GROUNDWATER SAMPLING REPORT

PER- AND POLY-FLUOROALKYL SUBSTANCES GROUNDWATER SAMPLING VICINITY OF HELENA, LEWIS & CLARK COUNTY, MONTANA

Prepared for:

STATE OF MONTANA, DEPARTMENT OF ENVIRONMENTAL QUALITY

P.O. Box 200901
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Contract No. 421030
Task Order No. 18

TETRA TECH

Revision 2

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ACRONYMS AND ABBREVIATIONS

µg/L	Micrograms per liter
ng/L	Nanograms per liter
AFFF	Aqueous film forming foam
bgs	below ground surface
CECRA	Comprehensive Environmental Cleanup and Responsibility Act
DEQ	Department of Environmental Quality
EPA	U.S. Environmental Protection Agency
ITRC	Interstate Technology and Regulatory Council
PFAS	Per- and Poly-fluoroalkyl substance
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane sulfonic acid
RPD	Relative Percent Difference
RSL	Regional Screening Level
SAP/QAPP	Sampling and Analysis Quality Assurance Project Plan
Tetra Tech	Tetra Tech, Inc. (EMI Unit)

INTRODUCTION

Tetra Tech, Inc. EMI Unit (Tetra Tech) was tasked to conduct groundwater sampling for the Montana Department of Environmental Quality (DEQ) under Contract No. 421030 Task Order No. 18. The purpose of this Task Order is to provide technical expertise and services to DEQ for completion of per- and poly-fluoroalkyl substances (PFAS) groundwater sampling and preparation of a Groundwater Sampling and Analysis Results Report. Groundwater sampling is needed to assess potential PFAS impacts to groundwater from potential PFAS sources in the vicinity of Helena, Montana.

PFAS are a family of thousands of chemicals that vary widely in their chemical and physical properties, as well as their potential risks to human health and the environment (Interstate Technology and Regulatory Council [ITRC] 2021). PFAS are present in many different commercial products, such as non-stick coatings, food packaging, personal health care products, stain- and water-resistant products (e.g., clothing and carpets), and protective coatings. Certain PFAS, including perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA), are mobile, persistent, and bioaccumulative, and are not known to degrade in the environment (ITRC 2021). Major sources of PFAS include aqueous film forming foam (AFFF), landfills, PFAS production and manufacturing facilities, wastewater treatment plants, and biosolids applications sites. PFAS have been documented in soil, sediment, groundwater, surface water, and biota across the United States.

PFAS are a suite of emerging contaminants of concern that may pose potential human health risks. The U.S. Environmental Protection Agency (EPA) has determined that exposure to PFAS compounds at concentrations above certain levels may result in adverse health effects. In May 2016, EPA issued drinking water health advisories specifying 70 nanograms per liter (ng/L) as the human health benchmark for PFOA and PFOS (individual and combined concentrations) in drinking water (EPA 2016). In the June 2019 revision of *Circular DEQ-7 Montana Numeric Water Quality Standards*, DEQ added a human health groundwater standard for PFOA and PFOS, individually or combined, at the 2016 EPA lifetime drinking water health advisory level of 0.07 micrograms per liter (ug/L), equivalent to 70 ng/L (DEQ 2019). The DEQ groundwater standard applies to both the PFOA and PFOS individually and cumulative concentration. Additionally, Perfluorobutane sulfonic acid (PFBS) has a risked based EPA Tapwater Regional Screening Level (RSL) of 0.6 µg/L, equivalent to 600 ng/L (EPA 2021).

SITE DESCRIPTION

DEQ identified eight monitoring wells to be sampled by Tetra Tech within the Helena Valley, Lewis & Clark County, Montana. Locations of these wells are shown on Figure 1, summarized in Table 1, and described in detail below.

Sample location GW-01 is a Lewis & Clark County monitoring well at the former Scratch Gravel Hills Sanitary Landfill with a total depth of 90-feet below ground surface (bgs). Monitoring well GW-01 was selected as a monitoring location because the well is at the northern (downgradient/cross-gradient) boundary of the closed landfill. The landfill is a potential PFAS source. Additionally, since this is a deeper bedrock well, the location may provide information on PFAS vertical flow in fractured bedrock.

Sample locations GW-02 and GW-03 are City of Helena landfill monitoring wells with total depths of 78- and 68-feet bgs respectively. Monitoring wells GW-02 and GW-03 were selected as monitoring locations because the wells are downgradient from two potential PFAS sources: the closed municipal landfill and adjacent to a historic train derailment fire that had been extinguished with an AFFF application (AECOM 2018a).

Sample location GW-04 is a Lewis & Clark County Water Quality Protection District monitoring well at the Helena Regional Airport with a total depth of 34-feet bgs. Monitoring well GW-04 was selected as a monitoring location because the well is generally downgradient from the Helena Regional Airport Authority property and approximately 4,500 feet northwest and cross-gradient from the confirmed PFAS source, Helena Army Aviation Support Facility at the Helena Regional Airport; and the potential PFAS source, Rocky Mountain Emergency Services Training Center (AECOM 2018b).

Sample locations GW-05 and GW-06 are Lewis & Clark County Water Quality Protection District monitoring wells with total depths of 18- and 46-feet bgs respectively. Monitoring wells GW-05 and GW-06 were selected as monitoring locations because the wells are near the downgradient end of the Helena Valley aquifer system before reaching Lake Helena; near Prickly Pear Creek; and are downgradient of potential PFAS sources such as sewage lagoons, septic tanks, and drain fields from residential subdivisions.

Sample location GW-07 is a Lewis & Clark County Water Quality Protection District monitoring well at the corner of Lincoln Road and Applegate Road near a gravel pit with a total depth of 99-feet bgs. Monitoring well GW-07 was selected as a monitoring location because the area is not likely to be impacted by PFAS. The only known potential sources of PFAS in the vicinity of the monitoring well are septic tank drain fields located approximately 3,000 to 4,000 feet in an upgradient direction.

Sample location GW-08 is a DEQ monitoring well at the Helena Solvent Site with a total depth of 30-feet bgs. Helena Solvent Site is a groundwater solvent plume associated with at least two former dry cleaners and other potential solvent sources in Helena, Montana. The site is a Groundwater Remediation Program Site being addressed under the authority of the Montana Water Quality Act. Monitoring well GW-08 was selected as a monitoring location because the well is within the centerline of the Helena Solvent Site plume and dry-cleaning facilities are a potential source of PFAS contamination. Monitoring well GW-08 is also located immediately adjacent to a storm sewer.

SAMPLING ACTIVITIES / OBSERVATIONS

Tetra Tech staff collected groundwater samples from the eight monitoring wells (Figure 1) on October 6 and October 7, 2021. Samples were collected following the approved Sampling and Analysis Quality Assurance Project Plan SAP/QAPP (Tetra Tech 2021) with no deviations.

A summary of the field notes is provided below and complete field notes are included in Appendix B.

- A pH probe was initially calibrated on October 5, 2021 when field equipment was organized in preparation of sampling activities. During recalibration on the morning of October 6, 2021 at location GW-07, the pH probe failed to hold calibration. Upon inspection of the pH sensor, the glass bulb was noted as cracked and as a result, pH measurements were not collected.
- Sample location GW-08 was noted as turbid with no improvement during low-flow purging.
- On October 6, 2021 the field duplicate HPFAS_GW-09_20211006 was collected at location GW-05.
- On October 7, 2021 the field duplicate HPFAS_GW-11_20211007 was collected at location GW-04.
- On October 7, 2021 the blind field blank HPFAS_GW-10_20211007 was collected at location GW-02.
- On October 7, 2021 the equipment rinsate blank HPFAS_GW-12_20211007 was collected at location GW-08.
- The laboratory provided one additional field blank per cooler for a total of three cooler field blanks.

SAMPLE RESULTS

Groundwater samples were collected from eight monitoring wells and analyzed for twenty-eight PFAS compounds. Prior to sampling, monitoring wells were purged following approved SAP/QAPP procedures (Tetra Tech 2021) and field parameters for water temperature, dissolved oxygen, specific conductivity, total dissolved solids, and turbidity were recorded (Table 2). Monitoring wells were purged until field parameters visually stabilized for five consecutive minutes then field parameters were recorded and the sample was collected. Analytical results are presented in Table 3 and described in detail below for each monitoring location.

The groundwater sample collected from monitoring well GW-01 on October 6, 2021 had nine detections for PFAS compounds (Table 3). PFOA and PFOS were detected at concentrations of 18 and 6.3 ng/L, respectively (Figure 2), below DEQ's human health groundwater standard of 70 ng/L. PFBS was detected at a concentration of 2.0 ng/L, below the EPA Tap Water RSL of 600 ng/L.

The groundwater sample collected from monitoring well GW-02 on October 7, 2021 had nine detections for PFAS compounds (Table 3). PFOA and PFOS were detected at concentrations of 4.4 and 4.5 ng/L respectively (Figure 2), below DEQ's human health groundwater standard of 70 ng/L. PFBS was detected at a concentration of 6.5 ng/L, below the EPA Tap Water RSL of 600 ng/L.

The groundwater sample collected from monitoring well GW-03 on October 7, 2021 had seven detections for PFAS compounds (Table 3). PFOA and PFOS were detected at concentrations of 3.7 and 20 ng/L, respectively (Figure 2), below DEQ's human health groundwater standard of 70 ng/L. PFBS was detected at a concentration of 1.6 ng/L, below the EPA Tap Water RSL of 600 ng/L.

The groundwater sample collected from monitoring well GW-04 on October 7, 2021 had three detections for PFAS compounds (Table 3). PFOA and PFOS were not detected at concentrations above the analytical reporting limits of 2.0 ng/L (Figure 2). PFBS was not detected at a concentration above the analytical reporting limit of 2.0 ng/L.

Samples collected from monitoring wells GW-05 and GW-06 on October 6, 2021 had no analyzed PFAS compounds detected above analytical reporting limits (Table 3 and Figure 2). PFBS was not detected at a concentration above the analytical reporting limit of 2.0 ng/L.

The groundwater sample collected from monitoring well GW-07 on October 6, 2021 had one detection for PFAS compounds (Table 3). PFOA and PFOS were not detected at concentrations above the analytical reporting limits of 2 ng/L (Figure 2). PFBS was not detected at a concentration above the analytical reporting limit of 2.0 ng/L.

The groundwater sample collected from monitoring well GW-08 on October 7, 2021 had nine detections for PFAS compounds (Table 3). PFOA and PFOS were detected at concentrations of 3.3 and 7.3 ng/L, respectively (Figure 2), below DEQ's human health groundwater standard of 70 ng/L. PFBS was detected at a concentration of 3.8 ng/L, below the EPA Tap Water RSL of 600 ng/L.

QUALITY CONTROL

Quality control samples were collected and analyzed in accordance with the SAP/QAPP for PFAS Groundwater Sampling Vicinity of Helena, Montana (Tetra Tech 2021). Quality control samples consisted of field duplicate samples, a field blank, an equipment rinsate blank, and three cooler blanks. Source water for the blind field blank and the equipment rinsate blank were PFAS-free distilled water from the laboratory and were prepared at a frequency of one per sampling event to assess potential external sources of contamination. Laboratory-provided cooler blanks were used to assess laboratory internal sources of contamination and were prepared at a frequency of one per sample cooler. Field duplicates were collected at a frequency of one per day, one per sampling event to evaluate precision. Precision is the degree of agreement between individual measurements of the same property under similar conditions.

One blind field blank, one equipment rinsate blank, and three cooler field blanks were prepared and analyzed during the sampling event (Table 4). Concentrations for all analyzed PFAS analytes in all blanks were below the analytical laboratory reporting limit, indicating that no cross contamination had occurred during sample collection, processing, and analysis.

Field duplicate samples were collected at the same time and from the same source as the parent samples. Variabilities between analytical results from original and duplicate samples were then calculated as relative percent differences (RPD) according to the following formula:

$$RPD = \frac{|A - B|}{(A + B)/2} \quad x \quad 100$$

where: A = Concentration of analyte in original sample

B = Concentration of analyte in duplicate sample

The RPD goal for this project is 20 percent or less. Two field duplicate samples were collected and analyzed along with their original sample counterparts (Table 5). Analytical results from the duplicate and original samples from location GW-05 were all reported as non-detections above the respective reporting limits, therefore the RPD was 0.0 percent (Table 5). The RPD for the 28 analytes for the duplicate and original samples collected at location GW-04 was 0.6 percent (Table 5). Based on these results, the level of precision for the sampling event is acceptable.

DISCUSSION / SUMMARY

PFAS are a suite of emerging contaminants of concern that may pose potential human health risks. Currently, only PFOA and PFOS are regulated by DEQ (DEQ 2019). Four of the eight monitoring wells sampled had positive detections for PFOA and PFOS, however all detentions (both individually and cumulatively) were below DEQ's human health groundwater standard of 70 ng/L. The same four monitoring wells also had detections for PFBS, which has an EPA Tap Water RSL of 600 ng/L (EPA 2021). All PFBS detections were well below the EPA Tap Water RSL of 600 ng/L. In total, eleven different PFAS compounds were detected in six of the eight monitoring wells.

While the number of sampling wells does not support spatial statistical analysis or PFAS source identification, general observations include:

- Monitoring wells associated with potential sources of PFAS including landfills, a historic train derailment site, and a chlorinated solvent site (GW-01, GW-02, GW-03, and GW-08) had more PFAS detections (average 8.25 detections per well) compared to wells not associated with known potential sources (average 2.4 detections per well).
- The presence of PFAS compounds including PFOA, PFOS, and PFBS in the groundwater sample collected at GW-01 (screened interval from 85-90 feet bgs) suggests these compounds have migrated into the fractured bedrock aquifer.
- PFOA, PFOS, and PFBS were only detected in monitoring wells associated with potential sources of PFAS including landfills, a historic train derailment, and chlorinated solvent site (Figure 2).

RECOMMENDATIONS

Based on the detection frequency and concentrations, Tetra Tech has the following recommendations:

1. Sample the eight monitoring wells again during high-groundwater conditions to determine if PFAS detection frequencies and concentrations fluctuate with changing groundwater conditions.
2. Identify additional monitoring wells to be sampled near GW-01, GW-02, GW-03, and GW-08 to determine if the detected concentrations of PFOA, PFOS, and PFBS in monitoring wells sampled on October 6 and 7, 2021 are representative of groundwater conditions in these areas.
    a. Additional monitoring wells near location GW-01 should include wells completed within the fractured bedrock to confirm the presence of PFAS compounds in the fractured bedrock aquifer.

REFERENCES

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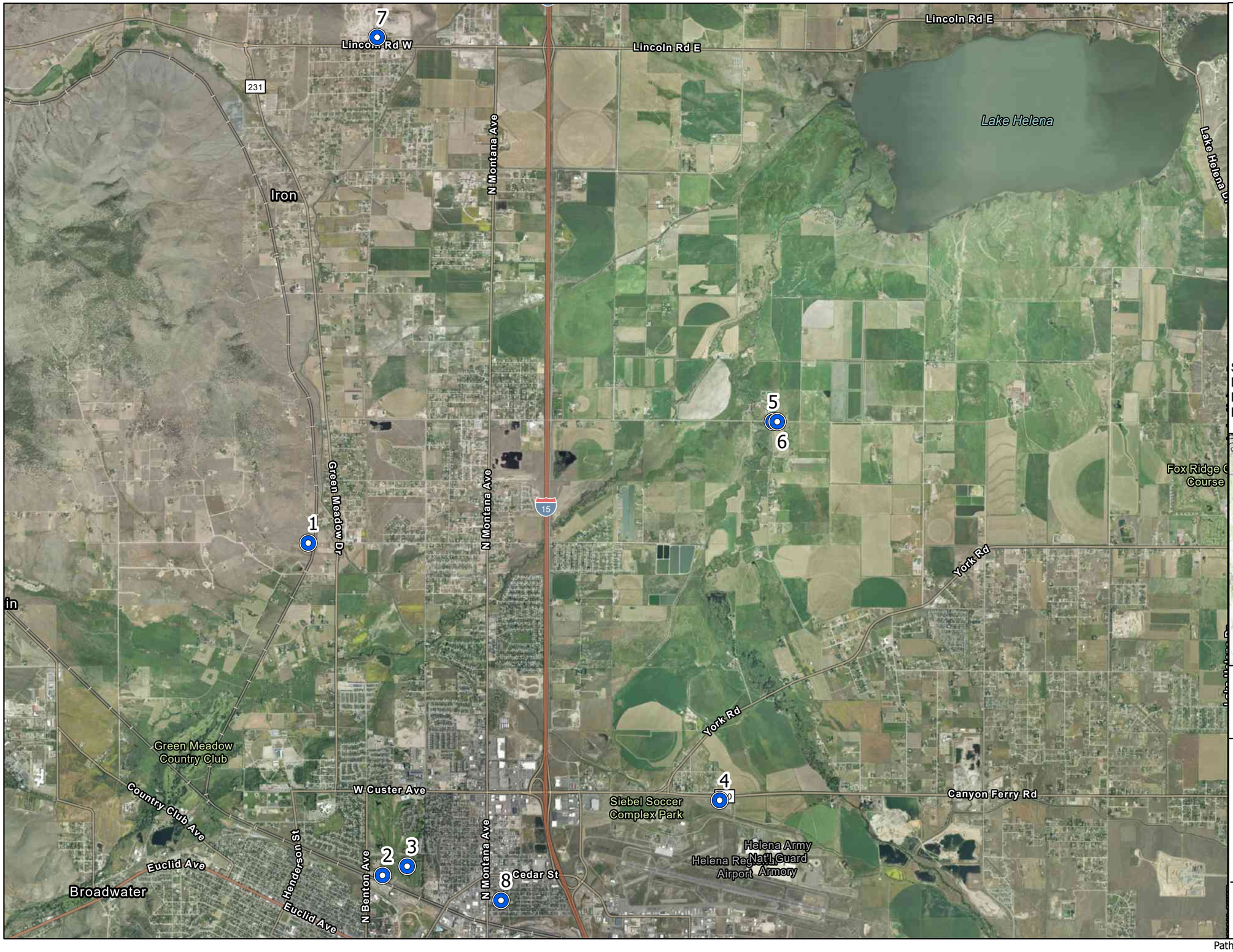
FIGURES



DEQ Montana Department of Environmental Quality

Montana Department of Environmental Quality
Cleanup, Protection, and Redevelopment Section

FIGURE 1
Project Location

Helena PFAS
TO No: 18

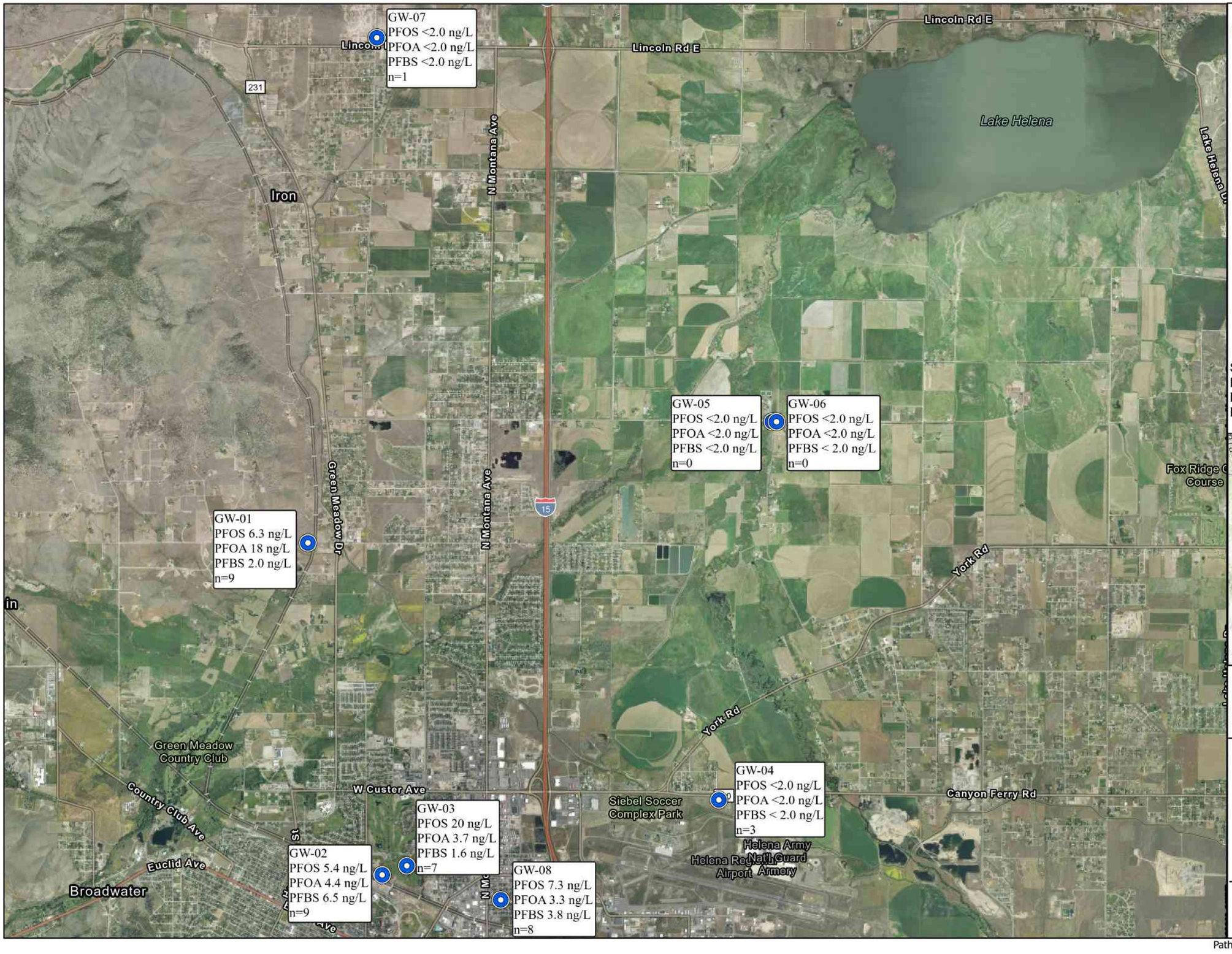
City:	County:	State
Helena	Lewis & Clark	Montana

TETRA TECH

Analyst: CJK

Date: 11/12/2021

Path: S:\GIS\State\TO18_Helena_PFAS\TO18_Helena_PFAS.aprx



Monitoring Wells

Location ID
PFOS Concentration
PFOA Concentration
PFBS Concentrations
Number PFAS analytes detected

Notes:
n Number of Detect Analytes
ng/L nanograms per liter
PFBS Perfluorobutanesulfonic Acid
PFOA Perfluorooctanoic Acid
PFOS Perfluorooctanesulfonic Acid
PFAS Per- and Polyfluoroalkyl Substances

0 2,000 4,000 8,000 Feet

Spatial Reference
Name: NAD 1983 UTM Zone 12N
Datum: North American 1983
Projection: Transverse Mercator

N W E S

DEQ Montana Department of Environmental Quality

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Cleanup, Protection, and Redevelopment Section

FIGURE 2
PFOS, PFOA, and PFBS Concentrations

Helena PFAS
TO No: 18

City:	County:	State
Helena	Lewis & Clark	Montana

TETRA TECH

Analyst: CJK

Date: 1/11/2022

Path: S:\GIS\State\TO18_Helena_PFAS\TO18_Helena_PFAS.aprx

TABLES

Table 1: Sample Locations

Project Site ID	Well Diameter	Screened Interval (feet)	Total Depth (feet)	Historic Static Water Level (feet)	Well Material	Type of Well	GWIC ID #	Latitude & Longitude	Well Owner	Well Name
GW-1	2-inch	85 - 90	90	63 - 72	PVC	Monitoring	254310	46.645616, -112.052097	Lewis & Clark County	LC-10
GW-2	2-inch	58 - 78	78	49 - 51	PVC	Monitoring	Not Available	46.60654, -112.03863	City of Helena	HL-10-1
GW-3	4-inch	60 - 68	68	44 - 46	PVC	Monitoring	61976	46.607651, -112.034432	City of Helena	HL90-02
GW-4	4-inch	24 - 34	34	24 - 27	PVC	Monitoring	193012	46.6159, -111.9811	Lewis and Clark Water Quality Protection District (LCWQPD)	Airport North South Well
GW-5	4-inch	8 - 18	18	5 - 6	PVC	Monitoring	191527	46.660635, -111.972727	LCWQPD	LCWQPD - Sierra and Floweree South Well
GW-6	4-inch	36 - 46	46	7	PVC	Monitoring	191526	46.660635, -111.972027	LCWQPD	LCWQPD - Sierra and Floweree North Well
GW-7	4-inch	89 - 99	99	71 - 75	PVC	Monitoring	191534	46.7053746, -112.0414602	LCWQPD	LCWQPD - Lincoln Road and Applegate
GW-8	2-inch	10 - 30	30	1 - 13	PVC	Monitoring	278849	46.603777, -112.018305	Montana DEQ	HSMW-20

Notes

DEQ Department of Environmental Quality
GWIC Groundwater Informaiton Center
LCWQPD Lewis and Clark Water Quality Protection District
PVC polyvinyl chloride

Table 2: Field Parameters

Sample Location	Approximate Sample Pump Depth (Feet)	Water Temperature (°C)	Dissolved Oxygen (mg/L)	Specific Conductivity (µS/cm)	Total Disolved Solids (mg/L)	Turbidity (NTU)	pH* (SU)
GW-1	88	14.4	2.38	3050	1983	0	NA
GW-2	74	11.2	2.84	3966	2578	0	NA
GW-3	66	9.8	0.72	2515	1635	0	NA
GW-4	30	12.4	10.26	1237	804	0	NA
GW-5	15	11.2	0.21	1964	1276	0	NA
GW-6	42	10.4	3.13	1259	818	0	NA
GW-7	96	11	7.64	3418	2221	0	NA
GW-8	24	14.3	5.8	3620	2371	2.1	NA

Notes:

*Glass bulb for pH probe cracked the morning of sampling and pH measurement could not be collected.

°C Degrees Celcius

µS/cm microsiemens per centerimeter

mg/L milligrams per liter

NA not available

NTU nephelometric turbidity units

SU standard units

		Concentration (nanograms per liter)							
Location ID -->		**GW-01**	**GW-02**	**GW-03**	**GW-04**	**GW-05**	**GW-06**	**GW-07**	**GW-08**
Sample ID -->		**HPFAS_GW-01_20211006**	**HPFAS_GW-02_20211007**	**HPFAS_GW-03_20211007**	**HPFAS_GW-04_20211007**	**HPFAS_GW-05_20211006**	**HPFAS_GW-06_20211006**	**HPFAS_GW-07_20211006**	**HPFAS_GW-08_20211006**
Analyte	**Screening Level**								
11Cl-PF3OUdS	--	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U
4:2 FTS	--	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U
6:2 FTS	--	8.0U	8.0U	8.0U	8.0U	8.0U	8.0U	8.0U	8.0U
8:2 FTS	--	3.0U	3.0U	3.0U	3.0U	3.0U	3.0U	3.0U	3.0U
9Cl-PF3ONS	--	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U
ADONA	--	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U
FOSA	--	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U
HFPO-DA	--	3.0U	3.0U	3.0U	3.0U	3.0U	3.0U	3.0U	3.0U
N-ethyl Perfluoroctanesulfonamidoacetic Acid	--	**17**	3.0U	3.0U	3.0U	3.0U	3.0U	3.0U	3.0U
NMeFOSAA	--	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U
Perfluorobutanoic Acid	--	**13**	**8.0**	**4.9J**	**0.80J**	5.0U	5.0U	**3.5J**	**5.0J**
Perfluorobutanesulfonic Acid (PFBS)	600[a]	**2.0**	**6.5**	**1.6J**	2.0U	2.0U	2.0U	2.0U	**3.8**
Perfluorodecanoic Acid	--	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U
Perfluorododecanoic Acid	--	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U
Perfluorodecanesulfonic Acid	--	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U
Perfluoroheptanoic Acid	--	**7.5**	**4.8**	2.0U	2.0U	2.0U	2.0U	2.0U	**1.3J**
Perfluoroheptanesulfonic Acid	--	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U
Perfluorohexanoic Acid	--	**25**	**14**	2.0U	**0.94J**	2.0U	2.0U	2.0U	**2.6**
Perfluorohexanesulfonic Acid	--	**2.3**	**22**	**11**	**4.5**	2.0U	2.0U	2.0U	**2.5**
Perfluorononanoic Acid	--	2.0U	2.0U	**1.2J**	2.0U	2.0U	2.0U	2.0U	2.0U
Perfluorononanesulfonic Acid	--	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U
Perfluorooctanoic Acid (PFOA)	70[b]	**18**	**4.4**	**3.7**	2.0U	2.0U	2.0U	2.0U	**3.3**
Perfluorooctanesulfonic Acid (PFOS)	70[b]	**6.3**	**5.4**	**20**	2.0U	2.0U	2.0U	2.0U	**7.3**
Perfluoropentanoic Acid	--	**16**	**17**	**1.3J**	2.0U	2.0U	2.0U	2.0U	**2.6**
Perfluoropentanesulfonic Acid	--	2.0U	**7.8**	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U
Perfluorotetradecanoic Acid	--	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U
Perfluorotridecanoic Acid	--	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0UJ
Perfluoroundecanoic Acid	--	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U
Number of Analytes Detected Above Analytical Reporting Limit		**9**	**9**	**7**	**3**	**0**	**0**	**1**	**8**
Cummulative Detect Concentration		**107.1**	**90.9**	**43.7**	**6.2**	**0.0**	**0.0**	**3.5**	**28.4**

Notes:

-- No Screening Level

J The analyte was positively identified; the associated value is the approximate concentration of the analyte in the sample.

U The analyte was analyzed for, but was not detected at or above the associated value (reporting limit).

UJ The analyte was analyzed for, but was not detected at or above the associated value (reporting limit), which is considered approximate due to deficiencies in one or more quality control criteria.

BOLD Detections greater than anlytical reporting limit.

[a]EPA. 2021. Regional Screening Levels (RSL) – Generic Tables. May. https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables

[b]Montana Department of Environmental Quality (DEQ). 2019. Circular DEQ-7. Montana Numerical Water Quality Standards. Helena, MT. June.

Table 4: Sample Blanks

Location ID -->	Concentration (nanograms per liter)				
	GW-02	GW-08	Cooler Blanks		
Sample ID -->	HPFAS_GW-10_20211007 (Blind Field Blank)	HPFAS_GW-12_20211006 (Field Rinsate Blank)	Cooler Field Blank 1	Cooler Field Blank 2	Cooler Field Blank 3
Analyte					
11Cl-PF3OUdS	2.0U	2.0U	2.0U	2.0U	2.0U
4:2 FTS	2.0U	2.0U	2.0U	2.0U	2.0UJ
6:2 FTS	8.0U	8.0U	8.0U	8.0U	8.0U
8:2 FTS	3.0U	3.0U	3.0U	3.0U	3.0U
9Cl-PF3ONS	2.0U	2.0U	2.0U	2.0U	2.0U
ADONA	2.0U	2.0U	2.0U	2.0U	2.0U
FOSA	2.0U	2.0U	2.0U	2.0U	2.0U
HFPO-DA	3.0U	3.0U	3.0U	3.0U	3.0UJ
N-ethyl Perfluoroctanesulfonamidoacetic Acid	3.0U	3.0U	3.0U	3.0U	3.0U
NMeFOSAA	2.0U	2.0U	2.0U	2.0U	2.0U
Perfluorobutanoic Acid	5.0U	5.0U	5.0U	5.0U	5.0UJ
Perfluorobutanesulfonic Acid	2.0U	2.0U	2.0U	2.0U	2.0U
Perfluorodecanoic Acid	2.0U	2.0U	2.0U	2.0U	2.0U
Perfluorododecanoic Acid	2.0U	2.0U	2.0U	2.0U	2.0U
Perfluorodecanesulfonic Acid	2.0U	2.0U	2.0U	2.0U	2.0U
Perfluoroheptanoic Acid	2.0U	2.0U	2.0U	2.0U	2.0UJ
Perfluoroheptanesulfonic Acid	2.0U	2.0U	2.0U	2.0U	2.0U
Perfluorohexanoic Acid	2.0U	2.0U	2.0U	2.0U	2.0UJ
Perfluorohexanesulfonic Acid	2.0U	2.0U	2.0U	2.0U	2.0U
Perfluorononanoic Acid	2.0U	2.0U	2.0U	2.0U	2.0UJ
Perfluorononanesulfonic Acid	2.0U	2.0U	2.0U	2.0U	2.0U
Perfluorooctanoic Acid (PFOA)	2.0U	2.0U	2.0U	2.0U	2.0U
Perfluorooctanesulfonic Acid (PFOS)	2.0U	2.0U	2.0U	2.0U	2.0U
Perfluoropentanoic Acid	2.0U	2.0U	2.0U	2.0U	2.0UJ
Perfluoropentanesulfonic Acid	2.0U	2.0U	2.0U	2.0U	2.0U
Perfluorotetradecanoic Acid	2.0U	2.0U	2.0U	2.0U	2.0U
Perfluorotridecanoic Acid	2.0U	2.0U	2.0U	2.0U	2.0U
Perfluoroundecanoic Acid	2.0U	2.0U	2.0U	2.0U	2.0U

Notes:

J The analyte was positively identified; the associated value is the approximate concentration of the analyte in the sample.

U The analyte was analyzed for, but was not detected at or above the associated value (reporting limit).

UJ The analyte was analyzed for, but was not detected at or above the associated value (reporting limit), which is considered approximate due to deficiencies in one or more quality control criteria.

Table 5: Field Duplicates

Location ID -->	GW-04			GW-05		
Sample ID -->	HPFAS_GW-04_20211007	HPFAS_GW-11_20211007 (Duplicate Sample)	Relative Percent Difference	HPFAS_GW-05_20211006	HPFAS_GW-9_20211006 (Duplicate Sample)	Relative Percent Difference
Analyte						
11Cl-PF3OUdS	2.0U	2.0U	0.0%	2.0U	2.0U	0.0%
4:2 FTS	2.0U	2.0U	0.0%	2.0U	2.0U	0.0%
6:2 FTS	8.0U	8.0U	0.0%	8.0U	8.0U	0.0%
8:2 FTS	3.0U	3.0U	0.0%	3.0U	3.0U	0.0%
9Cl-PF3ONS	2.0U	2.0U	0.0%	2.0U	2.0U	0.0%
ADONA	2.0U	2.0U	0.0%	2.0U	2.0U	0.0%
FOSA	2.0U	2.0U	0.0%	2.0U	2.0U	0.0%
HFPO-DA	3.0U	3.0U	0.0%	3.0U	3.0U	0.0%
N-ethyl Perfluoroctanesulfonamidoacetic Acid	3.0U	3.0U	0.0%	3.0U	3.0U	0.0%
NMeFOSAA	2.0U	2.0U	0.0%	2.0U	2.0U	0.0%
Perfluorobutanoic Acid	**0.80J**	**0.80J**	0.0%	5.0U	5.0U	0.0%
Perfluorobutanesulfonic Acid	2.0U	2.0U	0.0%	2.0U	2.0U	0.0%
Perfluorodecanoic Acid	2.0U	2.0U	0.0%	2.0U	2.0U	0.0%
Perfluorododecanoic Acid	2.0U	2.0U	0.0%	2.0U	2.0U	0.0%
Perfluorodecanesulfonic Acid	2.0U	2.0U	0.0%	2.0U	2.0U	0.0%
Perfluoroheptanoic Acid	2.0U	2.0U	0.0%	2.0U	2.0U	0.0%
Perfluoroheptanesulfonic Acid	2.0U	2.0U	0.0%	2.0U	2.0U	0.0%
Perfluorohexanoic Acid	**0.94**	**0.82**	13.6%	2.0U	2.0U	0.0%
Perfluorohexanesulfonic Acid	**4.5**	**4.7**	4.3%	2.0U	2.0U	0.0%
Perfluorononanoic Acid	2.0U	2.0U	0.0%	2.0U	2.0U	0.0%
Perfluorononanesulfonic Acid	2.0U	2.0U	0.0%	2.0U	2.0U	0.0%
Perfluorooctanoic Acid (PFOA)	2.0U	2.0U	0.0%	2.0U	2.0U	0.0%
Perfluorooctanesulfonic Acid (PFOS)	2.0U	2.0U	0.0%	2.0U	2.0U	0.0%
Perfluoropentanoic Acid	2.0U	2.0U	0.0%	2.0U	2.0U	0.0%
Perfluoropentanesulfonic Acid	2.0U	2.0U	0.0%	2.0U	2.0U	0.0%
Perfluorotetradecanoic Acid	2.0U	2.0U	0.0%	2.0U	2.0U	0.0%
Perfluorotridecanoic Acid	2.0U	2.0U	0.0%	2.0U	2.0U	0.0%
Perfluoroundecanoic Acid	2.0U	2.0U	0.0%	2.0U	2.0U	0.0%
Average Relative Percent Difference			***0.6%***			***0.0%***

Notes:

J The analyte was positively identified; the associated value is the approximate concentration of the analyte in the sample.

U The analyte was analyzed for, but was not detected at or above the associated value (reporting limit).

BOLD Detections greater than anlytical reporting limit.

APPENDIX A

WELL LOGS

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

Return to menu
Plot this site in State Library Digital Atlas
Plot this site in Google Maps
View hydrograph for this site

Site Name: LEWIS AND CLARK CO. (LC-10)
GWIC Id: 254310

Section 1: Well Owner(s)

Section 2: Location

Township	Range	Section	Quarter Sections
10N	04W	1	SW¼ SW¼ SW¼ SE¼

County	Geocode
LEWIS AND CLARK	

Latitude	Longitude	Geomethod	Datum
46.645616	-112.052097	SURVEY	NAD83

Ground Surface Altitude	Ground Surface Method	Datum	Date
3839	NAV-GPS	NAD83	

Measuring Point Altitude	MP Method	Datum	Date Applies
3840.38			1/1/1990

Addition	Block	Lot

Section 3: Proposed Use of Water

There are no uses assigned to this well.

Section 4: Type of Work

Drilling Method: Unassigned

Section 5: Well Completion Date

Date well completed: Unknown

Section 6: Well Construction Details

There are no borehole dimensions assigned to this well.
There are no casing strings assigned to this well.
There are no completion records assigned to this well.

Annular Space (Seal/Grout/Packer)

There are no annular space records assigned to this well.

Section 7: Well Test Data

There are no well test data details assigned to this well.

Section 9: Well Log

Geologic Source

110CLVM - COLLUVIUM (QUATERNARY)

Lithology Data

There are no lithologic details assigned to this well.

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

There is no certification data for this well.

Hydrometrics, Inc.

Consulting Scientists and Engineers
Helena, Montana

Monitor Well Log

Hole Name: HL-10-01

Date Hole Started: 5/25/10 Date Hole Finished: 5/25/10

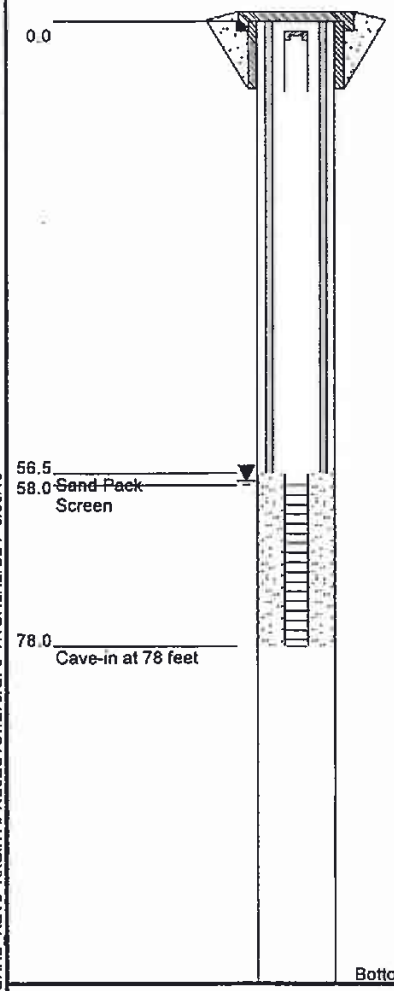
Client: City of Helena
Project: City of Helena
County: Lewis & Clark State: Montana
Property Owner: City of Helena
Legal Description: SE, NW, SW, S19, T10N, R3W
Location Description: West of the end of the Driving Range, west of HL-90-1
Recorded By: Rick Lane
Drilling Company: H&L Drilling
Driller: Dan Downey
Drilling Method: Air Rotary
Drilling Fluids Used: Water
Purpose of Hole: Install Monitor Well
Target Aquifer: Above Bedrock
Hole Diameter (in): 6"
Total Depth Drilled (ft): 120

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	Y	2-inch Trilock PVC	
Surface Casing Used?	Y	6-inch steel	0-53
Screen/Perforations?	Y	0.010-inch slot Trilock PVC	58-78
Sand Pack?	Y	10/20 colorado silica sand	56.5-78
Annular Seal?	Y	Bentonite Chips	56.5-0
Surface Seal?	N		
DEVELOPMENT/SAMPLING			
Well Developed?	Y	Produces 2-4 gpm	
Water Samples Taken?	Y	Yes	
Boring Samples Taken?	N		

Latitude: 46.60654 Longitude: -112.03863
Static Water Level Below MP: 59 Surface Casing Height (ft): 1.83
Date: 5/25/10 Riser Height (ft): 1.52
MP Description: Top of PVC Ground Surface Elevation (ft): 3941.49
MP Height Above or Below Ground (ft): 1.52 MP Elevation (ft): 3943.01

Remarks:

WELL CONSTRUCTION



SAMPLE NOTES

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 6.0' Sandy Gravel
Rounded to subrounded, color is black and brown, moist, with 10% medium to coarse-grained, brown sand. Added water.

6.0 - 16.0' Gravelly Sand
Medium to coarse grained, dark, moist, sand, 10-15% subrounded, black, brown, gravel.

16.0 - 30.0' Sand
Fine to medium grained, light brown, dry, sand. Trace amounts of gravel (less than 5%).

30.0 - 40.0' Sandy Gravel
Rounded to subrounded, black and brown, 20% medium grained sand.

40.0 - 53.0' Clayey Gravel
Same gravel as above, dark brown, moise, clay 10-20%. Hand drilling, added water.

53.0 - 68.0' Cemented Sand and Gravel
Rounded to subrounded, yellow to very dark, gravel cemented together with fine to medium grained sand cemented by calcium deposits.

68.0 - 85.0' Sandy Gravel
Large, multi-colored, subrounded, very broken by drill rig, gravel, coarse, brown sand less than 15%.

85.0 - 95.0' Sandy Gravel
Same as above with trace amounts of clay.

95.0 - 103.0' Silty Clay
Tan, very moist clay. Fine, dark silt (20%), trace amounts of fine sand.

103.0 - 108.0' Sandy Gravel
60% subrounded, multi-colored, gravel, 40% coarse sand.

108.0 - 120.0' Sandy Gravel
Same as above with trace amounts of sand fines increasing with depth.

STANDARD REV5 K:\GINT\PROJECTS\1273.GPJ HYDHLN2.GDT 6/30/10

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

Return to menu
Plot this site in State Library Digital Atlas
Plot this site in Google Maps
View scanned well log (11/2/2006 4:30:08 PM)

Site Name: HELENA LANDFILL * HL90-2
GWIC Id: 61976

Section 1: Well Owner(s)

1) HELENA LANDFILL (MAIL)
N/A
HELENA MT 59601 [01/25/1990]

Section 2: Location

Township	Range	Section	Quarter Sections
10N	03W	19	NE¼ SW¼

County LEWIS AND CLARK

Geocode

Latitude	Longitude	Geomethod	Datum
46.607651	-112.034432	TRS-SEC	NAD83

Ground Surface Altitude **Ground Surface Method** **Datum** **Date**

Addition **Block** **Lot**

Section 3: Proposed Use of Water

MONITORING (1)

Section 4: Type of Work

Drilling Method: AIR ROTARY
Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Thursday, January 25, 1990

Section 6: Well Construction Details

There are no borehole dimensions assigned to this well.

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
0	58	6				STEEL
0	68	4				PVC

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
60	68	4			

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0	0	BENTONITE	

Section 7: Well Test Data

Total Depth: 68
Static Water Level: 46
Water Temperature:

Air Test *

12 gpm with drill stem set at _ feet for _ hours.
Time of recovery _ hours.
Recovery water level _ feet.
Pumping water level _ feet.

** During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.*

Section 8: Remarks

Section 9: Well Log

Geologic Source

Unassigned

From	To	Description
0	25	SILTY SANDY GRAVEL
25	35	GRAVELLY SAND
35	58	SILTY SAND
58	61	CLAY & SANDY GRAVELLY
61	80	GRAVELLY SAND

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name:
Company: HYDROMETRICS INC
License No: -
Date Completed: 1/25/1990

MONTANA WELL LOG REPORT

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Other Options

Return to menu
Plot this site in State Library Digital Atlas
Plot this site in Google Maps
View hydrograph for this site
View field visits for this site
View water quality for this site
View scanned well log (10/30/2006 9:12:56 AM)

Site Name: LCWQPD - AIRPORT NORTH - SOUTH WELL
GWIC Id: 193012

Section 1: Well Owner(s)

1) LEWIS AND CLARK WATER QUALITY PROTECTION DISTRICT (MAIL)
N/A
HELENA MT 59701 [11/30/2001]

Section 2: Location

Township	Range	Section	Quarter Sections
10N	03W	21	NW¼ NE¼ NE¼ NE¼

County: LEWIS AND CLARK
Geocode:

Latitude	Longitude	Geomethod	Datum
46.615662309347	-111.981891903671	SURP-GPS	WGS84

Ground Surface Altitude	Ground Surface Method	Datum	Date
3782.793	SUR-GPS	NAVD88	9/17/2012

Measuring Point Altitude	MP Method	Datum	Date Applies
3782.483	SUR-GPS	NAVD88	11/30/2001 10:30:00 AM

Addition: **Block**: **Lot**:

Section 3: Proposed Use of Water

MONITORING (1)

Section 4: Type of Work

Drilling Method: ROTARY
Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Friday, November 30, 2001

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	34	8

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
0	34	4		220.00		PVC

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
24	34	4		0.020	SCREEN-CONTINUOUS-PVC

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0	22.5	BENTONITE	
22.5	34	10/20 SAND PACKER	

Section 7: Well Test Data

Total Depth: 34
Static Water Level: 27.37
Water Temperature:

Pump Test *

Depth pump set for test _ feet.
4.3 gpm pump rate with _ feet of drawdown after 1 hours of pumping.
Time of recovery _ hours.
Recovery water level _ feet.
Pumping water level 30.8 feet.

** During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.*

Section 8: Remarks

Section 9: Well Log

Geologic Source
110ALVM - ALLUVIUM (QUATERNARY)

From	To	Description
0	5	SAND GRAVEL WITH SILT AND CLAY
5	10	TAN FINE SAND AND SILT
10	15	SAND GRAVEL AND SILT
15	25	FINE SAND SILT WITH GRAVEL COARSE SAND
25	30	FINE SAND WITH COARSE SAND
30	34	FINE SAND AND SILT

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: MARK MILLER
Company: TREASURE STATE DRILLING
License No: WWC-611
Date Completed: 11/30/2001

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

Return to menu
Plot this site in State Library Digital Atlas
Plot this site in Google Maps
View hydrograph for this site
View field visits for this site
View water quality for this site
View scanned well log (10/10/2006 8:51:15 AM)

Site Name: LCWQPD - SIERRA AND FLOWEREE SOUTH WELL
GWIC Id: 191527

Section 1: Well Owner(s)

1) LEWIS AND CLARK WATER QUALITY PROTECTION DISTRICT (MAIL)
N/A
HELENA MT 59701 [12/04/2001]

Section 2: Location

Township	Range	Section	Quarter Sections
10N	03W	3	NW¼ NW¼ NE¼ NW¼

County: LEWIS AND CLARK
Geocode:

Latitude	Longitude	Geomethod	Datum
46.660513117647	-111.972743547407	SURP-GPS	WGS84

Ground Surface Altitude	Ground Surface Method	Datum	Date
3685.668	SUR-GPS	NAVD88	9/17/2012

Measuring Point Altitude	MP Method	Datum	Date Applies
3685.273	SUR-GPS	NAVD88	12/4/2001 3:10:00 PM

Addition: **Block:** **Lot:**

Section 3: Proposed Use of Water

MONITORING (1)

Section 4: Type of Work

Drilling Method: ROTARY
Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Tuesday, December 4, 2001

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	18	8

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
0	18	4		220.00		PVC

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
8	18	4		0.020	SCREEN-CONTINUOUS-PVC

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0	7	BENTONITE	
7	18	10/20 GRAVEL PACKER	

Section 7: Well Test Data

Total Depth: 18
Static Water Level: 5.58
Water Temperature:

Pump Test *

Depth pump set for test _ feet.
13.6 gpm pump rate with _ feet of drawdown after 1 hours of pumping.
Time of recovery _ hours.
Recovery water level _ feet.
Pumping water level 9.3 feet.

** During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.*

Section 8: Remarks

Section 9: Well Log

Geologic Source

110ALVM - ALLUVIUM (QUATERNARY)

From	To	Description
0	10	GRAVEL 1.5IN TO .188IN 70 PERCENT COARSE SAND 25 PERCENT AND SILT
10	15	COARSE SAND AND GRAVEL

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: MARK MILLER
Company: TREASURE STATE DRILLING
License No: WWC-611
Date Completed: 12/4/2001

MONTANA WELL LOG REPORT

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Other Options

Return to menu
Plot this site in State Library Digital Atlas
Plot this site in Google Maps
View hydrograph for this site
View field visits for this site
View water quality for this site
View scanned well log (10/10/2006 8:51:21 AM)

Site Name: LCWQPD - SIERRA AND FLOWEREE NORTH WELL
GWIC Id: 191526

Section 1: Well Owner(s)

1) LEWIS AND CLARK COUNTY WATER QUALITY PROTECTION DISTRICT (MAIL)
N/A
HELENA MT 59701 [12/04/2001]

Section 2: Location

Township	Range	Section	Quarter Sections
10N	03W	3	NW¼ NW¼ NE¼ NW¼

County: LEWIS AND CLARK
Geocode:

Latitude	Longitude	Geomethod	Datum
46.660558821123	-111.972748907405	SURP-GPS	WGS84

Ground Surface Altitude	Ground Surface Method	Datum	Date
3685.856	SUR-GPS	NAVD88	9/17/2012

Measuring Point Altitude	MP Method	Datum	Date Applies
3685.478	SUR-GPS	NAVD88	12/4/2001 1:45:00 PM

Addition: **Block:** **Lot:**

Section 3: Proposed Use of Water

MONITORING (1)

Section 4: Type of Work

Drilling Method: ROTARY
Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Tuesday, December 4, 2001

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	46	8

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
0	46	4		220.00		PVC

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
36	46	4		0.020	SCREEN-CONTINUOUS-PVC

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0	31	BENTONITE	
31	46	10/20 GRAVEL PACKER	

Section 7: Well Test Data

Total Depth: 46
Static Water Level: 6.9
Water Temperature:

Pump Test *

Depth pump set for test _ feet.
20 gpm pump rate with _ feet of drawdown after 1 hours of pumping.
Time of recovery _ hours.
Recovery water level _ feet.
Pumping water level 10.4 feet.

** During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.*

Section 8: Remarks

Section 9: Well Log

Geologic Source

110ALVM - ALLUVIUM (QUATERNARY)

From	To	Description
0	10	GRAVEL 1.5IN TO .188IN 70 PERCENT COARSE SAND 25 PERCENT AND SILT
10	20	COARSE SAND GRAVEL
20	25	GRAVEL WITH COARSE SAND SILT AND CLAY
25	30	COARSE SAND WITH SILT AND CLAY
30	35	COARSE SAND AND SILT WITH GRAVEL
35	40	GRAVEL SAND SILT CLAY
40	45	SAND WITH GRAVEL

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: MARK MILLER
Company: TREASURE STATE DRILLING
License No: WWC-611
Date Completed: 12/4/2001

MONTANA WELL LOG REPORT

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Other Options

Go to GWIC website
Plot this site in State Library Digital Atlas
Plot this site in Google Maps
View hydrograph for this site
View field visits for this site
View water quality for this site
View scanned well log (11/16/2006 4:40:57 PM)

Site Name: LCWQPD - GRAVEL PIT WELL
GWIC Id: 191534

Section 1: Well Owner(s)

1) LEWIS AND CLARK WATER QUALITY PROTECTION DISTRICT (MAIL)
N/A
HELENA MT 59701 [11/28/2001]
2) LCWQPD (WELL)
LINCOLN RD & APPLEGATE RD
N/A N/A N/A [11/28/2001]

Section 2: Location

Township	Range	Section	Quarter Sections
11N	03W	18	SW¼ SW¼ SW¼ SW¼

County	Geocode
LEWIS AND CLARK	

Latitude	Longitude	Geomethod	Datum
46.705374905664	-112.041460211067	SURP-GPS	WGS84

Ground Surface Altitude	Ground Surface Method	Datum	Date
3799.843	SUR-GPS	NAVD88	9/17/2012

Measuring Point Altitude	MP Method	Datum	Date Applies
3799.562	SUR-GPS	NAVD88	11/28/2001 1:00:00 PM

Addition	Block	Lot

Section 3: Proposed Use of Water

MONITORING (1)

Section 4: Type of Work

Drilling Method: ROTARY
Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Wednesday, November 28, 2001

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	99	8

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
0	99	4		220.00		PVC

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
89	99	4		0.020	SCREEN-PVC

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0	86	BENTONITE	
86	99	10/20 GRAVEL PACKER	

Section 7: Well Test Data

Total Depth: 100
Static Water Level: 71.41
Water Temperature:

Pump Test *

Depth pump set for test _ feet.
27 gpm pump rate with _ feet of drawdown after 1 hours of pumping.
Time of recovery _ hours.
Recovery water level _ feet.
Pumping water level 74.7 feet.

** During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.*

Section 8: Remarks

Section 9: Well Log

Geologic Source

110ALVM - ALLUVIUM (QUATERNARY)

From	To	Description
0	25	GRAVEL AND COARSE SAND
25	35	GRAVELLY SAND
35	40	FINE GRAVEL WITH 15 PERCENT SAND SILT
40	70	FINE GRAVEL 80 PERCENT WITH 20 PERCENT SILT AND SAND
70	85	75 PERCENT FINE SAND SILT WITH 25 PERCENT GRAVEL
85	90	80 PERCENT GRAVEL 20 PERCENT SAND AND SILT
90	95	95 PERCENT GRAVEL 5 PERCENT SILT AND SAND
95	100	90 PERCENT GRAVEL 10 PERCENT SAND SILT

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name:
Company: TREASURE STATE DRILLING
License No: WWC-611
Date Completed: 11/28/2001

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

Return to menu
Plot this site in State Library Digital Atlas
Plot this site in Google Maps
View scanned well log (7/21/2014 8:26:08 AM)

Site Name: MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY * HSMW-20
GWIC Id: 278849

Section 1: Well Owner(s)

1) MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY (MAIL)
PO BOX 200901
HELENA MT 59620 [06/12/2014]

Section 2: Location

Township	Range	Section	Quarter Sections
10N	03W	20	SW¼ SW¼ SW¼

County: LEWIS AND CLARK
Geocode:

Latitude	Longitude	Geomethod	Datum
46.603777777778	-112.018305555556	NAV-GPS	NAD83

Ground Surface Altitude: **Ground Surface Method:** **Datum:** **Date:**

Addition: **Block:** **Lot:**

Section 3: Proposed Use of Water

MONITORING (1)

Section 4: Type of Work

Drilling Method: AUGER
Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Thursday, June 12, 2014

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	30	8.25

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
0	30	2			THREADED	PVC-SCHED 40

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
10	30	2		.10	UNKNOWN
10	30	2		.10	SCREEN-OTHER

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
1.5	8	3/8 HOLE PLUG	
8	30	(10-20) SAND	

Section 7: Well Test Data

Total Depth: 30
Static Water Level: 12.88
Water Temperature:

** During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.*

Section 8: Remarks

Section 9: Well Log

Geologic Source

Unassigned

From	To	Description
0	14	SAND, CLAY AND GRAVEL
14	30	SANDY CLAY

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: STEVE MALKOVICH
Company: OKEEFE DRILLING CO
License No: MWC-380
Date Completed: 6/12/2014

APPENDIX B

FIELD NOTES

Helena PFAS

Submitted by: Chris.Kelley_EMI

Submitted time: Oct 7, 2021, 1:48:57 PM

Staff Name

- **Chris Kelley**

Project Name

Helena PFAS

Sample Date

Oct 6, 2021, 12:17:00 PM

Weather Conditions

Sunny windy 75F

Sample Details

Sample Location

GW-1

Geopoint Location

Lat: 46.64563 Lon: -112.0521

Sample ID

HPFAS_GW-1_20211006

Field Parameters

Static Water Level (feet bgs)

67.94

Sampling Method

Submersible Pump

Pump Flow Rate (mL/ min)

200

Estimated Purge Volume (Liters)

2

Water Temperature (°C)

14.4

Dissolved Oxygen (mg/L)

2.38

Specific Conductivity (µS/cm)

3,050

Total Disolved Solids (mg/L)

1,983

Turbidity (NTU)

0

Sample Collected?

Yes

pic_repeat

Picture

Picture Caption

SWL GW-01

QC_Samples

Duplicate Collected?

No

Field Reagent Blank Collected?

No

MS/MSD Collected?

No

Equipment Rinsate Collected?

No

Helena PFAS

Submitted by: Chris.Kelley_EMI

Submitted time: Oct 7, 2021, 1:49:01 PM

Staff Name

- **Chris Kelley**

Project Name

Helena PFAS

Sample Date

Oct 7, 2021, 9:20:00 AM

Weather Conditions

Cloudy, cool, 57F

Sample Details

Sample Location

GW-2

Geopoint Location

Sample ID

HPFAS_GW-2_20211007

Field Parameters

Static Water Level (feet bgs)

57.39

Sampling Method

Submersible Pump

Pump Flow Rate (mL/ min)

200

Estimated Purge Volume (Liters)

2

Water Temperature (°C)

11.2

Dissolved Oxygen (mg/L)

2.84

Specific Conductivity (µS/cm)

3,966

Total Disolved Solids (mg/L)

2,578

Turbidity (NTU)

0

Sample Collected?

Yes

pic_repeat

Picture

QC_Samples

Duplicate Collected?

No

Field Reagent Blank Collected?

Yes

Field Reagent Blank ID

HPFAS_GW-10_20211007

MS/MSD Collected?

No

Equipment Rinsate Collected?

No

Helena PFAS

Submitted by: Chris.Kelley_EMI

Submitted time: Oct 7, 2021, 1:49:00 PM

Staff Name

- **Chris Kelley**

Project Name

Helena PFAS

Sample Date

Oct 7, 2021, 8:34:00 AM

Weather Conditions

Partly cloudy, 54F

Sample Details

Sample Location

GW-3

Geopoint Location

Sample ID

HPFAS_GW-3_20211007

Field Parameters

Static Water Level (feet bgs)

43.25

Sampling Method

Submersible Pump

Pump Flow Rate (mL/ min)

200

Estimated Purge Volume (Liters)

2

Water Temperature (°C)

9.8

Dissolved Oxygen (mg/L)

0.72

Specific Conductivity (µS/cm)

2,515

Total Disolved Solids (mg/L)

1,635

Turbidity (NTU)

0

Sample Collected?

Yes

pic_repeat

Picture

Picture

Picture Caption

Well locked after sampling.

QC_Samples

Duplicate Collected?

No

Field Reagent Blank Collected?

No

MS/MSD Collected?

No

Equipment Rinsate Collected?

No

Helena PFAS

Submitted by: Chris.Kelley_EMI

Submitted time: Oct 7, 2021, 1:49:03 PM

Project Name

Helena PFAS

Sample Date

Oct 7, 2021, 10:46:00 AM

Weather Conditions

Raining

Sample Details

Sample Location

GW-4

Geopoint Location

Sample ID

HPFAS_GW-4_20211007

Field Parameters

Static Water Level (feet bgs)

26.38

Sampling Method

Submersible Pump

Pump Flow Rate (mL/ min)

200

Estimated Purge Volume (Liters)

3

Water Temperature (°C)

12.4

Dissolved Oxygen (mg/L)

10.26

Specific Conductivity (µS/cm)

1,237

Total Disolved Solids (mg/L)

804

Turbidity (NTU)

0

Sample Collected?

Yes

pic_repeat

Picture

Picture

QC_Samples

Duplicate Collected?

No

Field Reagent Blank Collected?

No

MS/MSD Collected?

Yes

MS/MSD ID

HPFAS_GW-11_20211007

Equipment Rinsate Collected?

No

Helena PFAS

Submitted by: Chris.Kelley_EMI

Submitted time: Oct 7, 2021, 1:48:55 PM

Staff Name

- **Chris Kelley**

Project Name

Helena PFAS

Sample Date

Oct 6, 2021, 11:47:07 AM

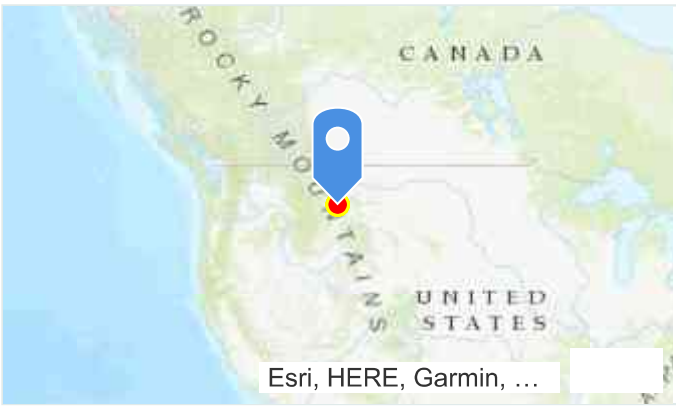
Sample Details

Sample Location

GW-5

Geopoint Location

Lat: 46.66054 Lon: -111.97276



Sample ID

HPFAS_GW-5_20211006

Field Parameters

Static Water Level (feet bgs)

27.09

Sampling Method

Submersible Pump

Pump Flow Rate (mL/ min)

200

Estimated Purge Volume (Liters)

3

Water Temperature (°C)

11.2

Dissolved Oxygen (mg/L)

0.21

Specific Conductivity (µS/cm)

1,964

Total Disolved Solids (mg/L)

1,276

Turbidity (NTU)

0

Sample Collected?

Yes

pic_repeat

Picture

Picture Caption

Sonic water level meter

QC_Samples

Duplicate Collected?

Yes

Duplicate ID

HPFAS_GW-09_20211006

Field Reagent Blank Collected?

No

MS/MSD Collected?

No

Equipment Rinsate Collected?

No

Comments

No pH.

Helena PFAS

Submitted by: Chris.Kelley_EMI

Submitted time: Oct 7, 2021, 1:48:54 PM

Staff Name

- **Chris Kelley**

Project Name

Helena PFAS

Sample Date

Oct 6, 2021, 10:30:00 AM

Weather Conditions

Sunny, wind from east ~10mph, 68F

Sample Details

Sample Location

GW-6

Geopoint Location

Sample ID

HPFAS_GW-6_20211006

Field Parameters

Static Water Level (feet bgs)

25.95

Sampling Method

Submersible Pump

Pump Flow Rate (mL/ min)

200

Estimated Purge Volume (Liters)

3

Water Temperature (°C)

10.4

Dissolved Oxygen (mg/L)

3.13

Specific Conductivity (µS/cm)

1,259

Total Disolved Solids (mg/L)

818

Turbidity (NTU)

0

Sample Collected?

Yes

pic_repeat

Picture

Picture Caption

Water level reading GW06

QC_Samples

Duplicate Collected?

No

Field Reagent Blank Collected?

No

MS/MSD Collected?

No

Equipment Rinsate Collected?

No

Comments

pH not holding calibration

Helena PFAS

Submitted by: Chris.Kelley_EMI

Submitted time: Oct 7, 2021, 1:48:53 PM

Staff Name

- **Chris Kelley**

Project Name

Helena PFAS

Sample Date

Oct 6, 2021, 8:30:00 AM

Weather Conditions

Sunny, wind from east ~5mph, 65F

Sample Details

Sample Location

GW-7

Geopoint Location

Sample ID

HPFAS_GW-7_20211006

Field Parameters

Static Water Level (feet bgs)

67.11

Sampling Method

Submersible Pump

Pump Flow Rate (mL/ min)

200

Estimated Purge Volume (Liters)

2

Water Temperature (°C)

11

Dissolved Oxygen (mg/L)

7.64

Specific Conductivity (µS/cm)

3,418

Total Disolved Solids (mg/L)

2,221

Turbidity (NTU)

0

Sample Collected?

Yes

pic_repeat

Picture

Picture Caption

Depth with sonic water level meter GW-07

Picture

Picture Caption

Low-flow purging GW-07

QC_Samples

Duplicate Collected?

No

Field Reagent Blank Collected?

No

MS/MSD Collected?

No

Equipment Rinsate Collected?

No

Comments

pH sensor not holding calibration, pH not recorded.

Helena PFAS

Submitted by: Chris.Kelley_EMI

Submitted time: Oct 7, 2021, 1:48:58 PM

Project Name

Helena PFAS

Sample Date

Oct 6, 2021, 2:30:00 PM

Weather Conditions

Sunny 76F

Sample Details

Sample Location

GW-8

Geopoint Location

Sample ID

HPFAS_GW-8_20211006

Field Parameters

Static Water Level (feet bgs)

26.89

Sampling Method

Submersible Pump

Pump Flow Rate (mL/ min)

200

Estimated Purge Volume (Liters)

2

Water Temperature (°C)

14.3

Dissolved Oxygen (mg/L)

5.8

Specific Conductivity (µS/cm)

3,620

Total Disolved Solids (mg/L)

2,371

Turbidity (NTU)

2.1

Sample Collected?

Yes

pic_repeat

Picture

Picture Caption

SWL GW-08

Picture

Picture Caption

Sample turbidity

QC_Samples

Duplicate Collected?

No

Field Reagent Blank Collected?

No

MS/MSD Collected?

No

Equipment Rinsate Collected?

Yes

Equipment Rinsate ID

HPFAS_GW-12_20211006

Comments

No pH. Sample turbid with no improvement during low flow purge

APPENDIX C
DATA VALIDATION

DATA VALIDATION CHECKLIST – STAGE 2A
HELENA VALLEY PFAS

Site Name	Helena Valley PFAS Site	**Contract Task Order No.**	421030-18
Data Reviewer (signature and date)	Debbie Kuhl November 5, 2021	**Technical Reviewer (signature and date)**	
Laboratory Report No.	H21100261	**Laboratory**	Energy Laboratories, Inc. Helena, MT
Analyses	Per- and polyfluoroalkyl substances (PFAS) by EPA Method 537, Modified		
Samples and Matrix	Fifteen water samples including two field duplicates samples, one equipment rinsate blank sample, and four field blank samples		
Field Duplicate Pairs	HPFAS_GW-05_20211006/HPFAS_GW-09_20211006 and HPFAS_GW-04_20211007/HPFAS_GW-11_20211007		
Field Blanks	HPFAS_GW-10_20211007, HPFAS_GW-12_20211006, Field Blank 1, Field Blank 2, and Field Blank 3		

INTRODUCTION

This checklist summarizes the Stage 2A validation performed on the subject laboratory report, in accordance with the U.S. Environmental Protection Agency (EPA) *Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use* (January 2009). Analytical data were evaluated in general accordance with the Tetra Tech *Quality Assurance Project Plan, Superfund Technical Assessment and Response Team (START V), EPA Region 4, Revision 2* (February 2021), and the EPA *National Functional Guidelines for Organic Superfund Methods Data Review* (November 2020).

OVERALL EVALUATION

No rejection of results was required for this data package. The results may be used as qualified based on this validation effort.

Data completeness:

Within Criteria	Exceedance/Notes
Y	

DATA VALIDATION CHECKLIST – STAGE 2A
HELENA VALLEY PFAS

Sample preservation, receipt, and holding times:

Within Criteria	Exceedance/Notes
N	Field Blank 1, Field Blank 2, and Field Blank 3 are not listed on the chain-of-custody (COC) form but were analyzed with the field samples. Apparently, they were provided by the laboratory and remained in the shipping containers during sampling and shipping.

Method blanks:

Within Criteria	Exceedance/Notes
Y	

Field blanks:

Within Criteria	Exceedance/Notes
Y	

System monitoring compounds (surrogates and labeled compounds):

Within Criteria	Exceedance/Notes
N	**HPFAS_GW-01_20211006**: Internal standards M2-8:2FTS and M2-4:2FTS were recovered above laboratory control limits. The non-detect 8:2 FTS and 4:2 FTS results for this sample were not qualified. **HPFAS_GW-08_20211006:** Internal standard M2PFTeDA was recovered below laboratory control limits and M2-4:2FTS was recovered above laboratory control limits. The non-detect PFTrDA result for this sample was qualified as estimated (flagged UJ). The non-detect 4:2 FTS result for this sample was not qualified. **HPFAS_GW-02_20211007:** Internal standard M2-4:2FTS was recovered above laboratory control limits. The non-detect 4:2 FTS result for this sample was not qualified. **HPFAS_GW-03_20211007:** Internal standard M2-8:2FTS was recovered above laboratory control limits. The non-detect 8:2 FTS result for this sample was not qualified. **HPFAS_GW-12_20211007:** Internal standard M2-8:2FTS was recovered above laboratory control limits. The non-detect 8:2 FTS result for this sample was not qualified. M2-6:2FTS

	Field Blank 3: Internal standards M4PFBA, M4PFHpA, M8PFOA, M5PFPeA M5PFHxA M2-4:2FTS, and M3HFPO-DA were recovered below laboratory control limits. The non-detect PFBA, PFHpA, PFOA, PFPeA PFHxA 4:2FTS, and HFPO-DA results for this sample were qualified as estimated (flagged UJ).

MS/MSD:

Within Criteria	Exceedance/Notes
N	**HPFAS_GW-01_20211006**: The %R for PFHxA is below laboratory acceptance limits. However, the average MS/MSD %R for PFHxA is within acceptance limits; therefore, the parent sample PFHxA result was not qualified.

Laboratory duplicates:

Within Criteria	Exceedance/Notes
Y	

Field duplicates:

Within Criteria	Exceedance/Notes
Y	

LCSs/LCSDs:

Within Criteria	Exceedance/Notes
Y	

Sample dilutions:

Within Criteria	Exceedance/Notes
Y	No project samples underwent dilution.

Re-extraction and reanalysis:

Within Criteria	Exceedance/Notes
NA	

MDLs/RLs:

Within Criteria	Exceedance/Notes
Y	The laboratory report provides only RL values, while the electronic data deliverable (and hence, the qualified data table) includes both method detection limit and RL values. Analyte detections below the RL values were reported and qualified as estimated (flagged J) by the laboratory.

Tentatively identified compounds:

Within Criteria	Exceedance/Notes
NA	

Other [specify]:

Within Criteria	Exceedance/Notes
NA	

Overall Qualifications:

See results summary pages attached for changes to the laboratory qualifiers based upon this validation. The following is a list of qualifiers and definitions that may be used for the validation of this data package:

J	The analyte was positively identified; the associated value is the approximate concentration of the analyte in the sample.
J+	The analyte was positively identified; the associated value is the approximate concentration of the analyte in the sample and may be biased high.
J-	The analyte was positively identified; the associated value is the approximate concentration of the analyte in the sample and may be biased low.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated value is the approximate concentration of the analyte in the sample.
R	The sample result is rejected as unusable due to serious deficiencies in one or more quality control criteria. The analyte may or may not be present in the sample.
U	The analyte was analyzed for, but was not detected at or above the associated value (reporting limit).
UJ	The analyte was analyzed for, but was not detected at or above the associated value (reporting limit), which is considered approximate due to deficiencies in one or more quality control criteria.

APPENDIX D

Analytical Data Laboratory Report

ANALYTICAL SUMMARY REPORT

October 22, 2021

MT DEQ Remediation Division
PO Box 200901
Helena, MT 59620-0901

Work Order: H21100261 Quote ID: H2241

Project Name: Helena Groundwater PFAS

Energy Laboratories Inc Helena MT received the following 15 samples for MT DEQ Remediation Division on 10/7/2021 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H21100261-001	HPFAS_GW-01_20211006	10/06/21 13:15	10/07/21	Groundwater	PFAS Compounds in Aqueous Matrices PFAS 537 Modified Extraction
H21100261-002	HPFAS_GW-05_20211006	10/06/21 11:45	10/07/21	Groundwater	Same As Above
H21100261-003	HPFAS_GW-06_20211006	10/06/21 10:45	10/07/21	Groundwater	Same As Above
H21100261-004	HPFAS_GW-07_20211006	10/06/21 9:10	10/07/21	Groundwater	Same As Above
H21100261-005	HPFAS_GW-08_20211006	10/06/21 14:55	10/07/21	Groundwater	Same As Above
H21100261-006	HPFAS_GW-09_20211006	10/06/21 11:55	10/07/21	Groundwater	Same As Above
H21100261-007	HPFAS_GW-02_20211007	10/07/21 9:45	10/07/21	Groundwater	Same As Above
H21100261-008	HPFAS_GW-03_20211007	10/07/21 9:10	10/07/21	Groundwater	Same As Above
H21100261-009	HPFAS_GW-04_20211007	10/07/21 11:00	10/07/21	Groundwater	Same As Above
H21100261-010	HPFAS_GW-10_20211007	10/07/21 10:00	10/07/21	Groundwater	Same As Above
H21100261-011	HPFAS_GW-11_20211007	10/07/21 11:10	10/07/21	Groundwater	Same As Above
H21100261-012	HPFAS_GW-12_20211006	10/06/21 15:15	10/07/21	Groundwater	Same As Above
H21100261-013	Field Blank 1	10/06/21 9:10	10/07/21	Groundwater	Same As Above
H21100261-014	Field Blank 2	10/06/21 9:10	10/07/21	Groundwater	Same As Above
H21100261-015	Field Blank 3	10/06/21 9:10	10/07/21	Groundwater	Same As Above

The analyses presented in this report were performed by Energy Laboratories, Inc., 3161 E. Lyndale Ave., Helena, MT 59604, unless otherwise noted. Any exceptions or problems with the analyses are noted in the report package. Any issues encountered during sample receipt are documented in the Work Order Receipt Checklist.

The results as reported relate only to the item(s) submitted for testing. This report shall be used or copied only in its entirety. Energy Laboratories, Inc. is not responsible for the consequences arising from the use of a partial report.

If you have any questions regarding these test results, please contact your Project Manager.

ANALYTICAL SUMMARY REPORT

Report Approved By:

CLIENT: MT DEQ Remediation Division
Project: Helena Groundwater PFAS
Work Order: H21100261

Report Date: 10/22/21

CASE NARRATIVE

Tests associated with analyst identified as ELI-B were subcontracted to Energy Laboratories, 1120 S. 27th St., Billings, MT, EPA Number MT00005.
Comments imported for SUBBED Workorder: B21101045
PFAS Analyte Translation

Analyte Acronym	Analyte Name
PFBA	Perfluorobutanoic Acid
PFPeA	Perfluoropentanoic Acid
PFHxA	Perfluorohexanoic Acid
PFHpA	Perfluoroheptanoic Acid
PFOA	Perfluorooctanoic Acid
PFNA	Perfluorononanoic Acid
PFDA	Perfluorodecanoic Acid
PFUnA	Perfluoroundecanoic Acid
PFDoA	Perfluorododecanoic Acid
PFTrDA	Perfluorotridecanoic Acid
PFTA	Perfluorotetradecanoic Acid
PFBS	Perfluorobutanesulfonic Acid
PFPeS	Perfluoropentanesulfonic Acid
PFHxS	Perfluorohexanesulfonic Acid
PFHpS	Perfluoroheptanesulfonic Acid
PFOS	Perfluorooctanesulfonic Acid
PFNS	Perfluorononanesulfonic Acid
PFDS	Perfluorodecanesulfonic Acid
FOSA	Perfluorooctanesulfonamide
NEtFOSAA	N-ethylPerfluoroctanesulfonamidoacetic Acid
NMeFOSAA	N-methylPerfluorooctanesulfonamidoacetic Acid
8:2 FTS	1H, 1H, 2H, 2H-perfluorodecane sulfonic acid
4:2 FTS	1H, 1H, 2H, 2H-perfluorohexane sulfonic acid
6:2 FTS	1H, 1H, 2H, 2H-perfluorooctane sulfonic acid
11Cl-PF3OUdS	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic Acid
ADONA	4,8-dioxa-3H-perfluorononanoic Acid
9Cl-PF3ONS	9-chlorohexadecafluoro-3-oxanone-1-sulfonic Acid
HFPO-DA	Hexafluoropropylene Oxide Dimer Acid

End of comments imported for SUBBED Workorder: B21101045

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ Remediation Division
Project: Helena Groundwater PFAS
Lab ID: H21100261-001
Client Sample ID: HPFAS_GW-01_20211006

Report Date: 10/22/21
Collection Date: 10/06/21 13:15
DateReceived: 10/07/21
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PFAS COMPOUNDS IN AQUEOUS MATRICES							
PFBA	13	ng/L		5.0		E537M	10/15/21 13:57 / eli-b
PFPeA	16	ng/L		2.0		E537M	10/15/21 13:57 / eli-b
PFHxA	25	ng/L		2.0		E537M	10/15/21 13:57 / eli-b
PFHpA	7.5	ng/L		2.0		E537M	10/15/21 13:57 / eli-b
PFOA	18	ng/L		2.0		E537M	10/15/21 13:57 / eli-b
PFNA	ND	ng/L		2.0		E537M	10/15/21 13:57 / eli-b
PFDA	ND	ng/L		2.0		E537M	10/15/21 13:57 / eli-b
PFUnA	ND	ng/L		2.0		E537M	10/15/21 13:57 / eli-b
PFDoA	ND	ng/L		2.0		E537M	10/15/21 13:57 / eli-b
PFTrDA	ND	ng/L		2.0		E537M	10/15/21 13:57 / eli-b
PFTA	ND	ng/L		2.0		E537M	10/15/21 13:57 / eli-b
PFBS	2.0	ng/L		2.0		E537M	10/15/21 13:57 / eli-b
PFPeS	ND	ng/L		2.0		E537M	10/15/21 13:57 / eli-b
PFHxS	2.3	ng/L		2.0		E537M	10/15/21 13:57 / eli-b
PFHpS	ND	ng/L		2.0		E537M	10/15/21 13:57 / eli-b
PFOS	6.3	ng/L		2.0		E537M	10/15/21 13:57 / eli-b
PFNS	ND	ng/L		2.0		E537M	10/15/21 13:57 / eli-b
PFDS	ND	ng/L		2.0		E537M	10/15/21 13:57 / eli-b
FOSA	ND	ng/L		2.0		E537M	10/15/21 13:57 / eli-b
NEtFOSAA	17	ng/L		3.0		E537M	10/15/21 13:57 / eli-b
NMeFOSAA	ND	ng/L		2.0		E537M	10/15/21 13:57 / eli-b
8:2 FTS	ND	ng/L		3.0		E537M	10/15/21 13:57 / eli-b
4:2 FTS	ND	ng/L		2.0		E537M	10/15/21 13:57 / eli-b
6:2 FTS	ND	ng/L		8.0		E537M	10/15/21 13:57 / eli-b
11Cl-PF3OUdS	ND	ng/L		2.0		E537M	10/15/21 13:57 / eli-b
ADONA	ND	ng/L		2.0		E537M	10/15/21 13:57 / eli-b
9Cl-PF3ONS	ND	ng/L		2.0		E537M	10/15/21 13:57 / eli-b
HFPO-DA	ND	ng/L		3.0		E537M	10/15/21 13:57 / eli-b
IS: M4PFBA	66.0	%REC		50-150		E537M	10/15/21 13:57 / eli-b
IS: M3PFHxS	108	%REC		50-150		E537M	10/15/21 13:57 / eli-b
IS: M4PFHpA	128	%REC		50-150		E537M	10/15/21 13:57 / eli-b
IS: M8PFOA	130	%REC		50-150		E537M	10/15/21 13:57 / eli-b
IS: M9PFNA	119	%REC		50-150		E537M	10/15/21 13:57 / eli-b
IS: M6PFDA	123	%REC		50-150		E537M	10/15/21 13:57 / eli-b
IS: M7PFUnA	98.0	%REC		50-150		E537M	10/15/21 13:57 / eli-b
IS: M2PFDoA	119	%REC		50-150		E537M	10/15/21 13:57 / eli-b
IS: M2PFTeDA	111	%REC		50-150		E537M	10/15/21 13:57 / eli-b
IS: M3PFBS	96.0	%REC		50-150		E537M	10/15/21 13:57 / eli-b
IS: M5PFPeA	97.0	%REC		50-150		E537M	10/15/21 13:57 / eli-b
IS: M5PFHxA	101	%REC		50-150		E537M	10/15/21 13:57 / eli-b
IS: M8PFOS	105	%REC		50-150		E537M	10/15/21 13:57 / eli-b
IS: M8FOSA	98.0	%REC		50-150		E537M	10/15/21 13:57 / eli-b
IS: d5-N-EtFOSAA	113	%REC		50-150		E537M	10/15/21 13:57 / eli-b

Report Definitions:
RL - Analyte Reporting Limit
QCL - Quality Control Limit
MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ Remediation Division
Project: Helena Groundwater PFAS
Lab ID: H21100261-001
Client Sample ID: HPFAS_GW-01_20211006

Report Date: 10/22/21
Collection Date: 10/06/21 13:15
DateReceived: 10/07/21
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PFAS COMPOUNDS IN AQUEOUS MATRICES							
IS: d3-N-MeFOSAA	116	%REC		50-150		E537M	10/15/21 13:57 / eli-b
IS: M2-8:2FTS	193	%REC	S	50-150		E537M	10/15/21 13:57 / eli-b
IS: M2-4:2FTS	205	%REC	S	50-150		E537M	10/15/21 13:57 / eli-b
IS: M2-6:2FTS	146	%REC		50-150		E537M	10/15/21 13:57 / eli-b
IS: M3HFPO-DA	113	%REC		50-150		E537M	10/15/21 13:57 / eli-b

Report Definitions:
RL - Analyte Reporting Limit
QCL - Quality Control Limit
S - Spike recovery outside of advisory limits
MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ Remediation Division
Project: Helena Groundwater PFAS
Lab ID: H21100261-002
Client Sample ID: HPFAS_GW-05_20211006

Report Date: 10/22/21
Collection Date: 10/06/21 11:45
DateReceived: 10/07/21
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PFAS COMPOUNDS IN AQUEOUS MATRICES							
PFBA	ND	ng/L		5.0		E537M	10/15/21 13:01 / eli-b
PFPeA	ND	ng/L		2.0		E537M	10/15/21 13:01 / eli-b
PFHxA	ND	ng/L		2.0		E537M	10/15/21 13:01 / eli-b
PFHpA	ND	ng/L		2.0		E537M	10/15/21 13:01 / eli-b
PFOA	ND	ng/L		2.0		E537M	10/15/21 13:01 / eli-b
PFNA	ND	ng/L		2.0		E537M	10/15/21 13:01 / eli-b
PFDA	ND	ng/L		2.0		E537M	10/15/21 13:01 / eli-b
PFUnA	ND	ng/L		2.0		E537M	10/15/21 13:01 / eli-b
PFDoA	ND	ng/L		2.0		E537M	10/15/21 13:01 / eli-b
PFTrDA	ND	ng/L		2.0		E537M	10/15/21 13:01 / eli-b
PFTA	ND	ng/L		2.0		E537M	10/15/21 13:01 / eli-b
PFBS	ND	ng/L		2.0		E537M	10/15/21 13:01 / eli-b
PFPeS	ND	ng/L		2.0		E537M	10/15/21 13:01 / eli-b
PFHxS	ND	ng/L		2.0		E537M	10/15/21 13:01 / eli-b
PFHpS	ND	ng/L		2.0		E537M	10/15/21 13:01 / eli-b
PFOS	ND	ng/L		2.0		E537M	10/15/21 13:01 / eli-b
PFNS	ND	ng/L		2.0		E537M	10/15/21 13:01 / eli-b
PFDS	ND	ng/L		2.0		E537M	10/15/21 13:01 / eli-b
FOSA	ND	ng/L		2.0		E537M	10/15/21 13:01 / eli-b
NEtFOSAA	ND	ng/L		3.0		E537M	10/15/21 13:01 / eli-b
NMeFOSAA	ND	ng/L		2.0		E537M	10/15/21 13:01 / eli-b
8:2 FTS	ND	ng/L		3.0		E537M	10/15/21 13:01 / eli-b
4:2 FTS	ND	ng/L		2.0		E537M	10/15/21 13:01 / eli-b
6:2 FTS	ND	ng/L		8.0		E537M	10/15/21 13:01 / eli-b
11Cl-PF3OUdS	ND	ng/L		2.0		E537M	10/15/21 13:01 / eli-b
ADONA	ND	ng/L		2.0		E537M	10/15/21 13:01 / eli-b
9Cl-PF3ONS	ND	ng/L		2.0		E537M	10/15/21 13:01 / eli-b
HFPO-DA	ND	ng/L		3.0		E537M	10/15/21 13:01 / eli-b
IS: M4PFBA	105	%REC		50-150		E537M	10/15/21 13:01 / eli-b
IS: M3PFHxS	112	%REC		50-150		E537M	10/15/21 13:01 / eli-b
IS: M4PFHpA	118	%REC		50-150		E537M	10/15/21 13:01 / eli-b
IS: M8PFOA	114	%REC		50-150		E537M	10/15/21 13:01 / eli-b
IS: M9PFNA	114	%REC		50-150		E537M	10/15/21 13:01 / eli-b
IS: M6PFDA	128	%REC		50-150		E537M	10/15/21 13:01 / eli-b
IS: M7PFUnA	121	%REC		50-150		E537M	10/15/21 13:01 / eli-b
IS: M2PFDoA	114	%REC		50-150		E537M	10/15/21 13:01 / eli-b
IS: M2PFTeDA	121	%REC		50-150		E537M	10/15/21 13:01 / eli-b
IS: M3PFBS	114	%REC		50-150		E537M	10/15/21 13:01 / eli-b
IS: M5PFPeA	120	%REC		50-150		E537M	10/15/21 13:01 / eli-b
IS: M5PFHxA	118	%REC		50-150		E537M	10/15/21 13:01 / eli-b
IS: M8PFOS	110	%REC		50-150		E537M	10/15/21 13:01 / eli-b
IS: M8FOSA	114	%REC		50-150		E537M	10/15/21 13:01 / eli-b
IS: d5-N-EtFOSAA	121	%REC		50-150		E537M	10/15/21 13:01 / eli-b

Report Definitions:
RL - Analyte Reporting Limit
QCL - Quality Control Limit
MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ Remediation Division
Project: Helena Groundwater PFAS
Lab ID: H21100261-002
Client Sample ID: HPFAS_GW-05_20211006

Report Date: 10/22/21
Collection Date: 10/06/21 11:45
DateReceived: 10/07/21
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PFAS COMPOUNDS IN AQUEOUS MATRICES							
IS: d3-N-MeFOSAA	122	%REC		50-150		E537M	10/15/21 13:01 / eli-b
IS: M2-8:2FTS	139	%REC		50-150		E537M	10/15/21 13:01 / eli-b
IS: M2-4:2FTS	132	%REC		50-150		E537M	10/15/21 13:01 / eli-b
IS: M2-6:2FTS	121	%REC		50-150		E537M	10/15/21 13:01 / eli-b
IS: M3HFPO-DA	114	%REC		50-150		E537M	10/15/21 13:01 / eli-b

Report Definitions:
RL - Analyte Reporting Limit
QCL - Quality Control Limit
MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ Remediation Division
Project: Helena Groundwater PFAS
Lab ID: H21100261-003
Client Sample ID: HPFAS_GW-06_20211006

Report Date: 10/22/21
Collection Date: 10/06/21 10:45
DateReceived: 10/07/21
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PFAS COMPOUNDS IN AQUEOUS MATRICES							
PFBA	ND	ng/L		5.0		E537M	10/15/21 13:20 / eli-b
PFPeA	ND	ng/L		2.0		E537M	10/15/21 13:20 / eli-b
PFHxA	ND	ng/L		2.0		E537M	10/15/21 13:20 / eli-b
PFHpA	ND	ng/L		2.0		E537M	10/15/21 13:20 / eli-b
PFOA	ND	ng/L		2.0		E537M	10/15/21 13:20 / eli-b
PFNA	ND	ng/L		2.0		E537M	10/15/21 13:20 / eli-b
PFDA	ND	ng/L		2.0		E537M	10/15/21 13:20 / eli-b
PFUnA	ND	ng/L		2.0		E537M	10/15/21 13:20 / eli-b
PFDoA	ND	ng/L		2.0		E537M	10/15/21 13:20 / eli-b
PFTrDA	ND	ng/L		2.0		E537M	10/15/21 13:20 / eli-b
PFTA	ND	ng/L		2.0		E537M	10/15/21 13:20 / eli-b
PFBS	ND	ng/L		2.0		E537M	10/15/21 13:20 / eli-b
PFPeS	ND	ng/L		2.0		E537M	10/15/21 13:20 / eli-b
PFHxS	ND	ng/L		2.0		E537M	10/15/21 13:20 / eli-b
PFHpS	ND	ng/L		2.0		E537M	10/15/21 13:20 / eli-b
PFOS	ND	ng/L		2.0		E537M	10/15/21 13:20 / eli-b
PFNS	ND	ng/L		2.0		E537M	10/15/21 13:20 / eli-b
PFDS	ND	ng/L		2.0		E537M	10/15/21 13:20 / eli-b
FOSA	ND	ng/L		2.0		E537M	10/15/21 13:20 / eli-b
NEtFOSAA	ND	ng/L		3.0		E537M	10/15/21 13:20 / eli-b
NMeFOSAA	ND	ng/L		2.0		E537M	10/15/21 13:20 / eli-b
8:2 FTS	ND	ng/L		3.0		E537M	10/15/21 13:20 / eli-b
4:2 FTS	ND	ng/L		2.0		E537M	10/15/21 13:20 / eli-b
6:2 FTS	ND	ng/L		8.0		E537M	10/15/21 13:20 / eli-b
11Cl-PF3OUdS	ND	ng/L		2.0		E537M	10/15/21 13:20 / eli-b
ADONA	ND	ng/L		2.0		E537M	10/15/21 13:20 / eli-b
9Cl-PF3ONS	ND	ng/L		2.0		E537M	10/15/21 13:20 / eli-b
HFPO-DA	ND	ng/L		3.0		E537M	10/15/21 13:20 / eli-b
IS: M4PFBA	123	%REC		50-150		E537M	10/15/21 13:20 / eli-b
IS: M3PFHxS	113	%REC		50-150		E537M	10/15/21 13:20 / eli-b
IS: M4PFHpA	126	%REC		50-150		E537M	10/15/21 13:20 / eli-b
IS: M8PFOA	126	%REC		50-150		E537M	10/15/21 13:20 / eli-b
IS: M9PFNA	121	%REC		50-150		E537M	10/15/21 13:20 / eli-b
IS: M6PFDA	125	%REC		50-150		E537M	10/15/21 13:20 / eli-b
IS: M7PFUnA	113	%REC		50-150		E537M	10/15/21 13:20 / eli-b
IS: M2PFDoA	108	%REC		50-150		E537M	10/15/21 13:20 / eli-b
IS: M2PFTeDA	106	%REC		50-150		E537M	10/15/21 13:20 / eli-b
IS: M3PFBS	112	%REC		50-150		E537M	10/15/21 13:20 / eli-b
IS: M5PFPeA	127	%REC		50-150		E537M	10/15/21 13:20 / eli-b
IS: M5PFHxA	118	%REC		50-150		E537M	10/15/21 13:20 / eli-b
IS: M8PFOS	119	%REC		50-150		E537M	10/15/21 13:20 / eli-b
IS: M8FOSA	101	%REC		50-150		E537M	10/15/21 13:20 / eli-b
IS: d5-N-EtFOSAA	106	%REC		50-150		E537M	10/15/21 13:20 / eli-b

Report Definitions:
RL - Analyte Reporting Limit
QCL - Quality Control Limit
MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ Remediation Division
Project: Helena Groundwater PFAS
Lab ID: H21100261-003
Client Sample ID: HPFAS_GW-06_20211006

Report Date: 10/22/21
Collection Date: 10/06/21 10:45
DateReceived: 10/07/21
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PFAS COMPOUNDS IN AQUEOUS MATRICES							
IS: d3-N-MeFOSAA	102	%REC		50-150		E537M	10/15/21 13:20 / eli-b
IS: M2-8:2FTS	116	%REC		50-150		E537M	10/15/21 13:20 / eli-b
IS: M2-4:2FTS	115	%REC		50-150		E537M	10/15/21 13:20 / eli-b
IS: M2-6:2FTS	105	%REC		50-150		E537M	10/15/21 13:20 / eli-b
IS: M3HFPO-DA	112	%REC		50-150		E537M	10/15/21 13:20 / eli-b

Report Definitions:
RL - Analyte Reporting Limit
QCL - Quality Control Limit
MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ Remediation Division
Project: Helena Groundwater PFAS
Lab ID: H21100261-004
Client Sample ID: HPFAS_GW-07_20211006

Report Date: 10/22/21
Collection Date: 10/06/21 09:10
DateReceived: 10/07/21
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PFAS COMPOUNDS IN AQUEOUS MATRICES							
PFBA	3.5	ng/L	J	5.0		E537M	10/15/21 13:38 / eli-b
PFPeA	ND	ng/L		2.0		E537M	10/15/21 13:38 / eli-b
PFHxA	ND	ng/L		2.0		E537M	10/15/21 13:38 / eli-b
PFHpA	ND	ng/L		2.0		E537M	10/15/21 13:38 / eli-b
PFOA	ND	ng/L		2.0		E537M	10/15/21 13:38 / eli-b
PFNA	ND	ng/L		2.0		E537M	10/15/21 13:38 / eli-b
PFDA	ND	ng/L		2.0		E537M	10/15/21 13:38 / eli-b
PFUnA	ND	ng/L		2.0		E537M	10/15/21 13:38 / eli-b
PFDoA	ND	ng/L		2.0		E537M	10/15/21 13:38 / eli-b
PFTrDA	ND	ng/L		2.0		E537M	10/15/21 13:38 / eli-b
PFTA	ND	ng/L		2.0		E537M	10/15/21 13:38 / eli-b
PFBS	ND	ng/L		2.0		E537M	10/15/21 13:38 / eli-b
PFPeS	ND	ng/L		2.0		E537M	10/15/21 13:38 / eli-b
PFHxS	ND	ng/L		2.0		E537M	10/15/21 13:38 / eli-b
PFHpS	ND	ng/L		2.0		E537M	10/15/21 13:38 / eli-b
PFOS	ND	ng/L		2.0		E537M	10/15/21 13:38 / eli-b
PFNS	ND	ng/L		2.0		E537M	10/15/21 13:38 / eli-b
PFDS	ND	ng/L		2.0		E537M	10/15/21 13:38 / eli-b
FOSA	ND	ng/L		2.0		E537M	10/15/21 13:38 / eli-b
NEtFOSAA	ND	ng/L		3.0		E537M	10/15/21 13:38 / eli-b
NMeFOSAA	ND	ng/L		2.0		E537M	10/15/21 13:38 / eli-b
8:2 FTS	ND	ng/L		3.0		E537M	10/15/21 13:38 / eli-b
4:2 FTS	ND	ng/L		2.0		E537M	10/15/21 13:38 / eli-b
6:2 FTS	ND	ng/L		8.0		E537M	10/15/21 13:38 / eli-b
11Cl-PF3OUdS	ND	ng/L		2.0		E537M	10/15/21 13:38 / eli-b
ADONA	ND	ng/L		2.0		E537M	10/15/21 13:38 / eli-b
9Cl-PF3ONS	ND	ng/L		2.0		E537M	10/15/21 13:38 / eli-b
HFPO-DA	ND	ng/L		3.0		E537M	10/15/21 13:38 / eli-b
IS: M4PFBA	91.0	%REC		50-150		E537M	10/15/21 13:38 / eli-b
IS: M3PFHxS	104	%REC		50-150		E537M	10/15/21 13:38 / eli-b
IS: M4PFHpA	110	%REC		50-150		E537M	10/15/21 13:38 / eli-b
IS: M8PFOA	111	%REC		50-150		E537M	10/15/21 13:38 / eli-b
IS: M9PFNA	110	%REC		50-150		E537M	10/15/21 13:38 / eli-b
IS: M6PFDA	114	%REC		50-150		E537M	10/15/21 13:38 / eli-b
IS: M7PFUnA	102	%REC		50-150		E537M	10/15/21 13:38 / eli-b
IS: M2PFDoA	107	%REC		50-150		E537M	10/15/21 13:38 / eli-b
IS: M2PFTeDA	98.0	%REC		50-150		E537M	10/15/21 13:38 / eli-b
IS: M3PFBS	108	%REC		50-150		E537M	10/15/21 13:38 / eli-b
IS: M5PFPeA	113	%REC		50-150		E537M	10/15/21 13:38 / eli-b
IS: M5PFHxA	116	%REC		50-150		E537M	10/15/21 13:38 / eli-b
IS: M8PFOS	106	%REC		50-150		E537M	10/15/21 13:38 / eli-b
IS: M8FOSA	54.0	%REC		50-150		E537M	10/15/21 13:38 / eli-b
IS: d5-N-EtFOSAA	99.0	%REC		50-150		E537M	10/15/21 13:38 / eli-b

Report Definitions:
RL - Analyte Reporting Limit
QCL - Quality Control Limit
J - Estimated value - analyte was present but less than the Reporting Limit (RL)
MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ Remediation Division
Project: Helena Groundwater PFAS
Lab ID: H21100261-004
Client Sample ID: HPFAS_GW-07_20211006

Report Date: 10/22/21
Collection Date: 10/06/21 09:10
DateReceived: 10/07/21
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PFAS COMPOUNDS IN AQUEOUS MATRICES							
IS: d3-N-MeFOSAA	94.0	%REC		50-150		E537M	10/15/21 13:38 / eli-b
IS: M2-8:2FTS	129	%REC		50-150		E537M	10/15/21 13:38 / eli-b
IS: M2-4:2FTS	122	%REC		50-150		E537M	10/15/21 13:38 / eli-b
IS: M2-6:2FTS	109	%REC		50-150		E537M	10/15/21 13:38 / eli-b
IS: M3HFPO-DA	109	%REC		50-150		E537M	10/15/21 13:38 / eli-b

Report Definitions:
RL - Analyte Reporting Limit
QCL - Quality Control Limit
MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ Remediation Division
Project: Helena Groundwater PFAS
Lab ID: H21100261-005
Client Sample ID: HPFAS_GW-08_20211006

Report Date: 10/22/21
Collection Date: 10/06/21 14:55
DateReceived: 10/07/21
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PFAS COMPOUNDS IN AQUEOUS MATRICES							
PFBA	5.0	ng/L	J	5.0		E537M	10/15/21 18:16 / eli-b
PFPeA	2.6	ng/L		2.0		E537M	10/15/21 18:16 / eli-b
PFHxA	2.6	ng/L		2.0		E537M	10/15/21 18:16 / eli-b
PFHpA	1.3	ng/L	J	2.0		E537M	10/15/21 18:16 / eli-b
PFOA	3.3	ng/L		2.0		E537M	10/15/21 18:16 / eli-b
PFNA	ND	ng/L		2.0		E537M	10/15/21 18:16 / eli-b
PFDA	ND	ng/L		2.0		E537M	10/15/21 18:16 / eli-b
PFUnA	ND	ng/L		2.0		E537M	10/15/21 18:16 / eli-b
PFDoA	ND	ng/L		2.0		E537M	10/15/21 18:16 / eli-b
PFTrDA	ND	ng/L		2.0		E537M	10/15/21 18:16 / eli-b
PFTA	ND	ng/L		2.0		E537M	10/15/21 18:16 / eli-b
PFBS	3.8	ng/L		2.0		E537M	10/15/21 18:16 / eli-b
PFPeS	ND	ng/L		2.0		E537M	10/15/21 18:16 / eli-b
PFHxS	2.5	ng/L		2.0		E537M	10/15/21 18:16 / eli-b
PFHpS	ND	ng/L		2.0		E537M	10/15/21 18:16 / eli-b
PFOS	7.3	ng/L		2.0		E537M	10/15/21 18:16 / eli-b
PFNS	ND	ng/L		2.0		E537M	10/15/21 18:16 / eli-b
PFDS	ND	ng/L		2.0		E537M	10/15/21 18:16 / eli-b
FOSA	ND	ng/L		2.0		E537M	10/15/21 18:16 / eli-b
NEtFOSAA	ND	ng/L		3.0		E537M	10/15/21 18:16 / eli-b
NMeFOSAA	ND	ng/L		2.0		E537M	10/15/21 18:16 / eli-b
8:2 FTS	ND	ng/L		3.0		E537M	10/15/21 18:16 / eli-b
4:2 FTS	ND	ng/L		2.0		E537M	10/15/21 18:16 / eli-b
6:2 FTS	ND	ng/L		8.0		E537M	10/15/21 18:16 / eli-b
11Cl-PF3OUdS	ND	ng/L		2.0		E537M	10/15/21 18:16 / eli-b
ADONA	ND	ng/L		2.0		E537M	10/15/21 18:16 / eli-b
9Cl-PF3ONS	ND	ng/L		2.0		E537M	10/15/21 18:16 / eli-b
HFPO-DA	ND	ng/L		3.0		E537M	10/15/21 18:16 / eli-b
IS: M4PFBA	65.0	%REC		50-150		E537M	10/15/21 18:16 / eli-b
IS: M3PFHxS	103	%REC		50-150		E537M	10/15/21 18:16 / eli-b
IS: M4PFHpA	119	%REC		50-150		E537M	10/15/21 18:16 / eli-b
IS: M8PFOA	118	%REC		50-150		E537M	10/15/21 18:16 / eli-b
IS: M9PFNA	107	%REC		50-150		E537M	10/15/21 18:16 / eli-b
IS: M6PFDA	104	%REC		50-150		E537M	10/15/21 18:16 / eli-b
IS: M7PFUnA	89.0	%REC		50-150		E537M	10/15/21 18:16 / eli-b
IS: M2PFDoA	81.0	%REC		50-150		E537M	10/15/21 18:16 / eli-b
IS: M2PFTeDA	48.0	%REC	S	50-150		E537M	10/15/21 18:16 / eli-b
IS: M3PFBS	111	%REC		50-150		E537M	10/15/21 18:16 / eli-b
IS: M5PFPeA	105	%REC		50-150		E537M	10/15/21 18:16 / eli-b
IS: M5PFHxA	115	%REC		50-150		E537M	10/15/21 18:16 / eli-b
IS: M8PFOS	103	%REC		50-150		E537M	10/15/21 18:16 / eli-b
IS: M8FOSA	84.0	%REC		50-150		E537M	10/15/21 18:16 / eli-b
IS: d5-N-EtFOSAA	87.0	%REC		50-150		E537M	10/15/21 18:16 / eli-b

Report Definitions:
RL - Analyte Reporting Limit
QCL - Quality Control Limit
J - Estimated value - analyte was present but less than the Reporting Limit (RL)
MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)
S - Spike recovery outside of advisory limits

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ Remediation Division
Project: Helena Groundwater PFAS
Lab ID: H21100261-005
Client Sample ID: HPFAS_GW-08_20211006

Report Date: 10/22/21
Collection Date: 10/06/21 14:55
DateReceived: 10/07/21
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PFAS COMPOUNDS IN AQUEOUS MATRICES							
IS: d3-N-MeFOSAA	82.0	%REC		50-150		E537M	10/15/21 18:16 / eli-b
IS: M2-8:2FTS	104	%REC		50-150		E537M	10/15/21 18:16 / eli-b
IS: M2-4:2FTS	180	%REC	S	50-150		E537M	10/15/21 18:16 / eli-b
IS: M2-6:2FTS	124	%REC		50-150		E537M	10/15/21 18:16 / eli-b
IS: M3HFPO-DA	115	%REC		50-150		E537M	10/15/21 18:16 / eli-b

Report Definitions:
RL - Analyte Reporting Limit
QCL - Quality Control Limit
S - Spike recovery outside of advisory limits
MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ Remediation Division
Project: Helena Groundwater PFAS
Lab ID: H21100261-006
Client Sample ID: HPFAS_GW-09_20211006

Report Date: 10/22/21
Collection Date: 10/06/21 11:55
DateReceived: 10/07/21
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PFAS COMPOUNDS IN AQUEOUS MATRICES							
PFBA	ND	ng/L		5.0		E537M	10/15/21 15:29 / eli-b
PFPeA	ND	ng/L		2.0		E537M	10/15/21 15:29 / eli-b
PFHxA	ND	ng/L		2.0		E537M	10/15/21 15:29 / eli-b
PFHpA	ND	ng/L		2.0		E537M	10/15/21 15:29 / eli-b
PFOA	ND	ng/L		2.0		E537M	10/15/21 15:29 / eli-b
PFNA	ND	ng/L		2.0		E537M	10/15/21 15:29 / eli-b
PFDA	ND	ng/L		2.0		E537M	10/15/21 15:29 / eli-b
PFUnA	ND	ng/L		2.0		E537M	10/15/21 15:29 / eli-b
PFDoA	ND	ng/L		2.0		E537M	10/15/21 15:29 / eli-b
PFTrDA	ND	ng/L		2.0		E537M	10/15/21 15:29 / eli-b
PFTA	ND	ng/L		2.0		E537M	10/15/21 15:29 / eli-b
PFBS	ND	ng/L		2.0		E537M	10/15/21 15:29 / eli-b
PFPeS	ND	ng/L		2.0		E537M	10/15/21 15:29 / eli-b
PFHxS	ND	ng/L		2.0		E537M	10/15/21 15:29 / eli-b
PFHpS	ND	ng/L		2.0		E537M	10/15/21 15:29 / eli-b
PFOS	ND	ng/L		2.0		E537M	10/15/21 15:29 / eli-b
PFNS	ND	ng/L		2.0		E537M	10/15/21 15:29 / eli-b
PFDS	ND	ng/L		2.0		E537M	10/15/21 15:29 / eli-b
FOSA	ND	ng/L		2.0		E537M	10/15/21 15:29 / eli-b
NEtFOSAA	ND	ng/L		3.0		E537M	10/15/21 15:29 / eli-b
NMeFOSAA	ND	ng/L		2.0		E537M	10/15/21 15:29 / eli-b
8:2 FTS	ND	ng/L		3.0		E537M	10/15/21 15:29 / eli-b
4:2 FTS	ND	ng/L		2.0		E537M	10/15/21 15:29 / eli-b
6:2 FTS	ND	ng/L		8.0		E537M	10/15/21 15:29 / eli-b
11Cl-PF3OUdS	ND	ng/L		2.0		E537M	10/15/21 15:29 / eli-b
ADONA	ND	ng/L		2.0		E537M	10/15/21 15:29 / eli-b
9Cl-PF3ONS	ND	ng/L		2.0		E537M	10/15/21 15:29 / eli-b
HFPO-DA	ND	ng/L		3.0		E537M	10/15/21 15:29 / eli-b
IS: M4PFBA	105	%REC		50-150		E537M	10/15/21 15:29 / eli-b
IS: M3PFHxS	102	%REC		50-150		E537M	10/15/21 15:29 / eli-b
IS: M4PFHpA	117	%REC		50-150		E537M	10/15/21 15:29 / eli-b
IS: M8PFOA	109	%REC		50-150		E537M	10/15/21 15:29 / eli-b
IS: M9PFNA	107	%REC		50-150		E537M	10/15/21 15:29 / eli-b
IS: M6PFDA	118	%REC		50-150		E537M	10/15/21 15:29 / eli-b
IS: M7PFUnA	98.0	%REC		50-150		E537M	10/15/21 15:29 / eli-b
IS: M2PFDoA	106	%REC		50-150		E537M	10/15/21 15:29 / eli-b
IS: M2PFTeDA	99.0	%REC		50-150		E537M	10/15/21 15:29 / eli-b
IS: M3PFBS	107	%REC		50-150		E537M	10/15/21 15:29 / eli-b
IS: M5PFPeA	121	%REC		50-150		E537M	10/15/21 15:29 / eli-b
IS: M5PFHxA	117	%REC		50-150		E537M	10/15/21 15:29 / eli-b
IS: M8PFOS	113	%REC		50-150		E537M	10/15/21 15:29 / eli-b
IS: M8FOSA	57.0	%REC		50-150		E537M	10/15/21 15:29 / eli-b
IS: d5-N-EtFOSAA	86.0	%REC		50-150		E537M	10/15/21 15:29 / eli-b

Report Definitions:
RL - Analyte Reporting Limit
QCL - Quality Control Limit
MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ Remediation Division
Project: Helena Groundwater PFAS
Lab ID: H21100261-006
Client Sample ID: HPFAS_GW-09_20211006

Report Date: 10/22/21
Collection Date: 10/06/21 11:55
DateReceived: 10/07/21
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PFAS COMPOUNDS IN AQUEOUS MATRICES							
IS: d3-N-MeFOSAA	95.0	%REC		50-150		E537M	10/15/21 15:29 / eli-b
IS: M2-8:2FTS	130	%REC		50-150		E537M	10/15/21 15:29 / eli-b
IS: M2-4:2FTS	113	%REC		50-150		E537M	10/15/21 15:29 / eli-b
IS: M2-6:2FTS	98.0	%REC		50-150		E537M	10/15/21 15:29 / eli-b
IS: M3HFPO-DA	108	%REC		50-150		E537M	10/15/21 15:29 / eli-b

Report Definitions:
RL - Analyte Reporting Limit
QCL - Quality Control Limit
MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ Remediation Division
Project: Helena Groundwater PFAS
Lab ID: H21100261-007
Client Sample ID: HPFAS_GW-02_20211007

Report Date: 10/22/21
Collection Date: 10/07/21 09:45
DateReceived: 10/07/21
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PFAS COMPOUNDS IN AQUEOUS MATRICES							
PFBA	8.0	ng/L		5.0		E537M	10/15/21 15:48 / eli-b
PFPeA	17	ng/L		2.0		E537M	10/15/21 15:48 / eli-b
PFHxA	14	ng/L		2.0		E537M	10/15/21 15:48 / eli-b
PFHpA	4.8	ng/L		2.0		E537M	10/15/21 15:48 / eli-b
PFOA	4.4	ng/L		2.0		E537M	10/15/21 15:48 / eli-b
PFNA	ND	ng/L		2.0		E537M	10/15/21 15:48 / eli-b
PFDA	ND	ng/L		2.0		E537M	10/15/21 15:48 / eli-b
PFUnA	ND	ng/L		2.0		E537M	10/15/21 15:48 / eli-b
PFDoA	ND	ng/L		2.0		E537M	10/15/21 15:48 / eli-b
PFTrDA	ND	ng/L		2.0		E537M	10/15/21 15:48 / eli-b
PFTA	ND	ng/L		2.0		E537M	10/15/21 15:48 / eli-b
PFBS	6.5	ng/L		2.0		E537M	10/15/21 15:48 / eli-b
PFPeS	7.8	ng/L		2.0		E537M	10/15/21 15:48 / eli-b
PFHxS	22	ng/L		2.0		E537M	10/15/21 15:48 / eli-b
PFHpS	ND	ng/L		2.0		E537M	10/15/21 15:48 / eli-b
PFOS	5.4	ng/L		2.0		E537M	10/15/21 15:48 / eli-b
PFNS	ND	ng/L		2.0		E537M	10/15/21 15:48 / eli-b
PFDS	ND	ng/L		2.0		E537M	10/15/21 15:48 / eli-b
FOSA	ND	ng/L		2.0		E537M	10/15/21 15:48 / eli-b
NEtFOSAA	ND	ng/L		3.0		E537M	10/15/21 15:48 / eli-b
NMeFOSAA	ND	ng/L		2.0		E537M	10/15/21 15:48 / eli-b
8:2 FTS	ND	ng/L		3.0		E537M	10/15/21 15:48 / eli-b
4:2 FTS	ND	ng/L		2.0		E537M	10/15/21 15:48 / eli-b
6:2 FTS	ND	ng/L		8.0		E537M	10/15/21 15:48 / eli-b
11Cl-PF3OUdS	ND	ng/L		2.0		E537M	10/15/21 15:48 / eli-b
ADONA	ND	ng/L		2.0		E537M	10/15/21 15:48 / eli-b
9Cl-PF3ONS	ND	ng/L		2.0		E537M	10/15/21 15:48 / eli-b
HFPO-DA	ND	ng/L		3.0		E537M	10/15/21 15:48 / eli-b
IS: M4PFBA	77.0	%REC		50-150		E537M	10/15/21 15:48 / eli-b
IS: M3PFHxS	96.0	%REC		50-150		E537M	10/15/21 15:48 / eli-b
IS: M4PFHpA	114	%REC		50-150		E537M	10/15/21 15:48 / eli-b
IS: M8PFOA	117	%REC		50-150		E537M	10/15/21 15:48 / eli-b
IS: M9PFNA	109	%REC		50-150		E537M	10/15/21 15:48 / eli-b
IS: M6PFDA	120	%REC		50-150		E537M	10/15/21 15:48 / eli-b
IS: M7PFUnA	101	%REC		50-150		E537M	10/15/21 15:48 / eli-b
IS: M2PFDoA	97.0	%REC		50-150		E537M	10/15/21 15:48 / eli-b
IS: M2PFTeDA	101	%REC		50-150		E537M	10/15/21 15:48 / eli-b
IS: M3PFBS	107	%REC		50-150		E537M	10/15/21 15:48 / eli-b
IS: M5PFPeA	108	%REC		50-150		E537M	10/15/21 15:48 / eli-b
IS: M5PFHxA	113	%REC		50-150		E537M	10/15/21 15:48 / eli-b
IS: M8PFOS	102	%REC		50-150		E537M	10/15/21 15:48 / eli-b
IS: M8FOSA	81.0	%REC		50-150		E537M	10/15/21 15:48 / eli-b
IS: d5-N-EtFOSAA	100	%REC		50-150		E537M	10/15/21 15:48 / eli-b

Report Definitions:
RL - Analyte Reporting Limit
QCL - Quality Control Limit
MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ Remediation Division
Project: Helena Groundwater PFAS
Lab ID: H21100261-007
Client Sample ID: HPFAS_GW-02_20211007

Report Date: 10/22/21
Collection Date: 10/07/21 09:45
DateReceived: 10/07/21
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PFAS COMPOUNDS IN AQUEOUS MATRICES							
IS: d3-N-MeFOSAA	95.0	%REC		50-150		E537M	10/15/21 15:48 / eli-b
IS: M2-8:2FTS	113	%REC		50-150		E537M	10/15/21 15:48 / eli-b
IS: M2-4:2FTS	156	%REC	S	50-150		E537M	10/15/21 15:48 / eli-b
IS: M2-6:2FTS	114	%REC		50-150		E537M	10/15/21 15:48 / eli-b
IS: M3HFPO-DA	104	%REC		50-150		E537M	10/15/21 15:48 / eli-b

Report Definitions:
RL - Analyte Reporting Limit
QCL - Quality Control Limit
S - Spike recovery outside of advisory limits
MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ Remediation Division
Project: Helena Groundwater PFAS
Lab ID: H21100261-008
Client Sample ID: HPFAS_GW-03_20211007

Report Date: 10/22/21
Collection Date: 10/07/21 09:10
DateReceived: 10/07/21
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PFAS COMPOUNDS IN AQUEOUS MATRICES							
PFBA	4.9	ng/L	J	5.0		E537M	10/15/21 16:07 / eli-b
PFPeA	1.3	ng/L	J	2.0		E537M	10/15/21 16:07 / eli-b
PFHxA	ND	ng/L		2.0		E537M	10/15/21 16:07 / eli-b
PFHpA	ND	ng/L		2.0		E537M	10/15/21 16:07 / eli-b
PFOA	3.7	ng/L		2.0		E537M	10/15/21 16:07 / eli-b
PFNA	1.2	ng/L	J	2.0		E537M	10/15/21 16:07 / eli-b
PFDA	ND	ng/L		2.0		E537M	10/15/21 16:07 / eli-b
PFUnA	ND	ng/L		2.0		E537M	10/15/21 16:07 / eli-b
PFDoA	ND	ng/L		2.0		E537M	10/15/21 16:07 / eli-b
PFTrDA	ND	ng/L		2.0		E537M	10/15/21 16:07 / eli-b
PFTA	ND	ng/L		2.0		E537M	10/15/21 16:07 / eli-b
PFBS	1.6	ng/L	J	2.0		E537M	10/15/21 16:07 / eli-b
PFPeS	ND	ng/L		2.0		E537M	10/15/21 16:07 / eli-b
PFHxS	11	ng/L		2.0		E537M	10/15/21 16:07 / eli-b
PFHpS	ND	ng/L		2.0		E537M	10/15/21 16:07 / eli-b
PFOS	20	ng/L		2.0		E537M	10/15/21 16:07 / eli-b
PFNS	ND	ng/L		2.0		E537M	10/15/21 16:07 / eli-b
PFDS	ND	ng/L		2.0		E537M	10/15/21 16:07 / eli-b
FOSA	ND	ng/L		2.0		E537M	10/15/21 16:07 / eli-b
NEtFOSAA	ND	ng/L		3.0		E537M	10/15/21 16:07 / eli-b
NMeFOSAA	ND	ng/L		2.0		E537M	10/15/21 16:07 / eli-b
8:2 FTS	ND	ng/L		3.0		E537M	10/15/21 16:07 / eli-b
4:2 FTS	ND	ng/L		2.0		E537M	10/15/21 16:07 / eli-b
6:2 FTS	ND	ng/L		8.0		E537M	10/15/21 16:07 / eli-b
11Cl-PF3OUdS	ND	ng/L		2.0		E537M	10/15/21 16:07 / eli-b
ADONA	ND	ng/L		2.0		E537M	10/15/21 16:07 / eli-b
9Cl-PF3ONS	ND	ng/L		2.0		E537M	10/15/21 16:07 / eli-b
HFPO-DA	ND	ng/L		3.0		E537M	10/15/21 16:07 / eli-b
IS: M4PFBA	90.0	%REC		50-150		E537M	10/15/21 16:07 / eli-b
IS: M3PFHxS	100	%REC		50-150		E537M	10/15/21 16:07 / eli-b
IS: M4PFHpA	104	%REC		50-150		E537M	10/15/21 16:07 / eli-b
IS: M8PFOA	104	%REC		50-150		E537M	10/15/21 16:07 / eli-b
IS: M9PFNA	101	%REC		50-150		E537M	10/15/21 16:07 / eli-b
IS: M6PFDA	108	%REC		50-150		E537M	10/15/21 16:07 / eli-b
IS: M7PFUnA	96.0	%REC		50-150		E537M	10/15/21 16:07 / eli-b
IS: M2PFDoA	96.0	%REC		50-150		E537M	10/15/21 16:07 / eli-b
IS: M2PFTeDA	103	%REC		50-150		E537M	10/15/21 16:07 / eli-b
IS: M3PFBS	98.0	%REC		50-150		E537M	10/15/21 16:07 / eli-b
IS: M5PFPeA	104	%REC		50-150		E537M	10/15/21 16:07 / eli-b
IS: M5PFHxA	101	%REC		50-150		E537M	10/15/21 16:07 / eli-b
IS: M8PFOS	99.0	%REC		50-150		E537M	10/15/21 16:07 / eli-b
IS: M8FOSA	63.0	%REC		50-150		E537M	10/15/21 16:07 / eli-b
IS: d5-N-EtFOSAA	101	%REC		50-150		E537M	10/15/21 16:07 / eli-b

Report Definitions:
RL - Analyte Reporting Limit
QCL - Quality Control Limit
J - Estimated value - analyte was present but less than the Reporting Limit (RL)
MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ Remediation Division
Project: Helena Groundwater PFAS
Lab ID: H21100261-008
Client Sample ID: HPFAS_GW-03_20211007

Report Date: 10/22/21
Collection Date: 10/07/21 09:10
DateReceived: 10/07/21
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PFAS COMPOUNDS IN AQUEOUS MATRICES							
IS: d3-N-MeFOSAA	95.0	%REC		50-150		E537M	10/15/21 16:07 / eli-b
IS: M2-8:2FTS	154	%REC	S	50-150		E537M	10/15/21 16:07 / eli-b
IS: M2-4:2FTS	108	%REC		50-150		E537M	10/15/21 16:07 / eli-b
IS: M2-6:2FTS	101	%REC		50-150		E537M	10/15/21 16:07 / eli-b
IS: M3HFPO-DA	99.0	%REC		50-150		E537M	10/15/21 16:07 / eli-b

Report Definitions:
RL - Analyte Reporting Limit
QCL - Quality Control Limit
S - Spike recovery outside of advisory limits
MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ Remediation Division
Project: Helena Groundwater PFAS
Lab ID: H21100261-009
Client Sample ID: HPFAS_GW-04_20211007

Report Date: 10/22/21
Collection Date: 10/07/21 11:00
DateReceived: 10/07/21
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PFAS COMPOUNDS IN AQUEOUS MATRICES							
PFBA	0.80	ng/L	J	5.0		E537M	10/15/21 16:25 / eli-b
PFPeA	ND	ng/L		2.0		E537M	10/15/21 16:25 / eli-b
PFHxA	0.94	ng/L	J	2.0		E537M	10/15/21 16:25 / eli-b
PFHpA	ND	ng/L		2.0		E537M	10/15/21 16:25 / eli-b
PFOA	ND	ng/L		2.0		E537M	10/15/21 16:25 / eli-b
PFNA	ND	ng/L		2.0		E537M	10/15/21 16:25 / eli-b
PFDA	ND	ng/L		2.0		E537M	10/15/21 16:25 / eli-b
PFUnA	ND	ng/L		2.0		E537M	10/15/21 16:25 / eli-b
PFDoA	ND	ng/L		2.0		E537M	10/15/21 16:25 / eli-b
PFTrDA	ND	ng/L		2.0		E537M	10/15/21 16:25 / eli-b
PFTA	ND	ng/L		2.0		E537M	10/15/21 16:25 / eli-b
PFBS	ND	ng/L		2.0		E537M	10/15/21 16:25 / eli-b
PFPeS	ND	ng/L		2.0		E537M	10/15/21 16:25 / eli-b
PFHxS	4.5	ng/L		2.0		E537M	10/15/21 16:25 / eli-b
PFHpS	ND	ng/L		2.0		E537M	10/15/21 16:25 / eli-b
PFOS	ND	ng/L		2.0		E537M	10/15/21 16:25 / eli-b
PFNS	ND	ng/L		2.0		E537M	10/15/21 16:25 / eli-b
PFDS	ND	ng/L		2.0		E537M	10/15/21 16:25 / eli-b
FOSA	ND	ng/L		2.0		E537M	10/15/21 16:25 / eli-b
NEtFOSAA	ND	ng/L		3.0		E537M	10/15/21 16:25 / eli-b
NMeFOSAA	ND	ng/L		2.0		E537M	10/15/21 16:25 / eli-b
8:2 FTS	ND	ng/L		3.0		E537M	10/15/21 16:25 / eli-b
4:2 FTS	ND	ng/L		2.0		E537M	10/15/21 16:25 / eli-b
6:2 FTS	ND	ng/L		8.0		E537M	10/15/21 16:25 / eli-b
11Cl-PF3OUdS	ND	ng/L		2.0		E537M	10/15/21 16:25 / eli-b
ADONA	ND	ng/L		2.0		E537M	10/15/21 16:25 / eli-b
9Cl-PF3ONS	ND	ng/L		2.0		E537M	10/15/21 16:25 / eli-b
HFPO-DA	ND	ng/L		3.0		E537M	10/15/21 16:25 / eli-b
IS: M4PFBA	110	%REC		50-150		E537M	10/15/21 16:25 / eli-b
IS: M3PFHxS	106	%REC		50-150		E537M	10/15/21 16:25 / eli-b
IS: M4PFHpA	117	%REC		50-150		E537M	10/15/21 16:25 / eli-b
IS: M8PFOA	119	%REC		50-150		E537M	10/15/21 16:25 / eli-b
IS: M9PFNA	112	%REC		50-150		E537M	10/15/21 16:25 / eli-b
IS: M6PFDA	119	%REC		50-150		E537M	10/15/21 16:25 / eli-b
IS: M7PFUnA	106	%REC		50-150		E537M	10/15/21 16:25 / eli-b
IS: M2PFDoA	109	%REC		50-150		E537M	10/15/21 16:25 / eli-b
IS: M2PFTeDA	111	%REC		50-150		E537M	10/15/21 16:25 / eli-b
IS: M3PFBS	102	%REC		50-150		E537M	10/15/21 16:25 / eli-b
IS: M5PFPeA	116	%REC		50-150		E537M	10/15/21 16:25 / eli-b
IS: M5PFHxA	106	%REC		50-150		E537M	10/15/21 16:25 / eli-b
IS: M8PFOS	109	%REC		50-150		E537M	10/15/21 16:25 / eli-b
IS: M8FOSA	73.0	%REC		50-150		E537M	10/15/21 16:25 / eli-b
IS: d5-N-EtFOSAA	109	%REC		50-150		E537M	10/15/21 16:25 / eli-b

Report Definitions:
RL - Analyte Reporting Limit
MCL - Maximum Contaminant Level
QCL - Quality Control Limit
ND - Not detected at the Reporting Limit (RL)
J - Estimated value - analyte was present but less than the Reporting Limit (RL)

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ Remediation Division
Project: Helena Groundwater PFAS
Lab ID: H21100261-009
Client Sample ID: HPFAS_GW-04_20211007

Report Date: 10/22/21
Collection Date: 10/07/21 11:00
DateReceived: 10/07/21
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PFAS COMPOUNDS IN AQUEOUS MATRICES							
IS: d3-N-MeFOSAA	112	%REC		50-150		E537M	10/15/21 16:25 / eli-b
IS: M2-8:2FTS	148	%REC		50-150		E537M	10/15/21 16:25 / eli-b
IS: M2-4:2FTS	106	%REC		50-150		E537M	10/15/21 16:25 / eli-b
IS: M2-6:2FTS	100	%REC		50-150		E537M	10/15/21 16:25 / eli-b
IS: M3HFPO-DA	110	%REC		50-150		E537M	10/15/21 16:25 / eli-b

Report Definitions:
RL - Analyte Reporting Limit
QCL - Quality Control Limit
MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ Remediation Division
Project: Helena Groundwater PFAS
Lab ID: H21100261-010
Client Sample ID: HPFAS_GW-10_20211007

Report Date: 10/22/21
Collection Date: 10/07/21 10:00
DateReceived: 10/07/21
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PFAS COMPOUNDS IN AQUEOUS MATRICES							
PFBA	ND	ng/L		5.0		E537M	10/15/21 16:44 / eli-b
PFPeA	ND	ng/L		2.0		E537M	10/15/21 16:44 / eli-b
PFHxA	ND	ng/L		2.0		E537M	10/15/21 16:44 / eli-b
PFHpA	ND	ng/L		2.0		E537M	10/15/21 16:44 / eli-b
PFOA	ND	ng/L		2.0		E537M	10/15/21 16:44 / eli-b
PFNA	ND	ng/L		2.0		E537M	10/15/21 16:44 / eli-b
PFDA	ND	ng/L		2.0		E537M	10/15/21 16:44 / eli-b
PFUnA	ND	ng/L		2.0		E537M	10/15/21 16:44 / eli-b
PFDoA	ND	ng/L		2.0		E537M	10/15/21 16:44 / eli-b
PFTrDA	ND	ng/L		2.0		E537M	10/15/21 16:44 / eli-b
PFTA	ND	ng/L		2.0		E537M	10/15/21 16:44 / eli-b
PFBS	ND	ng/L		2.0		E537M	10/15/21 16:44 / eli-b
PFPeS	ND	ng/L		2.0		E537M	10/15/21 16:44 / eli-b
PFHxS	ND	ng/L		2.0		E537M	10/15/21 16:44 / eli-b
PFHpS	ND	ng/L		2.0		E537M	10/15/21 16:44 / eli-b
PFOS	ND	ng/L		2.0		E537M	10/15/21 16:44 / eli-b
PFNS	ND	ng/L		2.0		E537M	10/15/21 16:44 / eli-b
PFDS	ND	ng/L		2.0		E537M	10/15/21 16:44 / eli-b
FOSA	ND	ng/L		2.0		E537M	10/15/21 16:44 / eli-b
NEtFOSAA	ND	ng/L		3.0		E537M	10/15/21 16:44 / eli-b
NMeFOSAA	ND	ng/L		2.0		E537M	10/15/21 16:44 / eli-b
8:2 FTS	ND	ng/L		3.0		E537M	10/15/21 16:44 / eli-b
4:2 FTS	ND	ng/L		2.0		E537M	10/15/21 16:44 / eli-b
6:2 FTS	ND	ng/L		8.0		E537M	10/15/21 16:44 / eli-b
11Cl-PF3OUdS	ND	ng/L		2.0		E537M	10/15/21 16:44 / eli-b
ADONA	ND	ng/L		2.0		E537M	10/15/21 16:44 / eli-b
9Cl-PF3ONS	ND	ng/L		2.0		E537M	10/15/21 16:44 / eli-b
HFPO-DA	ND	ng/L		3.0		E537M	10/15/21 16:44 / eli-b
IS: M4PFBA	115	%REC		50-150		E537M	10/15/21 16:44 / eli-b
IS: M3PFHxS	102	%REC		50-150		E537M	10/15/21 16:44 / eli-b
IS: M4PFHpA	113	%REC		50-150		E537M	10/15/21 16:44 / eli-b
IS: M8PFOA	112	%REC		50-150		E537M	10/15/21 16:44 / eli-b
IS: M9PFNA	111	%REC		50-150		E537M	10/15/21 16:44 / eli-b
IS: M6PFDA	117	%REC		50-150		E537M	10/15/21 16:44 / eli-b
IS: M7PFUnA	107	%REC		50-150		E537M	10/15/21 16:44 / eli-b
IS: M2PFDoA	102	%REC		50-150		E537M	10/15/21 16:44 / eli-b
IS: M2PFTeDA	101	%REC		50-150		E537M	10/15/21 16:44 / eli-b
IS: M3PFBS	106	%REC		50-150		E537M	10/15/21 16:44 / eli-b
IS: M5PFPeA	114	%REC		50-150		E537M	10/15/21 16:44 / eli-b
IS: M5PFHxA	116	%REC		50-150		E537M	10/15/21 16:44 / eli-b
IS: M8PFOS	109	%REC		50-150		E537M	10/15/21 16:44 / eli-b
IS: M8FOSA	96.0	%REC		50-150		E537M	10/15/21 16:44 / eli-b
IS: d5-N-EtFOSAA	95.0	%REC		50-150		E537M	10/15/21 16:44 / eli-b

Report Definitions:
RL - Analyte Reporting Limit
QCL - Quality Control Limit
MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ Remediation Division
Project: Helena Groundwater PFAS
Lab ID: H21100261-010
Client Sample ID: HPFAS_GW-10_20211007

Report Date: 10/22/21
Collection Date: 10/07/21 10:00
DateReceived: 10/07/21
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PFAS COMPOUNDS IN AQUEOUS MATRICES							
IS: d3-N-MeFOSAA	95.0	%REC		50-150		E537M	10/15/21 16:44 / eli-b
IS: M2-8:2FTS	120	%REC		50-150		E537M	10/15/21 16:44 / eli-b
IS: M2-4:2FTS	106	%REC		50-150		E537M	10/15/21 16:44 / eli-b
IS: M2-6:2FTS	99.0	%REC		50-150		E537M	10/15/21 16:44 / eli-b
IS: M3HFPO-DA	108	%REC		50-150		E537M	10/15/21 16:44 / eli-b

Report Definitions:
RL - Analyte Reporting Limit
QCL - Quality Control Limit
MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ Remediation Division
Project: Helena Groundwater PFAS
Lab ID: H21100261-011
Client Sample ID: HPFAS_GW-11_20211007

Report Date: 10/22/21
Collection Date: 10/07/21 11:10
DateReceived: 10/07/21
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PFAS COMPOUNDS IN AQUEOUS MATRICES							
PFBA	0.80	ng/L	J	5.0		E537M	10/15/21 17:02 / eli-b
PFPeA	ND	ng/L		2.0		E537M	10/15/21 17:02 / eli-b
PFHxA	0.82	ng/L	J	2.0		E537M	10/15/21 17:02 / eli-b
PFHpA	ND	ng/L		2.0		E537M	10/15/21 17:02 / eli-b
PFOA	ND	ng/L		2.0		E537M	10/15/21 17:02 / eli-b
PFNA	ND	ng/L		2.0		E537M	10/15/21 17:02 / eli-b
PFDA	ND	ng/L		2.0		E537M	10/15/21 17:02 / eli-b
PFUnA	ND	ng/L		2.0		E537M	10/15/21 17:02 / eli-b
PFDoA	ND	ng/L		2.0		E537M	10/15/21 17:02 / eli-b
PFTrDA	ND	ng/L		2.0		E537M	10/15/21 17:02 / eli-b
PFTA	ND	ng/L		2.0		E537M	10/15/21 17:02 / eli-b
PFBS	ND	ng/L		2.0		E537M	10/15/21 17:02 / eli-b
PFPeS	ND	ng/L		2.0		E537M	10/15/21 17:02 / eli-b
PFHxS	4.7	ng/L		2.0		E537M	10/15/21 17:02 / eli-b
PFHpS	ND	ng/L		2.0		E537M	10/15/21 17:02 / eli-b
PFOS	ND	ng/L		2.0		E537M	10/15/21 17:02 / eli-b
PFNS	ND	ng/L		2.0		E537M	10/15/21 17:02 / eli-b
PFDS	ND	ng/L		2.0		E537M	10/15/21 17:02 / eli-b
FOSA	ND	ng/L		2.0		E537M	10/15/21 17:02 / eli-b
NEtFOSAA	ND	ng/L		3.0		E537M	10/15/21 17:02 / eli-b
NMeFOSAA	ND	ng/L		2.0		E537M	10/15/21 17:02 / eli-b
8:2 FTS	ND	ng/L		3.0		E537M	10/15/21 17:02 / eli-b
4:2 FTS	ND	ng/L		2.0		E537M	10/15/21 17:02 / eli-b
6:2 FTS	ND	ng/L		8.0		E537M	10/15/21 17:02 / eli-b
11Cl-PF3OUdS	ND	ng/L		2.0		E537M	10/15/21 17:02 / eli-b
ADONA	ND	ng/L		2.0		E537M	10/15/21 17:02 / eli-b
9Cl-PF3ONS	ND	ng/L		2.0		E537M	10/15/21 17:02 / eli-b
HFPO-DA	ND	ng/L		3.0		E537M	10/15/21 17:02 / eli-b
IS: M4PFBA	111	%REC		50-150		E537M	10/15/21 17:02 / eli-b
IS: M3PFHxS	105	%REC		50-150		E537M	10/15/21 17:02 / eli-b
IS: M4PFHpA	109	%REC		50-150		E537M	10/15/21 17:02 / eli-b
IS: M8PFOA	117	%REC		50-150		E537M	10/15/21 17:02 / eli-b
IS: M9PFNA	107	%REC		50-150		E537M	10/15/21 17:02 / eli-b
IS: M6PFDA	123	%REC		50-150		E537M	10/15/21 17:02 / eli-b
IS: M7PFUnA	107	%REC		50-150		E537M	10/15/21 17:02 / eli-b
IS: M2PFDoA	111	%REC		50-150		E537M	10/15/21 17:02 / eli-b
IS: M2PFTeDA	125	%REC		50-150		E537M	10/15/21 17:02 / eli-b
IS: M3PFBS	104	%REC		50-150		E537M	10/15/21 17:02 / eli-b
IS: M5PFPeA	115	%REC		50-150		E537M	10/15/21 17:02 / eli-b
IS: M5PFHxA	112	%REC		50-150		E537M	10/15/21 17:02 / eli-b
IS: M8PFOS	107	%REC		50-150		E537M	10/15/21 17:02 / eli-b
IS: M8FOSA	86.0	%REC		50-150		E537M	10/15/21 17:02 / eli-b
IS: d5-N-EtFOSAA	122	%REC		50-150		E537M	10/15/21 17:02 / eli-b

Report Definitions:
RL - Analyte Reporting Limit
QCL - Quality Control Limit
J - Estimated value - analyte was present but less than the Reporting Limit (RL)
MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ Remediation Division
Project: Helena Groundwater PFAS
Lab ID: H21100261-011
Client Sample ID: HPFAS_GW-11_20211007

Report Date: 10/22/21
Collection Date: 10/07/21 11:10
DateReceived: 10/07/21
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PFAS COMPOUNDS IN AQUEOUS MATRICES							
IS: d3-N-MeFOSAA	126	%REC		50-150		E537M	10/15/21 17:02 / eli-b
IS: M2-8:2FTS	146	%REC		50-150		E537M	10/15/21 17:02 / eli-b
IS: M2-4:2FTS	111	%REC		50-150		E537M	10/15/21 17:02 / eli-b
IS: M2-6:2FTS	107	%REC		50-150		E537M	10/15/21 17:02 / eli-b
IS: M3HFPO-DA	105	%REC		50-150		E537M	10/15/21 17:02 / eli-b

Report Definitions:
RL - Analyte Reporting Limit
QCL - Quality Control Limit
MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ Remediation Division
Project: Helena Groundwater PFAS
Lab ID: H21100261-012
Client Sample ID: HPFAS_GW-12_20211006

Report Date: 10/22/21
Collection Date: 10/06/21 15:15
DateReceived: 10/07/21
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PFAS COMPOUNDS IN AQUEOUS MATRICES							
PFBA	ND	ng/L		5.0		E537M	10/15/21 17:21 / eli-b
PFPeA	ND	ng/L		2.0		E537M	10/15/21 17:21 / eli-b
PFHxA	ND	ng/L		2.0		E537M	10/15/21 17:21 / eli-b
PFHpA	ND	ng/L		2.0		E537M	10/15/21 17:21 / eli-b
PFOA	ND	ng/L		2.0		E537M	10/15/21 17:21 / eli-b
PFNA	ND	ng/L		2.0		E537M	10/15/21 17:21 / eli-b
PFDA	ND	ng/L		2.0		E537M	10/15/21 17:21 / eli-b
PFUnA	ND	ng/L		2.0		E537M	10/15/21 17:21 / eli-b
PFDoA	ND	ng/L		2.0		E537M	10/15/21 17:21 / eli-b
PFTrDA	ND	ng/L		2.0		E537M	10/15/21 17:21 / eli-b
PFTA	ND	ng/L		2.0		E537M	10/15/21 17:21 / eli-b
PFBS	ND	ng/L		2.0		E537M	10/15/21 17:21 / eli-b
PFPeS	ND	ng/L		2.0		E537M	10/15/21 17:21 / eli-b
PFHxS	ND	ng/L		2.0		E537M	10/15/21 17:21 / eli-b
PFHpS	ND	ng/L		2.0		E537M	10/15/21 17:21 / eli-b
PFOS	ND	ng/L		2.0		E537M	10/15/21 17:21 / eli-b
PFNS	ND	ng/L		2.0		E537M	10/15/21 17:21 / eli-b
PFDS	ND	ng/L		2.0		E537M	10/15/21 17:21 / eli-b
FOSA	ND	ng/L		2.0		E537M	10/15/21 17:21 / eli-b
NEtFOSAA	ND	ng/L		3.0		E537M	10/15/21 17:21 / eli-b
NMeFOSAA	ND	ng/L		2.0		E537M	10/15/21 17:21 / eli-b
8:2 FTS	ND	ng/L		3.0		E537M	10/15/21 17:21 / eli-b
4:2 FTS	ND	ng/L		2.0		E537M	10/15/21 17:21 / eli-b
6:2 FTS	ND	ng/L		8.0		E537M	10/15/21 17:21 / eli-b
11Cl-PF3OUdS	ND	ng/L		2.0		E537M	10/15/21 17:21 / eli-b
ADONA	ND	ng/L		2.0		E537M	10/15/21 17:21 / eli-b
9Cl-PF3ONS	ND	ng/L		2.0		E537M	10/15/21 17:21 / eli-b
HFPO-DA	ND	ng/L		3.0		E537M	10/15/21 17:21 / eli-b
IS: M4PFBA	111	%REC		50-150		E537M	10/15/21 17:21 / eli-b
IS: M3PFHxS	103	%REC		50-150		E537M	10/15/21 17:21 / eli-b
IS: M4PFHpA	110	%REC		50-150		E537M	10/15/21 17:21 / eli-b
IS: M8PFOA	109	%REC		50-150		E537M	10/15/21 17:21 / eli-b
IS: M9PFNA	113	%REC		50-150		E537M	10/15/21 17:21 / eli-b
IS: M6PFDA	129	%REC		50-150		E537M	10/15/21 17:21 / eli-b
IS: M7PFUnA	93.0	%REC		50-150		E537M	10/15/21 17:21 / eli-b
IS: M2PFDoA	128	%REC		50-150		E537M	10/15/21 17:21 / eli-b
IS: M2PFTeDA	114	%REC		50-150		E537M	10/15/21 17:21 / eli-b
IS: M3PFBS	98.0	%REC		50-150		E537M	10/15/21 17:21 / eli-b
IS: M5PFPeA	112	%REC		50-150		E537M	10/15/21 17:21 / eli-b
IS: M5PFHxA	109	%REC		50-150		E537M	10/15/21 17:21 / eli-b
IS: M8PFOS	105	%REC		50-150		E537M	10/15/21 17:21 / eli-b
IS: M8FOSA	104	%REC		50-150		E537M	10/15/21 17:21 / eli-b
IS: d5-N-EtFOSAA	115	%REC		50-150		E537M	10/15/21 17:21 / eli-b

Report Definitions:
RL - Analyte Reporting Limit
QCL - Quality Control Limit
MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ Remediation Division
Project: Helena Groundwater PFAS
Lab ID: H21100261-012
Client Sample ID: HPFAS_GW-12_20211006

Report Date: 10/22/21
Collection Date: 10/06/21 15:15
DateReceived: 10/07/21
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PFAS COMPOUNDS IN AQUEOUS MATRICES							
IS: d3-N-MeFOSAA	107	%REC		50-150		E537M	10/15/21 17:21 / eli-b
IS: M2-8:2FTS	162	%REC	S	50-150		E537M	10/15/21 17:21 / eli-b
IS: M2-4:2FTS	109	%REC		50-150		E537M	10/15/21 17:21 / eli-b
IS: M2-6:2FTS	103	%REC		50-150		E537M	10/15/21 17:21 / eli-b
IS: M3HFPO-DA	111	%REC		50-150		E537M	10/15/21 17:21 / eli-b

Report Definitions:
RL - Analyte Reporting Limit
QCL - Quality Control Limit
S - Spike recovery outside of advisory limits
MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ Remediation Division
Project: Helena Groundwater PFAS
Lab ID: H21100261-013
Client Sample ID: Field Blank 1

Report Date: 10/22/21
Collection Date: 10/06/21 09:10
DateReceived: 10/07/21
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PFAS COMPOUNDS IN AQUEOUS MATRICES							
PFBA	ND	ng/L		5.0		E537M	10/15/21 12:43 / eli-b
PFPeA	ND	ng/L		2.0		E537M	10/15/21 12:43 / eli-b
PFHxA	ND	ng/L		2.0		E537M	10/15/21 12:43 / eli-b
PFHpA	ND	ng/L		2.0		E537M	10/15/21 12:43 / eli-b
PFOA	ND	ng/L		2.0		E537M	10/15/21 12:43 / eli-b
PFNA	ND	ng/L		2.0		E537M	10/15/21 12:43 / eli-b
PFDA	ND	ng/L		2.0		E537M	10/15/21 12:43 / eli-b
PFUnA	ND	ng/L		2.0		E537M	10/15/21 12:43 / eli-b
PFDoA	ND	ng/L		2.0		E537M	10/15/21 12:43 / eli-b
PFTrDA	ND	ng/L		2.0		E537M	10/15/21 12:43 / eli-b
PFTA	ND	ng/L		2.0		E537M	10/15/21 12:43 / eli-b
PFBS	ND	ng/L		2.0		E537M	10/15/21 12:43 / eli-b
PFPeS	ND	ng/L		2.0		E537M	10/15/21 12:43 / eli-b
PFHxS	ND	ng/L		2.0		E537M	10/15/21 12:43 / eli-b
PFHpS	ND	ng/L		2.0		E537M	10/15/21 12:43 / eli-b
PFOS	ND	ng/L		2.0		E537M	10/15/21 12:43 / eli-b
PFNS	ND	ng/L		2.0		E537M	10/15/21 12:43 / eli-b
PFDS	ND	ng/L		2.0		E537M	10/15/21 12:43 / eli-b
FOSA	ND	ng/L		2.0		E537M	10/15/21 12:43 / eli-b
NEtFOSAA	ND	ng/L		3.0		E537M	10/15/21 12:43 / eli-b
NMeFOSAA	ND	ng/L		2.0		E537M	10/15/21 12:43 / eli-b
8:2 FTS	ND	ng/L		3.0		E537M	10/15/21 12:43 / eli-b
4:2 FTS	ND	ng/L		2.0		E537M	10/15/21 12:43 / eli-b
6:2 FTS	ND	ng/L		8.0		E537M	10/15/21 12:43 / eli-b
11Cl-PF3OUdS	ND	ng/L		2.0		E537M	10/15/21 12:43 / eli-b
ADONA	ND	ng/L		2.0		E537M	10/15/21 12:43 / eli-b
9Cl-PF3ONS	ND	ng/L		2.0		E537M	10/15/21 12:43 / eli-b
HFPO-DA	ND	ng/L		3.0		E537M	10/15/21 12:43 / eli-b
IS: M4PFBA	123	%REC		50-150		E537M	10/15/21 12:43 / eli-b
IS: M3PFHxS	122	%REC		50-150		E537M	10/15/21 12:43 / eli-b
IS: M4PFHpA	124	%REC		50-150		E537M	10/15/21 12:43 / eli-b
IS: M8PFOA	120	%REC		50-150		E537M	10/15/21 12:43 / eli-b
IS: M9PFNA	124	%REC		50-150		E537M	10/15/21 12:43 / eli-b
IS: M6PFDA	123	%REC		50-150		E537M	10/15/21 12:43 / eli-b
IS: M7PFUnA	115	%REC		50-150		E537M	10/15/21 12:43 / eli-b
IS: M2PFDoA	115	%REC		50-150		E537M	10/15/21 12:43 / eli-b
IS: M2PFTeDA	113	%REC		50-150		E537M	10/15/21 12:43 / eli-b
IS: M3PFBS	114	%REC		50-150		E537M	10/15/21 12:43 / eli-b
IS: M5PFPeA	124	%REC		50-150		E537M	10/15/21 12:43 / eli-b
IS: M5PFHxA	122	%REC		50-150		E537M	10/15/21 12:43 / eli-b
IS: M8PFOS	113	%REC		50-150		E537M	10/15/21 12:43 / eli-b
IS: M8FOSA	108	%REC		50-150		E537M	10/15/21 12:43 / eli-b
IS: d5-N-EtFOSAA	117	%REC		50-150		E537M	10/15/21 12:43 / eli-b

Report Definitions:
RL - Analyte Reporting Limit
QCL - Quality Control Limit
MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ Remediation Division
Project: Helena Groundwater PFAS
Lab ID: H21100261-013
Client Sample ID: Field Blank 1

Report Date: 10/22/21
Collection Date: 10/06/21 09:10
DateReceived: 10/07/21
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PFAS COMPOUNDS IN AQUEOUS MATRICES							
IS: d3-N-MeFOSAA	132	%REC		50-150		E537M	10/15/21 12:43 / eli-b
IS: M2-8:2FTS	147	%REC		50-150		E537M	10/15/21 12:43 / eli-b
IS: M2-4:2FTS	118	%REC		50-150		E537M	10/15/21 12:43 / eli-b
IS: M2-6:2FTS	110	%REC		50-150		E537M	10/15/21 12:43 / eli-b
IS: M3HFPO-DA	119	%REC		50-150		E537M	10/15/21 12:43 / eli-b

Report Definitions:
RL - Analyte Reporting Limit
QCL - Quality Control Limit
MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ Remediation Division
Project: Helena Groundwater PFAS
Lab ID: H21100261-014
Client Sample ID: Field Blank 2

Report Date: 10/22/21
Collection Date: 10/06/21 09:10
DateReceived: 10/07/21
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PFAS COMPOUNDS IN AQUEOUS MATRICES							
PFBA	ND	ng/L		5.0		E537M	10/15/21 15:11 / eli-b
PFPeA	ND	ng/L		2.0		E537M	10/15/21 15:11 / eli-b
PFHxA	ND	ng/L		2.0		E537M	10/15/21 15:11 / eli-b
PFHpA	ND	ng/L		2.0		E537M	10/15/21 15:11 / eli-b
PFOA	ND	ng/L		2.0		E537M	10/15/21 15:11 / eli-b
PFNA	ND	ng/L		2.0		E537M	10/15/21 15:11 / eli-b
PFDA	ND	ng/L		2.0		E537M	10/15/21 15:11 / eli-b
PFUnA	ND	ng/L		2.0		E537M	10/15/21 15:11 / eli-b
PFDoA	ND	ng/L		2.0		E537M	10/15/21 15:11 / eli-b
PFTrDA	ND	ng/L		2.0		E537M	10/15/21 15:11 / eli-b
PFTA	ND	ng/L		2.0		E537M	10/15/21 15:11 / eli-b
PFBS	ND	ng/L		2.0		E537M	10/15/21 15:11 / eli-b
PFPeS	ND	ng/L		2.0		E537M	10/15/21 15:11 / eli-b
PFHxS	ND	ng/L		2.0		E537M	10/15/21 15:11 / eli-b
PFHpS	ND	ng/L		2.0		E537M	10/15/21 15:11 / eli-b
PFOS	ND	ng/L		2.0		E537M	10/15/21 15:11 / eli-b
PFNS	ND	ng/L		2.0		E537M	10/15/21 15:11 / eli-b
PFDS	ND	ng/L		2.0		E537M	10/15/21 15:11 / eli-b
FOSA	ND	ng/L		2.0		E537M	10/15/21 15:11 / eli-b
NEtFOSAA	ND	ng/L		3.0		E537M	10/15/21 15:11 / eli-b
NMeFOSAA	ND	ng/L		2.0		E537M	10/15/21 15:11 / eli-b
8:2 FTS	ND	ng/L		3.0		E537M	10/15/21 15:11 / eli-b
4:2 FTS	ND	ng/L		2.0		E537M	10/15/21 15:11 / eli-b
6:2 FTS	ND	ng/L		8.0		E537M	10/15/21 15:11 / eli-b
11Cl-PF3OUdS	ND	ng/L		2.0		E537M	10/15/21 15:11 / eli-b
ADONA	ND	ng/L		2.0		E537M	10/15/21 15:11 / eli-b
9Cl-PF3ONS	ND	ng/L		2.0		E537M	10/15/21 15:11 / eli-b
HFPO-DA	ND	ng/L		3.0		E537M	10/15/21 15:11 / eli-b
IS: M4PFBA	124	%REC		50-150		E537M	10/15/21 15:11 / eli-b
IS: M3PFHxS	115	%REC		50-150		E537M	10/15/21 15:11 / eli-b
IS: M4PFHpA	127	%REC		50-150		E537M	10/15/21 15:11 / eli-b
IS: M8PFOA	118	%REC		50-150		E537M	10/15/21 15:11 / eli-b
IS: M9PFNA	119	%REC		50-150		E537M	10/15/21 15:11 / eli-b
IS: M6PFDA	129	%REC		50-150		E537M	10/15/21 15:11 / eli-b
IS: M7PFUnA	108	%REC		50-150		E537M	10/15/21 15:11 / eli-b
IS: M2PFDoA	106	%REC		50-150		E537M	10/15/21 15:11 / eli-b
IS: M2PFTeDA	92.0	%REC		50-150		E537M	10/15/21 15:11 / eli-b
IS: M3PFBS	115	%REC		50-150		E537M	10/15/21 15:11 / eli-b
IS: M5PFPeA	126	%REC		50-150		E537M	10/15/21 15:11 / eli-b
IS: M5PFHxA	123	%REC		50-150		E537M	10/15/21 15:11 / eli-b
IS: M8PFOS	123	%REC		50-150		E537M	10/15/21 15:11 / eli-b
IS: M8FOSA	91.0	%REC		50-150		E537M	10/15/21 15:11 / eli-b
IS: d5-N-EtFOSAA	108	%REC		50-150		E537M	10/15/21 15:11 / eli-b

Report Definitions:
RL - Analyte Reporting Limit
QCL - Quality Control Limit
MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ Remediation Division
Project: Helena Groundwater PFAS
Lab ID: H21100261-014
Client Sample ID: Field Blank 2

Report Date: 10/22/21
Collection Date: 10/06/21 09:10
DateReceived: 10/07/21
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PFAS COMPOUNDS IN AQUEOUS MATRICES							
IS: d3-N-MeFOSAA	114	%REC		50-150		E537M	10/15/21 15:11 / eli-b
IS: M2-8:2FTS	118	%REC		50-150		E537M	10/15/21 15:11 / eli-b
IS: M2-4:2FTS	104	%REC		50-150		E537M	10/15/21 15:11 / eli-b
IS: M2-6:2FTS	107	%REC		50-150		E537M	10/15/21 15:11 / eli-b
IS: M3HFPO-DA	125	%REC		50-150		E537M	10/15/21 15:11 / eli-b

Report Definitions:
RL - Analyte Reporting Limit
QCL - Quality Control Limit
MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ Remediation Division
Project: Helena Groundwater PFAS
Lab ID: H21100261-015
Client Sample ID: Field Blank 3

Report Date: 10/22/21
Collection Date: 10/06/21 09:10
DateReceived: 10/07/21
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PFAS COMPOUNDS IN AQUEOUS MATRICES							
PFBA	ND	ng/L		5.0		E537M	10/15/21 17:39 / eli-b
PFPeA	ND	ng/L		2.0		E537M	10/15/21 17:39 / eli-b
PFHxA	ND	ng/L		2.0		E537M	10/15/21 17:39 / eli-b
PFHpA	ND	ng/L		2.0		E537M	10/15/21 17:39 / eli-b
PFOA	ND	ng/L		2.0		E537M	10/15/21 17:39 / eli-b
PFNA	ND	ng/L		2.0		E537M	10/15/21 17:39 / eli-b
PFDA	ND	ng/L		2.0		E537M	10/15/21 17:39 / eli-b
PFUnA	ND	ng/L		2.0		E537M	10/15/21 17:39 / eli-b
PFDoA	ND	ng/L		2.0		E537M	10/15/21 17:39 / eli-b
PFTrDA	ND	ng/L		2.0		E537M	10/15/21 17:39 / eli-b
PFTA	ND	ng/L		2.0		E537M	10/15/21 17:39 / eli-b
PFBS	ND	ng/L		2.0		E537M	10/15/21 17:39 / eli-b
PFPeS	ND	ng/L		2.0		E537M	10/15/21 17:39 / eli-b
PFHxS	ND	ng/L		2.0		E537M	10/15/21 17:39 / eli-b
PFHpS	ND	ng/L		2.0		E537M	10/15/21 17:39 / eli-b
PFOS	ND	ng/L		2.0		E537M	10/15/21 17:39 / eli-b
PFNS	ND	ng/L		2.0		E537M	10/15/21 17:39 / eli-b
PFDS	ND	ng/L		2.0		E537M	10/15/21 17:39 / eli-b
FOSA	ND	ng/L		2.0		E537M	10/15/21 17:39 / eli-b
NEtFOSAA	ND	ng/L		3.0		E537M	10/15/21 17:39 / eli-b
NMeFOSAA	ND	ng/L		2.0		E537M	10/15/21 17:39 / eli-b
8:2 FTS	ND	ng/L		3.0		E537M	10/15/21 17:39 / eli-b
4:2 FTS	ND	ng/L		2.0		E537M	10/15/21 17:39 / eli-b
6:2 FTS	ND	ng/L		8.0		E537M	10/15/21 17:39 / eli-b
11Cl-PF3OUdS	ND	ng/L		2.0		E537M	10/15/21 17:39 / eli-b
ADONA	ND	ng/L		2.0		E537M	10/15/21 17:39 / eli-b
9Cl-PF3ONS	ND	ng/L		2.0		E537M	10/15/21 17:39 / eli-b
HFPO-DA	ND	ng/L		3.0		E537M	10/15/21 17:39 / eli-b
IS: M4PFBA	36.0	%REC	S	50-150		E537M	10/15/21 17:39 / eli-b
IS: M3PFHxS	86.0	%REC		50-150		E537M	10/15/21 17:39 / eli-b
IS: M4PFHpA	40.0	%REC	S	50-150		E537M	10/15/21 17:39 / eli-b
IS: M8PFOA	42.0	%REC	S	50-150		E537M	10/15/21 17:39 / eli-b
IS: M9PFNA	50.0	%REC		50-150		E537M	10/15/21 17:39 / eli-b
IS: M6PFDA	65.0	%REC		50-150		E537M	10/15/21 17:39 / eli-b
IS: M7PFUnA	77.0	%REC		50-150		E537M	10/15/21 17:39 / eli-b
IS: M2PFDoA	101	%REC		50-150		E537M	10/15/21 17:39 / eli-b
IS: M2PFTeDA	105	%REC		50-150		E537M	10/15/21 17:39 / eli-b
IS: M3PFBS	80.0	%REC		50-150		E537M	10/15/21 17:39 / eli-b
IS: M5PFPeA	35.0	%REC	S	50-150		E537M	10/15/21 17:39 / eli-b
IS: M5PFHxA	35.0	%REC	S	50-150		E537M	10/15/21 17:39 / eli-b
IS: M8PFOS	100	%REC		50-150		E537M	10/15/21 17:39 / eli-b
IS: M8FOSA	70.0	%REC		50-150		E537M	10/15/21 17:39 / eli-b
IS: d5-N-EtFOSAA	102	%REC		50-150		E537M	10/15/21 17:39 / eli-b

Report Definitions:
RL - Analyte Reporting Limit
QCL - Quality Control Limit
S - Spike recovery outside of advisory limits
MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ Remediation Division
Project: Helena Groundwater PFAS
Lab ID: H21100261-015
Client Sample ID: Field Blank 3

Report Date: 10/22/21
Collection Date: 10/06/21 09:10
DateReceived: 10/07/21
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PFAS COMPOUNDS IN AQUEOUS MATRICES							
IS: d3-N-MeFOSAA	95.0	%REC		50-150		E537M	10/15/21 17:39 / eli-b
IS: M2-8:2FTS	91.0	%REC		50-150		E537M	10/15/21 17:39 / eli-b
IS: M2-4:2FTS	36.0	%REC	S	50-150		E537M	10/15/21 17:39 / eli-b
IS: M2-6:2FTS	39.0	%REC	S	50-150		E537M	10/15/21 17:39 / eli-b
IS: M3HFPO-DA	31.0	%REC	S	50-150		E537M	10/15/21 17:39 / eli-b

Report Definitions:
RL - Analyte Reporting Limit
QCL - Quality Control Limit
S - Spike recovery outside of advisory limits
MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ Remediation Division **Work Order:** H21100261 **Report Date:** 10/22/21

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E537M										Batch: B_160345
Lab ID: MB-160345	28	Method Blank				Run: SUB-B369035				10/15/21 12:06
PFBA		ND	ng/L	5.0						
PFPeA		ND	ng/L	2.0						
PFHxA		ND	ng/L	2.0						
PFHpA		ND	ng/L	2.0						
PFOA		ND	ng/L	2.0						
PFNA		ND	ng/L	2.0						
PFDA		ND	ng/L	2.0						
PFUnA		ND	ng/L	2.0						
PFDoA		ND	ng/L	2.0						
PFTrDA		ND	ng/L	2.0						
PFTA		ND	ng/L	2.0						
PFBS		ND	ng/L	2.0						
PFPeS		ND	ng/L	2.0						
PFHxS		ND	ng/L	2.0						
PFHpS		ND	ng/L	2.0						
PFOS		ND	ng/L	2.0						
PFNS		ND	ng/L	2.0						
PFDS		ND	ng/L	2.0						
FOSA		ND	ng/L	2.0						
NEtFOSAA		ND	ng/L	3.0						
NMeFOSAA		ND	ng/L	2.0						
8:2 FTS		ND	ng/L	3.0						
4:2 FTS		ND	ng/L	2.0						
6:2 FTS		ND	ng/L	8.0						
11Cl-PF3OUdS		ND	ng/L	2.0						
ADONA		ND	ng/L	2.0						
9Cl-PF3ONS		ND	ng/L	2.0						
HFPO-DA		ND	ng/L	3.0						
Lab ID: LCS-160345	28	Laboratory Control Sample				Run: SUB-B369035				10/15/21 12:24
PFBA		29	ng/L	5.0	96	73	129			
PFPeA		29	ng/L	2.0	96	72	129			
PFHxA		26	ng/L	2.0	87	72	129			
PFHpA		29	ng/L	2.0	97	72	130			
PFOA		31	ng/L	2.0	103	71	133			
PFNA		29	ng/L	2.0	96	69	130			
PFDA		27	ng/L	2.0	90	71	129			
PFUnA		29	ng/L	2.0	97	69	133			
PFDoA		28	ng/L	2.0	93	72	134			
PFTrDA		31	ng/L	2.0	102	65	144			
PFTA		30	ng/L	2.0	98	71	132			
PFBS		26	ng/L	2.0	98	72	130			
PFPeS		28	ng/L	2.0	100	71	127			
PFHxS		26	ng/L	2.0	94	68	131			
PFHpS		27	ng/L	2.0	93	69	134			

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ Remediation Division **Work Order:** H21100261 **Report Date:** 10/22/21

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E537M										Batch: B_160345
Lab ID: LCS-160345	28	Laboratory Control Sample				Run: SUB-B369035				10/15/21 12:24
PFOS		27	ng/L	2.0	96	65	140			
PFNS		27	ng/L	2.0	94	69	127			
PFDS		27	ng/L	2.0	93	53	142			
FOSA		32	ng/L	2.0	106	67	137			
NEtFOSAA		31	ng/L	3.0	105	61	135			
NMeFOSAA		35	ng/L	2.0	118	65	136			
8:2 FTS		26	ng/L	3.0	91	67	138			
4:2 FTS		28	ng/L	2.0	101	63	143			
6:2 FTS		29	ng/L	8.0	102	64	140			
11Cl-PF3OUdS		26	ng/L	2.0	90	70	130			
ADONA		28	ng/L	2.0	97	70	130			
9Cl-PF3ONS		26	ng/L	2.0	92	70	130			
HFPO-DA		26	ng/L	3.0	86	70	130			
Lab ID: H21100261-001A	28	Sample Matrix Spike				Run: SUB-B369035				10/15/21 14:16
PFBA		37	ng/L	5.0	90	73	129			
PFPeA		40	ng/L	2.0	89	72	129			
PFHxA		43	ng/L	2.0	69	72	129			S
PFHpA		32	ng/L	2.0	94	72	130			
PFOA		39	ng/L	2.0	80	71	133			
PFNA		25	ng/L	2.0	94	69	130			
PFDA		25	ng/L	2.0	94	71	129			
PFUnA		25	ng/L	2.0	93	69	133			
PFDoA		24	ng/L	2.0	90	72	134			
PFTrDA		24	ng/L	2.0	90	65	144			
PFTA		24	ng/L	2.0	90	71	132			
PFBS		22	ng/L	2.0	87	72	130			
PFPeS		27	ng/L	2.0	111	71	127			
PFHxS		25	ng/L	2.0	96	68	131			
PFHpS		23	ng/L	2.0	92	69	134			
PFOS		29	ng/L	2.0	94	65	140			
PFNS		23	ng/L	2.0	92	69	127			
PFDS		23	ng/L	2.0	89	53	142			
FOSA		27	ng/L	2.0	102	67	137			
NEtFOSAA		41	ng/L	3.0	90	61	135			
NMeFOSAA		23	ng/L	2.0	88	65	136			
8:2 FTS		25	ng/L	3.0	98	67	138			
4:2 FTS		24	ng/L	2.0	97	63	143			
6:2 FTS		23	ng/L	8.0	90	64	140			
11Cl-PF3OUdS		21	ng/L	2.0	85	70	130			
ADONA		22	ng/L	2.0	87	70	130			
9Cl-PF3ONS		22	ng/L	2.0	89	70	130			
HFPO-DA		22	ng/L	3.0	82	70	130			

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

S - Spike recovery outside of advisory limits

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ Remediation Division **Work Order:** H21100261 **Report Date:** 10/22/21

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: **E537M**										Batch: B_160345
Lab ID: **H21100261-001A**	28	Sample Matrix Spike Duplicate				Run: SUB-B369035			10/15/21 14:34	
PFBA		37	ng/L	5.0	88	73	129	0.6	30	
PFPeA		40	ng/L	2.0	88	72	129	0.9	30	
PFHxA		47	ng/L	2.0	78	72	129	6.9	30	
PFHpA		31	ng/L	2.0	88	72	130	2.7	30	
PFOA		43	ng/L	2.0	94	71	133	11	30	
PFNA		25	ng/L	2.0	93	69	130	2.1	30	
PFDA		25	ng/L	2.0	91	71	129	0.1	30	
PFUnA		24	ng/L	2.0	89	69	133	1.0	30	
PFDoA		26	ng/L	2.0	94	72	134	7.4	30	
PFTrDA		24	ng/L	2.0	87	65	144	0.9	30	
PFTA		25	ng/L	2.0	92	71	132	4.9	30	
PFBS		23	ng/L	2.0	87	72	130	2.9	30	
PFPeS		27	ng/L	2.0	104	71	127	2.7	30	
PFHxS		25	ng/L	2.0	92	68	131	0.5	30	
PFHpS		22	ng/L	2.0	86	69	134	3.5	30	
PFOS		30	ng/L	2.0	94	65	140	2.9	30	
PFNS		22	ng/L	2.0	83	69	127	6.3	30	
PFDS		23	ng/L	2.0	86	53	142	0.8	30	
FOSA		26	ng/L	2.0	94	67	137	4.2	30	
NEtFOSAA		43	ng/L	3.0	94	61	135	4.4	30	
NMeFOSAA		24	ng/L	2.0	89	65	136	4.4	30	
8:2 FTS		24	ng/L	3.0	93	67	138	1.2	30	
4:2 FTS		22	ng/L	2.0	86	63	143	9.1	30	
6:2 FTS		19	ng/L	8.0	74	64	140	15	30	
11Cl-PF3OUdS		21	ng/L	2.0	80	70	130	2.2	30	
ADONA		21	ng/L	2.0	81	70	130	4.2	30	
9Cl-PF3ONS		22	ng/L	2.0	86	70	130	0.2	30	
HFPO-DA		22	ng/L	3.0	80	70	130	1.1	30	
Lab ID: **H21100261-005A**	28	Sample Duplicate				Run: SUB-B369035			10/15/21 18:35	
PFBA		4.6	ng/L	5.0				0.0	30	
PFPeA		2.4	ng/L	2.0				0.0	30	
PFHxA		2.4	ng/L	2.0				0.0	30	
PFHpA		1.2	ng/L	2.0				0.0	30	
PFOA		3.0	ng/L	2.0				0.0	30	
PFNA		ND	ng/L	2.0				0.0	30	
PFDA		ND	ng/L	2.0				0.0	30	
PFUnA		ND	ng/L	2.0				0.0	30	
PFDoA		ND	ng/L	2.0				0.0	30	
PFTrDA		ND	ng/L	2.0				0.0	30	
PFTA		ND	ng/L	2.0				0.0	30	
PFBS		3.8	ng/L	2.0				0.0	30	
PFPeS		ND	ng/L	2.0				0.0	30	
PFHxS		2.4	ng/L	2.0				0.0	30	
PFHpS		ND	ng/L	2.0				0.0	30	

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ Remediation Division **Work Order:** H21100261 **Report Date:** 10/22/21

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E537M										Batch: B_160345
Lab ID: H21100261-005A	28	Sample Duplicate				Run: SUB-B369035				10/15/21 18:35
PFOS		6.7	ng/L	2.0				0.0	30	
PFNS		ND	ng/L	2.0				0.0	30	
PFDS		ND	ng/L	2.0				0.0	30	
FOSA		ND	ng/L	2.0				0.0	30	
NEtFOSAA		ND	ng/L	3.0				0.0	30	
NMeFOSAA		ND	ng/L	2.0				0.0	30	
8:2 FTS		ND	ng/L	3.0				0.0	30	
4:2 FTS		ND	ng/L	2.0				0.0	30	
6:2 FTS		ND	ng/L	8.0				0.0	30	
11Cl-PF3OUdS		ND	ng/L	2.0				0.0	30	
ADONA		ND	ng/L	2.0				0.0	30	
9Cl-PF3ONS		ND	ng/L	2.0				0.0	30	
HFPO-DA		ND	ng/L	3.0				0.0	30	
Lab ID: MB-160345	20	Method Blank				Run: SUB-B369035				10/15/21 12:06
IS: M4PFBA		0.97	% Recovery		97	50	150			
IS: M3PFHxS		0.93	% Recovery		93	50	150			
IS: M4PFHpA		1.0	% Recovery		100	50	150			
IS: M8PFOA		0.95	% Recovery		95	50	150			
IS: M9PFNA		0.93	% Recovery		93	50	150			
IS: M6PFDA		1.0	% Recovery		103	50	150			
IS: M7PFUnA		0.90	% Recovery		90	50	150			
IS: M2PFDoA		0.98	% Recovery		98	50	150			
IS: M2PFTeDA		0.76	% Recovery		76	50	150			
IS: M3PFBS		0.93	% Recovery		93	50	150			
IS: M5PFPeA		1.0	% Recovery		100	50	150			
IS: M5PFHxA		1.0	% Recovery		101	50	150			
IS: M8PFOS		0.93	% Recovery		93	50	150			
IS: M8FOSA		0.89	% Recovery		89	50	150			
IS: d5-N-EtFOSAA		0.86	% Recovery		86	50	150			
IS: d3-N-MeFOSAA		0.85	% Recovery		85	50	150			
IS: M2-8:2FTS		0.95	% Recovery		95	50	150			
IS: M2-4:2FTS		0.89	% Recovery		89	50	150			
IS: M2-6:2FTS		0.87	% Recovery		87	50	150			
IS: M3HFPO-DA		0.96	% Recovery		96	50	150			
Lab ID: LCS-160345	20	Laboratory Control Sample				Run: SUB-B369035				10/15/21 12:24
IS: M4PFBA		0.99	% Recovery		99	50	150			
IS: M3PFHxS		0.93	% Recovery		93	50	150			
IS: M4PFHpA		1.0	% Recovery		100	50	150			
IS: M8PFOA		1.0	% Recovery		100	50	150			
IS: M9PFNA		0.98	% Recovery		98	50	150			
IS: M6PFDA		0.97	% Recovery		97	50	150			
IS: M7PFUnA		0.90	% Recovery		90	50	150			
IS: M2PFDoA		0.93	% Recovery		93	50	150			

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ Remediation Division **Work Order:** H21100261 **Report Date:** 10/22/21

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E537M										Batch: B_160345
Lab ID: LCS-160345	20	Laboratory Control Sample				Run: SUB-B369035				10/15/21 12:24
IS: M2PFTeDA		0.94	% Recovery		94	50	150			
IS: M3PFBS		0.93	% Recovery		93	50	150			
IS: M5PFPeA		1.0	% Recovery		103	50	150			
IS: M5PFHxA		1.0	% Recovery		100	50	150			
IS: M8PFOS		1.0	% Recovery		102	50	150			
IS: M8FOSA		0.85	% Recovery		85	50	150			
IS: d5-N-EtFOSAA		0.84	% Recovery		84	50	150			
IS: d3-N-MeFOSAA		0.79	% Recovery		79	50	150			
IS: M2-8:2FTS		1.0	% Recovery		101	50	150			
IS: M2-4:2FTS		0.95	% Recovery		95	50	150			
IS: M2-6:2FTS		0.95	% Recovery		95	50	150			
IS: M3HFPO-DA		1.0	% Recovery		103	50	150			
Lab ID: H21100261-001A	20	Sample Matrix Spike				Run: SUB-B369035				10/15/21 14:16
IS: M4PFBA		0.58	% Recovery		66	50	150			
IS: M3PFHxS		0.97	% Recovery		111	50	150			
IS: M4PFHpA		1.2	% Recovery		137	50	150			
IS: M8PFOA		1.3	% Recovery		143	50	150			
IS: M9PFNA		1.2	% Recovery		133	50	150			
IS: M6PFDA		1.2	% Recovery		137	50	150			
IS: M7PFUnA		0.96	% Recovery		109	50	150			
IS: M2PFDoA		1.1	% Recovery		124	50	150			
IS: M2PFTeDA		1.0	% Recovery		119	50	150			
IS: M3PFBS		0.96	% Recovery		109	50	150			
IS: M5PFPeA		0.86	% Recovery		98	50	150			
IS: M5PFHxA		0.97	% Recovery		110	50	150			
IS: M8PFOS		0.97	% Recovery		110	50	150			
IS: M8FOSA		0.55	% Recovery		62	50	150			
IS: d5-N-EtFOSAA		1.1	% Recovery		123	50	150			
IS: d3-N-MeFOSAA		1.1	% Recovery		126	50	150			
IS: M2-8:2FTS		1.8	% Recovery		210	50	150			S
IS: M2-4:2FTS		2.1	% Recovery		236	50	150			S
IS: M2-6:2FTS		1.6	% Recovery		180	50	150			S
IS: M3HFPO-DA		1.0	% Recovery		116	50	150			
Lab ID: H21100261-001A	20	Sample Matrix Spike Duplicate				Run: SUB-B369035				10/15/21 14:34
IS: M4PFBA		0.57	% Recovery		63	50	150			
IS: M3PFHxS		0.92	% Recovery		101	50	150			
IS: M4PFHpA		1.1	% Recovery		124	50	150			
IS: M8PFOA		1.1	% Recovery		123	50	150			
IS: M9PFNA		1.0	% Recovery		113	50	150			
IS: M6PFDA		1.1	% Recovery		122	50	150			
IS: M7PFUnA		0.97	% Recovery		106	50	150			
IS: M2PFDoA		1.0	% Recovery		113	50	150			
IS: M2PFTeDA		1.0	% Recovery		110	50	150			

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

S - Spike recovery outside of advisory limits

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ Remediation Division **Work Order:** H21100261 **Report Date:** 10/22/21

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E537M										Batch: B_160345
Lab ID: H21100261-001A	20	Sample Matrix Spike Duplicate				Run: SUB-B369035				10/15/21 14:34
IS: M3PFBS		0.92	% Recovery		101	50	150			
IS: M5PFPeA		0.83	% Recovery		91	50	150			
IS: M5PFHxA		0.93	% Recovery		102	50	150			
IS: M8PFOS		0.99	% Recovery		108	50	150			
IS: M8FOSA		0.69	% Recovery		76	50	150			
IS: d5-N-EtFOSAA		1.0	% Recovery		111	50	150			
IS: d3-N-MeFOSAA		0.99	% Recovery		109	50	150			
IS: M2-8:2FTS		1.4	% Recovery		155	50	150			S
IS: M2-4:2FTS		2.0	% Recovery		222	50	150			S
IS: M2-6:2FTS		1.7	% Recovery		183	50	150			S
IS: M3HFPO-DA		1.0	% Recovery		110	50	150			
Lab ID: H21100261-005A	20	Sample Duplicate				Run: SUB-B369035				10/15/21 18:35
IS: M4PFBA		0.59	% Recovery		67	50	150			
IS: M3PFHxS		0.97	% Recovery		110	50	150			
IS: M4PFHpA		1.1	% Recovery		125	50	150			
IS: M8PFOA		1.1	% Recovery		128	50	150			
IS: M9PFNA		0.97	% Recovery		110	50	150			
IS: M6PFDA		0.95	% Recovery		108	50	150			
IS: M7PFUnA		0.64	% Recovery		73	50	150			
IS: M2PFDoA		0.53	% Recovery		60	50	150			
IS: M2PFTeDA		0.54	% Recovery		62	50	150			
IS: M3PFBS		0.96	% Recovery		109	50	150			
IS: M5PFPeA		0.95	% Recovery		108	50	150			
IS: M5PFHxA		1.0	% Recovery		119	50	150			
IS: M8PFOS		0.88	% Recovery		100	50	150			
IS: M8FOSA		0.86	% Recovery		98	50	150			
IS: d5-N-EtFOSAA		0.61	% Recovery		70	50	150			
IS: d3-N-MeFOSAA		0.71	% Recovery		81	50	150			
IS: M2-8:2FTS		0.98	% Recovery		111	50	150			
IS: M2-4:2FTS		1.5	% Recovery		175	50	150			S
IS: M2-6:2FTS		1.1	% Recovery		120	50	150			
IS: M3HFPO-DA		0.95	% Recovery		108	50	150			

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

S - Spike recovery outside of advisory limits

Work Order Receipt Checklist

MT DEQ Remediation Division

H21100261

Login completed by:	Wanda Johnson	Date Received:	10/7/2021
Reviewed by:	BL2000\jcsmith	Received by:	RAT
Reviewed Date:	10/22/2021	Carrier name:	Hand Del

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on all shipping container(s)/cooler(s)?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on all sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes ☑	No ☐	
Temp Blank received in all shipping container(s)/cooler(s)?	Yes ☑	No ☐	Not Applicable ☐
Container/Temp Blank temperature:	°C See Comments		
Containers requiring zero headspace have no headspace or bubble that is <6mm (1/4").	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	Not Applicable ☑

Standard Reporting Procedures:

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. If moisture corrected, data units are typically noted as –dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

Radiochemical precision results represent a 2-sigma Total Measurement Uncertainty.

Contact and Corrective Action Comments:

Cooler 1 received at 0.6 °C and Cooler 2 received at 2.2 °C both coolers received on ice. wjj 10/7/2021

Chain of Custody & Analytical Request Record

ENERGY LABORATORIES — Trust our People. Trust our Data.

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Account Information *(Billing Information)*

Company/Name	Montana DEQ
Contact	Patrick Skibicki
Phone	
Mailing Address	
City, State, Zip	
Email	PSkibicki@mt.gov
Receive Invoice	☐Hard Copy ☒Email
Receive Report	☐Hard Copy ☒Email
Purchase Order	
Quote	22411
Bottle Order	

Report Information *(if different than Account Information)*

Company/Name	Tetra Tech
Contact	Chris Kelley
Phone	509 715 9074
Mailing Address	
City, State, Zip	
Email	chris.kelley@tetratech.com
Receive Report	☐Hard Copy ☒Email

Special Report/Formats: ☐ LEVEL IV ☐ NELAC ☒ EDD/EDT *(contact laboratory)* ☐ Other

Comments

Project Information

Project Name, PWSID, Permit, etc.	Helena PFAS
Sampler Name	Chris Kelley
Sampler Phone	509 715 9074
Sample Origin State	MT
EPA/State Compliance	☒Yes ☐ No
Lab provided preservatives were used	☐ Yes ☒ No

MINING CLIENTS, please indicate sample type.
*If ore has been processed or refined, call before sending.
☐ Byproduct 11 (e)2 material ☐ Unprocessed ore (NOT ground or refined)*

Matrix Codes
A - Air
W - Water
S - Soils/Solids
V - Vegetation
B - Bioassay
O - Other
DW - Drinking Water

All turnaround times are standard unless marked as RUSH
Energy Laboratories MUST be contacted prior to RUSH sample submittal for charges and scheduling – See Instructions Page

Sample Identification (Name, Location, Interval, etc.)	Collection Date	Collection Time	Number of Containers	Matrix (See Codes Above)	PFAS Method 537m	See Attached	RUSH TAT	ELI LAB ID (Laboratory Use Only)
1 HPFAS_GW-01_20211006	10/6	1315	3	W	X			H21100261
2 HPFAS_GW-05_20211006	10/6	1145	3	W	X			
3 HPFAS_GW-06_20211006	10/6	1045	3	W	X			
4 HPFAS_GW-07_20211006	10/6	0910	3	W	X			
5 HPFAS_GW-08_20211006	10/6	1455	3	W	X			
6 HPFAS_GW-09_20211006	10/6	1155	3	W	X			
7								
8								
9								
10								

Custody Record MUST be signed	Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
	Chris Kelley	10/7/21 1240				
	Relinquished by (print)	Date/Time	Signature	Received by Laboratory (print)	Date/Time	Signature
				Rebecca Todd	10-7-21 1240	

LABORATORY USE ONLY

Shipped By	Cooler ID(s)	Custody Seals	Intact	Receipt Temp	Temp Blank	On Ice	Payment Type	Amount	Receipt Number *(cash/check only)*
hand	2	Y (N) C B	Y N	0.6°C 2.2	(Y) N	(Y) N	CC Cash Check	$	

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All subcontracted data will be clearly notated on your analytical report.

Chain of Custody & Analytical Request Record

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www.energylab.com

Account Information (Billing information)

Company/Name: Montana DEQ
Contact: Patrick Skibicki
Phone:
Mailing Address:
City State, Zip:
Email: PSkibicki@mt.gov
Receive Invoice: ☐Hard Copy ☑Email | Receive Report: ☐Hard Copy ☑Email
Purchase Order: | Quote: 2241 | Bottle Order:

Report Information (if different than Account Information)

Company/Name: ~~Chris Kelley~~ Tetra Tech
Contact: Chris Kelley
Phone: 509 715-9024
Mailing Address:
City, State, Zip:
Email: chris.kelley@tetratech.com
Receive Report: ☐Hard Copy ☑Email
Special Report/Formats:
☐ LEVEL IV ☐ NELAC ☑ EDD/EDT (contact laboratory) ☐ Other

Comments

Project Information

Project Name, PWSID Permit, etc.: Helena PFAS
Sampler Name: Chris Kelley | Sampler Phone: 509 715 9024
Sample Origin State: MT | EPA/State Compliance: ☒ Yes ☐ No
Lab provided preservatives were used: ☐ Yes ☑ No
MINING CLIENTS, please indicate sample type.
*If ore has been processed or refined, call before sending.
☐ Byproduct 11 (e)2 material ☐ Unprocessed ore (NOT ground or refined)*

Matrix Codes
A - Air
W - Water
S - Soils/Solids
V - Vegetation
B - Bioassay
O - Other
DW - Drinking Water

All turnaround times are standard unless marked as RUSH. Energy Laboratories MUST be contacted prior to RUSH sample submittal for charges and scheduling – See Instructions Page

Sample Identification (Name, Location, Interval, etc.)	Collection Date	Collection Time	Number of Containers	Matrix (See Codes Above)	PFAS Method 537m	See Attached	RUSH TAT	ELI LAB ID (Laboratory Use Only)
1 HPFAS_GW-02_20211007	10/7	0945	3	W	X			H21100261
2 HPFAS_GW-03_20211007	10/7	0910	3	W	X			
3 HPFAS_GW-04_20211007	10/7	1100	3	W	X			
4 HPFAS_GW-10_20211007	10/7	1000	3	W	X			
5 HPFAS_GW-11_20211007	10/7	1110	3	W	X			
6 ~~HPFAS_GW-12_20211007~~	~~10/7~~		~~3~~	~~W~~	~~X~~			
7 HPFAS_GW-12_20211006	10/6	1515	3	W	X			
8								
9								
10								

Custody Record MUST be signed	Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
	Chris Kelley	10/7/21 1210				
	Relinquished by (print)	Date/Time	Signature	Received by Laboratory (print)	Date/Time	Signature
				Jessica Dolce	10-7-21 1210	

LABORATORY USE ONLY

Shipped By	Cooler ID(s)	Custody Seals	Intact	Receipt Temp	Temp Blank	On Ice	Payment Type	Amount	Receipt Number (cash/check only)
hand	2	Y (N) C B	Y N	21.0°C 22.2	(Y) N	(Y) N	CC Cash Check	$	

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All subcontracted data will be clearly notated on your analytical report.

APPENDIX E

EQuIS Error Log

EDP Error Log

User Name:Nora.Dwyer

Format Name:MTWMRD

Format Version:1.00.13

EDD File(s):
C:\Users\Nora.Dwyer\OneDrive - Tetra Tech, Inc\Desktop\PFAS_MT-WMRD_EDD_Initial_Field_SurfaceWater_Sediment_Soil.xlsx

Reference Values File: C:\Users\Nora.Dwyer\OneDrive - Tetra Tech, Inc\Desktop\MT-WMRD.rvf

Run Date: 11/23/2021 4:33:22 PM

45 total errors:

Table	Line	Column	Value	Message	Type
TestResultQC_v1	7	chemical_name	Propanoic acid, 2,2,3-trifluoro-3-[1,1,2,2,3,3-hexafluoro-3-(trifluoromethoxy)propoxy]-	Value exceeds field length	ERROR
TestResultQC_v1	16	chemical_name	1-Decanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heneicosafluoro-	Value exceeds field length	ERROR
TestResultQC_v1	22	chemical_name	1-Nonanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,9-nonadecafluoro-	Value exceeds field length	ERROR
TestResultQC_v1	35	chemical_name	Propanoic acid, 2,2,3-trifluoro-3-[1,1,2,2,3,3-hexafluoro-3-(trifluoromethoxy)propoxy]-	Value exceeds field length	ERROR
TestResultQC_v1	44	chemical_name	1-Decanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heneicosafluoro-	Value exceeds field length	ERROR
TestResultQC_v1	50	chemical_name	1-Nonanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,9-nonadecafluoro-	Value exceeds field length	ERROR
TestResultQC_v1	63	chemical_name	Propanoic acid, 2,2,3-trifluoro-3-[1,1,2,2,3,3-hexafluoro-3-(trifluoromethoxy)propoxy]-	Value exceeds field length	ERROR
TestResultQC_v1	72	chemical_name	1-Decanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heneicosafluoro-	Value exceeds field length	ERROR
TestResultQC_v1	78	chemical_name	1-Nonanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,9-nonadecafluoro-	Value exceeds field length	ERROR
TestResultQC_v1	91	chemical_name	Propanoic acid, 2,2,3-trifluoro-3-[1,1,2,2,3,3-hexafluoro-3-(trifluoromethoxy)propoxy]-	Value exceeds field length	ERROR
TestResultQC_v1	100	chemical_name	1-Decanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-	Value exceeds	ERROR

			heneicosafluoro-	field length	
TestResultQC_v1	106	chemical_name	1-Nonanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,9-nonadecafluoro-	Value exceeds field length	ERROR
TestResultQC_v1	119	chemical_name	Propanoic acid, 2,2,3-trifluoro-3-[1,1,2,2,3,3-hexafluoro-3-(trifluoromethoxy)propoxy]-	Value exceeds field length	ERROR
TestResultQC_v1	128	chemical_name	1-Decanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heneicosafluoro-	Value exceeds field length	ERROR
TestResultQC_v1	134	chemical_name	1-Nonanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,9-nonadecafluoro-	Value exceeds field length	ERROR
TestResultQC_v1	147	chemical_name	Propanoic acid, 2,2,3-trifluoro-3-[1,1,2,2,3,3-hexafluoro-3-(trifluoromethoxy)propoxy]-	Value exceeds field length	ERROR
TestResultQC_v1	156	chemical_name	1-Decanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heneicosafluoro-	Value exceeds field length	ERROR
TestResultQC_v1	162	chemical_name	1-Nonanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,9-nonadecafluoro-	Value exceeds field length	ERROR
TestResultQC_v1	175	chemical_name	Propanoic acid, 2,2,3-trifluoro-3-[1,1,2,2,3,3-hexafluoro-3-(trifluoromethoxy)propoxy]-	Value exceeds field length	ERROR
TestResultQC_v1	184	chemical_name	1-Decanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heneicosafluoro-	Value exceeds field length	ERROR
TestResultQC_v1	190	chemical_name	1-Nonanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,9-nonadecafluoro-	Value exceeds field length	ERROR
TestResultQC_v1	203	chemical_name	Propanoic acid, 2,2,3-trifluoro-3-[1,1,2,2,3,3-hexafluoro-3-(trifluoromethoxy)propoxy]-	Value exceeds field length	ERROR
TestResultQC_v1	212	chemical_name	1-Decanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heneicosafluoro-	Value exceeds field length	ERROR
TestResultQC_v1	218	chemical_name	1-Nonanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,9-nonadecafluoro-	Value exceeds	ERROR

				field length	
TestResultQC_v1	231	chemical_name	Propanoic acid, 2,2,3-trifluoro-3-[1,1,2,2,3,3-hexafluoro-3-(trifluoromethoxy)propoxy]-	Value exceeds field length	ERROR
TestResultQC_v1	240	chemical_name	1-Decanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heneicosafluoro-	Value exceeds field length	ERROR
TestResultQC_v1	246	chemical_name	1-Nonanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,9-nonadecafluoro-	Value exceeds field length	ERROR
TestResultQC_v1	259	chemical_name	Propanoic acid, 2,2,3-trifluoro-3-[1,1,2,2,3,3-hexafluoro-3-(trifluoromethoxy)propoxy]-	Value exceeds field length	ERROR
TestResultQC_v1	268	chemical_name	1-Decanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heneicosafluoro-	Value exceeds field length	ERROR
TestResultQC_v1	274	chemical_name	1-Nonanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,9-nonadecafluoro-	Value exceeds field length	ERROR
TestResultQC_v1	287	chemical_name	Propanoic acid, 2,2,3-trifluoro-3-[1,1,2,2,3,3-hexafluoro-3-(trifluoromethoxy)propoxy]-	Value exceeds field length	ERROR
TestResultQC_v1	296	chemical_name	1-Decanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heneicosafluoro-	Value exceeds field length	ERROR
TestResultQC_v1	302	chemical_name	1-Nonanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,9-nonadecafluoro-	Value exceeds field length	ERROR
TestResultQC_v1	315	chemical_name	Propanoic acid, 2,2,3-trifluoro-3-[1,1,2,2,3,3-hexafluoro-3-(trifluoromethoxy)propoxy]-	Value exceeds field length	ERROR
TestResultQC_v1	324	chemical_name	1-Decanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heneicosafluoro-	Value exceeds field length	ERROR
TestResultQC_v1	330	chemical_name	1-Nonanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,9-nonadecafluoro-	Value exceeds field length	ERROR
TestResultQC_v1	343	chemical_name	Propanoic acid, 2,2,3-trifluoro-3-[1,1,2,2,3,3-hexafluoro-3-(trifluoromethoxy)propoxy]-	Value exceeds	ERROR

				field length	
TestResultQC_v1	352	chemical_name	1-Decanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heneicosafluoro-	Value exceeds field length	ERROR
TestResultQC_v1	358	chemical_name	1-Nonanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,9-nonadecafluoro-	Value exceeds field length	ERROR
TestResultQC_v1	371	chemical_name	Propanoic acid, 2,2,3-trifluoro-3-[1,1,2,2,3,3-hexafluoro-3-(trifluoromethoxy)propoxy]-	Value exceeds field length	ERROR
TestResultQC_v1	380	chemical_name	1-Decanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heneicosafluoro-	Value exceeds field length	ERROR
TestResultQC_v1	386	chemical_name	1-Nonanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,9-nonadecafluoro-	Value exceeds field length	ERROR
TestResultQC_v1	399	chemical_name	Propanoic acid, 2,2,3-trifluoro-3-[1,1,2,2,3,3-hexafluoro-3-(trifluoromethoxy)propoxy]-	Value exceeds field length	ERROR
TestResultQC_v1	408	chemical_name	1-Decanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heneicosafluoro-	Value exceeds field length	ERROR
TestResultQC_v1	414	chemical_name	1-Nonanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,9-nonadecafluoro-	Value exceeds field length	ERROR