/28/23 15:11	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.21	0.040	ug/Kg	☼	01/01/23 13:22	01/28/23 15:11	1
Perfluorohexanesulfonic acid (PFHxS)	**13**		0.21	0.030	ug/Kg	☼	01/01/23 13:22	01/28/23 15:11	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	**0.025**	**J**	0.21	0.024	ug/Kg	☼	01/01/23 13:22	01/28/23 15:11	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	**0.050**	**J**	0.21	0.050	ug/Kg	☼	01/01/23 13:22	01/28/23 15:11	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.21	0.036	ug/Kg	☼	01/01/23 13:22	01/28/23 15:11	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.21	0.043	ug/Kg	☼	01/01/23 13:22	01/28/23 15:11	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.21	0.032	ug/Kg	☼	01/01/23 13:22	01/28/23 15:11	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.21	0.041	ug/Kg	☼	01/01/23 13:22	01/28/23 15:11	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*87*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:11*	*1*
13C4 PFHpA	*82*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:11*	*1*
13C4 PFOA	*85*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:11*	*1*
13C5 PFNA	*59*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:11*	*1*
13C2 PFDA	*87*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:11*	*1*
13C2 PFUnA	*90*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:11*	*1*
13C2 PFDoA	*82*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:11*	*1*
13C2 PFTeDA	*91*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:11*	*1*
13C3 PFBS	*84*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:11*	*1*
18O2 PFHxS	*86*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:11*	*1*
13C4 PFOS	*63*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:11*	*1*
d3-NMeFOSAA	*66*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:11*	*1*
d5-NEtFOSAA	*70*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:11*	*1*
13C3 HFPO-DA	*89*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:11*	*1*

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	**370**		10	2.2	ug/Kg	☼	01/01/23 13:22	01/30/23 23:55	50

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*71*		*50 - 150*	*01/01/23 13:22*	*01/30/23 23:55*	*50*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture (ASTM D 2216)	**4.3**		0.1	0.1	%			12/27/22 11:47	1
Percent Solids (ASTM D 2216)	**95.7**		0.1	0.1	%			12/27/22 11:47	1

Client: Shannon & Wilson, Inc
Project/Site: LDW

Job ID: 320-95531-1

Client Sample ID: SB-2022-002:8.0-12202022
Date Collected: 12/20/22 10:55
Date Received: 12/22/22 09:50

Lab Sample ID: 320-95531-6
Matrix: Solid
Percent Solids: 85.5

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**3.5**		0.22	0.035	ug/Kg	☼	01/01/23 13:22	01/28/23 15:22	1
Perfluoroheptanoic acid (PFHpA)	**1.7**		0.22	0.042	ug/Kg	☼	01/01/23 13:22	01/28/23 15:22	1
Perfluorooctanoic acid (PFOA)	**2.0**		0.22	0.059	ug/Kg	☼	01/01/23 13:22	01/28/23 15:22	1
Perfluorononanoic acid (PFNA)	**0.11**	**J**	0.22	0.025	ug/Kg	☼	01/01/23 13:22	01/28/23 15:22	1
Perfluorodecanoic acid (PFDA)	ND		0.22	0.054	ug/Kg	☼	01/01/23 13:22	01/28/23 15:22	1
Perfluoroundecanoic acid (PFUnA)	ND		0.22	0.047	ug/Kg	☼	01/01/23 13:22	01/28/23 15:22	1
Perfluorododecanoic acid (PFDoA)	ND		0.22	0.034	ug/Kg	☼	01/01/23 13:22	01/28/23 15:22	1
Perfluorotridecanoic acid (PFTriA)	ND		0.22	0.023	ug/Kg	☼	01/01/23 13:22	01/28/23 15:22	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.22	0.041	ug/Kg	☼	01/01/23 13:22	01/28/23 15:22	1
Perfluorobutanesulfonic acid (PFBS)	**0.45**		0.22	0.042	ug/Kg	☼	01/01/23 13:22	01/28/23 15:22	1
Perfluorohexanesulfonic acid (PFHxS)	**11**		0.22	0.032	ug/Kg	☼	01/01/23 13:22	01/28/23 15:22	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		0.22	0.026	ug/Kg	☼	01/01/23 13:22	01/28/23 15:22	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		0.22	0.054	ug/Kg	☼	01/01/23 13:22	01/28/23 15:22	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.22	0.039	ug/Kg	☼	01/01/23 13:22	01/28/23 15:22	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.22	0.046	ug/Kg	☼	01/01/23 13:22	01/28/23 15:22	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.22	0.035	ug/Kg	☼	01/01/23 13:22	01/28/23 15:22	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.22	0.044	ug/Kg	☼	01/01/23 13:22	01/28/23 15:22	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*91*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:22*	*1*
13C4 PFHpA	*91*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:22*	*1*
13C4 PFOA	*90*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:22*	*1*
13C5 PFNA	*77*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:22*	*1*
13C2 PFDA	*89*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:22*	*1*
13C2 PFUnA	*91*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:22*	*1*
13C2 PFDoA	*87*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:22*	*1*
13C2 PFTeDA	*98*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:22*	*1*
13C3 PFBS	*87*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:22*	*1*
18O2 PFHxS	*93*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:22*	*1*
13C4 PFOS	*81*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:22*	*1*
d3-NMeFOSAA	*69*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:22*	*1*
d5-NEtFOSAA	*71*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:22*	*1*
13C3 HFPO-DA	*95*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:22*	*1*

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	**200**		4.5	0.96	ug/Kg	☼	01/01/23 13:22	02/01/23 20:52	20

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*91*		*50 - 150*	*01/01/23 13:22*	*02/01/23 20:52*	*20*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture (ASTM D 2216)	**14.5**		0.1	0.1	%			12/27/22 11:47	1
Percent Solids (ASTM D 2216)	**85.5**		0.1	0.1	%			12/27/22 11:47	1

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DRAFT FOR PUBLIC COMMENT

Client Sample ID: SB-2022-003:2.0-12202022

Date Collected: 12/20/22 10:30
Date Received: 12/22/22 09:50

Lab Sample ID: 320-95531-7

Matrix: Solid
Percent Solids: 83.8

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		0.23	0.036	ug/Kg	☼	01/01/23 13:22	01/28/23 15:32	1
Perfluoroheptanoic acid (PFHpA)	ND		0.23	0.044	ug/Kg	☼	01/01/23 13:22	01/28/23 15:32	1
Perfluorooctanoic acid (PFOA)	ND		0.23	0.062	ug/Kg	☼	01/01/23 13:22	01/28/23 15:32	1
Perfluorononanoic acid (PFNA)	ND		0.23	0.026	ug/Kg	☼	01/01/23 13:22	01/28/23 15:32	1
Perfluorodecanoic acid (PFDA)	ND		0.23	0.056	ug/Kg	☼	01/01/23 13:22	01/28/23 15:32	1
Perfluoroundecanoic acid (PFUnA)	ND		0.23	0.049	ug/Kg	☼	01/01/23 13:22	01/28/23 15:32	1
Perfluorododecanoic acid (PFDoA)	ND		0.23	0.035	ug/Kg	☼	01/01/23 13:22	01/28/23 15:32	1
Perfluorotridecanoic acid (PFTriA)	ND		0.23	0.025	ug/Kg	☼	01/01/23 13:22	01/28/23 15:32	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.23	0.043	ug/Kg	☼	01/01/23 13:22	01/28/23 15:32	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.23	0.044	ug/Kg	☼	01/01/23 13:22	01/28/23 15:32	1
Perfluorohexanesulfonic acid (PFHxS)	ND		0.23	0.034	ug/Kg	☼	01/01/23 13:22	01/28/23 15:32	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.23	0.050	ug/Kg	☼	01/01/23 13:22	01/28/23 15:32	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		0.23	0.027	ug/Kg	☼	01/01/23 13:22	01/28/23 15:32	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		0.23	0.056	ug/Kg	☼	01/01/23 13:22	01/28/23 15:32	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.23	0.041	ug/Kg	☼	01/01/23 13:22	01/28/23 15:32	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.23	0.048	ug/Kg	☼	01/01/23 13:22	01/28/23 15:32	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.23	0.036	ug/Kg	☼	01/01/23 13:22	01/28/23 15:32	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.23	0.046	ug/Kg	☼	01/01/23 13:22	01/28/23 15:32	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*85*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:32*	*1*
13C4 PFHpA	*84*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:32*	*1*
13C4 PFOA	*88*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:32*	*1*
13C5 PFNA	*83*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:32*	*1*
13C2 PFDA	*83*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:32*	*1*
13C2 PFUnA	*84*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:32*	*1*
13C2 PFDoA	*80*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:32*	*1*
13C2 PFTeDA	*81*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:32*	*1*
13C3 PFBS	*82*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:32*	*1*
18O2 PFHxS	*86*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:32*	*1*
13C4 PFOS	*84*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:32*	*1*
d3-NMeFOSAA	*64*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:32*	*1*
d5-NEtFOSAA	*66*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:32*	*1*
13C3 HFPO-DA	*88*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:32*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture (ASTM D 2216)	**16.2**		0.1	0.1	%			12/27/22 11:47	1
Percent Solids (ASTM D 2216)	**83.8**		0.1	0.1	%			12/27/22 11:47	1

Client: Shannon & Wilson, Inc
Project/Site: LDW

Job ID: 320-95531-1

Client Sample ID: SB-2022-003:5.0-12202022
Date Collected: 12/20/22 10:35
Date Received: 12/22/22 09:50

Lab Sample ID: 320-95531-8
Matrix: Solid
Percent Solids: 81.6

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		0.24	0.037	ug/Kg	☼	01/01/23 13:22	01/28/23 15:42	1
Perfluoroheptanoic acid (PFHpA)	ND		0.24	0.046	ug/Kg	☼	01/01/23 13:22	01/28/23 15:42	1
Perfluorooctanoic acid (PFOA)	ND		0.24	0.064	ug/Kg	☼	01/01/23 13:22	01/28/23 15:42	1
Perfluorononanoic acid (PFNA)	ND		0.24	0.026	ug/Kg	☼	01/01/23 13:22	01/28/23 15:42	1
Perfluorodecanoic acid (PFDA)	ND		0.24	0.058	ug/Kg	☼	01/01/23 13:22	01/28/23 15:42	1
Perfluoroundecanoic acid (PFUnA)	ND		0.24	0.051	ug/Kg	☼	01/01/23 13:22	01/28/23 15:42	1
Perfluorododecanoic acid (PFDoA)	ND		0.24	0.036	ug/Kg	☼	01/01/23 13:22	01/28/23 15:42	1
Perfluorotridecanoic acid (PFTriA)	ND		0.24	0.025	ug/Kg	☼	01/01/23 13:22	01/28/23 15:42	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.24	0.045	ug/Kg	☼	01/01/23 13:22	01/28/23 15:42	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.24	0.046	ug/Kg	☼	01/01/23 13:22	01/28/23 15:42	1
Perfluorohexanesulfonic acid (PFHxS)	ND		0.24	0.035	ug/Kg	☼	01/01/23 13:22	01/28/23 15:42	1
Perfluorooctanesulfonic acid (PFOS)	**0.073**	**J I**	0.24	0.052	ug/Kg	☼	01/01/23 13:22	01/28/23 15:42	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		0.24	0.028	ug/Kg	☼	01/01/23 13:22	01/28/23 15:42	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		0.24	0.058	ug/Kg	☼	01/01/23 13:22	01/28/23 15:42	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.24	0.042	ug/Kg	☼	01/01/23 13:22	01/28/23 15:42	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.24	0.049	ug/Kg	☼	01/01/23 13:22	01/28/23 15:42	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.24	0.037	ug/Kg	☼	01/01/23 13:22	01/28/23 15:42	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.24	0.047	ug/Kg	☼	01/01/23 13:22	01/28/23 15:42	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*83*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:42*	*1*
13C4 PFHpA	*84*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:42*	*1*
13C4 PFOA	*88*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:42*	*1*
13C5 PFNA	*83*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:42*	*1*
13C2 PFDA	*90*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:42*	*1*
13C2 PFUnA	*90*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:42*	*1*
13C2 PFDoA	*80*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:42*	*1*
13C2 PFTeDA	*84*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:42*	*1*
13C3 PFBS	*80*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:42*	*1*
18O2 PFHxS	*87*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:42*	*1*
13C4 PFOS	*85*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:42*	*1*
d3-NMeFOSAA	*68*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:42*	*1*
d5-NEtFOSAA	*74*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:42*	*1*
13C3 HFPO-DA	*86*		*50 - 150*	*01/01/23 13:22*	*01/28/23 15:42*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture (ASTM D 2216)	**18.4**		0.1	0.1	%			12/27/22 11:47	1
Percent Solids (ASTM D 2216)	**81.6**		0.1	0.1	%			12/27/22 11:47	1

Client Sample ID: SB-2022-003:8.5-12202022

Date Collected: 12/20/22 10:40
Date Received: 12/22/22 09:50

Lab Sample ID: 320-95531-9

Matrix: Solid
Percent Solids: 83.2

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**0.37**		0.24	0.037	ug/Kg	☼	01/01/23 13:22	01/28/23 16:12	1
Perfluoroheptanoic acid (PFHpA)	**0.15**	**J**	0.24	0.046	ug/Kg	☼	01/01/23 13:22	01/28/23 16:12	1
Perfluorooctanoic acid (PFOA)	**0.28**		0.24	0.064	ug/Kg	☼	01/01/23 13:22	01/28/23 16:12	1
Perfluorononanoic acid (PFNA)	ND		0.24	0.026	ug/Kg	☼	01/01/23 13:22	01/28/23 16:12	1
Perfluorodecanoic acid (PFDA)	ND		0.24	0.058	ug/Kg	☼	01/01/23 13:22	01/28/23 16:12	1
Perfluoroundecanoic acid (PFUnA)	ND		0.24	0.050	ug/Kg	☼	01/01/23 13:22	01/28/23 16:12	1
Perfluorododecanoic acid (PFDoA)	ND		0.24	0.036	ug/Kg	☼	01/01/23 13:22	01/28/23 16:12	1
Perfluorotridecanoic acid (PFTriA)	ND		0.24	0.025	ug/Kg	☼	01/01/23 13:22	01/28/23 16:12	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.24	0.044	ug/Kg	☼	01/01/23 13:22	01/28/23 16:12	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.24	0.046	ug/Kg	☼	01/01/23 13:22	01/28/23 16:12	1
Perfluorohexanesulfonic acid (PFHxS)	**1.6**		0.24	0.035	ug/Kg	☼	01/01/23 13:22	01/28/23 16:12	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		0.24	0.028	ug/Kg	☼	01/01/23 13:22	01/28/23 16:12	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	**0.066**	**J**	0.24	0.058	ug/Kg	☼	01/01/23 13:22	01/28/23 16:12	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.24	0.042	ug/Kg	☼	01/01/23 13:22	01/28/23 16:12	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.24	0.049	ug/Kg	☼	01/01/23 13:22	01/28/23 16:12	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.24	0.037	ug/Kg	☼	01/01/23 13:22	01/28/23 16:12	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.24	0.047	ug/Kg	☼	01/01/23 13:22	01/28/23 16:12	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*83*		*50 - 150*	*01/01/23 13:22*	*01/28/23 16:12*	*1*
13C4 PFHpA	*84*		*50 - 150*	*01/01/23 13:22*	*01/28/23 16:12*	*1*
13C4 PFOA	*87*		*50 - 150*	*01/01/23 13:22*	*01/28/23 16:12*	*1*
13C5 PFNA	*80*		*50 - 150*	*01/01/23 13:22*	*01/28/23 16:12*	*1*
13C2 PFDA	*86*		*50 - 150*	*01/01/23 13:22*	*01/28/23 16:12*	*1*
13C2 PFUnA	*85*		*50 - 150*	*01/01/23 13:22*	*01/28/23 16:12*	*1*
13C2 PFDoA	*80*		*50 - 150*	*01/01/23 13:22*	*01/28/23 16:12*	*1*
13C2 PFTeDA	*82*		*50 - 150*	*01/01/23 13:22*	*01/28/23 16:12*	*1*
13C3 PFBS	*82*		*50 - 150*	*01/01/23 13:22*	*01/28/23 16:12*	*1*
18O2 PFHxS	*88*		*50 - 150*	*01/01/23 13:22*	*01/28/23 16:12*	*1*
13C4 PFOS	*84*		*50 - 150*	*01/01/23 13:22*	*01/28/23 16:12*	*1*
d3-NMeFOSAA	*66*		*50 - 150*	*01/01/23 13:22*	*01/28/23 16:12*	*1*
d5-NEtFOSAA	*66*		*50 - 150*	*01/01/23 13:22*	*01/28/23 16:12*	*1*
13C3 HFPO-DA	*85*		*50 - 150*	*01/01/23 13:22*	*01/28/23 16:12*	*1*

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	**54**		2.4	0.52	ug/Kg	☼	01/01/23 13:22	02/01/23 20:42	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*92*		*50 - 150*	*01/01/23 13:22*	*02/01/23 20:42*	*10*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture (ASTM D 2216)	**16.8**		0.1	0.1	%			12/27/22 11:47	1
Percent Solids (ASTM D 2216)	**83.2**		0.1	0.1	%			12/27/22 11:47	1

Client: Shannon & Wilson, Inc
Project/Site: LDW

Job ID: 320-95531-1

Client Sample ID: SB-2022-100:4.5-12202022
Date Collected: 12/20/22 10:53
Date Received: 12/22/22 09:50

Lab Sample ID: 320-95531-10
Matrix: Solid
Percent Solids: 94.8

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**0.64**		0.20	0.031	ug/Kg	☼	01/01/23 13:22	01/28/23 16:22	1
Perfluoroheptanoic acid (PFHpA)	**0.84**		0.20	0.038	ug/Kg	☼	01/01/23 13:22	01/28/23 16:22	1
Perfluorooctanoic acid (PFOA)	**0.50**		0.20	0.054	ug/Kg	☼	01/01/23 13:22	01/28/23 16:22	1
Perfluorononanoic acid (PFNA)	ND		0.20	0.022	ug/Kg	☼	01/01/23 13:22	01/28/23 16:22	1
Perfluorodecanoic acid (PFDA)	ND		0.20	0.048	ug/Kg	☼	01/01/23 13:22	01/28/23 16:22	1
Perfluoroundecanoic acid (PFUnA)	ND		0.20	0.042	ug/Kg	☼	01/01/23 13:22	01/28/23 16:22	1
Perfluorododecanoic acid (PFDoA)	ND		0.20	0.030	ug/Kg	☼	01/01/23 13:22	01/28/23 16:22	1
Perfluorotridecanoic acid (PFTriA)	ND		0.20	0.021	ug/Kg	☼	01/01/23 13:22	01/28/23 16:22	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.20	0.037	ug/Kg	☼	01/01/23 13:22	01/28/23 16:22	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.20	0.038	ug/Kg	☼	01/01/23 13:22	01/28/23 16:22	1
Perfluorohexanesulfonic acid (PFHxS)	**3.8**	**F1**	0.20	0.029	ug/Kg	☼	01/01/23 13:22	01/28/23 16:22	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		0.20	0.023	ug/Kg	☼	01/01/23 13:22	01/28/23 16:22	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		0.20	0.048	ug/Kg	☼	01/01/23 13:22	01/28/23 16:22	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.20	0.035	ug/Kg	☼	01/01/23 13:22	01/28/23 16:22	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.20	0.041	ug/Kg	☼	01/01/23 13:22	01/28/23 16:22	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.20	0.031	ug/Kg	☼	01/01/23 13:22	01/28/23 16:22	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.20	0.039	ug/Kg	☼	01/01/23 13:22	01/28/23 16:22	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*85*		*50 - 150*	*01/01/23 13:22*	*01/28/23 16:22*	*1*
13C4 PFHpA	*89*		*50 - 150*	*01/01/23 13:22*	*01/28/23 16:22*	*1*
13C4 PFOA	*83*		*50 - 150*	*01/01/23 13:22*	*01/28/23 16:22*	*1*
13C5 PFNA	*72*		*50 - 150*	*01/01/23 13:22*	*01/28/23 16:22*	*1*
13C2 PFDA	*88*		*50 - 150*	*01/01/23 13:22*	*01/28/23 16:22*	*1*
13C2 PFUnA	*83*		*50 - 150*	*01/01/23 13:22*	*01/28/23 16:22*	*1*
13C2 PFDoA	*80*		*50 - 150*	*01/01/23 13:22*	*01/28/23 16:22*	*1*
13C2 PFTeDA	*88*		*50 - 150*	*01/01/23 13:22*	*01/28/23 16:22*	*1*
13C3 PFBS	*83*		*50 - 150*	*01/01/23 13:22*	*01/28/23 16:22*	*1*
18O2 PFHxS	*88*		*50 - 150*	*01/01/23 13:22*	*01/28/23 16:22*	*1*
13C4 PFOS	*76*		*50 - 150*	*01/01/23 13:22*	*01/28/23 16:22*	*1*
d3-NMeFOSAA	*65*		*50 - 150*	*01/01/23 13:22*	*01/28/23 16:22*	*1*
d5-NEtFOSAA	*65*		*50 - 150*	*01/01/23 13:22*	*01/28/23 16:22*	*1*
13C3 HFPO-DA	*90*		*50 - 150*	*01/01/23 13:22*	*01/28/23 16:22*	*1*

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	**160**		4.0	0.87	ug/Kg	☼	01/01/23 13:22	02/01/23 21:03	20

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*85*		*50 - 150*	*01/01/23 13:22*	*02/01/23 21:03*	*20*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture (ASTM D 2216)	**5.2**		0.1	0.1	%			12/27/22 11:47	1
Percent Solids (ASTM D 2216)	**94.8**		0.1	0.1	%			12/27/22 11:47	1

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DRAFT FOR PUBLIC COMMENT

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: LDW

Job ID: 320-95531-1

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Matrix: Solid

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFHxA (50-150)	C4PFHA (50-150)	PFOA (50-150)	PFNA (50-150)	PFDA (50-150)	PFUnA (50-150)	PFDoA (50-150)	PFTDA (50-150)
320-95531-1	SB-2022-001:1.5-12202022	68	104	84	83	111	109	109	98
320-95531-2	SB-2022-001:6.0-12202022	82	84	85	73	82	83	79	82
320-95531-2 - DL	SB-2022-001:6.0-12202022								
320-95531-3	SB-2022-001:10.0-12202022	80	86	86	92	95	104	101	97
320-95531-4	SB-2022-002:2.0-12202022	89	88	87	85	89	87	81	90
320-95531-5	SB-2022-002:4.5-12202022	87	82	85	59	87	90	82	91
320-95531-5 - DL	SB-2022-002:4.5-12202022								
320-95531-6	SB-2022-002:8.0-12202022	91	91	90	77	89	91	87	98
320-95531-6 - DL	SB-2022-002:8.0-12202022								
320-95531-7	SB-2022-003:2.0-12202022	85	84	88	83	83	84	80	81
320-95531-8	SB-2022-003:5.0-12202022	83	84	88	83	90	90	80	84
320-95531-9	SB-2022-003:8.5-12202022	83	84	87	80	86	85	80	82
320-95531-9 - DL	SB-2022-003:8.5-12202022								
320-95531-10	SB-2022-100:4.5-12202022	85	89	83	72	88	83	80	88
320-95531-10 - DL	SB-2022-100:4.5-12202022								
320-95531-10 MS	SB-2022-100:4.5-12202022	91	88	91	76	92	92	86	96
320-95531-10 MS - DL	SB-2022-100:4.5-12202022								
320-95531-10 MSD	SB-2022-100:4.5-12202022	89	89	88	71	84	87	77	82
320-95531-10 MSD - DL	SB-2022-100:4.5-12202022								
LCS 320-644098/2-A	Lab Control Sample	90	92	89	85	86	86	80	79
MB 320-644098/1-A	Method Blank	86	86	83	84	86	87	79	85

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	C3PFBS (50-150)	PFHxS (50-150)	PFOS (50-150)	d3NMFOS (50-150)	d5NEFOS (50-150)	HFPODA (50-150)		
320-95531-1	SB-2022-001:1.5-12202022	85	91	77	154 *5+	99	87		
320-95531-2	SB-2022-001:6.0-12202022	82	83	75	60	62	86		
320-95531-2 - DL	SB-2022-001:6.0-12202022			71					
320-95531-3	SB-2022-001:10.0-12202022	87	87	85	92	81	88		
320-95531-4	SB-2022-002:2.0-12202022	84	85	86	62	66	91		
320-95531-5	SB-2022-002:4.5-12202022	84	86	63	66	70	89		
320-95531-5 - DL	SB-2022-002:4.5-12202022			71					
320-95531-6	SB-2022-002:8.0-12202022	87	93	81	69	71	95		
320-95531-6 - DL	SB-2022-002:8.0-12202022			91					
320-95531-7	SB-2022-003:2.0-12202022	82	86	84	64	66	88		
320-95531-8	SB-2022-003:5.0-12202022	80	87	85	68	74	86		
320-95531-9	SB-2022-003:8.5-12202022	82	88	84	66	66	85		
320-95531-9 - DL	SB-2022-003:8.5-12202022			92					
320-95531-10	SB-2022-100:4.5-12202022	83	88	76	65	65	90		
320-95531-10 - DL	SB-2022-100:4.5-12202022			85					
320-95531-10 MS	SB-2022-100:4.5-12202022	86	92	78	69	71	94		
320-95531-10 MS - DL	SB-2022-100:4.5-12202022			90					
320-95531-10 MSD	SB-2022-100:4.5-12202022	85	87	71	65	66	94		
320-95531-10 MSD - DL	SB-2022-100:4.5-12202022			96					
LCS 320-644098/2-A	Lab Control Sample	89	90	90	67	66	88		
MB 320-644098/1-A	Method Blank	87	89	87	65	65	91		

Surrogate Legend

PFHxA = 13C2 PFHxA
C4PFHA = 13C4 PFHpA
PFOA = 13C4 PFOA

Eurofins Sacramento

DRAFT FOR PUBLIC COMMENT

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: LDW

Job ID: 320-95531-1

PFNA = 13C5 PFNA
PFDA = 13C2 PFDA
PFUnA = 13C2 PFUnA
PFDoA = 13C2 PFDoA
PFTDA = 13C2 PFTeDA
C3PFBS = 13C3 PFBS
PFHxS = 18O2 PFHxS
PFOS = 13C4 PFOS
d3NMFOS = d3-NMeFOSAA
d5NEFOS = d5-NEtFOSAA
HFPODA = 13C3 HFPO-DA

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Lab Sample ID: MB 320-644098/1-A
Matrix: Solid
Analysis Batch: 650197

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 644098

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		0.20	0.031	ug/Kg		01/01/23 13:22	01/28/23 14:11	1
Perfluoroheptanoic acid (PFHpA)	ND		0.20	0.038	ug/Kg		01/01/23 13:22	01/28/23 14:11	1
Perfluorooctanoic acid (PFOA)	ND		0.20	0.053	ug/Kg		01/01/23 13:22	01/28/23 14:11	1
Perfluorononanoic acid (PFNA)	ND		0.20	0.022	ug/Kg		01/01/23 13:22	01/28/23 14:11	1
Perfluorodecanoic acid (PFDA)	ND		0.20	0.048	ug/Kg		01/01/23 13:22	01/28/23 14:11	1
Perfluoroundecanoic acid (PFUnA)	ND		0.20	0.042	ug/Kg		01/01/23 13:22	01/28/23 14:11	1
Perfluorododecanoic acid (PFDoA)	ND		0.20	0.030	ug/Kg		01/01/23 13:22	01/28/23 14:11	1
Perfluorotridecanoic acid (PFTriA)	ND		0.20	0.021	ug/Kg		01/01/23 13:22	01/28/23 14:11	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.20	0.037	ug/Kg		01/01/23 13:22	01/28/23 14:11	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.20	0.038	ug/Kg		01/01/23 13:22	01/28/23 14:11	1
Perfluorohexanesulfonic acid (PFHxS)	ND		0.20	0.029	ug/Kg		01/01/23 13:22	01/28/23 14:11	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.20	0.043	ug/Kg		01/01/23 13:22	01/28/23 14:11	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		0.20	0.023	ug/Kg		01/01/23 13:22	01/28/23 14:11	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		0.20	0.048	ug/Kg		01/01/23 13:22	01/28/23 14:11	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		0.20	0.035	ug/Kg		01/01/23 13:22	01/28/23 14:11	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		0.20	0.041	ug/Kg		01/01/23 13:22	01/28/23 14:11	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		0.20	0.031	ug/Kg		01/01/23 13:22	01/28/23 14:11	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.20	0.039	ug/Kg		01/01/23 13:22	01/28/23 14:11	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*86*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:11*	*1*
13C4 PFHpA	*86*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:11*	*1*
13C4 PFOA	*83*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:11*	*1*
13C5 PFNA	*84*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:11*	*1*
13C2 PFDA	*86*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:11*	*1*
13C2 PFUnA	*87*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:11*	*1*
13C2 PFDoA	*79*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:11*	*1*
13C2 PFTeDA	*85*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:11*	*1*
13C3 PFBS	*87*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:11*	*1*
18O2 PFHxS	*89*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:11*	*1*
13C4 PFOS	*87*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:11*	*1*
d3-NMeFOSAA	*65*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:11*	*1*
d5-NEtFOSAA	*65*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:11*	*1*
13C3 HFPO-DA	*91*		*50 - 150*	*01/01/23 13:22*	*01/28/23 14:11*	*1*

Lab Sample ID: LCS 320-644098/2-A
Matrix: Solid
Analysis Batch: 650197

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 644098

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorohexanoic acid (PFHxA)	2.00	1.93		ug/Kg		96	70 - 132
Perfluoroheptanoic acid (PFHpA)	2.00	1.96		ug/Kg		98	71 - 131
Perfluorooctanoic acid (PFOA)	2.00	2.01		ug/Kg		100	69 - 133
Perfluorononanoic acid (PFNA)	2.00	2.00		ug/Kg		100	72 - 129

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: LCS 320-644098/2-A
Matrix: Solid
Analysis Batch: 650197

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 644098

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorodecanoic acid (PFDA)	2.00	1.92		ug/Kg		96	69 - 133
Perfluoroundecanoic acid (PFUnA)	2.00	2.08		ug/Kg		104	64 - 136
Perfluorododecanoic acid (PFDoA)	2.00	2.31		ug/Kg		116	69 - 135
Perfluorotridecanoic acid (PFTriA)	2.00	2.27		ug/Kg		114	66 - 139
Perfluorotetradecanoic acid (PFTeA)	2.00	1.96		ug/Kg		98	69 - 133
Perfluorobutanesulfonic acid (PFBS)	1.78	1.77		ug/Kg		100	72 - 128
Perfluorohexanesulfonic acid (PFHxS)	1.82	1.74		ug/Kg		96	67 - 130
Perfluorooctanesulfonic acid (PFOS)	1.86	1.85		ug/Kg		99	68 - 136
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	2.00	1.92		ug/Kg		96	63 - 144
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	2.00	1.84		ug/Kg		92	61 - 139
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	1.87	1.92		ug/Kg		103	75 - 135
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	2.00	2.00		ug/Kg		100	77 - 137
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	1.89	2.05		ug/Kg		108	76 - 136
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	1.89	1.97		ug/Kg		105	79 - 139

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*90*		*50 - 150*
13C4 PFHpA	*92*		*50 - 150*
13C4 PFOA	*89*		*50 - 150*
13C5 PFNA	*85*		*50 - 150*
13C2 PFDA	*86*		*50 - 150*
13C2 PFUnA	*86*		*50 - 150*
13C2 PFDoA	*80*		*50 - 150*
13C2 PFTeDA	*79*		*50 - 150*
13C3 PFBS	*89*		*50 - 150*
18O2 PFHxS	*90*		*50 - 150*
13C4 PFOS	*90*		*50 - 150*
d3-NMeFOSAA	*67*		*50 - 150*
d5-NEtFOSAA	*66*		*50 - 150*
13C3 HFPO-DA	*88*		*50 - 150*

Lab Sample ID: 320-95531-10 MS
Matrix: Solid
Analysis Batch: 650197

Client Sample ID: SB-2022-100:4.5-12202022
Prep Type: Total/NA
Prep Batch: 644098

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorohexanoic acid (PFHxA)	0.64		2.08	2.66		ug/Kg	☼	97	70 - 132
Perfluoroheptanoic acid (PFHpA)	0.84		2.08	3.12		ug/Kg	☼	110	71 - 131
Perfluorooctanoic acid (PFOA)	0.50		2.08	2.64		ug/Kg	☼	103	69 - 133

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: 320-95531-10 MS
Matrix: Solid
Analysis Batch: 650197

Client Sample ID: SB-2022-100:4.5-12202022
Prep Type: Total/NA
Prep Batch: 644098

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorononanoic acid (PFNA)	ND		2.08	2.02		ug/Kg	☼	97	72 - 129
Perfluorodecanoic acid (PFDA)	ND		2.08	2.06		ug/Kg	☼	99	69 - 133
Perfluoroundecanoic acid (PFUnA)	ND		2.08	2.16		ug/Kg	☼	104	64 - 136
Perfluorododecanoic acid (PFDoA)	ND		2.08	2.33		ug/Kg	☼	112	69 - 135
Perfluorotridecanoic acid (PFTriA)	ND		2.08	2.48		ug/Kg	☼	119	66 - 139
Perfluorotetradecanoic acid (PFTeA)	ND		2.08	1.98		ug/Kg	☼	95	69 - 133
Perfluorobutanesulfonic acid (PFBS)	ND		1.84	1.85		ug/Kg	☼	101	72 - 128
Perfluorohexanesulfonic acid (PFHxS)	3.8	F1	1.89	6.16		ug/Kg	☼	126	67 - 130
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		2.08	2.13		ug/Kg	☼	102	63 - 144
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		2.08	2.11		ug/Kg	☼	101	61 - 139
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.94	2.34		ug/Kg	☼	120	75 - 135
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		2.08	2.05		ug/Kg	☼	99	77 - 137
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.96	2.60		ug/Kg	☼	133	76 - 136
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.96	2.44		ug/Kg	☼	124	79 - 139

Isotope Dilution	*MS %Recovery*	*MS Qualifier*	*Limits*
13C2 PFHxA	*91*		*50 - 150*
13C4 PFHpA	*88*		*50 - 150*
13C4 PFOA	*91*		*50 - 150*
13C5 PFNA	*76*		*50 - 150*
13C2 PFDA	*92*		*50 - 150*
13C2 PFUnA	*92*		*50 - 150*
13C2 PFDoA	*86*		*50 - 150*
13C2 PFTeDA	*96*		*50 - 150*
13C3 PFBS	*86*		*50 - 150*
18O2 PFHxS	*92*		*50 - 150*
13C4 PFOS	*78*		*50 - 150*
d3-NMeFOSAA	*69*		*50 - 150*
d5-NEtFOSAA	*71*		*50 - 150*
13C3 HFPO-DA	*94*		*50 - 150*

Lab Sample ID: 320-95531-10 MSD
Matrix: Solid
Analysis Batch: 650197

Client Sample ID: SB-2022-100:4.5-12202022
Prep Type: Total/NA
Prep Batch: 644098

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)	0.64		2.07	2.64		ug/Kg	☼	97	70 - 132	1	30
Perfluoroheptanoic acid (PFHpA)	0.84		2.07	3.01		ug/Kg	☼	105	71 - 131	4	30
Perfluorooctanoic acid (PFOA)	0.50		2.07	2.77		ug/Kg	☼	110	69 - 133	5	30
Perfluorononanoic acid (PFNA)	ND		2.07	2.08		ug/Kg	☼	100	72 - 129	3	30

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: 320-95531-10 MSD
Matrix: Solid
Analysis Batch: 650197

Client Sample ID: SB-2022-100:4.5-12202022
Prep Type: Total/NA
Prep Batch: 644098

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorodecanoic acid (PFDA)	ND		2.07	2.19		ug/Kg	☼	106	69 - 133	6	30
Perfluoroundecanoic acid (PFUnA)	ND		2.07	2.09		ug/Kg	☼	101	64 - 136	3	30
Perfluorododecanoic acid (PFDoA)	ND		2.07	2.34		ug/Kg	☼	113	69 - 135	0	30
Perfluorotridecanoic acid (PFTriA)	ND		2.07	2.52		ug/Kg	☼	122	66 - 139	2	30
Perfluorotetradecanoic acid (PFTeA)	ND		2.07	2.19		ug/Kg	☼	106	69 - 133	10	30
Perfluorobutanesulfonic acid (PFBS)	ND		1.84	1.83		ug/Kg	☼	100	72 - 128	1	30
Perfluorohexanesulfonic acid (PFHxS)	3.8	F1	1.89	7.12	F1	ug/Kg	☼	178	67 - 130	15	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		2.07	2.09		ug/Kg	☼	101	63 - 144	2	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		2.07	2.03		ug/Kg	☼	98	61 - 139	4	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.93	2.55		ug/Kg	☼	132	75 - 135	9	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		2.07	2.09		ug/Kg	☼	101	77 - 137	2	30
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.95	2.65		ug/Kg	☼	136	76 - 136	2	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.95	2.71		ug/Kg	☼	139	79 - 139	10	30

Isotope Dilution	*MSD %Recovery*	*MSD Qualifier*	*Limits*
13C2 PFHxA	*89*		*50 - 150*
13C4 PFHpA	*89*		*50 - 150*
13C4 PFOA	*88*		*50 - 150*
13C5 PFNA	*71*		*50 - 150*
13C2 PFDA	*84*		*50 - 150*
13C2 PFUnA	*87*		*50 - 150*
13C2 PFDoA	*77*		*50 - 150*
13C2 PFTeDA	*82*		*50 - 150*
13C3 PFBS	*85*		*50 - 150*
18O2 PFHxS	*87*		*50 - 150*
13C4 PFOS	*71*		*50 - 150*
d3-NMeFOSAA	*65*		*50 - 150*
d5-NEtFOSAA	*66*		*50 - 150*
13C3 HFPO-DA	*94*		*50 - 150*

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 - DL

Lab Sample ID: 320-95531-10 MS
Matrix: Solid
Analysis Batch: 650927

Client Sample ID: SB-2022-100:4.5-12202022
Prep Type: Total/NA
Prep Batch: 644098

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorooctanesulfonic acid (PFOS) - DL	160		1.93	202	4	ug/Kg	☼	2303	68 - 136

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 - DL (Continued)

Isotope Dilution	MS %Recovery	MS Qualifier	Limits
13C4 PFOS - DL	90		50 - 150

Lab Sample ID: 320-95531-10 MSD — **Client Sample ID: SB-2022-100:4.5-12202022**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 650927 — **Prep Batch: 644098**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorooctanesulfonic acid (PFOS) - DL	160		1.92	187	4	ug/Kg	☼	1532	68 - 136	8	30

Isotope Dilution	MSD %Recovery	MSD Qualifier	Limits
13C4 PFOS - DL	96		50 - 150

Method: D 2216 - Percent Moisture

Lab Sample ID: 320-95536-A-1 DU — **Client Sample ID: Duplicate**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 642801

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Percent Moisture	21.0		20.3		%		4	20
Percent Solids	79.0		79.7		%		1	20

LCMS

Prep Batch: 644098

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-95531-1	SB-2022-001:1.5-12202022	Total/NA	Solid	SHAKE	
320-95531-2 - DL	SB-2022-001:6.0-12202022	Total/NA	Solid	SHAKE	
320-95531-2	SB-2022-001:6.0-12202022	Total/NA	Solid	SHAKE	
320-95531-3	SB-2022-001:10.0-12202022	Total/NA	Solid	SHAKE	
320-95531-4	SB-2022-002:2.0-12202022	Total/NA	Solid	SHAKE	
320-95531-5 - DL	SB-2022-002:4.5-12202022	Total/NA	Solid	SHAKE	
320-95531-5	SB-2022-002:4.5-12202022	Total/NA	Solid	SHAKE	
320-95531-6	SB-2022-002:8.0-12202022	Total/NA	Solid	SHAKE	
320-95531-6 - DL	SB-2022-002:8.0-12202022	Total/NA	Solid	SHAKE	
320-95531-7	SB-2022-003:2.0-12202022	Total/NA	Solid	SHAKE	
320-95531-8	SB-2022-003:5.0-12202022	Total/NA	Solid	SHAKE	
320-95531-9	SB-2022-003:8.5-12202022	Total/NA	Solid	SHAKE	
320-95531-9 - DL	SB-2022-003:8.5-12202022	Total/NA	Solid	SHAKE	
320-95531-10 - DL	SB-2022-100:4.5-12202022	Total/NA	Solid	SHAKE	
320-95531-10	SB-2022-100:4.5-12202022	Total/NA	Solid	SHAKE	
MB 320-644098/1-A	Method Blank	Total/NA	Solid	SHAKE	
LCS 320-644098/2-A	Lab Control Sample	Total/NA	Solid	SHAKE	
320-95531-10 MS	SB-2022-100:4.5-12202022	Total/NA	Solid	SHAKE	
320-95531-10 MS - DL	SB-2022-100:4.5-12202022	Total/NA	Solid	SHAKE	
320-95531-10 MSD	SB-2022-100:4.5-12202022	Total/NA	Solid	SHAKE	
320-95531-10 MSD - DL	SB-2022-100:4.5-12202022	Total/NA	Solid	SHAKE	

Analysis Batch: 650197

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-95531-1	SB-2022-001:1.5-12202022	Total/NA	Solid	EPA 537(Mod)	644098
320-95531-2	SB-2022-001:6.0-12202022	Total/NA	Solid	EPA 537(Mod)	644098
320-95531-3	SB-2022-001:10.0-12202022	Total/NA	Solid	EPA 537(Mod)	644098
320-95531-4	SB-2022-002:2.0-12202022	Total/NA	Solid	EPA 537(Mod)	644098
320-95531-5	SB-2022-002:4.5-12202022	Total/NA	Solid	EPA 537(Mod)	644098
320-95531-6	SB-2022-002:8.0-12202022	Total/NA	Solid	EPA 537(Mod)	644098
320-95531-7	SB-2022-003:2.0-12202022	Total/NA	Solid	EPA 537(Mod)	644098
320-95531-8	SB-2022-003:5.0-12202022	Total/NA	Solid	EPA 537(Mod)	644098
320-95531-9	SB-2022-003:8.5-12202022	Total/NA	Solid	EPA 537(Mod)	644098
320-95531-10	SB-2022-100:4.5-12202022	Total/NA	Solid	EPA 537(Mod)	644098
MB 320-644098/1-A	Method Blank	Total/NA	Solid	EPA 537(Mod)	644098
LCS 320-644098/2-A	Lab Control Sample	Total/NA	Solid	EPA 537(Mod)	644098
320-95531-10 MS	SB-2022-100:4.5-12202022	Total/NA	Solid	EPA 537(Mod)	644098
320-95531-10 MSD	SB-2022-100:4.5-12202022	Total/NA	Solid	EPA 537(Mod)	644098

Analysis Batch: 650521

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-95531-2 - DL	SB-2022-001:6.0-12202022	Total/NA	Solid	EPA 537(Mod)	644098
320-95531-5 - DL	SB-2022-002:4.5-12202022	Total/NA	Solid	EPA 537(Mod)	644098

Analysis Batch: 650927

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-95531-6 - DL	SB-2022-002:8.0-12202022	Total/NA	Solid	EPA 537(Mod)	644098
320-95531-9 - DL	SB-2022-003:8.5-12202022	Total/NA	Solid	EPA 537(Mod)	644098
320-95531-10 - DL	SB-2022-100:4.5-12202022	Total/NA	Solid	EPA 537(Mod)	644098
320-95531-10 MS - DL	SB-2022-100:4.5-12202022	Total/NA	Solid	EPA 537(Mod)	644098
320-95531-10 MSD - DL	SB-2022-100:4.5-12202022	Total/NA	Solid	EPA 537(Mod)	644098

General Chemistry

Analysis Batch: 642801

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-95531-1	SB-2022-001:1.5-12202022	Total/NA	Solid	D 2216	
320-95531-2	SB-2022-001:6.0-12202022	Total/NA	Solid	D 2216	
320-95531-3	SB-2022-001:10.0-12202022	Total/NA	Solid	D 2216	
320-95531-4	SB-2022-002:2.0-12202022	Total/NA	Solid	D 2216	
320-95531-5	SB-2022-002:4.5-12202022	Total/NA	Solid	D 2216	
320-95531-6	SB-2022-002:8.0-12202022	Total/NA	Solid	D 2216	
320-95531-7	SB-2022-003:2.0-12202022	Total/NA	Solid	D 2216	
320-95531-8	SB-2022-003:5.0-12202022	Total/NA	Solid	D 2216	
320-95531-9	SB-2022-003:8.5-12202022	Total/NA	Solid	D 2216	
320-95531-10	SB-2022-100:4.5-12202022	Total/NA	Solid	D 2216	
320-95536-A-1 DU	Duplicate	Total/NA	Solid	D 2216	

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: LDW

Job ID: 320-95531-1

Client Sample ID: SB-2022-001:1.5-12202022
Lab Sample ID: 320-95531-1
Date Collected: 12/20/22 11:05
Matrix: Solid
Date Received: 12/22/22 09:50

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			642801	12/27/22 11:47	TCS	EET SAC

Client Sample ID: SB-2022-001:1.5-12202022
Lab Sample ID: 320-95531-1
Date Collected: 12/20/22 11:05
Matrix: Solid
Date Received: 12/22/22 09:50
Percent Solids: 94.4

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.12 g	10.0 mL	644098	01/01/23 13:22	PV	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	650197	01/28/23 14:31	K1S	EET SAC

Client Sample ID: SB-2022-001:6.0-12202022
Lab Sample ID: 320-95531-2
Date Collected: 12/20/22 11:10
Matrix: Solid
Date Received: 12/22/22 09:50

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			642801	12/27/22 11:47	TCS	EET SAC

Client Sample ID: SB-2022-001:6.0-12202022
Lab Sample ID: 320-95531-2
Date Collected: 12/20/22 11:10
Matrix: Solid
Date Received: 12/22/22 09:50
Percent Solids: 95.2

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE	DL		5.22 g	10.0 mL	644098	01/01/23 13:22	PV	EET SAC
Total/NA	Analysis	EPA 537(Mod)	DL	10	1 mL	1 mL	650521	01/30/23 23:25	K1S	EET SAC
Total/NA	Prep	SHAKE			5.22 g	10.0 mL	644098	01/01/23 13:22	PV	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	650197	01/28/23 14:41	K1S	EET SAC

Client Sample ID: SB-2022-001:10.0-12202022
Lab Sample ID: 320-95531-3
Date Collected: 12/20/22 11:15
Matrix: Solid
Date Received: 12/22/22 09:50

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			642801	12/27/22 11:47	TCS	EET SAC

Client Sample ID: SB-2022-001:10.0-12202022
Lab Sample ID: 320-95531-3
Date Collected: 12/20/22 11:15
Matrix: Solid
Date Received: 12/22/22 09:50
Percent Solids: 82.4

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.12 g	10.0 mL	644098	01/01/23 13:22	PV	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	650197	01/28/23 14:51	K1S	EET SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: LDW

Job ID: 320-95531-1

Client Sample ID: SB-2022-002:2.0-12202022
Lab Sample ID: 320-95531-4
Date Collected: 12/20/22 10:45
Matrix: Solid
Date Received: 12/22/22 09:50

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			642801	12/27/22 11:47	TCS	EET SAC

Client Sample ID: SB-2022-002:2.0-12202022
Lab Sample ID: 320-95531-4
Date Collected: 12/20/22 10:45
Matrix: Solid
Date Received: 12/22/22 09:50
Percent Solids: 95.3

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.50 g	10.0 mL	644098	01/01/23 13:22	PV	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	650197	01/28/23 15:01	K1S	EET SAC

Client Sample ID: SB-2022-002:4.5-12202022
Lab Sample ID: 320-95531-5
Date Collected: 12/20/22 10:50
Matrix: Solid
Date Received: 12/22/22 09:50

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			642801	12/27/22 11:47	TCS	EET SAC

Client Sample ID: SB-2022-002:4.5-12202022
Lab Sample ID: 320-95531-5
Date Collected: 12/20/22 10:50
Matrix: Solid
Date Received: 12/22/22 09:50
Percent Solids: 95.7

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE	DL		5.02 g	10.0 mL	644098	01/01/23 13:22	PV	EET SAC
Total/NA	Analysis	EPA 537(Mod)	DL	50	1 mL	1 mL	650521	01/30/23 23:55	K1S	EET SAC
Total/NA	Prep	SHAKE			5.02 g	10.0 mL	644098	01/01/23 13:22	PV	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	650197	01/28/23 15:11	K1S	EET SAC

Client Sample ID: SB-2022-002:8.0-12202022
Lab Sample ID: 320-95531-6
Date Collected: 12/20/22 10:55
Matrix: Solid
Date Received: 12/22/22 09:50

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			642801	12/27/22 11:47	TCS	EET SAC

Client Sample ID: SB-2022-002:8.0-12202022
Lab Sample ID: 320-95531-6
Date Collected: 12/20/22 10:55
Matrix: Solid
Date Received: 12/22/22 09:50
Percent Solids: 85.5

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.23 g	10.0 mL	644098	01/01/23 13:22	PV	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	650197	01/28/23 15:22	K1S	EET SAC
Total/NA	Prep	SHAKE	DL		5.23 g	10.0 mL	644098	01/01/23 13:22	PV	EET SAC
Total/NA	Analysis	EPA 537(Mod)	DL	20	1 mL	1 mL	650927	02/01/23 20:52	S1M	EET SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: LDW

Job ID: 320-95531-1

Client Sample ID: SB-2022-003:2.0-12202022
Lab Sample ID: 320-95531-7
Date Collected: 12/20/22 10:30
Matrix: Solid
Date Received: 12/22/22 09:50

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			642801	12/27/22 11:47	TCS	EET SAC

Client Sample ID: SB-2022-003:2.0-12202022
Lab Sample ID: 320-95531-7
Date Collected: 12/20/22 10:30
Matrix: Solid
Date Received: 12/22/22 09:50
Percent Solids: 83.8

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.11 g	10.0 mL	644098	01/01/23 13:22	PV	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	650197	01/28/23 15:32	K1S	EET SAC

Client Sample ID: SB-2022-003:5.0-12202022
Lab Sample ID: 320-95531-8
Date Collected: 12/20/22 10:35
Matrix: Solid
Date Received: 12/22/22 09:50

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			642801	12/27/22 11:47	TCS	EET SAC

Client Sample ID: SB-2022-003:5.0-12202022
Lab Sample ID: 320-95531-8
Date Collected: 12/20/22 10:35
Matrix: Solid
Date Received: 12/22/22 09:50
Percent Solids: 81.6

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.09 g	10.0 mL	644098	01/01/23 13:22	PV	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	650197	01/28/23 15:42	K1S	EET SAC

Client Sample ID: SB-2022-003:8.5-12202022
Lab Sample ID: 320-95531-9
Date Collected: 12/20/22 10:40
Matrix: Solid
Date Received: 12/22/22 09:50

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			642801	12/27/22 11:47	TCS	EET SAC

Client Sample ID: SB-2022-003:8.5-12202022
Lab Sample ID: 320-95531-9
Date Collected: 12/20/22 10:40
Matrix: Solid
Date Received: 12/22/22 09:50
Percent Solids: 83.2

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.01 g	10.0 mL	644098	01/01/23 13:22	PV	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	650197	01/28/23 16:12	K1S	EET SAC
Total/NA	Prep	SHAKE	DL		5.01 g	10.0 mL	644098	01/01/23 13:22	PV	EET SAC
Total/NA	Analysis	EPA 537(Mod)	DL	10	1 mL	1 mL	650927	02/01/23 20:42	S1M	EET SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: LDW

Job ID: 320-95531-1

Client Sample ID: SB-2022-100:4.5-12202022

Lab Sample ID: 320-95531-10
Date Collected: 12/20/22 10:53
Matrix: Solid
Date Received: 12/22/22 09:50

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			642801	12/27/22 11:47	TCS	EET SAC

Client Sample ID: SB-2022-100:4.5-12202022

Lab Sample ID: 320-95531-10
Date Collected: 12/20/22 10:53
Matrix: Solid
Date Received: 12/22/22 09:50
Percent Solids: 94.8

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.22 g	10.0 mL	644098	01/01/23 13:22	PV	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	650197	01/28/23 16:22	K1S	EET SAC
Total/NA	Prep	SHAKE	DL		5.22 g	10.0 mL	644098	01/01/23 13:22	PV	EET SAC
Total/NA	Analysis	EPA 537(Mod)	DL	20	1 mL	1 mL	650927	02/01/23 21:03	S1M	EET SAC

Laboratory References:

EET SAC = Eurofins Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: LDW

Job ID: 320-95531-1

Laboratory: Eurofins Sacramento

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	17-020	02-20-24

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
D 2216		Solid	Percent Moisture
D 2216		Solid	Percent Solids

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: LDW

Job ID: 320-95531-1

Method	Method Description	Protocol	Laboratory
EPA 537(Mod)	PFAS for QSM 5.3, Table B-15	EPA	EET SAC
D 2216	Percent Moisture	ASTM	EET SAC
SHAKE	Shake Extraction with Ultrasonic Bath Extraction	SW846	EET SAC

Protocol References:

ASTM = ASTM International

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

EET SAC = Eurofins Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: LDW

Job ID: 320-95531-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-95531-1	SB-2022-001:1.5-12202022	Solid	12/20/22 11:05	12/22/22 09:50
320-95531-2	SB-2022-001:6.0-12202022	Solid	12/20/22 11:10	12/22/22 09:50
320-95531-3	SB-2022-001:10.0-12202022	Solid	12/20/22 11:15	12/22/22 09:50
320-95531-4	SB-2022-002:2.0-12202022	Solid	12/20/22 10:45	12/22/22 09:50
320-95531-5	SB-2022-002:4.5-12202022	Solid	12/20/22 10:50	12/22/22 09:50
320-95531-6	SB-2022-002:8.0-12202022	Solid	12/20/22 10:55	12/22/22 09:50
320-95531-7	SB-2022-003:2.0-12202022	Solid	12/20/22 10:30	12/22/22 09:50
320-95531-8	SB-2022-003:5.0-12202022	Solid	12/20/22 10:35	12/22/22 09:50
320-95531-9	SB-2022-003:8.5-12202022	Solid	12/20/22 10:40	12/22/22 09:50
320-95531-10	SB-2022-100:4.5-12202022	Solid	12/20/22 10:53	12/22/22 09:50

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Eurofins Sacramento
880 Riverside Parkway
West Sacramento, CA 95605
Phone (916) 373-5600 Phone (916) 372-1059

Chain of Custody Record

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Client Information	Sampler: CTC	Lab PM: David Althacker	Carrier Tracking No(s):	COC No:
Client Contact: Shoshana Howard	Phone: 206-695-6716	E-Mail:	State of Origin: WA	Page: Page 1 of 1
Company: Shannon & Wilson, Inc.	PWSID:			Job #: 21-1-12596-025
Address: 400 N. 34th St., Suite 100	Due Date Requested:			
City: Seattle	TAT Requested (days): Standard			
State, Zip: WA, 98103	Compliance Project: Δ Yes Δ No			
Phone:	PO #: 21-1-12596-025			
Email: SKH@shanwil.com	WO #:			
Project Name: LDW	Project #:			
Site: LDW	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Y - Trizma, Z - other (specify)
Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	EPA 537 (modified) 18 PFAS	Total Number of containers	Special Instructions/Note:
			Preservation Code:			N			
SB-2022-001: 1.5 -12202022	12/20/22	1105	G	S	N	N	X		
SB-2022-001: 6.0 -12202022	12/20/22	1110	G	S			X		
SB-2022-001: 10.0 -12202022	12/20/22	1115	G	S			X		
SB-2022-002: 2.0 -12202022	12/20/22	1045	G	S			X		
SB-2022-002: 4.5 -12202022	12/20/22	1050	G	S			X		
SB-2022-002: 8.0 -12202022	12/20/22	1055	G	S			X		
SB-2022-003: 2.0 -12202022	12/20/22	1030	G	S			X		
SB-2022-003: 5.0 -12202022	12/20/22	1035	G	S			X		
SB-2022-003: 8.5 -12202022	12/20/22	1040	G	S			X		
SB-2022-100: 4.5 -12202022	12/20/22	1053	G	S			X		

320-95531 Chain of Custody

Possible Hazard Identification
■ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ■ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ■ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by	Date/Time	Company	Received by	Date/Time	Company
1	Christian Canfield	12/20/22 1500	SWI		12/21/22 950	FEDEX
2	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
3	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: ■ Yes Δ No | Custody Seal No.: 2123208, 2123209

Cooler Temperature(s) °C and Other Remarks: 4.4

Ver: 01/16/2019

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Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-95531-1

Login Number: 95531
List Number: 1
Creator: Her, David A

List Source: Eurofins Sacramento

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	213209/2123208
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

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ANALYTICAL REPORT

PREPARED FOR

Attn: Shoshana Howard
Shannon & Wilson, Inc
400 N. 34th Suite 100
PO BOX 300303
Seattle, Washington 98103

Generated 3/26/2023 6:42:07 PM

JOB DESCRIPTION

EMJ

JOB NUMBER

320-97138-1

Eurofins Sacramento
880 Riverside Parkway
West Sacramento CA 95605

See page two for job notes and contact information.

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my EOL

Eurofins Sacramento

Job Notes

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The data in the report relate to the field sample(s) as received by the laboratory and associated QC. All results have been reviewed and have been found to be compliant with laboratory and accreditation requirements, with the exception of the noted deviation(s). For questions, please contact the Project Manager.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing Northern California, LLC Project Manager.

Authorization



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Authorized for release by
David Alltucker, Project Manager I
David.Alltucker@et.eurofinsus.com
(916)374-4383

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Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-97138-1

Qualifiers

LCMS

Qualifier	Qualifier Description
*5-	Isotope dilution analyte is outside acceptance limits, low biased.
G	The reported quantitation limit has been raised due to an exhibited elevated noise or matrix interference
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Job ID: 320-97138-1

Laboratory: Eurofins Sacramento

Narrative

Job Narrative
320-97138-1

Receipt
The samples were received on 2/25/2023 9:00 AM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 1.9º C.

LCMS
Method EPA 537(Mod): The continuing calibration verification (CCV) associated with batch 320-658077 recovered above the upper control limit for isotope dilution analyte (IDA) 13C3 HFPO-DA, The associated target analyte, Hexafluoropropylene Oxide Dimer Acid (HFPO-DA) was within control limits in the CCV, therefore the data is reported. The IDA 13C3 HFPO-DA, was in control in all associated samples. MW-63-02222023 (320-97138-8), MW-40-02222023 (320-97138-9), MW-41-02222023 (320-97138-10), MW-64-02222023 (320-97138-11), MW-60-02222023 (320-97138-12), MW-61-02222023 (320-97138-13), MW-36-02222023 (320-97138-14), MW-74-02222023 (320-97138-15), MW-38-02232023 (320-97138-16), MW-77-02232023 (320-97138-17), MW-37-02232023 (320-97138-18), MW-32-02232023 (320-97138-19), MW-68-02232023 (320-97138-20), MW-67-02232023 (320-97138-21) and (CCV 320-658077/12)

Method EPA 537(Mod): The Isotope Dilution Analyte (IDA) recovery associated with the following samples is below the method recommended limit: MW-41-02222023 (320-97138-10), MW-64-02222023 (320-97138-11) and MW-68-02232023 (320-97138-20). Generally, data quality is not considered affected if the IDA signal-to-noise ratio is greater than 10:1, which is achieved for all IDA in the samples.

Method EPA 537(Mod): Results for samples MW-40-02222023 (320-97138-9), MW-41-02222023 (320-97138-10), MW-64-02222023 (320-97138-11), MW-60-02222023 (320-97138-12), MW-61-02222023 (320-97138-13), MW-36-02222023 (320-97138-14) and MW-74-02222023 (320-97138-15) were reported from the analysis of a diluted extract due to high concentration of the target analyte in the analysis of the undiluted extract. The dilution factor was applied to the labeled internal standard area counts and these area counts were within acceptance limits

Method EPA 537(Mod): The following sample exhibited matrix interferences for one or more analytes causing elevation of the reporting limit (RL): MW-69-02212023 (320-97138-3) . The RL for the affected analytes has been raised to be equal to the matrix interference, and a "G" qualifier applied.

Method EPA 537(Mod): The following samples exhibited elevated noise or matrix interferences for one or more analytes causing elevation of the reporting limit (RL): MW-32-02232023 (320-97138-19) and MW-68-02232023 (320-97138-20) . The RL for the affected analytes has been raised to be equal to the matrix interference, and a "G" qualifier applied.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Organic Prep
Method 3535: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-656766.

Method 3535: During the solid phase extraction process, the following samples contained non-settable particulates which clogged the solid phase extraction column: MW-70-02212023 (320-97138-2), MW-46-02212023 (320-97138-6) and MW-100-02212023 (320-97138-7).

Method 3535: The following samples were observed to be yellow in color and have floating particulates present in the sample bottle prior to extraction: MW-71-02212023 (320-97138-1), MW-70-02212023 (320-97138-2), MW-69-02212023 (320-97138-3), MW-50-02212023 (320-97138-4), MW-52-02212023 (320-97138-5), MW-46-02212023 (320-97138-6) and MW-100-02212023 (320-97138-7) .

Method 3535: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-656959.

Method 3535: The following sample was light yellow and contained a thin layer of sediment at the bottom of the bottle prior to extraction:

Job ID: 320-97138-1 (Continued)

Laboratory: Eurofins Sacramento (Continued)

MW-41-02222023 (320-97138-10).

Method 3535: The following sample contained floating particulates in the sample bottle prior to extraction: MW-74-02222023 (320-97138-15).

Method 3535: The following samples were light yellow prior to extraction: MW-40-02222023 (320-97138-9), MW-77-02232023 (320-97138-17) and MW-32-02232023 (320-97138-19).

Method 3535: The following samples were light yellow and contained floating particulates in the sample bottle prior to extraction: MW-64-02222023 (320-97138-11), MW-60-02222023 (320-97138-12), MW-61-02222023 (320-97138-13), MW-36-02222023 (320-97138-14) and MW-68-02232023 (320-97138-20).

Method 3535: During the solid phase extraction process, the following samples contained non-settable particulates which clogged the solid phase extraction column: MW-41-02222023 (320-97138-10), MW-64-02222023 (320-97138-11), MW-60-02222023 (320-97138-12), MW-36-02222023 (320-97138-14), MW-74-02222023 (320-97138-15), MW-77-02232023 (320-97138-17), MW-32-02232023 (320-97138-19) and MW-68-02232023 (320-97138-20).

Method 3535: The following samples were light yellow after extraction/final volume: MW-40-02222023 (320-97138-9), MW-61-02222023 (320-97138-13) and MW-77-02232023 (320-97138-17).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-97138-1

Client Sample ID: MW-71-02212023 — Lab Sample ID: 320-97138-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	3.4		1.7	0.49	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.8		1.7	0.21	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	4.2		1.7	0.72	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	0.41	J	1.7	0.23	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	1.3	J	1.7	0.17	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	3.0		1.7	0.48	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	5.6		1.7	0.46	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-70-02212023 — Lab Sample ID: 320-97138-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	22		1.8	0.52	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	4.7		1.8	0.22	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	10		1.8	0.76	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	0.53	J	1.8	0.24	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	17		1.8	0.18	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	130		1.8	0.51	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	72		1.8	0.48	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-69-02212023 — Lab Sample ID: 320-97138-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	4.2		1.9	0.56	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.0		1.9	0.24	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	5.7		1.9	0.82	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	1.4	J	1.9	0.26	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorodecanoic acid (PFDA)	0.57	J	1.9	0.30	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	19		1.9	0.55	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	35		1.9	0.52	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-50-02212023 — Lab Sample ID: 320-97138-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	150		1.8	0.53	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	27		1.8	0.23	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	26		1.8	0.77	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	1.4	J	1.8	0.25	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	17		1.8	0.18	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	190		1.8	0.52	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	270		1.8	0.49	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-52-02212023 — Lab Sample ID: 320-97138-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	10		1.7	0.50	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	3.5		1.7	0.22	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	5.1		1.7	0.74	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	0.72	J	1.7	0.23	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorodecanoic acid (PFDA)	0.37	J	1.7	0.27	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	2.4		1.7	0.17	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	28		1.7	0.50	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	76		1.7	0.47	ng/L	1		EPA 537(Mod)	Total/NA

This Detection Summary does not include radiochemical test results.

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Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-97138-1

Client Sample ID: MW-46-02212023 — Lab Sample ID: 320-97138-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	12		1.8	0.52	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.1		1.8	0.22	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	4.3		1.8	0.76	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	2.3		1.8	0.18	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	28		1.8	0.51	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	52		1.8	0.48	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-100-02212023 — Lab Sample ID: 320-97138-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	11		1.7	0.50	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.1		1.7	0.22	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	4.6		1.7	0.74	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	0.26	J	1.7	0.23	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	2.0		1.7	0.17	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	29		1.7	0.49	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	46		1.7	0.47	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-63-02222023 — Lab Sample ID: 320-97138-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	22		1.8	0.54	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	5.3		1.8	0.23	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	17		1.8	0.79	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	1.1	J	1.8	0.25	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	5.2		1.8	0.18	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	59		1.8	0.53	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	230		1.8	0.50	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-40-02222023 — Lab Sample ID: 320-97138-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	120		2.0	0.58	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	33		2.0	0.25	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	22		2.0	0.85	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	0.61	J	2.0	0.27	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	13		2.0	0.20	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	200		2.0	0.57	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	630		10	2.7	ng/L	5		EPA 537(Mod)	Total/NA

Client Sample ID: MW-41-02222023 — Lab Sample ID: 320-97138-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluoroheptanoic acid (PFHpA)	72		1.8	0.22	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	45		1.8	0.76	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	1.6	J	1.8	0.24	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	57		1.8	0.18	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanoic acid (PFHxA) - DL	410		18	5.2	ng/L	10		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS) - DL	470		18	5.1	ng/L	10		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	1100		18	4.9	ng/L	10		EPA 537(Mod)	Total/NA

This Detection Summary does not include radiochemical test results.

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Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-97138-1

Client Sample ID: MW-64-02222023 — Lab Sample ID: 320-97138-11

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	73		1.8	0.52	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	11		1.8	0.22	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	18		1.8	0.76	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	15		1.8	0.18	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	150		1.8	0.51	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	480		8.9	2.4	ng/L	5		EPA 537(Mod)	Total/NA

Client Sample ID: MW-60-02222023 — Lab Sample ID: 320-97138-12

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	350		1.8	0.53	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	110		1.8	0.23	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	170		1.8	0.77	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	1.1	J	1.8	0.25	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	85		1.8	0.18	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS) - DL	1400		91	26	ng/L	50		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	4200		91	25	ng/L	50		EPA 537(Mod)	Total/NA

Client Sample ID: MW-61-02222023 — Lab Sample ID: 320-97138-13

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluoroheptanoic acid (PFHpA)	250		1.8	0.23	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	220		1.8	0.77	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	3.2		1.8	0.25	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorodecanoic acid (PFDA)	0.44	J	1.8	0.28	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	130		1.8	0.18	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanoic acid (PFHxA) - DL	1000		36	11	ng/L	20		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS) - DL	3200		36	10	ng/L	20		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	1900		36	9.8	ng/L	20		EPA 537(Mod)	Total/NA

Client Sample ID: MW-36-02222023 — Lab Sample ID: 320-97138-14

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	270		1.8	0.52	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	110		1.8	0.23	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	37		1.8	0.77	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	0.25	J	1.8	0.24	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	42		1.8	0.18	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	68		1.8	0.49	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS) - DL	470		9.0	2.6	ng/L	5		EPA 537(Mod)	Total/NA

Client Sample ID: MW-74-02222023 — Lab Sample ID: 320-97138-15

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluoroheptanoic acid (PFHpA)	150		1.8	0.22	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	230		1.8	0.76	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	1.8		1.8	0.24	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	58		1.8	0.18	ng/L	1		EPA 537(Mod)	Total/NA

This Detection Summary does not include radiochemical test results.

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Client Sample ID: MW-74-02222023 (Continued) — Lab Sample ID: 320-97138-15

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA) - DL	410		180	52	ng/L	100		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS) - DL	1500		180	51	ng/L	100		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	14000		180	48	ng/L	100		EPA 537(Mod)	Total/NA

Client Sample ID: MW-38-02232023 — Lab Sample ID: 320-97138-16

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	1.3	J	1.9	0.54	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.75	J	1.9	0.23	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	2.3		1.9	0.79	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	0.62	J	1.9	0.25	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.61	J	1.9	0.19	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	8.6		1.9	0.53	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	12		1.9	0.51	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-77-02232023 — Lab Sample ID: 320-97138-17

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	0.88	J	1.8	0.53	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	0.94	J	1.8	0.78	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.79	J	1.8	0.18	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	3.4		1.8	0.52	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	18		1.8	0.50	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-37-02232023 — Lab Sample ID: 320-97138-18

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	2.0		1.9	0.54	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.95	J	1.9	0.23	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	4.0		1.9	0.80	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	0.69	J	1.9	0.25	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorodecanoic acid (PFDA)	0.31	J	1.9	0.29	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.91	J	1.9	0.19	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	3.9		1.9	0.54	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	11		1.9	0.51	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-32-02232023 — Lab Sample ID: 320-97138-19

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	29		1.8	0.52	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	11		1.8	0.22	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	18		1.8	0.76	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	0.51	J	1.8	0.24	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	97		1.8	0.51	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	27		1.8	0.48	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-68-02232023 — Lab Sample ID: 320-97138-20

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	9.6		1.8	0.52	ng/L	1		EPA 537(Mod)	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.7		1.8	0.22	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	26		1.8	0.76	ng/L	1		EPA 537(Mod)	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: MW-68-02232023 (Continued)

Lab Sample ID: 320-97138-20

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorononanoic acid (PFNA)	2.7		1.8	0.24	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorodecanoic acid (PFDA)	0.46	J	1.8	0.28	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	31		1.8	0.51	ng/L	1		EPA 537(Mod)	Total/NA

Client Sample ID: MW-67-02232023

Lab Sample ID: 320-97138-21

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluoroheptanoic acid (PFHpA)	0.51	J	1.8	0.23	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanoic acid (PFOA)	2.6		1.8	0.77	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorononanoic acid (PFNA)	0.68	J	1.8	0.25	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorodecanoic acid (PFDA)	0.31	J	1.8	0.28	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.76	J	1.8	0.18	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	6.9		1.8	0.52	ng/L	1		EPA 537(Mod)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	22		1.8	0.49	ng/L	1		EPA 537(Mod)	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-97138-1

Client Sample ID: MW-71-02212023
Date Collected: 02/21/23 10:55
Date Received: 02/25/23 09:00

Lab Sample ID: 320-97138-1
Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**3.4**		1.7	0.49	ng/L		02/27/23 04:29	03/04/23 08:38	1
Perfluoroheptanoic acid (PFHpA)	**1.8**		1.7	0.21	ng/L		02/27/23 04:29	03/04/23 08:38	1
Perfluorooctanoic acid (PFOA)	**4.2**		1.7	0.72	ng/L		02/27/23 04:29	03/04/23 08:38	1
Perfluorononanoic acid (PFNA)	**0.41**	**J**	1.7	0.23	ng/L		02/27/23 04:29	03/04/23 08:38	1
Perfluorodecanoic acid (PFDA)	ND		1.7	0.26	ng/L		02/27/23 04:29	03/04/23 08:38	1
Perfluoroundecanoic acid (PFUnA)	ND		1.7	0.94	ng/L		02/27/23 04:29	03/04/23 08:38	1
Perfluorododecanoic acid (PFDoA)	ND		1.7	0.47	ng/L		02/27/23 04:29	03/04/23 08:38	1
Perfluorotridecanoic acid (PFTriA)	ND		1.7	1.1	ng/L		02/27/23 04:29	03/04/23 08:38	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.7	0.62	ng/L		02/27/23 04:29	03/04/23 08:38	1
Perfluorobutanesulfonic acid (PFBS)	**1.3**	**J**	1.7	0.17	ng/L		02/27/23 04:29	03/04/23 08:38	1
Perfluorohexanesulfonic acid (PFHxS)	**3.0**		1.7	0.48	ng/L		02/27/23 04:29	03/04/23 08:38	1
Perfluorooctanesulfonic acid (PFOS)	**5.6**		1.7	0.46	ng/L		02/27/23 04:29	03/04/23 08:38	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.3	1.0	ng/L		02/27/23 04:29	03/04/23 08:38	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.3	1.1	ng/L		02/27/23 04:29	03/04/23 08:38	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.7	0.20	ng/L		02/27/23 04:29	03/04/23 08:38	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.4	1.3	ng/L		02/27/23 04:29	03/04/23 08:38	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.7	0.27	ng/L		02/27/23 04:29	03/04/23 08:38	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.7	0.34	ng/L		02/27/23 04:29	03/04/23 08:38	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*84*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:38*	*1*
13C4 PFHpA	*93*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:38*	*1*
13C4 PFOA	*103*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:38*	*1*
13C5 PFNA	*99*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:38*	*1*
13C2 PFDA	*96*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:38*	*1*
13C2 PFUnA	*96*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:38*	*1*
13C2 PFDoA	*79*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:38*	*1*
13C2 PFTeDA	*82*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:38*	*1*
13C3 PFBS	*83*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:38*	*1*
18O2 PFHxS	*90*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:38*	*1*
13C4 PFOS	*86*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:38*	*1*
d3-NMeFOSAA	*101*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:38*	*1*
d5-NEtFOSAA	*108*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:38*	*1*
13C3 HFPO-DA	*114*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:38*	*1*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-97138-1

Client Sample ID: MW-70-02212023
Date Collected: 02/21/23 12:40
Date Received: 02/25/23 09:00

Lab Sample ID: 320-97138-2
Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**22**		1.8	0.52	ng/L		02/27/23 04:29	03/04/23 08:49	1
Perfluoroheptanoic acid (PFHpA)	**4.7**		1.8	0.22	ng/L		02/27/23 04:29	03/04/23 08:49	1
Perfluorooctanoic acid (PFOA)	**10**		1.8	0.76	ng/L		02/27/23 04:29	03/04/23 08:49	1
Perfluorononanoic acid (PFNA)	**0.53**	**J**	1.8	0.24	ng/L		02/27/23 04:29	03/04/23 08:49	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		02/27/23 04:29	03/04/23 08:49	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.98	ng/L		02/27/23 04:29	03/04/23 08:49	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.49	ng/L		02/27/23 04:29	03/04/23 08:49	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		02/27/23 04:29	03/04/23 08:49	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.65	ng/L		02/27/23 04:29	03/04/23 08:49	1
Perfluorobutanesulfonic acid (PFBS)	**17**		1.8	0.18	ng/L		02/27/23 04:29	03/04/23 08:49	1
Perfluorohexanesulfonic acid (PFHxS)	**130**		1.8	0.51	ng/L		02/27/23 04:29	03/04/23 08:49	1
Perfluorooctanesulfonic acid (PFOS)	**72**		1.8	0.48	ng/L		02/27/23 04:29	03/04/23 08:49	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.4	1.1	ng/L		02/27/23 04:29	03/04/23 08:49	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.4	1.2	ng/L		02/27/23 04:29	03/04/23 08:49	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.21	ng/L		02/27/23 04:29	03/04/23 08:49	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.3	ng/L		02/27/23 04:29	03/04/23 08:49	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.28	ng/L		02/27/23 04:29	03/04/23 08:49	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		02/27/23 04:29	03/04/23 08:49	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*85*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:49*	*1*
13C4 PFHpA	*94*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:49*	*1*
13C4 PFOA	*101*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:49*	*1*
13C5 PFNA	*95*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:49*	*1*
13C2 PFDA	*95*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:49*	*1*
13C2 PFUnA	*86*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:49*	*1*
13C2 PFDoA	*85*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:49*	*1*
13C2 PFTeDA	*65*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:49*	*1*
13C3 PFBS	*95*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:49*	*1*
18O2 PFHxS	*90*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:49*	*1*
13C4 PFOS	*90*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:49*	*1*
d3-NMeFOSAA	*106*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:49*	*1*
d5-NEtFOSAA	*95*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:49*	*1*
13C3 HFPO-DA	*126*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:49*	*1*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-97138-1

Client Sample ID: MW-69-02212023
Date Collected: 02/21/23 13:10
Date Received: 02/25/23 09:00

Lab Sample ID: 320-97138-3
Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**4.2**		1.9	0.56	ng/L		02/27/23 04:29	03/04/23 08:59	1
Perfluoroheptanoic acid (PFHpA)	**2.0**		1.9	0.24	ng/L		02/27/23 04:29	03/04/23 08:59	1
Perfluorooctanoic acid (PFOA)	**5.7**		1.9	0.82	ng/L		02/27/23 04:29	03/04/23 08:59	1
Perfluorononanoic acid (PFNA)	**1.4**	**J**	1.9	0.26	ng/L		02/27/23 04:29	03/04/23 08:59	1
Perfluorodecanoic acid (PFDA)	**0.57**	**J**	1.9	0.30	ng/L		02/27/23 04:29	03/04/23 08:59	1
Perfluoroundecanoic acid (PFUnA)	ND		1.9	1.1	ng/L		02/27/23 04:29	03/04/23 08:59	1
Perfluorododecanoic acid (PFDoA)	ND		1.9	0.53	ng/L		02/27/23 04:29	03/04/23 08:59	1
Perfluorotridecanoic acid (PFTriA)	ND		1.9	1.3	ng/L		02/27/23 04:29	03/04/23 08:59	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.9	0.71	ng/L		02/27/23 04:29	03/04/23 08:59	1
Perfluorobutanesulfonic acid (PFBS)	ND	G	7.7	7.7	ng/L		02/27/23 04:29	03/04/23 08:59	1
Perfluorohexanesulfonic acid (PFHxS)	**19**		1.9	0.55	ng/L		02/27/23 04:29	03/04/23 08:59	1
Perfluorooctanesulfonic acid (PFOS)	**35**		1.9	0.52	ng/L		02/27/23 04:29	03/04/23 08:59	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.8	1.2	ng/L		02/27/23 04:29	03/04/23 08:59	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.8	1.3	ng/L		02/27/23 04:29	03/04/23 08:59	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.9	0.23	ng/L		02/27/23 04:29	03/04/23 08:59	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.9	1.5	ng/L		02/27/23 04:29	03/04/23 08:59	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.9	0.31	ng/L		02/27/23 04:29	03/04/23 08:59	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.9	0.39	ng/L		02/27/23 04:29	03/04/23 08:59	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*73*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:59*	*1*
13C4 PFHpA	*74*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:59*	*1*
13C4 PFOA	*74*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:59*	*1*
13C5 PFNA	*81*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:59*	*1*
13C2 PFDA	*79*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:59*	*1*
13C2 PFUnA	*72*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:59*	*1*
13C2 PFDoA	*73*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:59*	*1*
13C2 PFTeDA	*68*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:59*	*1*
13C3 PFBS	*73*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:59*	*1*
18O2 PFHxS	*72*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:59*	*1*
13C4 PFOS	*77*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:59*	*1*
d3-NMeFOSAA	*77*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:59*	*1*
d5-NEtFOSAA	*77*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:59*	*1*
13C3 HFPO-DA	*96*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:59*	*1*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-97138-1

Client Sample ID: MW-50-02212023
Date Collected: 02/21/23 13:55
Date Received: 02/25/23 09:00

Lab Sample ID: 320-97138-4
Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**150**		1.8	0.53	ng/L		02/27/23 04:29	03/04/23 09:09	1
Perfluoroheptanoic acid (PFHpA)	**27**		1.8	0.23	ng/L		02/27/23 04:29	03/04/23 09:09	1
Perfluorooctanoic acid (PFOA)	**26**		1.8	0.77	ng/L		02/27/23 04:29	03/04/23 09:09	1
Perfluorononanoic acid (PFNA)	**1.4**	**J**	1.8	0.25	ng/L		02/27/23 04:29	03/04/23 09:09	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		02/27/23 04:29	03/04/23 09:09	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	1.0	ng/L		02/27/23 04:29	03/04/23 09:09	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.50	ng/L		02/27/23 04:29	03/04/23 09:09	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		02/27/23 04:29	03/04/23 09:09	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.66	ng/L		02/27/23 04:29	03/04/23 09:09	1
Perfluorobutanesulfonic acid (PFBS)	**17**		1.8	0.18	ng/L		02/27/23 04:29	03/04/23 09:09	1
Perfluorohexanesulfonic acid (PFHxS)	**190**		1.8	0.52	ng/L		02/27/23 04:29	03/04/23 09:09	1
Perfluorooctanesulfonic acid (PFOS)	**270**		1.8	0.49	ng/L		02/27/23 04:29	03/04/23 09:09	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.6	1.1	ng/L		02/27/23 04:29	03/04/23 09:09	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.6	1.2	ng/L		02/27/23 04:29	03/04/23 09:09	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		02/27/23 04:29	03/04/23 09:09	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.4	ng/L		02/27/23 04:29	03/04/23 09:09	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		02/27/23 04:29	03/04/23 09:09	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		02/27/23 04:29	03/04/23 09:09	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*87*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:09*	*1*
13C4 PFHpA	*97*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:09*	*1*
13C4 PFOA	*106*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:09*	*1*
13C5 PFNA	*103*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:09*	*1*
13C2 PFDA	*101*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:09*	*1*
13C2 PFUnA	*99*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:09*	*1*
13C2 PFDoA	*91*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:09*	*1*
13C2 PFTeDA	*90*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:09*	*1*
13C3 PFBS	*99*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:09*	*1*
18O2 PFHxS	*88*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:09*	*1*
13C4 PFOS	*94*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:09*	*1*
d3-NMeFOSAA	*98*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:09*	*1*
d5-NEtFOSAA	*102*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:09*	*1*
13C3 HFPO-DA	*128*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:09*	*1*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-97138-1

Client Sample ID: MW-52-02212023
Date Collected: 02/21/23 15:05
Date Received: 02/25/23 09:00

Lab Sample ID: 320-97138-5
Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**10**		1.7	0.50	ng/L		02/27/23 04:29	03/04/23 09:19	1
Perfluoroheptanoic acid (PFHpA)	**3.5**		1.7	0.22	ng/L		02/27/23 04:29	03/04/23 09:19	1
Perfluorooctanoic acid (PFOA)	**5.1**		1.7	0.74	ng/L		02/27/23 04:29	03/04/23 09:19	1
Perfluorononanoic acid (PFNA)	**0.72**	**J**	1.7	0.23	ng/L		02/27/23 04:29	03/04/23 09:19	1
Perfluorodecanoic acid (PFDA)	**0.37**	**J**	1.7	0.27	ng/L		02/27/23 04:29	03/04/23 09:19	1
Perfluoroundecanoic acid (PFUnA)	ND		1.7	0.96	ng/L		02/27/23 04:29	03/04/23 09:19	1
Perfluorododecanoic acid (PFDoA)	ND		1.7	0.48	ng/L		02/27/23 04:29	03/04/23 09:19	1
Perfluorotridecanoic acid (PFTriA)	ND		1.7	1.1	ng/L		02/27/23 04:29	03/04/23 09:19	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.7	0.63	ng/L		02/27/23 04:29	03/04/23 09:19	1
Perfluorobutanesulfonic acid (PFBS)	**2.4**		1.7	0.17	ng/L		02/27/23 04:29	03/04/23 09:19	1
Perfluorohexanesulfonic acid (PFHxS)	**28**		1.7	0.50	ng/L		02/27/23 04:29	03/04/23 09:19	1
Perfluorooctanesulfonic acid (PFOS)	**76**		1.7	0.47	ng/L		02/27/23 04:29	03/04/23 09:19	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.3	1.0	ng/L		02/27/23 04:29	03/04/23 09:19	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.3	1.1	ng/L		02/27/23 04:29	03/04/23 09:19	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.7	0.21	ng/L		02/27/23 04:29	03/04/23 09:19	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.5	1.3	ng/L		02/27/23 04:29	03/04/23 09:19	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.7	0.28	ng/L		02/27/23 04:29	03/04/23 09:19	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.7	0.35	ng/L		02/27/23 04:29	03/04/23 09:19	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*89*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:19*	*1*
13C4 PFHpA	*110*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:19*	*1*
13C4 PFOA	*105*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:19*	*1*
13C5 PFNA	*111*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:19*	*1*
13C2 PFDA	*112*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:19*	*1*
13C2 PFUnA	*104*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:19*	*1*
13C2 PFDoA	*95*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:19*	*1*
13C2 PFTeDA	*90*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:19*	*1*
13C3 PFBS	*110*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:19*	*1*
18O2 PFHxS	*101*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:19*	*1*
13C4 PFOS	*102*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:19*	*1*
d3-NMeFOSAA	*100*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:19*	*1*
d5-NEtFOSAA	*105*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:19*	*1*
13C3 HFPO-DA	*135*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:19*	*1*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-97138-1

Client Sample ID: MW-46-02212023
Date Collected: 02/21/23 16:25
Date Received: 02/25/23 09:00

Lab Sample ID: 320-97138-6
Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**12**		1.8	0.52	ng/L		02/27/23 04:29	03/04/23 09:30	1
Perfluoroheptanoic acid (PFHpA)	**2.1**		1.8	0.22	ng/L		02/27/23 04:29	03/04/23 09:30	1
Perfluorooctanoic acid (PFOA)	**4.3**		1.8	0.76	ng/L		02/27/23 04:29	03/04/23 09:30	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.24	ng/L		02/27/23 04:29	03/04/23 09:30	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		02/27/23 04:29	03/04/23 09:30	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.99	ng/L		02/27/23 04:29	03/04/23 09:30	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.49	ng/L		02/27/23 04:29	03/04/23 09:30	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		02/27/23 04:29	03/04/23 09:30	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.65	ng/L		02/27/23 04:29	03/04/23 09:30	1
Perfluorobutanesulfonic acid (PFBS)	**2.3**		1.8	0.18	ng/L		02/27/23 04:29	03/04/23 09:30	1
Perfluorohexanesulfonic acid (PFHxS)	**28**		1.8	0.51	ng/L		02/27/23 04:29	03/04/23 09:30	1
Perfluorooctanesulfonic acid (PFOS)	**52**		1.8	0.48	ng/L		02/27/23 04:29	03/04/23 09:30	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.5	1.1	ng/L		02/27/23 04:29	03/04/23 09:30	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.5	1.2	ng/L		02/27/23 04:29	03/04/23 09:30	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		02/27/23 04:29	03/04/23 09:30	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.3	ng/L		02/27/23 04:29	03/04/23 09:30	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		02/27/23 04:29	03/04/23 09:30	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		02/27/23 04:29	03/04/23 09:30	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*61*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:30*	*1*
13C4 PFHpA	*68*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:30*	*1*
13C4 PFOA	*75*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:30*	*1*
13C5 PFNA	*67*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:30*	*1*
13C2 PFDA	*69*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:30*	*1*
13C2 PFUnA	*66*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:30*	*1*
13C2 PFDoA	*59*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:30*	*1*
13C2 PFTeDA	*52*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:30*	*1*
13C3 PFBS	*63*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:30*	*1*
18O2 PFHxS	*66*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:30*	*1*
13C4 PFOS	*61*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:30*	*1*
d3-NMeFOSAA	*71*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:30*	*1*
d5-NEtFOSAA	*62*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:30*	*1*
13C3 HFPO-DA	*82*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:30*	*1*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-97138-1

Client Sample ID: MW-100-02212023

Date Collected: 02/21/23 17:00
Date Received: 02/25/23 09:00

Lab Sample ID: 320-97138-7

Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**11**		1.7	0.50	ng/L		02/27/23 04:29	03/04/23 09:40	1
Perfluoroheptanoic acid (PFHpA)	**2.1**		1.7	0.22	ng/L		02/27/23 04:29	03/04/23 09:40	1
Perfluorooctanoic acid (PFOA)	**4.6**		1.7	0.74	ng/L		02/27/23 04:29	03/04/23 09:40	1
Perfluorononanoic acid (PFNA)	**0.26**	**J**	1.7	0.23	ng/L		02/27/23 04:29	03/04/23 09:40	1
Perfluorodecanoic acid (PFDA)	ND		1.7	0.27	ng/L		02/27/23 04:29	03/04/23 09:40	1
Perfluoroundecanoic acid (PFUnA)	ND		1.7	0.95	ng/L		02/27/23 04:29	03/04/23 09:40	1
Perfluorododecanoic acid (PFDoA)	ND		1.7	0.48	ng/L		02/27/23 04:29	03/04/23 09:40	1
Perfluorotridecanoic acid (PFTriA)	ND		1.7	1.1	ng/L		02/27/23 04:29	03/04/23 09:40	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.7	0.63	ng/L		02/27/23 04:29	03/04/23 09:40	1
Perfluorobutanesulfonic acid (PFBS)	**2.0**		1.7	0.17	ng/L		02/27/23 04:29	03/04/23 09:40	1
Perfluorohexanesulfonic acid (PFHxS)	**29**		1.7	0.49	ng/L		02/27/23 04:29	03/04/23 09:40	1
Perfluorooctanesulfonic acid (PFOS)	**46**		1.7	0.47	ng/L		02/27/23 04:29	03/04/23 09:40	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.3	1.0	ng/L		02/27/23 04:29	03/04/23 09:40	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.3	1.1	ng/L		02/27/23 04:29	03/04/23 09:40	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.7	0.21	ng/L		02/27/23 04:29	03/04/23 09:40	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.5	1.3	ng/L		02/27/23 04:29	03/04/23 09:40	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.7	0.28	ng/L		02/27/23 04:29	03/04/23 09:40	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.7	0.35	ng/L		02/27/23 04:29	03/04/23 09:40	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*68*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:40*	*1*
13C4 PFHpA	*77*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:40*	*1*
13C4 PFOA	*80*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:40*	*1*
13C5 PFNA	*79*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:40*	*1*
13C2 PFDA	*76*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:40*	*1*
13C2 PFUnA	*77*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:40*	*1*
13C2 PFDoA	*71*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:40*	*1*
13C2 PFTeDA	*61*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:40*	*1*
13C3 PFBS	*70*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:40*	*1*
18O2 PFHxS	*72*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:40*	*1*
13C4 PFOS	*74*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:40*	*1*
d3-NMeFOSAA	*80*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:40*	*1*
d5-NEtFOSAA	*71*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:40*	*1*
13C3 HFPO-DA	*91*		*50 - 150*	*02/27/23 04:29*	*03/04/23 09:40*	*1*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-97138-1

Client Sample ID: MW-63-02222023
Date Collected: 02/22/23 10:05
Date Received: 02/25/23 09:00

Lab Sample ID: 320-97138-8
Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**22**		1.8	0.54	ng/L		02/27/23 12:17	03/04/23 05:13	1
Perfluoroheptanoic acid (PFHpA)	**5.3**		1.8	0.23	ng/L		02/27/23 12:17	03/04/23 05:13	1
Perfluorooctanoic acid (PFOA)	**17**		1.8	0.79	ng/L		02/27/23 12:17	03/04/23 05:13	1
Perfluorononanoic acid (PFNA)	**1.1**	**J**	1.8	0.25	ng/L		02/27/23 12:17	03/04/23 05:13	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.29	ng/L		02/27/23 12:17	03/04/23 05:13	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	1.0	ng/L		02/27/23 12:17	03/04/23 05:13	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.51	ng/L		02/27/23 12:17	03/04/23 05:13	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		02/27/23 12:17	03/04/23 05:13	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.68	ng/L		02/27/23 12:17	03/04/23 05:13	1
Perfluorobutanesulfonic acid (PFBS)	**5.2**		1.8	0.18	ng/L		02/27/23 12:17	03/04/23 05:13	1
Perfluorohexanesulfonic acid (PFHxS)	**59**		1.8	0.53	ng/L		02/27/23 12:17	03/04/23 05:13	1
Perfluorooctanesulfonic acid (PFOS)	**230**		1.8	0.50	ng/L		02/27/23 12:17	03/04/23 05:13	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.6	1.1	ng/L		02/27/23 12:17	03/04/23 05:13	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.6	1.2	ng/L		02/27/23 12:17	03/04/23 05:13	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		02/27/23 12:17	03/04/23 05:13	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.7	1.4	ng/L		02/27/23 12:17	03/04/23 05:13	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.30	ng/L		02/27/23 12:17	03/04/23 05:13	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.37	ng/L		02/27/23 12:17	03/04/23 05:13	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*91*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:13*	*1*
13C4 PFHpA	*108*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:13*	*1*
13C4 PFOA	*107*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:13*	*1*
13C5 PFNA	*97*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:13*	*1*
13C2 PFDA	*96*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:13*	*1*
13C2 PFUnA	*93*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:13*	*1*
13C2 PFDoA	*91*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:13*	*1*
13C2 PFTeDA	*80*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:13*	*1*
13C3 PFBS	*89*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:13*	*1*
18O2 PFHxS	*90*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:13*	*1*
13C4 PFOS	*88*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:13*	*1*
d3-NMeFOSAA	*111*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:13*	*1*
d5-NEtFOSAA	*106*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:13*	*1*
13C3 HFPO-DA	*126*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:13*	*1*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-97138-1

Client Sample ID: MW-40-02222023

Date Collected: 02/22/23 11:05
Date Received: 02/25/23 09:00

Lab Sample ID: 320-97138-9

Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**120**		2.0	0.58	ng/L		02/27/23 12:17	03/04/23 05:24	1
Perfluoroheptanoic acid (PFHpA)	**33**		2.0	0.25	ng/L		02/27/23 12:17	03/04/23 05:24	1
Perfluorooctanoic acid (PFOA)	**22**		2.0	0.85	ng/L		02/27/23 12:17	03/04/23 05:24	1
Perfluorononanoic acid (PFNA)	**0.61**	**J**	2.0	0.27	ng/L		02/27/23 12:17	03/04/23 05:24	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		02/27/23 12:17	03/04/23 05:24	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		02/27/23 12:17	03/04/23 05:24	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		02/27/23 12:17	03/04/23 05:24	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		02/27/23 12:17	03/04/23 05:24	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.73	ng/L		02/27/23 12:17	03/04/23 05:24	1
Perfluorobutanesulfonic acid (PFBS)	**13**		2.0	0.20	ng/L		02/27/23 12:17	03/04/23 05:24	1
Perfluorohexanesulfonic acid (PFHxS)	**200**		2.0	0.57	ng/L		02/27/23 12:17	03/04/23 05:24	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		5.0	1.2	ng/L		02/27/23 12:17	03/04/23 05:24	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		5.0	1.3	ng/L		02/27/23 12:17	03/04/23 05:24	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.0	0.24	ng/L		02/27/23 12:17	03/04/23 05:24	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		4.0	1.5	ng/L		02/27/23 12:17	03/04/23 05:24	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.0	0.32	ng/L		02/27/23 12:17	03/04/23 05:24	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.40	ng/L		02/27/23 12:17	03/04/23 05:24	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*90*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:24*	*1*
13C4 PFHpA	*98*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:24*	*1*
13C4 PFOA	*103*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:24*	*1*
13C5 PFNA	*89*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:24*	*1*
13C2 PFDA	*89*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:24*	*1*
13C2 PFUnA	*89*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:24*	*1*
13C2 PFDoA	*80*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:24*	*1*
13C2 PFTeDA	*77*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:24*	*1*
13C3 PFBS	*90*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:24*	*1*
18O2 PFHxS	*88*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:24*	*1*
13C4 PFOS	*85*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:24*	*1*
d3-NMeFOSAA	*96*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:24*	*1*
d5-NEtFOSAA	*92*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:24*	*1*
13C3 HFPO-DA	*126*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:24*	*1*

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	**630**		10	2.7	ng/L		02/27/23 12:17	03/07/23 02:30	5

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*96*		*50 - 150*	*02/27/23 12:17*	*03/07/23 02:30*	*5*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-97138-1

Client Sample ID: MW-41-02222023

Date Collected: 02/22/23 11:30
Date Received: 02/25/23 09:00

Lab Sample ID: 320-97138-10

Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoroheptanoic acid (PFHpA)	**72**		1.8	0.22	ng/L		02/27/23 12:17	03/04/23 05:34	1
Perfluorooctanoic acid (PFOA)	**45**		1.8	0.76	ng/L		02/27/23 12:17	03/04/23 05:34	1
Perfluorononanoic acid (PFNA)	**1.6**	**J**	1.8	0.24	ng/L		02/27/23 12:17	03/04/23 05:34	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		02/27/23 12:17	03/04/23 05:34	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.99	ng/L		02/27/23 12:17	03/04/23 05:34	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.49	ng/L		02/27/23 12:17	03/04/23 05:34	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		02/27/23 12:17	03/04/23 05:34	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.66	ng/L		02/27/23 12:17	03/04/23 05:34	1
Perfluorobutanesulfonic acid (PFBS)	**57**		1.8	0.18	ng/L		02/27/23 12:17	03/04/23 05:34	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.5	1.1	ng/L		02/27/23 12:17	03/04/23 05:34	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.5	1.2	ng/L		02/27/23 12:17	03/04/23 05:34	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		02/27/23 12:17	03/04/23 05:34	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.3	ng/L		02/27/23 12:17	03/04/23 05:34	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		02/27/23 12:17	03/04/23 05:34	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		02/27/23 12:17	03/04/23 05:34	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFHpA	*63*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:34*	*1*
13C4 PFOA	*70*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:34*	*1*
13C5 PFNA	*69*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:34*	*1*
13C2 PFDA	*67*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:34*	*1*
13C2 PFUnA	*60*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:34*	*1*
13C2 PFDoA	*47*	**5-*	*50 - 150*	*02/27/23 12:17*	*03/04/23 05:34*	*1*
13C2 PFTeDA	*39*	**5-*	*50 - 150*	*02/27/23 12:17*	*03/04/23 05:34*	*1*
13C3 PFBS	*62*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:34*	*1*
13C4 PFOS	*66*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:34*	*1*
d3-NMeFOSAA	*68*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:34*	*1*
d5-NEtFOSAA	*56*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:34*	*1*
13C3 HFPO-DA	*93*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:34*	*1*

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**410**		18	5.2	ng/L		02/27/23 12:17	03/07/23 03:01	10
Perfluorohexanesulfonic acid (PFHxS)	**470**		18	5.1	ng/L		02/27/23 12:17	03/07/23 03:01	10
Perfluorooctanesulfonic acid (PFOS)	**1100**		18	4.9	ng/L		02/27/23 12:17	03/07/23 03:01	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*65*		*50 - 150*	*02/27/23 12:17*	*03/07/23 03:01*	*10*
18O2 PFHxS	*67*		*50 - 150*	*02/27/23 12:17*	*03/07/23 03:01*	*10*
13C4 PFOS	*61*		*50 - 150*	*02/27/23 12:17*	*03/07/23 03:01*	*10*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-97138-1

Client Sample ID: MW-64-02222023

Date Collected: 02/22/23 12:45
Date Received: 02/25/23 09:00

Lab Sample ID: 320-97138-11

Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**73**		1.8	0.52	ng/L		02/27/23 12:17	03/04/23 05:44	1
Perfluoroheptanoic acid (PFHpA)	**11**		1.8	0.22	ng/L		02/27/23 12:17	03/04/23 05:44	1
Perfluorooctanoic acid (PFOA)	**18**		1.8	0.76	ng/L		02/27/23 12:17	03/04/23 05:44	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.24	ng/L		02/27/23 12:17	03/04/23 05:44	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		02/27/23 12:17	03/04/23 05:44	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.98	ng/L		02/27/23 12:17	03/04/23 05:44	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.49	ng/L		02/27/23 12:17	03/04/23 05:44	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		02/27/23 12:17	03/04/23 05:44	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.65	ng/L		02/27/23 12:17	03/04/23 05:44	1
Perfluorobutanesulfonic acid (PFBS)	**15**		1.8	0.18	ng/L		02/27/23 12:17	03/04/23 05:44	1
Perfluorohexanesulfonic acid (PFHxS)	**150**		1.8	0.51	ng/L		02/27/23 12:17	03/04/23 05:44	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.5	1.1	ng/L		02/27/23 12:17	03/04/23 05:44	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.5	1.2	ng/L		02/27/23 12:17	03/04/23 05:44	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.21	ng/L		02/27/23 12:17	03/04/23 05:44	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.3	ng/L		02/27/23 12:17	03/04/23 05:44	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		02/27/23 12:17	03/04/23 05:44	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		02/27/23 12:17	03/04/23 05:44	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*52*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:44*	*1*
13C4 PFHpA	*64*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:44*	*1*
13C4 PFOA	*62*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:44*	*1*
13C5 PFNA	*61*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:44*	*1*
13C2 PFDA	*55*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:44*	*1*
13C2 PFUnA	*51*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:44*	*1*
13C2 PFDoA	*44*	**5-*	*50 - 150*	*02/27/23 12:17*	*03/04/23 05:44*	*1*
13C2 PFTeDA	*35*	**5-*	*50 - 150*	*02/27/23 12:17*	*03/04/23 05:44*	*1*
13C3 PFBS	*58*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:44*	*1*
18O2 PFHxS	*55*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:44*	*1*
13C4 PFOS	*53*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:44*	*1*
d3-NMeFOSAA	*60*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:44*	*1*
d5-NEtFOSAA	*51*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:44*	*1*
13C3 HFPO-DA	*84*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:44*	*1*

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	**480**		8.9	2.4	ng/L		02/27/23 12:17	03/07/23 02:40	5

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*64*		*50 - 150*	*02/27/23 12:17*	*03/07/23 02:40*	*5*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-97138-1

Client Sample ID: MW-60-02222023

Date Collected: 02/22/23 13:50
Date Received: 02/25/23 09:00

Lab Sample ID: 320-97138-12

Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**350**		1.8	0.53	ng/L		02/27/23 12:17	03/04/23 05:54	1
Perfluoroheptanoic acid (PFHpA)	**110**		1.8	0.23	ng/L		02/27/23 12:17	03/04/23 05:54	1
Perfluorooctanoic acid (PFOA)	**170**		1.8	0.77	ng/L		02/27/23 12:17	03/04/23 05:54	1
Perfluorononanoic acid (PFNA)	**1.1**	**J**	1.8	0.25	ng/L		02/27/23 12:17	03/04/23 05:54	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		02/27/23 12:17	03/04/23 05:54	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	1.0	ng/L		02/27/23 12:17	03/04/23 05:54	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.50	ng/L		02/27/23 12:17	03/04/23 05:54	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		02/27/23 12:17	03/04/23 05:54	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.66	ng/L		02/27/23 12:17	03/04/23 05:54	1
Perfluorobutanesulfonic acid (PFBS)	**85**		1.8	0.18	ng/L		02/27/23 12:17	03/04/23 05:54	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.5	1.1	ng/L		02/27/23 12:17	03/04/23 05:54	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.5	1.2	ng/L		02/27/23 12:17	03/04/23 05:54	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		02/27/23 12:17	03/04/23 05:54	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.4	ng/L		02/27/23 12:17	03/04/23 05:54	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		02/27/23 12:17	03/04/23 05:54	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		02/27/23 12:17	03/04/23 05:54	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*63*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:54*	*1*
13C4 PFHpA	*65*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:54*	*1*
13C4 PFOA	*71*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:54*	*1*
13C5 PFNA	*67*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:54*	*1*
13C2 PFDA	*68*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:54*	*1*
13C2 PFUnA	*68*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:54*	*1*
13C2 PFDoA	*60*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:54*	*1*
13C2 PFTeDA	*52*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:54*	*1*
13C3 PFBS	*65*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:54*	*1*
13C4 PFOS	*63*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:54*	*1*
d3-NMeFOSAA	*63*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:54*	*1*
d5-NEtFOSAA	*64*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:54*	*1*
13C3 HFPO-DA	*90*		*50 - 150*	*02/27/23 12:17*	*03/04/23 05:54*	*1*

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanesulfonic acid (PFHxS)	**1400**		91	26	ng/L		02/27/23 12:17	03/07/23 03:21	50
Perfluorooctanesulfonic acid (PFOS)	**4200**		91	25	ng/L		02/27/23 12:17	03/07/23 03:21	50

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*66*		*50 - 150*	*02/27/23 12:17*	*03/07/23 03:21*	*50*
13C4 PFOS	*58*		*50 - 150*	*02/27/23 12:17*	*03/07/23 03:21*	*50*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-97138-1

Client Sample ID: MW-61-02222023

Date Collected: 02/22/23 14:55
Date Received: 02/25/23 09:00

Lab Sample ID: 320-97138-13

Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoroheptanoic acid (PFHpA)	**250**		1.8	0.23	ng/L		02/27/23 12:17	03/04/23 06:05	1
Perfluorooctanoic acid (PFOA)	**220**		1.8	0.77	ng/L		02/27/23 12:17	03/04/23 06:05	1
Perfluorononanoic acid (PFNA)	**3.2**		1.8	0.25	ng/L		02/27/23 12:17	03/04/23 06:05	1
Perfluorodecanoic acid (PFDA)	**0.44**	**J**	1.8	0.28	ng/L		02/27/23 12:17	03/04/23 06:05	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	1.0	ng/L		02/27/23 12:17	03/04/23 06:05	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.50	ng/L		02/27/23 12:17	03/04/23 06:05	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		02/27/23 12:17	03/04/23 06:05	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.66	ng/L		02/27/23 12:17	03/04/23 06:05	1
Perfluorobutanesulfonic acid (PFBS)	**130**		1.8	0.18	ng/L		02/27/23 12:17	03/04/23 06:05	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.5	1.1	ng/L		02/27/23 12:17	03/04/23 06:05	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.5	1.2	ng/L		02/27/23 12:17	03/04/23 06:05	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		02/27/23 12:17	03/04/23 06:05	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.4	ng/L		02/27/23 12:17	03/04/23 06:05	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		02/27/23 12:17	03/04/23 06:05	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		02/27/23 12:17	03/04/23 06:05	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFHpA	*101*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:05*	*1*
13C4 PFOA	*104*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:05*	*1*
13C5 PFNA	*121*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:05*	*1*
13C2 PFDA	*119*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:05*	*1*
13C2 PFUnA	*114*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:05*	*1*
13C2 PFDoA	*108*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:05*	*1*
13C2 PFTeDA	*95*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:05*	*1*
13C3 PFBS	*111*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:05*	*1*
13C4 PFOS	*122*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:05*	*1*
d3-NMeFOSAA	*110*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:05*	*1*
d5-NEtFOSAA	*102*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:05*	*1*
13C3 HFPO-DA	*150*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:05*	*1*

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**1000**		36	11	ng/L		02/27/23 12:17	03/07/23 03:11	20
Perfluorohexanesulfonic acid (PFHxS)	**3200**		36	10	ng/L		02/27/23 12:17	03/07/23 03:11	20
Perfluorooctanesulfonic acid (PFOS)	**1900**		36	9.8	ng/L		02/27/23 12:17	03/07/23 03:11	20

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*96*		*50 - 150*	*02/27/23 12:17*	*03/07/23 03:11*	*20*
18O2 PFHxS	*85*		*50 - 150*	*02/27/23 12:17*	*03/07/23 03:11*	*20*
13C4 PFOS	*104*		*50 - 150*	*02/27/23 12:17*	*03/07/23 03:11*	*20*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-97138-1

Client Sample ID: MW-36-02222023
Date Collected: 02/22/23 15:52
Date Received: 02/25/23 09:00

Lab Sample ID: 320-97138-14
Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**270**		1.8	0.52	ng/L		02/27/23 12:17	03/04/23 06:25	1
Perfluoroheptanoic acid (PFHpA)	**110**		1.8	0.23	ng/L		02/27/23 12:17	03/04/23 06:25	1
Perfluorooctanoic acid (PFOA)	**37**		1.8	0.77	ng/L		02/27/23 12:17	03/04/23 06:25	1
Perfluorononanoic acid (PFNA)	**0.25**	**J**	1.8	0.24	ng/L		02/27/23 12:17	03/04/23 06:25	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		02/27/23 12:17	03/04/23 06:25	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	1.0	ng/L		02/27/23 12:17	03/04/23 06:25	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.50	ng/L		02/27/23 12:17	03/04/23 06:25	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		02/27/23 12:17	03/04/23 06:25	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.66	ng/L		02/27/23 12:17	03/04/23 06:25	1
Perfluorobutanesulfonic acid (PFBS)	**42**		1.8	0.18	ng/L		02/27/23 12:17	03/04/23 06:25	1
Perfluorooctanesulfonic acid (PFOS)	**68**		1.8	0.49	ng/L		02/27/23 12:17	03/04/23 06:25	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.5	1.1	ng/L		02/27/23 12:17	03/04/23 06:25	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.5	1.2	ng/L		02/27/23 12:17	03/04/23 06:25	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		02/27/23 12:17	03/04/23 06:25	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.4	ng/L		02/27/23 12:17	03/04/23 06:25	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		02/27/23 12:17	03/04/23 06:25	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		02/27/23 12:17	03/04/23 06:25	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*72*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:25*	*1*
13C4 PFHpA	*84*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:25*	*1*
13C4 PFOA	*82*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:25*	*1*
13C5 PFNA	*84*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:25*	*1*
13C2 PFDA	*82*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:25*	*1*
13C2 PFUnA	*72*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:25*	*1*
13C2 PFDoA	*73*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:25*	*1*
13C2 PFTeDA	*66*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:25*	*1*
13C3 PFBS	*77*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:25*	*1*
13C4 PFOS	*72*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:25*	*1*
d3-NMeFOSAA	*79*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:25*	*1*
d5-NEtFOSAA	*84*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:25*	*1*
13C3 HFPO-DA	*104*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:25*	*1*

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanesulfonic acid (PFHxS)	**470**		9.0	2.6	ng/L		02/27/23 12:17	03/07/23 02:51	5

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*71*		*50 - 150*	*02/27/23 12:17*	*03/07/23 02:51*	*5*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-97138-1

Client Sample ID: MW-74-02222023

Date Collected: 02/22/23 16:25
Date Received: 02/25/23 09:00

Lab Sample ID: 320-97138-15

Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoroheptanoic acid (PFHpA)	**150**		1.8	0.22	ng/L		02/27/23 12:17	03/04/23 06:35	1
Perfluorooctanoic acid (PFOA)	**230**		1.8	0.76	ng/L		02/27/23 12:17	03/04/23 06:35	1
Perfluorononanoic acid (PFNA)	**1.8**		1.8	0.24	ng/L		02/27/23 12:17	03/04/23 06:35	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		02/27/23 12:17	03/04/23 06:35	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.98	ng/L		02/27/23 12:17	03/04/23 06:35	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.49	ng/L		02/27/23 12:17	03/04/23 06:35	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		02/27/23 12:17	03/04/23 06:35	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.65	ng/L		02/27/23 12:17	03/04/23 06:35	1
Perfluorobutanesulfonic acid (PFBS)	**58**		1.8	0.18	ng/L		02/27/23 12:17	03/04/23 06:35	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.5	1.1	ng/L		02/27/23 12:17	03/04/23 06:35	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.5	1.2	ng/L		02/27/23 12:17	03/04/23 06:35	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.21	ng/L		02/27/23 12:17	03/04/23 06:35	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.3	ng/L		02/27/23 12:17	03/04/23 06:35	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		02/27/23 12:17	03/04/23 06:35	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		02/27/23 12:17	03/04/23 06:35	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFHpA	*71*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:35*	*1*
13C4 PFOA	*71*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:35*	*1*
13C5 PFNA	*60*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:35*	*1*
13C2 PFDA	*70*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:35*	*1*
13C2 PFUnA	*61*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:35*	*1*
13C2 PFDoA	*54*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:35*	*1*
13C2 PFTeDA	*50*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:35*	*1*
13C3 PFBS	*69*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:35*	*1*
13C4 PFOS	*64*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:35*	*1*
d3-NMeFOSAA	*66*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:35*	*1*
d5-NEtFOSAA	*62*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:35*	*1*
13C3 HFPO-DA	*94*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:35*	*1*

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**410**		180	52	ng/L		02/27/23 12:17	03/07/23 03:32	100
Perfluorohexanesulfonic acid (PFHxS)	**1500**		180	51	ng/L		02/27/23 12:17	03/07/23 03:32	100
Perfluorooctanesulfonic acid (PFOS)	**14000**		180	48	ng/L		02/27/23 12:17	03/07/23 03:32	100

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*77*		*50 - 150*	*02/27/23 12:17*	*03/07/23 03:32*	*100*
18O2 PFHxS	*70*		*50 - 150*	*02/27/23 12:17*	*03/07/23 03:32*	*100*
13C4 PFOS	*74*		*50 - 150*	*02/27/23 12:17*	*03/07/23 03:32*	*100*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-97138-1

Client Sample ID: MW-38-02232023
Date Collected: 02/23/23 09:16
Date Received: 02/25/23 09:00

Lab Sample ID: 320-97138-16
Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**1.3**	**J**	1.9	0.54	ng/L		02/27/23 12:17	03/04/23 06:46	1
Perfluoroheptanoic acid (PFHpA)	**0.75**	**J**	1.9	0.23	ng/L		02/27/23 12:17	03/04/23 06:46	1
Perfluorooctanoic acid (PFOA)	**2.3**		1.9	0.79	ng/L		02/27/23 12:17	03/04/23 06:46	1
Perfluorononanoic acid (PFNA)	**0.62**	**J**	1.9	0.25	ng/L		02/27/23 12:17	03/04/23 06:46	1
Perfluorodecanoic acid (PFDA)	ND		1.9	0.29	ng/L		02/27/23 12:17	03/04/23 06:46	1
Perfluoroundecanoic acid (PFUnA)	ND		1.9	1.0	ng/L		02/27/23 12:17	03/04/23 06:46	1
Perfluorododecanoic acid (PFDoA)	ND		1.9	0.51	ng/L		02/27/23 12:17	03/04/23 06:46	1
Perfluorotridecanoic acid (PFTriA)	ND		1.9	1.2	ng/L		02/27/23 12:17	03/04/23 06:46	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.9	0.68	ng/L		02/27/23 12:17	03/04/23 06:46	1
Perfluorobutanesulfonic acid (PFBS)	**0.61**	**J**	1.9	0.19	ng/L		02/27/23 12:17	03/04/23 06:46	1
Perfluorohexanesulfonic acid (PFHxS)	**8.6**		1.9	0.53	ng/L		02/27/23 12:17	03/04/23 06:46	1
Perfluorooctanesulfonic acid (PFOS)	**12**		1.9	0.51	ng/L		02/27/23 12:17	03/04/23 06:46	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.7	1.1	ng/L		02/27/23 12:17	03/04/23 06:46	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.7	1.2	ng/L		02/27/23 12:17	03/04/23 06:46	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.9	0.22	ng/L		02/27/23 12:17	03/04/23 06:46	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.7	1.4	ng/L		02/27/23 12:17	03/04/23 06:46	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.9	0.30	ng/L		02/27/23 12:17	03/04/23 06:46	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.9	0.37	ng/L		02/27/23 12:17	03/04/23 06:46	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*94*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:46*	*1*
13C4 PFHpA	*108*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:46*	*1*
13C4 PFOA	*102*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:46*	*1*
13C5 PFNA	*102*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:46*	*1*
13C2 PFDA	*106*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:46*	*1*
13C2 PFUnA	*91*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:46*	*1*
13C2 PFDoA	*91*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:46*	*1*
13C2 PFTeDA	*87*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:46*	*1*
13C3 PFBS	*91*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:46*	*1*
18O2 PFHxS	*84*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:46*	*1*
13C4 PFOS	*92*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:46*	*1*
d3-NMeFOSAA	*107*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:46*	*1*
d5-NEtFOSAA	*104*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:46*	*1*
13C3 HFPO-DA	*133*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:46*	*1*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-97138-1

Client Sample ID: MW-77-02232023
Date Collected: 02/23/23 10:30
Date Received: 02/25/23 09:00

Lab Sample ID: 320-97138-17
Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**0.88**	**J**	1.8	0.53	ng/L		02/27/23 12:17	03/04/23 06:56	1
Perfluoroheptanoic acid (PFHpA)	ND		1.8	0.23	ng/L		02/27/23 12:17	03/04/23 06:56	1
Perfluorooctanoic acid (PFOA)	**0.94**	**J**	1.8	0.78	ng/L		02/27/23 12:17	03/04/23 06:56	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.25	ng/L		02/27/23 12:17	03/04/23 06:56	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.29	ng/L		02/27/23 12:17	03/04/23 06:56	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	1.0	ng/L		02/27/23 12:17	03/04/23 06:56	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.51	ng/L		02/27/23 12:17	03/04/23 06:56	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		02/27/23 12:17	03/04/23 06:56	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.67	ng/L		02/27/23 12:17	03/04/23 06:56	1
Perfluorobutanesulfonic acid (PFBS)	**0.79**	**J**	1.8	0.18	ng/L		02/27/23 12:17	03/04/23 06:56	1
Perfluorohexanesulfonic acid (PFHxS)	**3.4**		1.8	0.52	ng/L		02/27/23 12:17	03/04/23 06:56	1
Perfluorooctanesulfonic acid (PFOS)	**18**		1.8	0.50	ng/L		02/27/23 12:17	03/04/23 06:56	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.6	1.1	ng/L		02/27/23 12:17	03/04/23 06:56	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.6	1.2	ng/L		02/27/23 12:17	03/04/23 06:56	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		02/27/23 12:17	03/04/23 06:56	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.7	1.4	ng/L		02/27/23 12:17	03/04/23 06:56	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		02/27/23 12:17	03/04/23 06:56	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.37	ng/L		02/27/23 12:17	03/04/23 06:56	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*61*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:56*	*1*
13C4 PFHpA	*64*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:56*	*1*
13C4 PFOA	*66*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:56*	*1*
13C5 PFNA	*68*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:56*	*1*
13C2 PFDA	*67*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:56*	*1*
13C2 PFUnA	*59*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:56*	*1*
13C2 PFDoA	*54*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:56*	*1*
13C2 PFTeDA	*51*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:56*	*1*
13C3 PFBS	*61*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:56*	*1*
18O2 PFHxS	*61*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:56*	*1*
13C4 PFOS	*62*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:56*	*1*
d3-NMeFOSAA	*66*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:56*	*1*
d5-NEtFOSAA	*62*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:56*	*1*
13C3 HFPO-DA	*81*		*50 - 150*	*02/27/23 12:17*	*03/04/23 06:56*	*1*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-97138-1

Client Sample ID: MW-37-02232023
Date Collected: 02/23/23 11:40
Date Received: 02/25/23 09:00

Lab Sample ID: 320-97138-18
Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**2.0**		1.9	0.54	ng/L		02/27/23 12:17	03/04/23 07:06	1
Perfluoroheptanoic acid (PFHpA)	**0.95**	**J**	1.9	0.23	ng/L		02/27/23 12:17	03/04/23 07:06	1
Perfluorooctanoic acid (PFOA)	**4.0**		1.9	0.80	ng/L		02/27/23 12:17	03/04/23 07:06	1
Perfluorononanoic acid (PFNA)	**0.69**	**J**	1.9	0.25	ng/L		02/27/23 12:17	03/04/23 07:06	1
Perfluorodecanoic acid (PFDA)	**0.31**	**J**	1.9	0.29	ng/L		02/27/23 12:17	03/04/23 07:06	1
Perfluoroundecanoic acid (PFUnA)	ND		1.9	1.0	ng/L		02/27/23 12:17	03/04/23 07:06	1
Perfluorododecanoic acid (PFDoA)	ND		1.9	0.52	ng/L		02/27/23 12:17	03/04/23 07:06	1
Perfluorotridecanoic acid (PFTriA)	ND		1.9	1.2	ng/L		02/27/23 12:17	03/04/23 07:06	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.9	0.69	ng/L		02/27/23 12:17	03/04/23 07:06	1
Perfluorobutanesulfonic acid (PFBS)	**0.91**	**J**	1.9	0.19	ng/L		02/27/23 12:17	03/04/23 07:06	1
Perfluorohexanesulfonic acid (PFHxS)	**3.9**		1.9	0.54	ng/L		02/27/23 12:17	03/04/23 07:06	1
Perfluorooctanesulfonic acid (PFOS)	**11**		1.9	0.51	ng/L		02/27/23 12:17	03/04/23 07:06	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.7	1.1	ng/L		02/27/23 12:17	03/04/23 07:06	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.7	1.2	ng/L		02/27/23 12:17	03/04/23 07:06	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.9	0.23	ng/L		02/27/23 12:17	03/04/23 07:06	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.8	1.4	ng/L		02/27/23 12:17	03/04/23 07:06	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.9	0.30	ng/L		02/27/23 12:17	03/04/23 07:06	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.9	0.38	ng/L		02/27/23 12:17	03/04/23 07:06	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*96*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:06*	*1*
13C4 PFHpA	*109*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:06*	*1*
13C4 PFOA	*105*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:06*	*1*
13C5 PFNA	*109*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:06*	*1*
13C2 PFDA	*101*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:06*	*1*
13C2 PFUnA	*94*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:06*	*1*
13C2 PFDoA	*98*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:06*	*1*
13C2 PFTeDA	*93*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:06*	*1*
13C3 PFBS	*104*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:06*	*1*
18O2 PFHxS	*104*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:06*	*1*
13C4 PFOS	*104*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:06*	*1*
d3-NMeFOSAA	*121*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:06*	*1*
d5-NEtFOSAA	*103*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:06*	*1*
13C3 HFPO-DA	*138*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:06*	*1*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-97138-1

Client Sample ID: MW-32-02232023
Date Collected: 02/23/23 12:58
Date Received: 02/25/23 09:00

Lab Sample ID: 320-97138-19
Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**29**		1.8	0.52	ng/L		02/27/23 12:17	03/04/23 07:16	1
Perfluoroheptanoic acid (PFHpA)	**11**		1.8	0.22	ng/L		02/27/23 12:17	03/04/23 07:16	1
Perfluorooctanoic acid (PFOA)	**18**		1.8	0.76	ng/L		02/27/23 12:17	03/04/23 07:16	1
Perfluorononanoic acid (PFNA)	**0.51**	**J**	1.8	0.24	ng/L		02/27/23 12:17	03/04/23 07:16	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		02/27/23 12:17	03/04/23 07:16	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.99	ng/L		02/27/23 12:17	03/04/23 07:16	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.49	ng/L		02/27/23 12:17	03/04/23 07:16	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		02/27/23 12:17	03/04/23 07:16	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.65	ng/L		02/27/23 12:17	03/04/23 07:16	1
Perfluorobutanesulfonic acid (PFBS)	ND	G	18	18	ng/L		02/27/23 12:17	03/04/23 07:16	1
Perfluorohexanesulfonic acid (PFHxS)	**97**		1.8	0.51	ng/L		02/27/23 12:17	03/04/23 07:16	1
Perfluorooctanesulfonic acid (PFOS)	**27**		1.8	0.48	ng/L		02/27/23 12:17	03/04/23 07:16	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.5	1.1	ng/L		02/27/23 12:17	03/04/23 07:16	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.5	1.2	ng/L		02/27/23 12:17	03/04/23 07:16	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		02/27/23 12:17	03/04/23 07:16	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.3	ng/L		02/27/23 12:17	03/04/23 07:16	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		02/27/23 12:17	03/04/23 07:16	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		02/27/23 12:17	03/04/23 07:16	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*69*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:16*	*1*
13C4 PFHpA	*72*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:16*	*1*
13C4 PFOA	*74*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:16*	*1*
13C5 PFNA	*82*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:16*	*1*
13C2 PFDA	*73*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:16*	*1*
13C2 PFUnA	*68*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:16*	*1*
13C2 PFDoA	*70*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:16*	*1*
13C2 PFTeDA	*56*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:16*	*1*
13C3 PFBS	*78*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:16*	*1*
18O2 PFHxS	*67*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:16*	*1*
13C4 PFOS	*70*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:16*	*1*
d3-NMeFOSAA	*77*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:16*	*1*
d5-NEtFOSAA	*69*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:16*	*1*
13C3 HFPO-DA	*93*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:16*	*1*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-97138-1

Client Sample ID: MW-68-02232023
Date Collected: 02/23/23 15:02
Date Received: 02/25/23 09:00

Lab Sample ID: 320-97138-20
Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**9.6**		1.8	0.52	ng/L		02/27/23 12:17	03/04/23 07:27	1
Perfluoroheptanoic acid (PFHpA)	**2.7**		1.8	0.22	ng/L		02/27/23 12:17	03/04/23 07:27	1
Perfluorooctanoic acid (PFOA)	**26**		1.8	0.76	ng/L		02/27/23 12:17	03/04/23 07:27	1
Perfluorononanoic acid (PFNA)	**2.7**		1.8	0.24	ng/L		02/27/23 12:17	03/04/23 07:27	1
Perfluorodecanoic acid (PFDA)	**0.46**	**J**	1.8	0.28	ng/L		02/27/23 12:17	03/04/23 07:27	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.98	ng/L		02/27/23 12:17	03/04/23 07:27	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.49	ng/L		02/27/23 12:17	03/04/23 07:27	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		02/27/23 12:17	03/04/23 07:27	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.65	ng/L		02/27/23 12:17	03/04/23 07:27	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.8	0.18	ng/L		02/27/23 12:17	03/04/23 07:27	1
Perfluorohexanesulfonic acid (PFHxS)	**31**		1.8	0.51	ng/L		02/27/23 12:17	03/04/23 07:27	1
Perfluorooctanesulfonic acid (PFOS)	ND	G	160	160	ng/L		02/27/23 12:17	03/04/23 07:27	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.5	1.1	ng/L		02/27/23 12:17	03/04/23 07:27	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.5	1.2	ng/L		02/27/23 12:17	03/04/23 07:27	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.21	ng/L		02/27/23 12:17	03/04/23 07:27	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.3	ng/L		02/27/23 12:17	03/04/23 07:27	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		02/27/23 12:17	03/04/23 07:27	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		02/27/23 12:17	03/04/23 07:27	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*56*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:27*	*1*
13C4 PFHpA	*67*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:27*	*1*
13C4 PFOA	*66*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:27*	*1*
13C5 PFNA	*70*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:27*	*1*
13C2 PFDA	*66*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:27*	*1*
13C2 PFUnA	*57*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:27*	*1*
13C2 PFDoA	*60*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:27*	*1*
13C2 PFTeDA	*46*	**5-*	*50 - 150*	*02/27/23 12:17*	*03/04/23 07:27*	*1*
13C3 PFBS	*61*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:27*	*1*
18O2 PFHxS	*57*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:27*	*1*
13C4 PFOS	*63*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:27*	*1*
d3-NMeFOSAA	*65*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:27*	*1*
d5-NEtFOSAA	*68*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:27*	*1*
13C3 HFPO-DA	*89*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:27*	*1*

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-97138-1

Client Sample ID: MW-67-02232023
Date Collected: 02/23/23 16:06
Date Received: 02/25/23 09:00

Lab Sample ID: 320-97138-21
Matrix: Water

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		1.8	0.53	ng/L		02/27/23 12:17	03/04/23 07:37	1
Perfluoroheptanoic acid (PFHpA)	**0.51**	**J**	1.8	0.23	ng/L		02/27/23 12:17	03/04/23 07:37	1
Perfluorooctanoic acid (PFOA)	**2.6**		1.8	0.77	ng/L		02/27/23 12:17	03/04/23 07:37	1
Perfluorononanoic acid (PFNA)	**0.68**	**J**	1.8	0.25	ng/L		02/27/23 12:17	03/04/23 07:37	1
Perfluorodecanoic acid (PFDA)	**0.31**	**J**	1.8	0.28	ng/L		02/27/23 12:17	03/04/23 07:37	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	1.0	ng/L		02/27/23 12:17	03/04/23 07:37	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.50	ng/L		02/27/23 12:17	03/04/23 07:37	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		02/27/23 12:17	03/04/23 07:37	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.66	ng/L		02/27/23 12:17	03/04/23 07:37	1
Perfluorobutanesulfonic acid (PFBS)	**0.76**	**J**	1.8	0.18	ng/L		02/27/23 12:17	03/04/23 07:37	1
Perfluorohexanesulfonic acid (PFHxS)	**6.9**		1.8	0.52	ng/L		02/27/23 12:17	03/04/23 07:37	1
Perfluorooctanesulfonic acid (PFOS)	**22**		1.8	0.49	ng/L		02/27/23 12:17	03/04/23 07:37	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.5	1.1	ng/L		02/27/23 12:17	03/04/23 07:37	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.5	1.2	ng/L		02/27/23 12:17	03/04/23 07:37	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		02/27/23 12:17	03/04/23 07:37	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.4	ng/L		02/27/23 12:17	03/04/23 07:37	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		02/27/23 12:17	03/04/23 07:37	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		02/27/23 12:17	03/04/23 07:37	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*95*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:37*	*1*
13C4 PFHpA	*108*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:37*	*1*
13C4 PFOA	*102*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:37*	*1*
13C5 PFNA	*105*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:37*	*1*
13C2 PFDA	*103*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:37*	*1*
13C2 PFUnA	*101*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:37*	*1*
13C2 PFDoA	*91*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:37*	*1*
13C2 PFTeDA	*83*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:37*	*1*
13C3 PFBS	*105*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:37*	*1*
18O2 PFHxS	*92*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:37*	*1*
13C4 PFOS	*99*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:37*	*1*
d3-NMeFOSAA	*111*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:37*	*1*
d5-NEtFOSAA	*93*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:37*	*1*
13C3 HFPO-DA	*131*		*50 - 150*	*02/27/23 12:17*	*03/04/23 07:37*	*1*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-97138-1

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Matrix: Water

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFHxA (50-150)	C4PFHA (50-150)	PFOA (50-150)	PFNA (50-150)	PFDA (50-150)	PFUnA (50-150)	PFDoA (50-150)	PFTDA (50-150)
320-97138-1	MW-71-02212023	84	93	103	99	96	96	79	82
320-97138-2	MW-70-02212023	85	94	101	95	95	86	85	65
320-97138-3	MW-69-02212023	73	74	74	81	79	72	73	68
320-97138-4	MW-50-02212023	87	97	106	103	101	99	91	90
320-97138-5	MW-52-02212023	89	110	105	111	112	104	95	90
320-97138-6	MW-46-02212023	61	68	75	67	69	66	59	52
320-97138-7	MW-100-02212023	68	77	80	79	76	77	71	61
320-97138-8	MW-63-02222023	91	108	107	97	96	93	91	80
320-97138-9	MW-40-02222023	90	98	103	89	89	89	80	77
320-97138-9 - DL	MW-40-02222023								
320-97138-10	MW-41-02222023		63	70	69	67	60	47 *5-	39 *5-
320-97138-10 - DL	MW-41-02222023	65							
320-97138-11	MW-64-02222023	52	64	62	61	55	51	44 *5-	35 *5-
320-97138-11 - DL	MW-64-02222023								
320-97138-12	MW-60-02222023	63	65	71	67	68	68	60	52
320-97138-12 - DL	MW-60-02222023								
320-97138-13	MW-61-02222023		101	104	121	119	114	108	95
320-97138-13 - DL	MW-61-02222023	96							
320-97138-14	MW-36-02222023	72	84	82	84	82	72	73	66
320-97138-14 - DL	MW-36-02222023								
320-97138-15	MW-74-02222023		71	71	60	70	61	54	50
320-97138-15 - DL	MW-74-02222023	77							
320-97138-16	MW-38-02232023	94	108	102	102	106	91	91	87
320-97138-17	MW-77-02232023	61	64	66	68	67	59	54	51
320-97138-18	MW-37-02232023	96	109	105	109	101	94	98	93
320-97138-19	MW-32-02232023	69	72	74	82	73	68	70	56
320-97138-20	MW-68-02232023	56	67	66	70	66	57	60	46 *5-
320-97138-21	MW-67-02232023	95	108	102	105	103	101	91	83
LCS 320-656766/2-A	Lab Control Sample	90	93	107	102	96	96	92	90
LCS 320-656959/2-A	Lab Control Sample	94	102	109	99	99	102	93	97
LCSD 320-656766/3-A	Lab Control Sample Dup	97	113	109	110	107	104	99	95
LCSD 320-656959/3-A	Lab Control Sample Dup	93	98	96	99	96	92	92	89
MB 320-656766/1-A	Method Blank	97	104	103	102	104	99	91	93
MB 320-656959/1-A	Method Blank	99	111	115	115	115	112	104	105

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	C3PFBS (50-150)	PFHxS (50-150)	PFOS (50-150)	d3NMFOS (50-150)	d5NEFOS (50-150)	HFPODA (50-150)		
320-97138-1	MW-71-02212023	83	90	86	101	108	114		
320-97138-2	MW-70-02212023	95	90	90	106	95	126		
320-97138-3	MW-69-02212023	73	72	77	77	77	96		
320-97138-4	MW-50-02212023	99	88	94	98	102	128		
320-97138-5	MW-52-02212023	110	101	102	100	105	135		
320-97138-6	MW-46-02212023	63	66	61	71	62	82		
320-97138-7	MW-100-02212023	70	72	74	80	71	91		
320-97138-8	MW-63-02222023	89	90	88	111	106	126		
320-97138-9	MW-40-02222023	90	88	85	96	92	126		
320-97138-9 - DL	MW-40-02222023			96					
320-97138-10	MW-41-02222023	62		66	68	56	93		
320-97138-10 - DL	MW-41-02222023		67	61					

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Job ID: 320-97138-1
Project/Site: EMJ

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Matrix: Water
Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	C3PFBS (50-150)	PFHxS (50-150)	PFOS (50-150)	d3NMFOS (50-150)	d5NEFOS (50-150)	HFPODA (50-150)		
320-97138-11	MW-64-02222023	58	55	53	60	51	84		
320-97138-11 - DL	MW-64-02222023			64					
320-97138-12	MW-60-02222023	65		63	63	64	90		
320-97138-12 - DL	MW-60-02222023		66	58					
320-97138-13	MW-61-02222023	111		122	110	102	150		
320-97138-13 - DL	MW-61-02222023		85	104					
320-97138-14	MW-36-02222023	77		72	79	84	104		
320-97138-14 - DL	MW-36-02222023		71						
320-97138-15	MW-74-02222023	69		64	66	62	94		
320-97138-15 - DL	MW-74-02222023		70	74					
320-97138-16	MW-38-02232023	91	84	92	107	104	133		
320-97138-17	MW-77-02232023	61	61	62	66	62	81		
320-97138-18	MW-37-02232023	104	104	104	121	103	138		
320-97138-19	MW-32-02232023	78	67	70	77	69	93		
320-97138-20	MW-68-02232023	61	57	63	65	68	89		
320-97138-21	MW-67-02232023	105	92	99	111	93	131		
LCS 320-656766/2-A	Lab Control Sample	89	92	90	105	98	122		
LCS 320-656959/2-A	Lab Control Sample	85	97	96	121	117	114		
LCSD 320-656766/3-A	Lab Control Sample Dup	95	102	98	118	97	128		
LCSD 320-656959/3-A	Lab Control Sample Dup	83	94	92	106	106	109		
MB 320-656766/1-A	Method Blank	91	95	94	109	108	126		
MB 320-656959/1-A	Method Blank	101	108	107	117	116	126		

Surrogate Legend

PFHxA = 13C2 PFHxA
C4PFHA = 13C4 PFHpA
PFOA = 13C4 PFOA
PFNA = 13C5 PFNA
PFDA = 13C2 PFDA
PFUnA = 13C2 PFUnA
PFDoA = 13C2 PFDoA
PFTDA = 13C2 PFTeDA
C3PFBS = 13C3 PFBS
PFHxS = 18O2 PFHxS
PFOS = 13C4 PFOS
d3NMFOS = d3-NMeFOSAA
d5NEFOS = d5-NEtFOSAA
HFPODA = 13C3 HFPO-DA

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Lab Sample ID: MB 320-656766/1-A
Matrix: Water
Analysis Batch: 658083

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 656766

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		02/27/23 04:29	03/04/23 08:08	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		02/27/23 04:29	03/04/23 08:08	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		02/27/23 04:29	03/04/23 08:08	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		02/27/23 04:29	03/04/23 08:08	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		02/27/23 04:29	03/04/23 08:08	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		02/27/23 04:29	03/04/23 08:08	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		02/27/23 04:29	03/04/23 08:08	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		02/27/23 04:29	03/04/23 08:08	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.73	ng/L		02/27/23 04:29	03/04/23 08:08	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		02/27/23 04:29	03/04/23 08:08	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.57	ng/L		02/27/23 04:29	03/04/23 08:08	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		02/27/23 04:29	03/04/23 08:08	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		5.0	1.2	ng/L		02/27/23 04:29	03/04/23 08:08	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		5.0	1.3	ng/L		02/27/23 04:29	03/04/23 08:08	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.0	0.24	ng/L		02/27/23 04:29	03/04/23 08:08	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		4.0	1.5	ng/L		02/27/23 04:29	03/04/23 08:08	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.0	0.32	ng/L		02/27/23 04:29	03/04/23 08:08	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.40	ng/L		02/27/23 04:29	03/04/23 08:08	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*97*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:08*	*1*
13C4 PFHpA	*104*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:08*	*1*
13C4 PFOA	*103*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:08*	*1*
13C5 PFNA	*102*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:08*	*1*
13C2 PFDA	*104*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:08*	*1*
13C2 PFUnA	*99*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:08*	*1*
13C2 PFDoA	*91*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:08*	*1*
13C2 PFTeDA	*93*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:08*	*1*
13C3 PFBS	*91*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:08*	*1*
18O2 PFHxS	*95*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:08*	*1*
13C4 PFOS	*94*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:08*	*1*
d3-NMeFOSAA	*109*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:08*	*1*
d5-NEtFOSAA	*108*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:08*	*1*
13C3 HFPO-DA	*126*		*50 - 150*	*02/27/23 04:29*	*03/04/23 08:08*	*1*

Lab Sample ID: LCS 320-656766/2-A
Matrix: Water
Analysis Batch: 658083

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 656766

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorohexanoic acid (PFHxA)	40.0	43.5		ng/L		109	72 - 129
Perfluoroheptanoic acid (PFHpA)	40.0	40.0		ng/L		100	72 - 130
Perfluorooctanoic acid (PFOA)	40.0	41.3		ng/L		103	71 - 133
Perfluorononanoic acid (PFNA)	40.0	40.5		ng/L		101	69 - 130

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: LCS 320-656766/2-A
Matrix: Water
Analysis Batch: 658083

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 656766

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorodecanoic acid (PFDA)	40.0	43.7		ng/L		109	71 - 129
Perfluoroundecanoic acid (PFUnA)	40.0	43.0		ng/L		107	69 - 133
Perfluorododecanoic acid (PFDoA)	40.0	44.2		ng/L		111	72 - 134
Perfluorotridecanoic acid (PFTriA)	40.0	39.2		ng/L		98	65 - 144
Perfluorotetradecanoic acid (PFTeA)	40.0	37.7		ng/L		94	71 - 132
Perfluorobutanesulfonic acid (PFBS)	35.5	36.4		ng/L		102	72 - 130
Perfluorohexanesulfonic acid (PFHxS)	36.5	36.7		ng/L		101	68 - 131
Perfluorooctanesulfonic acid (PFOS)	37.2	38.5		ng/L		104	65 - 140
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	40.0	42.5		ng/L		106	65 - 136
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	40.0	40.3		ng/L		101	61 - 135
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	37.4	40.1		ng/L		107	77 - 137
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	40.0	37.8		ng/L		95	72 - 132
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	37.8	36.3		ng/L		96	76 - 136
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.8	41.6		ng/L		110	81 - 141

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*90*		*50 - 150*
13C4 PFHpA	*93*		*50 - 150*
13C4 PFOA	*107*		*50 - 150*
13C5 PFNA	*102*		*50 - 150*
13C2 PFDA	*96*		*50 - 150*
13C2 PFUnA	*96*		*50 - 150*
13C2 PFDoA	*92*		*50 - 150*
13C2 PFTeDA	*90*		*50 - 150*
13C3 PFBS	*89*		*50 - 150*
18O2 PFHxS	*92*		*50 - 150*
13C4 PFOS	*90*		*50 - 150*
d3-NMeFOSAA	*105*		*50 - 150*
d5-NEtFOSAA	*98*		*50 - 150*
13C3 HFPO-DA	*122*		*50 - 150*

Lab Sample ID: LCSD 320-656766/3-A
Matrix: Water
Analysis Batch: 658083

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 656766

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)	40.0	41.4		ng/L		103	72 - 129	5	30
Perfluoroheptanoic acid (PFHpA)	40.0	39.2		ng/L		98	72 - 130	2	30
Perfluorooctanoic acid (PFOA)	40.0	45.4		ng/L		114	71 - 133	10	30

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: LCSD 320-656766/3-A
Matrix: Water
Analysis Batch: 658083

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 656766

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorononanoic acid (PFNA)			40.0	38.6		ng/L		96	69 - 130	5	30
Perfluorodecanoic acid (PFDA)			40.0	41.9		ng/L		105	71 - 129	4	30
Perfluoroundecanoic acid (PFUnA)			40.0	44.0		ng/L		110	69 - 133	2	30
Perfluorododecanoic acid (PFDoA)			40.0	45.0		ng/L		113	72 - 134	2	30
Perfluorotridecanoic acid (PFTriA)			40.0	41.0		ng/L		103	65 - 144	5	30
Perfluorotetradecanoic acid (PFTeA)			40.0	42.0		ng/L		105	71 - 132	11	30
Perfluorobutanesulfonic acid (PFBS)			35.5	38.3		ng/L		108	72 - 130	5	30
Perfluorohexanesulfonic acid (PFHxS)			36.5	37.6		ng/L		103	68 - 131	2	30
Perfluorooctanesulfonic acid (PFOS)			37.2	38.9		ng/L		105	65 - 140	1	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)			40.0	41.8		ng/L		104	65 - 136	2	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)			40.0	45.0		ng/L		113	61 - 135	11	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid			37.4	41.8		ng/L		112	77 - 137	4	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)			40.0	40.5		ng/L		101	72 - 132	7	30
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid			37.8	39.0		ng/L		103	76 - 136	7	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			37.8	44.3		ng/L		117	81 - 141	6	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFHxA	*97*		*50 - 150*
13C4 PFHpA	*113*		*50 - 150*
13C4 PFOA	*109*		*50 - 150*
13C5 PFNA	*110*		*50 - 150*
13C2 PFDA	*107*		*50 - 150*
13C2 PFUnA	*104*		*50 - 150*
13C2 PFDoA	*99*		*50 - 150*
13C2 PFTeDA	*95*		*50 - 150*
13C3 PFBS	*95*		*50 - 150*
18O2 PFHxS	*102*		*50 - 150*
13C4 PFOS	*98*		*50 - 150*
d3-NMeFOSAA	*118*		*50 - 150*
d5-NEtFOSAA	*97*		*50 - 150*
13C3 HFPO-DA	*128*		*50 - 150*

Lab Sample ID: MB 320-656959/1-A
Matrix: Water
Analysis Batch: 658077

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 656959

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		02/27/23 12:17	03/04/23 04:32	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		02/27/23 12:17	03/04/23 04:32	1

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: MB 320-656959/1-A
Matrix: Water
Analysis Batch: 658077

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 656959

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		02/27/23 12:17	03/04/23 04:32	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		02/27/23 12:17	03/04/23 04:32	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		02/27/23 12:17	03/04/23 04:32	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		02/27/23 12:17	03/04/23 04:32	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		02/27/23 12:17	03/04/23 04:32	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		02/27/23 12:17	03/04/23 04:32	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.73	ng/L		02/27/23 12:17	03/04/23 04:32	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		02/27/23 12:17	03/04/23 04:32	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.57	ng/L		02/27/23 12:17	03/04/23 04:32	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		02/27/23 12:17	03/04/23 04:32	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		5.0	1.2	ng/L		02/27/23 12:17	03/04/23 04:32	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		5.0	1.3	ng/L		02/27/23 12:17	03/04/23 04:32	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.0	0.24	ng/L		02/27/23 12:17	03/04/23 04:32	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		4.0	1.5	ng/L		02/27/23 12:17	03/04/23 04:32	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.0	0.32	ng/L		02/27/23 12:17	03/04/23 04:32	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.40	ng/L		02/27/23 12:17	03/04/23 04:32	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*99*		*50 - 150*	*02/27/23 12:17*	*03/04/23 04:32*	*1*
13C4 PFHpA	*111*		*50 - 150*	*02/27/23 12:17*	*03/04/23 04:32*	*1*
13C4 PFOA	*115*		*50 - 150*	*02/27/23 12:17*	*03/04/23 04:32*	*1*
13C5 PFNA	*115*		*50 - 150*	*02/27/23 12:17*	*03/04/23 04:32*	*1*
13C2 PFDA	*115*		*50 - 150*	*02/27/23 12:17*	*03/04/23 04:32*	*1*
13C2 PFUnA	*112*		*50 - 150*	*02/27/23 12:17*	*03/04/23 04:32*	*1*
13C2 PFDoA	*104*		*50 - 150*	*02/27/23 12:17*	*03/04/23 04:32*	*1*
13C2 PFTeDA	*105*		*50 - 150*	*02/27/23 12:17*	*03/04/23 04:32*	*1*
13C3 PFBS	*101*		*50 - 150*	*02/27/23 12:17*	*03/04/23 04:32*	*1*
18O2 PFHxS	*108*		*50 - 150*	*02/27/23 12:17*	*03/04/23 04:32*	*1*
13C4 PFOS	*107*		*50 - 150*	*02/27/23 12:17*	*03/04/23 04:32*	*1*
d3-NMeFOSAA	*117*		*50 - 150*	*02/27/23 12:17*	*03/04/23 04:32*	*1*
d5-NEtFOSAA	*116*		*50 - 150*	*02/27/23 12:17*	*03/04/23 04:32*	*1*
13C3 HFPO-DA	*126*		*50 - 150*	*02/27/23 12:17*	*03/04/23 04:32*	*1*

Lab Sample ID: LCS 320-656959/2-A
Matrix: Water
Analysis Batch: 658077

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 656959

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorohexanoic acid (PFHxA)	40.0	40.7		ng/L		102	72 - 129
Perfluoroheptanoic acid (PFHpA)	40.0	36.4		ng/L		91	72 - 130
Perfluorooctanoic acid (PFOA)	40.0	38.0		ng/L		95	71 - 133
Perfluorononanoic acid (PFNA)	40.0	41.8		ng/L		105	69 - 130
Perfluorodecanoic acid (PFDA)	40.0	42.8		ng/L		107	71 - 129
Perfluoroundecanoic acid (PFUnA)	40.0	40.5		ng/L		101	69 - 133

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: LCS 320-656959/2-A
Matrix: Water
Analysis Batch: 658077

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 656959

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorododecanoic acid (PFDoA)	40.0	41.4		ng/L		103	72 - 134
Perfluorotridecanoic acid (PFTriA)	40.0	44.4		ng/L		111	65 - 144
Perfluorotetradecanoic acid (PFTeA)	40.0	39.3		ng/L		98	71 - 132
Perfluorobutanesulfonic acid (PFBS)	35.5	35.2		ng/L		99	72 - 130
Perfluorohexanesulfonic acid (PFHxS)	36.5	35.5		ng/L		97	68 - 131
Perfluorooctanesulfonic acid (PFOS)	37.2	36.2		ng/L		97	65 - 140
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	40.0	36.6		ng/L		92	65 - 136
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	40.0	37.2		ng/L		93	61 - 135
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	37.4	38.9		ng/L		104	77 - 137
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	40.0	40.7		ng/L		102	72 - 132
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	37.8	39.4		ng/L		104	76 - 136
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.8	41.3		ng/L		109	81 - 141

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*94*		*50 - 150*
13C4 PFHpA	*102*		*50 - 150*
13C4 PFOA	*109*		*50 - 150*
13C5 PFNA	*99*		*50 - 150*
13C2 PFDA	*99*		*50 - 150*
13C2 PFUnA	*102*		*50 - 150*
13C2 PFDoA	*93*		*50 - 150*
13C2 PFTeDA	*97*		*50 - 150*
13C3 PFBS	*85*		*50 - 150*
18O2 PFHxS	*97*		*50 - 150*
13C4 PFOS	*96*		*50 - 150*
d3-NMeFOSAA	*121*		*50 - 150*
d5-NEtFOSAA	*117*		*50 - 150*
13C3 HFPO-DA	*114*		*50 - 150*

Lab Sample ID: LCSD 320-656959/3-A
Matrix: Water
Analysis Batch: 658077

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 656959

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)	40.0	38.4		ng/L		96	72 - 129	6	30
Perfluoroheptanoic acid (PFHpA)	40.0	41.4		ng/L		103	72 - 130	13	30
Perfluorooctanoic acid (PFOA)	40.0	45.0		ng/L		112	71 - 133	17	30
Perfluorononanoic acid (PFNA)	40.0	40.2		ng/L		101	69 - 130	4	30
Perfluorodecanoic acid (PFDA)	40.0	40.6		ng/L		101	71 - 129	5	30

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: LCSD 320-656959/3-A
Matrix: Water
Analysis Batch: 658077

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 656959

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluoroundecanoic acid (PFUnA)			40.0	43.6		ng/L		109	69 - 133	7	30
Perfluorododecanoic acid (PFDoA)			40.0	42.7		ng/L		107	72 - 134	3	30
Perfluorotridecanoic acid (PFTriA)			40.0	42.4		ng/L		106	65 - 144	5	30
Perfluorotetradecanoic acid (PFTeA)			40.0	36.3		ng/L		91	71 - 132	8	30
Perfluorobutanesulfonic acid (PFBS)			35.5	35.5		ng/L		100	72 - 130	1	30
Perfluorohexanesulfonic acid (PFHxS)			36.5	37.8		ng/L		103	68 - 131	6	30
Perfluorooctanesulfonic acid (PFOS)			37.2	35.9		ng/L		96	65 - 140	1	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)			40.0	40.1		ng/L		100	65 - 136	9	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)			40.0	39.8		ng/L		100	61 - 135	7	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid			37.4	39.9		ng/L		107	77 - 137	3	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)			40.0	40.4		ng/L		101	72 - 132	1	30
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid			37.8	37.2		ng/L		98	76 - 136	6	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			37.8	47.1		ng/L		125	81 - 141	13	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFHxA	*93*		*50 - 150*
13C4 PFHpA	*98*		*50 - 150*
13C4 PFOA	*96*		*50 - 150*
13C5 PFNA	*99*		*50 - 150*
13C2 PFDA	*96*		*50 - 150*
13C2 PFUnA	*92*		*50 - 150*
13C2 PFDoA	*92*		*50 - 150*
13C2 PFTeDA	*89*		*50 - 150*
13C3 PFBS	*83*		*50 - 150*
18O2 PFHxS	*94*		*50 - 150*
13C4 PFOS	*92*		*50 - 150*
d3-NMeFOSAA	*106*		*50 - 150*
d5-NEtFOSAA	*106*		*50 - 150*
13C3 HFPO-DA	*109*		*50 - 150*

LCMS

Prep Batch: 656766

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-97138-1	MW-71-02212023	Total/NA	Water	3535	
320-97138-2	MW-70-02212023	Total/NA	Water	3535	
320-97138-3	MW-69-02212023	Total/NA	Water	3535	
320-97138-4	MW-50-02212023	Total/NA	Water	3535	
320-97138-5	MW-52-02212023	Total/NA	Water	3535	
320-97138-6	MW-46-02212023	Total/NA	Water	3535	
320-97138-7	MW-100-02212023	Total/NA	Water	3535	
MB 320-656766/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-656766/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-656766/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

Prep Batch: 656959

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-97138-8	MW-63-02222023	Total/NA	Water	3535	
320-97138-9 - DL	MW-40-02222023	Total/NA	Water	3535	
320-97138-9	MW-40-02222023	Total/NA	Water	3535	
320-97138-10	MW-41-02222023	Total/NA	Water	3535	
320-97138-10 - DL	MW-41-02222023	Total/NA	Water	3535	
320-97138-11	MW-64-02222023	Total/NA	Water	3535	
320-97138-11 - DL	MW-64-02222023	Total/NA	Water	3535	
320-97138-12 - DL	MW-60-02222023	Total/NA	Water	3535	
320-97138-12	MW-60-02222023	Total/NA	Water	3535	
320-97138-13	MW-61-02222023	Total/NA	Water	3535	
320-97138-13 - DL	MW-61-02222023	Total/NA	Water	3535	
320-97138-14	MW-36-02222023	Total/NA	Water	3535	
320-97138-14 - DL	MW-36-02222023	Total/NA	Water	3535	
320-97138-15 - DL	MW-74-02222023	Total/NA	Water	3535	
320-97138-15	MW-74-02222023	Total/NA	Water	3535	
320-97138-16	MW-38-02232023	Total/NA	Water	3535	
320-97138-17	MW-77-02232023	Total/NA	Water	3535	
320-97138-18	MW-37-02232023	Total/NA	Water	3535	
320-97138-19	MW-32-02232023	Total/NA	Water	3535	
320-97138-20	MW-68-02232023	Total/NA	Water	3535	
320-97138-21	MW-67-02232023	Total/NA	Water	3535	
MB 320-656959/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-656959/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-656959/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

Analysis Batch: 658077

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-97138-8	MW-63-02222023	Total/NA	Water	EPA 537(Mod)	656959
320-97138-9	MW-40-02222023	Total/NA	Water	EPA 537(Mod)	656959
320-97138-10	MW-41-02222023	Total/NA	Water	EPA 537(Mod)	656959
320-97138-11	MW-64-02222023	Total/NA	Water	EPA 537(Mod)	656959
320-97138-12	MW-60-02222023	Total/NA	Water	EPA 537(Mod)	656959
320-97138-13	MW-61-02222023	Total/NA	Water	EPA 537(Mod)	656959
320-97138-14	MW-36-02222023	Total/NA	Water	EPA 537(Mod)	656959
320-97138-15	MW-74-02222023	Total/NA	Water	EPA 537(Mod)	656959
320-97138-16	MW-38-02232023	Total/NA	Water	EPA 537(Mod)	656959
320-97138-17	MW-77-02232023	Total/NA	Water	EPA 537(Mod)	656959
320-97138-18	MW-37-02232023	Total/NA	Water	EPA 537(Mod)	656959

LCMS (Continued)

Analysis Batch: 658077 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-97138-19	MW-32-02232023	Total/NA	Water	EPA 537(Mod)	656959
320-97138-20	MW-68-02232023	Total/NA	Water	EPA 537(Mod)	656959
320-97138-21	MW-67-02232023	Total/NA	Water	EPA 537(Mod)	656959
MB 320-656959/1-A	Method Blank	Total/NA	Water	EPA 537(Mod)	656959
LCS 320-656959/2-A	Lab Control Sample	Total/NA	Water	EPA 537(Mod)	656959
LCSD 320-656959/3-A	Lab Control Sample Dup	Total/NA	Water	EPA 537(Mod)	656959

Analysis Batch: 658083

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-97138-1	MW-71-02212023	Total/NA	Water	EPA 537(Mod)	656766
320-97138-2	MW-70-02212023	Total/NA	Water	EPA 537(Mod)	656766
320-97138-3	MW-69-02212023	Total/NA	Water	EPA 537(Mod)	656766
320-97138-4	MW-50-02212023	Total/NA	Water	EPA 537(Mod)	656766
320-97138-5	MW-52-02212023	Total/NA	Water	EPA 537(Mod)	656766
320-97138-6	MW-46-02212023	Total/NA	Water	EPA 537(Mod)	656766
320-97138-7	MW-100-02212023	Total/NA	Water	EPA 537(Mod)	656766
MB 320-656766/1-A	Method Blank	Total/NA	Water	EPA 537(Mod)	656766
LCS 320-656766/2-A	Lab Control Sample	Total/NA	Water	EPA 537(Mod)	656766
LCSD 320-656766/3-A	Lab Control Sample Dup	Total/NA	Water	EPA 537(Mod)	656766

Analysis Batch: 658716

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-97138-9 - DL	MW-40-02222023	Total/NA	Water	EPA 537(Mod)	656959
320-97138-10 - DL	MW-41-02222023	Total/NA	Water	EPA 537(Mod)	656959
320-97138-11 - DL	MW-64-02222023	Total/NA	Water	EPA 537(Mod)	656959
320-97138-12 - DL	MW-60-02222023	Total/NA	Water	EPA 537(Mod)	656959
320-97138-13 - DL	MW-61-02222023	Total/NA	Water	EPA 537(Mod)	656959
320-97138-14 - DL	MW-36-02222023	Total/NA	Water	EPA 537(Mod)	656959
320-97138-15 - DL	MW-74-02222023	Total/NA	Water	EPA 537(Mod)	656959

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-97138-1

Client Sample ID: MW-71-02212023
Lab Sample ID: 320-97138-1
Date Collected: 02/21/23 10:55
Matrix: Water
Date Received: 02/25/23 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			294.1 mL	10.00 mL	656766	02/27/23 04:29	HJA	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	658083	03/04/23 08:38	RS1	EET SAC

Client Sample ID: MW-70-02212023
Lab Sample ID: 320-97138-2
Date Collected: 02/21/23 12:40
Matrix: Water
Date Received: 02/25/23 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			281.4 mL	10.00 mL	656766	02/27/23 04:29	HJA	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	658083	03/04/23 08:49	RS1	EET SAC

Client Sample ID: MW-69-02212023
Lab Sample ID: 320-97138-3
Date Collected: 02/21/23 13:10
Matrix: Water
Date Received: 02/25/23 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			258.6 mL	10.00 mL	656766	02/27/23 04:29	HJA	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	658083	03/04/23 08:59	RS1	EET SAC

Client Sample ID: MW-50-02212023
Lab Sample ID: 320-97138-4
Date Collected: 02/21/23 13:55
Matrix: Water
Date Received: 02/25/23 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			274.7 mL	10.00 mL	656766	02/27/23 04:29	HJA	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	658083	03/04/23 09:09	RS1	EET SAC

Client Sample ID: MW-52-02212023
Lab Sample ID: 320-97138-5
Date Collected: 02/21/23 15:05
Matrix: Water
Date Received: 02/25/23 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			287.5 mL	10.00 mL	656766	02/27/23 04:29	HJA	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	658083	03/04/23 09:19	RS1	EET SAC

Client Sample ID: MW-46-02212023
Lab Sample ID: 320-97138-6
Date Collected: 02/21/23 16:25
Matrix: Water
Date Received: 02/25/23 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			278.9 mL	10.00 mL	656766	02/27/23 04:29	HJA	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	658083	03/04/23 09:30	RS1	EET SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-97138-1

Client Sample ID: MW-100-02212023
Lab Sample ID: 320-97138-7
Date Collected: 02/21/23 17:00
Matrix: Water
Date Received: 02/25/23 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			288.7 mL	10.00 mL	656766	02/27/23 04:29	HJA	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	658083	03/04/23 09:40	RS1	EET SAC

Client Sample ID: MW-63-02222023
Lab Sample ID: 320-97138-8
Date Collected: 02/22/23 10:05
Matrix: Water
Date Received: 02/25/23 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			270.3 mL	10.0 mL	656959	02/27/23 12:17	SEY	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	658077	03/04/23 05:13	RS1	EET SAC

Client Sample ID: MW-40-02222023
Lab Sample ID: 320-97138-9
Date Collected: 02/22/23 11:05
Matrix: Water
Date Received: 02/25/23 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			248.7 mL	10.0 mL	656959	02/27/23 12:17	SEY	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	658077	03/04/23 05:24	RS1	EET SAC
Total/NA	Prep	3535	DL		248.7 mL	10.0 mL	656959	02/27/23 12:17	SEY	EET SAC
Total/NA	Analysis	EPA 537(Mod)	DL	5	1 mL	1 mL	658716	03/07/23 02:30	S1M	EET SAC

Client Sample ID: MW-41-02222023
Lab Sample ID: 320-97138-10
Date Collected: 02/22/23 11:30
Matrix: Water
Date Received: 02/25/23 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			278.2 mL	10.0 mL	656959	02/27/23 12:17	SEY	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	658077	03/04/23 05:34	RS1	EET SAC
Total/NA	Prep	3535	DL		278.2 mL	10.0 mL	656959	02/27/23 12:17	SEY	EET SAC
Total/NA	Analysis	EPA 537(Mod)	DL	10	1 mL	1 mL	658716	03/07/23 03:01	S1M	EET SAC

Client Sample ID: MW-64-02222023
Lab Sample ID: 320-97138-11
Date Collected: 02/22/23 12:45
Matrix: Water
Date Received: 02/25/23 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			280.5 mL	10.0 mL	656959	02/27/23 12:17	SEY	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	658077	03/04/23 05:44	RS1	EET SAC
Total/NA	Prep	3535	DL		280.5 mL	10.0 mL	656959	02/27/23 12:17	SEY	EET SAC
Total/NA	Analysis	EPA 537(Mod)	DL	5	1 mL	1 mL	658716	03/07/23 02:40	S1M	EET SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-97138-1

Client Sample ID: MW-60-02222023
Date Collected: 02/22/23 13:50
Date Received: 02/25/23 09:00

Lab Sample ID: 320-97138-12
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			275.5 mL	10.0 mL	656959	02/27/23 12:17	SEY	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	658077	03/04/23 05:54	RS1	EET SAC
Total/NA	Prep	3535	DL		275.5 mL	10.0 mL	656959	02/27/23 12:17	SEY	EET SAC
Total/NA	Analysis	EPA 537(Mod)	DL	50	1 mL	1 mL	658716	03/07/23 03:21	S1M	EET SAC

Client Sample ID: MW-61-02222023
Date Collected: 02/22/23 14:55
Date Received: 02/25/23 09:00

Lab Sample ID: 320-97138-13
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			275.4 mL	10.0 mL	656959	02/27/23 12:17	SEY	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	658077	03/04/23 06:05	RS1	EET SAC
Total/NA	Prep	3535	DL		275.4 mL	10.0 mL	656959	02/27/23 12:17	SEY	EET SAC
Total/NA	Analysis	EPA 537(Mod)	DL	20	1 mL	1 mL	658716	03/07/23 03:11	S1M	EET SAC

Client Sample ID: MW-36-02222023
Date Collected: 02/22/23 15:52
Date Received: 02/25/23 09:00

Lab Sample ID: 320-97138-14
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			276.3 mL	10.0 mL	656959	02/27/23 12:17	SEY	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	658077	03/04/23 06:25	RS1	EET SAC
Total/NA	Prep	3535	DL		276.3 mL	10.0 mL	656959	02/27/23 12:17	SEY	EET SAC
Total/NA	Analysis	EPA 537(Mod)	DL	5	1 mL	1 mL	658716	03/07/23 02:51	S1M	EET SAC

Client Sample ID: MW-74-02222023
Date Collected: 02/22/23 16:25
Date Received: 02/25/23 09:00

Lab Sample ID: 320-97138-15
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			279.5 mL	10.0 mL	656959	02/27/23 12:17	SEY	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	658077	03/04/23 06:35	RS1	EET SAC
Total/NA	Prep	3535	DL		279.5 mL	10.0 mL	656959	02/27/23 12:17	SEY	EET SAC
Total/NA	Analysis	EPA 537(Mod)	DL	100	1 mL	1 mL	658716	03/07/23 03:32	S1M	EET SAC

Client Sample ID: MW-38-02232023
Date Collected: 02/23/23 09:16
Date Received: 02/25/23 09:00

Lab Sample ID: 320-97138-16
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			267.3 mL	10.0 mL	656959	02/27/23 12:17	SEY	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	658077	03/04/23 06:46	RS1	EET SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-97138-1

Client Sample ID: MW-77-02232023
Lab Sample ID: 320-97138-17
Date Collected: 02/23/23 10:30
Matrix: Water
Date Received: 02/25/23 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			271.8 mL	10.0 mL	656959	02/27/23 12:17	SEY	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	658077	03/04/23 06:56	RS1	EET SAC

Client Sample ID: MW-37-02232023
Lab Sample ID: 320-97138-18
Date Collected: 02/23/23 11:40
Matrix: Water
Date Received: 02/25/23 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			266.3 mL	10.0 mL	656959	02/27/23 12:17	SEY	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	658077	03/04/23 07:06	RS1	EET SAC

Client Sample ID: MW-32-02232023
Lab Sample ID: 320-97138-19
Date Collected: 02/23/23 12:58
Matrix: Water
Date Received: 02/25/23 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			278.8 mL	10.0 mL	656959	02/27/23 12:17	SEY	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	658077	03/04/23 07:16	RS1	EET SAC

Client Sample ID: MW-68-02232023
Lab Sample ID: 320-97138-20
Date Collected: 02/23/23 15:02
Matrix: Water
Date Received: 02/25/23 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			280 mL	10.0 mL	656959	02/27/23 12:17	SEY	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	658077	03/04/23 07:27	RS1	EET SAC

Client Sample ID: MW-67-02232023
Lab Sample ID: 320-97138-21
Date Collected: 02/23/23 16:06
Matrix: Water
Date Received: 02/25/23 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			275.5 mL	10.0 mL	656959	02/27/23 12:17	SEY	EET SAC
Total/NA	Analysis	EPA 537(Mod)		1	1 mL	1 mL	658077	03/04/23 07:37	RS1	EET SAC

Laboratory References:

EET SAC = Eurofins Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-97138-1

Laboratory: Eurofins Sacramento

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Washington	State	C581	05-05-23

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-97138-1

Method	Method Description	Protocol	Laboratory
EPA 537(Mod)	PFAS for QSM 5.3, Table B-15	EPA	EET SAC
3535	Solid-Phase Extraction (SPE)	SW846	EET SAC

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

EET SAC = Eurofins Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: EMJ

Job ID: 320-97138-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-97138-1	MW-71-02212023	Water	02/21/23 10:55	02/25/23 09:00
320-97138-2	MW-70-02212023	Water	02/21/23 12:40	02/25/23 09:00
320-97138-3	MW-69-02212023	Water	02/21/23 13:10	02/25/23 09:00
320-97138-4	MW-50-02212023	Water	02/21/23 13:55	02/25/23 09:00
320-97138-5	MW-52-02212023	Water	02/21/23 15:05	02/25/23 09:00
320-97138-6	MW-46-02212023	Water	02/21/23 16:25	02/25/23 09:00
320-97138-7	MW-100-02212023	Water	02/21/23 17:00	02/25/23 09:00
320-97138-8	MW-63-02222023	Water	02/22/23 10:05	02/25/23 09:00
320-97138-9	MW-40-02222023	Water	02/22/23 11:05	02/25/23 09:00
320-97138-10	MW-41-02222023	Water	02/22/23 11:30	02/25/23 09:00
320-97138-11	MW-64-02222023	Water	02/22/23 12:45	02/25/23 09:00
320-97138-12	MW-60-02222023	Water	02/22/23 13:50	02/25/23 09:00
320-97138-13	MW-61-02222023	Water	02/22/23 14:55	02/25/23 09:00
320-97138-14	MW-36-02222023	Water	02/22/23 15:52	02/25/23 09:00
320-97138-15	MW-74-02222023	Water	02/22/23 16:25	02/25/23 09:00
320-97138-16	MW-38-02232023	Water	02/23/23 09:16	02/25/23 09:00
320-97138-17	MW-77-02232023	Water	02/23/23 10:30	02/25/23 09:00
320-97138-18	MW-37-02232023	Water	02/23/23 11:40	02/25/23 09:00
320-97138-19	MW-32-02232023	Water	02/23/23 12:58	02/25/23 09:00
320-97138-20	MW-68-02232023	Water	02/23/23 15:02	02/25/23 09:00
320-97138-21	MW-67-02232023	Water	02/23/23 16:06	02/25/23 09:00

Eurofins Sacramento
880 Riverside Parkway
West Sacramento, CA 95605
Phone (916) 373-5600 Phone (916) 372-1059

Chain of Custody Record

eurofins

Client Information	Sampler: Ryan Petersen / Mason Hall	Lab PM: David Alltucker	Carrier Tracking No(s):	COC No:
Client Contact: Shoshana Howard	Phone: 206-695-6211	E-Mail: Shoshana.Howard@shanwil.com	State of Origin: WA	Page: Page 1 of 2
Company: Shannon & Wilson	PWSID:			Job #: 21-1-12596-025
Address: 400 N 34th Street	Due Date Requested:			
City: Seattle	TAT Requested (days): Standard			
State, Zip: WA, 98103	Compliance Project: Δ Yes Δ No			
Phone: 206-632-8020	PO #: 21-1-12596-025			
Email: info-seattle@shanwil.com	WO #			
Project Name: EMJ	Project #:			
Site:	SSOW#:			

Analysis Requested

320-97138 Chain of Custody

Preservation Codes:
A - HCL
B - NaOH
C - Zn Acetate
D - Nitric Acid
E - NaHSO4
F - MeOH
G - Amchlor
H - Ascorbic Acid
I - Ice
J - DI Water
K - EDTA
L - EDA
M - Hexane
N - None
O - AsNaO2
P - Na2O4S
Q - Na2SO3
R - Na2S2O3
S - H2SO4
T - TSP Dodecahydrate
U - Acetone
V - MCAA
W - pH 4-5
Y - Trizma
Z - other (specify)
Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8015 - EPA method 8015 (DRO) (Modified)	Total Number of container	Special Instructions/Note:
			Preservation Code:				N		
MW-71-02212023	02/21/23	10:55	G	W	N	N	N	X	
MW-70-02212023	02/21/23	12:40	G	W	N	N	N	X	
MW-69-02212023	02/21/23	13:10	G	W	N	N	N	X	
MW-50-02212023	02/21/23	13:55	G	W	N	N	N	X	
MW-52-02212023	02/21/23	15:05	G	W	N	N	N	X	
MW-46-02212023	02/21/23	16:45	G	W	N	N	N	X	
MW-100-02212023	02/21/23	17:00	G	W	N	N	N	X	
MW-63-02222023	2/22/23	1005	G	W	N	N	N	X	
MW-40-02222023	2/22/23	1105	G	W	N	N	N	X	
MW-41-02222023	2/22/23	1130	G	W	N	N	N	X	
MW-64-02222023	02/22/23	1245	G	W	N	N	N	X	

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For ____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:		Date:		Time:		Method of Shipment: FEDEX	
Relinquished by: Ryan Petersen	Date/Time: 2/24/23 1000	Company: S&W	Received by:	Date/Time: 2/25/23 - 900	Company: EETSAC		
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company		
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company		

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.: 2122506 2/24/23

Cooler Temperature(s) °C and Other Remarks:

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Eurofins Sacramento
880 Riverside Parkway
West Sacramento, CA 95605
Phone (916) 373-5600 Phone (916) 372-1059

Chain of Custody Record

eurofins

Client Information	Sampler: RYAN PETERSON	Lab PM: David Milhuisen	Carrier Tracking No(s):	COC No:
Client Contact: Shashawna Howard	Phone: 206-645-5811	E-Mail: Shashawna.Howard@shanwil.com	State of Origin: WA	Page: Page 2 of 2
Company: Shannon & Wilson	PWSID:			Job #: 21-1-12596-025
Address: 400 N. 34th St. Suite 100	Due Date Requested:			
City: Seattle	TAT Requested (days): Standard			
State, Zip: WA, 98103	Compliance Project: Δ Yes Δ No			
Phone:	PO #: 21-1-12596-025			
Email:	WO #:			
Project Name: EMJ	Project #:			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Y - Trizma, Z - other (specify), Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	PFAS, EPA 537.1 Mod (18 Analytes)	Total Number of containers	Special Instructions/Note:
			Preservation Code:		N				
MW-60-02222023	2/22/23	1350	G	W	N	N	X		
MW-61-02222023	2/22/23	1455	G	W	N	N	X		
MW-36-02222023	2/22/23	1552	G	W	N	N	X		
MW-74-02222023	2/22/23	1625	G	W	N	N	X		
MW-38-02232023	2/23/23	0916	G	W	N	N	X		
MW-77-02232023	2/23/23	1030	G	W	N	N	X		
MW-37-02232023	2/23/23	1140	G	W	N	N	X		
MW-32-02232023	2/23/23	1258	G	W	N	N	X		
MW-68-02232023	2/23/23	1502	G	W	N	N	X		
MW-67-02232023	2/23/23	1606	G	W	N	N	X		

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☑ Disposal By Lab ☐ Archive For ____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by	Date/Time	Company	Received by	Date/Time	Company
1	RYAN PETERSON	2/24/23 1000	SEW		2/25/23 900	EETSAM
2						
3						

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks:

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Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-97138-1

Login Number: 97138
List Number: 1
Creator: Guzman, Juan

List Source: Eurofins Sacramento

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	2122506
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

ANALYTICAL REPORT

PREPARED FOR

Attn: Shoshana Howard
Shannon & Wilson, Inc
400 N. 34th Suite 100
PO BOX 300303
Seattle, Washington 98103

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JOB DESCRIPTION

21-1-12596-025

JOB NUMBER

320-97185-1

Eurofins Sacramento
880 Riverside Parkway
West Sacramento CA 95605

See page two for job notes and contact information.

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Job Notes

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The data in the report relate to the field sample(s) as received by the laboratory and associated QC. All results have been reviewed and have been found to be compliant with laboratory and accreditation requirements, with the exception of the noted deviation(s). For questions, please contact the Project Manager.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing Northern California, LLC Project Manager.

Authorization



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Authorized for release by
David Alltucker, Project Manager I
David.Alltucker@et.eurofinsus.com
(916)374-4383

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Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: 21-1-12596-025

Job ID: 320-97185-1

Qualifiers

LCMS

Qualifier	Qualifier Description
*+	LCS and/or LCSD is outside acceptance limits, high biased.
E	Result exceeded calibration range.
I	Value is EMPC (estimated maximum possible concentration).
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Job ID: 320-97185-1

Laboratory: Eurofins Sacramento

Narrative

Job Narrative
320-97185-1

Receipt
The samples were received on 2/28/2023 9:30 AM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 0.9º C.

LCMS
Method 537 (modified): The laboratory control sample (LCS) and / or laboratory control sample duplicate (LCSD) for preparation batch 320-658949 and analytical batch 320-659484 recovered outside control limits for the following analytes: 11Cl-PF3OUdS. These analytes were biased high in the LCS and were not detected in the associated samples; therefore, the data have been reported.

Method 537 (modified): The concentration of one or more analytes associated with the following samples exceeded the instrument calibration range: MW-79-02242023 (320-97185-1). These analytes have been qualified; however, the peaks did not saturate the instrument detector. Historical data indicate that for the isotope dilution method, dilution and re-analysis will not produce significantly different results from those reported above the calibration range.

Method 537 (modified): The concentration of one or more analytes associated with the following sample exceeded the instrument calibration range: MW-43-02242023 (320-97185-4). This analyte has been qualified; however, the peak did not saturate the instrument detector. Historical data indicate that for the isotope dilution method, dilution and re-analysis will not produce significantly different results from those reported above the calibration range.

Method 537 (modified): The "I" qualifier means the transition mass ratio for the indicated analyte was above the established ratio limits. The qualitative identification of the analyte has some degree of uncertainty, and the reported value may have some high bias. However, analyst judgment was used to positively identify the analyte.
MW-53-02242023 (320-97185-2)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Organic Prep
Method 3535: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-658949.

Method 3535: The following samples in preparation batch 320-658949 were observed to be yellow and contain floating particulates present in the sample bottle. MW-79-02242023 (320-97185-1), MW-53-02242023 (320-97185-2)

Method 3535: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-658990.

Method 3535: During the solid phase extraction process, the following samples contained floating orange sediment at the bottom of the bottle which clogged the solid phase extraction column: MW-23-02272023 (320-97185-6) and MW-101-02272023 (320-97185-9).

Method 3535: The following samples in preparation batch 320-659327 were observed to be yellow and contain a thin layer of sediment present in the bottom of the bottle prior to extraction. MW-43-02242023 (320-97185-4) and MW-78-02242023 (320-97185-5)

Method 3535: The following samples in preparation batch 320-659327 were yellow in color following concentration. MW-43-02242023 (320-97185-4)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: 21-1-12596-025

Job ID: 320-97185-1

Client Sample ID: MW-79-02242023 — Lab Sample ID: 320-97185-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	240		1.8	0.52	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	50		1.8	0.23	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	65		1.8	0.77	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	1.8		1.8	0.24	ng/L	1		537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	130		1.8	0.18	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	940	E	1.8	0.51	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	940	E	1.8	0.49	ng/L	1		537 (modified)	Total/NA

Client Sample ID: MW-53-02242023 — Lab Sample ID: 320-97185-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	4.4		1.8	0.52	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.3		1.8	0.22	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	3.4		1.8	0.76	ng/L	1		537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	2.6		1.8	0.18	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	37		1.8	0.51	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	26	I	1.8	0.49	ng/L	1		537 (modified)	Total/NA

Client Sample ID: MW-54-02242023 — Lab Sample ID: 320-97185-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	3.7		1.7	0.50	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.2		1.7	0.21	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	4.1		1.7	0.73	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	0.45	J	1.7	0.23	ng/L	1		537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	1.5	J	1.7	0.17	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	7.8		1.7	0.49	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	13		1.7	0.46	ng/L	1		537 (modified)	Total/NA

Client Sample ID: MW-43-02242023 — Lab Sample ID: 320-97185-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	190		1.9	0.56	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	40		1.9	0.24	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	67		1.9	0.82	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	0.28	J	1.9	0.26	ng/L	1		537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	160		1.9	0.19	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	670	E	1.9	0.55	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	120		1.9	0.52	ng/L	1		537 (modified)	Total/NA

Client Sample ID: MW-78-02242023 — Lab Sample ID: 320-97185-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	6.7		1.9	0.54	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	3.8		1.9	0.23	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	4.5		1.9	0.79	ng/L	1		537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	1.7	J	1.9	0.19	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	9.0		1.9	0.53	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	18		1.9	0.50	ng/L	1		537 (modified)	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: 21-1-12596-025

Job ID: 320-97185-1

Client Sample ID: MW-23-02272023 — Lab Sample ID: 320-97185-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	0.98	J	1.7	0.17	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	1.5	J	1.7	0.49	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	6.8		1.7	0.47	ng/L	1		537 (modified)	Total/NA

Client Sample ID: MW-72-02272023 — Lab Sample ID: 320-97185-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluoroheptanoic acid (PFHpA)	0.26	J	1.9	0.23	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	1.3	J	1.9	0.80	ng/L	1		537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.80	J	1.9	0.19	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	3.4		1.9	0.53	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	5.1		1.9	0.51	ng/L	1		537 (modified)	Total/NA

Client Sample ID: MW-8-02272023 — Lab Sample ID: 320-97185-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	6.0		1.8	0.53	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.0		1.8	0.23	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	4.4		1.8	0.77	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	0.27	J	1.8	0.25	ng/L	1		537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	2.1		1.8	0.18	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	46		1.8	0.52	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	59		1.8	0.49	ng/L	1		537 (modified)	Total/NA

Client Sample ID: MW-101-02272023 — Lab Sample ID: 320-97185-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	0.87	J	1.8	0.76	ng/L	1		537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	1.1	J	1.8	0.18	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	1.8		1.8	0.51	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	8.3		1.8	0.49	ng/L	1		537 (modified)	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Shannon & Wilson, Inc
Project/Site: 21-1-12596-025

Job ID: 320-97185-1

Client Sample ID: MW-79-02242023

Date Collected: 02/24/23 12:15
Date Received: 02/28/23 09:30

Lab Sample ID: 320-97185-1
Matrix: Water

Method: EPA 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**240**		1.8	0.52	ng/L		03/07/23 19:15	03/09/23 10:01	1
Perfluoroheptanoic acid (PFHpA)	**50**		1.8	0.23	ng/L		03/07/23 19:15	03/09/23 10:01	1
Perfluorooctanoic acid (PFOA)	**65**		1.8	0.77	ng/L		03/07/23 19:15	03/09/23 10:01	1
Perfluorononanoic acid (PFNA)	**1.8**		1.8	0.24	ng/L		03/07/23 19:15	03/09/23 10:01	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		03/07/23 19:15	03/09/23 10:01	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.99	ng/L		03/07/23 19:15	03/09/23 10:01	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.50	ng/L		03/07/23 19:15	03/09/23 10:01	1
Perfluorotridecanoic acid (PFTrDA)	ND		1.8	1.2	ng/L		03/07/23 19:15	03/09/23 10:01	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.66	ng/L		03/07/23 19:15	03/09/23 10:01	1
Perfluorobutanesulfonic acid (PFBS)	**130**		1.8	0.18	ng/L		03/07/23 19:15	03/09/23 10:01	1
Perfluorohexanesulfonic acid (PFHxS)	**940**	**E**	1.8	0.51	ng/L		03/07/23 19:15	03/09/23 10:01	1
Perfluorooctanesulfonic acid (PFOS)	**940**	**E**	1.8	0.49	ng/L		03/07/23 19:15	03/09/23 10:01	1
NEtFOSAA	ND		4.5	1.2	ng/L		03/07/23 19:15	03/09/23 10:01	1
NMeFOSAA	ND		4.5	1.1	ng/L		03/07/23 19:15	03/09/23 10:01	1
HFPO-DA (GenX)	ND		3.6	1.4	ng/L		03/07/23 19:15	03/09/23 10:01	1
F-53B Major	ND		1.8	0.22	ng/L		03/07/23 19:15	03/09/23 10:01	1
F-53B Minor	ND	*+	1.8	0.29	ng/L		03/07/23 19:15	03/09/23 10:01	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		03/07/23 19:15	03/09/23 10:01	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*99*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:01*	*1*
13C4 PFHpA	*99*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:01*	*1*
13C4 PFOA	*98*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:01*	*1*
13C5 PFNA	*93*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:01*	*1*
13C2 PFDA	*99*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:01*	*1*
13C2 PFUnA	*103*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:01*	*1*
13C2 PFDoA	*107*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:01*	*1*
13C2 PFTeDA	*98*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:01*	*1*
13C3 PFBS	*105*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:01*	*1*
18O2 PFHxS	*96*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:01*	*1*
13C4 PFOS	*88*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:01*	*1*
d3-NMeFOSAA	*106*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:01*	*1*
d5-NEtFOSAA	*112*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:01*	*1*
13C3 HFPO-DA	*97*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:01*	*1*

Client Sample ID: MW-53-02242023

Date Collected: 02/24/23 13:33
Date Received: 02/28/23 09:30

Lab Sample ID: 320-97185-2
Matrix: Water

Method: EPA 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**4.4**		1.8	0.52	ng/L		03/07/23 19:15	03/09/23 10:21	1
Perfluoroheptanoic acid (PFHpA)	**2.3**		1.8	0.22	ng/L		03/07/23 19:15	03/09/23 10:21	1
Perfluorooctanoic acid (PFOA)	**3.4**		1.8	0.76	ng/L		03/07/23 19:15	03/09/23 10:21	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.24	ng/L		03/07/23 19:15	03/09/23 10:21	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		03/07/23 19:15	03/09/23 10:21	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.99	ng/L		03/07/23 19:15	03/09/23 10:21	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.49	ng/L		03/07/23 19:15	03/09/23 10:21	1

Client Sample ID: MW-53-02242023

Date Collected: 02/24/23 13:33
Date Received: 02/28/23 09:30

Lab Sample ID: 320-97185-2
Matrix: Water

Method: EPA 537 (modified) - Fluorinated Alkyl Substances (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorotridecanoic acid (PFTrDA)	ND		1.8	1.2	ng/L		03/07/23 19:15	03/09/23 10:21	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.66	ng/L		03/07/23 19:15	03/09/23 10:21	1
Perfluorobutanesulfonic acid (PFBS)	**2.6**		1.8	0.18	ng/L		03/07/23 19:15	03/09/23 10:21	1
Perfluorohexanesulfonic acid (PFHxS)	**37**		1.8	0.51	ng/L		03/07/23 19:15	03/09/23 10:21	1
Perfluorooctanesulfonic acid (PFOS)	**26**	**I**	1.8	0.49	ng/L		03/07/23 19:15	03/09/23 10:21	1
NEtFOSAA	ND		4.5	1.2	ng/L		03/07/23 19:15	03/09/23 10:21	1
NMeFOSAA	ND		4.5	1.1	ng/L		03/07/23 19:15	03/09/23 10:21	1
HFPO-DA (GenX)	ND		3.6	1.3	ng/L		03/07/23 19:15	03/09/23 10:21	1
F-53B Major	ND		1.8	0.22	ng/L		03/07/23 19:15	03/09/23 10:21	1
F-53B Minor	ND	*+	1.8	0.29	ng/L		03/07/23 19:15	03/09/23 10:21	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		03/07/23 19:15	03/09/23 10:21	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*110*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:21*	*1*
13C4 PFHpA	*113*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:21*	*1*
13C4 PFOA	*103*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:21*	*1*
13C5 PFNA	*101*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:21*	*1*
13C2 PFDA	*110*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:21*	*1*
13C2 PFUnA	*116*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:21*	*1*
13C2 PFDoA	*117*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:21*	*1*
13C2 PFTeDA	*103*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:21*	*1*
13C3 PFBS	*110*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:21*	*1*
18O2 PFHxS	*103*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:21*	*1*
13C4 PFOS	*102*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:21*	*1*
d3-NMeFOSAA	*109*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:21*	*1*
d5-NEtFOSAA	*119*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:21*	*1*
13C3 HFPO-DA	*109*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:21*	*1*

Client Sample ID: MW-54-02242023

Date Collected: 02/24/23 14:25
Date Received: 02/28/23 09:30

Lab Sample ID: 320-97185-3
Matrix: Water

Method: EPA 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**3.7**		1.7	0.50	ng/L		03/07/23 19:15	03/09/23 10:31	1
Perfluoroheptanoic acid (PFHpA)	**2.2**		1.7	0.21	ng/L		03/07/23 19:15	03/09/23 10:31	1
Perfluorooctanoic acid (PFOA)	**4.1**		1.7	0.73	ng/L		03/07/23 19:15	03/09/23 10:31	1
Perfluorononanoic acid (PFNA)	**0.45**	**J**	1.7	0.23	ng/L		03/07/23 19:15	03/09/23 10:31	1
Perfluorodecanoic acid (PFDA)	ND		1.7	0.27	ng/L		03/07/23 19:15	03/09/23 10:31	1
Perfluoroundecanoic acid (PFUnA)	ND		1.7	0.94	ng/L		03/07/23 19:15	03/09/23 10:31	1
Perfluorododecanoic acid (PFDoA)	ND		1.7	0.47	ng/L		03/07/23 19:15	03/09/23 10:31	1
Perfluorotridecanoic acid (PFTrDA)	ND		1.7	1.1	ng/L		03/07/23 19:15	03/09/23 10:31	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.7	0.63	ng/L		03/07/23 19:15	03/09/23 10:31	1
Perfluorobutanesulfonic acid (PFBS)	**1.5**	**J**	1.7	0.17	ng/L		03/07/23 19:15	03/09/23 10:31	1
Perfluorohexanesulfonic acid (PFHxS)	**7.8**		1.7	0.49	ng/L		03/07/23 19:15	03/09/23 10:31	1

Client Sample ID: MW-54-02242023

Date Collected: 02/24/23 14:25
Date Received: 02/28/23 09:30

Lab Sample ID: 320-97185-3
Matrix: Water

Method: EPA 537 (modified) - Fluorinated Alkyl Substances (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	**13**		1.7	0.46	ng/L		03/07/23 19:15	03/09/23 10:31	1
NEtFOSAA	ND		4.3	1.1	ng/L		03/07/23 19:15	03/09/23 10:31	1
NMeFOSAA	ND		4.3	1.0	ng/L		03/07/23 19:15	03/09/23 10:31	1
HFPO-DA (GenX)	ND		3.4	1.3	ng/L		03/07/23 19:15	03/09/23 10:31	1
F-53B Major	ND		1.7	0.21	ng/L		03/07/23 19:15	03/09/23 10:31	1
F-53B Minor	ND	*+	1.7	0.27	ng/L		03/07/23 19:15	03/09/23 10:31	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.7	0.34	ng/L		03/07/23 19:15	03/09/23 10:31	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*106*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:31*	*1*
13C4 PFHpA	*108*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:31*	*1*
13C4 PFOA	*100*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:31*	*1*
13C5 PFNA	*94*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:31*	*1*
13C2 PFDA	*101*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:31*	*1*
13C2 PFUnA	*97*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:31*	*1*
13C2 PFDoA	*97*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:31*	*1*
13C2 PFTeDA	*93*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:31*	*1*
13C3 PFBS	*105*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:31*	*1*
18O2 PFHxS	*96*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:31*	*1*
13C4 PFOS	*93*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:31*	*1*
d3-NMeFOSAA	*106*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:31*	*1*
d5-NEtFOSAA	*105*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:31*	*1*
13C3 HFPO-DA	*99*		*25 - 150*	*03/07/23 19:15*	*03/09/23 10:31*	*1*

Client Sample ID: MW-43-02242023

Date Collected: 02/24/23 15:24
Date Received: 02/28/23 09:30

Lab Sample ID: 320-97185-4
Matrix: Water

Method: EPA 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**190**		1.9	0.56	ng/L		03/08/23 20:43	03/13/23 10:40	1
Perfluoroheptanoic acid (PFHpA)	**40**		1.9	0.24	ng/L		03/08/23 20:43	03/13/23 10:40	1
Perfluorooctanoic acid (PFOA)	**67**		1.9	0.82	ng/L		03/08/23 20:43	03/13/23 10:40	1
Perfluorononanoic acid (PFNA)	**0.28**	**J**	1.9	0.26	ng/L		03/08/23 20:43	03/13/23 10:40	1
Perfluorodecanoic acid (PFDA)	ND		1.9	0.30	ng/L		03/08/23 20:43	03/13/23 10:40	1
Perfluoroundecanoic acid (PFUnA)	ND		1.9	1.1	ng/L		03/08/23 20:43	03/13/23 10:40	1
Perfluorododecanoic acid (PFDoA)	ND		1.9	0.53	ng/L		03/08/23 20:43	03/13/23 10:40	1
Perfluorotridecanoic acid (PFTrDA)	ND		1.9	1.3	ng/L		03/08/23 20:43	03/13/23 10:40	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.9	0.70	ng/L		03/08/23 20:43	03/13/23 10:40	1
Perfluorobutanesulfonic acid (PFBS)	**160**		1.9	0.19	ng/L		03/08/23 20:43	03/13/23 10:40	1
Perfluorohexanesulfonic acid (PFHxS)	**670**	**E**	1.9	0.55	ng/L		03/08/23 20:43	03/13/23 10:40	1
Perfluorooctanesulfonic acid (PFOS)	**120**		1.9	0.52	ng/L		03/08/23 20:43	03/13/23 10:40	1
NEtFOSAA	ND		4.8	1.3	ng/L		03/08/23 20:43	03/13/23 10:40	1
NMeFOSAA	ND		4.8	1.2	ng/L		03/08/23 20:43	03/13/23 10:40	1
HFPO-DA (GenX)	ND		3.9	1.4	ng/L		03/08/23 20:43	03/13/23 10:40	1
F-53B Major	ND		1.9	0.23	ng/L		03/08/23 20:43	03/13/23 10:40	1
F-53B Minor	ND		1.9	0.31	ng/L		03/08/23 20:43	03/13/23 10:40	1

Client Sample ID: MW-43-02242023

Lab Sample ID: 320-97185-4

Date Collected: 02/24/23 15:24
Matrix: Water
Date Received: 02/28/23 09:30

Method: EPA 537 (modified) - Fluorinated Alkyl Substances (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.9	0.39	ng/L		03/08/23 20:43	03/13/23 10:40	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*117*		*25 - 150*	*03/08/23 20:43*	*03/13/23 10:40*	*1*
13C4 PFHpA	*102*		*25 - 150*	*03/08/23 20:43*	*03/13/23 10:40*	*1*
13C4 PFOA	*102*		*25 - 150*	*03/08/23 20:43*	*03/13/23 10:40*	*1*
13C5 PFNA	*99*		*25 - 150*	*03/08/23 20:43*	*03/13/23 10:40*	*1*
13C2 PFDA	*93*		*25 - 150*	*03/08/23 20:43*	*03/13/23 10:40*	*1*
13C2 PFUnA	*89*		*25 - 150*	*03/08/23 20:43*	*03/13/23 10:40*	*1*
13C2 PFDoA	*87*		*25 - 150*	*03/08/23 20:43*	*03/13/23 10:40*	*1*
13C2 PFTeDA	*73*		*25 - 150*	*03/08/23 20:43*	*03/13/23 10:40*	*1*
13C3 PFBS	*111*		*25 - 150*	*03/08/23 20:43*	*03/13/23 10:40*	*1*
18O2 PFHxS	*113*		*25 - 150*	*03/08/23 20:43*	*03/13/23 10:40*	*1*
13C4 PFOS	*90*		*25 - 150*	*03/08/23 20:43*	*03/13/23 10:40*	*1*
d3-NMeFOSAA	*86*		*25 - 150*	*03/08/23 20:43*	*03/13/23 10:40*	*1*
d5-NEtFOSAA	*80*		*25 - 150*	*03/08/23 20:43*	*03/13/23 10:40*	*1*
13C3 HFPO-DA	*94*		*25 - 150*	*03/08/23 20:43*	*03/13/23 10:40*	*1*

Client Sample ID: MW-78-02242023

Lab Sample ID: 320-97185-5

Date Collected: 02/24/23 16:30
Matrix: Water
Date Received: 02/28/23 09:30

Method: EPA 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**6.7**		1.9	0.54	ng/L		03/08/23 20:43	03/13/23 11:11	1
Perfluoroheptanoic acid (PFHpA)	**3.8**		1.9	0.23	ng/L		03/08/23 20:43	03/13/23 11:11	1
Perfluorooctanoic acid (PFOA)	**4.5**		1.9	0.79	ng/L		03/08/23 20:43	03/13/23 11:11	1
Perfluorononanoic acid (PFNA)	ND		1.9	0.25	ng/L		03/08/23 20:43	03/13/23 11:11	1
Perfluorodecanoic acid (PFDA)	ND		1.9	0.29	ng/L		03/08/23 20:43	03/13/23 11:11	1
Perfluoroundecanoic acid (PFUnA)	ND		1.9	1.0	ng/L		03/08/23 20:43	03/13/23 11:11	1
Perfluorododecanoic acid (PFDoA)	ND		1.9	0.51	ng/L		03/08/23 20:43	03/13/23 11:11	1
Perfluorotridecanoic acid (PFTrDA)	ND		1.9	1.2	ng/L		03/08/23 20:43	03/13/23 11:11	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.9	0.68	ng/L		03/08/23 20:43	03/13/23 11:11	1
Perfluorobutanesulfonic acid (PFBS)	**1.7**	**J**	1.9	0.19	ng/L		03/08/23 20:43	03/13/23 11:11	1
Perfluorohexanesulfonic acid (PFHxS)	**9.0**		1.9	0.53	ng/L		03/08/23 20:43	03/13/23 11:11	1
Perfluorooctanesulfonic acid (PFOS)	**18**		1.9	0.50	ng/L		03/08/23 20:43	03/13/23 11:11	1
NEtFOSAA	ND		4.7	1.2	ng/L		03/08/23 20:43	03/13/23 11:11	1
NMeFOSAA	ND		4.7	1.1	ng/L		03/08/23 20:43	03/13/23 11:11	1
HFPO-DA (GenX)	ND		3.7	1.4	ng/L		03/08/23 20:43	03/13/23 11:11	1
F-53B Major	ND		1.9	0.22	ng/L		03/08/23 20:43	03/13/23 11:11	1
F-53B Minor	ND		1.9	0.30	ng/L		03/08/23 20:43	03/13/23 11:11	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.9	0.37	ng/L		03/08/23 20:43	03/13/23 11:11	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*104*		*25 - 150*	*03/08/23 20:43*	*03/13/23 11:11*	*1*
13C4 PFHpA	*99*		*25 - 150*	*03/08/23 20:43*	*03/13/23 11:11*	*1*
13C4 PFOA	*94*		*25 - 150*	*03/08/23 20:43*	*03/13/23 11:11*	*1*
13C5 PFNA	*102*		*25 - 150*	*03/08/23 20:43*	*03/13/23 11:11*	*1*

Client Sample ID: MW-78-02242023

Lab Sample ID: 320-97185-5
Matrix: Water
Date Collected: 02/24/23 16:30
Date Received: 02/28/23 09:30

Method: EPA 537 (modified) - Fluorinated Alkyl Substances (Continued)

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFDA	98		25 - 150	03/08/23 20:43	03/13/23 11:11	1
13C2 PFUnA	98		25 - 150	03/08/23 20:43	03/13/23 11:11	1
13C2 PFDoA	89		25 - 150	03/08/23 20:43	03/13/23 11:11	1
13C2 PFTeDA	74		25 - 150	03/08/23 20:43	03/13/23 11:11	1
13C3 PFBS	99		25 - 150	03/08/23 20:43	03/13/23 11:11	1
18O2 PFHxS	95		25 - 150	03/08/23 20:43	03/13/23 11:11	1
13C4 PFOS	100		25 - 150	03/08/23 20:43	03/13/23 11:11	1
d3-NMeFOSAA	89		25 - 150	03/08/23 20:43	03/13/23 11:11	1
d5-NEtFOSAA	85		25 - 150	03/08/23 20:43	03/13/23 11:11	1
13C3 HFPO-DA	98		25 - 150	03/08/23 20:43	03/13/23 11:11	1

Client Sample ID: MW-23-02272023

Lab Sample ID: 320-97185-6
Matrix: Water
Date Collected: 02/27/23 10:45
Date Received: 02/28/23 09:30

Method: EPA 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		1.7	0.50	ng/L		03/08/23 08:18	03/11/23 23:20	1
Perfluoroheptanoic acid (PFHpA)	ND		1.7	0.22	ng/L		03/08/23 08:18	03/11/23 23:20	1
Perfluorooctanoic acid (PFOA)	ND		1.7	0.73	ng/L		03/08/23 08:18	03/11/23 23:20	1
Perfluorononanoic acid (PFNA)	ND		1.7	0.23	ng/L		03/08/23 08:18	03/11/23 23:20	1
Perfluorodecanoic acid (PFDA)	ND		1.7	0.27	ng/L		03/08/23 08:18	03/11/23 23:20	1
Perfluoroundecanoic acid (PFUnA)	ND		1.7	0.95	ng/L		03/08/23 08:18	03/11/23 23:20	1
Perfluorododecanoic acid (PFDoA)	ND		1.7	0.47	ng/L		03/08/23 08:18	03/11/23 23:20	1
Perfluorotridecanoic acid (PFTrDA)	ND		1.7	1.1	ng/L		03/08/23 08:18	03/11/23 23:20	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.7	0.63	ng/L		03/08/23 08:18	03/11/23 23:20	1
Perfluorobutanesulfonic acid (PFBS)	**0.98**	**J**	1.7	0.17	ng/L		03/08/23 08:18	03/11/23 23:20	1
Perfluorohexanesulfonic acid (PFHxS)	**1.5**	**J**	1.7	0.49	ng/L		03/08/23 08:18	03/11/23 23:20	1
Perfluorooctanesulfonic acid (PFOS)	**6.8**		1.7	0.47	ng/L		03/08/23 08:18	03/11/23 23:20	1
NEtFOSAA	ND		4.3	1.1	ng/L		03/08/23 08:18	03/11/23 23:20	1
NMeFOSAA	ND		4.3	1.0	ng/L		03/08/23 08:18	03/11/23 23:20	1
HFPO-DA (GenX)	ND		3.4	1.3	ng/L		03/08/23 08:18	03/11/23 23:20	1
F-53B Major	ND		1.7	0.21	ng/L		03/08/23 08:18	03/11/23 23:20	1
F-53B Minor	ND		1.7	0.28	ng/L		03/08/23 08:18	03/11/23 23:20	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.7	0.34	ng/L		03/08/23 08:18	03/11/23 23:20	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFHxA	96		25 - 150	03/08/23 08:18	03/11/23 23:20	1
13C4 PFHpA	104		25 - 150	03/08/23 08:18	03/11/23 23:20	1
13C4 PFOA	96		25 - 150	03/08/23 08:18	03/11/23 23:20	1
13C5 PFNA	89		25 - 150	03/08/23 08:18	03/11/23 23:20	1
13C2 PFDA	93		25 - 150	03/08/23 08:18	03/11/23 23:20	1
13C2 PFUnA	95		25 - 150	03/08/23 08:18	03/11/23 23:20	1
13C2 PFDoA	87		25 - 150	03/08/23 08:18	03/11/23 23:20	1
13C2 PFTeDA	83		25 - 150	03/08/23 08:18	03/11/23 23:20	1
13C3 PFBS	84		25 - 150	03/08/23 08:18	03/11/23 23:20	1
18O2 PFHxS	95		25 - 150	03/08/23 08:18	03/11/23 23:20	1
13C4 PFOS	95		25 - 150	03/08/23 08:18	03/11/23 23:20	1

Client: Shannon & Wilson, Inc
Project/Site: 21-1-12596-025

Job ID: 320-97185-1

Client Sample ID: MW-23-02272023

Lab Sample ID: 320-97185-6
Matrix: Water
Date Collected: 02/27/23 10:45
Date Received: 02/28/23 09:30

Method: EPA 537 (modified) - Fluorinated Alkyl Substances (Continued)

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
d3-NMeFOSAA	*91*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:20*	*1*
d5-NEtFOSAA	*90*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:20*	*1*
13C3 HFPO-DA	*94*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:20*	*1*

Client Sample ID: MW-72-02272023

Lab Sample ID: 320-97185-7
Matrix: Water
Date Collected: 02/27/23 11:50
Date Received: 02/28/23 09:30

Method: EPA 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		1.9	0.54	ng/L		03/08/23 08:18	03/11/23 23:31	1
Perfluoroheptanoic acid (PFHpA)	**0.26**	**J**	1.9	0.23	ng/L		03/08/23 08:18	03/11/23 23:31	1
Perfluorooctanoic acid (PFOA)	**1.3**	**J**	1.9	0.80	ng/L		03/08/23 08:18	03/11/23 23:31	1
Perfluorononanoic acid (PFNA)	ND		1.9	0.25	ng/L		03/08/23 08:18	03/11/23 23:31	1
Perfluorodecanoic acid (PFDA)	ND		1.9	0.29	ng/L		03/08/23 08:18	03/11/23 23:31	1
Perfluoroundecanoic acid (PFUnA)	ND		1.9	1.0	ng/L		03/08/23 08:18	03/11/23 23:31	1
Perfluorododecanoic acid (PFDoA)	ND		1.9	0.52	ng/L		03/08/23 08:18	03/11/23 23:31	1
Perfluorotridecanoic acid (PFTrDA)	ND		1.9	1.2	ng/L		03/08/23 08:18	03/11/23 23:31	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.9	0.68	ng/L		03/08/23 08:18	03/11/23 23:31	1
Perfluorobutanesulfonic acid (PFBS)	**0.80**	**J**	1.9	0.19	ng/L		03/08/23 08:18	03/11/23 23:31	1
Perfluorohexanesulfonic acid (PFHxS)	**3.4**		1.9	0.53	ng/L		03/08/23 08:18	03/11/23 23:31	1
Perfluorooctanesulfonic acid (PFOS)	**5.1**		1.9	0.51	ng/L		03/08/23 08:18	03/11/23 23:31	1
NEtFOSAA	ND		4.7	1.2	ng/L		03/08/23 08:18	03/11/23 23:31	1
NMeFOSAA	ND		4.7	1.1	ng/L		03/08/23 08:18	03/11/23 23:31	1
HFPO-DA (GenX)	ND		3.7	1.4	ng/L		03/08/23 08:18	03/11/23 23:31	1
F-53B Major	ND		1.9	0.22	ng/L		03/08/23 08:18	03/11/23 23:31	1
F-53B Minor	ND		1.9	0.30	ng/L		03/08/23 08:18	03/11/23 23:31	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.9	0.37	ng/L		03/08/23 08:18	03/11/23 23:31	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFHxA	*98*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:31*	*1*
13C4 PFHpA	*106*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:31*	*1*
13C4 PFOA	*101*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:31*	*1*
13C5 PFNA	*104*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:31*	*1*
13C2 PFDA	*97*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:31*	*1*
13C2 PFUnA	*100*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:31*	*1*
13C2 PFDoA	*82*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:31*	*1*
13C2 PFTeDA	*86*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:31*	*1*
13C3 PFBS	*97*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:31*	*1*
18O2 PFHxS	*104*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:31*	*1*
13C4 PFOS	*96*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:31*	*1*
d3-NMeFOSAA	*90*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:31*	*1*
d5-NEtFOSAA	*96*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:31*	*1*
13C3 HFPO-DA	*100*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:31*	*1*

Client: Shannon & Wilson, Inc
Project/Site: 21-1-12596-025

Job ID: 320-97185-1

Client Sample ID: MW-8-02272023

Lab Sample ID: 320-97185-8

Date Collected: 02/27/23 12:50

Matrix: Water

Date Received: 02/28/23 09:30

Method: EPA 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**6.0**		1.8	0.53	ng/L		03/08/23 08:18	03/11/23 23:41	1
Perfluoroheptanoic acid (PFHpA)	**2.0**		1.8	0.23	ng/L		03/08/23 08:18	03/11/23 23:41	1
Perfluorooctanoic acid (PFOA)	**4.4**		1.8	0.77	ng/L		03/08/23 08:18	03/11/23 23:41	1
Perfluorononanoic acid (PFNA)	**0.27**	**J**	1.8	0.25	ng/L		03/08/23 08:18	03/11/23 23:41	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		03/08/23 08:18	03/11/23 23:41	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	1.0	ng/L		03/08/23 08:18	03/11/23 23:41	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.50	ng/L		03/08/23 08:18	03/11/23 23:41	1
Perfluorotridecanoic acid (PFTrDA)	ND		1.8	1.2	ng/L		03/08/23 08:18	03/11/23 23:41	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.66	ng/L		03/08/23 08:18	03/11/23 23:41	1
Perfluorobutanesulfonic acid (PFBS)	**2.1**		1.8	0.18	ng/L		03/08/23 08:18	03/11/23 23:41	1
Perfluorohexanesulfonic acid (PFHxS)	**46**		1.8	0.52	ng/L		03/08/23 08:18	03/11/23 23:41	1
Perfluorooctanesulfonic acid (PFOS)	**59**		1.8	0.49	ng/L		03/08/23 08:18	03/11/23 23:41	1
NEtFOSAA	ND		4.5	1.2	ng/L		03/08/23 08:18	03/11/23 23:41	1
NMeFOSAA	ND		4.5	1.1	ng/L		03/08/23 08:18	03/11/23 23:41	1
HFPO-DA (GenX)	ND		3.6	1.4	ng/L		03/08/23 08:18	03/11/23 23:41	1
F-53B Major	ND		1.8	0.22	ng/L		03/08/23 08:18	03/11/23 23:41	1
F-53B Minor	ND		1.8	0.29	ng/L		03/08/23 08:18	03/11/23 23:41	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		03/08/23 08:18	03/11/23 23:41	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*103*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:41*	*1*
13C4 PFHpA	*107*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:41*	*1*
13C4 PFOA	*102*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:41*	*1*
13C5 PFNA	*98*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:41*	*1*
13C2 PFDA	*102*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:41*	*1*
13C2 PFUnA	*109*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:41*	*1*
13C2 PFDoA	*97*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:41*	*1*
13C2 PFTeDA	*94*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:41*	*1*
13C3 PFBS	*99*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:41*	*1*
18O2 PFHxS	*114*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:41*	*1*
13C4 PFOS	*106*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:41*	*1*
d3-NMeFOSAA	*100*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:41*	*1*
d5-NEtFOSAA	*101*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:41*	*1*
13C3 HFPO-DA	*113*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:41*	*1*

Client Sample ID: MW-101-02272023

Lab Sample ID: 320-97185-9

Date Collected: 02/27/23 15:00

Matrix: Water

Date Received: 02/28/23 09:30

Method: EPA 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		1.8	0.52	ng/L		03/08/23 08:18	03/11/23 23:51	1
Perfluoroheptanoic acid (PFHpA)	ND		1.8	0.22	ng/L		03/08/23 08:18	03/11/23 23:51	1
Perfluorooctanoic acid (PFOA)	**0.87**	**J**	1.8	0.76	ng/L		03/08/23 08:18	03/11/23 23:51	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.24	ng/L		03/08/23 08:18	03/11/23 23:51	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		03/08/23 08:18	03/11/23 23:51	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.99	ng/L		03/08/23 08:18	03/11/23 23:51	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.49	ng/L		03/08/23 08:18	03/11/23 23:51	1

Client: Shannon & Wilson, Inc
Project/Site: 21-1-12596-025

Job ID: 320-97185-1

Client Sample ID: MW-101-02272023
Date Collected: 02/27/23 15:00
Date Received: 02/28/23 09:30

Lab Sample ID: 320-97185-9
Matrix: Water

Method: EPA 537 (modified) - Fluorinated Alkyl Substances (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorotridecanoic acid (PFTrDA)	ND		1.8	1.2	ng/L		03/08/23 08:18	03/11/23 23:51	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.66	ng/L		03/08/23 08:18	03/11/23 23:51	1
Perfluorobutanesulfonic acid (PFBS)	**1.1**	**J**	1.8	0.18	ng/L		03/08/23 08:18	03/11/23 23:51	1
Perfluorohexanesulfonic acid (PFHxS)	**1.8**		1.8	0.51	ng/L		03/08/23 08:18	03/11/23 23:51	1
Perfluorooctanesulfonic acid (PFOS)	**8.3**		1.8	0.49	ng/L		03/08/23 08:18	03/11/23 23:51	1
NEtFOSAA	ND		4.5	1.2	ng/L		03/08/23 08:18	03/11/23 23:51	1
NMeFOSAA	ND		4.5	1.1	ng/L		03/08/23 08:18	03/11/23 23:51	1
HFPO-DA (GenX)	ND		3.6	1.3	ng/L		03/08/23 08:18	03/11/23 23:51	1
F-53B Major	ND		1.8	0.22	ng/L		03/08/23 08:18	03/11/23 23:51	1
F-53B Minor	ND		1.8	0.29	ng/L		03/08/23 08:18	03/11/23 23:51	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		03/08/23 08:18	03/11/23 23:51	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*78*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:51*	*1*
13C4 PFHpA	*76*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:51*	*1*
13C4 PFOA	*80*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:51*	*1*
13C5 PFNA	*72*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:51*	*1*
13C2 PFDA	*77*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:51*	*1*
13C2 PFUnA	*81*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:51*	*1*
13C2 PFDoA	*76*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:51*	*1*
13C2 PFTeDA	*69*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:51*	*1*
13C3 PFBS	*82*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:51*	*1*
18O2 PFHxS	*82*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:51*	*1*
13C4 PFOS	*77*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:51*	*1*
d3-NMeFOSAA	*84*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:51*	*1*
d5-NEtFOSAA	*78*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:51*	*1*
13C3 HFPO-DA	*80*		*25 - 150*	*03/08/23 08:18*	*03/11/23 23:51*	*1*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: 21-1-12596-025

Job ID: 320-97185-1

Method: 537 (modified) - Fluorinated Alkyl Substances

Matrix: Water

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFHxA (25-150)	C4PFHA (25-150)	PFOA (25-150)	PFNA (25-150)	PFDA (25-150)	PFUnA (25-150)	PFDoA (25-150)	PFTDA (25-150)
320-97185-1	MW-79-02242023	99	99	98	93	99	103	107	98
320-97185-2	MW-53-02242023	110	113	103	101	110	116	117	103
320-97185-3	MW-54-02242023	106	108	100	94	101	97	97	93
320-97185-4	MW-43-02242023	117	102	102	99	93	89	87	73
320-97185-5	MW-78-02242023	104	99	94	102	98	98	89	74
320-97185-6	MW-23-02272023	96	104	96	89	93	95	87	83
320-97185-7	MW-72-02272023	98	106	101	104	97	100	82	86
320-97185-8	MW-8-02272023	103	107	102	98	102	109	97	94
320-97185-9	MW-101-02272023	78	76	80	72	77	81	76	69
LCS 320-658949/2-A	Lab Control Sample	109	109	103	100	106	104	106	98
LCS 320-658990/2-A	Lab Control Sample	92	95	97	96	95	102	97	87
LCS 320-659327/2-A	Lab Control Sample	114	118	114	119	113	117	95	84
LCSD 320-658949/3-A	Lab Control Sample Dup	102	104	95	94	100	100	104	94
LCSD 320-658990/3-A	Lab Control Sample Dup	95	110	99	99	103	108	101	94
LCSD 320-659327/21-A	Lab Control Sample Dup	104	105	100	105	104	96	101	87
MB 320-658949/1-A	Method Blank	105	108	104	101	104	108	109	103
MB 320-658990/1-A	Method Blank	101	105	104	96	96	94	99	94
MB 320-659327/1-A	Method Blank	98	101	98	108	103	105	95	81

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	C3PFBS (25-150)	PFHxS (25-150)	PFOS (25-150)	d3NMFOS (25-150)	d5NEFOS (25-150)	HFPODA (25-150)		
320-97185-1	MW-79-02242023	105	96	88	106	112	97		
320-97185-2	MW-53-02242023	110	103	102	109	119	109		
320-97185-3	MW-54-02242023	105	96	93	106	105	99		
320-97185-4	MW-43-02242023	111	113	90	86	80	94		
320-97185-5	MW-78-02242023	99	95	100	89	85	98		
320-97185-6	MW-23-02272023	84	95	95	91	90	94		
320-97185-7	MW-72-02272023	97	104	96	90	96	100		
320-97185-8	MW-8-02272023	99	114	106	100	101	113		
320-97185-9	MW-101-02272023	82	82	77	84	78	80		
LCS 320-658949/2-A	Lab Control Sample	109	103	98	100	106	101		
LCS 320-658990/2-A	Lab Control Sample	76	96	98	99	88	98		
LCS 320-659327/2-A	Lab Control Sample	114	117	118	99	100	110		
LCSD 320-658949/3-A	Lab Control Sample Dup	100	97	94	96	106	98		
LCSD 320-658990/3-A	Lab Control Sample Dup	92	99	106	103	98	102		
LCSD 320-659327/21-A	Lab Control Sample Dup	101	100	98	90	99	102		
MB 320-658949/1-A	Method Blank	107	106	104	104	106	103		
MB 320-658990/1-A	Method Blank	79	98	93	106	101	96		
MB 320-659327/1-A	Method Blank	96	94	102	101	96	100		

Surrogate Legend

PFHxA = 13C2 PFHxA
C4PFHA = 13C4 PFHpA
PFOA = 13C4 PFOA
PFNA = 13C5 PFNA
PFDA = 13C2 PFDA
PFUnA = 13C2 PFUnA
PFDoA = 13C2 PFDoA
PFTDA = 13C2 PFTeDA
C3PFBS = 13C3 PFBS

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: 21-1-12596-025

Job ID: 320-97185-1

PFHxS = 18O2 PFHxS
PFOS = 13C4 PFOS
d3NMFOS = d3-NMeFOSAA
d5NEFOS = d5-NEtFOSAA
HFPODA = 13C3 HFPO-DA

Method: 537 (modified) - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-658949/1-A
Matrix: Water
Analysis Batch: 659484

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 658949

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		03/07/23 19:15	03/09/23 08:30	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		03/07/23 19:15	03/09/23 08:30	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		03/07/23 19:15	03/09/23 08:30	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		03/07/23 19:15	03/09/23 08:30	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		03/07/23 19:15	03/09/23 08:30	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		03/07/23 19:15	03/09/23 08:30	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		03/07/23 19:15	03/09/23 08:30	1
Perfluorotridecanoic acid (PFTrDA)	ND		2.0	1.3	ng/L		03/07/23 19:15	03/09/23 08:30	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.73	ng/L		03/07/23 19:15	03/09/23 08:30	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		03/07/23 19:15	03/09/23 08:30	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.57	ng/L		03/07/23 19:15	03/09/23 08:30	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		03/07/23 19:15	03/09/23 08:30	1
NEtFOSAA	ND		5.0	1.3	ng/L		03/07/23 19:15	03/09/23 08:30	1
NMeFOSAA	ND		5.0	1.2	ng/L		03/07/23 19:15	03/09/23 08:30	1
HFPO-DA (GenX)	ND		4.0	1.5	ng/L		03/07/23 19:15	03/09/23 08:30	1
F-53B Major	ND		2.0	0.24	ng/L		03/07/23 19:15	03/09/23 08:30	1
F-53B Minor	ND		2.0	0.32	ng/L		03/07/23 19:15	03/09/23 08:30	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.40	ng/L		03/07/23 19:15	03/09/23 08:30	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*105*		*25 - 150*	*03/07/23 19:15*	*03/09/23 08:30*	*1*
13C4 PFHpA	*108*		*25 - 150*	*03/07/23 19:15*	*03/09/23 08:30*	*1*
13C4 PFOA	*104*		*25 - 150*	*03/07/23 19:15*	*03/09/23 08:30*	*1*
13C5 PFNA	*101*		*25 - 150*	*03/07/23 19:15*	*03/09/23 08:30*	*1*
13C2 PFDA	*104*		*25 - 150*	*03/07/23 19:15*	*03/09/23 08:30*	*1*
13C2 PFUnA	*108*		*25 - 150*	*03/07/23 19:15*	*03/09/23 08:30*	*1*
13C2 PFDoA	*109*		*25 - 150*	*03/07/23 19:15*	*03/09/23 08:30*	*1*
13C2 PFTeDA	*103*		*25 - 150*	*03/07/23 19:15*	*03/09/23 08:30*	*1*
13C3 PFBS	*107*		*25 - 150*	*03/07/23 19:15*	*03/09/23 08:30*	*1*
18O2 PFHxS	*106*		*25 - 150*	*03/07/23 19:15*	*03/09/23 08:30*	*1*
13C4 PFOS	*104*		*25 - 150*	*03/07/23 19:15*	*03/09/23 08:30*	*1*
d3-NMeFOSAA	*104*		*25 - 150*	*03/07/23 19:15*	*03/09/23 08:30*	*1*
d5-NEtFOSAA	*106*		*25 - 150*	*03/07/23 19:15*	*03/09/23 08:30*	*1*
13C3 HFPO-DA	*103*		*25 - 150*	*03/07/23 19:15*	*03/09/23 08:30*	*1*

Lab Sample ID: LCS 320-658949/2-A
Matrix: Water
Analysis Batch: 659484

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 658949

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorohexanoic acid (PFHxA)	40.0	39.2		ng/L		98	73 - 133
Perfluoroheptanoic acid (PFHpA)	40.0	39.7		ng/L		99	72 - 132
Perfluorooctanoic acid (PFOA)	40.0	40.5		ng/L		101	70 - 130
Perfluorononanoic acid (PFNA)	40.0	43.3		ng/L		108	75 - 135
Perfluorodecanoic acid (PFDA)	40.0	40.1		ng/L		100	76 - 136
Perfluoroundecanoic acid (PFUnA)	40.0	42.6		ng/L		106	68 - 128

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCS 320-658949/2-A
Matrix: Water
Analysis Batch: 659484

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 658949

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorododecanoic acid (PFDoA)	40.0	41.3		ng/L		103	71 - 131
Perfluorotridecanoic acid (PFTrDA)	40.0	39.9		ng/L		100	71 - 131
Perfluorotetradecanoic acid (PFTeA)	40.0	41.1		ng/L		103	70 - 130
Perfluorobutanesulfonic acid (PFBS)	35.5	36.5		ng/L		103	67 - 127
Perfluorohexanesulfonic acid (PFHxS)	36.5	37.6		ng/L		103	59 - 119
Perfluorooctanesulfonic acid (PFOS)	37.2	38.0		ng/L		102	70 - 130
NEtFOSAA	40.0	38.2		ng/L		96	76 - 136
NMeFOSAA	40.0	41.0		ng/L		102	76 - 136
HFPO-DA (GenX)	40.0	42.4		ng/L		106	51 - 173
F-53B Major	37.4	42.6		ng/L		114	75 - 135
F-53B Minor	37.8	44.0	*+	ng/L		117	54 - 114
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.8	43.2		ng/L		114	79 - 139

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*109*		*25 - 150*
13C4 PFHpA	*109*		*25 - 150*
13C4 PFOA	*103*		*25 - 150*
13C5 PFNA	*100*		*25 - 150*
13C2 PFDA	*106*		*25 - 150*
13C2 PFUnA	*104*		*25 - 150*
13C2 PFDoA	*106*		*25 - 150*
13C2 PFTeDA	*98*		*25 - 150*
13C3 PFBS	*109*		*25 - 150*
18O2 PFHxS	*103*		*25 - 150*
13C4 PFOS	*98*		*25 - 150*
d3-NMeFOSAA	*100*		*25 - 150*
d5-NEtFOSAA	*106*		*25 - 150*
13C3 HFPO-DA	*101*		*25 - 150*

Lab Sample ID: LCSD 320-658949/3-A
Matrix: Water
Analysis Batch: 659484

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 658949

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)	40.0	38.8		ng/L		97	73 - 133	1	30
Perfluoroheptanoic acid (PFHpA)	40.0	40.9		ng/L		102	72 - 132	3	30
Perfluorooctanoic acid (PFOA)	40.0	44.4		ng/L		111	70 - 130	9	30
Perfluorononanoic acid (PFNA)	40.0	44.6		ng/L		112	75 - 135	3	30
Perfluorodecanoic acid (PFDA)	40.0	42.9		ng/L		107	76 - 136	7	30
Perfluoroundecanoic acid (PFUnA)	40.0	42.2		ng/L		106	68 - 128	1	30
Perfluorododecanoic acid (PFDoA)	40.0	42.6		ng/L		106	71 - 131	3	30

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCSD 320-658949/3-A
Matrix: Water
Analysis Batch: 659484

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 658949

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorotridecanoic acid (PFTrDA)			40.0	38.4		ng/L		96	71 - 131	4	30
Perfluorotetradecanoic acid (PFTeA)			40.0	40.3		ng/L		101	70 - 130	2	30
Perfluorobutanesulfonic acid (PFBS)			35.5	38.2		ng/L		107	67 - 127	5	30
Perfluorohexanesulfonic acid (PFHxS)			36.5	37.9		ng/L		104	59 - 119	1	30
Perfluorooctanesulfonic acid (PFOS)			37.2	37.8		ng/L		102	70 - 130	0	30
NEtFOSAA			40.0	36.3		ng/L		91	76 - 136	5	30
NMeFOSAA			40.0	42.1		ng/L		105	76 - 136	3	30
HFPO-DA (GenX)			40.0	40.8		ng/L		102	51 - 173	4	30
F-53B Major			37.4	41.9		ng/L		112	75 - 135	2	30
F-53B Minor			37.8	44.3	*+	ng/L		117	54 - 114	1	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			37.8	44.7		ng/L		118	79 - 139	3	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFHxA	*102*		*25 - 150*
13C4 PFHpA	*104*		*25 - 150*
13C4 PFOA	*95*		*25 - 150*
13C5 PFNA	*94*		*25 - 150*
13C2 PFDA	*100*		*25 - 150*
13C2 PFUnA	*100*		*25 - 150*
13C2 PFDoA	*104*		*25 - 150*
13C2 PFTeDA	*94*		*25 - 150*
13C3 PFBS	*100*		*25 - 150*
18O2 PFHxS	*97*		*25 - 150*
13C4 PFOS	*94*		*25 - 150*
d3-NMeFOSAA	*96*		*25 - 150*
d5-NEtFOSAA	*106*		*25 - 150*
13C3 HFPO-DA	*98*		*25 - 150*

Lab Sample ID: MB 320-658990/1-A
Matrix: Water
Analysis Batch: 660114

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 658990

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		03/08/23 08:18	03/11/23 22:50	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		03/08/23 08:18	03/11/23 22:50	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		03/08/23 08:18	03/11/23 22:50	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		03/08/23 08:18	03/11/23 22:50	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		03/08/23 08:18	03/11/23 22:50	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		03/08/23 08:18	03/11/23 22:50	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		03/08/23 08:18	03/11/23 22:50	1
Perfluorotridecanoic acid (PFTrDA)	ND		2.0	1.3	ng/L		03/08/23 08:18	03/11/23 22:50	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.73	ng/L		03/08/23 08:18	03/11/23 22:50	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		03/08/23 08:18	03/11/23 22:50	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.57	ng/L		03/08/23 08:18	03/11/23 22:50	1

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: MB 320-658990/1-A
Matrix: Water
Analysis Batch: 660114

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 658990

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		03/08/23 08:18	03/11/23 22:50	1
NEtFOSAA	ND		5.0	1.3	ng/L		03/08/23 08:18	03/11/23 22:50	1
NMeFOSAA	ND		5.0	1.2	ng/L		03/08/23 08:18	03/11/23 22:50	1
HFPO-DA (GenX)	ND		4.0	1.5	ng/L		03/08/23 08:18	03/11/23 22:50	1
F-53B Major	ND		2.0	0.24	ng/L		03/08/23 08:18	03/11/23 22:50	1
F-53B Minor	ND		2.0	0.32	ng/L		03/08/23 08:18	03/11/23 22:50	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.40	ng/L		03/08/23 08:18	03/11/23 22:50	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*101*		*25 - 150*	*03/08/23 08:18*	*03/11/23 22:50*	*1*
13C4 PFHpA	*105*		*25 - 150*	*03/08/23 08:18*	*03/11/23 22:50*	*1*
13C4 PFOA	*104*		*25 - 150*	*03/08/23 08:18*	*03/11/23 22:50*	*1*
13C5 PFNA	*96*		*25 - 150*	*03/08/23 08:18*	*03/11/23 22:50*	*1*
13C2 PFDA	*96*		*25 - 150*	*03/08/23 08:18*	*03/11/23 22:50*	*1*
13C2 PFUnA	*94*		*25 - 150*	*03/08/23 08:18*	*03/11/23 22:50*	*1*
13C2 PFDoA	*99*		*25 - 150*	*03/08/23 08:18*	*03/11/23 22:50*	*1*
13C2 PFTeDA	*94*		*25 - 150*	*03/08/23 08:18*	*03/11/23 22:50*	*1*
13C3 PFBS	*79*		*25 - 150*	*03/08/23 08:18*	*03/11/23 22:50*	*1*
18O2 PFHxS	*98*		*25 - 150*	*03/08/23 08:18*	*03/11/23 22:50*	*1*
13C4 PFOS	*93*		*25 - 150*	*03/08/23 08:18*	*03/11/23 22:50*	*1*
d3-NMeFOSAA	*106*		*25 - 150*	*03/08/23 08:18*	*03/11/23 22:50*	*1*
d5-NEtFOSAA	*101*		*25 - 150*	*03/08/23 08:18*	*03/11/23 22:50*	*1*
13C3 HFPO-DA	*96*		*25 - 150*	*03/08/23 08:18*	*03/11/23 22:50*	*1*

Lab Sample ID: LCS 320-658990/2-A
Matrix: Water
Analysis Batch: 660114

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 658990

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorohexanoic acid (PFHxA)	40.0	41.8		ng/L		105	73 - 133
Perfluoroheptanoic acid (PFHpA)	40.0	42.1		ng/L		105	72 - 132
Perfluorooctanoic acid (PFOA)	40.0	46.7		ng/L		117	70 - 130
Perfluorononanoic acid (PFNA)	40.0	44.6		ng/L		112	75 - 135
Perfluorodecanoic acid (PFDA)	40.0	46.6		ng/L		116	76 - 136
Perfluoroundecanoic acid (PFUnA)	40.0	43.6		ng/L		109	68 - 128
Perfluorododecanoic acid (PFDoA)	40.0	41.1		ng/L		103	71 - 131
Perfluorotridecanoic acid (PFTrDA)	40.0	40.4		ng/L		101	71 - 131
Perfluorotetradecanoic acid (PFTeA)	40.0	41.7		ng/L		104	70 - 130
Perfluorobutanesulfonic acid (PFBS)	35.5	39.9		ng/L		112	67 - 127
Perfluorohexanesulfonic acid (PFHxS)	36.5	40.6		ng/L		111	59 - 119
Perfluorooctanesulfonic acid (PFOS)	37.2	35.7		ng/L		96	70 - 130
NEtFOSAA	40.0	44.1		ng/L		110	76 - 136
NMeFOSAA	40.0	41.4		ng/L		103	76 - 136

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCS 320-658990/2-A
Matrix: Water
Analysis Batch: 660114

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 658990

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
HFPO-DA (GenX)			40.0	43.8		ng/L		109	51 - 173		
F-53B Major			37.4	39.7		ng/L		106	75 - 135		
F-53B Minor			37.8	39.7		ng/L		105	54 - 114		
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			37.8	43.7		ng/L		116	79 - 139		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*92*		*25 - 150*
13C4 PFHpA	*95*		*25 - 150*
13C4 PFOA	*97*		*25 - 150*
13C5 PFNA	*96*		*25 - 150*
13C2 PFDA	*95*		*25 - 150*
13C2 PFUnA	*102*		*25 - 150*
13C2 PFDoA	*97*		*25 - 150*
13C2 PFTeDA	*87*		*25 - 150*
13C3 PFBS	*76*		*25 - 150*
18O2 PFHxS	*96*		*25 - 150*
13C4 PFOS	*98*		*25 - 150*
d3-NMeFOSAA	*99*		*25 - 150*
d5-NEtFOSAA	*88*		*25 - 150*
13C3 HFPO-DA	*98*		*25 - 150*

Lab Sample ID: LCSD 320-658990/3-A
Matrix: Water
Analysis Batch: 660114

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 658990

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)			40.0	43.3		ng/L		108	73 - 133	3	30
Perfluoroheptanoic acid (PFHpA)			40.0	40.4		ng/L		101	72 - 132	4	30
Perfluorooctanoic acid (PFOA)			40.0	45.4		ng/L		114	70 - 130	3	30
Perfluorononanoic acid (PFNA)			40.0	48.3		ng/L		121	75 - 135	8	30
Perfluorodecanoic acid (PFDA)			40.0	43.8		ng/L		109	76 - 136	6	30
Perfluoroundecanoic acid (PFUnA)			40.0	41.1		ng/L		103	68 - 128	6	30
Perfluorododecanoic acid (PFDoA)			40.0	41.4		ng/L		103	71 - 131	1	30
Perfluorotridecanoic acid (PFTrDA)			40.0	41.8		ng/L		104	71 - 131	3	30
Perfluorotetradecanoic acid (PFTeA)			40.0	41.9		ng/L		105	70 - 130	0	30
Perfluorobutanesulfonic acid (PFBS)			35.5	34.0		ng/L		96	67 - 127	16	30
Perfluorohexanesulfonic acid (PFHxS)			36.5	37.9		ng/L		104	59 - 119	7	30
Perfluorooctanesulfonic acid (PFOS)			37.2	34.3		ng/L		92	70 - 130	4	30
NEtFOSAA			40.0	41.8		ng/L		104	76 - 136	5	30
NMeFOSAA			40.0	44.4		ng/L		111	76 - 136	7	30
HFPO-DA (GenX)			40.0	41.7		ng/L		104	51 - 173	5	30
F-53B Major			37.4	38.6		ng/L		103	75 - 135	3	30
F-53B Minor			37.8	41.4		ng/L		110	54 - 114	4	30

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCSD 320-658990/3-A
Matrix: Water
Analysis Batch: 660114

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 658990

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			37.8	38.9		ng/L		103	79 - 139	12	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFHxA	*95*		*25 - 150*
13C4 PFHpA	*110*		*25 - 150*
13C4 PFOA	*99*		*25 - 150*
13C5 PFNA	*99*		*25 - 150*
13C2 PFDA	*103*		*25 - 150*
13C2 PFUnA	*108*		*25 - 150*
13C2 PFDoA	*101*		*25 - 150*
13C2 PFTeDA	*94*		*25 - 150*
13C3 PFBS	*92*		*25 - 150*
18O2 PFHxS	*99*		*25 - 150*
13C4 PFOS	*106*		*25 - 150*
d3-NMeFOSAA	*103*		*25 - 150*
d5-NEtFOSAA	*98*		*25 - 150*
13C3 HFPO-DA	*102*		*25 - 150*

Lab Sample ID: MB 320-659327/1-A
Matrix: Water
Analysis Batch: 660344

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 659327

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		03/08/23 20:43	03/13/23 09:09	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		03/08/23 20:43	03/13/23 09:09	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		03/08/23 20:43	03/13/23 09:09	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		03/08/23 20:43	03/13/23 09:09	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		03/08/23 20:43	03/13/23 09:09	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		03/08/23 20:43	03/13/23 09:09	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		03/08/23 20:43	03/13/23 09:09	1
Perfluorotridecanoic acid (PFTrDA)	ND		2.0	1.3	ng/L		03/08/23 20:43	03/13/23 09:09	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.73	ng/L		03/08/23 20:43	03/13/23 09:09	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		03/08/23 20:43	03/13/23 09:09	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.57	ng/L		03/08/23 20:43	03/13/23 09:09	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		03/08/23 20:43	03/13/23 09:09	1
NEtFOSAA	ND		5.0	1.3	ng/L		03/08/23 20:43	03/13/23 09:09	1
NMeFOSAA	ND		5.0	1.2	ng/L		03/08/23 20:43	03/13/23 09:09	1
HFPO-DA (GenX)	ND		4.0	1.5	ng/L		03/08/23 20:43	03/13/23 09:09	1
F-53B Major	ND		2.0	0.24	ng/L		03/08/23 20:43	03/13/23 09:09	1
F-53B Minor	ND		2.0	0.32	ng/L		03/08/23 20:43	03/13/23 09:09	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.40	ng/L		03/08/23 20:43	03/13/23 09:09	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*98*		*25 - 150*	*03/08/23 20:43*	*03/13/23 09:09*	*1*
13C4 PFHpA	*101*		*25 - 150*	*03/08/23 20:43*	*03/13/23 09:09*	*1*
13C4 PFOA	*98*		*25 - 150*	*03/08/23 20:43*	*03/13/23 09:09*	*1*
13C5 PFNA	*108*		*25 - 150*	*03/08/23 20:43*	*03/13/23 09:09*	*1*

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: MB 320-659327/1-A
Matrix: Water
Analysis Batch: 660344

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 659327

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFDA	103		25 - 150	03/08/23 20:43	03/13/23 09:09	1
13C2 PFUnA	105		25 - 150	03/08/23 20:43	03/13/23 09:09	1
13C2 PFDoA	95		25 - 150	03/08/23 20:43	03/13/23 09:09	1
13C2 PFTeDA	81		25 - 150	03/08/23 20:43	03/13/23 09:09	1
13C3 PFBS	96		25 - 150	03/08/23 20:43	03/13/23 09:09	1
18O2 PFHxS	94		25 - 150	03/08/23 20:43	03/13/23 09:09	1
13C4 PFOS	102		25 - 150	03/08/23 20:43	03/13/23 09:09	1
d3-NMeFOSAA	101		25 - 150	03/08/23 20:43	03/13/23 09:09	1
d5-NEtFOSAA	96		25 - 150	03/08/23 20:43	03/13/23 09:09	1
13C3 HFPO-DA	100		25 - 150	03/08/23 20:43	03/13/23 09:09	1

Lab Sample ID: LCS 320-659327/2-A
Matrix: Water
Analysis Batch: 660344

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 659327

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorohexanoic acid (PFHxA)	40.0	38.7		ng/L		97	73 - 133
Perfluoroheptanoic acid (PFHpA)	40.0	42.0		ng/L		105	72 - 132
Perfluorooctanoic acid (PFOA)	40.0	39.9		ng/L		100	70 - 130
Perfluorononanoic acid (PFNA)	40.0	39.7		ng/L		99	75 - 135
Perfluorodecanoic acid (PFDA)	40.0	42.5		ng/L		106	76 - 136
Perfluoroundecanoic acid (PFUnA)	40.0	40.8		ng/L		102	68 - 128
Perfluorododecanoic acid (PFDoA)	40.0	40.5		ng/L		101	71 - 131
Perfluorotridecanoic acid (PFTrDA)	40.0	39.7		ng/L		99	71 - 131
Perfluorotetradecanoic acid (PFTeA)	40.0	38.4		ng/L		96	70 - 130
Perfluorobutanesulfonic acid (PFBS)	35.5	35.6		ng/L		100	67 - 127
Perfluorohexanesulfonic acid (PFHxS)	36.5	35.3		ng/L		97	59 - 119
Perfluorooctanesulfonic acid (PFOS)	37.2	36.2		ng/L		97	70 - 130
NEtFOSAA	40.0	34.8		ng/L		87	76 - 136
NMeFOSAA	40.0	36.9		ng/L		92	76 - 136
HFPO-DA (GenX)	40.0	38.9		ng/L		97	51 - 173
F-53B Major	37.4	36.3		ng/L		97	75 - 135
F-53B Minor	37.8	31.9		ng/L		84	54 - 114
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.8	37.9		ng/L		100	79 - 139

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
13C2 PFHxA	114		25 - 150
13C4 PFHpA	118		25 - 150
13C4 PFOA	114		25 - 150
13C5 PFNA	119		25 - 150
13C2 PFDA	113		25 - 150
13C2 PFUnA	117		25 - 150
13C2 PFDoA	95		25 - 150

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCS 320-659327/2-A
Matrix: Water
Analysis Batch: 660344

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 659327

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
13C2 PFTeDA	84		25 - 150
13C3 PFBS	114		25 - 150
18O2 PFHxS	117		25 - 150
13C4 PFOS	118		25 - 150
d3-NMeFOSAA	99		25 - 150
d5-NEtFOSAA	100		25 - 150
13C3 HFPO-DA	110		25 - 150

Lab Sample ID: LCSD 320-659327/21-A
Matrix: Water
Analysis Batch: 660344

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 659327

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)			40.0	41.1		ng/L		103	73 - 133	6	30
Perfluoroheptanoic acid (PFHpA)			40.0	42.7		ng/L		107	72 - 132	2	30
Perfluorooctanoic acid (PFOA)			40.0	43.1		ng/L		108	70 - 130	8	30
Perfluorononanoic acid (PFNA)			40.0	43.6		ng/L		109	75 - 135	9	30
Perfluorodecanoic acid (PFDA)			40.0	40.3		ng/L		101	76 - 136	5	30
Perfluoroundecanoic acid (PFUnA)			40.0	43.9		ng/L		110	68 - 128	7	30
Perfluorododecanoic acid (PFDoA)			40.0	40.5		ng/L		101	71 - 131	0	30
Perfluorotridecanoic acid (PFTrDA)			40.0	42.5		ng/L		106	71 - 131	7	30
Perfluorotetradecanoic acid (PFTeA)			40.0	42.4		ng/L		106	70 - 130	10	30
Perfluorobutanesulfonic acid (PFBS)			35.5	39.0		ng/L		110	67 - 127	9	30
Perfluorohexanesulfonic acid (PFHxS)			36.5	35.8		ng/L		98	59 - 119	1	30
Perfluorooctanesulfonic acid (PFOS)			37.2	38.6		ng/L		104	70 - 130	6	30
NEtFOSAA			40.0	35.0		ng/L		88	76 - 136	1	30
NMeFOSAA			40.0	40.6		ng/L		101	76 - 136	9	30
HFPO-DA (GenX)			40.0	40.8		ng/L		102	51 - 173	5	30
F-53B Major			37.4	39.6		ng/L		106	75 - 135	8	30
F-53B Minor			37.8	40.4		ng/L		107	54 - 114	24	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			37.8	41.9		ng/L		111	79 - 139	10	30

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
13C2 PFHxA	104		25 - 150
13C4 PFHpA	105		25 - 150
13C4 PFOA	100		25 - 150
13C5 PFNA	105		25 - 150
13C2 PFDA	104		25 - 150
13C2 PFUnA	96		25 - 150
13C2 PFDoA	101		25 - 150
13C2 PFTeDA	87		25 - 150
13C3 PFBS	101		25 - 150
18O2 PFHxS	100		25 - 150

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCSD 320-659327/21-A
Matrix: Water
Analysis Batch: 660344

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 659327

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
13C4 PFOS	98		25 - 150
d3-NMeFOSAA	90		25 - 150
d5-NEtFOSAA	99		25 - 150
13C3 HFPO-DA	102		25 - 150

LCMS

Prep Batch: 658949

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-97185-1	MW-79-02242023	Total/NA	Water	3535	
320-97185-2	MW-53-02242023	Total/NA	Water	3535	
320-97185-3	MW-54-02242023	Total/NA	Water	3535	
MB 320-658949/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-658949/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-658949/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

Prep Batch: 658990

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-97185-6	MW-23-02272023	Total/NA	Water	3535	
320-97185-7	MW-72-02272023	Total/NA	Water	3535	
320-97185-8	MW-8-02272023	Total/NA	Water	3535	
320-97185-9	MW-101-02272023	Total/NA	Water	3535	
MB 320-658990/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-658990/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-658990/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

Prep Batch: 659327

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-97185-4	MW-43-02242023	Total/NA	Water	3535	
320-97185-5	MW-78-02242023	Total/NA	Water	3535	
MB 320-659327/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-659327/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-659327/21-A	Lab Control Sample Dup	Total/NA	Water	3535	

Analysis Batch: 659484

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-97185-1	MW-79-02242023	Total/NA	Water	537 (modified)	658949
320-97185-2	MW-53-02242023	Total/NA	Water	537 (modified)	658949
320-97185-3	MW-54-02242023	Total/NA	Water	537 (modified)	658949
MB 320-658949/1-A	Method Blank	Total/NA	Water	537 (modified)	658949
LCS 320-658949/2-A	Lab Control Sample	Total/NA	Water	537 (modified)	658949
LCSD 320-658949/3-A	Lab Control Sample Dup	Total/NA	Water	537 (modified)	658949

Analysis Batch: 660114

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-97185-6	MW-23-02272023	Total/NA	Water	537 (modified)	658990
320-97185-7	MW-72-02272023	Total/NA	Water	537 (modified)	658990
320-97185-8	MW-8-02272023	Total/NA	Water	537 (modified)	658990
320-97185-9	MW-101-02272023	Total/NA	Water	537 (modified)	658990
MB 320-658990/1-A	Method Blank	Total/NA	Water	537 (modified)	658990
LCS 320-658990/2-A	Lab Control Sample	Total/NA	Water	537 (modified)	658990
LCSD 320-658990/3-A	Lab Control Sample Dup	Total/NA	Water	537 (modified)	658990

Analysis Batch: 660344

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-97185-4	MW-43-02242023	Total/NA	Water	537 (modified)	659327
320-97185-5	MW-78-02242023	Total/NA	Water	537 (modified)	659327
MB 320-659327/1-A	Method Blank	Total/NA	Water	537 (modified)	659327
LCS 320-659327/2-A	Lab Control Sample	Total/NA	Water	537 (modified)	659327
LCSD 320-659327/21-A	Lab Control Sample Dup	Total/NA	Water	537 (modified)	659327

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: 21-1-12596-025

Job ID: 320-97185-1

Client Sample ID: MW-79-02242023
Lab Sample ID: 320-97185-1
Date Collected: 02/24/23 12:15
Matrix: Water
Date Received: 02/28/23 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			277 mL	10.0 mL	658949	03/07/23 19:15	PV	EET SAC
Total/NA	Analysis	537 (modified)		1	1 mL	1 mL	659484	03/09/23 10:01	S1M	EET SAC

Client Sample ID: MW-53-02242023
Lab Sample ID: 320-97185-2
Date Collected: 02/24/23 13:33
Matrix: Water
Date Received: 02/28/23 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			277.8 mL	10.0 mL	658949	03/07/23 19:15	PV	EET SAC
Total/NA	Analysis	537 (modified)		1	1 mL	1 mL	659484	03/09/23 10:21	S1M	EET SAC

Client Sample ID: MW-54-02242023
Lab Sample ID: 320-97185-3
Date Collected: 02/24/23 14:25
Matrix: Water
Date Received: 02/28/23 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			291.1 mL	10.0 mL	658949	03/07/23 19:15	PV	EET SAC
Total/NA	Analysis	537 (modified)		1	1 mL	1 mL	659484	03/09/23 10:31	S1M	EET SAC

Client Sample ID: MW-43-02242023
Lab Sample ID: 320-97185-4
Date Collected: 02/24/23 15:24
Matrix: Water
Date Received: 02/28/23 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			259.7 mL	10.0 mL	659327	03/08/23 20:43	PV	EET SAC
Total/NA	Analysis	537 (modified)		1	1 mL	1 mL	660344	03/13/23 10:40	AEC	EET SAC

Client Sample ID: MW-78-02242023
Lab Sample ID: 320-97185-5
Date Collected: 02/24/23 16:30
Matrix: Water
Date Received: 02/28/23 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			268.7 mL	10.0 mL	659327	03/08/23 20:43	PV	EET SAC
Total/NA	Analysis	537 (modified)		1	1 mL	1 mL	660344	03/13/23 11:11	AEC	EET SAC

Client Sample ID: MW-23-02272023
Lab Sample ID: 320-97185-6
Date Collected: 02/27/23 10:45
Matrix: Water
Date Received: 02/28/23 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			290.1 mL	10.0 mL	658990	03/08/23 08:18	EFG	EET SAC
Total/NA	Analysis	537 (modified)		1	1 mL	1 mL	660114	03/11/23 23:20	S1M	EET SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: 21-1-12596-025

Job ID: 320-97185-1

Client Sample ID: MW-72-02272023

Lab Sample ID: 320-97185-7

Date Collected: 02/27/23 11:50

Matrix: Water

Date Received: 02/28/23 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			266.8 mL	10.0 mL	658990	03/08/23 08:18	EFG	EET SAC
Total/NA	Analysis	537 (modified)		1	1 mL	1 mL	660114	03/11/23 23:31	S1M	EET SAC

Client Sample ID: MW-8-02272023

Lab Sample ID: 320-97185-8

Date Collected: 02/27/23 12:50

Matrix: Water

Date Received: 02/28/23 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			275.1 mL	10.0 mL	658990	03/08/23 08:18	EFG	EET SAC
Total/NA	Analysis	537 (modified)		1	1 mL	1 mL	660114	03/11/23 23:41	S1M	EET SAC

Client Sample ID: MW-101-02272023

Lab Sample ID: 320-97185-9

Date Collected: 02/27/23 15:00

Matrix: Water

Date Received: 02/28/23 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			278.1 mL	10.0 mL	658990	03/08/23 08:18	EFG	EET SAC
Total/NA	Analysis	537 (modified)		1	1 mL	1 mL	660114	03/11/23 23:51	S1M	EET SAC

Laboratory References:

EET SAC = Eurofins Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: 21-1-12596-025

Job ID: 320-97185-1

Laboratory: Eurofins Sacramento

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Washington	State	C581	05-05-23

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: 21-1-12596-025

Job ID: 320-97185-1

Method	Method Description	Protocol	Laboratory
537 (modified)	Fluorinated Alkyl Substances	EPA	EET SAC
3535	Solid-Phase Extraction (SPE)	SW846	EET SAC

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

EET SAC = Eurofins Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: 21-1-12596-025

Job ID: 320-97185-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-97185-1	MW-79-02242023	Water	02/24/23 12:15	02/28/23 09:30
320-97185-2	MW-53-02242023	Water	02/24/23 13:33	02/28/23 09:30
320-97185-3	MW-54-02242023	Water	02/24/23 14:25	02/28/23 09:30
320-97185-4	MW-43-02242023	Water	02/24/23 15:24	02/28/23 09:30
320-97185-5	MW-78-02242023	Water	02/24/23 16:30	02/28/23 09:30
320-97185-6	MW-23-02272023	Water	02/27/23 10:45	02/28/23 09:30
320-97185-7	MW-72-02272023	Water	02/27/23 11:50	02/28/23 09:30
320-97185-8	MW-8-02272023	Water	02/27/23 12:50	02/28/23 09:30
320-97185-9	MW-101-02272023	Water	02/27/23 15:00	02/28/23 09:30

Eurofins Sacramento
880 Riverside Parkway
West Sacramento, CA 95605
Phone (916) 373-5600 Phone (916) 372-1059

Chain of Custody Record

eurofins

Client Information	Sampler: Ryan Peterson	Lab PM: David Althacker	Carrier Tracking No(s):	COC No:
Client Contact: Shoshana Howard	Phone: 206-695-6811	E-Mail: Shoshana.Howard@shanwil.com	State of Origin: WA	Page: Page 1 of 1
Company: Shannon & Wilson	PWSID:			Job #: 21-1-12596-025
Address: 400 N. 34th St. Suite 100	Due Date Requested:			
City: Seattle	TAT Requested (days): Standard			
State, Zip: WA, 98103	Compliance Project: Δ Yes Δ No			
Phone: 206-695-6811	PO #: 21-1-12596-025			
Email: Shoshana.Howard@shanwil.com	WO #:			
Project Name:	Project #:			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, Other:
M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Y - Trizma, Z - other (specify)

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	PFAS, 537.1 mod (18 Analytes)	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N		
MW-79-02242023	2/24/23	1215	G	W	N	N	X		
MW-53-02242023	2/24/23	1333	G	W	N	N	X		
MW-54-02242023	2/24/23	1425	G	W	N	N	X		
MW-43-02242023	2/24/23	1524	G	W	N	N	X		
MW-78-02242023	2/24/23	1630	G	W	N	N	X		
MW-23-02272023	2/27/23	1045	G	W	N	N	X		
MW-72-02272023	2/27/23	1150	G	W	N	N	X		
MW-8-02272023	2/27/23	1250	G	W	N	N	X		
MW-101-02272023	2/27/23	1500	G	W	N	N	X		

320-97185 Chain of Custody

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For ____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment: FEDEX

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Ryan Peterson	2/27/23 1330	SEW		2/28/23 930	FEDEX
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.: 2122507

Cooler Temperature(s) °C and Other Remarks: 0.9

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Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-97185-1

Login Number: 97185
List Number: 1
Creator: Fisher, Jamyiah L

List Source: Eurofins Sacramento

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	2122507
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

APPENDIX G: DATA QUALITY SUMMARY REPORT

Appendix G

Data Quality Summary Report

SHANNON & WILSON
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

September 13, 2024

Earle M. Jorgensen Company
10650 S. Alameda Street
Lynwood, CA 90262

RE: QUALITY ASSURANCE/ QUALITY CONTROL NARRATIVE FOR JORGENSEN FORGE CORPORATION PROPERTY PER- AND POLYFLUOROALKYL SUBSTANCES INVESTIGATION

This quality assurance (QA)/quality control (QC) summary outlines the technical review of analytical results generated during the per- and polyfluoroalkyl substances (PFAS) investigation completed at the Jorgensen Forge Corporation (JFC) property, located at 8531 East Marginal Way South in Tukwila, Washington (the Site). Soil and groundwater sampling data are summarized below.

Shannon & Wilson reviewed project and QC analytical data to assess whether the data met the designated quality objectives and were acceptable for project use. The review included evaluation of the following: sample collection and handling, holding times, blanks (to assess contamination), project sample and laboratory quality control sample duplicates (to assess precision), laboratory control samples (LCSs) and sample isotope dilution analytes (IDAs) recoveries (to assess accuracy), and matrix spike sample (MS) recoveries (to assess matrix effects). Calibration curves and continuing calibration verification (CCV) recoveries were not reviewed unless a QC discrepancy was noted by the laboratory in a case narrative. QC deviations that do not impact data quality (e.g., high LCS recovery associated with non-detect results), are not discussed. More elaborate data quality descriptions are reported in the Laboratory Data Review Checklists (LDRCs), which are included as attachments to this narrative.

Sample results and method detection limits (MDLs) for non-detect results were compared to screening levels established to be protective of surface water ecological receptors (Ecology, 2022)[i]. Applicable data quality indicators are discussed for each method under separate subheadings. Data which did not meet acceptance criteria have been described and the associated samples and data quality implications or qualifications are summarized.

2355 Hill Road ▪ Fairbanks, Alaska 99709-5326 ▪ 907 479-0600 ▪ Fax 907 479-5691
▪ www.shannonwilson.com ▪
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ANALYTICAL METHODS AND DATA QUALITY OBJECTIVES

The analytical methods and associated data quality objectives (DQOs) used for this review were established in the Quality Assurance Project Plan included as Appendix F to the Remedial Investigation Work Plan (Shannon & Wilson, 2020)[ii]. The DQOs represent the minimum acceptable QC limits and goals for analytical measurements and are used as comparison criteria during data quality review to determine both the quality and usability of the analytical data.

The six DQOs used for this review were accuracy, precision, representativeness, comparability, sensitivity, and completeness.

- Accuracy measures the correctness, or the closeness, between the true value and the quantity detected. It is measured by calculating the percent recovery of known concentrations of spiked compounds that were introduced into the appropriate sample matrix. Surrogate, LCS, and MS sample recoveries were used to measure accuracy for this project.
- Precision measures the reproducibility of repetitive measurements. It is measured by calculating the relative percent difference (RPD) between duplicate samples. Laboratory duplicate samples, field duplicate samples, MS and matrix spike duplicate sample (MSD) sample pairs, and LCS and laboratory control sample duplicate (LCSD) pairs were used to measure precision for this project.
- Representativeness describes the degree to which data accurately and precisely represents site characteristics. This is addressed in more detail in the following section(s).
- Comparability describes whether two data sets can be considered equivalent with respect to the project goal. This is addressed in more detail in the following section(s).
- Sensitivity describes the lowest concentration that the analytical method can reliably quantitate and is evaluated by verifying that the detected results and/or reporting limits (RLs) meet the project-specific remediation levels and/or screening levels.
- Completeness describes the amount of valid data obtained from the sampling event(s). It is calculated as the percentage of valid measurements compared to the total number of measurements. The completeness goal for this project was set at 90 percent.

In addition to these criteria for the six DQOs described above, sample collection and handling procedures and blank samples were reviewed to ensure overall data quality. Sample handling was reviewed to assess parameters such as chain-of-custody (COC) documentation, the use of appropriate sample containers and preservatives, shipment cooler temperature, and method-specified sample holding times. Each of these parameters

contributes to the general representativeness and comparability of the project data. The combination of evaluations of the above-mentioned parameters will lead to a determination of the overall project data completeness.

SUMMARY OF SAMPLES

Project and quality control samples were analyzed by Eurofins TestAmerica of Sacramento, California, a National Environmental Laboratory Accreditation Program-certified laboratory.

The laboratory reports were assigned the following work order (WO) numbers:

Exhibit 1: Work Order Summary

Event	Laboratory WO	Matrix	Duplicate Samples
September 2022	320-92176-1	Groundwater	*MW-37-09142022 / MW-100-09142022*
November 2022	320-94316-1	Soil and Groundwater	*MW-77:2.0 / MW-101:2.0*
	320-94486-1	Groundwater	None
December 2022	320-95531-1	Soil	*SB-2022-002:4.5-12202022 / SB-2022-100:4.5-12202022*
February 2023	320-97138-1	Groundwater	*MW-46-02212023 / MW-100-02212023*
	320-97185-1	Groundwater	*MW-23-02272023 / MW-101-02272023*

The laboratory reports are included in Appendix E of the PFAS Investigation report and associated LDRCs are included as an attachment to this narrative.

For these events, a total of 18 primary soil samples were collected and 2 field duplicate samples. In addition, a total of 46 primary groundwater samples were collected and 3 field duplicate samples.

DATA QUALITY REVIEW

This section presents the findings of the data quality review and the resulting data qualifications for project samples. See the attached associated LDRC for more elaborate data quality descriptions.

Sample Handling

The evaluation of proper sample handling procedures includes verification of the following: correct COC documentation, appropriate sample containers and preservatives, cooler temperatures maintained within the recommended temperature range (0 to 6 degrees Celsius [°C]), and sample analyses performed within method-specified holding times. No

sample handling discrepancies were noted upon receipt at the laboratory which resulted in data qualification. See the associated LDRC checklist for a more detailed discussion.

Method Blanks

Method blanks were utilized to detect potential laboratory cross-contamination of project samples. Samples are considered affected if they are detected within ten times the concentration of the detection in the method blank. Samples were analyzed in every batch, as required. There were no method blank detections that resulted in data qualifications, with the following exceptions.

- WO 320-94316-1: The method blank associated with preparation batch 634646 had detections for perfluorononanoic acid (PFNA) and 9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS) at estimated detections below their respective reporting limits. The project samples *MW-77-11112022* and *MW-78-11112022* had detections for these analytes at concentrations less than five times the method blank detection. The sample results are considered non-detect and are flagged "B*" in the analytical summary tables at the RL.

Additional method blank detections were observed that did not affect the data quality or usability. Refer to the associated LDRC checklist for a more detailed discussion.

Equipment Blanks

Equipment blank samples were collected to assess the possibility of sample contamination from sampling equipment. The equipment blank samples were collected post decontamination after collecting project samples and analyzed for the same analyses as the project samples. Target analytes were not detected in the equipment blank samples. Data quality and usability were not affected. See the associated LDRC checklist for a more detailed discussion.

Laboratory Control Samples

The LCS/LCSD samples were prepared by adding spike compounds to blank samples in order to assess laboratory extraction and instrumentation performance. The LCS/LCSD recoveries and/or RPDs were within laboratory and project limits and did not result in qualification of the data with the following exceptions. See the associated LDRC checklist for a more detailed discussion.

Matrix Spike Samples

MS samples are prepared by adding spike compounds to project samples to assess potential matrix interference. The MS/MSD and/or RPDs were within laboratory and project limits and did not result in qualification of the data with the following exceptions.

- WO 320-94316-1: The MS and MSD associated with preparation batch 633024 had an RPD failure for 9Cl-PF3ONS. The associated project sample *MW-79:10.0* did not have a detection for this analyte. The non-detect result is flagged "J*" in the analytical summary tables to identify the imprecision.

See the associated LDRC checklist for a more detailed discussion.

IDA Recovery

IDA compounds were added to project samples by the laboratory prior to analysis, in accordance with method requirements. Recoveries were then calculated as percentages and reported by the laboratory as a measure of analytical extraction efficiency. Surrogate recoveries were inside the established control limits, with the following exceptions.

- WO 320-92176-1: The project sample *MW-23-09132022* had several IDA recovery failures that affect the data quality. Analytes associated with the IDA recovery failures are considered estimated in these project samples are flagged "J*" in the analytical summary tables to identify the QC failures. Refer to the associated LDRC for more detailed discussion.
- WO 320-97138-1: The project samples *MW-41-02222023*, *MW-64-02222023*, and *MW-68-02232023* had one or more IDA recovery failures that affected the data quality. Analytes associated with the IDA recovery failures are considered estimated in these project samples are flagged "J*" in the analytical summary tables to identify the QC failures. Refer to the associated LDRC for more detailed discussion.

Field Duplicates

Field duplicate sample was collected and submitted to the laboratory as a blind sample in accordance with the overall project objectives. Field duplicate samples were collected at the required frequency for the overall project. Field duplicates met the project-specified DQO of 50% for soil samples and 30% for groundwater samples and are considered comparable, with the following exceptions.

- WO 320-95531-1: The field duplicate pair *SB-2022-002:4.5-12202022* / *SB-2022-100:4.5-12202022* had RPD failures for perfluorohexanesulfonic acid (PFHxS),

perfluorooctanesulfonic acid (PFOS), and perfluorooctanoic acid (PFOA). These analytes were flagged "J*" in the analytical summary table to identify the imprecision.

Analytical Sensitivity

Analytical sensitivity was evaluated to verify that the MDLs met the applicable screening levels for protection of surface water ecological receptors (Ecology, 2022). The non-detect results were less than the screening levels.

Additional Flags

Additional quality control failures were noted by the laboratory that required additional qualification.

- WO 320-92176-1: The PFOS result in sample *MW-53-09142022* and the PFNA result in sample *MW-61-09142022* had transition mass ratio failures. The laboratory noted that there was some uncertainty in these reported results with a potential high bias. The analytical results are flagged "JH*" in the analytical summary tables to identify the potential bias.
- WO 320-94316-1: The PFOS result in sample *MW-101:2.0* had a transition mass ratio failure. The laboratory noted that there was some uncertainty in the reported result but did not identify a potential bias. The result is flagged "J*" in the analytical summary tables to identify the uncertainty in the reported result.
- WO 320-95531-1: The PFOS results for samples *SB-2022-002:2.0-12202022* and *SB-2022-003:5.0-12202022* were manually integrated by the laboratory. Some uncertainty is imparted to these results and the results are flagged "J*" in the analytical summary tables.
- WO 320-97185-1: The PFOS result in sample *MW-53-02242023* had a transition mass ratio failure. The laboratory noted that there was some uncertainty in these reported results with a potential high bias. The analytical result is flagged "JH*" in the analytical summary tables to identify the potential bias.
- WO 320-97185-1: The PFOS result in sample *MW-79-02242023* and the PFHxS results in samples *MW-43-02242023* and *MW-79-02242023* had results that exceeded the calibration range. These results are considered estimated, no direction of bias, and are flagged "J*" in the analytical database to identify the uncertainty in the reported results.

SUMMARY OF QUALIFIED RESULTS

Overall, the data validation process deemed the project data acceptable for use with the minor exceptions noted above resulting in qualification of the data. We did not reject any

analytical results due to failures with laboratory QC samples, sample handling, or other issues. Flags can be found in the associated analytical summary tables and an analytical flag summary table is attached to this narrative as Table E-1.

COMPLETENESS

No data were rejected pursuant to the data quality review, and data may be used, as qualified, for the purposes of the project.

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[i] Washington State Department of Ecology (Ecology), 2022, Draft guidance for investigating and remediating PFAS contamination in Washington State: Guidance document prepared by Ecology, publication no. 22-09-058, December.

[ii] Shannon & Wilson, 2020, Remedial investigation work plan, Jorgensen Forge Corporation property, Tukwila, Washington: work plan prepared by Shannon & Wilson, Seattle, Wash., 21-1-12596-013, for Earle M. Jorgensen Company, Lynwood, Calif., April 15.

IMPORTANT INFORMATION

Important Information

About Your Geotechnical/Environmental Report

IMPORTANT INFORMATION

CONSULTING SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND FOR SPECIFIC CLIENTS.

Consultants prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for the purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the consultant.

THE CONSULTANT'S REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical/environmental report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask the consultant to evaluate how any factors that change subsequent to the date of the report may affect the recommendations. Unless your consultant indicates otherwise, your report should not be used (1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); (2) when the size, elevation, or configuration of the proposed project is altered; (3) when the location or orientation of the proposed project is modified; (4) when there is a change of ownership; or (5) for application to an adjacent site. Consultants cannot accept responsibility for problems that may occur if they are not consulted after factors that were considered in the development of the report have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural processes or human activity. Because a geotechnical/environmental report is based on conditions that existed at the time of subsurface exploration, construction decisions should not be based on a report whose adequacy may have been affected by time. Ask the consultant to advise if additional tests are desirable before construction starts; for example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/environmental report. The consultant should be kept apprised of any such events and should be consulted to determine if additional tests are necessary.

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help reduce their impacts. Retaining

IMPORTANT INFORMATION

your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

The conclusions contained in your consultant's report are preliminary, because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Actual subsurface conditions can be discerned only during earthwork; therefore, you should retain your consultant to observe actual conditions and to provide conclusions. Only the consultant who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The consultant who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical/environmental report. To help avoid these problems, the consultant should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological, and environmental findings, and to review the adequacy of their plans and specifications relative to these issues.

BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE REPORT.

Final boring logs developed by the consultant are based upon interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical/environmental reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.

To reduce the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/environmental report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared, and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes that aggravate them to a disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical/environmental engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims

IMPORTANT INFORMATION

being lodged against consultants. To help prevent this problem, consultants have developed a number of clauses for use in their contracts, reports, and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where the consultant's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

The preceding paragraphs are based on information provided by the Geoprofessional Business Association (https://www.geoprofessional.org)

APPENDIX I: STAR FORGE REPORTS

Appendix I

Star Forge Reports

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- Excerpts from the UST Decommissioning and Site Assessment Report (DH Environmental, Inc., 2024c)
- Excerpts from the Final Dangerous Waste Clean Closure report (DH Environmental, Inc., 2024a)
- Excerpts from the Agency Review Draft Interim Action Completion Report (DH Environmental, Inc., 2024b).

Underground Storage Tank Decommissioning and Site Assessment Report

Former Jorgensen Forge Property
8531 E. Marginal Way S.
Tukwila, WA 98108

Prepared For:

Star Forge, LLC

Prepared By:

DH Environmental, Inc.
1011 SW Klickitat Way
Suite 107
Seattle, Washington

May 8, 2024

DRAFT FOR PUBLIC COMMENT

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Section 1: INTRODUCTION

DH Environmental, Inc. (DH Environmental) has prepared this Underground Storage Tank (UST) decommissioning and site assessment report on behalf of Star Forge, LLC (Star Forge), the current owner of the former Jorgensen Forge Facility located at 8531 East Marginal Way South, in Tukwila, Washington (herein referred to as the Property) (Figure 1).

This report has been prepared in accordance with Agreed Order No. DE 21034, entered into by Star Forge and the Washington State Department of Ecology (Ecology), pursuant to the Washington State Model Toxics Control Act (MTCA) and Cleanup Regulation established in Chapter 173-340 of the Washington Administrative Code (WAC).

1.1 SITE DESCRIPTION

The former Jorgensen Forge Property consists of approximately 21.6 acres located in an industrial area along the east bank of the Lower Duwamish Waterway (LDW). The Property is bordered to the north by Boeing Plant 2, and to the south by the Boeing Isaacson property. It is bordered to the west by the LDW, and to the east by East Marginal Way South and the King County Regional Airport.

The Property was used from 1942-1965 for fabrication of structural steel, tractor, and road equipment, including forging and heat-treating operations conducted for the U.S. Navy. It was owned and operated by Earle M. Jorgensen Co. (EMJ) from 1965 until 1992, when it was purchased by Jorgensen Forge Corporation (JFC). JFC manufactured specialized large-scale metal parts for the aircraft and marine industries, including open die steel forgings and rolled aluminum rings. JFC also processed nickel, titanium, and specialized alloys.

Historical industrial use of the Property has contaminated soil and groundwater, including in the vicinity of the USTs described in this report. Star Forge bought the Property out of bankruptcy in November 2016. As part of the bankruptcy proceeding, the bankruptcy court approved a settlement agreement pursuant to which EMJ was required to enter into an agreed order with Ecology to investigate and remediate contaminated soils and groundwater at the Property and any locations where hazardous substances released on the Property have come to be located (the Site). In fulfillment of that requirement, EMJ entered into Agreed Order No. DE 14143 with Ecology in 2017. At this time, EMJ is conducting a Remedial Investigation (RI) of the Site. This report and site assessment data will be provided to EMJ and Ecology for reference in the RI.

1.2 UNDERGROUND STORAGE TANK SYSTEMS

At the time Star Forge and Ecology entered into Agreed Order No. DE 21034, the Property had 18 remaining USTs located in two separate concrete vaults. The tanks were emptied of liquids, licensed with Ecology, and covered under financial assurance mechanisms. The USTs were

associated with Ecology UST identification number 6163 and were grouped into a North Tank Vault (UST-26 through -35) and a South Tank Vault (UST-15 through -22), as shown in Figures 2 through 4.

To be consistent with previous naming conventions, the names of all tanks referenced in this report follow the naming convention presented by Shannon & Wilson in 2019 (Shannon & Wilson, 2019). A copy of Shannon and Wilson's 2019 figure and naming convention is provided for reference in Appendix A.

The USTs in each tank-bed were buried below grade but within concrete vault structures that extended above grade. Both tank nests were constructed within the basement of former buildings. Once the former buildings were demolished, the voids around the tanks were filled with sand and slag that was available from forging operations on-site. The North Tank Vault included a concrete base that was approximately 5-feet below the surrounding grade. The concrete walls of the South Tank Vault extended slightly deeper and did not contain a concrete bottom.

DH Environmental collected samples from the tank contents and surrounding fill-slag for waste designation purposes in 2020. The contents of the USTs and surrounding fill material was designated as non-hazardous waste (DH Environmental, 2020; DH Environmental, 2020b; DH Environmental 2020c).

1.3 LOCAL GEOLOGY AND HYDROGEOLOGY

The Property is located within the Duwamish/Cedar River valley, part of the Puget Lowland, a regional low-lying trough between the Cascade Range to the east and the Olympic Mountains to the west. The Puget Lowland has largely been filled with sediment deposits left behind by glaciers that advanced and retreated multiple times through the Puget Lowland within the last 2 million years. Sediment within the Duwamish Valley primarily consists of sand and silt which has washed down from Mt. Rainier. This material is often interbedded with layers of silt, clay, and organic soils from localized deposits associated with lakes and ponds that formed along the river valley, or mudflats that formed along Puget Sound. Fill materials were also placed throughout the River Valley since the early 20th century, including in portions of the Property when the Duwamish Waterway was straightened, dredged, and historical channels and embayments were filled.

Shallow subsurface soils at the Property generally consist of a mixture of sand, silty sand, and gravel, to depths up to 24 feet below grade. Fill materials tend to be thickest at the western end of the property along the LDW (Shannon & Wilson, 2022). Soils below the North Tank Vault primarily consisted of brown to gray, fine to medium sand with trace gravel. Shallow soils at the South Tank Vault were similar, while soils below the base of the excavation contained higher amounts of silt and organics, and appeared to be native soils.

Groundwater in the vicinity of the tank vaults, as measured in nearby monitoring wells MW-11, MW-14, and MW-15, has ranged from approximately 10.5- to 12-feet below grade (Shannon & Wilson, 2022). Groundwater flow at the Property generally moves west, but varies depending on the season and proximity to the LDW (Shannon & Wilson, 2022). Groundwater was not encountered during the UST decommissioning activities.

Section 2: UNDERGROUND STORAGE TANK DECOMMISSIONING

This section describes the UST decommissioning activities for the 18 USTs on the Property. The tanks and piping inside the concrete vaults were decommissioned and removed between August 9 and August 17, 2023. The piping outside of the North Tank Vault was removed on August 21 and October 11, 2023. The piping outside of the South Tank Vault was removed on October 11 and 12, 2023.

UST decommissioning activities were overseen by Mr. Brad Reilly with ECI Environmental Services (ECI), under subcontract to the demolition contractor for the project, Construction Group International, of Woodinville, Washington (CGI). Mr. Reilly is certified by the International Code Council for UST Decommissioning. A DH Environmental licensed hydrogeologist was also on site to observe the decommissioning and to perform site assessment activities.

2.1 PRELIMINARY ACTIVITIES

2.1.1 Ecology 30-day Notice

Prior to decommissioning the USTs, Star Forge submitted a 30-Day Notice of Intent to Decommission USTs form to Ecology, as required by WAC 173-360A-0810. A copy of the 30-Day Notice is included in Appendix B.

2.1.2 City of Tukwila Fire Department Permit

The City of Tukwila requires a permit for the permanent closure of USTs. Prior to decommissioning the USTs, Star Forge obtained a Fire Permit for Tank Removal from the City of Tukwila. A copy of Fire Permit F23-0135 is included in Appendix C.

2.1.3 Underground Storage Tank Cleaning

Prior to removal of the USTs, the tanks were cleaned and triple-rinsed by Marine Vacuum Services of Seattle, Washington (MarVac). Rinse certificates are provided in Appendix D.

2.2 UNDERGROUND STORAGE TANK REMOVAL

CGI removed the USTs in both tank vaults between August 9 and August 18, 2023. Once the tanks had been cleaned, the above-ground concrete vault structure and fill materials overlying the tanks were removed. Three USTs in the North Tank Vault, UST-26, -28, and -31, were previously filled with sand. The top of these three tanks were cut open and the sand was removed with an excavator. Residual sand was removed by tilting the tanks on end and dumping the loose sand out. Once the sand had been removed, the empty tanks were removed in the

same manner as the others, by lifting the tanks out of the ground using an excavator. Once removed from the ground, the tanks were scraped and brushed clean to remove any loose soil or debris prior to transport. They were then loaded onto trucks and shipped for recycling as described in Section 2.3. Removal and disposal of the concrete vault structures and backfill materials are also described in Section 2.3.

USTs -26 through -35, in the North Tank Vault, generally appeared in good condition at the time of removal. They were well protected with numerous sacrificial anodes surrounding each tank. The paint on the tank walls was still intact, and no holes or areas of significant corrosion were visible.

USTs -15 through -22, in the South Tank Vault, generally appeared in much worse condition than the tanks from the North Tank Vault. No sacrificial anodes were present on the South Tanks, and significant corrosion and pitting was visible on each tank. In some instances, corrosion holes were visible completely through the tank walls.

Photos of the tank removal work are included in a photo log in Appendix E. Decomissioning certificates are included in Appendix F.

Piping within the concrete vaults of each tank area was removed concurrently with the tanks. The piping was disconnected at each tank prior to the tanks being removed. ECI had a vacuum trailer on site for all piping removal work in the event liquids were present in the piping. No liquids were observed in any of the piping during removal. Removal of the product piping outside of the concrete vaults is described in Sections 2.2.1 and 2.2.2. Site assessment sampling activities are described in Section 3.

2.2.1 Piping Removal – North Tanks

At the North Tank Vault, a 4-inch diameter product pipe extended from the southeast corner of the concrete vault, due south towards the Aluminum Heat Treat Building (Aluminum Building), as shown on Figure 3. This is consistent with as-built drawings for the North Tank Vault. The pipe was exposed and removed on August 21, 2023. The pipe appeared to be a single length pipe without couplers. The pipe ran underneath the north foundation wall of the Aluminum Building where it was cut flush with the foundation wall. No liquids were observed in the pipe when it was cut. Soil from the piping trench was temporarily stockpiled for offsite disposal.

On October 11, 2023, after the Aluminum Building had been demolished, the remaining section of piping was removed. The piping was discovered to have been previously cut and capped approximately 1-foot north of the northern foundation wall of the Aluminum Building. The pipe was bent to form a 90-degree elbow and it had been cut and capped just past the elbow. Based on an interview with a former employee, this pipe had been removed to make room for the installation of the Aluminum Heat Treat Furnace Pit in the mid-1970s. At that time the building

use transitioned from the Powerhouse into use as the Aluminum Heat Treat Building. The product pipe is shown in Photo 7 in the Photo Log in Appendix E.

Soil generated during removal of the last segment of piping was added to the temporary soil stockpile, where it was covered until the product piping had been removed from the South Tank Vault. Disposal of the soil is described in Section 2.3.

2.2.2 Piping Removal – South Tanks

At the South Tank Vault, a single 2-inch diameter product pipe was observed to extend from inside the tank vault, west beneath the Aluminum Building. After the Aluminum Building had been demolished, the piping beneath the slab was exposed and removed on October 11 and 12, 2023. The product piping alignment is shown in Figure 4, and it appears to have been installed so that it was routed around the former Aluminum Heat Treat Furnace Pit.

Consistent with historical drawings of the area, a second pipe, believed to be a fuel return line, was visible in the same trench as the product pipe. A third pipe, believed to be a steam line, was also present. The second and third pipes appeared to have been previously cut approximately 15-feet south of where the first pipe entered the tank vault. A small electrical conduit was also present in the same trench, and all three pipes and the electrical conduit ran west underneath the former Aluminum Building. At the west edge of the Aluminum Building, the piping turned and ran north approximately 15-feet, where it entered a utilidor. The utilidor continued approximately 25-feet north, where it turned and ran west underneath the former drive lane between the main shop building and the aluminum building.

The top of the utilidor was constructed with a concrete slab approximately 12-inches thick. The portion of the slab underneath the drive lane was also covered with a layer of asphalt paving. The concrete lid was broken apart using a hydraulic hammer to expose the product piping in the utilidor. Once exposed, the product lines from the tank vault were observed to enter the utilidor where at least some of them appeared to have been cut and capped. Other lines of unknown purpose were also present in the utilidor, including portions of lines that had been cut or broken at some point prior to the utilidor being exposed. Most of the lines in the utilidor were not labeled, or the labeling was not legible. Some of the lines were still present where the utilidor entered the main shop building, and labeling on the shop ends of the pipes indicated at least two pipes labeled as “fuel oil”, one pipe labeled as “fuel oil return”, one pipe labeled “propane”, and another pipe labeled “compressed air”. More pipe segments were visible in the utilidor than were visible inside the shop building, and the original purpose or contents of these lines are unknown. Photos of the piping removal, including piping in the utilidor, are included in the Photo Log in Appendix E.

CGI cut the rebar from the top of the utilidor to allow access to the underlying piping. ECI had a vacuum trailer on site for the piping removal work in the event liquids were present in the piping. The piping was lifted out of the utilidor using an excavator to slope the piping away from portions that had to be cut with a demolition saw. No liquids were observed in any of the piping

during removal. After the rebar and piping had been cut and removed, the utilidor was emptied of debris in preparation for sampling and backfill.

Rainwater was observed to have accumulated in the utilidor prior to breaking open the concrete lid. The water was confirmed during an inspection of the utilidor by CGI on October 10, 2023, prior to demolition of the utilidor top. Additional rainwater may have also entered during rain events on October 11, 2023, when 0.39 inches of precipitation fell (NOAA, 2024). A slight sheen was present on the water along with a petroleum type odor. A sample of the water was collected using a disposable bailer on October 12, 2023, for waste designation purposes, and the water was removed from the utilidor by ECI using a vacuum trailer. Approximately 275-gallons of water was removed and temporarily stored in a Department of Transportation (DOT) rated shipping tote. Once the water had been removed, CGI crews removed the remaining pieces of concrete debris in preparation for soil sampling and backfilling.

Prior to the utilidor being backfilled, a soil sample was collected beneath the utilidor on October 13, 2023 as part of site assessment activities, as described in Section 3.2. Disposal of the soil, concrete and water generated during piping removal activities are described in Section 2.3

2.3 WASTE DISPOSAL

2.3.1 Underground Storage Tank and Product Piping Disposal

Each of the 18 USTs were loaded onto trucks for transportation to a metal recycling facility. Product piping was combined with rebar from the concrete vault structure and other recyclable materials generated from demolition activities. All scrap metal from the project was disposed of to Sutter Metals in Tacoma, Washington, or Seattle Iron and Metals Corporation, in Seattle, Washington.

2.3.2 Concrete and Soil Disposal

On August 14, 2023, the concrete vault structures were sampled for waste designation purposes. Sampling was conducted to confirm that petroleum or metals that may have leached into the concrete would not designate as hazardous or dangerous waste. The concrete was determined to be non-hazardous waste suitable for disposal to a subtitle D landfill. A copy of the waste designation package is included in Appendix G.

The backfill material consisting of slag, sand, and gravel surrounding the tanks was previously sampled and designated as non-hazardous waste (DH Environmental, 2020). As a result, no further sampling was conducted of the tank backfill, and it was loaded into trucks for offsite disposal. Because the South Tank Vault did not contain a concrete bottom, backfill materials were removed to the depth of the base of the tanks, approximately 8-feet below grade.

Once the tank backfill materials were removed, the concrete vault structures were also removed.

The concrete from the vault structures was processed within the footprint of the respective excavation areas to remove rebar and facilitate loading onto trucks. The rebar was segregated for recycling and the concrete was loaded into trucks for offsite disposal.

Soil and concrete generated during the product piping removal was temporarily stockpiled until all piping removal activities were complete. The soil was sampled for waste designation purposes and determined to be non-hazardous waste, suitable for disposal to a subtitle D landfill. A copy of the piping soil designation package is included in Appendix H.

A total of 4,082.59-tons of soil and concrete were transported for disposal to Roosevelt Regional Landfill, in Roosevelt, Washington. The Roosevelt Landfill is a permitted Subtitle D Landfill operated by Republic Services. A copy of the soil and concrete disposal records is included in Appendix I.

2.3.3 Water Disposal

Analytical results for the tote of water pumped from the South Tank Vault piping utilidor resulted in a waste designation determination that the water was non-hazardous waste. A copy of the waste designation package is included in Appendix J. The water was temporarily stored in a DOT-rated 275-gallon shipping tote until it was pumped out via vacuum truck by DH Environmental on December 4, 2023. Due to the small volume of water, it was combined with water generated during cleaning of several subsurface vaults on the property, unrelated to the UST decommissioning activities. This water was temporarily stored in a 20,000-gallon frac tank, before being disposed of to MarVac in Seattle, Washington in December 2023.

2.4 BACKFILL AND RESTORATION

Following the collection of site assessment samples, described in Section 3, the North and South Tank Vault excavations were backfilled between September 6 and 15, 2023. The base and sidewalls of the excavation were lined with plastic sheeting prior to backfilling. The backfill was placed in lifts and compacted to 95% compaction. Compaction testing was conducted by Krazan and Associates under subcontract to CGI.

Backfill of the product piping trenches and piping utilidor was conducted on October 13, 2023.

Backfill material consisted of 1-1/4” crushed rock sourced from the ICON Materials quarry in Auburn, Washington. Prior to being imported into the Site, all import backfill was tested at the quarry to confirm it met backfill requirements, as specified in the Interim Action Work Plan. Analytical results for the import backfill are reported under separate cover as part of the Interim Action Completion Report.

Paving of the excavation areas and piping trenches was conducted as part of final site restoration in March, 2024.

Section 3: SITE ASSESSMENT SAMPLING

Following removal of the USTs and product piping, site assessment soil samples were collected as described in the following sections. Sample locations are shown in Figures 3 and 4. All confirmation soil samples from the UST vaults were collected from the excavator bucket, with care taken to ensure the sample was not collected from soil in direct contact with the bucket. All soil samples were collected in general accordance with the Ecology-approved Interim Action Work Plan (IAWP; DH Environmental, 2023). Groundwater was not encountered during the tank removal or site assessment sampling activities.

3.1 NORTH TANK VAULT

Site assessment soil samples from the North Tank Vault and associated product piping were collected between August 21 – 30, 2023. Soil samples were collected from the base and sidewalls of the excavation following removal of the concrete vault surrounding the former USTs.

Soil samples from the base of the excavation were collected from an approximate depth of 6.5-feet below grade. This depth was approximately 0.5-feet below the base of the former concrete slab, at the interface with native soil. Soil samples from the sidewall of the excavation were collected from an approximate depth of 5-feet below grade, near the base of the sidewall.

A total of 27 soil samples were collected from the base and sidewalls of the North Tank Vault, including one duplicate sample. A total of three soil samples were collected beneath the piping run from the North Tank Vault. Piping samples were collected by hand, directly from the base of the piping trench following removal of the piping.

The majority of soil samples from the base of the North Tank Vault excavation were collected along the east side of the excavation, beneath the former fill ports of the tanks where releases were most likely to have occurred. One bottom sample, NT-SS-35, beneath the former tank UST-35, was moved to sample soil where a former sump was observed in the concrete vault. This sump was believed to be a feature associated with the former basement structure of the building that the tanks were installed in following building demolition.

Sidewall samples from the North Tank Vault were generally distributed equally around the perimeter of the excavation. Sidewall samples NT-SS-13, NT-SS-14, NT-SS-17, and NT-SS-18, were adjusted to focus on areas where staining was observed. Sidewall sample NT-SS-14 and bottom sample NT-SS-31 were collected near the former fill port for the USTs.

3.2 SOUTH TANK VAULT

Prior to collecting site assessment samples in the South Tank Vault, two test pits were advanced at the north and south ends of the South Tank Vault to investigate for the presence of a concrete

slab. Each test pit was advanced to a depth of 4-feet below the base of the tanks. The test pits confirmed that concrete was not present, which is consistent with as-built records for the South Tank Vault.

Site assessment soil samples from the South Tank Vault and associated product piping were collected between August 22 and October 13, 2023. Soil samples were collected from the base and sidewalls of the excavation following removal of the concrete vault surrounding the former USTs.

Soil samples from the base of the excavation were collected from an approximate depth of 8.5-feet below grade. This depth was approximately 0.5-feet below the base of the former tanks, at the interface with native soil. Soil samples from the sidewall of the excavation were collected from an approximate depth of 6.5-feet below grade, near the base of the sidewall.

A total of 23 soil samples were collected from the base and sidewalls of the South Tank Vault, including one duplicate sample. A total of three soil samples were collected beneath the piping run from the South Tank Vault. Piping samples ST-piping-SS-21 and ST-piping-SS-22 were collected by hand, directly from the base of the piping trench following removal of the piping. Piping sample ST-piping-SS-20 was collected from an excavator bucket, from a depth of 6.5-feet below grade, beneath a utilidor.

All of the soil samples from the base of the South Tank Vault excavation were collected along the west side of the excavation, beneath the former fill ports of the tanks where releases were most likely to have occurred. Sidewall samples from the South Tank Vault were generally distributed equally around the perimeter of the excavation. Sidewall sample ST-SS-15 was collected from stained soil near the former fill port for the USTs.

3.3 SAMPLE LOCATIONS

Site assessment soil sampling locations are shown on Figures 3 and 4. Sample locations were recorded using a mapping grade GPS unit capable of sub-meter accuracy (Trimble GeoXH or Trimble DA2). Where it was not safe to enter an excavation, the sample locations were recorded by surveying the corresponding northing or easting that lined up with each sample.

3.4 SITE ASSESSMENT ANALYTICAL RESULTS

All Site Assessment soil samples were analyzed for diesel-range organics (DRO) by Method NWTPH-Dx and gasoline-range organics (GRO) by Method NWTPH-Gx.

In accordance with the IAWP, and in consultation with Ecology, multiple soil samples were selected for follow-up analysis for the following compounds:

- 1-2, dibromoethane (EDB), 1-2, Dichloroethane (EDC), methyl tertiary-butyl ether (MTBE), benzene, toluene, ethylbenzene and xylenes (BTEX) and halogenated VOCs (HVOCs) by EPA Method 8260D,
- Polychlorinated biphenyls (PCBs) by EPA Method 8082, and,
- Carcinogenic Polyaromatic Hydrocarbons (cPAHs) and naphthalenes by EPA Method 8270E/Selected Ion Monitoring (SIM);
- Total RCRA 8 metals plus copper, nickel, and zinc, by EPA Methods 6010D (arsenic, barium, cadmium, chromium, lead, selenium, and silver) and 7471B (mercury).

The samples selected for follow-up analysis were chosen in consultation with Ecology, following review of the initial DRO and GRO data. Of the 15 samples selected for follow-up analysis, MTBE, EDB, EDC, and benzene were not reported in any of the soil samples at a concentration greater than or equal to the practical quantitation limit (PQL). Mercury, selenium and silver were also not reported in any of the soil samples at a concentration greater than or equal to the PQL. PCBs were reported in four samples at a concentration greater than or equal to the PQL, all at a total concentration of less than 1 milligram per kilogram (mg/kg). Naphthalene was reported in most follow-up samples at low concentrations, with the highest concentration reported at 2.9 mg/kg. A discussion of the results for select compounds is described in Sections 3.4.1 through 3.4.5.

The analytical results for DRO, GRO, Toluene, Ethylbenzene, and Xylenes, cPAHs, total metals, and PCBs are summarized in Tables 1 through 6. In each table, a compound was only listed if it was reported in at least one sample at a concentration greater than or equal to the PQL. A copy of the laboratory analytical reports is included in Appendix K.

3.4.1 Diesel- and Gasoline-Range Hydrocarbons

GRO and DRO were reported in soil samples from both the North and South Tank Vaults at elevated concentration.

GRO was reported at a maximum concentration of 480 mg/kg in the North Tank Vault, in sample NT-SS-17-5.0, which was collected along the south sidewall of the excavation. The highest concentration of DRO in the North Tank Vault was reported in the same sample at a concentration of 225,000 mg/kg.

GRO was reported at a maximum concentration of 1,300 mg/kg in the South Tank Vault, in sample ST-SS-8-8.5, which was collected from the base of the excavation at the south end. The highest concentration of DRO in the South Tank Vault was reported at a concentration of 18,000 mg/kg in sample ST-SS-17-6.5, located along the middle of the west sidewall of the excavation. The results for DRO and GRO for the North and South Tank vaults are summarized in Tables 1 and 2, respectively.

3.4.2 Toluene, Ethylbenzene, and Xylenes

Benzene was not reported in any of the site assessment samples at a concentration greater than the PQL. Toluene, ethylbenzene, and xylenes were reported at low concentrations in several samples. The results for Toluene, Ethylbenzene, and Xylenes are summarized in Table 3.

3.4.3 cPAHs

Each of the seven cPAH compounds was reported in one or more of the soil samples selected for follow-up analysis. Soil sample ST-piping-SS-22 contained the highest toxic equivalent concentration (TEC) of benzo(a)pyrene at 0.830 mg/kg. The results for cPAHs are summarized in Table 4.

3.4.4 Metals

Cadmium was only reported in one sample at a concentration greater than the PQL, sample ST-piping-SS-20-6.5, at a concentration of 0.85 mg/kg. This sample was collected beneath the product piping utilidor between the former Aluminum Building and the main shop building.

Arsenic was reported in three samples at a concentration greater than the PQL. The highest concentration of arsenic was reported in sample NT-SS-31-6.5, which was collected from the base of the North Tank Vault, near the midpoint along the east side, at a concentration of 39 mg/kg.

Nickel was elevated in one sample, NT-piping-SS-24, at a concentration of 910 mg/kg. This sample was collected beneath the northernmost product piping sample from the North Tank Vault. The results for total metals are summarized in Table 5.

3.4.5 PCBs

PCBs were reported in four of the follow-up soil samples at a concentration greater than the PQL. The highest concentration was reported in sample NT-piping-SS-24-2.0 at a concentration of 0.52 mg/kg. The results for PCBs are summarized in Table 6.

Section 4: CONCLUSIONS

The purpose of a UST site assessment is to determine if there has been a release of a regulated substance from a UST system. Confirmed and suspected releases have been reported from both former UST vaults as early as 1990 when Dames & Moore first identified elevated levels of petroleum in soil west of the former Aluminum Heat Treat Building (Dames & Moore, 1990). Later findings by SEACOR in 1991 supported this when they reported that three USTs in the North Tank Vault failed tightness testing. An additional investigation conducted in 1991 by SEACOR also identified light non-aqueous phase liquid (LNAPL) west of the former South Tank Vault (SEACOR, 1993 and 1993b). LNAPL was again identified west of the former North Tank Vault in 1995, along with high concentrations of DRO in soil west of the former South Tank Vault (Dames & Moore, 1999). More recent investigations by Shannon & Wilson also identified likely releases from both former UST vaults, including the presence of a significant LNAPL plume on groundwater west of the South Tank Vault (Shannon & Wilson, 2020).

As described above, multiple investigations conducted over a 30-year period have identified likely releases from the former North and South Tank vaults at the Jorgensen Site. The site assessment activities described in this report were conducted pursuant to Agreed Order No. DE 21034 following UST decommissioning by removal. In accordance with the requirements of WAC 173-360A-0730(8)(g)(iii), the results of this site assessment conclude there has been a release of a regulated substance from both the former North and South UST systems at the former Jorgensen Forge Site.

We recommend this information be considered by Ecology and EMJ during the remedial investigation and final cleanup of the Site.

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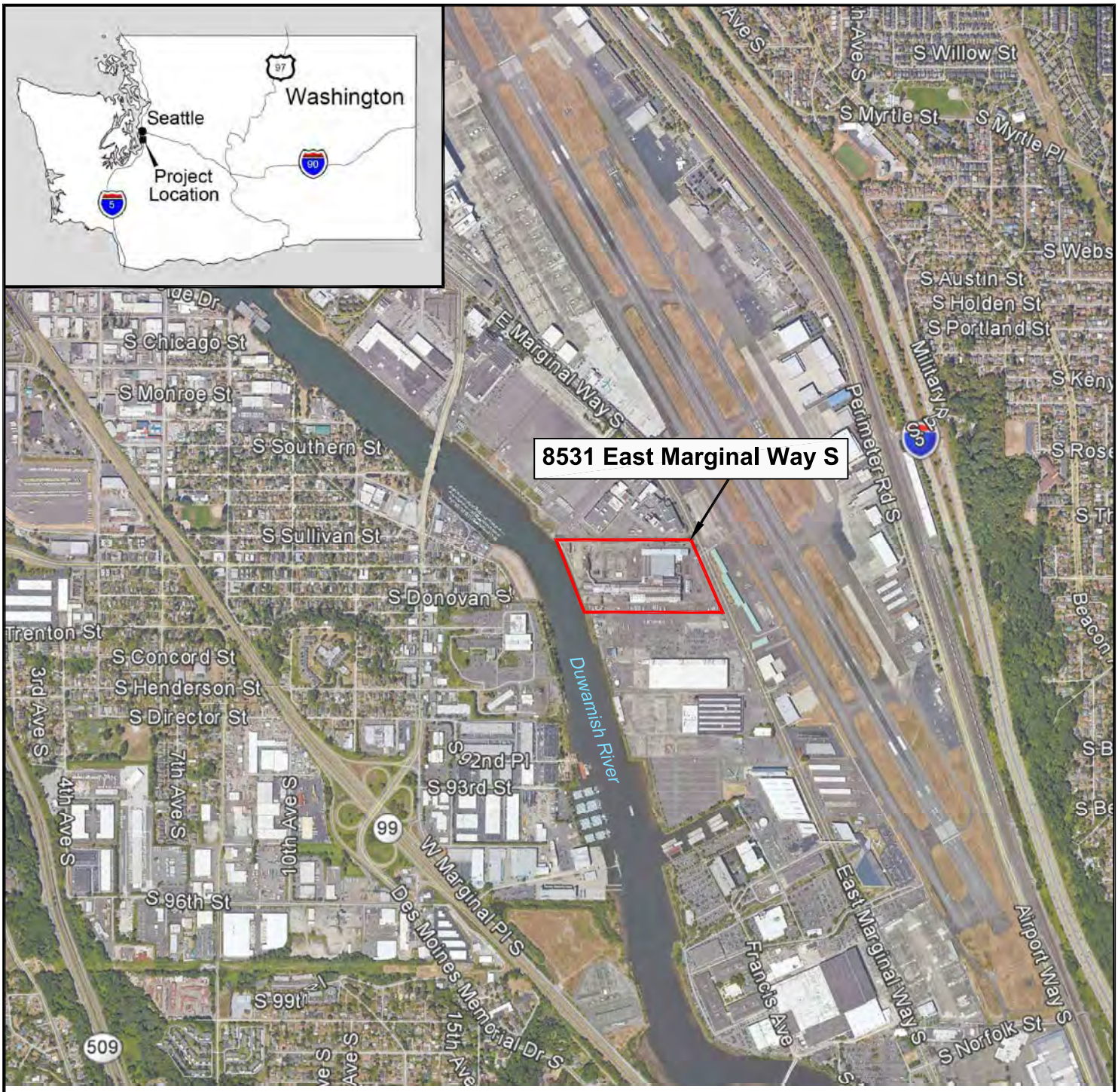
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Legend

Former Jorgensen Forge Property

N

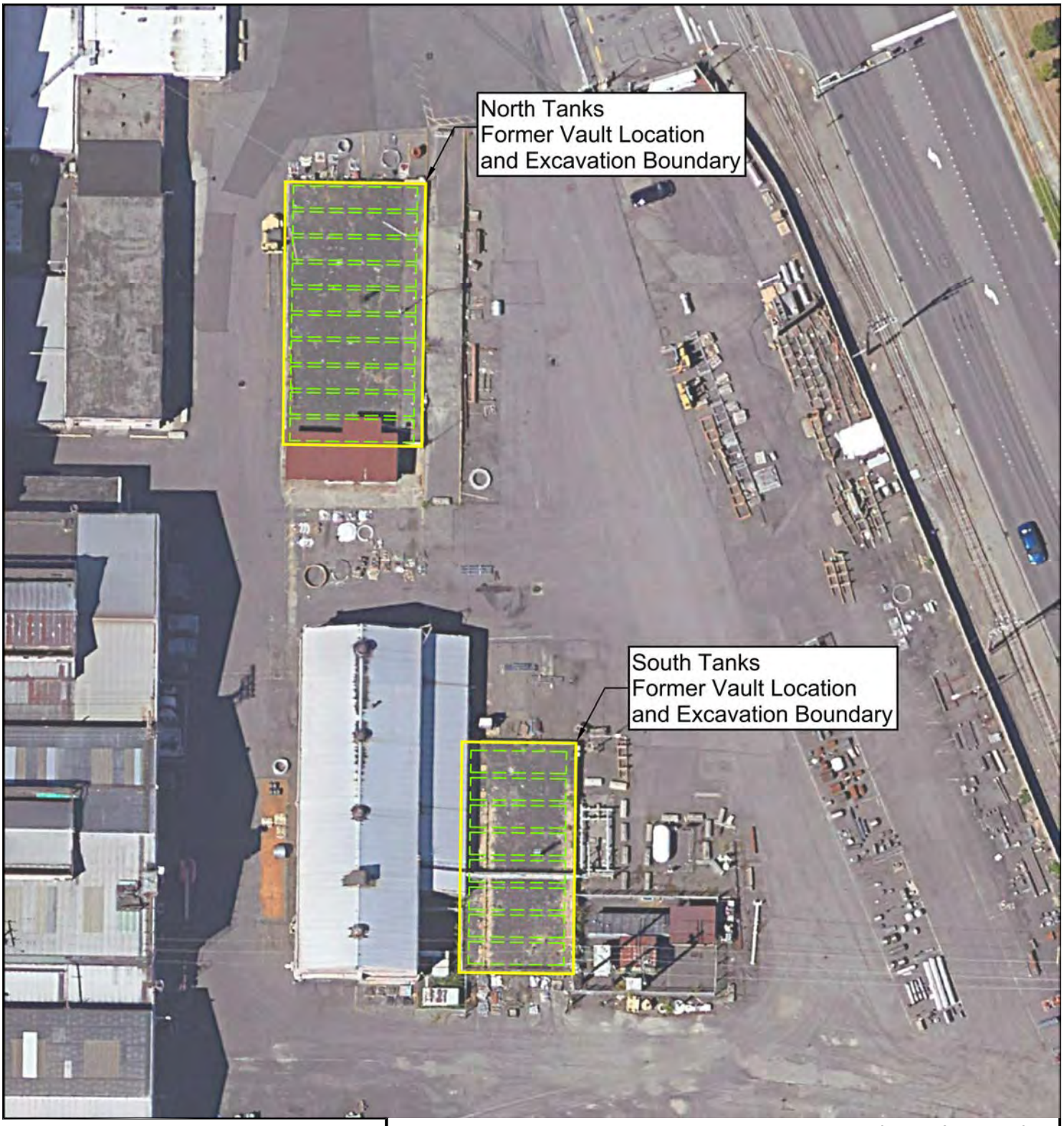
Background Images Source: Google Earth Pro 5/26/2018

DH Environmental Inc

Vicinity Map

Former Jorgensen Forge Facility 8531 E. Marginal Way S. Tukwila, Washington	02-05-2024	Figure 1

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0 25 50
Scale in Feet

Legend

Former Underground Storage Tank Location

N

Background Images Source: Google Earth Pro 5/26/2018

DH Environmental Inc

North & South Tank Vault Location Map

Former Jorgensen Forge Facility 8531 E. Marginal Way S. Tukwila, Washington	02-05-2024	Figure 2

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DH Environmental Inc

North Tanks Sample Location Map

Former Jorgensen Forge Facility 8531 E. Marginal Way S. Tukwila, Washington	01-26-2024	Figure 3

Legend

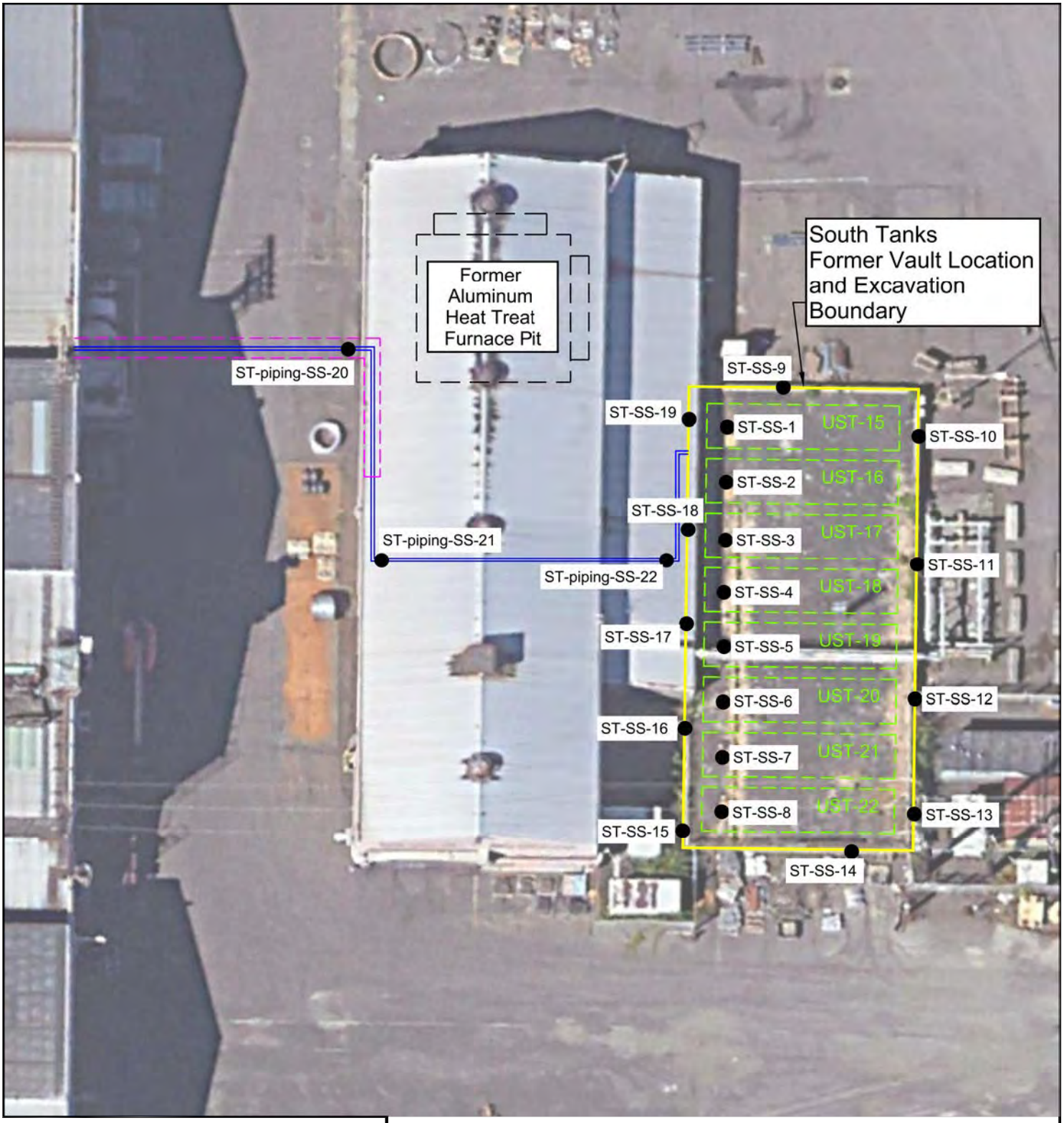
- Soil Sample Location and Designation
- Former Underground Storage Tank Location and Designation
- Former Product Piping Location

0 25
Scale in Feet

N

Background Images Source: Google Earth Pro 5/26/2018

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DH Environmental Inc

South Tanks Sample Location Map

Former Jorgensen Forge Facility 8531 E. Marginal Way S. Tukwila, Washington	02-05-2024	Figure 4

Legend

- Soil Sample Location and Designation
- Former Underground Storage Tank Location and Designation
- Former Utilidor
- Former Product Piping

0 25
Scale in Feet

N

Background Images Source: Google Earth Pro 5/26/2018

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Table 1
Analytical Results Summary Table - GRO & DRO
UST Site Assessment Soil Samples - North Tank Vault
Former Jorgensen Forge Facility
Tukwila, Washington

all values reported in units of mg/kg

Lab Report	Sample Date	Sample Location	Sample ID	GRO	DRO
2308-250	8/22/2023	North Tank Bottom	NT-SS-29-6.5-082223	4.9 U	57 U
			NT-SS-30-6.5-082223	5.8 U	58 U
			NT-SS-31-6.5-082223	80	32,000
			NT-SS-32-6.5-082223	5.3 U	60 U
			NT-SS-33-6.5-082223	5.7 U	61 U
			NT-SS-34-6.5-082223	280	10,800
			NT-SS-35-6.5-082224	6.5	6,600
			NT-SS-Dup-1-082223	6.5	14,000
2308-357	8/30/2023		NT-SS-28-6.5-083023	5.3 U	58 U
			NT-SS-27-6.5-083023	7.7 U	120
			NT-SS-26-6.5-083023	4.9 U	56
2308-315	8/28/2023	North Tank Sidewalls	NT-SS-17-5.0-082823	480	225,000
			NT-SS-18-5.0-082823	180	23,500
			NT-SS-19-5.0-082824	6.2 U	66 U
			NT-SS-16-5.0-082825	6.0 U	60 U
			NT-SS-15-5.0-082826	110	1,120
2308-357	8/30/2023		NT-SS-20-5.0-083023	5.2 U	96
			NT-SS-21-5.0-083023	5.1 U	59 U
			NT-SS-22-5.0-083024	5.3 U	59 U
			NT-SS-23-5.0-083024	6.2 U	65 U
			NT-SS-14-5.0-083025	450	37,900
			NT-SS-13-5.0-083025	100	51,900
			NT-SS-12-5.0-083026	5.6 U	56 U
			NT-SS-11-5.0-083026	7.2 U	69 U
2308-250	8/21/2023	North Tank Piping	NT-piping-SS-24-2.0-082123	6.4 U	8,900
			NT-piping-SS-25-2.0-082123	5.2 U	399
			NT-piping-SS-26-2.0-082123	4.8 U	120

Notes:

1. "U" denotes analyte not reported at a concentration greater than or equal to the given laboratory practical quantitation limit (PQL)
2. DRO concentrations include the sum of diesel-range and lube oil-range hydrocarbons. If neither diesel-range or lube oil-range hydrocarbons were reported in a sample at a concentration greater than the PQL, the greatest PQL value is listed with a "U" flag
3. Samples analyzed by Onsite Environmental, Inc., of Redmond Washington

Abbreviations

GRO = Gasoline-range organics
DRO = diesel-range organics
mg/kg = milligrams per kilogram

Analytical Methods

GRO by Method NWTPH-Gx
DRO by Method NWTPH-Dx

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Table 2

Analytical Results Summary Table - GRO & DRO

UST Site Assessment Soil Samples - South Tank Vault

Former Jorgensen Forge Facility

Tukwila, Washington

all values reported in units of mg/kg

Lab Report	Sample Date	Sample Location	Sample ID	GRO	DRO
2308-250	8/22/2023	South Tank Bottom	ST-SS-8-8.5-082223	1,300	5,300
			ST-SS-7-8.5-082223	5.7 U	3,400
			ST-SS-6-8.5-082223	5.6 U	57
			ST-SS-1-8.5-082223	6.7 U	67 U
			ST-SS-2-8.5-082223	7.3 U	149
			ST-SS-Dup-2-082223	6.4 U	58
2308-357	8/30/2023		ST-SS-3-8.5-083023	56 U	330
			ST-SS-4-8.5-083023	5.8 U	130
			ST-SS-5-8.5-083023	120 U	430
		South Tank Sidewalls	ST-SS-15-6.5-083023	280 U	15,000
			ST-SS-16-6.5-083023	230 U	6,000
			ST-SS-17-6.5-083023	170 U	18,000
			ST-SS-18-6.5-083023	78 U	2,900
			ST-SS-19-6.5-083023	4.7 U	56 U
			ST-SS-9-6.5-083023	5.7 U	66 U
			ST-SS-10-6.5-083023	7.1 U	73 U
			ST-SS-11-6.5-083023	7.1 U	38
			ST-SS-12-6.5-083023	6.6 U	63 U
			ST-SS-13-6.5-083023	8.6 U	80 U
			ST-SS-14-6.5-083023	6.8 U	69 U
2310-177	10/13/2023	South Tank Piping	ST-piping-SS-20-6.5	220	4,260
			ST-piping-SS-21-2.0	4.8 U	380
			ST-piping-SS-22-2.0	4.0 U	190

Notes:

1. "U" denotes analyte not reported at a concentration greater than or equal to the given laboratory practical quantitation limit (PQL)
2. DRO concentrations include the sum of diesel-range and lube oil-range hydrocarbons. If neither diesel-range or lube oil-range hydrocarbons were reported in a sample at a concentration greater than the PQL, the greatest PQL value is listed with a "U" flag
3. Samples analyzed by Onsite Environmental, Inc., of Redmond Washington

Abbreviations

GRO = Gasoline-range organics

DRO = diesel-range organics

mg/kg = milligrams per kilogram

Analytical Methods

GRO by Method NWTPH-Gx

DRO by Method NWTPH-Dx

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Table 3
Analytical Results Summary Table - Toluene, Ethylbenzene, & Xylenes
UST Site Assessment Soil Samples
Former Jorgensen Forge Facility
Tukwila, Washington

all values reported in units of mg/kg

Location	Sample ID	Toluene	Ethylbenzene	Xylenes
North Tank Bottom	NT-SS-31-6.5-082223	0.0041 U	0.00082 U	0.0084
	NT-SS-34-6.5-082223	0.26 U	0.051 U	0.20
	NT-SS-35-6.5-082224	0.0044 U	0.0021	0.057
	T-SS-Dup-1-082223	0.0048 U	0.0012	0.028
North Tank Sidewalls	NT-SS-17-5.0-082823	0.25 U	0.065	0.54
	NT-SS-18-5.0-082823	0.0047 U	0.15	0.39 J
	NT-SS-13-5.0-083025	0.0046 U	0.00092 U	0.0163
North Tank Piping	NT-piping-SS-24-2.0-082123	0.0058 U	0.0012 U	0.0023 U
South Tank Bottom	ST-SS-8-8.5-082223	0.33	0.80	6.5
	ST-SS-7-8.5-082223	0.0047 U	0.00094 U	0.0096
South Tank Sidewalls	ST-SS-15-6.5-083023	0.21 U	0.085	0.73
	ST-SS-17-6.5-083023	0.22 U	0.044 U	0.087 U
South Tank Piping	ST-piping-SS-20-6.5	0.40	0.46	3.0
	ST-piping-SS-21-2.0	0.0041 U	0.00082 U	0.0012
	ST-piping-SS-22-2.0	0.0037 U	0.00074 U	0.0015 U

Notes

1. Analytes are only shown if they were reported in at least one soil sample at a concentration greater than or equal to the laboratory practical quantitation limit (PQL).
2. "U" denotes analyte not reported at a concentration greater than or equal to the given laboratory PQL.
3. "J" denotes the reported concentration is an estimate
4. Xylenes concentrations include the sum of m,p-xylene and o-xylene. If neither compound was reported in a sample at a concentration greater than the PQL, the greatest PQL value is listed with a "U" flag.

Abbreviations

mg/kg = milligrams per kilogram

Analytical Methods

VOCs by EPA Method 8260D

Samples analyzed by Onsite Environmental, Inc., of Redmond Washington

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Table 4
Analytical Results Summary Table - cPAHs
UST Site Assessment Soil Samples
Former Jorgensen Forge Facility
Tukwila, Washington

all values reported in units of mg/kg

Sample ID	Benzo[a]anthracene	Chrysene	Benzo(b)fluoranthene	Benzo(j,k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-cd)pyrene	Dibenzo(a,h)anthracene	TEC
TEF	0.1	0.01	0.1	0.1	1	0.1	0.1	
NT-SS-31-6.5-082223	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	--
NT-SS-34-6.5-082223	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	--
NT-SS-35-6.5-082224	0.0078 U	0.0098	0.0097 U	0.0078 U	0.010 U	0.0088 U	0.0078 U	--
T-SS-Dup-1-082223	0.036	0.052	0.093 U	0.015 U	0.10 U	0.026 U	0.015 U	0.004
NT-SS-17-5.0-082823	0.026	0.072	0.041 U	0.020 U	0.033 U	0.031 U	0.036 U	0.003
NT-SS-18-5.0-082823	0.0028	0.0062	0.0045 U	0.0021 U	0.013 U	0.0054 U	0.0022 U	0.000
NT-SS-13-5.0-083025	0.13	0.15	0.097	0.036 U	0.14	0.080	0.036 U	0.172
NT-piping-SS-24-2.0-082123	0.033 UJ	0.038 J	0.056 J	0.062 J	0.033 UJ	0.033 UJ	0.033 UJ	0.012
ST-SS-8-8.5-082223	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	--
ST-SS-7-8.5-082223	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	--
ST-SS-15-6.5-083023	0.035 U	0.16	0.035 U	0.035 U	0.042	0.035 U	0.035 U	0.044
ST-SS-17-6.5-083023	0.13	0.38	0.046	0.035 U	0.074	0.035 U	0.035 U	0.095
ST-piping-SS-20-6.5	0.030 U	0.071	0.045	0.030 U	0.034	0.030 U	0.030 U	0.039
ST-piping-SS-21-2.0	0.11	0.13	0.18	0.056	0.13	0.16	0.031	0.185
ST-piping-SS-22-2.0	0.57	0.59	0.68	0.23	0.63	0.37	0.088	0.830

Notes

1. Analytes are only shown if they were reported in at least one soil sample at a concentration greater than or equal to the laboratory practical quantitation limit (PQL).
2. "U" denotes analyte not reported at a concentration greater than or equal to the given laboratory PQL.
3. "J" denotes the reported concentration is an estimate
4. "--" indicates a TEC value was not calculated, because none of the individual cPAH compounds were reported at a concentration greater than or equal to the PQL.

Abbreviations

cPAHs = Carcinogenic Polyaromatic Hydrocarbons
mg/kg = milligrams per kilogram
TEF = Toxic Equivalent Factor, (WAC 173-340-708
TEC = Toxic Equivalent Concentration of benzo(a)pyrene

Analytical Methods

cPAHs by EPA 8270E/SIM
Analyzed at Onsite Environmental, Redmond, Washington

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Table 5
Analytical Results Summary Table - Total Metals
UST Site Assessment Soil Samples
Former Jorgensen Forge Facility
Tukwila, Washington

all values reported in units of mg/kg

	Arsenic	Barium	Cadmium	Chromium	Copper	Lead	Nickel	Zinc
NT-SS-31-6.5	39	26	0.58 U	7.2	17	5.8 U	12	19
NT-SS-34-6.5	12 U	24	0.60 U	7.0	11	6.0 U	8.1	21
NT-SS-35-6.5	12 U	27	0.59 U	8.7	12	5.9 U	8.4	25
T-SS-Dup-1	12 U	24	0.59 U	7.8	11	5.9 U	7.7	22
NT-SS-17-5.0	12 U	34	0.59 U	9.3	20	12	18	59
NT-SS-18-5.0	12 U	28	0.62 U	7.7	17	6.2 U	9.4	20
NT-SS-13-5.0	11 U	27	0.54 U	7.9	21	5.4 U	11	23
NT-piping-SS-24-2.0	27	65	0.61 U	100	150	140	910	190
ST-SS-8-8.5	13 U	28	0.63 U	7.9	10	6.3 U	7.6	23
ST-SS-7-8.5	12 U	23	0.62 U	7.7	8.1	6.2 U	6.5	19
ST-SS-15-6.5	11 U	21	0.53 U	7.1	7.8	11	7.5	20
ST-SS-17-6.5	11 U	25	0.53 U	8.3	8.1	5.3 U	8.0	22
ST-piping-SS-20-6.5	31	82	0.85	25	67	49	94	280
ST-piping-SS-21-2.0	11 U	41	0.55 U	55	56	18	64	44
ST-piping-SS-22-2.0	11 U	33	0.55 U	20	30	18	58	43

Notes

1. Analytes are only shown if they were reported in at least one soil sample at a concentration greater than or equal to the laboratory practical quantitation limit (PQL).
2. "U" denotes analyte not reported at a concentration greater than or equal to the given laboratory PQL.

Abbreviations

mg/kg = milligrams per kilogram

Analytical Methods

arsenic, barium, cadmium, chromium, lead, selenium, and silver by EPA Method 6010D

mercury by EPA Method 7471B

Analyzed at Onsite Environmental, Redmond, Washington

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Table 6
Analytical Results Summary Table - PCBs
UST Site Assessment Soil Samples
Former Jorgensen Forge Facility
Tukwila, Washington

all values reported in units of mg/kg

Sample Name	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1262	Aroclor 1268	Total PCBs
NT-SS-31-6.5	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	--
NT-SS-34-6.5	0.060 U	0.060 U	0.060 U	0.060 U	0.060 U	0.060 U	0.060 U	0.060 U	0.060 U	--
NT-SS-35-6.5	0.059 U	0.059 U	0.059 U	0.059 U	0.059 U	0.059 U	0.059 U	0.059 U	0.059 U	--
T-SS-Dup-1	0.059 U	0.059 U	0.059 U	0.059 U	0.059 U	0.059 U	0.059 U	0.059 U	0.059 U	--
NT-SS-17-5.0	0.059 U	0.059 U	0.059 U	0.059 U	0.059 U	0.16	0.11	0.059 U	0.059 U	0.27
NT-SS-18-5.0	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.084	0.062 U	0.062 U	0.062 U	0.084
NT-SS-13-5.0	0.054 U	0.054 U	0.054 U	0.054 U	0.054 U	0.13	0.054 U	0.054 U	0.068	0.20
NT-piping-SS-24-2.0	0.061 U	0.061 U	0.061 U	0.061 U	0.061 U	0.29	0.23	0.061 U	0.061 U	0.52
ST-SS-8-8.5	0.063 U	0.063 U	0.063 U	0.063 U	0.063 U	0.063 U	0.063 U	0.063 U	0.063 U	--
ST-SS-7-8.5	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	--
ST-SS-15-6.5	0.053 U	0.053 U	0.053 U	0.053 U	0.053 U	0.053 U	0.053 U	0.053 U	0.053 U	--
ST-SS-17-6.5	0.053 U	0.053 U	0.053 U	0.053 U	0.053 U	0.053 U	0.053 U	0.053 U	0.053 U	--
ST-piping-SS-20-6.5	0.057 U	0.057 U	0.057 U	0.057 U	0.057 U	0.057 U	0.057 U	0.057 U	0.057 U	--
ST-piping-SS-21-2.0	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	--
ST-piping-SS-22-2.0	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	--

Notes

1. Analytes are only shown if they were reported in at least one soil sample at a concentration greater than or equal to the laboratory practical quantitation limit (PQL).
2. "U" denotes analyte not reported at a concentration greater than or equal to the given laboratory PQL.
3. "--" indicates none of the individual PCB aroclors were reported at a concentration greater than or equal to the PQL.

Abbreviations

PCB = polychlorinated biphenyl
UST = Underground Storage Tank
mg/kg = milligrams per kilogram

Analytical Methods

PCBs by EPA Method 8082
Analyzed at Onsite Environmental, Redmond, Washington

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Appendix E - Photo Log
UST Decommissioning and Site Assessment Report
Former Jorgensen Forge Property



Photo 1: North Tank Vault, exposing UST-26 in preparation for removal. View to the west.



Photo 2: North Tank Vault, exposing UST-28 in preparation for removal. View to the west.



Photo 3: North Tank Vault, last two tanks prepared for removal. View to the south southwest.



Photo 4: North Tank Vault, tanks staged for transport. The tank fragments on the left side were tanks previously filled with sand, which were cut open to empty. View to the north.



Photo 5: North Tank Vault, loading a tank for recycling. View to the southwest.



Photo 6: North Tank Vault, emptied of tanks and backfill, prior to removal of the concrete vault. View to the northwest.



Photo 7: North Tank Vault, product piping removal. View to the north northwest.



Photo 8: North Tank Vault, southernmost end of the product piping. The piping had been cut just inside the foundation wall of the aluminum building. A cap was still present on the end of the pipe.



Photo 9: North Tank Vault, removal of the concrete vault structure. View to the north.



Photo 10: North Tank Vault, backfilling the tank excavation. View to the west northwest.



Photo 11: North Tank Vault, following final paving and site restoration. View to the south southwest.



Photo 12: South Tank Vault, removal of UST-15. View to the southwest.



Photo 13: South Tank Vault, tank prepared for removal. View to the west.



Photo 14: South Tank Vault, tank staged for transport. Note the condition of the tanks from the South Tank Vault in comparison to those from the North Tank Vault. View to the west.



Photo 15: South Tank Vault, loading a tank for recycling. View to the west.



Photo 16: South Tank Vault, example of a pinhole caused by corrosion. These were visible on multiple tanks.



Photo 17: South Tank Vault, emptied of tanks and backfill, prior to removal of the concrete vault. View to the south southwest.



Photo 18: South Tank Vault, backfilling the excavation. View to the south southwest.



Photo 19: South Tank Vault, single product line visible entering the foundation underneath of the former Aluminum Building, along with a small electrical conduit. View to the north northeast.



Photo 20: South Tank Vault, product line running from left to right (north to south), where it joins two other lines that used to stub up through the concrete slab floor. Those lines appeared to have been cut and bent at some point in the past. View to the east.



Photo 21: South Tank Vault, product piping running north towards a utilidor. View to the north.



Photo 22: South Tank Vault, product piping in the utilidor following removal of the concrete top. Note there are more pipes visible in the utilidor than were visible running towards the former tanks. Several of the pipes had been cut and/or capped at some point in the past. View to the south southwest.



Photo 23: South Tank Vault, product piping in the utilidor following removal of the concrete top. Note there are more pipes visible in the utilidor than were visible running towards the former tanks. Several of the pipes had been cut and/or capped at some point in the past. View to the south southwest.



Photo 24: South Tank Vault, following final paving and site restoration. View to the south.

Final Dangerous Waste Clean Closure Report

Former Jorgensen Forge Site
RCRA Site ID: WAD000602813

8531 East Marginal Way South
Tukwila, WA 98108

MAY 10th, 2024

Prepared for:

Star Forge, LLC
8531 East Marginal Way South
Tukwila, WA 98108

Prepared by:

DH Environmental, Inc.
1011 SW Klickitat Way, Suite 107
Seattle, WA 98134

DRAFT FOR PUBLIC COMMENT

Executive Summary

This Final Dangerous Waste Clean Closure Report has been prepared by DH Environmental, Inc. for the purpose of documenting efforts undertaken by Star Forge, LLC (Star Forge) to carry out Clean Closure of the Dangerous Waste Management Units at the Former Jorgensen Forge Site located at 8531 East Marginal Way South, Tukwila, WA. In addition, this report presents documentation of disposal of chemicals and other waste generated from demolition of the Former Jorgensen Forge Facility.

The facility is subject to Clean Closure because it was a Large Quantity Generator of Dangerous Waste and operated multiple Dangerous Waste Management Units. As of the date of this report, Star Forge has completed the required Clean Closure activities under the Dangerous Waste Regulations (WAC 173-303-200(h)) and in accordance with Agreed Order No. DE 21034 between the Washington State Department of Ecology and Star Forge, as well as the associated Interim Action Work Plan that incorporated final elements required for Clean Closure. This Final Dangerous Waste Clean Closure Report is a follow-up document to the Star Forge's interim Clean Closure Report submitted to Ecology in July 2022, which is attached for reference.

Project Information

Project Title	Former Jorgensen Forge Site
Project Location	8531 East Marginal Way South Tukwila, WA 98108
Project Owner	Star Forge, LLC 8531 East Marginal Way South Tukwila, WA 98108
Report Delivery Date	April 2024
Report Prepared by	Stacy Fox, CHMM Sr. Project Scientist DH Environmental, Inc. Nathan Moxley, LG, LHG Principal Hydrogeologist DH Environmental, Inc. David Hill, PE, CHMM Principal Engineer DH Environmental, Inc. 

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Attachment 6: July 2020 Dangerous Waste Clean Closure Report

LIST OF ACRONYMS AND ABBREVIATIONS

CAA	Central Accumulation Area
DOT	Department of Transportation
DWMU	Dangerous Waste Management Unit
Ecology	Washington State Department of Ecology
EPA	United States Environmental Protection Agency
HVOC	Halogenated Organic Compounds
MTCA	Washington State Model Toxics Control Act
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
RCRA	Resource Conservation and Recovery Act
SVOC	Semivolatile Organic Compounds
TCLP	Toxicity Characteristic Leachate Procedure
TSDF	Treatment, Storage and Disposal Facility
VOC	Volatile Organic Compounds

1.0 OVERVIEW

DH Environmental, Inc. (DH Environmental) has prepared this Report on behalf of Star Forge, LLC (Star Forge) to document final Clean Closure of the former Jorgensen Forge Facility located at 8531 East Marginal Way South, Tukwila, Washington (the "Facility"; Figure 2). The purpose of this document is to report the results of the efforts that have been undertaken by Star Forge to carry out Clean Closure of the applicable Dangerous Waste Management Units at the Facility in accordance with WAC 173-303-610(2) and (5) and in accordance with Agreed Order No. DE 21034 between the Washington State Department of Ecology and Star Forge LLC, as well as the associated Interim Action Work Plan that incorporated final elements required for Clean Closure. This Final Dangerous Waste Clean Closure Report is a follow-up document to Star Forge's interim Clean Closure Report submitted to Ecology in July 2022, which is attached for reference.

1.1 Site Description[1]

The former Jorgensen Forge Site is approximately 21.6 acres, located in an industrial area along the east bank of the Lower Duwamish Waterway. The site is bordered to the north by the Boeing Plant 2 property, and to the south by the Boeing Isaacson property. It is bordered to the west by the Lower Duwamish Waterway, and to the east-by-East Marginal Way South and the King County Regional Airport.

The Facility was used from 1942-1965 for fabrication of structural steel, tractor and road equipment. Operations at the site included forging and heat-treating by Isaacson Iron Works, which operated as a U.S. naval vessel manufacturer.

The Facility was owned and operated by Earle M. Jorgensen Company (EMJ) from 1965 until 1992, when it was purchased by the plant management group and became the Jorgensen Forge Corporation. Jorgensen manufactured specialized large-scale metal parts for the aircraft and marine industries, including open die steel forgings and rolled aluminum rings. They also processed nickel, titanium, and specialized alloys.

Contamination at the Facility is the result of heavy industrial use since the 1940's, and possible contaminated groundwater migrating onto the property from off-site sources.

Contaminants of concern at the site include:

- Polychlorinated biphenyls (PCBs)
- Volatile organic compounds (VOCs)
- Halogenated volatile organic compounds (HVOCs)
- Metals (including but not limited to arsenic, cadmium, chromium, lead, nickel, copper, and zinc)
- Petroleum hydrocarbons

[1] Information in this section was derived from the Washington State Department of Ecology's Jorgensen Forge Corp. Site Information webpage page: https://apps.ecology.wa.gov/gsp/Sitepage.aspx?csid=3689

1.2 Clean Closure Overview

Closure is the term used in the Dangerous Waste Regulations to refer to the process of taking a Dangerous Waste Management Unit (DWMU) out of service and properly cleaning up or decontaminating the DWMU and any areas affected by potential releases from the DWMU. When this process is finished, a unit is referred to as "closed."[2]

Generators are required to meet closure performance standards at WAC 173-303-610(2) and (5). This means that when a DWMU is closed all Dangerous Waste must be removed, and DWMUs that managed or accumulated Dangerous Wastes must be removed or decontaminated.

After wastes and waste residues are removed and units have been inspected, facility owners and generators will manage two types of materials during closure: debris (such as unit parts, structures, piping, equipment, and unit containment systems) and environmental media (such as soil, groundwater, surface water, and sediments). In accordance with Ecology's guidance for Clean Closure, if environmental media has been contaminated as a result of DWMU operations, and cleanup levels have not been established for a site, then by default, MTCA Method A or B unrestricted cleanup levels can be used to achieve Clean Closure of the associated DWMU.

The following sections describe the efforts taken to comply with the requirements for Clean Closure of the DWMUs. In addition, all chemical products, abated hazardous building materials, and industrial materials at the facility that could not be beneficially reused were designated in accordance with WAC 173-303-070 and disposed of off-site at a RCRA permitted Treatment, Storage, and Disposal Facility (TSDF), or other properly permitted disposal facility if the waste did not designate as Dangerous Waste. Table 1 summarizes the waste disposed of associated with the DWMU Clean Closures, and chemical products and industrial materials requiring disposal as dangerous waste for demolition and overall closure of the Facility. The initial Clean Closure Report submitted in July 2020 contains details about removal and disposal of other wastes not discussed in this final Clean Closure Report but are included in the disposal summary in Table 1.

[2]Ecology, 2005. *Guidance for Clean Closure of Dangerous Waste Units and Facilities*. Hazardous Waste and Toxics Reduction Program. Publication No. 94-111.

2.0 CLOSURE OF DANGEROUS WASTE MANAGEMENT UNITS

For the purpose of Clean Closure in accordance with the Dangerous Waste Regulations, DH Environmental evaluated various areas at the Facility that generated and/or stored Dangerous Waste through historical records and discussions with former staff. Some of these areas served as Dangerous Waste Central Accumulation Areas (CAAs), while others were locations where waste was generated and temporarily stored. Figure 2 shows the areas determined to be DWMU's subject to closure.

The following areas were determined to be DWMU's subject to closure because they either served as CAAs, or waste was generated and temporarily stored and handled in quantities greater than 55 gallons. The Clean Closure work summarized below was all conducted in conjunction with general demolition of the entire facility in 2023 and 2024, and in accordance with the Interim Action Workplan.

2.1 Central Accumulation Area DWMU

The Central Accumulation Area (CAA) was one of two 90/180-day Dangerous Waste accumulation areas. The CAA was located on the northwest corner of the Facility and the location is shown in Figure 2. The CAA was an approximately 1,000 square feet (SF) structure with aluminum siding, a concrete slab, and an approximately 1 ft. concrete base wall that served as secondary containment. The CAA stored Dangerous Waste in drums and small containers generated from facility maintenance and operations. Based on historical documents and interviews with facility staff, the structure at one time contained a 300 gallon above ground storage tank that serviced diesel fuel. Consequently, the structure was also known as the "diesel house". As discussed in the July 2020 Clean Closure Report, due to visual staining of the concrete inside the CAA, an attempt to decontaminate the concrete was made using high pressure steam and water sprays. However, subsequent sampling of the concrete slab revealed the concrete still exceeded MTCA Method A, Unrestricted, for Diesel Range Organics. Consequently, it was written into the Interim Action Workplan that the concrete would be removed, designated, and disposed of off-site, and the underlying soil would be sampled for Diesel Range Organics in accordance with the IAWP Sampling and Analysis Plan to determine if any excavation of underlying soil would be necessary to achieve Clean Closure of this DWMU. In August 2023, the CAA was demolished, and the underlying soil concentrations of Diesel Range Organics were confirmed to be less than the MTCA Method A unrestricted soil cleanup level of 2,000 milligrams per kilogram (mg/kg). After backfilling the footprint of the CAA with approved and tested clean fill (crushed rock), the CAA was determined to have met all Clean Closure standards in accordance with WAC 173-303-610(2) and (5). Further details about closure of the CAA, including data and photo documentation, are included in the individual CAA Clean Closure Package in Attachment 1.

2.2 Tote Storage Area DWMU

The Tote Storage Area was another 90/180-day Dangerous Waste accumulation area located on the west side of the Facility and the location is shown in Figure 2. The Tote Storage Area was an approximately 800 SF structure with wooden siding and an asphalt slab. The Tote Storage Area stored Dangerous Waste and used oil totes and drums generated from facility maintenance and operations. Based on historical documents and interviews with facility staff, the structure at one time was used to clean and etch product samples prior to laboratory testing.

Subsequently, the structure was also known as the "Acid House" or "Etch House" before it was used as a 90/180-day Dangerous Waste accumulation area in the 1990s.

Similar to the CAA, the Tote Storage Area slab was found to be visually impacted with staining and suspected historical releases. After the slab was treated in accordance with Clean Closure Performance standards using high-pressure steam and water sprays, the asphalt slab was sampled in June of 2020, and found to exceed MTCA Method A concentrations for Diesel Range Organics as well as PCBs. In addition, subsurface sampling in the Tote Storage Area was conducted by Shannon and Wilson in November 2020 and January 2021 to support a Remedial Investigation being conducted by the former owner of the facility (EMJ). The results of the subsurface sampling of the Tote Storage Area revealed that PCBs exceeded the MTCA Method A soil cleanup level of 1 mg/kg, at depths up to 1.5-feet below grade in two locations. Consequently, it was written into the IAWP that the concrete would be removed, designated, and disposed of off-site, and the underlying soil would be excavated to depths necessary to achieve cleanup levels. In addition, the IAWP required confirmation sampling to be conducted in accordance with the IAWP Sampling and Analysis Plan to demonstrate that cleanup levels for PCBs and diesel range organics were obtained.

In October 2023, the Tote Storage Area superstructure and slab were demolished, and excavation was conducted to maximum depth of 2 feet within the footprint of the structure (including the entrance ramp). This resulted in removal of approximately 98 tons of soil/debris from the Tote Storage Area footprint. After confirmation sampling confirmed all cleanup levels were met, the footprint of the Tote Storage Area was backfilled with approved and tested clean fill (crushed rock). As such, the Tote Storage Area was determined to have met all Clean Closure standards in accordance with WAC 173-303-610(2) and (5). Further details about closure of the Tote Storage Area, including data and photo documentation, are included in the individual Tote Storage Area Clean Closure Package in Attachment 2.

2.3 Baghouse DWMU

The baghouse and baghouse processing area were located north of the west end of the main building and north of the tote storage building. The baghouse building was approximately 4,000 SF, and housed equipment to capture and contain dust from the baghouse tunnel that conveyed air and dust from the former melt shop to the baghouse. The baghouse dust was designated as a K061 waste stream as it meets the definition of K061 Specific Source Waste from iron and steel sources in accordance with WAC 173-303-9904. The baghouse processing area and concrete slab were divided by a wall thereby creating two separate areas denoted as 'Baghouse North' and 'Baghouse South' for the purposes of cleaning and sampling. Only the Baghouse North slab exceeded Clean Closure cleanup levels for diesel range organics and hexavalent chromium. After the baghouse structure was demolished, the Baghouse North slab was excavated and disposed of offsite as K061 Hazardous Waste. The underlying soil was then sampled in accordance with the IAWP and found to meet MTCA Method A cleanup levels for diesel range organics and hexavalent chromium.

The baghouse tunnel was the baghouse dust conveyance duct connecting the former melt shop and the baghouse. Although significant dust removal was conducted in 2019 by Clean Harbors as contracted by Star Forge, some K061 dust remained in the duct that could not be safely removed until it was lowered to the ground and reduced to smaller sections. The baghouse tunnel was cut in place and carefully lowered to the ground using cranes onto

bermed exclusion zones where the ducting and all associated equipment was inspected again prior to further reduction. All remaining dust was removed using a combination of "wet wiping", scraping, and the use of a vacuum with HEPA filters. All media generated from removing the residual dust inside the duct was managed as K061 Hazardous Waste. Once the Clean Debris performance standards were met in accordance with WAC 173-303-610(2) and (5), the tunnel sections were shipped off site for recycling. Where sections of the ducting could not meet the Clean Debris standard, for example, along expansion joints, those sections were disposed of as K061 waste.

In November 2023, the baghouse and associated equipment were effectively demolished. The decontamination of the baghouse media, along with disposal of materials that could not be reasonably decontaminated resulted in generation and disposal of approximately 106 tons of K061 Debris that was placed in 20-yard roll-off bins and shipped via rail to Chemical Waste Management in Arlington, OR for macroencapsulation and disposal. In addition, approximately 282 gallons (2,350 lbs) of K061 designated water was generated from decontamination efforts. This water was also disposed of at Chemical Waste Management in Arlington, OR.

On 11/18/2023, the underlying soil of the Baghouse North footprint was sampled in accordance with the IAWP SAP and was demonstrated to meet all cleanup levels. After the footprint of the baghouse was backfilled with approved and tested clean fill (crushed rock), the Baghouse DWMU was determined to have met all Clean Closure standards in accordance with WAC 173-303-610(2) and (5).

An individual DWMU Closure Package was developed for each of these areas and is provided in Attachments 1-3. Confirmation sampling laboratory data of underlying soil, photo logs, and disposal documentation (hazardous waste manifests) are included in the individual closure packages. The closure requirements for each DWMU have been met and are described in detail in the individual packages.

3.0 LIME HOPPER RELEASE INCIDENT

On the southwest side of the Facility, there was an elevated storage hopper approximately 25 feet above ground containing lime that was historically used in forging operations. This hopper was enclosed inside a structure and elevated, so it was not apparent to anyone that it contained any materials. This area of the facility, referred to as the "melt shop," ceased operation in 2015, prior to Star Forge's ownership of the facility. Therefore, the on-site presence of this lime was unknown to all parties.

On 11/22/2023, the lime hopper was breached by Star Forge's demolition contractor while cutting into the structure for demolition. The breach resulted in an estimated 500-lbs of lime falling from the vessel onto the ground. Due to the northerly wind direction and location of the hopper being approximately 150 feet from the south property line, some of the lime crossed over onto Boeing's property adjacent to the south. The lime did not impact the Duwamish River because the wind was blowing directly south. The wind was light to moderate at the time of the release.

All catch basins in the area of demolition were blocked prior to the incident occurring as a stormwater Best Management Practice. In addition, all stormwater drainage at the Facility is treated and batched tested before discharging the Lower Duwamish under two Administrative Orders with the WA State Department of Ecology.

No injuries or exposures were reported because of this release. Lime (calcium hydroxide/calcium oxide) is not highly toxic, but it does designate as Dangerous Waste in accordance with the WA State Dangerous Waste regulations because when mixed with an equal weight of water, the pH exceeds 12.5. This testing was conducted on-site by DH Environmental with a pH meter. Washington has a State-Only Dangerous Waste designation of WSC2 for corrosive solids. Due to this release qualifying as a "Dangerous Waste Release", the Washington State Emergency Management Division (1-800-258-5990) was notified in addition to the National Response Center (1-800-424-8802). Beau Johnson, the Ecology Site Manager, was also notified, in addition to the Boeing EHS manager for the property to the south. The incident was assigned a Washington Statewide Environmental Tracking System (ERTS) number 726905.

After initial actions were taken to clean up the lime that was released to the ground and temporarily contain the lime inside the hopper to avoid further dispersion, Star Forge's team assessed removal actions and began planning for removal of the remaining lime in the elevated hopper. From 11/22/2023 – 12/7/2023, Star Forge, through its demolition contractor, Construction Group International, deployed HAZMAT workers elevated on a scissor lift to remove the remaining lime from the elevated hopper using air movers and vacuum boxes to contain the lime without dispersion. The lime was successfully removed from the hopper and contained in DOT vacuum bins for off-site disposal. Impacted subsurface debris and gravel was loaded into roll off boxes for offsite disposal as well. All lime and impacted debris associated with the cleanup was designated as WA State Dangerous Waste Corrosive Solid (WSC2) and WA State Dangerous Waste, Toxic (WT02). This resulted in disposal of 95 tons of lime and impacted debris. All of the waste associated with the cleanup was disposed of at Chemical Waste Management in Arlington, OR. Attachment 5 is the Incident Report that was delivered to all authorities and parties notified of the incident.

5.0 HAZARDOUS BUILDING MATERIALS ABATEMENT AND DISPOSAL

In August 2019, SoundEarth Strategies contracted with Star Forge to complete the pre-demolition hazardous building materials survey of the Former Jorgensen Forge Facility in accordance with the Washington State Labor and Industries "Good Faith Inspection" requirements (WAC 296-62-07721) and the Puget Sound Clean Air Agency asbestos survey requirements.

From September 2019 to February 2020, Star Forge's demolition contractor, Construction Group International (a licensed abatement contractor) conducted abatement activities of the hazardous building materials identified in the survey reports prior to demolition except for the Galbestos[3] siding identified in the survey that was found to contain asbestos greater than one percent. Removal of the Galbestos siding was conducted in conjunction with demolition in 2023 and 2024 and was classified as Class 2 Asbestos Work[4].

Abatement of the hazardous building materials identified in the pre-demolition survey resulted in removal and disposal of approximately 72 cubic yards of materials classifying as friable asbestos and 661 tons of materials classifying as non-friable asbestos which was primarily Galbestos siding. In addition, PCB Bulk Product Waste[5] was identified in the Tote Storage Area paint on structural beams and was profiled and disposed of along with other PCB Remediation Waste associated with the Tote Storage Area DWMU closure (see Attachment 2 for further details).

[3] Galbestos is the registered trademark for galvanized panels consisting of thick gauge, corrugated galvanized metal sheeting with thin, double-sided asbestos felt-like coatings.

[4] *Class II asbestos work* means activities involving the removal of ACM which is not thermal system insulation or surfacing material. This includes, but is not limited to, the removal of asbestos-containing wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastics.

[5] PCB bulk product waste is waste derived from products manufactured to contain PCB in a non-liquid state at 50 parts per million or greater, such as paint and sealants.

6.0 SUMMARY

DH Environmental was contracted by Star Forge to assist with facilitation and documentation of Dangerous Waste Clean Closure for the former Jorgensen Forge Facility located at 8531 East Marginal Way South Tukwila, WA. From 2020 – 2024, DH Environmental supported Star Forge with Facility cleanouts from shops and work areas, DWMU designation and evaluation, DWMU cleaning and confirmation sampling, and overall documentation of Clean Closure activities occurring concurrently with demolition operations. As of the date of this report, Star Forge has completed the required Clean Closure requirements under the Dangerous Waste Regulations (WAC 173-303-200(h)) and in accordance with Agreed Order No. DE 21034 between the Washington State Department of Ecology and Star Forge, LLC. The 2023 Dangerous Waste Annual Report has been updated to include notification of closure of the three DWMUs described in in this Final Clean Closure Report and is included in Attachment 4.

TABLE - 1
Star Forge, LLC
Hazardous Waste Shipments from Overall Facility Closure
2018 - 2024

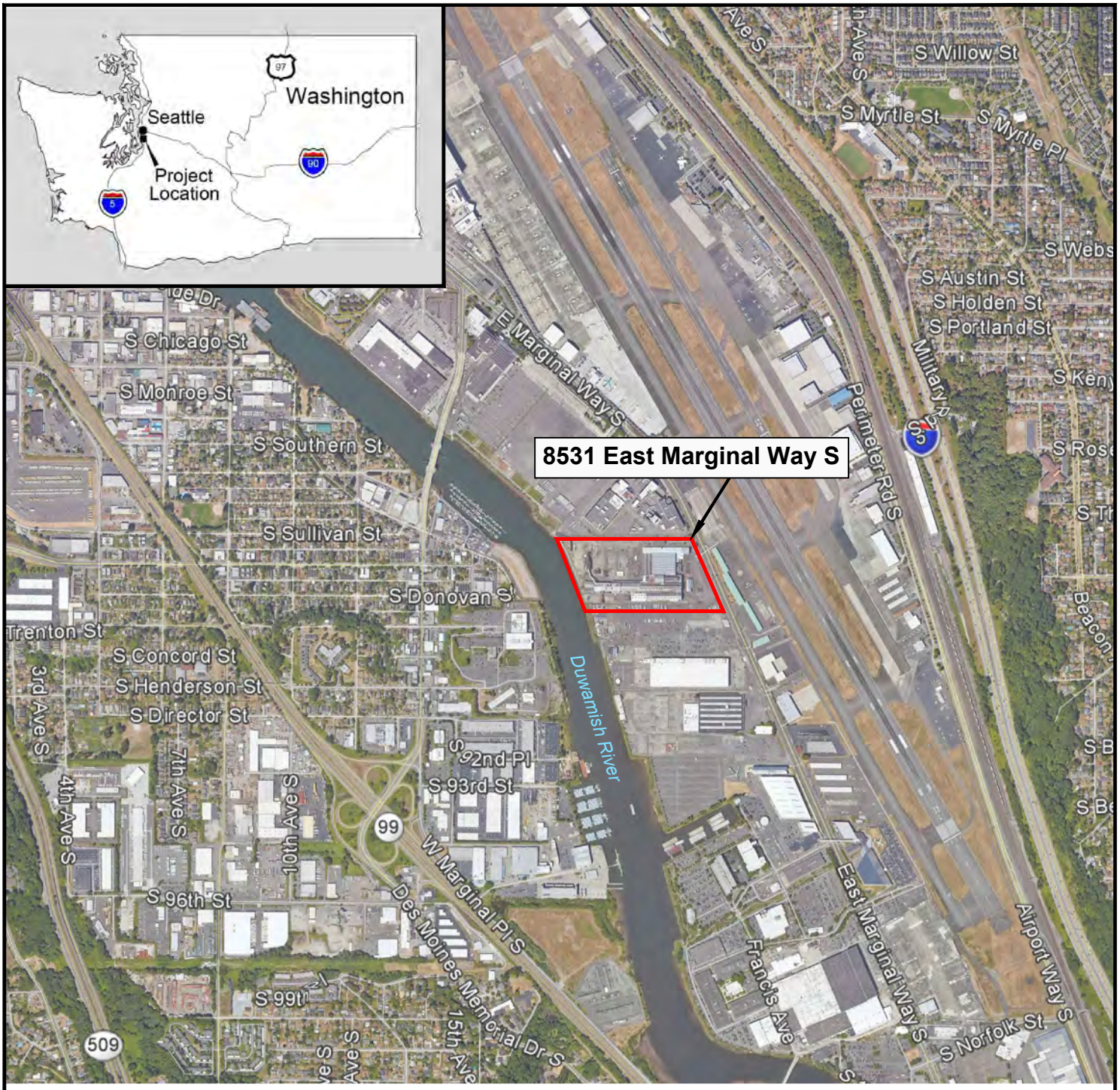
Profile #	Waste Description	Shipment Date	Shipment Weight (lbs)	Manifest #	Hazardous Waste Code	Dangerous Waste Code	TSCA
CH1721830-1	PPE from decontamination of facility	11/08/2018	75	12885240FLE	D007	NA	NA
CH1721784-1	Sludge from decontamination of facility	11/08/2018	1200	12885239FLE	D007	NA	NA
CH1735588	Aquasol 20 20	01/11/2019	356	012885528FLE	D002	NA	NA
CH1742114	CH2O Boiler Treatment - 6267	01/11/2019	293	012885527FLE	D002	NA	NA
CH1750992	Consolidated Aerosol Liquids	01/11/2019	139	012885528FLE	D001, D035	NA	NA
1282936-1	Contaminated Grease	01/11/2019	235	012885527FLE	NONE	WT02	NA
CH1735567	Coolacide - Loosepack	01/11/2019	110	012885528FLE	NONE	WP02, WT02	NA
CH1729496	Eliminator 103 - Loosepack	01/11/2019	25	012885528FLE	NONE	WT02	NA
1282936-1	Contaminated Grease	01/17/2019	167	011776126FLE	NONE	WT02	NA
CH1786528	Consolidated Acids	02/18/2019	132	012884952FLE	D002	NA	NA
CH1786533	Flammable acids	02/18/2019	135	012884952FLE	D001, D002	NA	NA
LCCRA	Labpack Acid & Acid Compatibles For Incineration	02/18/2019	30	012884952FLE	D002	WT02	NA
LCCRA	Labpack Acid & Acid Compatibles For Incineration	02/18/2019	22	012884952FLE	D001, D002	WT02	NA
LCCRA	Labpack Acid & Acid Compatibles For Incineration	02/18/2019	6	012884952FLE	D002	WT02	NA
LCCRB	Labpack Basic & Basic Compatibles For Incineration	02/18/2019	60	012884952FLE	D002	WT02	NA
LCCRC	Labpack Organics For Incineration	02/18/2019	37	012884952FLE	NONE	WT02	NA
LCCRO	Labpack Oxidizers For Incineration	02/18/2019	7	012884952FLE	D001, D003	WT02	NA
ES1785848	Pit Cleaning Sludge	02/18/2019	8457	012886241FLE	D004,D007,D008	NA	NA
ES1785845	Pit Cleaning Sludge	02/18/2019	2788	012886241FLE	D006,D007,D008	NA	NA
ES1785848	Pit Cleaning Sludge	03/15/2019	8418	012886248FLE	D004,D007,D008	NA	NA
ES1785848	Pit Cleaning Sludge	03/15/2019	10841	012886264FLE	D004,D007,D008	NA	NA
ES1795989	Ring Mill Coolant - Antifreeze	03/22/2019	9988	012886287FLE	NONE	WT02	NA
ES1785848	Pit Cleaning Sludge	05/03/2019	9851	012886309FLE	D004,D007,D008	NA	NA
ES1785848	Pit Cleaning Sludge	05/03/2019	2865	012886328FLE	D004,D007,D008	NA	NA
OR329284	Pit Cleaning Sludge	05/08/2019	8500	011968468FLE	D004,D007,D008	NA	NA
OR329284	Pit Cleaning Sludge	05/17/2019	12780	011961581FLE	D004,D007,D008	NA	NA
OR329284	Pit Cleaning Sludge	05/17/2019	3060	011961582FLE	D004,D007,D008	NA	NA
OR340979	Vault Sludge	05/20/2019	10000	012886361FLE	NONE	WP02, WT02	NA
OR329284	Pit Cleaning Sludge	05/23/2019	16160	011961597FLE	D004,D007,D008	NA	NA
ES1785848	Pit Cleaning Sludge	05/31/2019	17976	012886371FLE	D004,D007,D008	NA	NA
ES1785848	Pit Cleaning Sludge	06/03/2019	7719	012886372FLE	D004,D007,D008	NA	NA
ES1795989	Ring Mill Coolant - Antifreeze	06/12/2019	1260	012886377FLE	NONE	WT02	NA
OR340979	Vault Sludge	06/25/2019	10960	012886384FLE	NONE	WP02, WT02	NA
OR340979	Vault Sludge	06/25/2019	1080	012886385FLE	NONE	WP02, WT02	NA
OR340979	Vault Sludge	06/26/2019	39660	011968520FLE	NONE	WP02, WT02	NA
OR340979	Vault Sludge	06/26/2019	33580	011968521FLE	NONE	WP02, WT02	NA
OR340979	Vault Sludge	07/10/2019	53120	020246762JJK	NONE	WP02, WT02	NA
1877983	Echogel - Unused	08/02/2019	554	011968578FLE	NONE	WT02	NA
1883817	Echogel - Used	08/02/2019	2946	011968578FLE	NONE	WT02	NA
ES1785848	Pit Cleaning Sludge	08/06/2019	12786	012886399FLE	D004,D007,D008	NA	NA
OR329284	Pit Cleaning Sludge	09/12/2019	15820	011961788FLE	D004,D007,D008	NA	NA
LCCRA	Labpack Acid & Acid Compatibles For Incineration	10/11/2019	252	013867363FLE	D001, D002	NA	NA
LCCRB	Labpack Basic & Basic Compatibles For Incineration	10/11/2019	200	013867363FLE	D002	NA	NA
OR343220	Oil Tank Cleaning Sludge	11/06/2019	19160	012886418FLE	NONE	WT02	NA
49312	Area-wide Dust	11/18/2019	63320	012886445FLE	NONE	WT02	NA
49312	Area-wide Dust	11/19/2019	64780	012886444FLE	NONE	WT02	NA
49312	Area-wide Dust	11/21/2019	63020	012886471FLE	NONE	WT02	NA
49312	Area-wide Dust	11/21/2019	63000	012886472FLE	NONE	WT02	NA
49312	Area-wide Dust	11/25/2019	61380	012886473FLE	NONE	WT02	NA
49312	Area-wide Dust	11/25/2019	64320	012886474FLE	NONE	WT02	NA
49312	Area-wide Dust	12/03/2019	62000	012886475FLE	NONE	WT02	NA
49312	Area-wide Dust	12/03/2019	64000	012886476FLE	NONE	WT02	NA
49312	Area-wide Dust	12/05/2019	62000	012886477FLE	NONE	WT02	NA
49312	Area-wide Dust	12/05/2019	64000	012886478FLE	NONE	WT02	NA
49312	Area-wide Dust	12/09/2019	62000	012886479FLE	NONE	WT02	NA
49312	Area-wide Dust	12/09/2019	62000	012886480FLE	NONE	WT02	NA
49312	Area-wide Dust	12/09/2019	64000	012886481FLE	NONE	WT02	NA
49312	Area-wide Dust	12/10/2019	62000	012886482FLE	NONE	WT02	NA
49312	Area-wide Dust	12/11/2019	62000	012886483FLE	NONE	WT02	NA
49312	Area-wide Dust	12/11/2019	62000	012886484FLE	NONE	WT02	NA
49312	Area-wide Dust	12/11/2019	64000	012886485FLE	NONE	WT02	NA
49312	Area-wide Dust	12/12/2019	62000	012886486FLE	NONE	WT02	NA
49312	Area-wide Dust	12/13/2019	63020	012886487FLE	NONE	WT02	NA
49312	Area-wide Dust	12/13/2019	64000	012886488FLE	NONE	WT02	NA
49312	Area-wide Dust	12/15/2019	62000	012886491FLE	NONE	WT02	NA
49312	Area-wide Dust	12/16/2019	64000	012886489FLE	NONE	WT02	NA
49312	Area-wide Dust	12/16/2019	62000	012886490FLE	NONE	WT02	NA
49312	Area-wide Dust	12/17/2019	64000	012886492FLE	NONE	WT02	NA
49312	Area-wide Dust	12/18/2019	63000	012886493FLE	NONE	WT02	NA
49312	Area-wide Dust	12/18/2019	62000	012886494FLE	NONE	WT02	NA
49312	Area-wide Dust	12/19/2019	62000	012886495FLE	NONE	WT02	NA
49312	Area-wide Dust	12/19/2019	64000	012886509FLE	NONE	WT02	NA
49312	Area-wide Dust	12/20/2019	64000	012886500FLE	NONE	WT02	NA
49312	Area-wide Dust	12/20/2019	62000	012886501FLE	NONE	WT02	NA
49312	Area-wide Dust	12/20/2019	62000	012886502FLE	NONE	WT02	NA
49312	Area-wide Dust	01/08/2020	62740	012886503FLE	NONE	WT02	NA
49312	Area-wide Dust	01/30/2020	60560	012886504FLE	NONE	WT02	NA
49312	Area-wide Dust	02/10/2020	61460	012886505FLE	NONE	WT02	NA
49312	Area-wide Dust	02/10/2020	61100	012886506FLE	NONE	WT02	NA
OR344535	Baghouse Dust	02/10/2020	19760	014224090FLE	K061	NA	NA
OR343941	AOD pit Solids	02/11/2020	34260	014224089FLE	D007	NA	NA
OR343941	AOD pit Solids	02/11/2020	21660	014224091FLE	D007	NA	NA
49312	Area-wide Dust	02/12/2020	62780	012886507FLE	NONE	WT02	NA

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TABLE - 1
Star Forge, LLC
Hazardous Waste Shipments from Overall Facility Closure
2018 - 2024

Profile #	Waste Description	Shipment Date	Shipment Weight (lbs)	Manifest #	Hazardous Waste Code	Dangerous Waste Code	TSCA
49312	Area-wide Dust	02/13/2020	62220	012886508FLE	NONE	WT02	NA
OR344529	Baghouse Dust/Debris	02/17/2020	4440	013537409FLE	K061	NA	NA
OR344529	Baghouse Dust/Debris	02/17/2020	3880	013537410FLE	K061	NA	NA
OR344529	Baghouse Dust/Debris	02/17/2020	2840	013537411FLE	K061	NA	NA
OR344535	Baghouse Dust	02/25/2020	20620	013537408FLE	K061	NA	NA
49312	Area-wide Dust	02/27/2020	63500	012886511FLE	NONE	WT02	NA
OR344529	Baghouse Dust/Debris	03/12/2020	4220	013537460FLE	K061	NA	NA
OR344341	Stormwater Treatment Tank Sludge	03/19/2020	48900	012886530FLE	D007, D008	NA	NA
49312	Area-wide Dust	03/31/2020	20700	012886541FLE	NONE	WT02	NA
49312	Area-wide Dust	03/31/2020	27020	012886544FLE	NONE	WT02	NA
49312	Area-wide Dust	03/31/2020	16600	012886545FLE	NONE	WT02	NA
49312	Area-wide Dust	03/31/2020	20860	012886546FLE	NONE	WT02	NA
49312	Area-wide Dust	03/31/2020	21480	012886551FLE	NONE	WT02	NA
CH1997101	Paint chips/Dust/Sandblast media	04/01/2020	180	014582446FLE	D005, D006, D007, D008	NA	NA
ES1785848	Pit Cleaning Sludge	04/01/2020	400	014582446FLE	D004,D007,D008	NA	NA
ES1785848	Pit Cleaning Sludge	04/01/2020	400	014582446FLE	D004,D007,D008	NA	NA
ES1785848	Pit Cleaning Sludge	04/01/2020	400	014582446FLE	D004,D007,D008	NA	NA
CH1997777	Safety Klean Cleaning Solvent	04/01/2020	190	014582447FLE	D001, D039	NA	NA
CH1997727	Salt Rock	04/01/2020	400	014582446FLE	D004, D005, D006, D007, D008, D010	NA	NA
CH1997099	Oil Based Paint	04/02/2020	120	014582452FLE	D001, D005, D006, D007, D008, D011, D035	NA	NA
ES1785848	Pit Cleaning Sludge	04/02/2020	600	014582453FLE	D004,D007,D008	NA	NA
ES1785848	Pit Cleaning Sludge	04/02/2020	600	014582453FLE	D004,D007,D008	NA	NA
ES1785848	Pit Cleaning Sludge	04/02/2020	600	014582453FLE	D004,D007,D008	NA	NA
49312	Area-wide Dust	04/20/2020	11580	012886243FLE	NONE	WT02	NA
OR344535	Baghouse Dust	04/28/2020	31660	008281988FLE	K061	NA	NA
OR344535	Baghouse Dust	04/28/2020	31500	008281990FLE	K061	NA	NA
CH2030655	Filter Cleaning Wash Water contaminated with Baghouse Dust	06/18/2020	8650	014587860FLE	K061, D007	NA	NA
CH344529	Baghouse Dust/Debris	06/18/2020	700	014587861FLE	K061	NA	NA
OR345145	Baghouse Decon Water	06/29/2020	375	020121293JJK	K061	NA	NA
OR345146	Baghouse Dust	06/29/2020	5000	020121293JJK	K061	NA	NA
OR345148	Baghouse Debris	06/29/2020	600	020121293JJK	K061	NA	NA
OR345688	Spill cleanup debris from vandalized transformer	09/25/2020	220	021751122JJK	NONE	NONE	PCB
OR346417	Lithium Grease	02/19/2021	30	021751223JJK	NONE	WT02	NA
OR346415	Hydrochloric Acid	02/19/2021	25	021751223JJK	D002	NA	NA
OR350784	Non-Fluorinated AFFF	06/14/2022	667	023708599JJK	NONE	WP02	NA
OR350789	AFFF contaminated Debris Disposal of Non-flourinated AFFF vessels.	06/16/2022	2080	023708603JJK	NONE	WP02	NA
OR350974	Catch Basin Solids Waste	06/24/2022	1914	023708607JJK	NONE	NONE	PCB
OR356878	Lead Paint Chips - Oil Shed Demo	10/20/2023	950	023708954JJK	D008	NA	NA
OR350947	Spill cleanup debris from vandalized transformer	10/20/2023	1584	023708954JJK	NONE	NONE	PCB
OR356878	Lead Paint Chips	10/20/2023	950	023708954JJK	D008	NA	NA
OR356857	Tote Storage Building Demolition	10/24/2023	57,380.00	023708958JJK	NONE	NONE	PCB
OR356857	Tote Storage Building Demolition	10/24/2023	57,840.00	023708959JJK	NONE	NONE	PCB
OR356857	Tote Storage Building Demolition	10/24/2023	44,900.00	023708960JJK	NONE	NONE	PCB
OR356857	Tote Storage Building Demolition	10/24/2023	35,220.00	023708961JJK	NONE	NONE	PCB
OR356547	K061 Debris	10/25/2023	5400	023708963JJK	K061	NA	NA
OR356547	K061 Debris	11/21/2023	41860	023708972JJK	K061	NA	NA
OR356547	K061 Debris	11/21/2023	38900	023708973JJK	K061	NA	NA
OR356547	K061 Debris	12/07/2023	47320	023708986JJK	K061	NA	NA
OR356547	K061 Debris	12/07/2023	7480	023708987JJK	K061	NA	NA
OR356547	K061 Debris	12/07/2023	28940	023708988JJK	K061	NA	NA
OR356547	K061 Debris	12/07/2023	9320	023708989JJK	K061	NA	NA
OR356547	K061 Debris	12/07/2023	31880	023709000JJK	K061	NA	NA
OR357669	Lime Decon water	12/11/2023	4000	023708907JJK	D002	NA	NA
OR357533	Lead Debris	12/14/2023	37120	025895501JJK	D008	NA	NA
OR357533	Lead Debris	12/14/2023	50840	025895502JJK	D008	NA	NA
OR357533	Lead Debris	12/14/2023	36880	025895505JJK	D008	NA	NA
OR357533	Lead Debris	12/14/2023	48980	025895506JJK	D008	NA	NA
OR357533	Lead Debris	12/14/2023	35540	025895507JJK	D008	NA	NA
OR357535	Lime Debris	12/14/2023	18280	025895512JJK	NONE	WSC2, WT02	NA
OR357535	Lime Debris	12/14/2023	19100	025895513JJK	NONE	WSC2, WT02	NA
OR357535	Lime Debris	12/14/2023	12180	025895514JJK	NONE	WSC2, WT02	NA
OR357535	Lime Debris	12/14/2023	31600	025895515JJK	NONE	WSC2, WT02	NA
OR357535	Lime Debris	12/14/2023	30220	025895516JJK	NONE	WSC2, WT02	NA
OR357535	Lime Debris	12/14/2023	32890	025895517JJK	NONE	WSC2, WT02	NA
OR357535	Lime Debris	12/14/2023	26000	025895518JJK	NONE	WSC2, WT02	NA
OR357535	Lime Debris	12/14/2023	19110	025895519JJK	NONE	WSC2, WT02	NA
OR357533	Lead Debris	12/15/2023	24780	025895508JJK	D008	NA	NA
OR357562	K061 decon water	12/18/2023	2200	025895530JJK	K061	NA	NA
OR357562	K061 decon water	12/18/2023	150	025895530JJK	K061	NA	NA
OR357799	Debris from cleanup of vandalized transformer	12/27/2023	57140	018614506FLE	NONE	NONE	PCB
OR357799	Debris from cleanup of vandalized transformer	12/27/2023	45360	018614507FLE	NONE	NONE	PCB
OR357799	Debris from cleanup of vandalized transformer	12/27/2023	46380	018614508FLE	NONE	NONE	PCB
OR357799	Debris from cleanup of vandalized transformer	12/27/2023	54100	018614509FLE	NONE	NONE	PCB
OR357930	PCB impacted soil discovered during demo of Powerhouse	01/11/2024	52820	017543360JJK	NONE	NONE	PCB
OR357930	PCB impacted soil discovered during demo of Powerhouse	01/11/2024	56820	017543361JJK	NONE	NONE	PCB
OR357930	PCB impacted soil discovered during demo of Powerhouse	01/22/2024	64940	025895556JJK	NONE	NONE	PCB
OR357930	PCB impacted soil discovered during demo of Powerhouse	01/22/2024	57600	025895557JJK	NONE	NONE	PCB
OR347800	Drained TSCA Transformer Carcass Disposal	01/24/2024	2240	025895525JJK	NONE	NONE	PCB
OR358045	Drained non-TSCA Transformer Carcass Disposal	01/24/2024	16530	025895526JJK	NONE	NONE	PCB
OR357930	PCB impacted soil discovered during demo of Powerhouse	01/30/2024	60152.4	025895550JJK	NONE	NONE	PCB
OR357930	PCB impacted soil discovered during demo of Powerhouse	01/30/2024	60280	025895553JJK	NONE	NONE	PCB
OR357533	Lead Debris	02/01/2024	34160	025895511JJK	D008	NA	NA
OR357930	PCB impacted soil discovered during demo of Powerhouse	02/01/2024	34440	025895551JJK	NONE	NONE	PCB
OR357930	PCB impacted soil discovered during demo of Powerhouse	02/01/2024	35120	025895552JJK	NONE	NONE	PCB
OR357533	Lead Debris	02/23/2024	23860	025895503JJK	D008	NA	NA
OR357533	Lead Debris	02/23/2024	33660	025895504JJK	D008	NA	NA
OR357533	Lead Debris	02/23/2024	31640	025895510JJK	D008	NA	NA
OR357533	Lead Debris	03/04/2024	25161	025895600JJK	D008	NA	NA
OR357533	Lead Debris	03/04/2024	23570	025895601JJK	D008	NA	NA

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DH Environmental Inc

VICINITY MAP

Former Jorgensen Forge Facility 8531 E. Marginal Way S. Tukwila, Washington	05-22-2020	Figure 1

LEGEND

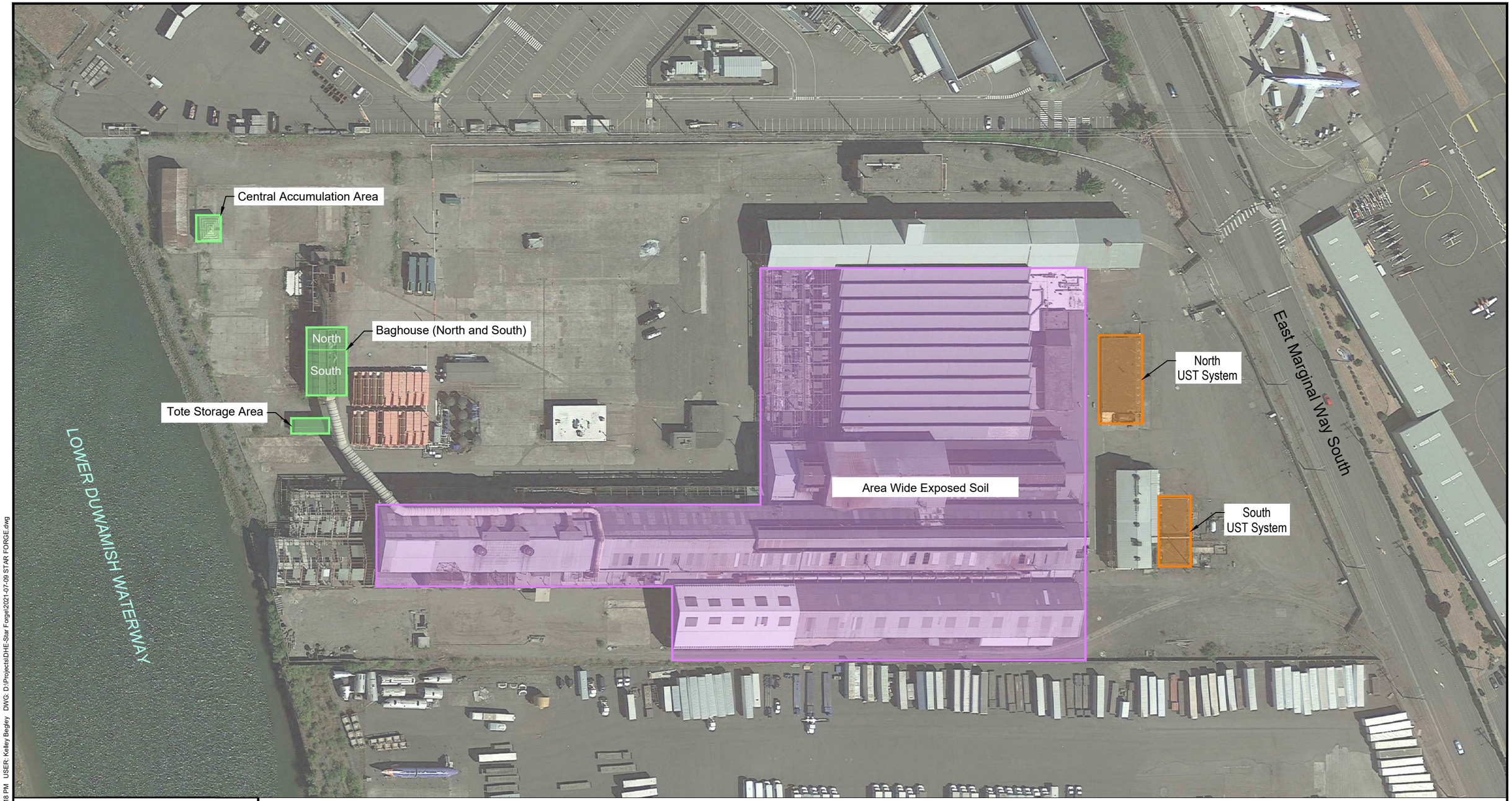
Property Location

N

Background Images Source: Google Earth Pro 5/26/2018

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Interim Action Work Areas

Former Jorgensen Forge Facility 8531 E. Marginal Way S. Tukwila, WA, 98108	07/12/2021	Figure 2

Legend

- Former Dangerous Waste Management Units
- Underground Storage Tank Systems
- Area Wide Interior Soil and Dust

Note:

1. Aerial Photography Source: Google Earth Pro, 08/14/2020.

N

0 60 120

Scale in Feet

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PLOT TIME: 7/12/2021 2:19 PM MOD TIME: 7/12/2021 2:18 PM USER: Kelley Begley DWG: D:\Projects\DHE-Star Forge\2021-07-09 STAR FORGE.dwg

Dangerous Waste Management Unit Closure Documentation Form

Dangerous Waste Generators

1 Facility Information

Facility Name	Former Jorgensen Forge Facility
Address	8531 East Marginal Way South Tukwila, WA 98108
DWMU Name/Identifier	Central Accumulation Area (CAA)
RCRA ID Number	WAD000602813
Facility History, Function, Location and Layout	The Former Jorgensen Forge Facility was in operation by multiple owners from 1942-2017. The facility fabricated and manufactured structural steel, tractor, and road equipment, as well as large-scale metal parts for the aircraft and marine industries, including open die steel forgings and rolled aluminum rings. The facility also processed nickel, titanium, and specialized alloys.
Generator Status	Large Quantity Generator
Reason for Closure	Facility Operations Ceased Operations in 2018
DWMU Closure Date	August 31st, 2023

2 Dangerous Waste Management Unit Information

Unit Description	The CAA was an approximately 1,000 SF structure with aluminum siding, a concrete slab, and an approximately 1 ft. concrete base wall that served as secondary containment. The CAA stored Dangerous Waste in drums and small containers generated from facility maintenance and operations.
Location	Figure 1 of shows a vicinity map, and Figure 2 shows the Site Map with locations of the Dangerous Waste Management Units.
Waste Managed at the DWMU	Although the entire history of waste operations at the CAA is unknown, based on statements from former facility staff and review of annual reports, the Dangerous Waste accumulated in the CAA DWMU was primarily facility maintenance waste such as paint related material, solvents, lubricants, and investigation derived waste from environmental investigations.
Applicable Waste Codes	D001, D035, D002, D007, D008, WT02, WP02 (not all inclusive)

3 Closure Performance Standard

WAC 173-303-200(h)

i) All dangerous waste and dangerous waste residues must be removed from the containment system. Remaining containers, liners, base, and soil containing or contaminated with dangerous waste or dangerous waste residues must be decontaminated or removed.

ii) In addition, such a generator is exempt from all the requirements in WAC 173-303-610 and 173-303-620, except for WAC 173-303-610(2) and (5).

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Dangerous Waste Management Unit Closure Documentation Form

Dangerous Waste Generators

4 Closure Activities

As discussed in the July 2020 interim Clean Closure Report, due to visual staining of the concrete inside the CAA, an attempt to decontaminate the concrete was made using high pressure steam and water sprays. However, subsequent sampling revealed the concrete still exceeded MTCA Method A, Unrestricted, for Diesel Range Organics. Consequently, it was written into the Interim Action Workplan that the concrete would be removed, designated, and disposed of off-site, and the underlying soil would be sampled for Diesel Range Organics in accordance with the IAWP Sampling and Analysis Plan to determine if any excavation of underlying soil would be necessary to achieve Clean Closure of this DWMU. August 2023, the CAA was demolished, and the underlying soil Diesel Range Organics concentrations were found to be below MTCA Method A unrestricted levels. After backfilling the footprint of the CAA with approved and tested clean fill (crushed rock), the CAA was determined to have met all Clean Closure standards in accordance with WAC 173-303-610(2) and (5). Figure CAA-1 shows the confirmation sample locations and Table CAA-1 provides the summary table of the confirmation results.

All samples were transported to OnSite Environmental of Redmond, WA for laboratory analysis following standard chain of custody procedures. OnSite Environmental is a WA State laboratory accredited in accordance with WAC 173-50. Each sample area was analyzed by the following test methods in accordance with the IAWP Sampling and Analysis Plan:

- Diesel Range Organics by NWTPH-Dx

4 Closure Status

The following closure criteria for the Central Accumulation Area DWMU have been met:

☒ All Dangerous Waste has been removed from the DWMU and disposed of off-site

☒ Remaining containers, liners, base, and soil containing or contaminated with dangerous waste or dangerous waste residues have been decontaminated or removed.

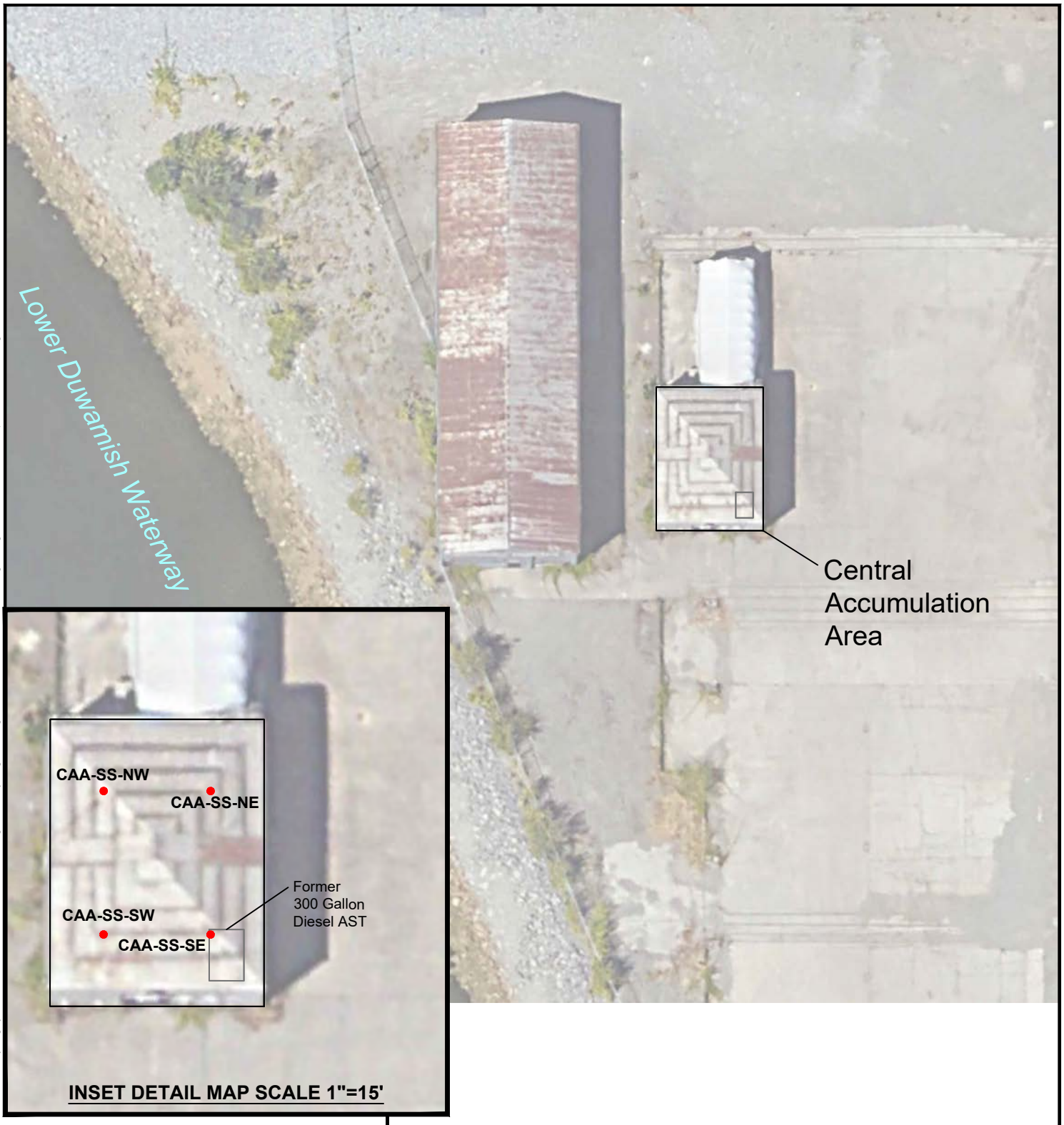
☒ The underlying soil has been sampled and evaluated against MTCA Method A or B unrestricted use exposure assumptions in accordance with WAC 173-303-610(2)(b), and the results indicate the contaminant concentrations are below action levels/cleanup levels.

As of 8/31/2023, the Central Accumulation Area Clean Closure requirements have been met.

The following attached documents support documentation of the Central Accumulation Area Clean Closure completion status.

- Figure CAA-1
- Table CAA-1
- CAA Photo Log
- OnSite Environmental Laboratory Report 2308-281

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INSET DETAIL MAP SCALE 1"=15'

DANGEROUS WASTE CENTRAL ACCUMULATION AREA SAMPLE LOCATIONS

Former Jorgensen Forge Facility 8531 East Marginal Way S Tukwila, WA, 98108	01-12-2024	**Figure CAA-1**

LEGEND

- Waste Designation Sample Location

N

0 15 30

Scale in Feet

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PLOT TIME: 1/26/2024 2:34 PM MOD TIME: 1/26/2024 11:49 AM USER: Kelley Begley DWG: P:\DH Environmental\Site\Star Forge-Formerly Jorgensen\Figures\2024-01\DH 2024-01 Star Forge Dangerous Waste Central sample locations info.dwg

Table CAA-1
CAA DWMU Sample Location Data Summary
Former Jorgnensen Forge Final Clean Closure Report
Star Forge, LLC

	Central Accumulation Area DWMU				
Sample ID	CAA-SS-NW-0.25-082423	CAA-SS-NE-0.25-082423	CAA-SS-SW-0.25-082423	CAA-SS-SE-0.25-082423	CAA-SS-DUP-1-082423
Analyte					
Petroleum Hydrocarbons (mg/kg)					
Diesel Range Organics	ND (PQL 26)	790	ND (PQL 27)	87	ND (PQL 27)
Lube Oil Range Organics	93	410	220	340	290

Notes:
1. All samples were below the MTCA Method A Unrestricted cleanup level of 2,000 mg/kg.

Abbreviations
ID = Identification
ND = Non-Detect at the PQL
NA = Not Analysed
PQL = Practical Quantitation Limit

Analytical Methods
NWTPH-DX Analysis by OnSite Environmental, Inc., see lab report # 2308-281

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Dangerous Waste Management Unit Closure Documentation
Former Jorgensen Forge Facility
CAA Photo Log



Photo CAA-01: Facing West, Pre-Demolition Photo of the CAA (forefront building)
Date Taken: 8/24/2023



Photo CAA-02: Facing South, Slab Demolition Photo of the CAA
Date Taken: 8/24/2023



Photo CAA-03: Facing Southwest, Photo of the CAA sub-slab soil
Date Taken: 8/24/2023



Photo CAA-04: Facing Southwest, Photo of the CAA, backfilled and closure completed
Date Taken: 4/23/2024

Dangerous Waste Management Unit Closure Documentation Form

Dangerous Waste Generators

1 Facility Information

Facility Name	Former Jorgensen Forge Facility
Address	8531 East Marginal Way South Tukwila, WA 98108
DWMU Name/Identifier	Tote Storage Area
RCRA ID Number	WAD000602813
Facility History, Function, Location and Layout	The Former Jorgensen Forge Facility was in operation by multiple owners from 1942-2017. The facility fabricated and manufactured structural steel, tractor, and road equipment, as well as large-scale metal parts for the aircraft and marine industries, including open die steel forgings and rolled aluminum rings. The facility also processed nickel, titanium, and specialized alloys.
Generator Status	Large Quantity Generator
Reason for Closure	Facility Operations Ceased Operations in 2018
DWMU Closure Date	10/26/2023

2 Dangerous Waste Management Unit Information

Unit Description	The Tote Storage Area was a 90/180-day Dangerous Waste accumulation area located on the west side of the site. The Tote Storage Area was an approximately 800 SF structure with wooden siding and an asphalt slab. The Tote Storage Area stored Dangerous Waste and used oil totes and drums generated from facility maintenance and operations. Based on historical documents and statements from former facility staff, the structure at one time was used to clean and etch product samples prior to laboratory testing. Subsequently, the structure was also known as the "Acid House" or "Etch House" before it was used as a 90/180-day Dangerous Waste accumulation area in the 1990s.
Location	The Tote Storage was located on the west side of the property just south of the Baghouse. Figure 1 of the Final Clean Closure Report shows a vicinity map, and Figure 2 shows the Site Map with locations of the Dangerous Waste Management Units.
Waste Managed at the DWMU	Although the entire history of waste operations at the Tote Storage Area is unknown, based on statements from former facility staff and review of annual reports, the Dangerous Waste accumulated in the Tote Storage Area DWMU was primarily facility maintenance rinsewaters, oils, and investigation derived waste.
Applicable Waste Codes	D007, D008, K061, and TSCA Regulated Waste

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Dangerous Waste Management Unit Closure Documentation Form

Dangerous Waste Generators

3 Closure Performance Standard

WAC 173-303-200(h)

i) All dangerous waste and dangerous waste residues must be removed from the containment system. Remaining containers, liners, base, and soil containing or contaminated with dangerous waste or dangerous waste residues must be decontaminated or removed.

ii) In addition, such a generator is exempt from all the requirements in WAC 173-303-610 and 173-303-620, except for WAC 173-303-610(2) and (5).

4 Closure Activities

As discussed in the July 2020 interim Clean Closure Report, due to visual staining of the asphalt flooring inside the Tote Storage Area, an attempt to decontaminate the concrete was made using high pressure steam and water sprays. However, subsequent sampling revealed the concrete still exceeded MTCA Method A, Unrestricted, for Diesel Range Organics and PCBs. Consequently, it was written into the Interim Action Workplan that the concrete would be removed, designated, and disposed of off-site, and the underlying soil would be excavated down to applicable cleanup levels (2,000 mg/kg for Diesel Range Organics and 1 mg/kg for PCBs) and confirmation sampling would be conducted in accordance with the IAWP Sampling and Analysis Plan.

In October 2023, the Tote Storage Area DWMU was demolished. Due to PCBs detected in the Tote Storage Area structure paint, concrete, and underlying soil, all the demolition debris and underlying soil were designated as TSCA Remediation Waste (performance based) and was profiled into Chemical Waste Management in Arlington, OR for disposal. The structure and slab were demolished, and the underlying soil was excavated down to a maximum depth of approximately 2 feet below ground surface which resulted in off-site disposal of approximately 98 tons of soil/debris.

Confirmation samples of the underlying soil were collected in the areas shown in Figure TSA-1. All results confirmed that MTCA Method A cleanup levels for Diesel Range Organics and PCBs were achieved. The results are summarized in Table TSA-1. After backfilling the footprint of the Tote Storage Area with approved and tested clean fill (crushed rock), the Tote Storage Area was determined to have met all Clean Closure standards in accordance with WAC 173-303-610(2) and (5). The Tote Storage Area Photo Log provides additional closure documentation.

All samples were transported to OnSite Environmental of Redmond, WA for laboratory analysis following standard chain of custody procedures. OnSite Environmental is a WA State laboratory accredited in accordance with WAC 173-50. Each sample was analyzed by the following test methods in accordance with the IAWP Sampling and Analysis Plan:

- Diesel Range Organics by NWTPH-Dx
- PCBs by EPA 8082

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Dangerous Waste Management Unit Closure Documentation Form

Dangerous Waste Generators

4 Closure Status

The following closure criteria for the Tote Storage Area DWMU have been met:

☒ All Dangerous Waste has been removed from the DWMU and disposed of off-site

☒ Remaining containers, liners, base, and soil containing or contaminated with dangerous waste or dangerous waste residues have been decontaminated or removed.

☒ The underlying soil has been sampled and evaluated against MTCA Method A or B unrestricted use exposure assumptions in accordance with WAC 173-303-610(2)(b), and the results indicate the contaminant concentrations are below action levels/cleanup levels.

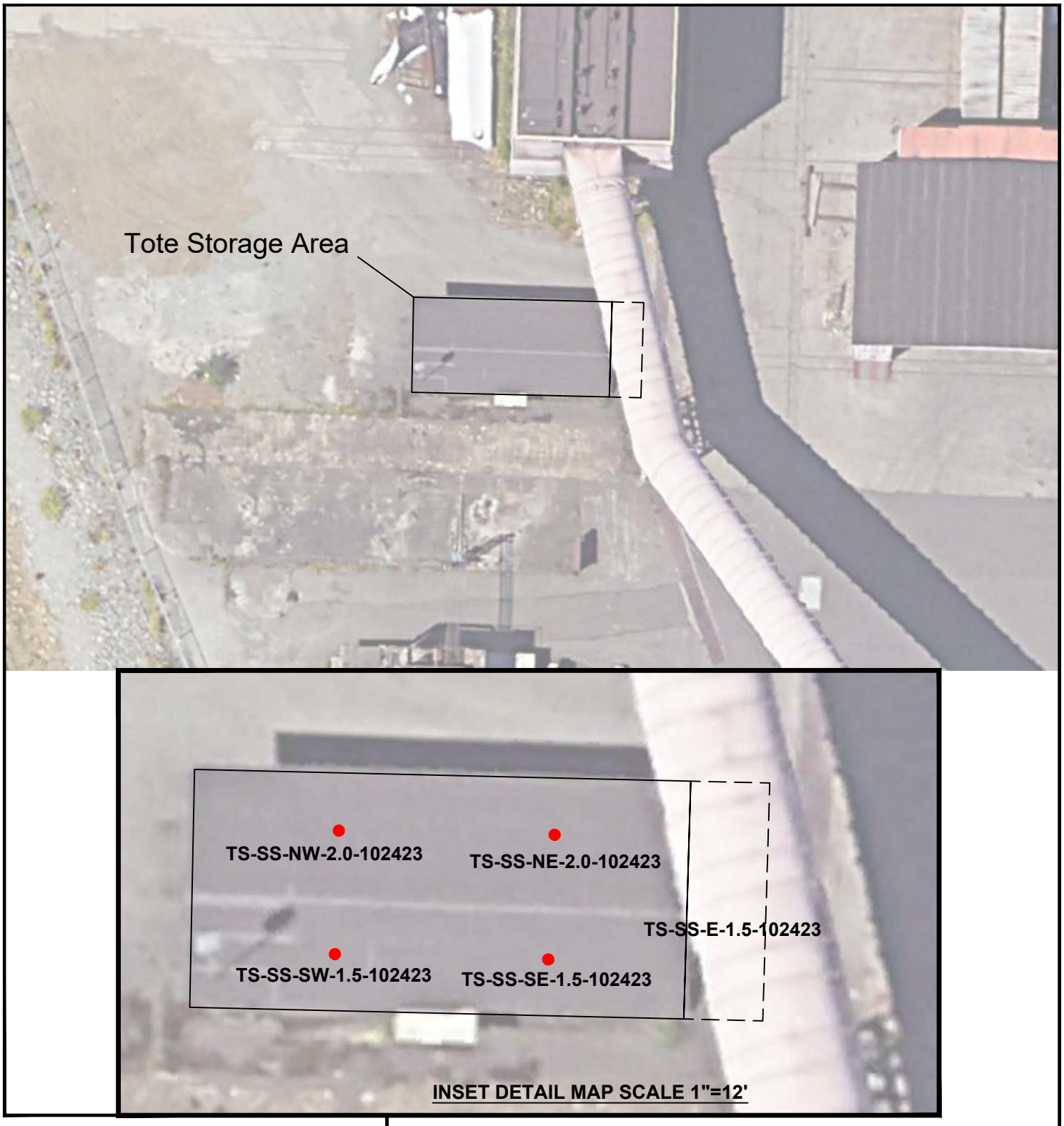
As of 10/26/2023, the Tote Storage Area Clean Closure requirements have been met.

The following attached documents support documentation of the Central Accumulation Area Clean Closure completion status.

- Figure TSA-1
- Table TSA-1
- Tote Storage Area Photo Log
- OnSite Environmental Laboratory Report 2310-277
- Off-site disposal records:

Profile #	Waste Description	Shipment Date	Shipment Weight (lbs)	Manifest #	Hazardous Waste Code	Dangerous Waste Code	TSCA Status
OR356857	Tote Storage Building Demolition	10/24/2023	57,380.00	023708958JJK	NONE	NONE	PCB Remediation Waste
OR356857	Tote Storage Building Demolition	10/24/2023	57,840.00	023708959JJK	NONE	NONE	PCB Remediation Waste
OR356857	Tote Storage Building Demolition	10/24/2023	44,900.00	023708960JJK	NONE	NONE	PCB Remediation Waste
OR356857	Tote Storage Building Demolition	10/24/2023	35,220.00	023708961JJK	NONE	NONE	PCB Remediation Waste
		Total	195,340	lbs			
			97.67	tons			

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TOTE STORAGE AREA CONFIRMATION SAMPLING

Former Jorgensen Forge Facility 8531 East Marginal Way S Tukwila, WA, 98108	01-26-2024	Figure TSA-01

LEGEND

- Tote Storage Area Confirmation Sample Location

N

0 15 30

Scale in Feet

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PLOT TIME: 1/26/2024 2:34 PM MOD TIME: 1/26/2024 1:10 PM USER: Kelley Begley DWG: P:\DH Environmental\Site\Star Forge-Formerly Jorgensen\Figures\2024-01\DH 2024-01 Star Forge Tote Storage Bldg.dwg

Table TSA-1
Tote Storage Area DWMU Sample Location Data Summary
Former Jorgnensen Forge Final Clean Closure Report
Star Forge, LLC

	Tote Storage Area					
Sample ID	**TS-Dup-1**	**TS-SS-NW-2.0-102423**	**TS-SS-NE-2.0-102423**	**TS-SS-SW-1.5-102423**	**TS-SS-SE-1.5-102423**	**TS-SS-E-1.5-102423**
Analyte						
Petroleum Hydrocarbons (mg/kg) by NWTPH-Dx						
Diesel Range Organics	**33**	**ND (PQL 27)**	**430**	**ND (PQL 26)**	**ND (PQL 26)**	**900**
Lube Oil Range Organics	**ND (PQL 53)**	**ND (PQL 53)**	**260**	**ND (PQL 52)**	**ND (PQL 52)**	**560**
Polychlorinated Biphenyls (mg/kg) by EPA 8082A	**0.063 Total**	**ND (PQL 0.053)**	**0.18 Total**	**ND (PQL 0.052)**	**ND (PQL 0.052)**	**0.36 Total**

Notes:

1. **All samples were below the MTCA Method A Unrestricted cleanup level of 2,000 mg/kg for Diesel Range Organics**
2. **All samples were below the MTCA Method A Unrestricted cleanup level of 1 mg/kg for Polychlorinated Biphenyls**

Abbreviations

ID = Identification
ND = Non-Detect at the PQL
NA = Not Analysed
PQL = Practical Quantitation Limit

Analytical Methods

NWTPH-DX and EPA 8082A Analysis by OnSite Environmental, Inc., see lab report # 2308-281

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Dangerous Waste Management Unit Closure Documentation
Former Jorgensen Forge Facility
Tote Storage Area Photo Log (Page 1)



Photo TSA-01: Facing West, Interior Photo of the CAA
Date Taken: 3/11/2019



Photo TSA-02: Facing Northeast, Active Demolition of the Tote Storage Area
Date Taken: 10/24/2023

Dangerous Waste Management Unit Closure Documentation
Former Jorgensen Forge Facility
Tote Storage Area Photo Log (Continued – Page 2)



Photo TSA-03: Facing West, Active Confirmation Sampling of Tote Storage Area Subsurface Soil
Date Taken: 8/24/2023

Dangerous Waste Management Unit Closure Documentation
Former Jorgensen Forge Facility
Tote Storage Area Photo Log (Continued – Page 3)



Photo TSA-04: Facing Waste, Backfilled Footprint of Tote Storage Area
Date Taken: 4/22/2024

Dangerous Waste Management Unit Closure Documentation Form

Dangerous Waste Generators

1 Facility Information

Facility Name	Former Jorgensen Forge Facility
Address	8531 East Marginal Way South Tukwila, WA 98108
DWMU Name/Identifier	Baghouse
RCRA ID Number	WAD000602813
Facility History, Function, Location and Layout	The Former Jorgensen Forge Facility was in operation by multiple owners from 1942-2017. The facility fabricated and manufactured structural steel, tractor, and road equipment, as well as large-scale metal parts for the aircraft and marine industries, including open die steel forgings and rolled aluminum rings. The facility also processed nickel, titanium, and specialized alloys.
Generator Status	Large Quantity Generator
Reason for Closure	Facility Operations Ceased Operations in 2018
DWMU Closure Date	11/21/23

2 Dangerous Waste Management Unit Information

Unit Description	The Baghouse building was primarily a steel structure with an approximately 4,000 SF footprint that housed equipment to capture and contain dust from the Baghouse tunnel that conveyed air and dust from the former melt shop to the Baghouse. The Baghouse processing area and concrete slab were divided by a wall thereby creating two separate areas denoted as 'Baghouse North' and 'Baghouse South' for the purposes of cleaning and sampling. For the purpose of Clean Closure, the Baghouse building, as well as approximately 550 feet of Baghouse duct (also referred to as the "Baghouse tunnel") which was comprised of steel duct, rubber gaskets, and flanges were subject to closure and the Clean Debris Standard as defined in the Alternative Treatment Standards for Hazardous Debris as established in 40 CFR 268.45 and described in Ecology's guidance[1]. The duct diameter ranged from approximately 2 feet to 12 feet. All Baghouse dust and debris that could not be decontaminated to meet the clean debris standard was designated as a K061 waste stream as it meets the definition of K061 Specific Source Waste from iron and steel sources in accordance with WAC 173-303-9904.
Location	The Baghouse and Baghouse processing area were located north of the west end of the facility and north of the Tote Storage Area. Figure 1 of the Final Clean Closure Report shows a vicinity map, and Figure 2 shows the Site Map with locations of the Dangerous Waste Management Units.
Waste Managed at the DWMU	Although the entire history of waste operations at the Baghouse is unknown, based on statements from former facility staff and review of annual reports, the Dangerous Waste accumulated in the Baghouse DWMU was primarily

[1] Washington State Department of Ecology, *Guidance for Clean Closure of Dangerous Waste Units and Facilities*, Publication No. 94111, Revised May 2005.

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	K061 dust and debris which was released from hoppers and placed in bulk containers (such as roll-off boxes) for off-site disposal.
Applicable Waste Codes	K061

3 Closure Performance Standard

WAC 173-303-200(h)
i) All dangerous waste and dangerous waste residues must be removed from the containment system. Remaining containers, liners, base, and soil containing or contaminated with dangerous waste or dangerous waste residues must be decontaminated or removed.

ii) In addition, such a generator is exempt from all the requirements in WAC 173-303-610 and 173-303-620, except for WAC 173-303-610(2) and (5).

4 Closure Activities

As discussed in the July 2020 interim Clean Closure Report, due to visual staining and suspected contamination of the Baghouse concrete slab, an attempt to decontaminate the concrete was made using high pressure steam and water sprays. However, subsequent sampling revealed the Baghouse North concrete slab still exceeded MTCA Method A, Unrestricted, for Diesel Range Organics and Hexavalent Chromium. Consequently, it was written into the Interim Action Workplan that the concrete would be removed, designated, and disposed of off-site, and the underlying soil would be sampled for Diesel Range Organics and Hexavalent Chromium in accordance with the IAWP Sampling and Analysis Plan to determine if any excavation of underlying soil would be necessary to achieve Clean Closure of this DWMU.

In November 2023, the Baghouse was demolished, and the Baghouse tunnel was cut by lift elevated crews with blowtorches and lowered to the ground using cranes and placed into exclusion zones for inspection and decontamination as described in the IAWP. All materials associated with the Baghouse were visually inspected to determine if the clean debris standards were met. If it was determined that the clean debris standards were not met, the ducting and other materials were decontaminated by a combination of “wet wiping”, scraping, and the use of a vacuum with HEPA filters. All media generated from removing the residual dust inside the duct was managed as K061 Hazardous Waste. The decontamination of the Baghouse media, along with disposal of materials that could not be reasonably decontaminated resulted in generation and disposal of approximately 106 tons of K061 Debris that was placed in 20-yard roll-off bins and shipped via rail Chemical Waste Management in Arlington, OR for macroencapsulation and disposal. In addition, approximately 282 gallons (2,350 lbs) of K061 designated water was generated from decontamination efforts.

As a conservative approach, prior to sampling the subsurface of the Baghouse slab, the top 6 inches of soil was “scraped” from the underlying soil from Baghouse slab footprint. Upon collection of samples of the underlying Baghouse North area, the soil Diesel Range Organics and Hexavalent Chromium concentrations were found to be below MTCA Method A unrestricted levels. After backfilling the footprint of the Baghouse with approved and tested clean fill (crushed rock), the Baghouse was determined to have met all Clean Closure standards in accordance with WAC 173-303-610(2) and (5). Figure BH-1 shows the confirmation sample locations and Table BH-1 provides the summary table of the confirmation results. The Baghouse Photo Log provides additional closure documentation.

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All samples were transported to OnSite Environmental of Redmond, WA for laboratory analysis following standard chain of custody procedures. OnSite Environmental is a WA State laboratory accredited in accordance with WAC 173-50. Each sample area was analyzed by the following test methods in accordance with the IAWP Sampling and Analysis Plan:

- Diesel Range Organics by NWTPH-Dx
- Hexavalent Chromium by EPA 7196A

4 Closure Status

The following closure criteria for the Baghouse DWMU have been met:

☒ All Dangerous Waste has been removed from the DWMU and disposed of off-site

☒ Remaining containers, liners, base, and soil containing or contaminated with dangerous waste or dangerous waste residues have been decontaminated or removed.

☒ The underlying soil has been sampled and evaluated against MTCA Method A or B unrestricted use exposure assumptions in accordance with WAC 173-303-610(2)(b), and the results indicate the contaminant concentrations are below action levels/cleanup levels.

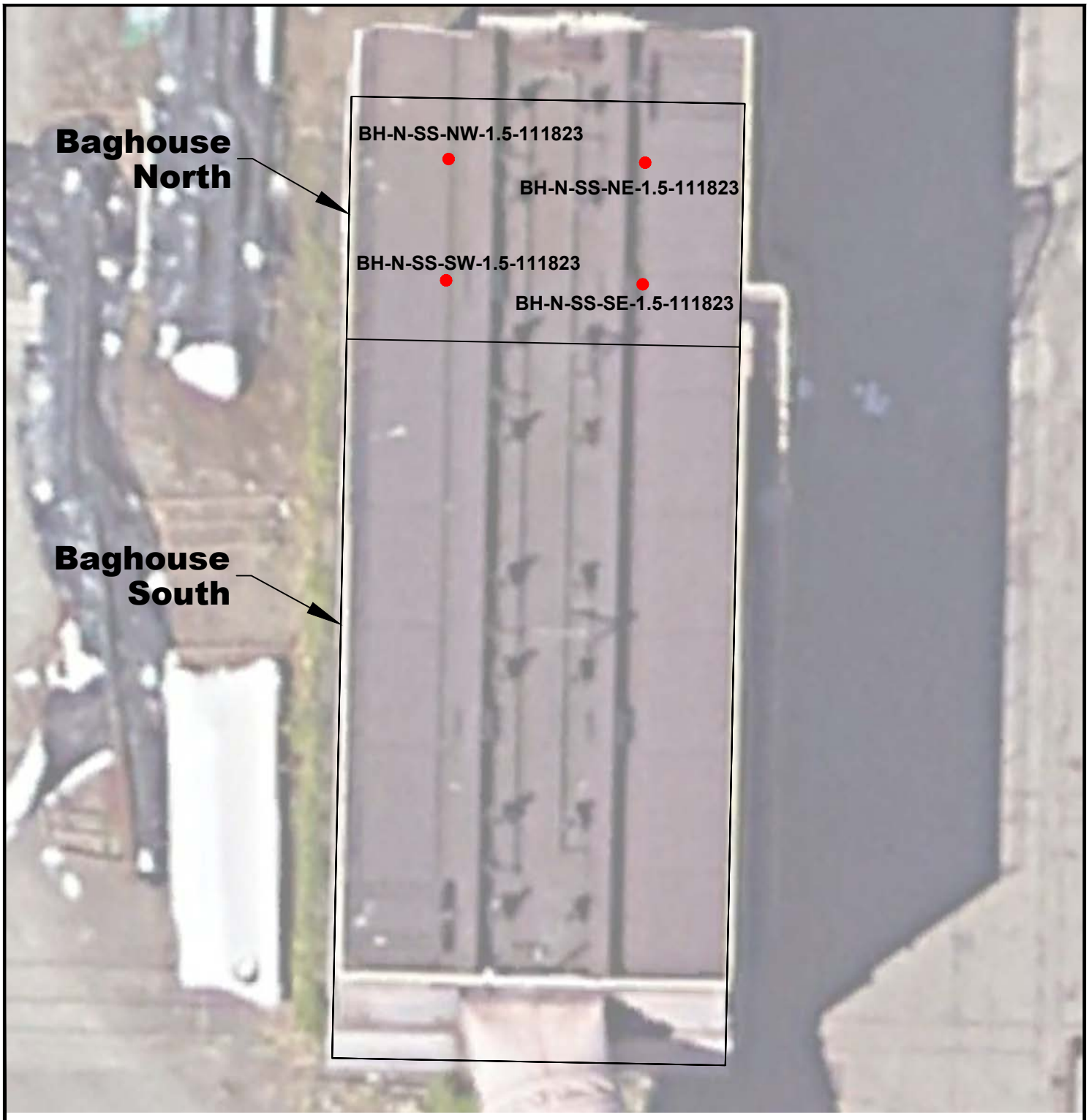
As of 11/21/2023, the Baghouse DWMU Clean Closure requirements have been met.

The following attached documents support documentation of the Baghouse Clean Closure completion status.

- Figure BH-1
- Table BH-1
- Baghouse Photo Log
- OnSite Environmental Laboratory Report 2311-212
- Off-site disposal records from IAWP related Clean Closure efforts:

Profile #	Waste Description	Shipment Date	Shipment Weight (lbs)	Manifest #	Hazardous Waste Code	Dangerous Waste Code	TSCA
OR356547	K061 Debris	10/25/2023	5,400	023708963JJK	K061	NA	NA
OR356547	K061 Debris	11/21/2023	41,860	023708972JJK	K061	NA	NA
OR356547	K061 Debris	11/21/2023	38,900	023708973JJK	K061	NA	NA
OR356547	K061 Debris	12/07/2023	47,320	023708986JJK	K061	NA	NA
OR356547	K061 Debris	12/07/2023	7,480	023708987JJK	K061	NA	NA
OR356547	K061 Debris	12/07/2023	28,940	023708988JJK	K061	NA	NA
OR356547	K061 Debris	12/07/2023	9,320	023708989JJK	K061	NA	NA
OR356547	K061 Debris	12/07/2023	31,880	023709000JJK	K061	NA	NA
OR357562	K061 decon water	12/18/2023	2,200	025895530JJK	K061	NA	NA
OR357562	K061 decon water	12/18/2023	150	025895530JJK	K061	NA	NA
		Total	213,450	lbs			
			106.73	tons			

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- Clean Closure Confirmation Sample Location

N

0 6 12

Scale in Feet

DH Environmental Inc

Baghouse North Sample Location Map

Former Jorgensen Forge Facility 8531 East Marginal Way S Tukwila, WA, 98108	01-12-2024	Figure BH-1

PLOT TIME: 1/26/2024 2:34 PM MOD TIME: 1/26/2024 12:19 PM USER: Kelley Begley DWG: P:\DH Environmental\Site\Star Forge-Formerly Jorgensen\Figures\2024-01\DH 2024-01 Star Forge Baghouse.dwg

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Table BH-1
Baghouse DWMU Sample Location Data Summary
Former Jorgnensen Forge Final Clean Closure Report
Star Forge, LLC

	Baghouse				
Sample ID	**BH-N-Dup-1**	**BH-N-SS-NW-1.5-111823**	**BH-N-SS-NE-1.5-111823**	**BH-N-SS-SW-1.5-111823**	**BH-N-SS-SE-1.5-111823**
Analyte					
Petroleum Hydrocarbons (mg/kg) by NWTPH-Dx					
Diesel Range Organics	**ND (PQL 58)**	**ND (PQL 29)**	**ND (PQL 29)**	**ND (PQL 43)**	**ND (PQL 58)**
Lube Oil Range Organics	**570**	**180**	**210**	**430**	**570**
Hexavalent Chromium by EPA 7196A	**ND (PGL 1.1)**	**2.8**	**ND (PQL 1.1)**	**1.4**	**ND (PQL 1.1)**

Notes:
1. All samples were below the MTCA Method A Unrestricted cleanup level of 2,000 mg/kg for Diesel Range Organics
2. All samples were below the MTCA Method A Unrestricted cleanup level of 19 mg/kg for Hexavalent Chromium

Abbreviations
ID = Identification
ND = Non-Detect at the PQL
NA = Not Analysed
PQL = Practical Quantitation Limit

Analytical Methods
NWTPH-DX and EPA 7196A Analysis by OnSite Environmental, Inc., see lab report # 2311-212

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Photo BH-01: Facing Southwest, Google Earth Aerial Image, August, 22nd, 2022

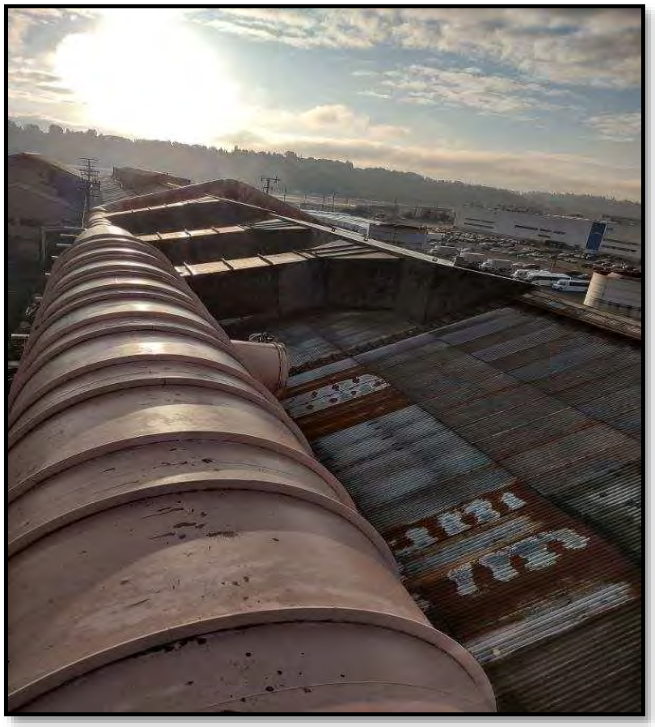


Photo BH-02: Facing East, Rooftop Image of Baghouse Tunnel Pre-Demolition
Photo Taken: 9/5/2023



Photo BH-03: Facing Southwest, Active Removal and Lowering of the Baghouse Tunnel
Photo Taken: 9/22/2023



Photo BH-04: Example of Residual Baghouse Dust in the Duct Interior Requiring Removal
Photo Taken: 9/21/2023

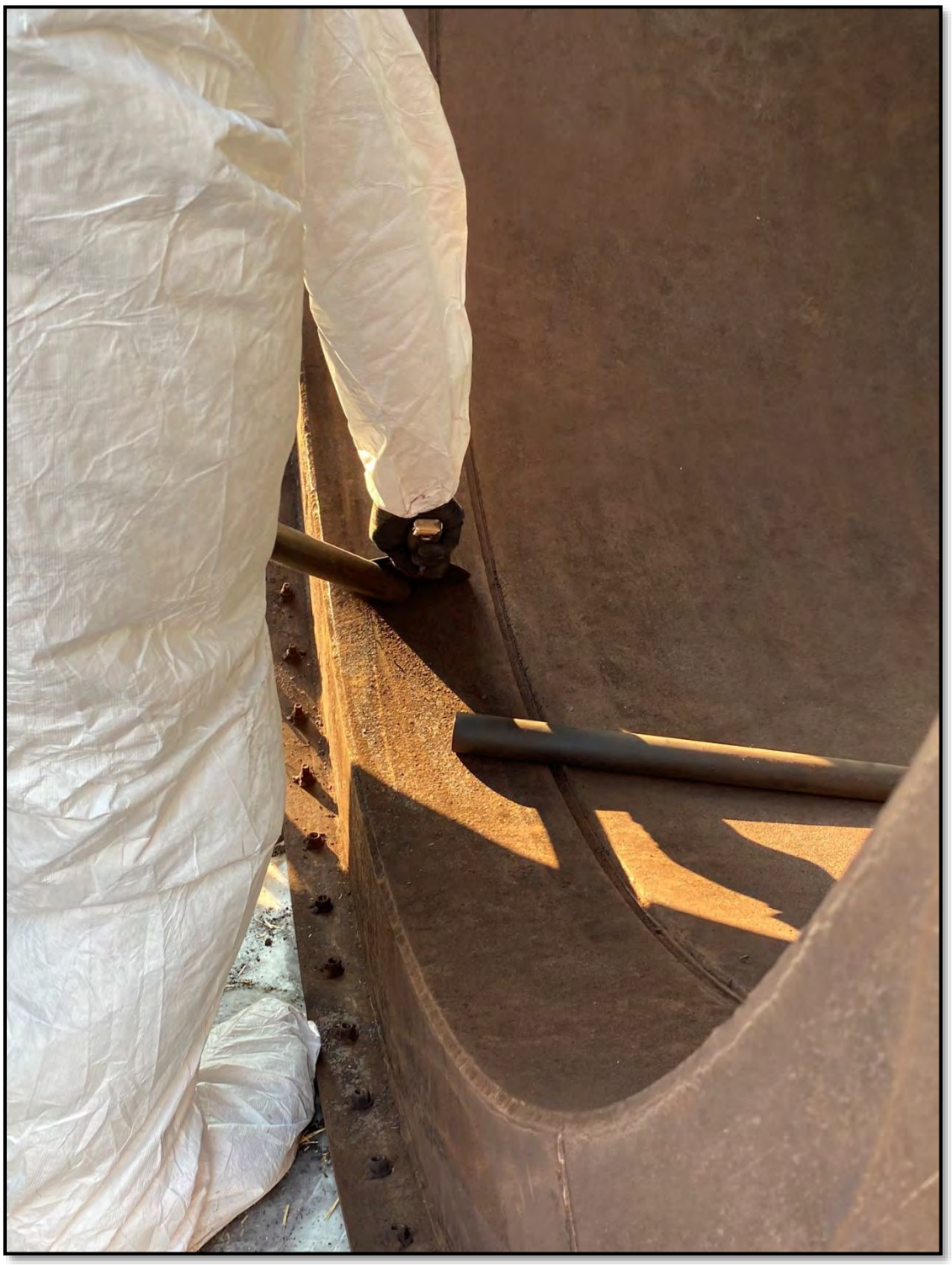


Photo BH-05: Active Scraping and Vacuum Removal of Baghouse Dust in the Duct Interior
Photo Taken: 9/22/2023

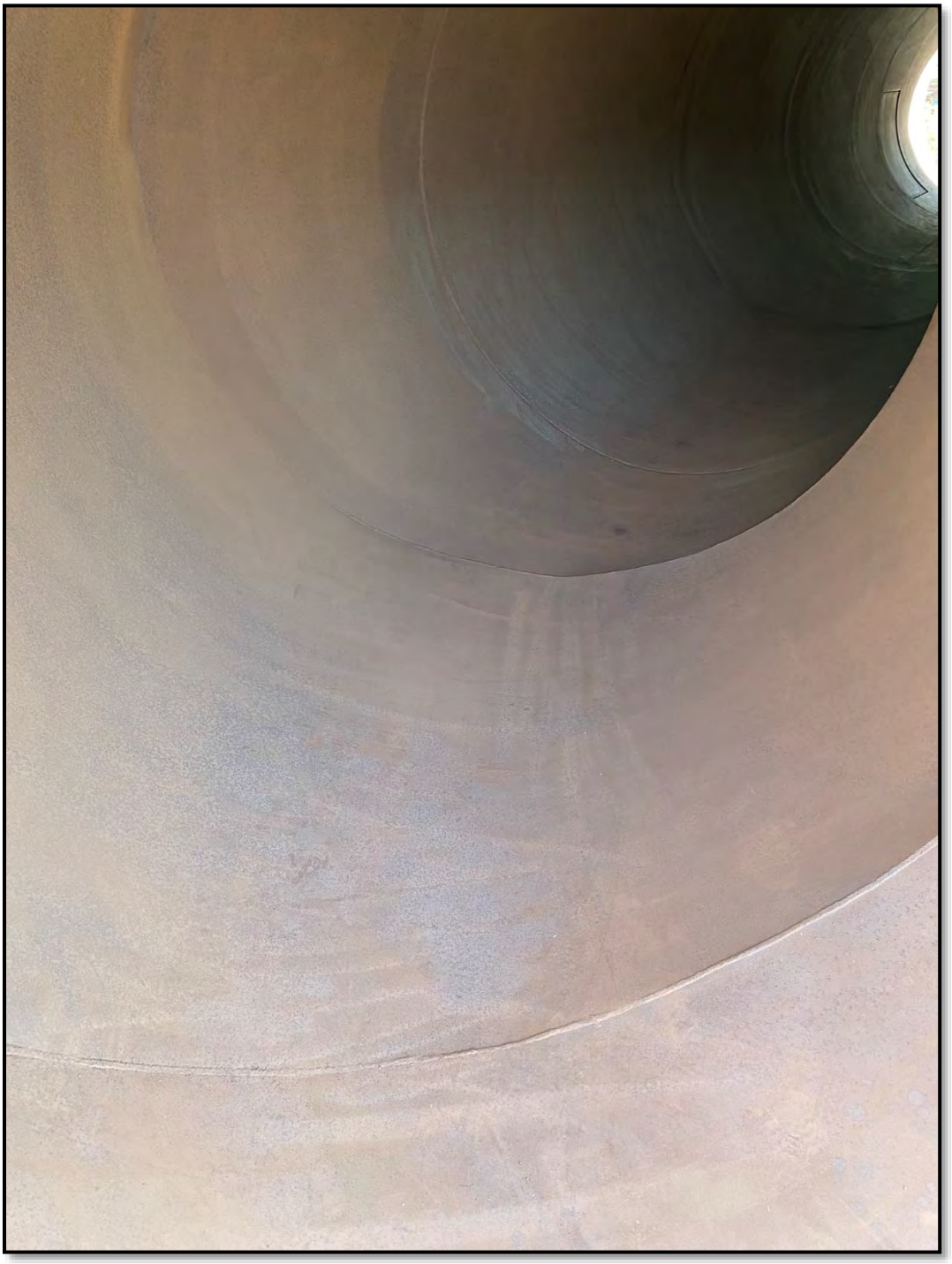


Photo BH-06: Example of Decontaminated Baghouse Duct Inspected and Cleared for Meeting Clean Debris Standard
Photo Taken: 9/20/2023

Dangerous Waste Management Unit Closure Documentation
Former Jorgensen Forge Facility
Baghouse Photo Log (Page 7)

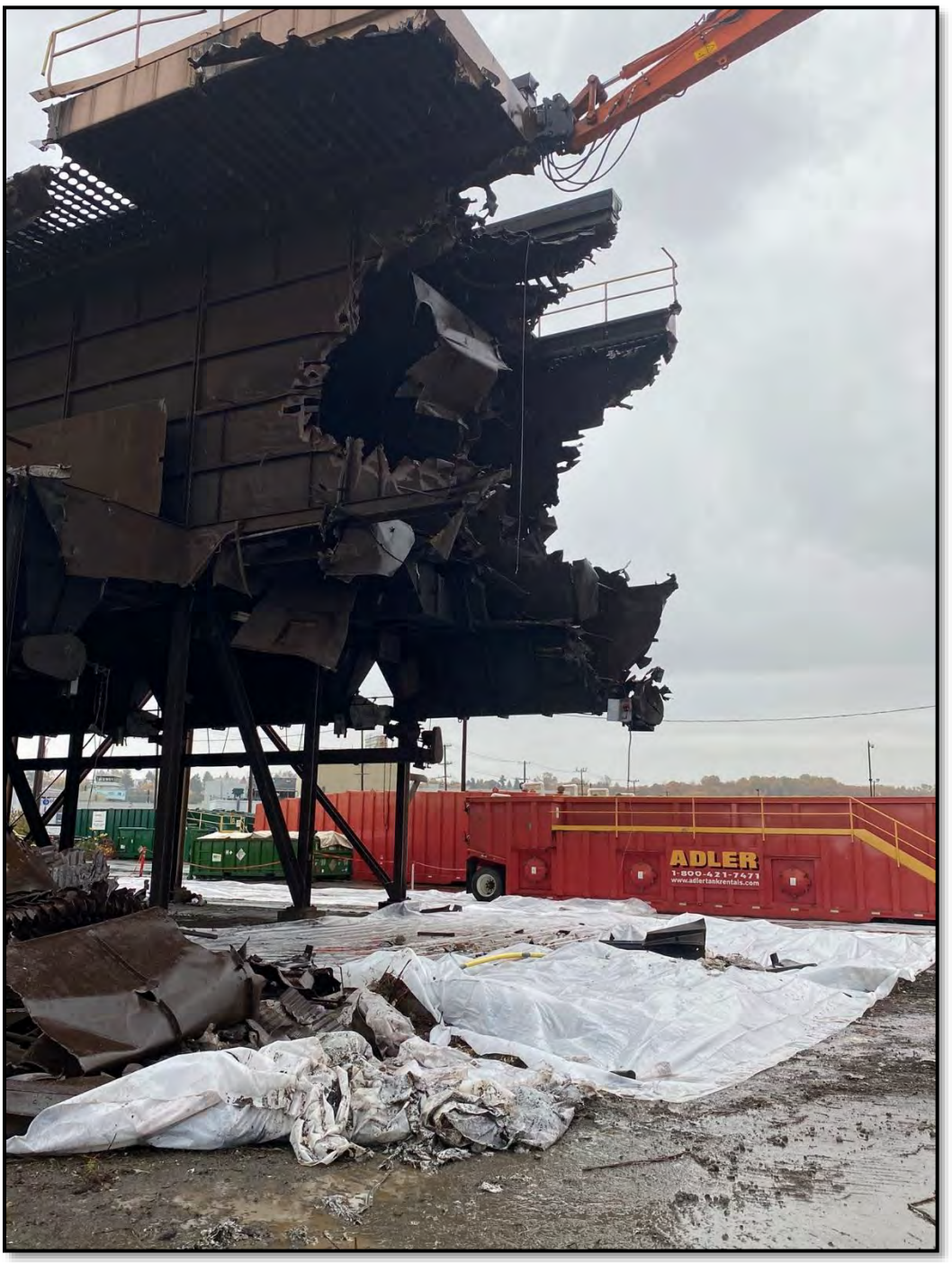


Photo BH-07: Facing East, Active Demolition of Baghouse
Structure Photo Taken: 11/10/2023



Photo BH-08: Facing North, Footprint of Baghouse North After Slab Removal
Photo Taken: 11/22/2023



Photo BH-09: Facing West, Backfilled Footprint of Baghouse North Post Demolition
Photo Taken: 4/22/2024

Interim Action Completion Report

Agency Review Draft

Former Jorgensen Forge Property
8531 E. Marginal Way S.
Tukwila, WA 98108

Prepared For:

Star Forge, LLC

Prepared By:

DH Environmental, Inc.
1011 SW Klickitat Way
Suite 107
Seattle, Washington

July 31st 2024

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Appendix B	Final Clean Closure Report, June 2024
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Appendix D	Photo Log of Current Site Conditions
Appendix E	Heating Oil Tank Documentation
Appendix F	Transformer Spill Performance Based Disposal Report
Appendix G	Powerhouse Vault Excavation and Disposal Documentation
Appendix H	Stormwater Engineer Certification Letter
Appendix I	Administrative Order Docket Number 22970
Appendix J	Cultural Resources Monitoring Report, Stell Environmental Enterprises, July 2024

Section 1: INTRODUCTION

DH Environmental, Inc. (DH Environmental) has prepared this Interim Action Completion Report (IACR) on behalf of Star Forge, LLC (Star Forge), the current owner of the former Jorgensen Forge Facility located at 8531 East Marginal Way South, in Tukwila, Washington (herein referred to as the Property) (Figure 1).

This report has been prepared in accordance with Agreed Order No. DE 21034 (Star Forge AO), entered into by Star Forge and the Washington State Department of Ecology (Ecology), pursuant to the Washington State Model Toxics Control Act (MTCA) and Cleanup Regulation established in Chapter 173-340 of the Washington Administrative Code (WAC).

1.1 SITE DESCRIPTION

The former Jorgensen Forge Property consists of approximately 21.6 acres located in an industrial area along the east bank of the Lower Duwamish Waterway (LDW). The Property is bordered to the north by Boeing Plant 2, and to the south by the Boeing Isaacson property. It is bordered to the west by the LDW, and to the east by East Marginal Way South and the King County Regional Airport.

The Property was used from 1942-1965 for fabrication of structural steel, tractor, and road equipment, including forging and heat-treating operations conducted for the U.S. Navy. It was owned and operated by Earle M. Jorgensen Co. (EMJ) from 1965 until 1992, when it was purchased by Jorgensen Forge Corporation (JFC). JFC manufactured specialized large-scale metal parts for the aircraft and marine industries, including open die steel forgings and rolled aluminum rings. JFC also processed nickel, titanium, and specialized alloys.

Historical industrial use of the Property has contaminated soil and groundwater, including in the vicinity of the USTs described in this report. Star Forge bought the Property out of bankruptcy in November 2016. As part of the bankruptcy proceeding, the bankruptcy court approved a settlement agreement pursuant to which EMJ was required to enter into an agreed order with Ecology to investigate and remediate contaminated soils and groundwater at the Property and any locations where hazardous substances released on the Property have come to be located (the Site). In fulfillment of that requirement, EMJ entered into Agreed Order No. DE 14143 (EMJ AO) with Ecology in 2017. At this time, EMJ is conducting a Remedial Investigation (RI) of the Site. This report and site assessment data will be provided to EMJ and Ecology for reference in the RI.

1.2 INTERIM ACTION SCOPE

As required by Section VII.A of the Star Forge AO, the Interim Action included three specific tasks which are described in the following sections. This work was all conducted in conjunction with demolition of the facility structures and subsequent restoration of the Property.

1.2.1 Underground Storage Tank System Permanent Closure by Removal and Site Assessment Sampling

The Property had two Underground Storage Tank (UST) vaults, located in two separate concrete structures (North Tank Vault and South Tank Vault), with a total of 18 UST systems as defined in WAC 173-360A-0150(77). The North Tank Vault included 10 USTs designated as UST-26 through UST-35, and the South Tank Vault included 8 USTs designated as UST-15 through UST-22. All liquids were removed from the USTs in 2020, and all associated media was sampled and designated for disposal. However, at the request of Ecology, the decommissioning of the USTs could not be conducted until an Interim Action Work Plan and AO were approved. In addition, the City of Tukwila also required a demolition permit as structural decommissioning was required for removal. The USTs were all licensed with Ecology and covered under appropriate financial assurance mechanisms until final decommissioning and closure was completed. In accordance with the requirements of the Star Forge AO and WAC 173-360A, a Permanent Closure Report was submitted to Ecology under separate cover in May 2024 (DH Environmental, 2024). The UST Decommissioning and Site Assessment Report is included as Appendix A to this IACR.

1.2.2 Clean Closure of Dangerous Waste Management Units

DH Environmental prepared and submitted an interim Dangerous Waste Clean Closure Report to Ecology for the purpose of documenting the Clean Closure of Dangerous Waste Management Units (DWMUs) at the Property (DH Environmental, 2020a; 2020b, and 2020c) in accordance with WAC 173-303-610(2) and (5). The Clean Closure Report documented removal of Dangerous Waste from the Property and provided updated records of Dangerous Waste Designations of debris, slag, and the concrete and asphalt slabs in each DWMU. The interim Dangerous Waste Clean Closure Report included documentation of all Clean Closure work that could be conducted without obtaining a demolition permit which was ultimately tied to the IAWP and Star Forge AO. After Star Forge acquired all permits and IAWP approvals, the remaining Clean Closure work specified in the IAWP resumed in 2023 in conjunction with demolition of the Property structures. The remaining Clean Closure tasks included demolition of three DWMUs, removal of the underlying slabs, confirmation sampling of the underlying soil, and minor excavation below one of the units to achieve MTCA Method A cleanup standards.

The Final Clean Closure Report was delivered to Ecology under separate cover in May 2024. This report is included as Appendix B to this IACR.

1.2.3 Limited Exposed Soil Removal

Certain areas within the main buildings had exposed soil at grade (i.e. no stockpiles). Star Forge believed that this material was “track-in” from the former forging operations at the Property, or imported aggregate for base course, and/or paver base for equipment pads, walkways, or other in-plant facilities. Prior to demolition in 2019 and 2020, Star Forge, through its contractor Clean Harbors, removed and disposed of approximately 2,500,000 lbs of “area wide dust”. The area wide dust “passed” TCLP for RCRA 8 metals. However, the elevated total metals concentration caused

the area-wide dust to “book designate” as a Toxic Criteria Dangerous Waste and was assigned WA State Dangerous Waste number WT02. A fish bioassay was not conducted to refute the book designation by Clean Harbors. Therefore, the WT02 designation was assumed and approximately 2,500,000 lbs of the area wide dust was removed and disposed of as WA State Toxic Criteria WT02 waste during 2019 and early 2020.

Although most of the area wide dust was removed from inside the buildings prior to demolition, residual dust did remain on some surfaces. Therefore, in June 2020, DH Environmental conducted an area wide statistical analysis of the dust, fine particles, and exposed soil to designate the remaining material so that it could be properly managed during the forthcoming demolition of the structures. Exposed soil, along with area-wide residual dust, was designated as non-dangerous waste if disposal was required (DH Environmental, 2020a). Exposed soil and dust were indistinguishable at the ground surface where pavement was not present or unknown to be present.

During planning for demolition and site stabilization, and at the request of Ecology, exposed soil was identified for potential removal to facilitate surface preparation for the application of asphalt pavement. If required, any soil removal was limited to less than 100 cubic yards, and removal would require consultation with Ecology among other requirements. The areas of unpaved surfaces were mapped by Sound Earth Strategies in 2020 and represented approximately 14,000 square feet within the main building. During demolition, these areas of exposed soil were covered with geomembrane liners to prevent stormwater from contacting the areas of exposed soil.

Through the demolition process, no exposed soil inside the buildings required removal as part of the Interim Action or site demolition work. Because the area wide dust was designated as non-Dangerous Waste, further removal from surfaces was not required and any remaining residual dust was disposed of with the general demolition debris as it was either adhered to structural surfaces or swept up and disposed of during general stormwater BMP maintenance.

Clean fill was imported across the footprint of the former Forge Shop and Melt Shop to restore the grade and achieve proper drainage.

Individual cases of soil removal outside of the building footprints were required for other tasks and are described in Section 4. No exposed soil inside the buildings required removal and off-site disposal, which was a communicated potential outcome.

Section 2: UNDERGROUND STORAGE TANK DECOMMISSIONING AND SITE ASSESSMENT

The purpose of a UST site assessment is to determine if there has been a release of a regulated substance from a UST system. Confirmed and suspected releases have been reported from both former UST vaults as early as 1990 when Dames & Moore first identified elevated levels of petroleum in soil west of the former Aluminum Heat Treat Building and South Tank Vault. Later findings by SEACOR in 1991 supported this when they reported that three USTs in the North Tank Vault failed tightness testing. An additional investigation conducted in 1991 by SEACOR also identified light non-aqueous phase liquid (LNAPL) west of the former South Tank Vault. LNAPL was again identified west of the former North Tank Vault in 1995, along with high concentrations of DRO in soil west of the former South Tank Vault. More recent investigations by Shannon & Wilson also identified likely releases from both former UST vaults, including the presence of a significant LNAPL plume on groundwater west of the South Tank Vault. As described in the Underground Storage Tank Decommissioning and Site Assessment Report, multiple investigations conducted over a 30-year period have identified likely releases from the former North and South Tank vaults at the Site. The site assessment activities described in the UST Decommissioning and Site Assessment Report were conducted pursuant to the Star Forge AO following UST decommissioning by removal. In accordance with the requirements of WAC 173-360A-0730(8)(g)(iii), the results of the site assessment concluded there has been a release of a regulated substance from both the former North and South UST systems at the former Jorgensen Forge Site. The Star Forge AO and IAWP did not require Star Forge to remediate the known subsurface releases, as EMJ is responsible pursuant to the bankruptcy court settlement agreement and EMJ AO for investigation and remediation of all legacy contamination on the Site.

We recommend the Site Assessment data be considered by Ecology and EMJ during the remedial investigation and final cleanup of the Site. The UST decommissioning and site assessment activities were reported to Ecology under separate cover in May 2024. The Underground Storage Tank Decommissioning and Site Assessment Report is included in Appendix A of this IACR. Financial assurance for the USTs was terminated upon authorization from the Ecology UST program in June 2024 and all 18 tanks have been listed as removed in Ecology's database.

Section 3: CLEAN CLOSURE OF DANGEROUS WASTE MANAGEMENT UNITS

DH Environmental was contracted by Star Forge to assist with facilitation and documentation of Dangerous Waste Clean Closure for the former Jorgensen Forge Facility. From 2020 – 2024, DH Environmental supported Star Forge with facility cleanouts from shops and work areas, DWMU designation and evaluation, DWMU cleaning and confirmation sampling, and overall documentation of Clean Closure activities occurring concurrently with demolition operations. As of May 10th, 2024, Star Forge has completed the required Clean Closure requirements under the Dangerous Waste Regulations (WAC 173-303-200(h)) and in accordance with the Star Forge AO. The 2023 Dangerous Waste Annual Report has been updated to include notification of closure of the three DWMUs described in in the Final Clean Closure Report and is included in Attachment 4 of the report.

The Final Clean Closure Report was delivered to Ecology under separate cover in May 2024. The report is included as Appendix B to this IACR.

Section 4: ADDITIONAL TASKS ASSOCIATED WITH DEMOLITION AND FACILITY CLOSURE

4.1 IMPORT FILL

The facility had multiple subsurface features, including a basement under the main office building, two UST excavations, and multiple equipment vaults. Concurrent with demolition, and with the exception of filling the -2 level of the 5,000 Ton Press Pit with control density fill (CDF) as described in Section 4.2, and the engineered pit covers addressed in Section 4.3, all subsurface features and excavation areas were filled with compacted fill material as specified by a licensed professional engineer and approved by Ecology and the City of Tukwila. All imported crushed rock was sampled in accordance with the Fill Material Sampling Work Plan (SoundEarth, 2020) which was included in the Demolition Plan and referenced in the IAWP.

A total of approximately 29,600 tons of 1-¼ minus crushed rock was imported to the property to fill UST excavations, basement structures, equipment vaults, and other subsurface features. All imported rock was sampled prior to import. The import fill samples were analyzed for chemicals of concern identified in Column B of the Washington State Department of Ecology's Lower Duwamish Waterway Preliminary Cleanup Levels (PCULs) Workbook, Soil Summary page, dated April 5, 2019. The sampling results were compared to the values for the "Most Stringent Soil PCUL Saturated Zone Non-potable GW". A total of 47 soil samples were collected from the fill source facility, ICON Materials, located at 4040 Kersey Way SE, in Auburn, Washington. All sample results confirmed the import fill met the approved specifications. The import fill analytical results summary table, laboratory analytical reports, and the import fill weight summary table are included in Appendix C.

4.2 5,000-TON PRESS PIT

In November 2023, after dewatering of the 5,000-ton press vault located in the Forge Shop area, Star Forge's contractor (CGI) encountered two levels of subsurface "rooms" adjacent to the press pit that extended approximately 36-feet below ground surface (-1 and -2 levels). The subsurface characteristics of these levels were unknown because they were under water at the start of demolition. The source of the water was likely due to groundwater infiltration after power was cut off from the building and the pumps that had historically kept water out of these rooms ceased to operate in 2019. After evaluating the structural and safety risks of demolishing the floors of each level in order to apply crushed rock as fill, CGI requested to use CDF to fill the void spaces in the -2 level instead of crushed rock because the CDF would be less intrusive, more effective, and safer to apply. The floors were constructed of thick concrete slabs and beams, with primary and secondary reinforcements consisting of rebar up to 2-inches in diameter. The floors/ceilings would have required removal in order to fill and compact the voids with crushed rock. Demolition of these floors would have presented a risk of collapse of the vault sidewalls.

After requesting this IAWP and permit deviation from Ecology and the City of Tukwila, both parties approved use of CDF instead of crushed rock in this application. The CDF was applied to the subsurface rooms from 11/27/2023 - 11/28/2023. Approximately 612 cubic yards of CDF was pumped into the -2 level to bring it up to grade with the floor of the -1 level. The 5,000-ton press pit was still filled with crush rock, along with the -1 floor of the adjacent subsurface structure. Only the bottom, -2 level, of the adjacent rooms was filled with CDF.

The control density fill specifications are included in Appendix C.

4.3 ENGINEERED PIT COVERS

Most of the subsurface vaults/pits at the facility were filled with crushed rock or CDF/crushed rock during the facility demolition process as described in the Demolition Plan and IAWP. However, due to concerns about future access to four former process vaults where Aqueous Film Forming Foam (AFFF) may have been used at the facility, Star Forge met with, and discussed with Ecology an option to install engineered covers over these subsurface features. Star Forge agreed to install water-tight structural covers over four subsurface features at the property. The covers were designed by a licensed structural engineer and were installed over the following subsurface features formerly containing AFFF fire suppression systems, as described in the Ecology-approved, PFAS Investigation Work Plan (Shannon & Wilson, 2022b) prepared pursuant to the EMJ AO:

- 660-ton press control room
- 1,250-ton press control room
- 2,500-ton press control room
- Quench tank vault

These covers are meant to satisfy the City of Tukwila municipal code in the same manner as filling the pits with crushed rock, while also meeting the requirements of WAC 173-340-430(3)(b), a MTCA regulation that states: “If the cleanup action is not known, the interim action shall not foreclose reasonable alternatives for the cleanup action. This is not meant to preclude the destruction or removal of hazardous substances”.

The engineered pit covers have the following features:

- The covers are set on curbs surrounding the entire pit to prevent stormwater run-on/runoff.
- The covers have a waterproof membrane that will prevent direct rain from entering the pits.
- The covers are structurally designed for operational loading (snow loads, wind, personnel, and light equipment).

The pit cover approach was suggested by and was approved by Ecology as detailed in the Section 6 of the IAWP. The engineered pit cover design package was reviewed by Ecology and approved by the City of Tukwila as part of the permitting process for demolition. Photos of the completed and currently installed pit covers are provided in Appendix D – Photo Log of Current Site Conditions.

4.4 HEATING OIL TANK REMOVALS

Two heating oil tanks (HOTs) were removed from the property during the course of demolition and site restoration. The first was a small HOT located west of the former Administrative Building. This HOT was previously identified by Shannon & Wilson as "UST-6", with a capacity of 600-gallons. The HOT was removed by CGI as part of the demolition of the adjacent Administrative Building in January 2024. The HOT was empty at the time of removal, and there was no visual or olfactory evidence of contamination in soil adjacent to or beneath the former HOT.

The second HOT was discovered on February 22, 2024, in an area formerly used for office space north of the former forge shop. This tank was full of red dyed diesel fuel (heating oil) at the time of discovery. The heating oil was sampled and submitted for analysis of hydrocarbon identification by Method NWTPH-HCID, and PCBs by EPA Method 8082. The HCID results confirmed the fuel was diesel fuel, and PCBs were not reported in the sample at a concentration greater than the laboratory practical quantitation limit (PQL) of 1 mg/kg. DH Environmental communicated the discovery of the tank to Ecology at the time of discovery, and the tank was pumped out and triple rinsed on February 28, 2024. The product and rinsate were transported for offsite disposal to Marine Vacuum Service on the same day. The laboratory analytical report for the heating oil, the disposal records, and a location map for the HOT are included in Appendix E. CGI removed the tank on February 28, 2024. The tank appeared to be in good condition at the time of removal and no breaches, holes or piercings were observed. No visual or olfactory evidence of contamination was observed in the soil adjacent to or beneath the HOT during removal.

4.5 ABOVE GROUND TANKS REMOVALS

Several above ground storage tanks or hydraulic oil equipment reservoirs were removed from the facility during demolition activities. The first was a 6,000-gallon former hydraulic oil tank located adjacent to the North UST vault. This tank was identified by Shannon & Wilson as "AST-6". The AST was empty and was removed for offsite disposal at the same time as the USTs.

The second AST was an 11,000-gallon former lathe cutting oil tank. This tank was located in a subsurface vault in the drive lane between the former Lathe Shop and Administrative Building. This tank was identified by Shannon & Wilson as "UST-1", however, it is important to note the tank was not a UST. Rather it was an AST, located in a subsurface vault, and subject to visual inspection. These details were communicated with Ecology on several occasions, including via letter to Mr. Drew Imke, a Senior UST Inspector for Ecology, in March 2020 (Marten Law, 2020). This AST was removed on October 11, 2023, after it had been pumped out and triple rinsed by Marine Vacuum Service.

In addition to the two ASTs described above, two hydraulic oil equipment reservoirs were also removed from equipment formerly located in the Arc Furnace Pit. These equipment reservoirs were identified by Shannon & Wilson as "UST-42" and "UST-43". It is important to note they were not USTs. Rather, they were reservoirs attached to operating equipment. The equipment and

attached reservoirs were removed in October 2023 as part of the demolition and filling of the former Arc Furnace pit.

4.6 TRANSFORMER PCB SPILL CLEANUP

On September 16, 2020, personnel from DH Environmental discovered evidence of vandalism and theft from the facility, including damage to two large transformers in the former powerhouse structure (apparently resulting from an attempt by trespassers to scavenge metal). The damage to one of the transformers, designated TC-24, resulted in a small spill of transformer oil. Transformer TC-24 was located on the east half of the second floor of the former Powerhouse structure. It was estimated that approximately 3- to 5-gallons of transformer oil were spilled from transformer TC-24. PCBs were reported in a sample of the transformer oil at a concentration of 1,400 milligrams per kilogram (mg/kg). Assuming the maximum volume of 5-gallons was released, the total mass of PCBs from the spill was 0.05 pounds.

The spill occurred indoors inside the TC-24 transformer room. Some of the transformer oil dripped down through a hatch on the second floor and onto the first-floor slab directly beneath the TC-24 transformer room. No storm drains, sanitary sewers, or soil were impacted by the release. The spill only impacted the east half of the central powerhouse structure, on the first and second floors.

DH Environmental conducted an initial response on September 17th, 2020, and removed and disposed of all free liquid transformer oil and impacted debris that was removable. Due to the physical location of the transformers and the condition of the building in which they were located, the final cleanup actions had to be conducted concurrent with building demolition. As such, final cleanup was written into the facility Demolition Plan and IAWP. Initial notifications to Ecology were made at the time of the incident (ERTS # 700704).

The final cleanup and disposal of the impacted media, as well as the transformers, was conducted in December 2023 as a Performance Based Cleanup in accordance with 40 CFR § 761.61(b). A Performance Based Disposal Report was delivered to USEPA Region 10 and Ecology on May 30th, 2024 (DH Environmental, 2024c). The report is included in Appendix F of this IACR.

4.7 POWERHOUSE VAULT DISCOVERY, EXCAVATION, AND BACKFILLING

A previously unknown subsurface vault was discovered during demolition activities west of the former Powerhouse structure on December 15, 2023. This vault was located west of the Powerhouse, between the Powerhouse and Lime Storage Hopper, and was subsequently referred to as the "Powerhouse Vault". The discovery of the Powerhouse Vault was not related to the demolition of the Powerhouse structure itself, or the transformer cleanup described in Section 4.6.

The Powerhouse vault was located beneath an above ground concrete structure, which was sitting on a steel plate, supported by a steel I-beam. During demolition and cleanup of that area, the equipment operator removed the steel plate and I-beam, exposing the vault underneath. The

vault had concrete sidewalls and a concrete bottom and was partially filled with soil and water. An initial waste characterization soil sample was collected from the exposed soil at the west end of the vault and the results indicated the soil contained PCBs at a concentration of 50 mg/kg. A copy of lab report 2312-224 is included in Appendix G. The discovery of the Powerhouse Vault was communicated with Ecology following receipt of the analytical results. Water from the vault was removed by DH Environmental using a vacuum truck and temporarily stored in a frac tank on site. CGI removed all soil from the vault and shipped it for offsite disposal to Chemical Waste Management of Arlington, Oregon, a permitted Subtitle C/TSCA landfill. Approximately 211.35-tons of soil were disposed of in accordance with the requirements of 40 CFR 761. Disposal records are included in Appendix G.

During excavation of the portion of the vault that extends towards the south, the soil type abruptly changed to a dense gravel material, and the vault appeared to end. As such, a new waste characterization soil sample was collected for PCB analysis, and PCBs were reported at a concentration of 0.14 mg/kg (lab report 2312-300, sample ID 'W. Pwrhouse Vault Soil-2'). Given the low concentration of PCBs at the south end of the vault, no further excavation was conducted, and the vault was backfilled with crushed rock as specified in the demolition plan for other subsurface features at the facility.

4.8 LIME HOPPER RELEASE INCIDENT

On 11/22/2023, an elevated (approximately 25ft) lime storage hopper located on the southwest side of the main structure was breached by Star Forge's demolition contractor while cutting into the structure for demolition. The breach resulted in an estimated 500-lbs of lime falling from the vessel onto the ground. No injuries or exposures were reported because of this release and no lime was released into the LDW. However, due to the lime designating as Dangerous Waste, the Washington State Emergency Management Division (1-800-258-5990) was notified in addition to the National Response Center (1-800-424-8802). Beau Johnson, the Ecology Site Manager, was also notified, in addition to the Boeing EHS manager for the property to the south. The incident was assigned a Washington Statewide Environmental Tracking System (ERTS) number 726905. Cleanup of the dispersed lime as well as removal of the existing lime in the storage hopper was completed on December 7, 2023. Further details about the release and cleanup are included in the Final Clean Closure Report included in Appendix B.

4.9 STORMWATER MANAGEMENT

Stormwater from the site drains to the LDW. All stormwater was managed under the requirements of Washington State Industrial Stormwater General Permit (ISGP) WAR003231, Administrative Orders 18074 and 18170, and King County Discharge Authorization DA# 1122-01 & 02. The Administrative Order required all stormwater to be treated on the site and retained until data is received confirming that the treated batch is in compliance with indicator levels and benchmarks included in the permit and Administrative Orders. Based on hydrology modeling, site rainfall history, and historic site data, Star Forge determined the required storage capacity to maintain an

appropriate volume in storage tanks to collect and retain treated stormwater while awaiting analytical results to determine if stormwater met the applicable water quality parameters.

4.9.1 Stormwater Treatment

The onsite stormwater treatment system included settling tanks, sand filters, enhanced chitosan treatment, and final polishing with a granular activated carbon/proprietary metals treatment media. Monitoring of water quality was conducted per batch of stormwater treated to verify compliance with discharge limits/indicator levels and to monitor treatment media effectiveness and prevent breakthrough prior to media replacement. 104 batches of stormwater were sampled since April 2020, and all batches met the discharge requirements of the ISGP, Administrative Orders and King County discharge authorization. The goal was to discharge all water to the LDW, however due to delays in receiving laboratory results for approval to discharge to LDW, approximately 8.6 million gallons were discharged to King County under discharge authorization 1122-01 and 02.

4.9.2 Post Demolition Stormwater Conveyance System Cleaning

Upon completion of all demolition activities and site paving, the stormwater conveyance system was cleaned as required by the City of Tukwila Demolition Permit and the ISGP. On March 25, 2024, the system cleaning was completed. The system was cleaned via jet rodding and pressure washing to the extent possible utilizing industry standard equipment. All conveyance system cleanout waste was collected, designated, and disposed offsite at properly permitted disposal facilities.

4.9.3 Stormwater Conveyance System Engineering Assessment

As required by the City of Tukwila demolition permit, a third-party engineer from PACLAND performed a site visit on March 15, 2024, to evaluate the condition of the existing site after demolition of buildings and stabilization of the disturbed areas, which consisted of paving/grading operations to direct stormwater runoff to existing storm drainage infrastructure. The evaluation concluded that the storm drainage system is functioning properly. The Engineer Certification Letter is included in Appendix H.

4.9.4 ISGP Termination

Because demolition has been completed and no industrial operations are active at the site, a Notice of Termination of the ISGP was filed by Star Forge and was received on June 10th, 2024. However, due to documented contamination in soil and groundwater at the site, a new Administrative Order (Docket # 22970) was issued on July 25th, 2024, that requires Star Forge to continue treating stormwater at the site to ensure discharges from the site meet Washington State Water Quality Standards. However, batch testing is no longer required as the treatment system has sufficiently demonstrated that the treated discharge meets all indicator levels. Administrative Docket Order # 22970 is included as Appendix I for reference.

4.10 CULTURAL RESOURCE MONITORING

In accordance with the IAWP and SEPA requirements, the demolition and Interim Action work required a Cultural Resources Inadvertent Discovery Plan (IDP) which required archeological monitoring during all ground disturbing activities. Archaeological monitoring pursuant to the IDP was provided by Stell Environmental Enterprises. No significant archaeological resources were discovered during any excavations requiring monitoring during demolition of the Property Structures, or completion of the IAWP. The final Cultural Resources Monitoring Report prepared by Stell Environmental Enterprises is included in Appendix J.

Section 5: CONCLUSIONS

Star Forge has completed all Interim Action work specified in Agreed Order No. DE 21034, and in accordance with the associated IAWP. The Permanent Closure requirements of the UST Systems have been met along with completion of the Clean Closure of the DWMU's. The Permanent Closure UST Site Assessment was prepared and submitted to Ecology in accordance with WAC 173-360A-0810(3) and WAC 173-360A-0730 and Ecology determined that the UST Systems were permanently closed by removal. A Final Dangerous Waste Clean Closure Report was prepared and submitted to Ecology to demonstrate compliance with WAC 173-303-200(h) and WAC 173-303-610 (2) and (5). No significant deviations from IAWP were required other than approved use of control density fill in the 5,000-ton press vault. All notable and/or unanticipated tasks associated with demolition and facility closure outside of the IAWP scope were disclosed to and coordinated with Ecology as well as all appropriate regulatory agencies in concurrence with demolition and property restoration.

Section 6: REFERENCES

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DH Environmental, 2024a. UST Decommissioning and Site Assessment Report. Former Jorgensen Forge Site, Tukwila, Washington. May 8.

DH Environmental, 2024b. Final Clean Closure Report. Former Jorgensen Forge Site, Tukwila, Washington. May 8.

DH Environmental, 2024c. Letter to Mr. Brett Feldhahn, EPA Region 10 PCB Coordinator, Re: Transformer Spill, Performance-Based Disposal Documentation, Former Jorgensen Forge Property, Tukwila, Washington. May 30.

Marten Law, 2020. Former Jorgensen Forge Facility: 8531 E. Marginal Way South, Tukwila, WA Cleanup Site ID No. 3689, 2019. Letter to Mr. Andrew Imke, WA State Dept. of Ecology. March 2.

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SEACOR, 1993b, Draft, area 2 -- oil-water separator area, focused remedial investigation Feasibility study, Forge Facility, 8531 East Marginal Way South, Seattle, Washington. April 7.

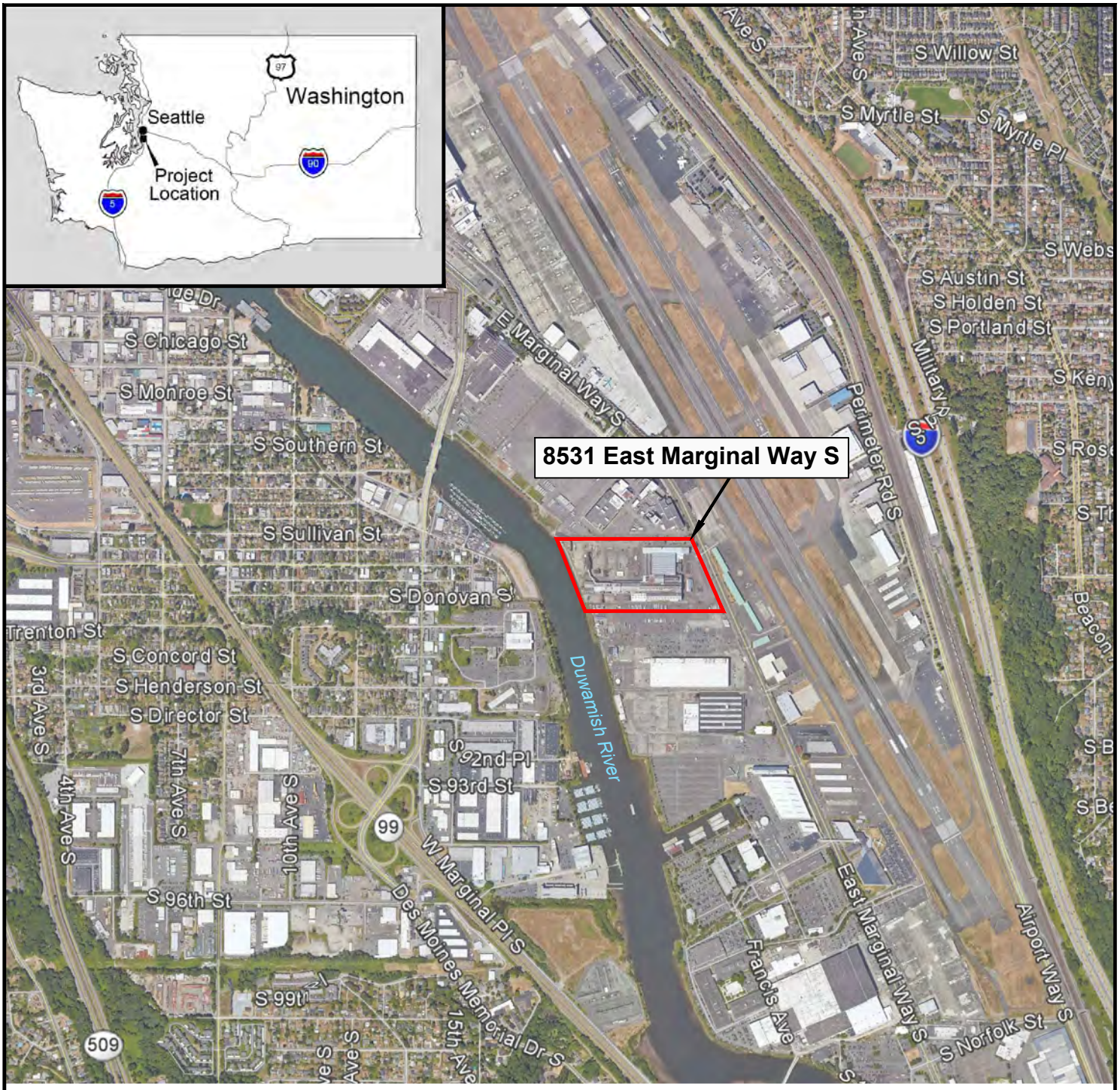
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DH Environmental Inc

VICINITY MAP

Former Jorgensen Forge Facility 8531 E. Marginal Way S. Tukwila, Washington	05-22-2020	Figure 1

LEGEND

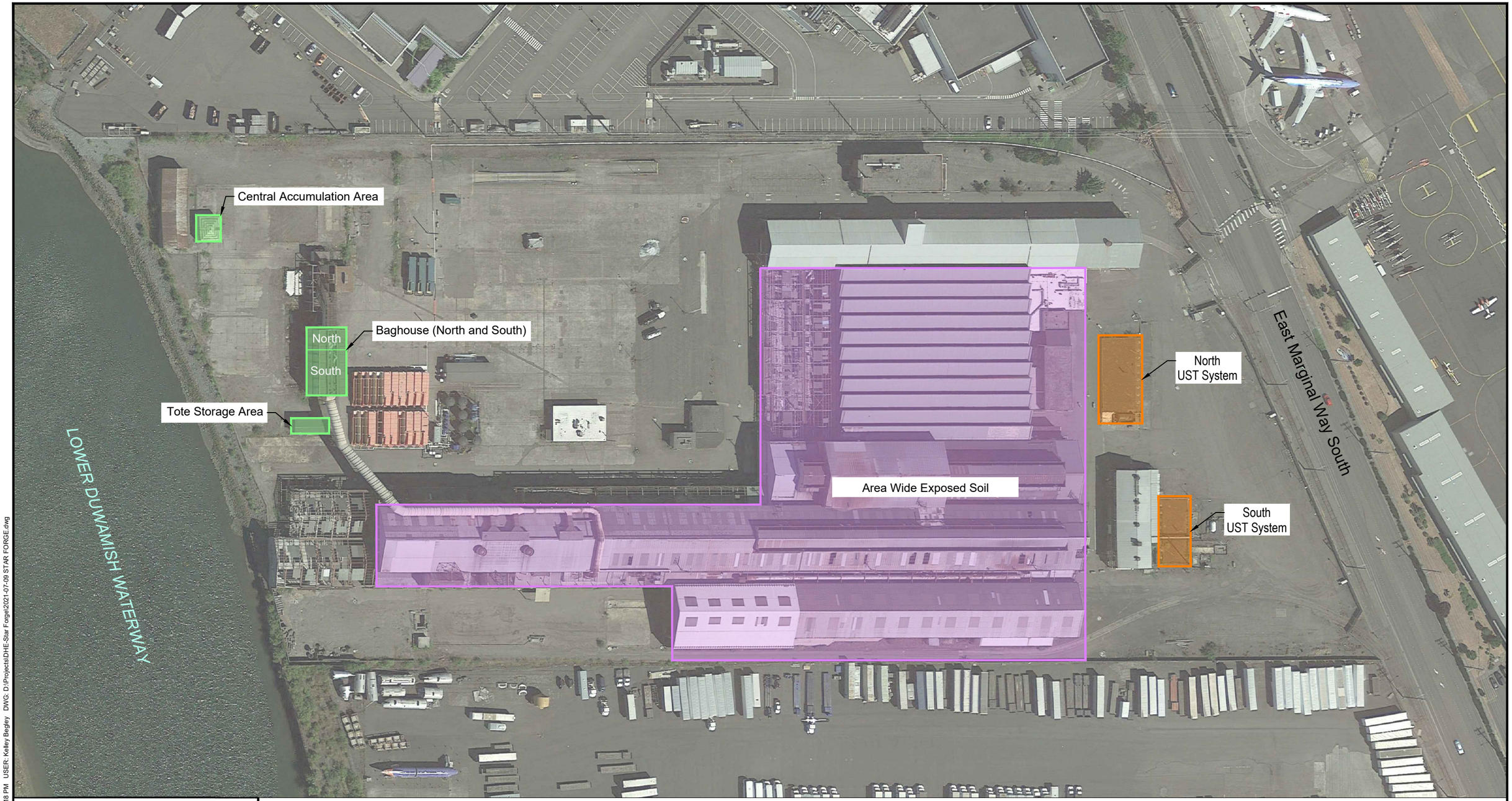
Property Location

N

Background Images Source: Google Earth Pro 5/26/2018

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PLOT TIME: 5/22/2020 11:18 AM MOD TIME: 5/22/2020 11:17 AM USER: Kelley Begley DWG: P:\DH Environmental\Site\Jorgensen\DH 2020-05 Jorgensen Vic Map.dwg



Interim Action Work Areas

Former Jorgensen Forge Facility 8531 E. Marginal Way S. Tukwila, WA, 98108	07/12/2021	Figure 2

Legend

- Former Dangerous Waste Management Units
- Underground Storage Tank Systems
- Area Wide Interior Soil and Dust

Note:

1. Aerial Photography Source: Google Earth Pro, 08/14/2020.

N

0 60 120

Scale in Feet

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PLOT TIME: 7/12/2021 2:19 PM MOD TIME: 7/12/2021 2:18 PM USER: Kelley Begley DWG: D:\Projects\DHE-Star Forge\2021-07-09 STAR FORGE.dwg



Photo 01, Facing Southeast, 7/15/2024



Photo 02, Facing South, 7/15/2024

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Photo 03, Facing Northwest, 7/15/2024



Photo 04, Facing North, 7/15/2024

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Photo 05, Facing West, 7/15/2024



Photo 06, Facing East, 7/15/2024

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Photo 07, Facing West, 2,500 Ton Press Pit Pump Room Pit Cover



Photo 08, Facing West, Quench Tank Vault Pit Cover

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Photo 09, Facing West, 660 Ton Press Pump Room Pit Cover

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Photo 10, Facing West, 1,250 Press Pump Room Pit Cover



Photo 11, Facing North, Former Central Accumulation Area DWMU Area, 7/15/2024

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Photo 12, Facing South, Former Baghouse DWMU Area, 7/15/2024

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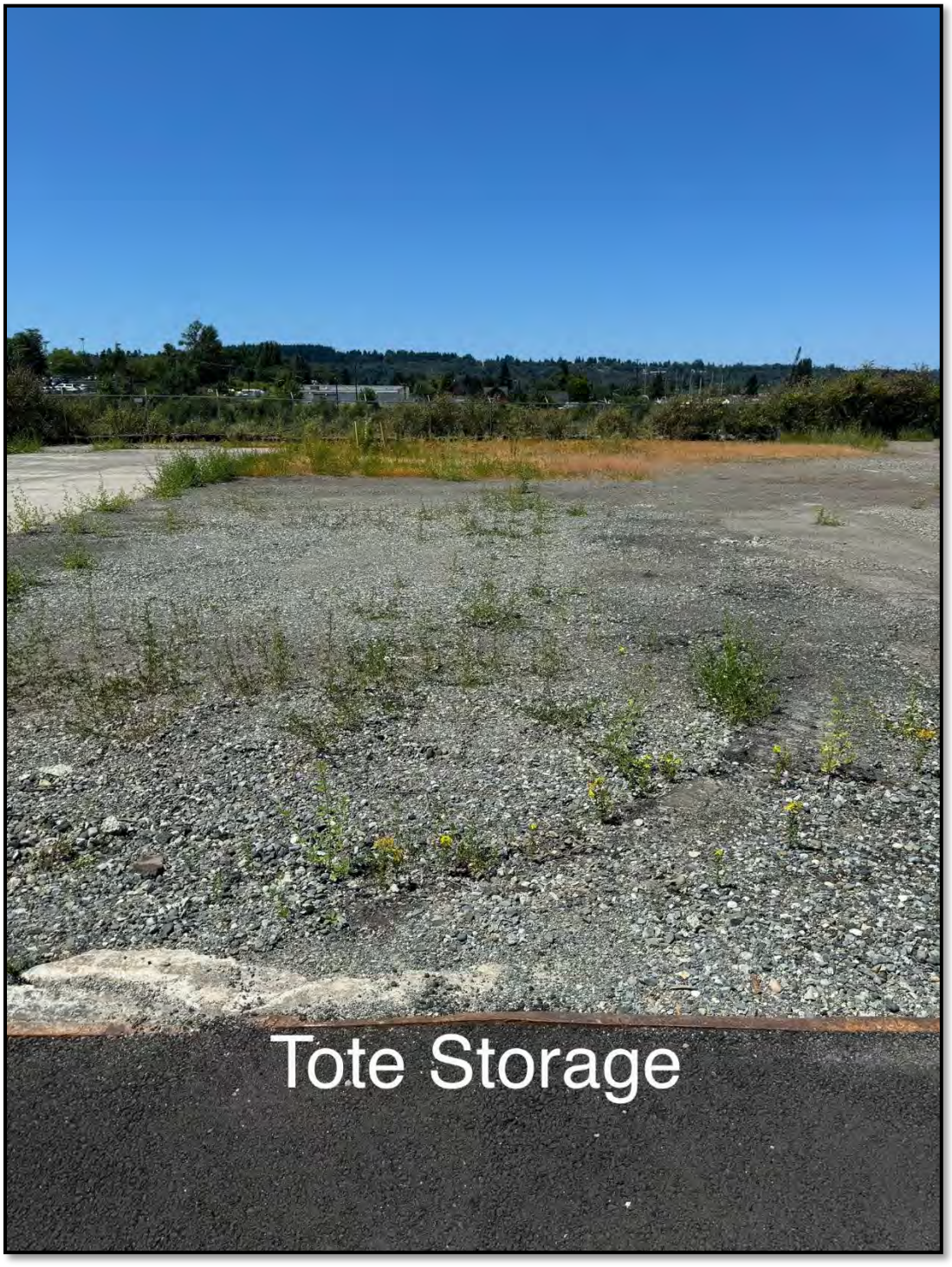
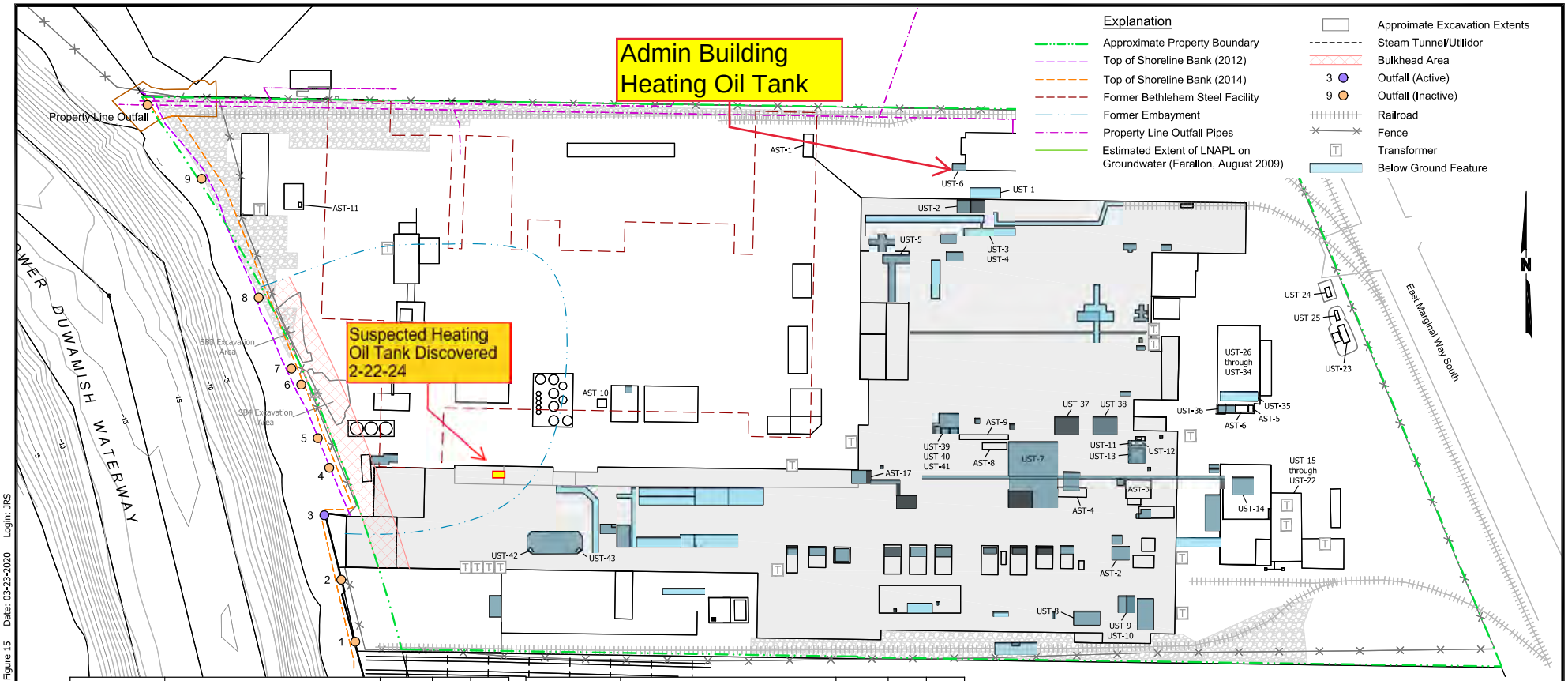


Photo 13, Facing West, Former Tote Storage DWMU Area, 7/15/2024

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Tank ID	Description	Containment	Capacity (Gallons)	Status
UST-1	Hollowbore 59/60 Lathes Cutting Oil Holding Tank	V	11,000	P
UST-2	Hollowbore 59/60 Horizontal Lathes Intermediate Cutting Oil Tank	V	240	R
UST-3	Hollowbore 58 Horizontal Lathe Clean Cutting Oil Tank	V	5,500	R
UST-4	Hollowbore 58 Horizontal Lathe Dirty Cutting Oil Tank	V	5,000	R
UST-5	Tacchi Cutting Oil Tank	V	2,500	R
UST-6	Office Building Heating Oil UST	G	600	P
UST-7	5,000-Ton Press Hydraulic Oil Tank	V	4,000	R
UST-8	Ring Expander Hydraulic Oil Tank	V	300	R
UST-9	Ring Mill Coolant Tank	V	500	R
UST-10	Ring Mill Coolant Tank	V	500	R
UST-11	Quench Tank 5 (Q5)	V	-	R
UST-12	Quench Tank 6 (Q6)	V	5,000	R
UST-13	Quench Tank 7 (Q7)	V	-	R
UST-14	Quench Tank 8 (Q8)	V	-	R
UST-15 through UST-22	Decommissioned Diesel Storage Area Tanks (8 tanks)	V	96,000	P
UST-23	Former Regulated Gasoline UST	G	8,000	R
UST-24	Former Unregulated UST	G	2,000	R
UST-25	Former Unregulated UST	G	1,000	R
UST-26 through UST-35	Decommissioned Oil Storage Area Tanks (10 tanks)	V	150,000	P

Tank ID	Description	Containment	Capacity (Gallons)	Status
UST-36	Waste Oil Tank	V	2,000	R
UST-37	West Craven Lathe	V	30	R
UST-38	East Craven Lathe	V	100	R
UST-39	Quench Tank 1 (Q1)	V	13,000	R
UST-40	Quench Tank 2 (Q2)	V	13,000	R
UST-41	Quench Tank 3 (Q3)	V	-	R
UST-42	Arc Furnace Hydraulic Oil Tank	V	500	P
UST-43	Arc Furnace Hydraulic Oil Tank	V	500	P
AST-1	Former Cutting Oil Supply Tank	C	4,000	R
AST-2	660-Ton Press Hydraulic Oil Tank	C	700	R
AST-3	1,250-Ton Press Hydraulic Oil Tank	C	1,000	R
AST-4	L and F Press Hydraulic Oil Tank	C	700	R
AST-5	Used Oil Centrifuge	C	1,200	P
AST-6	Clean Hydraulic Oil Tank	C	6,000	P
AST-7	2,500 Ton Press Hydraulic Oil Tank	C	1,500	R
AST-8	Quench Tank 4 (Q4)	C	-	R
AST-9	Quench Tank 9 (Q9)	C	-	R
AST-10	Former Gasoline AST	C	300	R
AST-11	Diesel Fuel Tank	C	300	P

NOTES

1. Figure adapted from client file, *141500101002_1-8.dwg*, prepared by PES Environmental, Inc. dated July 2017, and *01012802-006.dwg*, prepared by Achor Environmental, LLC and Farallon Consulting. Property Boundary from client file, *11078 Topo E-MAIL.dwg*, prepared by Anchor QEA, LLC., Dated Jan 24, 2012.

0 120 240

Scale in Feet

ABBREVIATIONS

AST = Aboveground Storage Tank
UST = Underground Storage Tank
V = Within Vault
C = Within Containment
G = Directly within Soil
- = Unknown
R = Removed
P = Present

Jorgensen Forge Facility
8531 East Marginal Way S
Tukwila, Washington

ASTs AND USTs

April 2020 21-1-12596-013

SHANNON & WILSON, INC. GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 15

Filename: E:\21\12596\013\21-1-12596-013 ASTs and USTs.dwg Layout: Figure 15 Date: 03-23-2020 Login: JRS

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Photo 01, Facing West, Admin Building Heating Oil Tank Excavation, 1/29/2024



Photo 02, Facing North, Admin Building Heating Oil Tank Excavation, 1/29/2024

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Photo 03, Facing Northwest, Admin Building Heating Oil Tank Excavation, 1/29/2024



Photo 04, Facing North, Admin Building Heating Oil Tank Excavation, 1/29/2024

DRAFT FOR PUBLIC COMMENT

1011 SW Klickitat Way, Suite 107
Seattle, WA 98134

May 30, 2024

Mr. Brett Feldhahn
PCB Coordinator
US EPA Region 10
1200 Sixth Avenue
Seattle, WA 98101
206-553-2899

Via email to:
feldhahn.brett@epa.gov
bejo461@ecy.wa.gov

Re: Former Jorgensen Forge Property, Tukwila, Washington
Transformer Spill, Performance-Based Disposal Documentation

Dear Mr. Feldhahn,

This letter has been prepared on behalf of Star Forge, LLC, to document the cleanup of a transformer spill at the former Jorgensen Forge property (Property), located at 8531 E. Marginal Way, in Tukwila, Washington. A vicinity map is included in Figure 1.

The spill and subsequent cleanup of polychlorinated biphenyls (PCBs) described in this report, including the initial spill response, agency notifications, final cleanup and confirmation sampling, and disposal of PCB remediation waste under 40 CFR § 761.61(b), was conducted prior to the recent rule changes affecting 40 CFR § 761.61(b), which went into effect on February 26, 2024.

Initial Spill Discovery

On September 16, 2020, personnel from DH Environmental discovered evidence of vandalism and theft from the Property, including damage to two large transformers in the former Powerhouse structure (apparently resulting from an attempt by thieves to scavenge metal). The damage to one of the transformers, designated TC-24, resulted in a small spill of transformer oil. Transformer TC-24 was located on the east half of the second floor of the former Powerhouse structure. The location of the former Powerhouse structure is shown in Figure 2. Additional location information is included in Attachment 1.

It was estimated that approximately 3- to 5-gallons of transformer oil were spilled from transformer TC-24. PCBs were reported in a sample of the transformer oil at a concentration of 1,400 milligrams per kilogram (mg/kg). Assuming the maximum volume of 5-gallons was released, the total mass of PCBs from the spill was 0.05 pounds.

The spill occurred indoors inside the TC-24 transformer room. Some of the transformer oil dripped down through a hatch on the second floor and onto the first floor slab directly beneath the TC-24 transformer room. No storm drains, sanitary sewers, or soil were impacted by the release. The spill only impacted the east half of the central powerhouse structure, on the first and second floors.

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The second transformer, designated as TC-23, was located on the west half of the second floor of the former Powerhouse structure. Transformer TC-23 appeared to be empty and no evidence of a release was visible. Residual oil from transformer TC-23 was later sampled and PCBs were reported at a concentration of 14.3 mg/kg.

A field report documenting the original spill discovery is included in Attachment 1.

Initial Spill Response

DH Environmental personnel responded to the spill the day after discovery, on September 17, 2020. All recoverable transformer oil was removed using spill absorbent. All spent absorbent and cleanup debris were containerized in Department of Transportation (DOT) approved 55-gallon drums for offsite disposal. Plastic sheeting was laid over all surfaces that had been impacted by the transformer oil, and M_L PCB marking stickers were placed on the plastic and on all doorways leading into the rooms affected by the transformer spill. Spill absorbent was placed inside transformer TC-24 to absorb any remaining residual oil, and the drain valve was covered with an oil absorbent pad and secured in place with tape.

Post cleanup samples were collected from the concrete slabs that transformer oil had been spilled on. Concrete samples were collected from both the first and second floors by drilling into the concrete floor and collecting the cuttings into a laboratory supplied sampling jar. A wipe sample was also collected from the concrete surface on the second floor, closest to the transformer that had spilled. PCBs were reported in the concrete samples at a concentration of 200 mg/kg and 30 mg/kg, from the first and second floors, respectively. PCBs were reported in the wipe sample from the second floor at a concentration of 24,000 micrograms per 100 square centimeters (µg/100 cm^2). A copy of the initial laboratory analytical reports is included in Attachment 1.

Agency Notifications

The spill was reported to the Washington State Department of Ecology (Ecology) Environmental Report Tracking System (ERTS) on September 17, 2020 (ERTS # 700704). A follow-up letter was also provided to Ms. Katy Harvey in Ecology's Hazardous Waste & Toxics Reduction Program on September 25th, 2020.

In addition, a letter was sent to Ms. Michelle Pirzadeh, the EPA Region 10 Administrator, on March 17, 2022, requesting clarification on the storage limitations outlined in 40 CFR § 761.65(a)(1). At that time, final cleanup of the transformer spill was not possible due to long-delayed negotiations with Ecology surrounding an interim action workplan for the facility. Those delays in turn held up issuance of a demolition permit by the City of Tukwila, which was necessary to remove the transformers and conduct the final cleanup. To date, no response to the March 2022 letter has been received from EPA.

A copy of the March 2022 letter to Ms. Pirzadeh is included as Attachment 1. Attachment 1 also includes a copy of the ERTS notification confirmation email and field report, a copy of the letter provided to Ms. Harvey, and copies of the disposal records for the initial cleanup waste.

Final Cleanup Activities

Due to the physical location of the transformers and the condition of the building in which they were located, the final cleanup actions required demolition of the building. The transformer carcasses were too big to be removed using the former staircase, and the crane rails used to install the transformers were not structurally sound. Due to PCB contamination of the concrete slabs on the first and second floors, the concrete slabs themselves also required removal. Because the concrete slabs were structural members of the building, they had to be removed concurrent with building demolition.

Once Ecology and Star Forge, LLC entered into an Agreed Order for implementation of an interim action work plan unrelated to the transformer spill (including removal of existing underground storage tanks and completion of "clean closure" under Ecology's dangerous waste regulations), the City of Tukwila issued a demolition permit for the removal of all buildings on the property. Demolition permit D19-0311 was issued on August 8, 2023. Due to structural considerations and construction sequencing, demolition of the former Powerhouse structure did not begin until the week of December 11, 2023.

To remove the empty transformer carcasses, the south wall of the Powerhouse structure was removed from the second floor using heavy equipment. Care was taken to pull the wall outwards, away from the exterior of the building, to minimize demolition debris from contacting the PCB impacted concrete. The PCB impacted concrete slabs had been covered with plastic sheeting as an added measure of protection. Once the south wall was removed, the transformer carcasses were pulled through the wall and lowered to the ground using a crane. The transformer carcasses were then wrapped with plastic and placed on plastic sheeting pending off-site disposal.

Once the transformer carcasses had been removed, the roof and the walls above the second floor of the building were removed. Care was taken to remove sections of the building in a manner to minimize them from falling inwards and onto the PCB impacted concrete floor.

Once the walls and roof had been removed above the second floor, the concrete slab in the eastern half of the second floor (the TC-24 transformer room) was removed and allowed to fall onto the first floor directly beneath it. The PCB impacted concrete was then carefully removed using an excavator and placed on plastic sheeting pending off-site disposal. The eastern half of the first floor was then covered with a new layer of plastic sheeting before continuing with removal of the remaining structure. The remaining structure was then removed, again being careful to direct debris outwards and away from the first floor slab.

Any debris that came into contact with the PCB impacted concrete slabs was assumed to also be PCB impacted, and was segregated and managed as PCB remediation waste. Debris from the walls, roof, and western portions of the building was managed as standard construction debris. Once the general construction debris was cleared from the surrounding area, the PCB impacted slab on the east half of the first floor was removed and placed on plastic sheeting. The stockpile of PCB impacted concrete was then covered with plastic sheeting until off-site transportation could be arranged.

Confirmation Soil Sampling

Once the first floor PCB impacted concrete slab from the eastern half of the former Powerhouse structure had been removed, confirmation soil samples were collected beneath the former slab. The final extent of slab removal was approximately 11-feet wide (east-west) by 22-feet long (north-south) by 1.5-feet deep. Soil samples were collected by dividing the excavation area into quadrants and collecting a soil sample from the center of each quadrant. The samples were collected by scooping the soil from the base of the excavation directly into a laboratory supplied sampling jar. Dedicated nitrile gloves were worn for the collection of each sample. The samples were labeled with the prefix "powerhouse-SS" to indicate a soil sample from beneath the powerhouse, followed by a directional indicator to indicate which quadrant the sample was collected from (northeast [NE], northwest [NW], southeast [SE], or southwest [SW]), followed by the depth in feet below grade. For example, the soil sample from the southwest quadrant of the excavation was labeled as 'powerhouse-SS-SW-1.5'. One duplicate soil sample 'Powerhouse-dup-1' was also collected from the same location as sample 'Powerhouse-SS-SE-1.5'.

Following sample collection, the soil samples were placed in an iced cooler for delivery to the lab following chain of custody protocols. The samples were delivered to Onsite Environmental, Inc., in Redmond, Washington for analysis of PCBs by EPA Method 8082A.

PCBs were not reported in any of the soil samples at a concentration greater than or equal to the laboratory practical quantitation limit (PQL). The post-excavation PCB analytical results are summarized in Table 1. The laboratory analytical report is included in Attachment 2.

Waste Disposal

All cleanup debris was disposed of as Toxic Substances Control Act (TSCA) regulated PCB remediation waste to Chemical Waste Management, a permitted TSCA/Subtitle C Landfill in Arlington, Oregon.

The original spill response cleanup waste consisted of two, 55-gallon drums with a total weight of 220-pounds. The drums were disposed of on September 25, 2020, under profile number OR345688. The cleanup waste was shipped for disposal on hazardous waste manifest number 021751122JJK.

A total of 101.49-tons of PCB impacted concrete and debris were direct-hauled via dump truck on December 27, 2023 under profile OR357799. The concrete and debris was shipped on hazardous waste manifests 018614506FLE through 018614509FLE (4 loads).

Transformer TC-24, from the original spill, was loaded onto a container for shipment under profile OR357800 (PCBs greater than 500 parts per million [ppm]). The 2,240-pound transformer carcass was shipped on manifest 025895525JJK on January 24, 2024.

Transformer TC-23, which never leaked, was loaded into a separate container for shipment under profile OR358045 (PCBs less than 500 ppm). Transformer TC-23 was packaged for shipment with a third transformer from elsewhere on the property. The third transformer was designated as TC-26,

and was originally located on the roof, approximately 200-feet east of the former powerhouse. Historical records indicate transformer TC-26 was non-detect for PCBs in 1997. Residual oil from transformer TC-26 was sampled in January 2024 and PCBs were reported at a concentration of 0.79 mg/kg. The TC-23 and TC-26 transformer carcasses were both filled with oil absorbent as a precautionary measure prior to shipment, and both were shipped out on manifest 025895526JJK on January 24, 2024. The combined shipping weight of both transformer carcasses was 16,560-pounds.

A copy of the disposal records is included in Attachment 3.

Equipment Decontamination

All equipment potentially in contact with PCB remediation waste was kept segregated from other areas of the site. When not in active use, the excavator buckets and breaker bar were temporarily wrapped with plastic sheeting. Before being used on other areas of the site, the equipment was decontaminated following the procedures in 40 CFR § 761 subpart S, by manually wiping all surfaces with diesel-soaked rags. Following the solvent wipe procedure, the equipment was wiped again with rags and an Alconox detergent solution, followed by a final wipe with rags and distilled water. The decontamination was verified by collecting standard wipe tests, as defined in 40 CFR § 761.123, from each piece of equipment. Decontamination was conducted on two separate dates, December 20 and 27, 2023. The results of each wipe sample confirmed PCBs were less than the decontamination standards in 40 CFR § 761.79(b)(3)(i) of 10 micrograms per 100 square centimeters ($\mu g/100\ cm^2$). A copy of the wipe testing analytical reports are included in Attachment 4.

All rags, plastic sheeting, personal protective equipment (PPE), and other miscellaneous decontamination supplies were bagged and disposed of with the transformers.

Sincerely,



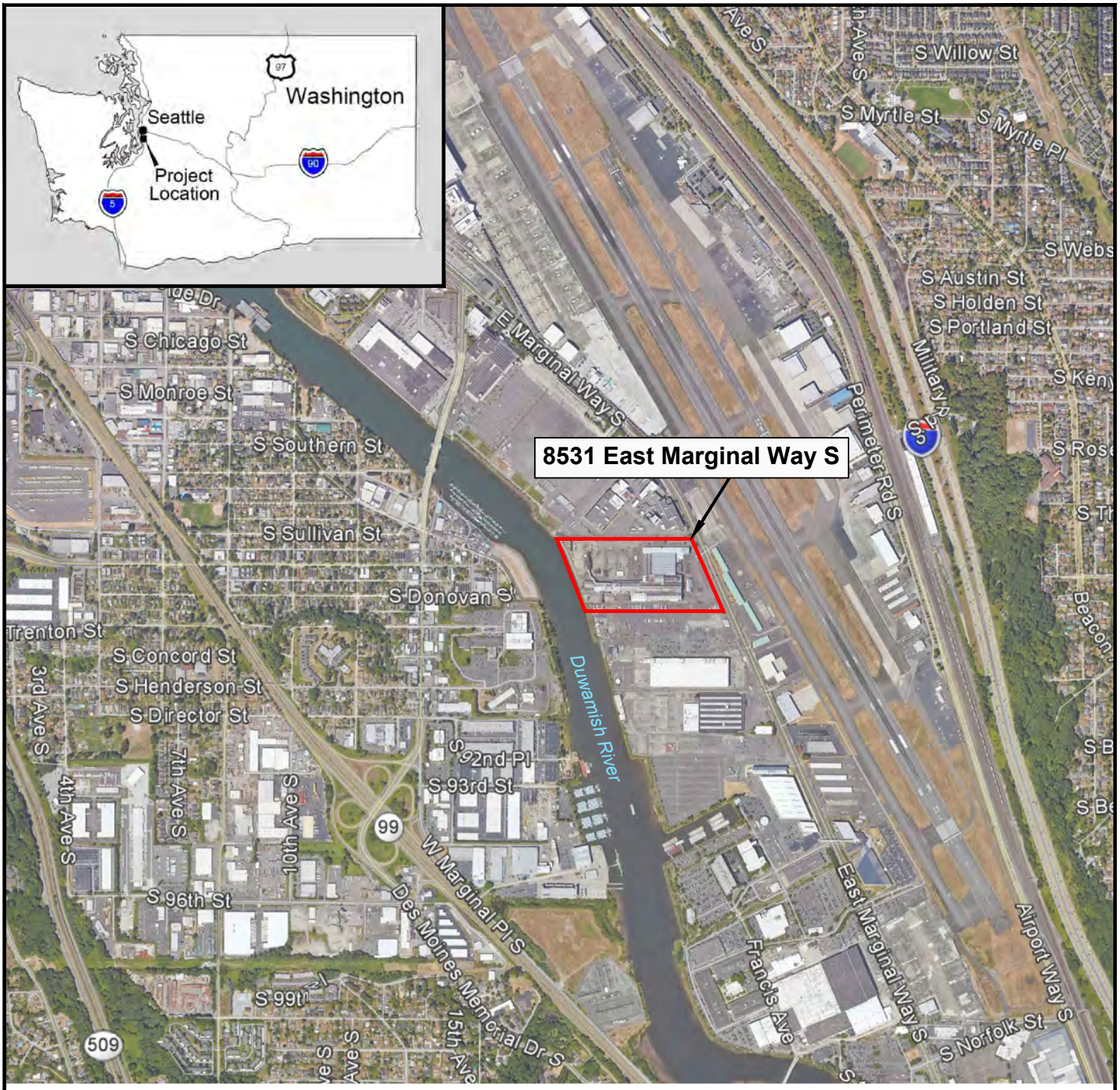
Nathan Moxley, LHG
Principal Geologist
DH Environmental, Inc.
nathan.moxley@dhenviro.com

Cc: Mr. Beau Johnson, LG, Cleanup Site Manager, Toxics Cleanup Program, NWRO, Washington State Dept. of Ecology.

Enclosures

Figure 1	Vicinity Map
Figure 2	Former Powerhouse Structure Location Map

Table 1	Post-Excavation Confirmation Soil Sample Analytical Results Summary
Attachment 1	Letter to Ms. Michelle Pirzadeh, Regional Administrator, US EPA Region 10, March 17, 2022
Attachment 2	Post-excavation Soil Sample Laboratory Analytical Report (2312-241)
Attachment 3	PCB Disposal Documents
Attachment 4	PCB Wipe Sample Laboratory Analytical Results (2312-252 and 2312-300)



Legend

Former Jorgensen Forge Property

N

Background Images Source: Google Earth Pro 5/26/2018

DH Environmental Inc

Vicinity Map

Former Jorgensen Forge Facility 8531 E. Marginal Way S. Tukwila, Washington	02-05-2024	Figure 1

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DH Environmental Inc.

Former Powerhouse Structure Location Map

Former Jorgensen Forge Facility 8531 E. Marginal Way S. Tukwila, WA, 98108	01/12/2024	Figure 2

Legend

Former Powerhouse Structure

Note:

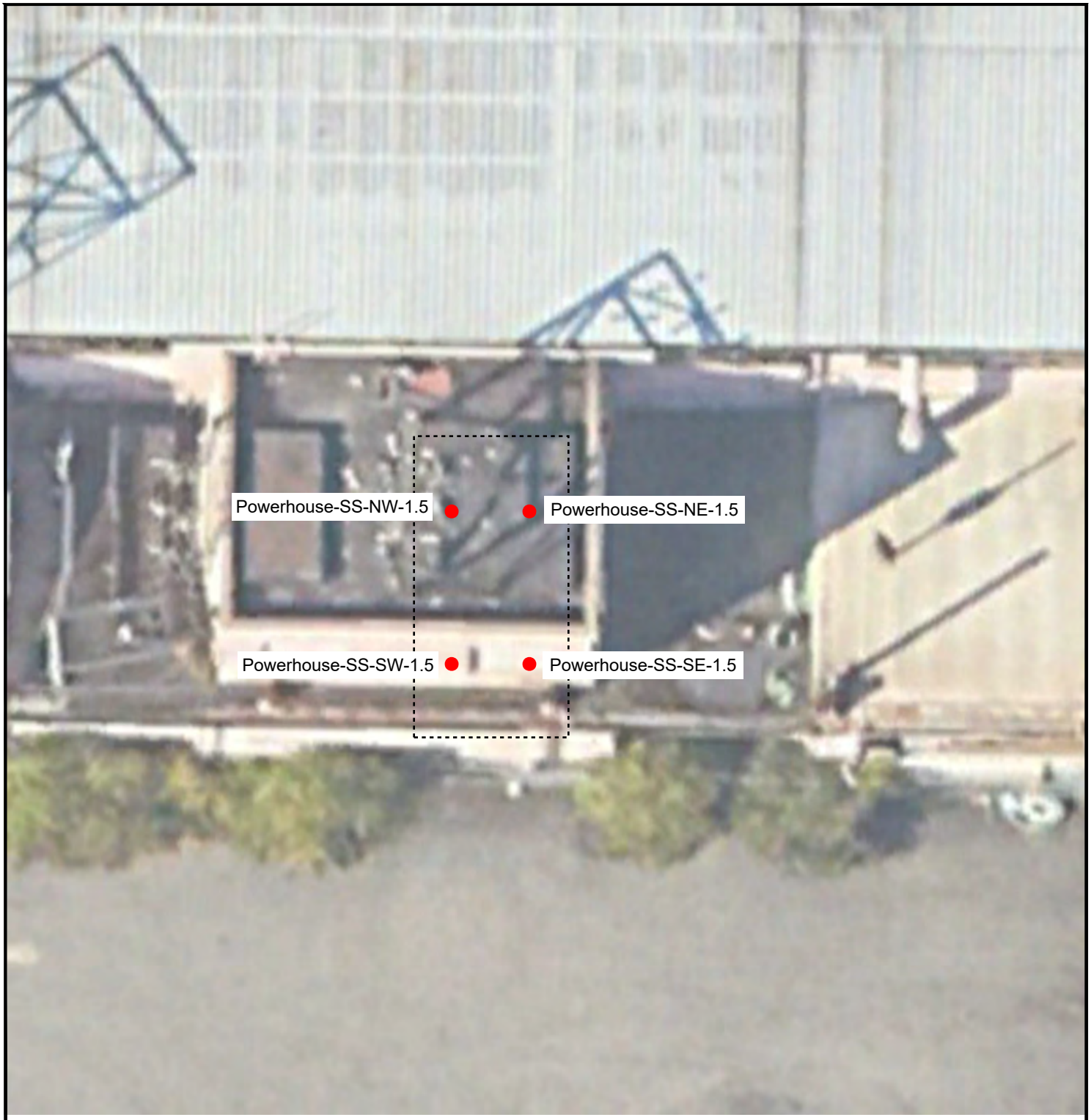
1. Aerial Photography Source: Google Earth Pro, 08/14/2020.

N

0 60 120

Scale in Feet

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DH Environmental Inc

Confirmation Soil Sample Locations

Former Jorgensen Forge Facility 8531 East Marginal Way S Tukwila, WA, 98108	01-26-2024	Figure 3

LEGEND

- Confirmation Soil Sample Location and Designation
- Approximate Excavation Extent

N

0 5 10

Scale in Feet

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Table 1
PCB Analytical Results Summary
Confirmation Soil Samples, Powerhouse Slab Removal
December 19, 2023
Former Jorgensen Forge Site, Tukwila, Washington

Sample ID	PCBs (mg/kg)								
	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1262	Total PCBs
Powerhouse-SS-NW-1.5	0.053 U	0.053 U	0.053 U	0.053 U	0.053 U	0.053 U	0.053 U	0.053 U	**0.053 U**
Powerhouse-SS-NE-1.5	0.054 U	0.054 U	0.054 U	0.054 U	0.054 U	0.054 U	0.054 U	0.054 U	**0.054 U**
Powerhouse-SS-SW-1.5	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	**0.055 U**
Powerhouse-SS-SE-1.5	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	**0.056 U**
Powerhouse-Dup-1	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	**0.056 U**

Notes
1. "U" denotes analyte not detected at a concentration greater than or equal to the given laboratory practical quantitation limit (PQL).

Abbreviations
PCB = polychlorinated biphenyl
mg/kg = milligrams per kilogram

Analytical Methods
PCBs by EPA Method 8082A
Analyzed by Onsite Environmental, of Redmond, Washington (Lab report 2312-241)

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1011 SW Klickitat Way, Suite 107
Seattle, WA 98134

March 17, 2022

Ms. Michelle Pirzadeh
Regional Administrator
US EPA Region 10
1200 Sixth Avenue
Seattle, WA 98101
206-553-1272

Via email to:
pirzadeh.michelle@epa.gov
mullin.michelle@epa.gov

Re: Former Jorgensen Forge Property, Tukwila, Washington
Extension Request for PCB Storage Limitation Under 40 CFR § 761.65

Dear Ms. Pirzadeh,

Based on a recent meeting with Ms. Michelle Mullin, we agreed to send this request for an extension to the polychlorinated biphenyls (PCB) storage limitations outlined in 40 CFR § 761.65(a)(1), for the disposal of PCB waste at the former Jorgensen Forge property, located at 8531 E. Marginal Way S., in Tukwila, Washington (Property).

As described below, there is also some question as to whether the storage limitations apply in this case. Therefore, we also request clarification on the issue for our future reference.

Background

On September 16, 2020, personnel from DH Environmental discovered evidence of vandalism and theft from the Property, including damage to two large transformers (apparently resulting from an attempt by thieves to scavenge metal) that resulted in the spill of transformer oil from one of the transformers. The spill was reported to the Washington State Department of Ecology (Ecology) Environmental Report Tracking System (ERTS) on September 17, 2020 (ERTS # 700704). A follow-up letter was also provided to Ms. Katy Harvey in Ecology's Hazardous Waste & Toxics Reduction Program on September 25th, 2020. A copy of the ERTS notification confirmation email and attached field report, including initial lab data from the transformer oil, are included in Attachments 1 and 2, respectively. A copy of the letter provided to Ms. Harvey is included as Attachment 3.

It was estimated that approximately 3- to 5-gallons of transformer oil were spilled. PCBs were reported in a sample of the transformer oil at a concentration of 1,400 milligrams per kilogram (mg/kg). Assuming the maximum volume of 5-gallons was released, the total quantity of PCBs from the spill was 0.05 pounds. A copy of the spill volume calculations were provided in the field report attached to the ERTS notification included in Attachment 2.

The spill occurred indoors on the second floor of the building, and some of the transformer oil dripped down to the first floor. No storm drains, sanitary sewers, or soil were impacted by the release. DH Environmental personnel responded to the spill the next day on September 17, 2020.

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All recoverable transformer oil was removed using spill absorbent. All spent absorbent and cleanup debris were containerized in Department of Transportation (DOT) approved 55-gallon drums for offsite disposal. Plastic sheeting was laid over all surfaces that had been impacted by the transformer oil, and M_L PCB marking stickers were placed on the plastic and on all doorways leading into the rooms affected by the transformer spill. All cleanup debris was disposed of as Toxic Substances Control Act (TSCA) regulated PCB waste to Chemical Waste Management, a permitted Subtitle C Landfill in Arlington, Oregon. The cleanup waste was disposed of on September 25, 2020, under profile number OR345688. The cleanup waste was shipped for disposal on hazardous waste manifest number 021751122JJK.

Post cleanup samples were collected from the concrete slabs that transformer oil had been spilled on. Concrete samples were collected from both the first and second floors by drilling into the concrete floor and collecting the cuttings into a laboratory supplied sampling jar. A wipe sample was also collected from the concrete surface on the second floor, closest to the transformer that had spilled. PCBs were reported in the concrete samples at a concentration of 200 milligrams per kilogram (mg/kg) and 30 mg/kg, from the first and second floors, respectively. PCBs were reported in the wipe sample from the second floor at a concentration of 24,000 micrograms per 100 square centimeters (µg/100 cm^2).

Planned Cleanup Activities

Due to the physical location of the transformers and the current condition of the building in which they are located, the final cleanup of the transformer spill will require portions of the building to be removed. The transformer carcasses are too big to be removed using the existing staircase, and the crane rails believed to have been used to install the transformers are not structurally sound. In addition, the concrete slabs themselves also require removal. Because the concrete slab on the second floor is a structural member of the building, it cannot be removed without demolition of the structure itself.

The owner of the Property, Star Forge, LLC, plans to demolish all of the buildings on the Property and has applied to the City of Tukwila (City) for a demolition permit. We have recommended the PCB cleanup of these transformers and concrete slabs be conducted as part of those demolition activities. The City has indicated that Star Forge cannot proceed with any demolition on the Property – even for removal of the transformers – until they have approved and issued the demolition permit. The demolition work plan submitted to the City as part of the demolition permit application includes a section describing the removal of the transformers and a performance-based cleanup to be performed under 40 CFR 761.61(b). Essentially, the transformers will be removed through the roof using a crane, and the concrete slabs will be segregated during demolition and disposed of as TSCA waste to a subtitle C landfill. No attempt will be made to scarify or otherwise remove the PCBs from the concrete. We estimate approximately 20 cubic yards of concrete will require removal and disposal as PCB waste, plus the two transformer carcasses. The location of these transformers is shown on PDF pages 3 and 4 of the September 25, 2020 letter to Ms. Harvey, included in Attachment 3.

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Final Cleanup Schedule

We do not yet know when the demolition permit will be approved, but all indications are that it will be approved this year. The City has indicated their review and approval of the demolition permit is contingent upon final Ecology approval of the Interim Action Work Plan (IAWP) for the Property, because certain activities described in the IAWP require demolition of overlying superstructures.

Ecology has recently approved the public review draft of the IAWP for the property, and the IAWP is currently out for public comment as of March 14, 2022. A copy of the public review draft of the IAWP was provided to Ms. Michelle Mullin, EPA Region 10 PCB Coordinator, via email on March 14, 2022. We expect the City of Tukwila to take action on the demolition permit application after the IAWP is finalized.

Regulatory Interpretation

In accordance with 40 CFR 761.60(b)(6)(ii)(B), the transformer carcasses are not regulated under subpart D of this chapter, because they have both been drained of free-flowing liquids. This includes the storage time limitations in Subpart D (40 CFR 761.65), which is supported by the 2014 PCB Q&A Manual (EPA, 2014), which states:

> *Q: If I store a drained PCB-Contaminated transformer for disposal for more than nine months, must I file an exception report?*
>
> *A: Storage for disposal of drained PCB-contaminated articles, including transformers, is not regulated (see §761.60(b)(6)(ii)(B)). Therefore, neither the one-year disposal requirement nor the one-year exception reporting requirement apply to the waste.*

The concrete which has been contaminated by oil spilled from the transformer is a spill of 10-pounds or less (estimated mass of 0.05-pounds), and notification to EPA is not required for a spill of this size per the requirements of 40 CFR § 761.125(a)(1)(iv). In addition, the spill is still considered an active cleanup due to the current lack of access to the site. As noted in 40 CFR § 761.125(b)(2),

> *Completion of cleanup may be delayed beyond 48 hours in case of circumstances including but not limited to, civil emergency, adverse weather conditions, lack of access to the site, and emergency operating conditions.*

Request for Clarification and Extension of PCB Storage Limitations

When the vandalism to the transformers and the resulting spill were discovered, we believed the demolition permit from the City of Tukwila would be issued shortly. As indicated above, however, the City has delayed processing of the demolition permit application while the owner of the Property has negotiated an Agreed Order and IAWP with Ecology. The IAWP addresses removal of 18 underground storage tanks and the permanent closure of dangerous waste management units on the Property, which is already the subject of a remedial investigation being conducted by the prior owner under a separate Agreed Order with Ecology. In the interim, we have been very involved with preparing the required work plans and related tasks necessary to support the demolition permit and approval of the IAWP. Because the demolition permit application is still

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pending review by the City of Tukwila, and we cannot perform the demolition work required for removal of the transformers and contaminated concrete until that application is approved, we respectfully request an extension to the PCB storage limitations outlined in 40 CFR § 761.65(a)(1), if your office interprets those storage limitations to apply in this case.

As communicated with Ms. Mullin in our call on March 14, 2022, we will keep her office informed as work progresses on this Property related to any tasks involving PCBs, including activities that may not be considered "TSCA regulated". We appreciate the open line of communication and collaboration as we work towards demolition of these buildings and the final cleanup of the PCB spill.

Please let us know if you need any more information as you consider this request. We are happy to show you or your staff the affected areas of the property if that will be helpful in your decision making, as some of these details are hard to convey on figures and photographs alone.

Sincerely,



Nathan Moxley, LHG
Principal Geologist
DH Environmental, Inc.
nathan.moxley@dhenviro.com

Cc: Ms. Michelle Mullin, USEPA Region 10 PCB Coordinator

Enclosures

Attachment 1	ERTS Notification Email Confirmation, 9/17/2020
Attachment 2	Transformer Spill Discovery Field Report and Initial Sample Data (email attachment with ERTS report)
Attachment 3	Letter to Ms. Katy Harvey, Ecology Dangerous Waste Program, 9/25/2020

References:

EPA, 2014. June 2014 Version, Revisions to the PCB Q and A Manual. June.

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Nathan Moxley

From: David Hill
Sent: Thursday, September 17, 2020 1:37 PM
To: ECY RE NWRO ERTS
Cc: Harvey, Katy (ECY); Sanchez, Maureen (ECY); Billick, Ben (ECY); Lynn Miranda; Richard H. Allan; Bradley M. Marten; James Robertson; Stephen Busby; Adler, David (ECY); Musa, Donna K. (ECY)
Subject: RE: Transformer Oil Spill at 8531 E Marginal Way S, Tukwila, WA 98108 (Former Jorgensen Forge Facility)

THIS EMAIL ORIGINATED FROM OUTSIDE THE WASHINGTON STATE EMAIL SYSTEM - Take caution not to open attachments or links unless you know the sender AND were expecting the attachment or the link

Thank you Katelyn. If there is any way to do so, can you please have the spill group contact me if they intent to make a site visit? I understand our folks are wrapping up on-site now and I want to be sure they have someone to escort them.

Thanks,

David J. Hill, PE, CHMM, CPEA
President / Principal Engineer
DH Environmental, Inc.
Phone: 206.293.3126
email: davehill@dhenviro.com
www.dhenviro.com

From: ECY RE NWRO ERTS <nwroerts@ECY.WA.GOV>
Sent: Thursday, September 17, 2020 1:11 PM
To: David Hill <davehill@dhenviro.com>
Cc: Harvey, Katy (ECY) <KGIB461@ECY.WA.GOV>; Sanchez, Maureen (ECY) <MASA461@ECY.WA.GOV>; Billick, Ben (ECY) <BBIL461@ECY.WA.GOV>; Lynn Miranda <Lynn.Miranda@TukwilaWA.gov>; Richard H. Allan <rallan@martenlaw.com>; Bradley M. Marten <bmarten@martenlaw.com>; James Robertson <jrobertson@JorgensenForge.com>; Stephen Busby <sbusby@ce-starllc.com>; Adler, David (ECY) <DADL461@ECY.WA.GOV>; Musa, Donna K. (ECY) <DMUS461@ECY.WA.GOV>
Subject: RE: Transformer Oil Spill at 8531 E Marginal Way S, Tukwila, WA 98108 (Former Jorgensen Forge Facility)

Thank you David,

This report has been documented in Ecology's Environmental Report Tracking System (ERTS) as report # 700704.

Katelynn Piazza (she/her)
ERTS & SEPA Coordinator
Washington State Department of Ecology
Northwest Regional Office
3190 160th Ave SE | Bellevue, WA 98008-5452
(425) 649-7229 | katelynn.piazza@ecy.wa.gov

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NOTICE: This communication is a public record and may be subject to disclosure pursuant to the Public Records Act (RCW 42.56).

From: David Hill <davehill@dhenviro.com>
Sent: Thursday, September 17, 2020 1:02 PM
To: ECY RE NWRO ERTS <nwroerts@ECY.WA.GOV>
Cc: Harvey, Katy (ECY) <KGIB461@ECY.WA.GOV>; Sanchez, Maureen (ECY) <MASA461@ECY.WA.GOV>; Billick, Ben (ECY) <BBIL461@ECY.WA.GOV>; Lynn Miranda <Lynn.Miranda@TukwilaWA.gov>; Richard H. Allan <rallan@martenlaw.com>; Bradley M. Marten <bmarten@martenlaw.com>; James Robertson <jrobertson@JorgensenForge.com>; Stephen Busby <sbusby@ce-starllc.com>
Subject: Transformer Oil Spill at 8531 E Marginal Way S, Tukwila, WA 98108 (Former Jorgensen Forge Facility)

THIS EMAIL ORIGINATED FROM OUTSIDE THE WASHINGTON STATE EMAIL SYSTEM - Take caution not to open attachments or links unless you know the sender AND were expecting the attachment or the link

Good afternoon,

Please see the attached report regarding a transformer oil spill at 8531 E Marginal Way S, Tukwila, WA 98108. The spill was a result of vandalism/attempted theft at the site and it is unknown exactly when the spill occurred. An estimated 3-5 gallons was spilled from the transformer and all oil was contained on-site and indoors. No storm drains, sanitary sewers, or soil have been impacted. DH Environmental, Inc. is currently onsite conducting cleanup.

This incident is related to ongoing break-ins and trespass at the site. We will follow up with applicable police reports. I may be reached at the email and phone number below.

Thank you,

David J. Hill, PE, CHMM, CPEA
President / Principal Engineer
DH Environmental, Inc.
Phone: 206.293.3126
email: davehill@dhenviro.com
www.dhenviro.com

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DH Environmental Inc 1011 SW KLICKITAT WAY SUITE 107 SEATTLE, WASHINGTON 98134	**FIELD REPORT**		File Name: FR_SF break-in discovery_09162020
	Project: Star Forge		Date: 9/16/2020
	Owner: Star Forge	Time of Arrival: 0900	Report Number: 1
Prepared by: Nathan Moxley	Location: 8531 East Marginal Way	Time of Departure: 1230	Page: Page 1 of 1
Purpose of Site Visit: Slag pH Sampling	Weather: Indoors	Travel/Prep. Time: 3 hr	Project/Contract Number: Work Order 03 – Clean Closure

Upon arrival to the site I assessed personal safety hazards: ☒ Yes or ☒ Referred to Site Safety Plan and Safety Tailgate if applicable
Safety Hazards Were Addressed by : ☒ Performing tool box safety meeting ☒ Donning PPE, and observing safety standards

Site Visit Purpose and Details:

A site visit was conducted to collect samples of metal slag-like material from subsurface process pits. Upon arrival to the Facility, evidence of a break-in was observed in the former Melt Shop Area and other areas throughout the property.

Summary of Field Activities:

Nathan Moxley and Brian Johnson of DH Environmental arrived onsite at approximately 0900. Upon arrival we unloaded confined space entry gear and sampling equipment.

While preparing to conduct sampling it was evident that people had been in the building. There was debris in various places throughout the former Melt Shop that was not present the last time we were on site. Many electrical equipment panels had been smashed, and debris had been piled in various places. It appeared someone had been collecting copper wire and/or components and breaking open equipment to retrieve copper inside of them. Some debris appeared to have fallen or had been dropped from the overhead gantry cranes. We walked around the facility to make sure no one was present. We observed similar conditions in other areas throughout the facility (smashed electrical panels/equipment, evidence of people stealing scrap metal). We also found evidence of human waste and used hypodermic needles.

During our inspection we checked the second-floor transformers upstairs and south of the former Arc Furnace Pit. Both transformers had been broken open, and oil was covering the floor around transformer TC-24. No oil was observed around the second transformer (unknown number/label), even though the top had been pried off, and a winch had been hung from an overhead beam to lift the top, and possibly internal components, out. At least two hypodermic needles were visible on the floor near the TC-24 transformer. Food and cigarette butts were also visible, and it appeared someone had spent a significant amount of time working to open the transformers. Ceramic bushings had been smashed and broken on the floor surrounding both transformers, and a sledge hammer was visible next to Transformer TC-24. The floor had visible holes in it, and oil was visible on the first floor beneath the TC-24 transformer room. In addition, what appeared to be footprints were visible near the oil on the first floor, indicating minor amounts of oil may have been tracked around. Less than 5-gallons of oil were estimated to have been spilled from the TC-24 transformer

A sample of the transformer oil was collected from a puddle on the floor using a new, dedicated, oil absorbent pad. The absorbent pad was soaked in oil and wrung out into a laboratory supplied sampling jar. The sample was identified as "SF-transformer oil-09162020", and it was submitted to Onsite Environmental on a rush turnaround for analysis of PCBs by EPA Method 8082.

A calculation sheet is attached documenting the quantity of PCBs estimated to have been released from the Transformer.

☒ **THIS FIELD REPORT IS FINAL**	**FIELD REPRESENTATIVE:** Nathan Moxley, LG, LHG	**DATE:** 9/17/2020
☒**THIS FIELD REPORT IS FINAL**	**REVIEWED BY:** DAVID HILL, PE, CHMM, CPEA	**DATE:** 9/17/2020

This report presents observations and a record of field activities relating to our services only. Other work may have been performed on this project that was not under the direction or guidance of DH Environmental, Inc. Our work did not include supervision or direction of the work of others. DH Environmental, Inc. is not responsible for job or site safety of others on this project. DISCLAIMER: Any electronic form, facsimile or hard copy of the original document (email, text, table, and/or figure), if provided, and any attachments are only a copy of the original document. The original document is stored by DH Environmental, Inc. and will serve as the official document of record.

ATTACHMENTS:

☒ Site Photos ☐ Sketch ☐ Chain of Custody ☒Other: PCB Release Quantity Calculation; Onsite Lab Report # 2009-155
☐ Sample Log ☐ Drawing(s) ☐ Calibration Records

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Attachment 1 – Photo Log
Star Forge Break-In and Transformer Spill
9/16/2020

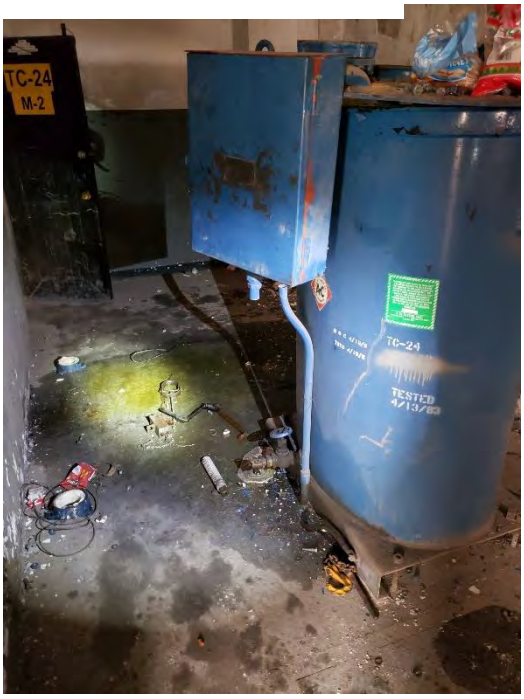


Photo 1: Transformer TC-24. Spilled oil visible on the floor. Taken from the 2nd floor TC-24 Transformer room.

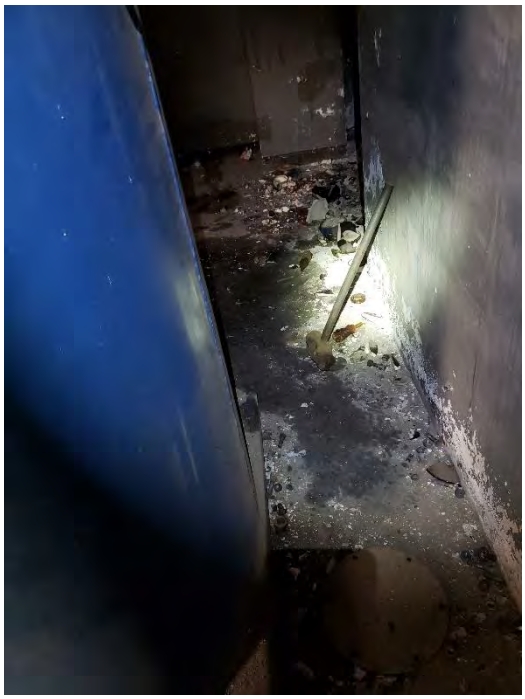


Photo 2: Area behind transformer TC-24. Sledge hammer visible that was used to smash ceramic insulators/bushings from transformer and adjacent connections. Taken from the 2nd floor TC-24 Transformer room.

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Photo 3: PCB oil on the floor behind transformer TC-24. Broken ceramic insulators and debris also visible. A hypodermic needle is visible in the background. Taken from the 2nd floor TC-24 Transformer room.



Photo 4: Hypodermic needle next to the TC-24 transformer. Taken from the 2nd floor TC-24 Transformer room.

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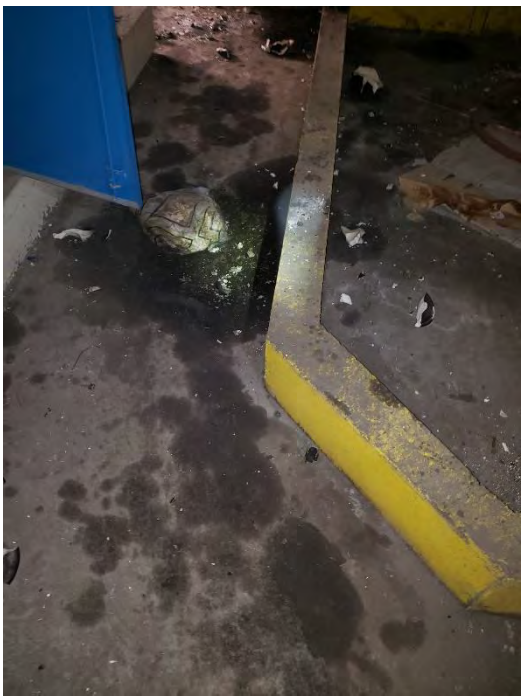


Photo 5: Spilled oil on the first floor beneath the TC-24 transformer room. Oil had dripped through the ceiling due to holes in the upstairs floor. Footprints are visible in the oil in the foreground.

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Star Forge

Transformer Spill 9/17/2020

PCB Release Quantity Calculation

Specific gravity of transformer oils	= ~ 0.9 [1]
Density of Water	= ~ 1 g/cm^3 [2]
	= 3.79 kg/gal
Estimated spill volume	= less than 5-gallons
PCB concentration of spilled oil	= 1,400 mg/kg [3]

Mass of Spilled PCBs:

Mass of oil: 5-gallons oil x 3.79 kg/gal x 0.9	= 17.1 kg oil
Mass PCBs: 17.1 kg oil x 1,400 mg/kg PCBs	= 23,940 mg PCBs
	= 0.05 pounds

Reportable Quantity (RQ) Calculations:

Federal RQ for PCBs	= 1 lb [4]
	= 453,592 mg

Volume oil required to reach RQ: $\frac{(X)(3.79\frac{kg}{gal})(0.9)(1{,}400\frac{mg}{kg}\ PCBs)}{453{,}592\ mg\ PCBs}$

Where X = volume of oil required to reach RQ

$$X = \frac{453{,}592\ mg\ PCBs}{(3.79\frac{kg}{gal})(0.9)(1{,}400\frac{mg}{kg}PCBs)} = 95 \text{ gallons}$$

[1] Transformer Oil Chemical Data Sheet, density at 59-deg F (15-deg C); https://cameochemicals.noaa.gov/chemical/12205

[2] https://pubchem.ncbi.nlm.nih.gov/compound/Water#section=Density

[3] Onsite Environmental Lab Report # 2009-155

[4] 40 CFR § 302.4 - Designation of hazardous substances

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1011SW Klickitat Way, Suite 107
Seattle, WA 98134

Via Email

25 September 2020

Katy Harvey
Hazardous Waste & Toxics Reduction Program
Washington Department of Ecology
3190 160th Ave SE
Bellevue, WA 98008
kgib461@ecy.wa.gov

Re: Response to Vandalism/transformer fluid spill at former Jorgensen Forge facility

Dear Ms. Harvey:

I'm writing in response to your email of September 17 to provide information on our initial cleanup.

As you know, the spill of transformer fluid resulted from vandalism and attempted theft by one or more trespassers on the property. The spill occurred indoors on the second floor above ground level. Initial figures showing the approximate location of the spill are attached.

The attached photo log includes photos of the transformer from which the release occurred. The green label on the transformer indicates it has been tested and found to contain less than 50 ppm PCBs. The transformer previously had been drained of PCBs, possibly by a prior owner, and in any event was not in use. The release occurred because someone, presumably to get at copper that could be stripped from the unit and sold, smashed the transformer with a sledgehammer, and released residual oil still contained in the unit.

We don't know exactly when that illegal activity occurred. The area in which the vandalism took place is fenced. There have recently been a number of break-ins to the site, including an arrest made by the Tukwila Police Department this month, but the damage to transformer TC-24, and the consequent spill, was not discovered until last week during a sampling event. We have conservatively assumed that the spill occurred more than 72 hours before the cleanup began. Therefore, the cleanup will be conducted under the performance based cleanup requirements of 40 CFR 761.61(b). Proceeding in this manner is in accordance with the June 2014 Version of the PCB Q&A Manual.

The waste generated has been and will continue to be managed as TSCA waste and will be disposed of at Chemical Waste Management in Arlington, Oregon, a TSCA-approved facility. The initial cleanup waste (absorbent and loose impacted debris) has been shipped off-site for disposal in less than 30 days in

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accordance with 40CFR § 761.65(c). The waste was shipped on 9/25/2020. A photo of the manifest and approved profile is attached.

We are evaluating the approach to completing cleanup. Final disposal records and confirmation samples from the cleanup will be provided in our final report when the cleanup is complete.

Further security measures are being taken on-site to prevent site trespassers. These further measures include additional fencing around the main structures, additional lighting, and close coordination with the Tukwila Police Department.

Please contact me at the below number or email with any questions.

Thank you,



David Hill, PE, CHMM, CPEA
Principal
DH Environmental, Inc.
(206) 293-3126
davehill@dhenviro.com

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Southwest Bank Area

Approximate Area of JFOS Removal Action

Sheet Pile Footprint

2-66 Area

2016 Excavation

Former SCL Transformers

12-Inch Diameter Lateral

6-Inch Diameter Lateral

Dangerous Waste Central Accumulation Area (Fig. 3)

Bethlehem Steel 12-Inch Diameter Lateral

12-Inch Diameter Property Line Pipe

15-Inch Diameter Lateral

Boeing Plant 2 Facility

South Yard Area

15-Inch Diameter Lateral

Office Building Lateral

King County International Airport (Boeing Field)

Property Line Outfall

Galvanized Bolt Storage

Black Shack Motor Storage

300 Gallon Diesel AST

Shipping Yard

Truck Scale

Former Aboveground Cutting Oil Supply Tank

Main Office

24-Inch Diameter Property Line Pipe

4-Inch Diameter Lateral

Machine Shop Concrete Pile (Fig. 7)

Shipping Chemical Storage Area

East Marginal Way South

Melt Bag House Air Pumps

Galvanizing Shop

Power House

Templet Shop

Receiving Yard

Former Cutting Oil Supply Line

Hollowbore Area

Shipping Area

Diesel Fueling and Used Oil Storage (Former Waste Chemical Storage) Building

Former Billet/Ingot Storage

Tower Shop

Melt Bag House Control Room

Baghouse (Fig. 5)

Former Swarf Storage Area

Metal Storage Shed

Fastenal Warehouse

Area 1 LNAPL Plume

Offices

Former Unregistered 2000-Gallon UST

Excavation Limits

Delivered Material Storage Area

Fabricating Shop

Stoke House

Machine Shop Area

Oil House

Former Unregistered 1000-Gallon UST

Former 8000-Gallon UST

Sludge Location (Observed in 1990)

Melt Bag House

Stormwater Treatment System

Former Oil-Water Separator

Receiving

Engineering Office Trailer

Electrical Shop

Maintenance Tooling

Auto Repair Shop

Carpentry Shop

Former Human Resources Trailer

Former Product Dispenser Location

SB3 Excavation Area

Former Steam Clean Area

Former Acid Pit

Bolt and Rivet Storage

Blacksmith Shop

Former Gasoline AST

Covered Metal Chip Storage

Lab

Offices

Heat Treat Area

Tool Room

Mach. 1st Floor Engineering 2nd Floor

SB4 Excavation Area

Tote/Drum Storage Building (Fig. 4)

Former Etch House/Temporary Storage Area

Melt Shop Pits (Fig. 6)

Former Steam Clean Area

Machine Shop

Underground Storage Tank Area (Fig. 8)

Former Liquid Cooling Gas Storage

Former Shops and Locker Rooms

Former Shops and Locker Rooms

Portable Quench Tank Q9

Portable Quench Tank Q4

Fuel Oil Supply and Return Lines

6,000 Gallon Propane Tank

Electric Trench

Forge Furnaces

Hydraulic Oil Tank

Area 2 LNAPL Plume

Aluminum Heat Treat Building

Former Electrical Station

Utilidor

Former Melt Shop Area

Former Metals Storage Area

Forge Furnaces

Forge Furnaces

Forge Shop Area

Finished Material Storage Area

Former Melt Steel Slag and Mill Scale AOD/EAF Slag Storage Area

Former Scrap and Magnetic Scrap

Billet and Grinding

Billet Grinding Bag House

Former Billet Storage

Former Upsetter Machine

Former Tank Fill Ports

Magnetic Metal Chips/Turnings Storage Area

Former Scrap Storage Bins

Former Swarf Stockpile Area

Boeing/Isaacson Property

Area Wide Sampling (Fig. 9)

LOWER DUWAMISHWATERWAY

Location of Transformer Spill 9/17/2020 (first and second floor)

N

0 60 120

Scale in Feet

Legend

- Approximate Property Boundary
- Top of Shoreline Bank (2012)
- Top of Shoreline Bank (2014)
- Former Bethlehem Steel Facility
- Former Embayment
- Property Line Outfall Pipes
- Estimated Extent of LNAPL on Groundwater (Farallon, August 2009)
- Approximate Excavation Extents
- Bulkhead Area
- Outfall (Active)
- Outfall (Inactive)
- Railroad
- Fence
- Transformer
- Below Ground Feature

Notes:

1. Figure adapted from client file, 141500101002_1-8.dwg, prepared by PES Environmental, Inc. dated July 2017, and 01012802-006.dwg, prepared by Achor Environmental, LLC and Farallon Consulting. Property Boundary from client file, 11078 Topo E-MAIL.dwg, prepared by Anchor QEA, LLC., Dated Jan 24, 2012.
2. Red text refers to features of the former Bethlehem Steel Facility.

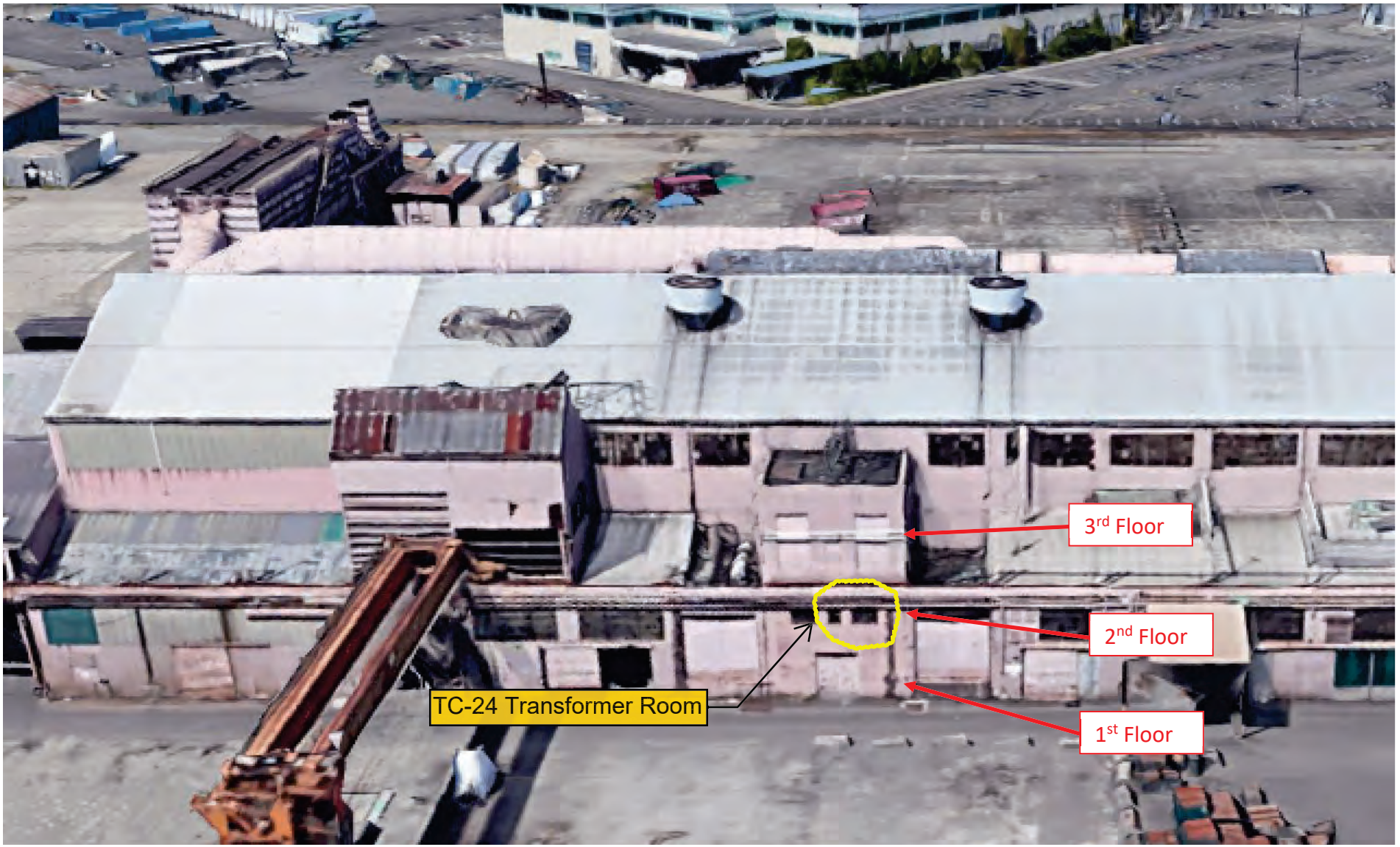
DH Environmental Inc

SITE MAP

Former Jorgensen Forge Facility 8531 E. Marginal Way S. Tukwila, WA, 98108	06-19-2020	Figure 2

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PLOT TIME: 6/18/2020 9:47 AM MOD TIME: 6/17/2020 5:54 PM USER: Kelley Begley DWG: P:\DH Environmental\Site\Star Forge\Figures\2020-06\DH 2020-06 Star Forge Site Map.dwg



View to the north showing the former Melt Shop Area. Transformer TC-24 is located on the 2nd floor behind the window marked in yellow. Transformer oil also dripped through holes in the floor to the first floor directly beneath the TC-24 room.

Photo Log
Star Forge Break-In and Transformer Spill
9/17/2020 – Post Cleanup Response Pictures

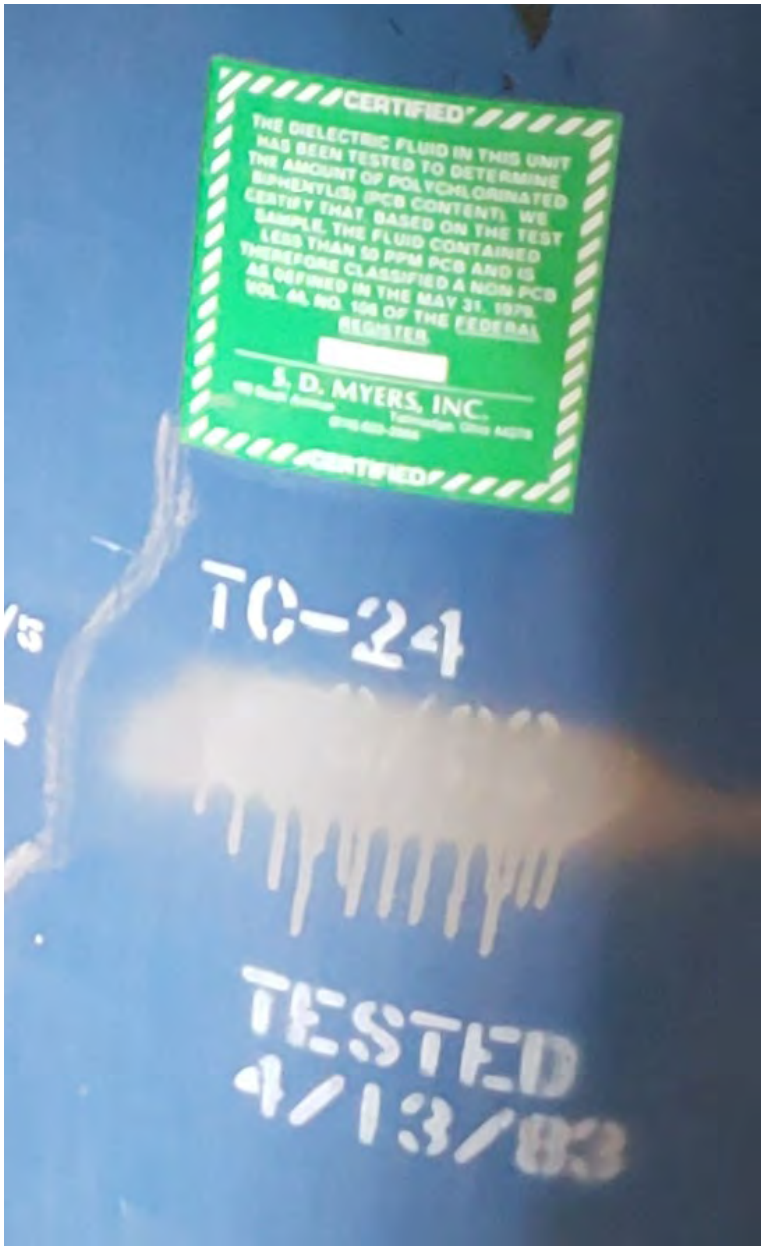


Photo 1: Transformer TC-24. The green label indicates the transformer was sampled and is a non-PCB transformer.

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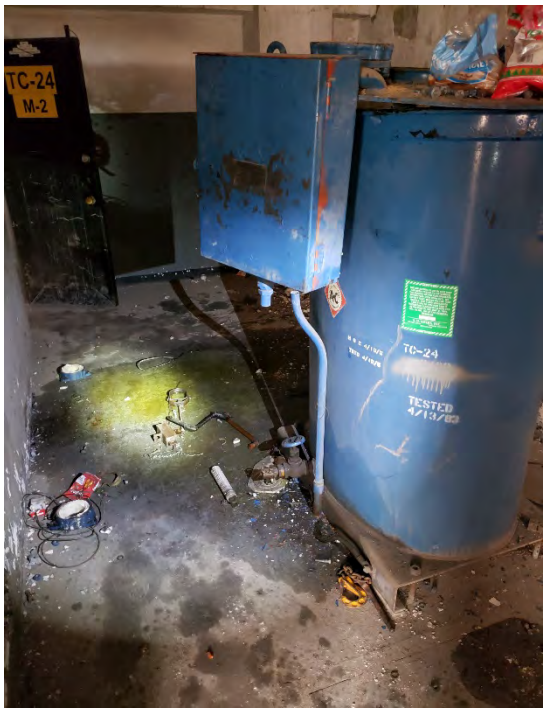


Photo 2: Transformer TC-24 Spill Area (second level) prior to cleanup actions.



Photo 3: Transformer TC-24 Spill Area (second level) after to cleanup actions.

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Photo 4: Transformer TC-24 Spill Area (second level) after to cleanup actions. The drain valve was damaged but has now been secured. A spill pad has been placed on the ground to capture any drips and visqueen was placed on the ground of the impacted area.

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Photo 5: First level spill area prior to cleanup actions.



Photo 6: First level spill area after cleanup actions.

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Photo 7: Drummed Cleanup Media in the Tote Storage Area

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Powerhouse Vault Location Map

Former Jorgensen Forge Facility 8531 E. Marginal Way S. Tukwila, WA, 98108	01/26/2024	Figure 1

Legend

Approximate Location of Powerhouse Vault

N

0 60 120

Scale in Feet

Note:

1. Aerial Photography Source: Google Earth Pro, 08/14/2020.

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Photo Log
Previously Unknown Powerhouse Vault
December 2023
Former Jorgensen Forge Facility, Tukwila, WA



Photo 1: Location of the vault, west of the Powerhouse, after initial discovery. The vault was hidden beneath a concrete structure, and beneath a steel plate supported by an I-beam. The main Powerhouse structure is visible in the background, view to the east southeast.



Photo 2: Powerhouse vault, west of the Powerhouse, after initial discovery. View to the south.



Photo 3: Powerhouse vault, west of the Powerhouse, after initial discovery. Initial waste characterization soil sample collected from the brown soil marked with a red arrow. View to the southwest.



Photo 4: Powerhouse vault, west of the Powerhouse, following soil removal from the portion of the vault extending east-west. The vault contains a concrete base and sidewalls. Soil was stockpiled on plastic pending profile approval as TSCA waste to a subtitle C landfill. View to the west.



Photo 5: Powerhouse vault, west of the Powerhouse, following soil removal from the portion of the vault extending east-west. View to the east.



Photo 6: Powerhouse vault, west of the Powerhouse, following soil removal from the portion of the vault extending east-west. The vault appears to end after the steel I-beam visible in the top portion of this picture, and the fill material distinctly changes to a very dense gravel. No concrete sidewall was present at the south end of the vault. View to the south.

IMPORTANT INFORMATION

Important Information

About Your Geotechnical/Environmental Report

IMPORTANT INFORMATION

CONSULTING SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND FOR SPECIFIC CLIENTS.

Consultants prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for the purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the consultant.

THE CONSULTANT'S REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical/environmental report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask the consultant to evaluate how any factors that change subsequent to the date of the report may affect the recommendations. Unless your consultant indicates otherwise, your report should not be used (1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); (2) when the size, elevation, or configuration of the proposed project is altered; (3) when the location or orientation of the proposed project is modified; (4) when there is a change of ownership; or (5) for application to an adjacent site. Consultants cannot accept responsibility for problems that may occur if they are not consulted after factors that were considered in the development of the report have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural processes or human activity. Because a geotechnical/environmental report is based on conditions that existed at the time of subsurface exploration, construction decisions should not be based on a report whose adequacy may have been affected by time. Ask the consultant to advise if additional tests are desirable before construction starts; for example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/environmental report. The consultant should be kept apprised of any such events and should be consulted to determine if additional tests are necessary.

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help reduce their impacts. Retaining

IMPORTANT INFORMATION

your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

The conclusions contained in your consultant's report are preliminary, because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Actual subsurface conditions can be discerned only during earthwork; therefore, you should retain your consultant to observe actual conditions and to provide conclusions. Only the consultant who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The consultant who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical/environmental report. To help avoid these problems, the consultant should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological, and environmental findings, and to review the adequacy of their plans and specifications relative to these issues.

BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE REPORT.

Final boring logs developed by the consultant are based upon interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical/environmental reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.

To reduce the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/environmental report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared, and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes that aggravate them to a disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical/environmental engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims

IMPORTANT INFORMATION

being lodged against consultants. To help prevent this problem, consultants have developed a number of clauses for use in their contracts, reports, and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where the consultant's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

The preceding paragraphs are based on information provided by the GBA, Silver Spring, Maryland