PREPARED FOR:
Earle M. Jorgensen Company
10650 S. Alameda Street
Lynwood, CA 90262

BY:

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

(206) 632-8080
www.shannonwilson.com

PFAS INVESTIGATION WORK PLAN

Jorgensen Forge Corporation Property

TUKWILA, WASHINGTON

SHANNON & WILSON

June 30, 2022

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

Prepared for: Earle M. Jorgensen
10650 S. Alameda Street
Lynwood, CA 90262

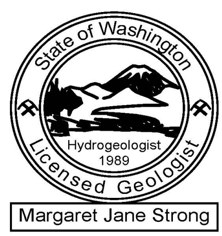
Subject: PFAS INVESTIGATION WORK, JORGENSEN FORGE CORPORATION, TUKWILA, WASHINGTON

This PFAS Investigation Work Plan 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.

Remedial investigation (RI) activities are being completed by EMJ under Agreed Order (AO) number DE 14143, issued by Ecology and dated July 28, 2017. EMJ owned the property from 1965 to 1992 and has assumed responsibility for implementing RI activities at the site pursuant to the AO under the Model Toxics Control Act (MTCA) and MTCA's implementing regulations. During RI activities completed in 2021/2022, PFAS were identified in groundwater. This Work Plan is to undertake additional work to delineate PFAS in soil and groundwater.

Sincerely,

SHANNON & WILSON



Ryan Peterson Digitally signed by Ryan Peterson Date: 2022.06.30 19:46:36 -07'00'

Meg Strong Digitally signed by Meg Strong

Ryan Peterson, PE
Senior Engineer
Role: Project Engineer

Meg Strong, LHG
Senior Consultant
Role: Project Coordinator

RBP:SKH:MJS/rbp

CONTENTS

Exhibits

Tables

CONTENTS

Figures

Appended

ACRONYMS

AFFF	aqueous film forming foam
AO	Agree Order
bgs	below ground surface
City	City of Tukwila
CO2	carbon dioxide
DOH	Washington State Department of Health
Ecology	Washington State Department of Ecology
EMJ	Earle M. Jorgensen Company
EPA	U.S. Environmental Protection Agency
MTCA	Model Toxics Control Act
ng/L	nanograms per liter
PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutanesulfonic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonate
QAPP	Quality Assurance Project Plan
RIWP	Remedial Investigation Work Plan
SAL	State Action Level
SAP	Sampling and Analysis Plan
Site	8531 East Marginal Way South, City of Tukwila, Washington

1 INTRODUCTION

This per- and polyfluoroalkyl substances (PFAS) Investigation Work Plan has been prepared on behalf of the Earle M. Jorgensen Company (EMJ) under Agreed Order (AO) Number DE 14143, issued by the Washington State Department of Ecology (Ecology) and dated July 28, 2017 (Ecology, 2017). Under the AO, EMJ will complete a remedial investigation and feasibility study and will prepare a draft cleanup action plan for the uplands portion of the Jorgensen Forge Corporation property located at 8531 East Marginal Way South, City of Tukwila, Washington (Site). The location of the Site is shown in Figure 1.

The investigation described in this work plan is to address data gaps that remain after the extensive investigations that have been previously completed at the Site. This investigation is limited to evaluation for PFAS impacts to soil and groundwater on the uplands portion of the property.

The proposed PFAS investigation activities include groundwater sampling from monitoring wells, installation of groundwater monitoring wells, and soil sampling from borings.

2 BACKGROUND

2.1 Per- and Polyfluoroalkyl Substances Emergence

PFAS compounds are a group of man-made fluorinated organic chemicals that have been used since the 1950s. Perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) are the two PFAS compounds that were produced in the largest amounts in the United States 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 aqueous film forming foam (AFFF), which was used to fight liquid hydrocarbon fires (U.S. Environmental Protection Agency [EPA], 2017).

In the early 2000s, PFAS compounds were identified as contaminants of emerging concern. Cleanup levels for PFAS compounds are being developed and the regulatory environment is evolving. 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. This Lifetime HA Levels were updated by EPA on June 15, 2022, and EPA is working on setting drinking water maximum contaminant limits for PFAS compounds within the next year. The new EPA HA Levels are:

- 0.004 ng/L PFOS
- 0.02 ng/L PFOA
- 10 ng/L GenX chemicals
- 2,000 ng/L perfluorobutanesulfonic acid (PFBS)

In August 2021, the Washington State Department of Health (DOH) identified State Action Levels (SALs) for five PFAS compounds (set individually) in drinking water. The SALs became effective in January 2022. The new SALs are more stringent than the EPA level (15 ng/L for PFOS and 10 ng/L for PFOA) and it is understood that Ecology will adopt the SALs as drinking water cleanup levels for sites with potable groundwater. Ecology has generated other preliminary cleanup levels using the refence dose exposure from the SALs. These cleanup levels include values that are protective of human health or ecological exposure routeways including surface water ecological health (marine and fresh water), soil human health direct contact, and soil leaching to groundwater. It is our understanding that these preliminary cleanup values are still being reviewed.

Despite the fact that groundwater on the Site is not potable, we have used SALs to screen the groundwater PFAS concentrations since there are currently no other relevant screening values.

These SAL drinking water levels are as follows:

- 15 ng/L PFOS
- 10 ng/L PFOA
- 65 ng/L perfluorohexanesulfonic acid (PFHxS)
- 9 ng/L perfluorononanoic acid (PFNA)
- 345 ng/L PFBS

2.2 Aqueous Film-Forming Foam at the Jorgensen Forge Property

During facility walk-throughs undertaken on several occasions, AFFF fire suppression systems were noted to serve the pump rooms for the 660-ton, 1,250-ton, and 2,500-ton presses, and the vault for Quench Tanks 1, 2, and 3 (Q1/Q2/Q3) in the Heat Shop.

During Site visits completed in November 2021 and January 2022, remnants of the AFFF systems or evidence of their former presence were observed at the Site.

As shown in Exhibit 2-1 below, the 660-ton press pump room remains at the Site (photograph taken in November 2021). An AFFF tank is present on the roof of the pump room and AFFF wall decals are visible on the exterior of the structure.

Exhibit 2-1: AFFF System at the 660-Ton Press Pump Room (November 2021)

The 1,250-ton press pump room is no longer present at the Site and no evidence of the AFFF system was noted to remain. However, Exhibit 2-2 shows a photograph of the 1,250-ton press and pump room structure taken in 2018. What appears to be an AFFF tank is visible on the top of the pump room structure.

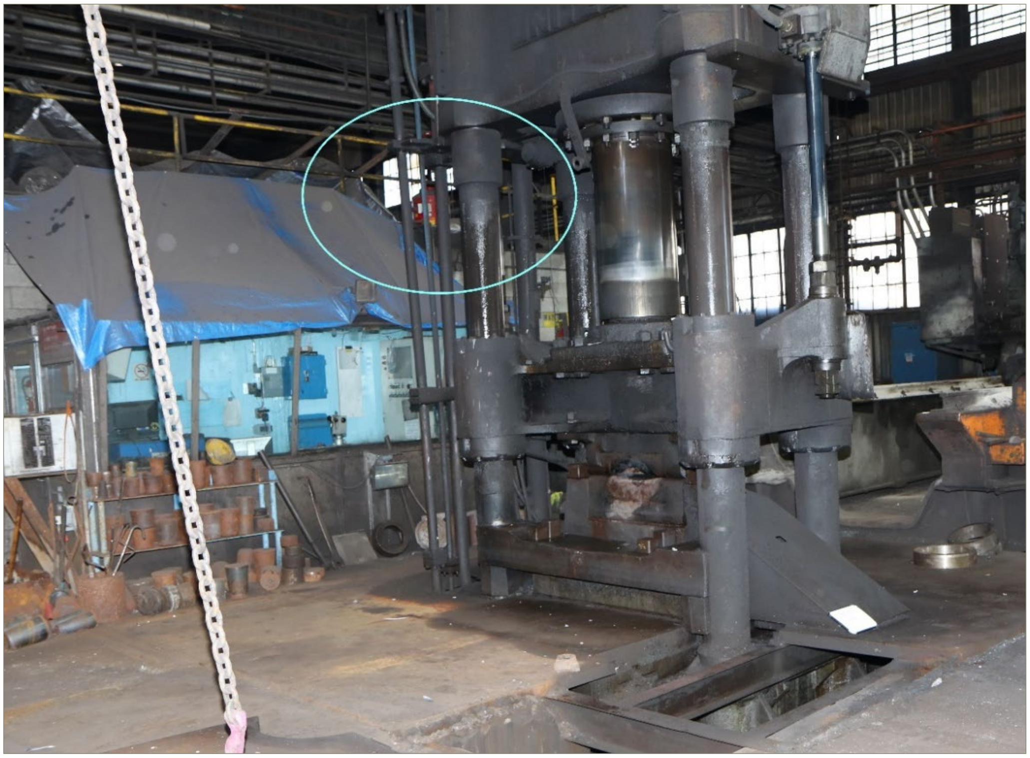


Exhibit 2-2: 1,250-Ton Press and Pump Room (September 2018)

Portions of the 2,500-ton press pump room remain at the Site. The following photographs (Exhibits 2-3, 2-4, and 2-5) show the 2,500-ton press pump room and AFFF system components (photographs were taken in January 2022). Exhibit 2-3 shows AFFF wall decals on the exterior of the pump room structure. Exhibit 2-4 shows the interior of the 2,500-ton press pump room. Within the photograph, an AFFF tank is visible on the roof of the structure. The AFFF tank is shown in greater detail in Exhibit 2-5. The system was noted to have three discharge pipes, which appeared to have led to the 2,500-ton press pump room, the 2,500-ton press pit, and to "V2". It is believed that this "V2" refers to the vertical furnace which was located within the Q1/Q2/Q3 vault.

Exhibit 2-3: AFFF Wall Decals on the Exterior of the 2,500-Ton Press Pump Room (January 2022)

Exhibit 2-4: Interior of the 2,500-Ton Press Pump Room with AFFF Tank Visible on Roof (January 2022)

Exhibit 2-5: AFFF Tank and Piping on Roof of the 2,500-Ton Press Pump Room (January 2022)

An AFFF placard was observed on the wall next to the Q1/Q2/Q3 vault (Exhibit 2-6) and sprinklers were noted on the top rim of the westernmost quench tank (Exhibit 2-7). Sprinklers were not visible on the other two tanks. It is not clear which features within the vault were serviced by the AFFF system. The vault contained the three quench tanks and a vertical furnace. Based on electrical permits discussed on page 8, it is believed that a carbon dioxide (CO_2) fire suppression system may have served Q1 starting in approximately 2010.

Exhibit 2-6: AFFF Placard on Wall Adjacent to Q1/Q2/Q3 Vault (January 2022)

Exhibit 2-7: Sprinklers on Westernmost Quench Tank (January 2022)

Metal placards affixed to the AFFF tanks on the 660-ton press pump room roof and the 2,500-ton press pump room roof indicated that the tanks were built in 1982. An old metal inspection tag on the 660-ton press pump room AFFF tank indicated that inspections had occurred as early as April 1995.

Service labels affixed to the AFFF tank for the 660-ton press pump room had statements indicating that the foam had been tested annually between 2015 and 2019 by a company called The Safety Team. Similar labels were affixed to the 2,500-ton press pump room AFFF tank. A manager (Mr. Andrew Saechao) at The Safety Team was interviewed in November 2021. Mr. Saechao stated that each AFFF system is tested based on its configuration and he had no records stating how testing of the AFFF systems at the Jorgensen Forge facility was undertaken. He did state 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. Records received from the City's Fire Marshall office have not provided any relevant information related to the AFFF systems or annual testing at the Jorgensen Forge facility. However, the records did include electrical permits (dated 2010) associated with a CO2 fire suppression system for Q1 and Quench Tank 6 (Q6).

A long-time facility employee (Mr. Wayne Turk) indicated that fire suppression systems were installed in the pump rooms and in the Q1/Q2/Q3 vault. Mr. Turk stated that the fire suppression systems were serviced annually. He was not aware of the systems ever being activated, either in response to a fire or inadvertently, and he stated he had not observed leaks from the systems. However, Mr. Turk did recall a fire at the facility 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 melt metal breached a furnace wall, or sparks from metal processing would ignite some nearby cardboard.

In 2015, a potential storage area for AFFF was observed during an inspection by an Ecology Hazardous Waste Compliance Inspector (Ecology, 2015). The inspector noted a 55-gallon drum labeled as "AFFF Solution/Water" in the "Used Oil Building." The Used Oil Building is interpreted to refer to the Diesel Storage and Used Oil Storage Building located in the northwest corner of the Site. Further information on quantity and contents of containers and dates of storage was not available.

Related to the use of AFFF at the Site, a Declaration by Michael Lewis dated June 2, 2022, was provided by Marten Law on behalf of Star Forge (Marten Law, 2022). Michael Lewis reports in his declaration he was an employee at the Jorgenson Forge facility from 1983 to 2019, including the period after late 2016 when Star Forge acquired the Site. Mr. Lewis states that he witnessed the removal of the 2,500-Ton press after the facility closure. Mr. Lewis further states that the AFFF fire suppression system was still present during the 2,500-Ton press removal and that during the removal of the 2,500-Ton press, valves to the AFFF tank and water supply were turned off, lines were dry, and no liquid escaped. Star Forge reports that the AFFF tank (and content) associated with the 2,500-Ton press was removed from the Site in June 2022. The tank and content were reportedly disposed as persistent waste at the Chemical Waste Management facility in Arlington, Oregon on June 16, 2022 (DH Environmental, Inc., 2022). Star Forge reports that the AFFF tank associated with the 600-Ton press also was removed and disposed of in June 2022 (DH Environmental, 2022).

In his declaration, Mr. Lewis states that the AFFF system associated with the 1,250-Ton press pit was inadvertently activated by a contractor during his employment. There does not appear to be any documentation associated with the removal of the AFFF fire suppression system from the 1,250-Ton press pit area. As shown in photographs in Exhibit 2-2, the AFFF tank was present in September 2018, and was absent by November 2021. It is unknown how the AFFF from the 1,250-Ton press pit area was handled when the 1,250-Ton press was removed.

To date, Shannon & Wilson has not been able to verify the information provided by Mr. Lewis.

3 PREVIOUS PER- AND POLYFLUOROALKYL SUBSTANCES TESTING

Groundwater samples at the Site had not been previously tested for AFFF-related compounds prior to 2021. Limited groundwater sampling for PFAS was completed during the first and fourth quarter 2021 groundwater monitoring events to evaluate for the presence of PFAS within groundwater at the Site. Samples were collected from upgradient wells MW-8, MW-71, and MW-72 (to establish whether there is migration onto the Site); the vicinity of the AFFF fire suppression systems using wells MW-60, MW-63, and MW-64; and downgradient wells MW-43 and MW-68. 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- and 1,250-ton press pump rooms) and MW-74 (southwest of the 660- 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 below ground surface [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).

Based on our prior experience with AFFF-affected sites, the samples were analyzed for the Unregulated Contaminant Monitoring Rule 3 list of six perfluorinated compounds:

- PFOS
- PFOA
- PFBS
- PFHxS
- Perfluoroheptanoic acid
- PFNA

Analytical results are summarized in Table 1 and shown in Figure 2. All six analyzed PFAS compounds were detected within at least one sample. Four of the PFAS compounds (PFOS, PFOA, PFHxS, and PFBS) were detected above their respective DOH SALs within one or more samples, with PFOS, PFOA, and PFHxS being the most frequently detected at elevated concentrations.

Samples taken from upgradient wells MW-8, MW-71, and MW-72 contained detectable concentrations of some of the analyzed PFAS compounds. Although the upgradient well detections were typically below the DOH SALs, PFOS was detected above its DOH SAL (15 ng/L) within the samples taken from MW-8 (detections of 46 and 140 ng/L).

PFOS, PFOA, and PFHxS were each detected at concentrations above their respective DOH SALs (15, 10, and 65 ng/L) within the wells located in the vicinity of the AFFF systems and in the downgradient wells. The highest concentrations were measured within monitoring wells MW-60 and MW-74, which are located downgradient of the 660- and 1,250-ton press pump rooms. The sample taken from MW-60 contained PFOS, PFOA, and PFHxS at maximum concentrations of 4,100, 180, and 2,100 ng/L, respectively. Though located further from the AFFF systems, the sample taken from MW-74 contained higher concentrations than the sample taken from MW-60; the sample contained PFOS, PFOA, PFHxS, and PFBS at concentrations of 15,000, 350, 3,800, and 380 ng/L, respectively. Elevated PFOS, PFOA, and PFHxS were also detected within the samples taken from MW-36, MW-63, and MW-64; however, the detections were an order-of-magnitude lower than those measured within the MW-60 and MW-74 samples. PFBS was detected above its DOH SAL (345 ng/L) within the sample taken from one well (MW-74).

In general, the samples taken from the downgradient (near-shore) wells MW-43 and MW-68 contained concentrations of PFOS, PFOA, and PFHxS above the DOH SALs but at lower concentrations than the vicinity of the system wells.

The observed concentrations are consistent with a release or releases of AFFF from within the vicinity of the 660- and/or 1,250-ton press pump rooms. None of the sampled wells were near and downgradient of the 2,500-ton press pump room or the Q1/Q2/Q3 vault. Therefore, it is unclear if a release occurred within the vicinity of these features. It is unknown if PFAS-impacted groundwater has reached the southern property boundary, which is close to MW-74.

4 PER- AND POLYFLUOROALKYL SUBSTANCES INVESTIGATION

The objectives of the PFAS Investigation are:

- Evaluate the extent of PFAS-impacted groundwater, including at the southern property boundary.
- Evaluate concentrations of PFAS in groundwater downgradient of the 2,500-ton press pump room and Q1/Q2/Q3 vaults.
- Evaluate concentrations of PFAS in soil for potential contribution to groundwater.

4.1 Data Gaps

Due to the limited nature of the groundwater PFAS sampling events in 2021, there is no PFAS data near to or downgradient of the 2,500-ton press pump room or the Q1/Q2/Q3 vault. Therefore, it is unclear 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 concentration. The monitoring wells downgradient and crossgradient of MW-74 were not sampled at that time. Therefore, it is unknown if PFAS-impacted groundwater has reached the southern property boundary, which is close to MW-74.

The distribution of PFAS in soil is unknown as there has been no PFAS analysis of soil to date.

The PFAS Investigation to address the above data gaps will include the following primary field tasks:

- 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

Tasks 1, 2, and 3 consist of sampling and analysis for PFAS in soil and/or water and are to be completed in numerical sequence. The locations of monitoring wells and borings for Tasks 2 and 3 may be adjusted based on the analytical results from previous tasks.

The Remedial Investigation Work Plan (RIWP) (Shannon & Wilson, 2020) discusses procedures and methods that will be implemented for the PFAS Investigation, including the Sampling and Analysis Plan (SAP) (Appendix E of the RIWP), health and safety procedures (Appendix G of the RIWP), and Quality Assurance Project Plan (QAPP) (Appendix F of the RIWP).

A summary of the data gap actions, and rationale for those actions, is provided in Exhibit 4.1.

Exhibit 4-1: Data Gap Actions and Rationale

Well/Boring Number	Action	Rationale
MW-23	Sample groundwater	Additional spatial coverage; evaluate upgradient and crossgradient impacts to the Site
MW-32	Sample groundwater	Delineate crossgradient extent to 1,250-ton press pit and upgradient of the 660-ton press pit
MW-37	Sample groundwater	Delineate crossgradient extent from MW-74, which had the highest PFAS values in groundwater detected to date
MW-38/MW-67	Sample groundwater	Delineate downgradient of MW-74 and along south property boundary
MW-40/MW-41	Sample groundwater	Delineate two aquifer depths downgradient of 1,250-ton press pit
MW-46/MW-54	Sample groundwater	Delineate crossgradient and downgradient extent Q1/Q2/Q3 vault and the 2,500-ton press pit
MW-50	Sample groundwater	Upgradient of the hazardous waste storage area
MW-52/MW-69	Sample groundwater	Delineate downgradient (dependent on tide condition) extent of the hazardous waste storage area
MW-53/MW-70	Sample groundwater	Delineate groundwater potentially migrating on or off the property
MW-61	Sample groundwater	Evaluate potential source for impacts detected at MW-74
MW-77	Install monitoring well	Delineate downgradient extent of MW-74
MW-78	Install monitoring well	Delineate downgradient extent of 2,500-ton press pit
MW-79	Install monitoring well	Delineate downgradient extent of Q1/Q2/Q3 vault and along alignment of AFFF piping
SB-2022-001 / SB-2022-002	Sample soil	Delineate downgradient extent of 1,250-ton press pit and beyond hydrocarbon in soil plume
SB-2022-003	Sample soil	Adjacent to MW-74 where highest concentration of PFAS in groundwater detected
28 Monitoring Wells (discussed in Task 4)	Sample groundwater	To evaluate PFAS distribution, one round of groundwater monitoring

4.2 Task 1 – Analysis of Groundwater from Existing Monitoring Wells

Groundwater from 15 existing monitoring wells will be analyzed for PFAS. The selected wells have not been previously analyzed for PFAS and are wells in the vicinity of potential release areas of AFFF. Results will support the evaluation for the extent of PFAS-impacted groundwater, including at the southern property boundary. The selected monitoring wells are shown in Figure 3 and listed in Table 2.

Groundwater will be purged and sampled using procedures described in Section 5.3.2 of the SAP. Special precautions for PFAS sampling are provided in Attachment 4 of the SAP.

Field duplicates will be collected at a frequency of at least one duplicate for every 20 groundwater and 20 soil samples, in accordance with the SAP. A groundwater field duplicate will be collected during Task 1. Additional groundwater field duplicates will not be collected for the PFAS Investigation if 20 or less samples are collected in total.

Two equipment blanks will be analyzed for quality assurance purposes. The equipment blanks will analyze (a) lab-supplied water sent through new peristaltic tubing, and (b) lab-supplied water poured over a decontaminated water-level indicator. A sampling summary table is provided as Table 2.

Samples will be submitted for a standard 15-day turnaround to Eurofins TestAmerica of Sacramento, California (a National Environmental Laboratory Accreditation Program-certified laboratory). Contact information is provided below.

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

Groundwater samples will be analyzed using EPA Method 537 (modified) (18 analytes). EPA Method 537 (modified) was selected to provide a range of short- and long-chain PFAS compounds, including those listed in the SALs and compounds historically detected in AFFF-impacted media. A comparison of the selected screening levels and laboratory analytical limits are provided in Tables 3 and 4 for groundwater and soil, respectively.

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

Three monitoring wells will be installed in locations to further define the limits of PFAS-impacted groundwater and potential sources. Based on available information, the anticipated locations of the two wells are provided in Figure 3. The wells will be assigned IDs of MW-77, MW-78, and MW-79. The location of MW-77 was selected to support evaluation of the extent of PFAS-impacted water at the southern property boundary. The location of MW-78 was selected to support evaluation of a release of AFFF from the 2,500-ton press pump room. The location of MW-79 was selected to support evaluation of a release of AFFF near the base of the Q1/Q2/Q3 vaults and the well screen will be placed to align with the vault base. The location of installed monitoring wells may be altered based on field conditions and analytical results of Task 1.

Hollow-stem auger drilling will be used to advance the borings. Up to three soil samples will be collected from each boring at approximately 2-, 5-, and 10-, foot depth. A soil field duplicate will be collected. Soil sampling procedures are provided in Sections 4.2 and 4.3 of the SAP. Special precautions for PFAS sampling are provided in Attachment 4 of the SAP. One equipment blank will be analyzed for quality assurance purposes. The equipment blank will analyze lab-supplied water poured over a decontaminated stainless steel sampling spoon. Soil will be analyzed using EPA Method 537 (modified) (18 analytes). The analytes include the PFAS compounds listed for the SALs.

The wells will be screened at approximately 10 to 20 feet depth, except at MW-79 as discussed above. After installation, the wells will be developed, and groundwater will be sampled using procedures provided in Sections 5.2 and 5.3.2 or the SAP. Groundwater samples will be analyzed using EPA Method 537 (modified) (18 analytes). A sampling summary is provided in Table 2.

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

Up to three direct-push borings will be advanced on the Jorgensen Forge Property to collect soil samples near potential source areas of AFFF releases. Unsaturated soil (shallower than approximately 10 feet depth) will be analyzed for PFAS to evaluate for the potential for contribution to groundwater.

The locations of the borings (SB-2022-001 through SB-2022-004) are adjacent to areas where a release of AFFF may have occurred. The locations are shown in Figure 3 but may be altered based on field conditions and analytical results of Tasks 1 and 2.

Up to three soil samples from each boring will be analyzed from approximately 2-, 5-, and 10-foot depth. Soil will be analyzed using EPA Method 537 (modified) (18 analytes).

A soil field duplicate will be analyzed for quality assurance purposes. A sampling summary is provided in Table 2.

4.5 Task 4 – Groundwater Sampling of PFAS Monitoring Wells

After Tasks 1 through 3 have been completed, one groundwater sampling event will be conducted. During the event, 28 monitoring wells that have been used to sample groundwater for PFAS will be re-sampled. The sampling event will include wells MW-8, MW-23, MW-32, MW-36, MW-37, MW-38, MW-40, MW-41, MW-43, MW-46, MW-50, MW-52, MW-53, MW-54, MW-60, MW-61, MW-63, MW-64, MW-67, MW-68, MW-69, MW-70, MW-71, MW-72, MW-74, MW-77, MW-78, and MW-79.

Sampling and analysis will be undertaken following the same procedures outlined in Task 1.

5 REPORTING AND SCHEDULE

As required by the AO, the work will be initiated following Ecology's approval of this work plan. Scheduling will depend on subcontractor availability and will strive to limit impacts to Site activities.

The analytical results will be reviewed and qualified by Shannon & Wilson staff in general conformance with what the EPA refers to as a Stage 2a Validation (EPA, 2009). Validation procedures are provided in Attachment 4 of the QAPP. The data will be validated and finalized within 60 days of completion of field activities.

A summary of finding will be submitted to Ecology within 90 days of receipt of the final validated data. Information from the PFAS investigation work will be incorporated into the RI Report or provided as an Addendum.

6 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 work plan.

7 REFERENCES

DH Environmental, Inc., 2022, Star Forge AFFF system disposal: Field report prepared by DH Environmental, Inc, Seattle, Wash., for former Jorgensen Forge facility, Tukwila, Wash., June 14 and June 15.

Marten Law, 2022, Star Forge response to AFFF questions: Letter to Maureen Sanchez, Washington State Department of Ecology, Shoreline, Wash., from Richard H. Allen of Marten Law, Seattle, Wash., June 3.

Shannon & Wilson, 2020, Remedial investigation work plan, Jorgensen Forge Corporation Property, Tukwila, Washington: Report prepared by Shannon & Wilson, Seattle, Wash., project 21-1-12596-013, for Earle M. Jorgensen Company, Lynnwood, Cali., April 15.

U.S. Environmental Protection Agency (EPA), 2009, Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use, January 13.

U.S. Environmental Protection Agency (EPA), 2017, Technical fact sheet – perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA): Technical fact sheet prepared by the EPA Office of Land and Emergency Management (5106P), EPA 505-F-17-001, November.

Washington State Department of Ecology (Ecology), 2015: Dangerous Waste Compliance Inspection on October 8, 2015 at Jorgensen Forge RCRA Site ID WA000602813: Letter prepared by Washington State Department of Ecology, Northwest Regional Office, Bellevue, Wash., submitted to Jorgensen Forge, Seattle, Wash., November 24.

Washington State Department of Ecology (Ecology), 2017, Agreed order no. DE 14143 in the matter of remedial action by Earle M Jorgensen Company: Washington State Department of Ecology, signed July 28.

Table 1: February and November 2021 PFAS Groundwater Results

Sample Location	Sample ID	Sample Date	Well Screen Interval (feet bgs)	Perfluorooctanesulfonic Acid (PFOS)	Perfluorooctanoic Acid (PFOA)	Perfluorobutanesulfonic Acid (PFBS)	Perfluorohexanesulfonic Acid (PFHxS)	Perfluoroheptanoic Acid (PFHpA)	Perfluorononanoic Acid (PFNA)
Upgradient Wells			**DOH SAL:**	15	10	345	65	—	9
MW-8	MW-8-20211602	02/16/21	5-20	**46**	3.2	2.2	27	1.2 J	<1.8
	MW-8-20211711	11/17/21		**140**	3.7 J	2.6 J	32	<8.7	<8.7
MW-71	MW-71-20211602	02/16/21	4.5-19.5	7.5	2.7	1.1 J	2.4	1.3 J	0.47 J
	MW-71-20211611	11/16/21		5.5	3.4	0.82 J	2.2	1.7	<1.7
MW-72	MW-72-20211602	02/16/21	4.5-19.25	3.6	2.0	0.67 J	3.0	0.45 J	<1.8
	MW-72-20211711	11/17/21		6.8	3.0	1.3 J	4.7	0.67 J	<1.7
Area of AFFF Use									
MW-36	MW-36-20210312	12/03/21	A zone*	**52**	6.7	15	**110**	10	<1.9
	MW-200-20210312	12/03/21		**60**	7.1	16	**110**	9.5	<2.0
MW-60	MW-60-20211602	02/16/21	3.75-18.75	**4,100**	**180**	110	**2,100**	190	<1.8
	MW-60-20211711	11/17/21		**1,200**	**61**	56	**840**	39	<19
MW-63	MW-63-20211602	02/16/21	5-20	**190**	**18**	6.4	**150**	6.4	<1.8
	MW-103-20211602	02/16/21		**190**	**19**	6.4	**160**	5.9	<1.8
	MW-63-20211611	11/16/21		**54**	**10**	6.2	**76**	5.7	<1.8
MW-64	MW-64-20211602	02/16/21	45-60	**730**	**14**	14	**150**	11	0.48 J
	MW-64-20211611	11/16/21		**700**	**13**	10	**140**	6.5 J	<9.3
MW-74	MW-74-20210312	12/03/21	4-18.75	**15,000**	**350**	**380**	**3,800**	140	0.49 J
Downgradient Wells									
MW-43	MW-43-20211602	02/16/21	30-40	**79**	**50**	190	**730**	31	<1.8
	MW-43-20211611	11/16/21		**60**	**65**	170	**860**	36	<1.8
MW-68	MW-68-20211602	02/16/21	5-18	**67 JH***	**22**	3.7	34	4.2	2.3
	MW-68-20211711	11/17/21		8	2.2	<1.8	2.5	<1.8	<1.8

NOTES:

* = Screen interval not known.

Results reported from Eurofins TestAmerica, Inc. work order 320-70313-1, 320-81991-1, and 320-82516-1.

Sample *MW-103-20211602* is a field duplicate of sample *MW-63-20211602* .

Results in nanograms per liter (ng/L).

— = No applicable regulatory limit exists for the associated analyte.

< = Analyte was not detected; reported as <Reporting Limit (RL).

BOLD = Detected concentration exceeds the DOH SAL.

J = Estimated concentration, detected greater than the method detection limit (MDL) and less than the reporting limit (RL). Flag applied by the laboratory.

JH* = Estimated concentration, biased high, due to quality control failures. Flag applied by Shannon & Wilson, Inc. (*)

AFFF = aqueous film forming foat; bgs = below ground surface; DOH SAL = Washington State Department of Health State Action Level; PFAS = per- and polyfluorinated alkyl substances

Table 2: Proposed Sampling Summary

Sample Location	Number of Groundwater Analyses	Number of Soil Analyses	Analytical Method	Comments
Task 1 - Analysis of Groundwater from Existing Monitoring Wells				
MW-23	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-32	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-37	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-38	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-40	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-41	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-46	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-50	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-52	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-53	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-54	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-61	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-67	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-69	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-70	1	0	EPA Method 537 (modified) (18 Analytes)	
EB-1	1	0	EPA Method 537 (modified) (18 Analytes)	Equipment blank of lab-supplied water sent through new peristaltic tubing.
EB-2	1	0	EPA Method 537 (modified) (18 Analytes)	Equipment blank of lab-supplied water poured over decontaminated water-level indicator.
MW-100	1	0	EPA Method 537 (modified) (18 Analytes)	Field duplicate of groundwater sample from a monitoring well.
Task 2 - Installation of Monitoring Wells and Groundwater Analysis				
MW-77	1	3	EPA Method 537 (modified) (18 Analytes)	Soil will be collected during monitoring well installation at approximately 2-, 5-, and 10-foot depth. Groundwater will be collected after well installation.
MW-78	1	3	EPA Method 537 (modified) (18 Analytes)	
MW-79	1	3	EPA Method 537 (modified) (18 Analytes)	
EB-3	1	0	EPA Method 537 (modified) (18 Analytes)	Equipment blank of lab-supplied water poured over a decontaminated stainless steel sampling spoon.
MW-101	0	1	EPA Method 537 (modified) (18 Analytes)	Field duplicate of soil.

Table 2: Proposed Sampling Summary

Sample Location	Number of Groundwater Analyses	Number of Soil Analyses	Analytical Method	Comments
Task 3 - Analysis of Unsaturated Soil Near Potential Source Areas				
SB-2022-001	0	3	EPA Method 537 (modified) (18 Analytes)	Soil will be colltected from the unsaturated zone from approximately 2-, 5-, and 10-foot depth.
SB-2022-002	0	3	EPA Method 537 (modified) (18 Analytes)	
SB-2022-003	0	3	EPA Method 537 (modified) (18 Analytes)	
SB-2022-100	0	1	EPA Method 537 (modified) (18 Analytes)	Field duplicate of soil.
Task 4 - Groundwater Sampling of PFAS Monitoring Wells				
MW-8	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-23	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-32	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-36	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-37	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-38	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-40	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-41	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-43	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-46	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-50	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-52	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-53	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-54	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-60	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-61	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-63	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-64	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-67	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-68	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-69	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-70	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-71	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-72	1	0	EPA Method 537 (modified) (18 Analytes)	

Table 2: Proposed Sampling Summary

Sample Location	Number of Groundwater Analyses	Number of Soil Analyses	Analytical Method	Comments
MW-74	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-77	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-78	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-79	1	0	EPA Method 537 (modified) (18 Analytes)	
MW-100	1	0	EPA Method 537 (modified) (18 Analytes)	Field duplicate of groundwater sample from a monitoring well.
MW-101	1	0	EPA Method 537 (modified) (18 Analytes)	Field duplicate of groundwater sample from a monitoring well.

EPA = U.S. Environmental Protection Agency

Table 3: Groundwater Analytical Limits of Detection and Project Screening Levels

Analyte	CAS	EPA Lifetime Health Advisory Level[1]	SALs for Drinking Water[2]	Eurofins TestAmerica Method	MDL	RL[3]
Groundwater (ng/L)						
Perfluorohexanoic acid (PFHxA)	307-24-4	-	-	537.1	0.580	2.00
Perfluoroheptanoic acid (PFHpA)	375-85-9	-	-	537.1	0.250	2.00
Perfluorooctanoic acid (PFOA)	335-67-1	70	**10**	537.1	0.850	2.00
Perfluorononanoic acid (PFNA)	375-95-1	-	**9**	537.1	0.270	2.00
Perfluorodecanoic acid (PFDA)	335-76-2	-	-	537.1	0.310	2.00
Perfluoroundecanoic acid (PFUnA)	2058-94-8	-	-	537.1	1.10	2.00
Perfluorododecanoic acid (PFDoA)	307-55-1	-	-	537.1	0.550	2.00
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	-	-	537.1	1.30	2.00
Perfluorotetradecanoic acid (PFTeA)	376-06-7	-	-	537.1	0.730	2.00
Perfluorobutanesulfonic acid (PFBS)	375-73-5	-	**345**	537.1	0.200	2.00
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	-	**65**	537.1	0.570	2.00
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	70	**15**	537.1	0.540	2.00
NEtFOSAA	2991-50-6	-	-	537.1	1.30	5.00
NMeFOSAA	2355-31-9	-	-	537.1	1.20	5.00
HFPO-DA (GenX)	13252-13-6	-	-	537.1	1.50	4.00
9Cl-PF3ONS	756426-58-1	-	-	537.1	0.240	2.00
11Cl-PF3OUdS	763051-92-9	-	-	537.1	0.320	2.00
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	-	-	537.1	0.400	2.00

NOTES:

Concentrations are in nanograms per liter (ng/L).

The selected screening criteria are bolded and shaded blue.

1 The advisory levels are 70 ng/L for PFOS and PFOA either separately or combined.

2 Screening criteria for water are the Washington Department of Health State Action Levels for drinking water. See Section 2.1 of the work plan for a discussion about selection and applicability of screening levels.

3 The RL represents the level of the lowest calibration standard (i.e., the laboratory practical quantitation limit [PQL]); the RL may not always be achievable.

- = not established

CAS = Chemical Abstracts Service; EPA = U.S. Environmental Protection Agency; MDL = method detection limit; RL = reporting level; SAL = State Action Level

Table 4: Soil Analytical Limits of Detection and Project Screening Levels

Analyte	CAS	DRAFT Ecology PCUL for Soil Protective of Groundwater (Vadose)	DRAFT Ecology PCUL for Soil Direct Contact		Eurofins TestAmerica		
			Method B	Method C	Method	MDL	RL[1]
Soil (mg/kg)							
Perfluorohexanoic acid (PFHxA)	307-24-4	-	-	-	537.1	3.1E-05	2.0E-04
Perfluoroheptanoic acid (PFHpA)	375-85-9	-	-	-	537.1	3.8E-05	2.0E-04
Perfluorooctanoic acid (PFOA)	335-67-1	**6.3E-05**	0.24	11	537.1	5.3E-05	2.0E-04
Perfluorononanoic acid (PFNA)	375-95-1	**8.0E-05**	0.20	9	537.1	2.2E-05	2.0E-04
Perfluorodecanoic acid (PFDA)	335-76-2	-	-	-	537.1	4.8E-05	2.0E-04
Perfluoroundecanoic acid (PFUnA)	2058-94-8	-	-	-	537.1	4.2E-05	2.0E-04
Perfluorododecanoic acid (PFDoA)	307-55-1	-	-	-	537.1	3.0E-05	2.0E-04
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	-	-	-	537.1	2.1E-05	2.0E-04
Perfluorotetradecanoic acid (PFTeA)	376-06-7	-	-	-	537.1	3.7E-05	2.0E-04
Perfluorobutanesulfonic acid (PFBS)	375-73-5	**1.8E-03**	24	1100	537.1	3.8E-05	2.0E-04
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	**4.1E-04**	0.78	34	537.1	2.9E-05	2.0E-04
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	**1.7E-04**	0.24	11	537.1	4.3E-05	2.0E-04
NEtFOSAA	2991-50-6	-	-	-	537.1	4.8E-05	2.0E-04
NMeFOSAA	2355-31-9	-	-	-	537.1	2.3E-05	2.0E-04
HFPO-DA (GenX)	13252-13-6	-	-	-	537.1	4.1E-05	2.0E-04
9Cl-PF3ONS	756426-58-1	-	-	-	537.1	3.5E-05	2.0E-04
11Cl-PF3OUdS	763051-92-9	-	-	-	537.1	3.1E-05	2.0E-04
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	-	-	-	537.1	3.9E-05	2.0E-04

NOTES:

Concentrations are in milligrams per kilogram (mg/kg).

The selected screening criteria are bolded and shaded blue.

1 The RL represents the level of the lowest calibration standard (i.e., the laboratory practical quantitation limit [PQL]); the RL may not always be achievable.

- = not established

CAS = Chemical Abstracts Service; EPA = U.S. Environmental Protection Agency; MDL = method detection limit; RL = reporting level; SAL = State Action Level

Jorgensen Forge Facility
DRAFT PFAS Investigation Work Plan

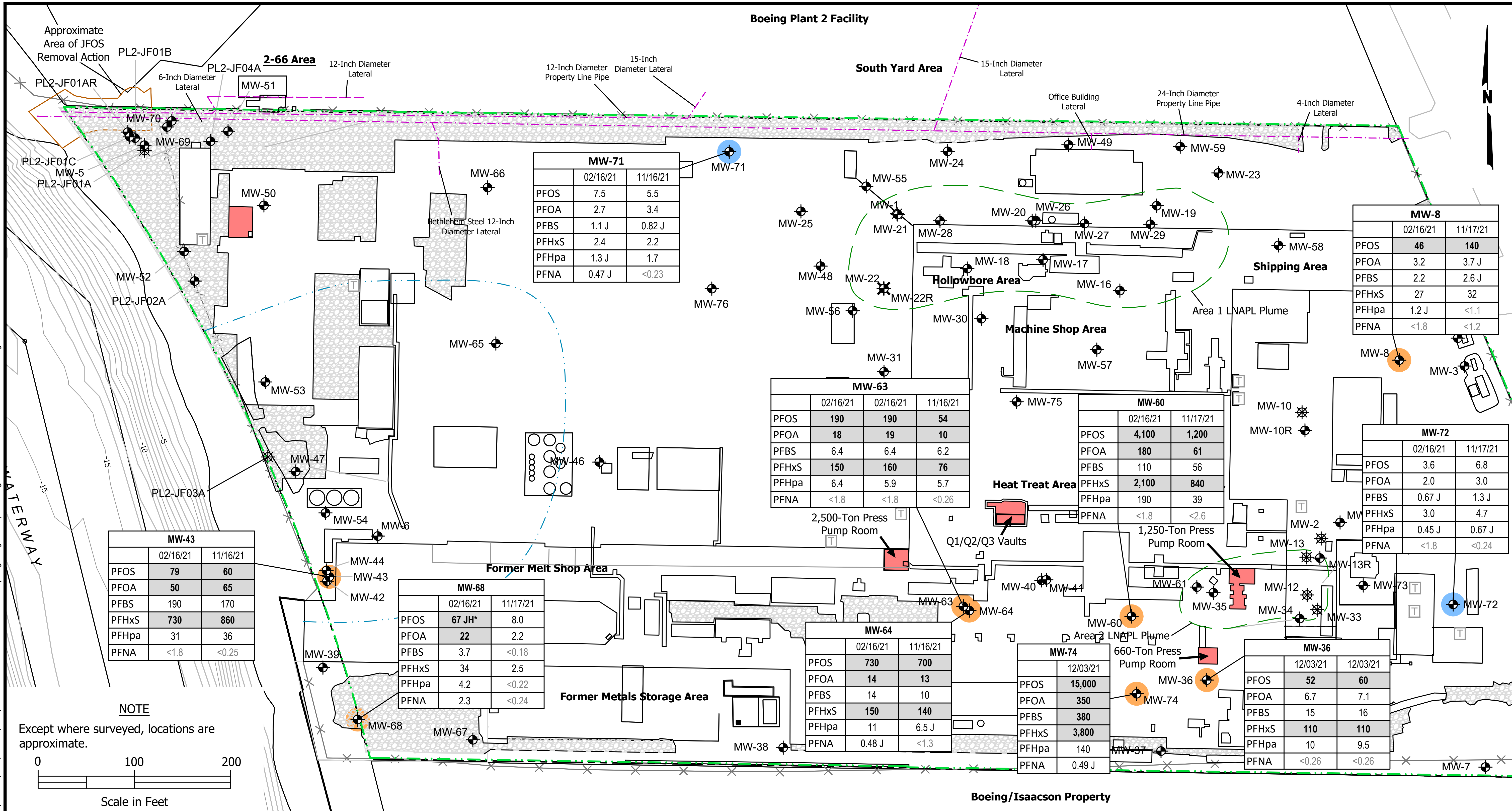
SITE LOCATION MAP

June 2022 21-1-12596-025

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 1

Filename: C:\Users\jrs\CAD Group Dropbox\JDrive\21\12596\025\21-1-12596-025 Site Location.dwg Date: 06-21-2022 Login: JRS



MW-71		
	02/16/21	11/16/21
PFOS	7.5	5.5
PFOA	2.7	3.4
PFBS	1.1 J	0.82 J
PFHxS	2.4	2.2
PFHpa	1.3 J	1.7
PFNA	0.47 J	<0.23

MW-8		
	02/16/21	11/17/21
PFOS	**46**	**140**
PFOA	3.2	3.7 J
PFBS	2.2	2.6 J
PFHxS	27	32
PFHpa	1.2 J	<1.1
PFNA	<1.8	<1.2

MW-63			
	02/16/21	02/16/21	11/16/21
PFOS	**190**	**190**	**54**
PFOA	**18**	**19**	**10**
PFBS	6.4	6.4	6.2
PFHxS	**150**	**160**	**76**
PFHpa	6.4	5.9	5.7
PFNA	<1.8	<1.8	<0.26

MW-60		
	02/16/21	11/17/21
PFOS	**4,100**	**1,200**
PFOA	**180**	**61**
PFBS	110	56
PFHxS	**2,100**	**840**
PFHpa	190	39
PFNA	<1.8	<2.6

MW-72		
	02/16/21	11/17/21
PFOS	3.6	6.8
PFOA	2.0	3.0
PFBS	0.67 J	1.3 J
PFHxS	3.0	4.7
PFHpa	0.45 J	0.67 J
PFNA	<1.8	<0.24

MW-43		
	02/16/21	11/16/21
PFOS	**79**	**60**
PFOA	**50**	**65**
PFBS	190	170
PFHxS	**730**	**860**
PFHpa	31	36
PFNA	<1.8	<0.25

MW-68		
	02/16/21	11/17/21
PFOS	**67 JH***	8.0
PFOA	**22**	2.2
PFBS	3.7	<0.18
PFHxS	34	2.5
PFHpa	4.2	<0.22
PFNA	2.3	<0.24

MW-64		
	02/16/21	11/16/21
PFOS	**730**	**700**
PFOA	**14**	**13**
PFBS	14	10
PFHxS	**150**	**140**
PFHpa	11	6.5 J
PFNA	0.48 J	<1.3

MW-74	
	12/03/21
PFOS	**15,000**
PFOA	**350**
PFBS	**380**
PFHxS	**3,800**
PFHpa	140
PFNA	0.49 J

MW-36		
	12/03/21	12/03/21
PFOS	**52**	**60**
PFOA	6.7	7.1
PFBS	15	16
PFHxS	**110**	**110**
PFHpa	10	9.5
PFNA	<0.26	<0.26

NOTE

Except where surveyed, locations are approximate.

0 100 200

Scale in Feet

Explanation

- Approximate Property Boundary
- Former Embayment
- Estimated Extent of LNAPL on Groundwater (Farallon, August 2009)
- MW-23 Monitoring Well Location (Various)
- MW-2 Decommissioned
- MW-22 Location Unknown
- MW-68 Groundwater Detected with PFAS Exceeding Washington State Dept. of Health State Action Level
- MW-71 Groundwater Analyzed for PFAS with No Detected Exceedances of Dept. of Health State Action Levels
- Transformer
- Unpaved Surface
- Features Where AFFF Fire Suppression Components Have Been Observed or AFFF Has Been Stored

Abbreviations

PFOS = Perfluorooctanesulfonic acid
PFOA = Perfluorooctanoic acid
PFBS = Perfluorobutanesulfonic acid
PFHxS = Perfluorohexanesulfonic acid
PFHpa = Perfluoroheptanoic acid
PFNA = Perfluorononanoic acid

Sampling Notes

Results are in nanograms per liter.

< = Analyte was not detected; reported as <Detection Limit (DL)

BOLD = Detected concentration exceeds the Washington State Department of Health State Action Level.

J = Estimated concentration, detected greater than the method detection limit (MDL) and less than the reporting limit (RL). Flag applied by the laboratory.

JH* = Estimated concentration, biased high, due to quality control failures. Flag applied by Shannon & Wilson, Inc. (*)

Jorgensen Forge Facility
DRAFT PFAS Investigation Work Plan

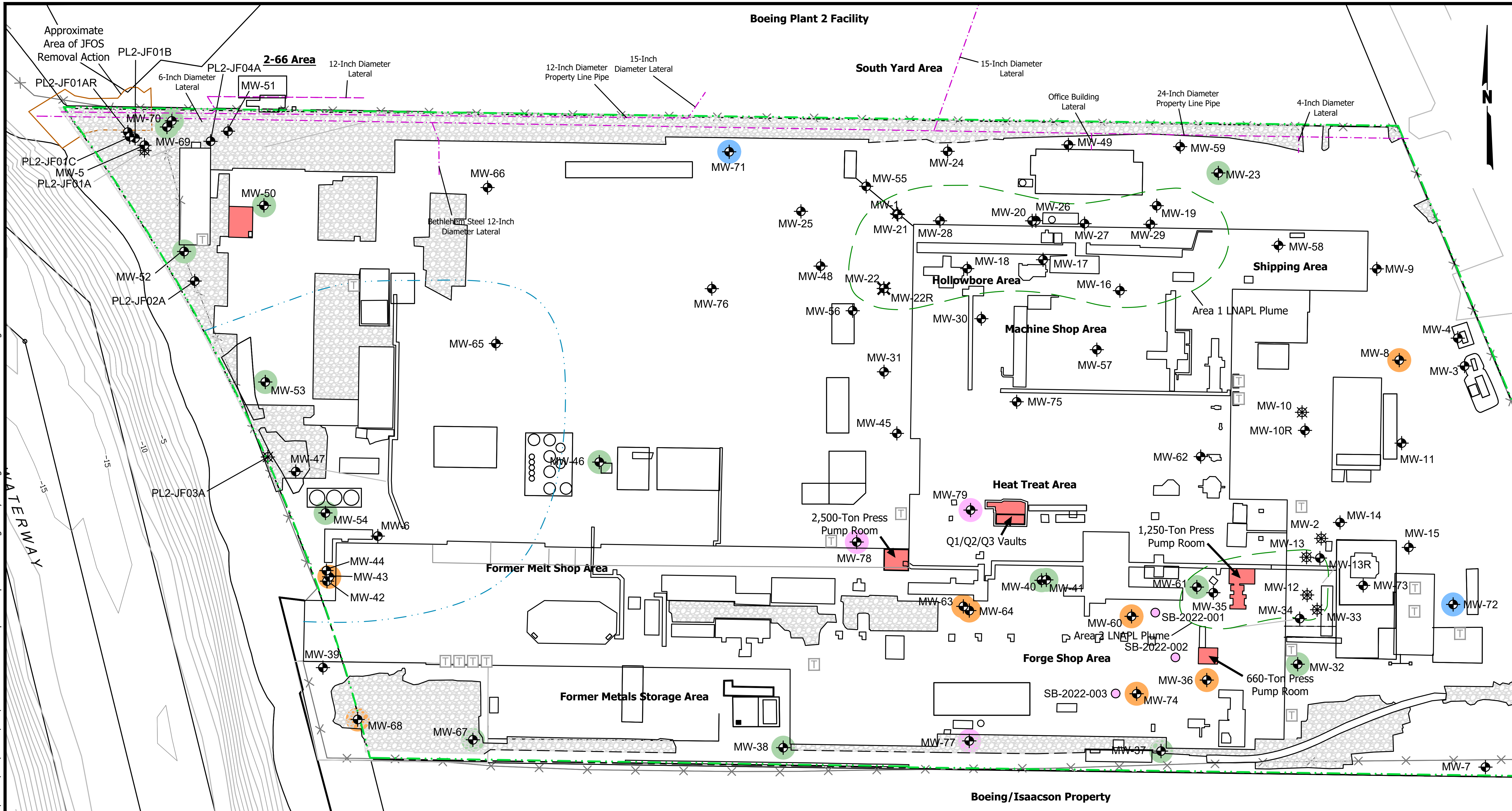
FEBRUARY AND NOVEMBER 2021 PFAS GROUNDWATER RESULTS

June 2022 21-1-12596-025

SHANNON & WILSON, INC. GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 2

Filename: C:\Users\jrs\CAD Group Dropbox\JDrive\211\12596\025\21-1-12596-025 PFAS GW Sampling.dwg Layout: Figure 2 Date: 06-21-2022 Login: JRS



Explanation

- Approximate Property Boundary
- Former Embayment
- Estimated Extent of LNAPL on Groundwater (Farallon, August 2009)
- MW-23 Monitoring Well Location (Various)
- MW-2 Decommissioned
- MW-22 Location Unknown
- MW-68 Groundwater Detected with PFAS Exceeding Washington State Dept. of Health State Action Level
- MW-71 Groundwater Analyzed for PFAS with No Detected Exceedances of Dept. of Health State Action Levels
- MW-68 Task 1 Groundwater Sampling
- MW-77 Task 2 Groundwater Monitoring Well Installation
- SB-2022-001 Task 3 Borings
- Transformer
- Unpaved Surface
- Features Where AFFF Fire Suppression Components Have Been Observed or AFFF Has Been Stored

0 100 200

Scale in Feet

NOTE

Except where surveyed, locations are approximate.

Jorgensen Forge Facility
DRAFT PFAS Investigation Work Plan

PROPOSED EXPLORATIONS

June 2022 21-1-12596-025

SHANNON & WILSON, INC. GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 3

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 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 ASFE/Association of Engineering Firms Practicing in the Geosciences, Silver Spring, Maryland