

# Site Characterization Report - Groundwater

Williams Alaska Petroleum, Inc. Former North Pole Refinery North Pole, AK

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## **ACRONYMS AND ABBREVIATIONS**

AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
AFFF	Aqueous Film Forming Foam
Arcadis	Arcadis U.S., Inc.
bgs	below ground surface
EPA	U.S. Environmental Protection Agency
FHRA	Flint Hills Resources Alaska
FTA	Fire Training Area
Integral	Integral Consulting Inc.
IRM	Interim Remedial Measures
LCS	laboratory control sample
LHA	Lifetime Health Advisory
MRL	method reporting limit
MS/MSD	matrix spike and matrix spike duplicate
PARCC	precision, accuracy, representativeness, completeness, comparability
PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutane sulfonic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexane
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanoic sulfonate
PFTrDA	perfluorotridecanoic acid
PFUnDA	perfluoroundecanoic acid
POET	point of entry treatment
RPD	relative percent difference

SCR	Site Characterization Report
SWA	Southwest Former Wash Area
Williams	Williams Alaska Petroleum
WTZ	Water Table Zone

## EXECUTIVE SUMMARY

On behalf of Williams Alaska Petroleum (Williams), Integral Consulting Inc. has prepared this site characterization report (SCR) for the former Flint Hills Resources Alaska (FHRA) North Pole Refinery, located on H and H Lane in North Pole, Alaska (Site). This SCR was specifically prepared to document the results of focused characterization activities at the Site to assess the horizontal and vertical extent of per-and polyfluoroalkyl substances (PFAS) in groundwater and surface water and to identify potential areas for future evaluation.

The use and storage of PFAS at the Site was identified in the 2013 Perfluorinated Compounds Investigation Report produced by Arcadis U.S., Inc. on behalf of FHRA. PFAS were historically used at the refinery in fire-training exercises and "hot work" (e.g., welding or grinding) activities. FHRA refining operations ceased in May 2014, and demolition of the refining operations (three crude units, sulfolane unit, ancillary structures, and several bulk storage areas) and other facility areas (waste water lagoons, storage areas, fire training area) was initiated in 2016. Since 2019, Marathon Oil has operated at the Site and Site use is limited to terminal operations and bulk fuel storage.

Investigations related to potential concentrations of PFAS at the former North Pole Refinery have been completed between 2012 and 2018. Activities completed previously included groundwater and soil sampling onsite, excavation within the fire training area as an interim remedial measure (IRM), and offsite evaluation of nearby private drinking water wells, monitoring wells, and surface water bodies. Following these activities, a June 19, 2020, letter was sent to Williams from the Alaska Department of Environmental Conservation (ADEC), which outlined ADEC's specific requests for PFAS site characterization on the former North Pole Refinery.

In response to the June 2020 letter, ADEC and Williams agreed to a focused groundwater and surface water investigation to identify potential onsite sources of PFAS. Groundwater samples were collected from a total of 132 wells to be analyzed for PFAS, and one surface water sample was collected from the North Gravel Pit.

Concentrations of perfluorooctanoic acid (PFOA) and perfluorooctanoic sulfonate (PFOS) have been vertically delineated (using wells screened in the water table zone, Zone 1, Zone 2, and Zone 3 aquifer units) to the ADEC cleanup levels for PFOA and PFOS in groundwater of 0.4  $\mu$ g/L, respectively. Horizontal delineation to the cleanup level for PFOA and PFOS (0.4  $\mu$ g/L) is complete in all four zones to the northwest (along the property boundary), to the east and west. Delineation along the southern property boundary (upgradient of anticipated source areas associated with fires and/or hot work conducted in Crude Unit 2 and the sulfolane unit) is not complete and well installation activities are proposed.

## 1 INTRODUCTION

On behalf of Williams Alaska Petroleum (Williams), Integral Consulting Inc. (Integral) has prepared this groundwater and surface water site characterization report (SCR) for the former Flint Hills Resources Alaska (FHRA) North Pole Refinery, located on H and H Lane in North Pole, Alaska (Site; Figure 1).

This SCR describes the activities completed as outlined in the September 24, 2020, *Technical Memorandum for the Completion of Onsite Groundwater and Surface Water PFAS Characterization Workplan* (Tech Memo; Integral 2020).

Field activities were completed by Shannon & Wilson in November and December 2020, by qualified persons as defined by 18 Alaska Administrative Code (AAC) 75.990.

The objectives of the groundwater and surface water characterization were to determine the nature and extent of per- and polyfluoroalkyl substances (PFAS) in groundwater and surface water at the Site and identify potential areas where PFAS may have been released.

After identifying any potential areas of interest and based on the results of PFAS site characterization activities, Williams will work with the Alaska Department of Environmental Conservation (ADEC) to identify appropriate additional site characterization activities, if any, to address those areas.

## **2 SITE DESCRIPTION AND HISTORY**

A description of the Site and surrounding area, the current and former Site operations, and the owner operator history is presented below.

#### 2.1 SITE DESCRIPTION

The former FHRA North Pole Refinery facility is located within the city limits of North Pole in the Fairbanks North Star Borough, Alaska, on 240 acres, approximately 13 miles southeast of Fairbanks (Figure 1). The site is currently a bulk storage and terminal facility owned and operated by Marathon Petroleum. Current and historical site features are included on Figure 2.

Prior to demolition by FHRA in 2016, three crude unit processing units were present in the southern portion of the Site and several tank farms were present in the western and central area of the Site. Loading and unloading areas included a truck rack located to the north of the tank farm area and a rail car loading area located to the west. Historically a truck rack was located between the rail car loading area and the tank farm. Wastewater treatment lagoons (A, B, and C), storage areas, and a fire training area (FTA) were also present. In addition, a firehouse and several administrative and warehouse buildings were present at the facility. Two gravel pits, identified as North Gravel Pit and South Gravel Pit, are located in the southwestern portion of the Site. In December 2016, approximately 9.1 acres located in the southeastern corner of the property was subdivided and transferred to Petro Star, Inc. Refinery (Figure 2).

The area south of the site is occupied by Petro Star, Inc. Refinery and the Golden Valley Electric Association power plant. North of the site are residential properties, the North Pole High School, and the city's wastewater treatment plant. The Tanana River is located to the west, flowing to the northwest towards Fairbanks. The area east of the site includes residential and undeveloped parcels, the Old Richardson Highway, and the Alaska Railroad. Current and historical Site and surrounding features are included in Figure 2.

#### 2.2 OWNER OPERATOR HISTORY

The site was originally developed in the mid-1970s, with production at the Earth Resources of Alaska refinery starting in 1977. Refining operations included the processing of crude oil from the Trans-Alaska Pipeline. MAPCO purchased the refinery in 1980 and merged with Williams in 1998; Williams operated at the Site until 2004. Since 2004, the Site has been owned and operated by FHRA. Refining operations ceased in May 2014, and demolition of the refining operations (three crude units, sulfolane unit, ancillary structures, and several bulk storage areas) and other facility areas (wastewater lagoons, storage areas, FTA was initiated in 2016.

Since 2019, the Site operations have been limited to terminal and bulk fuel storage under operator/owner Marathon Oil.

#### 2.3 AFFF HISTORY

The use and storage of PFAS-containing aqueous film forming foam (AFFF) at the site was identified in the 2013 Perfluorinated Compounds Investigation Report produced by Arcadis U.S., Inc. (Arcadis 2013a). A summary of the AFFF use and storage is as follows based on the 2013 Report:

- Hot work: From the mid-1990s through 2011, operations and maintenance staff were permitted to use AFFF when hot work was being conducted. AFFF was applied in containment areas to flat surfaces adjacent to the work and likely to contain hydrocarbons (sumps, troughs, and concrete pads). Concentrations of AFFF reportedly used during these activities ranged between 10 and 50 percent of a water-based solution, with volumes varying (Arcadis 2013a). The locations of AFFF hot work could not be confirmed.
- Fire Training: Fire training activities involving the use of AFFF were reportedly held three times per year at the onsite FTA. Based on engineering drawings, the FTA was lined with a synthetic liner. The presence of the liner was confirmed during excavation of the FTA in 2015 (Arcadis 2015). In 2009, FHRA ceased live fire training. Arcadis (2013a) also reported that eight large-scale, joint response, field exercises involving the refinery's fire brigade and other local fire departments, were conducted between 1989 and 2006. However, there is no documented use of AFFF at those events.
- Fire Response: According to Arcadis (2013a), AFFF was not used in response to an actual fire/incident. FHRA could not confirm anecdotal employee recollections of two potential incidents, and no incident reports were found.
- Storage and Staging: AFFF was identified as being stored in bulk totes in several locations including the chemical storage pad immediately west of the FTA, the Blend Building, adjacent to the Fire Hall, and in the welding shop (during the winter months). Storage at the facility in various locations including those identified occurred from the mid-1990s through at least 2016 when the facility was demolished. Purchasing records indicate that quantities of AFFF purchased from the mid-1990's to 2004 were "relatively small" and that FHRA increased AFFF inventory to manage worst case fire scenarios with 13,750 gallons of AFFF from National foam purchased between 2004 and 2007. In addition, the three previously existing crude units contained fire foam stations containing up to approximately 50 gallons of AFFF each. Two fire trucks with foam storage tanks were also used at the facility (Arcadis 2013a).

## **3 GEOLOGY AND HYDROLOGY**

The nearest surface water body is the Tanana River, a tributary of the Yukon River, which flows in a northwest direction along the western Site boundary. The Chena River and Chena Lake are also located to the east of the Site.

Site and surrounding area are located on the Tanana River floodplain, a relatively flat-lying alluvial plain situated between the Tanana River and Chena Slough. Within undeveloped portions of the Site, up to 2 ft of organic soil has been historically identified, with silt and silty sand layers lying beneath (Arcadis 2013b). Gravel fill has been identified within developed Site areas at depths of up to 6 ft below ground surface (bgs), and discontinuous shallow peat layers have been observed intermittently at depths between 2 and 15 ft bgs (Arcadis 2013b).

A review of the U.S. Geological Survey Geologic Map of Alaska reveals that the site is underlain by unconsolidated surficial deposits. These deposits are characterized as being poorly to wellsorted, poorly to moderately well-stratified, and consisting predominantly of alluvial, colluvial, marine, lacustrine, eolian, and swamp deposits (Wilson et al. 2015). Glacial deposits have also been identified at the Site as part of site characterization activities. Bedrock depth has been estimated at 400 to 600 ft bgs (Arcadis 2013b).

Discontinuous permafrost has been encountered at the property at depths ranging between 70 and 130 ft bgs (Arcadis 2018a). Permafrost does not transmit groundwater, and therefore directs the flow of groundwater and by default, groundwater impacts, by creating localized regions of converging and diverging horizontal and vertical flow around permafrost bodies (Carlson and Barnes 2011). As part of Site investigation activities in 2013, a permafrost model was constructed using the geologic modeling software Leapfrog (Arcadis 2013b). While permafrost is largely absent under the developed portions of the Site, there is discontinuous permafrost in the northern portions of the Site, a shallow permafrost body in the wooded area south of Transfer Road, and a large, relatively continuous permafrost mass extending north and west of the Site (Arcadis 2013b).

Based on current and historical data, groundwater flow at the Site is towards the northwest, with some seasonal variation in flow direction.

## 4 PREVIOUS PFAS INVESTIGATIONS

Investigations related to potential concentrations of PFAS at the former North Pole Refinery have been completed between 2012 and 2018. Activities completed to date include groundwater and soil sampling onsite, excavation within the FTA as an interim remedial measure (IRM), and offsite evaluation of nearby private drinking water wells, monitoring wells, and surface water bodies.

Additional information related to these actions is included in the sections below.

#### 4.1 PHASE I INVESTIGATION

Initial investigations related to PFAS began in 2012. This Phase I investigation focused primarily on the FTA at the Site, where AFFF was used as part of training activities.

In October 2012, groundwater samples were collected from seven onsite monitoring wells, including two wells downgradient of the FTA (MW-195A and MW-195B), three wells in the area of the facility's wastewater treatment lagoons (MW-110, MW-174A, and MW-321-15), and two samples upgradient of the investigation area (MW-192A and MW-192B). In addition, six multi-level hydropunch locations were sampled at depths of 10 and 25 ft bgs north and west of the FTA. Results were as follows:

- Both perfluorooctanoic acid (PFOA) and perfluorooctanoic sulfonate (PFOS) were reported at concentrations exceeding the ADEC screening levels of 3.1 and 1.3 µg /L, respectively, in the groundwater sample collected from MW-321-15.
- PFOS was reported at concentrations exceeding the ADEC screening level of 1.3  $\mu$ g/L from sample HP-58 at 10 ft bgs.
- All other samples were reported as either not detected or detected at results below the applicable screening levels.

#### 4.2 PHASE II INVESTIGATION

In December 2012, 29 monitoring wells were sampled as part of the Phase II investigation. Monitoring wells were chosen for the following objectives:

- Confirmatory sampling at location MW-321-15
- Horizontally and vertically delineation of the groundwater results reported at MW-321-15 and downgradient of the FTA

- Evaluation of potential PFAS in groundwater located in downgradient areas of the Site
- Evaluation of background conditions located generally upgradient of refinery operations.

Reported concentrations of PFOA and PFOS in all wells, with the exception of MW-321-15, were either below the ADEC screening levels or not detected in groundwater samples. The result from MW-321-15 was an estimated "J" value of 2.6  $\mu$ g /L, suggesting that the observed concentration during the Phase I sampling may have been due to matrix interference.

#### 4.3 PHASE III INVESTIGATION

Investigation activities completed as part of the Phase III investigation included groundwater sampling at MW-321-15 and soil sampling within the FTA. Seven soil samples were collected above the FTA liner near areas where AFFF was used and in the drainage area along the southern border of the FTA. The liner was encountered at approximately 1.6 ft bgs, and Arcadis concluded that the liner would prevent PFAS from migrating to groundwater.

Results were as follows:

- Concentrations of PFOS and PFOA in MW-321-15 were consistent with previous sampling results, with PFOS reported at 7.6  $\mu$ g/L (estimated) and PFOA reported at 1.3  $\mu$ g/L.
- Reported concentrations of PFOA in soil ranged between 6.9 and 110 µg/kg (estimated).
- PFOS in soil was reported at concentrations ranging between 250 μg/kg (estimated) and 2,500 μg/kg (estimated).

Based on the results, it was concluded that the Phase III groundwater result from MW-321-15 confirmed that the Phase I groundwater result from MW-321-15 was biased high due to matrix interference. While direct contact levels had not been established, soil screening levels for PFOS (54.7 mg/kg) and PFOA (137 mg/kg) were developed and the results also compared to Minnesota risk-based values for PFOS and PFOA, which were 14 and 13 mg/kg, respectively. All reported concentrations were below both criteria.

#### 4.4 GROUNDWATER TREATMENT SYSTEM SAMPLING

Samples from the influent and effluent ports of the onsite groundwater remediation systems identified as GAC East and West were collected in December 2014, January 2015, and February 2015. Results were compared to the ADEC screening levels in place at the time:  $0.73 \mu g/L$  (PFOA) and  $1.1 \mu g/L$  (PFOS). A summary of results are as follows:

- Concentrations of PFOA in influent samples collected from the GAC-East facility ranged between 0.031 and 0.036  $\mu$ g/L. Reported concentrations of PFOS ranged between 0.058 and 0.074  $\mu$ g/L.
- Concentrations of PFOA in effluent samples collected from the GAC-East facility ranged between not detected and 0.018 µg/L. Reported concentrations of PFOS ranged between not detected and 0.036 µg/L.
- Concentrations of PFOA in influent samples collected from the GAC-West facility ranged between 0.014 (estimated) and 0.016 µg/L (estimated). Reported concentrations of PFOS ranged between 0.029 and 0.036 µg/L.
- PFOA and PFOS were not detected in effluent samples collected from the GAC-West facility.

#### 4.5 EXCAVATION INTERIM REMEDIAL MEASURE

Excavation activities were completed at the Site between June 2 and September 11, 2015, in the areas of Lagoon B, the Southwest Former Wash Area (SWA), and the FTA. The Lagoon and SWA excavations were unrelated to any potential onsite PFAS. Excavation activities within the FTA were completed to address impacts related to benzene, toluene, ethylbenzene, and total xylenes; gasoline-range organics; diesel-range organics; and PFAS.

Prior to excavation, approximately 80,000 gallons of standing water were removed from the FTA, and approximately 2,404 tons of soil and debris were removed as part of the excavation. Within the FTA excavation, soil was removed from the ground surface to a depth of approximately 2 to 3 ft bgs, and included removal of the membrane liner. Horizontal extent was determined by the presence of the FTA liner. PFOA and PFOS were detected in 28 sidewall samples: reported PFOA concentrations ranged between 0.27 (estimated) and 250 µg/kg; PFOS concentrations were reported ranging between 0.31 (estimated) and 3,000 µg/kg.

#### 4.6 ONSITE GROUNDWATER MONITORING

Groundwater samples were collected in 2017 and 2018 from monitoring wells along the northwest property boundary, one monitoring well between the process area and the property boundary, and MW-321-15. Results were compared to the both the U.S. Environmental Protection Agency (EPA) Lifetime Health Advisory (LHA) (0.07  $\mu$ g/L for PFOA and PFOS individually and combined) and ADEC groundwater cleanup levels for PFOA and PFOS of 0.4  $\mu$ g/L, respectively.

In 2017, a total of nine monitoring wells were sampled for PFAS. The combined concentration of PFOS and PFOA was approximately equal to or above the LHA (0.07  $\mu$ g/L) in monitoring wells MW-362-15 and MW-365-25 along the property boundary. PFOS and PFOA each individually

exceeded the LHA of 0.07  $\mu$ g/L in monitoring wells MW-309-15 (between the process area and the property boundary) and MW-321-15. PFOS exceeded the ADEC groundwater cleanup level in MW-321-15.

The same nine monitoring wells were sampled again in 2018. Concentrations increased since 2017, with the combined concentration of PFOS and PFOA exceeding the LHA in samples collected from MW-358-20, MW-362-25, and MW-362-15. PFOS and PFOA individually exceeded the ADEC groundwater cleanup level in MW-309-15 and MW-321-15.

#### 4.7 OFFSITE EVALUATIONS

The offsite evaluations in 2018 were completed in two phases: Phase I (summer 2018) and Phase II (fall/winter 2018). Activities completed included the following:

- Phase I: sampling of 4 private water wells fitted with point of entry treatment (POET) systems and 9 groundwater monitoring wells
- Phase II: sampling of 17 private water wells fitted with POET systems, 14 private wells with no treatment systems, 34 groundwater monitoring wells, and 4 surface water locations.

Letters containing results of sampling were provided to homeowners in December 2020. The offsite evaluations concluded that the POET systems were effectively removing PFAS. In all treated samples, PFOS and PFOA were not detected, and all other PFAS were reported at concentrations well below ADEC's action level. Twenty private water wells were fitted with POET systems following sampling activities.

Surface water samples in fall/winter 2018 were collected from Kimberly Lake (primary and duplicate) and Badger Slough (upstream, midstream, and downstream). Concentrations of PFOS ranged between 0.002 and 0.024  $\mu$ g/L, and concentrations of PFOA ranged between 0.0018 and 0.017  $\mu$ g/L. Three fish were also sampled from Kimberly Lake. Fish tissue samples contained concentrations of PFOS ranging between 47 and 68 ppb.

## **5 FIELDWORK/FOCUSED SITE CHARACTERIZATION**

In a letter dated June 19, 2020, ADEC requested that PFAS characterization be conducted to understand the vertical and horizontal extent of PFAS contamination where AFFF was previously stored, used, or dispersed during refinery "hot work." The request identified specific potential areas of concern, including sumps and tanks associated with the refinery wastewater collection system, the welding building and other potential storage locations, the former sulfolane extraction unit, former and current lagoons, and the two gravel pits located on the property.

In response, ADEC and Williams agreed to a groundwater and surface water investigation to identify potential onsite sources of PFAS. In December 2020, representatives from Shannon & Wilson mobilized to the Site to collect groundwater and surface water samples to be analyzed for PFAS. Prior to sampling, a synoptic water level event was completed at all accessible onsite wells. A licensed surveyor was also present onsite to collect elevation data for the monitoring wells that were suspected to have been effected by permafrost melt and freezing patterns. These revised survey results were used to determine groundwater elevation and flow direction.

Monitoring wells are divided into four depth zones: the Water Table Zone (WTZ); Zone 1, consisting of wells screened at depths between 10 and 55 ft bgs; Zone 2, consisting of wells screened at depths between 55 and 90 ft bgs; and Zone 3, consisting of wells screened at depths between 90 and 150 ft bgs. In all zones, groundwater flow was to the northwest, as presented in Figures 3 through 6. A summary of synoptic gauging results is included as Appendix A, and the surveyor report is included as Appendix B.

Groundwater samples were collected from a total of 132 wells to be analyzed for PFAS, as presented on Figure 7 (former operation features are shown on Figure 2). Samples were collected using methods to minimize the potential for cross-contamination, including the use of PFAS-free pumps and sampling materials for groundwater sample collection. Samples were analyzed for PFAS by SGS Laboratory using liquid chromatography-tandem mass spectrometry methods for PFAS analysis, compliant with DoD QSM 5.3, reporting 18 PFAS compounds. This was a deviation from the original work plan and was approved by ADEC via email correspondence (Fish 2020, pers. comm.).

A summary of groundwater sample results is presented as Table 1, and a summary of surface water results is provided as Table 2. The QA/QC sample results are presented as Table 3. Laboratory analytical data packages are included in Appendix C. Results of groundwater sampling are as follows:

- PFOA was reported at concentrations ranging between not detected and 1.2  $\mu$ g/L. Five groundwater samples exceeded the ADEC cleanup level of 0.4  $\mu$ g/L, and all were located within the WTZ.
- PFOS was reported at concentrations ranging between not detected and 8.68  $\mu$ g/L. Eleven groundwater samples exceeded the ADEC standard of 0.4  $\mu$ g/L, also all within the WTZ.
- Detections of perfluorohexanoic acid (PFHxA), perfluoroheptanoic acid (PFHpA), PFNA, perfluorodecanoic acid (PFDA), perfluoroundecanoic acid (PFUnDA), perfluorododecanoic acid (PFDoA), perfluorotridecanoic acid (PFTrDA), perfluorobutane sulfonic acid (PFBS), and perfluorohexane sulfonate (PFHxS) were reported in at least one groundwater sample.
- Perfluorotetradecanoic acid (PFTA), MeFOSAA, EtFOSAA, HFPODA (Gen X), ADONA, 9Cl-PF3ONS (F-53B Major), and 11Cl-PF3OUdS (F-53B Minor) were not detected in any groundwater samples.

Surface water samples were proposed for both the North and South Gravel Pits; however, only the North Gravel Pit was accessible for sampling. The South Gravel Pit was frozen, and field personnel were unable to break through the ice to collect a surface water sample. Results for the North Gravel Pit are summarized below:

- PFOA was reported at a concentration of 0.0293 μg/L.
- PFOS was reported at a concentration of 0.0566 µg/L.
- Concentrations of PFHxA, PFHpA, PFOA, PFNA, PFBS, PFHxS, and PFOS were identified in the sample collected from the North Gravel Pit.

Purge water generated as part of sampling activities was managed in accordance with ADEC regulations. Final waste manifests and approvals for disposal of the investigation-derived wastes are included in Appendix D.

## 6 RESULTS AND FINDINGS

Following investigation activities conducted in December, the results of the most recent sampling as well as previously collected data were used to gain a comprehensive understanding of onsite conditions. Groundwater sampling results were compared to ADEC's cleanup levels (0.4  $\mu$ g/L for PFOA and PFOS individually). A discussion of results, trends, and potential sources are included in the sections below.

#### 6.1 2020 INVESTIGATION RESULTS

As described in Section 4, monitoring wells are characterized by aquifer zone: the WTZ, Zone 1 (wells screened 10–55 ft bgs), Zone 2 (wells screened 55–90 ft bgs), and Zone 3 (wells screened 90–150 ft bgs). Results for PFOA and PFOS in each zone are presented on Figures 8 and 9, respectively. The results for the combined total of PFOA + PFOS are presented on Figure 10.

The only exceedances of the ADEC cleanup level of  $0.4 \mu g/L$  for PFOA were in the WTZ. All results for PFOA in the groundwater samples collected from Zone 2 and 3 were either not detected or detected below the cleanup levels. Therefore, vertical delineation of PFOA is complete. Horizontal delineation is complete to the north, east, and west of all samples exceeding the ADEC cleanup level; however, concentrations of PFOA in MW-361-15 are not delineated to the south.

Similarly, PFOS concentrations reported above the ADEC cleanup level of 0.4  $\mu$ g/L were all located within the WTZ. Vertical delineation of PFOS is complete. PFOS is horizontally delineated to the north, east, and west, but as described for PFOA, concentrations of PFOS in MW-361-15 are not delineated to the south.

When examining the combined total of PFOA+PFOS in groundwater, again only wells in the WTZ exceed the 0.4  $\mu$ g/L cleanup level; vertical delineation is complete. With the exception of monitoring well MW-361-15, all exceedances are horizontally delineated. Concentrations of PFOA, PFOS, and the combined total of PFOA+PFOS present in the monitoring wells located along the north-northwest property boundary are all below the ADEC cleanup levels.

#### 6.2 POTENTIAL PFAS SOURCES

In an effort to identify potential sources of PFAS, groundwater results were superimposed on a map identifying key former operations areas (Figures 7 through 10). The likely sources of PFAS were identified (Figure 11):

• *Sulfolane Extraction Unit and Crude Unit #2:* The highest concentrations of both PFOA and PFOS were located at monitoring well MW-176A-15 (1.2 and 8.68 µg/L, respectively),

directly downgradient from the Sulfolane Extract Unit. Additional samples including MW-115-15, MW-336-20, MW-336-15, and O-34 along the same groundwater flow path contained elevated concentrations of PFOA and PFOS.

- *Lagoons:* The samples collected from MW-110-20, MW-321-15, and MW-195A-15 contained concentrations of PFOA and/or PFOS exceeding the ADEC cleanup levels. The three monitoring wells surround Lagoon C, and sample MW-110-20 is directly adjacent to Lagoon B.
- *Crude Unit #3:* The sample collected at location O-10 contained elevated levels of PFOA and PFOS, almost exceeding and exceeding the ADEC cleanup levels, respectively. Well O-10 is located directly downgradient from Crude Unit #3.
- *Loading Areas:* The sample collected from monitoring well MW-345-15, directly downgradient from the former truck loading area and railcar loading area, contained elevated concentrations of PFOA and a reported concentration of PFOS exceeding the ADEC cleanup level.
- *Neighboring Petro Star Refinery Property:* Elevated concentrations of PFOA and PFOS were identified in WTZ monitoring wells MW-367-12 and MW-368-15 in the southeastern corner of the Site. There are no upgradient monitoring wells of the sampled locations to delineate groundwater impacts, and it may be possible that Petro Star is an upgradient source of impacts within that area.

## 7 QUALITY ASSURANCE ASSESSMENT

This section summarizes the data usability assessment and the data validation report that were prepared for the PFAS site characterization groundwater and surface water samples collected between December 1 and 17, 2020, from the Site. The data usability assessment determines whether analytical data points are scientifically valid and defensible and of a sufficient level of precision, accuracy, representativeness, completeness, comparability (PARCC) and sensitivity to support the project goals.

The data validation was performed by Integral. The data validation report is provided as Appendix E.

The data quality review indicates that the data are generally usable and of good quality to support the project goals. The remaining part of this section presents the results of the data usability assessment.

#### 7.1 DATA USABILITY EVALUATION

Measurement quality objectives evaluate and control the data-collection process to ensure that measurement uncertainty is within an acceptable range to meet the project data quality objectives. Measurement quality objectives define the acceptable quality of field and laboratory data for the project in terms of data quality indicators, such as the PARCC parameters (USEPA 2002). These parameters, as well as analytical sensitivity (i.e., detectability), were used to assess conformance of the groundwater and surface water data with quality control criteria, as detailed below.

### 7.2 DATA VALIDATION APPROACH

The groundwater and surface water data received 100 percent Stage 2A validation, which included a review of all laboratory summary forms of quality control. One sample delivery group received a Stage 2B validation, which included elements of the Stage 2A validation and review of all summary forms of instrument performance data. The data validation was based upon criteria described in EPA's functional guidelines for organic data review (USEPA 2017) and the referenced analytical method.

Data that did not meet the applicable laboratory or data validation quality control limits were qualified as estimated (assigned a "UJ" qualifier) during the quality assurance review.<sup>1</sup> The data validation report (Appendix E) provides a synopsis of the quality control metrics that were

<sup>&</sup>lt;sup>1</sup> The complete definitions for the data qualifiers are presented in the data validation report.

evaluated and an overview of the data validation qualifiers that were applied to the sample results.

The analytical laboratory provided the electronic data deliverables in an Integral-specified format. Integral incorporated the PFAS sample results into a custom-developed historical database for the project.

#### 7.3 PRECISION

Precision reflects the reproducibility between individual measurements of the same location. In this context, field duplicate samples (i.e., multiple samples of the same media) are collected to assess the variability resulting from field conditions and/or sampling technique.

Eight sets of field replicates were collected:

- Sample O-134 was the blind field duplicate of Sample O-34
- Sample MW-404-15 was the blind field duplicate of Sample MW-304-15
- Sample MW-459-35 was the blind field duplicate of Sample MW-359-35
- Sample MW-462-150 was the blind field duplicate of Sample MW-362-150
- Sample MW-470-75 was the blind field duplicate of Sample MW-370-75
- Sample MW-249B-20 was the blind field duplicate of Sample MW-149B-20
- Sample MW-451-15 was the blind field duplicate of Sample MW-351-15
- Sample MW-206-25 was the blind field duplicate of Sample MW-106-25.

The comparability of the replicate results was assessed for field replicates by calculating the relative percent difference (RPD) of the results, as shown in the equation below:

$$RPD = ABS \left[ \frac{Parent_{Chem} - Replicate_{Chem}}{(Parent_{Chem} + Replicate_{Chem})/2} \right]$$

EPA has not established control limits for field replicates. For this project, the target control limit for field replicates is an RPD less than 35 percent for values greater than 5 times the method reporting limit (MRL). For values less than 5 times the MRL, the absolute difference should be less than the MRL. These control limits were met for all analytes in the field duplicates.

The RPDs for laboratory duplicates and matrix spike and matrix spike duplicates (MS/MSD) were evaluated against the laboratory-specified control limits. None of the results were qualified due to laboratory duplicate results.

### 7.4 ACCURACY

Accuracy (bias) represents the degree to which a measured concentration conforms to a reference value. Matrix spike samples, laboratory control samples (LCSs), and surrogates were analyzed to assess the data accuracy. These results are discussed below.

#### 7.4.1 Matrix Spike Recoveries

The percent recoveries of the matrix spikes were evaluated against the laboratory-specified control limits. Qualifiers were not assigned for percent recoveries outside the control limits when the MS/MSD was performed on a non-project batch quality control sample. None of the results were qualified due to MS/MSD results.

#### 7.4.2 LCS Recoveries

The percent recoveries of the LCSs were evaluated against the laboratory-specified control limits. None of the results were qualified due to LCS results.

#### 7.4.3 Surrogate Recoveries

The percent recoveries of the surrogates were evaluated against the laboratory-specified control limits. Several non-detected results were estimated ("UJ") for percent recoveries below the lower control limit. None of the results were rejected due to surrogate recovery results.

#### 7.5 REPRESENTATIVENESS

Representativeness is the degree to which data represent a characteristic of an environmental condition, and is applicable to the samples collected for chemical analysis. The groundwater and surface water samples were collected and processed according to protocols outlined in the Tech Memo (Integral 2020). All samples were properly handled (i.e., proper preservation and shipping temperature) during collection and receipt by the laboratory.

No issues were identified related to the analytical results that may affect the representativeness of these results.

#### 7.6 COMPLETENESS

Data completeness refers to the amount of usable data collected. No results were rejected and completeness for the data set was 100 percent.

### 7.7 COMPARABILITY

Comparability is the qualitative similarity of one data set to another (i.e., the extent to which different data sets can be combined for use). To allow for future comparability, the 2020 groundwater and surface water samples were analyzed by a standard analytical method; which is listed in the Tech Memo (Integral 2020). These data will be compared to both historical and future groundwater and surface water data collected as part of the continuing site characterization.

#### 7.8 ADDITIONAL QUALITY CONTROL METRICS

In addition to the PARCC parameters discussed above, the data validation review included the assessment of the following parameters:

- Continuing calibration
- Initial calibration
- Internal standard performance
- Field and laboratory blank contamination.

No data were qualified for these parameters.

The laboratory method detection limits for PFOA and PFOS met the ADEC published action levels discussed in the Tech Memo (Integral 2020). The data are usable for evaluation of PFAS in groundwater and surface water.

#### 7.9 DATA USABILITY SUMMARY

In total, 2,884 data points were validated. Of these, 3 (<1%) of the data points were qualified as estimated ("UJ" qualifier) during the data validation process. Overall, the data meet the criteria set forth in the referenced quality assurance documents and all results are acceptable for their intended use.

## 8 **RECOMMENDATIONS**

Following the historical and current investigation activities described in this report, the following next steps are proposed:

#### **Groundwater Delineation**

As described in Section 5.1 above, concentrations of PFAS, particularly PFOA and PFOS, in groundwater have been vertically delineated. Horizontal delineation of groundwater is not completed to the south near the upgradient edge of the Site adjacent to the neighboring Petro Star Refinery. Integral proposes that two additional monitoring wells be installed to the south of MW-361-15 in the WTZ to complete horizontal delineation or identify potential source(s) of the impacts. All well locations will be confirmed prior to installation to be outside of the "no dig" zones described by Marathon during the June 22, 2021 Site Walk.

#### Surface Water Investigation

Integral proposes that surface water sampling be conducted within the South Gravel Pit, as proposed previously. A second, confirmatory sample will also be collected from the North Gravel Pit.

Upon completion of delineation activities proposed herein, Williams and ADEC can determine if additional follow-up activities are recommended for the Site.

## 9 REFERENCES

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## Figures



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Figure 1. Site Location

Former North Pole Refinery North Pole, AK





December 2020



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**Figure 4.** Groundwater Contour Maps (Onsite Wells) -Zone 1 (10 - 55 ft) December 2020



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Figure 5. Groundwater Contour Map (Onsite Wells) -Zone 2 (55 - 90 ft) December 2020



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Figure 6. Groundwater Contour Map (Onsite Wells) -Zone 3 (90 - 150 ft) December 2020



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Figure 7. Sampling Locations December 2020








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Figure 11. Potential PFAS Areas of Interest

# Tables

	ADEC	Sample Identification:	MW-102-70	MW-106-25	MW-109-15	MW-110-20	MW-110-65
	Groundwater	Sample Date:	12/8/2020	12/15/2020	12/14/2020	12/9/2020	12/9/2020
Analyte (µg/L)	Cleanup Level	·	Result Qualifier				
Next Generation Analytes							
11CI-PF3OUdS (F-53B Minor)	NS		0.004 <i>U</i>	0.004 <i>U</i>	0.0038 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
3H-perfluoro-3-[(3-methoxy-propoxy)propanoic acid] (ADONA)	NS		0.004 <i>U</i>	0.004 <i>U</i>	0.0038 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
9CI-PF3ONS (F-53B Major)	NS		0.004 <i>U</i>	0.004 <i>U</i>	0.0038 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
Hexafluoropropylene oxide-dimer acid(HFPO-DA, GenX)	NS		0.004 <i>U</i>	0.004 <i>U</i>	0.0038 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
Perfluorooctanesulfonamidoacetic acids							
2-(N-methyl-perfluorooctane sulfonamido) acetic acid (MeFOSAA)	NS		0.004 <i>U</i>	0.004 <i>U</i>	0.0038 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
2-(N-ethyl-perfluorooctane sulfonamido) acetate (EtFOSAA)	NS		0.004 <i>U</i>	0.004 <i>U</i>	0.0038 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
Perfluoroalklysulfonaic acids							
Perfluorobutanesulfonic acid (PFBS)	NS		0.002 <i>U</i>	0.002 <i>U</i>	0.0021 J	0.0026 J	0.002 <i>U</i>
Perfluorohexanesulfonic acid (PFHxS)	NS		0.0141	0.0085	0.0304	0.062	0.0038 J
Perfluoroocanesulfonic acid (PFOS)	0.4		0.0353	0.0051	0.0902	0.602	0.0036 J
Perfluoroalklycarboxylic acids							
Perfluorohexanoic acid (PFHxA)	NS		0.0132	0.004	0.0292	0.0717	0.002 <i>U</i>
Perfluoroheptanoic acid (PFHpA)	NS		0.0098	0.004	0.021	0.105	0.002 <i>U</i>
Perflorooctanoic acid (PFOA)	0.4		0.0139	0.0045	0.0295	0.115	0.002 <i>U</i>
Perfluorononanoic acid (PFNA)	NS		0.0183	0.002 J	0.0606	0.315	0.002 <i>U</i>
Perfluorodecanoic Acid (PFDA)	NS		0.002 <i>U</i>	0.002 <i>U</i>	0.0028 J	0.0173	0.002 <i>U</i>
Perfluoroundecanoic acid (PFUnA)	NS		0.002 <i>U</i>	0.002 <i>U</i>	0.0053	0.0178	0.002 <i>U</i>
Perfluorododecanoic acid (PFDoA)	NS		0.002 <i>U</i>	0.002 <i>U</i>	0.0019 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perfluorotridecanoic acid (PFTrDA)	NS		0.002 <i>U</i>	0.002 <i>U</i>	0.0019 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perfluorotetradecanoic acid (PFTA)	NS		0.002 <i>U</i>	0.002 <i>U</i>	0.0019 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>

Notes:

Highlighted indicates value exceeds Cleanup Level.

ADEC = Alaska Department of Environmental Conservation NS = no standard PFAS = per- and polyfluoroalkylated substances

Data Qualifiers:

J = The result is an estimated quantity.

U = The material was analyzed for, but was not detected.

	ADEC	Sample Identification:	MW-113-15	MW-115-15	MW-130-25	MW-133-20	MW-137-20
	Groundwater	Sample Date:	12/9/2020	12/1/2020	12/6/2020	12/6/2020	12/4/2020
Analyte (µg/L)	Cleanup Level		Result Qualifier				
Next Generation Analytes							
11CI-PF3OUdS (F-53B Minor)	NS		0.004 <i>U</i>				
3H-perfluoro-3-[(3-methoxy-propoxy)propanoic acid] (ADONA)	NS		0.004 <i>U</i>				
9CI-PF3ONS (F-53B Major)	NS		0.004 <i>U</i>				
Hexafluoropropylene oxide-dimer acid(HFPO-DA, GenX)	NS		0.004 <i>U</i>				
Perfluorooctanesulfonamidoacetic acids							
2-(N-methyl-perfluorooctane sulfonamido) acetic acid (MeFOSAA)	NS		0.004 <i>U</i>				
2-(N-ethyl-perfluorooctane sulfonamido) acetate (EtFOSAA)	NS		0.004 <i>U</i>				
Perfluoroalklysulfonaic acids							
Perfluorobutanesulfonic acid (PFBS)	NS		0.0076	0.0136	0.0122	0.002 <i>U</i>	0.002 <i>U</i>
Perfluorohexanesulfonic acid (PFHxS)	NS		0.0852	0.255	0.101	0.0106	0.0247
Perfluoroocanesulfonic acid (PFOS)	0.4		0.165	2.11	0.218	0.0053	0.0526
Perfluoroalklycarboxylic acids							
Perfluorohexanoic acid (PFHxA)	NS		0.13	0.404	0.125	0.0198	0.0561
Perfluoroheptanoic acid (PFHpA)	NS		0.109	0.445	0.139	0.0164	0.0638
Perflorooctanoic acid (PFOA)	0.4		0.0998	0.368	0.137	0.0143	0.0916
Perfluorononanoic acid (PFNA)	NS		0.219	1.88	0.238	0.008	0.0435
Perfluorodecanoic Acid (PFDA)	NS		0.0025 J	0.096	0.0074	0.002 <i>U</i>	0.0066
Perfluoroundecanoic acid (PFUnA)	NS		0.002 U	0.187	0.0261	0.002 <i>U</i>	0.0043
Perfluorododecanoic acid (PFDoA)	NS		0.002 U	0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perfluorotridecanoic acid (PFTrDA)	NS		0.002 U	0.002 <i>U</i>	0.0242 J	0.002 <i>U</i>	0.01 <i>U</i>
Perfluorotetradecanoic acid (PFTA)	NS		0.002 U	0.002 <i>U</i>	0.02 <i>U</i>	0.002 <i>U</i>	0.01 <i>U</i>

Notes:

Highlighted indicates value exceeds Cleanup Level.

ADEC = Alaska Department of Environmental Conservation NS = no standard PFAS = per- and polyfluoroalkylated substances

Data Qualifiers:

J = The result is an estimated quantity.

U = The material was analyzed for, but was not detected.

	ADEC	Sample Identification:	MW-139-25	MW-141-20	MW-146A-15	MW-146B-30	MW-149A-15	MW-149B-20
	Groundwater	Sample Date:	12/8/2020	12/9/2020	12/8/2020	12/8/2020	12/15/2020	12/14/2020
Analyte (µg/L)	Cleanup Level		Result Qualifier					
Next Generation Analytes								
11CI-PF3OUdS (F-53B Minor)	NS		0.004 <i>U</i>	0.004 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
3H-perfluoro-3-[(3-methoxy-propoxy)propanoic acid] (ADONA)	NS		0.004 <i>U</i>	0.004 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
9CI-PF3ONS (F-53B Major)	NS		0.004 <i>U</i>	0.004 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
Hexafluoropropylene oxide-dimer acid(HFPO-DA, GenX)	NS		0.004 <i>U</i>	0.004 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
Perfluorooctanesulfonamidoacetic acids								
2-(N-methyl-perfluorooctane sulfonamido) acetic acid (MeFOSAA)	NS		0.004 <i>U</i>	0.004 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
2-(N-ethyl-perfluorooctane sulfonamido) acetate (EtFOSAA)	NS		0.004 <i>U</i>	0.004 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
Perfluoroalklysulfonaic acids								
Perfluorobutanesulfonic acid (PFBS)	NS		0.0029 J	0.0022 J	0.0036 J	0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perfluorohexanesulfonic acid (PFHxS)	NS		0.0483	0.0261	0.0622	0.0203	0.002 J	0.0035 J
Perfluoroocanesulfonic acid (PFOS)	0.4		0.17	0.0553	0.0198	0.0432	0.002 <i>U</i>	0.002 J
Perfluoroalklycarboxylic acids								
Perfluorohexanoic acid (PFHxA)	NS		0.0706	0.0309	0.121	0.026	0.002 <i>U</i>	0.0038 J
Perfluoroheptanoic acid (PFHpA)	NS		0.0714	0.0234	0.218	0.0214	0.002 <i>U</i>	0.0029 J
Perflorooctanoic acid (PFOA)	0.4		0.0803	0.0217	0.0321	0.022	0.002 <i>U</i>	0.003 J
Perfluorononanoic acid (PFNA)	NS		0.4	0.0549	0.0366	0.0481	0.002 <i>U</i>	0.002 <i>U</i>
Perfluorodecanoic Acid (PFDA)	NS		0.0059	0.002 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perfluoroundecanoic acid (PFUnA)	NS		0.0023 J	0.002 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perfluorododecanoic acid (PFDoA)	NS		0.002 <i>U</i>	0.002 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perfluorotridecanoic acid (PFTrDA)	NS		0.002 <i>U</i>	0.002 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perfluorotetradecanoic acid (PFTA)	NS		0.002 <i>U</i>	0.002 U	0.0021 <i>U</i>	0.0021 <i>U</i>	0.002 <i>U</i>	0.002 U

Notes:

Highlighted indicates value exceeds Cleanup Level.

ADEC = Alaska Department of Environmental Conservation NS = no standard PFAS = per- and polyfluoroalkylated substances

Data Qualifiers:

J = The result is an estimated quantity.

U = The material was analyzed for, but was not detected.

	ADEC	Sample Identification:	MW-154A-75	MW-154B-95	MW-174-15	MW-174A-50	MW-174B-90	MW-176A-15
	Groundwater	Sample Date:	12/8/2020	12/8/2020	12/8/2020	12/9/2020	12/8/2020	12/1/2020
Analyte (µg/L)	Cleanup Level		Result Qualifier					
Next Generation Analytes								
11CI-PF3OUdS (F-53B Minor)	NS		0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>
3H-perfluoro-3-[(3-methoxy-propoxy)propanoic acid] (ADONA)	NS		0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>
9CI-PF3ONS (F-53B Major)	NS		0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>
Hexafluoropropylene oxide-dimer acid(HFPO-DA, GenX)	NS		0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>
Perfluorooctanesulfonamidoacetic acids								
2-(N-methyl-perfluorooctane sulfonamido) acetic acid (MeFOSAA)	NS		0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>
2-(N-ethyl-perfluorooctane sulfonamido) acetate (EtFOSAA)	NS		0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>
Perfluoroalklysulfonaic acids								
Perfluorobutanesulfonic acid (PFBS)	NS		0.0027 J	0.0023 J	0.0042	0.002 <i>U</i>	0.0021 <i>U</i>	0.0394
Perfluorohexanesulfonic acid (PFHxS)	NS		0.026	0.0321	0.114	0.0068	0.0037 J	1.46
Perfluoroocanesulfonic acid (PFOS)	0.4		0.0773	0.136	0.301	0.0192	0.0026 J	8.68
Perfluoroalklycarboxylic acids								
Perfluorohexanoic acid (PFHxA)	NS		0.025	0.0399	0.0856	0.0038 J	0.0021 <i>U</i>	0.997
Perfluoroheptanoic acid (PFHpA)	NS		0.016	0.0366	0.0722	0.0043	0.0021 <i>U</i>	0.698
Perflorooctanoic acid (PFOA)	0.4		0.0215	0.0415	0.148	0.0066	0.0021 <i>U</i>	1.2
Perfluorononanoic acid (PFNA)	NS		0.109	0.201	0.76	0.0099	0.0021 <i>U</i>	4.93
Perfluorodecanoic Acid (PFDA)	NS		0.002 <i>U</i>	0.0039 J	0.0044	0.002 <i>U</i>	0.0021 <i>U</i>	0.0786
Perfluoroundecanoic acid (PFUnA)	NS		0.002 U	0.0029 J	0.0051	0.002 <i>U</i>	0.0021 <i>U</i>	0.0806
Perfluorododecanoic acid (PFDoA)	NS		0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>
Perfluorotridecanoic acid (PFTrDA)	NS		0.002 U	0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>
Perfluorotetradecanoic acid (PFTA)	NS		0.002 U	0.002 U	0.002 U	0.002 U	0.0021 <i>U</i>	0.0021 <i>U</i>

Notes:

Highlighted indicates value exceeds Cleanup Level.

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Data Qualifiers:

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	ADEC	Sample Identification:	MW-176B-50	MW-176C-90	MW-178A-15	MW-178B-50	MW-178C-90	MW-180A-15
	Groundwater	Sample Date:	12/1/2020	12/1/2020	12/1/2020	12/1/2020	12/1/2020	12/2/2020
Analyte (µg/L)	Cleanup Level		Result Qualifier					
Next Generation Analytes								
11CI-PF3OUdS (F-53B Minor)	NS		0.004 <i>U</i>	0.0042 <i>U</i>				
3H-perfluoro-3-[(3-methoxy-propoxy)propanoic acid] (ADONA)	NS		0.004 <i>U</i>	0.0042 <i>U</i>				
9CI-PF3ONS (F-53B Major)	NS		0.004 <i>U</i>	0.0042 <i>U</i>				
Hexafluoropropylene oxide-dimer acid(HFPO-DA, GenX)	NS		0.004 <i>U</i>	0.0042 <i>U</i>				
Perfluorooctanesulfonamidoacetic acids								
2-(N-methyl-perfluorooctane sulfonamido) acetic acid (MeFOSAA)	NS		0.004 <i>U</i>	0.0042 <i>U</i>				
2-(N-ethyl-perfluorooctane sulfonamido) acetate (EtFOSAA)	NS		0.004 <i>U</i>	0.0042 <i>U</i>				
Perfluoroalklysulfonaic acids								
Perfluorobutanesulfonic acid (PFBS)	NS		0.002 <i>U</i>	0.0021 <i>U</i>				
Perfluorohexanesulfonic acid (PFHxS)	NS		0.011	0.0048	0.0538	0.0148	0.0038 J	0.0373
Perfluoroocanesulfonic acid (PFOS)	0.4		0.0324	0.0035 J	0.105	0.0881	0.0031 <i>J</i>	0.0234
Perfluoroalklycarboxylic acids								
Perfluorohexanoic acid (PFHxA)	NS		0.0095	0.002 <i>U</i>	0.0882	0.0097	0.0028 J	0.0278
Perfluoroheptanoic acid (PFHpA)	NS		0.007	0.002 <i>U</i>	0.135	0.0081	0.002 <i>U</i>	0.0347
Perflorooctanoic acid (PFOA)	0.4		0.0092	0.002 <i>U</i>	0.166	0.011	0.002 <i>U</i>	0.0391
Perfluorononanoic acid (PFNA)	NS		0.0459	0.002 <i>U</i>	0.231	0.0793	0.002 <i>U</i>	0.0376
Perfluorodecanoic Acid (PFDA)	NS		0.002 <i>U</i>	0.002 <i>U</i>	0.0027 J	0.002 <i>U</i>	0.002 <i>U</i>	0.0021 <i>U</i>
Perfluoroundecanoic acid (PFUnA)	NS		0.002 <i>U</i>	0.002 <i>U</i>	0.0057	0.002 <i>U</i>	0.002 <i>U</i>	0.0021 <i>U</i>
Perfluorododecanoic acid (PFDoA)	NS		0.002 <i>U</i>	0.0021 <i>U</i>				
Perfluorotridecanoic acid (PFTrDA)	NS		0.002 <i>U</i>	0.0021 <i>U</i>				
Perfluorotetradecanoic acid (PFTA)	NS		0.002 <i>U</i>	0.0021 <i>U</i>				

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	ADEC	Sample Identification:	MW-180B-50	MW-180C-90	MW-186A-15	MW-186B-60	MW-186C-100	MW-186D-135
	Groundwater	Sample Date:	12/2/2020	12/2/2020	12/1/2020	12/2/2020	12/2/2020	12/2/2020
_Analyte (μg/L)	Cleanup Level	·	Result Qualifier					
Next Generation Analytes								
11CI-PF3OUdS (F-53B Minor)	NS		0.0042 <i>U</i>					
3H-perfluoro-3-[(3-methoxy-propoxy)propanoic acid] (ADONA)	NS		0.0042 <i>U</i>					
9CI-PF3ONS (F-53B Major)	NS		0.0042 <i>U</i>					
Hexafluoropropylene oxide-dimer acid(HFPO-DA, GenX)	NS		0.0042 <i>U</i>					
Perfluorooctanesulfonamidoacetic acids								
2-(N-methyl-perfluorooctane sulfonamido) acetic acid (MeFOSAA)	NS		0.0042 <i>U</i>					
2-(N-ethyl-perfluorooctane sulfonamido) acetate (EtFOSAA)	NS		0.0042 <i>U</i>					
Perfluoroalklysulfonaic acids								
Perfluorobutanesulfonic acid (PFBS)	NS		0.0021 <i>U</i>	0.0021 <i>U</i>	0.0041 <i>J</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>
Perfluorohexanesulfonic acid (PFHxS)	NS		0.0047	0.0036 J	0.0585	0.0095	0.0061	0.0047
Perfluoroocanesulfonic acid (PFOS)	0.4		0.0047	0.004 J	0.214	0.0353	0.0068	0.0026 J
Perfluoroalklycarboxylic acids								
Perfluorohexanoic acid (PFHxA)	NS		0.0021 <i>U</i>	0.0021 <i>U</i>	0.101	0.0072	0.0037 J	0.0022 J
Perfluoroheptanoic acid (PFHpA)	NS		0.0021 <i>U</i>	0.0021 <i>U</i>	0.0905	0.0053	0.0021 <i>U</i>	0.0021 <i>U</i>
Perflorooctanoic acid (PFOA)	0.4		0.0025 J	0.0021 <i>U</i>	0.0955	0.0079	0.0027 J	0.0021 <i>U</i>
Perfluorononanoic acid (PFNA)	NS		0.0021 <i>U</i>	0.0021 <i>U</i>	0.319	0.0535	0.0038 J	0.0021 <i>U</i>
Perfluorodecanoic Acid (PFDA)	NS		0.0021 <i>U</i>	0.0021 <i>U</i>	0.0069	0.0021 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>
Perfluoroundecanoic acid (PFUnA)	NS		0.0021 <i>U</i>	0.0021 <i>U</i>	0.0056	0.0021 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>
Perfluorododecanoic acid (PFDoA)	NS		0.0021 <i>U</i>					
Perfluorotridecanoic acid (PFTrDA)	NS		0.0021 <i>U</i>					
Perfluorotetradecanoic acid (PFTA)	NS		0.0021 <i>U</i>					

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	ADEC	Sample Identification:	MW-186E-75	MW-192A-15	MW-192B-55	MW-195A-15	MW-195B-150	MW-198-150
	Groundwater	Sample Date:	12/2/2020	12/7/2020	12/7/2020	12/9/2020	12/9/2020	12/4/2020
Analyte (µg/L)	Cleanup Level		Result Qualifier					
Next Generation Analytes								
11CI-PF3OUdS (F-53B Minor)	NS		0.0042 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
3H-perfluoro-3-[(3-methoxy-propoxy)propanoic acid] (ADONA)	NS		0.0042 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
9CI-PF3ONS (F-53B Major)	NS		0.0042 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
Hexafluoropropylene oxide-dimer acid(HFPO-DA, GenX)	NS		0.0042 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
Perfluorooctanesulfonamidoacetic acids								
2-(N-methyl-perfluorooctane sulfonamido) acetic acid (MeFOSAA)	NS		0.0042 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
2-(N-ethyl-perfluorooctane sulfonamido) acetate (EtFOSAA)	NS		0.0042 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
Perfluoroalklysulfonaic acids								
Perfluorobutanesulfonic acid (PFBS)	NS		0.0021 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.396	0.002 <i>U</i>	0.002 <i>U</i>
Perfluorohexanesulfonic acid (PFHxS)	NS		0.008	0.0092	0.004 J	1.64	0.003 J	0.0038 J
Perfluoroocanesulfonic acid (PFOS)	0.4		0.0239	0.004 J	0.0032 J	0.55	0.002 <i>U</i>	0.002 <i>U</i>
Perfluoroalklycarboxylic acids								
Perfluorohexanoic acid (PFHxA)	NS		0.0054	0.0021 <i>U</i>	0.0021 <i>U</i>	2.75	0.002 <i>U</i>	0.002 <i>U</i>
Perfluoroheptanoic acid (PFHpA)	NS		0.0038 J	0.0048	0.0021 <i>U</i>	0.931	0.002 <i>U</i>	0.002 <i>U</i>
Perflorooctanoic acid (PFOA)	0.4		0.006	0.0043	0.0021 <i>U</i>	0.589	0.002 <i>U</i>	0.002 <i>U</i>
Perfluorononanoic acid (PFNA)	NS		0.0349	0.0021 <i>U</i>	0.0021 <i>U</i>	0.957	0.002 <i>U</i>	0.002 <i>U</i>
Perfluorodecanoic Acid (PFDA)	NS		0.0021 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.007	0.002 <i>U</i>	0.002 <i>U</i>
Perfluoroundecanoic acid (PFUnA)	NS		0.0021 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.0036 J	0.002 <i>U</i>	0.002 <i>U</i>
Perfluorododecanoic acid (PFDoA)	NS		0.0021 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perfluorotridecanoic acid (PFTrDA)	NS		0.0021 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perfluorotetradecanoic acid (PFTA)	NS		0.0021 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>

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5	ADEC	Sample Identification:	MW-206-25	MW-249B-20	MW-300-150	MW-301-CMT-10	MW-304-15	MW-309-15
	Groundwater	Sample Date:	12/15/2020	12/14/2020	12/3/2020	12/9/2020	12/4/2020	12/7/2020
Analyte (µg/L)	Cleanup Level	·	Result Qualifier					
Next Generation Analytes								
11CI-PF3OUdS (F-53B Minor)	NS		0.004 <i>U</i>	0.0042 <i>U</i>				
3H-perfluoro-3-[(3-methoxy-propoxy)propanoic acid] (ADONA)	NS		0.004 <i>U</i>	0.0042 <i>U</i>				
9CI-PF3ONS (F-53B Major)	NS		0.004 <i>U</i>	0.0042 <i>U</i>				
Hexafluoropropylene oxide-dimer acid(HFPO-DA, GenX)	NS		0.004 <i>U</i>	0.0042 <i>U</i>				
Perfluorooctanesulfonamidoacetic acids								
2-(N-methyl-perfluorooctane sulfonamido) acetic acid (MeFOSAA)	NS		0.004 <i>U</i>	0.0042 <i>U</i>				
2-(N-ethyl-perfluorooctane sulfonamido) acetate (EtFOSAA)	NS		0.004 <i>U</i>	0.0042 <i>U</i>				
Perfluoroalklysulfonaic acids								
Perfluorobutanesulfonic acid (PFBS)	NS		0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.004	0.0037 J
Perfluorohexanesulfonic acid (PFHxS)	NS		0.0074	0.0037 J	0.0054	0.0264	0.0238	0.0723
Perfluoroocanesulfonic acid (PFOS)	0.4		0.0053	0.002 <i>U</i>	0.0028 J	0.0345	0.0225	0.137
Perfluoroalklycarboxylic acids								
Perfluorohexanoic acid (PFHxA)	NS		0.0044	0.0039 J	0.002 <i>U</i>	0.0214	0.0456	0.0645
Perfluoroheptanoic acid (PFHpA)	NS		0.0044	0.0027 J	0.002 <i>U</i>	0.027	0.0249	0.0587
Perflorooctanoic acid (PFOA)	0.4		0.0042	0.003 J	0.002 <i>U</i>	0.0228	0.0218	0.081
Perfluorononanoic acid (PFNA)	NS		0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.033	0.0462	0.179
Perfluorodecanoic Acid (PFDA)	NS		0.002 <i>U</i>	0.0022 J				
Perfluoroundecanoic acid (PFUnA)	NS		0.002 <i>U</i>	0.0021 <i>U</i>				
Perfluorododecanoic acid (PFDoA)	NS		0.002 <i>U</i>	0.0021 <i>U</i>				
Perfluorotridecanoic acid (PFTrDA)	NS		0.002 <i>U</i>	0.0021 <i>U</i>				
Perfluorotetradecanoic acid (PFTA)	NS		0.002 <i>U</i>	0.0021 <i>U</i>				

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	ADEC	Sample Identification:	MW-309-150	MW-309-66	MW-310-110	MW-310-15	MW-310-65	MW-321-15
	Groundwater	Sample Date:	12/7/2020	12/7/2020	12/8/2020	12/7/2020	12/7/2020	12/6/2020
Analyte (µg/L)	Cleanup Level		Result Qualifier					
Next Generation Analytes								
11CI-PF3OUdS (F-53B Minor)	NS		0.0042 <i>U</i>	0.004 <i>U</i>				
3H-perfluoro-3-[(3-methoxy-propoxy)propanoic acid] (ADONA)	NS		0.0042 <i>U</i>	0.004 <i>U</i>				
9CI-PF3ONS (F-53B Major)	NS		0.0042 <i>U</i>	0.004 <i>U</i>				
Hexafluoropropylene oxide-dimer acid(HFPO-DA, GenX)	NS		0.0042 <i>U</i>	0.004 <i>U</i>				
Perfluorooctanesulfonamidoacetic acids								
2-(N-methyl-perfluorooctane sulfonamido) acetic acid (MeFOSAA)	NS		0.0042 <i>U</i>	0.004 <i>U</i>				
2-(N-ethyl-perfluorooctane sulfonamido) acetate (EtFOSAA)	NS		0.0042 <i>U</i>	0.004 <i>U</i>				
Perfluoroalklysulfonaic acids								
Perfluorobutanesulfonic acid (PFBS)	NS		0.0021 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.0102	0.0021 <i>U</i>	0.0056
Perfluorohexanesulfonic acid (PFHxS)	NS		0.0037 J	0.0111	0.0032 J	0.158	0.0057	0.408
Perfluoroocanesulfonic acid (PFOS)	0.4		0.0021 <i>U</i>	0.0353	0.0024 <i>J</i>	0.261	0.0044	3.68
Perfluoroalklycarboxylic acids								
Perfluorohexanoic acid (PFHxA)	NS		0.0021 <i>U</i>	0.0086	0.0021 <i>U</i>	0.162	0.0022 J	0.216
Perfluoroheptanoic acid (PFHpA)	NS		0.0021 <i>U</i>	0.0072	0.0021 <i>U</i>	0.0999	0.0021 <i>U</i>	0.224
Perflorooctanoic acid (PFOA)	0.4		0.0021 <i>U</i>	0.0126	0.0021 <i>U</i>	0.111	0.0023 J	0.487
Perfluorononanoic acid (PFNA)	NS		0.0021 <i>U</i>	0.0275	0.0021 <i>U</i>	0.407	0.0021 <i>U</i>	3.15
Perfluorodecanoic Acid (PFDA)	NS		0.0021 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.0024 J	0.0021 <i>U</i>	0.0102
Perfluoroundecanoic acid (PFUnA)	NS		0.0021 <i>U</i>	0.0053				
Perfluorododecanoic acid (PFDoA)	NS		0.0021 <i>U</i>	0.002 <i>U</i>				
Perfluorotridecanoic acid (PFTrDA)	NS		0.0021 <i>U</i>	0.002 <i>U</i>				
Perfluorotetradecanoic acid (PFTA)	NS		0.0021 <i>U</i>	0.002 <i>U</i>				

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	ADEC	Sample Identification:	MW-321-150	MW-321-65	MW-330-150	MW-330-20	MW-330-65	MW-335-55
	Groundwater	Sample Date:	12/6/2020	12/6/2020	12/8/2020	12/8/2020	12/8/2020	12/9/2020
Analyte (µg/L)	Cleanup Level	·	Result Qualifier					
Next Generation Analytes								
11CI-PF3OUdS (F-53B Minor)	NS		0.004 <i>U</i>					
3H-perfluoro-3-[(3-methoxy-propoxy)propanoic acid] (ADONA)	NS		0.004 <i>U</i>					
9CI-PF3ONS (F-53B Major)	NS		0.004 <i>U</i>					
Hexafluoropropylene oxide-dimer acid(HFPO-DA, GenX)	NS		0.004 <i>U</i>					
Perfluorooctanesulfonamidoacetic acids								
2-(N-methyl-perfluorooctane sulfonamido) acetic acid (MeFOSAA)	NS		0.004 <i>U</i>					
2-(N-ethyl-perfluorooctane sulfonamido) acetate (EtFOSAA)	NS		0.004 <i>U</i>					
Perfluoroalklysulfonaic acids								
Perfluorobutanesulfonic acid (PFBS)	NS		0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.0051	0.002 <i>U</i>	0.002 <i>U</i>
Perfluorohexanesulfonic acid (PFHxS)	NS		0.0042	0.0094	0.0025 J	0.0463	0.0047	0.0057
Perfluoroocanesulfonic acid (PFOS)	0.4		0.0034 <i>J</i>	0.0363	0.002 <i>U</i>	0.0387	0.0038 J	0.0045
Perfluoroalklycarboxylic acids								
Perfluorohexanoic acid (PFHxA)	NS		0.002 <i>U</i>	0.0069	0.002 <i>U</i>	0.201	0.002 <i>U</i>	0.002 J
Perfluoroheptanoic acid (PFHpA)	NS		0.002 <i>U</i>	0.0063	0.002 <i>U</i>	0.141	0.002 <i>U</i>	0.0021 J
Perflorooctanoic acid (PFOA)	0.4		0.002 <i>U</i>	0.0119	0.002 <i>U</i>	0.074	0.0022 J	0.0032 J
Perfluorononanoic acid (PFNA)	NS		0.002 <i>U</i>	0.0221	0.002 <i>U</i>	0.0699	0.002 <i>U</i>	0.002 <i>U</i>
Perfluorodecanoic Acid (PFDA)	NS		0.002 <i>U</i>					
Perfluoroundecanoic acid (PFUnA)	NS		0.0057	0.002 <i>U</i>				
Perfluorododecanoic acid (PFDoA)	NS		0.002 <i>U</i>					
Perfluorotridecanoic acid (PFTrDA)	NS		0.002 <i>U</i>					
Perfluorotetradecanoic acid (PFTA)	NS		0.002 <i>U</i>	0.002 U				

Notes:

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	ADEC	Sample Identification:	MW-336-15	MW-336-20	MW-336-35	MW-336-55	MW-345-15	MW-345-55
	Groundwater	Sample Date:	12/1/2020	12/1/2020	12/4/2020	12/4/2020	12/4/2020	12/4/2020
Analyte (µg/L)	Cleanup Level	•	Result Qualifier					
Next Generation Analytes								
11CI-PF3OUdS (F-53B Minor)	NS		0.004 <i>U</i>					
3H-perfluoro-3-[(3-methoxy-propoxy)propanoic acid] (ADONA)	NS		0.004 <i>U</i>					
9CI-PF3ONS (F-53B Major)	NS		0.004 <i>U</i>					
Hexafluoropropylene oxide-dimer acid(HFPO-DA, GenX)	NS		0.004 <i>U</i>					
Perfluorooctanesulfonamidoacetic acids								
2-(N-methyl-perfluorooctane sulfonamido) acetic acid (MeFOSAA)	NS		0.004 <i>U</i>					
2-(N-ethyl-perfluorooctane sulfonamido) acetate (EtFOSAA)	NS		0.004 <i>U</i>					
Perfluoroalklysulfonaic acids								
Perfluorobutanesulfonic acid (PFBS)	NS		0.0072	0.0073	0.002 <i>U</i>	0.002 <i>U</i>	0.0183	0.0036 J
Perfluorohexanesulfonic acid (PFHxS)	NS		0.244	0.293	0.0105	0.0039 J	0.263	0.0335
Perfluoroocanesulfonic acid (PFOS)	0.4		3.83	3.67	0.0555	0.0049	0.605	0.0807
Perfluoroalklycarboxylic acids								
Perfluorohexanoic acid (PFHxA)	NS		0.223	0.232	0.0065	0.002 <i>U</i>	0.201	0.0265
Perfluoroheptanoic acid (PFHpA)	NS		0.228	0.223	0.0068	0.002 <i>U</i>	0.172	0.0139
Perflorooctanoic acid (PFOA)	0.4		0.329	0.343	0.0081	0.002 <i>U</i>	0.275	0.0221
Perfluorononanoic acid (PFNA)	NS		4.99	4.84	0.0356	0.002 <i>U</i>	1.54	0.11
Perfluorodecanoic Acid (PFDA)	NS		0.22	0.248	0.002 <i>U</i>	0.002 <i>U</i>	0.0238	0.002 <i>U</i>
Perfluoroundecanoic acid (PFUnA)	NS		1.68	2.54	0.002 <i>U</i>	0.002 <i>U</i>	0.013	0.002 <i>U</i>
Perfluorododecanoic acid (PFDoA)	NS		0.002 <i>U</i>					
Perfluorotridecanoic acid (PFTrDA)	NS		0.0027 J	0.0052	0.002 <i>U</i>	0.002 <i>U</i>	0.01 <i>U</i>	0.002 <i>U</i>
Perfluorotetradecanoic acid (PFTA)	NS		0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.01 <i>U</i>	0.002 U

Notes:

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	ADEC	Sample Identification:	MW-345-75	MW-351-15	MW-351-150	MW-351-55	MW-351-75	MW-354-15
	Groundwater	Sample Date:	12/4/2020	12/14/2020	12/14/2020	12/14/2020	12/14/2020	12/1/2020
Analyte (µg/L)	Cleanup Level		Result Qualifier					
Next Generation Analytes								
11CI-PF3OUdS (F-53B Minor)	NS		0.004 <i>U</i>	0.0038 U	0.004 <i>U</i>	0.004 <i>U</i>	0.0038 U	0.004 <i>U</i>
3H-perfluoro-3-[(3-methoxy-propoxy)propanoic acid] (ADONA)	NS		0.004 <i>U</i>	0.0038 U	0.004 <i>U</i>	0.004 <i>U</i>	0.0038 U	0.004 <i>U</i>
9CI-PF3ONS (F-53B Major)	NS		0.004 <i>U</i>	0.0038 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0038 <i>U</i>	0.004 <i>U</i>
Hexafluoropropylene oxide-dimer acid(HFPO-DA, GenX)	NS		0.004 <i>U</i>	0.0038 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0038 <i>U</i>	0.004 <i>U</i>
Perfluorooctanesulfonamidoacetic acids								
2-(N-methyl-perfluorooctane sulfonamido) acetic acid (MeFOSAA)	NS		0.004 <i>U</i>	0.0038 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0038 <i>U</i>	0.004 <i>U</i>
2-(N-ethyl-perfluorooctane sulfonamido) acetate (EtFOSAA)	NS		0.004 <i>U</i>	0.0038 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0038 <i>U</i>	0.004 <i>U</i>
Perfluoroalklysulfonaic acids								
Perfluorobutanesulfonic acid (PFBS)	NS		0.0036 J	0.0035 J	0.002 <i>U</i>	0.002 <i>U</i>	0.0019 <i>U</i>	0.002 <i>U</i>
Perfluorohexanesulfonic acid (PFHxS)	NS		0.0359	0.0653	0.0022 J	0.0101	0.0065	0.0573
Perfluoroocanesulfonic acid (PFOS)	0.4		0.0893	0.101	0.002 <i>U</i>	0.0264	0.014	0.185
Perfluoroalklycarboxylic acids								
Perfluorohexanoic acid (PFHxA)	NS		0.0294	0.059	0.002 <i>U</i>	0.0062	0.0035 J	0.216
Perfluoroheptanoic acid (PFHpA)	NS		0.015	0.0478	0.002 <i>U</i>	0.0052	0.0028 J	0.255
Perflorooctanoic acid (PFOA)	0.4		0.0236	0.0672	0.002 <i>U</i>	0.0101	0.0055	0.302
Perfluorononanoic acid (PFNA)	NS		0.124	0.162	0.002 <i>U</i>	0.0284	0.012	0.326
Perfluorodecanoic Acid (PFDA)	NS		0.002 <i>U</i>	0.0019 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.0019 <i>U</i>	0.0049
Perfluoroundecanoic acid (PFUnA)	NS		0.002 <i>U</i>	0.0019 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.0019 <i>U</i>	0.0108
Perfluorododecanoic acid (PFDoA)	NS		0.002 U	0.0019 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.0019 <i>U</i>	0.002 <i>U</i>
Perfluorotridecanoic acid (PFTrDA)	NS		0.002 <i>U</i>	0.0019 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.0019 <i>U</i>	0.002 <i>U</i>
Perfluorotetradecanoic acid (PFTA)	NS		0.002 U	0.0019 <i>U</i>	0.002 U	0.002 <i>U</i>	0.0019 <i>U</i>	0.002 U

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	ADEC	Sample Identification:	MW-354-35	MW-354-65	MW-355-15	MW-358-15	MW-358-150	MW-358-20
	Groundwater	Sample Date:	12/1/2020	12/1/2020	12/9/2020	12/9/2020	12/13/2020	12/9/2020
Analyte (µg/L)	Cleanup Level		Result Qualifier					
Next Generation Analytes								
11CI-PF3OUdS (F-53B Minor)	NS		0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
3H-perfluoro-3-[(3-methoxy-propoxy)propanoic acid] (ADONA)	NS		0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
9CI-PF3ONS (F-53B Major)	NS		0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
Hexafluoropropylene oxide-dimer acid(HFPO-DA, GenX)	NS		0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
Perfluorooctanesulfonamidoacetic acids								
2-(N-methyl-perfluorooctane sulfonamido) acetic acid (MeFOSAA)	NS		0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
2-(N-ethyl-perfluorooctane sulfonamido) acetate (EtFOSAA)	NS		0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
Perfluoroalklysulfonaic acids								
Perfluorobutanesulfonic acid (PFBS)	NS		0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.0023 J	0.002 <i>U</i>	0.0052
Perfluorohexanesulfonic acid (PFHxS)	NS		0.0369	0.0046	0.0212	0.0273	0.0028 J	0.057
Perfluoroocanesulfonic acid (PFOS)	0.4		0.277	0.0065	0.0196	0.0545	0.002 <i>U</i>	0.123
Perfluoroalklycarboxylic acids								
Perfluorohexanoic acid (PFHxA)	NS		0.0401	0.0024 J	0.0262	0.0296	0.002 <i>U</i>	0.0658
Perfluoroheptanoic acid (PFHpA)	NS		0.0339	0.002 <i>U</i>	0.0263	0.0272	0.002 <i>U</i>	0.0546
Perflorooctanoic acid (PFOA)	0.4		0.0453	0.002 J	0.0187	0.0291	0.002 <i>U</i>	0.063
Perfluorononanoic acid (PFNA)	NS		0.511	0.0021 <i>J</i>	0.0245	0.0902	0.002 <i>U</i>	0.234
Perfluorodecanoic Acid (PFDA)	NS		0.0086	0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.002 J
Perfluoroundecanoic acid (PFUnA)	NS		0.0228	0.002 <i>U</i>				
Perfluorododecanoic acid (PFDoA)	NS		0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.002 U	0.002 <i>U</i>	0.002 U
Perfluorotridecanoic acid (PFTrDA)	NS		0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perfluorotetradecanoic acid (PFTA)	NS		0.0021 <i>U</i>	0.002 U	0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>

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	ADEC	Sample Identification:	MW-358-40	MW-358-60	MW-359-15	MW-359-150	MW-359-35	MW-359-60
	Groundwater	Sample Date:	12/9/2020	12/13/2020	12/10/2020	12/10/2020	12/10/2020	12/10/2020
_Analyte (μg/L)	Cleanup Level	·	Result Qualifier					
Next Generation Analytes								
11CI-PF3OUdS (F-53B Minor)	NS		0.004 <i>U</i>					
3H-perfluoro-3-[(3-methoxy-propoxy)propanoic acid] (ADONA)	NS		0.004 <i>U</i>					
9CI-PF3ONS (F-53B Major)	NS		0.004 <i>U</i>					
Hexafluoropropylene oxide-dimer acid(HFPO-DA, GenX)	NS		0.004 <i>U</i>					
Perfluorooctanesulfonamidoacetic acids								
2-(N-methyl-perfluorooctane sulfonamido) acetic acid (MeFOSAA)	NS		0.004 <i>U</i>					
2-(N-ethyl-perfluorooctane sulfonamido) acetate (EtFOSAA)	NS		0.004 <i>U</i>					
Perfluoroalklysulfonaic acids								
Perfluorobutanesulfonic acid (PFBS)	NS		0.0042	0.002 <i>U</i>	0.0038 J	0.002 <i>U</i>	0.0058	0.002 J
Perfluorohexanesulfonic acid (PFHxS)	NS		0.0547	0.0189	0.0354	0.0049	0.0634	0.0249
Perfluoroocanesulfonic acid (PFOS)	0.4		0.121	0.0493	0.0663	0.0035 J	0.138	0.0693
Perfluoroalklycarboxylic acids								
Perfluorohexanoic acid (PFHxA)	NS		0.0606	0.0165	0.0507	0.002 <i>U</i>	0.0825	0.0266
Perfluoroheptanoic acid (PFHpA)	NS		0.051	0.0137	0.0422	0.002 <i>U</i>	0.0714	0.0199
Perflorooctanoic acid (PFOA)	0.4		0.0611	0.0201	0.0391	0.002 <i>U</i>	0.0735	0.0243
Perfluorononanoic acid (PFNA)	NS		0.221	0.0557	0.195	0.003 J	0.397	0.12
Perfluorodecanoic Acid (PFDA)	NS		0.002 J	0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.0025 J	0.002 <i>U</i>
Perfluoroundecanoic acid (PFUnA)	NS		0.002 <i>U</i>					
Perfluorododecanoic acid (PFDoA)	NS		0.002 U	0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.002 U	0.002 <i>U</i>
Perfluorotridecanoic acid (PFTrDA)	NS		0.002 <i>U</i>					
Perfluorotetradecanoic acid (PFTA)	NS		0.002 U	0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.002 U	0.002 U

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	ADEC	Sample Identification:	MW-359-80	MW-360-15	MW-360-150	MW-360-35	MW-360-50	MW-360-80
	Groundwater	Sample Date:	12/10/2020	12/10/2020	12/13/2020	12/10/2020	12/10/2020	12/10/2020
Analyte (µg/L)	Cleanup Level	·	Result Qualifier					
Next Generation Analytes								
11CI-PF3OUdS (F-53B Minor)	NS		0.004 <i>U</i>					
3H-perfluoro-3-[(3-methoxy-propoxy)propanoic acid] (ADONA)	NS		0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 U	0.004 <i>U</i>
9CI-PF3ONS (F-53B Major)	NS		0.004 <i>U</i>					
Hexafluoropropylene oxide-dimer acid(HFPO-DA, GenX)	NS		0.004 <i>U</i>					
Perfluorooctanesulfonamidoacetic acids								
2-(N-methyl-perfluorooctane sulfonamido) acetic acid (MeFOSAA)	NS		0.004 <i>U</i>					
2-(N-ethyl-perfluorooctane sulfonamido) acetate (EtFOSAA)	NS		0.004 <i>U</i>					
Perfluoroalklysulfonaic acids								
Perfluorobutanesulfonic acid (PFBS)	NS		0.002 <i>U</i>	0.0036 J	0.002 <i>U</i>	0.0064	0.0049	0.002 <i>U</i>
Perfluorohexanesulfonic acid (PFHxS)	NS		0.0152	0.0213	0.0049	0.0395	0.0366	0.012
Perfluoroocanesulfonic acid (PFOS)	0.4		0.0395	0.0214	0.0026 J	0.0684	0.0652	0.0249
Perfluoroalklycarboxylic acids								
Perfluorohexanoic acid (PFHxA)	NS		0.0137	0.0273	0.0022 J	0.0496	0.0475	0.0095
Perfluoroheptanoic acid (PFHpA)	NS		0.01	0.0195	0.002 <i>U</i>	0.0343	0.0341	0.0068
Perflorooctanoic acid (PFOA)	0.4		0.0136	0.0189	0.002 <i>U</i>	0.0376	0.0361	0.009
Perfluorononanoic acid (PFNA)	NS		0.0591	0.037	0.002 <i>U</i>	0.0941	0.101	0.0377
Perfluorodecanoic Acid (PFDA)	NS		0.002 U	0.002 U	0.002 <i>U</i>	0.002 <i>U</i>	0.002 U	0.002 U
Perfluoroundecanoic acid (PFUnA)	NS		0.002 U	0.002 <i>U</i>				
Perfluorododecanoic acid (PFDoA)	NS		0.002 U	0.002 <i>U</i>				
Perfluorotridecanoic acid (PFTrDA)	NS		0.002 U	0.002 <i>U</i>				
Perfluorotetradecanoic acid (PFTA)	NS		0.002 U	0.002 U	0.002 <i>U</i>	0.002 U	0.002 <i>U</i>	0.002 U

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	ADEC	Sample Identification:	MW-361-15	MW-362-15	MW-362-150	MW-362-25	MW-362-35	MW-362-50
	Groundwater	Sample Date:	12/2/2020	12/13/2020	12/13/2020	12/13/2020	12/13/2020	12/13/2020
Analyte (µg/L)	Cleanup Level	•	Result Qualifier					
Next Generation Analytes								
11CI-PF3OUdS (F-53B Minor)	NS		0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0038 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
3H-perfluoro-3-[(3-methoxy-propoxy)propanoic acid] (ADONA)	NS		0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0038 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
9CI-PF3ONS (F-53B Major)	NS		0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0038 U	0.004 <i>U</i>	0.004 <i>U</i>
Hexafluoropropylene oxide-dimer acid(HFPO-DA, GenX)	NS		0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0038 U	0.004 <i>U</i>	0.004 <i>U</i>
Perfluorooctanesulfonamidoacetic acids								
2-(N-methyl-perfluorooctane sulfonamido) acetic acid (MeFOSAA)	NS		0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0038 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
2-(N-ethyl-perfluorooctane sulfonamido) acetate (EtFOSAA)	NS		0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0038 U	0.004 <i>U</i>	0.004 <i>U</i>
Perfluoroalklysulfonaic acids								
Perfluorobutanesulfonic acid (PFBS)	NS		0.0309	0.0022 J	0.002 <i>U</i>	0.0019 <i>U</i>	0.002 J	0.002 <i>U</i>
Perfluorohexanesulfonic acid (PFHxS)	NS		1.85	0.0275	0.0034 J	0.0259	0.0247	0.0195
Perfluoroocanesulfonic acid (PFOS)	0.4		7.98	0.0443	0.0022 J	0.0424	0.0449	0.0349
Perfluoroalklycarboxylic acids								
Perfluorohexanoic acid (PFHxA)	NS		0.896	0.0281	0.002 <i>U</i>	0.0255	0.0235	0.0202
Perfluoroheptanoic acid (PFHpA)	NS		0.861	0.0246	0.002 <i>U</i>	0.0187	0.0191	0.0155
Perflorooctanoic acid (PFOA)	0.4		1.06	0.0258	0.002 <i>U</i>	0.0215	0.0207	0.016
Perfluorononanoic acid (PFNA)	NS		0.221	0.0751	0.002 <i>U</i>	0.0673	0.0621	0.0464
Perfluorodecanoic Acid (PFDA)	NS		0.09	0.002 <i>U</i>	0.002 <i>U</i>	0.0019 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perfluoroundecanoic acid (PFUnA)	NS		0.0075	0.002 <i>U</i>	0.002 <i>U</i>	0.0019 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perfluorododecanoic acid (PFDoA)	NS		0.0035 J	0.002 <i>U</i>	0.002 <i>U</i>	0.0019 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perfluorotridecanoic acid (PFTrDA)	NS		0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.0019 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perfluorotetradecanoic acid (PFTA)	NS		0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.0019 <i>U</i>	0.002 <i>U</i>	0.002 U

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	ADEC	Sample Identification:	MW-362-80	MW-363-15	MW-364-15	MW-364-150	MW-364-30	MW-364-65
	Groundwater	Sample Date:	12/13/2020	12/15/2020	12/15/2020	12/15/2020	12/15/2020	12/15/2020
_Analyte (μg/L)	Cleanup Level	•	Result Qualifier					
Next Generation Analytes								
11CI-PF3OUdS (F-53B Minor)	NS		0.004 <i>U</i>					
3H-perfluoro-3-[(3-methoxy-propoxy)propanoic acid] (ADONA)	NS		0.004 <i>U</i>					
9CI-PF3ONS (F-53B Major)	NS		0.004 <i>U</i>					
Hexafluoropropylene oxide-dimer acid(HFPO-DA, GenX)	NS		0.004 <i>U</i>					
Perfluorooctanesulfonamidoacetic acids								
2-(N-methyl-perfluorooctane sulfonamido) acetic acid (MeFOSAA)	NS		0.004 <i>U</i>					
2-(N-ethyl-perfluorooctane sulfonamido) acetate (EtFOSAA)	NS		0.004 <i>U</i>					
Perfluoroalklysulfonaic acids								
Perfluorobutanesulfonic acid (PFBS)	NS		0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.0038 J	0.002 J
Perfluorohexanesulfonic acid (PFHxS)	NS		0.008	0.0113	0.0067	0.0056	0.0238	0.0167
Perfluoroocanesulfonic acid (PFOS)	0.4		0.0106	0.002 <i>U</i>	0.0049	0.0028 J	0.0321	0.033
Perfluoroalklycarboxylic acids								
Perfluorohexanoic acid (PFHxA)	NS		0.0046	0.0157	0.0073	0.0025 J	0.021	0.0134
Perfluoroheptanoic acid (PFHpA)	NS		0.0035 J	0.0055	0.0051	0.002 <i>U</i>	0.0133	0.0089
Perflorooctanoic acid (PFOA)	0.4		0.0049	0.0037 J	0.0052	0.002 <i>U</i>	0.0177	0.0126
Perfluorononanoic acid (PFNA)	NS		0.0084	0.002 <i>U</i>	0.0081	0.002 <i>U</i>	0.0398	0.0442
Perfluorodecanoic Acid (PFDA)	NS		0.002 <i>U</i>					
Perfluoroundecanoic acid (PFUnA)	NS		0.002 <i>U</i>					
Perfluorododecanoic acid (PFDoA)	NS		0.002 <i>U</i>					
Perfluorotridecanoic acid (PFTrDA)	NS		0.002 <i>U</i>					
Perfluorotetradecanoic acid (PFTA)	NS		0.002 U	0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.002 U	0.002 <i>U</i>

Notes:

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	ADEC	Sample Identification:	MW-364-90	MW-365-15	MW-366-15	MW-367-15	MW-368-15	MW-370-15
	Groundwater	Sample Date:	12/15/2020	12/7/2020	12/1/2020	12/6/2020	12/6/2020	12/7/2020
Analyte (µg/L)	Cleanup Level		Result Qualifier					
Next Generation Analytes								
11CI-PF3OUdS (F-53B Minor)	NS		0.004 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0042 <i>U</i>
3H-perfluoro-3-[(3-methoxy-propoxy)propanoic acid] (ADONA)	NS		0.004 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0042 <i>U</i>
9CI-PF3ONS (F-53B Major)	NS		0.004 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0042 <i>U</i>
Hexafluoropropylene oxide-dimer acid(HFPO-DA, GenX)	NS		0.004 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0042 <i>U</i>
Perfluorooctanesulfonamidoacetic acids								
2-(N-methyl-perfluorooctane sulfonamido) acetic acid (MeFOSAA)	NS		0.004 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0042 <i>U</i>
2-(N-ethyl-perfluorooctane sulfonamido) acetate (EtFOSAA)	NS		0.004 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0042 <i>U</i>
Perfluoroalklysulfonaic acids								
Perfluorobutanesulfonic acid (PFBS)	NS		0.002 <i>U</i>	0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.0037 J	0.0035 J
Perfluorohexanesulfonic acid (PFHxS)	NS		0.0154	0.0063	0.0094	0.0134	0.0607	0.0625
Perfluoroocanesulfonic acid (PFOS)	0.4		0.0319	0.0041 <i>J</i>	0.0328	0.0322	0.0218	0.167
Perfluoroalklycarboxylic acids								
Perfluorohexanoic acid (PFHxA)	NS		0.0124	0.0029 J	0.0188	0.0602	0.132	0.0503
Perfluoroheptanoic acid (PFHpA)	NS		0.0085	0.0021 <i>U</i>	0.0116	0.115	0.159	0.0429
Perflorooctanoic acid (PFOA)	0.4		0.0118	0.0039 J	0.0243	0.113	0.11	0.0701
Perfluorononanoic acid (PFNA)	NS		0.0508	0.0021 <i>U</i>	0.0098	0.0753	0.119	0.234
Perfluorodecanoic Acid (PFDA)	NS		0.002 <i>U</i>	0.0021 <i>U</i>	0.002 <i>U</i>	0.0508	0.002 <i>U</i>	0.0027 J
Perfluoroundecanoic acid (PFUnA)	NS		0.002 <i>U</i>	0.0021 <i>U</i>	0.002 <i>U</i>	0.0095	0.002 <i>U</i>	0.0034 J
Perfluorododecanoic acid (PFDoA)	NS		0.002 U	0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.002 U	0.0021 <i>U</i>
Perfluorotridecanoic acid (PFTrDA)	NS		0.002 U	0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.0021 <i>U</i>
Perfluorotetradecanoic acid (PFTA)	NS		0.002 U	0.0021 <i>U</i>	0.002 U	0.002 U	0.002 U	0.0021 <i>U</i>

Notes:

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	ADEC	Sample Identification:	MW-370-55	MW-370-75	MW-371-125	MW-371-15	MW-371-55	MW-371-75
	Groundwater	Sample Date:	12/7/2020	12/7/2020	12/14/2020	12/14/2020	12/14/2020	12/14/2020
_Analyte (μg/L)	Cleanup Level	•	Result Qualifier					
Next Generation Analytes								
11CI-PF3OUdS (F-53B Minor)	NS		0.0042 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0038 <i>U</i>
3H-perfluoro-3-[(3-methoxy-propoxy)propanoic acid] (ADONA)	NS		0.0042 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0038 U
9CI-PF3ONS (F-53B Major)	NS		0.0042 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0038 U
Hexafluoropropylene oxide-dimer acid(HFPO-DA, GenX)	NS		0.0042 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0038 U
Perfluorooctanesulfonamidoacetic acids								
2-(N-methyl-perfluorooctane sulfonamido) acetic acid (MeFOSAA)	NS		0.0042 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0038 U
2-(N-ethyl-perfluorooctane sulfonamido) acetate (EtFOSAA)	NS		0.0042 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0038 U
Perfluoroalklysulfonaic acids								
Perfluorobutanesulfonic acid (PFBS)	NS		0.0021 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.0131	0.002 <i>U</i>	0.0019 <i>U</i>
Perfluorohexanesulfonic acid (PFHxS)	NS		0.0178	0.0065	0.005	0.127	0.0172	0.0102
Perfluoroocanesulfonic acid (PFOS)	0.4		0.0601	0.015	0.0056	0.245	0.0436	0.0314
Perfluoroalklycarboxylic acids								
Perfluorohexanoic acid (PFHxA)	NS		0.0142	0.0032 J	0.0021 <i>U</i>	0.112	0.0146	0.0085
Perfluoroheptanoic acid (PFHpA)	NS		0.0115	0.0028 J	0.0021 <i>U</i>	0.0674	0.0114	0.0077
Perflorooctanoic acid (PFOA)	0.4		0.0211	0.0053	0.0022 J	0.103	0.0174	0.0119
Perfluorononanoic acid (PFNA)	NS		0.0649	0.0085	0.0051	0.452	0.0631	0.0327
Perfluorodecanoic Acid (PFDA)	NS		0.0021 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.0051	0.002 <i>U</i>	0.0019 <i>U</i>
Perfluoroundecanoic acid (PFUnA)	NS		0.0021 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.0021 J	0.002 <i>U</i>	0.0019 <i>U</i>
Perfluorododecanoic acid (PFDoA)	NS		0.0021 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.0019 <i>U</i>
Perfluorotridecanoic acid (PFTrDA)	NS		0.0021 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.01 <i>UJ</i>	0.002 <i>U</i>	0.0019 <i>U</i>
Perfluorotetradecanoic acid (PFTA)	NS		0.0021 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.01 <i>UJ</i>	0.002 <i>U</i>	0.0019 <i>U</i>

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	ADEC	Sample Identification:	MW-372-15	MW-373-15	MW-404-15	MW-451-15	MW-459-35	MW-462-150
	Groundwater	Sample Date:	12/8/2020	12/8/2020	12/4/2020	12/14/2020	12/10/2020	12/13/2020
_Analyte (μg/L)	Cleanup Level	·	Result Qualifier					
Next Generation Analytes								
11CI-PF3OUdS (F-53B Minor)	NS		0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0038 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
3H-perfluoro-3-[(3-methoxy-propoxy)propanoic acid] (ADONA)	NS		0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0038 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
9CI-PF3ONS (F-53B Major)	NS		0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0038 U	0.004 <i>U</i>	0.004 <i>U</i>
Hexafluoropropylene oxide-dimer acid(HFPO-DA, GenX)	NS		0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0038 U	0.004 <i>U</i>	0.004 <i>U</i>
Perfluorooctanesulfonamidoacetic acids								
2-(N-methyl-perfluorooctane sulfonamido) acetic acid (MeFOSAA)	NS		0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0038 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
2-(N-ethyl-perfluorooctane sulfonamido) acetate (EtFOSAA)	NS		0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0038 U	0.004 <i>U</i>	0.004 <i>U</i>
Perfluoroalklysulfonaic acids								
Perfluorobutanesulfonic acid (PFBS)	NS		0.0047	0.0023 J	0.0039 J	0.0033 J	0.0056	0.002 <i>U</i>
Perfluorohexanesulfonic acid (PFHxS)	NS		0.0497	0.0263	0.0253	0.0656	0.0636	0.0037 J
Perfluoroocanesulfonic acid (PFOS)	0.4		0.0219	0.0318	0.0235	0.105	0.139	0.0026 J
Perfluoroalklycarboxylic acids								
Perfluorohexanoic acid (PFHxA)	NS		0.158	0.048	0.0454	0.0601	0.0809	0.002 <i>U</i>
Perfluoroheptanoic acid (PFHpA)	NS		0.171	0.0443	0.0252	0.0482	0.0717	0.002 <i>U</i>
Perflorooctanoic acid (PFOA)	0.4		0.0978	0.029	0.0228	0.0661	0.0724	0.002 <i>U</i>
Perfluorononanoic acid (PFNA)	NS		0.0359	0.0354	0.0493	0.166	0.395	0.002 <i>U</i>
Perfluorodecanoic Acid (PFDA)	NS		0.002 <i>U</i>	0.0027 J	0.002 <i>U</i>	0.0019 <i>U</i>	0.0023 J	0.002 <i>U</i>
Perfluoroundecanoic acid (PFUnA)	NS		0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.0019 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perfluorododecanoic acid (PFDoA)	NS		0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.0019 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perfluorotridecanoic acid (PFTrDA)	NS		0.002 <i>U</i>	0.002 <i>U</i>	0.01 <i>U</i>	0.0019 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perfluorotetradecanoic acid (PFTA)	NS		0.002 U	0.002 <i>U</i>	0.01 <i>U</i>	0.0019 <i>U</i>	0.002 <i>U</i>	0.002 U

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	ADEC	Sample Identification:	MW-470-75	O-10	O-134	O-14	O-15	O-16
	Groundwater	Sample Date:	12/7/2020	12/3/2020	12/1/2020	12/7/2020	12/3/2020	12/4/2020
Analyte (µg/L)	Cleanup Level	•	Result Qualifier					
Next Generation Analytes								
11CI-PF3OUdS (F-53B Minor)	NS		0.0042 <i>U</i>	0.004 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>
3H-perfluoro-3-[(3-methoxy-propoxy)propanoic acid] (ADONA)	NS		0.0042 <i>U</i>	0.004 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>
9CI-PF3ONS (F-53B Major)	NS		0.0042 <i>U</i>	0.004 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>
Hexafluoropropylene oxide-dimer acid(HFPO-DA, GenX)	NS		0.0042 <i>U</i>	0.004 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>
Perfluorooctanesulfonamidoacetic acids								
2-(N-methyl-perfluorooctane sulfonamido) acetic acid (MeFOSAA)	NS		0.0042 <i>U</i>	0.004 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>
2-(N-ethyl-perfluorooctane sulfonamido) acetate (EtFOSAA)	NS		0.0042 <i>U</i>	0.004 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>
Perfluoroalklysulfonaic acids								
Perfluorobutanesulfonic acid (PFBS)	NS		0.0021 <i>U</i>	0.0045	0.325	0.0029 J	0.0037 J	0.002 <i>U</i>
Perfluorohexanesulfonic acid (PFHxS)	NS		0.006	0.456	2.99	0.0295	0.0113	0.0468
Perfluoroocanesulfonic acid (PFOS)	0.4		0.0143	2.74	3.2	0.0095	0.0078	0.202
Perfluoroalklycarboxylic acids								
Perfluorohexanoic acid (PFHxA)	NS		0.0032 J	0.134	1.6	0.0587	0.043	0.0477
Perfluoroheptanoic acid (PFHpA)	NS		0.0026 J	0.152	0.502	0.0519	0.0304	0.0869
Perflorooctanoic acid (PFOA)	0.4		0.0057	0.39	1.17	0.0248	0.0149	0.0966
Perfluorononanoic acid (PFNA)	NS		0.0087	1.94	2.01	0.014	0.0035 J	0.164
Perfluorodecanoic Acid (PFDA)	NS		0.0021 <i>U</i>	0.0237	0.0167	0.0021 <i>U</i>	0.0021 <i>U</i>	0.0138
Perfluoroundecanoic acid (PFUnA)	NS		0.0021 <i>U</i>	0.206	0.0186	0.0021 <i>U</i>	0.0021 <i>U</i>	0.008
Perfluorododecanoic acid (PFDoA)	NS		0.0021 <i>U</i>	0.002 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.002 <i>U</i>
Perfluorotridecanoic acid (PFTrDA)	NS		0.0021 <i>U</i>	0.02 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.002 <i>U</i>
Perfluorotetradecanoic acid (PFTA)	NS		0.0021 <i>U</i>	0.02 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.002 <i>U</i>

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	ADEC	Sample Identification:	O-18	O-24	O-24-65	O-30	O-34	O-35
	Groundwater	Sample Date:	12/7/2020	12/4/2020	12/4/2020	12/3/2020	12/1/2020	12/1/2020
Analyte (µg/L)	Cleanup Level		Result Qualifier					
Next Generation Analytes								
11CI-PF3OUdS (F-53B Minor)	NS		0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>
3H-perfluoro-3-[(3-methoxy-propoxy)propanoic acid] (ADONA)	NS		0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>
9CI-PF3ONS (F-53B Major)	NS		0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>
Hexafluoropropylene oxide-dimer acid(HFPO-DA, GenX)	NS		0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>
Perfluorooctanesulfonamidoacetic acids								
2-(N-methyl-perfluorooctane sulfonamido) acetic acid (MeFOSAA)	NS		0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>
2-(N-ethyl-perfluorooctane sulfonamido) acetate (EtFOSAA)	NS		0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>
Perfluoroalklysulfonaic acids								
Perfluorobutanesulfonic acid (PFBS)	NS		0.0034 J	0.0029 J	0.002 <i>U</i>	0.002 <i>U</i>	0.315	0.0054
Perfluorohexanesulfonic acid (PFHxS)	NS		0.101	0.0457	0.0089	0.0184	2.62	0.0795
Perfluoroocanesulfonic acid (PFOS)	0.4		0.32	0.172	0.0086	0.0061	3.34	0.253
Perfluoroalklycarboxylic acids								
Perfluorohexanoic acid (PFHxA)	NS		0.095	0.0673	0.0057	0.036	1.56	0.119
Perfluoroheptanoic acid (PFHpA)	NS		0.109	0.0498	0.0047	0.032	0.48	0.139
Perflorooctanoic acid (PFOA)	0.4		0.138	0.0936	0.0048	0.0287	1.13	0.152
Perfluorononanoic acid (PFNA)	NS		0.248	0.152	0.0043	0.0129	1.97	0.635
Perfluorodecanoic Acid (PFDA)	NS		0.0076	0.0047	0.002 <i>U</i>	0.002 <i>U</i>	0.0164	0.0149
Perfluoroundecanoic acid (PFUnA)	NS		0.005	0.0091	0.002 <i>U</i>	0.002 <i>U</i>	0.0185	0.0121
Perfluorododecanoic acid (PFDoA)	NS		0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>
Perfluorotridecanoic acid (PFTrDA)	NS		0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>
Perfluorotetradecanoic acid (PFTA)	NS		0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>

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	ADEC	Sample Identification:	O-6	O-9
	Groundwater	Sample Date:	12/8/2020	12/3/2020
Analyte (µg/L)	Cleanup Level		Result Qualifier	Result Qualifier
Next Generation Analytes				
11CI-PF3OUdS (F-53B Minor)	NS		0.004 <i>U</i>	0.004 <i>U</i>
3H-perfluoro-3-[(3-methoxy-propoxy)propanoic acid] (ADONA)	NS		0.004 <i>U</i>	0.004 <i>U</i>
9CI-PF3ONS (F-53B Major)	NS		0.004 <i>U</i>	0.004 <i>U</i>
Hexafluoropropylene oxide-dimer acid(HFPO-DA, GenX)	NS		0.004 <i>U</i>	0.004 <i>U</i>
Perfluorooctanesulfonamidoacetic acids				
2-(N-methyl-perfluorooctane sulfonamido) acetic acid (MeFOSAA)	NS		0.004 <i>U</i>	0.004 <i>U</i>
2-(N-ethyl-perfluorooctane sulfonamido) acetate (EtFOSAA)	NS		0.004 <i>U</i>	0.004 <i>U</i>
Perfluoroalklysulfonaic acids				
Perfluorobutanesulfonic acid (PFBS)	NS		0.0035 J	0.0027 J
Perfluorohexanesulfonic acid (PFHxS)	NS		0.0546	0.02
Perfluoroocanesulfonic acid (PFOS)	0.4		0.126	0.0099
Perfluoroalklycarboxylic acids				
Perfluorohexanoic acid (PFHxA)	NS		0.0588	0.116
Perfluoroheptanoic acid (PFHpA)	NS		0.0639	0.0685
Perflorooctanoic acid (PFOA)	0.4		0.0687	0.0572
Perfluorononanoic acid (PFNA)	NS		0.167	0.0208
Perfluorodecanoic Acid (PFDA)	NS		0.002 <i>U</i>	0.002 <i>U</i>
Perfluoroundecanoic acid (PFUnA)	NS		0.002 <i>U</i>	0.002 <i>U</i>
Perfluorododecanoic acid (PFDoA)	NS		0.002 <i>U</i>	0.002 <i>U</i>
Perfluorotridecanoic acid (PFTrDA)	NS		0.002 <i>U</i>	0.02 <i>U</i>
Perfluorotetradecanoic acid (PFTA)	NS		0.002 U	0.02 <i>U</i>

Notes:

Highlighted indicates value exceeds Cleanup Level.

ADEC = Alaska Department of Environmental Conservation NS = no standard PFAS = per- and polyfluoroalkylated substances

Data Qualifiers:

J = The result is an estimated quantity.

U = The material was analyzed for, but was not detected.

UJ = The material was analyzed for, but was not detected. The sample quantitation limit is an estimated quantity.

#### August 2021

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S	Sample Identification:	North Gravel Pit
	Sample Date:	12/17/2020
Analyte (µg/L)		Result Qualifier
Next Generation Analytes		
11CI-PF3OUdS (F-53B Minor)		0.004 <i>U</i>
3H-perfluoro-3-[(3-methoxy-propoxy)propanoic acid] (ADC	ONA)	0.004 <i>U</i>
9CI-PF3ONS (F-53B Major)		0.004 <i>U</i>
Hexafluoropropylene oxide-dimer acid(HFPO-DA, GenX)		0.004 <i>U</i>
Perfluorooctanesulfonamidoacetic acids		
2-(N-methyl-perfluorooctane sulfonamido) acetic acid (Me	eFOSAA)	0.004 <i>U</i>
2-(N-ethyl-perfluorooctane sulfonamido) acetate (EtFOSA	AA)	0.004 <i>U</i>
Perfluoroalklysulfonaic acids		
Perfluorobutanesulfonic acid (PFBS)		0.0022 J
Perfluorohexanesulfonic acid (PFHxS)		0.0343
Perfluoroocanesulfonic acid (PFOS)		0.0566
Perfluoroalklycarboxylic acids		
Perfluorohexanoic acid (PFHxA)		0.0331
Perfluoroheptanoic acid (PFHpA)		0.0236
Perflorooctanoic acid (PFOA)		0.0293
Perfluorononanoic acid (PFNA)		0.0912
Perfluorodecanoic Acid (PFDA)		0.002 <i>U</i>
Perfluoroundecanoic acid (PFUnA)		0.002 <i>U</i>
Perfluorododecanoic acid (PFDoA)		0.002 <i>U</i>
Perfluorotridecanoic acid (PFTrDA)		0.002 <i>U</i>
Perfluorotetradecanoic acid (PFTA)		0.002 <i>U</i>

Notes:

PFAS = per- and polyfluoroalkylated substances

Data Qualifiers:

J = The result is an estimated quantity.

U = The material was analyzed for, but was not detected.

	ADEC	Sample Identification:	EB-178A-15	EB-35	EB-186B-60	EB-186C-100	EB-9	EB-198-150
	Groundwater	Sample Date:	12/1/2020	12/1/2020	12/2/2020	12/2/2020	12/3/2020	12/4/2020
Analyte (µg/L)	Cleanup Level		Result Qualifier					
Next Generation Analytes								
11CI-PF3OUdS (F-53B Minor)	NS		0.004 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
3H-perfluoro-3-[(3-methoxy-propoxy)propanoic acid] (ADONA)	NS		0.004 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
9CI-PF3ONS (F-53B Major)	NS		0.004 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
Hexafluoropropylene oxide-dimer acid(HFPO-DA, GenX)	NS		0.004 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
Perfluorooctanesulfonamidoacetic acids								
2-(N-ethyl-perfluorooctane sulfonamido) acetate (EtFOSAA)	NS		0.004 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
2-(N-methyl-perfluorooctane sulfonamido) acetic acid (MeFOSAA)	NS		0.004 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
Perfluoroalklysulfonaic acids								
Perfluorobutanesulfonic acid (PFBS)	NS		0.002 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perfluorohexanesulfonic acid (PFHxS)	NS		0.002 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perfluoroocanesulfonic acid (PFOS)	0.4		0.002 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perfluoroalklycarboxylic acids								
Perfluorohexanoic acid (PFHxA)	NS		0.002 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perfluoroheptanoic acid (PFHpA)	NS		0.002 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perflorooctanoic acid (PFOA)	0.4		0.002 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perfluorononanoic acid (PFNA)	NS		0.002 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perfluorodecanoic Acid (PFDA)	NS		0.002 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.002 U	0.002 <i>U</i>
Perfluoroundecanoic acid (PFUnA)	NS		0.002 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perfluorododecanoic acid (PFDoA)	NS		0.002 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perfluorotridecanoic acid (PFTrDA)	NS		0.002 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perfluorotetradecanoic acid (PFTA)	NS		0.002 U	0.0021 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.002 U	0.002 U

Notes:

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PFAS = per- and polyfluoroalkylated substances

Data Qualifiers:

U = The material was analyzed for, but was not detected.

	ADEC	Sample Identification:	EB-304-15	EB-321-15	EB-192A-15	EB-310-65	EB-154A-75	EB-330-20
	Groundwater	Sample Date:	12/4/2020	12/6/2020	12/7/2020	12/7/2020	12/8/2020	12/8/2020
Analyte (µg/L)	Cleanup Level		Result Qualifier					
Next Generation Analytes								
11CI-PF3OUdS (F-53B Minor)	NS		0.004 <i>U</i>	0.004 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
3H-perfluoro-3-[(3-methoxy-propoxy)propanoic acid] (ADONA)	NS		0.004 <i>U</i>	0.004 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
9CI-PF3ONS (F-53B Major)	NS		0.004 <i>U</i>	0.004 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
Hexafluoropropylene oxide-dimer acid(HFPO-DA, GenX)	NS		0.004 <i>U</i>	0.004 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
Perfluorooctanesulfonamidoacetic acids								
2-(N-ethyl-perfluorooctane sulfonamido) acetate (EtFOSAA)	NS		0.004 <i>U</i>	0.004 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
2-(N-methyl-perfluorooctane sulfonamido) acetic acid (MeFOSAA)	NS		0.004 <i>U</i>	0.004 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>
Perfluoroalklysulfonaic acids								
Perfluorobutanesulfonic acid (PFBS)	NS		0.002 <i>U</i>	0.002 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perfluorohexanesulfonic acid (PFHxS)	NS		0.002 <i>U</i>	0.002 U	0.0021 <i>U</i>	0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perfluoroocanesulfonic acid (PFOS)	0.4		0.002 <i>U</i>	0.002 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perfluoroalklycarboxylic acids								
Perfluorohexanoic acid (PFHxA)	NS		0.002 <i>U</i>	0.002 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perfluoroheptanoic acid (PFHpA)	NS		0.002 <i>U</i>	0.002 U	0.0021 <i>U</i>	0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perflorooctanoic acid (PFOA)	0.4		0.002 <i>U</i>	0.002 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perfluorononanoic acid (PFNA)	NS		0.002 <i>U</i>	0.002 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perfluorodecanoic Acid (PFDA)	NS		0.002 <i>U</i>	0.002 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perfluoroundecanoic acid (PFUnA)	NS		0.002 <i>U</i>	0.002 U	0.0021 <i>U</i>	0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perfluorododecanoic acid (PFDoA)	NS		0.002 <i>U</i>	0.002 <i>U</i>	0.0021 <i>UJ</i>	0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perfluorotridecanoic acid (PFTrDA)	NS		0.002 <i>U</i>	0.002 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>
Perfluorotetradecanoic acid (PFTA)	NS		0.002 <i>U</i>	0.002 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>

Notes:

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PFAS = per- and polyfluoroalkylated substances

Data Qualifiers:

U = The material was analyzed for, but was not detected.

	ADEC	Sample Identification:	EB-355-15	EB-358-40	EB-360-50	EB-360-150	EB-362-25	EB-109-15
	Groundwater	Sample Date:	12/9/2020	12/9/2020	12/10/2020	12/13/2020	12/13/2020	12/14/2020
Analyte (µg/L)	Cleanup Level		Result Qualifier					
Next Generation Analytes								
11CI-PF3OUdS (F-53B Minor)	NS		0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0038 <i>U</i>	0.004 <i>U</i>
3H-perfluoro-3-[(3-methoxy-propoxy)propanoic acid] (ADONA)	NS		0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0038 <i>U</i>	0.004 <i>U</i>
9CI-PF3ONS (F-53B Major)	NS		0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0038 <i>U</i>	0.004 <i>U</i>
Hexafluoropropylene oxide-dimer acid(HFPO-DA, GenX)	NS		0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0038 <i>U</i>	0.004 <i>U</i>
Perfluorooctanesulfonamidoacetic acids								
2-(N-ethyl-perfluorooctane sulfonamido) acetate (EtFOSAA)	NS		0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0038 <i>U</i>	0.004 <i>U</i>
2-(N-methyl-perfluorooctane sulfonamido) acetic acid (MeFOSAA)	NS		0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.004 <i>U</i>	0.0038 <i>U</i>	0.004 <i>U</i>
Perfluoroalklysulfonaic acids								
Perfluorobutanesulfonic acid (PFBS)	NS		0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.002 U	0.0019 <i>U</i>	0.002 <i>U</i>
Perfluorohexanesulfonic acid (PFHxS)	NS		0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.002 U	0.0019 <i>U</i>	0.002 <i>U</i>
Perfluoroocanesulfonic acid (PFOS)	0.4		0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.0019 <i>U</i>	0.002 <i>U</i>
Perfluoroalklycarboxylic acids								
Perfluorohexanoic acid (PFHxA)	NS		0.002 <i>U</i>	0.002 U	0.002 <i>U</i>	0.002 <i>U</i>	0.0019 <i>U</i>	0.002 <i>U</i>
Perfluoroheptanoic acid (PFHpA)	NS		0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.002 U	0.0019 <i>U</i>	0.002 <i>U</i>
Perflorooctanoic acid (PFOA)	0.4		0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.0019 <i>U</i>	0.002 <i>U</i>
Perfluorononanoic acid (PFNA)	NS		0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.0019 <i>U</i>	0.002 <i>U</i>
Perfluorodecanoic Acid (PFDA)	NS		0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.0019 <i>U</i>	0.002 <i>U</i>
Perfluoroundecanoic acid (PFUnA)	NS		0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.0096 U	0.002 <i>U</i>
Perfluorododecanoic acid (PFDoA)	NS		0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.0096 <i>U</i>	0.002 <i>U</i>
Perfluorotridecanoic acid (PFTrDA)	NS		0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.002 <i>U</i>	0.0019 <i>U</i>	0.002 <i>U</i>
Perfluorotetradecanoic acid (PFTA)	NS		0.002 <i>U</i>	0.002 <i>U</i>	0.002 U	0.002 <i>U</i>	0.0019 <i>U</i>	0.002 <i>U</i>

Notes:

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NS = no standard

PFAS = per- and polyfluoroalkylated substances

Data Qualifiers:

U = The material was analyzed for, but was not detected.

	ADEC	Sample Identification:	EB-149B-20	EB-363-15
	Groundwater	Sample Date:	12/15/2020	12/15/2020
Analyte (µg/L)	Cleanup Level		Result Qualifier	Result Qualifier
Next Generation Analytes				
11CI-PF3OUdS (F-53B Minor)	NS		0.004 <i>U</i>	0.004 <i>U</i>
3H-perfluoro-3-[(3-methoxy-propoxy)propanoic acid] (ADONA)	NS		0.004 <i>U</i>	0.004 <i>U</i>
9CI-PF3ONS (F-53B Major)	NS		0.004 <i>U</i>	0.004 <i>U</i>
Hexafluoropropylene oxide-dimer acid(HFPO-DA, GenX)	NS		0.004 <i>U</i>	0.004 <i>U</i>
Perfluorooctanesulfonamidoacetic acids				
2-(N-ethyl-perfluorooctane sulfonamido) acetate (EtFOSAA)	NS		0.004 <i>U</i>	0.004 <i>U</i>
2-(N-methyl-perfluorooctane sulfonamido) acetic acid (MeFOSAA)	NS		0.004 <i>U</i>	0.004 <i>U</i>
Perfluoroalklysulfonaic acids				
Perfluorobutanesulfonic acid (PFBS)	NS		0.002 <i>U</i>	0.002 <i>U</i>
Perfluorohexanesulfonic acid (PFHxS)	NS		0.002 <i>U</i>	0.002 <i>U</i>
Perfluoroocanesulfonic acid (PFOS)	0.4		0.002 <i>U</i>	0.002 <i>U</i>
Perfluoroalklycarboxylic acids				
Perfluorohexanoic acid (PFHxA)	NS		0.002 U	0.002 <i>U</i>
Perfluoroheptanoic acid (PFHpA)	NS		0.002 U	0.002 <i>U</i>
Perflorooctanoic acid (PFOA)	0.4		0.002 U	0.002 <i>U</i>
Perfluorononanoic acid (PFNA)	NS		0.002 <i>U</i>	0.002 <i>U</i>
Perfluorodecanoic Acid (PFDA)	NS		0.002 <i>U</i>	0.002 <i>U</i>
Perfluoroundecanoic acid (PFUnA)	NS		0.002 <i>U</i>	0.002 <i>U</i>
Perfluorododecanoic acid (PFDoA)	NS		0.002 <i>U</i>	0.002 <i>U</i>
Perfluorotridecanoic acid (PFTrDA)	NS		0.002 <i>U</i>	0.002 <i>U</i>
Perfluorotetradecanoic acid (PFTA)	NS		0.002 <i>U</i>	0.002 <i>U</i>

Notes:

ADEC = Alaska Department of Environmental Conservation

NS = no standard

PFAS = per- and polyfluoroalkylated substances

Data Qualifiers:

U = The material was analyzed for, but was not detected.

UJ = The material was analyzed for, but was not detected. The sample quantitation limit is an estimated quantity.

#### August 2021

### Table 4. PFAS Results - NPT (Disposal Characterization)

Sample Identification:	NPT-1	NPT-2	NPT-3	NPT-4-T	NPT-5-T
Sample Date:	12/17/2020	12/17/2020	12/17/2020	12/17/2020	12/17/2020
Analyte (µg/L)	Result Qualifier				
Next Generation Analytes					
11CI-PF3OUdS (F-53B Minor)	0.1 <i>U</i>	0.1 <i>U</i>	0.042 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>
3H-perfluoro-3-[(3-methoxy-propoxy)propanoic acid] (ADONA)	0.1 <i>U</i>	0.042 <i>U</i>	0.042 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>
9CI-PF3ONS (F-53B Major)	0.1 <i>U</i>	0.1 <i>U</i>	0.042 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>
Hexafluoropropylene oxide-dimer acid(HFPO-DA, GenX)	0.1 <i>U</i>	0.042 <i>U</i>	0.042 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>
Perfluorooctanesulfonamidoacetic acids					
2-(N-methyl-perfluorooctane sulfonamido) acetic acid (MeFOSAA)	0.1 <i>U</i>	0.1 <i>U</i>	0.1 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>
2-(N-ethyl-perfluorooctane sulfonamido) acetate (EtFOSAA)	0.1 <i>U</i>	0.1 <i>U</i>	0.1 <i>U</i>	0.0042 <i>U</i>	0.0042 <i>U</i>
Perfluoroalklysulfonaic acids					
Perfluorobutanesulfonic acid (PFBS)	0.0634 J	0.021 <i>U</i>	0.021 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>
Perfluorohexanesulfonic acid (PFHxS)	0.18	0.0407 J	0.0344 <i>J</i>	0.0021 <i>U</i>	0.0021 <i>U</i>
Perfluoroocanesulfonic acid (PFOS)	0.708	0.218	0.0632	0.0021 <i>U</i>	0.0021 <i>U</i>
Perfluoroalklycarboxylic acids					
Perfluorohexanoic acid (PFHxA)	0.109	0.0367 J	0.0425	0.0021 <i>U</i>	0.0021 <i>U</i>
Perfluoroheptanoic acid (PFHpA)	0.0804 J	0.0325 J	0.0364 J	0.0021 <i>U</i>	0.0021 <i>U</i>
Perflorooctanoic acid (PFOA)	0.115	0.0476	0.0339 J	0.0021 <i>U</i>	0.0021 <i>U</i>
Perfluorononanoic acid (PFNA)	0.367	0.184	0.0947	0.0021 <i>U</i>	0.0021 <i>U</i>
Perfluorodecanoic Acid (PFDA)	0.052 <i>U</i>	0.052 <i>U</i>	0.021 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>
Perfluoroundecanoic acid (PFUnA)	0.052 <i>U</i>	0.052 <i>U</i>	0.052 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>
Perfluorododecanoic acid (PFDoA)	0.052 <i>U</i>	0.052 <i>U</i>	0.052 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>
Perfluorotridecanoic acid (PFTrDA)	0.052 <i>U</i>	0.021 <i>U</i>	0.021 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>
Perfluorotetradecanoic acid (PFTA)	0.052 U	0.021 <i>U</i>	0.021 <i>U</i>	0.0021 <i>U</i>	0.0021 <i>U</i>

#### Notes:

NPT =

PFAS = per- and polyfluoroalkylated substances

Data Qualifiers:

J = The result is an estimated quantity.

U = The material was analyzed for, but was not detected.

Appendix A Groundwater Elevation Measurements

## Table - Onsite Groundwater Elevation Measurements

Monitoring Well	Date	Time	TOM to GS (ft)	TOM to TOC (ft)	DTP from TOC (ft below TOC)	DTW from TOC (ft below TOC)	Product Thickness (ft)	TOC Elevation †	GW Elevation †‡	Notes
MW-102-70	12/28/2020	13:50	4.02	0.37		12.43		496.19	483.76	
MW-106-25	12/28/2020	16:36	2.55	0.63		14.52		499.48	484.96	
MW-109-15	12/28/2020	12:28	1.00	0.66		9.50		495.14	485.64	
MW-110-20	12/28/2020	9:50	3.44	0.31		11.33		496.73	485.40	
MW-110-65	12/28/2020	9:41	3.39	0.33		11.43		496.78	485.35	
MW-113-15	12/28/2020	12:33	3.27	0.39		9.90		494.41	484.51	
MW-115-15	12/28/2020	12:00	3.38	0.83	9.87	9.88	0.01	495.82	485.95	
MW-130-25	12/28/2020	12:15	3.48	0.60	Sheen	12.25	Sheen	497.03	484.78	
MW-133-20	12/28/2020	14:55	2.83	0.38		12.98		498.36	485.38	
MW-137-20	12/28/2020	14:25	3.61	0.25		12.73		497.42	484.69	
MW-139-25	12/28/2020	13:34	2.96	1.00		13.13		497.30	484.17	
MW-141-20	12/28/2020	11:44	3.14	0.77		9.07		492.55	483.48	
MW-146A-15	12/28/2020	11:50	3.14	0.47		11.40		495.11	483.71	
MW-146B-30	12/28/2020	11:53	2.53	0.19		11.18		494.90	483.72	
MW-149A-15	12/28/2020	15:25	1.19	0.53		10.22		493.31	483.09	
MW-149B-20	12/28/2020	15:25	0.87	0.26		10.43		493.50	483.07	
MW-154A-75	12/28/2020	13:26	3.05	0.20		14.11		498.29	484.18	
MW-154B-95	12/28/2020	13:28	2.90	0.23		13.81		497.96	484.15	
MW-174-15	12/28/2020	15:41	3.34	0.18		9.80		494.74	484.94	
MW-174A-50	12/28/2020	15:50	3.36	0.96		9.85		493.82	483.97	
MW-174B-90	12/28/2020	15:44	2.79	0.57		8.69		493.57	484.88	
MW-176A-15	12/28/2020	10:20	3.52	0.21	11.42	13.22	1.80	497.29	485.51	
MW-176B-50	12/28/2020	10:25	3.60	0.36		11.42		497.08	485.66	
MW-176C-90	12/28/2020	10:30	3.52	0.54		11.15		496.84	485.69	
MW-178A-15	12/28/2020	10:40	3.42	1.08		10.80		496.49	485.69	
MW-178B-50	12/28/2020	10:42	3.25	1.18		10.40		496.09	485.69	
MW-178C-90	12/28/2020	10:45	3.38	0.35		11.55		497.27	485.72	
MW-180A-15	12/28/2020	14:00	3.67	0.67		11.33		497.41	486.08	
MW-180B-50	12/28/2020	14:05	3.40	0.81		10.83		496.88	486.05	
MW-180C-90	12/28/2020	14:10	3.38	0.54		11.00		497.07	486.07	
MW-186A-15	12/28/2020	12:25	3.44	0.24	11.57	11.58	0.01	495.96	484.39	
MW-186B-60	12/28/2020	12:27	3.63	0.42		11.49		496.04	484.55	
MW-186D-135	12/28/2020	12:29	3.29	0.33		11.16		495.78	484.62	
MW-186E-75	12/28/2020	12:32	3.38	0.29		11.37		495.90	484.53	
MW-186C-100	12/28/2020	12:34	3.29	0.21		11.17		495.75	484.58	

## Table - Onsite Groundwater Elevation Measurements

Monitoring Well	Date	Time	TOM to GS (ft)	TOM to TOC (ft)	DTP from TOC (ft below TOC)	DTW from TOC (ft below TOC)	Product Thickness (ft)	TOC Elevation †	GW Elevation †‡	Notes
MW-192A-15	12/28/2020	12:08	3.40	0.33		9.80		496.35	486.55	
MW-192B-55	12/28/2020	12:10	3.26	0.73		9.05		495.62	486.57	
MW-195A-15	12/28/2020	10:10	3.36	0.17		11.35		496.40	485.05	
MW-195B-150	12/28/2020	10:16	3.12	0.47		10.86		495.95	485.09	
MW-198-150	12/28/2020	13:50	0.00	0.42		7.40		493.21	485.81	
MW-300-150	12/28/2020	14:40	2.60	0.67		10.17		496.00	485.83	
MW-301-CMT-10	12/28/2020	16:07	3.49	0.31		9.00		492.57	483.57	
MW-304-15	12/28/2020	13:46	3.41	0.16		13.16		497.04	483.88	
MW-309-15	12/28/2020	13:10	3.00	0.45		10.40		494.77	484.37	
MW-309-66	12/28/2020	13:08	3.80	0.26		10.68		495.06	484.38	
MW-309-150	12/28/2020	13:06	3.11	0.42		10.48		494.84	484.36	
MW-310-15	12/28/2020	11:08	3.46	0.11		10.31		494.52	484.21	
MW-310-65	12/28/2020	11:10	3.22	0.32		9.98		494.36	484.38	
MW-310-110	12/28/2020	11:12	3.36	0.59		9.47		493.88	484.41	
MW-321-15	12/28/2020	15:59	3.01	0.27		10.51		495.73	485.22	
MW-321-65	12/28/2020	14:03	3.12	0.30		10.40		495.57	485.17	
MW-321-150	12/28/2020	14:06	2.84	0.52		10.04		495.22	485.18	
MW-330-20	12/28/2020	10:49	3.29	0.46		15.04		499.89	484.85	
MW-330-65	12/28/2020	10:47	3.05	0.56		14.82		499.68	484.86	
MW-330-150	12/28/2020	10:42	3.05	0.56		14.61		499.51	484.90	
MW-336-15	12/28/2020	17:10	0.00	0.71	Sheen	6.76	Sheen	492.90	486.14	
MW-336-20	12/28/2020	17:12	0.00	0.33	Sheen	7.23	Sheen	493.32	486.09	
MW-336-35	12/28/2020	17:00	0.00	0.27		7.18		493.27	486.09	
MW-336-55	12/28/2020	17:05	0.00	0.40		7.15		493.30	486.15	
MW-345-15	12/28/2020	12:55	3.32	0.44		11.25		495.71	484.46	
MW-345-55	12/28/2020	12:57	3.78	0.53		11.54		496.02	484.48	
MW-345-75	12/28/2020	13:00	3.35	0.61		11.19		495.65	484.46	
MW-351-15	12/28/2020	11:05	3.49	0.80		9.33		493.41	484.08	
MW-351-55	12/28/2020	11:05	3.43	0.66		9.38		493.55	484.17	
MW-351-75	12/28/2020	11:05	3.47	0.67		9.27		493.42	484.15	
MW-351-150	12/28/2020	11:05	3.40	0.25		9.57		493.74	484.17	
MW-354-15	12/28/2020	13:10	3.24	0.65	10.97	10.98	0.01	496.35	485.38	
MW-354-35	12/28/2020	13:15	4.15	0.90		11.55		496.91	485.36	
MW-354-65	12/28/2020	13:20	3.83	0.46		12.33		497.72	485.39	
MW-355-15	12/28/2020	10:28	3.40	0.68		12.60		497.61	485.01	
## Table - Onsite Groundwater Elevation Measurements

Monitoring Well	Date	Time	TOM to GS (ft)	TOM to TOC (ft)	DTP from TOC (ft below TOC)	DTW from TOC (ft below TOC)	Product Thickness (ft)	TOC Elevation †	GW Elevation †‡	Notes
MW-355-55	12/28/2020	10:26	3.35	0.75		12.40		497.35	484.95	
MW-358-15	12/28/2020	12:20	3.35	0.16		12.14		495.26	483.12	
MW-358-20	12/28/2020	12:20	3.40	0.25		12.28		495.40	483.12	
MW-358-40	12/28/2020	12:20	3.29	0.32		11.90		495.02	483.12	
MW-358-60	12/28/2020	12:20	3.23	0.27		11.95		495.07	483.12	Broken collar
MW-358-150	12/28/2020	12:20	3.46	0.26		11.88		495.08	483.20	
MW-359-15	12/28/2020	12:57	3.10	0.44		11.53		494.69	483.16	
MW-359-35	12/28/2020	12:57	2.89	0.52		11.33		494.48	483.15	
MW-359-60	12/28/2020	12:57	3.40	0.37		11.55		494.75	483.20	
MW-359-80	12/28/2020	12:57	3.03	0.37		11.61		494.73	483.12	
MW-359-150	12/28/2020	12:57	3.33	0.40		11.26		494.44	483.18	
MW-360-15	12/28/2020	13:52	3.29	0.26		11.63		494.94	483.31	
MW-360-35	12/28/2020	13:52	3.34	0.26		11.75		495.05	483.30	
MW-360-50	12/28/2020	13:52	3.35	0.19		11.65		494.97	483.32	
MW-360-80	12/28/2020	13:52	3.26	0.47		11.18		494.52	483.34	
MW-360-150	12/28/2020	13:52	3.11	0.34		11.27		494.64	483.37	
MW-361-15	12/28/2020	13:40	3.17	0.29		10.48		496.83	486.35	
MW-362-15	12/28/2020	11:40	3.42	0.28		11.70		495.18	483.48	
MW-362-25	12/28/2020	11:40	3.81	0.34		12.25		495.75	483.50	
MW-362-35	12/28/2020	11:40	3.44	0.28		11.66		495.17	483.51	
MW-362-50	12/28/2020	11:40	3.32	0.38		11.48		494.97	483.49	
MW-362-80	12/28/2020	11:40	2.99	0.31		11.53		494.99	483.46	
MW-362-150	12/28/2020	11:40	3.46	0.42		11.81		495.25	483.44	
MW-363-15	12/28/2020	15:34	2.99	0.11		11.94		495.04	483.10	Frostjacked
MW-364-15	12/28/2020	14:50	3.13	0.32		11.27		494.29	483.02	
MW-364-30	12/28/2020	14:50	3.17	0.33		11.30		494.32	483.02	
MW-364-65	12/28/2020	14:50	3.04	0.25		10.92		493.97	483.05	
MW-364-90	12/28/2020	14:50	3.29	0.48		11.19		494.24	483.05	
MW-364-150	12/28/2020	14:50	3.22	0.20		11.22		494.25	483.03	
MW-365-15	12/28/2020	15:55	0.00	0.25		8.03		494.10	486.07	
MW-366-15	12/28/2020	11:30	0.00	0.33	7.55	7.75	0.20	493.54	485.95	
MW-367-15	12/28/2020	11:45	3.43	0.42	Sheen	11.26	Sheen	497.39	486.13	
MW-368-15	12/28/2020	15:46	3.29	0.54		10.43		496.69	486.26	
MW-370-15	12/28/2020	11:23	3.59	0.45		10.89		495.17	484.28	
MW-370-55	12/28/2020	11:26	3.85	0.52		10.90		495.20	484.30	

### Table - Onsite Groundwater Elevation Measurements

Monitoring Well	Date	Time	TOM to GS (ft)	TOM to TOC (ft)	DTP from TOC (ft below TOC)	DTW from TOC (ft below TOC)	Product Thickness (ft)	TOC Elevation †	GW Elevation †‡	Notes
MW-370-75	12/28/2020	11:28	3.54	0.66		10.46		494.76	484.30	
MW-371-15	12/28/2020	10:37	3.44	0.17		12.17		496.35	484.18	
MW-371-55	12/28/2020	10:37	3.30	0.63		11.38		495.58	484.20	
MW-371-75	12/28/2020	10:37	3.62	0.46		11.75		495.94	484.19	
MW-371-125	12/28/2020	10:37	3.34	0.31		11.84		496.03	484.19	
MW-372-15	12/28/2020	16:24	3.46	0.29		15.44		500.33	484.89	
MW-373-15	12/28/2020	16:42	3.56	0.54		14.10		500.26	486.16	
0-6	12/28/2020	12:37	3.17	0.32		10.50		495.23	484.73	
0-9	12/28/2020	11:10	3.92	0.13	12.20	12.21	0.01	497.61	485.41	
O-10	12/28/2020	11:00	2.75	0.06	11.22	11.70	0.48	496.70	485.38	
O-14	12/28/2020	16:50	0.00	0.33		8.84		494.90	486.06	
O-15	12/28/2020	15:35	3.44	0.19		12.24		498.71	486.47	
O-16	12/28/2020	13:48	0.00	0.21	7.65	7.66	0.01	493.45	485.80	
O-18	12/28/2020	16:10	0.00	0.24		7.85		492.83	484.98	
0-24	12/28/2020	10:12	3.17	0.26		12.93		497.30	484.37	
O-24-65	12/28/2020	10:12	3.28	0.23		13.06		497.43	484.37	
O-30	12/28/2020	15:00	3.60	0.61		12.25		498.00	485.75	
O-34	12/28/2020	10:55	3.42	0.38	Sheen	11.17	Sheen	496.56	485.39	
O-35	12/28/2020	10:12	3.50	0.23	11.55	12.08	0.53	497.26	485.60	
North Gravel Pit	12/28/2020	11:00				8.61		492.78	484.17	
South Gravel Pit	12/28/2020									Frozen

Notes:

† Elevation reported in National Geodetic Vertical Datum of 1929 (NGVD '29), values are equal to feet above mean sea level.

-- parameter not recorded

ft feet

TOM top of monument

GS ground surface

TOC top of casing (pipe)

DTW depth to water

DTP depth to product (LNAPL)

Sheen Product was observed on the interface probe but was not measurable in the well (product thickness less than 0.01 feet).

‡ At locations where LNAPL was observed, a specific gravity of 0.8 was used to calculate the potentiometric head (theoretical groundwater elevation).

Appendix B Surveyor Report



# MONITOR WELL SURVEY

# **December 2020 Onsite Wells**

Williams NPR North Pole, AK

Prepared For Shannon & Wilson

Surveyed December 2020

Design Alaska, Inc. Architects • Engineers • Surveyors 601 College Road Fairbanks, Alaska 99701 Phone 907-452-1241 Fax 907-456-6883 mail@designalaska.com



	<u>ALASKA ST.</u> NAD83, ZOI	<u>ATE PLANE</u> NE 3, US FT	<u>NGVD '29</u>	<u>ELEVATION</u>	<u>NAVD '88</u>		
WELL ID	<b>NORTHING</b>	EASTING	<u>PIPE</u>	GROUND	<u>PIPE</u>	GROUND	DATE
MW-102-70	3927955.1	1429113.9	496.19	492.6	501.25	497.6	29-Dec-20
MW-106-25	3926112.1	1428065.1	499.48	497.6	504.54	502.6	29-Dec-20
MW-109-15	3925855.2	1428675.0	495.14	494.8	500.20	499.9	30-Dec-20
MW-110-20	3925975.4	1428873.1	496.73	493.6	501.79	498.7	30-Dec-20
MW-110-65	3925984.1	1428864.8	496.78	493.8	501.84	498.8	30-Dec-20
MW-113-15	3926957.7	1428778.0	494.41	491.5	499.47	496.6	29-Dec-20
MW-115-15	3925758.8	1429540.8	495.82	493.2	500.88	498.3	30-Dec-20
MW-130-25	3926825.7	1429354.6	497.03	494.2	502.09	499.2	30-Dec-20
MW-133-20	3926597.4	1430160.2	498.36	495.8	503.42	500.9	30-Dec-20
MW-137-20	3927083.8	1429737.5	497.42	494.0	502.48	499.1	30-Dec-20
MW-139-25	3927428.0	1428848.6	497.30	495.3	502.36	500.4	29-Dec-20
MW-141-20	3927598.0	1427540.7	492.55	490.1	497.61	495.2	29-Dec-20
MW-146A-15	3927201.1	1427049.4	495.11	492.5	500.17	497.5	29-Dec-20
MW-146B-30	3927193.3	1427048.2	494.90	492.6	499.96	497.6	29-Dec-20
MW-149A-15	3928676.8	1428953.1	493.31	492.9	498.37	497.9	28-Dec-20
MW-149B-20	3928677.7	1428959.6	493.50	492.9	498.56	498.0	28-Dec-20
MW-154A-75	3927391.5	1428835.9	498.29	495.4	503.35	500.5	29-Dec-20
MW-154B-95	3927410.2	1428845.4	497.96	495.3	503.02	500.3	29-Dec-20
MW-174-15	3926469.7	1428666.7	494.74	491.5	499.80	496.6	30-Dec-20
MW-174A-50	3926454.5	1428665.4	493.82	491.5	498.88	496.6	30-Dec-20
MW-174B-90	3926461.3	1428664.2	493.57	491.4	498.63	496.5	30-Dec-20
MW-176A-15	3926055.8	1429416.3	497.29	494.0	502.35	499.0	30-Dec-20
MW-176B-50	3926056.3	1429412.0	497.08	493.9	502.14	499.0	30-Dec-20
MW-176C-90	3926056.8	1429407.8	496.84	493.8	501.90	498.9	30-Dec-20
MW-178A-15	3926117.3	1429586.6	496.49	494.2	501.55	499.2	30-Dec-20
MW-178B-50	3926117.1	1429580.0	496.09	494.0	501.15	499.0	30-Dec-20
MW-178C-90	3926117.3	1429573.6	497.27	494.3	502.33	499.3	30-Dec-20
MW-180A-15	3925874.9	1429928.6	497.41	494.4	502.47	499.4	30-Dec-20



	<u>ALASKA ST</u> NAD83, ZO	<u>ATE PLANE</u> NE 3, US FT	<u>NGVD '29</u>	<u>ELEVATION</u>	<u>NAVD '88</u>		
WELL ID	<b>NORTHING</b>	EASTING	<u>PIPE</u>	GROUND	<u>PIPE</u>	GROUND	DATE
MW-180B-50	3925879.5	1429922.6	496.88	494.2	501.94	499.3	30-Dec-20
MW-180C-90	3925873.8	1429924.2	497.07	494.2	502.13	499.3	30-Dec-20
MW-186A-15	3927025.9	1429092.8	495.96	492.7	501.02	497.8	30-Dec-20
MW-186B-60	3927021.2	1429092.7	496.04	492.8	501.10	497.8	30-Dec-20
MW-186D-135	3927010.4	1429093.2	495.78	492.8	500.84	497.8	30-Dec-20
MW-186E-75	3927030.4	1429093.3	495.90	492.8	500.96	497.9	30-Dec-20
MW-186C-100	3927017.1	1429092.5	495.75	492.6	500.81	497.7	30-Dec-20
MW-192A-15	3924992.2	1428889.4	496.35	493.5	501.41	498.5	28-Dec-20
MW-192B-55	3924992.6	1428887.1	495.62	493.3	500.68	498.4	28-Dec-20
MW-195A-15	3926110.9	1428572.6	496.40	493.3	501.46	498.3	30-Dec-20
MW-195B-150	3926110.9	1428566.3	495.95	493.3	501.01	498.4	30-Dec-20
MW-198-150	3925820.0	1429027.7	493.21	493.6	498.27	498.7	30-Dec-20
MW-300-150	3926139.6	1429895.1	496.00	494.0	501.06	499.1	30-Dec-20
MW-301-CMT-10	3927444.5	1427850.4	492.57	489.5	497.63	494.6	29-Dec-20
MW-304-15	3927723.8	1428828.0	497.04	493.8	502.10	498.8	29-Dec-20
MW-309-15	3927042.7	1428539.0	494.77	492.2	499.83	497.3	29-Dec-20
MW-309-66	3927043.2	1428532.4	495.06	492.0	500.12	497.0	29-Dec-20
MW-309-150	3927043.9	1428525.5	494.84	492.0	499.90	497.0	29-Dec-20
MW-310-15	3926810.9	1428028.9	494.52	491.4	499.58	496.5	29-Dec-20
MW-310-65	3926805.7	1428036.7	494.36	491.5	499.42	496.6	29-Dec-20
MW-310-110	3926802.8	1428044.6	493.88	491.2	498.94	496.2	29-Dec-20
MW-321-15	3926256.8	1428855.8	495.73	493.0	500.79	498.1	30-Dec-20
MW-321-65	3926265.1	1428856.3	495.57	492.9	500.63	498.0	30-Dec-20
MW-321-151	3926273.7	1428856.1	495.22	492.9	500.28	498.0	30-Dec-20
MW-330-20	3926218.8	1428281.5	499.89	497.1	504.95	502.2	30-Dec-20
MW-330-65	3926212.4	1428284.8	499.68	497.2	504.74	502.3	30-Dec-20
MW-330-150	3926206.2	1428288.4	499.51	497.1	504.57	502.2	30-Dec-20
MW-336-15	3925763.6	1429752.5	492.90	493.6	497.96	498.7	30-Dec-20



	<u>ALASKA ST.</u> NAD83, ZO	<u>ATE PLANE</u> NE 3, US FT	<u>NGVD '29</u>	<u>ELEVATION</u>	<u>NAVD '88</u>		
WELL ID	<b>NORTHING</b>	<b>EASTING</b>	<u>PIPE</u>	GROUND	<u>PIPE</u>	GROUND	DATE
MW-336-20	3925763.9	1429746.3	493.32	493.6	498.38	498.7	30-Dec-20
MW-336-35	3925767.4	1429740.4	493.27	493.6	498.33	498.6	30-Dec-20
MW-336-55	3925773.2	1429748.7	493.30	493.7	498.36	498.8	30-Dec-20
MW-345-15	3927056.3	1428877.7	495.71	492.9	500.77	497.9	29-Dec-20
MW-345-55	3927056.1	1428883.2	496.02	492.9	501.08	498.0	29-Dec-20
MW-345-75	3927061.1	1428881.2	495.65	493.0	500.71	498.1	29-Dec-20
MW-351-15	3927232.4	1428305.3	493.41	490.7	498.47	495.8	29-Dec-20
MW-351-55	3927228.1	1428314.8	493.55	490.8	498.61	495.8	29-Dec-20
MW-351-75	3927230.2	1428309.9	493.42	490.7	498.48	495.7	29-Dec-20
MW-351-150	3927226.1	1428320.3	493.74	491.2	498.80	496.2	29-Dec-20
MW-354-15	3926404.9	1429496.4	496.35	493.3	501.41	498.4	30-Dec-20
MW-354-35	3926404.6	1429492.8	496.91	494.0	501.97	499.0	30-Dec-20
MW-354-65	3926403.8	1429485.7	497.72	494.3	502.78	499.4	30-Dec-20
MW-355-15	3926095.2	1428312.6	497.61	494.9	502.67	500.0	29-Dec-20
MW-355-55	3926094.9	1428317.2	497.35	495.0	502.41	500.0	29-Dec-20
MW-358-15	3927849.5	1428011.1	495.26	492.1	500.32	497.2	29-Dec-20
MW-358-20	3927845.2	1428005.6	495.40	492.3	500.46	497.3	29-Dec-20
MW-358-40	3927841.9	1428001.8	495.02	492.1	500.08	497.1	29-Dec-20
MW-358-60	3927838.6	1427996.5	495.07	492.1	500.13	497.2	29-Dec-20
MW-358-150	3927835.1	1427992.2	495.08	491.9	500.14	497.0	29-Dec-20
MW-359-15	3928071.1	1428297.3	494.69	492.0	499.75	497.1	29-Dec-20
MW-359-35	3928060.3	1428287.5	494.48	492.1	499.54	497.2	29-Dec-20
MW-359-60	3928072.9	1428303.9	494.75	491.7	499.81	496.8	29-Dec-20
MW-359-80	3928066.2	1428292.1	494.73	492.0	499.79	497.1	29-Dec-20
MW-359-150	3928075.3	1428310.1	494.44	491.5	499.50	496.6	29-Dec-20
MW-360-15	3928286.4	1428409.3	494.94	491.9	500.00	497.0	29-Dec-20
MW-360-35	3928285.7	1428403.4	495.05	492.0	500.11	497.0	29-Dec-20
MW-360-50	3928286.7	1428397.4	494.97	491.8	500.03	496.9	29-Dec-20



	<u>ALASKA ST.</u> NAD83, ZO	<u>ATE PLANE</u> NE 3, US FT	<u>NGVD '29</u>	<u>ELEVATION</u>	<u>NAVD '88</u>		
WELL ID	<b>NORTHING</b>	EASTING	<u>PIPE</u>	GROUND	<u>PIPE</u>	GROUND	DATE
MW-360-80	3928286.9	1428415.8	494.52	491.8	499.58	496.8	29-Dec-20
MW-360-150	3928287.6	1428391.6	494.64	491.9	499.70	497.0	29-Dec-20
MW-361-15	3925554.1	1429896.3	496.83	493.9	501.89	499.0	30-Dec-20
MW-362-15	3927627.7	1427762.6	495.18	492.0	500.24	497.1	29-Dec-20
MW-362-25	3927622.1	1427777.9	495.75	492.3	500.81	497.3	29-Dec-20
MW-362-35	3927623.9	1427772.8	495.17	492.5	500.23	497.5	29-Dec-20
MW-362-50	3927625.8	1427768.2	494.97	492.1	500.03	497.1	29-Dec-20
MW-362-80	3927629.7	1427756.9	494.99	492.3	500.05	497.3	29-Dec-20
MW-362-150	3927631.5	1427751.1	495.25	492.2	500.31	497.3	29-Dec-20
MW-363-15	3928662.8	1429296.6	495.04	492.1	500.10	497.1	30-Dec-20
MW-364-15	3928680.5	1428505.1	494.29	491.5	499.35	496.6	30-Dec-20
MW-364-30	3928676.7	1428502.6	494.32	491.5	499.38	496.5	30-Dec-20
MW-364-65	3928670.5	1428508.5	493.97	491.2	499.03	496.3	30-Dec-20
MW-364-90	3928675.2	1428507.5	494.24	491.4	499.30	496.5	30-Dec-20
MW-364-150	3928670.6	1428503.7	494.25	491.2	499.31	496.3	30-Dec-20
MW-365-15	3925519.6	1429147.6	494.10	494.3	499.16	499.4	30-Dec-20
MW-366-15	3925550.6	1429332.7	493.54	493.8	498.60	498.8	30-Dec-20
MW-367-15	3925546.0	1429600.7	497.39	494.6	502.45	499.7	30-Dec-20
MW-368-15	3925539.0	1429779.2	496.69	493.9	501.75	498.9	30-Dec-20
MW-370-15	3927030.1	1428351.4	495.17	492.0	500.23	497.1	29-Dec-20
MW-370-55	3927034.2	1428354.3	495.20	491.9	500.26	497.0	29-Dec-20
MW-370-75	3927038.2	1428357.3	494.76	491.9	499.82	497.0	29-Dec-20
MW-371-15	3927291.1	1428608.4	496.35	493.1	501.41	498.1	29-Dec-20
MW-371-55	3927291.4	1428588.4	495.58	492.9	500.64	498.0	29-Dec-20
MW-371-75	3927291.0	1428601.2	495.94	492.8	501.00	497.9	29-Dec-20
MW-371-125	3927292.1	1428594.5	496.03	493.1	501.09	498.1	29-Dec-20
MW-372-15	3926141.8	1428204.5	500.33	497.2	505.39	502.3	29-Dec-20
MW-373-15	3925969.6	1428265.6	500.26	497.2	505.32	502.3	29-Dec-20



	<u>ALASKA ST.</u> NAD83, ZO	<u>ATE PLANE</u> NE 3, US FT	<u>NGVD '29</u>	<b>ELEVATION</b>	<u>NAVD '88</u>		
WELL ID	NORTHING	EASTING	<u>PIPE</u>	GROUND	<u>PIPE</u>	GROUND	DATE
O-6	3926744.1	1428769.8	495.23	492.5	500.29	497.5	29-Dec-20
O-9	3926505.3	1429912.5	497.61	493.8	502.67	498.9	30-Dec-20
O-10	3926386.3	1429760.8	496.70	494.0	501.76	499.1	30-Dec-20
O-14	3925995.3	1430224.2	494.90	495.2	499.96	500.3	30-Dec-20
O-15	3925553.8	1430177.5	498.71	495.6	503.77	500.6	30-Dec-20
O-16	3925819.7	1429033.9	493.45	493.6	498.51	498.7	30-Dec-20
O-18	3926309.4	1429007.3	492.83	493.1	497.89	498.2	30-Dec-20
O-24	3927281.2	1429428.4	497.30	494.4	502.36	499.5	30-Dec-20
0-24-65	3927287.1	1429429.1	497.43	494.5	502.49	499.6	30-Dec-20
O-30	3926425.9	1430292.8	498.00	495.0	503.06	500.0	30-Dec-20
O-34	3926268.9	1429394.5	496.56	493.5	501.62	498.6	30-Dec-20
O-35	3925985.1	1429404.3	497.26	493.8	502.32	498.8	30-Dec-20
North Gravel Pit	Mark Inside	Pump House	492.78		497.84		29-Dec-20