2018 ANNUAL GROUNDWATER MONITORING REPORT
MONTANA DEPARTMENT OF TRANSPORTATION
MAINTENANCE FACILITY
PLAINS, MONTANA

Prepared for:

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In Response to:

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Environmental Services, Groundwater Investigation
Montana Department of Transportation
Plains Maintenance Facility
Sanders County, MT

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1.0 INTRODUCTION

Hydrometrics, Inc. was contracted by the Montana Department of Transportation (MDT) to monitor groundwater contamination emanating from stockpiled sand/salt (used for highway maintenance in the winter) at the MDT facility in Plains, MT during 2017 and 2018. This report describes results of groundwater monitoring conducted in 2018. Results of groundwater monitoring in previous years (2012-2017) is described in Water and Environmental Technologies (2014) and Hydrometrics (2017).

Hydrometrics completed the following tasks in 2018:

- Conducted three groundwater monitoring events, in January, April, and July 2018.
- All groundwater samples were collected from a tap or hydrant closest to the water well.
- Measured water quality field parameters (pH, temperature, specific conductivity (SC), and dissolved oxygen) with a calibrated meter during well purging and recorded stabilized readings on appropriate field sampling forms.
- Submitted groundwater samples under chain-of-custody protocol to a DEQ-accredited laboratory (Energy Labs) for analysis of calcium, magnesium, chloride, sodium, pH, total dissolved solids (TDS), and SC.
- Prepared a report after completing three sampling events (this report).

1.1 BACKGROUND AND SITE DESCRIPTION

The MDT site is located in Section 22, T20N, Range 26W, approximately one mile northwest of Plains, Montana on Lynch Creek Road. Neighboring properties consist of an auto repair shop, a USDA office, private residences, and agricultural land. In 2018, groundwater samples were collected from 17 to 21 wells during monitoring events. Locations of wells are shown on Figure 1-1.

Previous monitoring has documented elevated chloride levels in shallow groundwater at the site (Water and Environment, 2014; Hydrometrics, 2016; and Hydrometrics, 2017). The current monitoring was completed under contract SPB12-2177V approved by the MDT. This 2017 and 2018 investigation was completed to further define the scope and extent of a chloride groundwater plume documented by previous monitoring.

The site is situated on flat to gently sloping topography underlain by alluvial gravel deposits associated with the Clark Fork River. The Clark Fork River is located approximately 1.5 miles to the west. Based on well logs from the Haun, Leichtnam, and Weeks replacement wells installed in 2018, the hydrostratigraphy of the area consists of the following units:

- A shallow aquifer composed of alluvial gravel, sand, and silt that extends to approximately 30 feet below ground surface (bgs), overlying;
- A shallow aquitard composed of fine silt and clay that extends to a depth of approximately 150 feet bgs, overlying; and
- Silt, sand, and gravel layers of unknown thickness and lateral extent.

The salt plume occurs in the shallow sand and gravel aquifer and all wells in the area that are monitored are completed in this unit with the exception of the new Haun, Leichtnam, and Weeks replacement wells which are completed in the deep sand and gravel aquifers.

MDT PLAINS MAINTENANCE FACILITY	**WELL LOCATIONS**	FIGURE 1-1

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Hydrometrics, Inc.
Consulting Scientists and Engineers

2.0 GROUNDWATER MONITORING

Fourteen wells identified in the Water and Environmental Technologies 2014 report plus seven additional wells added during 2018 (Figure 1-1) were monitored during January, April, and July 2018. Additional sampling was conducted by Hydrometrics and by MDT on replacement wells (deep aquifer) for three residences (Haun, Leichtnam, and Weeks) several times during the year. Water treatment systems were installed on these three wells by MDT. Raw and treated water samples were collected from these deep aquifer replacement wells by MDT on September 21, 2018 and sampling results are included in this report.

Wells were purged until field parameters (temperature, SC, and pH) stabilized. Water quality parameters were recorded on field sheets included in Appendix A. Field and laboratory analytical results are tabulated in Table 4-1. Samples analyzed for Ca, Mg, and Na were filtered and preserved with acid in the field. One duplicate sample was taken per monitoring event for QA/QC purposes. Samples were shipped to and analyzed by Energy Laboratories in Helena, Montana.

3.0 GROUNDWATER FLOW DIRECTION

Water levels were measured during the monitoring events in 2017 and prior years with an electric probe from several wells. In 2018, Hydrometrics was instructed to no longer use a probe and groundwater measurements were discontinued for most monitoring events. During the July 2018 event, water levels were measured with a sonic meter. Past water level data (see WET, 2014) and groundwater concentration data suggests that the contaminant plume movement has been and continues to be primarily to the north and northwest, roughly paralleling Highway 200. Local variations/heterogeneities in aquifer permeability and seasonal variations in groundwater levels and flow direction may result in periodic minor changes in flow paths.

4.0 ANALYTICAL RESULTS

Analytical data are summarized in Table 4-1 and laboratory reports are provided in Appendix B. Spatial variations in TDS, chloride, and SC for April and July 2018 are shown on Figures 4-1 through 4-6. Concentration trend graphs for TDS, chloride, and SC are included in Appendix C. Mann Kendall Trend tests are in Appendix D and are summarized in Table 4-2.

Data indicate the chloride plume boundary may continue downgradient beyond the sampling area and there may be some variation in the width of the plume seasonally. Chloride concentrations in the Meredith, Sears, Newman, Wood, and Vanderwall wells appear to be close to the northeast boundary of the plume as these wells are at or below 40 mg/L chloride which is significantly below levels in wells clearly affected by the plume. The west/northwest boundary of the plume is open, as no downgradient well was sampled that indicated an end to the plume (i.e., where chloride levels are near background levels of approximately 30 mg/L) in this direction. However, the extent of the plume that exceeds federal secondary drinking water standards (secondary maximum contaminant limit or SMCL of 250 mg/L) for chloride, SC greater than 1,000 microSiemens per centimeter (µS/cm), and/or TDS greater than 500 mg/L is defined by the data collected from the wells.

Currently, nine wells have been identified that exceed the secondary drinking water standard for chloride (250 mg/L). The number of wells exceeding the standard has increased as additional wells have been added to the monitoring network and as additional monitoring events have occurred. A summary of wells exceeding the secondary drinking water standard for chloride is as follows:

- Wells exceeding the standard in groundwater samples for the December 2016 event were Weeks (shallow), MDT, Haun (shallow), and Abrams-USDA wells.
- In 2017, these four wells plus the Meredith, Sears, Abrams, Anthony, and Leichtnam (shallow) wells exceeded the secondary drinking water standard for chloride.

TABLE 4-1. FIELD AND ANALYTICAL RESULTS
MDT MAINTENANCE FACILITY - PLAINS, MT

Site Location		Sample ID	Lab Sample ID	Collection Date	Static Water Levels (feet)	Field ORP (mV)	Field DO (mg/L)	Field PH (s.u.)	Field SC (umhos/cm)	Field Turbidity	Field Temperature (°C)	pH (s.u.)	pH Measurement Temp (°C)	Conductivity @ 25 C (umhos/cm)	Solids, Total Dissolved TDS @ 180 C (mg/L)	Alkalinity (mg/L)	Bicarbonate (mg/L)	Carbonate (mg/L)	Chloride (mg/L)
MDT Plains Shop	2 Lower Lynch Creek Rd, (facility well)	--	--	11/27/1996	--	--	--	--	--	--	--	7.7	--	435	221	185	226	--	12
MDT Plains Shop	2 Lower Lynch Creek Rd, (facility well)	--	--	7/16/2012	--	--	--	--	1227	--	--	7.4	--	**1250**	**688**	220	--	--	**260**
County Airport	--	--	--	9/27/2012	--	--	--	--	380	--	--	--	--	**--**	**--**	--	--	--	**--**
Gary's Glass and Auto Body	7493 MT Highway 200 (commercial)	--	--	9/27/2012	--	--	--	--	526	--	--	7.4	--	533	293	200	240	<4	34
MDT Plains Shop	2 Lower Lynch Creek Rd, (facility well)	--	--	9/27/2012	--	--	--	--	1207	--	--	7.4	--	**1660**	**911**	200	240	<4	**400**
RTI, Inc.	--	--	--	9/27/2012	--	--	--	--	968	--	--	7.4	--	603	340	220	270	<4	44
Wood	Leslie & Beverly (residence), 16 Kruger Road	--	--	9/27/2012	--	--	--	--	462	--	--	7.5	--	466	273	180	210	<4	25
Clark Fork Valley Hospital	--	--	--	10/23/2012	--	--	--	--	486	--	--	7.2	--	493	266	190	230	<4	31
Davis	Greg & Deb (residence), 12 Lower Lynch Creek Road	--	--	10/23/2012	--	--	--	--	602	--	--	7.5	--	619	329	210	250	<4	60
First Security Bank	--	--	--	10/23/2012	--	--	--	--	328	--	--	7.8	--	397	217	180	210	7	9
Weeks Shallow	Jim & Julie (residence), 15 Lower Lynch Creek Rd	--	--	10/23/2012	--	--	--	--	--	--	--	7.4	--	988	496	220	270	<4	180
Abrams	Mike and Donna (residence), 4 Howells Lane	--	--	3/27/2013	--	--	5.58	7.12	967	--	10.47	7.4	--	**1020**	**512**	260	320	<4	140
Abrams - USDA Building	7485 MT Highway 200, (commercial)	--	--	3/27/2013	--	--	6.51	7.34	829	--	11.31	7.6	--	911	421	210	250	<4	130
Anthony	Jack and Deanna (residence), 3 Howells Lane	--	--	3/27/2013	--	--	7.38	7.2	990	--	10.45	7.4	--	**1050**	**509**	270	330	<4	150
Gary's Glass and Auto Body	7493 MT Highway 200 (commercial)	--	--	3/27/2013	--	--	7.88	7.14	527	--	10.25	7.4	--	560	291	200	240	<4	37
Haun Shallow	William (residence), 7491 MT Highway 200	--	--	3/27/2013	--	--	6.26	7.22	1077	--	9.7	7.5	--	**1140**	**579**	230	270	<4	190
Joner	Greg and Kimberly (residence), 7479 MT Highway 200	--	--	3/27/2013	--	--	6.7	7.36	787	--	10.63	7.5	--	832	428	230	280	<4	100
MDT Plains Shop	2 Lower Lynch Creek Rd, (facility well)	--	--	3/27/2013	--	--	6.78	7.14	1939	--	10.78	7.3	--	**2050**	**876**	210	260	<4	**490**
Merideth	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	--	--	3/27/2013	--	--	6.51	7.34	829	--	11.31	--	--	**--**	**--**	--	--	--	**--**
Vanderwall	Zach and Courtney (residence), 11 Smiling Tree Lane	--	--	3/27/2013	--	--	6.51	7.34	829	--	11.31	--	--	**--**	**--**	--	--	--	**--**
Weeks Shallow	Jim & Julie (residence), 15 Lower Lynch Creek Rd	--	--	3/27/2013	--	--	6.46	7.22	924	--	10.86	7.4	--	978	**505**	210	260	<4	160
Wood	Leslie & Beverly (residence), 16 Kruger Road	--	--	3/27/2013	--	--	5.87	7.28	484	--	11.22	7.5	--	265	265	190	220	<4	31
Abrams	Mike and Donna (residence), 4 Howells Lane	--	--	6/11/2013	--	--	4.86	7.05	958	--	13.69	7.6	--	**1010**	496	240	290	<4	160
Abrams - USDA Building	7485 MT Highway 200, (commercial)	--	--	6/11/2013	--	--	7.01	7.14	913	--	11.12	7.8	--	952	446	220	260	<4	160
Anthony	Jack and Deanna (residence), 3 Howells Lane	--	--	6/11/2013	--	--	5.45	7.02	988	--	10.9	7.6	--	**1040**	**504**	250	310	<4	170
Haun Shallow	William (residence), 7491 MT Highway 200	--	--	6/11/2013	--	--	6.44	7.13	1000	--	10.55	7.7	--	**1050**	**533**	230	280	<4	190
Joner	Greg and Kimberly (residence), 7479 MT Highway 200	--	--	6/11/2013	--	--	6.18	7.04	802	--	10.66	7.6	--	844	445	230	270	<4	110
MDT Plains Shop	2 Lower Lynch Creek Rd, (facility well)	--	--	6/11/2013	--	--	6.58	6.72	4317	--	12.06	7.3	--	**4550**	**2440**	220	260	<4	**1400**
Merideth	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	--	--	6/11/2013	--	--	5.36	7.23	1227	--	11.21	7.8	--	**1280**	**641**	220	260	<4	**270**
Vanderwall	Zach and Courtney (residence), 11 Smiling Tree Lane	--	--	6/11/2013	--	--	4.57	5.88	705	--	10.77	7.7	--	746	392	240	290	<4	77
Weeks Shallow	Jim & Julie (residence), 15 Lower Lynch Creek Rd	--	--	6/11/2013	--	--	6.24	7.01	933	--	10.68	7.4	--	982	483	210	260	<4	170
Wood	Leslie & Beverly (residence), 16 Kruger Road	--	--	6/11/2013	--	--	6.33	7.08	500	--	10.63	7.7	--	523	266	200	240	<4	35
Abrams	Mike and Donna (residence), 4 Howells Lane	--	--	9/26/2013	--	--	5.39	7.08	967	--	13.79	7.4	--	986	**532**	260	320	<4	150
Abrams - USDA Building	7485 MT Highway 200, (commercial)	--	--	9/26/2013	--	--	6.22	7.23	848	--	13.59	7.6	--	865	464	210	250	<4	140
Anthony	Jack and Deanna (residence), 3 Howells Lane	--	--	9/26/2013	--	--	6.45	7.22	952	--	13.79	7.4	--	964	**520**	270	330	<4	140
Davis	Greg & Deb (residence), 12 Lower Lynch Creek Road	--	--	9/26/2013	--	--	5.93	7.28	543	--	12.72	7.6	--	561	306	230	270	<4	43
Haun Shallow	William (residence), 7491 MT Highway 200	--	--	9/26/2013	--	--	4.19	7.03	1062	--	13.63	7.5	--	**1090**	**588**	230	290	<4	200
MDT Plains Shop	2 Lower Lynch Creek Rd, (facility well)	--	--	9/26/2013	--	--	6.31	6.72	2621	--	13.89	7.2	--	**2730**	**1460**	220	270	<4	**770**
Merideth	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	--	--	9/26/2013	--	--	2.12	7.25	623	--	12.41	7.6	--	641	356	230	270	6	58
Vanderwall	Zach and Courtney (residence), 11 Smiling Tree Lane	--	--	9/26/2013	--	--	3.49	7.34	646	--	13.97	7.6	--	660	380	230	290	<4	62
Weeks Shallow	Jim & Julie (residence), 15 Lower Lynch Creek Rd	--	--	9/26/2013	--	--	5.12	6.97	884	--	12.34	7.4	--	912	466	210	260	<4	150
Wood	Leslie & Beverly (residence), 16 Kruger Road	--	--	9/26/2013	--	--	5.41	6.95	476	--	12.69	7.5	--	490	270	210	250	<4	31
Sears	Lyla (residence), 131 Lower Lynch Creek Rd	--	--	9/26/2013	--	--	1.42	7.04	594	--	11.8	7.5	--	613	346	240	280	4	43
Eldridge	Scott (residence), 22 Lyla Ln	--	--	9/26/2013	--	--	4.61	7.52	420	--	15.66	7.6	--	436	256	190	220	<4	17
Abrams	Mike and Donna (residence), 4 Howells Lane	--	--	12/18/2013	--	--	6.2	6.74	1018	--	12.14	7.4	--	**1080**	**551**	290	350	<4	140
Abrams - USDA Building	7485 MT Highway 200, (commercial)	--	--	12/18/2013	--	--	6.36	7.12	799	--	11.53	7.6	--	856	428	220	270	<4	120
Anthony	Jack and Deanna (residence), 3 Howells Lane	--	--	12/18/2013	--	--	6.13	6.51	1010	--	9.79	7.4	--	**1070**	**543**	300	370	<4	140
Davis	Greg & Deb (residence), 12 Lower Lynch Creek Road	--	--	12/18/2013	--	--	5.61	6.84	560	--	9.25	7.6	--	599	309	220	260	<4	41
Haun Shallow	William (residence), 7491 MT Highway 200	--	--	12/18/2013	--	--	5.48	6.8	1240	--	9.9	7.5	--	**1320**	**652**	230	280	<4	**260**
MDT Plains Shop	2 Lower Lynch Creek Rd, (facility well)	--	--	12/18/2013	--	--	5.57	6.89	2782	--	12	7.2	--	**2910**	**1430**	230	280	<4	**760**
Merideth	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	--	--	12/18/2013	--	--	0.69	7.19	561	--	11.58	7.6	--	600	308	230	290	<4	29
Vanderwall	Zach and Courtney (residence), 11 Smiling Tree Lane	--	--	12/18/2013	--	--	2.66	6.81	499	--	10.84	7.7	--	532	272	220	260	<4	19
Weeks Shallow	Jim & Julie (residence), 15 Lower Lynch Creek Rd	--	--	12/18/2013	--	--	5.6	7.09	849	--	10.35	7.5	--	905	453	220	260	<4	130
Sears	Lyla (residence), 131 Lower Lynch Creek Rd	--	--	12/18/2013	--	--	1.02	6.86	606	--	11.05	7.6	--	642	326	240	300	<4	37
Eldridge	Scott (residence), 22 Lyla Ln	--	--	12/18/2013	--	--	3.79	7.2	367	--	12.17	7.6	--	394	211	160	200	<4	8
Abrams	Mike and Donna (residence), 4 Howells Lane	PDT1410-110	--	10/16/2014	--	--	--	--	--	--	--	7.6	--	**1190**	**650**	--	--	--	200
Davis	Greg & Deb (residence), 12 Lower Lynch Creek Road	PDT1410-106	--	10/16/2014	--	--	--	--	--	--	--	7.7	--	734	407	--	--	--	96
Gary's Glass and Auto Body	7493 MT Highway 200 (commercial)	--	--	10/16/2014	--	--	--	--	--	--	--	7.6	--	572	322	--	--	--	50
Haun Shallow	William (residence), 7491 MT Highway 200	PDT1410-104	--	10/16/2014	--	--	--	--	--	--	--	7.3	--	**3130**	**1800**	--	--	--	**870**
MDT Plains Shop	2 Lower Lynch Creek Rd, (facility well)	PDT1410-102	--	10/16/2014	--	--	--	--	--	--	--	7.6	--	**2000**	**1050**	--	--	--	**500**
Sears	Lyla (residence), 131 Lower Lynch Creek Rd	PDT1410-107	--	10/16/2014	--	--	--	--	--	--	--	7.9	--	700	388	--	--	--	70
Weeks Shallow	Jim & Julie (residence), 15 Lower Lynch Creek Rd	PDT1410-105	--	10/16/2014	--	--	--	--	--	--	--	7.6	--	**1840**	**1030**	--	--	--	**460**
Wood	Leslie & Beverly (residence), 16 Kruger Road	PDT1410-101	--	10/16/2014	--	--	--	--	--	--	--	7.7	--	463	264	--	--	--	24
Abrams - USDA Building	7485 MT Highway 200, (commercial)	--	--	10/17/2014	--	--	--	--	--	--	--	7.7	--	**1180**	**651**	--	--	--	230
Anthony	Jack and Deanna (residence), 3 Howells Lane	PDT1410-109	--	10/17/2014	--	--	--	--	--	--	--	7.5	--	**1040**	**561**	--	--	--	160
Eldridge	Scott (residence), 22 Lyla Ln	PDT1410-114	--	10/17/2014	--	--	--	--	--	--	--	7.7	--	633	349	--	--	--	50
Joner	Greg and Kimberly (residence), 7479 MT Highway 200	PDT1410-111	--	10/17/2014	--	--	--	--	--	--	--	7.8	--	905	495	--	--	--	130

TABLE 4-1. FIELD AND ANALYTICAL RESULTS
MDT MAINTENANCE FACILITY - PLAINS, MT

Site Location		Sample ID	Lab Sample ID	Collection Date	Sulfate (mg/L)	Fluoride (mg/L)	Hardness (mg/L)	Nitrate+ Nitrite (mg/L)	Nitrate as N (mg/L)	Nitrite as N (mg/L)	Arsenic (mg/L)	Calcium (mg/L)	Iron (mg/L)	Lead (mg/L)	Magnesium (mg/L)	Manganese (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Groundwater Elevation (ft)	E-Coli Coliform (per 100ml)	Total Coliform (per 100ml)
MDT Plains Shop	2 Lower Lynch Creek Rd, (facility well)	--	--	11/27/1996	18	--	176	3	--	--	--	--	<0.03	--	14	--	2	17	--	--	--
MDT Plains Shop	2 Lower Lynch Creek Rd, (facility well)	--	--	7/16/2012	12	--	139	4	--	--	0.003	36	**1.32**	0.005	12	--	2	204	--	--	--
County Airport	--	--	--	9/27/2012	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Gary's Glass and Auto Body	7493 MT Highway 200 (commercial)	--	--	9/27/2012	12	--	216	4	--	--	<0.001	60	<0.03	<0.001	16	--	2	23	--	--	--
MDT Plains Shop	2 Lower Lynch Creek Rd, (facility well)	--	--	9/27/2012	16	--	276	4	--	--	<0.001	71	0.16	0.001	24	--	3	221	--	--	--
RTI, Inc.	--	--	--	9/27/2012	14	--	230	3	--	--	0.002	63	<0.03	<0.001	17	--	3	32	--	--	--
Wood	Leslie & Beverly (residence), 16 Kruger Road	--	--	9/27/2012	12	--	198	3	--	--	<0.001	56	0.1	<0.001	14	--	2	16	--	--	--
Clark Fork Valley Hospital	--	--	--	10/23/2012	14	--	172	2	--	--	0.006	46	**5.01**	0.004	14	--	2	35	--	--	--
Davis	Greg & Deb (residence), 12 Lower Lynch Creek Road	--	--	10/23/2012	13	--	197	3	--	--	0.002	54	0.09	<0.001	15	--	2	49	--	--	--
First Security Bank	--	--	--	10/23/2012	9	--	186	2	--	--	<0.001	556	<0.03	<0.001	11	--	2	7	--	--	--
Weeks Shallow	Jim & Julie (residence), 15 Lower Lynch Creek Rd	--	--	10/23/2012	14	--	241	4	--	--	0.002	63	0.04	<0.001	20	--	3	103	--	--	--
Abrams	Mike and Donna (residence), 4 Howells Lane	--	--	3/27/2013	27	--	310	5	--	--	--	83	--	--	25	--	3	79	--	--	--
Abrams - USDA Building	7485 MT Highway 200, (commercial)	--	--	3/27/2013	18	--	226	3	--	--	--	60	--	--	18	--	3	86	--	--	--
Anthony	Jack and Deanna (residence), 3 Howells Lane	--	--	3/27/2013	24	--	328	4	--	--	--	87	--	--	27	--	3	77	--	--	--
Gary's Glass and Auto Body	7493 MT Highway 200 (commercial)	--	--	3/27/2013	16	--	216	4	--	--	--	60	--	--	16	--	2	21	--	--	--
Haun Shallow	William (residence), 7491 MT Highway 200	--	--	3/27/2013	17	--	251	4	--	--	--	66	--	--	21	--	3	118	--	--	--
Joner	Greg and Kimberly (residence), 7479 MT Highway 200	--	--	3/27/2013	22	--	278	5	--	--	--	77	--	--	21	--	3	51	--	--	--
MDT Plains Shop	2 Lower Lynch Creek Rd, (facility well)	--	--	3/27/2013	21	--	273	4	--	--	--	70	--	--	24	--	3	283	--	--	--
Merideth	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	--	--	3/27/2013	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanderwall	Zach and Courtney (residence), 11 Smiling Tree Lane	--	--	3/27/2013	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Weeks Shallow	Jim & Julie (residence), 15 Lower Lynch Creek Rd	--	--	3/27/2013	18	--	248	4	--	--	--	65	--	--	21	--	3	92	--	--	--
Wood	Leslie & Beverly (residence), 16 Kruger Road	--	--	3/27/2013	17	--	208	3	--	--	--	58	--	--	15	--	2	17	--	--	--
Abrams	Mike and Donna (residence), 4 Howells Lane	--	--	6/11/2013	24	--	303	6	--	--	--	82	--	--	24	--	3	81	--	--	--
Abrams - USDA Building	7485 MT Highway 200, (commercial)	--	--	6/11/2013	19	--	245	4	--	--	--	65	--	--	20	--	3	93	--	--	--
Anthony	Jack and Deanna (residence), 3 Howells Lane	--	--	6/11/2013	25	--	315	5	--	--	--	85	--	--	25	--	3	83	--	--	--
Haun Shallow	William (residence), 7491 MT Highway 200	--	--	6/11/2013	19	--	252	4	--	--	--	68	--	--	20	--	3	113	--	--	--
Joner	Greg and Kimberly (residence), 7479 MT Highway 200	--	--	6/11/2013	24	--	298	5	--	--	--	83	--	--	22	--	3	52	--	--	--
MDT Plains Shop	2 Lower Lynch Creek Rd, (facility well)	--	--	6/11/2013	25	--	715	6	--	--	--	181	--	--	64	--	4	613	--	--	--
Merideth	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	--	--	6/11/2013	22	--	344	4	--	--	--	94	--	--	27	--	3	112	--	--	--
Vanderwall	Zach and Courtney (residence), 11 Smiling Tree Lane	--	--	6/11/2013	29	--	288	3	--	--	--	80	--	--	22	--	3	40	--	--	--
Weeks Shallow	Jim & Julie (residence), 15 Lower Lynch Creek Rd	--	--	6/11/2013	19	--	261	4	--	--	--	67	--	--	23	--	3	94	--	--	--
Wood	Leslie & Beverly (residence), 16 Kruger Road	--	--	6/11/2013	18	--	226	4	--	--	--	64	--	--	16	--	2	17	--	--	--
Abrams	Mike and Donna (residence), 4 Howells Lane	--	--	9/26/2013	22	--	301	5	--	--	0.002	81	<0.03	<0.001	24	--	3	90	--	--	--
Abrams - USDA Building	7485 MT Highway 200, (commercial)	--	--	9/26/2013	19	--	262	4	--	--	0.001	70	0.09	<0.001	21	--	3	77	--	--	--
Anthony	Jack and Deanna (residence), 3 Howells Lane	--	--	9/26/2013	23	--	326	4	--	--	0.001	86	0.07	<0.001	27	--	3	82	--	--	--
Davis	Greg & Deb (residence), 12 Lower Lynch Creek Road	--	--	9/26/2013	18	--	231	3	--	--	0.001	63	0.05	<0.001	18	--	2	34	--	--	--
Haun Shallow	William (residence), 7491 MT Highway 200	--	--	9/26/2013	19	--	282	4	--	--	0.001	75	<0.03	<0.001	23	--	3	117	--	--	--
MDT Plains Shop	2 Lower Lynch Creek Rd, (facility well)	--	--	9/26/2013	24	--	320	4	--	--	<0.001	82	**0.38**	<0.001	28	--	3	425	--	--	--
Merideth	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	--	--	9/26/2013	25	--	199	3	--	--	0.006	54	<0.03	<0.001	15	--	3	62	--	--	--
Vanderwall	Zach and Courtney (residence), 11 Smiling Tree Lane	--	--	9/26/2013	27	--	261	3	--	--	0.001	72	0.07	<0.001	20	--	3	40	--	--	--
Weeks Shallow	Jim & Julie (residence), 15 Lower Lynch Creek Rd	--	--	9/26/2013	18	--	260	4	--	--	0.002	68	<0.03	<0.001	22	--	3	89	--	--	--
Wood	Leslie & Beverly (residence), 16 Kruger Road	--	--	9/26/2013	17	--	221	3	--	--	<0.001	62	<0.03	<0.001	16	--	2	17	--	--	--
Sears	Lyla (residence), 131 Lower Lynch Creek Rd	--	--	9/26/2013	26	--	243	3	--	--	0.001	67	<0.03	<0.001	18	--	3	36	--	--	--
Eldridge	Scott (residence), 22 Lyla Ln	--	--	9/26/2013	23	--	195	2	--	--	0.002	55	0.11	0.001	14	--	2	18	--	--	--
Abrams	Mike and Donna (residence), 4 Howells Lane	--	--	12/18/2013	25	--	323	6	--	--	0.003	88	0.04	0.002	25	--	3	89	--	--	--
Abrams - USDA Building	7485 MT Highway 200, (commercial)	--	--	12/18/2013	19	--	229	4	--	--	0.002	62	0.19	0.001	18	--	3	76	--	--	--
Anthony	Jack and Deanna (residence), 3 Howells Lane	--	--	12/18/2013	23	--	329	4	--	--	0.002	89	<0.03	<0.001	26	--	3	78	--	--	--
Davis	Greg & Deb (residence), 12 Lower Lynch Creek Road	--	--	12/18/2013	18	--	227	4	--	--	0.002	63	0.03	<0.001	17	--	2	31	--	--	--
Haun Shallow	William (residence), 7491 MT Highway 200	--	--	12/18/2013	20	--	341	4	--	--	0.001	92	0.06	0.002	27	--	3	109	--	--	--
MDT Plains Shop	2 Lower Lynch Creek Rd, (facility well)	--	--	12/18/2013	31	--	308	4	--	--	0.001	79	0.17	<0.001	27	--	3	433	--	--	--
Merideth	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	--	--	12/18/2013	26	--	217	3	--	--	0.006	60	<0.03	<0.001	16	--	2	37	--	--	--
Vanderwall	Zach and Courtney (residence), 11 Smiling Tree Lane	--	--	12/18/2013	26	--	208	2	--	--	0.002	59	<0.03	<0.001	15	--	2	27	--	--	--
Weeks Shallow	Jim & Julie (residence), 15 Lower Lynch Creek Rd	--	--	12/18/2013	21	--	249	4	--	--	0.002	66	0.11	<0.001	20	--	2	75	--	--	--
Sears	Lyla (residence), 131 Lower Lynch Creek Rd	--	--	12/18/2013	26	--	240	3	--	--	0.001	68	<0.03	<0.001	17	--	3	34	--	--	--
Eldridge	Scott (residence), 22 Lyla Ln	--	--	12/18/2013	22	--	163	2	--	--	0.002	47	<0.03	<0.001	11	--	2	14	--	--	--
Abrams	Mike and Donna (residence), 4 Howells Lane	PDT1410-110	--	10/16/2014	--	--	--	--	--	--	--	101	--	--	29	--	--	85	--	--	--
Davis	Greg & Deb (residence), 12 Lower Lynch Creek Road	PDT1410-106	--	10/16/2014	--	--	262	--	--	--	--	72	--	--	20	--	--	37	--	--	--
Gary's Glass and Auto Body	7493 MT Highway 200 (commercial)	--	--	10/16/2014	--	--	150	--	--	--	--	42	--	--	11	--	--	18	--	--	--
Haun Shallow	William (residence), 7491 MT Highway 200	PDT1410-104	--	10/16/2014	--	--	650	--	--	--	--	173	--	--	53	--	--	332	--	--	--
MDT Plains Shop	2 Lower Lynch Creek Rd, (facility well)	PDT1410-102	--	10/16/2014	--	--	249	--	--	--	--	65	--	--	21	--	--	288	2446.91	--	--
Sears	Lyla (residence), 131 Lower Lynch Creek Rd	PDT1410-107	--	10/16/2014	--	--	267	--	--	--	--	74	--	--	20	--	--	36	--	--	--
Weeks Shallow	Jim & Julie (residence), 15 Lower Lynch Creek Rd	PDT1410-105	--	10/16/2014	--	--	423	--	--	--	--	110	--	--	36	--	--	178	2447.1	--	--
Wood	Leslie & Beverly (residence), 16 Kruger Road	PDT1410-101	--	10/16/2014	--	--	183	--	--	--	--	52	--	--	13	--	--	18	2447.07	--	--
Abrams - USDA Building	7485 MT Highway 200, (commercial)	--	--	10/17/2014	--	--	352	--	--	--	--	95	--	--	28	--	--	87	--	--	--
Anthony	Jack and Deanna (residence), 3 Howells Lane	PDT1410-109	--	10/17/2014	--	--	333	--	--	--	--	89	--	--	27	--	--	81	2446.57	--	--
Eldridge	Scott (residence), 22 Lyla Ln	PDT1410-114	--	10/17/2014	--	--	242	--	--	--	--	69	--	--	17	--	--	33	2446.69	--	--
Joner	Greg and Kimberly (residence), 7479 MT Highway 200	PDT1410-111	--	10/17/2014	--	--	308	--	--	--	--	87	--	--	22	--	--	56	--	--	--

TABLE 4-1. FIELD AND ANALYTICAL RESULTS
MDT MAINTENANCE FACILITY - PLAINS, MT

Site Location		Sample ID	Lab Sample ID	Collection Date	Static Water Levels (feet)	Field ORP (mV)	Field DO (mg/L)	Field PH (s.u.)	Field SC (umhos/cm)	Field Turbidity	Field Temperature (°C)	pH (s.u.)	pH Measurement Temp (°C)	Conductivity @ 25 C (umhos/cm)	Solids, Total Dissolved TDS @ 180 C (mg/L)	Alkalinity (mg/L)	Bicarbonate (mg/L)	Carbonate (mg/L)	Chloride (mg/L)
Merideth	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	PDT1410-112	--	10/17/2014	--	--	--	--	--	--	--	7.8	--	989	**525**	--	--	--	160
Merideth DUP	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	PDT1410-113	--	10/17/2014	--	--	--	--	--	--	--	7.8	--	989	**519**	--	--	--	160
USDA	--	PDT1410-108	--	10/17/2014	--	--	--	--	--	--	--	7.7	--	**1180**	**651**	--	--	--	230
Vanderwall	Zach and Courtney (residence), 11 Smiling Tree Lane	PDT1410-115	--	10/17/2014	--	--	--	--	--	--	--	7.8	--	737	399	--	--	--	77
Abrams - USDA Building	7485 MT Highway 200, (commercial)	--	--	1/20/2015	--	--	--	--	--	--	--	7.6	--	**1260**	**697**	--	--	--	247
Davis	Greg & Deb (residence), 12 Lower Lynch Creek Road	PDT1501-102	--	1/20/2015	--	--	--	--	--	--	--	7.7	--	606	337	--	--	--	49
Eldridge	Scott (residence), 22 Lyla Ln	PDT1501-104	--	1/20/2015	--	--	--	--	--	--	--	7.8	--	423	248	--	--	--	12
MDT Plains Shop	2 Lower Lynch Creek Rd, (facility well)	PDT1501-101	--	1/20/2015	--	--	--	--	--	--	--	7.6	--	**1350**	**711**	--	--	--	**261**
Sears	Lyla (residence), 131 Lower Lynch Creek Rd	PDT1501-103	--	1/20/2015	--	--	--	--	--	--	--	7.7	--	645	363	--	--	--	49
USDA	--	PDT1501-106	--	1/20/2015	--	--	--	--	--	--	--	7.6	--	**1260**	**697**	--	--	--	247
Vanderwall	Zach and Courtney (residence), 11 Smiling Tree Lane	PDT1501-105	--	1/20/2015	--	--	--	--	--	--	--	7.8	--	480	270	--	--	--	17
Weeks Shallow	Jim & Julie (residence), 15 Lower Lynch Creek Rd	SYSTEM FROZEN NO SAMPLE	--	1/20/2015	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Abrams	Mike and Donna (residence), 4 Howells Lane	SYSTEM FROZEN NO SAMPLE	--	1/21/2015	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Anthony	Jack and Deanna (residence), 3 Howells Lane	PDT1501-107	--	1/21/2015	--	--	--	--	--	--	--	7.5	--	**1080**	**594**	--	--	--	173
Blank	--	PDT1501-114	--	1/21/2015	--	--	--	--	--	--	--	5.8	--	3	**ND**	--	--	--	**ND**
Gary's Glass and Auto Body	7493 MT Highway 200 (commercial)	PDT1501-110	--	1/21/2015	--	--	--	--	--	--	--	7.5	--	563	320	--	--	--	42
Haun Shallow	William (residence), 7491 MT Highway 200	PDT1501-111	--	1/21/2015	--	--	--	--	--	--	--	7.6	--	**2280**	**1260**	--	--	--	**586**
Joner	Greg and Kimberly (residence), 7479 MT Highway 200	PDT1501-113	--	1/21/2015	--	--	--	--	--	--	--	7.7	--	885	486	--	--	--	120
Merideth	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	PDT1501-108	--	1/21/2015	--	--	--	--	--	--	--	7.8	--	557	316	--	--	--	27
Merideth	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	PDT1501-109	--	1/21/2015	--	--	--	--	--	--	--	7.8	--	557	318	--	--	--	27
Wood	Leslie & Beverly (residence), 16 Kruger Road	PDT1501-112	--	1/21/2015	--	--	--	--	--	--	--	7.6	--	467	265	--	--	--	23
Abrams	Mike and Donna (residence), 4 Howells Lane	PDT0415-112	--	4/28/2015	--	--	--	--	--	--	--	7.72	--	**1220**	**694**	--	--	--	223
Abrams - USDA Building	7485 MT Highway 200, (commercial)	--	--	4/28/2015	--	--	--	--	--	--	--	7.7	--	**1460**	**505**	--	--	--	**316**
Anthony	Jack and Deanna (residence), 3 Howells Lane	PDT0415-113	--	4/28/2015	--	--	--	--	--	--	--	7.69	--	**1140**	**628**	--	--	--	189
Eldridge	Scott (residence), 22 Lyla Ln	PDT0415-105	--	4/28/2015	--	--	--	--	--	--	--	7.8	--	404	230	--	--	--	9
Gary's Glass and Auto Body	7493 MT Highway 200 (commercial)	PDT0415-102	--	4/28/2015	--	--	--	--	--	--	--	7.67	--	646	360	--	--	--	70
Haun Shallow	William (residence), 7491 MT Highway 200	PDT0415-110	--	4/28/2015	--	--	--	--	--	--	--	7.68	--	**3250**	**1810**	--	--	--	**881**
Joner	Greg and Kimberly (residence), 7479 MT Highway 200	PDT0415-111	--	4/28/2015	--	--	--	--	--	--	--	8.3	--	857	464	--	--	--	108
MDT Plains Shop	2 Lower Lynch Creek Rd, (facility well)	PDT04115-101	--	4/28/2015	--	--	--	--	--	--	--	7.48	--	**1440**	**738**	--	--	--	**307**
Merideth	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	PDT0415-108	--	4/28/2015	--	--	--	--	--	--	--	7.79	--	961	**526**	--	--	--	156
Sears	Lyla (residence), 131 Lower Lynch Creek Rd	PDT0415-106	--	4/28/2015	--	--	--	--	--	--	--	7.79	--	740	410	--	--	--	69
Sears	Lyla (residence), 131 Lower Lynch Creek Rd	PDT0415-107	--	4/28/2015	--	--	--	--	--	--	--	7.79	--	739	398	--	--	--	69
USDA	--	PT0415-114	--	4/28/2015	--	--	--	--	--	--	--	7.76	--	**1460**	**505**	--	--	--	**316**
Vanderwall	Zach and Courtney (residence), 11 Smiling Tree Lane	PDT0415-104	--	4/28/2015	--	--	--	--	--	--	--	7.64	--	905	**502**	--	--	--	113
Weeks Shallow	Jim & Julie (residence), 15 Lower Lynch Creek Rd	PDT0415-109	--	4/28/2015	--	--	--	--	--	--	--	7.76	--	**2250**	**1250**	--	--	--	**580**
Wood	Leslie & Beverly (residence), 16 Kruger Road	PDT0415-103	--	4/28/2015	--	--	--	--	--	--	--	7.75	--	518	289	--	--	--	34
Abrams	Mike and Donna (residence), 4 Howells Lane	PMDT0820-13	--	8/20/2015	--	--	--	--	--	--	--	7.5	--	**1100**	**596**	--	--	--	179
Abrams - USDA Building	7485 MT Highway 200, (commercial)	--	--	8/20/2015	--	--	--	--	--	--	--	7.6	--	921	500	--	--	--	147
Anthony	Jack and Deanna (residence), 3 Howells Lane	PMDT0820-014	--	8/20/2015	--	--	--	--	--	--	--	7.4	--	**1120**	**619**	--	--	--	181
Eldridge	Scott (residence), 22 Lyla Ln	PMDT0820-11	--	8/20/2015	--	--	--	--	--	--	--	7.6	--	445	250	--	--	--	13
Gary's Glass and Auto Body	7493 MT Highway 200 (commercial)	PMDT0820-03	--	8/20/2015	--	--	--	--	--	--	--	7.5	--	613	346	--	--	--	55
Haun Shallow	William (residence), 7491 MT Highway 200	PMDT0820-06	--	8/20/2015	--	--	--	--	--	--	--	7.4	--	**2810**	**1510**	--	--	--	**730**
Joner	Greg and Kimberly (residence), 7479 MT Highway 200	PMDT0820-015	--	8/20/2015	--	--	--	--	--	--	--	7.7	--	887	487	--	--	--	121
MDT Plains Shop	2 Lower Lynch Creek Rd, (facility well)	PMDT0820-01	--	8/20/2015	--	--	--	--	--	--	--	7.4	--	**1630**	**871**	--	--	--	**369**
Merideth	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	PMDT0820-08	--	8/20/2015	--	--	--	--	--	--	--	7.6	--	595	340	--	--	--	40
Sears	Lyla (residence), 131 Lower Lynch Creek Rd	PMDT0820-09	--	8/20/2015	--	--	--	--	--	--	--	7.7	--	626	347	--	--	--	42
Sears DUP	Lyla (residence), 131 Lower Lynch Creek Rd	PMDT0820-010	--	8/20/2015	--	--	--	--	--	--	--	7.7	--	629	346	--	--	--	43
USDA	--	PMDT0820-05	--	8/20/2015	--	--	--	--	--	--	--	7.6	--	921	500	--	--	--	147
Vanderwall	Zach and Courtney (residence), 11 Smiling Tree Lane	PMDT0820-012	--	8/20/2015	--	--	--	--	--	--	--	7.7	--	776	88	--	--	--	88
Weeks Shallow	Jim & Julie (residence), 15 Lower Lynch Creek Rd	PMDT0820-07	--	8/20/2015	--	--	--	--	--	--	--	7.5	--	**1580**	**885**	--	--	--	**358**
Wood	Leslie & Beverly (residence), 16 Kruger Road	PMDT0820-02	--	8/20/2015	--	--	--	--	--	--	--	7.09	--	511	295	--	--	--	33
Abrams	Mike and Donna (residence), 4 Howells Lane	PMDT1112-13	--	11/12/2015	--	--	--	--	--	--	--	7.4	--	**1220**	**687**	--	--	--	198
Abrams - USDA Building	7485 MT Highway 200, (commercial)	--	--	11/12/2015	--	--	--	--	--	--	--	7.6	--	875	493	--	--	--	139
Anthony	Jack and Deanna (residence), 3 Howells Lane	PMDT1112-12	--	11/12/2015	--	--	--	--	--	--	--	7.5	--	**1180**	**677**	--	--	--	205
Eldridge	Scott (residence), 22 Lyla Ln	PMDT1112-08	--	11/12/2015	--	--	--	--	--	--	--	7.7	--	377	221	--	--	--	7
Gary's Glass and Auto Body	7493 MT Highway 200 (commercial)	PMDT1112-03	--	11/12/2015	--	--	--	--	--	--	--	7.5	--	638	369	--	--	--	54
Haun Shallow	William (residence), 7491 MT Highway 200	PMDT1112-04	--	11/12/2015	--	--	--	--	--	--	--	7.5	--	**1760**	**939**	--	--	--	**404**
Joner	Greg and Kimberly (residence), 7479 MT Highway 200	PMDT1112-10	--	11/12/2015	--	--	--	--	--	--	--	7.7	--	892	**507**	--	--	--	128
MDT Plains Shop	2 Lower Lynch Creek Rd, (facility well)	PMDT1112-01	--	11/12/2015	--	--	--	--	--	--	--	7.3	--	**1340**	**720**	--	--	--	**297**
Merideth	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	PMDT1112-06	--	11/12/2015	--	--	--	--	--	--	--	7.7	--	557	320	--	--	--	27
Merideth	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	PMDT1112-07	--	11/12/2015	--	--	--	--	--	--	--	7.5	--	557	317	--	--	--	27
Sears	Lyla (residence), 131 Lower Lynch Creek Rd	SYSTEM OFF FOR THE WINTER	--	11/12/2015	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
USDA	--	PMDT1112-11	--	11/12/2015	--	--	--	--	--	--	--	7.6	--	875	493	--	--	--	139
Vanderwall	Zach and Courtney (residence), 11 Smiling Tree Lane	PMDT1112-09	--	11/12/2015	--	--	--	--	--	--	--	7.7	--	499	291	--	--	--	19
Weeks Shallow	Jim & Julie (residence), 15 Lower Lynch Creek Rd	PMDT1112-05	--	11/12/2015	--	--	--	--	--	--	--	7.6	--	**1220**	**666**	--	--	--	**255**
Wood	Leslie & Beverly (residence), 16 Kruger Road	PMDT1112-02	--	11/12/2015	--	--	--	--	--	--	--	7.6	--	554	320	--	--	--	43
Abrams	Mike and Donna (residence), 4 Howells Lane	PMDT0419-05	--	4/19/2016	--	--	--	--	--	--	--	7.6	--	934	**524**	--	--	--	157
Abrams - USDA Building	7485 MT Highway 200, (commercial)	--	--	4/19/2016	--	--	--	--	--	--	--	7.6	--	968	**536**	--	--	--	168

TABLE 4-1. FIELD AND ANALYTICAL RESULTS
MDT MAINTENANCE FACILITY - PLAINS, MT

Site Location		Sample ID	Lab Sample ID	Collection Date	Sulfate (mg/L)	Fluoride (mg/L)	Hardness (mg/L)	Nitrate+ Nitrite (mg/L)	Nitrate as N (mg/L)	Nitrite as N (mg/L)	Arsenic (mg/L)	Calcium (mg/L)	Iron (mg/L)	Lead (mg/L)	Magnesium (mg/L)	Manganese (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Groundwater Elevation (ft)	E-Coli Coliform (per 100ml)	Total Coliform (per 100ml)
Merideth	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	PDT1410-112	--	10/17/2014	--	--	250	--	--	--	--	69	--	--	19	--	--	97	--	--	--
Merideth DUP	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	PDT1410-113	--	10/17/2014	--	--	--	--	--	--	--	68	--	--	19	--	--	99	--	--	--
USDA	--	PDT1410-108	--	10/17/2014	--	--	--	--	--	--	--	95	--	--	28	--	--	87	--	--	--
Vanderwall	Zach and Courtney (residence), 11 Smiling Tree Lane	PDT1410-115	--	10/17/2014	--	--	258	--	--	--	--	72	--	--	19	--	--	47	2446.65	--	--
Abrams - USDA Building	7485 MT Highway 200, (commercial)	--	--	1/20/2015	--	--	293	--	--	--	--	78	--	--	24	--	--	120	--	--	--
Davis	Greg & Deb (residence), 12 Lower Lynch Creek Road	PDT1501-102	--	1/20/2015	--	--	218	--	--	--	--	61	--	--	16	--	--	30	--	--	--
Eldridge	Scott (residence), 22 Lyla Ln	PDT1501-104	--	1/20/2015	--	--	167	--	--	--	--	47	--	--	12	--	--	20	2446.43	--	--
MDT Plains Shop	2 Lower Lynch Creek Rd, (facility well)	PDT1501-101	--	1/20/2015	--	--	151	--	--	--	--	39	--	--	13	--	--	205	2444.49	--	--
Sears	Lyla (residence), 131 Lower Lynch Creek Rd	PDT1501-103	--	1/20/2015	--	--	232	--	--	--	--	65	--	--	17	--	--	35	--	--	--
USDA	--	PDT1501-106	--	1/20/2015	--	--	--	--	--	--	--	78	--	--	24	--	--	120	--	--	--
Vanderwall	Zach and Courtney (residence), 11 Smiling Tree Lane	PDT1501-105	--	1/20/2015	--	--	176	--	--	--	--	49	--	--	13	--	--	27	2446.61	--	--
Weeks Shallow	Jim & Julie (residence), 15 Lower Lynch Creek Rd	SYSTEM FROZEN NO SAMPLE	--	1/20/2015	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Abrams	Mike and Donna (residence), 4 Howells Lane	SYSTEM FROZEN NO SAMPLE	--	1/21/2015	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2446.1	--	--
Anthony	Jack and Deanna (residence), 3 Howells Lane	PDT1501-107	--	1/21/2015	--	--	324	--	--	--	--	87	--	--	26	--	--	82	2446.6	--	--
Blank	--	PDT1501-114	--	1/21/2015	--	--	--	--	--	--	--	ND	--	--	ND	--	--	ND	--	--	--
Gary's Glass and Auto Body	7493 MT Highway 200 (commercial)	PDT1501-110	--	1/21/2015	--	--	225	--	--	--	--	62	--	--	17	--	--	21	--	--	--
Haun Shallow	William (residence), 7491 MT Highway 200	PDT1501-111	--	1/21/2015	--	--	443	--	--	--	--	118	--	--	36	--	--	259	--	--	--
Joner	Greg and Kimberly (residence), 7479 MT Highway 200	PDT1501-113	--	1/21/2015	--	--	291	--	--	--	--	82	--	--	21	--	--	55	--	--	--
Merideth	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	PDT1501-108	--	1/21/2015	--	--	185	--	--	--	--	51	--	--	14	--	--	38	--	--	--
Merideth	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	PDT1501-109	--	1/21/2015	--	--	192	--	--	--	--	52	--	--	15	--	--	38	--	--	--
Wood	Leslie & Beverly (residence), 16 Kruger Road	PDT1501-112	--	1/21/2015	--	--	192	--	--	--	--	54	--	--	14	--	--	17	2447.67	--	--
Abrams	Mike and Donna (residence), 4 Howells Lane	PDT0415-112	--	4/28/2015	--	--	364	--	--	--	--	98	--	--	29	--	--	90	2447.439	--	--
Abrams - USDA Building	7485 MT Highway 200, (commercial)	--	--	4/28/2015	--	--	341	--	--	--	--	89	--	--	29	--	--	141	--	--	--
Anthony	Jack and Deanna (residence), 3 Howells Lane	PDT0415-113	--	4/28/2015	--	--	263	--	--	--	--	61	--	--	27	--	--	86	2447.76	--	--
Eldridge	Scott (residence), 22 Lyla Ln	PDT0415-105	--	4/28/2015	--	--	167	--	--	--	--	47	--	--	12	--	--	17	2447.76	--	--
Gary's Glass and Auto Body	7493 MT Highway 200 (commercial)	PDT0415-102	--	4/28/2015	--	--	248	--	--	--	--	68	--	--	19	--	--	24	--	--	--
Haun Shallow	William (residence), 7491 MT Highway 200	PDT0415-110	--	4/28/2015	--	--	576	--	--	--	--	150	--	--	49	--	--	370	--	--	--
Joner	Greg and Kimberly (residence), 7479 MT Highway 200	PDT0415-111	--	4/28/2015	--	--	286	--	--	--	--	80	--	--	21	--	--	55	--	--	--
MDT Plains Shop	2 Lower Lynch Creek Rd, (facility well)	PDT04115-101	--	4/28/2015	--	--	190	--	--	--	--	48	--	--	17	--	--	211	2448.09	--	--
Merideth	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	PDT0415-108	--	4/28/2015	--	--	280	--	--	--	--	76	--	--	22	--	--	73	--	--	--
Sears	Lyla (residence), 131 Lower Lynch Creek Rd	PDT0415-106	--	4/28/2015	--	--	284	--	--	--	--	76	--	--	23	--	--	38	--	--	--
Sears	Lyla (residence), 131 Lower Lynch Creek Rd	PDT0415-107	--	4/28/2015	--	--	280	--	--	--	--	76	--	--	22	--	--	37	--	--	--
USDA	--	PT0415-114	--	4/28/2015	--	--	--	--	--	--	--	89	--	--	29	--	--	141	--	--	--
Vanderwall	Zach and Courtney (residence), 11 Smiling Tree Lane	PDT0415-104	--	4/28/2015	--	--	311	--	--	--	--	85	--	--	24	--	--	55	2447.26	--	--
Weeks Shallow	Jim & Julie (residence), 15 Lower Lynch Creek Rd	PDT0415-109	--	4/28/2015	--	--	462	--	--	--	--	116	--	--	42	--	--	223	2446.57	--	--
Wood	Leslie & Beverly (residence), 16 Kruger Road	PDT0415-103	--	4/28/2015	--	--	212	--	--	--	--	60	--	--	15	--	--	17	2448.41	--	--
Abrams	Mike and Donna (residence), 4 Howells Lane	PMDT0820-13	--	8/20/2015	--	--	293	--	--	--	--	78	--	--	24	--	--	95	2445.179	--	--
Abrams - USDA Building	7485 MT Highway 200, (commercial)	--	--	8/20/2015	--	--	233	--	--	--	--	62	--	--	19	--	--	82	--	--	--
Anthony	Jack and Deanna (residence), 3 Howells Lane	PMDT0820-014	--	8/20/2015	--	--	318	--	--	--	--	83	--	--	27	--	--	87	2445.49	--	--
Eldridge	Scott (residence), 22 Lyla Ln	PMDT0820-11	--	8/20/2015	--	--	176	--	--	--	--	49	--	--	13	--	--	20	2444.99	--	--
Gary's Glass and Auto Body	7493 MT Highway 200 (commercial)	PMDT0820-03	--	8/20/2015	--	--	235	--	--	--	--	66	--	--	17	--	--	25	--	--	--
Haun Shallow	William (residence), 7491 MT Highway 200	PMDT0820-06	--	8/20/2015	--	--	432	--	--	--	--	117	--	--	34	--	--	368	--	--	--
Joner	Greg and Kimberly (residence), 7479 MT Highway 200	PMDT0820-015	--	8/20/2015	--	--	290	--	--	--	--	80	--	--	22	--	--	58	--	--	--
MDT Plains Shop	2 Lower Lynch Creek Rd, (facility well)	PMDT0820-01	--	8/20/2015	--	--	186	--	--	--	--	48	--	--	16	--	--	235	--	--	--
Merideth	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	PMDT0820-08	--	8/20/2015	--	--	198	--	--	--	--	53	--	--	16	--	--	41	--	--	--
Sears	Lyla (residence), 131 Lower Lynch Creek Rd	PMDT0820-09	--	8/20/2015	--	--	234	--	--	--	--	64	--	--	18	--	--	35	--	--	--
Sears DUP	Lyla (residence), 131 Lower Lynch Creek Rd	PMDT0820-010	--	8/20/2015	--	--	231	--	--	--	--	63	--	--	18	--	--	34	--	--	--
USDA	--	PMDT0820-05	--	8/20/2015	--	--	--	--	--	--	--	62	--	--	19	--	--	82	--	--	--
Vanderwall	Zach and Courtney (residence), 11 Smiling Tree Lane	PMDT0820-012	--	8/20/2015	--	--	262	--	--	--	--	72	--	--	20	--	--	46	2445.39	--	--
Weeks Shallow	Jim & Julie (residence), 15 Lower Lynch Creek Rd	PMDT0820-07	--	8/20/2015	--	--	324	--	--	--	--	87	--	--	26	--	--	164	2447.6	--	--
Wood	Leslie & Beverly (residence), 16 Kruger Road	PMDT0820-02	--	8/20/2015	--	--	205	--	--	--	--	59	--	--	14	--	--	17	2445.92	--	--
Abrams	Mike and Donna (residence), 4 Howells Lane	PMDT1112-13	--	11/12/2015	--	--	364	--	--	--	--	98	--	--	29	--	--	105	2444.029	--	--
Abrams - USDA Building	7485 MT Highway 200, (commercial)	--	--	11/12/2015	--	--	240	--	--	--	--	65	--	--	19	--	--	78	--	--	--
Anthony	Jack and Deanna (residence), 3 Howells Lane	PMDT1112-12	--	11/12/2015	--	--	370	--	--	--	--	97	--	--	31	--	--	91	2444.99	--	--
Eldridge	Scott (residence), 22 Lyla Ln	PMDT1112-08	--	11/12/2015	--	--	164	--	--	--	--	46	--	--	12	--	--	16	2447.76	--	--
Gary's Glass and Auto Body	7493 MT Highway 200 (commercial)	PMDT1112-03	--	11/12/2015	--	--	180	--	--	--	--	72	--	--	20	--	--	27	--	--	--
Haun Shallow	William (residence), 7491 MT Highway 200	PMDT1112-04	--	11/12/2015	--	--	196	--	--	--	--	52	--	--	16	--	--	286	--	--	--
Joner	Greg and Kimberly (residence), 7479 MT Highway 200	PMDT1112-10	--	11/12/2015	--	--	291	--	--	--	--	82	--	--	21	--	--	65	--	--	--
MDT Plains Shop	2 Lower Lynch Creek Rd, (facility well)	PMDT1112-01	--	11/12/2015	--	--	192	--	--	--	--	49	--	--	17	--	--	198	--	--	--
Merideth	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	PMDT1112-06	--	11/12/2015	--	--	217	--	--	--	--	59	--	--	17	--	--	31	--	--	--
Merideth	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	PMDT1112-07	--	11/12/2015	--	--	--	--	--	--	--	59	--	--	16	--	--	31	--	--	--
Sears	Lyla (residence), 131 Lower Lynch Creek Rd	SYSTEM OFF FOR THE WINTER	--	11/12/2015	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
USDA	--	PMDT1112-11	--	11/12/2015	--	--	--	--	--	--	--	65	--	--	19	--	--	78	--	--	--
Vanderwall	Zach and Courtney (residence), 11 Smiling Tree Lane	PMDT1112-09	--	11/12/2015	--	--	202	--	--	--	--	56	--	--	15	--	--	28	2444.9	--	--
Weeks Shallow	Jim & Julie (residence), 15 Lower Lynch Creek Rd	PMDT1112-05	--	11/12/2015	--	--	265	--	--	--	--	70	--	--	22	--	--	142	2445.36	--	--
Wood	Leslie & Beverly (residence), 16 Kruger Road	PMDT1112-02	--	11/12/2015	--	--	228	--	--	--	--	65	--	--	16	--	--	23	2445.154	--	--
Abrams	Mike and Donna (residence), 4 Howells Lane	PMDT0419-05	--	4/19/2016	--	--	250	--	--	--	--	67	--	--	20	--	--	88	--	--	--
Abrams - USDA Building	7485 MT Highway 200, (commercial)	--	--	4/19/2016	--	--	240	--	--	--	--	63	--	--	20	--	--	97	--	--	--

TABLE 4-1. FIELD AND ANALYTICAL RESULTS
MDT MAINTENANCE FACILITY - PLAINS, MT

Site Location		Sample ID	Lab Sample ID	Collection Date	Static Water Levels (feet)	Field ORP (mV)	Field DO (mg/L)	Field PH (s.u.)	Field SC (umhos/cm)	Field Turbidity	Field Temperature (°C)	pH (s.u.)	pH Measurement Temp (°C)	Conductivity @ 25 C (umhos/cm)	Solids, Total Dissolved TDS @ 180 C (mg/L)	Alkalinity (mg/L)	Bicarbonate (mg/L)	Carbonate (mg/L)	Chloride (mg/L)
Anthony	Jack and Deanna (residence), 3 Howells Lane	PMDT0419-14	--	4/19/2016	--	--	--	--	--	--	--	7.4	--	**1030**	**590**	--	--	--	136
Eldridge	Scott (residence), 22 Lyla Ln	PMDT0419-09	--	4/19/2016	--	--	--	--	--	--	--	7.7	--	380	226	--	--	--	6
Eldridge DUP	Scott (residence), 22 Lyla Ln	PMDT0419-10	--	4/19/2016	--	--	--	--	--	--	--	7.7	--	380	229	--	--	--	6
Gary's Glass and Auto Body	7493 MT Highway 200 (commercial)	PMDT0419-02	--	4/19/2016	--	--	--	--	--	--	--	7.4	--	793	487	--	--	--	117
Haun Shallow	William (residence), 7491 MT Highway 200	PMDT0419-04	--	4/19/2016	--	--	--	--	--	--	--	7.7	--	**1400**	**749**	--	--	--	**297**
Joner	Greg and Kimberly (residence), 7479 MT Highway 200	PMDT0419-13	--	4/19/2016	--	--	--	--	--	--	--	7.6	--	946	**549**	--	--	--	146
MDT Plains Shop	2 Lower Lynch Creek Rd, (facility well)	PMDT0419-01	--	4/19/2016	--	--	--	--	--	--	--	7.3	--	**1220**	**659**	--	--	--	243
Merideth	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	PMDT0419-07	--	4/19/2016	--	--	--	--	--	--	--	7.7	--	517	299	--	--	--	21
Sears	Lyla (residence), 131 Lower Lynch Creek Rd	PMDT0419-08	--	4/19/2016	--	--	--	--	--	--	--	7.6	--	572	324	--	--	--	28
USDA	--	PMDT0419-12	--	4/19/2016	--	--	--	--	--	--	--	7.6	--	968	**536**	--	--	--	168
Vanderwall	Zach and Courtney (residence), 11 Smiling Tree Lane	PMDT0419-11	--	4/19/2016	--	--	--	--	--	--	--	7.8	--	508	295	--	--	--	19
Wood	Leslie & Beverly (residence), 16 Kruger Road	PMDT0419-03	--	4/19/2016	--	--	--	--	--	--	--	7.6	--	558	322	--	--	--	40
Weeks Shallow	Jim & Julie (residence), 15 Lower Lynch Creek Rd	PMDT0419-06	--	4/29/2016	--	--	--	--	--	--	--	7.7	--	**1280**	**715**	--	--	--	**266**
Joner	Greg and Kimberly (residence), 7479 MT Highway 200	--	--	12/1/2016	No Access	--	--	--	--	--	--	--	--	**--**	**--**	--	--	--	**--**
Sears	Lyla (residence), 131 Lower Lynch Creek Rd	--	--	12/1/2016	No Access	--	--	--	--	--	--	--	--	**--**	**--**	--	--	--	**--**
MDT Plains Shop	2 Lower Lynch Creek Rd, (facility well)	Pln-1216-01	H16120037-001	12/1/2016	--	151.4	6.65	6.76	1361	Clear	13.26	7.2	--	**1460**	**802**	--	--	--	**300**
Gary's Glass and Auto Body	7493 MT Highway 200 (commercial)	Pln-1216-02	H16120037-002	12/1/2016	No Access	152.1	7.87	6.98	585	Clear	14.11	7.5	--	635	386	--	--	--	70
Wood	Leslie & Beverly (residence), 16 Kruger Road	Pln-1216-03	H16120037-003	12/1/2016	--	158.7	5.98	7.03	451	Clear	11.96	7.5	--	489	292	--	--	--	29
Wood	Leslie & Beverly (residence), 16 Kruger Road	Pln-1216-04	H16120037-004	12/1/2016	--	--	--	--	--	--	--	7.5	--	490	292	--	--	--	29
Haun Shallow	William (residence), 7491 MT Highway 200	Pln-1216-05	H16120037-005	12/1/2016	No Access	145.5	5.53	7.22	2134	Clear	12.30	7.4	--	**2300**	**1320**	--	--	--	**550**
Weeks Shallow	Jim & Julie (residence), 15 Lower Lynch Creek Rd	Pln-1216-06	H16120037-006	12/1/2016	--	143.5	6.51	7.28	1517	Clear	12.12	7.4	--	**1650**	**979**	--	--	--	**370**
Merideth	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	Pln-1216-07	H16120037-007	12/1/2016	No Access	149.3	5.5	7.42	585	Clear	12.00	7.7	--	636	376	--	--	--	56
Eldridge	Scott (residence), 22 Lyla Ln	Pln-1216-08	H16120037-008	12/1/2016	--	149.2	7.34	7.50	386	Clear	11.89	7.7	--	421	255	--	--	--	10
Vanderwall	Zach and Courtney (residence), 11 Smiling Tree Lane	Pln-1216-09	H16120037-009	12/1/2016	--	150.2	4.57	7.41	612	Clear	11.47	7.6	--	666	382	--	--	--	54
Anthony	Jack and Deanna (residence), 3 Howells Lane	Pln-1216-10	H16120037-010	12/1/2016	--	147.1	6.9	7.35	1011	Clear	11.94	7.4	--	**1090**	**636**	--	--	--	170
Abrams	Mike and Donna (residence), 4 Howells Lane	Pln-1216-11	H16120037-011	12/1/2016	--	147	7.48	7.36	949	Clear	11.92	7.4	--	**1020**	**587**	--	--	--	140
USDA	--	Pln-1216-12	H16120037-012	12/1/2016	--	143.3	6.77	7.38	1265	Slightly Cloudy	12.23	7.5	--	**1370**	**750**	--	--	--	**290**
Davis	Greg & Deb (residence), 12 Lower Lynch Creek Road	Pln-1216-13	H16120037-013	12/1/2016	--	147.3	7.63	7.48	552	Clear	11.34	7.5	--	602	351	--	--	--	47
Abrams - USDA Building	7485 MT Highway 200, (commercial)	--	--	12/2/2016	--	--	--	--	--	--	--	7.5	--	**1370**	**750**	--	--	--	**290**
Abrams - USDA Building	7485 MT Highway 200, (commercial)	--	--	5/24/2017	--	--	--	--	--	--	--	7.5	--	**1710**	**1020**	--	--	--	**360**
MDT Plains Shop	2 Lower Lynch Creek Rd, (facility well)	Pln-0517-01	H17050519-001	5/24/2017	--	106.7	8.23	6.69	2026	Clear	9.07	7.2	--	**2290**	**1420**	--	--	--	**540**
Gary's Glass and Auto Body	7493 MT Highway 200 (commercial)	Pln-0517-02	H17050519-002	5/24/2017	--	75.9	9.58	7.13	709	Clear	8.17	7.5	--	807	**516**	--	--	--	110
Gary's Glass and Auto Body DU	7493 MT Highway 200 (commercial)	Pln-0517-03	H17050519-003	5/24/2017	--	--	--	--	--	--	--	7.5	--	811	**524**	--	--	--	110
Wood	Leslie & Beverly (residence), 16 Kruger Road	Pln-0517-04	H17050519-004	5/24/2017	--	83.5	7.51	7.32	425	Clear	8.86	7.6	--	488	279	--	--	--	29
Davis	Greg & Deb (residence), 12 Lower Lynch Creek Road	Pln-0517-05	H17050519-005	5/24/2017	--	89.8	7.1	7.44	525	Clear	9.03	7.6	--	603	351	--	--	--	44
Haun Shallow	William (residence), 7491 MT Highway 200	Pln-0517-06	H17050519-006	5/24/2017	--	89.1	6	7.06	2730	Clear	8.99	7.5	--	**3090**	**1730**	--	--	--	**760**
Weeks Shallow	Jim & Julie (residence), 15 Lower Lynch Creek Rd	Pln-0517-07	H17050519-007	5/24/2017	--	67.9	8.54	7.14	3303	Clear	8.59	7.4	--	**3760**	**2300**	--	--	--	**1200**
Merideth	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	Pln-0517-08	H17050519-008	5/24/2017	--	73.2	7.44	7.48	1224	Clear	8.97	7.6	--	**1400**	**871**	--	--	--	**270**
USDA	--	Pln-0517-09	H17050519-009	5/24/2017	--	-1.9	8.04	7.39	1503	Clear	9.07	7.5	--	**1710**	**1020**	--	--	--	**360**
Abrams	Mike and Donna (residence), 4 Howells Lane	Pln-0517-10	H17050519-010	5/24/2017	--	63.4	8.22	7.39	1320	Clear	8.97	7.5	--	**1510**	**948**	--	--	--	**300**
Anthony	Jack and Deanna (residence), 3 Howells Lane	Pln-0517-11	H17050519-011	5/24/2017	--	69.9	6.64	7.39	1071	Clear	8.82	7.5	--	**1230**	**726**	--	--	--	210
Joner	Greg and Kimberly (residence), 7479 MT Highway 200	Pln-0517-12	H17050519-012	5/24/2017	--	65.2	7.86	7.53	833	Clear	8.2	7.7	--	951	**539**	--	--	--	120
Eldridge	Scott (residence), 22 Lyla Ln	Pln-0517-13	H17050519-013	5/24/2017	--	91.9	8	7.55	595	Clear	8.31	7.7	--	682	407	--	--	--	33
Vanderwall	Zach and Courtney (residence), 11 Smiling Tree Lane	Pln-0517-14	H17050519-014	5/24/2017	--	97	6.9	7.33	843	Clear	8.48	7.5	--	961	**546**	--	--	--	100
Sears	Lyla (residence), 131 Lower Lynch Creek Rd	Pln-0517-15	H17050519-015	5/24/2017	--	102.5	5.72	7.45	795	Clear	8.24	7.6	--	908	**533**	--	--	--	98
Weeks Shallow	Jim & Julie (residence), 15 Lower Lynch Creek Rd	--	--	8/25/2017	--	--	--	--	--	--	--	7.6	--	**3260**	**1860**	200	250	<4	**829**
MDT Plains Shop	2 Lower Lynch Creek Rd, (facility well)	PLN-1017-01	H17100097-001	10/3/2017	16.7	71.1	7.33	7.02	1876	Clear	13.7	7.3	--	**1960**	**1060**	--	--	--	**470**
Gary's Glass and Auto Body	7493 MT Highway 200 (commercial)	PLN-1017-02	H17100097-002	10/3/2017	No Access	29.8	8.22	7.38	613	Clear	15.28	7.5	--	641	376	--	--	--	63
Wood	Leslie & Beverly (residence), 16 Kruger Road	PLN-1017-03	H17100097-003	10/3/2017	18.37	62.3	6.27	7.52	459	Clear	12.28	7.6	--	483	292	--	--	--	27
Abrams - USDA Building	7485 MT Highway 200, (commercial)	PLN-1017-04	H17100097-004	10/3/2017	19.31	1.4	7.55	7.37	1188	Clear	13.41	7.5	--	**1240**	**706**	--	--	--	237
Abrams - USDA Building DUP	7485 MT Highway 200, (commercial)	PLN-1017-05	H17100097-005	10/3/2017	--	--	--	--	--	--	--	7.5	--	**1240**	**713**	--	--	--	238
Abrams	Mike and Donna (residence), 4 Howells Lane	PLN-1017-06	H17100097-006	10/3/2017	18.02	21.5	8.72	7.37	1499	Clear	13.82	7.4	--	**1570**	**917**	--	--	--	**333**
Anthony	Jack and Deanna (residence), 3 Howells Lane	PLN-1017-07	H17100097-007	10/3/2017	16.65	4.3	8.49	7.35	1480	Clear	12.69	7.4	--	**1540**	**934**	--	--	--	**334**
Joner	Greg and Kimberly (residence), 7479 MT Highway 200	PLN-1017-08	H17100097-008	10/3/2017	No Access	81.6	7.9	7.54	923	Clear	13.06	7.6	--	968	**563**	--	--	--	139
Newman	--	PLN-1017-09	H17100097-009	10/3/2017	18.61	106.1	6.51	7.55	506	Clear	12.54	7.6	--	527	315	--	--	--	26
Vanderwall	Zach and Courtney (residence), 11 Smiling Tree Lane	PLN-1017-10	H17100097-010	10/3/2017	18.6	96.7	6.27	7.56	515	Clear	12.41	7.7	--	537	308	--	--	--	31
Sears	Lyla (residence), 131 Lower Lynch Creek Rd	PLN-1017-11	H17100097-011	10/3/2017	No Access	161.5	6.39	7.53	560	Clear	12.31	7.7	--	582	331	--	--	--	33
Merideth	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	PLN-1017-12	H17100097-012	10/3/2017	No Access	209.7	3.91	7.55	793	Clear	12.15	7.7	--	827	451	--	--	--	111
Davis	Greg & Deb (residence), 12 Lower Lynch Creek Road	PLN-1017-13	H17100097-013	10/3/2017	19.1	185.8	7.45	9.51	604	Clear	12.26	7.6	--	628	363	--	--	--	62
Haun Shallow	William (residence), 7491 MT Highway 200	PLN-1017-14	H17100097-014	10/3/2017	No Access	114.9	6.94	7.31	3412	Clear	14.06	7.4	--	**3550**	**2020**	--	--	--	**981**
Gary's Glass and Auto Body	7493 MT Highway 200 (commercial)	PLN-1017-15	H17100097-015	10/4/2017	17.9	179.2	7.83	7.45	627	Clear	13.75	7.5	--	676	417	--	--	--	43
Welch	--	PLN-1017-16	H17100097-016	10/4/2017	18.55	159.9	7.51	7.67	765	Clear	12.84	7.7	--	826	483	--	--	--	102
Dryers	--	PLN-1017-17	H17100097-017	10/4/2017	17.86	146.9	8.8	7.59	620	Clear	12.17	7.5	--	666	401	--	--	--	41
Baker	--	PLN-1017-18	H17100097-018	10/4/2017	16.84	145.5	5.58	7.7	459	Clear	13.27	7.6	--	496	303	--	--	--	23
Ford Dealership	--	PLN-1017-19	H17100097-019	10/4/2017	18.11	136.1	7.03	7.53	639	Clear	14.3	7.5	--	689	406	--	--	--	53
Madden	--	PLN-1017-20	H17100097-020	10/4/2017	19.61	128.7	7.27	7.66	508	Clear	13.08	7.7	--	550	331	--	--	--	21
Leichtam Shallow	Leichtnam, Mindy, 23 Lower Lynch Ck Rd	PLN-1117-01	H17110101-001	11/6/2017	--	82.1	5.66	7.07	2955	--	13.03	7.4	--	**3070**	**1740**	--	--	--	**794**
MDT Plains Shop	2 Lower Lynch Creek Rd, (facility well)	PLN-0118-01	H18010171-001	1/9/2018	--	191.8	7.21	7.44	1339	Clear	12.5	7.4	--	**1340**	**697**	--	--	--	**259**

TABLE 4-1. FIELD AND ANALYTICAL RESULTS
MDT MAINTENANCE FACILITY - PLAINS, MT

Site Location		Sample ID	Lab Sample ID	Collection Date	Sulfate (mg/L)	Fluoride (mg/L)	Hardness (mg/L)	Nitrate+ Nitrite (mg/L)	Nitrate as N (mg/L)	Nitrite as N (mg/L)	Arsenic (mg/L)	Calcium (mg/L)	Iron (mg/L)	Lead (mg/L)	Magnesium (mg/L)	Manganese (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Groundwater Elevation (ft)	E-Coli Coliform (per 100ml)	Total Coliform (per 100ml)
Anthony	Jack and Deanna (residence), 3 Howells Lane	PMDT0419-14	--	4/19/2016	--	--	317	--	--	--	--	84	--	--	26	--	--	83	2445.85	--	--
Eldridge	Scott (residence), 22 Lyla Ln	PMDT0419-09	--	4/19/2016	--	--	--	--	--	--	--	45	--	--	11	--	--	15	2444.99	--	--
Eldridge DUP	Scott (residence), 22 Lyla Ln	PMDT0419-10	--	4/19/2016	--	--	--	--	--	--	--	45	--	--	12	--	--	15	--	--	--
Gary's Glass and Auto Body	7493 MT Highway 200 (commercial)	PMDT0419-02	--	4/19/2016	--	--	--	--	--	--	--	85	--	--	23	--	--	35	--	--	--
Haun Shallow	William (residence), 7491 MT Highway 200	PMDT0419-04	--	4/19/2016	--	--	161	--	--	--	--	43	--	--	13	--	--	224	--	--	--
Joner	Greg and Kimberly (residence), 7479 MT Highway 200	PMDT0419-13	--	4/19/2016	--	--	--	--	--	--	--	85	--	--	22	--	--	66	--	--	--
MDT Plains Shop	2 Lower Lynch Creek Rd, (facility well)	PMDT0419-01	--	4/19/2016	--	--	210	--	--	--	--	53	--	--	19	--	--	166	--	--	--
Merideth	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	PMDT0419-07	--	4/19/2016	--	--	206	--	--	--	--	56	--	--	16	--	--	26	--	--	--
Sears	Lyla (residence), 131 Lower Lynch Creek Rd	PMDT0419-08	--	4/19/2016	--	--	--	--	--	--	--	62	--	--	17	--	--	30	--	--	--
USDA	--	PMDT0419-12	--	4/19/2016	--	--	--	--	--	--	--	63	--	--	20	--	--	97	--	--	--
Vanderwall	Zach and Courtney (residence), 11 Smiling Tree Lane	PMDT0419-11	--	4/19/2016	--	--	--	--	--	--	--	57	--	--	15	--	--	24	2445.36	--	--
Wood	Leslie & Beverly (residence), 16 Kruger Road	PMDT0419-03	--	4/19/2016	--	--	--	--	--	--	--	63	--	--	16	--	--	22	2446.49	--	--
Weeks Shallow	Jim & Julie (residence), 15 Lower Lynch Creek Rd	PMDT0419-06	--	4/29/2016	--	--	268	--	--	--	--	71	--	--	22	--	--	149	2444.83	--	--
Joner	Greg and Kimberly (residence), 7479 MT Highway 200	--	--	12/1/2016	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sears	Lyla (residence), 131 Lower Lynch Creek Rd	--	--	12/1/2016	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MDT Plains Shop	2 Lower Lynch Creek Rd, (facility well)	Pln-1216-01	H16120037-001	12/1/2016	--	--	268	--	--	--	--	68	--	--	24	--	--	197	--	--	--
Gary's Glass and Auto Body	7493 MT Highway 200 (commercial)	Pln-1216-02	H16120037-002	12/1/2016	--	--	258	--	--	--	--	72	--	--	19	--	--	27	--	--	--
Wood	Leslie & Beverly (residence), 16 Kruger Road	Pln-1216-03	H16120037-003	12/1/2016	--	--	212	--	--	--	--	60	--	--	15	--	--	19	--	--	--
Wood	Leslie & Beverly (residence), 16 Kruger Road	Pln-1216-04	H16120037-004	12/1/2016	--	--	204	--	--	--	--	60	--	--	15	--	--	19	--	--	--
Haun Shallow	William (residence), 7491 MT Highway 200	Pln-1216-05	H16120037-005	12/1/2016	--	--	405	--	--	--	--	108	--	--	33	--	--	310	--	--	--
Weeks Shallow	Jim & Julie (residence), 15 Lower Lynch Creek Rd	Pln-1216-06	H16120037-006	12/1/2016	--	--	366	--	--	--	--	97	--	--	30	--	--	194	--	--	--
Merideth	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	Pln-1216-07	H16120037-007	12/1/2016	--	--	248	--	--	--	--	68	--	--	19	--	--	37	--	--	--
Eldridge	Scott (residence), 22 Lyla Ln	Pln-1216-08	H16120037-008	12/1/2016	--	--	186	--	--	--	--	53	--	--	13	--	--	18	--	--	--
Vanderwall	Zach and Courtney (residence), 11 Smiling Tree Lane	Pln-1216-09	H16120037-009	12/1/2016	--	--	--	--	--	--	--	73	--	--	20	--	--	40	--	--	--
Anthony	Jack and Deanna (residence), 3 Howells Lane	Pln-1216-10	H16120037-010	12/1/2016	--	--	340	--	--	--	--	90	--	--	28	--	--	94	--	--	--
Abrams	Mike and Donna (residence), 4 Howells Lane	Pln-1216-11	H16120037-011	12/1/2016	--	--	324	--	--	--	--	87	--	--	26	--	--	92	--	--	--
USDA	--	Pln-1216-12	H16120037-012	12/1/2016	--	--	--	--	--	--	--	85	--	--	27	--	--	150	--	--	--
Davis	Greg & Deb (residence), 12 Lower Lynch Creek Road	Pln-1216-13	H16120037-013	12/1/2016	--	--	241	--	--	--	--	67	--	--	18	--	--	28	--	--	--
Abrams - USDA Building	7485 MT Highway 200, (commercial)	--	--	12/2/2016	--	--	323	--	--	--	--	85	--	--	27	--	--	150	--	--	--
Abrams - USDA Building	7485 MT Highway 200, (commercial)	--	--	5/24/2017	--	--	399	--	--	--	--	104	--	--	34	--	--	178	--	--	--
MDT Plains Shop	2 Lower Lynch Creek Rd, (facility well)	Pln-0517-01	H17050519-001	5/24/2017	--	--	494	--	--	--	--	127	--	--	43	--	--	252	--	--	--
Gary's Glass and Auto Body	7493 MT Highway 200 (commercial)	Pln-0517-02	H17050519-002	5/24/2017	--	--	318	--	--	--	--	88	--	--	24	--	--	32	--	--	--
Gary's Glass and Auto Body DU	7493 MT Highway 200 (commercial)	Pln-0517-03	H17050519-003	5/24/2017	--	--	--	--	--	--	--	87	--	--	24	--	--	32	--	--	--
Wood	Leslie & Beverly (residence), 16 Kruger Road	Pln-0517-04	H17050519-004	5/24/2017	--	--	--	--	--	--	--	57	--	--	15	--	--	17	--	--	--
Davis	Greg & Deb (residence), 12 Lower Lynch Creek Road	Pln-0517-05	H17050519-005	5/24/2017	--	--	--	--	--	--	--	67	--	--	18	--	--	27	--	--	--
Haun Shallow	William (residence), 7491 MT Highway 200	Pln-0517-06	H17050519-006	5/24/2017	--	--	551	--	--	--	--	145	--	--	46	--	--	399	--	--	--
Weeks Shallow	Jim & Julie (residence), 15 Lower Lynch Creek Rd	Pln-0517-07	H17050519-007	5/24/2017	--	--	761	--	--	--	--	183	--	--	74	--	--	420	--	--	--
Merideth	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	Pln-0517-08	H17050519-008	5/24/2017	--	--	407	--	--	--	--	107	--	--	34	--	--	111	--	--	--
USDA	--	Pln-0517-09	H17050519-009	5/24/2017	--	--	--	--	--	--	--	104	--	--	34	--	--	178	--	--	--
Abrams	Mike and Donna (residence), 4 Howells Lane	Pln-0517-10	H17050519-010	5/24/2017	--	--	445	--	--	--	--	119	--	--	36	--	--	115	--	--	--
Anthony	Jack and Deanna (residence), 3 Howells Lane	Pln-0517-11	H17050519-011	5/24/2017	--	--	361	--	--	--	--	97	--	--	29	--	--	96	--	--	--
Joner	Greg and Kimberly (residence), 7479 MT Highway 200	Pln-0517-12	H17050519-012	5/24/2017	--	--	309	--	--	--	--	86	--	--	23	--	--	69	--	--	--
Eldridge	Scott (residence), 22 Lyla Ln	Pln-0517-13	H17050519-013	5/24/2017	--	--	--	--	--	--	--	84	--	--	21	--	--	28	--	--	--
Vanderwall	Zach and Courtney (residence), 11 Smiling Tree Lane	Pln-0517-14	H17050519-014	5/24/2017	--	--	--	--	--	--	--	98	--	--	29	--	--	60	--	--	--
Sears	Lyla (residence), 131 Lower Lynch Creek Rd	Pln-0517-15	H17050519-015	5/24/2017	--	--	--	--	--	--	--	97	--	--	29	--	--	44	--	--	--
Weeks Shallow	Jim & Julie (residence), 15 Lower Lynch Creek Rd	--	--	8/25/2017	27	--	626	5	--	--	<0.005	160	**0.52**	--	55	--	5	386	--	--	--
MDT Plains Shop	2 Lower Lynch Creek Rd, (facility well)	PLN-1017-01	H17100097-001	10/3/2017	--	--	317	--	--	--	--	81	--	--	28	--	--	252	--	--	--
Gary's Glass and Auto Body	7493 MT Highway 200 (commercial)	PLN-1017-02	H17100097-002	10/3/2017	--	--	--	--	--	--	--	66	--	--	18	--	--	31	--	--	--
Wood	Leslie & Beverly (residence), 16 Kruger Road	PLN-1017-03	H17100097-003	10/3/2017	--	--	--	--	--	--	--	54	--	--	14	--	--	18	--	--	--
Abrams - USDA Building	7485 MT Highway 200, (commercial)	PLN-1017-04	H17100097-004	10/3/2017	--	--	--	--	--	--	--	97	--	--	31	--	--	93	--	--	--
Abrams - USDA Building DUP	7485 MT Highway 200, (commercial)	PLN-1017-05	H17100097-005	10/3/2017	--	--	--	--	--	--	--	99	--	--	31	--	--	91	--	--	--
Abrams	Mike and Donna (residence), 4 Howells Lane	PLN-1017-06	H17100097-006	10/3/2017	--	--	--	--	--	--	--	102	--	--	31	--	--	150	--	--	--
Anthony	Jack and Deanna (residence), 3 Howells Lane	PLN-1017-07	H17100097-007	10/3/2017	--	--	--	--	--	--	--	105	--	--	33	--	--	135	--	--	--
Joner	Greg and Kimberly (residence), 7479 MT Highway 200	PLN-1017-08	H17100097-008	10/3/2017	--	--	--	--	--	--	--	79	--	--	21	--	--	75	--	--	--
Newman	--	PLN-1017-09	H17100097-009	10/3/2017	--	--	--	--	--	--	--	53	--	--	13	--	--	33	--	--	--
Vanderwall	Zach and Courtney (residence), 11 Smiling Tree Lane	PLN-1017-10	H17100097-010	10/3/2017	--	--	--	--	--	--	--	51	--	--	14	--	--	37	--	--	--
Sears	Lyla (residence), 131 Lower Lynch Creek Rd	PLN-1017-11	H17100097-011	10/3/2017	--	--	--	--	--	--	--	61	--	--	17	--	--	30	--	--	--
Merideth	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	PLN-1017-12	H17100097-012	10/3/2017	--	--	--	--	--	--	--	62	--	--	18	--	--	73	--	--	--
Davis	Greg & Deb (residence), 12 Lower Lynch Creek Road	PLN-1017-13	H17100097-013	10/3/2017	--	--	--	--	--	--	--	61	--	--	17	--	--	34	--	--	--
Haun Shallow	William (residence), 7491 MT Highway 200	PLN-1017-14	H17100097-014	10/3/2017	--	--	510	--	--	--	--	135	--	--	42	--	--	497	--	--	--
Gary's Glass and Auto Body	7493 MT Highway 200 (commercial)	PLN-1017-15	H17100097-015	10/4/2017	--	--	--	--	--	--	--	71	--	--	19	--	--	35	--	--	--
Welch	--	PLN-1017-16	H17100097-016	10/4/2017	--	--	--	--	--	--	--	79	--	--	21	--	--	46	--	--	--
Dryers	--	PLN-1017-17	H17100097-017	10/4/2017	--	--	--	--	--	--	--	69	--	--	18	--	--	33	--	--	--
Baker	--	PLN-1017-18	H17100097-018	10/4/2017	--	--	--	--	--	--	--	54	--	--	14	--	--	23	--	--	--
Ford Dealership	--	PLN-1017-19	H17100097-019	10/4/2017	--	--	--	--	--	--	--	72	--	--	18	--	--	34	--	--	--
Madden	--	PLN-1017-20	H17100097-020	10/4/2017	--	--	--	--	--	--	--	60	--	--	18	--	--	22	--	--	--
Leichtam Shallow	Leichtnam, Mindy, 23 Lower Lynch Ck Rd	PLN-1117-01	H17110101-001	11/6/2017	--	--	--	--	--	--	--	154	--	--	52	--	--	345	--	--	--
MDT Plains Shop	2 Lower Lynch Creek Rd, (facility well)	PLN-0118-01	H18010171-001	1/9/2018	--	--	209	--	--	--	--	54	--	--	18	--	--	184	--	--	--

TABLE 4-1. FIELD AND ANALYTICAL RESULTS
MDT MAINTENANCE FACILITY - PLAINS, MT

Site Location		Sample ID	Lab Sample ID	Collection Date	Static Water Levels (feet)	Field ORP (mV)	Field DO (mg/L)	Field PH (s.u.)	Field SC (umhos/cm)	Field Turbidity	Field Temperature (°C)	pH (s.u.)	pH Measurement Temp (°C)	Conductivity @ 25 C (umhos/cm)	Solids, Total Dissolved TDS @ 180 C (mg/L)	Alkalinity (mg/L)	Bicarbonate (mg/L)	Carbonate (mg/L)	Chloride (mg/L)
Wood	Leslie & Beverly (residence), 16 Kruger Road	--	--	1/9/2018	Frozen	--	--	--	--	--	--	--	--	**--**	**--**	--	--	--	**--**
Haun Shallow	William (residence), 7491 MT Highway 200	PLN-0118-02	H18010171-002	1/9/2018	--	154.6	7.58	7.63	222	Clear	10.3	7.6	--	**2220**	**1140**	--	--	--	**511**
Weeks Shallow	Jim & Julie (residence), 15 Lower Lynch Creek Rd	PLN-0118-03	H18010171-003	1/9/2018	--	118.9	8.1	7.59	2339	Clear	11.4	7.6	--	**2370**	**1310**	--	--	--	**576**
Sears	Lyla (residence), 131 Lower Lynch Creek Rd	--	--	1/9/2018	Water Shut Off	--	--	--	--	--	--	--	--	**--**	**--**	--	--	--	**--**
Davis	Greg & Deb (residence), 12 Lower Lynch Creek Road	PLN-0118-04	H18010171-004	1/9/2018	--	124.8	6.68	7.69	574	Clear	11.4	7.6	--	580	318	--	--	--	42
Merideth	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	PLN-0118-05	H18010171-005	1/9/2018	--	138.9	3.13	7.69	584	Clear	11.8	7.7	--	588	320	--	--	--	34
Newman	--	PLN-0118-06	H18010171-006	1/9/2018	--	148	6.12	7.73	407.6	Clear	11.8	7.7	--	415	232	--	--	--	10
Newman Duplicate	--	PLN-0118-07	H18010171-007	1/9/2018	--	--	--	--	--	--	--	7.7	--	412	231	--	--	--	10
Dryers	--	--	--	1/9/2018	Frozen	--	--	--	--	--	--	--	--	**--**	**--**	--	--	--	**--**
Welch	--	PLN-0118-08	H18010171-008	1/9/2018	--	133.9	6.01	7.75	627	Clear	10.2	7.7	--	630	338	--	--	--	54
Vanderwall	Zach and Courtney (residence), 11 Smiling Tree Lane	PLN-0118-09	H18010171-009	1/9/2018	--	132.7	5.66	7.79	454.7	Clear	10.1	7.7	--	456	248	--	--	--	15
Madden	--	--	--	1/9/2018	Frozen	--	--	--	--	--	--	--	--	**--**	**--**	--	--	--	**--**
Baker	--	PLN-0118-10	H18010171-010	1/9/2018	--	146.9	6.47	7.74	392.3	Clear	10.7	7.7	--	399	225	--	--	--	10
Ford Dealership	--	PLN-0118-11	H18010171-011	1/9/2018	--	153.2	8.11	7.68	687	Clear	12.8	7.7	--	696	384	--	--	--	61
Abrams	Mike and Donna (residence), 4 Howells Lane	PLN-0118-12	H18010171-012	1/9/2018	--	100.6	7.68	7.41	1466	Clear	12	7.4	--	**1480**	**809**	--	--	--	**272**
Anthony	Jack and Deanna (residence), 3 Howells Lane	PLN-0118-13	H18010171-013	1/9/2018	--	88.9	8.2	7.55	1458	Clear	10.6	7.4	--	**1470**	**806**	--	--	--	**290**
Abrams - USDA Building	7485 MT Highway 200, (commercial)	PLN-0118-14	H18010171-014	1/9/2018	--	59.2	7.74	7.6	1258	Clear	11.9	7.5	--	**1270**	**675**	--	--	--	243
Gary's Glass and Auto Body	7493 MT Highway 200 (commercial)	PLN-0118-15	H18010171-015	1/9/2018	--	121.3	7.66	7.62	585	Clear	10.9	7.5	--	594	340	--	--	--	24
Leichtam Shallow	Leichtnam, Mindy, 23 Lower Lynch Ck Rd	PLN-0118-16	H18010171-016	1/9/2018	--	55.1	6.31	7.5	2070	Clear	12.1	7.4	--	**2110**	**1140**	--	--	--	**479**
Joner	Greg and Kimberly (residence), 7479 MT Highway 200	--	--	1/9/2018	Water Shut Off	--	--	--	--	--	--	--	--	**--**	**--**	--	--	--	**--**
Abrams	Mike and Donna (residence), 4 Howells Lane	PLN-0418-09	H18040490-009	4/25/2018	--	181	6.54	7.35	1032	Clear	10.63	7.4	--	**1040**	**575**	--	--	--	144
Abrams - USDA Building	7485 MT Highway 200, (commercial)	PLN-0418-08	H18040490-008	4/25/2018	--	181.4	7.13	7.3	1510	Clear	11.18	7.5	--	**1500**	**851**	--	--	--	**327**
Anthony	Jack and Deanna (residence), 3 Howells Lane	PLN-0418-10	H18040490-010	4/25/2018	--	181.9	6.02	7.35	1240	Clear	10.44	7.5	--	**1230**	**676**	--	--	--	217
Baker	--	PLN-0418-12	H18040490-012	4/25/2018	--	184.2	4.99	7.49	384	Clear	11.08	7.7	--	390	227	--	--	--	10
Davis	Greg & Deb (residence), 12 Lower Lynch Creek Road	PLN-0418-07	H18040490-007	4/25/2018	--	196.8	7.01	7.39	584	Clear	11.32	7.6	--	583	338	--	--	--	48
Dryers	--	PLN-0418-14	H18040490-014	4/25/2018	--	207.8	5.57	7.33	534	Clear	10.81	7.6	--	532	316	--	--	--	20
Ford Dealership	--	PLN-0418-04	H18040490-004	4/25/2018	--	190.8	7.66	7.21	695	Clear	10.77	7.6	--	689	408	--	--	--	64
Ford Dealership DUP	--	PLN-0418-05	H18040490-005	4/25/2018	--	--	--	--	--	--	--	7.6	--	689	402	--	--	--	64
Gary Revier (Auto Shop)	--	PLN-0418-06	H18040490-006	4/25/2018	--	189.5	6.74	7.26	631	Clear	10.52	7.6	--	626	385	--	--	--	29
Gary's Glass and Auto Body	7493 MT Highway 200 (commercial)	PLN-0418-02	H18040490-002	4/25/2018	--	182.7	7.63	6.82	668	Clear	9.82	7.5	--	665	384	--	--	--	77
Joner	Greg and Kimberly (residence), 7479 MT Highway 200	PLN-0418-11	H18040490-011	4/25/2018	--	191.3	602	7.53	955	Clear	11	7.7	--	946	**528**	--	--	--	146
Madden	--	PLN-0418-13	H18040490-013	4/25/2018	--	194.6	6.11	7.54	454	Clear	11.02	7.7	--	453	262	--	--	--	13
MDT Plains Shop	2 Lower Lynch Creek Rd, (facility well)	PLN-0418-01	H18040490-001	4/25/2018	--	191.2	6.42	6.67	1003	Clear	11.45	7.5	--	1000	**549**	--	--	--	167
Merideth	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	PLN-0418-18	H18040490-018	4/25/2018	--	270.3	4.15	7.47	514	Clear	11.96	7.7	--	515	289	--	--	--	30
Newman	--	PLN-0418-15	H18040490-015	4/25/2018	--	210.2	5.77	7.51	426	Clear	10.85	7.7	--	420	242	--	--	--	13
Sears	Lyla (residence), 131 Lower Lynch Creek Rd	PLN-0418-19	H18040490-019	4/25/2018	--	225.4	320	7.4	597	Clear	11.45	7.7	--	591	327	--	--	--	40
Vanderwall	Zach and Courtney (residence), 11 Smiling Tree Lane	PLN-0418-17	H18040490-017	4/25/2018	--	217.6	5.99	7.49	477	Clear	10.56	7.7	--	475	266	--	--	--	21
Welch	--	PLN-0418-16	H18040490-016	4/25/2018	--	213.9	7.1	7.63	503	Clear	11.2	7.8	--	501	276	--	--	--	29
Wood	Leslie & Beverly (residence), 16 Kruger Road	PLN-0418-03	H18040490-003	4/25/2018	--	187.1	7.09	7.05	595	Clear	11.09	7.6	--	592	346	--	--	--	55
Haun Shallow	William (residence), 7491 MT Highway 200	PLN-0418-21	H18040490-021	4/26/2018	--	44	6.27	7.01	428	Clear	14.85	7.6	--	428	248	--	--	--	3
Weeks Shallow	Jim & Julie (residence), 15 Lower Lynch Creek Rd	PLN-0418-20	H18040490-020	4/26/2018	--	77.1	3.13	6.74	622	Clear	14.29	7.5	--	623	364	--	--	--	10
Haun Shallow	William (residence), 7491 MT Highway 200	PLN-0518-01	H18050357-001	5/15/2018	--	--	--	--	--	--	--	--	--	**--**	**--**	--	--	--	**--**
Leichtam Shallow	Leichtnam, Mindy, 23 Lower Lynch Ck Rd	Leichtnam-1	H18060366-002	6/14/2018	--	--	--	--	--	--	--	7.6	10.9	361	209	150	180	<4	7
Merideth	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	Meridith-1	H18060366-001	6/14/2018	--	--	--	--	--	--	--	7.6	12.1	**1230**	**686**	210	250	<4	229
Weeks Shallow	Jim & Julie (residence), 15 Lower Lynch Creek Rd	Weeks-1	H18060366-003	6/14/2018	--	--	--	--	--	--	--	7.6	11.6	557	321	260	320	<4	11
Haun Shallow	William (residence), 7491 MT Highway 200	PLN-0118-01	H18060796-001	6/27/2018	--	--	--	--	--	--	--	7.6	13.4	472	279	230	280	<4	4
MDT Plains Shop	2 Lower Lynch Creek Rd, (facility well)	PLN-0718-01	H18070256-001	7/10/2018	27.47	169.6	6.62	6.8	1450	Clear	12	7.4	12.3	**1480**	**784**	--	--	--	**302**
Gary's Glass and Auto Body	7493 MT Highway 200 (commercial)	PLN-0718-02	H18070256-002	7/10/2018	No Access	102.8	6.81	7.04	643.5	Clear	12.9	7.6	11.4	671	385	--	--	--	69
Wood	Leslie & Beverly (residence), 16 Kruger Road	PLN-0718-03	H18070256-003	7/10/2018	28.72	161.5	6.15	7.22	510.3	Clear	11.4	7.7	11.6	533	298	--	--	--	37
Wood	Leslie & Beverly (residence), 16 Kruger Road	PLN-0718-04	H18070256-004	7/10/2018	--	--	--	--	--	--	--	7.7	11.8	532	291	--	--	--	37
Ford Dealership	--	PLN-0718-05	H18070256-005	7/10/2018	29.15	168.3	7.61	7.15	1038	Clear	12.3	7.5	12.2	**1070**	**616**	--	--	--	126
Gary Revier (Auto Shop)	--	PLN-0718-06	H18070256-006	7/10/2018	28.88	182.1	7.31	7.22	1052	Clear	12.5	7.5	12.6	**1080**	**638**	--	--	--	143
Dryers	--	PLN-0718-07	H18070256-007	7/10/2018	No Access	183	7.41	7.31	741	Clear	11.3	7.5	13.3	762	440	--	--	--	48
Welch	--	PLN-0718-08	H18070256-008	7/10/2018	30.7	157.3	7.31	7.17	626.2	Clear	11.9	7.7	13.5	660	371	--	--	--	58
Vanderwall	Zach and Courtney (residence), 11 Smiling Tree Lane	PLN-0718-09	H18070256-009	7/10/2018	32.06	185.8	5.64	7.2	966	Clear	11.2	7.6	13.1	991	**547**	--	--	--	127
Davis	Greg & Deb (residence), 12 Lower Lynch Creek Road	PLN-0718-10	H18070256-010	7/10/2018	No Access	121	7.15	7.4	632.7	Clear	12.1	7.7	13	654	355	--	--	--	63
Haun Shallow	William (residence), 7491 MT Highway 200	PLN-0718-11	H18070256-011	7/10/2018	25.99	-172.8	2.73	7.22	528.5	Clear	15.3	7.7	13.1	526	294	--	--	--	16
Abrams - USDA Building	7485 MT Highway 200, (commercial)	PLN-0718-12	H18070256-012	7/10/2018	30.61	76.3	7.94	7.33	1466	Clear	12.2	7.5	13.1	**1510**	**798**	--	--	--	309
Abrams	Mike and Donna (residence), 4 Howells Lane	PLN-0718-13	H18070256-013	7/10/2018	30.34	87.7	6.25	7.4	836	Clear	15.1	7.6	13.2	845	464	--	--	--	110
Anthony	Jack and Deanna (residence), 3 Howells Lane	PLN-0718-14	H18070256-014	7/10/2018	27.81	102.9	7.04	7.33	918	Clear	12.1	7.6	14	938	**525**	--	--	--	135
Joner	Greg and Kimberly (residence), 7479 MT Highway 200	PLN-0718-15	H18070256-015	7/10/2018	No Access	101.6	5.64	7.2	1210	Clear	11.5	7.6	14.3	**1240**	**767**	--	--	--	209
Newman	--	PLN-0718-16	H18070256-016	7/10/2018	No Access	112.1	6.06	7.33	538.9	Clear	11.6	7.7	14.1	561	330	--	--	--	32
Sears	Lyla (residence), 131 Lower Lynch Creek Rd	PLN-0718-17	H18070256-017	7/10/2018	No Access	128.4	8.7	7.39	1126	Clear	11.7	7.7	14.2	**1150**	**680**	--	--	--	178
Leichtam Shallow	Leichtnam, Mindy, 23 Lower Lynch Ck Rd	PLN-0718-18	H18070256-018	7/10/2018	31.16	112.5	2.22	7.5	342.2	Clear	13.6	7.6	14.6	350	238	--	--	--	7
Merideth	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	PLN-0718-19	H18070256-019	7/10/2018	No Access	126	7.31	7.47	1203	Clear	12.6	7.6	15.3	**1230**	**722**	--	--	--	230
Weeks Shallow	Jim & Julie (residence), 15 Lower Lynch Creek Rd	PLN-0718-20	H18070256-020	7/10/2018	34.6	-94.2	2.7	7.42	477.6	Clear	14.7	7.7	15.4	526	319	--	--	--	11
Madden	--	PLN-0718-21	H18070256-021	7/10/2018	34.78	95	4.25	7.42	407.5	Clear	11.3	7.8	16.5	420	254	--	--	--	11
Madden	--	PLN-0718-22	H18070256-022	7/10/2018	--	--	--	--	--	--	--	7.8	16	420	254	--	--	--	11

TABLE 4-1. FIELD AND ANALYTICAL RESULTS
MDT MAINTENANCE FACILITY - PLAINS, MT

Site Location		Sample ID	Lab Sample ID	Collection Date	Sulfate (mg/L)	Fluoride (mg/L)	Hardness (mg/L)	Nitrate+ Nitrite (mg/L)	Nitrate as N (mg/L)	Nitrite as N (mg/L)	Arsenic (mg/L)	Calcium (mg/L)	Iron (mg/L)	Lead (mg/L)	Magnesium (mg/L)	Manganese (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Groundwater Elevation (ft)	E-Coli Coliform (per 100ml)	Total Coliform (per 100ml)
Wood	Leslie & Beverly (residence), 16 Kruger Road	--	--	1/9/2018	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Haun Shallow	William (residence), 7491 MT Highway 200	PLN-0118-02	H18010171-002	1/9/2018	--	--	230	--	--	--	--	61	--	--	19	--	--	351	--	--	--
Weeks Shallow	Jim & Julie (residence), 15 Lower Lynch Creek Rd	PLN-0118-03	H18010171-003	1/9/2018	--	--	403	--	--	--	--	107	--	--	33	--	--	306	--	--	--
Sears	Lyla (residence), 131 Lower Lynch Creek Rd	--	--	1/9/2018	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Davis	Greg & Deb (residence), 12 Lower Lynch Creek Road	PLN-0118-04	H18010171-004	1/9/2018	--	--	--	--	--	--	--	61	--	--	17	--	--	28	--	--	--
Merideth	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	PLN-0118-05	H18010171-005	1/9/2018	--	--	--	--	--	--	--	59	--	--	17	--	--	33	--	--	--
Newman	--	PLN-0118-06	H18010171-006	1/9/2018	--	--	--	--	--	--	--	46	--	--	11	--	--	19	--	--	--
Newman Duplicate	--	PLN-0118-07	H18010171-007	1/9/2018	--	--	--	--	--	--	--	46	--	--	12	--	--	19	--	--	--
Dryers	--	--	--	1/9/2018	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Welch	--	PLN-0118-08	H18010171-008	1/9/2018	--	--	--	--	--	--	--	64	--	--	16	--	--	38	--	--	--
Vanderwall	Zach and Courtney (residence), 11 Smiling Tree Lane	PLN-0118-09	H18010171-009	1/9/2018	--	--	--	--	--	--	--	49	--	--	13	--	--	23	--	--	--
Madden	--	--	--	1/9/2018	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Baker	--	PLN-0118-10	H18010171-010	1/9/2018	--	--	--	--	--	--	--	45	--	--	11	--	--	17	--	--	--
Ford Dealership	--	PLN-0118-11	H18010171-011	1/9/2018	--	--	--	--	--	--	--	76	--	--	18	--	--	33	--	--	--
Abrams	Mike and Donna (residence), 4 Howells Lane	PLN-0118-12	H18010171-012	1/9/2018	--	--	--	--	--	--	--	101	--	--	31	--	--	132	--	--	--
Anthony	Jack and Deanna (residence), 3 Howells Lane	PLN-0118-13	H18010171-013	1/9/2018	--	--	--	--	--	--	--	103	--	--	33	--	--	123	--	--	--
Abrams - USDA Building	7485 MT Highway 200, (commercial)	PLN-0118-14	H18010171-014	1/9/2018	--	--	380	--	--	--	--	83	--	--	26	--	--	117	--	--	--
Gary's Glass and Auto Body	7493 MT Highway 200 (commercial)	PLN-0118-15	H18010171-015	1/9/2018	--	--	--	--	--	--	--	68	--	--	18	--	--	25	--	--	--
Leichtam Shallow	Leichtnam, Mindy, 23 Lower Lynch Ck Rd	PLN-0118-16	H18010171-016	1/9/2018	--	--	--	--	--	--	--	107	--	--	41	--	--	225	--	--	--
Joner	Greg and Kimberly (residence), 7479 MT Highway 200	--	--	1/9/2018	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Abrams	Mike and Donna (residence), 4 Howells Lane	PLN-0418-09	H18040490-009	4/25/2018	--	--	--	--	--	--	--	75	--	--	23	--	--	101	--	--	--
Abrams - USDA Building	7485 MT Highway 200, (commercial)	PLN-0418-08	H18040490-008	4/25/2018	--	--	--	--	--	--	--	86	--	--	27	--	--	168	--	--	--
Anthony	Jack and Deanna (residence), 3 Howells Lane	PLN-0418-10	H18040490-010	4/25/2018	--	--	--	--	--	--	--	86	--	--	27	--	--	119	--	--	--
Baker	--	PLN-0418-12	H18040490-012	4/25/2018	--	--	--	--	--	--	--	45	--	--	11	--	--	17	--	--	--
Davis	Greg & Deb (residence), 12 Lower Lynch Creek Road	PLN-0418-07	H18040490-007	4/25/2018	--	--	--	--	--	--	--	61	--	--	17	--	--	29	--	--	--
Dryers	--	PLN-0418-14	H18040490-014	4/25/2018	--	--	--	--	--	--	--	60	--	--	16	--	--	28	--	--	--
Ford Dealership	--	PLN-0418-04	H18040490-004	4/25/2018	--	--	--	--	--	--	--	76	--	--	19	--	--	34	--	--	--
Ford Dealership DUP	--	PLN-0418-05	H18040490-005	4/25/2018	--	--	--	--	--	--	--	75	--	--	18	--	--	35	--	--	--
Gary Revier (Auto Shop)	--	PLN-0418-06	H18040490-006	4/25/2018	--	--	--	--	--	--	--	71	--	--	18	--	--	31	--	--	--
Gary's Glass and Auto Body	7493 MT Highway 200 (commercial)	PLN-0418-02	H18040490-002	4/25/2018	--	--	--	--	--	--	--	70	--	--	19	--	--	29	--	--	--
Joner	Greg and Kimberly (residence), 7479 MT Highway 200	PLN-0418-11	H18040490-011	4/25/2018	--	--	--	--	--	--	--	83	--	--	23	--	--	73	--	--	--
Madden	--	PLN-0418-13	H18040490-013	4/25/2018	--	--	--	--	--	--	--	53	--	--	16	--	--	17	--	--	--
MDT Plains Shop	2 Lower Lynch Creek Rd, (facility well)	PLN-0418-01	H18040490-001	4/25/2018	--	--	--	--	--	--	--	43	--	--	14	--	--	143	--	--	--
Merideth	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	PLN-0418-18	H18040490-018	4/25/2018	--	--	--	--	--	--	--	56	--	--	16	--	--	26	--	--	--
Newman	--	PLN-0418-15	H18040490-015	4/25/2018	--	--	--	--	--	--	--	47	--	--	12	--	--	20	--	--	--
Sears	Lyla (residence), 131 Lower Lynch Creek Rd	PLN-0418-19	H18040490-019	4/25/2018	--	--	--	--	--	--	--	64	--	--	18	--	--	31	--	--	--
Vanderwall	Zach and Courtney (residence), 11 Smiling Tree Lane	PLN-0418-17	H18040490-017	4/25/2018	--	--	--	--	--	--	--	53	--	--	14	--	--	24	--	--	--
Welch	--	PLN-0418-16	H18040490-016	4/25/2018	--	--	--	--	--	--	--	53	--	--	14	--	--	29	--	--	--
Wood	Leslie & Beverly (residence), 16 Kruger Road	PLN-0418-03	H18040490-003	4/25/2018	--	--	--	--	--	--	--	68	--	--	17	--	--	22	--	--	--
Haun Shallow	William (residence), 7491 MT Highway 200	PLN-0418-21	H18040490-021	4/26/2018	--	--	--	<0.01	<0.01	0.01	--	42	--	--	10	--	--	35	--	Absent	**Present**
Weeks Shallow	Jim & Julie (residence), 15 Lower Lynch Creek Rd	PLN-0418-20	H18040490-020	4/26/2018	--	--	--	0.65	0.65	<0.01	--	62	--	--	16	--	--	45	--	Absent	Absent
Haun Shallow	William (residence), 7491 MT Highway 200	PLN-0518-01	H18050357-001	5/15/2018	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Absent	**Present**
Leichtam Shallow	Leichtnam, Mindy, 23 Lower Lynch Ck Rd	Leichtnam-1	H18060366-002	6/14/2018	10	0.3	142	1.95	--	--	0.030	42	0.12	<0.001	9	0.194	7	14	--	Absent	Absent
Merideth	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	Meridith-1	H18060366-001	6/14/2018	19	<0.1	309	3.7	--	--	<0.005	80	0.01	<0.001	27	<0.005	3	120	--	--	--
Weeks Shallow	Jim & Julie (residence), 15 Lower Lynch Creek Rd	Weeks-1	H18060366-003	6/14/2018	12	0.3	204	<0.01	--	--	0.162	58	**0.54**	<0.001	14	0.218	7	39	--	--	--
Haun Shallow	William (residence), 7491 MT Highway 200	PLN-0118-01	H18060796-001	6/27/2018	7	1	157	<0.01	--	--	0.038	45	**0.71**	<0.001	11	0.327	4	43	--	--	--
MDT Plains Shop	2 Lower Lynch Creek Rd, (facility well)	PLN-0718-01	H18070256-001	7/10/2018	--	--	--	--	--	--	--	66	--	--	23	--	--	193	--	--	--
Gary's Glass and Auto Body	7493 MT Highway 200 (commercial)	PLN-0718-02	H18070256-002	7/10/2018	--	--	--	--	--	--	--	68	--	--	19	--	--	29	--	--	--
Wood	Leslie & Beverly (residence), 16 Kruger Road	PLN-0718-03	H18070256-003	7/10/2018	--	--	--	--	--	--	--	58	--	--	15	--	--	20	--	--	--
Wood	Leslie & Beverly (residence), 16 Kruger Road	PLN-0718-04	H18070256-004	7/10/2018	--	--	--	--	--	--	--	58	--	--	15	--	--	19	--	--	--
Ford Dealership	--	PLN-0718-05	H18070256-005	7/10/2018	--	--	--	--	--	--	--	109	--	--	27	--	--	57	--	--	--
Gary Revier (Auto Shop)	--	PLN-0718-06	H18070256-006	7/10/2018	--	--	--	--	--	--	--	100	--	--	28	--	--	65	--	--	--
Dryers	--	PLN-0718-07	H18070256-007	7/10/2018	--	--	--	--	--	--	--	82	--	--	21	--	--	38	--	--	--
Welch	--	PLN-0718-08	H18070256-008	7/10/2018	--	--	--	--	--	--	--	69	--	--	18	--	--	35	--	--	--
Vanderwall	Zach and Courtney (residence), 11 Smiling Tree Lane	PLN-0718-09	H18070256-009	7/10/2018	--	--	--	--	--	--	--	95	--	--	26	--	--	63	--	--	--
Davis	Greg & Deb (residence), 12 Lower Lynch Creek Road	PLN-0718-10	H18070256-010	7/10/2018	--	--	--	--	--	--	--	68	--	--	18	--	--	33	--	--	--
Haun Shallow	William (residence), 7491 MT Highway 200	PLN-0718-11	H18070256-011	7/10/2018	--	--	--	--	--	--	--	45	--	--	11	--	--	51	--	--	--
Abrams - USDA Building	7485 MT Highway 200, (commercial)	PLN-0718-12	H18070256-012	7/10/2018	--	--	--	--	--	--	--	76	--	--	25	--	--	183	--	--	--
Abrams	Mike and Donna (residence), 4 Howells Lane	PLN-0718-13	H18070256-013	7/10/2018	--	--	--	--	--	--	--	50	--	--	16	--	--	97	--	--	--
Anthony	Jack and Deanna (residence), 3 Howells Lane	PLN-0718-14	H18070256-014	7/10/2018	--	--	--	--	--	--	--	58	--	--	17	--	--	102	--	--	--
Joner	Greg and Kimberly (residence), 7479 MT Highway 200	PLN-0718-15	H18070256-015	7/10/2018	--	--	--	--	--	--	--	101	--	--	29	--	--	92	--	--	--
Newman	--	PLN-0718-16	H18070256-016	7/10/2018	--	--	--	--	--	--	--	59	--	--	15	--	--	29	--	--	--
Sears	Lyla (residence), 131 Lower Lynch Creek Rd	PLN-0718-17	H18070256-017	7/10/2018	--	--	--	--	--	--	--	98	--	--	30	--	--	80	--	--	--
Leichtam Shallow	Leichtnam, Mindy, 23 Lower Lynch Ck Rd	PLN-0718-18	H18070256-018	7/10/2018	--	--	--	--	--	--	--	38	--	--	8	--	--	14	--	--	--
Merideth	Stan and Patsy (residence), 27 Lower Lynch Creek Rd	PLN-0718-19	H18070256-019	7/10/2018	--	--	--	--	--	--	--	81	--	--	26	--	--	121	--	--	--
Weeks Shallow	Jim & Julie (residence), 15 Lower Lynch Creek Rd	PLN-0718-20	H18070256-020	7/10/2018	--	--	--	--	--	--	--	52	--	--	13	--	--	36	--	--	--
Madden	--	PLN-0718-21	H18070256-021	7/10/2018	--	--	--	--	--	--	--	45	--	--	13	--	--	18	--	--	--
Madden	--	PLN-0718-22	H18070256-022	7/10/2018	--	--	--	--	--	--	--	46	--	--	13	--	--	17	--	--	--

TABLE 4-1. FIELD AND ANALYTICAL RESULTS
MDT MAINTENANCE FACILITY - PLAINS, MT

Site Location		Sample ID	Lab Sample ID	Collection Date	Static Water Levels (feet)	Field ORP (mV)	Field DO (mg/L)	Field PH (s.u.)	Field SC (umhos/cm)	Field Turbidity	Field Temperature (°C)	pH (s.u.)	pH Measurement Temp (°C)	Conductivity @ 25 C (umhos/cm)	Solids, Total Dissolved TDS @ 180 C (mg/L)	Alkalinity (mg/L)	Bicarbonate (mg/L)	Carbonate (mg/L)	Chloride (mg/L)
Baker	--	PLN-0718-23	H18070256-023	7/10/2018	28.73	97.9	6.09	7.21	544.9	Clear	12.9	7.6	16.4	560	336	--	--	--	22
Haun Deep - Treated	William (residence), 7491 MT Highway 200	MDTP-Haun-Treated	H18090525-001	9/21/2018	--	--	--	--	--	--	--	8.3	16.2	529	298	270	320	<4	5
Weeks Deep - Raw	Jim & Julie (residence), 15 Lower Lynch Creek Rd	MDTP-Weeks-Raw	H18090525-002	9/21/2018	--	--	--	--	--	--	--	7.7	15.3	452	252	210	250	<4	10
Weeks Deep - Treated	Jim & Julie (residence), 15 Lower Lynch Creek Rd	MDTP-Weeks-Treated	H18090525-003	9/21/2018	--	--	--	--	--	--	--	8.1	15	492	276	230	280	<4	11
Leichtam Deep - Treated	Leichtnam, Mindy, 23 Lower Lynch Ck Rd	MDTP-Leichtnam-Treated	H18090525-004	9/21/2018	--	--	--	--	--	--	--	7.7	15.4	355	216	150	180	<4	7
Haun Deep - Raw	William (residence), 7491 MT Highway 200	MDTP-Haun-Raw	H18090525-005	9/21/2018	--	--	--	--	--	--	--	7.8	15.8	472	266	240	290	<4	4
Leichtam Deep - Raw	Leichtnam, Mindy, 23 Lower Lynch Ck Rd	MDTP-Leichtram-Raw	H18090525-006	9/21/2018	--	--	--	--	--	--	--	7.8	16.8	353	201	150	180	<4	7

Bold values exceeded the below control levels
Chloride levels for federal Secondary Maximum Contaminant Levels (SMCLs) are 250 mg/L.
Class I waters are defined as having a specific conductance of less than 1,000 microSiemens/cm (equivalent to umhos/cm).
Total Dissolved Solids levels for federal Secondary Maximum Contaminant Levels (SMCLs) are 500 mg/L.
Sulfate levels for federal Secondary Maximum Contaminant Levels (SMCLs) are 250 mg/L.
Iron levels for federal Secondary Maximum Contaminant Levels (SMCLs) are 0.3 mg/L.

TABLE 4-1. FIELD AND ANALYTICAL RESULTS
MDT MAINTENANCE FACILITY - PLAINS, MT

Site Location		Sample ID	Lab Sample ID	Collection Date	Sulfate (mg/L)	Fluoride (mg/L)	Hardness (mg/L)	Nitrate+ Nitrite (mg/L)	Nitrate as N (mg/L)	Nitrite as N (mg/L)	Arsenic (mg/L)	Calcium (mg/L)	Iron (mg/L)	Lead (mg/L)	Magnesium (mg/L)	Manganese (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Groundwater Elevation (ft)	E-Coli Coliform (per 100ml)	Total Coliform (per 100ml)
Baker	--	PLN-0718-23	H18070256-023	7/10/2018	--	--	--	--	--	--	--	60	--	--	15	--	--	27	--	--	--
Haun Deep - Treated	William (residence), 7491 MT Highway 200	MDTP-Haun-Treated	H18090525-001	9/21/2018	6	0.9	15	<0.01	--	--	<0.001	5	0.01	--	<1	0.005	<1	122	--	--	--
Weeks Deep - Raw	Jim & Julie (residence), 15 Lower Lynch Creek Rd	MDTP-Weeks-Raw	H18090525-002	9/21/2018	15	0.4	162	<0.01	--	--	0.097	46	**2.23**	--	11	0.204	6	26	--	--	--
Weeks Deep - Treated	Jim & Julie (residence), 15 Lower Lynch Creek Rd	MDTP-Weeks-Treated	H18090525-003	9/21/2018	15	0.4	11	<0.01	--	--	0.001	4	<0.01	--	<1	<0.005	<1	112	--	--	--
Leichtam Deep - Treated	Leichtnam, Mindy, 23 Lower Lynch Ck Rd	MDTP-Leichtnam-Treated	H18090525-004	9/21/2018	12	0.3	1	2.77	--	--	<0.001	<1	0.01	--	<1	<0.005	<1	81	--	--	--
Haun Deep - Raw	William (residence), 7491 MT Highway 200	MDTP-Haun-Raw	H18090525-005	9/21/2018	6	1	151	0.02	--	--	0.010	44	**5.38**	--	10	0.36	4	41	--	--	--
Leichtam Deep - Raw	Leichtnam, Mindy, 23 Lower Lynch Ck Rd	MDTP-Leichtram-Raw	H18090525-006	9/21/2018	12	0.3	138	2.79	--	--	0.027	41	0.04	--	9	0.047	6	13	--	--	--

Bold values exceeded the below control levels
Chloride levels for federal Secondary Maximum Contaminant Levels (SMCLs) are 250 mg/L.
Class I waters are defined as having a specific conductance of less than 1,000 microSiemens/cm (equivalent to umhos/cm).
Total Dissolved Solids levels for federal Secondary Maximum Contaminant Levels (SMCLs) are 500 mg/L.
Sulfate levels for federal Secondary Maximum Contaminant Levels (SMCLs) are 250 mg/L.
Iron levels for federal Secondary Maximum Contaminant Levels (SMCLs) are 0.3 mg/L.

NORTH

SCALE
(In Feet)
0 500

LEGEND

WELL (SHOWING LEVELS OF TOTAL DISSOLVED SOLIDS IN mg/L)

APRIL 2018 TOTAL DISSOLVED SOLIDS (mg/L) (NS = NOT SAMPLED)

<500

>500

MDT PLAINS MAINTENANCE FACILITY	**TOTAL DISSOLVED SOLIDS APRIL 2018**	FIGURE **4-1**

UPDATE TIME: 10:13 AM
LTABORSKY\HEL\20181031\I:\LAND PROJECTS\1606001\PLAINS\DWG\1606001H003.DWG

Hydrometrics, Inc.
Consulting Scientists and Engineers

NORTH

SCALE
(In Feet)
0 500

LEGEND

WELL (SHOWING LEVELS OF CHLORIDE IN mg/L)

APRIL 2018 CHLORIDE CONCENTRATIONS (mg/L) (NS = NOT SAMPLED)

- <250
- >250

MDT PLAINS MAINTENANCE FACILITY	**CHLORIDE CONCENTRATIONS APRIL 2018**	FIGURE **4-2**

UPDATE TIME: 10:13 AM
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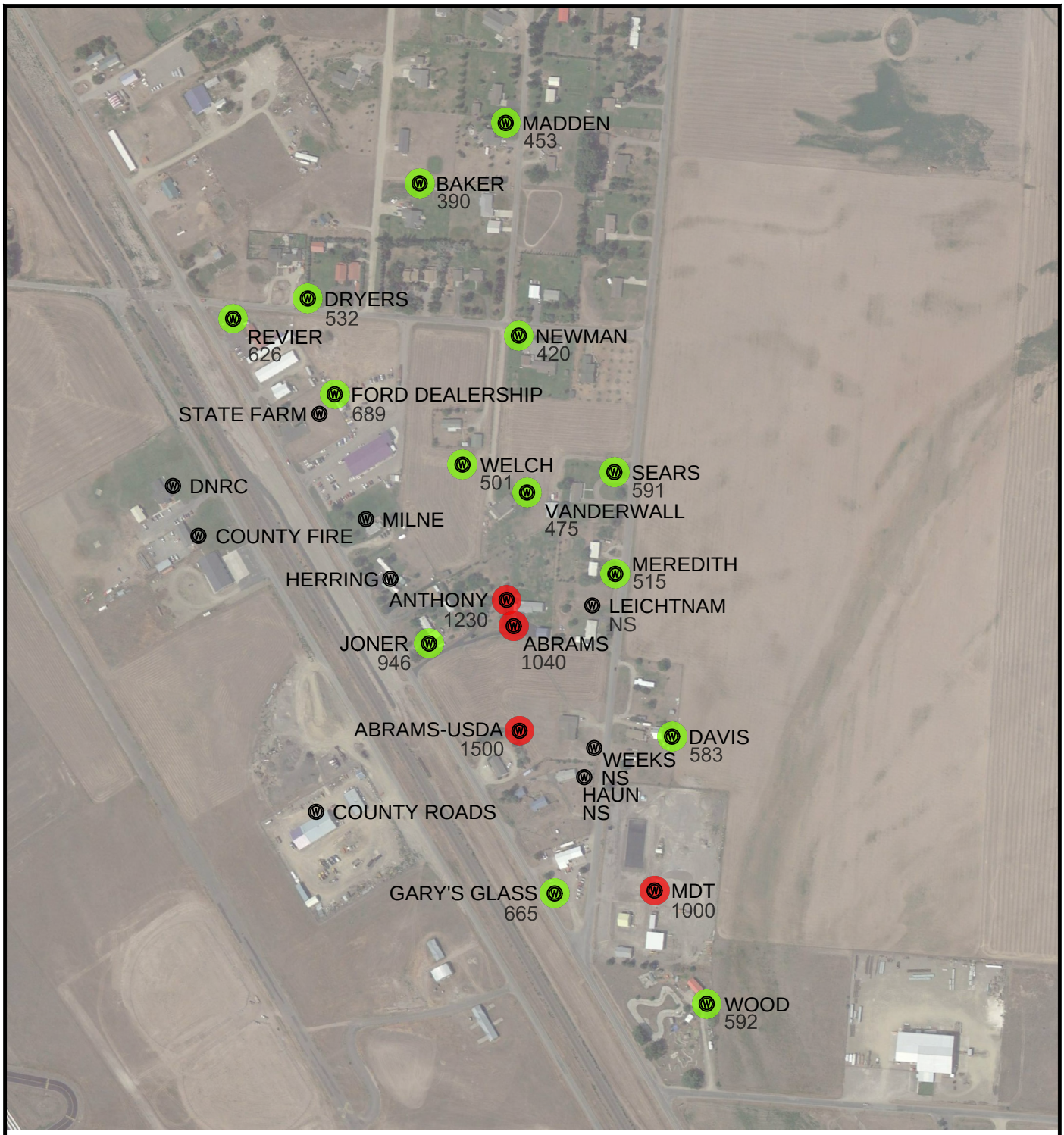
Hydrometrics, Inc.
Consulting Scientists and Engineers



NORTH

SCALE
(In Feet)
0 500

LEGEND

WELL (SHOWING LEVELS OF SPECIFIC CONDUCTIVITY IN µmho/cm)

APRIL 2018 SPECIFIC CONDUCTIVITY (µmho/cm) (NS = NOT SAMPLED)

<1000

>1000

MDT PLAINS MAINTENANCE FACILITY	**SPECIFIC CONDUCTIVITY APRIL 2018**	FIGURE **4-3**

UPDATE TIME: 10:13 AM
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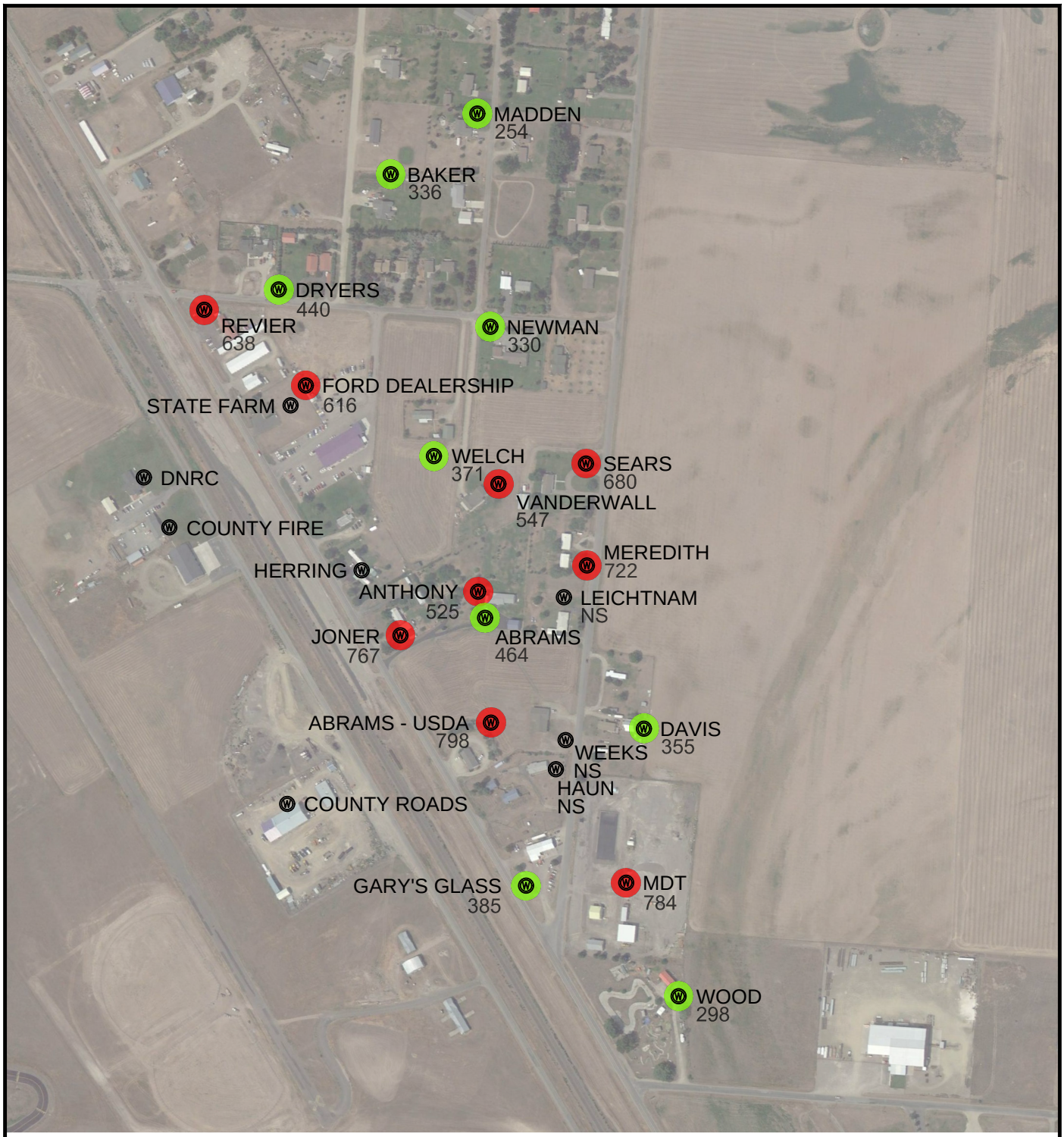
Hydrometrics, Inc.
Consulting Scientists and Engineers



NORTH

SCALE
(In Feet)
0 500

LEGEND

WELL (SHOWING LEVELS OF TOTAL DISSOLVED SOLIDS IN mg/L)
JULY 2018 TOTAL DISSOLVED SOLIDS (mg/L) (NS = NOT SAMPLED)

<500

>500

MDT PLAINS MAINTENANCE FACILITY	**TOTAL DISSOLVED SOLIDS JULY 2018**	FIGURE **4-4**

UPDATE TIME: 3:39 PM
LTABORSKY\HEL\20181030\I:\LAND PROJECTS\1606001\PLAINS\DWG\1606001H007.DWG

Hydrometrics, Inc.
Consulting Scientists and Engineers

NORTH

SCALE
(In Feet)
0 500

LEGEND

WELL (SHOWING LEVELS OF CHLORIDE IN mg/L)

JULY 2018 CHLORIDE CONCENTRATIONS (mg/L) (NS = NOT SAMPLED)

<250

>250

MDT PLAINS MAINTENANCE FACILITY	**CHLORIDE CONCENTRATIONS JULY 2018**	FIGURE **4-5**

UPDATE TIME: 3:39 PM
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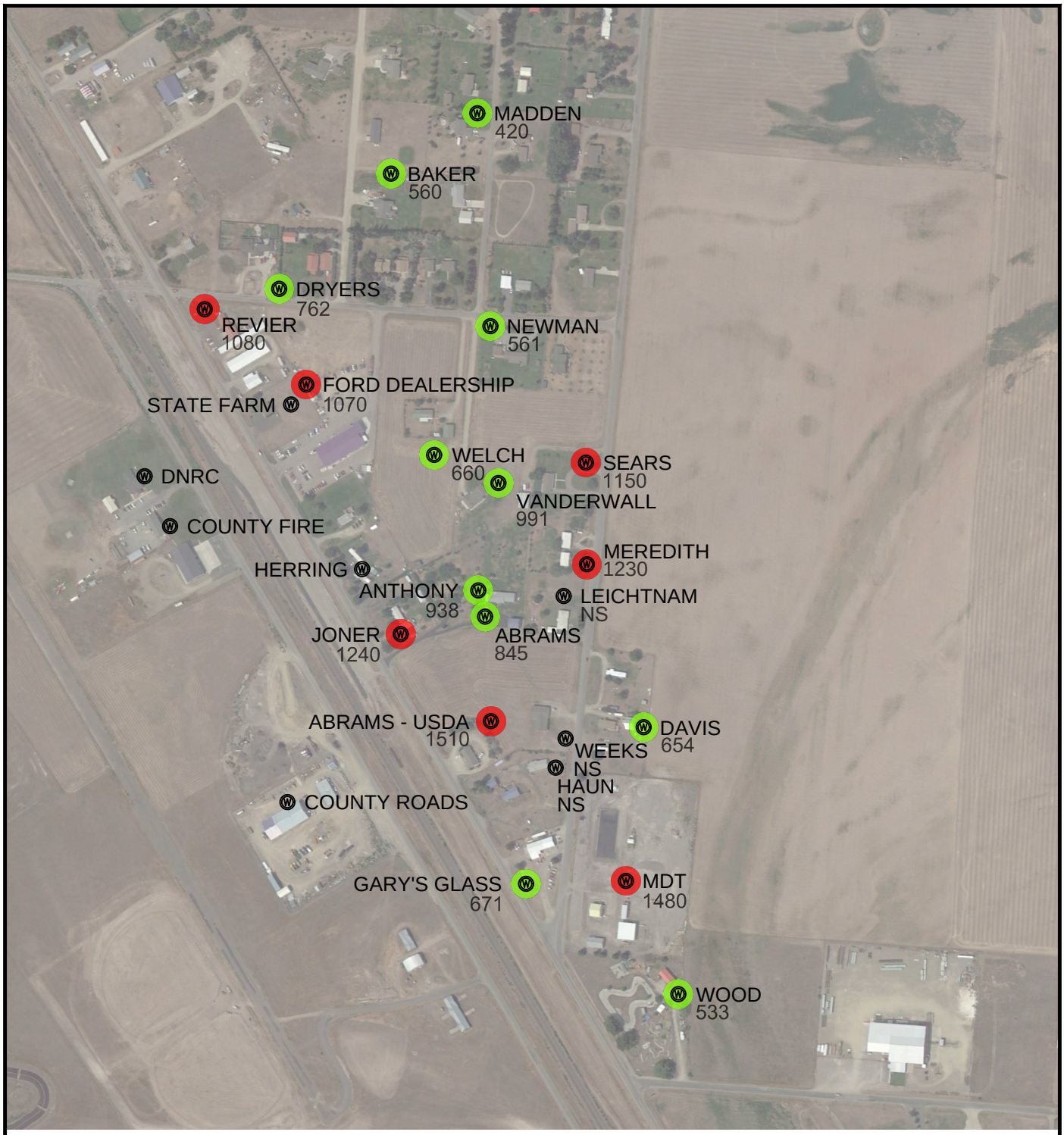
Hydrometrics, Inc.
Consulting Scientists and Engineers



NORTH

SCALE
(In Feet)
0 500

LEGEND

WELL (SHOWING LEVELS OF SPECIFIC CONDUCTIVITY IN µmho/cm)
JULY 2018 SPECIFIC CONDUCTIVITY (µmho/cm) (NS = NOT SAMPLED)

<1000

>1000

MDT PLAINS MAINTENANCE FACILITY	**SPECIFIC CONDUCTIVITY JULY 2018**	FIGURE **4-6**

UPDATE TIME: 3:39 PM
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Hydrometrics, Inc.
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TABLE 4-2. MANN KENDALL TREND TEST RESULTS (2013-2018)

Location	Parameter	Trend?
Abrams	Chloride	None
	TDS	None
	Specific Conductivity	None
Abrams-USDA	Chloride	Upward
	TDS	Upward
	Specific Conductivity	Upward
Anthony	Chloride	None
	TDS	Upward
	Specific Conductivity	Upward
Haun Shallow	Chloride	Upward
	TDS	Upward
	Specific Conductivity	Upward
MDT Plains	Chloride	None
	TDS	None
	Specific Conductivity	None
Meredith	Chloride	None
	TDS	None
	Specific Conductivity	None
Sears	Chloride	None
	TDS	None
	Specific Conductivity	None
Weeks Shallow	Chloride	Upward
	TDS	Upward
	Specific Conductivity	Upward

In 2018, eight wells exceeded the Class I groundwater limit of 1,000 µS/cm:

- In April 2018, wells exceeding 1,000 µS/cm were Abrams, Anthony, Abrams-USDA and MDT (Figure 4-3); and
- In July 2018, wells exceeding 1,000 µS/cm were Anthony, Abrams-USDA, Joner, Meredith, Revier, Ford Dealership and MDT (Figure 4-6).

Currently, four wells have been identified as exceeding the secondary drinking water standard for TDS (500 mg/L), but not for chloride. These wells include Joner, Revier, Ford Dealership, and Vanderwall.

Graphs of chloride, TDS, and SC values over time are shown in Appendix C. The wells that have had chloride values greater than the SMCL of 250 mg/L were evaluated to determine if the data indicates any trends over time using the Mann-Kendall statistical test. The Leichtnam well has insufficient data and was not tested. The Mann-Kendall test was performed as a two-tailed test using a 95% confidence threshold (p-value of 0.05 or less) using ChemStat and Excel software. Duplicate samples were not included in the test. Mann-Kendall trend test results (Table 4-2) suggest that the wells Abrams USDA Building, Haun and Weeks are statistically significantly increasing in chloride concentration. Mann-Kendall tests (constructed as described above) were also performed for SC and TDS for these wells and suggest that TDS and SC are also significantly increasing.

Montana water quality standards (17.30.1006 ARM) classify all groundwaters with natural SC less than 1,000 mS/cm as Class I. Groundwater in Clark Fork alluvium in the vicinity of the Plains MDT site falls within this classification. Wells in the vicinity of the MDT Plains Facility that exceeded the SC limit for Class I groundwater in January through July 2018 include MDT Plains, Abrams, Anthony, Abrams-USDA, Joner, Meredith, Sears, and Ford Dealership.

4.1 REPLACEMENT WELLS

The shallow Haun, Leichtnam and Weeks wells were replaced with deep wells in summer 2018. The deep wells access deeper gravel aquifers (160-260 feet bgs) that are isolated from the shallow salt-impacted aquifer. Deep aquifer chloride, TDS, and SC levels are low and comparable to shallow aquifer concentrations not impacted by salt. However, the deep aquifer contains naturally-occurring concentrations of arsenic that are above the federal drinking water standard of 0.01 mg/L (Table 4-1) as well as elevated iron and manganese concentrations. MDT installed treatment systems to remove the arsenic and treated water contains very low arsenic concentrations (<0.001 to 0.001 mg/L). Water softening treatment units were also installed to remove elevated iron and manganese.

5.0 SUMMARY

Monitoring of wells in the vicinity of the MDT Plains facility indicates that a sodium chloride (salt) plume occurs to the northwest of the MDT site in a shallow sand and gravel aquifer. In 2018, nine wells (Abrams, Abrams USDA Building, Anthony, Haun, Leichtnam, MDT Plains Shop, Merideth, Sears, and Weeks) completed in the shallow aquifer had chloride concentrations above the secondary drinking water standard of 250 mg/L and SC greater than the Montana Class I groundwater criteria of 1,000 µS/cm. All of the other wells show some seasonal variation but little change or decreasing trends. Wells along the northeast portion of the monitored area show somewhat erratic changes (for example, Vanderwall and Newman) that may indicate these locations are near the edge of the plume where slight shifts in the plume geometry over time affect their water quality.

The downgradient limit of the plume, where chloride and TDS exceed background levels is not well defined by the monitoring sites utilized in this study. However, the extent of the plume that exceeds secondary drinking water standards for chloride and/or TDS/SC appears to be defined by the data collected from the wells. Additionally, the plume boundaries appear to vary slightly due to seasonal changes in water levels/flow direction.

6.0 REFERENCES

Hydrometrics, Inc., 2016. *Groundwater Monitoring Report, Montana Department Of Transportation Maintenance Facility, Plains, Montana, Sanders County.*

Hydrometrics, Inc., 2017. *Groundwater Monitoring Report, Montana Department Of Transportation Maintenance Facility, Plains, Montana, Sanders County.*

Water and Environmental Technologies (WET), 2014. *MDT Plains Maintenance Groundwater Investigation, Sanders County, 2012-2013 Hazardous Materials Investigation Term Contract Term Assignment No. 6.*

APPENDIX A

FIELD SAMPLING DATA SHEETS
JANUARY 2018 AND APRIL 2018

Plains DOT Sampling Codes
Jan, 2018

Sample Code	Residence
PLN-0118-01	MDT
PLN-0118-02	Haun
PLN-0118-03	Weeks
PLN-0118-04	Davis
PLN-0118-05	Merideth
PLN-0118-06	Newman
PLN-0118-07	Newman Duplicate
PLN-0118-08	Welch
PLN-0118-09	Vanderwall
PLN-0118-10	Baker
PLN-0118-11	Ford Dealership
PLN-0118-12	Abrams Residence
PLN-0118-13	Anthony
PLN-0118-14	Abrams-USDA
PLN-0118-15	Gary Revier (Auto Shop)
PLN-0118-16	Leichtam

Frozen or water turned off: Wood, Gary's Glass, Sears, Dryers, Madden, Joner

1.8.18
Alberton GW Sampling

7:00 Calibrated YSI

Sample Time

8:40 MDT Alberton
~~Alb~~-0118-01 scut: ~~0~~
10gpm
ORP: 172.9 DO: 76.5 pH: 7.68
Sc: 405.8 Turb: C Temp: 10.1
tot. vol. removed: ~144g

910 4 Plex
Alb-0118-02 8gpm
ORP: 170.7 DO: 7.94 pH: 7.54
Sc: 573 Turb: C Temp: 8.5
tot. vol removed: ~100g

935 Rivers Edge
Alb-0118-03 4gpm
ORP: 161.5 DO: 7.99 pH: 7.52
Sc: 586 Turb: C Temp: 8.1
tot. vol removed: ~68g

Laurie

1.8.18

Sample Time

1002 Rental
Alb-0118-04 12gpm
ORP: 149.1 DO: 8.81 pH: 7.50
Sc: 618 Turb: C Temp: 9.7
tot. vol. Removed: ~146g
• large sand particles in well water

1010 Rental Duplicate
Alb-0118-05
" "

1103 Alberton PWS
Alb-0118-06
356g purged before sampling
ORP: 275.0 DO: 9.07 pH: 7.70
Sc: 551 Turb: C Temp: 10.8

1240 old Hagle well HW-3
Alb-0118-07 2gpm
ORP: -170.0 DO: 1.43 pH: 7.70
Sc: 3773 Turb: C Temp: 9.4
tot. vol. Removed: ~138g
Brown color, moderate odor

Childs
Rite in the Rain

1.8.18

Sample Time

HW-1
No Sample pump not turned on yet. SWL: 54.96'
Time: 12:46

1335 HW-2 Monitoring well
Alb-0118-08 3gpm
ORP: 10.1 DO: 7.88 pH: 7.44
SC: 1147 Turb: C Temp: 9.8
tot. vol. removed: ~100

Davie

1.9.18

Plains GW Sampling

7:01 Calibrated YSI

Sample Time

841 MDT
Pln-0118-01 12gpm
ORP: 191.8 DO: 7.21 pH: 7.44
Sc: 1339 Turb: C Temp: 12.5
TVR: 172g

– Wood
Frost Free Frozen: No Sample
8:48

– Gary's Glass
Frost Free Frozen: No Sample
8:53
* Pump turned back on, when handle was shut off. Owner asked it not be used in the cold.

Childs
Rite in the Rain

1.9.18

Sample Time

9:15 Hawn 8gpm
Pln-0118-02
ORP: 154.6 DO: 7.58 pH: 7.63
Sc: 2220 Turb: c Temp: 10.3
TVR: ~146g

936 Weeks
Pln-0118-03 10gpm
ORP: 118.9 DO: 8.10 pH: 7.59
Sc: 2339 Turb: c Temp: 11.4
TVR: ~164

– Sears
Water shut off for the winter 9:48

1010 Davis
Pln-0118-04 5gpm
ORP: 124.8 DO: 6.68 pH: 7.69
Sc: 574 Turb: c Temp: 11.4
TVR: ~64

Lance

1.9.18

Sample Time

1050 Meredith
pln-0118-05 8gpm
ORP: 138.9 DO: 3.13 pH: 7.69
Sc: 584 Turb: c Temp: 11.8
TVR: 98g

1107 Newman
pln-0118-06 6gpm
ORP: 148 DO: 6.12 pH: 7.73
Sc: 407.6 Turb: c Temp: 11.8
TVR: 74

1111 Newman Duplicate
pln-0118-07 "
" "

– Dryers
No Sample Frost Free
Frozen 1115

Childs

Rite in the Rain

1·9·18

Sample Time

1135 welsh
pln-0118-08 8gpm
ORP: 133.9 DO: 6.01 pH: 7.75
Sc: 627 Turb: c Temp: 10.2
TVR: 122g color: light tan

1156 Vanderwall
pln-0118-09 12gpm
ORP: 132.7 DO: 5.66 pH: 7.79
Sc: 454.7 Turb: c Temp: 10.1
TVR

- Madden
No Sample Frost Free
Frozen 1200

1226 Baker
pln-0118-10 4gpm
ORP: 146.9 DO: 6.47 pH: 7.74
Sc: 392.3 Turb: c Temp: 10.7
TVR

Dave

1·9·18

Sample Time

1303 Ford dealership
Pln-0118-11 10gpm
ORP: 153.2 DO: 8.11 pH: 7.68
Sc: 687 Turb: c Temp: 12.8
TVR: 126g

1321 Abrams residential
Pln-0118-12 12gpm
ORP: 104.0 DO: 7.68 pH: 7.41
Sc: 1466 Turb: c Temp: 12.0
TVR: 172g

1343 Anthony
Pln-0118-13 8gpm
ORP: 88.9 DO: 8.20 pH: 7.55
Sc: 1458 Turb: c Temp: 10.6
TVR: 130

1412 Abrams - USDA
Pln-0118-14 5gpm
ORP: 59.2 DO: 7.74 pH: 7.60
Sc: 1258 Turb: c Temp: 11.9
TVR: 102

Chris

Rite in the Rain

1.9.18

Sample Time

1445 Gray Revier (Auto Shop)
pln-0118-15 4gpm
ORP: 121.3 DO: 7.66 pH: 7.62
Sc: 585 Turb: c Temp: 10.9
TVR: 58g

1516 Leichtan Duplex
pln-0118-16 6gpm
ORP: 55.1 DO: 6.31 pH: 7.50
Sc: 2070 Turb: c Temp: 12.1
TVR: 112g

- Jones
Water turned off for
winter No Sample
1530

Lowe

Childs

Rite in the Rain

STANDARD OPERATING PROCEDURE
INSTRUMENT CALIBRATION FORM
HF-FORM-500

Hydrometrics, Inc.
Consulting Scientists and Engineers

Project Name: Plains GW

Project Number: 16060

Date: 1.9.18

Personnel: LC

Weather Conditions:

inside

calm | breeze | windy
no precip | rain | snow
clear | p. cloudy | overcast

Air Temperature:
°F °C

pH

Meter Type: YSI DSS
SN:

Time	Buffer	Temperature °C	Reading (Temp Corrected)
6:57	4	17.9	
6:55	7	17.5	
6:59	10	17.8	
Calibration check:			

Dissolved Oxygen

Meter Type:
SN:
Time:
Calibration Results: mg/L
Barometric Pressure: mm Hg

Specific Conductance

Meter Type: YSI DSS SN:

Time	Standard	Temperature °C	Reading (Temp Corrected)	Cell Factor
703	1413	18.0	1413	
Calibration check:				

Turbidity

Meter Type: SN:
Standard: Reading:

Redox Potential (Eh)

Meter Type: YSI DSS
SN:
Electrode: Ag/AgCl
Other:
Time: 706
Geotech Solution Potential (mV): 219
Temperature: °C 22.0

PID/FID

Meter Type: SN:
Span Gas Type:

Time	Span Gas		Calibration Memory	Response Factor	Reading
	Gauge Pressure	Concentration			
Calibration Check:					

Notes/Additional Information:

Hydrometrics, Inc.

STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: MDT
Sample Code Number: PLN-0118-
Sample Date: 1.9.18
Sample Time: 8:41 (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #:
Duplicate Sample Time:

For Groundwater Samples

well volume formula: V = (TD-SWL)x(Dia.^{2}) 25

Comments

TD (ft):
SWL (ft): no access/pumping
Casing Diameter (I.D.")
Water Volume (V) (gal):
x 3=(gal.)
Actual Vol. Removed (gal.) 172
Water Level Recovery: slow moderate rapid

Site Conditions

New Site: Yes No Photo taken: Yes No
Site Type: DRY surface water process water
monitoring well domestic well adit seep
spring other: Frost Free Industrial
Weather Conditions: calm breeze windy
no precip. rain snow
clear p. cloudy overcast
Air Temperature: °C 35 °F

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate
Other Flow or Description:
Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes
8:30	-	-	-	-	-		start
8:33	201.8	7.53	7.80	1349	C	12.7	36
8:36	197.4	6.95	7.61	1349	C	12.0	72
8:39	194.7	7.45	7.56	1339	C	12.5	108
8:41	192.7	7.33	7.49	1339	C	12.4	144
8:43	191.8	7.71	7.44	1339	C	12.5	168

Turbidity: (circle) clear slight moderate very

Sample Method: (describe) grab composite pump bailer other
Frost Free

Field Parameters

	Sample	Duplicate
ORP (mV)	191.8	
DO (mg/l)	7.71	
pH	7.44	
SC (µmhos/cm)	1339	
Turbidity (ntu)	C	
H_2O Tmp. (°C)	12.5	
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: 2 gpm

Sample Team Member Signature:

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Hydrometrics, Inc.

STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: Wood
Sample Code Number: PLN-0118-
Sample Date:
Sample Time: (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #:
Duplicate Sample Time:

Site Conditions

New Site: Yes No Photo taken: Yes No
Site Type: DRY surface water process water
monitoring well domestic well adit seep
spring other:
Weather Conditions: calm breeze windy
no precip. rain snow
clear p. cloudy overcast
Air Temperature: °C °F

For Groundwater Samples

well volume formula: V = (TD-SWL)x(Dia.^{2}) 25 Comments
TD (ft):
SWL (ft): no access/pumping
Casing Diameter (I.D.")
Water Volume (V) (gal):
x 3=(gal.)
Actual Vol. Removed (gal.)
Water Level Recovery: slow moderate rapid

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate
Other Flow or Description:
Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes

Turbidity: (circle) clear moderate slight very

Sample Method: (describe) grab composite pump bailer other

Field Parameters

	Sample	Duplicate
ORP (mV)		
DO (mg/l)		
pH		
SC (µmhos/cm)		
Turbidity (ntu)		
H_2O Tmp. (°C)		
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: Frozen 8:48 1.9.18

Sample Team Member Signature: Page of

Hydrometrics, Inc.

STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: Gary's Glass
Sample Code Number: PLN-0118-
Sample Date:
Sample Time: (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #:
Duplicate Sample Time:

Site Conditions

New Site: Yes No Photo taken: Yes No
Site Type: DRY surface water process water
monitoring well domestic well adit seep
spring other:
Weather Conditions: calm breeze windy
no precip. rain snow
clear p. cloudy overcast
Air Temperature: °C °F

For Groundwater Samples

well volume formula: V = (TD-SWL)x(Dia.^{2}) 25 Comments
TD (ft):
SWL (ft): no access/pumping
Casing Diameter (I.D.")
Water Volume (V) (gal):
x 3=(gal.)
Actual Vol. Removed (gal.)
Water Level Recovery: slow moderate rapid

For Surface Water Samples

Flow Method: Marsh McBimey Volumetric Flume Weir Estimate
Other Flow or Description:
Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes

Turbidity: (circle) clear moderate slight very

Sample Method: (describe) grab composite pump bailer other

Field Parameters

	Sample	Duplicate
ORP (mV)		
DO (mg/l)		
pH		
SC (µmhos/cm)		
Turbidity (ntu)		
H_2O Tmp. (°C)		
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: From 853 1.9.18

Sample Team Member Signature: Page of

Hydrometrics, Inc.

STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: Haun
Sample Code Number: PLN-0118-02
Sample Date: 1.9.18
Sample Time: 9:15 (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #:
Duplicate Sample Time:

For Groundwater Samples

well volume formula: V = (TD-SWL)x(Dia.^{2}) 25

Comments

TD (ft):
SWL (ft): no access/pumping
Casing Diameter (I.D.")
Water Volume (V) (gal):
x 3=(gal.)
Actual Vol. Removed (gal.) 146
Water Level Recovery: slow moderate rapid

Site Conditions

New Site: Yes (No) Photo taken: Yes (No)

Site Type: DRY surface water process water monitoring well (domestic well) adit seep spring other:

Weather Conditions: (calm) breeze windy no precip. (rain) snow clear p. cloudy (overcast)

Air Temperature: °C 34 °F

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate

Other Flow or Description:

Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes
858	–	–	–	–	–	–	Start
902	158.8	7.83	7.70	2233	C	8.7	~~24~~ 32
906	156.8	8.13	7.69	2224	C	9.4	~~48~~ 64
910	156.5	7.86	7.66	2202	C	10.8	96
914	154.1	7.63	7.64	2222	C	10.1	128
916	154.6	7.58	7.63	2221	C	10.3	144

Turbidity: (circle) (clear) slight moderate very

Sample Method: (describe) (grab) composite (pump) bailer other
Frost Free

Field Parameters

	Sample	Duplicate
ORP (mV)	154.6	
DO (mg/l)	7.58	
pH	7.63	
SC (µmhos/cm)	2220	
Turbidity (ntu)	C	
H_2O Tmp. (°C)	10.3	
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: 8gpm

Sample Team Member Signature: [signature] Page of

Hydrometrics, Inc.

STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: Weeks
Sample Code Number: PLN-0118-03
Sample Date: 1.9.18
Sample Time: 9:36 (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #:
Duplicate Sample Time:

For Groundwater Samples

well volume formula: V = (TD-SWL)x(Dia.^{2}) 25

Comments

TD (ft):
SWL (ft): no access/pumping
Casing Diameter (I.D.")
Water Volume (V) (gal):
x 3=(gal.)
Actual Vol. Removed (gal.) 164
Water Level Recovery: slow moderate rapid

Site Conditions

New Site: Yes (No) Photo taken: Yes (No)
Site Type: DRY surface water process water
monitoring well domestic well adit seep
spring other:
Weather Conditions: (calm) breeze windy
no precip. (rain) snow
clear p. cloudy (overcast)
Air Temperature: °C 35 °F

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate
Other Flow or Description:
Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes
9:24	-	-	-	-	-	-	Start
9:27	149.8	9.75	7.71	2112	C	11.0	30
9:30	141.0	9.00	7.72	1954	C	10.7	60
9:33	139.7	7.53	7.55	2195	C	11.6	90
9:36	131.0	7.41	7.53	2375	C	11.8	120
9:38	121.4	8.53	7.60	2379	C	11.3	140
9:40	118.9	8.10	7.59	2339	C	11.4	160

Turbidity: (circle) (clear) slight moderate very

Sample Method: (describe) (grab) composite (pump) bailer other
Frost Free

Field Parameters

	Sample	Duplicate
ORP (mV)	118.9	
DO (mg/l)	8.10	
pH	7.59	
SC (µmhos/cm)	2339	
Turbidity (ntu)	C	
H_2O Tmp. (°C)	11.4	
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: 10 gpm

Sample Team Member Signature: [signature] Page of

Hydrometrics, Inc.

STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: Sears
Sample Code Number: PLN-0118-
Sample Date:
Sample Time: (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #:
Duplicate Sample Time:

Site Conditions

New Site: Yes No Photo taken: Yes No
Site Type: DRY surface water process water
monitoring well domestic well adit seep
spring other:
Weather Conditions: calm breeze windy
no precip. rain snow
clear p. cloudy overcast
Air Temperature: °C °F

For Groundwater Samples

well volume formula: V = (TD-SWL)x(Dia.^{2}) 25 Comments
TD (ft):
SWL (ft): no access/pumping
Casing Diameter (I.D.")
Water Volume (V) (gal):
x 3=(gal.)
Actual Vol. Removed (gal.)
Water Level Recovery: slow moderate rapid

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate
Other Flow or Description:
Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes

Turbidity: (circle) clear moderate slight very

Sample Method: (describe) grab composite pump bailer other

Field Parameters

	Sample	Duplicate
ORP (mV)		
DO (mg/l)		
pH		
SC (µmhos/cm)		
Turbidity (ntu)		
H_2O Tmp. (°C)		
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: Water shut off 9:48 1.9.18

Sample Team Member Signature: Page of

Hydrometrics, Inc.

STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: Davis
Sample Code Number: PLN-0118-04
Sample Date: 1.9.18
Sample Time: 1010 (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #:
Duplicate Sample Time:

For Groundwater Samples

			Comments
well volume formula:	V = (TD-SWL)x(Dia.^{2})	25	
TD (ft):			
SWL (ft):			no access/pumping
Casing Diameter (I.D.")			
Water Volume (V) (gal):			
x 3=(gal.)			
Actual Vol. Removed (gal.)	64		
Water Level Recovery:	slow moderate rapid		

Site Conditions

New Site: Yes (No) Photo taken: Yes (No)
Site Type: DRY surface water process water
monitoring well (domestic well) adit seep
spring other:
Weather Conditions: (calm) breeze windy
no precip. (rain) snow
clear p. cloudy (overcast)
Air Temperature: °C 35 °F

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate
Other Flow or Description:
Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes
9:56	-	-	-	-	-	-	Start
9:59	118.3	6.97	7.91	584	C	11.2	15
10:02	120.2	7.33	7.77	575	C	11.3	30
10:05	122.1	7.01	7.73	575	C	11.5	45
10:08	124.8	6.68	7.69	574	C	11.4	60

Turbidity: (circle) (clear) moderate slight very

Sample Method: (describe) (grab) composite (pump) bailer other
Frost Free

Field Parameters

	Sample	Duplicate
ORP (mV)	124.8	
DO (mg/l)	6.68	
pH	7.69	
SC (µmhos/cm)	574	
Turbidity (ntu)	C	
H_2O Tmp. (°C)	11.4	
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: 5:30 pm, used sprinkler off house, Frost Free Frozen. water does not go through filter.

Sample Team Member Signature: [signature] Page of

Hydrometrics, Inc.

STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: Meredith
Sample Code Number: PLN-0118- 05
Sample Date: 1.9.18
Sample Time: 1050 (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #:
Duplicate Sample Time:

Site Conditions

New Site: Yes (No) Photo taken: Yes (No)
Site Type: DRY surface water process water monitoring well (domestic well) adit seep spring other:
Weather Conditions: (calm) breeze windy (no precip.) rain snow clear p. cloudy (overcast)
Air Temperature: °C 34 °F

For Groundwater Samples

well volume formula: V = (TD-SWL)x(Dia.^{2}) 25 — Comments
TD (ft):
SWL (ft): — no access/pumping
Casing Diameter (I.D.")
Water Volume (V) (gal):
x 3=(gal.)
Actual Vol. Removed (gal.) 98
Water Level Recovery: slow moderate rapid

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate
Other Flow or Description:
Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes
1036	–	–	–	–	–	–	Start
1039	135.7	7.80	7.77	581	C	10.3	24
1042	136.4	7.57	7.69	583	C	11.41	48
1045	138.7	4.00	7.71	585	C	11.9	72
1048	138.9	3.13	7.69	584	C	11.8	96

Turbidity: (circle) (clear) moderate slight very

Sample Method: (describe) (grab) composite (pump) bailer other Sprocket on House

Field Parameters

	Sample	Duplicate
ORP (mV)	138.9	
DO (mg/l)	3.13	
pH	7.69	
SC (µmhos/cm)	584	
Turbidity (ntu)	C	
H_2O Tmp. (°C)	11.8	
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: 8gpm

Sample Team Member Signature: Page of

Hydrometrics, Inc.

STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: Neiman
Sample Code Number: PLN-0118-06
Sample Date: 1.9.18
Sample Time: 1107 (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #: PLN-0118-07
Duplicate Sample Time: 1111

For Groundwater Samples

well volume formula: V = (TD-SWL)x(Dia.^{2}) 25

Comments

TD (ft):
SWL (ft): no access/pumping
Casing Diameter (I.D.")
Water Volume (V) (gal):
x 3=(gal.)
Actual Vol. Removed (gal.) 74
Water Level Recovery: slow moderate rapid

Site Conditions

New Site: Yes (No) Photo taken: Yes (No)
Site Type: DRY surface water process water
monitoring well domestic well adit seep
spring other:
Weather Conditions: (calm) breeze windy
no precip. (rain) snow
clear p. cloudy (overcast)
Air Temperature: °C 35 °F

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate
Other Flow or Description:
Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes
1054	-	-	-	-	-	-	Start
1057	148.4	4.74	7.75	408.6	C	11.6	18
1100	147.3	5.31	7.75	407.1	C	11.8	36
1103	147.1	5.62	7.72	407.3	C	11.1	54
1106	148.0	6.12	7.73	407.6	C	11.8	72

Turbidity: (circle) (clear) slight moderate very

Sample Method: (describe) (grab) composite (pump) bailer other
First Free

Field Parameters

	Sample	Duplicate
ORP (mV)	148.0	
DO (mg/l)	6.12	
pH	7.73	
SC (µmhos/cm)	407.6	
Turbidity (ntu)	C	
H_2O Tmp. (°C)	11.8	
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: 6 gpm

Sample Team Member Signature: [signature] Page of

Hydrometrics, Inc.

STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: Dry 2 & 3
Sample Code Number: PLN-0118-
Sample Date:
Sample Time: (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #:
Duplicate Sample Time:

Site Conditions

New Site: Yes No Photo taken: Yes No
Site Type: DRY surface water process water
monitoring well domestic well adit seep
spring other:
Weather Conditions: calm breeze windy
no precip. rain snow
clear p. cloudy overcast
Air Temperature: °C °F

For Groundwater Samples

well volume formula: V = (TD-SWL)x(Dia.^{2}) 25 Comments
TD (ft):
SWL (ft): no access/pumping
Casing Diameter (I.D.")
Water Volume (V) (gal):
x 3=(gal.)
Actual Vol. Removed (gal.)
Water Level Recovery: slow moderate rapid

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate
Other Flow or Description:
Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes

Turbidity: (circle) clear moderate slight very

Sample Method: (describe) grab composite pump bailer other

Field Parameters

	Sample	Duplicate
ORP (mV)		
DO (mg/l)		
pH		
SC (µmhos/cm)		
Turbidity (ntu)		
H_2O Tmp. (°C)		
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: Frost Free Frozen No Sample 1115 1.9.18

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Hydrometrics, Inc.

STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: welsh
Sample Code Number: PLN-0118- 08
Sample Date: 1.9.18
Sample Time: 1135 (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #: /
Duplicate Sample Time: /

For Groundwater Samples

well volume formula: V = (TD-SWL)x(Dia.^{2}) 25 — Comments

TD (ft):
SWL (ft): — no access/pumping
Casing Diameter (I.D.")
Water Volume (V) (gal):
x 3=(gal.)
Actual Vol. Removed (gal.) 122
Water Level Recovery: slow moderate rapid

Site Conditions

New Site: Yes (No) Photo taken: Yes (No)
Site Type: DRY surface water process water
monitoring well (domestic well) adit seep
spring other:
Weather Conditions: calm breeze windy
no precip. rain snow
clear p. cloudy (overcast)
Air Temperature: °C 36° F

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate
Other Flow or Description:
Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes
1120	—	—	—	—	—	—	Start
1123	145.4	6.26	7.72	653	C	11.2	24
1126	139.5	6.26	7.74	604	C	11.3	48
1129	137.2	6.20	7.76	627	C	10.5	72
1132	136.3	6.77	7.76	627	C	10.3	96
1135	133.9	6.01	7.75	627	C	10.2	120

Turbidity: (circle) (clear) slight moderate very

Sample Method: (describe) (grab) composite (pump) bailer other
First Free

Field Parameters

	Sample	Duplicate
ORP (mV)	133.9	
DO (mg/l)	6.01	
pH	7.75	
SC (µmhos/cm)	627	
Turbidity (ntu)	C	
H_2O Tmp. (°C)	10.2	
(Color)	light tan	
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: 8gpm

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STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: Vanderwell
Sample Code Number: PLN-0118-09
Sample Date: 1·9·18
Sample Time: 1156 (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #:
Duplicate Sample Time:

For Groundwater Samples

well volume formula: V = (TD-SWL)x(Dia.^{2}) 25 — Comments

TD (ft):
SWL (ft): — no access/pumping
Casing Diameter (I.D.")
Water Volume (V) (gal):
x 3=(gal.)
Actual Vol. Removed (gal.) 148
Water Level Recovery: slow moderate rapid

Site Conditions

New Site: Yes (No) Photo taken: Yes (No)
Site Type: DRY surface water process water
monitoring well (domestic well) adit seep
spring other:
Weather Conditions: (calm) breeze windy
no precip. (rain) snow
clear p. cloudy (overcast)
Air Temperature: °C 35 °F

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate
Other Flow or Description:
Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes
1143	–	–	–	–	–	–	Start
1146	133.4	7.04	7.91	455.5	C	9.6	36
1149	132.4	6.41	7.84	453.6	C	10.7	72
1152	131.1	8.78	7.84	454.2	C	10.9	108
1155	132.7	5.66	7.79	454.7	C	10.1	144

Turbidity: (circle) (clear) moderate slight very

Sample Method: (describe) (grab) composite (pump) bailer other
First Flow

Field Parameters

	Sample	Duplicate
ORP (mV)	132.7	
DO (mg/l)	5.66	
pH	7.79	
SC (µmhos/cm)	454.7	
Turbidity (ntu)	C	
H_2O Tmp. (°C)	10.1	
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: 12gpm

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STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: Madden
Sample Code Number: PLN-0118-
Sample Date:
Sample Time: (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #:
Duplicate Sample Time:

For Groundwater Samples

			Comments
well volume formula:	V = (TD-SWL)x(Dia.^{2})	25	
TD (ft):			
SWL (ft):			no access/pumping
Casing Diameter (I.D.")			
Water Volume (V) (gal):			
x 3=(gal.)			
Actual Vol. Removed (gal.)			
Water Level Recovery:	slow	moderate rapid	

Site Conditions

New Site: Yes No Photo taken: Yes No
Site Type: DRY surface water process water
monitoring well domestic well adit seep
spring other:
Weather Conditions: calm breeze windy
no precip. rain snow
clear p. cloudy overcast
Air Temperature: °C °F

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate
Other Flow or Description:
Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes

Turbidity: (circle) clear moderate slight very

Sample Method: (describe) grab composite pump bailer other

Field Parameters

	Sample	Duplicate
ORP (mV)		
DO (mg/l)		
pH		
SC (µmhos/cm)		
Turbidity (ntu)		
H_2O Tmp. (°C)		
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: Frozen Frost Free 1200 1.19.18

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STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: Baker
Sample Code Number: PLN-0118-10
Sample Date: 1.9.18
Sample Time: 1226 (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #:
Duplicate Sample Time:

Site Conditions

New Site: Yes (No) Photo taken: Yes (No)
Site Type: DRY surface water process water
monitoring well (domestic well) adit seep
spring other:
Weather Conditions: (calm) breeze windy
no precip. (rain) snow
clear p. cloudy (overcast)
Air Temperature: °C 35° F

For Groundwater Samples

well volume formula: V = (TD-SWL)x(Dia.^{2}) 25 — Comments
TD (ft):
SWL (ft): — no access/pumping
Casing Diameter (I.D.")
Water Volume (V) (gal):
x 3=(gal.)
Actual Vol. Removed (gal.) 66
Water Level Recovery: slow moderate rapid

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate
Other Flow or Description:
Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes
1209	—	—	—	—	—	—	Start
1213	143.0	5.45	7.81	393.1	C	10.3	16
1217	144.1	5.92	7.78	393.2	C	10.6	32
1221	145.8	6.22	7.77	392.6	C	10.8	48
1225	146.9	6.47	7.74	392.3	C	10.7	64

Turbidity: (circle) (clear) moderate slight very

Sample Method: (describe) (grab) composite (pump) bailer other
Sprocket on House

Field Parameters

	Sample	Duplicate
ORP (mV)	146.9	
DO (mg/l)	6.47	
pH	7.74	
SC (µmhos/cm)	392.3	
Turbidity (ntu)	C	
H_2O Tmp. (°C)	10.7	
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: 4gpm

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STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: Ford dealership
Sample Code Number: PLN-0118-11
Sample Date: 1.9.18
Sample Time: 1303 (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #:
Duplicate Sample Time:

For Groundwater Samples

well volume formula: V = (TD-SWL)x(Dia.^{2}) 25 — Comments

TD (ft):
SWL (ft): — no access/pumping
Casing Diameter (I.D.")
Water Volume (V) (gal):
x 3=(gal.)
Actual Vol. Removed (gal.) 126
Water Level Recovery: slow moderate rapid

Site Conditions

New Site: Yes **No** Photo taken: Yes **No**
Site Type: DRY surface water process water
monitoring well **domestic well** adit seep
spring other:
Weather Conditions: **calm** breeze windy
no precip. **rain** snow
clear p. cloudy **overcast**
Air Temperature: °C 35 °F

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate
Other Flow or Description:
Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes
1248	–	–	–	–	–	–	Start
1251	154.4	8.27	7.73	653	C	11.8	30
1254	152.4	8.25	7.73	674	C	12.7	60
1257	152.1	8.13	7.70	684	C	12.9	90
1300	153.2	8.11	7.68	687	C	12.8	120

Turbidity: (circle) **clear** moderate slight very

Sample Method: (describe) **grab** composite **pump** **bailer** other
Frost Free

Field Parameters

	Sample	Duplicate
ORP (mV)	153.2	
DO (mg/l)	8.11	
pH	7.68	
SC (µmhos/cm)	687	
Turbidity (ntu)	C	
H_2O Tmp. (°C)	12.8	
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: 10gpm

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STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: Abrams residential
Sample Code Number: PLN-0118-12
Sample Date: 1.9.18
Sample Time: 1321 (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #:
Duplicate Sample Time:

For Groundwater Samples

well volume formula: V = (TD-SWL)x(Dia.^{2}) 25

Comments

TD (ft):
SWL (ft): no access/pumping
Casing Diameter (I.D.")
Water Volume (V) (gal):
x 3=(gal.)
Actual Vol. Removed (gal.) 172
Water Level Recovery: slow moderate rapid

Site Conditions

New Site: Yes (No) Photo taken: Yes (No)

Site Type: DRY surface water process water monitoring well (domestic well) adit seep spring other:

Weather Conditions: (calm) breeze windy no precip. (rain) snow clear p. cloudy (overcast)

Air Temperature: °C 36° F

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate

Other Flow or Description:

Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes
1308	—	—	—	—	—	—	Start
1311	110.6	7.23	7.39	1460	C	11.8	36
1314	97.5	7.82	7.42	1469	C	12.1	72
1317	98.3	7.83	7.45	1471	C	16.2	108
1320	98.8	7.97	7.42	1467	C	12.0	144
1322	100.0	7.68	7.41	1466	C	12.0	168

Turbidity: (circle) (clear) moderate slight very

Sample Method: (describe) (grab) composite ~~pump~~ bailer other First Free

Field Parameters

	Sample	Duplicate
ORP (mV)	100.6	
DO (mg/l)	7.68	
pH	7.41	
SC (µmhos/cm)	1466	
Turbidity (ntu)	C	
H_2O Tmp. (°C)	12.0	
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: 12 gpm

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STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: Anthony
Sample Code Number: PLN-0118-13
Sample Date: 1.9.18
Sample Time: 1343 (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #:
Duplicate Sample Time:

For Groundwater Samples

well volume formula: V = (TD-SWL)x(Dia.^{2}) 25

Comments

TD (ft):
SWL (ft): no access/pumping
Casing Diameter (I.D.")
Water Volume (V) (gal):
x 3=(gal.)
Actual Vol. Removed (gal.) 130
Water Level Recovery: slow moderate rapid

Site Conditions

New Site: Yes (No) Photo taken: Yes (No)

Site Type: DRY surface water process water monitoring well (domestic well) adit seep spring other:

Weather Conditions: (calm) breeze windy no precip. (rain) snow clear p. cloudy (overcast)

Air Temperature: °C 30 °F

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate

Other Flow or Description:

Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes
1330	–	–	–	–	–	–	Start
1333	170.7	7.78	7.59	1465	C	10.3	24
1336	101.0	8.02	7.51	1465	C	9.9	48
1339	94.5	7.94	7.51	1458	C	10.6	72
1342	90.0	8.12	7.51	1461	C	10.2	96
1344	89.4	7.94	7.51	1460	C	10.2	112
1346	88.9	8.20	7.55	1458	C	10.6	128

Turbidity: (circle) (clear) slight moderate very

Sample Method: (describe) (grab) composite (pump) bailer other
First Free

Field Parameters

	Sample	Duplicate
ORP (mV)	88.9	
DO (mg/l)	8.20	
pH	7.55	
SC (µmhos/cm)	1458	
Turbidity (ntu)	C	
H_2O Tmp. (°C)	10.6	
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: 826-3453, 8ypm

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STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: Abrams - USDA
Sample Code Number: PLN-0118- 14
Sample Date: 1.9.18
Sample Time: 1412 (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #:
Duplicate Sample Time:

For Groundwater Samples

well volume formula: V = (TD-SWL)x(Dia.^{2}) 25

Comments

TD (ft):
SWL (ft): no access/pumping
Casing Diameter (I.D.")
Water Volume (V) (gal):
x 3=(gal.)
Actual Vol. Removed (gal.) 102
Water Level Recovery: slow moderate rapid

Site Conditions

New Site: Yes (No) Photo taken: Yes (No)
Site Type: DRY surface water process water
monitoring well (domestic well) adit seep
spring other:
Weather Conditions: (calm) breeze windy
no precip. (rain) snow
clear p. cloudy (overcast)
Air Temperature: °C 36 °F

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate
Other Flow or Description:
Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes
1358	—	—	—	—	—	—	Start
1401	92.1	6.92	7.68	1257	C	10.1	15
1404	62.9	7.15	7.57	1256	C	11.5	30
1407	60.4	7.22	7.57	1260	C	11.9	60
1410	58.1	7.50	7.57	1259	C	11.3	90
1412	59.2	7.74	7.60	1258	C	11.9	100

Turbidity: (circle) (clear) slight moderate very

Sample Method: (describe) (grab) composite (pump) bailer other Sprocket on building

Field Parameters

	Sample	Duplicate
ORP (mV)	59.2	
DO (mg/l)	7.74	
pH	7.60	
SC (µmhos/cm)	1258	
Turbidity (ntu)	C	
H_2O Tmp. (°C)	11.9	
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: 5 gal

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STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

(Hwy Revier 7461 Hwy200)

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: Gary's Auto Body
Sample Code Number: PLN-0118-15
Sample Date: 1.9.18
Sample Time: 1445 (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #:
Duplicate Sample Time:

For Groundwater Samples

		Comments
well volume formula:	V = (TD-SWL)x(Dia.^{2}) 25	
TD (ft):		
SWL (ft):		no access/pumping
Casing Diameter (I.D.")		
Water Volume (V) (gal):		
x 3=(gal.)		
Actual Vol. Removed (gal.)	58	
Water Level Recovery:	slow moderate rapid	

Site Conditions

New Site: Yes (No) Photo taken: Yes (No)

Site Type: DRY surface water process water monitoring well (domestic well) adit seep spring other:

Weather Conditions: calm (breeze) windy no precip. (rain) snow clear p. cloudy (overcast)

Air Temperature: °C 36 °F

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate

Other Flow or Description:

Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes
1432	–	–	–	–	–	–	Start
1435	114.6	7.69	7.79	593	C	10.8	12
1438	115.2	7.69	7.71	590	C	10.6	24
1441	115.4	7.71	7.65	589	C	10.8	36
1444	120.7	7.44	7.63	587	C	11.1	48
1446	121.3	7.66	7.62	585	C	10.9	56

Turbidity: (circle) (clear) slight moderate very

Sample Method: (describe) (grab) composite (pump) bailer other
Sink Injector

Field Parameters

	Sample	Duplicate
ORP (mV)	121.3	
DO (mg/l)	7.66	
pH	7.62	
SC (µmhos/cm)	585	
Turbidity (ntu)	C	
H_2O Tmp. (°C)	10.9	
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

(Comments): Sink not filtered, 4gpm

Sample Team Member Signature:

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STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: Leichtan duplex
Sample Code Number: PLN-0118-16
Sample Date: 1.9.18
Sample Time: 1516 (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #:
Duplicate Sample Time:

For Groundwater Samples

well volume formula: V = (TD-SWL)x(Dia.^{2}) 25 — Comments

TD (ft):
SWL (ft): — no access/pumping
Casing Diameter (I.D.")
Water Volume (V) (gal):
x 3=(gal.)
Actual Vol. Removed (gal.) 112
Water Level Recovery: slow moderate rapid

Site Conditions

New Site: Yes (No) Photo taken: Yes (No)
Site Type: DRY surface water process water
monitoring well (domestic well) adit seep
spring other:
Weather Conditions: (calm) breeze windy
no precip. (rain) snow
clear p. cloudy (overcast)
Air Temperature: °C 36 °F

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate
Other Flow or Description:
Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes
1500	–	–	–	–	–	–	Start
1503	100.2	6.28	7.41	1906	C	11.8	18
1506	65.2	5.96	7.41	2002	C	12.1	36
1509	59.0	6.32	7.44	2008	C	12.2	54
1512	53.7	6.41	7.43	2119	C	12.2	72
1515	56.6	6.71	7.48	2071	C	12.3	90
1518	55.1	6.31	7.50	2070	C	12.1	108

Turbidity: (circle) (clear) slight moderate very

Sample Method: (describe) (grab) composite (pump) bailer other

Field Parameters

	Sample	Duplicate
ORP (mV)	55.1	
DO (mg/l)	6.31	
pH	7.50	
SC (µmhos/cm)	2070	
Turbidity (ntu)	C	
H_2O Tmp. (°C)	12.1	
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: logger, used sprinkler at front of house, not filtered. Sprinkler on side of house buried in snow

Sample Team Member Signature: [signature] Page of

Hydrometrics, Inc.

STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: Sover
Sample Code Number: PLN-0118-
Sample Date:
Sample Time: (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #:
Duplicate Sample Time:

Site Conditions

New Site: Yes No
Photo taken: Yes No
Site Type: DRY surface water process water
monitoring well domestic well adit seep
spring other:
Weather Conditions: calm breeze windy
no precip. rain snow
clear p. cloudy overcast
Air Temperature: °C °F

For Groundwater Samples

well volume formula: V = (TD-SWL)x(Dia.^{2}) 25 Comments
TD (ft):
SWL (ft): no access/pumping
Casing Diameter (I.D.")
Water Volume (V) (gal):
x 3=(gal.)
Actual Vol. Removed (gal.)
Water Level Recovery: slow moderate rapid

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate
Other Flow or Description:
Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes

Turbidity: (circle) clear moderate slight very

Sample Method: (describe) grab composite pump bailer other

Field Parameters

	Sample	Duplicate
ORP (mV)		
DO (mg/l)		
pH		
SC (µmhos/cm)		
Turbidity (ntu)		
H_2O Tmp. (°C)		
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: Water Turned off for winter 1530 1-9-18

Sample Team Member Signature: Page of

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Account Information (Billing information)

Company/Name	Montana Dept. of Transportation
Contact	Enviro Services Att: Brian Goodman
Phone	406.444.7632
Mailing Address	2701 Prospect Ave.
City, State, Zip	Helena, MT 59620
Email	bgoodman@MT.gov
Receive Invoice	☐Hard Copy ☒Email
Receive Report	☐Hard Copy ☒Email
Purchase Order	
Quote	
Bottle Order	

Report Information (if different than Account Information)

Company/Name	Hydrometrics, Inc.
Contact	Laurie Childs, Doug Parker
Phone	406.599.7507
Mailing Address	30822 ½ Two Crows Ln
City, State, Zip	Airlee, MT 59821
Email	dparker@Hydrometrics.com, childs.laf@gmail.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.	Plains DOT GW
Sampler Name	Laurie Childs
Sampler Phone	406.599.7507
Sample Origin State	MT
EPA/State Compliance	☐ 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

Analysis Requested

	Sample Identification (Name, Location, Interval, etc.)	Collection Date	Collection Time	Number of Containers	Matrix (See Codes Above)	Dissolved: Ca, Mg, Sodium	CL-, PH, TDS, SC								See Attached	RUSH TAT	ELI LAB ID (Laboratory Use Only)
1	Pln-0118-01	1.9.18	841	2	W	X	X										
2	" -02		915														
3	" -03		936														
4	" -04		1010														
5	" -05		1050														
6	" -06		1107														
7	" -07		1111														
8	" -08		1135														
9	" -09		1156														
10	" -10		1226														

Custody Record MUST be signed	Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
	Laurie Childs	1-10-18 10:00				
	Relinquished by (print)	Date/Time	Signature	Received by Laboratory (print)	Date/Time	Signature

LABORATORY USE ONLY

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

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.

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Chain of Custody & Analytical Request Record

www.energylab.com

Account Information *(Billing information)*

Company/Name	
Contact	
Phone	"
Mailing Address	
City, State, Zip	
Email	
Receive Invoice ☐Hard Copy ☐Email	Receive Report ☐Hard Copy ☐Email
Purchase Order	Quote / Bottle Order

Report Information *(if different than Account Information)*

Company/Name	
Contact	
Phone	"
Mailing Address	
City, State, Zip	
Email	
Receive Report ☐Hard Copy ☐Email	
Special Report/Formats: ☐ LEVEL IV ☐ NELAC ☐ EDD/EDT *(contact laboratory)* ☐ Other_____	

Comments

Project Information

Project Name, PWSID, Permit, etc. "	
Sampler Name	Sampler Phone
Sample Origin State	EPA/State Compliance ☐ 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)*	Analysis Requested: Dissolved: Ca, Mg, Sodium	Analysis Requested: Cl, pH, TDS, Se	See Attached	RUSH TAT	ELI LAB ID *Laboratory Use Only*
1	Pn- 0118 -11	1.9.18	1303	2	2	X	X			
2	" -12		1321							
3	" -13		1343							
4	" -14		1412							
5	" -15		1445							
6	" -16		1516							
7										
8										
9										
10										

Custody Record MUST be signed	Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
	Laurie Childs	1.10.18 10:00				
	Relinquished by (print)	Date/Time	Signature	Received by Laboratory (print)	Date/Time	Signature

LABORATORY USE ONLY

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

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.

1.9.18

Sample Times

1445 Gary Reviter (Auto Shop)
pln-0118-15 4gpm
ORP: 121.3 DO: 7.66 pH: 7.62
Sc: 585 Turb: C Temp: 10.9
TVR: 58g

1516 Leichtan Duplex
pln-0118-16 6gpm
ORP: 55.1 DO: 6.31 pH: 7.50
Sc: 2070 Turb: C Temp: 12.1
TVR: 112g

- Jumer
Water turned off for winter No Sample
1530

Lance

4.25.18

6:15 Calibrated YSI

Sample Times

800 MDT
pln-0418-01 12gpm
ORP: 191.2 DO: 6.42 pH: 6.67
Sc: 1003 Turb: C Temp: 11.15
TVR: 196

820 Gary's Glass
pln-0418-02 10gpm
ORP: 182.7 DO: 7.63 pH: 6.82
Sc: 668 Turb: C Temp: 9.82
TVR: 165

850 Woods Rental
pln-0418-03 6gpm
ORP: 187.1 DO: 7.09 pH: 7.05
Sc: 595 Turb: C Temp: 11.09
TVR: 100

Childs

Rite in the Rain

4.25.18

Sample Time

920 Ford Dealership
pln-0418-04 5gpm
ORP: 190.8 DO: 7.66 pH: 7.21
Sc: 695 Turb: C Temp: 10.77
TVR: 110g

928 Ford Dealership Dup.
pln-0418-05 "

951 Gary's Auto (Review)
pln-0418-06 4gpm
ORP: 189.5 DO: 6.74 pH: 7.26
Sc: 631 Turb: C Temp: 10.52
TVR: ~110

1018 Davis
pln-0418-07 12gpm
ORP: 196.8 DO: 7.01 pH: 7.39
Sc: 584 Turb: C Temp: 11.32
TVR: ~ 200

Laurie

4.25.18

Sample Time

1050 USDA
pln-0418-8 5gpm
ORP: 181.4 DO: 7.13 pH: 7.30
Sc: 1510 Turb: C Temp: 11.18
TVR: ~110g

1125 Abrams
pln-0418-09 8gpm
ORP: 181.0 DO: 6.54 pH: 7.35
Sc: 1032 Turb: C Temp: 10.63
TVR: ~170

1145 Anthony
pln-0418-10 10gpm
ORP: 181.9 DO: 6.02 pH: 7.35
Sc: 1240 Turb: C Temp: 10.44
TVR: ~220

1226 Jones
pln-0418-11 8gpm TVR: ~210
ORP: 191.3 DO: 6.02 pH: 7.53
Sc: 955 Turb: C Temp: 11.00

Childs

Rite in the Rain

4.25.18

Sample Time

1306 Baker
pln-0418-12 5gpm
ORP: 184.2 DO: 4.99 pH: 7.49
Sc: 384 Turb: C Temp: 11.08
TVR: ~130

1335 Madden
pln-0418-13 12gpm
ORP: 194.6 DO: 6.11 pH: 7.54
Sc: 454 Turb: C Temp: 11.02
TVR: 12g

1440 Dyer
pln-0418-14 12gpm
ORP: 207.8 DO: 5.57 pH: 7.33
Sc: 534 Turb: C Temp: 10.81
TVR: ~2 bag

1435 Newman TVR: ~165
pln-0418-15 7gpm
ORP: 210.2 DO: 5.77 pH:
Sc: 420 Turb: C Temp: 10.85

Laurie

4.25.18

Sample Time

1506 Welch
pln-0418-16 6gpm
ORP: 213.9 DO: 7.10 pH: 7.63
Sc: 503 Turb: C Temp: 11.20
TVR: ~150g

1545 Vanderwall
pln-0418-17 12gpm
ORP: 217.6 DO: 5.44 pH: 7.49
Sc: 477 Turb: C Temp: 10.56
TVR: ~225g

1621 Merideth
pln-0418-18 10gpm
ORP: 220.3 DO: 4.15 pH: 7.47
Sc: 514 Turb: C Temp: 11.96
TVR: ~210

1700 Sears
pln-0418-19 8gpm TVR: ~170
ORP: 225.4 DO: 3.20 pH: 7.40
Sc: 597 Turb: C Temp: 11.45

Childs

Rite in the Rain

4·26·18

9:03 Calibrated YSI

Sample Time

1240 Weeks
pH-0418-20 15gpm
ORP: 77.1 DO: 3.13 pH: 6.74
Sc: 622 Turb: C Temp: 14.29
TUR: ~340

1335 Haon
pH-0418-21 15gpm
ORP: 424.0 DO: 6.27 pH: 7.01
Sc: 428 Turb: C Temp: 14.85
TUR: ~380

4·27·18
Baker called and let me know they got ionizer for their house.

Laurie

Childs

Rite in the Rain

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Chain of Custody & Analytical Request Record

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Account Information *(Billing information)*

Company/Name	
Contact	
Phone	
Mailing Address	
City, State, Zip	
Email	
Receive Invoice ☐Hard Copy ☐Email	Receive Report ☐Hard Copy ☐Email
Purchase Order	Quote / Bottle Order

Report Information *(if different than Account Information)*

Company/Name	
Contact	
Phone	
Mailing Address	
City, State, Zip	
Email	
Receive Report ☐Hard Copy ☐Email	
Special Report/Formats: ☐ LEVEL IV ☐ NELAC ☐ EDD/EDT *(contact laboratory)* ☐ Other_____	

Comments

Project Information

Project Name, PWSID, Permit, etc.	
Sampler Name	Sampler Phone
Sample Origin State	EPA/State Compliance ☐ 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)*	Dissolved Ca, Mg, Sodium	Cl, pH, TDS, SC	Nitrate, Nitrite, Calcium, Nitrate + Nitrite							See Attached	RUSH TAT	ELI LAB ID *Laboratory Use Only*
1	PIN-0418-21	4.26.18	1335	5	W	x	x	x									
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Custody Record MUST be signed	Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
	Laurie Childs	4.26.18 15:00				
	Relinquished by (print)	Date/Time	Signature	**Received by Laboratory (print)**	**Date/Time**	**Signature**

LABORATORY USE ONLY

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

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.

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Account Information *(Billing information)*

Company/Name	
Contact	
Phone	
Mailing Address	
City, State, Zip	
Email	
Receive Invoice ☐Hard Copy ☐Email	Receive Report ☐Hard Copy ☐Email
Purchase Order	Quote / Bottle Order

Report Information *(if different than Account Information)*

Company/Name	
Contact	
Phone	
Mailing Address	
City, State, Zip	
Email	
Receive Report ☐Hard Copy ☐Email	
Special Report/Formats: ☐ LEVEL IV ☐ NELAC ☐ EDD/EDT *(contact laboratory)* ☐ Other_____	

Comments

Project Information

Project Name, PWSID, Permit, etc.	
Sampler Name	Sampler Phone
Sample Origin State	EPA/State Compliance ☐ 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

Analysis Requested

	Sample Identification (Name, Location, Interval, etc.)	Collection Date	Collection Time	Number of Containers	Matrix (See Codes Above)	Dissolved: Ca, Mg, Sodium	Cl-, PH, TDS, Sc	Nitrate, Nitrite, Coliform, Nitrate-Nitrite						See Attached	RUSH TAT	ELI LAB ID (Laboratory Use Only)
1	PIN-0418-11	4.25.18	1226	2	W	x	x									
2	" -12		1306													
3	" -13		1335													
4	" -14		1400													
5	" -15		1435													
6	" -16		1506													
7	" -17		1545													
8	" -18		1621													
9	" -19		1700													
10	" -20	4.26.18	1240	5	W	x	x	x								

Custody Record MUST be signed	Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
	Claudie Childs	4.26.18 15:00				
	Relinquished by (print)	Date/Time	Signature	**Received by Laboratory (print)**	**Date/Time**	**Signature**

LABORATORY USE ONLY

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

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.

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Chain of Custody & Analytical Request Record

www.energylab.com

Account Information (Billing information)

Company/Name	Montana Dept. of Transportation
Contact	Enviro Services Att: Brian Goodman
Phone	406.444.7632
Mailing Address	2701 Prospect Ave
City, State, Zip	Helena, MT 59620
Email	bgoodman@MT.gov
Receive Invoice	☐Hard Copy ☐Email
Receive Report	☐Hard Copy ☐Email
Purchase Order	
Quote	
Bottle Order	

Report Information (if different than Account Information)

Company/Name	Hydrometrics, Inc.
Contact	Laurie Childs, Doug Parker
Phone	406.599.7507
Mailing Address	30822 1/2 Two Crows Ln
City, State, Zip	Ariel, MT 59821
Email	dparker@Hydrometrics.com, childs.laf@gmai
Receive Report	☐Hard Copy ☒Email
Special Report/Formats:	☐ LEVEL IV ☐ NELAC ☐ EDD/EDT (contact laboratory) ☐ Other_____

Comments

Project Information

Project Name, PWSID, Permit, etc.	Plains DOT GW
Sampler Name	Laurie Childs
Sampler Phone	406.599.7507
Sample Origin State	MT
EPA/State Compliance	☐ 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)	Dissolved: Ca, Mg, Sol, Na	Cl-, pH, TDS, SC								See Attached	RUSH TAT	ELI LAB ID (Laboratory Use Only)
1	PIN-0418-01	4.25.18	0800	2	W												
2	" " -02		0820														
3	" " -03		0850														
4	" " -04		0920														
5	" " -05		0928														
6	" " -06		0951														
7	" " -07		1018														
8	" " -08		1050														
9	" " -09		1125														
10	" " -10		1145														

Custody Record MUST be signed	Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
	Laurie Childs	4.26.18 15:00				
	Relinquished by (print)	Date/Time	Signature	Received by Laboratory (print)	Date/Time	Signature

LABORATORY USE ONLY

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

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Hydrometrics, Inc.

STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: Haum
Sample Code Number: PLN-0418-21
Sample Date: 04-26-18
Sample Time: 1335 (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #:
Duplicate Sample Time:

For Groundwater Samples

well volume formula: V = (TD-SWL)x(Dia.^{2}) 25

Comments

TD (ft):
SWL (ft): no access/pumping
Casing Diameter (I.D.")
Water Volume (V) (gal):
x 3=(gal.)
Actual Vol. Removed (gal.)
Water Level Recovery: slow moderate rapid

Site Conditions

New Site: Yes (No) Photo taken: Yes No
Site Type: DRY surface water process water
monitoring well domestic well adit seep
spring other:
Weather Conditions: (calm) breeze windy
(no precip.) rain snow
clear (p. cloudy) overcast
Air Temperature: °C 74 °F

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate
Other Flow or Description:
Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes
1313	–	–	–	–	–	–	Start
1318	48.5	6.14	7.10	473	C	14.38	60
1323	44.7	5.66	6.99	462	C	14.84	120
1328	47.3	6.47	7.05	444	C	14.87	180
1333	42.4	6.12	7.10	435	C	14.86	240
1338	43.1	7.00	7.02	430	C	14.85	300
1343	44.0	6.27	7.01	428	C	14.85	360

Turbidity: (circle) (clear) moderate slight very

Sample Method: (describe) (grab) composite (pump) bailer other
Frost Free

Field Parameters

	Sample	Duplicate
ORP (mV)	44.0	
DO (mg/l)	6.27	
pH	7.01	
SC (µmhos/cm)	428	
Turbidity (ntu)	C	
H_2O Tmp. (°C)	14.85	
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: 15 gpm. Checked ORP with standard @ 1329. Meter was reading correctly. TVR! ~380

Sample Team Member Signature:

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Hydrometrics, Inc.

STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: Weeks
Sample Code Number: PLN-0418-20
Sample Date: 04-26-18
Sample Time: 1240 (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #:
Duplicate Sample Time:

Site Conditions

New Site: Yes (No) Photo taken: Yes No
Site Type: DRY surface water process water
monitoring well domestic well adit seep
spring other:
Weather Conditions: (calm) breeze windy
(no precip.) rain snow
clear (p. cloudy) overcast
Air Temperature: °C 74 °F

For Groundwater Samples

well volume formula: V = (TD-SWL)x(Dia.²) 25 Comments
TD (ft):
SWL (ft): no access/pumping
Casing Diameter (I.D.")
Water Volume (V) (gal):
x 3=(gal.)
Actual Vol. Removed (gal.)
Water Level Recovery: slow moderate rapid

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate
Other Flow or Description:
Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes
1223	–	–	–	–	–	–	Start
1227	96.9	7.80	6.76	616	C	14.62	60
1231	90.7	5.08	6.65	616	C	14.26	120
1235	82.2	5.87	6.64	621	C	14.24	180
1239	78.0	7.33	6.64	622	C	14.22	240
1242	76.3	7.83	6.70	621	C	14.23	285
1245	77.1	3.13	6.74	622	C	14.29	330

Turbidity: (circle) (clear) moderate slight very

Sample Method: (describe) (grab) composite (pump) bailer other
Frost Free

Field Parameters

	Sample	Duplicate
ORP (mV)	77.1	
DO (mg/l)	3.13	
pH	6.74	
SC (µmhos/cm)	622	
Turbidity (ntu)	C	
H_2O Tmp. (°C)	14.29	
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: 15 gpm A Sprinkler ran 45 min. on same frost free before parameters! sample collected
TVR: ~340

Sample Team Member Signature: Page of

STANDARD OPERATING PROCEDURE
INSTRUMENT CALIBRATION FORM
HF-FORM-500

Hydrometrics, Inc.
Consulting Scientists and Engineers

Project Name: Plains GW

Project Number: 16060

Date: 4.26.18

Personnel: DE

Weather Conditions:

calm | breeze | windy
no precip | rain | snow
clear | p. cloudy | overcast

inside

Air Temperature:
°F °C

pH

Meter Type: YSI
SN:

Time	Buffer	Temperature °C	Reading (Temp Corrected)
9:05	4	17.96	4.00
9:03	7	17.77	7.00
	10		
Calibration check:			

Specific Conductance

Meter Type: SN:

Time	Standard	Temperature °C	Reading (Temp Corrected)	Cell Factor
9:08	1413	17.63	1413	
Calibration check:				

Dissolved Oxygen

Meter Type:
SN:
Time:
Calibration Results: mg/L
Barometric Pressure: mm Hg

Turbidity

Meter Type: SN:
Standard: Reading:

Redox Potential (Eh)

Meter Type:
SN:
Electrode: Ag/AgCl
Other:
Time: 9:12
Geotech Solution Potential (mV): 220
read: 220
Temperature: 17.96 °C

PID/FID

Meter Type: SN:
Span Gas Type:

Time	Span Gas		Calibration Memory	Response Factor	Reading
	Gauge Pressure	Concentration			
Calibration Check:					

Notes/Additional Information:

Hydrometrics, Inc.

STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: Sears
Sample Code Number: PLN-0418- 19
Sample Date: 04-25-18
Sample Time: 1700 (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #:
Duplicate Sample Time:

Site Conditions

New Site: Yes (No) Photo taken: Yes No
Site Type: DRY surface water process water
monitoring well domestic well adit seep
spring other:
Weather Conditions: (calm) breeze windy
no precip. rain snow
clear (p. cloudy) overcast
Air Temperature: °C 75 °F

For Groundwater Samples

well volume formula: V = (TD-SWL)x(Dia.^{2}) 25 Comments
TD (ft):
SWL (ft): no access/pumping
Casing Diameter (I.D.")
Water Volume (V) (gal):
x 3=(gal.)
Actual Vol. Removed (gal.)
Water Level Recovery: slow moderate rapid

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate
Other Flow or Description:
Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes
1639	-	-	-	-	-	-	Start
1643	210.5	05.85	7.88	594	C	11.68	32
1647	214.5	06.71	7.67	595	C	11.37	64
1651	218.8	7.77	7.55	593	C	11.33	96
1655	221.7	7.21	7.50	594	C	11.40	128
1657	223.3	7.55	7.49	596	C	11.31	144
1659	225.4	3.20	7.40	597	C	11.45	160

Turbidity: (circle) (clear) slight moderate very

Sample Method: (describe) (grab) composite (pump) bailer other
First Free

Field Parameters

	Sample	Duplicate
ORP (mV)	225.4	
DO (mg/l)	3.20	
pH	7.40	
SC (µmhos/cm)	597	
Turbidity (ntu)	C	
H_2O Tmp. (°C)	11.45	
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: 8gpm TVR: ~ 170

Sample Team Member Signature: [signature] Page of

Hydrometrics, Inc.

STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: Meridetta
Sample Code Number: PLN-0418-18
Sample Date: 04-25-18
Sample Time: 1621 (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #:
Duplicate Sample Time:

Site Conditions

New Site: Yes (No) Photo taken: Yes No
Site Type: DRY surface water process water monitoring well domestic well adit seep spring other:
Weather Conditions: calm breeze windy no precip. rain snow clear p. cloudy overcast
Air Temperature: °C 75 °F

For Groundwater Samples

well volume formula: V = (TD-SWL)x(Dia.²) 25 Comments
TD (ft):
SWL (ft): no access/pumping
Casing Diameter (I.D.")
Water Volume (V) (gal):
x 3=(gal.)
Actual Vol. Removed (gal.)
Water Level Recovery: slow moderate rapid

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate
Other Flow or Description:
Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes
1604	–	–	–	–	–	–	Start
1608	191.0	4.35	7.90	517	C	11.79	40
1612	195.2	6.45	7.84	511	C	11.64	80
1616	200.4	6.97	7.76	510	C	11.70	120
1620	213.8	7.02	7.61	511	C	11.93	160
1622	218.2	7.57	7.52	512	C	11.96	180
1624	220.3	4.15	7.47	514	C	11.96	200

Turbidity: (circle) clear moderate slight very

Sample Method: (describe) grab composite pump bailer other Spoolet on House

Field Parameters

	Sample	Duplicate
ORP (mV)	220.3	
DO (mg/l)	4.15	
pH	7.47	
SC (µmhos/cm)	514	
Turbidity (ntu)	C	
H_2O Tmp. (°C)	11.96	
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: 10 gpm TUR: ~210

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STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: Vandenwall
Sample Code Number: PLN-0418- 17
Sample Date: 04-25-18
Sample Time: 1545 (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #:
Duplicate Sample Time:

For Groundwater Samples

well volume formula: V = (TD-SWL)x(Dia.") 25 — Comments

TD (ft):
SWL (ft): — no access/pumping
Casing Diameter (I.D.")
Water Volume (V) (gal):
x 3=(gal.)
Actual Vol. Removed (gal.)
Water Level Recovery: slow moderate rapid

Site Conditions

New Site: Yes (No) Photo taken: Yes No
Site Type: DRY surface water process water
monitoring well domestic well adit seep
spring other:
Weather Conditions: calm (breeze) windy
(no precip.) rain snow
(clear) p. cloudy overcast
Air Temperature: °C 74 °F

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate
Other Flow or Description:
Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes
1527	–	–	–	–	–	–	Start
1531	196.5	7.58	8.04	485	C	11.70	48
1535	203.5	9.09	7.83	477	C	10.68	96
1539	213.2	8.51	7.64	476	C	11.00	144
1543	217.3	5.57	7.58	477	C	11.21	192
1545	217.6	5.99	7.49	477	C	10.56	216

Turbidity: (circle) (clear) slight moderate very

Sample Method: (describe) (grab) composite (pump) bailer other
First Free

Field Parameters

	Sample	Duplicate
ORP (mV)	217.6	
DO (mg/l)	5.99	
pH	7.49	
SC (µmhos/cm)	477	
Turbidity (ntu)	C	
H_2O Tmp. (°C)	10.56	
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: 12 gpm TVR: 225

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STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: Welch
Sample Code Number: PLN-0418-16
Sample Date: 04-25-18
Sample Time: 1506 (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #:
Duplicate Sample Time:

For Groundwater Samples

well volume formula: V = (TD-SWL)x(Dia.^{2}) 25 Comments

TD (ft):
SWL (ft): no access/pumping
Casing Diameter (I.D.")
Water Volume (V) (gal):
x 3=(gal.)
Actual Vol. Removed (gal.)
Water Level Recovery: slow moderate rapid

Site Conditions

New Site: Yes (No) Photo taken: Yes No
Site Type: DRY surface water process water monitoring well domestic well adit seep spring other:
Weather Conditions: (calm) breeze windy (no precip.) rain snow clear (p. cloudy) overcast
Air Temperature: °C 70 °F

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate
Other Flow or Description:
Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes
1445	–	–	–	–	–	–	Start
1450	196.6	7.27	7.90	510	C	11.12	30
1455	201.5	7.44	7.79	504	C	10.79	60
1500	206.3	8.76	7.68	515	C	10.40	90
1505	210.0	8.56	7.65	514	C	10.49	120
1507	212.4	8.22	7.63	505	C	10.42	132
1509	213.9	7.10	7.63	503	C	11.20	144

Turbidity: (circle) (clear) moderate slight very

Sample Method: (describe) (grab) composite (pump) bailer other
Trust Free

Field Parameters

	Sample	Duplicate
ORP (mV)	213.9	
DO (mg/l)	7.10	
pH	7.63	
SC (µmhos/cm)	503	
Turbidity (ntu)	C	
H_2O Tmp. (°C)	11.20	
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: 6 Gpm TUR: -150

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Hydrometrics, Inc.

STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: Newman
Sample Code Number: PLN-0418-15
Sample Date: 04-25-18
Sample Time: 1435 (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #:
Duplicate Sample Time:

For Groundwater Samples

well volume formula: V = (TD-SWL)x(Dia.^{2}) 25 — Comments

TD (ft):
SWL (ft): — no access/pumping
Casing Diameter (I.D.")
Water Volume (V) (gal):
x 3=(gal.)
Actual Vol. Removed (gal.)
Water Level Recovery: slow moderate rapid

Site Conditions

New Site: Yes (No) Photo taken: Yes No
Site Type: DRY surface water process water monitoring well domestic well adit seep spring other:
Weather Conditions: (calm) breeze windy (no precip.) rain snow clear (p. cloudy) overcast
Air Temperature: °C 60 °F

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate
Other Flow or Description:
Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes
1413	–	–	–	–	–	–	Start
1418	207.3	6.04	7.68	471	C	10.66	35
1423	206.1	5.51	7.55	419	C	11.01	70
1428	207.7	5.74	7.54	419	C	10.64	105
1433	208.9	5.61	7.56	420	C	10.94	140
1435	210.2	5.77	7.51	420	C	10.85	154

Turbidity: (circle) (clear) moderate slight very

Sample Method: (describe) (grab) composite (pump) bailer other
Frost Free

Field Parameters

	Sample	Duplicate
ORP (mV)	210.2	
DO (mg/l)	5.77	
pH	7.51	
SC (µmhos/cm)	420	
Turbidity (ntu)	C	
H_2O Tmp. (°C)	10.85	
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: 7gpm TVR: ~165

Sample Team Member Signature: [signature] Page of

Hydrometrics, Inc.

STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: Dyer
Sample Code Number: PLN-0418-14
Sample Date: 04-25-18
Sample Time: 1400 (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #:
Duplicate Sample Time:

Site Conditions

New Site: Yes (No) Photo taken: Yes No
Site Type: DRY surface water process water monitoring well domestic well adit seep spring other:
Weather Conditions: (calm) breeze windy no precip. rain snow clear (p. cloudy) overcast
Air Temperature: °C 65° F

For Groundwater Samples

well volume formula: V = (TD-SWL)x(Dia.²) 25 Comments
TD (ft):
SWL (ft): no access/pumping
Casing Diameter (I.D.")
Water Volume (V) (gal):
x 3=(gal.)
Actual Vol. Removed (gal.)
Water Level Recovery: slow moderate rapid

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate
Other Flow or Description:
Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes
1343	—	—	—	—	—	—	Start
1347	192.5	6.20	7.74	531	C	11.37	48
1351	196.3	6.08	7.61	529	C	10.91	96
1355	200.2	6.24	7.49	531	C	10.87	144
1359	207.3	5.80	7.45	534	C	10.83	192
1402	206.1	5.83	7.3	534	C	10.75	228
1404	207.8	5.57	7.33	534	C	10.81	252

Turbidity: (circle) (clear) moderate slight very

Sample Method: (describe) (grab) composite (pump) bailer other
Frost Free

Field Parameters

	Sample	Duplicate
ORP (mV)	207.8	
DO (mg/l)	5.57	
pH	7.33	
SC (µmhos/cm)	534	
Turbidity (ntu)	C	
H_2O Tmp. (°C)	10.81	
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: 12 gpm TVR: 260

Sample Team Member Signature: Page of

Hydrometrics, Inc.

STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: Madden
Sample Code Number: PLN-0418-13
Sample Date: 04-25-18
Sample Time: 1335 (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #:
Duplicate Sample Time:

For Groundwater Samples

well volume formula: V = (TD-SWL)x(Dia.^{2}) 25 Comments

TD (ft):
SWL (ft): no access/pumping
Casing Diameter (I.D.")
Water Volume (V) (gal):
x 3=(gal.)
Actual Vol. Removed (gal.)
Water Level Recovery: slow moderate rapid

Site Conditions

New Site: Yes (No) Photo taken: Yes No
Site Type: DRY surface water process water
monitoring well domestic well adit seep
spring other:
Weather Conditions: (calm) breeze windy
(no precip.) rain snow
clear (p. cloudy) overcast
Air Temperature: °C 62 °F

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate
Other Flow or Description:
Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes
1314	—	—	—	—	—	—	start
1318	183.9	6.51	7.80	455	C	11.06	48
1322	187.8	6.51	7.73	455	C	10.71	96
1326	191.5	6.40	7.65	451	C	10.80	144
1330	193.8	6.29	7.59	452	C	10.89	192
1334	194.6	6.11	7.54	454	C	11.02	240

Turbidity: (circle) (clear) moderate slight very

Sample Method: (describe) (grab) composite (pump) bailer other
Frost Free

Field Parameters

	Sample	Duplicate
ORP (mV)	194.6	
DO (mg/l)	6.11	
pH	7.54	
SC (µmhos/cm)	454	
Turbidity (ntu)	C	
H_2O Tmp. (°C)	11.02	
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: 12 gpm TUR:<250

Sample Team Member Signature: [signature] Page of

Hydrometrics, Inc.

STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: Baker
Sample Code Number: PLN-0418-17
Sample Date: 04-25-18
Sample Time: 1306 (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #:
Duplicate Sample Time:

For Groundwater Samples

well volume formula: V = (TD-SWL)x(Dia.^{2}) 28

Comments

TD (ft):
SWL (ft): no access/pumping
Casing Diameter (I.D.")
Water Volume (V) (gal):
x 3=(gal.)
Actual Vol. Removed (gal.)
Water Level Recovery: slow moderate rapid

Site Conditions

New Site: Yes (No) Photo taken: Yes No
Site Type: DRY surface water process water monitoring well domestic well adit seep spring other:
Weather Conditions: (calm) breeze windy no precip. rain snow clear (p. cloudy) overcast
Air Temperature: °C 60 °F

For Surface Water Samples

Flow Method: Marsh-McBirney Volumetric Flume Weir Estimate
Other Flow or Description:
Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes
1245	-	-	-	-	-	-	Start
1250	161.3	5.91	7.92	387	C	11.06	25
1255	163.3	5.57	7.74	386	C	10.00	50
1300	169.8	5.37	7.62	386	C	10.79	75
1305	174.4	5.91	7.55	386	C	10.70	100
1308	178.1	5.10	7.53	386	C	10.77	115
1310	184.2	4.99	7.49	384	C	11.08	125

Turbidity: (circle) (clear) moderate slight very

Sample Method: (describe) (grab) composite pump bailer other
Sprinkler on house

Field Parameters

	Sample	Duplicate
ORP (mV)	184.2	
DO (mg/l)	4.99	
pH	7.49	
SC (µmhos/cm)	384	
Turbidity (ntu)	C	
H_2O Tmp. (°C)	11.08	
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: Spr * Owner called to let me know they installed an ionizer on the house pipes. 4.27.18 will sample from Gardena pump moving forward.
TVR: ~130

Sample Team Member Signature:

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Hydrometrics, Inc.

STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: Joner
Sample Code Number: PLN-0418-11
Sample Date: 04-25-18
Sample Time: 1226 (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #:
Duplicate Sample Time:

For Groundwater Samples

well volume formula: V = (TD-SWL)x(Dia.^{2}) 25 Comments

TD (ft):
SWL (ft): no access/pumping
Casing Diameter (I.D.")
Water Volume (V) (gal):
x 3=(gal.)
Actual Vol. Removed (gal.)
Water Level Recovery: slow moderate rapid

Site Conditions

New Site: Yes No Photo taken: Yes No
Site Type: DRY surface water process water
monitoring well domestic well adit seep
spring other:
Weather Conditions: calm breeze windy
no precip. rain snow
clear p. cloudy overcast
Air Temperature: °C 59 °F

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate
Other Flow or Description:
Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes
1200	–	–	–	–	–	–	Start
1205	187.1	6.52	7.60	956	C	11.38	40
1210	188.7	6.48	7.59	954	C	11.04	80
1215	190.0	6.49	7.57	956	C	11.04	120
1220	190.7	6.63	7.54	955	C	11.03	160
1225	191.3	6.02	7.53	955	C	11.00	200

Turbidity: (circle) clear moderate slight very

Sample Method: (describe) grab composite pump bailer other
Frost Free

Field Parameters

	Sample	Duplicate
ORP (mV)	191.3	
DO (mg/l)	6.02	
pH	7.53	
SC (µmhos/cm)	955	
Turbidity (ntu)	C	
H_2O Tmp. (°C)	11.00	
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: 8gpm TUR:210

Sample Team Member Signature: Page of

Hydrometrics, Inc.

STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: Anthony
Sample Code Number: PLN-0418-10
Sample Date: 04-25-18
Sample Time: 1145 (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #: /
Duplicate Sample Time: /

For Groundwater Samples

well volume formula: V = (TD-SWL)x(Dia.^{2}) 25 — Comments

TD (ft):
SWL (ft): — no access/pumping
Casing Diameter (I.D.)
Water Volume (V) (gal):
x 3=(gal.)
Actual Vol. Removed (gal.)
Water Level Recovery: slow moderate rapid

Site Conditions

New Site: Yes No — Photo taken: Yes No

Site Type: DRY surface water process water monitoring well domestic well adit seep spring other:

Weather Conditions: calm breeze windy; no precip. rain snow; clear p. cloudy overcast

Air Temperature: °C 57 °F

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate

Other Flow or Description:

Flow: gpm cfs — Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes
1131	–	–	–	–	–	–	start
1135	197.3	7.18	7.44	1232	C	10.78	40
1139	192.9	6.59	7.37	1234	C	10.83	80
1143	189.9	6.40	7.35	1233	C	10.74	120
1147	186.5	6.54	7.35	1242	C	10.27	160
1150	182.3	6.29	7.35	1241	C	10.50	190
1152	181.9	6.02	7.35	1240	C	10.44	210

Turbidity: (circle) clear moderate slight very

Sample Method: (describe) grab composite pump bailer other — Frost Free

Field Parameters

	Sample	Duplicate
ORP (mV)	181.9	
DO (mg/l)	6.02	
pH	7.35	
SC (µmhos/cm)	1240	
Turbidity (ntu)	C	
H_2O Tmp. (°C)	10.44	
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: 10gpm TUR:-220

Sample Team Member Signature: Page of

Hydrometrics, Inc.

STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: ABrams
Sample Code Number: PLN-0418-C9
Sample Date: 04-25-18
Sample Time: 1125 (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #:
Duplicate Sample Time:

Site Conditions

New Site: Yes (No) Photo taken: Yes No
Site Type: DRY surface water process water
monitoring well (domestic well) adit seep
spring other:
Weather Conditions: (calm) breeze windy
~~no precip.~~ rain snow
clear (p. cloudy) overcast
Air Temperature: °C 55 °F

For Groundwater Samples

well volume formula: V = (TD-SWL)x(Dia.^{2}) 25 Comments
TD (ft):
SWL (ft): no access/pumping
Casing Diameter (I.D.")
Water Volume (V) (gal):
x 3=(gal.)
Actual Vol. Removed (gal.)
Water Level Recovery: slow moderate rapid

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate
Other Flow or Description:
Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes
1104	—	—	—	—	—	—	Start
1109	179.6	6.68	7.50	1038	C	11.03	40
1114	179.5	6.34	7.43	1030	C	10.46	80
1119	179.9	7.00	7.40	1033	C	10.52	120
1124	181.0	6.54	7.35	1032	C	10.63	160

Turbidity: (circle) (clear) moderate slight very

Sample Method: (describe) (grab) composite (pump) bailer other
Frost Free

Field Parameters

	Sample	Duplicate
ORP (mV)	181.0	
DO (mg/l)	6.54	
pH	7.35	
SC (µmhos/cm)	1032	
Turbidity (ntu)	C	
H_2O Tmp. (°C)	10.63	
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: 8 gpm TUR: 170

Sample Team Member Signature: J. Page of

Hydrometrics, Inc.

STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: USDA
Sample Code Number: PLN-0418-08
Sample Date: 04-25-18
Sample Time: 1050 (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #:
Duplicate Sample Time:

For Groundwater Samples

well volume formula: V = (TD-SWL)x(Dia.^{2}) 25 — Comments

TD (ft):
SWL (ft): — no access/pumping
Casing Diameter (I.D.")
Water Volume (V) (gal):
x 3=(gal.)
Actual Vol. Removed (gal.)
Water Level Recovery: slow moderate rapid

Site Conditions

New Site: Yes No — Photo taken: Yes No
Site Type: DRY surface water process water monitoring well domestic well adit seep spring other:
Weather Conditions: calm breeze windy no precip. rain snow clear p. cloudy overcast
Air Temperature: °C 53 °F

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate
Other Flow or Description:
Flow: gpm cfs — Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes
1028	–	–	–	–	–	–	Start
1033	207.3	6.59	7.29	1494	C	11.05	25
1038	189.7	6.64	7.27	1508	C	11.16	50
1043	183.6	6.63	7.28	1508	C	11.21	75
1048	181.4	7.13	7.30	1510	C	11.18	100

Turbidity: (circle) clear slight moderate very

Sample Method: (describe) grab composite pump bailer other — Spigot on Building

Field Parameters

	Sample	Duplicate
ORP (mV)	181.4	
DO (mg/l)	7.13	
pH	7.30	
SC (µmhos/cm)	1510	
Turbidity (ntu)	C	
H_2O Tmp. (°C)	11.18	
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: Sypm TVR: ~110

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STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: Davis
Sample Code Number: PLN-0418-07
Sample Date: 04-25-18
Sample Time: 1018 (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #:
Duplicate Sample Time:

Site Conditions

New Site: Yes (No) Photo taken: Yes No
Site Type: DRY surface water process water
monitoring well domestic well adit seep
spring other:
Weather Conditions: (calm) breeze windy
(no precip.) rain snow
clear (p. cloudy) overcast
Air Temperature: °C 52 °F

For Groundwater Samples

well volume formula: V = (TD-SWL)x(Dia.²) 25 Comments
TD (ft):
SWL (ft): no access/pumping
Casing Diameter (I.D.")
Water Volume (V) (gal):
x 3=(gal.)
Actual Vol. Removed (gal.)
Water Level Recovery: slow moderate rapid

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate
Other Flow or Description:
Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes
1000	–	–	–	–	–	–	Start
1004	147.9	6.80	7.39	581	C	11.21	48
1008	147.4	6.72	7.37	584	C	11.74	96
1012	145.7	7.05	7.36	584	C	11.38	144
1016	146.8	7.01	7.39	584	C	11.32	192

Turbidity: (circle) (clear) moderate slight very

Sample Method: (describe) (grab) composite (pump) bailer other
Front Free

Field Parameters

	Sample	Duplicate
ORP (mV)	146.8	
DO (mg/l)	7.01	
pH	7.39	
SC (µmhos/cm)	584	
Turbidity (ntu)	C	
H_2O Tmp. (°C)	11.32	
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: 12 gpm TVR: 200

Sample Team Member Signature: [signature] Page of

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STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: Gary's Auto Repair
Sample Code Number: PLN-0418-06
Sample Date: 04-25-18
Sample Time: 9:51 (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #:
Duplicate Sample Time:

Site Conditions

New Site: Yes No Photo taken: Yes No
Site Type: DRY surface water process water
monitoring well domestic well adit seep
spring other:
Weather Conditions: calm breeze windy
no precip. rain snow
clear p. cloudy overcast
Air Temperature: °C 50 °F

For Groundwater Samples

well volume formula: V = (TD-SWL)x(Dia.²) 25 Comments
TD (ft):
SWL (ft): no access/pumping
Casing Diameter (I.D.")
Water Volume (V) (gal):
x 3=(gal.)
Actual Vol. Removed (gal.)
Water Level Recovery: slow moderate rapid

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate
Other Flow or Description:
Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes
9:30	-	-	-	-	-	-	Start
9:35	197.7	5.50	7.21	639	C	12.00	20
9:40	174.3	7.75	7.61	646	C	11.56	40
9:45	180.9	7.22	7.37	634	C	10.65	60
9:50	180.5	6.88	7.27	631	C	10.53	80
9:55	189.5	6.74	7.26	631	C	10.52	100

Turbidity: (circle) clear moderate slight very

Sample Method: (describe) grab composite pump bailer other

Field Parameters

	Sample	Duplicate
ORP (mV)	189.5	
DO (mg/l)	6.74	
pH	7.26	
SC (µmhos/cm)	631	
Turbidity (ntu)	C	
H_2O Tmp. (°C)	10.52	
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: Hypo TUR: 110

Sample Team Member Signature: [signature] Page of

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STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: Ford Dealership
Sample Code Number: PLN-0418-04
Sample Date: 04-25-18
Sample Time: 9:26 (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #: PLN-0418-05
Duplicate Sample Time: 9:28

For Groundwater Samples

well volume formula: V = (TD-SWL)x(Dia.^{2}) 25 — Comments

TD (ft):
SWL (ft): — no access/pumping
Casing Diameter (I.D.")
Water Volume (V) (gal):
x 3=(gal.)
Actual Vol. Removed (gal.)
Water Level Recovery: slow moderate rapid

Site Conditions

New Site: Yes (No) Photo taken: Yes (No)
Site Type: DRY surface water process water monitoring well domestic well adit seep spring other:
Weather Conditions: calm (breeze) windy (no precip.) rain snow clear (p. cloudy) overcast
Air Temperature: °C 46 °F

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate
Other Flow or Description:
Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes
858	-	-	-	-	-	.	Start
903	194.4	7.64	7.18	690	C	10.51	25
908	190.9	7.43	7.19	693	C	10.86	50
913	190.3	7.58	7.19	695	C	10.88	75
918	190.8	7.66	7.21	695	C	10.77	100

Turbidity: (circle) (clear) slight moderate very

Sample Method: (describe) (grab) composite (pump) bailer other
Frost Free

Field Parameters

	Sample	Duplicate
ORP (mV)	190.8	
DO (mg/l)	7.66	
pH	7.21	
SC (µmhos/cm)	695	
Turbidity (ntu)	C	
H_2O Tmp. (°C)	10.77	
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: 5gpm, RV hooked up to the frost free. Split faucet. attached to 1 of 2 hose hookups.
TVR: ~110

Sample Team Member Signature: [signature] Page of

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STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: Wood's Rental
Sample Code Number: PLN-0418-03
Sample Date: 04-25-18
Sample Time: 8:50 (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #:
Duplicate Sample Time:

For Groundwater Samples

well volume formula: V = (TD-SWL)x(Dia.²) 25 — Comments

TD (ft):
SWL (ft): — no access/pumping
Casing Diameter (I.D.")
Water Volume (V) (gal):
x 3=(gal.)
Actual Vol. Removed (gal.)
Water Level Recovery: slow moderate rapid

Site Conditions

New Site: Yes (No) Photo taken: Yes (No)
Site Type: DRY surface water process water monitoring well domestic well adit seep spring other:
Weather Conditions: calm (breeze) windy (no precip.) rain snow clear (p. cloudy) overcast
Air Temperature: °C 43 °F

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate
Other Flow or Description:
Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes
8:30	–	–	–	–	–	–	Start
8:35	188.7	7.78	7.03	594	C	10.78	30
8:39	188.8	7.76	7.01	595	C	10.61	54
8:43	188.0	7.23	7.01	596	C	10.53	78
8:~~48~~46	187.1	7.09	7.05	595	C	11.09	96

Turbidity: (circle) (clear) slight moderate very

Sample Method: (describe) (grab) composite (pump) bailer other
Frost Free

Field Parameters

	Sample	Duplicate
ORP (mV)	187.1	
DO (mg/l)	7.09	
pH	7.05	
SC (µmhos/cm)	595	
Turbidity (ntu)	C	
H_2O Tmp. (°C)	11.09	
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: bgpm TVR: 100

Sample Team Member Signature: [signature] Page of

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STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: Gary's Glass
Sample Code Number: PLN-0418-02
Sample Date: 04-25-18
Sample Time: 8:20 (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #:
Duplicate Sample Time:

For Groundwater Samples

well volume formula: V = (TD-SWL)x(Dia.^{2}) 25 — Comments

TD (ft):
SWL (ft): — no access/pumping
Casing Diameter (I.D.")
Water Volume (V) (gal):
x 3=(gal.)
Actual Vol. Removed (gal.)
Water Level Recovery: slow moderate rapid

Site Conditions

New Site: Yes **(No)** Photo taken: Yes **(No)**

Site Type: DRY surface water process water monitoring well **(domestic well)** adit seep spring other:

Weather Conditions: calm **(breeze)** windy **(no precip)** rain snow clear p. cloudy **(overcast)**

Air Temperature: °C 41 °F

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate
Other Flow or Description:
Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes
803	–	–	–	–	–	–	S/2-A
807	178.1	7.88	6.77	679	C	9.72	40
811	180.9	7.68	6.79	669	C	9.85	80
815	181.2	7.75	6.83	669	C	9.84	120
819	182.7	7.63	6.82	668	C	9.82	160

Turbidity: (circle) **(clear)** moderate slight very

Sample Method: (describe) **(grab)** composite **(pump)** bailer other
Frost Free

Field Parameters

	Sample	Duplicate
ORP (mV)	182.7	
DO (mg/l)	7.63	
pH	6.82	
SC (µmhos/cm)	668	
Turbidity (ntu)	C	
H_2O Tmp. (°C)	9.82	
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: 10 gpm TUR: 165

Sample Team Member Signature: [signature] Page of

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STANDARD OPERATING PROCEDURE
WATER SAMPLING FORM
HF-FORM-430

Consulting Scientists and Engineers

Project Name: Plains GW Sampling MDT
Project Code: 16060
Sample Team Member(s): LC
Laboratory Used: Energy

Site Designation: MDT
Sample Code Number: PLN-0418-01
Sample Date: 04-25-18
Sample Time: 800 (military)

If Duplicate Sample Collected, Please Record Below

Duplicate Sample Code #:
Duplicate Sample Time:

For Groundwater Samples

well volume formula: V = (TD-SWL)x(Dia.^{2}) 25 — Comments

TD (ft):
SWL (ft): — no access/pumping
Casing Diameter (I.D.")
Water Volume (V) (gal):
x 3=(gal.)
Actual Vol. Removed (gal.)
Water Level Recovery: slow moderate rapid

Site Conditions

New Site: Yes (No) Photo taken: Yes (No)
Site Type: DRY surface water process water
monitoring well (domestic well) adit seep
spring other:
Weather Conditions: calm (breeze) windy
no precip. rain snow
clear p. cloudy (overcast)
Air Temperature: °C 41 °F

For Surface Water Samples

Flow Method: Marsh McBirney Volumetric Flume Weir Estimate
Other Flow or Description:
Flow: gpm cfs Staff Gage:

Field Parameter Stabilization

Time (military)	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/l)	pH	S.C. (µmhos/cm)	Turbidity (n.t.u.)	Temperature (°C)	Additional Parameters or Notes
741		Start					
745	207.6	7.08	6.72	1032	C	10.97	48
749	195.6	6.34	6.51	1001	C	11.49	96
753	192.8	6.34	6.60	1000	C	11.53	144
757	191.2	6.42	6.67	1003	C	11.45	192

Turbidity: (circle) (clear) moderate slight very

Sample Method: (describe) (grab) composite (pump) bailer other
First Freet

Field Parameters

	Sample	Duplicate
ORP (mV)	191.2	
DO (mg/l)	6.42	
pH	6.67	
SC (µmhos/cm)	1003	
Turbidity (ntu)	C	
H_2O Tmp. (°C)	11.45	
Color		
Other:		

Bottles Collected

Quantity	Size	Filter or Unfilt.	Preservative	Parameter	Additional Notes
1	1000 ml	UF	raw		
1	250ml	F	HNO3		
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			
	ml	F or UF			

Comments: 12 Gpm
TVR: 196

Sample Team Member Signature: Page of

STANDARD OPERATING PROCEDURE
INSTRUMENT CALIBRATION FORM
HF-FORM-500

Hydrometrics, Inc.
Consulting Scientists and Engineers

Project Name: Plains GW

Project Number: 16060

Date: 4.25.18

Personnel: LC

Weather Conditions:

calm	breeze	windy
no precip	rain	snow
clear	p. cloudy	overcast

inside

Air Temperature:
°F °C

pH

Meter Type: YSI
SN:

Time	Buffer	Temperature °C	Reading (Temp Corrected)
6:17	4	17.53	4.00
6:15	7	17.19	7.00
	10		
Calibration check:			

Specific Conductance

Meter Type: YSI SN:

Time	Standard	Temperature °C	Reading (Temp Corrected)	Cell Factor
6:25	1413	17.41	1413	
Calibration check:				

Dissolved Oxygen

Meter Type:
SN:
Time:
Calibration Results: mg/L
Barometric Pressure: mm Hg

Turbidity

Meter Type: SN:
Standard: Reading:

Redox Potential (Eh)

Meter Type: YSI
SN:
Electrode: Ag/AgCl
Other:
Time: 6:22
Geotech Solution Potential (mV): 220
recal. 220
Temperature: 17.54 °C

PID/FID

Meter Type: SN:
Span Gas Type:

Time	Span Gas		Calibration Memory	Response Factor	Reading
	Gauge Pressure	Concentration			
Calibration Check:					

Notes/Additional Information:

APPENDIX B

ANALYTICAL LABORATORY REPORTS

ANALYTICAL SUMMARY REPORT

January 16, 2018

MT Dept of Transportation
PO Box 201001
Helena, MT 59620-1001

Work Order: H18010171

Project Name: Plains DOT GW

Energy Laboratories Inc Helena MT received the following 16 samples for MT Dept of Transportation on 1/11/2018 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H18010171-001	Pln-0118-01	01/09/18 8:41	01/11/18	Aqueous	Metals by ICP/ICPMS, Dissolved Conductivity Anions by Ion Chromatography pH Solids, Total Dissolved
H18010171-002	Pln-0118-02	01/09/18 9:15	01/11/18	Aqueous	Same As Above
H18010171-003	Pln-0118-03	01/09/18 9:36	01/11/18	Aqueous	Same As Above
H18010171-004	Pln-0118-04	01/09/18 10:10	01/11/18	Aqueous	Same As Above
H18010171-005	Pln-0118-05	01/09/18 10:50	01/11/18	Aqueous	Same As Above
H18010171-006	Pln-0118-06	01/09/18 11:07	01/11/18	Aqueous	Same As Above
H18010171-007	Pln-0118-07	01/09/18 11:11	01/11/18	Aqueous	Same As Above
H18010171-008	Pln-0118-08	01/09/18 11:35	01/11/18	Aqueous	Same As Above
H18010171-009	Pln-0118-09	01/09/18 11:56	01/11/18	Aqueous	Same As Above
H18010171-010	Pln-0118-10	01/09/18 12:26	01/11/18	Aqueous	Same As Above
H18010171-011	Pln-0118-11	01/09/18 13:03	01/11/18	Aqueous	Same As Above
H18010171-012	Pln-0118-12	01/09/18 13:21	01/11/18	Aqueous	Same As Above
H18010171-013	Pln-0118-13	01/09/18 13:43	01/11/18	Aqueous	Same As Above
H18010171-014	Pln-0118-14	01/09/18 14:12	01/11/18	Aqueous	Same As Above
H18010171-015	Pln-0118-15	01/09/18 14:45	01/11/18	Aqueous	Same As Above
H18010171-016	Pln-0118-16	01/09/18 15:16	01/11/18	Aqueous	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 Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

The results as reported relate only to the item(s) submitted for testing.

If you have any questions regarding these test results, please call.

Report Approved By:

Amanda Carlson
Assistant Laboratory Manager-Helena,MT

Digitally signed by
Amanda B. Carlson
Date: 2018.01.16 14:46:22 -07:00

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Lab ID: H18010171-001
Client Sample ID: Pln-0118-01

Report Date: 01/16/18
Collection Date: 01/09/18 08:41
DateReceived: 01/11/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.4	s.u.	H	0.1		A4500-H B	01/11/18 11:14 / SRW
Conductivity @ 25 C	1340	umhos/cm		1		A2510 B	01/11/18 11:14 / SRW
Solids, Total Dissolved TDS @ 180 C	697	mg/L		10		A2540 C	01/11/18 13:06 / kmd
INORGANICS							
Chloride	259	mg/L		1		E300.0	01/11/18 15:45 / kmd
METALS, DISSOLVED							
Calcium	54	mg/L		1		E200.7	01/12/18 10:19 / sld
Magnesium	18	mg/L		1		E200.7	01/12/18 10:19 / sld
Sodium	184	mg/L		1		E200.7	01/12/18 10:19 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Lab ID: H18010171-002
Client Sample ID: Pln-0118-02

Report Date: 01/16/18
Collection Date: 01/09/18 09:15
DateReceived: 01/11/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.6	s.u.	H	0.1		A4500-H B	01/11/18 11:16 / SRW
Conductivity @ 25 C	2220	umhos/cm		1		A2510 B	01/11/18 11:16 / SRW
Solids, Total Dissolved TDS @ 180 C	1140	mg/L	D	20		A2540 C	01/11/18 13:06 / kmd
INORGANICS							
Chloride	511	mg/L		1		E300.0	01/11/18 16:00 / kmd
METALS, DISSOLVED							
Calcium	61	mg/L		1		E200.7	01/12/18 10:35 / sld
Magnesium	19	mg/L		1		E200.7	01/12/18 10:35 / sld
Sodium	351	mg/L		1		E200.7	01/12/18 10:35 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
H - Analysis performed past recommended holding time.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Lab ID: H18010171-003
Client Sample ID: Pln-0118-03

Report Date: 01/16/18
Collection Date: 01/09/18 09:36
DateReceived: 01/11/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.6	s.u.	H	0.1		A4500-H B	01/11/18 11:18 / SRW
Conductivity @ 25 C	2370	umhos/cm		1		A2510 B	01/11/18 11:18 / SRW
Solids, Total Dissolved TDS @ 180 C	1310	mg/L	D	20		A2540 C	01/11/18 13:07 / kmd
INORGANICS							
Chloride	576	mg/L		1		E300.0	01/11/18 16:15 / kmd
METALS, DISSOLVED							
Calcium	107	mg/L		1		E200.7	01/12/18 10:39 / sld
Magnesium	33	mg/L		1		E200.7	01/12/18 10:39 / sld
Sodium	306	mg/L		1		E200.7	01/12/18 10:39 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
H - Analysis performed past recommended holding time.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Lab ID: H18010171-004
Client Sample ID: Pln-0118-04

Report Date: 01/16/18
Collection Date: 01/09/18 10:10
DateReceived: 01/11/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.6	s.u.	H	0.1		A4500-H B	01/11/18 11:20 / SRW
Conductivity @ 25 C	580	umhos/cm		1		A2510 B	01/11/18 11:20 / SRW
Solids, Total Dissolved TDS @ 180 C	318	mg/L		10		A2540 C	01/11/18 13:07 / kmd
INORGANICS							
Chloride	42	mg/L		1		E300.0	01/11/18 16:29 / kmd
METALS, DISSOLVED							
Calcium	61	mg/L		1		E200.7	01/12/18 10:43 / sld
Magnesium	17	mg/L		1		E200.7	01/12/18 10:43 / sld
Sodium	28	mg/L		1		E200.7	01/12/18 10:43 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Lab ID: H18010171-005
Client Sample ID: Pln-0118-05

Report Date: 01/16/18
Collection Date: 01/09/18 10:50
DateReceived: 01/11/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.7	s.u.	H	0.1		A4500-H B	01/11/18 11:22 / SRW
Conductivity @ 25 C	588	umhos/cm		1		A2510 B	01/11/18 11:22 / SRW
Solids, Total Dissolved TDS @ 180 C	320	mg/L		10		A2540 C	01/11/18 13:07 / kmd
INORGANICS							
Chloride	34	mg/L		1		E300.0	01/11/18 16:44 / kmd
METALS, DISSOLVED							
Calcium	59	mg/L		1		E200.7	01/12/18 10:47 / sld
Magnesium	17	mg/L		1		E200.7	01/12/18 10:47 / sld
Sodium	33	mg/L		1		E200.7	01/12/18 10:47 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Lab ID: H18010171-006
Client Sample ID: Pln-0118-06

Report Date: 01/16/18
Collection Date: 01/09/18 11:07
DateReceived: 01/11/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.7	s.u.	H	0.1		A4500-H B	01/11/18 11:24 / SRW
Conductivity @ 25 C	415	umhos/cm		1		A2510 B	01/11/18 11:24 / SRW
Solids, Total Dissolved TDS @ 180 C	232	mg/L		10		A2540 C	01/11/18 13:08 / kmd
INORGANICS							
Chloride	10	mg/L		1		E300.0	01/11/18 16:58 / kmd
METALS, DISSOLVED							
Calcium	46	mg/L		1		E200.7	01/12/18 10:51 / sld
Magnesium	11	mg/L		1		E200.7	01/12/18 10:51 / sld
Sodium	19	mg/L		1		E200.7	01/12/18 10:51 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Lab ID: H18010171-007
Client Sample ID: Pln-0118-07

Report Date: 01/16/18
Collection Date: 01/09/18 11:11
DateReceived: 01/11/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.7	s.u.	H	0.1		A4500-H B	01/11/18 11:26 / SRW
Conductivity @ 25 C	412	umhos/cm		1		A2510 B	01/11/18 11:26 / SRW
Solids, Total Dissolved TDS @ 180 C	231	mg/L		10		A2540 C	01/11/18 13:08 / kmd
INORGANICS							
Chloride	10	mg/L		1		E300.0	01/11/18 17:13 / kmd
METALS, DISSOLVED							
Calcium	46	mg/L		1		E200.7	01/12/18 10:55 / sld
Magnesium	12	mg/L		1		E200.7	01/12/18 10:55 / sld
Sodium	19	mg/L		1		E200.7	01/12/18 10:55 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Lab ID: H18010171-008
Client Sample ID: Pln-0118-08

Report Date: 01/16/18
Collection Date: 01/09/18 11:35
DateReceived: 01/11/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.7	s.u.	H	0.1		A4500-H B	01/11/18 11:28 / SRW
Conductivity @ 25 C	630	umhos/cm		1		A2510 B	01/11/18 11:28 / SRW
Solids, Total Dissolved TDS @ 180 C	338	mg/L		10		A2540 C	01/11/18 13:08 / kmd
INORGANICS							
Chloride	54	mg/L		1		E300.0	01/11/18 17:28 / kmd
METALS, DISSOLVED							
Calcium	64	mg/L		1		E200.7	01/12/18 11:07 / sld
Magnesium	16	mg/L		1		E200.7	01/12/18 11:07 / sld
Sodium	38	mg/L		1		E200.7	01/12/18 11:07 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Lab ID: H18010171-009
Client Sample ID: Pln-0118-09

Report Date: 01/16/18
Collection Date: 01/09/18 11:56
DateReceived: 01/11/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.7	s.u.	H	0.1		A4500-H B	01/11/18 11:33 / SRW
Conductivity @ 25 C	456	umhos/cm		1		A2510 B	01/11/18 11:33 / SRW
Solids, Total Dissolved TDS @ 180 C	248	mg/L		10		A2540 C	01/11/18 13:08 / kmd
INORGANICS							
Chloride	15	mg/L		1		E300.0	01/11/18 17:42 / kmd
METALS, DISSOLVED							
Calcium	49	mg/L		1		E200.7	01/12/18 11:11 / sld
Magnesium	13	mg/L		1		E200.7	01/12/18 11:11 / sld
Sodium	23	mg/L		1		E200.7	01/12/18 11:11 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Lab ID: H18010171-010
Client Sample ID: Pln-0118-10

Report Date: 01/16/18
Collection Date: 01/09/18 12:26
DateReceived: 01/11/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.7	s.u.	H	0.1		A4500-H B	01/11/18 11:35 / SRW
Conductivity @ 25 C	399	umhos/cm		1		A2510 B	01/11/18 11:35 / SRW
Solids, Total Dissolved TDS @ 180 C	225	mg/L		10		A2540 C	01/11/18 13:08 / kmd
INORGANICS							
Chloride	10	mg/L		1		E300.0	01/11/18 19:10 / kmd
METALS, DISSOLVED							
Calcium	45	mg/L		1		E200.7	01/12/18 11:15 / sld
Magnesium	11	mg/L		1		E200.7	01/12/18 11:15 / sld
Sodium	17	mg/L		1		E200.7	01/12/18 11:15 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Lab ID: H18010171-011
Client Sample ID: Pln-0118-11

Report Date: 01/16/18
Collection Date: 01/09/18 13:03
DateReceived: 01/11/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.7	s.u.	H	0.1		A4500-H B	01/11/18 11:37 / SRW
Conductivity @ 25 C	696	umhos/cm		1		A2510 B	01/11/18 11:37 / SRW
Solids, Total Dissolved TDS @ 180 C	384	mg/L		10		A2540 C	01/11/18 13:08 / kmd
INORGANICS							
Chloride	61	mg/L		1		E300.0	01/11/18 19:25 / kmd
METALS, DISSOLVED							
Calcium	76	mg/L		1		E200.7	01/12/18 11:18 / sld
Magnesium	18	mg/L		1		E200.7	01/12/18 11:18 / sld
Sodium	33	mg/L		1		E200.7	01/12/18 11:18 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Lab ID: H18010171-012
Client Sample ID: Pln-0118-12

Report Date: 01/16/18
Collection Date: 01/09/18 13:21
DateReceived: 01/11/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.4	s.u.	H	0.1		A4500-H B	01/11/18 11:39 / SRW
Conductivity @ 25 C	1480	umhos/cm		1		A2510 B	01/11/18 11:39 / SRW
Solids, Total Dissolved TDS @ 180 C	809	mg/L		10		A2540 C	01/11/18 13:09 / kmd
INORGANICS							
Chloride	272	mg/L		1		E300.0	01/11/18 19:39 / kmd
METALS, DISSOLVED							
Calcium	101	mg/L		1		E200.7	01/12/18 11:34 / sld
Magnesium	31	mg/L		1		E200.7	01/12/18 11:34 / sld
Sodium	132	mg/L		1		E200.7	01/12/18 11:34 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Lab ID: H18010171-013
Client Sample ID: Pln-0118-13

Report Date: 01/16/18
Collection Date: 01/09/18 13:43
DateReceived: 01/11/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.4	s.u.	H	0.1		A4500-H B	01/11/18 11:41 / SRW
Conductivity @ 25 C	1470	umhos/cm		1		A2510 B	01/11/18 11:41 / SRW
Solids, Total Dissolved TDS @ 180 C	806	mg/L		10		A2540 C	01/11/18 13:09 / kmd
INORGANICS							
Chloride	290	mg/L		1		E300.0	01/11/18 19:54 / kmd
METALS, DISSOLVED							
Calcium	103	mg/L		1		E200.7	01/12/18 11:38 / sld
Magnesium	33	mg/L		1		E200.7	01/12/18 11:38 / sld
Sodium	123	mg/L		1		E200.7	01/12/18 11:38 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Lab ID: H18010171-014
Client Sample ID: Pln-0118-14

Report Date: 01/16/18
Collection Date: 01/09/18 14:12
DateReceived: 01/11/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.5	s.u.	H	0.1		A4500-H B	01/11/18 11:43 / SRW
Conductivity @ 25 C	1270	umhos/cm		1		A2510 B	01/11/18 11:43 / SRW
Solids, Total Dissolved TDS @ 180 C	675	mg/L		10		A2540 C	01/11/18 13:09 / kmd
INORGANICS							
Chloride	243	mg/L		1		E300.0	01/11/18 20:08 / kmd
METALS, DISSOLVED							
Calcium	83	mg/L		1		E200.7	01/12/18 11:42 / sld
Magnesium	26	mg/L		1		E200.7	01/12/18 11:42 / sld
Sodium	117	mg/L		1		E200.7	01/12/18 11:42 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Lab ID: H18010171-015
Client Sample ID: Pln-0118-15

Report Date: 01/16/18
Collection Date: 01/09/18 14:45
DateReceived: 01/11/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.5	s.u.	H	0.1		A4500-H B	01/11/18 11:47 / SRW
Conductivity @ 25 C	594	umhos/cm		1		A2510 B	01/11/18 11:47 / SRW
Solids, Total Dissolved TDS @ 180 C	340	mg/L		10		A2540 C	01/11/18 13:10 / kmd
INORGANICS							
Chloride	24	mg/L		1		E300.0	01/11/18 20:23 / kmd
METALS, DISSOLVED							
Calcium	68	mg/L		1		E200.7	01/12/18 11:54 / sld
Magnesium	18	mg/L		1		E200.7	01/12/18 11:54 / sld
Sodium	25	mg/L		1		E200.7	01/12/18 11:54 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Lab ID: H18010171-016
Client Sample ID: Pln-0118-16

Report Date: 01/16/18
Collection Date: 01/09/18 15:16
DateReceived: 01/11/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.4	s.u.	H	0.1		A4500-H B	01/11/18 11:49 / SRW
Conductivity @ 25 C	2110	umhos/cm		1		A2510 B	01/11/18 11:49 / SRW
Solids, Total Dissolved TDS @ 180 C	1140	mg/L	D	20		A2540 C	01/11/18 13:10 / kmd
INORGANICS							
Chloride	479	mg/L		1		E300.0	01/11/18 20:38 / kmd
METALS, DISSOLVED							
Calcium	107	mg/L		1		E200.7	01/12/18 11:58 / sld
Magnesium	41	mg/L		1		E200.7	01/12/18 11:58 / sld
Sodium	225	mg/L		1		E200.7	01/12/18 11:58 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
H - Analysis performed past recommended holding time.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation **Report Date:** 01/16/18

Project: Plains DOT GW **Work Order:** H18010171

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2510 B								Analytical Run: PHSC_101-H_180111A		
Lab ID: SC 150		Initial Calibration Verification Standard							01/11/18 08:39	
Conductivity @ 25 C		156	umhos/cm	1.0	104	90	110			
Lab ID: SC 5000		Initial Calibration Verification Standard							01/11/18 08:41	
Conductivity @ 25 C		4960	umhos/cm	1.0	99	90	110			
Lab ID: SC 20000		Initial Calibration Verification Standard							01/11/18 08:43	
Conductivity @ 25 C		19800	umhos/cm	1.0	99	90	110			
Lab ID: CCV - SC 1413		Continuing Calibration Verification Standard							01/11/18 09:10	
Conductivity @ 25 C		1420	umhos/cm	1.0	100	90	110			
Method: A2510 B										Batch: R131597
Lab ID: SC 1000		Laboratory Control Sample				Run: PHSC_101-H_180111A			01/11/18 08:45	
Conductivity @ 25 C		988	umhos/cm	1.0	98	90	110			
Lab ID: H18010171-008ADUP		Sample Duplicate				Run: PHSC_101-H_180111A			01/11/18 11:30	
Conductivity @ 25 C		624	umhos/cm	1.0				0.8	10	
Lab ID: H18010171-014ADUP		Sample Duplicate				Run: PHSC_101-H_180111A			01/11/18 11:45	
Conductivity @ 25 C		1270	umhos/cm	1.0				0.0	10	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW

Report Date: 01/16/18
Work Order: H18010171

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2540 C									Batch: TDS180111A	
Lab ID: MB-1_180111A		Method Blank				Run: ACCU-124 (14410200)_18011			01/11/18 13:04	
Solids, Total Dissolved TDS @ 180 C		ND	mg/L	2						
Lab ID: LCS-2_180111A		Laboratory Control Sample				Run: ACCU-124 (14410200)_18011			01/11/18 13:04	
Solids, Total Dissolved TDS @ 180 C		1980	mg/L	20	99	90	110			
Lab ID: H18010171-005A DUP		Sample Duplicate				Run: ACCU-124 (14410200)_18011			01/11/18 13:07	
Solids, Total Dissolved TDS @ 180 C		317	mg/L	10				0.9	5	
Lab ID: H18010171-015A DUP		Sample Duplicate				Run: ACCU-124 (14410200)_18011			01/11/18 13:10	
Solids, Total Dissolved TDS @ 180 C		342	mg/L	10				0.6	5	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation **Report Date:** 01/16/18

Project: Plains DOT GW **Work Order:** H18010171

Analyte		Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method:	**A4500-H B**								Analytical Run: PHSC_101-H_180111A		
Lab ID:	**pH 7**	Initial Calibration Verification Standard								01/11/18 08:36	
pH			7.0	s.u.	0.1	100	98	102			
Lab ID:	**CCV - pH 7**	Continuing Calibration Verification Standard								01/11/18 09:07	
pH			7.0	s.u.	0.1	100	98	102			
Method:	**A4500-H B**									Batch: R131597	
Lab ID:	**H18010171-008ADUP**	Sample Duplicate					Run: PHSC_101-H_180111A			01/11/18 11:30	
pH			7.7	s.u.	0.1				0.1	3	
Lab ID:	**H18010171-014ADUP**	Sample Duplicate					Run: PHSC_101-H_180111A			01/11/18 11:45	
pH			7.5	s.u.	0.1				0.3	3	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation **Report Date:** 01/16/18

Project: Plains DOT GW **Work Order:** H18010171

Analyte		Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method:	**E200.7**									Analytical Run: ICP2-HE_180112A	
Lab ID:	**ICV**	3	Initial Calibration Verification Standard								01/12/18 09:20
Calcium			39.2	mg/L	1.0	98	95	105			
Magnesium			39.2	mg/L	1.0	98	95	105			
Sodium			38.6	mg/L	1.0	97	95	105			
Lab ID:	**CCV-1**	3	Continuing Calibration Verification Standard								01/12/18 09:24
Calcium			24.7	mg/L	1.0	99	95	105			
Magnesium			24.3	mg/L	1.0	97	95	105			
Sodium			24.8	mg/L	1.0	99	95	105			
Lab ID:	**ICSA**	3	Interference Check Sample A								01/12/18 09:36
Calcium			459	mg/L	1.0	92	80	120			
Magnesium			510	mg/L	1.0	102	80	120			
Sodium			0.0349	mg/L	1.0		0	0			
Lab ID:	**ICSAB**	3	Interference Check Sample AB								01/12/18 09:40
Calcium			464	mg/L	1.0	93	80	120			
Magnesium			516	mg/L	1.0	103	80	120			
Sodium			20.0	mg/L	1.0	100	80	120			
Lab ID:	**CCV**	3	Continuing Calibration Verification Standard								01/12/18 10:11
Calcium			24.5	mg/L	1.0	98	90	110			
Magnesium			24.1	mg/L	1.0	96	90	110			
Sodium			24.7	mg/L	1.0	99	90	110			
Lab ID:	**CCV**	3	Continuing Calibration Verification Standard								01/12/18 10:59
Calcium			24.9	mg/L	1.0	100	90	110			
Magnesium			24.6	mg/L	1.0	98	90	110			
Sodium			25.1	mg/L	1.0	100	90	110			
Lab ID:	**CCV**	3	Continuing Calibration Verification Standard								01/12/18 11:46
Calcium			24.8	mg/L	1.0	99	90	110			
Magnesium			24.3	mg/L	1.0	97	90	110			
Sodium			24.6	mg/L	1.0	99	90	110			
Method:	**E200.7**										Batch: R131643
Lab ID:	**MB**	3	Method Blank				Run: ICP2-HE_180112A				01/12/18 09:48
Calcium			0.03	mg/L	0.01						
Magnesium			0.007	mg/L	0.005						
Sodium			ND	mg/L	0.02						
Lab ID:	**LFB**	3	Laboratory Fortified Blank				Run: ICP2-HE_180112A				01/12/18 09:52
Calcium			48.4	mg/L	1.0	97	85	115			
Magnesium			48.6	mg/L	1.0	97	85	115			
Sodium			49.2	mg/L	1.0	98	85	115			
Lab ID:	**H18010171-001BMS2**	3	Sample Matrix Spike				Run: ICP2-HE_180112A				01/12/18 10:27
Calcium			102	mg/L	1.0	96	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW

Report Date: 01/16/18
Work Order: H18010171

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7										Batch: R131643
Lab ID: H18010171-001BMS2	3	Sample Matrix Spike				Run: ICP2-HE_180112A			01/12/18 10:27	
Magnesium		67.5	mg/L	1.0	99	70	130			
Sodium		231	mg/L	1.0	94	70	130			
Lab ID: H18010171-001BMSD	3	Sample Matrix Spike Duplicate				Run: ICP2-HE_180112A			01/12/18 10:31	
Calcium		103	mg/L	1.0	98	70	130	1.0	20	
Magnesium		68.4	mg/L	1.0	100	70	130	1.3	20	
Sodium		231	mg/L	1.0	94	70	130	0.0	20	
Lab ID: H18010171-011BMS2	3	Sample Matrix Spike				Run: ICP2-HE_180112A			01/12/18 11:26	
Calcium		125	mg/L	1.0	97	70	130			
Magnesium		68.5	mg/L	1.0	100	70	130			
Sodium		80.0	mg/L	1.0	93	70	130			
Lab ID: H18010171-011BMSD	3	Sample Matrix Spike Duplicate				Run: ICP2-HE_180112A			01/12/18 11:30	
Calcium		121	mg/L	1.0	91	70	130	2.7	20	
Magnesium		66.3	mg/L	1.0	96	70	130	3.2	20	
Sodium		82.1	mg/L	1.0	97	70	130	2.7	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation **Report Date:** 01/16/18

Project: Plains DOT GW **Work Order:** H18010171

Analyte		Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method:	**E300.0**							Analytical Run: IC METROHM_180111A			
Lab ID:	**ICV**		Initial Calibration Verification Standard							01/11/18 10:25	
Chloride			100	mg/L	1.0	100	90	110			
Lab ID:	**CCV**		Continuing Calibration Verification Standard							01/11/18 14:47	
Chloride			49.9	mg/L	1.0	100	90	110			
Lab ID:	**CCV**		Continuing Calibration Verification Standard							01/11/18 18:26	
Chloride			50.6	mg/L	1.0	101	90	110			
Method:	**E300.0**									Batch: R131636	
Lab ID:	**ICB**		Method Blank				Run: IC METROHM_180111A			01/11/18 10:11	
Chloride			ND	mg/L	0.008						
Lab ID:	**LFB**		Laboratory Fortified Blank				Run: IC METROHM_180111A			01/11/18 10:40	
Chloride			24.1	mg/L	1.0	96	90	110			
Lab ID:	**H18010171-009AMS**		Sample Matrix Spike				Run: IC METROHM_180111A			01/11/18 17:57	
Chloride			40.6	mg/L	1.0	101	90	110			
Lab ID:	**H18010171-009AMSD**		Sample Matrix Spike Duplicate				Run: IC METROHM_180111A			01/11/18 18:12	
Chloride			40.6	mg/L	1.0	101	90	110	0.0	20	
Lab ID:	**H18010172-001AMS**		Sample Matrix Spike				Run: IC METROHM_180111A			01/11/18 21:07	
Chloride			25.9	mg/L	1.0	100	90	110			
Lab ID:	**H18010172-001AMSD**		Sample Matrix Spike Duplicate				Run: IC METROHM_180111A			01/11/18 21:22	
Chloride			26.0	mg/L	1.0	100	90	110	0.4	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

Work Order Receipt Checklist

MT Dept of Transportation

H18010171

Login completed by: Jessica C. Smith
Reviewed by: BL2000\rtooke
Reviewed Date: 1/11/2018

Date Received: 1/11/2018
Received by: TLL
Carrier name: UPS ARS Ground

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		
Water - VOA vials have zero headspace?	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.

Contact and Corrective Action Comments:

Cooler 1 was received at 0.9 °C, Cooler 2 at 0.3 °C. On Ice. Time on metals bottle in sample set Pln-0118-06 is 11:06, and time on bottles in sample set Pln-0118-15 is 1444. Used time from COC. JCS 01/11/2018

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Chain of Custody & Analytical Request Record

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Page 1 of 2

Account Information (Billing information)

Company/Name: Montana Dept. of Transportation
Contact: Enviro Services Att: Brian Goodman
Phone: 406.444.7632
Mailing Address: 2701 Prospect Ave.
City, State, Zip: Helena, MT 59620
Email: bgoodman@MT.gov
Receive Invoice: ☐ Hard Copy ☒ Email
Receive Report: ☐ Hard Copy ☒ Email
Purchase Order:
Quote:
Bottle Order:

Report Information (if different than Account Information)

Company/Name: Hydrometrics, Inc
Contact: Laurie Childs, Doug Parker
Phone: 406.599.7507
Mailing Address: 3022 1/2 Two Crows Ln
City, State, Zip: Arlee, MT 59821
Email: dparker@Hydrometrics.com, childs.laf@gmail.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.: Plains DOT GW
Sampler Name: Laurie Childs
Sampler Phone: 406.599.7507
Sample Origin State: MT
EPA/State Compliance: ☐ 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

Analysis Requested

	Sample Identification (Name, Location, Interval, etc.)	Collection Date	Collection Time	Number of Containers	Matrix (See Codes Above)	Dissolved: Ca, Mg, Sodium	CL-, pH, TDS, Sc	See Attached	RUSH TAT	ELI LAB ID (Laboratory Use Only)
C2 1	Pln - 0118 - 01	1.9.18	841	2	W	X	X			H18010171
C1 2	" - 02		915							
3	" - 03		936							
4	" - 04		1010							
5	" - 05		1050							
6	" - 06		1107							
7	" - 07		1111							
8	" - 08		1135							
C2 9	" - 09		1156							
C1 10	" - 10		1226							

Custody Record MUST be signed	Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
	Laurie Childs	1.18 10:00				
	Relinquished by (print)	Date/Time	Signature	Received by Laboratory (print)	Date/Time	Signature
				Tracy Crash	1/11/18 9:45	Tracy Crash

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)
UPS RSG	1	Y N (C) B	(Y) N	C1 = 0.9 °C	(Y) N	(Y) N	CC Cash Check	$	

C2 = 0.3

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.

ENERGY LAB
Trust our People. Trust our Data.

Chain of Custody & Analytical Request Record

www.energylab.com

Page 2 of 2

Account Information *(Billing information)*

Company/Name	
Contact	
Phone	
Mailing Address	"
City, State, Zip	
Email	
Receive Invoice ☐Hard Copy ☐Email	Receive Report ☐Hard Copy ☐Email
Purchase Order	Quote / Bottle Order

Report Information *(if different than Account Information)*

Company/Name	
Contact	
Phone	
Mailing Address	"
City, State, Zip	
Email	
Receive Report ☐Hard Copy ☐Email	
Special Report/Formats: ☐ LEVEL IV ☐ NELAC ☐ EDD/EDT *(contact laboratory)* ☐ Other_____	

Comments

Project Information

Project Name, PWSID, Permit, etc.	"
Sampler Name	Sampler Phone
Sample Origin State	EPA/State Compliance ☐ 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

Analysis Requested

	Sample Identification (Name, Location, Interval, etc.)	Collection Date	Collection Time	Number of Containers	Matrix (See Codes Above)	Dissolved: Ca, Mg, Sodium	Cl-, PH, TDS, SC								See Attached	RUSH TAT	ELI LAB ID (Laboratory Use Only)
1	Pn-0118-11	1.9.18	1303	2	2	X	X										H18010171
2	" -12		1321														
3	" -13		1343														
4	" -14		1412														
5	" -15		1445														
6	" -16		1516														
7																	
8																	
9																	
10																	

C2

Custody Record MUST be signed	Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
	Lauie Childs	1.9.18 10:00		Tracy Grant	1/11/18 9:45	
	Relinquished by (print)	Date/Time	Signature	Received by Laboratory (print)	Date/Time	Signature

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)*
UPSRSG	4	Y N C B	Y N	0.9°C	Y N	Y N	CC Cash Check_____	$	

CF=0.3

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.

ANALYTICAL SUMMARY REPORT

May 09, 2018

MT Dept of Transportation
PO Box 201001
Helena, MT 59620-1001

Work Order: H18040490

Project Name: Plains DOT GW

Energy Laboratories Inc Helena MT received the following 21 samples for MT Dept of Transportation on 4/27/2018 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H18040490-001	PLN-0418-01	04/25/18 8:00	04/27/18	Aqueous	Metals by ICP/ICPMS, Dissolved Conductivity Anions by Ion Chromatography pH Solids, Total Dissolved
H18040490-002	PLN-0418-02	04/25/18 8:20	04/27/18	Aqueous	Same As Above
H18040490-003	PLN-0418-03	04/25/18 8:50	04/27/18	Aqueous	Same As Above
H18040490-004	PLN-0418-04	04/25/18 9:20	04/27/18	Aqueous	Same As Above
H18040490-005	PLN-0418-05	04/25/18 9:28	04/27/18	Aqueous	Same As Above
H18040490-006	PLN-0418-06	04/25/18 9:51	04/27/18	Aqueous	Same As Above
H18040490-007	PLN-0418-07	04/25/18 10:18	04/27/18	Aqueous	Same As Above
H18040490-008	PLN-0418-08	04/25/18 10:50	04/27/18	Aqueous	Same As Above
H18040490-009	PLN-0418-09	04/25/18 11:25	04/27/18	Aqueous	Same As Above
H18040490-010	PLN-0418-10	04/25/18 11:45	04/27/18	Aqueous	Same As Above
H18040490-011	PLN-0418-11	04/25/18 12:26	04/27/18	Aqueous	Same As Above
H18040490-012	PLN-0418-12	04/25/18 13:06	04/27/18	Aqueous	Same As Above
H18040490-013	PLN-0418-13	04/25/18 13:35	04/27/18	Aqueous	Same As Above
H18040490-014	PLN-0418-14	04/25/18 14:00	04/27/18	Aqueous	Same As Above
H18040490-015	PLN-0418-15	04/25/18 14:35	04/27/18	Aqueous	Same As Above
H18040490-016	PLN-0418-16	04/25/18 15:06	04/27/18	Aqueous	Same As Above
H18040490-017	PLN-0418-17	04/25/18 15:45	04/27/18	Aqueous	Same As Above
H18040490-018	PLN-0418-18	04/25/18 16:21	04/27/18	Aqueous	Same As Above
H18040490-019	PLN-0418-19	04/25/18 17:00	04/27/18	Aqueous	Same As Above
H18040490-020	PLN-0418-20	04/26/18 12:40	04/27/18	Aqueous	Metals by ICP/ICPMS, Dissolved Bacteria, Private Water Supply Conductivity Anions by Ion Chromatography Nitrogen, Nitrite Nitrogen, Nitrate + Nitrite Nitrogen, Nitrate pH Solids, Total Dissolved
H18040490-021	PLN-0418-21	04/26/18 13:35	04/27/18	Aqueous	Same As Above

ANALYTICAL SUMMARY REPORT

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 Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

The results as reported relate only to the item(s) submitted for testing.

If you have any questions regarding these test results, please call.

Report Approved By:

Amanda Carlson
Assistant Laboratory Manager-Helena,MT

Digitally signed by
Amanda B. Carlson
Date: 2018.05.09 12:11:48 -06:00

CLIENT: MT Dept of Transportation
Project: Plains DOT GW
Work Order: H18040490

Report Date: 05/09/18

CASE NARRATIVE

Contacted L. Childs regarding the positive bacteria sample on 4/30/18. wj 4/30/18

This analysis confirmed the presence of coliform bacteria. Such bacterial growth indicates the water supply is or was being contaminated by some outside source. If E-Coli bacteria was found in your water sample, their presence will be indicated as "present" on your analytical report. E-Coli contamination indicates your water supply is or has been in contact with human or animal sewage.

There are many probable reasons why a water supply becomes contaminated. Perhaps you have done work on the pump or repaired a line. Surface drainage has perhaps influenced a shallow well. In any case, the water system should be disinfected to eliminate all bacterial growth.

DISINFECTION PROCEDURE

STEP 1: Calculate the depth of water in the well by subtracting the non-pumping (static) water level in the well from the depth of the well.

STEP 2: Using the table below, mix the amount given with water before adding to the well casing at the rate of 1 cup or less per 5 gallons of clear water; 2 cups to 1 quart in 10 gallons of clear water, to achieve the proper chlorine concentration in the well (approximately 100 mg/L). A high concentration of chlorine may void the warranty on the pump. Check with your supplier if concerned.

Depth of water in Well* (ft)	4"casing	6"casing	8"casing
10 ft	1 cup	1 cup	1 1/2 cups
20 ft	1 cup	1 cup	1 1/2 cups
30 ft	1 cup	2 cups	4 cups
40 ft	1 1/2 cups	2 cups	1 quart
60 ft	2 cups	4 cups	2 quarts
80 ft	2 cups	1 quart	2 quarts
100 ft	3 cups	1 1/2 qts	2 1/2 qts
150 ft	4 cups	2 1/2 qts	4 quarts

*Note: Depth of water in well is measured from the static water level to the bottom of the well.

STEP 3: Remove the well cap. Carefully pour the 5 to 10 gallon chlorine solution down the well. If available, attach a hose to an outside spigot and run the hose into the well casing and begin to circulate the water back down the well. Continue to recycle the water down the well until you can smell chlorinated water from the hose. This will ensure the chlorine solution has been thoroughly mixed in the well.

STEP 4: Once the well is disinfected, you may begin to disinfect the remainder of the system. Start at the farthest tap from the well. Turn on the COLD water tap only. (This process may be used to disinfect the HOT water as well; however, it may require multiple additions of chlorinated water to the well in order to achieve the quantity of chlorinated water required to disinfect the hot water tank). Once you can smell chlorinated water coming from the tap, you may shut it off. Follow this procedure will all cold water taps as you move back towards the well.

STEP 5: Leave the chlorine in the well and pipes for at least 24 hours to allow it to come into contact with the bacteria. DO NOT USE THE WATER DURING THIS PERIOD!

STEP 6: After 12-24 hours, turn on an outside faucet (avoid discharging large volumes of chlorinated water into your septic system) and flush the chlorinated water from the system until the chlorine smell is no longer present. Chlorinated water may be discharged to the ground surface but it must not be allowed to make its way into a surface water.

STEP 7: 72 hours after you are no longer able to detect chlorine in your system, collect a water sample to test for coliform bacteria. This sample should be taken to determine if the disinfection process was effective. If coliform bacteria sample tests prove that the water is still unsatisfactory after disinfection, the disinfection process should be repeated until satisfactory results are obtained. If you are unable to resolve the unsatisfactory samples with a few disinfection efforts, it may indicate that there is a problem that needs to be identified and corrected, i.e. a cracked well casing or a cross connection to the system. Contact a well professional or the Montana Dept. of Environmental Quality @ 406-444-4400 or visit their website: http://www.deq.state.mt.us/wqinfo/swp/index.asp

CLIENT: MT Dept of Transportation
Project: Plains DOT GW
Work Order: H18040490

Report Date: 05/09/18

CASE NARRATIVE

REFERENCE: Montana Department of Environmental Quality, Public Water and Subdivisions Bureau Compliance Section

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Client Sample ID: PLN-0418-20
Sampled By: Laurie Childs
Lab ID: H18040490-020E

Report Date: 05/09/18
Collection Date: 04/26/18 12:40
Received Date: 04/27/18 09:40
Matrix: Aqueous

Analyses	Result	Units	Safe/Unsafe	Qualifier	Method	Analysis Date / By
MICROBIOLOGICAL						
Coliform, Total	Absent	per 100ml	SAFE		A9223 B	04/27/18 12:15 / kmd
Coliform, E-Coli	Absent	per 100ml			A9223 B	04/27/18 12:15 / kmd

Comments: The notation "SAFE" indicates that the water was bacteriologically SAFE when sampled.
The notation "UNSAFE" indicates that the water was bacteriologically UNSAFE when sampled.

Method Reference: E - EPA / MCAWW Methodology A - Standard Methods 22nd Ed.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Client Sample ID: PLN-0418-21
Sampled By: Laurie Childs
Lab ID: H18040490-021E

Report Date: 05/09/18
Collection Date: 04/26/18 13:35
Received Date: 04/27/18 09:40
Matrix: Aqueous

Analyses	Result	Units	Safe/Unsafe	Qualifier	Method	Analysis Date / By
MICROBIOLOGICAL						
Coliform, Total	Present	per 100ml	**UNSAFE**		A9223 B	04/27/18 12:15 / kmd
Coliform, E-Coli	Absent	per 100ml			A9223 B	04/27/18 12:15 / kmd

Comments: The notation "SAFE" indicates that the water was bacteriologically SAFE when sampled.
The notation "UNSAFE" indicates that the water was bacteriologically UNSAFE when sampled.

Method Reference: E - EPA / MCAWW Methodology A - Standard Methods 22nd Ed.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Lab ID: H18040490-001
Client Sample ID: PLN-0418-01

Report Date: 05/09/18
Collection Date: 04/25/18 08:00
Date Received: 04/27/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.5	s.u.	H	0.1		A4500-H B	04/27/18 14:31 / SRW
Conductivity @ 25 C	1000	umhos/cm		1		A2510 B	04/27/18 14:31 / SRW
Solids, Total Dissolved TDS @ 180 C	549	mg/L		10		A2540 C	04/27/18 13:56 / SRW
INORGANICS							
Chloride	167	mg/L		1		E300.0	04/27/18 14:35 / SRW
METALS, DISSOLVED							
Calcium	43	mg/L		1		E200.7	04/30/18 14:21 / PNK
Magnesium	14	mg/L		1		E200.7	04/30/18 14:21 / PNK
Sodium	143	mg/L		1		E200.7	04/30/18 14:21 / PNK

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Lab ID: H18040490-002
Client Sample ID: PLN-0418-02

Report Date: 05/09/18
Collection Date: 04/25/18 08:20
Date Received: 04/27/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.5	s.u.	H	0.1		A4500-H B	04/27/18 14:33 / SRW
Conductivity @ 25 C	665	umhos/cm		1		A2510 B	04/27/18 14:33 / SRW
Solids, Total Dissolved TDS @ 180 C	384	mg/L		10		A2540 C	04/27/18 13:56 / SRW
INORGANICS							
Chloride	77	mg/L		1		E300.0	04/27/18 14:49 / SRW
METALS, DISSOLVED							
Calcium	70	mg/L		1		E200.7	04/30/18 14:36 / PNK
Magnesium	19	mg/L		1		E200.7	04/30/18 14:36 / PNK
Sodium	29	mg/L		1		E200.7	04/30/18 14:36 / PNK

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Lab ID: H18040490-003
Client Sample ID: PLN-0418-03

Report Date: 05/09/18
Collection Date: 04/25/18 08:50
Date Received: 04/27/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.6	s.u.	H	0.1		A4500-H B	04/27/18 14:35 / SRW
Conductivity @ 25 C	592	umhos/cm		1		A2510 B	04/27/18 14:35 / SRW
Solids, Total Dissolved TDS @ 180 C	346	mg/L		10		A2540 C	04/27/18 13:57 / SRW
INORGANICS							
Chloride	55	mg/L		1		E300.0	04/27/18 15:48 / SRW
METALS, DISSOLVED							
Calcium	68	mg/L		1		E200.7	04/30/18 14:47 / PNK
Magnesium	17	mg/L		1		E200.7	04/30/18 14:47 / PNK
Sodium	22	mg/L		1		E200.7	04/30/18 14:47 / PNK

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Lab ID: H18040490-004
Client Sample ID: PLN-0418-04

Report Date: 05/09/18
Collection Date: 04/25/18 09:20
Date Received: 04/27/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.6	s.u.	H	0.1		A4500-H B	04/27/18 14:37 / SRW
Conductivity @ 25 C	689	umhos/cm		1		A2510 B	04/27/18 14:37 / SRW
Solids, Total Dissolved TDS @ 180 C	408	mg/L		10		A2540 C	04/27/18 13:57 / SRW
INORGANICS							
Chloride	64	mg/L		1		E300.0	04/27/18 16:02 / SRW
METALS, DISSOLVED							
Calcium	76	mg/L		1		E200.7	04/30/18 14:51 / PNK
Magnesium	19	mg/L		1		E200.7	04/30/18 14:51 / PNK
Sodium	34	mg/L		1		E200.7	04/30/18 14:51 / PNK

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Lab ID: H18040490-005
Client Sample ID: PLN-0418-05

Report Date: 05/09/18
Collection Date: 04/25/18 09:28
Date Received: 04/27/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.6	s.u.	H	0.1		A4500-H B	04/27/18 14:39 / SRW
Conductivity @ 25 C	689	umhos/cm		1		A2510 B	04/27/18 14:39 / SRW
Solids, Total Dissolved TDS @ 180 C	402	mg/L		10		A2540 C	04/27/18 13:57 / SRW
INORGANICS							
Chloride	64	mg/L		1		E300.0	04/27/18 16:17 / SRW
METALS, DISSOLVED							
Calcium	75	mg/L		1		E200.7	04/30/18 14:54 / PNK
Magnesium	18	mg/L		1		E200.7	04/30/18 14:54 / PNK
Sodium	35	mg/L		1		E200.7	04/30/18 14:54 / PNK

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Lab ID: H18040490-006
Client Sample ID: PLN-0418-06

Report Date: 05/09/18
Collection Date: 04/25/18 09:51
Date Received: 04/27/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.6	s.u.	H	0.1		A4500-H B	04/27/18 14:41 / SRW
Conductivity @ 25 C	626	umhos/cm		1		A2510 B	04/27/18 14:41 / SRW
Solids, Total Dissolved TDS @ 180 C	385	mg/L		10		A2540 C	04/27/18 13:58 / SRW
INORGANICS							
Chloride	29	mg/L		1		E300.0	04/27/18 16:31 / SRW
METALS, DISSOLVED							
Calcium	71	mg/L		1		E200.7	04/30/18 14:58 / PNK
Magnesium	18	mg/L		1		E200.7	04/30/18 14:58 / PNK
Sodium	31	mg/L		1		E200.7	04/30/18 14:58 / PNK

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Lab ID: H18040490-007
Client Sample ID: PLN-0418-07

Report Date: 05/09/18
Collection Date: 04/25/18 10:18
Date Received: 04/27/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.6	s.u.	H	0.1		A4500-H B	04/27/18 14:43 / SRW
Conductivity @ 25 C	583	umhos/cm		1		A2510 B	04/27/18 14:43 / SRW
Solids, Total Dissolved TDS @ 180 C	338	mg/L		10		A2540 C	04/27/18 13:58 / SRW
INORGANICS							
Chloride	48	mg/L		1		E300.0	04/27/18 16:46 / SRW
METALS, DISSOLVED							
Calcium	61	mg/L		1		E200.7	04/30/18 15:02 / PNK
Magnesium	17	mg/L		1		E200.7	04/30/18 15:02 / PNK
Sodium	29	mg/L		1		E200.7	04/30/18 15:02 / PNK

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Lab ID: H18040490-008
Client Sample ID: PLN-0418-08

Report Date: 05/09/18
Collection Date: 04/25/18 10:50
Date Received: 04/27/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.5	s.u.	H	0.1		A4500-H B	04/27/18 14:45 / SRW
Conductivity @ 25 C	1500	umhos/cm		1		A2510 B	04/27/18 14:45 / SRW
Solids, Total Dissolved TDS @ 180 C	851	mg/L		10		A2540 C	04/27/18 13:58 / SRW
INORGANICS							
Chloride	327	mg/L		1		E300.0	04/27/18 17:01 / SRW
METALS, DISSOLVED							
Calcium	86	mg/L		1		E200.7	04/30/18 15:06 / PNK
Magnesium	27	mg/L		1		E200.7	04/30/18 15:06 / PNK
Sodium	168	mg/L		1		E200.7	04/30/18 15:06 / PNK

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Lab ID: H18040490-009
Client Sample ID: PLN-0418-09

Report Date: 05/09/18
Collection Date: 04/25/18 11:25
Date Received: 04/27/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.4	s.u.	H	0.1		A4500-H B	04/27/18 14:48 / SRW
Conductivity @ 25 C	1040	umhos/cm		1		A2510 B	04/27/18 14:48 / SRW
Solids, Total Dissolved TDS @ 180 C	575	mg/L		10		A2540 C	04/27/18 13:58 / SRW
INORGANICS							
Chloride	144	mg/L		1		E300.0	04/27/18 17:15 / SRW
METALS, DISSOLVED							
Calcium	75	mg/L		1		E200.7	04/30/18 15:10 / PNK
Magnesium	23	mg/L		1		E200.7	04/30/18 15:10 / PNK
Sodium	101	mg/L		1		E200.7	04/30/18 15:10 / PNK

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Lab ID: H18040490-010
Client Sample ID: PLN-0418-10

Report Date: 05/09/18
Collection Date: 04/25/18 11:45
Date Received: 04/27/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.5	s.u.	H	0.1		A4500-H B	04/27/18 14:50 / SRW
Conductivity @ 25 C	1230	umhos/cm		1		A2510 B	04/27/18 14:50 / SRW
Solids, Total Dissolved TDS @ 180 C	676	mg/L		10		A2540 C	04/27/18 13:59 / SRW
INORGANICS							
Chloride	217	mg/L		1		E300.0	04/27/18 17:30 / SRW
METALS, DISSOLVED							
Calcium	86	mg/L		1		E200.7	04/30/18 15:13 / PNK
Magnesium	27	mg/L		1		E200.7	04/30/18 15:13 / PNK
Sodium	119	mg/L		1		E200.7	04/30/18 15:13 / PNK

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Lab ID: H18040490-011
Client Sample ID: PLN-0418-11

Report Date: 05/09/18
Collection Date: 04/25/18 12:26
Date Received: 04/27/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.7	s.u.	H	0.1		A4500-H B	04/27/18 14:52 / SRW
Conductivity @ 25 C	946	umhos/cm		1		A2510 B	04/27/18 14:52 / SRW
Solids, Total Dissolved TDS @ 180 C	528	mg/L		10		A2540 C	04/27/18 13:59 / SRW
INORGANICS							
Chloride	146	mg/L		1		E300.0	04/27/18 17:45 / SRW
METALS, DISSOLVED							
Calcium	83	mg/L		1		E200.7	04/30/18 15:36 / PNK
Magnesium	23	mg/L		1		E200.7	04/30/18 15:36 / PNK
Sodium	73	mg/L		1		E200.7	04/30/18 15:36 / PNK

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Lab ID: H18040490-012
Client Sample ID: PLN-0418-12

Report Date: 05/09/18
Collection Date: 04/25/18 13:06
Date Received: 04/27/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.7	s.u.	H	0.1		A4500-H B	04/27/18 14:54 / SRW
Conductivity @ 25 C	390	umhos/cm		1		A2510 B	04/27/18 14:54 / SRW
Solids, Total Dissolved TDS @ 180 C	227	mg/L		10		A2540 C	04/27/18 13:59 / SRW
INORGANICS							
Chloride	10	mg/L		1		E300.0	04/27/18 17:59 / SRW
METALS, DISSOLVED							
Calcium	45	mg/L		1		E200.7	04/30/18 15:40 / PNK
Magnesium	11	mg/L		1		E200.7	04/30/18 15:40 / PNK
Sodium	17	mg/L		1		E200.7	04/30/18 15:40 / PNK

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Lab ID: H18040490-013
Client Sample ID: PLN-0418-13

Report Date: 05/09/18
Collection Date: 04/25/18 13:35
Date Received: 04/27/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.7	s.u.	H	0.1		A4500-H B	04/27/18 14:56 / SRW
Conductivity @ 25 C	453	umhos/cm		1		A2510 B	04/27/18 14:56 / SRW
Solids, Total Dissolved TDS @ 180 C	262	mg/L		10		A2540 C	04/27/18 13:59 / SRW
INORGANICS							
Chloride	13	mg/L		1		E300.0	04/27/18 19:27 / SRW
METALS, DISSOLVED							
Calcium	53	mg/L		1		E200.7	04/30/18 15:43 / PNK
Magnesium	16	mg/L		1		E200.7	04/30/18 15:43 / PNK
Sodium	17	mg/L		1		E200.7	04/30/18 15:43 / PNK

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Lab ID: H18040490-014
Client Sample ID: PLN-0418-14

Report Date: 05/09/18
Collection Date: 04/25/18 14:00
Date Received: 04/27/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.6	s.u.	H	0.1		A4500-H B	04/27/18 14:58 / SRW
Conductivity @ 25 C	532	umhos/cm		1		A2510 B	04/27/18 14:58 / SRW
Solids, Total Dissolved TDS @ 180 C	316	mg/L		10		A2540 C	04/27/18 13:59 / SRW
INORGANICS							
Chloride	20	mg/L		1		E300.0	04/27/18 19:41 / SRW
METALS, DISSOLVED							
Calcium	60	mg/L		1		E200.7	04/30/18 15:47 / PNK
Magnesium	16	mg/L		1		E200.7	04/30/18 15:47 / PNK
Sodium	28	mg/L		1		E200.7	04/30/18 15:47 / PNK

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Lab ID: H18040490-015
Client Sample ID: PLN-0418-15

Report Date: 05/09/18
Collection Date: 04/25/18 14:35
Date Received: 04/27/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.7	s.u.	H	0.1		A4500-H B	04/27/18 15:00 / SRW
Conductivity @ 25 C	420	umhos/cm		1		A2510 B	04/27/18 15:00 / SRW
Solids, Total Dissolved TDS @ 180 C	242	mg/L		10		A2540 C	04/27/18 13:59 / SRW
INORGANICS							
Chloride	13	mg/L		1		E300.0	04/27/18 19:56 / SRW
METALS, DISSOLVED							
Calcium	47	mg/L		1		E200.7	04/30/18 15:51 / PNK
Magnesium	12	mg/L		1		E200.7	04/30/18 15:51 / PNK
Sodium	20	mg/L		1		E200.7	04/30/18 15:51 / PNK

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Lab ID: H18040490-016
Client Sample ID: PLN-0418-16

Report Date: 05/09/18
Collection Date: 04/25/18 15:06
Date Received: 04/27/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.8	s.u.	H	0.1		A4500-H B	04/27/18 15:02 / SRW
Conductivity @ 25 C	501	umhos/cm		1		A2510 B	04/27/18 15:02 / SRW
Solids, Total Dissolved TDS @ 180 C	276	mg/L		10		A2540 C	04/27/18 14:00 / SRW
INORGANICS							
Chloride	29	mg/L		1		E300.0	04/27/18 20:11 / SRW
METALS, DISSOLVED							
Calcium	53	mg/L		1		E200.7	04/30/18 15:55 / PNK
Magnesium	14	mg/L		1		E200.7	04/30/18 15:55 / PNK
Sodium	29	mg/L		1		E200.7	04/30/18 15:55 / PNK

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Lab ID: H18040490-017
Client Sample ID: PLN-0418-17

Report Date: 05/09/18
Collection Date: 04/25/18 15:45
Date Received: 04/27/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.7	s.u.	H	0.1		A4500-H B	04/27/18 15:04 / SRW
Conductivity @ 25 C	475	umhos/cm		1		A2510 B	04/27/18 15:04 / SRW
Solids, Total Dissolved TDS @ 180 C	266	mg/L		10		A2540 C	04/27/18 14:00 / SRW
INORGANICS							
Chloride	21	mg/L		1		E300.0	04/27/18 20:25 / SRW
METALS, DISSOLVED							
Calcium	53	mg/L		1		E200.7	04/30/18 15:58 / PNK
Magnesium	14	mg/L		1		E200.7	04/30/18 15:58 / PNK
Sodium	24	mg/L		1		E200.7	04/30/18 15:58 / PNK

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Lab ID: H18040490-018
Client Sample ID: PLN-0418-18

Report Date: 05/09/18
Collection Date: 04/25/18 16:21
Date Received: 04/27/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.7	s.u.	H	0.1		A4500-H B	04/27/18 15:06 / SRW
Conductivity @ 25 C	515	umhos/cm		1		A2510 B	04/27/18 15:06 / SRW
Solids, Total Dissolved TDS @ 180 C	289	mg/L		10		A2540 C	04/27/18 14:00 / SRW
INORGANICS							
Chloride	30	mg/L		1		E300.0	04/27/18 20:40 / SRW
METALS, DISSOLVED							
Calcium	56	mg/L		1		E200.7	04/30/18 16:02 / PNK
Magnesium	16	mg/L		1		E200.7	04/30/18 16:02 / PNK
Sodium	26	mg/L		1		E200.7	04/30/18 16:02 / PNK

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Lab ID: H18040490-019
Client Sample ID: PLN-0418-19

Report Date: 05/09/18
Collection Date: 04/25/18 17:00
Date Received: 04/27/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.7	s.u.	H	0.1		A4500-H B	04/27/18 15:08 / SRW
Conductivity @ 25 C	591	umhos/cm		1		A2510 B	04/27/18 15:08 / SRW
Solids, Total Dissolved TDS @ 180 C	327	mg/L		10		A2540 C	04/27/18 14:00 / SRW
INORGANICS							
Chloride	40	mg/L		1		E300.0	04/27/18 20:54 / SRW
METALS, DISSOLVED							
Calcium	64	mg/L		1		E200.7	04/30/18 16:06 / PNK
Magnesium	18	mg/L		1		E200.7	04/30/18 16:06 / PNK
Sodium	31	mg/L		1		E200.7	04/30/18 16:06 / PNK

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Lab ID: H18040490-020
Client Sample ID: PLN-0418-20

Report Date: 05/09/18
Collection Date: 04/26/18 12:40
Date Received: 04/27/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.5	s.u.	H	0.1		A4500-H B	04/27/18 15:21 / SRW
Conductivity @ 25 C	623	umhos/cm		1		A2510 B	04/27/18 15:21 / SRW
Solids, Total Dissolved TDS @ 180 C	364	mg/L		10		A2540 C	04/27/18 14:01 / SRW
INORGANICS							
Chloride	10	mg/L		1		E300.0	04/27/18 21:09 / SRW
NUTRIENTS							
Nitrogen, Nitrate as N	0.65	mg/L		0.01		E353.2	05/02/18 15:30 / wjj
Nitrogen, Nitrate+Nitrite as N	0.65	mg/L		0.01		E353.2	05/01/18 10:06 / kmd
Nitrogen, Nitrite as N	ND	mg/L		0.01		E353.2	04/27/18 13:51 / cmm
METALS, DISSOLVED							
Calcium	62	mg/L		1		E200.7	04/30/18 16:17 / PNK
Magnesium	16	mg/L		1		E200.7	04/30/18 16:17 / PNK
Sodium	45	mg/L		1		E200.7	04/30/18 16:17 / PNK

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Lab ID: H18040490-021
Client Sample ID: PLN-0418-21

Report Date: 05/09/18
Collection Date: 04/26/18 13:35
Date Received: 04/27/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.6	s.u.	H	0.1		A4500-H B	04/27/18 15:25 / SRW
Conductivity @ 25 C	428	umhos/cm		1		A2510 B	04/27/18 15:25 / SRW
Solids, Total Dissolved TDS @ 180 C	248	mg/L		10		A2540 C	04/27/18 14:01 / SRW
INORGANICS							
Chloride	3	mg/L		1		E300.0	04/27/18 21:24 / SRW
NUTRIENTS							
Nitrogen, Nitrate as N	ND	mg/L		0.01		E353.2	05/02/18 15:30 / wjj
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.01		E353.2	05/01/18 10:07 / kmd
Nitrogen, Nitrite as N	0.01	mg/L		0.01		E353.2	04/27/18 13:52 / cmm
METALS, DISSOLVED							
Calcium	42	mg/L		1		E200.7	04/30/18 16:33 / PNK
Magnesium	10	mg/L		1		E200.7	04/30/18 16:33 / PNK
Sodium	35	mg/L		1		E200.7	04/30/18 16:33 / PNK

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW

Report Date: 05/09/18
Work Order: H18040490

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2510 B									Analytical Run: PHSC_101-H_180427A	
Lab ID: SC 150		Initial Calibration Verification Standard							04/27/18 08:49	
Conductivity @ 25 C		160	umhos/cm	1.0	107	90	110			
Lab ID: SC 5000		Initial Calibration Verification Standard							04/27/18 08:51	
Conductivity @ 25 C		4950	umhos/cm	1.0	99	90	110			
Lab ID: SC 20000		Initial Calibration Verification Standard							04/27/18 08:53	
Conductivity @ 25 C		19200	umhos/cm	1.0	96	90	110			
Lab ID: CCV - SC 1413		Continuing Calibration Verification Standard							04/27/18 10:22	
Conductivity @ 25 C		1410	umhos/cm	1.0	100	90	110			
Lab ID: CCV - SC 1413		Continuing Calibration Verification Standard							04/27/18 15:15	
Conductivity @ 25 C		1410	umhos/cm	1.0	100	90	110			
Method: A2510 B										Batch: R134290
Lab ID: SC 1000		Laboratory Control Sample				Run: PHSC_101-H_180427A			04/27/18 08:55	
Conductivity @ 25 C		1020	umhos/cm	1.0	102	90	110			
Lab ID: H18040490-019ADUP		Sample Duplicate				Run: PHSC_101-H_180427A			04/27/18 15:11	
Conductivity @ 25 C		591	umhos/cm	1.0				0.1	10	
Lab ID: H18040490-020ADUP		Sample Duplicate				Run: PHSC_101-H_180427A			04/27/18 15:23	
Conductivity @ 25 C		616	umhos/cm	1.0				1.2	10	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW

Report Date: 05/09/18
Work Order: H18040490

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2540 C									Batch: TDS180427A	
Lab ID: MB-1_180427A		Method Blank				Run: ACCU-124 (14410200)_18042			04/27/18 13:53	
Solids, Total Dissolved TDS @ 180 C		ND	mg/L	10						
Lab ID: LCS-2_180427A		Laboratory Control Sample				Run: ACCU-124 (14410200)_18042			04/27/18 13:53	
Solids, Total Dissolved TDS @ 180 C		2020	mg/L	20	101	90	110			
Lab ID: H18040490-006A DUP		Sample Duplicate				Run: ACCU-124 (14410200)_18042			04/27/18 13:58	
Solids, Total Dissolved TDS @ 180 C		382	mg/L	10				0.8	5	
Lab ID: H18040490-016A DUP		Sample Duplicate				Run: ACCU-124 (14410200)_18042			04/27/18 14:00	
Solids, Total Dissolved TDS @ 180 C		276	mg/L	10				0.0	5	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation **Report Date:** 05/09/18

Project: Plains DOT GW **Work Order:** H18040490

Analyte		Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method:	**A4500-H B**								Analytical Run: PHSC_101-H_180427A		
Lab ID:	**pH 7**	Initial Calibration Verification Standard								04/27/18 08:46	
pH			7.0	s.u.	0.1	100	98	102			
Lab ID:	**CCV - pH 7**	Continuing Calibration Verification Standard								04/27/18 10:19	
pH			7.0	s.u.	0.1	100	98	102			
Lab ID:	**CCV - pH 7**	Continuing Calibration Verification Standard								04/27/18 15:13	
pH			7.0	s.u.	0.1	100	98	102			
Method:	**A4500-H B**									Batch: R134290	
Lab ID:	**H18040490-019ADUP**	Sample Duplicate					Run: PHSC_101-H_180427A			04/27/18 15:11	
pH			7.7	s.u.	0.1				0.0	3	
Lab ID:	**H18040490-020ADUP**	Sample Duplicate					Run: PHSC_101-H_180427A			04/27/18 15:23	
pH			7.5	s.u.	0.1				0.0	3	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation **Report Date:** 05/09/18

Project: Plains DOT GW **Work Order:** H18040490

Analyte		Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method:	**E200.7**									Analytical Run: ICP2-HE_180430B	
Lab ID:	**ICV**	3	Initial Calibration Verification Standard								04/30/18 13:05
Calcium			39.2	mg/L	1.0	98	95	105			
Magnesium			39.0	mg/L	1.0	97	95	105			
Sodium			41.0	mg/L	1.0	102	95	105			
Lab ID:	**CCV-1**	3	Continuing Calibration Verification Standard								04/30/18 13:09
Calcium			24.8	mg/L	1.0	99	95	105			
Magnesium			24.7	mg/L	1.0	99	95	105			
Sodium			24.9	mg/L	1.0	99	95	105			
Lab ID:	**ICSA**	3	Interference Check Sample A								04/30/18 13:20
Calcium			451	mg/L	1.0	90	80	120			
Magnesium			492	mg/L	1.0	98	80	120			
Sodium			0.0346	mg/L	1.0		0	0			
Lab ID:	**ICSAB**	3	Interference Check Sample AB								04/30/18 13:24
Calcium			453	mg/L	1.0	91	80	120			
Magnesium			494	mg/L	1.0	99	80	120			
Sodium			20.8	mg/L	1.0	104	80	120			
Lab ID:	**CCV**	3	Continuing Calibration Verification Standard								04/30/18 13:54
Calcium			24.1	mg/L	1.0	96	90	110			
Magnesium			23.8	mg/L	1.0	95	90	110			
Sodium			24.7	mg/L	1.0	99	90	110			
Lab ID:	**CCV**	3	Continuing Calibration Verification Standard								04/30/18 14:39
Calcium			24.0	mg/L	1.0	96	90	110			
Magnesium			23.7	mg/L	1.0	95	90	110			
Sodium			25.1	mg/L	1.0	100	90	110			
Lab ID:	**CCV**	3	Continuing Calibration Verification Standard								04/30/18 15:25
Calcium			24.5	mg/L	1.0	98	90	110			
Magnesium			24.3	mg/L	1.0	97	90	110			
Sodium			25.2	mg/L	1.0	101	90	110			
Lab ID:	**CCV**	3	Continuing Calibration Verification Standard								04/30/18 16:10
Calcium			24.5	mg/L	1.0	98	90	110			
Magnesium			24.3	mg/L	1.0	97	90	110			
Sodium			25.1	mg/L	1.0	100	90	110			
Method:	**E200.7**										Batch: R134373
Lab ID:	**MB**	3	Method Blank				Run: ICP2-HE_180430B				04/30/18 13:32
Calcium			0.06	mg/L	0.01						
Magnesium			ND	mg/L	0.005						
Sodium			ND	mg/L	0.02						
Lab ID:	**LFB**	3	Laboratory Fortified Blank				Run: ICP2-HE_180430B				04/30/18 13:36
Calcium			48.5	mg/L	1.0	97	85	115			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW

Report Date: 05/09/18
Work Order: H18040490

Analyte		Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method:	**E200.7**									Batch: R134373	
Lab ID:	**LFB**	3	Laboratory Fortified Blank				Run: ICP2-HE_180430B			04/30/18 13:36	
Magnesium			48.2	mg/L	1.0	96	85	115			
Sodium			51.6	mg/L	1.0	103	85	115			
Lab ID:	**H18040496-001BMS2**	3	Sample Matrix Spike				Run: ICP2-HE_180430B			04/30/18 14:13	
Calcium			84.2	mg/L	1.0	95	70	130			
Magnesium			58.5	mg/L	1.0	96	70	130			
Sodium			56.4	mg/L	1.0	103	70	130			
Lab ID:	**H18040496-001BMSD**	3	Sample Matrix Spike Duplicate				Run: ICP2-HE_180430B			04/30/18 14:17	
Calcium			85.5	mg/L	1.0	98	70	130	1.6	20	
Magnesium			59.7	mg/L	1.0	98	70	130	2.0	20	
Sodium			59.6	mg/L	1.0	109	70	130	5.4	20	
Lab ID:	**H18040490-001BMS2**	3	Sample Matrix Spike				Run: ICP2-HE_180430B			04/30/18 14:28	
Calcium			91.0	mg/L	1.0	96	70	130			
Magnesium			63.1	mg/L	1.0	97	70	130			
Sodium			194	mg/L	1.0	102	70	130			
Lab ID:	**H18040490-001BMSD**	3	Sample Matrix Spike Duplicate				Run: ICP2-HE_180430B			04/30/18 14:32	
Calcium			90.6	mg/L	1.0	96	70	130	0.4	20	
Magnesium			63.1	mg/L	1.0	97	70	130	0.1	20	
Sodium			196	mg/L	1.0	106	70	130	0.9	20	
Lab ID:	**H18040490-010BMS2**	3	Sample Matrix Spike				Run: ICP2-HE_180430B			04/30/18 15:21	
Calcium			134	mg/L	1.0	96	70	130			
Magnesium			76.2	mg/L	1.0	99	70	130			
Sodium			174	mg/L	1.0	110	70	130			
Lab ID:	**H18040490-010BMSD**	3	Sample Matrix Spike Duplicate				Run: ICP2-HE_180430B			04/30/18 15:32	
Calcium			136	mg/L	1.0	99	70	130	1.2	20	
Magnesium			77.7	mg/L	1.0	102	70	130	1.9	20	
Sodium			169	mg/L	1.0	100	70	130	2.9	20	
Lab ID:	**H18040490-020BMS2**	3	Sample Matrix Spike				Run: ICP2-HE_180430B			04/30/18 16:25	
Calcium			114	mg/L	1.0	102	70	130			
Magnesium			66.2	mg/L	1.0	101	70	130			
Sodium			96.1	mg/L	1.0	103	70	130			
Lab ID:	**H18040490-020BMSD**	3	Sample Matrix Spike Duplicate				Run: ICP2-HE_180430B			04/30/18 16:29	
Calcium			114	mg/L	1.0	104	70	130	0.6	20	
Magnesium			66.8	mg/L	1.0	102	70	130	0.9	20	
Sodium			97.6	mg/L	1.0	106	70	130	1.6	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW

Report Date: 05/09/18
Work Order: H18040490

Analyte		Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method:	**E300.0**									Analytical Run: IC METROHM_180427A	
Lab ID:	**ICV**		Initial Calibration Verification Standard							04/27/18 10:31	
Chloride			102	mg/L	1.0	102	90	110			
Lab ID:	**CCV**		Continuing Calibration Verification Standard							04/27/18 11:00	
Chloride			51.2	mg/L	1.0	102	90	110			
Lab ID:	**CCV**		Continuing Calibration Verification Standard							04/27/18 15:04	
Chloride			51.1	mg/L	1.0	102	90	110			
Lab ID:	**CCV**		Continuing Calibration Verification Standard							04/27/18 18:43	
Chloride			50.8	mg/L	1.0	102	90	110			
Method:	**E300.0**									Batch: R134331	
Lab ID:	**ICB**		Method Blank				Run: IC METROHM_180427A			04/27/18 10:16	
Chloride			ND	mg/L	0.009						
Lab ID:	**LFB**		Laboratory Fortified Blank				Run: IC METROHM_180427A			04/27/18 10:45	
Chloride			25.0	mg/L	1.0	100	90	110			
Lab ID:	**H18040475-001BMS**		Sample Matrix Spike				Run: IC METROHM_180427A			04/27/18 13:40	
Chloride			81.8	mg/L	1.0	100	90	110			
Lab ID:	**H18040475-001BMSD**		Sample Matrix Spike Duplicate				Run: IC METROHM_180427A			04/27/18 13:54	
Chloride			81.8	mg/L	1.0	100	90	110	0.0	20	
Lab ID:	**H18040490-012AMS**		Sample Matrix Spike				Run: IC METROHM_180427A			04/27/18 18:14	
Chloride			36.0	mg/L	1.0	103	90	110			
Lab ID:	**H18040490-012AMSD**		Sample Matrix Spike Duplicate				Run: IC METROHM_180427A			04/27/18 18:28	
Chloride			35.8	mg/L	1.0	102	90	110	0.7	20	
Lab ID:	**H18040491-001AMS**		Sample Matrix Spike				Run: IC METROHM_180427A			04/27/18 21:53	
Chloride			677	mg/L	1.0	103	90	110			
Lab ID:	**H18040491-001AMSD**		Sample Matrix Spike Duplicate				Run: IC METROHM_180427A			04/27/18 22:07	
Chloride			659	mg/L	1.0	99	90	110	2.7	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW

Report Date: 05/09/18
Work Order: H18040490

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E353.2									Analytical Run: FIA203-HE_180427C	
Lab ID: ICV		Initial Calibration Verification Standard							04/27/18 13:42	
Nitrogen, Nitrite as N		1.00	mg/L	0.010	100	90	110			
Method: E353.2									Batch: R134316	
Lab ID: LFB		Laboratory Fortified Blank				Run: FIA203-HE_180427C			04/27/18 13:43	
Nitrogen, Nitrite as N		0.976	mg/L	0.011	98	90	110			
Lab ID: MBLK		Method Blank				Run: FIA203-HE_180427C			04/27/18 13:45	
Nitrogen, Nitrite as N		ND	mg/L	0.008						
Lab ID: H18040476-001BMS		Sample Matrix Spike				Run: FIA203-HE_180427C			04/27/18 13:47	
Nitrogen, Nitrite as N		1.24	mg/L	0.011	97	90	110			
Lab ID: H18040476-001BMSD		Sample Matrix Spike Duplicate				Run: FIA203-HE_180427C			04/27/18 13:48	
Nitrogen, Nitrite as N		1.24	mg/L	0.011	97	90	110	0.2	10	
Method: E353.2									Analytical Run: FIA203-HE_180501A	
Lab ID: ICV		Initial Calibration Verification Standard							05/01/18 09:38	
Nitrogen, Nitrate+Nitrite as N		1.06	mg/L	0.010	106	90	110			
Lab ID: CCV		Continuing Calibration Verification Standard							05/01/18 09:57	
Nitrogen, Nitrate+Nitrite as N		0.515	mg/L	0.010	103	90	110			
Method: E353.2									Batch: R134384	
Lab ID: MBLK		Method Blank				Run: FIA203-HE_180501A			05/01/18 09:39	
Nitrogen, Nitrate+Nitrite as N		ND	mg/L	0.009						
Lab ID: LFB		Laboratory Fortified Blank				Run: FIA203-HE_180501A			05/01/18 09:40	
Nitrogen, Nitrate+Nitrite as N		1.02	mg/L	0.011	102	90	110			
Lab ID: H18040486-001FMS		Sample Matrix Spike				Run: FIA203-HE_180501A			05/01/18 09:59	
Nitrogen, Nitrate+Nitrite as N		1.10	mg/L	0.011	101	90	110			
Lab ID: H18040486-001FMSD		Sample Matrix Spike Duplicate				Run: FIA203-HE_180501A			05/01/18 10:00	
Nitrogen, Nitrate+Nitrite as N		1.10	mg/L	0.011	102	90	110	0.4	10	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

Work Order Receipt Checklist

MT Dept of Transportation

H18040490

Login completed by: Jessica C. Smith
Reviewed by: BL2000\rtooke
Reviewed Date: 5/2/2018

Date Received: 4/27/2018
Received by: TLL
Carrier name: Return-UPS Ground

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		
Water - VOA vials have zero headspace?	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.

Contact and Corrective Action Comments:

Cooler 1 was received at 0.9 °C, Cooler 2 at 0.4 °C, and Cooler 3 at 1.0 °C. On Ice. No time on bottles in sample set PLN-0418-06, and no time on 1L bottle in sample set PLN-0418-19. Used time from COC. JCS 04/27/2018

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Account Information (Billing information)

Company/Name	Montana Dept. of Transportation
Contact	Enviro Services Att: Brian Goodman
Phone	406.444.7632
Mailing Address	2701 Prospect. Ave
City, State, Zip	Helena, MT 59620
Email	bgoodman@MT.gov
Receive Invoice	☐Hard Copy ☐Email
Receive Report	☐Hard Copy ☐Email
Purchase Order	
Quote	
Bottle Order	

Report Information (if different than Account Information)

Company/Name	Hydrometrics, Inc.
Contact	Laurie Childs, Doug Parker
Phone	406.599.7507
Mailing Address	30822 1/2 Two Crows In
City, State, Zip	Arlee, MT 59821
Email	dparker@Hydrometrics.com, Childs.laf@gmai
Receive Report	☐Hard Copy ☒Email

Special Report/Formats: ☐ LEVEL IV ☐ NELAC ☐ EDD/EDT (contact laboratory) ☐ Other_____

Comments

C1 = 0.9
C2 = 0.4
C3 = 1.0
} TB

Project Information

Project Name, PWSID, Permit, etc.	Plains DOT GW
Sampler Name	Laurie Childs
Sampler Phone	406.599.7507
Sample Origin State	MT
EPA/State Compliance	☐ 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)	Dissolved: Ca, Mg, Sodium	Cl⁻, pH, TDS, Sc	See Attached	RUSH TAT	ELI LAB ID (Laboratory Use Only)
C2	1 PIN-0418-01	4.25.18	0800	2	W					H18040490
C2	2 " " -02		0820							
C1	3 " " -03		0850							
C2	4 " " -04		0920							
C2	5 " " -05		0928							
C2	6 " " -06		0951							
C2	7 " " -07		1018							
C1	8 " " -08		1050							
C2	9 " " -09		1125							
C2	10 " " -10		1145							

Custody Record MUST be signed	Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
	Laurie Childs	4.26.18 1500		Tracy Conrad		
	Relinquished by (print)	Date/Time	Signature	Received by Laboratory (print)	Date/Time	Signature
				Tracy Conrad	4/27/18 9:40	Tracy Conrad

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)
UPSRSG	517, 488 522	Y N C B	Y N	°C See comments	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.

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Page 2 of 3

Account Information *(Billing information)*

Company/Name	
Contact	
Phone	
Mailing Address	"
City, State, Zip	
Email	
Receive Invoice ☐Hard Copy ☐Email	Receive Report ☐Hard Copy ☐Email
Purchase Order	Quote / Bottle Order

Report Information *(if different than Account Information)*

Company/Name	
Contact	
Phone	"
Mailing Address	
City, State, Zip	
Email	
Receive Report ☐Hard Copy ☐Email	
Special Report/Formats: ☐ LEVEL IV ☐ NELAC ☐ EDD/EDT *(contact laboratory)* ☐ Other_____	

Comments

C1 = 0.9
C2 = 0.4
C3 = 1.0

Project Information

Project Name, PWSID, Permit, etc.	"
Sampler Name	Sampler Phone
Sample Origin State	EPA/State Compliance ☐ 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)	Dissolved: Ca, Mg, Sodium	Cl⁻, pH, TDS, Sc	Nitrite, Nitrate, Coliform, Nitrate+Nitrite							See Attached	RUSH TAT	ELI LAB ID (Laboratory Use Only)
C3	1 PIN-0418-11	4.25.18	1226	2	W	x	x										H18040490
C3	2 " -12		1306														
C3	3 " -13		1335														
C3	4 " -14		1400														
C3	5 " -15		1435														
C3	6 " -16		1506														
C1	7 " -17		1545														
C1	8 " -18		1621														
C2	9 " -19		1700														
C3	10 " -20	4.26.18	1240	5	W	x	x	x									

Custody Record MUST be signed	Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
	Laurie Childs	4.26.18 15:00				
	Relinquished by (print)	Date/Time	Signature	Received by Laboratory (print)	Date/Time	Signature
				Tracy Christ	4/27/18 9:40	

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)*
USPS	517, 488, 522	Y N C B	Y N	°C See comments	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.

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Account Information (Billing information)

Company/Name	
Contact	
Phone	
Mailing Address	"
City, State, Zip	
Email	
Receive Invoice ☐Hard Copy ☐Email	Receive Report ☐Hard Copy ☐Email
Purchase Order	Quote / Bottle Order

Report Information (if different than Account Information)

Company/Name	
Contact	
Phone	
Mailing Address	"
City, State, Zip	
Email	
Receive Report ☐Hard Copy ☐Email	
Special Report/Formats: ☐ LEVEL IV ☐ NELAC ☐ EDD/EDT (contact laboratory) ☐ Other	

Comments

C1 = 0.9
C2 = 0.4
C3 = 1.0

Project Information

Project Name, PWSID, Permit, etc.	
Sampler Name "	Sampler Phone
Sample Origin State	EPA/State Compliance ☐ 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

Analysis Requested

	Sample Identification (Name, Location, Interval, etc.)	Collection Date	Collection Time	Number of Containers	Matrix (See Codes Above)	Dissolved: Ca, Mg, Sodium	Cl-, pH, TDS, SC	Nitrite, Nitrate	Calcium, Nitrate + Nitrite							See Attached	RUSH TAT	ELI LAB ID (Laboratory Use Only)
C3 1	PIN-0418-21	4.26.18	1335	5	W	x	x	x										H18040490
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

Custody Record MUST be signed	Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
	Laurie Childs	4.26.18 15:00				
	Relinquished by (print)	Date/Time	Signature	Received by Laboratory (print) Tracy Lerach	Date/Time 4/27/18 9:40	Signature

LABORATORY USE ONLY

Shipped By	Cooler ID(s)	Custody Seals	Intact	Receipt Temp °C	Temp Blank	On Ice	Payment Type	Amount $	Receipt Number (cash/check only)
UPSRSG	517, 488, 522	Y N C B	Y N	See comments	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.

ANALYTICAL SUMMARY REPORT

May 21, 2018

MT Dept of Transportation
PO Box 201001
Helena, MT 59620-1001

Work Order: H18050357

Project Name: Plains DOT GW

Energy Laboratories Inc Helena MT received the following 1 sample for MT Dept of Transportation on 5/16/2018 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H18050357-001	PLN-0518-01	05/15/18 12:45	05/16/18	Drinking Water	Bacteria, Private Water Supply

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 Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

The results as reported relate only to the item(s) submitted for testing.

If you have any questions regarding these test results, please call.

Report Approved By: Project Manager - Helena, MT

Digitally signed by
Wanda Johnson
Date: 2018.05.22 07:35:20 -06:00

CLIENT: MT Dept of Transportation
Project: Plains DOT GW
Work Order: H18050357

Report Date: 05/21/18

CASE NARRATIVE

This analysis confirmed the presence of coliform bacteria. Such bacterial growth indicates the water supply is or was being contaminated by some outside source. If E-Coli bacteria was found in your water sample, their presence will be indicated as "present" on your analytical report. E-Coli contamination indicates your water supply is or has been in contact with human or animal sewage.

There are many probable reasons why a water supply becomes contaminated. Perhaps you have done work on the pump or repaired a line. Surface drainage has perhaps influenced a shallow well. In any case, the water system should be disinfected to eliminate all bacterial growth.

DISINFECTION PROCEDURE

STEP 1: Calculate the depth of water in the well by subtracting the non-pumping (static) water level in the well from the depth of the well.

STEP 2: Using the table below, mix the amount given with water before adding to the well casing at the rate of 1 cup or less per 5 gallons of clear water; 2 cups to 1 quart in 10 gallons of clear water, to achieve the proper chlorine concentration in the well (approximately 100 mg/L). A high concentration of chlorine may void the warranty on the pump. Check with your supplier if concerned.

Depth of water in Well* (ft)	4"casing	6"casing	8"casing
10 ft	1 cup	1 cup	1 1/2 cups
20 ft	1 cup	1 cup	1 1/2 cups
30 ft	1 cup	2 cups	4 cups
40 ft	1 1/2 cups	2 cups	1 quart
60 ft	2 cups	4 cups	2 quarts
80 ft	2 cups	1 quart	2 quarts
100 ft	3 cups	1 1/2 qts	2 1/2 qts
150 ft	4 cups	2 1/2 qts	4 quarts

*Note: Depth of water in well is measured from the static water level to the bottom of the well.

STEP 3: Remove the well cap. Carefully pour the 5 to 10 gallon chlorine solution down the well. If available, attach a hose to an outside spigot and run the hose into the well casing and begin to circulate the water back down the well. Continue to recycle the water down the well until you can smell chlorinated water from the hose. This will ensure the chlorine solution has been thoroughly mixed in the well.

STEP 4: Once the well is disinfected, you may begin to disinfect the remainder of the system. Start at the farthest tap from the well. Turn on the COLD water tap only. (This process may be used to disinfect the HOT water as well; however, it may require multiple additions of chlorinated water to the well in order to achieve the quantity of chlorinated water required to disinfect the hot water tank). Once you can smell chlorinated water coming from the tap, you may shut it off. Follow this procedure will all cold water taps as you move back towards the well.

STEP 5: Leave the chlorine in the well and pipes for at least 24 hours to allow it to come into contact with the bacteria. DO NOT USE THE WATER DURING THIS PERIOD!

STEP 6: After 12-24 hours, turn on an outside faucet (avoid discharging large volumes of chlorinated water into your septic system) and flush the chlorinated water from the system until the chlorine smell is no longer present. Chlorinated water may be discharged to the ground surface but it must not be allowed to make its way into a surface water.

STEP 7: 72 hours after you are no longer able to detect chlorine in your system, collect a water sample to test for coliform bacteria. This sample should be taken to determine if the disinfection process was effective. If coliform bacteria sample tests prove that the water is still unsatisfactory after disinfection, the disinfection process should be repeated until satisfactory results are obtained. If you are unable to resolve the unsatisfactory samples with a few disinfection efforts, it may indicate that there is a problem that needs to be identified and corrected, i.e. a cracked well casing or a cross connection to the system. Contact a well professional or the Montana Dept. of Environmental Quality @ 406-444-4400 or visit their website: http://www.deq.state.mt.us/wqinfo/swp/index.asp

REFERENCE: Montana Department of Environmental Quality, Public Water and Subdivisions Bureau Compliance Section

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: Plains DOT GW
Client Sample ID: PLN-0518-01
Sampled By: Laurie Childs
Lab ID: H18050357-001A

Report Date: 05/21/18
Collection Date: 05/15/18 12:45
Received Date: 05/16/18 09:35
Matrix: Drinking Water

Analyses	Result	Units	Safe/Unsafe	Qualifier	Method	Analysis Date / By
MICROBIOLOGICAL						
Coliform, Total	Present	per 100ml	**UNSAFE**		A9223 B	05/16/18 13:55 / kmd
Coliform, E-Coli	Absent	per 100ml			A9223 B	05/16/18 13:55 / kmd

Comments: The notation "SAFE" indicates that the water was bacteriologically SAFE when sampled.
The notation "UNSAFE" indicates that the water was bacteriologically UNSAFE when sampled.

Method Reference: E - EPA / MCAWW Methodology A - Standard Methods 22nd Ed.

Work Order Receipt Checklist

MT Dept of Transportation

H18050357

Login completed by: Jessica C. Smith
Reviewed by: BL2000\wjohnson
Reviewed Date: 5/21/2018

Date Received: 5/16/2018
Received by: TLL
Carrier name: Return-UPS Ground

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:	0.4°C On Ice		
Water - VOA vials have zero headspace?	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.

Contact and Corrective Action Comments:

None

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Chain of Custody & Analytical Request Record

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Page 1 of 1

Account Information (Billing information)

Company/Name	Montana Dept. of Transportation
Contact	Enviro Services Att: Brian Goodman
Phone	406-444-7632
Mailing Address	2701 Prospect Ave.
City, State, Zip	Helena, MT 59620
Email	bgoodman@MT.gov
Receive Invoice	☐Hard Copy ☒Email
Receive Report	☐Hard Copy ☐Email
Purchase Order	
Quote	
Bottle Order	

Report Information (if different than Account Information)

Company/Name	Hydrometrics
Contact	Laurie Childs, Doug Parker
Phone	406-599-7507
Mailing Address	30822 1/2 Two Crows Ln
City, State, Zip	Arlee, MT 59821
Email	dparker@hydrometrics.com, childs.laf@gmail
Receive Report	☐Hard Copy ☐Email

Special Report/Formats: ☐ LEVEL IV ☐ NELAC ☐ EDD/EDT (contact laboratory) ☐ Other_____

Comments

Project Information

Project Name, PWSID, Permit, etc.	Plains DOT GW
Sampler Name	Laurie Childs
Sampler Phone	406-599-7507
Sample Origin State	MT
EPA/State Compliance	☐ 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

Analysis Requested

	Sample Identification (Name, Location, Interval, etc.)	Collection Date	Collection Time	Number of Containers	Matrix (See Codes Above)	Coliform									See Attached	RUSH TAT	ELI LAB ID (Laboratory Use Only)
1	PW-0518-01	5-15-18	1245	1	W	X											H18050357
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Custody Record MUST be signed	Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
	Laurie Childs	5-15-18 15:30				
	Relinquished by (print)	Date/Time	Signature	Received by Laboratory (print)	Date/Time	Signature
				Tracy Conrad	5/16/18 9:35	Tracy Conrad

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)
UPS RSG	498	Y N C B	Y N	0.4 °C	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.

ANALYTICAL SUMMARY REPORT

June 21, 2018

MT Dept of Transportation
PO Box 201001
Helena, MT 59620-1001

Work Order: H18060366

Project Name: MDT Plains GW Mon

Energy Laboratories Inc Helena MT received the following 3 samples for MT Dept of Transportation on 6/15/2018 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H18060366-001	Meridith-1	06/14/18 14:30	06/15/18	Aqueous	Metals by ICP/ICPMS, Acid Soluble Alkalinity Conductivity Hardness Anions by Ion Chromatography Nitrogen, Nitrate + Nitrite pH Solids, Total Dissolved
H18060366-002	Leichtnam-1	06/14/18 14:00	06/15/18	Aqueous	Metals by ICP/ICPMS, Acid Soluble Alkalinity Bacteria, Private Water Supply Conductivity Services Provided by Lab Hardness Anions by Ion Chromatography Nitrogen, Nitrate + Nitrite pH Solids, Total Dissolved
H18060366-003	Weeks-1	06/14/18 13:00	06/15/18	Aqueous	Metals by ICP/ICPMS, Acid Soluble Alkalinity Conductivity Hardness Anions by Ion Chromatography Nitrogen, Nitrate + Nitrite pH Solids, Total Dissolved

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 Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

The results as reported relate only to the item(s) submitted for testing.

If you have any questions regarding these test results, please call.

Report Approved By:

Project Manager - Helena, MT

Digitally signed by
Wanda Johnson
Date: 2018.06.21 16:00:27 -06:00

Understanding Your Test Results

Example Test Result

LABORATORY ANALYTICAL REPORT

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
INORGANICS							
Alkalinity, Total as CaCO3	254	mg/L		1		A2320 B	03/21/06 17:40 / qed
Chloride	27	mg/L		1		E300.0	03/22/06 19:13 / qed
Sulfate	318	mg/L		1		E300.0	03/22/06 19:13 / qed
Fluoride	1.0	mg/L		0.1		E300.0	03/22/06 19:13 / qed
Nitrogen, Nitrate+Nitrite as N	0.24	mg/L		0.05		E300.0	03/22/06 19:13 / qed

The following interpretation is based on public drinking water system standards. These standards only apply to public water systems but the health implications are the same for private well water users.

Definitions:

ND stands for no detection meaning the parameter was not detected in the sample
ppm (parts per million) is often used interchangeably with **mg/L** (milligrams per liter)
RL (reporting limit) is basically the smallest concentration a test can detect
MCL (maximum contaminant level) is a USEPA drinking water standard

Parameter Name	Possible Results	Quick Interp.	Warnings and Suggestions
Alkalinity (Total as $CaCO_3$) The ability of water to compensate for changes in pH. Higher alkalinity means water is less likely to experience big changes in acidity.	**ND or less than 100 (mg/L)**	**Corrosion Potential**	As alkalinity decreases below 100, if pH is lower than 6.5 there is increased potential for corrosion of pipes releasing metals into the water .
	100 to 200 (mg/L)	**Satisfactory**	Sufficient buffer potential to resist changes in pH and generally not significant scaling in pipes.
	200 or more (mg/L)	**Scaling Potential**	Possible scaling in pipes and water heaters.
Aluminum A naturally occurring metal generally found in concentrations between 0.01 and 0.3 mg/L in groundwater. The EPA secondary standard for aluminum is 0.050 to 0.2 mg/L because high concentrations can cause coloring of water.	**ND or less than 0.05 (mg/L)**	**Satisfactory**	No action necessary.
	0.05 or more (mg/L)	**Objectionable**	Standard based on aesthetics not health; if water discoloration is troublesome, consider treatment.
Antimony Antimony is not commonly found in nature; sources of contamination include petroleum refinery discharge, fire retardants, ceramics, electronics and solder.	**ND or less than 0.006 (mg/L)**	**Satisfactory**	Result generally shouldn't change dramatically through time, consider retesting next year if result is 0.005 or more.
	0.006 or more (mg/L)	**Unsatisfactory**	Health risk exists; consider water treatment and/or alternative sources; see fact sheet for more information
Arsenic Groundwater contamination can happen from mining, pesticides and wood preservatives; contamination can also occur naturally.	**ND**	**Satisfactory**	Retesting not necessary unless a change is suspected.
	0 to 0.010 (mg/L)	**Satisfactory**	Ideally, drinking water should contain no detectable arsenic; consider retesting next year if result is 0.008 mg/L or more.
	0.010 or more (mg/L)	**Unsatisfactory**	Health risk exists; consider water treatment and/or alternative drinking water sources; see fact sheet for more information.

Parameter Name	Possible Results	Quick Interp.	Warnings and Suggestions
Barium Found abundantly in nature and is used in the production of many household items; it can enter drinking water through industrial discharge and natural erosion.	**ND or less than 2 (mg/L)**	**Satisfactory**	Result generally shouldn't change dramatically through time, consider retesting next year if result is 1.6 mg/L or more.
	2 or more (mg/L)	**Unsatisfactory**	Health risk exists; consider water treatment and/or alternative drinking water sources; see fact sheet for more information.
Beryllium A naturally occurring metal used in metal refining; coal combustion; and electrical, aerospace and defense industries.	**ND or less than 0.004 (mg/L)**	**Satisfactory**	Result generally shouldn't change dramatically through time, consider retesting next year if result is 0.003 mg/L or more.
	0.004 or more (mg/L)	**Unsatisfactory**	Health risk exists; consider water treatment and/or alternative sources; see fact sheet for more information.
Bicarbonate as HCO_3 Bicarbonate is the principle alkaline constituent in drinking water. See alkalinity.	**Any Value**	**Satisfactory (depending on alkalinity)**	Bicarbonate does not pose a health risk; bicarbonate and carbonate are closely related to alkalinity.
Cadmium A metallic element that can enter drinking water through corrosion of pipes, erosion of natural deposits, metal refining and runoff from waste batteries and paints.	**ND or less than 0.005 (mg/L)**	**Satisfactory**	Result generally shouldn't change dramatically through time, consider retesting next year if result is 0.004 mg/L or more.
	0.005 or more (mg/L)	**Unsatisfactory**	Health risk exists; consider water treatment and/or alternative sources; see fact sheet for more information.
Calcium A naturally occurring metal essential in the human diet and common in groundwater with concentrations ranging from zero up to several hundred mg/L. A major contributor to the hardness of water which can cause scaling problems in pipes and hot water heaters.	**Any Value**	**Satisfactory (depending on hardness)**	Calcium does not pose a health risk; calcium and magnesium together make up the hardness; see hardness.
Carbonate as CO_3 Mineral found in groundwater. See alkalinity.	**Any Value**	**Satisfactory (depending on alkalinity)**	Carbonate does not pose a health risk; carbonate and bicarbonate are closely related to alkalinity; see alkalinity.
Chloride A common natural salt in groundwater. The EPA secondary standard for chloride is 250 mg/L; higher concentrations can cause a salty taste.	**ND or less than 250 (mg/L)**	**Satisfactory**	No action necessary.
	250 or more (mg/L)	**Objectionable**	Standard based on aesthetics not health; if salty taste is troublesome, consider treatment.

Parameter Name	Possible Results	Quick Interp.	Warnings and Suggestions
Chromium A metallic element commonly found in nature; contamination of groundwater can happen through discharge from leather tanning, steel and pulp mills or erosion of natural deposits.	**ND or less than 0.10 (mg/L)**	**Satisfactory**	Result generally shouldn't change dramatically through time, consider retesting next year if result is 0.08 mg/L or more.
	0.10 or more (mg/L)	**Unsatisfactory**	Health risk exists; consider water treatment and/or alternative sources; see fact sheet for more information.
Coliform Bacteria (Total) A type of bacteria which should not be present in groundwater; indicates potential contamination.	**Absent**	**Satisfactory**	Continue testing annually to monitor for contamination.
	Present	**Objectionable**	No direct health threat, but coliforms should not be present in groundwater; see fact sheet for more information.
Coliform Bacteria (*E. coli*) A type of bacteria found in feces of warm blooded animals which indicates fecal pollution. If *E. coli* is present in a sample, the water is unsafe to drink without treatment.	**Absent**	**Satisfactory**	Continue testing annually to monitor for contamination.
	Present	**Unsatisfactory**	Direct health threat; treat water for drinking and cooking; see fact sheet for more information.
Conductivity A measure of how easily electric current will pass through a water sample. This measurement is related to and often used to estimate total dissolved solids. Also used to estimate the tendency of water to corrode metal.	**Any Value**	**Satisfactory**	Conductivity does not pose a health risk; it is related to total dissolved solids and is used in calculating the corrosivity.
Corrosivity (Langelier Index) Corrosive water can mobilize metals (especially lead and copper) from pipes into drinking water and can eventually cause leaks in plumbing. While not a perfect tool, the Langelier Index is a useful guide for assessing the corrosive ability of water.	**Less than -2.5**	**High Corrosion Potential**	Corrosive water can leach metals from minerals in the earth or from pipes and fixtures; treatment and/or testing for metals is recommended.
	-2.5 to -0.5	**Moderate Corrosion Potential**	Corrosive water can leach metals from minerals in the earth or from pipes and fixtures; Consider treatment and/or testing for metals.
	-0.5 to 0.5	**Satisfactory**	Ideal range to minimize corrosion and scaling.
	0.5 to 2.5	**Moderate Scaling Potential**	Moderate potential for scaling in pipes and hot water heaters; consider treatment.
	More than 2.5	**High Scaling Potential**	High potential for scaling in pipes and hot water heaters; consider treatment.
Copper Potential health risks; copper is a metallic element that is rarely found in groundwater, but can be introduced into drinking water by corrosion of pipes.	**ND or less than 1.3 (mg/L)**	**Satisfactory**	Pipe corrosion is a common copper source; if water is corrosive, copper concentration could change through time; consider retesting next year if result is 1.0 mg/L or more. See fact sheet for more information.
	1.3 or more (mg/L)	**Unsatisfactory**	Health risk exists; consider water treatment and/or alternative drinking water sources; see fact sheet for more information.

Parameter Name	Possible Results	Quick Interp.	Warnings and Suggestions
Fluoride A naturally occurring nonmetal which promotes dental health at concentrations between 0.7 and 1.5 mg/L, but can cause health problems at high concentrations.	**ND or less than 0.7 (mg/L)**	**Satisfactory**	Concentrations below 0.7 mg/L are out of the ideal range for protection of tooth enamel.
	0.7 to 1.5 (mg/L)	**Satisfactory**	Ideal range for development and protection of tooth enamel.
	1.5 to 2.0 (mg/L)	**Satisfactory**	Concentrations above 1.5 mg/L are out of the ideal range for protection of tooth enamel.
	2.0 to 4.0 (mg/L)	**Objectionable**	Dental fluorosis or brownish discoloration of teeth can occur; a report by the National Research Council suggests possible health effects at concentrations in this range.
	4.0 or more (mg/L)	**Unsatisfactory**	Health risk exists; consider water treatment and/or alternative sources; see fact sheet for more information.
Hardness (as $CaCO_3$) Primarily caused by compounds of calcium and magnesium in water and can result in scaling in pipes/ water heaters; it also decreases the lather and effectiveness of soaps and detergents.	**ND or less than 60 (mg/L)**	**Corrosion Potential**	Softer water can be more corrosive; see corrosivity.
	61 to 120 (mg/L)	**Satisfactory**	Generally a satisfactory intermediate between corrosion and scaling; see corrosivity.
	121 or more (mg/L)	**Scaling Potential**	Harder water can cause scaling in pipes and hot water heaters; if scaling is troublesome, consider softening.
Iron (Total) Iron is a metallic element found in nature. Aesthetic problems such as staining of clothes and pipes, as well as sediment problems in plumbing are associated with iron.	**ND or less than 0.3 (mg/L)**	**Satisfactory**	No action is necessary
	0.3 or more (mg/L)	**Objectionable**	High iron can cause discoloration of fixtures and/or clothing and can support iron bacteria growth leading to taste and odor problems; if troublesome, consider treatment.
Lead A metallic element that often enters drinking water through corrosion of pipes.	**ND**	**Satisfactory**	If water is corrosive, lead concentration could change through time; see corrosivity.
	0 to 0.015 (mg/L)	**Satisfactory**	Pipe corrosion is a common lead source; if water is corrosive, lead concentration could increase; consider retesting next year if result is 0.012 mg/L or more; see fact sheet for more information.
	0.015 or more (mg/L)	**Unsatisfactory**	Health risk exists; consider water treatment and/or alternative drinking water sources; see fact sheet for more information.
Magnesium A naturally occurring metal important in human diet and common in groundwater; with calcium, magnesium is a major contributor to the hardness of water.	**Any Value**	**Satisfactory (depending on hardness)**	Magnesium does not pose a health risk; calcium and magnesium together make up the hardness; hard water can cause scaling in pipes; see hardness.
Manganese A naturally occurring metal important in the human diet; the EPA secondary standard for manganese is 0.05 mg/L; high concentrations can cause black to brown color, black staining, and a bitter taste.	**ND or less than 0.05 (mg/L)**	**Satisfactory**	No action necessary.
	0.010 or more (mg/L)	**Objectionable**	Standard based on aesthetics not health; if black/brown staining or bitter taste is troublesome, consider treatment.

Parameter Name	Possible Results	Quick Interp.	Warnings and Suggestions
Mercury A metallic element; sources of contamination of drinking water include erosion of natural deposits, discharge from refineries and factories and runoff from landfills and croplands.	**ND or less than 0.002 (mg/L)**	**Satisfactory**	Result generally shouldn't change dramatically through time, consider retesting next year if result is 0.0016 mg/L or more.
	0.002 or more (mg/L)	**Unsatisfactory**	Health risk exists; consider water treatment and/or alternative sources; see fact sheet for more information.
Nitrate + Nitrite as N or Nitrate as N Can occur naturally, from septic tanks/wastewater treatment, or from agricultural practices and causes oxygen deficiency in infants under 6 months of age; nitrate moves easily in groundwater so increasing nitrate levels can be an early warning that other contaminants are moving toward a well.	**ND or less than 1 (mg/L)**	**Satisfactory**	Continue testing annually to monitor for contamination.
	1 to 4 (mg/L)	**Possible Impairment**	Potential pollution exists; continue testing annually to monitor for changes.
	4 to 10 (mg/L)	**Above Normal Natural Levels**	Above normal levels; possible contamination; continue monitoring annually for changes; Monitor more regularly if infants under the age of 1 year are consuming the water.
	10 or more (mg/L)	**Unsatisfactory**	Health risk exists, discontinue use of water for infants under 1 year of age and persons with cardiovascular conditions; see fact sheet for more information.
pH The measure of acidity of water; pH is related to the ability of water to corrode pipes and release metals into water.	**6.5 to 8.5**	**Satisfactory**	pH of groundwater does not generally change rapidly so retesting is not necessary unless a change is suspected.
	Less than 6.5 or More than 8.5	**Objectionable**	pH slightly out of the ideal range is not a direct health threat but can affect corrosivity which can leach metals from minerals in the earth or from pipes; consider a corrosivity test.
Potassium A common salt in groundwater-essential in the human diet; concentrations are typically less than 10 mg/L.	**Any Value**	**Satisfactory**	Tap water concentrations generally range from 0.5 to 8 mg/l; no action is necessary .
Selenium A non-metallic element found in sedimentary rocks; sources of contamination include: discharge from petroleum refineries, erosion of natural deposits, and discharge from mines.	**ND or less than 0.05 (mg/L)**	**Satisfactory**	Result generally shouldn't change dramatically through time, consider retesting next year if result is 0.04 mg/L or more.
	0.05 or more (mg/L)	**Unsatisfactory**	Health risk exists; consider water treatment and/or alternative sources; see fact sheet for more information.
Sodium A common salt in groundwater which can impart a salty taste at concentrations over 250 mg/L; sodium can contribute to hypertension and high levels in drinking water should be noted by people on low sodium diets.	**Any Value**	**Satisfactory**	Sodium in drinking water supplies can range from 0.4 to 1,900 mg/l; sodium intake in drinking water should be considered by people on low sodium diets in association with reducing risk of cardiovascular disease.

Parameter Name	Possible Results	Quick Interp.	Warnings and Suggestions
Sodium Adsorption Ratio (SAR) SAR is the amount of sodium relative to calcium and magnesium in the water; high SAR can damage soil and reduce crop productivity.	**Any Value**	**Depends on conductivity and soil type**	SAR is not relevant for drinking water, but irrigation water with an SAR value above 6 can pose a risk to physical soil characteristics; SAR risk is evaluated based on its relationship to conductivity and the texture of the soil being irrigated; see fact sheet for more information.
Sulfate A common salt in groundwater which can impart a salty taste; high quantities can cause gastrointestinal distress in people unaccustomed to the water.	**ND or less than 250 (mg/L)**	**Satisfactory**	No action necessary.
	250 or more (mg/L)	**Objectionable**	Standard based on aesthetics not health; if salty taste is troublesome, consider treatment.
Thallium A metallic element; sources of contamination include: leaching from ore-processing sites, discharge from electronics, glass and drug factories.	**ND (mg/L)**	**Satisfactory**	No action necessary.
	0.001 to 0.002 (mg/L)	**Satisfactory**	Ideally, drinking water should contain less than 0.001 mg/l of thallium; consider retesting next year if result is 0.001 mg/L.
	0.002 or more (mg/L)	**Unsatisfactory**	Health risk exists; consider water treatment and/or alternative sources; see fact sheet for more information.
Total Dissolved Solids TDS is the sum of all minerals, metals and salts dissolved in water; high quantities can cause gastrointestinal distress in people unaccustomed to the water.	**ND or less than 500 (mg/L)**	**Satisfactory**	Total Dissolved Solids should not change significantly through time; retest if a change is suspected.
	500 or more (mg/L)	**Objectionable**	High total dissolved solids do not generally pose a serious health risk but can cause water to be colored, taste poor, stain, and cause diarrhea in people not accustomed to the water.
Uranium A naturally occurring metal that can be ingested through the air, water and plants. The EPA primary standard is 30 µg/L. Water can be contaminated from natural processes, mining, coal combustion, nuclear power plants and phosphate fertilizers.	**ND or less than 30 (µg/L)**	**Satisfactory**	Ideally, drinking water should not contain any uranium.; consider retesting next year if value is greater than 24 µg/L.
	30 or more (µg/L)	**Unsatisfactory**	Health risk exists; consider water treatment or alternative drinking water sources; see fact sheet for more information.
Zinc A naturally occurring metal essential to the human diet; the EPA secondary standard for zinc is 5 mg/L; high concentrations can cause a metallic taste.	**ND or less than 5 (mg/L)**	**Satisfactory**	No action necessary.
	5 or more (mg/L)	**Objectionable**	Standard based on aesthetics not health; if metallic taste is troublesome; consider treatment.

Applying knowledge to improve water quality
Northern Plains & Mountains Regional Water Program
A Partnership of USDA NIFA & Land Grant Colleges and Universities

W. Adam Sigler and Jim Bauder
Montana State University Extension Water Quality Program
Department of Land Resources and Environmental Sciences

Corrosivity

What is Corrosivity?

Corrosivity is a measure of how aggressive water is at corroding pipes and fixtures. Corrosive water can mobilize lead and copper from pipes into drinking water and can eventually cause leaks in plumbing.

Corrosive potential of water is increased by:

- → **pH** (lower than 6.5 or higher than 8.5)
- → **water flow rate** (faster flow)
- → **water temperature** (higher temp)
- → **dissolved gases** (more dissolved gas)
- → **conductivity** (higher conductivity)
- → **dissolved solids** (high dissolved solids)
- → **certain bacteria** (more bacteria)
- → **suspended solids** (more sediment)
- → **chlorine** (more chlorine)

Determining Corrosivity

One common index of corrosivity is the Langelier Index (LI). The LI is calculated using pH, temperature, total dissolved solids, alkalinity, and total hardness. The LI is a measure of the balance between pH and calcium carbonate ($CaCO_3$). As the LI value becomes more negative, the water is increasingly under-saturated with $CaCO_3$ and therefore has increased corrosion potential. As the LI value becomes more positive, the water is increasingly over-saturated with $CaCO_3$. Over-saturation results in $CaCO_3$ precipitation which can coat and protect pipes from corrosion but can cause scaling in pipes, hot water heaters, and fixtures. While not a perfect analytical tool, the LI serves as a useful guide for assessing corrosive ability of well water.

Langelier Index	Description	General Recommendation
-4	Severe Corrosion	Treatment Recommended/Consider Lead/Copper Test
-3	Moderate Corrosion	Treatment Recommended/Consider Lead/Copper Test
-2	Moderate Corrosion	Treatment May Be Needed/Consider Lead/Copper Test
-1	Mild Corrosion	Treatment May Be Needed/Consider Lead/Copper Test
-0.5	None-Mild Corrosion	Probably No Treatment
0	Near Balanced	No Treatment
0.5	Some Faint Coating	Probably No Treatment
1	Mild Scale Coating	Treatment May Be Needed
2	Mild to Moderate Coating	Treatment May Be Needed
3	Moderate Scale Forming	Treatment Advisable
4	Severe Scale Forming	Treatment Advisable

Adapted from Wilkes University Center For Environmental Quality;
Corrosion, Saturation Index, Balanced Water in Drinking Water Systems

Controlling Corrosion

Corrosiveness may be increased by installing water softeners, aeration devices, increasing hot water temperatures, chlorinating water or improper matching of metal pipes. Corrosion control options include pretreatment systems, installation of non-conductive unions, reducing hot water temperature, and replacing metal piping with CPVC. Pretreatment systems include neutralizing tank filters and caustic liquid treatment. These systems change the pH, hardness, and/or alkalinity to achieve a less corrosive water chemistry.

Additional Resources:

Corrosion ... in Drinking Water Systems; Wilkes University Center for Environmental Quality
http://www.water-research.net/corrosion.htm

Lead and Copper Fact Sheet; MSU Extension Water Quality
http://waterquality.montana.edu/docs/homeowners.shtml (listed under "Drinking Water")

Household Drinking Water Protection and Treatment; MSU Extension Service
http://waterquality.montana.edu/docs/homeowners.shtml (listed under "Drinking Water")

Northern Plains and Mountains Regional Water Program– Drinking Water Initiative
http://region8water.colostate.edu/regional/DrinkingWater/slideshow/projects.shtml

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains GW Mon
Client Sample ID: Leichtnam-1
Sampled By: Brian Goodman
Lab ID: H18060366-002D

Report Date: 06/21/18
Collection Date: 06/14/18 14:00
Received Date: 06/15/18 10:25
Matrix: Aqueous

Analyses	Result	Units	Safe/Unsafe	Qualifier	Method	Analysis Date / By
MICROBIOLOGICAL						
Coliform, Total	Absent	per 100ml	SAFE		A9223 B	06/15/18 16:09 / abc
Coliform, E-Coli	Absent	per 100ml			A9223 B	06/15/18 16:09 / abc

Comments: The notation "SAFE" indicates that the water was bacteriologically SAFE when sampled.
The notation "UNSAFE" indicates that the water was bacteriologically UNSAFE when sampled.

Method Reference: E - EPA / MCAWW Methodology A - Standard Methods 22nd Ed.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains GW Mon
Lab ID: H18060366-001
Client Sample ID: Meridith-1

Report Date: 06/21/18
Collection Date: 06/14/18 14:30
DateReceived: 06/15/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.6	s.u.	H	0.1		A4500-H B	06/15/18 11:27 / SRW
pH Measurement Temp	12.1	°C				A4500-H B	06/15/18 11:27 / SRW
Conductivity @ 25 C	1230	umhos/cm		1		A2510 B	06/15/18 11:27 / SRW
Solids, Total Dissolved TDS @ 180 C	686	mg/L		10		A2540 C	06/15/18 14:14 / SRW
INORGANICS							
Alkalinity, Total as CaCO3	210	mg/L		4		A2320 B	06/18/18 11:51 / SRW
Bicarbonate as HCO3	250	mg/L		4		A2320 B	06/18/18 11:51 / SRW
Carbonate as CO3	ND	mg/L		4		A2320 B	06/18/18 11:51 / SRW
Chloride	229	mg/L		1		E300.0	06/15/18 16:34 / SRW
Sulfate	19	mg/L		1		E300.0	06/15/18 16:34 / SRW
Fluoride	ND	mg/L		0.1	4	E300.0	06/15/18 16:34 / SRW
Hardness as CaCO3	309	mg/L		1		A2340 B	06/18/18 09:56 / SRW
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	3.70	mg/L	D	0.05		E353.2	06/18/18 13:49 / cmm
METALS, ACID-SOLUBLE							
Arsenic	ND	mg/L		0.005	0.01	E200.8	06/19/18 13:39 / sld
Calcium	80	mg/L		1		E200.7	06/18/18 09:56 / sld
Iron	0.01	mg/L		0.01		E200.8	06/19/18 13:39 / sld
Lead	ND	mg/L		0.001	0.015	E200.8	06/19/18 13:39 / sld
Magnesium	27	mg/L		1		E200.7	06/18/18 09:56 / sld
Manganese	ND	mg/L		0.005		E200.8	06/19/18 13:39 / sld
Potassium	3	mg/L		1		E200.7	06/18/18 09:56 / sld
Sodium	120	mg/L		1		E200.7	06/18/18 09:56 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
H - Analysis performed past recommended holding time.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains GW Mon
Lab ID: H18060366-002
Client Sample ID: Leichtnam-1

Report Date: 06/21/18
Collection Date: 06/14/18 14:00
DateReceived: 06/15/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.6	s.u.	H	0.1		A4500-H B	06/15/18 11:29 / SRW
pH Measurement Temp	10.9	°C				A4500-H B	06/15/18 11:29 / SRW
Conductivity @ 25 C	361	umhos/cm		1		A2510 B	06/15/18 11:29 / SRW
Solids, Total Dissolved TDS @ 180 C	209	mg/L		10		A2540 C	06/15/18 14:14 / SRW
INORGANICS							
Alkalinity, Total as CaCO3	150	mg/L		4		A2320 B	06/18/18 11:59 / SRW
Bicarbonate as HCO3	180	mg/L		4		A2320 B	06/18/18 11:59 / SRW
Carbonate as CO3	ND	mg/L		4		A2320 B	06/18/18 11:59 / SRW
Chloride	7	mg/L		1		E300.0	06/15/18 16:49 / SRW
Sulfate	10	mg/L		1		E300.0	06/15/18 16:49 / SRW
Fluoride	0.3	mg/L		0.1	4	E300.0	06/15/18 16:49 / SRW
Hardness as CaCO3	142	mg/L		1		A2340 B	06/18/18 10:19 / SRW
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	1.95	mg/L		0.01		E353.2	06/18/18 11:03 / cmm
METALS, ACID-SOLUBLE							
Arsenic	0.030	mg/L	*	0.005	0.01	E200.8	06/19/18 13:41 / sld
Calcium	42	mg/L		1		E200.7	06/18/18 10:19 / sld
Iron	0.12	mg/L		0.01		E200.7	06/18/18 10:19 / sld
Lead	ND	mg/L		0.001	0.015	E200.8	06/19/18 13:41 / sld
Magnesium	9	mg/L		1		E200.7	06/18/18 10:19 / sld
Manganese	0.194	mg/L		0.005		E200.7	06/18/18 10:19 / sld
Potassium	7	mg/L		1		E200.7	06/18/18 10:19 / sld
Sodium	14	mg/L		1		E200.7	06/18/18 10:19 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
* - The result exceeds the MCL.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
H - Analysis performed past recommended holding time.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains GW Mon
Lab ID: H18060366-003
Client Sample ID: Weeks-1

Report Date: 06/21/18
Collection Date: 06/14/18 13:00
DateReceived: 06/15/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.6	s.u.	H	0.1		A4500-H B	06/15/18 11:31 / SRW
pH Measurement Temp	11.6	°C				A4500-H B	06/15/18 11:31 / SRW
Conductivity @ 25 C	557	umhos/cm		1		A2510 B	06/15/18 11:31 / SRW
Solids, Total Dissolved TDS @ 180 C	321	mg/L		10		A2540 C	06/15/18 14:14 / SRW
INORGANICS							
Alkalinity, Total as CaCO3	260	mg/L		4		A2320 B	06/18/18 12:05 / SRW
Bicarbonate as HCO3	320	mg/L		4		A2320 B	06/18/18 12:05 / SRW
Carbonate as CO3	ND	mg/L		4		A2320 B	06/18/18 12:05 / SRW
Chloride	11	mg/L		1		E300.0	06/15/18 18:16 / SRW
Sulfate	12	mg/L		1		E300.0	06/15/18 18:16 / SRW
Fluoride	0.3	mg/L		0.1	4	E300.0	06/15/18 18:16 / SRW
Hardness as CaCO3	204	mg/L		1		A2340 B	06/18/18 10:23 / SRW
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.01		E353.2	06/18/18 11:04 / cmm
METALS, ACID-SOLUBLE							
Arsenic	0.162	mg/L	*	0.005	0.01	E200.8	06/19/18 13:43 / sld
Calcium	58	mg/L		1		E200.7	06/18/18 10:23 / sld
Iron	0.54	mg/L		0.01		E200.7	06/18/18 10:23 / sld
Lead	ND	mg/L		0.001	0.015	E200.8	06/19/18 13:43 / sld
Magnesium	14	mg/L		1		E200.7	06/18/18 10:23 / sld
Manganese	0.218	mg/L		0.005		E200.7	06/18/18 10:23 / sld
Potassium	7	mg/L		1		E200.7	06/18/18 10:23 / sld
Sodium	39	mg/L		1		E200.7	06/18/18 10:23 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
* - The result exceeds the MCL.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
H - Analysis performed past recommended holding time.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains GW Mon

Report Date: 06/21/18
Work Order: H18060366

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2320 B										Batch: R135635
Lab ID: MBLK		Method Blank				Run: PHSC_101-H_180618A				06/18/18 10:13
Alkalinity, Total as CaCO3		ND	mg/L	2						
Lab ID: LCS		Laboratory Control Sample				Run: PHSC_101-H_180618A				06/18/18 10:19
Alkalinity, Total as CaCO3		580	mg/L	4.0	97	90	110			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains GW Mon

Report Date: 06/21/18
Work Order: H18060366

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2510 B									Analytical Run: PHSC_101-H_180615A	
Lab ID: SC 150		Initial Calibration Verification Standard							06/15/18 08:52	
Conductivity @ 25 C		151	umhos/cm	1.0	101	90	110			
Lab ID: SC 5000		Initial Calibration Verification Standard							06/15/18 08:54	
Conductivity @ 25 C		4840	umhos/cm	1.0	97	90	110			
Lab ID: SC 20000		Initial Calibration Verification Standard							06/15/18 08:57	
Conductivity @ 25 C		18900	umhos/cm	1.0	95	90	110			
Method: A2510 B										Batch: R135588
Lab ID: SC 1000		Laboratory Control Sample				Run: PHSC_101-H_180615A			06/15/18 08:59	
Conductivity @ 25 C		985	umhos/cm	1.0	99	90	110			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains GW Mon

Report Date: 06/21/18
Work Order: H18060366

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2540 C									Batch: TDS180615A	
Lab ID: MB-1_180615A		Method Blank				Run: ACCU-124 (14410200)_18061			06/15/18 13:38	
Solids, Total Dissolved TDS @ 180 C		ND	mg/L	10						
Lab ID: LCS-2_180615A		Laboratory Control Sample				Run: ACCU-124 (14410200)_18061			06/15/18 13:38	
Solids, Total Dissolved TDS @ 180 C		2000	mg/L	20	100	90	110			
Lab ID: H18060368-001A DUP		Sample Duplicate				Run: ACCU-124 (14410200)_18061			06/15/18 13:38	
Solids, Total Dissolved TDS @ 180 C		542	mg/L	10				0.4	5	
Lab ID: H18060368-011A DUP		Sample Duplicate				Run: ACCU-124 (14410200)_18061			06/15/18 13:40	
Solids, Total Dissolved TDS @ 180 C		212	mg/L	10				1.9	5	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains GW Mon

Report Date: 06/21/18
Work Order: H18060366

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500-H B									Analytical Run: PHSC_101-H_180615A	
Lab ID: pH 7	2	Initial Calibration Verification Standard							06/15/18 08:47	
pH		7.0	s.u.	0.1	99	98	102			
pH Measurement Temp		21.3	°C			0	0			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Report Date: 06/21/18
Project: MDT Plains GW Mon
Work Order: H18060366

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7									Analytical Run: ICP2-HE_180618A	
Lab ID: ICV	6	Initial Calibration Verification Standard							06/18/18 09:22	
Calcium		40.9	mg/L	1.0	102	95	105			
Iron		4.07	mg/L	0.020	102	95	105			
Magnesium		40.5	mg/L	1.0	101	95	105			
Manganese		4.01	mg/L	0.010	100	95	105			
Potassium		41.3	mg/L	1.0	103	95	105			
Sodium		41.0	mg/L	1.0	103	95	105			
Lab ID: CCV-1	6	Continuing Calibration Verification Standard							06/18/18 09:26	
Calcium		26.1	mg/L	1.0	104	95	105			
Iron		2.56	mg/L	0.020	102	95	105			
Magnesium		25.7	mg/L	1.0	103	95	105			
Manganese		2.50	mg/L	0.010	100	95	105			
Potassium		24.1	mg/L	1.0	97	95	105			
Sodium		23.9	mg/L	1.0	96	95	105			
Lab ID: ICSA	6	Interference Check Sample A							06/18/18 09:37	
Calcium		502	mg/L	1.0	100	80	120			
Iron		194	mg/L	0.020	97	80	120			
Magnesium		555	mg/L	1.0	111	80	120			
Manganese		-0.00490	mg/L	0.010		0	0			
Potassium		-0.0442	mg/L	1.0		0	0			
Sodium		0.00802	mg/L	1.0		0	0			
Lab ID: ICSAB	6	Interference Check Sample AB							06/18/18 09:41	
Calcium		501	mg/L	1.0	100	80	120			
Iron		194	mg/L	0.020	97	80	120			
Magnesium		554	mg/L	1.0	111	80	120			
Manganese		0.489	mg/L	0.010	98	80	120			
Potassium		19.0	mg/L	1.0	95	80	120			
Sodium		18.8	mg/L	1.0	94	80	120			
Lab ID: CCV	6	Continuing Calibration Verification Standard							06/18/18 10:11	
Calcium		25.6	mg/L	1.0	102	90	110			
Iron		2.53	mg/L	0.020	101	90	110			
Magnesium		25.2	mg/L	1.0	101	90	110			
Manganese		2.47	mg/L	0.010	99	90	110			
Potassium		24.6	mg/L	1.0	98	90	110			
Sodium		24.4	mg/L	1.0	98	90	110			
Method: E200.7										Batch: R135665
Lab ID: MB	6	Method Blank				Run: ICP2-HE_180618A			06/18/18 09:49	
Calcium		ND	mg/L	0.07						
Iron		ND	mg/L	0.01						
Magnesium		0.02	mg/L	0.01						
Manganese		ND	mg/L	0.002						

Qualifiers:

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ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains GW Mon

Report Date: 06/21/18
Work Order: H18060366

Analyte		Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method:	**E200.7**										Batch: R135665
Lab ID:	**MB**	6	Method Blank				Run: ICP2-HE_180618A				06/18/18 09:49
Potassium			ND	mg/L	0.06						
Sodium			ND	mg/L	0.02						
Lab ID:	**LFB**	6	Laboratory Fortified Blank				Run: ICP2-HE_180618A				06/18/18 09:53
Calcium			50.0	mg/L	1.0	100	85	115			
Iron			5.01	mg/L	0.020	100	85	115			
Magnesium			49.7	mg/L	1.0	99	85	115			
Manganese			4.93	mg/L	0.010	99	85	115			
Potassium			50.2	mg/L	1.0	100	85	115			
Sodium			49.9	mg/L	1.0	100	85	115			
Lab ID:	**H18060366-001BMS2**	6	Sample Matrix Spike				Run: ICP2-HE_180618A				06/18/18 10:04
Calcium			129	mg/L	1.0	98	70	130			
Iron			5.11	mg/L	0.020	102	70	130			
Magnesium			77.7	mg/L	1.0	102	70	130			
Manganese			5.02	mg/L	0.0016	100	70	130			
Potassium			55.1	mg/L	1.0	104	70	130			
Sodium			168	mg/L	1.0	97	70	130			
Lab ID:	**H18060366-001BMSD**	6	Sample Matrix Spike Duplicate				Run: ICP2-HE_180618A				06/18/18 10:08
Calcium			129	mg/L	1.0	98	70	130	0.1	20	
Iron			5.12	mg/L	0.020	102	70	130	0.3	20	
Magnesium			77.9	mg/L	1.0	103	70	130	0.3	20	
Manganese			5.04	mg/L	0.0016	101	70	130	0.4	20	
Potassium			56.1	mg/L	1.0	106	70	130	1.7	20	
Sodium			169	mg/L	1.0	99	70	130	0.4	20	
Lab ID:	**H18060368-001BMS2**	6	Sample Matrix Spike				Run: ICP2-HE_180618A				06/18/18 10:38
Calcium			131	mg/L	1.0	107	70	130			
Iron			6.34	mg/L	0.020	106	70	130			
Magnesium			107	mg/L	1.0	111	70	130			
Manganese			5.24	mg/L	0.0016	104	70	130			
Potassium			52.8	mg/L	1.0	99	70	130			
Sodium			63.5	mg/L	1.0	97	70	130			
Lab ID:	**H18060368-001BMSD**	6	Sample Matrix Spike Duplicate				Run: ICP2-HE_180618A				06/18/18 10:42
Calcium			131	mg/L	1.0	108	70	130	0.3	20	
Iron			6.37	mg/L	0.020	106	70	130	0.4	20	
Magnesium			108	mg/L	1.0	112	70	130	0.4	20	
Manganese			5.25	mg/L	0.0016	105	70	130	0.3	20	
Potassium			52.8	mg/L	1.0	99	70	130	0.0	20	
Sodium			63.4	mg/L	1.0	97	70	130	0.0	20	

Qualifiers:

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QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation **Report Date:** 06/21/18

Project: MDT Plains GW Mon **Work Order:** H18060366

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8								Analytical Run: ICPMS205-H_180619C		
Lab ID: ICV	4	Initial Calibration Verification Standard								06/19/18 13:18
Arsenic		0.0598	mg/L	0.0050	100	90	110			
Iron		0.296	mg/L	0.020	99	90	110			
Lead		0.0587	mg/L	0.010	98	90	110			
Manganese		0.303	mg/L	0.010	101	90	110			
Lab ID: ICSA	4	Interference Check Sample A								06/19/18 13:20
Arsenic		7.61E-05	mg/L	0.0050						
Iron		99.9	mg/L	0.020	100	70	130			
Lead		2.42E-05	mg/L	0.010						
Manganese		0.000209	mg/L	0.010						
Lab ID: ICSAB	4	Interference Check Sample AB								06/19/18 13:21
Arsenic		0.0104	mg/L	0.0050	104	70	130			
Iron		101	mg/L	0.020	101	70	130			
Lead		9.82E-06	mg/L	0.010		0	0			
Manganese		0.0206	mg/L	0.010	103	70	130			
Lab ID: ICV	4	Initial Calibration Verification Standard								06/19/18 18:16
Arsenic		0.0598	mg/L	0.0050	100	90	110			
Iron		0.298	mg/L	0.020	99	90	110			
Lead		0.0617	mg/L	0.010	103	90	110			
Manganese		0.302	mg/L	0.010	101	90	110			
Lab ID: ICSA	4	Interference Check Sample A								06/19/18 18:17
Arsenic		5.92E-05	mg/L	0.0050						
Iron		102	mg/L	0.020	102	70	130			
Lead		5.90E-05	mg/L	0.010						
Manganese		0.000184	mg/L	0.010						
Lab ID: ICSAB	4	Interference Check Sample AB								06/19/18 18:19
Arsenic		0.0107	mg/L	0.0050	107	70	130			
Iron		102	mg/L	0.020	102	70	130			
Lead		4.22E-05	mg/L	0.010		0	0			
Manganese		0.0207	mg/L	0.010	104	70	130			
Method: E200.8										Batch: R135720
Lab ID: LRB	4	Method Blank				Run: ICPMS205-H_180619C				06/19/18 13:31
Arsenic		ND	mg/L	4E-05						
Iron		ND	mg/L	0.002						
Lead		ND	mg/L	3E-05						
Manganese		ND	mg/L	0.0003						
Lab ID: LFB	4	Laboratory Fortified Blank				Run: ICPMS205-H_180619C				06/19/18 13:33
Arsenic		0.0496	mg/L	0.0050	99	85	115			
Iron		0.147	mg/L	0.020	98	85	115			
Lead		0.0499	mg/L	0.010	100	85	115			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains GW Mon

Report Date: 06/21/18
Work Order: H18060366

Analyte		Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method:	**E200.8**									Batch: R135720	
Lab ID:	**LFB**	4	Laboratory Fortified Blank				Run: ICPMS205-H_180619C			06/19/18 13:33	
Manganese			0.0493	mg/L	0.010	99	85	115			
Lab ID:	**H18060223-001BMS**	4	Sample Matrix Spike				Run: ICPMS205-H_180619C			06/19/18 13:49	
Arsenic			0.0495	mg/L	0.0010	99	70	130			
Iron			0.162	mg/L	0.020	96	70	130			
Lead			0.0499	mg/L	0.0010	99	70	130			
Manganese			0.0552	mg/L	0.0010	98	70	130			
Lab ID:	**H18060223-001BMSD**	4	Sample Matrix Spike Duplicate				Run: ICPMS205-H_180619C			06/19/18 13:51	
Arsenic			0.0486	mg/L	0.0010	97	70	130	1.8	20	
Iron			0.160	mg/L	0.020	95	70	130	0.9	20	
Lead			0.0487	mg/L	0.0010	97	70	130	2.3	20	
Manganese			0.0551	mg/L	0.0010	98	70	130	0.3	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation **Report Date:** 06/21/18

Project: MDT Plains GW Mon **Work Order:** H18060366

Analyte		Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method:	**E300.0**							Analytical Run: IC METROHM_180615A			
Lab ID:	**ICV**	3	Initial Calibration Verification Standard							06/15/18 10:15	
Chloride			100	mg/L	1.0	100	90	110			
Sulfate			397	mg/L	1.0	99	90	110			
Fluoride			48.1	mg/L	0.10	96	90	110			
Lab ID:	**CCV**	3	Continuing Calibration Verification Standard							06/15/18 10:59	
Chloride			48.7	mg/L	1.0	97	90	110			
Sulfate			193	mg/L	1.0	96	90	110			
Fluoride			22.7	mg/L	0.10	91	90	110			
Lab ID:	**CCV**	3	Continuing Calibration Verification Standard							06/15/18 17:33	
Chloride			49.1	mg/L	1.0	98	90	110			
Sulfate			195	mg/L	1.0	97	90	110			
Fluoride			22.9	mg/L	0.10	91	90	110			
Method:	**E300.0**									Batch: R135655	
Lab ID:	**ICB**	3	Method Blank				Run: IC METROHM_180615A			06/15/18 10:01	
Chloride			ND	mg/L	0.009						
Sulfate			ND	mg/L	0.01						
Fluoride			ND	mg/L	0.009						
Lab ID:	**LFB**	3	Laboratory Fortified Blank				Run: IC METROHM_180615A			06/15/18 10:30	
Chloride			24.4	mg/L	1.0	97	90	110			
Sulfate			97.2	mg/L	1.0	97	90	110			
Fluoride			11.7	mg/L	0.10	94	90	110			
Lab ID:	**H18060366-002AMS**	3	Sample Matrix Spike				Run: IC METROHM_180615A			06/15/18 17:03	
Chloride			33.1	mg/L	1.0	104	90	110			
Sulfate			113	mg/L	1.0	102	90	110			
Fluoride			12.6	mg/L	0.10	98	90	110			
Lab ID:	**H18060366-002AMSD**	3	Sample Matrix Spike Duplicate				Run: IC METROHM_180615A			06/15/18 17:18	
Chloride			32.8	mg/L	1.0	103	90	110	0.9	20	
Sulfate			111	mg/L	1.0	101	90	110	1.1	20	
Fluoride			12.4	mg/L	0.10	97	90	110	0.9	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains GW Mon

Report Date: 06/21/18
Work Order: H18060366

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E353.2									Analytical Run: FIA203-HE_180618A	
Lab ID: ICV		Initial Calibration Verification Standard							06/18/18 09:10	
Nitrogen, Nitrate+Nitrite as N		1.04	mg/L	0.010	104	90	110			
Lab ID: CCV		Continuing Calibration Verification Standard							06/18/18 10:06	
Nitrogen, Nitrate+Nitrite as N		0.550	mg/L	0.010	110	90	110			
Lab ID: CCV		Continuing Calibration Verification Standard							06/18/18 10:47	
Nitrogen, Nitrate+Nitrite as N		0.498	mg/L	0.010	100	90	110			
Lab ID: CCV		Continuing Calibration Verification Standard							06/18/18 13:37	
Nitrogen, Nitrate+Nitrite as N		0.473	mg/L	0.010	95	90	110			
Method: E353.2									Batch: R135661	
Lab ID: MBLK		Method Blank				Run: FIA203-HE_180618A			06/18/18 09:11	
Nitrogen, Nitrate+Nitrite as N		ND	mg/L	0.009						
Lab ID: LFB		Laboratory Fortified Blank				Run: FIA203-HE_180618A			06/18/18 09:12	
Nitrogen, Nitrate+Nitrite as N		1.05	mg/L	0.011	105	90	110			
Lab ID: H18060141-009CDUP		Sample Duplicate				Run: FIA203-HE_180618A			06/18/18 09:15	
Nitrogen, Nitrate+Nitrite as N		0.0271	mg/L	0.010				12	10	R
Lab ID: LFB		Laboratory Fortified Blank				Run: FIA203-HE_180618A			06/18/18 10:50	
Nitrogen, Nitrate+Nitrite as N		1.05	mg/L	0.011	105	90	110			
Lab ID: H18060367-001DMS		Sample Matrix Spike				Run: FIA203-HE_180618A			06/18/18 11:09	
Nitrogen, Nitrate+Nitrite as N		1.10	mg/L	0.011	110	90	110			
Lab ID: H18060367-001DMSD		Sample Matrix Spike Duplicate				Run: FIA203-HE_180618A			06/18/18 11:10	
Nitrogen, Nitrate+Nitrite as N		1.07	mg/L	0.011	107	90	110	1.9	10	
Lab ID: H18060384-001AMS		Sample Matrix Spike				Run: FIA203-HE_180618A			06/18/18 13:39	
Nitrogen, Nitrate+Nitrite as N		0.917	mg/L	0.010	92	90	110			
Lab ID: H18060384-001AMSD		Sample Matrix Spike Duplicate				Run: FIA203-HE_180618A			06/18/18 13:40	
Nitrogen, Nitrate+Nitrite as N		0.935	mg/L	0.010	94	90	110	2.0	10	

Qualifiers:

RL - Analyte reporting limit.
ND - Not detected at the reporting limit.
R - RPD exceeds advisory limit.

Work Order Receipt Checklist

MT Dept of Transportation

H18060366

Login completed by: Jessica C. Smith
Reviewed by: BL2000\rtooke
Reviewed Date: 6/18/2018

Date Received: 6/15/2018
Received by: RAT
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:	1.0°C On Ice		
Water - VOA vials have zero headspace?	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.

Contact and Corrective Action Comments:

Bacteria bottle was labeled Leichtam but the COC inidicated the bacteria was for Weeks. Nutrients bottle in sample set Leichtam-1 was received open with cooler ice in the sample. Called client to verify what sample the bacteria was for and to inform them of the contaminated nutrient sample. We are to sub sample from unpreserved bottle for nutrients for Leichtam-1. Nutrients sample Leichtam-1 was sub-sampled and preserved to pH <2 with 2 mL of sulfuric acid per 250 mL in the laboratory upon receipt. JCS 06/15/218

Trust our People. Trust our Data.

Chain of Custody & Analytical Request Record

www.energylab.com

Account Information (Billing information)

Company/Name	MDT
Contact	Brian Goodman
Phone	459-0210 — 444-7632
Mailing Address	2201 Prospect
City, State, Zip	Helena, MT 59620
Email	bgoodman@mt.gov

Receive Invoice ☐ Hard Copy ☑ Email | Receive Report ☐ Hard Copy ☑ Email

Purchase Order | Quote | Bottle Order

Report Information (if different than Account Information)

Company/Name	MDT
Contact	
Phone	
Mailing Address	
City, State, Zip	
Email	

Receive Report ☐ Hard Copy ☐ Email

Special Report/Formats:

☐ LEVEL IV ☐ NELAC ☐ EDD/EDT (contact laboratory) ☐ Other _____

Comments

Project Information

Project Name, PWSID, Permit, etc.	MDT Plains GW Mon
Sampler Name: Brian G.	Sampler Phone: 459-0210
Sample Origin State: MT	EPA/State Compliance ☑ 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)	Domestic Water	Fe, As, Mn, Pb	Coliform	See Attached	RUSH TAT	ELI LAB ID (Laboratory Use Only)
1	Meridith-1	6-14-18	1430	3	3-W	✓	✓				H180603660
2	Leichtnam-4	↓	1400	3	3-W	✓	✓				
3	Weeks-1	↓	1300	4	4-W	✓	✓	✓			
4											
5											
6											
7											
8											
9											
10											

Custody Record MUST be signed	Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
	Brian J. Goodman	6-15-18 / 1025	BG			
	Relinquished by (print)	Date/Time	Signature	Received by Laboratory (print): Rebecca Dobe	Date/Time: 6/15/18 10:25	Signature: Rebecca Dobe

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	146	Y N C B	Y N	1.0 °C	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.

ANALYTICAL SUMMARY REPORT

July 18, 2018

MT Dept of Transportation
PO Box 201001
Helena, MT 59620-1001

Work Order: H18070256
Project Name: MDT Plains

Energy Laboratories Inc Helena MT received the following 23 samples for MT Dept of Transportation on 7/12/2018 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H18070256-001	PLN-0718-01	07/10/18 7:55	07/12/18	Aqueous	Metals by ICP/ICPMS, Dissolved Conductivity Anions by Ion Chromatography pH Solids, Total Dissolved
H18070256-002	PLN-0718-02	07/10/18 8:15	07/12/18	Aqueous	Same As Above
H18070256-003	PLN-0718-03	07/10/18 8:55	07/12/18	Aqueous	Same As Above
H18070256-004	PLN-0718-04	07/10/18 8:59	07/12/18	Aqueous	Same As Above
H18070256-005	PLN-0718-05	07/10/18 9:20	07/12/18	Aqueous	Same As Above
H18070256-006	PLN-0718-06	07/10/18 9:45	07/12/18	Aqueous	Same As Above
H18070256-007	PLN-0718-07	07/10/18 10:15	07/12/18	Aqueous	Same As Above
H18070256-008	PLN-0718-08	07/10/18 10:50	07/12/18	Aqueous	Same As Above
H18070256-009	PLN-0718-09	07/10/18 11:20	07/12/18	Aqueous	Same As Above
H18070256-010	PLN-0718-10	07/10/18 11:50	07/12/18	Aqueous	Same As Above
H18070256-011	PLN-0718-11	07/10/18 12:15	07/12/18	Aqueous	Same As Above
H18070256-012	PLN-0718-12	07/10/18 13:15	07/12/18	Aqueous	Same As Above
H18070256-013	PLN-0718-13	07/10/18 13:50	07/12/18	Aqueous	Same As Above
H18070256-014	PLN-0718-14	07/10/18 14:25	07/12/18	Aqueous	Same As Above
H18070256-015	PLN-0718-15	07/10/18 15:15	07/12/18	Aqueous	Same As Above
H18070256-016	PLN-0718-16	07/10/18 15:55	07/12/18	Aqueous	Same As Above
H18070256-017	PLN-0718-17	07/10/18 16:30	07/12/18	Aqueous	Same As Above
H18070256-018	PLN-0718-18	07/10/18 17:20	07/12/18	Aqueous	Same As Above
H18070256-019	PLN-0718-19	07/10/18 16:55	07/12/18	Aqueous	Same As Above
H18070256-020	PLN-0718-20	07/10/18 17:50	07/12/18	Aqueous	Same As Above
H18070256-021	PLN-0718- 21	07/10/18 18:25	07/12/18	Aqueous	Same As Above
H18070256-022	PLN-0718-22	07/10/18 18:40	07/12/18	Aqueous	Same As Above
H18070256-023	PLN-0718-23	07/10/18 19:15	07/12/18	Aqueous	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 Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

ANALYTICAL SUMMARY REPORT

The results as reported relate only to the item(s) submitted for testing.

If you have any questions regarding these test results, please call.

Report Approved By:

Amanda Carlson
Assistant Laboratory Manager-Helena,MT

Digitally signed by
Amanda B. Carlson
Date: 2018.07.18 08:20:39 -06:00

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains
Lab ID: H18070256-001
Client Sample ID: PLN-0718-01

Report Date: 07/18/18
Collection Date: 07/10/18 07:55
DateReceived: 07/12/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.4	s.u.	H	0.1		A4500-H B	07/12/18 12:41 / SRW
pH Measurement Temp	12.3	°C				A4500-H B	07/12/18 12:41 / SRW
Conductivity @ 25 C	1480	umhos/cm		1		A2510 B	07/12/18 12:41 / SRW
Solids, Total Dissolved TDS @ 180 C	784	mg/L		10		A2540 C	07/12/18 13:42 / cmm
INORGANICS							
Chloride	302	mg/L		1		E300.0	07/12/18 14:13 / SRW
METALS, DISSOLVED							
Calcium	66	mg/L		1		E200.7	07/13/18 16:31 / sld
Magnesium	23	mg/L		1		E200.7	07/13/18 16:31 / sld
Sodium	193	mg/L		1		E200.7	07/13/18 16:31 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains
Lab ID: H18070256-002
Client Sample ID: PLN-0718-02

Report Date: 07/18/18
Collection Date: 07/10/18 08:15
DateReceived: 07/12/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.6	s.u.	H	0.1		A4500-H B	07/12/18 12:45 / SRW
pH Measurement Temp	11.4	°C				A4500-H B	07/12/18 12:45 / SRW
Conductivity @ 25 C	671	umhos/cm		1		A2510 B	07/12/18 12:45 / SRW
Solids, Total Dissolved TDS @ 180 C	385	mg/L		10		A2540 C	07/12/18 13:42 / cmm
INORGANICS							
Chloride	69	mg/L		1		E300.0	07/12/18 14:28 / SRW
METALS, DISSOLVED							
Calcium	68	mg/L		1		E200.7	07/13/18 16:54 / sld
Magnesium	19	mg/L		1		E200.7	07/13/18 16:54 / sld
Sodium	29	mg/L		1		E200.7	07/13/18 16:54 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains
Lab ID: H18070256-003
Client Sample ID: PLN-0718-03

Report Date: 07/18/18
Collection Date: 07/10/18 08:55
DateReceived: 07/12/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.7	s.u.	H	0.1		A4500-H B	07/12/18 12:47 / SRW
pH Measurement Temp	11.6	°C				A4500-H B	07/12/18 12:47 / SRW
Conductivity @ 25 C	533	umhos/cm		1		A2510 B	07/12/18 12:47 / SRW
Solids, Total Dissolved TDS @ 180 C	298	mg/L		10		A2540 C	07/12/18 13:43 / cmm
INORGANICS							
Chloride	37	mg/L		1		E300.0	07/12/18 15:26 / SRW
METALS, DISSOLVED							
Calcium	58	mg/L		1		E200.7	07/13/18 16:58 / sld
Magnesium	15	mg/L		1		E200.7	07/13/18 16:58 / sld
Sodium	20	mg/L		1		E200.7	07/13/18 16:58 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains
Lab ID: H18070256-004
Client Sample ID: PLN-0718-04

Report Date: 07/18/18
Collection Date: 07/10/18 08:59
DateReceived: 07/12/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.7	s.u.	H	0.1		A4500-H B	07/12/18 12:49 / SRW
pH Measurement Temp	11.8	°C				A4500-H B	07/12/18 12:49 / SRW
Conductivity @ 25 C	532	umhos/cm		1		A2510 B	07/12/18 12:49 / SRW
Solids, Total Dissolved TDS @ 180 C	291	mg/L		10		A2540 C	07/12/18 13:43 / cmm
INORGANICS							
Chloride	37	mg/L		1		E300.0	07/12/18 15:41 / SRW
METALS, DISSOLVED							
Calcium	58	mg/L		1		E200.7	07/13/18 17:02 / sld
Magnesium	15	mg/L		1		E200.7	07/13/18 17:02 / sld
Sodium	19	mg/L		1		E200.7	07/13/18 17:02 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains
Lab ID: H18070256-005
Client Sample ID: PLN-0718-05

Report Date: 07/18/18
Collection Date: 07/10/18 09:20
DateReceived: 07/12/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.5	s.u.	H	0.1		A4500-H B	07/12/18 12:51 / SRW
pH Measurement Temp	12.2	°C				A4500-H B	07/12/18 12:51 / SRW
Conductivity @ 25 C	1070	umhos/cm		1		A2510 B	07/12/18 12:51 / SRW
Solids, Total Dissolved TDS @ 180 C	616	mg/L		10		A2540 C	07/12/18 13:43 / cmm
INORGANICS							
Chloride	126	mg/L		1		E300.0	07/12/18 15:55 / SRW
METALS, DISSOLVED							
Calcium	109	mg/L		1		E200.7	07/13/18 17:06 / sld
Magnesium	27	mg/L		1		E200.7	07/13/18 17:06 / sld
Sodium	57	mg/L		1		E200.7	07/13/18 17:06 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains
Lab ID: H18070256-006
Client Sample ID: PLN-0718-06

Report Date: 07/18/18
Collection Date: 07/10/18 09:45
DateReceived: 07/12/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.5	s.u.	H	0.1		A4500-H B	07/12/18 12:53 / SRW
pH Measurement Temp	12.6	°C				A4500-H B	07/12/18 12:53 / SRW
Conductivity @ 25 C	1080	umhos/cm		1		A2510 B	07/12/18 12:53 / SRW
Solids, Total Dissolved TDS @ 180 C	638	mg/L		10		A2540 C	07/12/18 13:44 / cmm
INORGANICS							
Chloride	143	mg/L		1		E300.0	07/12/18 16:10 / SRW
METALS, DISSOLVED							
Calcium	100	mg/L		1		E200.7	07/13/18 17:10 / sld
Magnesium	28	mg/L		1		E200.7	07/13/18 17:10 / sld
Sodium	65	mg/L		1		E200.7	07/13/18 17:10 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains
Lab ID: H18070256-007
Client Sample ID: PLN-0718-07

Report Date: 07/18/18
Collection Date: 07/10/18 10:15
DateReceived: 07/12/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.5	s.u.	H	0.1		A4500-H B	07/12/18 12:55 / SRW
pH Measurement Temp	13.3	°C				A4500-H B	07/12/18 12:55 / SRW
Conductivity @ 25 C	762	umhos/cm		1		A2510 B	07/12/18 12:55 / SRW
Solids, Total Dissolved TDS @ 180 C	440	mg/L		10		A2540 C	07/12/18 13:44 / cmm
INORGANICS							
Chloride	48	mg/L		1		E300.0	07/12/18 16:25 / SRW
METALS, DISSOLVED							
Calcium	82	mg/L		1		E200.7	07/13/18 17:14 / sld
Magnesium	21	mg/L		1		E200.7	07/13/18 17:14 / sld
Sodium	38	mg/L		1		E200.7	07/13/18 17:14 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains
Lab ID: H18070256-008
Client Sample ID: PLN-0718-08

Report Date: 07/18/18
Collection Date: 07/10/18 10:50
DateReceived: 07/12/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.7	s.u.	H	0.1		A4500-H B	07/12/18 12:58 / SRW
pH Measurement Temp	13.5	°C				A4500-H B	07/12/18 12:58 / SRW
Conductivity @ 25 C	660	umhos/cm		1		A2510 B	07/12/18 12:58 / SRW
Solids, Total Dissolved TDS @ 180 C	371	mg/L		10		A2540 C	07/12/18 13:44 / cmm
INORGANICS							
Chloride	58	mg/L		1		E300.0	07/12/18 16:39 / SRW
METALS, DISSOLVED							
Calcium	69	mg/L		1		E200.7	07/13/18 17:18 / sld
Magnesium	18	mg/L		1		E200.7	07/13/18 17:18 / sld
Sodium	35	mg/L		1		E200.7	07/13/18 17:18 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains
Lab ID: H18070256-009
Client Sample ID: PLN-0718-09

Report Date: 07/18/18
Collection Date: 07/10/18 11:20
DateReceived: 07/12/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.6	s.u.	H	0.1		A4500-H B	07/12/18 13:00 / SRW
pH Measurement Temp	13.1	°C				A4500-H B	07/12/18 13:00 / SRW
Conductivity @ 25 C	991	umhos/cm		1		A2510 B	07/12/18 13:00 / SRW
Solids, Total Dissolved TDS @ 180 C	547	mg/L		10		A2540 C	07/12/18 13:44 / cmm
INORGANICS							
Chloride	127	mg/L		1		E300.0	07/12/18 16:54 / SRW
METALS, DISSOLVED							
Calcium	95	mg/L		1		E200.7	07/13/18 17:22 / sld
Magnesium	26	mg/L		1		E200.7	07/13/18 17:22 / sld
Sodium	63	mg/L		1		E200.7	07/13/18 17:22 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains
Lab ID: H18070256-010
Client Sample ID: PLN-0718-10

Report Date: 07/18/18
Collection Date: 07/10/18 11:50
DateReceived: 07/12/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.7	s.u.	H	0.1		A4500-H B	07/12/18 13:02 / SRW
pH Measurement Temp	13.0	°C				A4500-H B	07/12/18 13:02 / SRW
Conductivity @ 25 C	654	umhos/cm		1		A2510 B	07/12/18 13:02 / SRW
Solids, Total Dissolved TDS @ 180 C	355	mg/L		10		A2540 C	07/12/18 13:44 / cmm
INORGANICS							
Chloride	63	mg/L		1		E300.0	07/12/18 17:08 / SRW
METALS, DISSOLVED							
Calcium	68	mg/L		1		E200.7	07/13/18 17:26 / sld
Magnesium	18	mg/L		1		E200.7	07/13/18 17:26 / sld
Sodium	33	mg/L		1		E200.7	07/13/18 17:26 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains
Lab ID: H18070256-011
Client Sample ID: PLN-0718-11

Report Date: 07/18/18
Collection Date: 07/10/18 12:15
DateReceived: 07/12/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.7	s.u.	H	0.1		A4500-H B	07/12/18 13:04 / SRW
pH Measurement Temp	13.1	°C				A4500-H B	07/12/18 13:04 / SRW
Conductivity @ 25 C	526	umhos/cm		1		A2510 B	07/12/18 13:04 / SRW
Solids, Total Dissolved TDS @ 180 C	294	mg/L		10		A2540 C	07/12/18 13:45 / cmm
INORGANICS							
Chloride	16	mg/L		1		E300.0	07/12/18 17:23 / SRW
METALS, DISSOLVED							
Calcium	45	mg/L		1		E200.7	07/13/18 17:30 / sld
Magnesium	11	mg/L		1		E200.7	07/13/18 17:30 / sld
Sodium	51	mg/L		1		E200.7	07/13/18 17:30 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains
Lab ID: H18070256-012
Client Sample ID: PLN-0718-12

Report Date: 07/18/18
Collection Date: 07/10/18 13:15
DateReceived: 07/12/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.5	s.u.	H	0.1		A4500-H B	07/12/18 13:06 / SRW
pH Measurement Temp	13.1	°C				A4500-H B	07/12/18 13:06 / SRW
Conductivity @ 25 C	1510	umhos/cm		1		A2510 B	07/12/18 13:06 / SRW
Solids, Total Dissolved TDS @ 180 C	798	mg/L		10		A2540 C	07/12/18 13:46 / cmm
INORGANICS							
Chloride	309	mg/L		1		E300.0	07/12/18 17:38 / SRW
METALS, DISSOLVED							
Calcium	76	mg/L		1		E200.7	07/13/18 17:53 / sld
Magnesium	25	mg/L		1		E200.7	07/13/18 17:53 / sld
Sodium	183	mg/L		1		E200.7	07/13/18 17:53 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains
Lab ID: H18070256-013
Client Sample ID: PLN-0718-13

Report Date: 07/18/18
Collection Date: 07/10/18 13:50
DateReceived: 07/12/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.6	s.u.	H	0.1		A4500-H B	07/12/18 13:08 / SRW
pH Measurement Temp	13.2	°C				A4500-H B	07/12/18 13:08 / SRW
Conductivity @ 25 C	845	umhos/cm		1		A2510 B	07/12/18 13:08 / SRW
Solids, Total Dissolved TDS @ 180 C	464	mg/L		10		A2540 C	07/12/18 13:48 / cmm
INORGANICS							
Chloride	110	mg/L		1		E300.0	07/12/18 19:05 / SRW
METALS, DISSOLVED							
Calcium	50	mg/L		1		E200.7	07/13/18 17:57 / sld
Magnesium	16	mg/L		1		E200.7	07/13/18 17:57 / sld
Sodium	97	mg/L		1		E200.7	07/13/18 17:57 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains
Lab ID: H18070256-014
Client Sample ID: PLN-0718-14

Report Date: 07/18/18
Collection Date: 07/10/18 14:25
DateReceived: 07/12/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.6	s.u.	H	0.1		A4500-H B	07/12/18 13:10 / SRW
pH Measurement Temp	14.0	°C				A4500-H B	07/12/18 13:10 / SRW
Conductivity @ 25 C	938	umhos/cm		1		A2510 B	07/12/18 13:10 / SRW
Solids, Total Dissolved TDS @ 180 C	525	mg/L		10		A2540 C	07/12/18 13:48 / cmm
INORGANICS							
Chloride	135	mg/L		1		E300.0	07/12/18 19:20 / SRW
METALS, DISSOLVED							
Calcium	58	mg/L		1		E200.7	07/13/18 18:01 / sld
Magnesium	17	mg/L		1		E200.7	07/13/18 18:01 / sld
Sodium	102	mg/L		1		E200.7	07/13/18 18:01 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains
Lab ID: H18070256-015
Client Sample ID: PLN-0718-15

Report Date: 07/18/18
Collection Date: 07/10/18 15:15
DateReceived: 07/12/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.6	s.u.	H	0.1		A4500-H B	07/12/18 13:12 / SRW
pH Measurement Temp	14.3	°C				A4500-H B	07/12/18 13:12 / SRW
Conductivity @ 25 C	1240	umhos/cm		1		A2510 B	07/12/18 13:12 / SRW
Solids, Total Dissolved TDS @ 180 C	767	mg/L		10		A2540 C	07/12/18 13:48 / cmm
INORGANICS							
Chloride	209	mg/L		1		E300.0	07/12/18 19:35 / SRW
METALS, DISSOLVED							
Calcium	101	mg/L		1		E200.7	07/13/18 18:06 / sld
Magnesium	29	mg/L		1		E200.7	07/13/18 18:06 / sld
Sodium	92	mg/L		1		E200.7	07/13/18 18:06 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains
Lab ID: H18070256-016
Client Sample ID: PLN-0718-16

Report Date: 07/18/18
Collection Date: 07/10/18 15:55
DateReceived: 07/12/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.7	s.u.	H	0.1		A4500-H B	07/12/18 13:14 / SRW
pH Measurement Temp	14.1	°C				A4500-H B	07/12/18 13:14 / SRW
Conductivity @ 25 C	561	umhos/cm		1		A2510 B	07/12/18 13:14 / SRW
Solids, Total Dissolved TDS @ 180 C	330	mg/L		10		A2540 C	07/12/18 13:48 / cmm
INORGANICS							
Chloride	32	mg/L		1		E300.0	07/12/18 19:49 / SRW
METALS, DISSOLVED							
Calcium	59	mg/L		1		E200.7	07/13/18 18:09 / sld
Magnesium	15	mg/L		1		E200.7	07/13/18 18:09 / sld
Sodium	29	mg/L		1		E200.7	07/13/18 18:09 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains
Lab ID: H18070256-017
Client Sample ID: PLN-0718-17

Report Date: 07/18/18
Collection Date: 07/10/18 16:30
DateReceived: 07/12/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.7	s.u.	H	0.1		A4500-H B	07/12/18 13:16 / SRW
pH Measurement Temp	14.2	°C				A4500-H B	07/12/18 13:16 / SRW
Conductivity @ 25 C	1150	umhos/cm		1		A2510 B	07/12/18 13:16 / SRW
Solids, Total Dissolved TDS @ 180 C	680	mg/L		10		A2540 C	07/12/18 13:49 / cmm
INORGANICS							
Chloride	178	mg/L		1		E300.0	07/12/18 20:04 / SRW
METALS, DISSOLVED							
Calcium	98	mg/L		1		E200.7	07/13/18 18:13 / sld
Magnesium	30	mg/L		1		E200.7	07/13/18 18:13 / sld
Sodium	80	mg/L		1		E200.7	07/13/18 18:13 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains
Lab ID: H18070256-018
Client Sample ID: PLN-0718-18

Report Date: 07/18/18
Collection Date: 07/10/18 17:20
DateReceived: 07/12/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.6	s.u.	H	0.1		A4500-H B	07/12/18 13:18 / SRW
pH Measurement Temp	14.6	°C				A4500-H B	07/12/18 13:18 / SRW
Conductivity @ 25 C	350	umhos/cm		1		A2510 B	07/12/18 13:18 / SRW
Solids, Total Dissolved TDS @ 180 C	238	mg/L	D	20		A2540 C	07/12/18 13:49 / cmm
INORGANICS							
Chloride	7	mg/L		1		E300.0	07/12/18 20:18 / SRW
METALS, DISSOLVED							
Calcium	38	mg/L		1		E200.7	07/13/18 18:17 / sld
Magnesium	8	mg/L		1		E200.7	07/13/18 18:17 / sld
Sodium	14	mg/L		1		E200.7	07/13/18 18:17 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
H - Analysis performed past recommended holding time.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains
Lab ID: H18070256-019
Client Sample ID: PLN-0718-19

Report Date: 07/18/18
Collection Date: 07/10/18 16:55
DateReceived: 07/12/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.6	s.u.	H	0.1		A4500-H B	07/12/18 13:21 / SRW
pH Measurement Temp	15.3	°C				A4500-H B	07/12/18 13:21 / SRW
Conductivity @ 25 C	1230	umhos/cm		1		A2510 B	07/12/18 13:21 / SRW
Solids, Total Dissolved TDS @ 180 C	722	mg/L		10		A2540 C	07/12/18 13:49 / cmm
INORGANICS							
Chloride	230	mg/L		1		E300.0	07/12/18 20:33 / SRW
METALS, DISSOLVED							
Calcium	81	mg/L		1		E200.7	07/13/18 18:29 / sld
Magnesium	26	mg/L		1		E200.7	07/13/18 18:29 / sld
Sodium	121	mg/L		1		E200.7	07/13/18 18:29 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains
Lab ID: H18070256-020
Client Sample ID: PLN-0718-20

Report Date: 07/18/18
Collection Date: 07/10/18 17:50
DateReceived: 07/12/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.7	s.u.	H	0.1		A4500-H B	07/12/18 13:23 / SRW
pH Measurement Temp	15.4	°C				A4500-H B	07/12/18 13:23 / SRW
Conductivity @ 25 C	526	umhos/cm		1		A2510 B	07/12/18 13:23 / SRW
Solids, Total Dissolved TDS @ 180 C	319	mg/L		10		A2540 C	07/12/18 13:49 / cmm
INORGANICS							
Chloride	11	mg/L		1		E300.0	07/12/18 20:48 / SRW
METALS, DISSOLVED							
Calcium	52	mg/L		1		E200.7	07/13/18 18:33 / sld
Magnesium	13	mg/L		1		E200.7	07/13/18 18:33 / sld
Sodium	36	mg/L		1		E200.7	07/13/18 18:33 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains
Lab ID: H18070256-021
Client Sample ID: PLN-0718- 21

Report Date: 07/18/18
Collection Date: 07/10/18 18:25
DateReceived: 07/12/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.8	s.u.	H	0.1		A4500-H B	07/12/18 13:35 / SRW
pH Measurement Temp	16.5	°C				A4500-H B	07/12/18 13:35 / SRW
Conductivity @ 25 C	420	umhos/cm		1		A2510 B	07/12/18 13:35 / SRW
Solids, Total Dissolved TDS @ 180 C	254	mg/L		10		A2540 C	07/12/18 13:49 / cmm
INORGANICS							
Chloride	11	mg/L		1		E300.0	07/12/18 21:02 / SRW
METALS, DISSOLVED							
Calcium	45	mg/L		1		E200.7	07/13/18 18:37 / sld
Magnesium	13	mg/L		1		E200.7	07/13/18 18:37 / sld
Sodium	18	mg/L		1		E200.7	07/13/18 18:37 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains
Lab ID: H18070256-022
Client Sample ID: PLN-0718-22

Report Date: 07/18/18
Collection Date: 07/10/18 18:40
DateReceived: 07/12/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.8	s.u.	H	0.1		A4500-H B	07/12/18 13:39 / SRW
pH Measurement Temp	16.0	°C				A4500-H B	07/12/18 13:39 / SRW
Conductivity @ 25 C	420	umhos/cm		1		A2510 B	07/12/18 13:39 / SRW
Solids, Total Dissolved TDS @ 180 C	254	mg/L		10		A2540 C	07/12/18 13:50 / cmm
INORGANICS							
Chloride	11	mg/L		1		E300.0	07/12/18 21:17 / SRW
METALS, DISSOLVED							
Calcium	46	mg/L		1		E200.7	07/13/18 18:53 / sld
Magnesium	13	mg/L		1		E200.7	07/13/18 18:53 / sld
Sodium	17	mg/L		1		E200.7	07/13/18 18:53 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains
Lab ID: H18070256-023
Client Sample ID: PLN-0718-23

Report Date: 07/18/18
Collection Date: 07/10/18 19:15
DateReceived: 07/12/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.6	s.u.	H	0.1		A4500-H B	07/12/18 13:41 / SRW
pH Measurement Temp	16.4	°C				A4500-H B	07/12/18 13:41 / SRW
Conductivity @ 25 C	560	umhos/cm		1		A2510 B	07/12/18 13:41 / SRW
Solids, Total Dissolved TDS @ 180 C	336	mg/L		10		A2540 C	07/12/18 13:50 / cmm
INORGANICS							
Chloride	22	mg/L		1		E300.0	07/12/18 22:44 / SRW
METALS, DISSOLVED							
Calcium	60	mg/L		1		E200.7	07/13/18 18:57 / sld
Magnesium	15	mg/L		1		E200.7	07/13/18 18:57 / sld
Sodium	27	mg/L		1		E200.7	07/13/18 18:57 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains

Report Date: 07/18/18
Work Order: H18070256

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2510 B									Analytical Run: PHSC_101-H_180712A	
Lab ID: SC 150		Initial Calibration Verification Standard							07/12/18 08:39	
Conductivity @ 25 C		150	umhos/cm	1.0	100	90	110			
Lab ID: SC 5000		Initial Calibration Verification Standard							07/12/18 08:41	
Conductivity @ 25 C		4810	umhos/cm	1.0	96	90	110			
Lab ID: SC 20000		Initial Calibration Verification Standard							07/12/18 08:43	
Conductivity @ 25 C		18900	umhos/cm	1.0	94	90	110			
Lab ID: CCV - SC 1413		Continuing Calibration Verification Standard							07/12/18 11:50	
Conductivity @ 25 C		1410	umhos/cm	1.0	100	90	110			
Lab ID: CCV - SC 1413		Continuing Calibration Verification Standard							07/12/18 13:30	
Conductivity @ 25 C		1410	umhos/cm	1.0	100	90	110			
Method: A2510 B										Batch: R136371
Lab ID: SC 1000		Laboratory Control Sample				Run: PHSC_101-H_180712A			07/12/18 08:45	
Conductivity @ 25 C		982	umhos/cm	1.0	98	90	110			
Lab ID: H18070256-001ADUP		Sample Duplicate				Run: PHSC_101-H_180712A			07/12/18 12:43	
Conductivity @ 25 C		1490	umhos/cm	1.0				0.7	10	
Lab ID: H18070256-020ADUP		Sample Duplicate				Run: PHSC_101-H_180712A			07/12/18 13:25	
Conductivity @ 25 C		526	umhos/cm	1.0				0.1	10	
Lab ID: H18070256-021ADUP		Sample Duplicate				Run: PHSC_101-H_180712A			07/12/18 13:37	
Conductivity @ 25 C		421	umhos/cm	1.0				0.1	10	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains

Report Date: 07/18/18
Work Order: H18070256

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2540 C										Batch: TDS180712A
Lab ID: MB-25_180712A		Method Blank				Run: ACCU-124 (14410200)_18071			07/12/18 09:33	
Solids, Total Dissolved TDS @ 180 C		ND	mg/L	10						
Lab ID: LCS-26_180712A		Laboratory Control Sample				Run: ACCU-124 (14410200)_18071			07/12/18 09:33	
Solids, Total Dissolved TDS @ 180 C		2010	mg/L	20	100	90	110			
Lab ID: H18070236-006A DUP		Sample Duplicate				Run: ACCU-124 (14410200)_18071			07/12/18 09:33	
Solids, Total Dissolved TDS @ 180 C		ND	mg/L	10					5	
- Since the difference between the analytical result for the sample and its duplicate is less than the reporting limit, the RPD variance is not considered significant.										
Lab ID: H18070256-002A DUP		Sample Duplicate				Run: ACCU-124 (14410200)_18071			07/12/18 13:43	
Solids, Total Dissolved TDS @ 180 C		383	mg/L	10				0.5	5	
Lab ID: MB-49_180712A		Method Blank				Run: ACCU-124 (14410200)_18071			07/12/18 13:45	
Solids, Total Dissolved TDS @ 180 C		ND	mg/L	10						
Lab ID: LCS-50_180712A		Laboratory Control Sample				Run: ACCU-124 (14410200)_18071			07/12/18 13:45	
Solids, Total Dissolved TDS @ 180 C		1930	mg/L	20	97	90	110			
Lab ID: H18070256-012A DUP		Sample Duplicate				Run: ACCU-124 (14410200)_18071			07/12/18 13:46	
Solids, Total Dissolved TDS @ 180 C		790	mg/L	10				1.0	5	
Lab ID: H18070256-022A DUP		Sample Duplicate				Run: ACCU-124 (14410200)_18071			07/12/18 13:50	
Solids, Total Dissolved TDS @ 180 C		255	mg/L	10				0.4	5	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains

Report Date: 07/18/18
Work Order: H18070256

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500-H B									Analytical Run: PHSC_101-H_180712A	
Lab ID: pH 7	2	Initial Calibration Verification Standard							07/12/18 08:34	
pH		7.0	s.u.	0.1	99	98	102			
pH Measurement Temp		21.3	°C			0	0			
Lab ID: CCV - pH 7	2	Continuing Calibration Verification Standard							07/12/18 11:47	
pH		7.0	s.u.	0.1	100	98	102			
pH Measurement Temp		21.0	°C			0	0			
Lab ID: CCV - pH 7	2	Continuing Calibration Verification Standard							07/12/18 13:27	
pH		7.0	s.u.	0.1	100	98	102			
pH Measurement Temp		20.0	°C			0	0			
Method: A4500-H B									Batch: R136371	
Lab ID: H18070256-001ADUP	2	Sample Duplicate				Run: PHSC_101-H_180712A			07/12/18 12:43	
pH		7.4	s.u.	0.1				0.1	3	
pH Measurement Temp		11.7	°C							
Lab ID: H18070256-020ADUP	2	Sample Duplicate				Run: PHSC_101-H_180712A			07/12/18 13:25	
pH		7.6	s.u.	0.1				0.1	3	
pH Measurement Temp		15.4	°C							
Lab ID: H18070256-021ADUP	2	Sample Duplicate				Run: PHSC_101-H_180712A			07/12/18 13:37	
pH		7.8	s.u.	0.1				0.1	3	
pH Measurement Temp		16.1	°C							

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation **Report Date:** 07/18/18

Project: MDT Plains **Work Order:** H18070256

Analyte		Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method:	**E200.7**									Analytical Run: ICP2-HE_180713A	
Lab ID:	**ICV**	3	Initial Calibration Verification Standard							07/13/18 10:44	
Calcium			39.6	mg/L	1.0	99	95	105			
Magnesium			39.4	mg/L	1.0	99	95	105			
Sodium			40.4	mg/L	1.0	101	95	105			
Lab ID:	**CCV-1**	3	Continuing Calibration Verification Standard							07/13/18 10:48	
Calcium			25.2	mg/L	1.0	101	95	105			
Magnesium			24.7	mg/L	1.0	99	95	105			
Sodium			25.3	mg/L	1.0	101	95	105			
Lab ID:	**ICSA**	3	Interference Check Sample A							07/13/18 11:00	
Calcium			454	mg/L	1.0	91	80	120			
Magnesium			504	mg/L	1.0	101	80	120			
Sodium			0.0270	mg/L	1.0		0	0			
Lab ID:	**ICSAB**	3	Interference Check Sample AB							07/13/18 11:04	
Calcium			462	mg/L	1.0	92	80	120			
Magnesium			511	mg/L	1.0	102	80	120			
Sodium			20.5	mg/L	1.0	103	80	120			
Lab ID:	**CCV**	3	Continuing Calibration Verification Standard							07/13/18 16:00	
Calcium			24.7	mg/L	1.0	99	90	110			
Magnesium			24.2	mg/L	1.0	97	90	110			
Sodium			26.2	mg/L	1.0	105	90	110			
Lab ID:	**CCV**	3	Continuing Calibration Verification Standard							07/13/18 16:47	
Calcium			24.4	mg/L	1.0	98	90	110			
Magnesium			24.0	mg/L	1.0	96	90	110			
Sodium			25.9	mg/L	1.0	103	90	110			
Lab ID:	**CCV**	3	Continuing Calibration Verification Standard							07/13/18 17:34	
Calcium			24.8	mg/L	1.0	99	90	110			
Magnesium			24.2	mg/L	1.0	97	90	110			
Sodium			25.4	mg/L	1.0	101	90	110			
Lab ID:	**CCV**	3	Continuing Calibration Verification Standard							07/13/18 18:21	
Calcium			24.3	mg/L	1.0	97	90	110			
Magnesium			23.9	mg/L	1.0	96	90	110			
Sodium			25.6	mg/L	1.0	102	90	110			
Method:	**E200.7**									Batch: R136440	
Lab ID:	**MB**	3	Method Blank				Run: ICP2-HE_180713A			07/13/18 11:12	
Calcium			ND	mg/L	0.07						
Magnesium			ND	mg/L	0.01						
Sodium			ND	mg/L	0.02						
Lab ID:	**LFB**	3	Laboratory Fortified Blank				Run: ICP2-HE_180713A			07/13/18 11:16	
Calcium			49.2	mg/L	1.0	98	85	115			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains

Report Date: 07/18/18
Work Order: H18070256

Analyte		Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method:	**E200.7**										Batch: R136440
Lab ID:	**LFB**	3	Laboratory Fortified Blank				Run: ICP2-HE_180713A				07/13/18 11:16
Magnesium			48.8	mg/L	1.0	98	85	115			
Sodium			49.1	mg/L	1.0	98	85	115			
Lab ID:	**H18070241-001BMS2**	3	Sample Matrix Spike				Run: ICP2-HE_180713A				07/13/18 16:23
Calcium			75.3	mg/L	1.0	99	70	130			
Magnesium			55.9	mg/L	1.0	101	70	130			
Sodium			61.5	mg/L	1.0	112	70	130			
Lab ID:	**H18070241-001BMSD**	3	Sample Matrix Spike Duplicate				Run: ICP2-HE_180713A				07/13/18 16:27
Calcium			73.5	mg/L	1.0	96	70	130	2.3	20	
Magnesium			54.5	mg/L	1.0	98	70	130	2.6	20	
Sodium			58.1	mg/L	1.0	105	70	130	5.6	20	
Lab ID:	**H18070256-001BMS2**	3	Sample Matrix Spike				Run: ICP2-HE_180713A				07/13/18 16:39
Calcium			115	mg/L	1.0	97	70	130			
Magnesium			73.4	mg/L	1.0	101	70	130			
Sodium			242	mg/L	1.0	98	70	130			
Lab ID:	**H18070256-001BMSD**	3	Sample Matrix Spike Duplicate				Run: ICP2-HE_180713A				07/13/18 16:43
Calcium			114	mg/L	1.0	95	70	130	0.8	20	
Magnesium			72.5	mg/L	1.0	99	70	130	1.2	20	
Sodium			246	mg/L	1.0	106	70	130	1.6	20	
Lab ID:	**H18070256-011BMS2**	3	Sample Matrix Spike				Run: ICP2-HE_180713A				07/13/18 17:46
Calcium			92.5	mg/L	1.0	95	70	130			
Magnesium			60.3	mg/L	1.0	99	70	130			
Sodium			104	mg/L	1.0	106	70	130			
Lab ID:	**H18070256-011BMSD**	3	Sample Matrix Spike Duplicate				Run: ICP2-HE_180713A				07/13/18 17:50
Calcium			92.0	mg/L	1.0	94	70	130	0.5	20	
Magnesium			60.1	mg/L	1.0	99	70	130	0.3	20	
Sodium			106	mg/L	1.0	109	70	130	1.6	20	
Lab ID:	**H18070256-021BMS2**	3	Sample Matrix Spike				Run: ICP2-HE_180713A				07/13/18 18:45
Calcium			95.7	mg/L	1.0	101	70	130			
Magnesium			64.1	mg/L	1.0	102	70	130			
Sodium			71.7	mg/L	1.0	108	70	130			
Lab ID:	**H18070256-021BMSD**	3	Sample Matrix Spike Duplicate				Run: ICP2-HE_180713A				07/13/18 18:49
Calcium			95.8	mg/L	1.0	101	70	130	0.1	20	
Magnesium			63.9	mg/L	1.0	102	70	130	0.4	20	
Sodium			74.0	mg/L	1.0	113	70	130	3.1	20	

Qualifiers:

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ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains

Report Date: 07/18/18
Work Order: H18070256

Analyte		Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method:	**E300.0**									Analytical Run: IC METROHM_180712A	
Lab ID:	**ICV**		Initial Calibration Verification Standard							07/12/18 09:51	
Chloride			97.4	mg/L	1.0	97	90	110			
Lab ID:	**CCV**		Continuing Calibration Verification Standard							07/12/18 10:20	
Chloride			48.2	mg/L	1.0	96	90	110			
Lab ID:	**CCV**		Continuing Calibration Verification Standard							07/12/18 14:42	
Chloride			49.4	mg/L	1.0	99	90	110			
Lab ID:	**CCV**		Continuing Calibration Verification Standard							07/12/18 18:22	
Chloride			49.2	mg/L	1.0	98	90	110			
Lab ID:	**CCV**		Continuing Calibration Verification Standard							07/12/18 22:01	
Chloride			48.9	mg/L	1.0	98	90	110			
Method:	**E300.0**									Batch: R136426	
Lab ID:	**ICB**		Method Blank				Run: IC METROHM_180712A			07/12/18 09:37	
Chloride			ND	mg/L	0.009						
Lab ID:	**LFB**		Laboratory Fortified Blank				Run: IC METROHM_180712A			07/12/18 11:19	
Chloride			26.3	mg/L	1.0	105	90	110			
Lab ID:	**H18070236-003AMS**		Sample Matrix Spike				Run: IC METROHM_180712A			07/12/18 12:46	
Chloride			260	mg/L	1.0		90	110			A
Lab ID:	**H18070236-003AMSD**		Sample Matrix Spike Duplicate				Run: IC METROHM_180712A			07/12/18 13:00	
Chloride			259	mg/L	1.0		90	110	0.3	20	A
Lab ID:	**H18070256-012AMS**		Sample Matrix Spike				Run: IC METROHM_180712A			07/12/18 17:52	
Chloride			356	mg/L	1.0		90	110			A
Lab ID:	**H18070256-012AMSD**		Sample Matrix Spike Duplicate				Run: IC METROHM_180712A			07/12/18 18:07	
Chloride			351	mg/L	1.0		90	110	1.5	20	A
Lab ID:	**H18070256-022AMS**		Sample Matrix Spike				Run: IC METROHM_180712A			07/12/18 21:31	
Chloride			36.0	mg/L	1.0	99	90	110			
Lab ID:	**H18070256-022AMSD**		Sample Matrix Spike Duplicate				Run: IC METROHM_180712A			07/12/18 21:46	
Chloride			35.9	mg/L	1.0	99	90	110	0.0	20	
Lab ID:	**H18070256-023AMS**		Sample Matrix Spike				Run: IC METROHM_180712A			07/12/18 22:59	
Chloride			47.0	mg/L	1.0	99	90	110			
Lab ID:	**H18070256-023AMSD**		Sample Matrix Spike Duplicate				Run: IC METROHM_180712A			07/12/18 23:13	
Chloride			47.1	mg/L	1.0	99	90	110	0.0	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

Work Order Receipt Checklist

MT Dept of Transportation

H18070256

Login completed by: Jessica C. Smith
Reviewed by: BL2000\rtooke
Reviewed Date: 7/17/2018

Date Received: 7/12/2018
Received by: TLL
Carrier name: Return-UPS Ground

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		
Water - VOA vials have zero headspace?	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.

Contact and Corrective Action Comments:

Cooler 1 was received at 0.6 °C, Cooler 2 at 0.7 °C. On Ice. Time on sample PLN-0718-18 is 17:18 -Time on COC is 17:20. Used time from COC. JCS 07/12/2018

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Chain of Custody & Analytical Request Record

www.energylab.com

Account Information (Billing information)

Company/Name: MDT Enviro Services
Contact: Brian Goodman
Phone: 406.444.7632
Mailing Address: 2701 Prospect Ave
City, State, Zip: Helena, MT 59620
Email: bgoodman@mt.gov
Receive Invoice: ☒ Hard Copy ☐ Email
Receive Report: ☐ Hard Copy ☒ Email
Purchase Order:
Quote:
Bottle Order: 27721

Report Information (if different than Account Information)

Company/Name: Hydrometrics
Contact: Laurie Childs
Phone: 406.599.7507
Mailing Address:
City, State, Zip:
Email: dparker@hydrometrics, childs.lafo@gmail.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.: MDT Plains
Sampler Name: Laurie Childs
Sampler Phone: 406.599.7507
Sample Origin State: Montana
EPA/State Compliance: ☐ 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)	Dissolved: Ca, Mg, Sodium	CL-, PH, TDS, SC	See Attached	RUSH TAT	ELI LAB ID (Laboratory Use Only)
C1	1 PIN-0718-01	7.10.18	0755	2	W	X	X			H18070256
	2 " -02		0815							
	3 " -03		0855							
	4 " -04		0859							
	5 " -05		0920							
1,2	6 " -06		0945							
C1	7 " -07		1015							
1,2	8 " -08		1050							
C1	9 " -09		1120							
C1	10 " -10		1150							

Custody Record MUST be signed	Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
	Laurie Childs	7.10.18 1100		Tracy Lovato	7/12/18 7:44	
	Relinquished by (print)	Date/Time	Signature	Received by Laboratory (print)	Date/Time	Signature

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)
UPS2SG	93,432	Y N C B	Y N	C1=0.6°C C2=0.7	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.

Trust our People. Trust our Data.

Chain of Custody & Analytical Request Record

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Page 2 of 3

Account Information *(Billing information)*

Company/Name	
Contact	
Phone	
Mailing Address	"
City, State, Zip	
Email	
Receive Invoice ☐Hard Copy ☐Email	Receive Report ☐Hard Copy ☐Email
Purchase Order	Quote / Bottle Order

Report Information *(if different than Account Information)*

Company/Name	
Contact	
Phone	
Mailing Address	"
City, State, Zip	
Email	
Receive Report ☐Hard Copy ☐Email	
Special Report/Formats: ☐ LEVEL IV ☐ NELAC ☐ EDD/EDT *(contact laboratory)* ☐ Other_____	

Comments

Project Information

Project Name, PWSID, Permit, etc.	
Sampler Name "	Sampler Phone
Sample Origin State	EPA/State Compliance ☐ 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)*	Dissolved: Ca, Mg, Sodium	Cl-, PH, TDS, SX								See Attached	RUSH TAT	ELI LAB ID *Laboratory Use Only*
C1	1 PN-0718-11	7.10.18	1215	2	W	X	X										H18070256
~~D2~~	2 " -12		1315														
C2	3 " -13		1350														
	4 " -14		1425														
	5 " -15		1515														
	6 " -16		1555														
	7 " -17		1630														
	8 " -18		1720														
	9 " -19		1655														
	10 " -20		1750														

Custody Record MUST be signed	Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
	Laurie Childs	7.11.18 1100		Tracy Lovasl	7/12/18 9:44	Tracy Lovasl
	Relinquished by (print)	Date/Time	Signature	Received by Laboratory (print)	Date/Time	Signature

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)*
UPS/RSG	93.432	Y N C B	Y N	C1=0.6°C C2=0.7	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.

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Page 3 of

Account Information (Billing information)

Company/Name
Contact
Phone
Mailing Address
City, State, Zip
Email
Receive Invoice ☐Hard Copy ☐Email
Purchase Order | Quote | Receive Report ☐Hard Copy ☐Email | Bottle Order

Report Information (if different than Account Information)

Company/Name
Contact
Phone
Mailing Address
City, State, Zip
Email
Receive Report ☐Hard Copy ☐Email
Special Report/Formats:
☐ LEVEL IV ☐ NELAC ☐ EDD/EDT (contact laboratory) ☐ Other

Comments

Project Information

Project Name, PWSID, Permit, etc.
Sampler Name
Sample Origin State | Sampler Phone
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)* | EPA/State Compliance ☐ Yes ☐ No

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

Analysis Requested

	Sample Identification (Name, Location, Interval, etc.)	Collection Date	Collection Time	Number of Containers	Matrix (See Codes Above)	Dissolved: Ca, Mg, Solids	Cl-, pH, TDS, SC	See Attached
1	PIN-0718-21	7.10.18	1825	2	W			
2	" -22		1840			X	X	
3	" -23		1915					
4								
5								
6								
7								
8								
9								
10								

C2
C2
C2

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

RUSH TAT

ELI LAB ID
Laboratory Use Only
H18070256

Custody Record MUST be signed

Relinquished by (print): Laurie Childs | Date/Time: 7.11.18 1100 | Signature
Relinquished by (print) | Date/Time | Signature
Received by (print) | Date/Time | Signature
Received by Laboratory (print): Tracy Carroll | Date/Time: 7/11/18 9:44 | Signature

Shipped By: UPS/RSG | Cooler ID(s): 93, 432 | Custody Seals: Y N C B | Intact: Y N | Receipt Temp: CL-0.6°C CC-0.7 | Temp Blank: Y N | On Ice: Y N | Payment Type: CC Cash

LABORATORY USE ONLY

In certain circumstances, samples submitted to Ener
This ser

ANALYTICAL SUMMARY REPORT

September 27, 2018

MT Dept of Transportation
PO Box 201001
Helena, MT 59620-1001

Work Order: H18090525

Project Name: MDT Plains Water Treatment

Energy Laboratories Inc Helena MT received the following 6 samples for MT Dept of Transportation on 9/24/2018 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H18090525-001	MDTP-Haun-Treated	09/21/18 14:45	09/24/18	Aqueous	Metals by ICP/ICPMS, Acid Soluble Alkalinity Conductivity Hardness Anions by Ion Chromatography Nitrogen, Nitrate + Nitrite pH Solids, Total Dissolved
H18090525-002	MDPT-Weeks-Raw	09/21/18 14:00	09/24/18	Aqueous	Same As Above
H18090525-003	MDPT-Weeks-Treated	09/21/18 14:15	09/24/18	Aqueous	Same As Above
H18090525-004	MDPT-Leichtnam-Treated	09/21/18 13:05	09/24/18	Aqueous	Same As Above
H18090525-005	MDPT-Haun-Raw	09/21/18 15:00	09/24/18	Aqueous	Same As Above
H18090525-006	MDPT-Leichtnam-Raw	09/21/18 12:55	09/24/18	Aqueous	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 Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

The results as reported relate only to the item(s) submitted for testing.

If you have any questions regarding these test results, please call.

Report Approved By: Wanda Johnson
Project Manager - Helena, MT

Digitally signed by
Wanda Johnson
Date: 2018.09.28 10:13:26 -06:00

Understanding Your Test Results

Example Test Result

LABORATORY ANALYTICAL REPORT

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
INORGANICS							
Alkalinity, Total as CaCO3	254	mg/L		1		A2320 B	03/21/06 17:40 / qed
Chloride	27	mg/L		1		E300.0	03/22/06 19:13 / qed
Sulfate	318	mg/L		1		E300.0	03/22/06 19:13 / qed
Fluoride	1.0	mg/L		0.1		E300.0	03/22/06 19:13 / qed
Nitrogen, Nitrate+Nitrite as N	0.24	mg/L		0.05		E300.0	03/22/06 19:13 / qed

The following interpretation is based on public drinking water system standards. These standards only apply to public water systems but the health implications are the same for private well water users.

Definitions:

ND stands for no detection meaning the parameter was not detected in the sample
ppm (parts per million) is often used interchangeably with **mg/L** (milligrams per liter)
RL (reporting limit) is basically the smallest concentration a test can detect
MCL (maximum contaminant level) is a USEPA drinking water standard

Parameter Name	Possible Results	Quick Interp.	Warnings and Suggestions
Alkalinity (Total as $CaCO_3$) The ability of water to compensate for changes in pH. Higher alkalinity means water is less likely to experience big changes in acidity.	**ND or less than 100 (mg/L)**	**Corrosion Potential**	As alkalinity decreases below 100, if pH is lower than 6.5 there is increased potential for corrosion of pipes releasing metals into the water .
	100 to 200 (mg/L)	**Satisfactory**	Sufficient buffer potential to resist changes in pH and generally not significant scaling in pipes.
	200 or more (mg/L)	**Scaling Potential**	Possible scaling in pipes and water heaters.
Aluminum A naturally occurring metal generally found in concentrations between 0.01 and 0.3 mg/L in groundwater. The EPA secondary standard for aluminum is 0.050 to 0.2 mg/L because high concentrations can cause coloring of water.	**ND or less than 0.05 (mg/L)**	**Satisfactory**	No action necessary.
	0.05 or more (mg/L)	**Objectionable**	Standard based on aesthetics not health; if water discoloration is troublesome, consider treatment.
Antimony Antimony is not commonly found in nature; sources of contamination include petroleum refinery discharge, fire retardants, ceramics, electronics and solder.	**ND or less than 0.006 (mg/L)**	**Satisfactory**	Result generally shouldn't change dramatically through time, consider retesting next year if result is 0.005 or more.
	0.006 or more (mg/L)	**Unsatisfactory**	Health risk exists; consider water treatment and/or alternative sources; see fact sheet for more information
Arsenic Groundwater contamination can happen from mining, pesticides and wood preservatives; contamination can also occur naturally.	**ND**	**Satisfactory**	Retesting not necessary unless a change is suspected.
	0 to 0.010 (mg/L)	**Satisfactory**	Ideally, drinking water should contain no detectable arsenic; consider retesting next year if result is 0.008 mg/L or more.
	0.010 or more (mg/L)	**Unsatisfactory**	Health risk exists; consider water treatment and/or alternative drinking water sources; see fact sheet for more information.

Parameter Name	Possible Results	Quick Interp.	Warnings and Suggestions
Barium Found abundantly in nature and is used in the production of many household items; it can enter drinking water through industrial discharge and natural erosion.	**ND or less than 2 (mg/L)**	**Satisfactory**	Result generally shouldn't change dramatically through time, consider retesting next year if result is 1.6 mg/L or more.
	2 or more (mg/L)	**Unsatisfactory**	Health risk exists; consider water treatment and/or alternative drinking water sources; see fact sheet for more information.
Beryllium A naturally occurring metal used in metal refining; coal combustion; and electrical, aerospace and defense industries.	**ND or less than 0.004 (mg/L)**	**Satisfactory**	Result generally shouldn't change dramatically through time, consider retesting next year if result is 0.003 mg/L or more.
	0.004 or more (mg/L)	**Unsatisfactory**	Health risk exists; consider water treatment and/or alternative sources; see fact sheet for more information.
Bicarbonate as HCO_3 Bicarbonate is the principle alkaline constituent in drinking water. See alkalinity.	**Any Value**	**Satisfactory (depending on alkalinity)**	Bicarbonate does not pose a health risk; bicarbonate and carbonate are closely related to alkalinity.
Cadmium A metallic element that can enter drinking water through corrosion of pipes, erosion of natural deposits, metal refining and runoff from waste batteries and paints.	**ND or less than 0.005 (mg/L)**	**Satisfactory**	Result generally shouldn't change dramatically through time, consider retesting next year if result is 0.004 mg/L or more.
	0.005 or more (mg/L)	**Unsatisfactory**	Health risk exists; consider water treatment and/or alternative sources; see fact sheet for more information.
Calcium A naturally occurring metal essential in the human diet and common in groundwater with concentrations ranging from zero up to several hundred mg/L. A major contributor to the hardness of water which can cause scaling problems in pipes and hot water heaters.	**Any Value**	**Satisfactory (depending on hardness)**	Calcium does not pose a health risk; calcium and magnesium together make up the hardness; see hardness.
Carbonate as CO_3 Mineral found in groundwater. See alkalinity.	**Any Value**	**Satisfactory (depending on alkalinity)**	Carbonate does not pose a health risk; carbonate and bicarbonate are closely related to alkalinity; see alkalinity.
Chloride A common natural salt in groundwater. The EPA secondary standard for chloride is 250 mg/L; higher concentrations can cause a salty taste.	**ND or less than 250 (mg/L)**	**Satisfactory**	No action necessary.
	250 or more (mg/L)	**Objectionable**	Standard based on aesthetics not health; if salty taste is troublesome, consider treatment.

Parameter Name	Possible Results	Quick Interp.	Warnings and Suggestions
Chromium A metallic element commonly found in nature; contamination of groundwater can happen through discharge from leather tanning, steel and pulp mills or erosion of natural deposits.	**ND or less than 0.10 (mg/L)**	**Satisfactory**	Result generally shouldn't change dramatically through time, consider retesting next year if result is 0.08 mg/L or more.
	0.10 or more (mg/L)	**Unsatisfactory**	Health risk exists; consider water treatment and/or alternative sources; see fact sheet for more information.
Coliform Bacteria (Total) A type of bacteria which should not be present in groundwater; indicates potential contamination.	**Absent**	**Satisfactory**	Continue testing annually to monitor for contamination.
	Present	**Objectionable**	No direct health threat, but coliforms should not be present in groundwater; see fact sheet for more information.
Coliform Bacteria (*E. coli*) A type of bacteria found in feces of warm blooded animals which indicates fecal pollution. If *E. coli* is present in a sample, the water is unsafe to drink without treatment.	**Absent**	**Satisfactory**	Continue testing annually to monitor for contamination.
	Present	**Unsatisfactory**	Direct health threat; treat water for drinking and cooking; see fact sheet for more information.
Conductivity A measure of how easily electric current will pass through a water sample. This measurement is related to and often used to estimate total dissolved solids. Also used to estimate the tendency of water to corrode metal.	**Any Value**	**Satisfactory**	Conductivity does not pose a health risk; it is related to total dissolved solids and is used in calculating the corrosivity.
Corrosivity (Langelier Index) Corrosive water can mobilize metals (especially lead and copper) from pipes into drinking water and can eventually cause leaks in plumbing. While not a perfect tool, the Langelier Index is a useful guide for assessing the corrosive ability of water.	**Less than -2.5**	**High Corrosion Potential**	Corrosive water can leach metals from minerals in the earth or from pipes and fixtures; treatment and/or testing for metals is recommended.
	-2.5 to -0.5	**Moderate Corrosion Potential**	Corrosive water can leach metals from minerals in the earth or from pipes and fixtures; Consider treatment and/or testing for metals.
	-0.5 to 0.5	**Satisfactory**	Ideal range to minimize corrosion and scaling.
	0.5 to 2.5	**Moderate Scaling Potential**	Moderate potential for scaling in pipes and hot water heaters; consider treatment.
	More than 2.5	**High Scaling Potential**	High potential for scaling in pipes and hot water heaters; consider treatment.
Copper Potential health risks; copper is a metallic element that is rarely found in groundwater, but can be introduced into drinking water by corrosion of pipes.	**ND or less than 1.3 (mg/L)**	**Satisfactory**	Pipe corrosion is a common copper source; if water is corrosive, copper concentration could change through time; consider retesting next year if result is 1.0 mg/L or more. See fact sheet for more information.
	1.3 or more (mg/L)	**Unsatisfactory**	Health risk exists; consider water treatment and/or alternative drinking water sources; see fact sheet for more information.

Parameter Name	Possible Results	Quick Interp.	Warnings and Suggestions
Fluoride A naturally occurring nonmetal which promotes dental health at concentrations between 0.7 and 1.5 mg/L, but can cause health problems at high concentrations.	**ND or less than 0.7 (mg/L)**	**Satisfactory**	Concentrations below 0.7 mg/L are out of the ideal range for protection of tooth enamel.
	0.7 to 1.5 (mg/L)	**Satisfactory**	Ideal range for development and protection of tooth enamel.
	1.5 to 2.0 (mg/L)	**Satisfactory**	Concentrations above 1.5 mg/L are out of the ideal range for protection of tooth enamel.
	2.0 to 4.0 (mg/L)	**Objectionable**	Dental fluorosis or brownish discoloration of teeth can occur; a report by the National Research Council suggests possible health effects at concentrations in this range.
	4.0 or more (mg/L)	**Unsatisfactory**	Health risk exists; consider water treatment and/or alternative sources; see fact sheet for more information.
Hardness (as $CaCO_3$) Primarily caused by compounds of calcium and magnesium in water and can result in scaling in pipes/ water heaters; it also decreases the lather and effectiveness of soaps and detergents.	**ND or less than 60 (mg/L)**	**Corrosion Potential**	Softer water can be more corrosive; see corrosivity.
	61 to 120 (mg/L)	**Satisfactory**	Generally a satisfactory intermediate between corrosion and scaling; see corrosivity.
	121 or more (mg/L)	**Scaling Potential**	Harder water can cause scaling in pipes and hot water heaters; if scaling is troublesome, consider softening.
Iron (Total) Iron is a metallic element found in nature. Aesthetic problems such as staining of clothes and pipes, as well as sediment problems in plumbing are associated with iron.	**ND or less than 0.3 (mg/L)**	**Satisfactory**	No action is necessary
	0.3 or more (mg/L)	**Objectionable**	High iron can cause discoloration of fixtures and/or clothing and can support iron bacteria growth leading to taste and odor problems; if troublesome, consider treatment.
Lead A metallic element that often enters drinking water through corrosion of pipes.	**ND**	**Satisfactory**	If water is corrosive, lead concentration could change through time; see corrosivity.
	0 to 0.015 (mg/L)	**Satisfactory**	Pipe corrosion is a common lead source; if water is corrosive, lead concentration could increase; consider retesting next year if result is 0.012 mg/L or more; see fact sheet for more information.
	0.015 or more (mg/L)	**Unsatisfactory**	Health risk exists; consider water treatment and/or alternative drinking water sources; see fact sheet for more information.
Magnesium A naturally occurring metal important in human diet and common in groundwater; with calcium, magnesium is a major contributor to the hardness of water.	**Any Value**	**Satisfactory (depending on hardness)**	Magnesium does not pose a health risk; calcium and magnesium together make up the hardness; hard water can cause scaling in pipes; see hardness.
Manganese A naturally occurring metal important in the human diet; the EPA secondary standard for manganese is 0.05 mg/L; high concentrations can cause black to brown color, black staining, and a bitter taste.	**ND or less than 0.05 (mg/L)**	**Satisfactory**	No action necessary.
	0.010 or more (mg/L)	**Objectionable**	Standard based on aesthetics not health; if black/brown staining or bitter taste is troublesome, consider treatment.

Parameter Name	Possible Results	Quick Interp.	Warnings and Suggestions
Mercury A metallic element; sources of contamination of drinking water include erosion of natural deposits, discharge from refineries and factories and runoff from landfills and croplands.	**ND or less than 0.002 (mg/L)**	**Satisfactory**	Result generally shouldn't change dramatically through time, consider retesting next year if result is 0.0016 mg/L or more.
	0.002 or more (mg/L)	**Unsatisfactory**	Health risk exists; consider water treatment and/or alternative sources; see fact sheet for more information.
Nitrate + Nitrite as N or Nitrate as N Can occur naturally, from septic tanks/wastewater treatment, or from agricultural practices and causes oxygen deficiency in infants under 6 months of age; nitrate moves easily in groundwater so increasing nitrate levels can be an early warning that other contaminants are moving toward a well.	**ND or less than 1 (mg/L)**	**Satisfactory**	Continue testing annually to monitor for contamination.
	1 to 4 (mg/L)	**Possible Impairment**	Potential pollution exists; continue testing annually to monitor for changes.
	4 to 10 (mg/L)	**Above Normal Natural Levels**	Above normal levels; possible contamination; continue monitoring annually for changes; Monitor more regularly if infants under the age of 1 year are consuming the water.
	10 or more (mg/L)	**Unsatisfactory**	Health risk exists, discontinue use of water for infants under 1 year of age and persons with cardiovascular conditions; see fact sheet for more information.
pH The measure of acidity of water; pH is related to the ability of water to corrode pipes and release metals into water.	**6.5 to 8.5**	**Satisfactory**	pH of groundwater does not generally change rapidly so retesting is not necessary unless a change is suspected.
	Less than 6.5 or More than 8.5	**Objectionable**	pH slightly out of the ideal range is not a direct health threat but can affect corrosivity which can leach metals from minerals in the earth or from pipes; consider a corrosivity test.
Potassium A common salt in groundwater-essential in the human diet; concentrations are typically less than 10 mg/L.	**Any Value**	**Satisfactory**	Tap water concentrations generally range from 0.5 to 8 mg/l; no action is necessary .
Selenium A non-metallic element found in sedimentary rocks; sources of contamination include: discharge from petroleum refineries, erosion of natural deposits, and discharge from mines.	**ND or less than 0.05 (mg/L)**	**Satisfactory**	Result generally shouldn't change dramatically through time, consider retesting next year if result is 0.04 mg/L or more.
	0.05 or more (mg/L)	**Unsatisfactory**	Health risk exists; consider water treatment and/or alternative sources; see fact sheet for more information.
Sodium A common salt in groundwater which can impart a salty taste at concentrations over 250 mg/L; sodium can contribute to hypertension and high levels in drinking water should be noted by people on low sodium diets.	**Any Value**	**Satisfactory**	Sodium in drinking water supplies can range from 0.4 to 1,900 mg/l; sodium intake in drinking water should be considered by people on low sodium diets in association with reducing risk of cardiovascular disease.

Parameter Name	Possible Results	Quick Interp.	Warnings and Suggestions
Sodium Adsorption Ratio (SAR) SAR is the amount of sodium relative to calcium and magnesium in the water; high SAR can damage soil and reduce crop productivity.	**Any Value**	**Depends on conductivity and soil type**	SAR is not relevant for drinking water, but irrigation water with an SAR value above 6 can pose a risk to physical soil characteristics; SAR risk is evaluated based on its relationship to conductivity and the texture of the soil being irrigated; see fact sheet for more information.
Sulfate A common salt in groundwater which can impart a salty taste; high quantities can cause gastrointestinal distress in people unaccustomed to the water.	**ND or less than 250 (mg/L)**	**Satisfactory**	No action necessary.
	250 or more (mg/L)	**Objectionable**	Standard based on aesthetics not health; if salty taste is troublesome, consider treatment.
Thallium A metallic element; sources of contamination include: leaching from ore-processing sites, discharge from electronics, glass and drug factories.	**ND (mg/L)**	**Satisfactory**	No action necessary.
	0.001 to 0.002 (mg/L)	**Satisfactory**	Ideally, drinking water should contain less than 0.001 mg/l of thallium; consider retesting next year if result is 0.001 mg/L.
	0.002 or more (mg/L)	**Unsatisfactory**	Health risk exists; consider water treatment and/or alternative sources; see fact sheet for more information.
Total Dissolved Solids TDS is the sum of all minerals, metals and salts dissolved in water; high quantities can cause gastrointestinal distress in people unaccustomed to the water.	**ND or less than 500 (mg/L)**	**Satisfactory**	Total Dissolved Solids should not change significantly through time; retest if a change is suspected.
	500 or more (mg/L)	**Objectionable**	High total dissolved solids do not generally pose a serious health risk but can cause water to be colored, taste poor, stain, and cause diarrhea in people not accustomed to the water.
Uranium A naturally occurring metal that can be ingested through the air, water and plants. The EPA primary standard is 30 µg/L. Water can be contaminated from natural processes, mining, coal combustion, nuclear power plants and phosphate fertilizers.	**ND or less than 30 (µg/L)**	**Satisfactory**	Ideally, drinking water should not contain any uranium.; consider retesting next year if value is greater than 24 µg/L.
	30 or more (µg/L)	**Unsatisfactory**	Health risk exists; consider water treatment or alternative drinking water sources; see fact sheet for more information.
Zinc A naturally occurring metal essential to the human diet; the EPA secondary standard for zinc is 5 mg/L; high concentrations can cause a metallic taste.	**ND or less than 5 (mg/L)**	**Satisfactory**	No action necessary.
	5 or more (mg/L)	**Objectionable**	Standard based on aesthetics not health; if metallic taste is troublesome; consider treatment.

Applying knowledge to improve water quality
Northern Plains & Mountains Regional Water Program
A Partnership of USDA NIFA & Land Grant Colleges and Universities

W. Adam Sigler and Jim Bauder
Montana State University Extension Water Quality Program
Department of Land Resources and Environmental Sciences

Corrosivity

What is Corrosivity?

Corrosivity is a measure of how aggressive water is at corroding pipes and fixtures. Corrosive water can mobilize lead and copper from pipes into drinking water and can eventually cause leaks in plumbing.

Corrosive potential of water is increased by:

- → **pH** (lower than 6.5 or higher than 8.5)
- → **water flow rate** (faster flow)
- → **water temperature** (higher temp)
- → **dissolved gases** (more dissolved gas)
- → **conductivity** (higher conductivity)
- → **dissolved solids** (high dissolved solids)
- → **certain bacteria** (more bacteria)
- → **suspended solids** (more sediment)
- → **chlorine** (more chlorine)

Determining Corrosivity

One common index of corrosivity is the Langelier Index (LI). The LI is calculated using pH, temperature, total dissolved solids, alkalinity, and total hardness. The LI is a measure of the balance between pH and calcium carbonate ($CaCO_3$). As the LI value becomes more negative, the water is increasingly under-saturated with $CaCO_3$ and therefore has increased corrosion potential. As the LI value becomes more positive, the water is increasingly over-saturated with $CaCO_3$. Over-saturation results in $CaCO_3$ precipitation which can coat and protect pipes from corrosion but can cause scaling in pipes, hot water heaters, and fixtures. While not a perfect analytical tool, the LI serves as a useful guide for assessing corrosive ability of well water.

Langelier Index	Description	General Recommendation
-4	Severe Corrosion	Treatment Recommended/Consider Lead/Copper Test
-3	Moderate Corrosion	Treatment Recommended/Consider Lead/Copper Test
-2	Moderate Corrosion	Treatment May Be Needed/Consider Lead/Copper Test
-1	Mild Corrosion	Treatment May Be Needed/Consider Lead/Copper Test
-0.5	None-Mild Corrosion	Probably No Treatment
0	Near Balanced	No Treatment
0.5	Some Faint Coating	Probably No Treatment
1	Mild Scale Coating	Treatment May Be Needed
2	Mild to Moderate Coating	Treatment May Be Needed
3	Moderate Scale Forming	Treatment Advisable
4	Severe Scale Forming	Treatment Advisable

Adapted from Wilkes University Center For Environmental Quality;
Corrosion, Saturation Index, Balanced Water in Drinking Water Systems

Controlling Corrosion

Corrosiveness may be increased by installing water softeners, aeration devices, increasing hot water temperatures, chlorinating water or improper matching of metal pipes. Corrosion control options include pretreatment systems, installation of non-conductive unions, reducing hot water temperature, and replacing metal piping with CPVC. Pretreatment systems include neutralizing tank filters and caustic liquid treatment. These systems change the pH, hardness, and/or alkalinity to achieve a less corrosive water chemistry.

Additional Resources:

Corrosion ... in Drinking Water Systems; Wilkes University Center for Environmental Quality
http://www.water-research.net/corrosion.htm

Lead and Copper Fact Sheet; MSU Extension Water Quality
http://waterquality.montana.edu/docs/homeowners.shtml (listed under "Drinking Water")

Household Drinking Water Protection and Treatment; MSU Extension Service
http://waterquality.montana.edu/docs/homeowners.shtml (listed under "Drinking Water")

Northern Plains and Mountains Regional Water Program– Drinking Water Initiative
http://region8water.colostate.edu/regional/DrinkingWater/slideshow/projects.shtml

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains Water Treatment
Lab ID: H18090525-001
Client Sample ID: MDTP-Haun-Treated

Report Date: 09/27/18
Collection Date: 09/21/18 14:45
DateReceived: 09/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	8.3	s.u.	H	0.1		A4500-H B	09/24/18 13:25 / SRW
pH Measurement Temp	16.2	°C				A4500-H B	09/24/18 13:25 / SRW
Conductivity @ 25 C	529	umhos/cm		1		A2510 B	09/24/18 13:25 / SRW
Solids, Total Dissolved TDS @ 180 C	298	mg/L		10		A2540 C	09/24/18 15:18 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	270	mg/L		4		A2320 B	09/25/18 09:31 / SRW
Bicarbonate as HCO3	320	mg/L		4		A2320 B	09/25/18 09:31 / SRW
Carbonate as CO3	ND	mg/L		4		A2320 B	09/25/18 09:31 / SRW
Chloride	5	mg/L		1		E300.0	09/24/18 20:39 / SRW
Sulfate	6	mg/L		1		E300.0	09/24/18 20:39 / SRW
Fluoride	0.9	mg/L		0.1	4	E300.0	09/24/18 20:39 / SRW
Hardness as CaCO3	15	mg/L		1		A2340 B	09/25/18 08:08 / sld
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.01		E353.2	09/25/18 13:06 / kmd
METALS, ACID-SOLUBLE							
Arsenic	ND	mg/L		0.001	0.01	E200.8	09/24/18 17:03 / sld
Calcium	5	mg/L		1		E200.7	09/24/18 16:23 / sld
Iron	0.01	mg/L		0.01		E200.8	09/24/18 17:03 / sld
Magnesium	ND	mg/L		1		E200.7	09/24/18 16:23 / sld
Manganese	0.005	mg/L		0.005		E200.8	09/24/18 17:03 / sld
Potassium	ND	mg/L		1		E200.7	09/24/18 16:23 / sld
Sodium	122	mg/L		1		E200.7	09/24/18 16:23 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains Water Treatment
Lab ID: H18090525-002
Client Sample ID: MDPT-Weeks-Raw

Report Date: 09/27/18
Collection Date: 09/21/18 14:00
DateReceived: 09/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.7	s.u.	H	0.1		A4500-H B	09/24/18 13:30 / SRW
pH Measurement Temp	15.3	°C				A4500-H B	09/24/18 13:30 / SRW
Conductivity @ 25 C	452	umhos/cm		1		A2510 B	09/24/18 13:30 / SRW
Solids, Total Dissolved TDS @ 180 C	252	mg/L		10		A2540 C	09/24/18 14:33 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	210	mg/L		4		A2320 B	09/25/18 09:38 / SRW
Bicarbonate as HCO3	250	mg/L		4		A2320 B	09/25/18 09:38 / SRW
Carbonate as CO3	ND	mg/L		4		A2320 B	09/25/18 09:38 / SRW
Chloride	10	mg/L		1		E300.0	09/24/18 20:53 / SRW
Sulfate	15	mg/L		1		E300.0	09/24/18 20:53 / SRW
Fluoride	0.4	mg/L		0.1	4	E300.0	09/24/18 20:53 / SRW
Hardness as CaCO3	162	mg/L		1		A2340 B	09/26/18 08:31 / sld
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.01		E353.2	09/25/18 13:10 / kmd
METALS, ACID-SOLUBLE							
Arsenic	0.097	mg/L	*	0.001	0.01	E200.8	09/24/18 17:05 / sld
Calcium	46	mg/L		1		E200.7	09/24/18 16:35 / sld
Iron	2.23	mg/L		0.01		E200.7	09/24/18 16:35 / sld
Magnesium	11	mg/L		1		E200.7	09/24/18 16:35 / sld
Manganese	0.204	mg/L		0.005		E200.8	09/24/18 17:05 / sld
Potassium	6	mg/L		1		E200.7	09/24/18 16:35 / sld
Sodium	26	mg/L		1		E200.7	09/24/18 16:35 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
* - The result exceeds the MCL.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
H - Analysis performed past recommended holding time.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains Water Treatment
Lab ID: H18090525-003
Client Sample ID: MDPT-Weeks-Treated

Report Date: 09/27/18
Collection Date: 09/21/18 14:15
DateReceived: 09/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	8.1	s.u.	H	0.1		A4500-H B	09/24/18 13:34 / SRW
pH Measurement Temp	15.0	°C				A4500-H B	09/24/18 13:34 / SRW
Conductivity @ 25 C	492	umhos/cm		1		A2510 B	09/24/18 13:34 / SRW
Solids, Total Dissolved TDS @ 180 C	276	mg/L		10		A2540 C	09/24/18 14:33 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	230	mg/L		4		A2320 B	09/25/18 09:46 / SRW
Bicarbonate as HCO3	280	mg/L		4		A2320 B	09/25/18 09:46 / SRW
Carbonate as CO3	ND	mg/L		4		A2320 B	09/25/18 09:46 / SRW
Chloride	11	mg/L		1		E300.0	09/24/18 21:07 / SRW
Sulfate	15	mg/L		1		E300.0	09/24/18 21:07 / SRW
Fluoride	0.4	mg/L		0.1	4	E300.0	09/24/18 21:07 / SRW
Hardness as CaCO3	11	mg/L		1		A2340 B	09/25/18 08:08 / sld
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.01		E353.2	09/25/18 13:11 / kmd
METALS, ACID-SOLUBLE							
Arsenic	0.001	mg/L		0.001	0.01	E200.8	09/24/18 17:07 / sld
Calcium	4	mg/L		1		E200.7	09/24/18 16:50 / sld
Iron	ND	mg/L		0.01		E200.8	09/24/18 17:07 / sld
Magnesium	ND	mg/L		1		E200.7	09/24/18 16:50 / sld
Manganese	ND	mg/L		0.005		E200.8	09/24/18 17:07 / sld
Potassium	ND	mg/L		1		E200.7	09/24/18 16:50 / sld
Sodium	112	mg/L		1		E200.7	09/24/18 16:50 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains Water Treatment
Lab ID: H18090525-004
Client Sample ID: MDPT-Leichtnam-Treated

Report Date: 09/27/18
Collection Date: 09/21/18 13:05
DateReceived: 09/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.7	s.u.	H	0.1		A4500-H B	09/24/18 13:37 / SRW
pH Measurement Temp	15.4	°C				A4500-H B	09/24/18 13:37 / SRW
Conductivity @ 25 C	355	umhos/cm		1		A2510 B	09/24/18 13:37 / SRW
Solids, Total Dissolved TDS @ 180 C	216	mg/L		10		A2540 C	09/24/18 14:33 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	150	mg/L		4		A2320 B	09/25/18 10:00 / SRW
Bicarbonate as HCO3	180	mg/L		4		A2320 B	09/25/18 10:00 / SRW
Carbonate as CO3	ND	mg/L		4		A2320 B	09/25/18 10:00 / SRW
Chloride	7	mg/L		1		E300.0	09/24/18 21:21 / SRW
Sulfate	12	mg/L		1		E300.0	09/24/18 21:21 / SRW
Fluoride	0.3	mg/L		0.1	4	E300.0	09/24/18 21:21 / SRW
Hardness as CaCO3	1	mg/L		1		A2340 B	09/25/18 08:08 / sld
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	2.77	mg/L	D	0.05		E353.2	09/25/18 13:12 / kmd
METALS, ACID-SOLUBLE							
Arsenic	ND	mg/L		0.001	0.01	E200.8	09/24/18 17:08 / sld
Calcium	ND	mg/L		1		E200.7	09/24/18 16:54 / sld
Iron	0.01	mg/L		0.01		E200.8	09/24/18 17:08 / sld
Magnesium	ND	mg/L		1		E200.7	09/24/18 16:54 / sld
Manganese	ND	mg/L		0.005		E200.8	09/24/18 17:08 / sld
Potassium	ND	mg/L		1		E200.7	09/24/18 16:54 / sld
Sodium	81	mg/L		1		E200.7	09/24/18 16:54 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
H - Analysis performed past recommended holding time.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains Water Treatment
Lab ID: H18090525-005
Client Sample ID: MDPT-Haun-Raw

Report Date: 09/27/18
Collection Date: 09/21/18 15:00
DateReceived: 09/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.8	s.u.	H	0.1		A4500-H B	09/24/18 13:39 / SRW
pH Measurement Temp	15.8	°C				A4500-H B	09/24/18 13:39 / SRW
Conductivity @ 25 C	472	umhos/cm		1		A2510 B	09/24/18 13:39 / SRW
Solids, Total Dissolved TDS @ 180 C	266	mg/L		10		A2540 C	09/24/18 14:34 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	240	mg/L		4		A2320 B	09/25/18 10:07 / SRW
Bicarbonate as HCO3	290	mg/L		4		A2320 B	09/25/18 10:07 / SRW
Carbonate as CO3	ND	mg/L		4		A2320 B	09/25/18 10:07 / SRW
Chloride	4	mg/L		1		E300.0	09/24/18 21:35 / SRW
Sulfate	6	mg/L		1		E300.0	09/24/18 21:35 / SRW
Fluoride	1.0	mg/L		0.1	4	E300.0	09/24/18 21:35 / SRW
Hardness as CaCO3	151	mg/L		1		A2340 B	09/26/18 08:31 / sld
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	0.02	mg/L		0.01		E353.2	09/25/18 13:13 / kmd
METALS, ACID-SOLUBLE							
Arsenic	0.010	mg/L	*	0.001	0.01	E200.8	09/24/18 17:10 / sld
Calcium	44	mg/L		1		E200.7	09/24/18 16:57 / sld
Iron	5.38	mg/L		0.01		E200.7	09/24/18 16:57 / sld
Magnesium	10	mg/L		1		E200.7	09/24/18 16:57 / sld
Manganese	0.360	mg/L		0.005		E200.8	09/24/18 17:10 / sld
Potassium	4	mg/L		1		E200.7	09/24/18 16:57 / sld
Sodium	41	mg/L		1		E200.7	09/24/18 16:57 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
* - The result exceeds the MCL.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
H - Analysis performed past recommended holding time.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains Water Treatment
Lab ID: H18090525-006
Client Sample ID: MDPT-Leichtnam-Raw

Report Date: 09/27/18
Collection Date: 09/21/18 12:55
DateReceived: 09/24/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.6	s.u.	H	0.1		A4500-H B	09/24/18 13:41 / SRW
pH Measurement Temp	16.8	°C				A4500-H B	09/24/18 13:41 / SRW
Conductivity @ 25 C	353	umhos/cm		1		A2510 B	09/24/18 13:41 / SRW
Solids, Total Dissolved TDS @ 180 C	201	mg/L		10		A2540 C	09/24/18 14:34 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	150	mg/L		4		A2320 B	09/25/18 10:15 / SRW
Bicarbonate as HCO3	180	mg/L		4		A2320 B	09/25/18 10:15 / SRW
Carbonate as CO3	ND	mg/L		4		A2320 B	09/25/18 10:15 / SRW
Chloride	7	mg/L		1		E300.0	09/24/18 21:49 / SRW
Sulfate	12	mg/L		1		E300.0	09/24/18 21:49 / SRW
Fluoride	0.3	mg/L		0.1	4	E300.0	09/24/18 21:49 / SRW
Hardness as CaCO3	138	mg/L		1		A2340 B	09/24/18 17:01 / abc
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	2.79	mg/L	D	0.02		E353.2	09/25/18 13:20 / kmd
METALS, ACID-SOLUBLE							
Arsenic	0.027	mg/L	*	0.001	0.01	E200.8	09/24/18 17:12 / sld
Calcium	41	mg/L		1		E200.7	09/24/18 17:01 / sld
Iron	0.04	mg/L		0.01		E200.8	09/24/18 17:12 / sld
Magnesium	9	mg/L		1		E200.7	09/24/18 17:01 / sld
Manganese	0.047	mg/L		0.005		E200.8	09/24/18 17:12 / sld
Potassium	6	mg/L		1		E200.7	09/24/18 17:01 / sld
Sodium	13	mg/L		1		E200.7	09/24/18 17:01 / sld

Report Definitions:

RL - Analyte reporting limit.
QCL - Quality control limit.
* - The result exceeds the MCL.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains Water Treatment

Report Date: 09/27/18
Work Order: H18090525

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2320 B										Batch: R138451
Lab ID: MBLK		Method Blank				Run: PHSC_101-H_180925A			09/25/18 09:14	
Alkalinity, Total as CaCO3		2	mg/L	2						
Lab ID: LCS		Laboratory Control Sample				Run: PHSC_101-H_180925A			09/25/18 09:20	
Alkalinity, Total as CaCO3		590	mg/L	4.0	98	90	110			
Lab ID: H18090525-003ADUP	3	Sample Duplicate				Run: PHSC_101-H_180925A			09/25/18 09:52	
Alkalinity, Total as CaCO3		230	mg/L	4.0				0.2	10	
Bicarbonate as HCO3		280	mg/L	4.0				0.2	10	
Carbonate as CO3		ND	mg/L	4.0					10	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains Water Treatment

Report Date: 09/27/18
Work Order: H18090525

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2510 B								Analytical Run: PHSC_101-H_180924A		
Lab ID: SC 150		Initial Calibration Verification Standard							09/24/18 08:52	
Conductivity @ 25 C		156	umhos/cm	1.0	104	90	110			
Lab ID: SC 20000		Initial Calibration Verification Standard							09/24/18 08:54	
Conductivity @ 25 C		19500	umhos/cm	1.0	98	90	110			
Lab ID: SC 5000		Initial Calibration Verification Standard							09/24/18 08:56	
Conductivity @ 25 C		4950	umhos/cm	1.0	99	90	110			
Method: A2510 B										Batch: R138413
Lab ID: SC 1000		Laboratory Control Sample				Run: PHSC_101-H_180924A			09/24/18 08:58	
Conductivity @ 25 C		1010	umhos/cm	1.0	101	90	110			
Lab ID: H18090525-001ADUP		Sample Duplicate				Run: PHSC_101-H_180924A			09/24/18 13:28	
Conductivity @ 25 C		526	umhos/cm	1.0				0.6	10	
Lab ID: H18090525-002ADUP		Sample Duplicate				Run: PHSC_101-H_180924A			09/24/18 13:32	
Conductivity @ 25 C		454	umhos/cm	1.0				0.5	10	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains Water Treatment

Report Date: 09/27/18
Work Order: H18090525

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2540 C									Batch: TDS180924A	
Lab ID: MB-1_180924A		Method Blank				Run: ACCU-124 (14410200)_18092			09/24/18 14:27	
Solids, Total Dissolved TDS @ 180 C		ND	mg/L	10						
Lab ID: LCS-2_180924A		Laboratory Control Sample				Run: ACCU-124 (14410200)_18092			09/24/18 14:29	
Solids, Total Dissolved TDS @ 180 C		1940	mg/L	20	97	90	110			
Lab ID: H18090538-001A DUP		Sample Duplicate				Run: ACCU-124 (14410200)_18092			09/24/18 15:31	
Solids, Total Dissolved TDS @ 180 C		192	mg/L	10				1.0	5	
Lab ID: H18090538-011A DUP		Sample Duplicate				Run: ACCU-124 (14410200)_18092			09/24/18 15:33	
Solids, Total Dissolved TDS @ 180 C		217	mg/L	10				0.9	5	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation **Report Date:** 09/27/18

Project: MDT Plains Water Treatment **Work Order:** H18090525

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500-H B									Analytical Run: PHSC_101-H_180924A	
Lab ID: pH 7	2	Initial Calibration Verification Standard							09/24/18 08:46	
pH		7.0	s.u.	0.1	99	98	102			
pH Measurement Temp		21.2	°C			0	0			
Method: A4500-H B									Batch: R138413	
Lab ID: H18090525-001ADUP	2	Sample Duplicate				Run: PHSC_101-H_180924A			09/24/18 13:28	
pH		8.3	s.u.	0.1				0.1	3	
pH Measurement Temp		15.8	°C							
Lab ID: H18090525-002ADUP	2	Sample Duplicate				Run: PHSC_101-H_180924A			09/24/18 13:32	
pH		7.7	s.u.	0.1				0.1	3	
pH Measurement Temp		15.1	°C							

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains Water Treatment

Report Date: 09/27/18
Work Order: H18090525

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7									Analytical Run: ICP2-HE_180924A	
Lab ID: ICV	5	Initial Calibration Verification Standard							09/24/18 11:24	
Calcium		39.5	mg/L	1.0	99	95	105			
Iron		4.03	mg/L	0.020	101	95	105			
Magnesium		39.6	mg/L	1.0	99	95	105			
Potassium		40.5	mg/L	1.0	101	95	105			
Sodium		40.6	mg/L	1.0	101	95	105			
Lab ID: CCV-1	5	Continuing Calibration Verification Standard							09/24/18 11:28	
Calcium		24.9	mg/L	1.0	100	95	105			
Iron		2.50	mg/L	0.020	100	95	105			
Magnesium		24.7	mg/L	1.0	99	95	105			
Potassium		25.1	mg/L	1.0	100	95	105			
Sodium		25.1	mg/L	1.0	101	95	105			
Lab ID: ICSA	5	Interference Check Sample A							09/24/18 11:39	
Calcium		454	mg/L	1.0	91	80	120			
Iron		181	mg/L	0.020	91	80	120			
Magnesium		500	mg/L	1.0	100	80	120			
Potassium		-0.00491	mg/L	1.0		0	0			
Sodium		0.0419	mg/L	1.0		0	0			
Lab ID: ICSAB	5	Interference Check Sample AB							09/24/18 11:43	
Calcium		450	mg/L	1.0	90	80	120			
Iron		180	mg/L	0.020	90	80	120			
Magnesium		495	mg/L	1.0	99	80	120			
Potassium		19.9	mg/L	1.0	99	80	120			
Sodium		20.0	mg/L	1.0	100	80	120			
Lab ID: CCV	5	Continuing Calibration Verification Standard							09/24/18 15:41	
Calcium		24.6	mg/L	1.0	98	90	110			
Iron		2.48	mg/L	0.020	99	90	110			
Magnesium		24.2	mg/L	1.0	97	90	110			
Potassium		26.3	mg/L	1.0	105	90	110			
Sodium		26.5	mg/L	1.0	106	90	110			
Lab ID: CCV	5	Continuing Calibration Verification Standard							09/24/18 16:27	
Calcium		24.4	mg/L	1.0	98	90	110			
Iron		2.45	mg/L	0.020	98	90	110			
Magnesium		24.0	mg/L	1.0	96	90	110			
Potassium		25.8	mg/L	1.0	103	90	110			
Sodium		26.0	mg/L	1.0	104	90	110			
Method: E200.7									Batch: R138434	
Lab ID: MB	5	Method Blank				Run: ICP2-HE_180924A			09/24/18 11:54	
Calcium		ND	mg/L	0.07						
Iron		ND	mg/L	0.01						
Magnesium		ND	mg/L	0.01						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains Water Treatment

Report Date: 09/27/18
Work Order: H18090525

Analyte		Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method:	**E200.7**									Batch: R138434	
Lab ID:	**MB**	5	Method Blank				Run: ICP2-HE_180924A			09/24/18 11:54	
Potassium			ND	mg/L	0.06						
Sodium			ND	mg/L	0.02						
Lab ID:	**LFB**	5	Laboratory Fortified Blank				Run: ICP2-HE_180924A			09/24/18 11:58	
Calcium			49.9	mg/L	1.0	100	85	115			
Iron			5.17	mg/L	0.020	103	85	115			
Magnesium			50.8	mg/L	1.0	102	85	115			
Potassium			50.7	mg/L	1.0	101	85	115			
Sodium			50.7	mg/L	1.0	101	85	115			
Lab ID:	**H18090525-002BMS2**	5	Sample Matrix Spike				Run: ICP2-HE_180924A			09/24/18 16:43	
Calcium			97.4	mg/L	1.0	102	70	130			
Iron			7.29	mg/L	0.020	101	70	130			
Magnesium			62.2	mg/L	1.0	102	70	130			
Potassium			59.5	mg/L	1.0	106	70	130			
Sodium			79.1	mg/L	1.0	107	70	130			
Lab ID:	**H18090525-002BMSD**	5	Sample Matrix Spike Duplicate				Run: ICP2-HE_180924A			09/24/18 16:46	
Calcium			94.8	mg/L	1.0	97	70	130	2.7	20	
Iron			7.18	mg/L	0.020	99	70	130	1.5	20	
Magnesium			60.0	mg/L	1.0	97	70	130	3.6	20	
Potassium			58.3	mg/L	1.0	104	70	130	2.1	20	
Sodium			78.0	mg/L	1.0	105	70	130	1.4	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Report Date: 09/27/18
Project: MDT Plains Water Treatment
Work Order: H18090525

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8									Analytical Run: ICPMS205-H_180924B	
Lab ID: ICV	3	Initial Calibration Verification Standard								09/24/18 12:48
Arsenic		0.0598	mg/L	0.0050	100	90	110			
Iron		0.309	mg/L	0.020	103	90	110			
Manganese		0.308	mg/L	0.010	103	90	110			
Lab ID: ICSA	3	Interference Check Sample A								09/24/18 12:50
Arsenic		8.35E-05	mg/L	0.0050						
Iron		97.8	mg/L	0.020	98	70	130			
Manganese		0.000207	mg/L	0.010						
Lab ID: ICSAB	3	Interference Check Sample AB								09/24/18 12:52
Arsenic		0.0101	mg/L	0.0050	101	70	130			
Iron		98.3	mg/L	0.020	98	70	130			
Manganese		0.0197	mg/L	0.010	99	70	130			
Lab ID: ICV	3	Initial Calibration Verification Standard								09/24/18 17:48
Arsenic		0.0610	mg/L	0.0050	102	90	110			
Iron		0.311	mg/L	0.020	104	90	110			
Manganese		0.310	mg/L	0.010	103	90	110			
Lab ID: ICSA	3	Interference Check Sample A								09/24/18 17:50
Arsenic		0.000109	mg/L	0.0050						
Iron		98.8	mg/L	0.020	99	70	130			
Manganese		0.000198	mg/L	0.010						
Lab ID: ICSAB	3	Interference Check Sample AB								09/24/18 17:52
Arsenic		0.00998	mg/L	0.0050	100	70	130			
Iron		99.0	mg/L	0.020	99	70	130			
Manganese		0.0199	mg/L	0.010	99	70	130			
Lab ID: ICV	3	Initial Calibration Verification Standard								09/24/18 19:31
Arsenic		0.0609	mg/L	0.0050	102	90	110			
Iron		0.314	mg/L	0.020	105	90	110			
Manganese		0.309	mg/L	0.010	103	90	110			
Lab ID: ICSA	3	Interference Check Sample A								09/24/18 19:33
Arsenic		8.79E-05	mg/L	0.0050						
Iron		98.5	mg/L	0.020	99	70	130			
Manganese		0.000185	mg/L	0.010						
Lab ID: ICSAB	3	Interference Check Sample AB								09/24/18 19:35
Arsenic		0.00998	mg/L	0.0050	100	70	130			
Iron		97.6	mg/L	0.020	98	70	130			
Manganese		0.0195	mg/L	0.010	97	70	130			
Method: E200.8										Batch: R138435
Lab ID: LRB	3	Method Blank				Run: ICPMS205-H_180924B				09/24/18 13:04
Arsenic		ND	mg/L	4E-05						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains Water Treatment

Report Date: 09/27/18
Work Order: H18090525

Analyte		Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method:	**E200.8**									Batch: R138435	
Lab ID:	**LRB**	3	Method Blank				Run: ICPMS205-H_180924B			09/24/18 13:04	
Iron			ND	mg/L	0.002						
Manganese			ND	mg/L	0.0003						
Lab ID:	**LFB**	3	Laboratory Fortified Blank				Run: ICPMS205-H_180924B			09/24/18 13:06	
Arsenic			0.0500	mg/L	0.0050	100	85	115			
Iron			0.156	mg/L	0.020	104	85	115			
Manganese			0.0505	mg/L	0.010	101	85	115			
Lab ID:	**H18090525-002BMS**	3	Sample Matrix Spike				Run: ICPMS205-H_180924B			09/24/18 17:14	
Arsenic			0.149	mg/L	0.0010	103	70	130			
Iron			2.46	mg/L	0.020		70	130			A
Manganese			0.253	mg/L	0.0010		70	130			A
Lab ID:	**H18090525-002BMSD**	3	Sample Matrix Spike Duplicate				Run: ICPMS205-H_180924B			09/24/18 17:16	
Arsenic			0.148	mg/L	0.0010	102	70	130	0.2	20	
Iron			2.44	mg/L	0.020		70	130	0.8	20	A
Manganese			0.253	mg/L	0.0010		70	130	0.1	20	A

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation **Report Date:** 09/27/18

Project: MDT Plains Water Treatment **Work Order:** H18090525

Analyte		Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method:	**E300.0**							Analytical Run: IC METROHM_180924A			
Lab ID:	**ICV**	3	Initial Calibration Verification Standard							09/24/18 14:32	
Chloride			102	mg/L	1.0	102	90	110			
Sulfate			411	mg/L	1.0	103	90	110			
Fluoride			5.11	mg/L	0.10	102	90	110			
Lab ID:	**CCV**	3	Continuing Calibration Verification Standard							09/24/18 19:28	
Chloride			52.1	mg/L	1.0	104	90	110			
Sulfate			210	mg/L	1.0	105	90	110			
Fluoride			2.61	mg/L	0.10	105	90	110			
Method:	**E300.0**									Batch: R138465	
Lab ID:	**ICB**	3	Method Blank				Run: IC METROHM_180924A			09/24/18 15:00	
Chloride			ND	mg/L	0.009						
Sulfate			0.03	mg/L	0.01						
Fluoride			ND	mg/L	0.009						
Lab ID:	**LFB**	3	Laboratory Fortified Blank				Run: IC METROHM_180924A			09/24/18 15:14	
Chloride			24.0	mg/L	1.0	96	90	110			
Sulfate			97.7	mg/L	1.0	98	90	110			
Fluoride			1.15	mg/L	0.10	92	90	110			
Lab ID:	**H18090059-014AMS**	3	Sample Matrix Spike				Run: IC METROHM_180924A			09/24/18 19:00	
Chloride			506	mg/L	1.0	97	90	110			
Sulfate			4550	mg/L	2.1	96	90	110			
Fluoride			22.9	mg/L	0.27	91	90	110			
Lab ID:	**H18090059-014AMSD**	3	Sample Matrix Spike Duplicate				Run: IC METROHM_180924A			09/24/18 19:14	
Chloride			510	mg/L	1.0	98	90	110	0.9	20	
Sulfate			4630	mg/L	2.1	100	90	110	1.7	20	
Fluoride			23.2	mg/L	0.27	92	90	110	1.3	20	
Lab ID:	**H18090528-001AMS**	3	Sample Matrix Spike				Run: IC METROHM_180924A			09/24/18 22:32	
Chloride			255	mg/L	1.0	98	90	110			
Sulfate			2220	mg/L	1.1	96	90	110			
Fluoride			14.3	mg/L	0.13	97	90	110			
Lab ID:	**H18090528-001AMSD**	3	Sample Matrix Spike Duplicate				Run: IC METROHM_180924A			09/24/18 22:46	
Chloride			254	mg/L	1.0	98	90	110	0.6	20	
Sulfate			2230	mg/L	1.1	97	90	110	0.2	20	
Fluoride			14.2	mg/L	0.13	96	90	110	0.8	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT Dept of Transportation
Project: MDT Plains Water Treatment

Report Date: 09/27/18
Work Order: H18090525

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E353.2									Analytical Run: FIA203-HE_180925C	
Lab ID: ICV		Initial Calibration Verification Standard							09/25/18 12:59	
Nitrogen, Nitrate+Nitrite as N		1.01	mg/L	0.010	101	90	110			
Lab ID: CCV		Continuing Calibration Verification Standard							09/25/18 13:18	
Nitrogen, Nitrate+Nitrite as N		0.501	mg/L	0.010	100	90	110			
Method: E353.2									Batch: R138501	
Lab ID: MBLK		Method Blank				Run: FIA203-HE_180925C			09/25/18 13:00	
Nitrogen, Nitrate+Nitrite as N		ND	mg/L	0.009						
Lab ID: LFB		Laboratory Fortified Blank				Run: FIA203-HE_180925C			09/25/18 13:02	
Nitrogen, Nitrate+Nitrite as N		1.03	mg/L	0.011	103	90	110			
Lab ID: H18090525-001CMS		Sample Matrix Spike				Run: FIA203-HE_180925C			09/25/18 13:07	
Nitrogen, Nitrate+Nitrite as N		1.03	mg/L	0.011	103	90	110			
Lab ID: H18090525-001CMSD		Sample Matrix Spike Duplicate				Run: FIA203-HE_180925C			09/25/18 13:08	
Nitrogen, Nitrate+Nitrite as N		1.01	mg/L	0.011	101	90	110	2.1	10	
Lab ID: H18090538-001CMS		Sample Matrix Spike				Run: FIA203-HE_180925C			09/25/18 13:23	
Nitrogen, Nitrate+Nitrite as N		1.38	mg/L	0.011	108	90	110			
Lab ID: H18090538-001CMSD		Sample Matrix Spike Duplicate				Run: FIA203-HE_180925C			09/25/18 13:24	
Nitrogen, Nitrate+Nitrite as N		1.35	mg/L	0.011	105	90	110	1.9	10	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

Work Order Receipt Checklist

MT Dept of Transportation

H18090525

Login completed by: Jessica C. Smith
Reviewed by: BL2000\rtooke
Reviewed Date: 9/25/2018

Date Received: 9/24/2018
Received by: TLL
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:	1.0°C On Ice		
Water - VOA vials have zero headspace?	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.

Contact and Corrective Action Comments:

None

Trust our People. Trust our Data.

Chain of Custody & Analytical Request Record

www.energylab.com

Page 1 of 1

Account Information (Billing information)

Company/Name	MT Dept. Transportation
Contact	Brian Goodman
Phone	441-7632 — 459-0210
Mailing Address	2701 Prospect
City, State, Zip	Helena MT 59620
Email	bgoodman@mt.gov
Receive Invoice	☐ Hard Copy ☑ Email
Receive Report	☐ Hard Copy ☑ Email
Purchase Order	
Quote	
Bottle Order	

Report Information (if different than Account Information)

Company/Name	
Contact	
Phone	
Mailing Address	
City, State, Zip	
Email	
Receive Report	☑ Hard Copy ☐ Email

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

Comments

Project Information

Project Name, PWSID, Permit, etc.	MDT Plains Water Treatment
Sampler Name	BG
Sampler Phone	459-0210
Sample Origin State	MT
EPA/State Compliance	☑ 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)	Analysis Requested: Domestic Water	Analysis Requested: As, Fe, Mn	See Attached	RUSH TAT	ELI LAB ID (Laboratory Use Only)
1	MDTP-Haun-Treated	9/21/18	1445	3	W	✓	✓			H180905-25
2	MDTP-Weeks-Raw		1400	3	W	✓	✓			
3	MDTP-Weeks-Treated		1415	3	W	✓	✓			
4	MDTP-Leichtman-Treated		1305	3	W	✓	✓			
5	MDTP-Haun-Raw		1500	3	W	✓	✓			
6	MDTP-Leichtman-Raw		1255	3	W	✓	✓			
7										
8										
9										
10										

Custody Record MUST be signed	Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
	Brian Goodman	9/21/18 1115	BG	Tracy Grant		
	Relinquished by (print)	Date/Time	Signature	Received by laboratory (print)	Date/Time	Signature
				Tracy Grant	9/24/18 1115	Tracy Grant

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	4	Y (N) C B	Y N	1.0 °C	(Y) N	(Y) N	CC Cash Check_____	$	

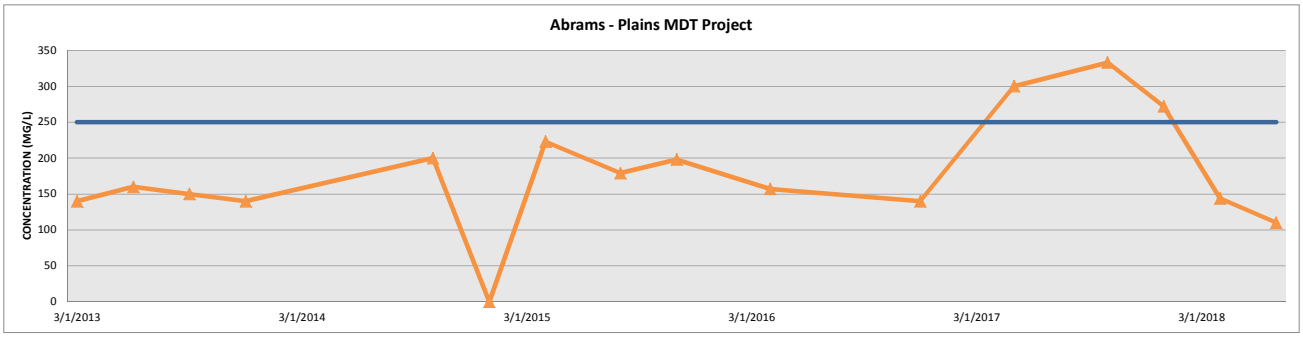
In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All subcontracted data will be clearly notated on your analytical report.

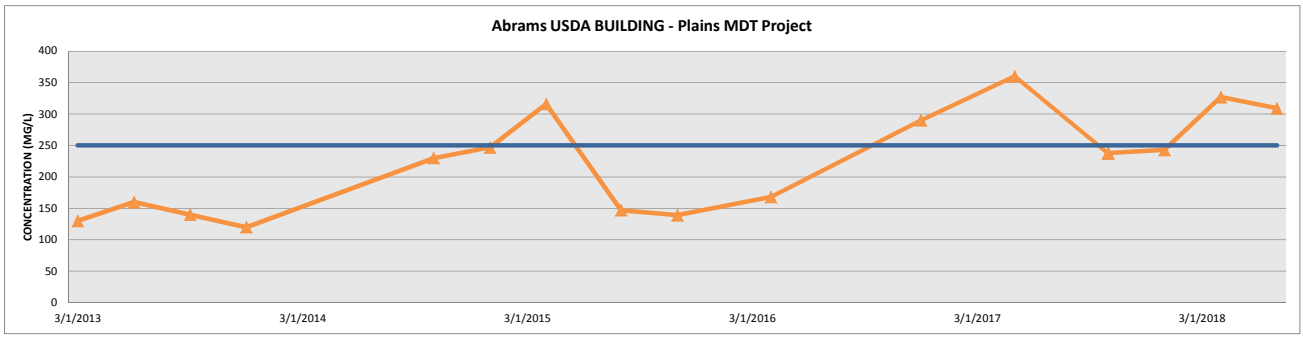
ELI-COC-12/16 v.1

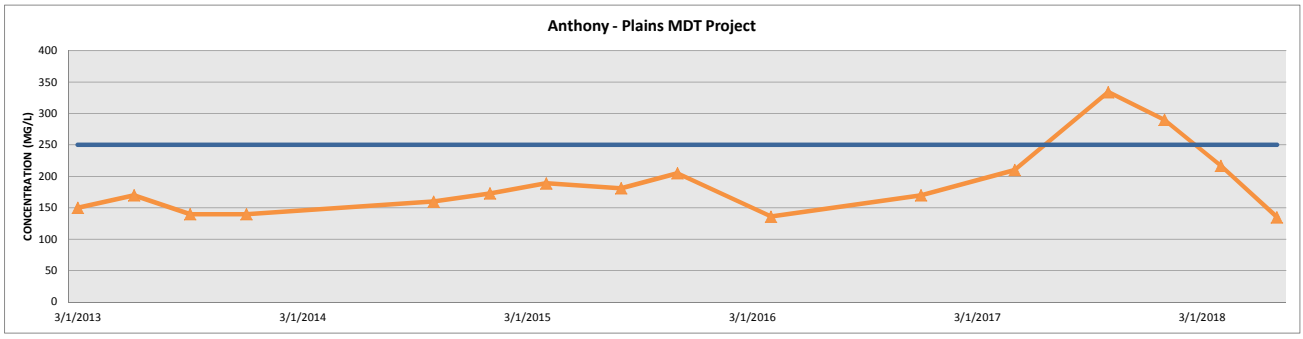
APPENDIX C

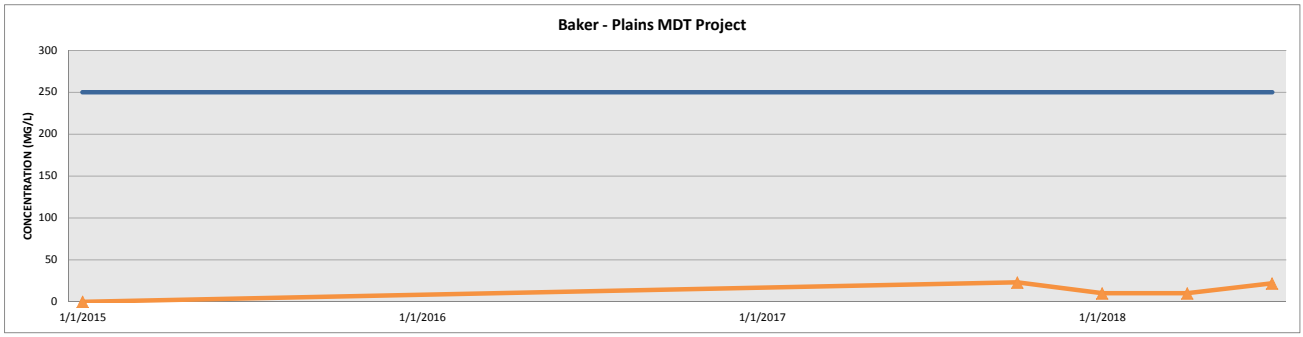
GRAPHS OF CHLORIDE, TDS, AND CONDUCTIVITY VALUES OVER TIME

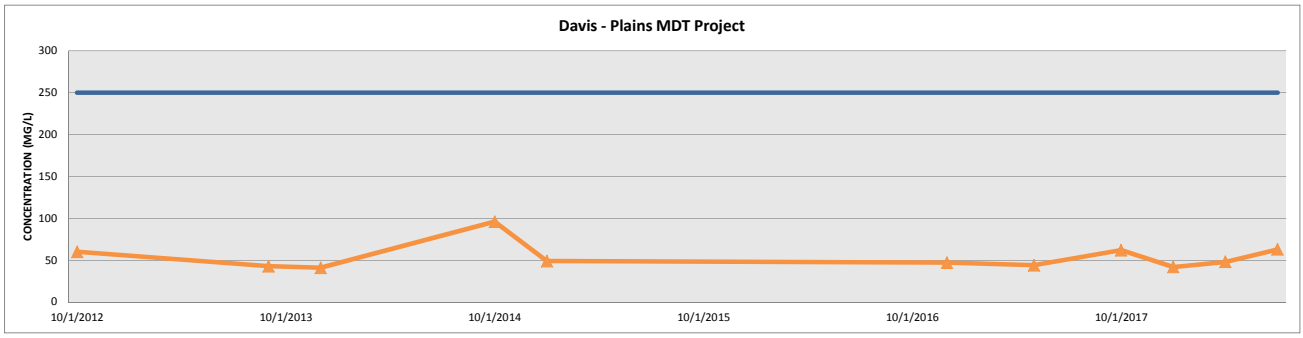
Chloride (mg/L)



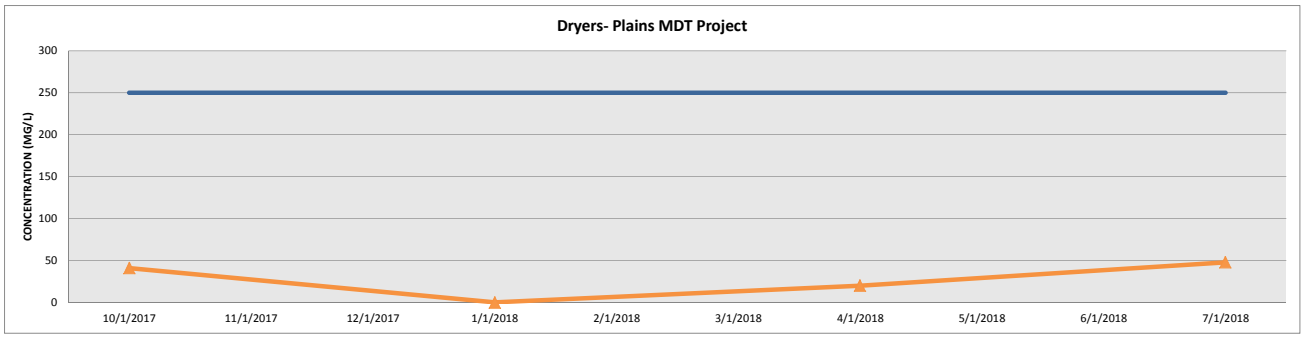


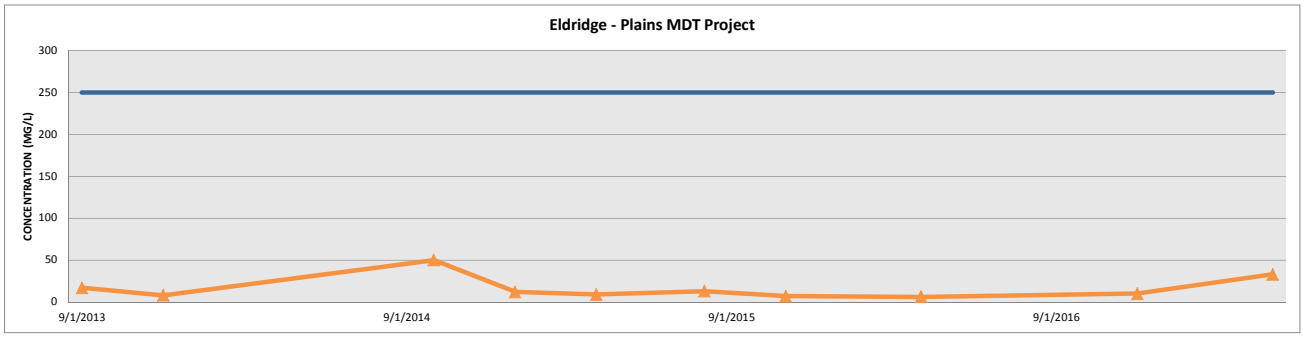


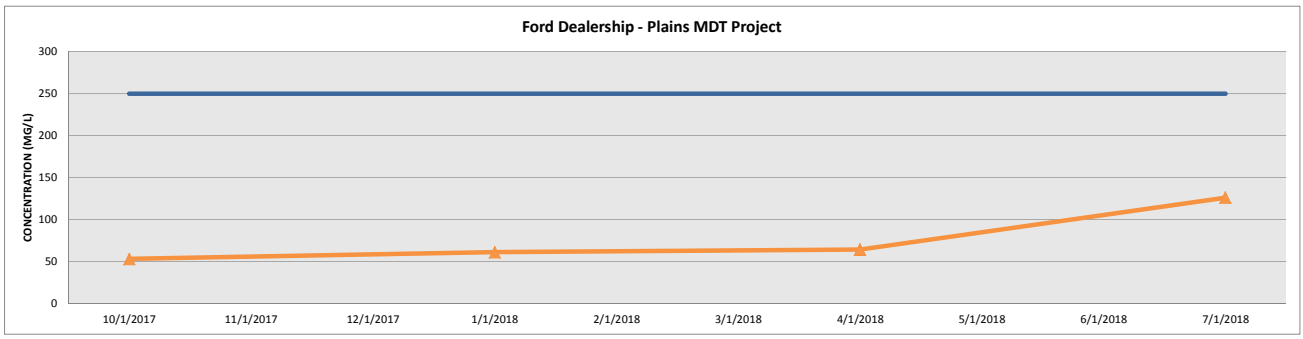


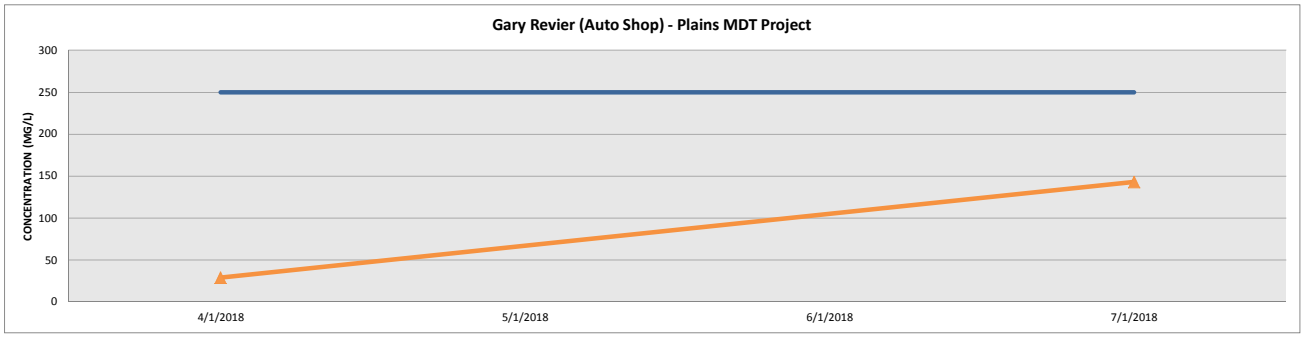


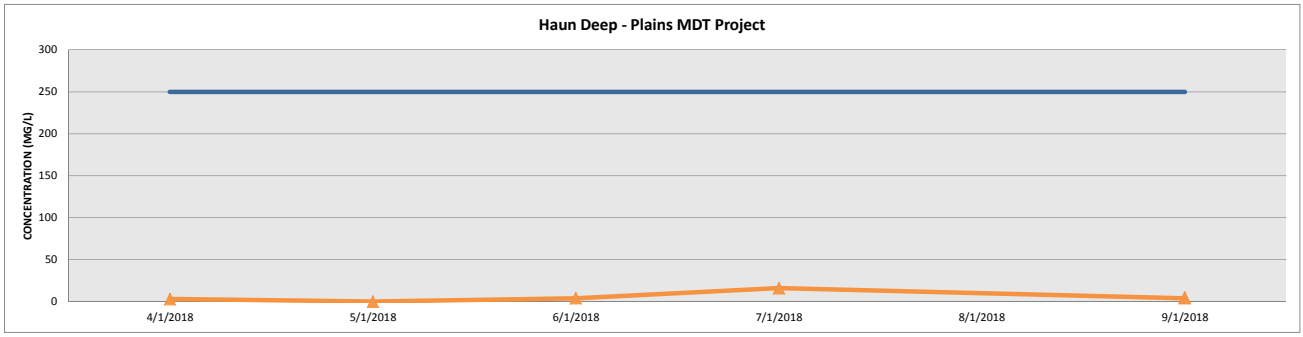
Chloride (mg/L)



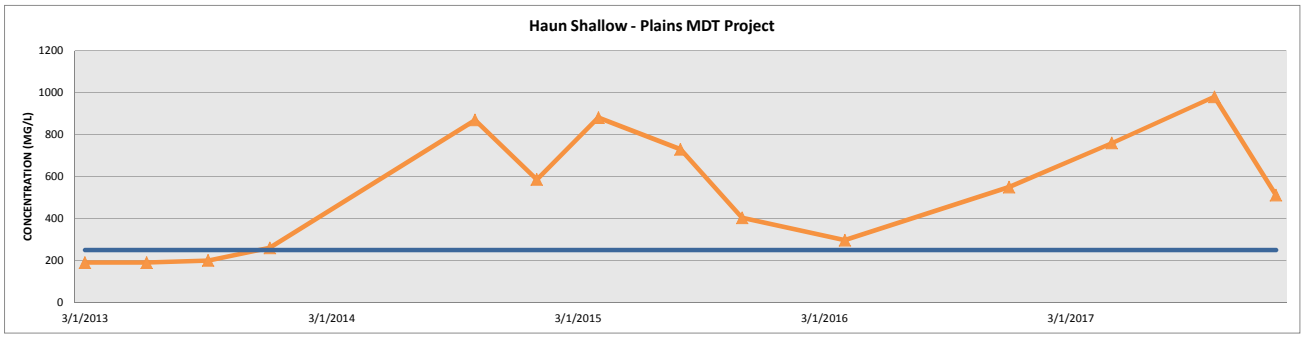


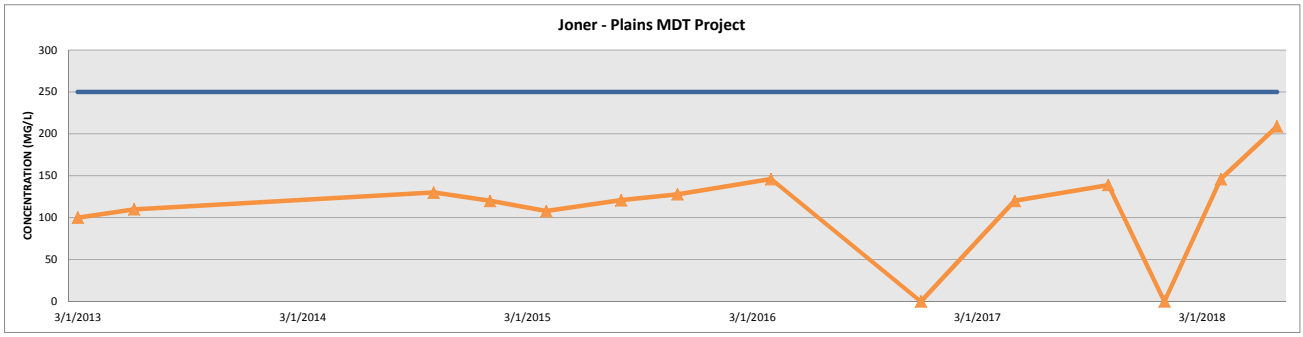


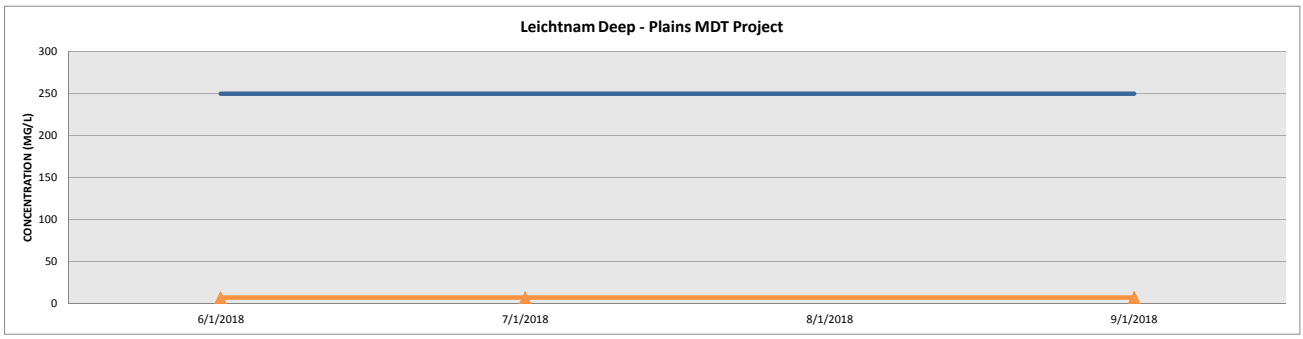


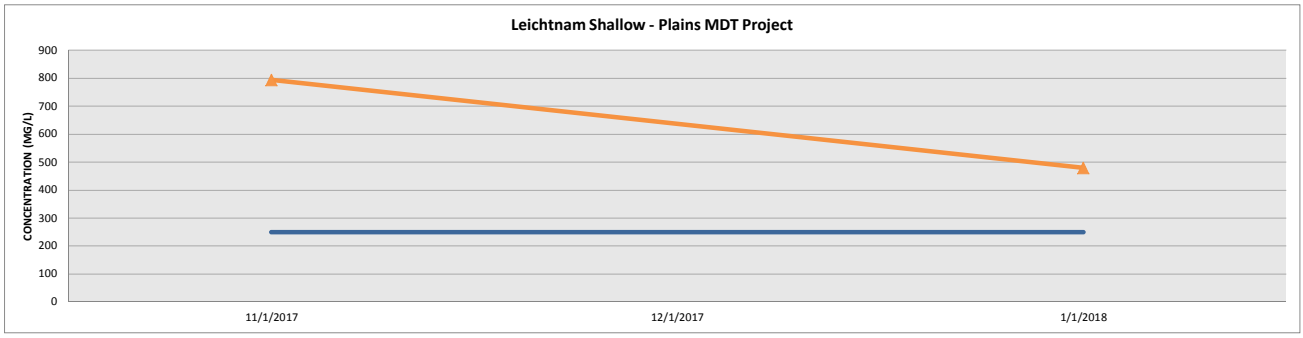


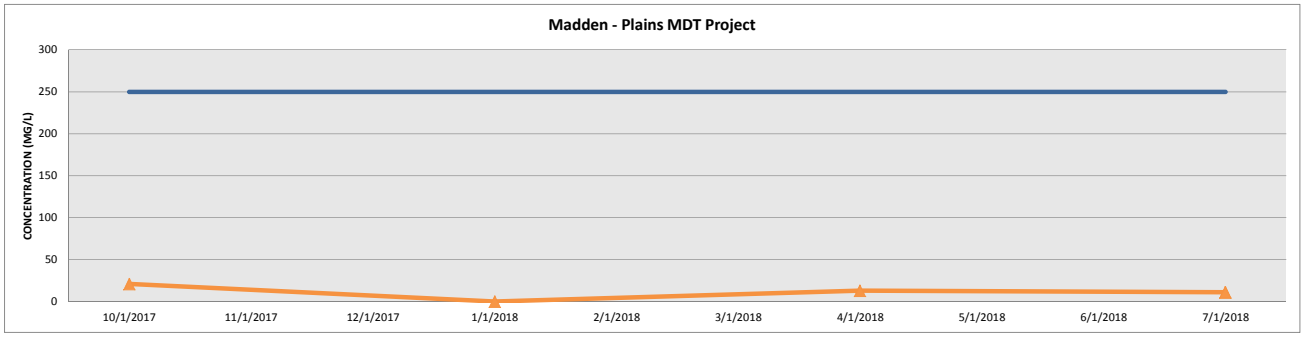
Chloride (mg/L)



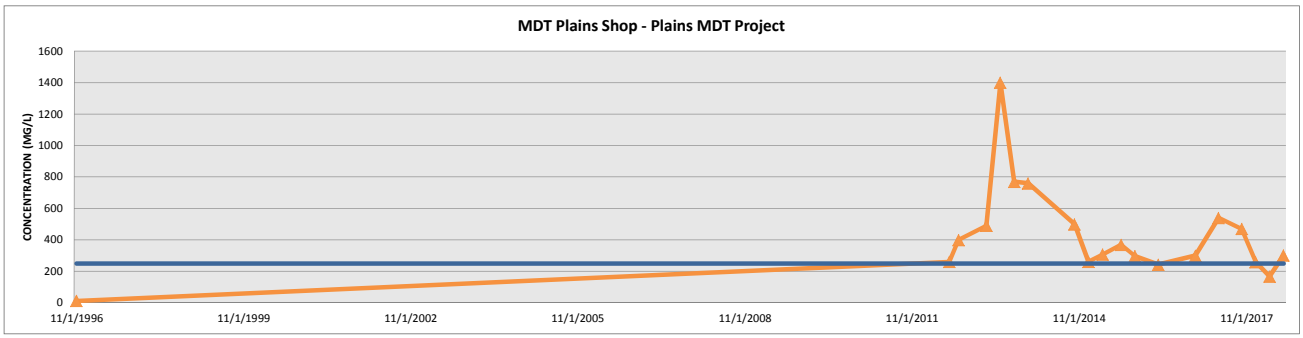


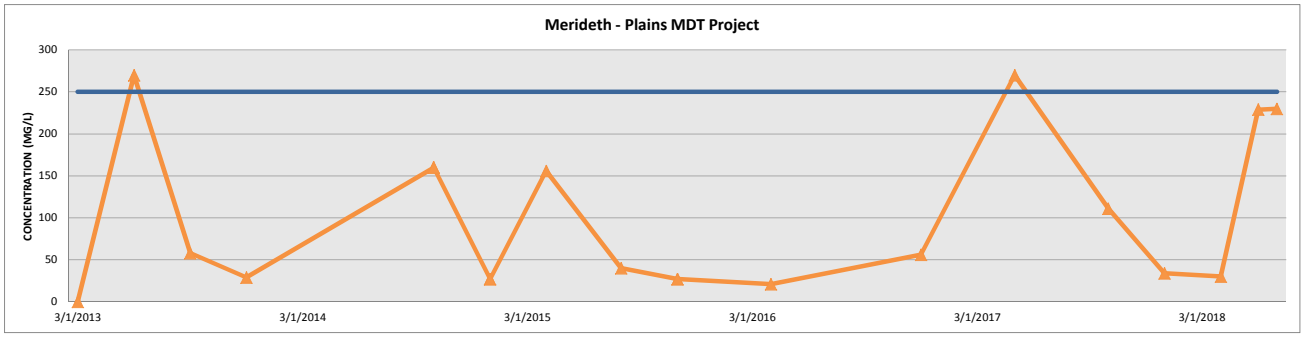


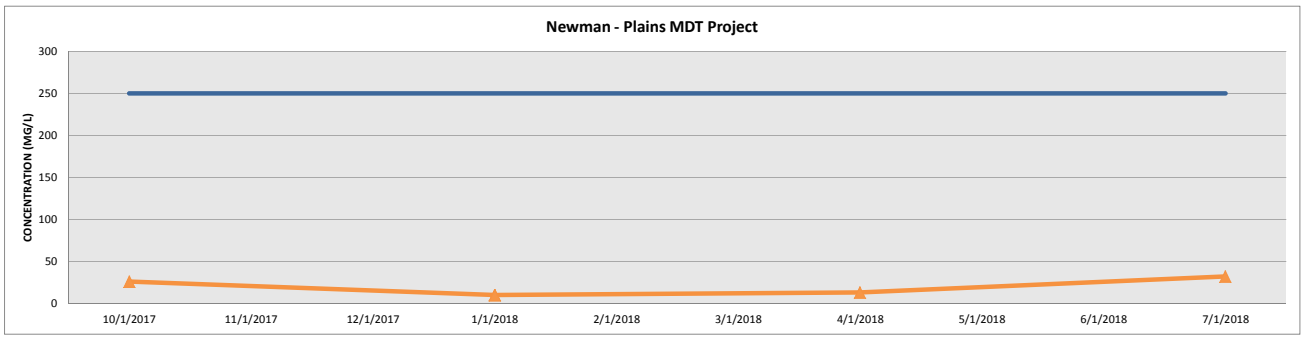


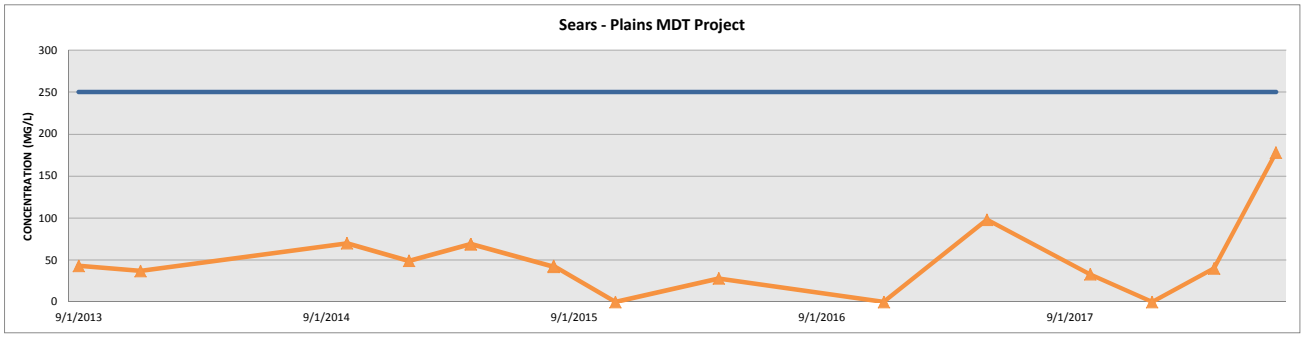


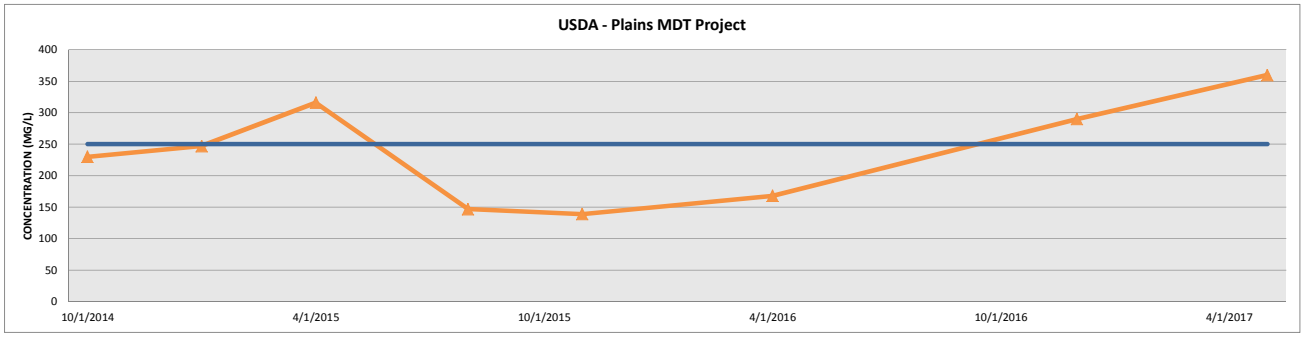
Chloride (mg/L)



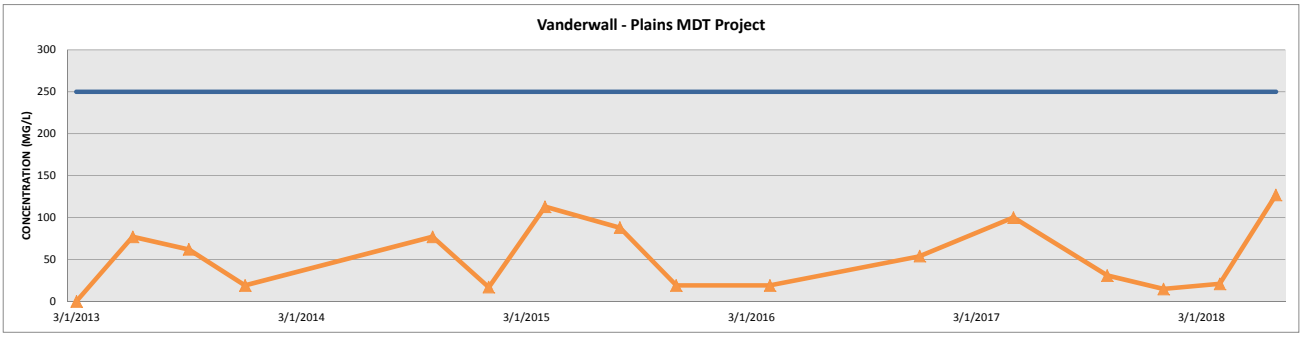


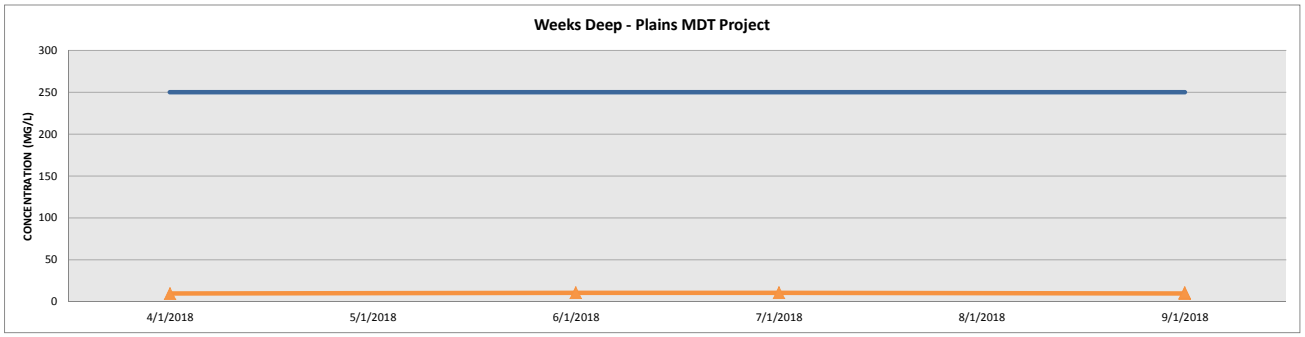


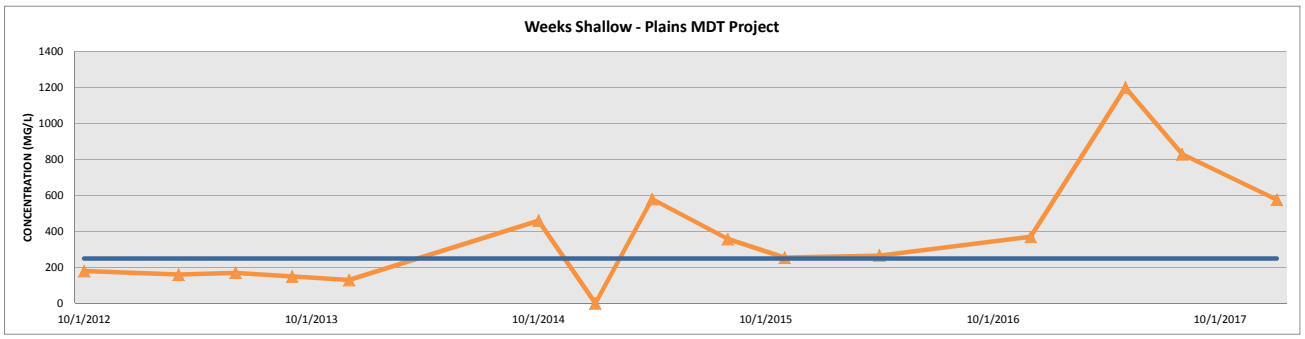


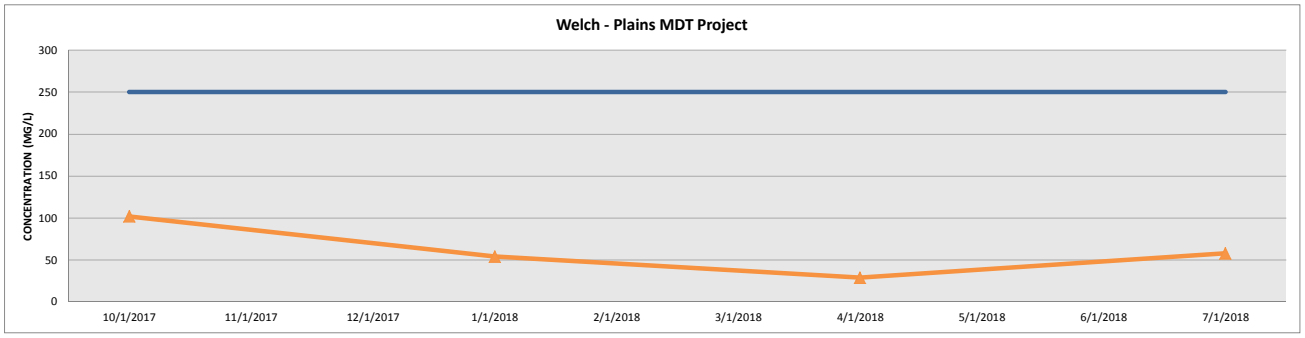


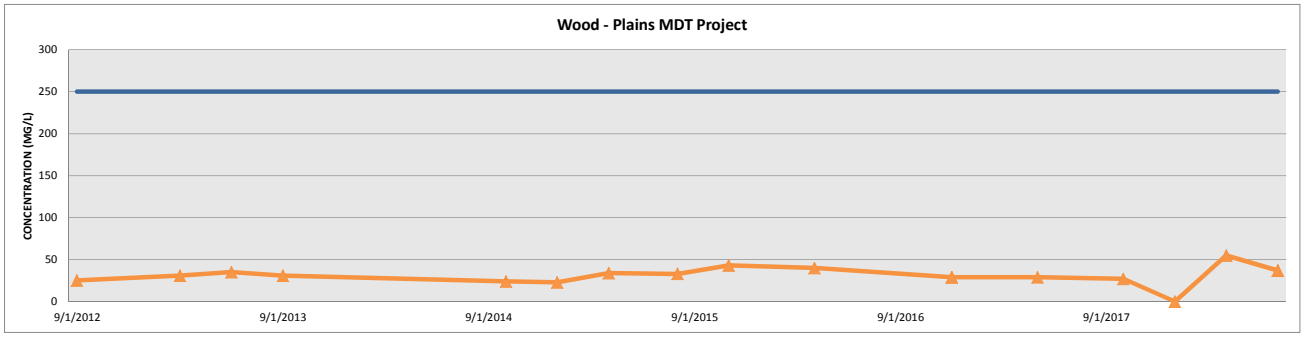
Chloride (mg/L)



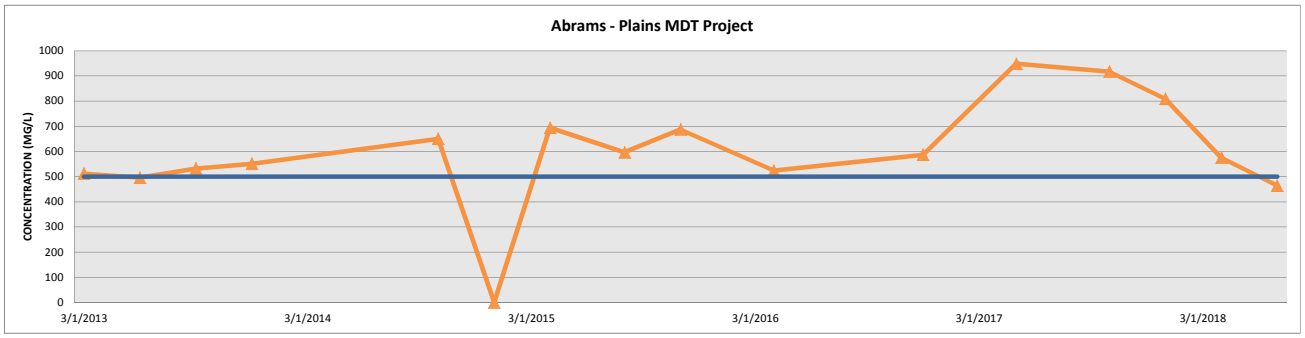


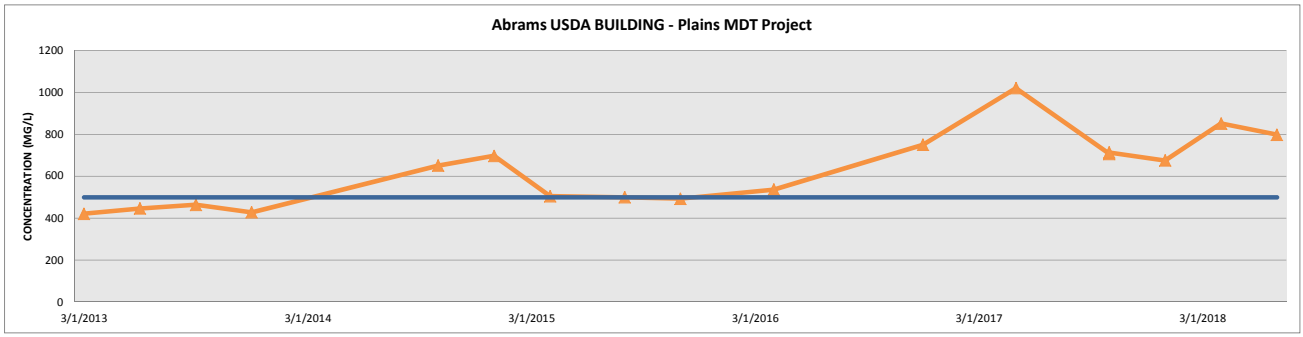


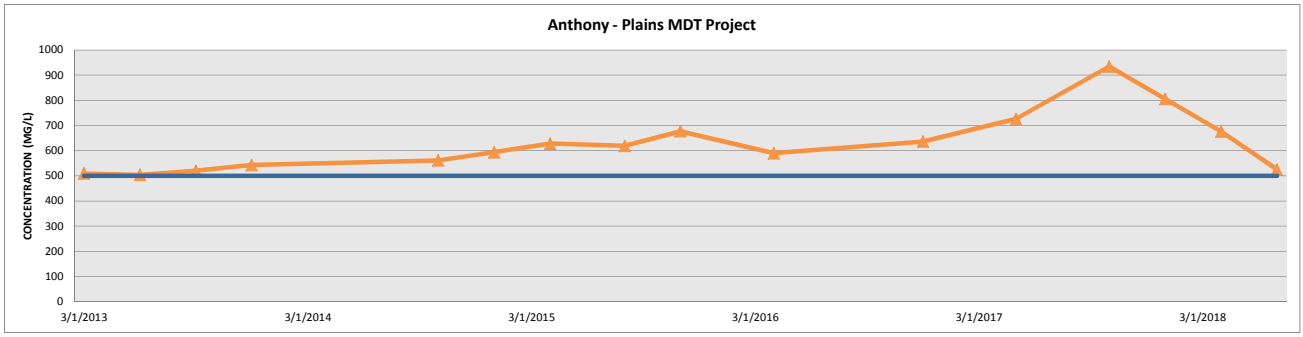


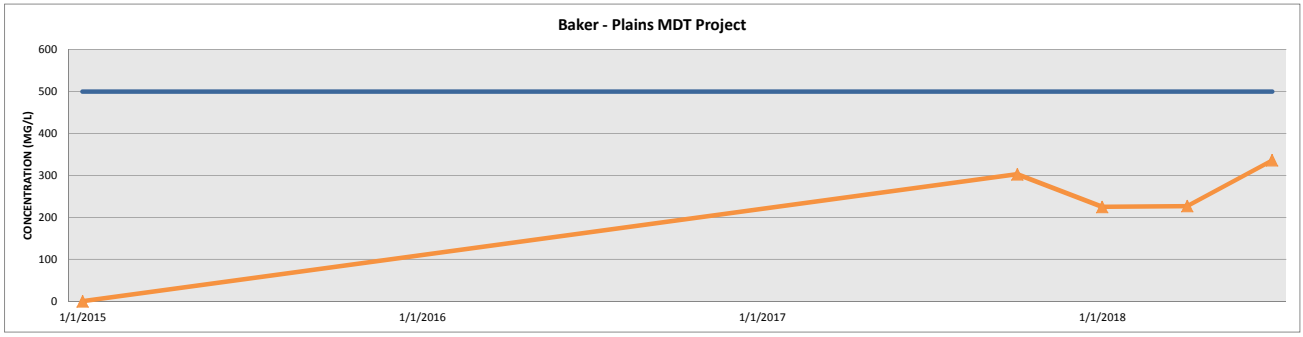


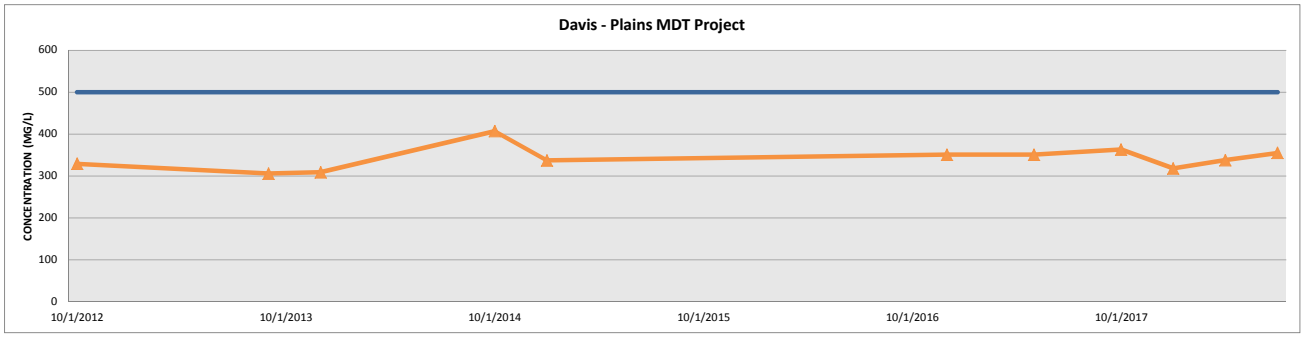
Total Dissolved Solids (mg/L)



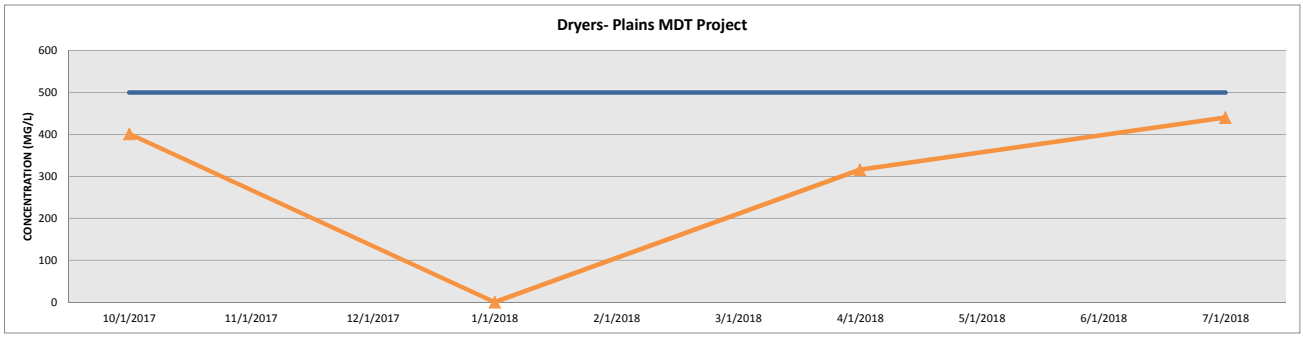


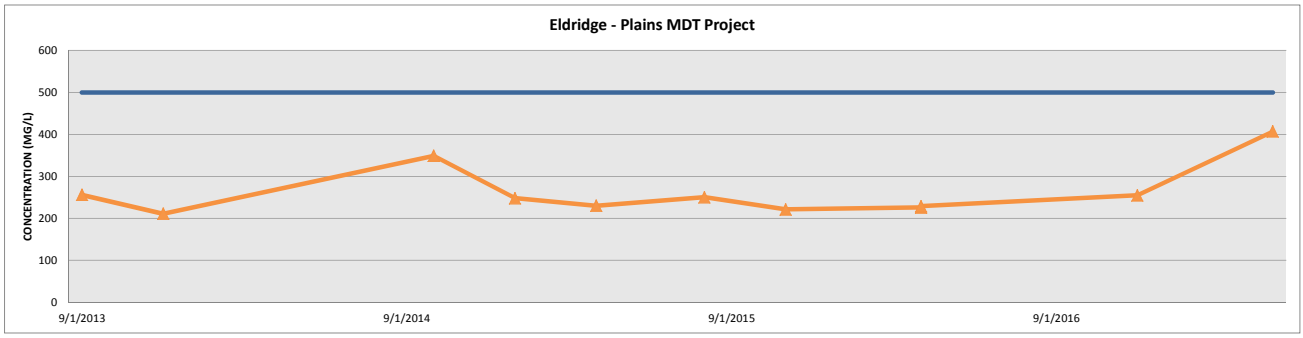


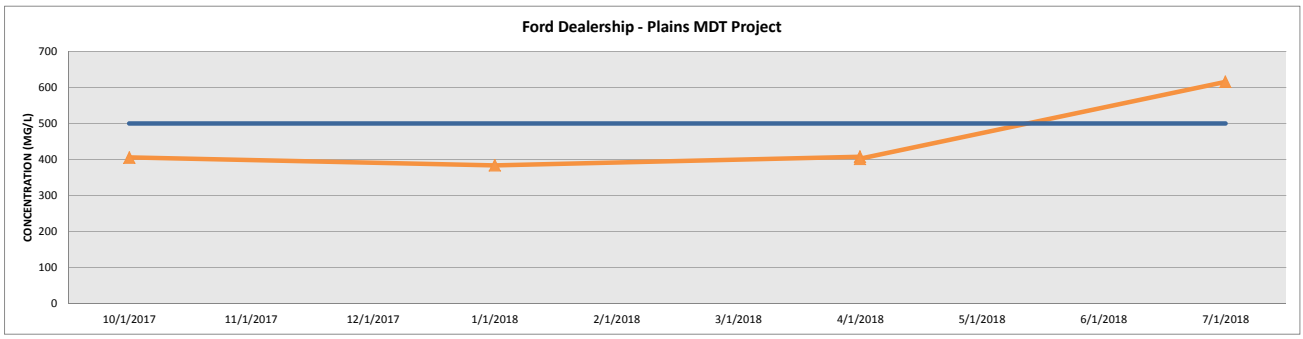


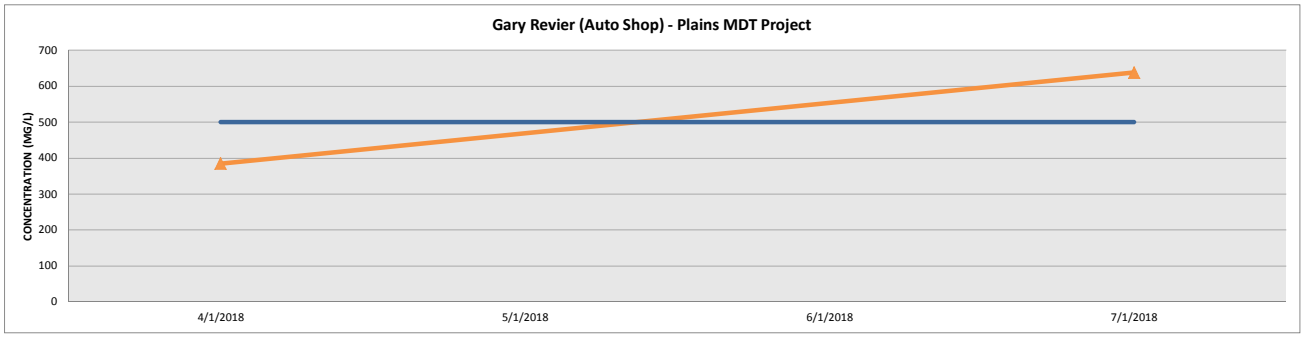


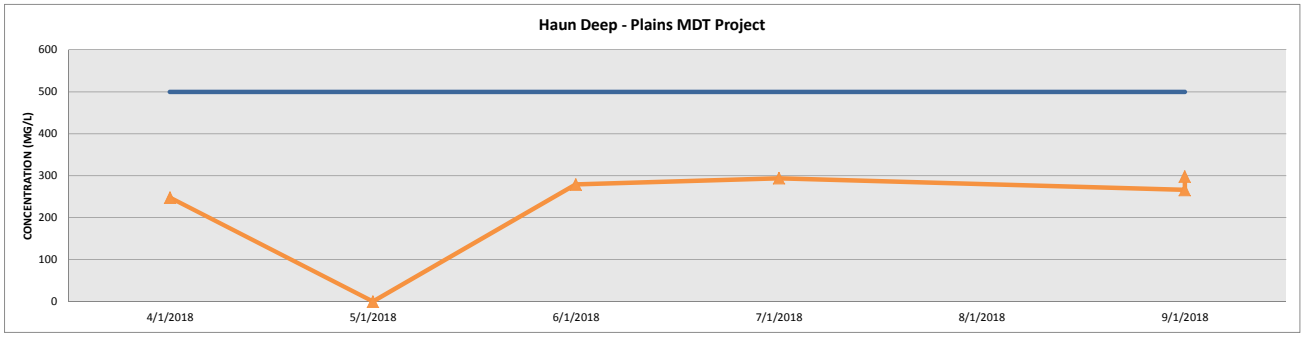
Total Dissolved Solids (mg/L)



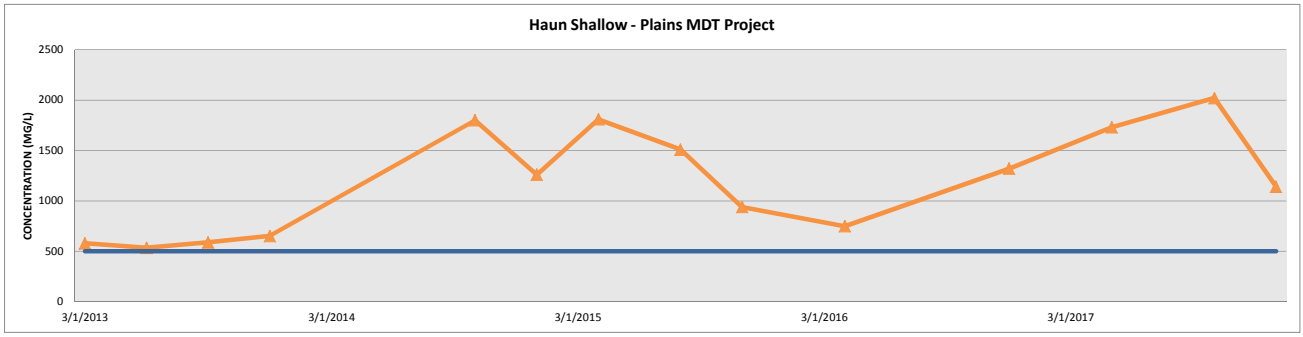


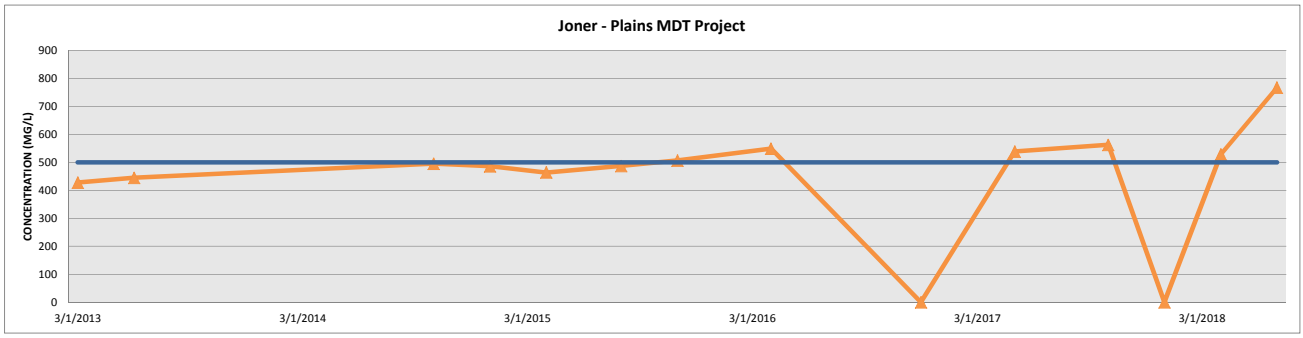


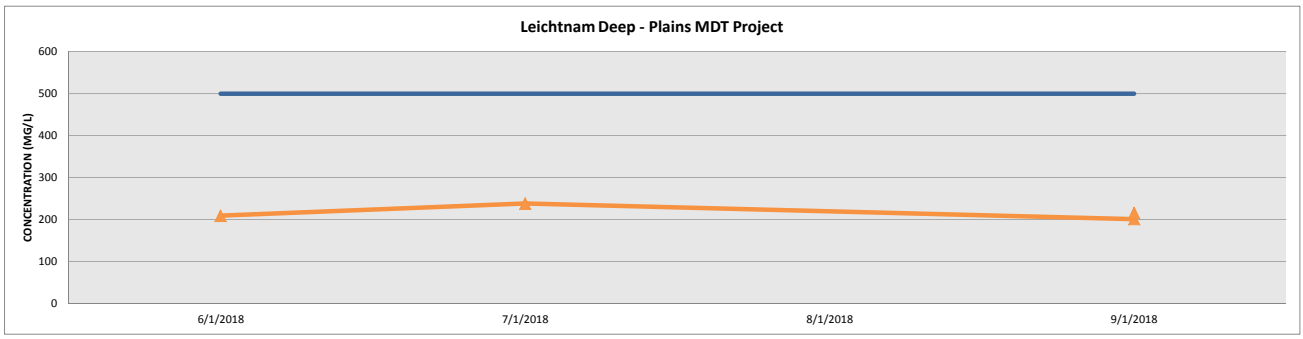


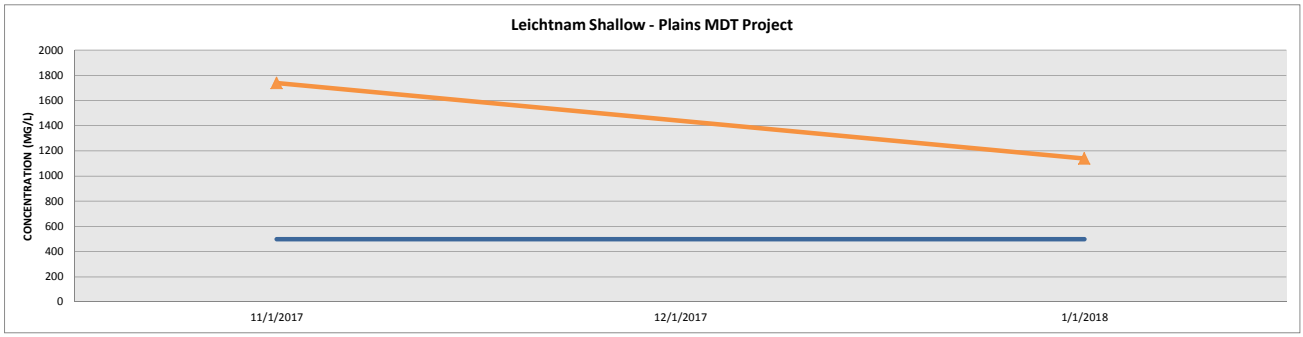


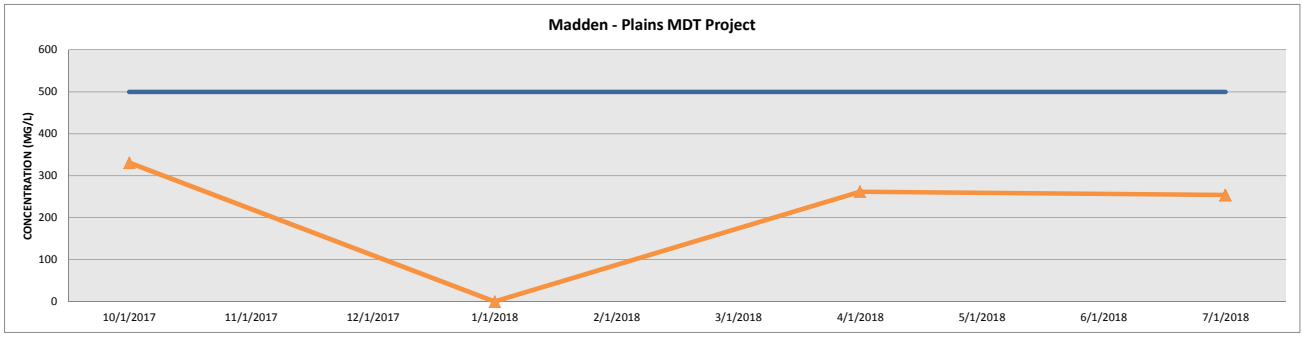
Total Dissolved Solids (mg/L)



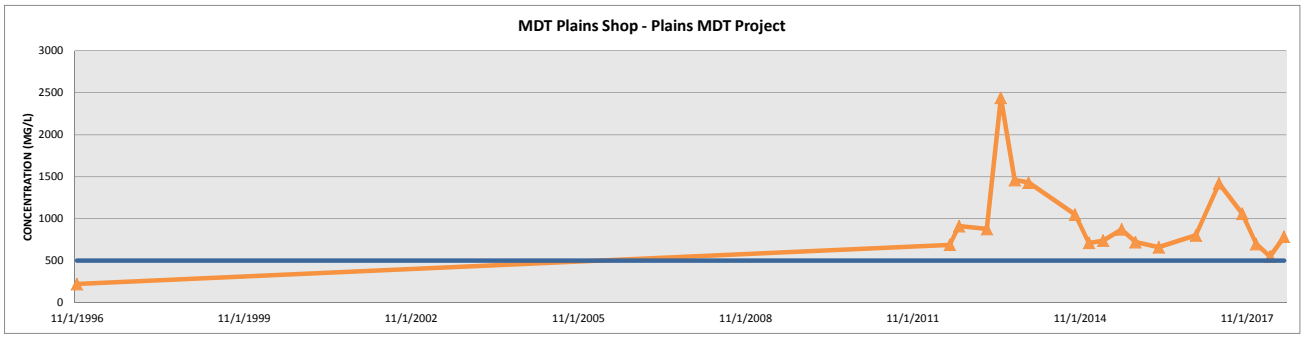


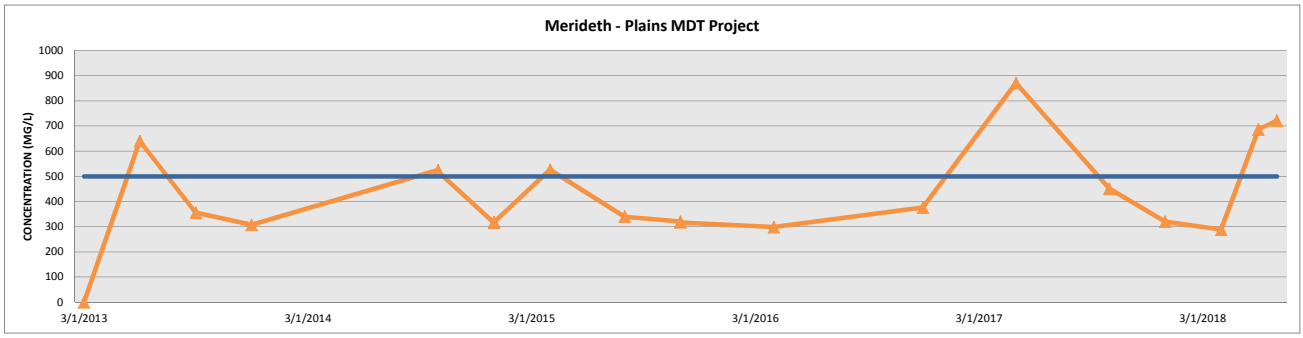


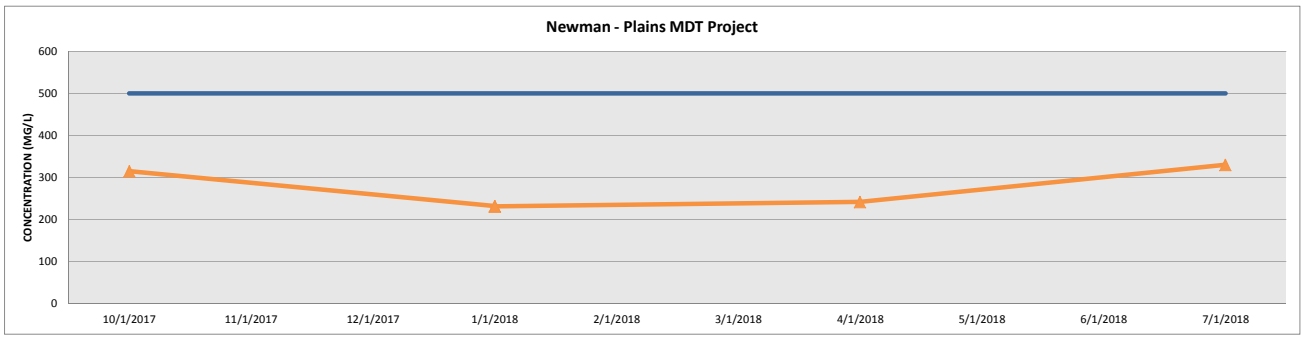


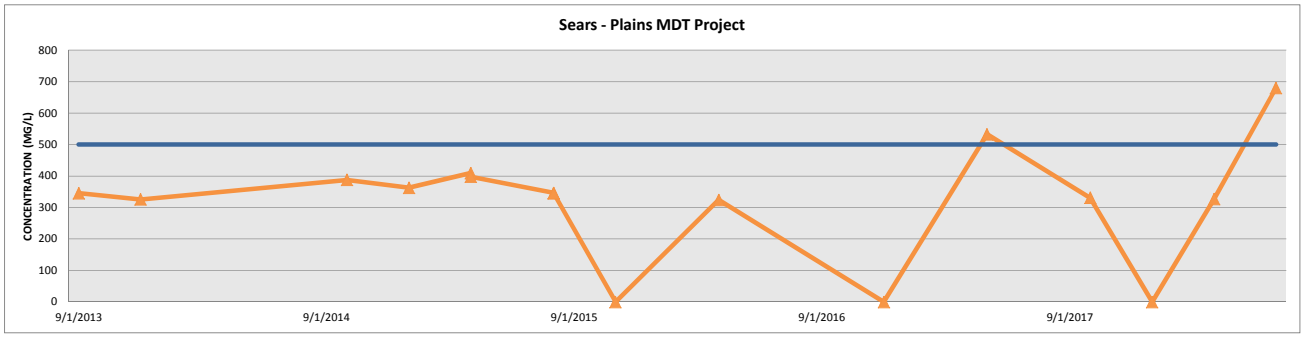


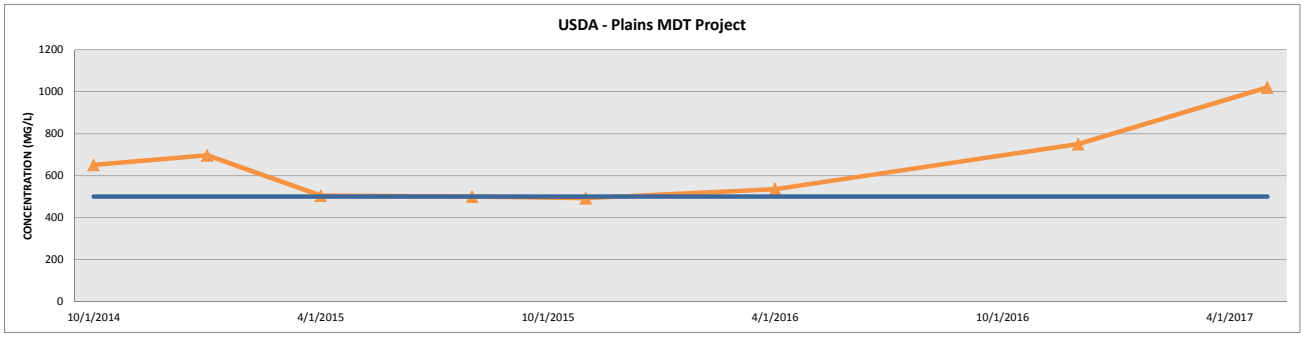
Total Dissolved Solids (mg/L)



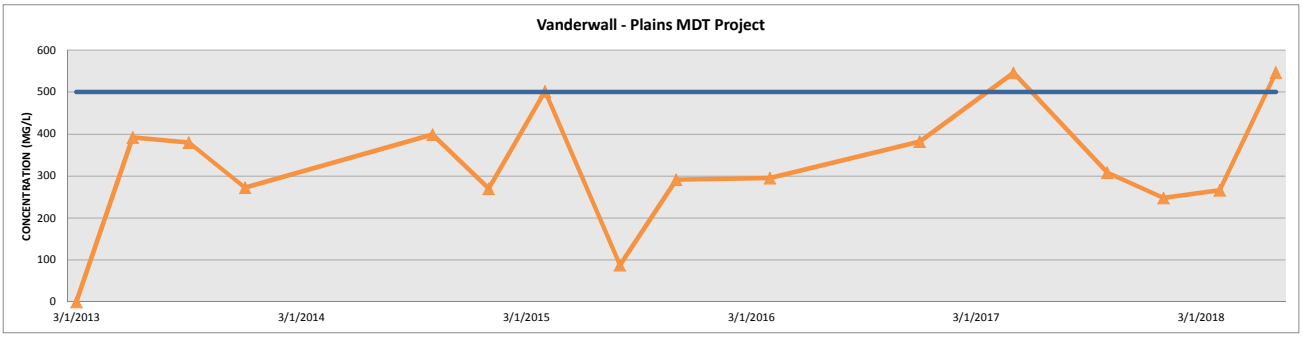


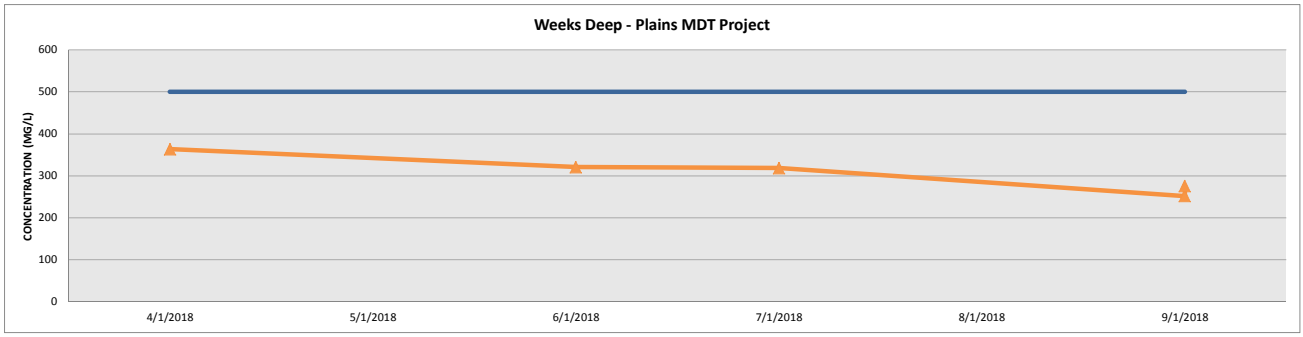


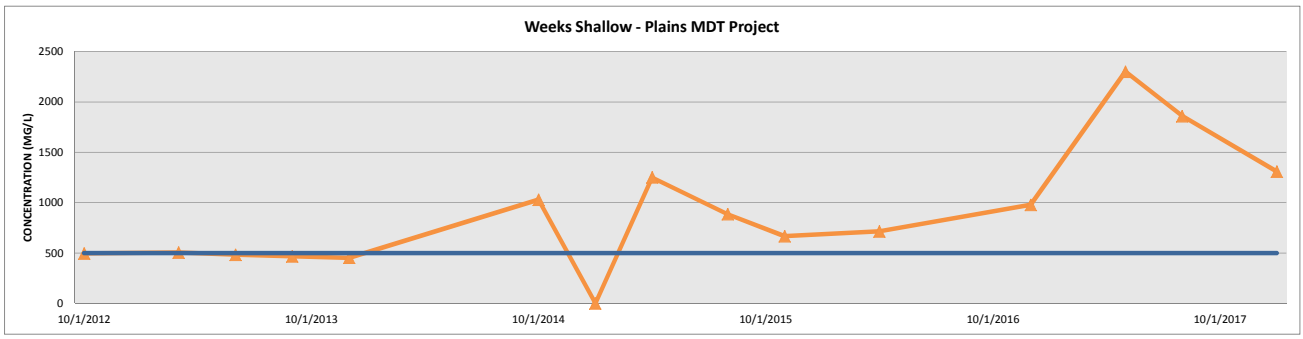


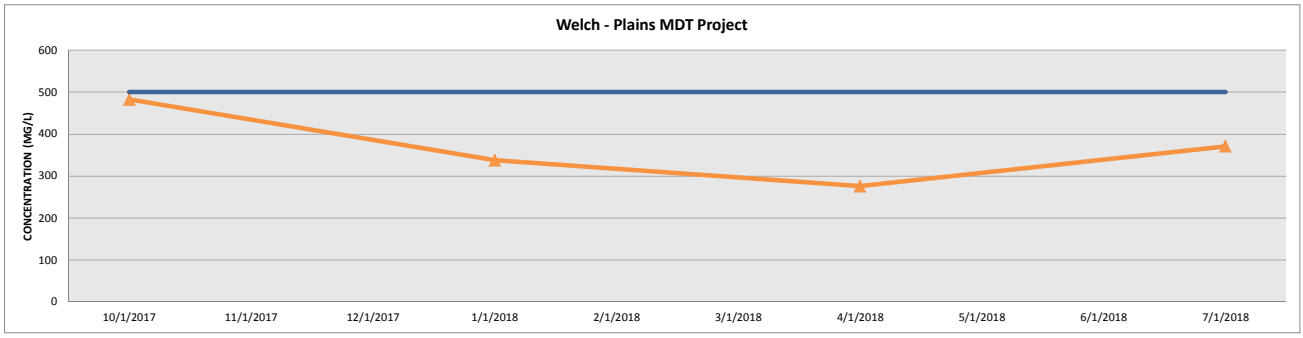


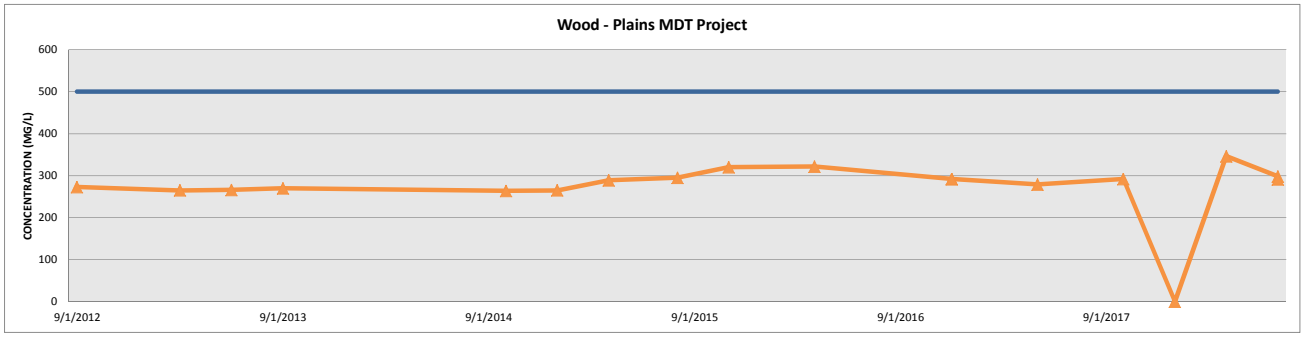
Total Dissolved Solids (mg/L)



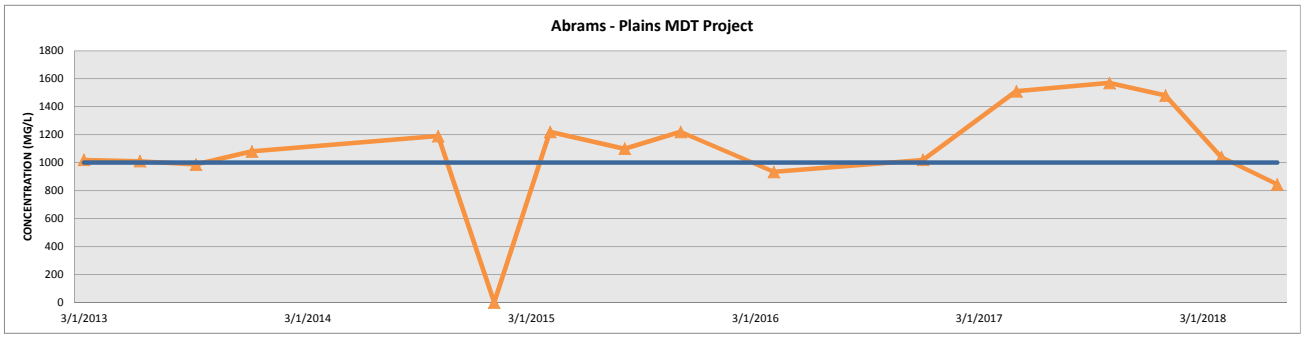


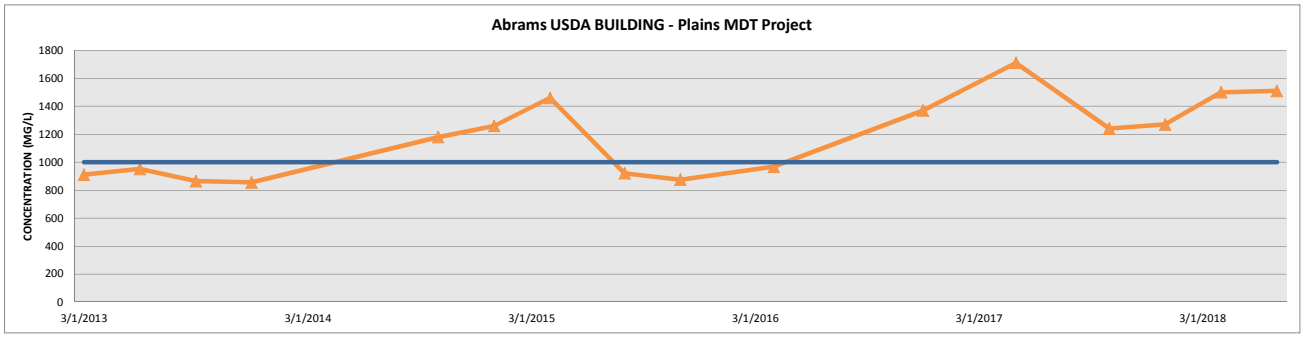


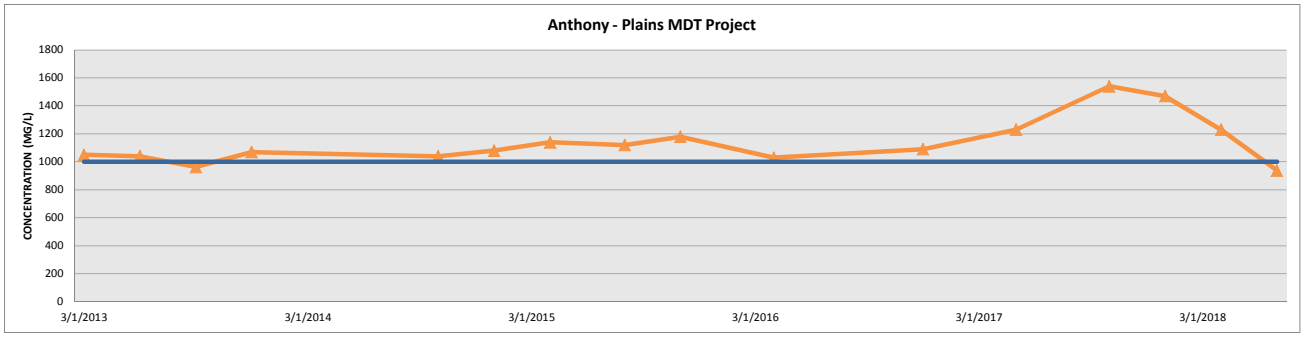


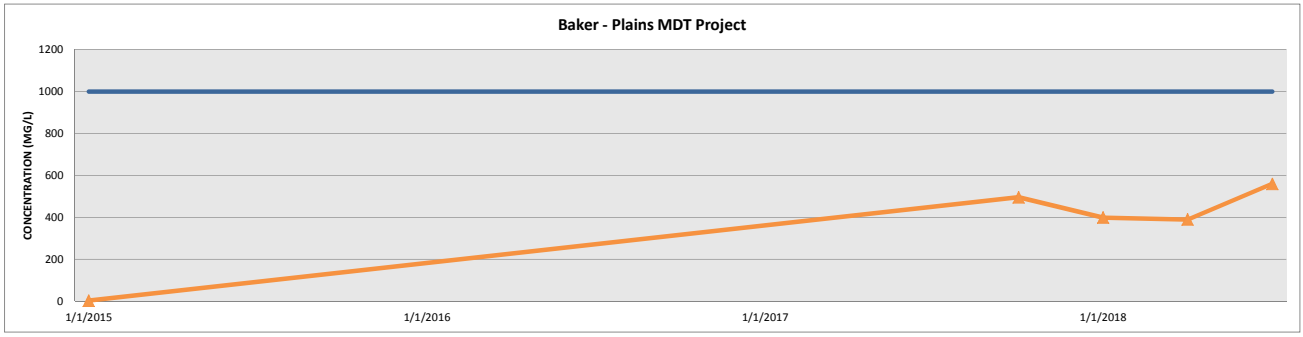


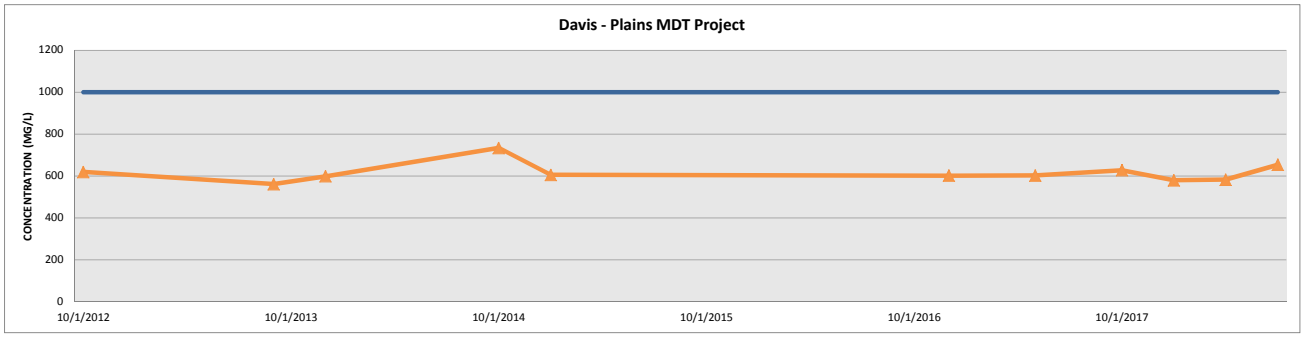
Conductivity @ 25C



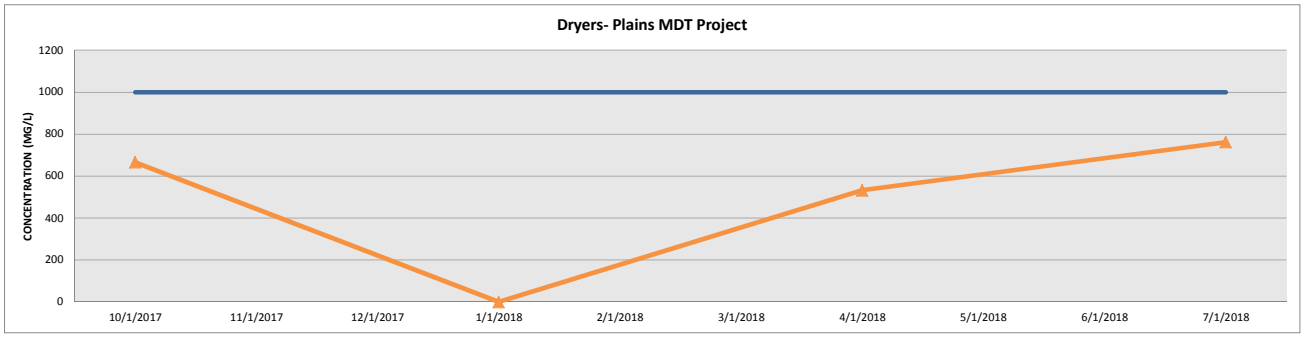


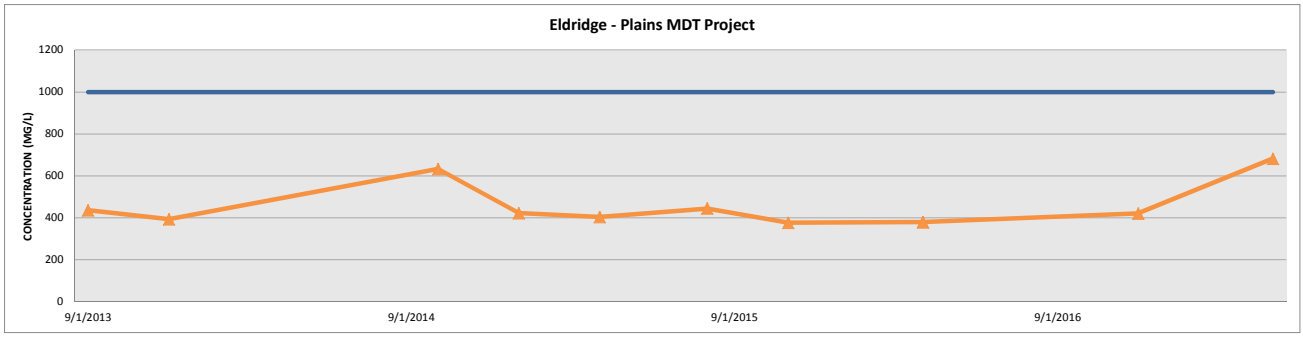


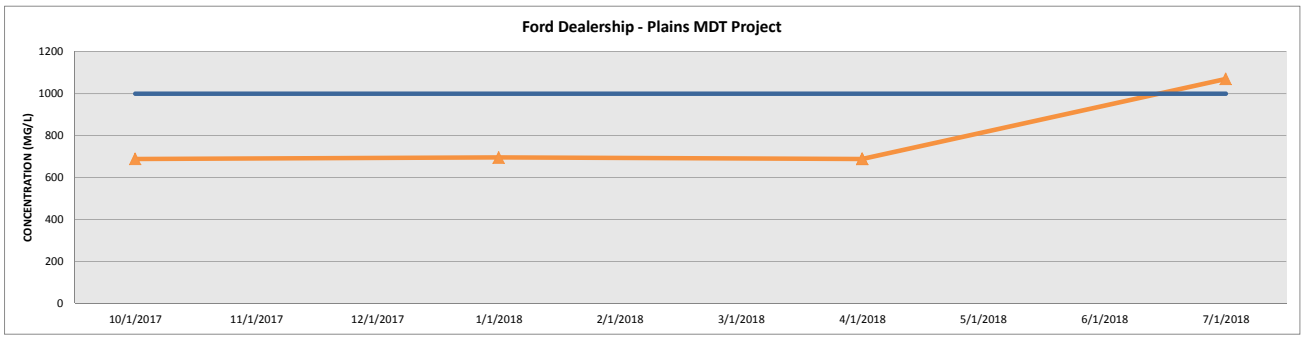


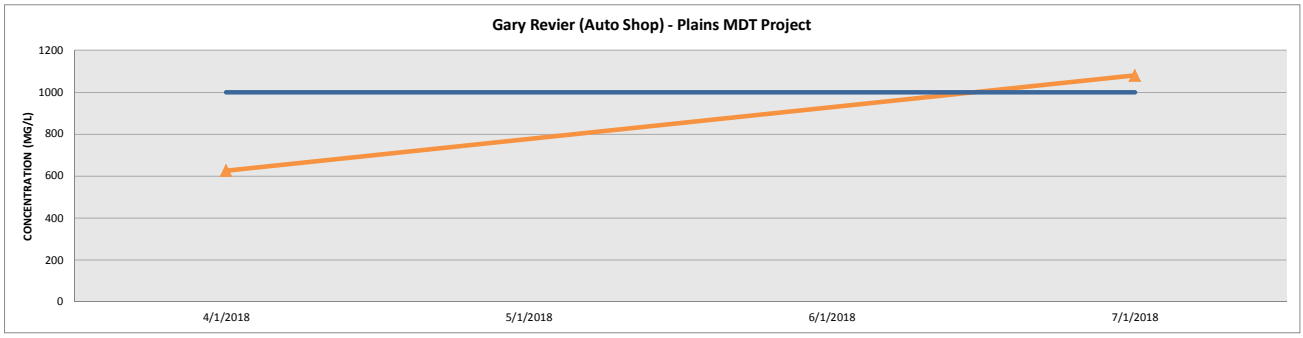


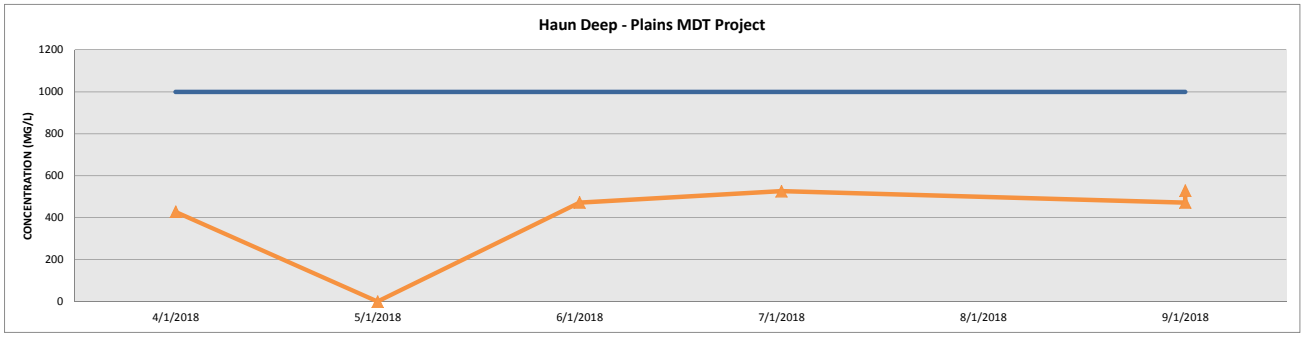
Conductivity @ 25C



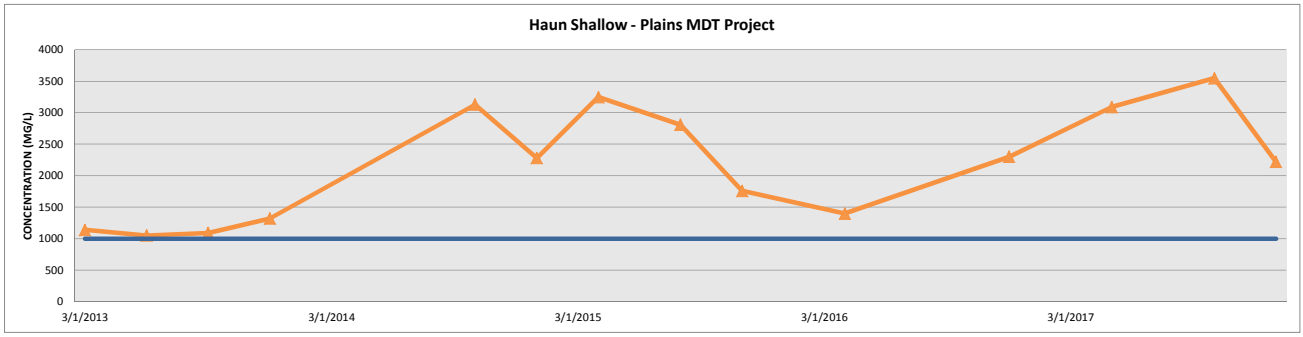


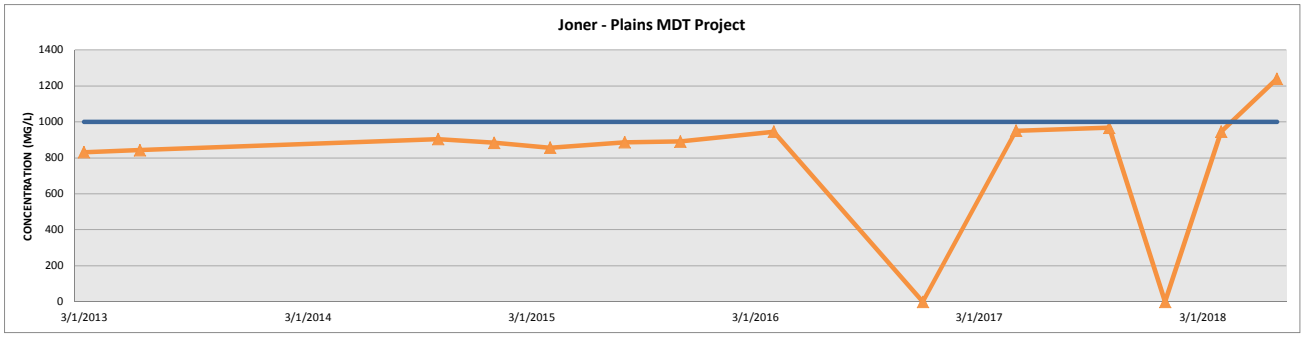


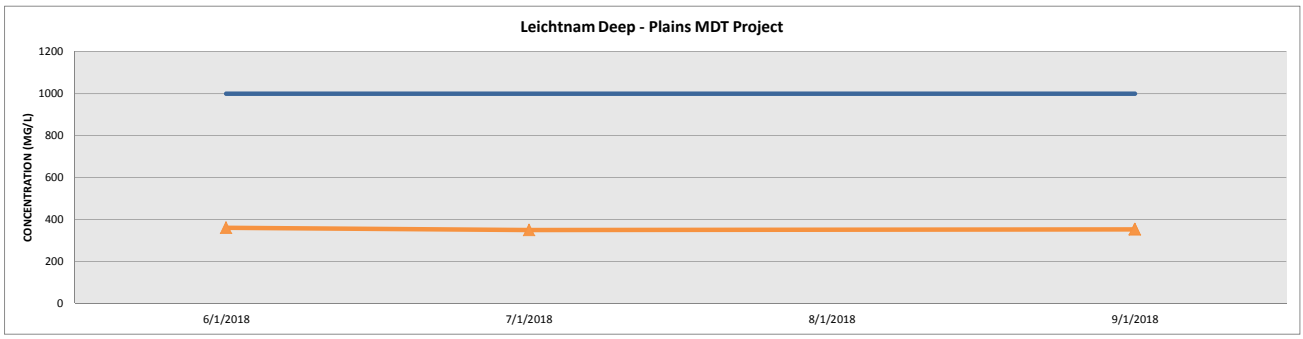


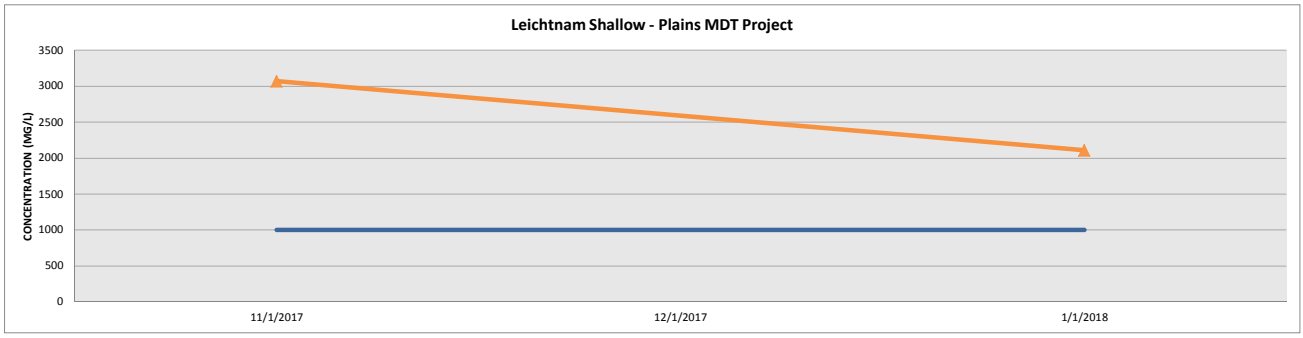


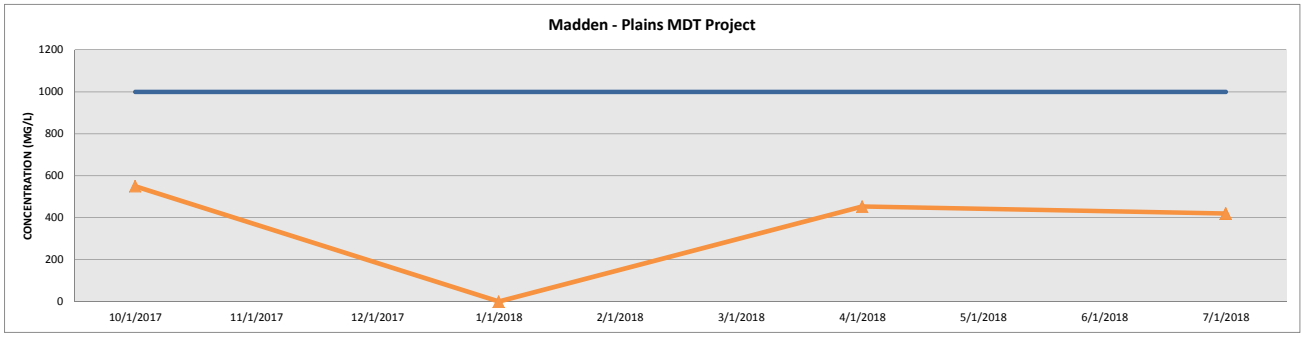
Conductivity @ 25C



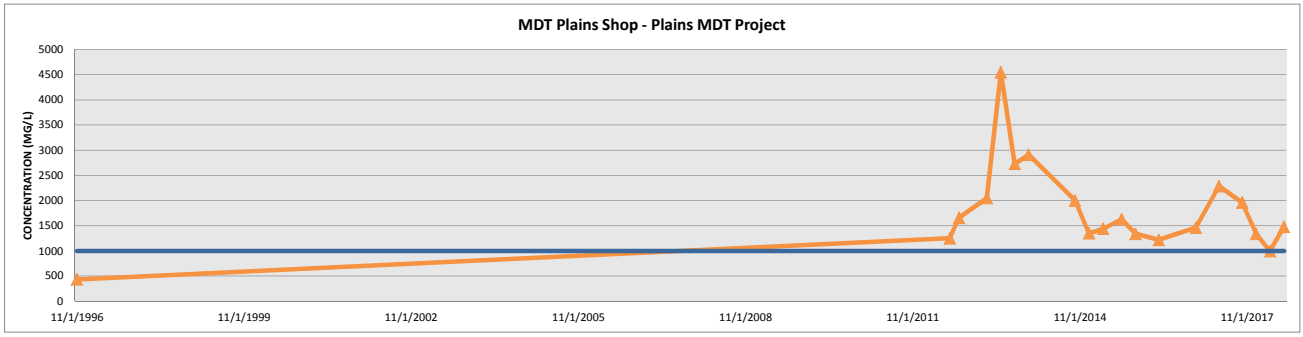


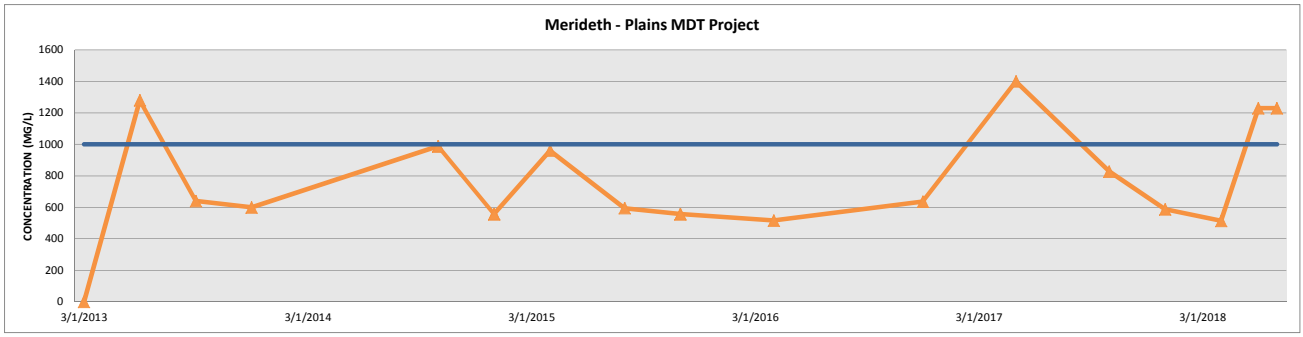


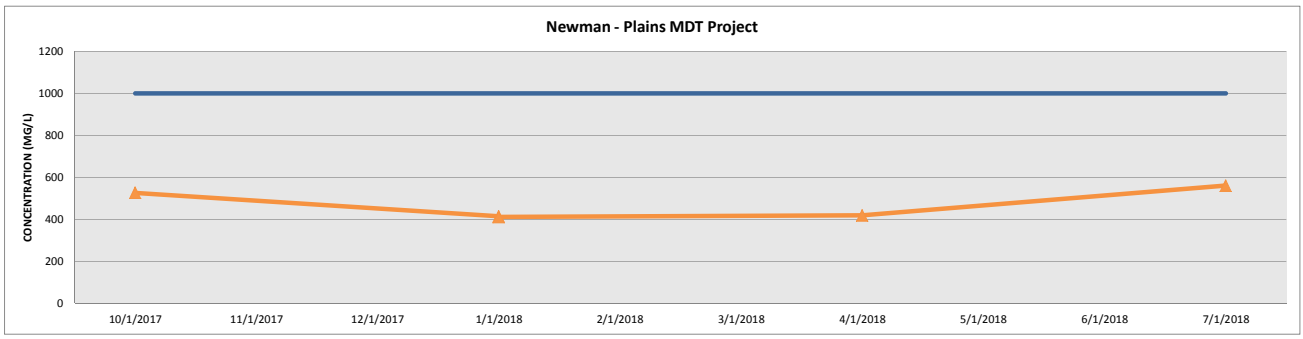


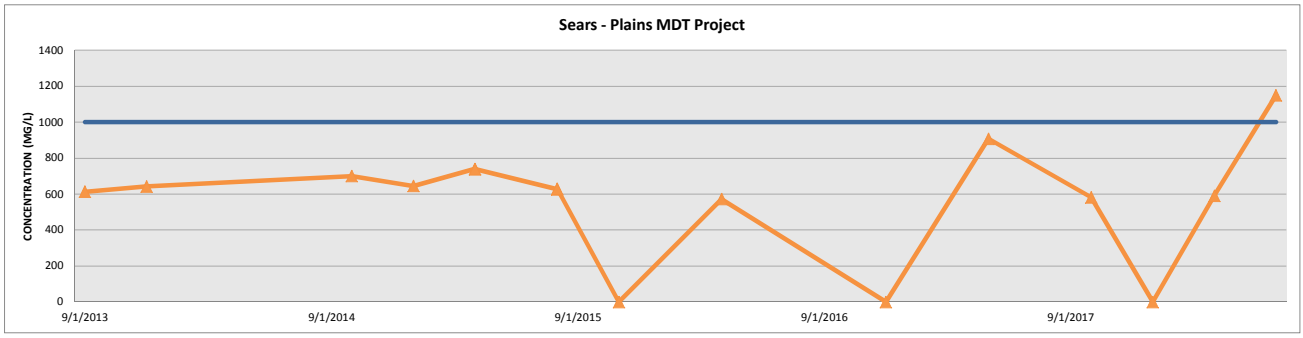


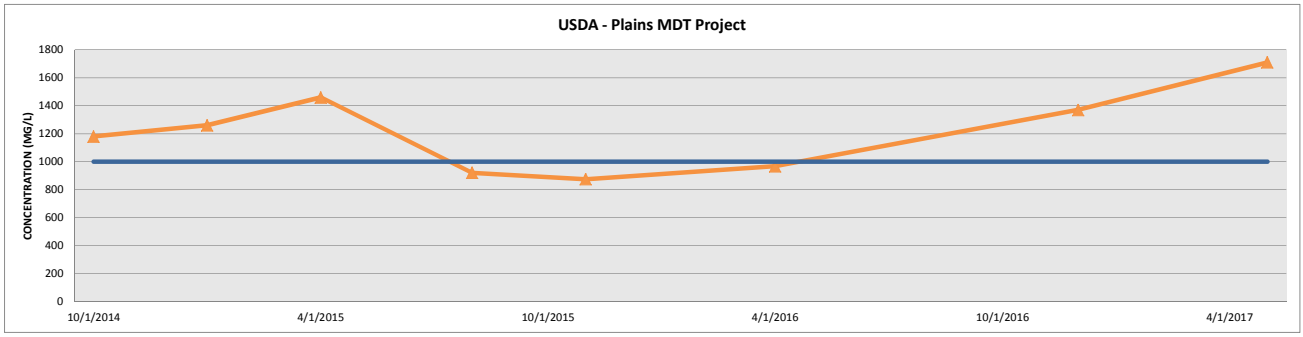
Conductivity @ 25C



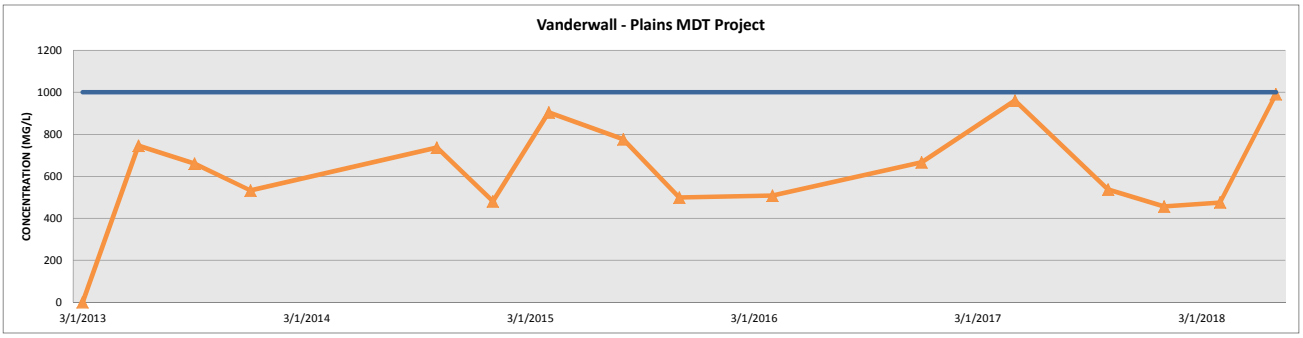


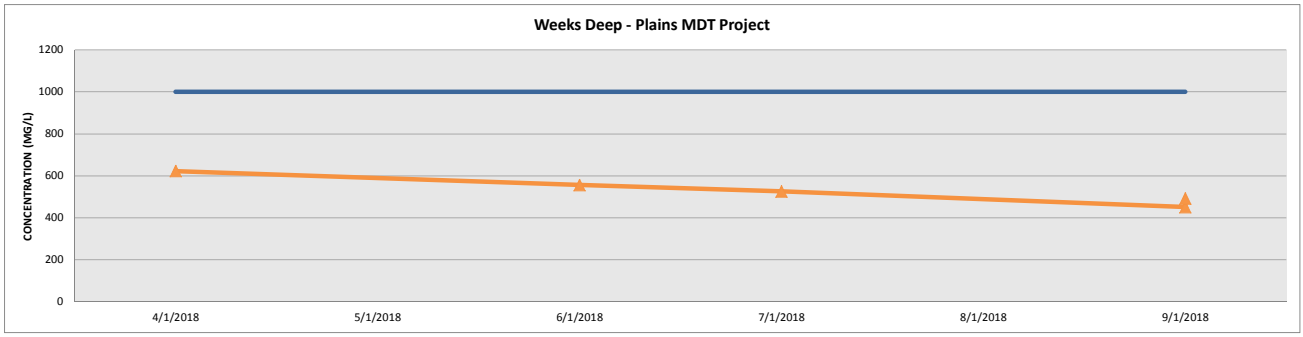


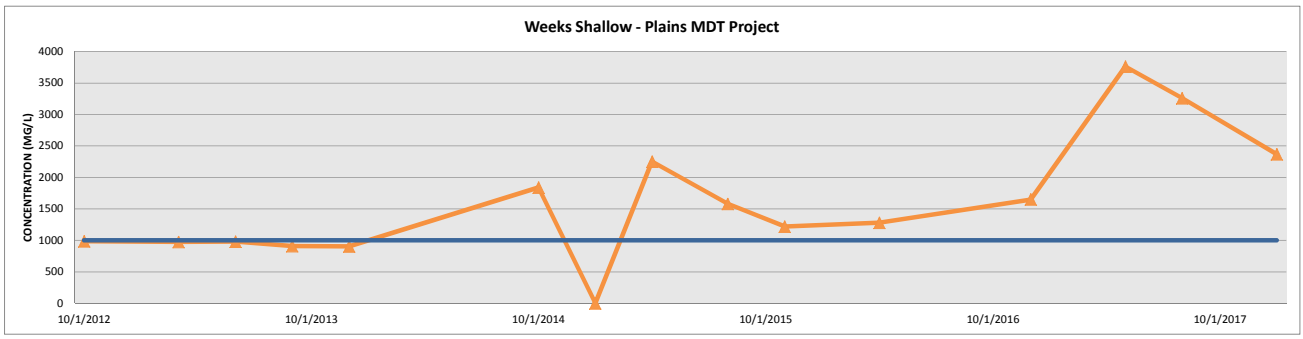


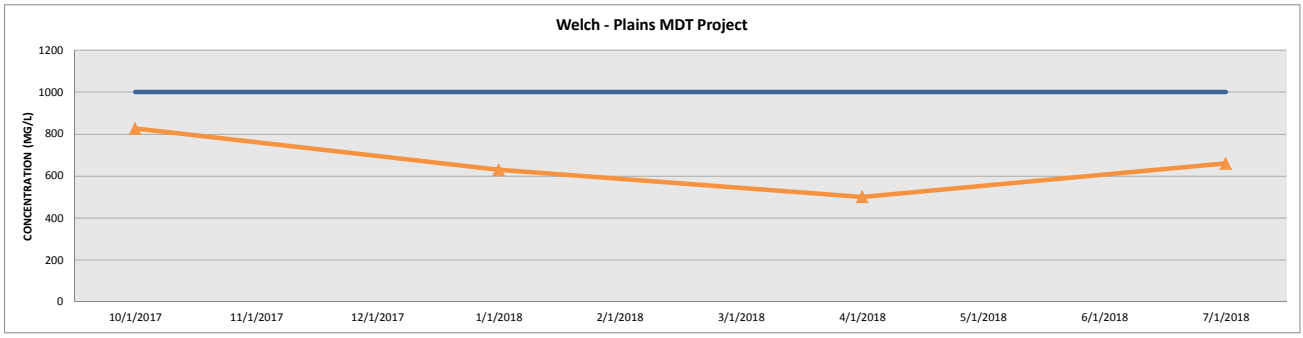


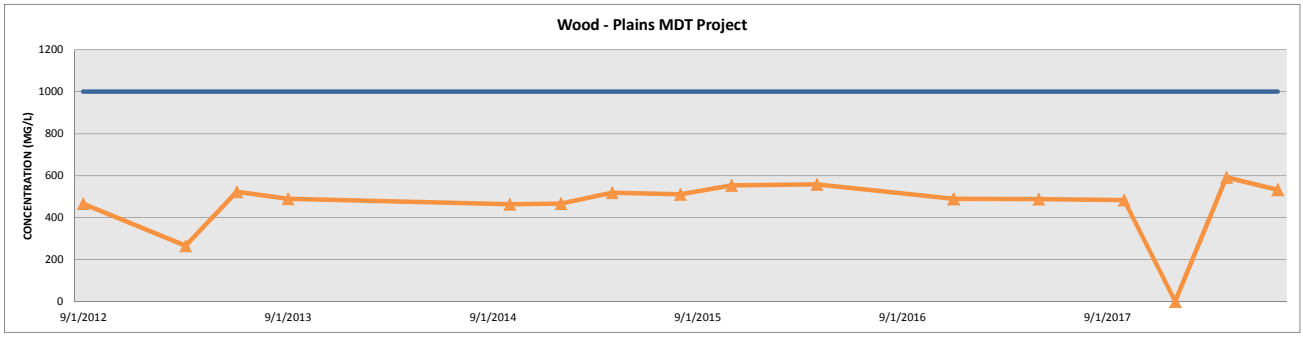
Conductivity @ 25C











APPENDIX D

MANN-KENDALL TEST RESULTS

Mann-Kendall Trend Analysis

Parameter: Chloride
Location: Abrams
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
160	140	20	1	0
150	140	10	2	0
140	140	0	2	0
200	140	60	3	0
223	140	83	4	0
179	140	39	5	0
198	140	58	6	0
157	140	17	7	0
140	140	0	7	0
300	140	160	8	0
333	140	193	9	0
272	140	132	10	0
144	140	4	11	0
110	140	-30	11	1
150	160	-10	11	2
140	160	-20	11	3
200	160	40	12	3
223	160	63	13	3
179	160	19	14	3
198	160	38	15	3
157	160	-3	15	4
140	160	-20	15	5
300	160	140	16	5
333	160	173	17	5
272	160	112	18	5
144	160	-16	18	6
110	160	-50	18	7
140	150	-10	18	8
200	150	50	19	8
223	150	73	20	8
179	150	29	21	8
198	150	48	22	8
157	150	7	23	8
140	150	-10	23	9
300	150	150	24	9
333	150	183	25	9
272	150	122	26	9
144	150	-6	26	10
110	150	-40	26	11
200	140	60	27	11
223	140	83	28	11
179	140	39	29	11
198	140	58	30	11
157	140	17	31	11
140	140	0	31	11
300	140	160	32	11
333	140	193	33	11
272	140	132	34	11
144	140	4	35	11
110	140	-30	35	12
223	200	23	36	12
179	200	-21	36	13
198	200	-2	36	14
157	200	-43	36	15
140	200	-60	36	16
300	200	100	37	16
333	200	133	38	16

272	200	72	39	16
144	200	-56	39	17
110	200	-90	39	18
179	223	-44	39	19
198	223	-25	39	20
157	223	-66	39	21
140	223	-83	39	22
300	223	77	40	22
333	223	110	41	22
272	223	49	42	22
144	223	-79	42	23
110	223	-113	42	24
198	179	19	43	24
157	179	-22	43	25
140	179	-39	43	26
300	179	121	44	26
333	179	154	45	26
272	179	93	46	26
144	179	-35	46	27
110	179	-69	46	28
157	198	-41	46	29
140	198	-58	46	30
300	198	102	47	30
333	198	135	48	30
272	198	74	49	30
144	198	-54	49	31
110	198	-88	49	32
140	157	-17	49	33
300	157	143	50	33
333	157	176	51	33
272	157	115	52	33
144	157	-13	52	34
110	157	-47	52	35
300	140	160	53	35
333	140	193	54	35
272	140	132	55	35
144	140	4	56	35
110	140	-30	56	36
333	300	33	57	36
272	300	-28	57	37
144	300	-156	57	38
110	300	-190	57	39
272	333	-61	57	40
144	333	-189	57	41
110	333	-223	57	42
144	272	-128	57	43
110	272	-162	57	44
110	144	-34	57	45

S Statistic = 57 - 45 = 12

Tied Group	Value	Members
1	140	3

Time Period	Observations
3/27/2013	1
6/11/2013	1
9/26/2013	1
12/18/2013	1
10/16/2014	1
4/28/2015	1

8/20/2015	1
11/12/2015	1
4/19/2016	1
12/1/2016	1
5/24/2017	1
10/3/2017	1
1/9/2018	1
4/25/2018	1
7/10/2018	1

There are 0 time periods with multiple data

A = 66
B = 0
C = 6
D = 0
E = 6
F = 0
a = 7350
b = 24570
c = 420
Group Variance = 404.667
Z-Score = 0.546819
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|0.546819| <= 1.97737 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Specific Conductivity, Lab
Location: Abrams
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
1010	1020	-10	0	1
986	1020	-34	0	2
1080	1020	60	1	2
1190	1020	170	2	2
1220	1020	200	3	2
1100	1020	80	4	2
1220	1020	200	5	2
934	1020	-86	5	3
1020	1020	0	5	3
1510	1020	490	6	3
1570	1020	550	7	3
1480	1020	460	8	3
1040	1020	20	9	3
845	1020	-175	9	4
986	1010	-24	9	5
1080	1010	70	10	5
1190	1010	180	11	5
1220	1010	210	12	5
1100	1010	90	13	5
1220	1010	210	14	5
934	1010	-76	14	6
1020	1010	10	15	6
1510	1010	500	16	6
1570	1010	560	17	6
1480	1010	470	18	6
1040	1010	30	19	6
845	1010	-165	19	7
1080	986	94	20	7
1190	986	204	21	7
1220	986	234	22	7
1100	986	114	23	7
1220	986	234	24	7
934	986	-52	24	8
1020	986	34	25	8
1510	986	524	26	8
1570	986	584	27	8
1480	986	494	28	8
1040	986	54	29	8
845	986	-141	29	9
1190	1080	110	30	9
1220	1080	140	31	9
1100	1080	20	32	9
1220	1080	140	33	9
934	1080	-146	33	10
1020	1080	-60	33	11
1510	1080	430	34	11
1570	1080	490	35	11
1480	1080	400	36	11
1040	1080	-40	36	12
845	1080	-235	36	13
1220	1190	30	37	13
1100	1190	-90	37	14
1220	1190	30	38	14
934	1190	-256	38	15
1020	1190	-170	38	16
1510	1190	320	39	16
1570	1190	380	40	16

1480	1190	290	41	16
1040	1190	-150	41	17
845	1190	-345	41	18
1100	1220	-120	41	19
1220	1220	0	41	19
934	1220	-286	41	20
1020	1220	-200	41	21
1510	1220	290	42	21
1570	1220	350	43	21
1480	1220	260	44	21
1040	1220	-180	44	22
845	1220	-375	44	23
1220	1100	120	45	23
934	1100	-166	45	24
1020	1100	-80	45	25
1510	1100	410	46	25
1570	1100	470	47	25
1480	1100	380	48	25
1040	1100	-60	48	26
845	1100	-255	48	27
934	1220	-286	48	28
1020	1220	-200	48	29
1510	1220	290	49	29
1570	1220	350	50	29
1480	1220	260	51	29
1040	1220	-180	51	30
845	1220	-375	51	31
1020	934	86	52	31
1510	934	576	53	31
1570	934	636	54	31
1480	934	546	55	31
1040	934	106	56	31
845	934	-89	56	32
1510	1020	490	57	32
1570	1020	550	58	32
1480	1020	460	59	32
1040	1020	20	60	32
845	1020	-175	60	33
1570	1510	60	61	33
1480	1510	-30	61	34
1040	1510	-470	61	35
845	1510	-665	61	36
1480	1570	-90	61	37
1040	1570	-530	61	38
845	1570	-725	61	39
1040	1480	-440	61	40
845	1480	-635	61	41
845	1040	-195	61	42

S Statistic = 61 - 42 = 19

Tied Group	Value	Members
1	1020	2
2	1220	2

Time Period	Observations
3/27/2013	1
6/11/2013	1
9/26/2013	1
12/18/2013	1
10/16/2014	1

4/28/2015	1
8/20/2015	1
11/12/2015	1
4/19/2016	1
12/1/2016	1
5/24/2017	1
10/3/2017	1
1/9/2018	1
4/25/2018	1
7/10/2018	1

There are 0 time periods with multiple data

A = 36
B = 0
C = 0
D = 0
E = 4
F = 0
a = 7350
b = 24570
c = 420
Group Variance = 406.333
Z-Score = 0.892959
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|0.892959| <= 1.97737 indicating no evidence of a trend

Mann-Kendall Trend Analysis
Parameter: Total Dissolved Solids
Location: Abrams
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
496	512	-16	0	1
532	512	20	1	1
551	512	39	2	1
650	512	138	3	1
694	512	182	4	1
596	512	84	5	1
687	512	175	6	1
524	512	12	7	1
587	512	75	8	1
948	512	436	9	1
917	512	405	10	1
809	512	297	11	1
575	512	63	12	1
464	512	-48	12	2
532	496	36	13	2
551	496	55	14	2
650	496	154	15	2
694	496	198	16	2
596	496	100	17	2
687	496	191	18	2
524	496	28	19	2
587	496	91	20	2
948	496	452	21	2
917	496	421	22	2
809	496	313	23	2
575	496	79	24	2
464	496	-32	24	3
551	532	19	25	3
650	532	118	26	3
694	532	162	27	3
596	532	64	28	3
687	532	155	29	3
524	532	-8	29	4
587	532	55	30	4
948	532	416	31	4
917	532	385	32	4
809	532	277	33	4
575	532	43	34	4
464	532	-68	34	5
650	551	99	35	5
694	551	143	36	5
596	551	45	37	5
687	551	136	38	5
524	551	-27	38	6
587	551	36	39	6
948	551	397	40	6
917	551	366	41	6
809	551	258	42	6
575	551	24	43	6
464	551	-87	43	7
694	650	44	44	7
596	650	-54	44	8
687	650	37	45	8
524	650	-126	45	9
587	650	-63	45	10
948	650	298	46	10
917	650	267	47	10

809	650	159	48	10
575	650	-75	48	11
464	650	-186	48	12
596	694	-98	48	13
687	694	-7	48	14
524	694	-170	48	15
587	694	-107	48	16
948	694	254	49	16
917	694	223	50	16
809	694	115	51	16
575	694	-119	51	17
464	694	-230	51	18
687	596	91	52	18
524	596	-72	52	19
587	596	-9	52	20
948	596	352	53	20
917	596	321	54	20
809	596	213	55	20
575	596	-21	55	21
464	596	-132	55	22
524	687	-163	55	23
587	687	-100	55	24
948	687	261	56	24
917	687	230	57	24
809	687	122	58	24
575	687	-112	58	25
464	687	-223	58	26
587	524	63	59	26
948	524	424	60	26
917	524	393	61	26
809	524	285	62	26
575	524	51	63	26
464	524	-60	63	27
948	587	361	64	27
917	587	330	65	27
809	587	222	66	27
575	587	-12	66	28
464	587	-123	66	29
917	948	-31	66	30
809	948	-139	66	31
575	948	-373	66	32
464	948	-484	66	33
809	917	-108	66	34
575	917	-342	66	35
464	917	-453	66	36
575	809	-234	66	37
464	809	-345	66	38
464	575	-111	66	39

S Statistic = 66 - 39 = 27

Tied Group	Value	Members
Time Period		**Observations**
3/27/2013		1
6/11/2013		1
9/26/2013		1
12/18/2013		1
10/16/2014		1
4/28/2015		1
8/20/2015		1

11/12/2015	1
4/19/2016	1
12/1/2016	1
5/24/2017	1
10/3/2017	1
1/9/2018	1
4/25/2018	1
7/10/2018	1

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0
a = 7350
b = 24570
c = 420
Group Variance = 408.333
Z-Score = 1.28667
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|1.28667| <= 1.97737 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Chloride

Location: Abrams - USDA Building

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
160	130	30	1	0
140	130	10	2	0
120	130	-10	2	1
230	130	100	3	1
247	130	117	4	1
316	130	186	5	1
147	130	17	6	1
139	130	9	7	1
168	130	38	8	1
290	130	160	9	1
360	130	230	10	1
237	130	107	11	1
238	130	108	12	1
243	130	113	13	1
327	130	197	14	1
309	130	179	15	1
140	160	-20	15	2
120	160	-40	15	3
230	160	70	16	3
247	160	87	17	3
316	160	156	18	3
147	160	-13	18	4
139	160	-21	18	5
168	160	8	19	5
290	160	130	20	5
360	160	200	21	5
237	160	77	22	5
238	160	78	23	5
243	160	83	24	5
327	160	167	25	5
309	160	149	26	5
120	140	-20	26	6
230	140	90	27	6
247	140	107	28	6
316	140	176	29	6
147	140	7	30	6
139	140	-1	30	7
168	140	28	31	7
290	140	150	32	7
360	140	220	33	7
237	140	97	34	7
238	140	98	35	7
243	140	103	36	7
327	140	187	37	7
309	140	169	38	7
230	120	110	39	7
247	120	127	40	7
316	120	196	41	7
147	120	27	42	7
139	120	19	43	7
168	120	48	44	7
290	120	170	45	7
360	120	240	46	7
237	120	117	47	7
238	120	118	48	7
243	120	123	49	7
327	120	207	50	7
309	120	189	51	7

247	230	17	52	7
316	230	86	53	7
147	230	-83	53	8
139	230	-91	53	9
168	230	-62	53	10
290	230	60	54	10
360	230	130	55	10
237	230	7	56	10
238	230	8	57	10
243	230	13	58	10
327	230	97	59	10
309	230	79	60	10
316	247	69	61	10
147	247	-100	61	11
139	247	-108	61	12
168	247	-79	61	13
290	247	43	62	13
360	247	113	63	13
237	247	-10	63	14
238	247	-9	63	15
243	247	-4	63	16
327	247	80	64	16
309	247	62	65	16
147	316	-169	65	17
139	316	-177	65	18
168	316	-148	65	19
290	316	-26	65	20
360	316	44	66	20
237	316	-79	66	21
238	316	-78	66	22
243	316	-73	66	23
327	316	11	67	23
309	316	-7	67	24
139	147	-8	67	25
168	147	21	68	25
290	147	143	69	25
360	147	213	70	25
237	147	90	71	25
238	147	91	72	25
243	147	96	73	25
327	147	180	74	25
309	147	162	75	25
168	139	29	76	25
290	139	151	77	25
360	139	221	78	25
237	139	98	79	25
238	139	99	80	25
243	139	104	81	25
327	139	188	82	25
309	139	170	83	25
290	168	122	84	25
360	168	192	85	25
237	168	69	86	25
238	168	70	87	25
243	168	75	88	25
327	168	159	89	25
309	168	141	90	25
360	290	70	91	25
237	290	-53	91	26
238	290	-52	91	27
243	290	-47	91	28
327	290	37	92	28
309	290	19	93	28

237	360	-123	93	29
238	360	-122	93	30
243	360	-117	93	31
327	360	-33	93	32
309	360	-51	93	33
238	237	Same Date	93	33
243	237	6	94	33
327	237	90	95	33
309	237	72	96	33
243	238	5	97	33
327	238	89	98	33
309	238	71	99	33
327	243	84	100	33
309	243	66	101	33
309	327	-18	101	34

S Statistic = 101 - 34 = 67

Tied Group	Value	Members

Time Period	Observations
3/27/2013	1
6/11/2013	1
9/26/2013	1
12/18/2013	1
10/17/2014	1
1/20/2015	1
4/28/2015	1
8/20/2015	1
11/12/2015	1
4/19/2016	1
12/2/2016	1
5/24/2017	1
10/3/2017	2
1/9/2018	1
4/25/2018	1
7/10/2018	1

There are 1 time periods with multiple data

A = 0
B = 18
C = 0
D = 0
E = 0
F = 2
a = 10608
b = 36720
c = 544
Group Variance = 588.333
Z-Score = 2.72102
Comparison Level at 95% confidence level = 1.65463 (upward trend)
2.72102 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

Parameter: Specific Conductivity, Lab
Location: Abrams - USDA Building
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
952	911	41	1	0
865	911	-46	1	1
856	911	-55	1	2
1180	911	269	2	2
1260	911	349	3	2
1460	911	549	4	2
921	911	10	5	2
875	911	-36	5	3
968	911	57	6	3
1370	911	459	7	3
1710	911	799	8	3
1240	911	329	9	3
1240	911	329	10	3
1270	911	359	11	3
1500	911	589	12	3
1510	911	599	13	3
865	952	-87	13	4
856	952	-96	13	5
1180	952	228	14	5
1260	952	308	15	5
1460	952	508	16	5
921	952	-31	16	6
875	952	-77	16	7
968	952	16	17	7
1370	952	418	18	7
1710	952	758	19	7
1240	952	288	20	7
1240	952	288	21	7
1270	952	318	22	7
1500	952	548	23	7
1510	952	558	24	7
856	865	-9	24	8
1180	865	315	25	8
1260	865	395	26	8
1460	865	595	27	8
921	865	56	28	8
875	865	10	29	8
968	865	103	30	8
1370	865	505	31	8
1710	865	845	32	8
1240	865	375	33	8
1240	865	375	34	8
1270	865	405	35	8
1500	865	635	36	8
1510	865	645	37	8
1180	856	324	38	8
1260	856	404	39	8
1460	856	604	40	8
921	856	65	41	8
875	856	19	42	8
968	856	112	43	8
1370	856	514	44	8
1710	856	854	45	8
1240	856	384	46	8
1240	856	384	47	8
1270	856	414	48	8
1500	856	644	49	8
1510	856	654	50	8

1260	1180	80	51	8
1460	1180	280	52	8
921	1180	-259	52	9
875	1180	-305	52	10
968	1180	-212	52	11
1370	1180	190	53	11
1710	1180	530	54	11
1240	1180	60	55	11
1240	1180	60	56	11
1270	1180	90	57	11
1500	1180	320	58	11
1510	1180	330	59	11
1460	1260	200	60	11
921	1260	-339	60	12
875	1260	-385	60	13
968	1260	-292	60	14
1370	1260	110	61	14
1710	1260	450	62	14
1240	1260	-20	62	15
1240	1260	-20	62	16
1270	1260	10	63	16
1500	1260	240	64	16
1510	1260	250	65	16
921	1460	-539	65	17
875	1460	-585	65	18
968	1460	-492	65	19
1370	1460	-90	65	20
1710	1460	250	66	20
1240	1460	-220	66	21
1240	1460	-220	66	22
1270	1460	-190	66	23
1500	1460	40	67	23
1510	1460	50	68	23
875	921	-46	68	24
968	921	47	69	24
1370	921	449	70	24
1710	921	789	71	24
1240	921	319	72	24
1240	921	319	73	24
1270	921	349	74	24
1500	921	579	75	24
1510	921	589	76	24
968	875	93	77	24
1370	875	495	78	24
1710	875	835	79	24
1240	875	365	80	24
1240	875	365	81	24
1270	875	395	82	24
1500	875	625	83	24
1510	875	635	84	24
1370	968	402	85	24
1710	968	742	86	24
1240	968	272	87	24
1240	968	272	88	24
1270	968	302	89	24
1500	968	532	90	24
1510	968	542	91	24
1710	1370	340	92	24
1240	1370	-130	92	25
1240	1370	-130	92	26
1270	1370	-100	92	27
1500	1370	130	93	27
1510	1370	140	94	27

1240	1710	-470	94	28
1240	1710	-470	94	29
1270	1710	-440	94	30
1500	1710	-210	94	31
1510	1710	-200	94	32
1240	1240	Same Date	94	32
1270	1240	30	95	32
1500	1240	260	96	32
1510	1240	270	97	32
1270	1240	30	98	32
1500	1240	260	99	32
1510	1240	270	100	32
1500	1270	230	101	32
1510	1270	240	102	32
1510	1500	10	103	32

S Statistic = 103 - 32 = 71

Tied Group	Value	Members
1	1240	2

Time Period	Observations
3/27/2013	1
6/11/2013	1
9/26/2013	1
12/18/2013	1
10/17/2014	1
1/20/2015	1
4/28/2015	1
8/20/2015	1
11/12/2015	1
4/19/2016	1
12/2/2016	1
5/24/2017	1
10/3/2017	2
1/9/2018	1
4/25/2018	1
7/10/2018	1

There are 1 time periods with multiple data

A = 18
B = 18
C = 0
D = 0
E = 2
F = 2
a = 10608
b = 36720
c = 544
Group Variance = 587.341
Z-Score = 2.88837
Comparison Level at 95% confidence level = 1.65463 (upward trend)
2.88837 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

Parameter: Total Dissolved Solids
Location: Abrams - USDA Building
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
446	421	25	1	0
464	421	43	2	0
428	421	7	3	0
651	421	230	4	0
697	421	276	5	0
505	421	84	6	0
500	421	79	7	0
493	421	72	8	0
536	421	115	9	0
750	421	329	10	0
1020	421	599	11	0
706	421	285	12	0
713	421	292	13	0
675	421	254	14	0
851	421	430	15	0
798	421	377	16	0
464	446	18	17	0
428	446	-18	17	1
651	446	205	18	1
697	446	251	19	1
505	446	59	20	1
500	446	54	21	1
493	446	47	22	1
536	446	90	23	1
750	446	304	24	1
1020	446	574	25	1
706	446	260	26	1
713	446	267	27	1
675	446	229	28	1
851	446	405	29	1
798	446	352	30	1
428	464	-36	30	2
651	464	187	31	2
697	464	233	32	2
505	464	41	33	2
500	464	36	34	2
493	464	29	35	2
536	464	72	36	2
750	464	286	37	2
1020	464	556	38	2
706	464	242	39	2
713	464	249	40	2
675	464	211	41	2
851	464	387	42	2
798	464	334	43	2
651	428	223	44	2
697	428	269	45	2
505	428	77	46	2
500	428	72	47	2
493	428	65	48	2
536	428	108	49	2
750	428	322	50	2
1020	428	592	51	2
706	428	278	52	2
713	428	285	53	2
675	428	247	54	2
851	428	423	55	2
798	428	370	56	2

697	651	46	57	2
505	651	-146	57	3
500	651	-151	57	4
493	651	-158	57	5
536	651	-115	57	6
750	651	99	58	6
1020	651	369	59	6
706	651	55	60	6
713	651	62	61	6
675	651	24	62	6
851	651	200	63	6
798	651	147	64	6
505	697	-192	64	7
500	697	-197	64	8
493	697	-204	64	9
536	697	-161	64	10
750	697	53	65	10
1020	697	323	66	10
706	697	9	67	10
713	697	16	68	10
675	697	-22	68	11
851	697	154	69	11
798	697	101	70	11
500	505	-5	70	12
493	505	-12	70	13
536	505	31	71	13
750	505	245	72	13
1020	505	515	73	13
706	505	201	74	13
713	505	208	75	13
675	505	170	76	13
851	505	346	77	13
798	505	293	78	13
493	500	-7	78	14
536	500	36	79	14
750	500	250	80	14
1020	500	520	81	14
706	500	206	82	14
713	500	213	83	14
675	500	175	84	14
851	500	351	85	14
798	500	298	86	14
536	493	43	87	14
750	493	257	88	14
1020	493	527	89	14
706	493	213	90	14
713	493	220	91	14
675	493	182	92	14
851	493	358	93	14
798	493	305	94	14
750	536	214	95	14
1020	536	484	96	14
706	536	170	97	14
713	536	177	98	14
675	536	139	99	14
851	536	315	100	14
798	536	262	101	14
1020	750	270	102	14
706	750	-44	102	15
713	750	-37	102	16
675	750	-75	102	17
851	750	101	103	17
798	750	48	104	17

706	1020	-314	104	18
713	1020	-307	104	19
675	1020	-345	104	20
851	1020	-169	104	21
798	1020	-222	104	22
713	706	Same Date	104	22
675	706	-31	104	23
851	706	145	105	23
798	706	92	106	23
675	713	-38	106	24
851	713	138	107	24
798	713	85	108	24
851	675	176	109	24
798	675	123	110	24
798	851	-53	110	25

S Statistic = 110 - 25 = 85

Tied Group	Value	Members
Time Period		**Observations**
3/27/2013		1
6/11/2013		1
9/26/2013		1
12/18/2013		1
10/17/2014		1
1/20/2015		1
4/28/2015		1
8/20/2015		1
11/12/2015		1
4/19/2016		1
12/2/2016		1
5/24/2017		1
10/3/2017		2
1/9/2018		1
4/25/2018		1
7/10/2018		1

There are 1 time periods with multiple data

A = 0
B = 18
C = 0
D = 0
E = 0
F = 2
a = 10608
b = 36720
c = 544
Group Variance = 588.333
Z-Score = 3.46312
Comparison Level at 95% confidence level = 1.65463 (upward trend)
3.46312 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

Parameter: Chloride
Location: Anthony
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
170	150	20	1	0
140	150	-10	1	1
140	150	-10	1	2
160	150	10	2	2
173	150	23	3	2
189	150	39	4	2
181	150	31	5	2
205	150	55	6	2
136	150	-14	6	3
170	150	20	7	3
210	150	60	8	3
334	150	184	9	3
290	150	140	10	3
217	150	67	11	3
135	150	-15	11	4
140	170	-30	11	5
140	170	-30	11	6
160	170	-10	11	7
173	170	3	12	7
189	170	19	13	7
181	170	11	14	7
205	170	35	15	7
136	170	-34	15	8
170	170	0	15	8
210	170	40	16	8
334	170	164	17	8
290	170	120	18	8
217	170	47	19	8
135	170	-35	19	9
140	140	0	19	9
160	140	20	20	9
173	140	33	21	9
189	140	49	22	9
181	140	41	23	9
205	140	65	24	9
136	140	-4	24	10
170	140	30	25	10
210	140	70	26	10
334	140	194	27	10
290	140	150	28	10
217	140	77	29	10
135	140	-5	29	11
160	140	20	30	11
173	140	33	31	11
189	140	49	32	11
181	140	41	33	11
205	140	65	34	11
136	140	-4	34	12
170	140	30	35	12
210	140	70	36	12
334	140	194	37	12
290	140	150	38	12
217	140	77	39	12
135	140	-5	39	13
173	160	13	40	13
189	160	29	41	13
181	160	21	42	13

205	160	45	43	13
136	160	-24	43	14
170	160	10	44	14
210	160	50	45	14
334	160	174	46	14
290	160	130	47	14
217	160	57	48	14
135	160	-25	48	15
189	173	16	49	15
181	173	8	50	15
205	173	32	51	15
136	173	-37	51	16
170	173	-3	51	17
210	173	37	52	17
334	173	161	53	17
290	173	117	54	17
217	173	44	55	17
135	173	-38	55	18
181	189	-8	55	19
205	189	16	56	19
136	189	-53	56	20
170	189	-19	56	21
210	189	21	57	21
334	189	145	58	21
290	189	101	59	21
217	189	28	60	21
135	189	-54	60	22
205	181	24	61	22
136	181	-45	61	23
170	181	-11	61	24
210	181	29	62	24
334	181	153	63	24
290	181	109	64	24
217	181	36	65	24
135	181	-46	65	25
136	205	-69	65	26
170	205	-35	65	27
210	205	5	66	27
334	205	129	67	27
290	205	85	68	27
217	205	12	69	27
135	205	-70	69	28
170	136	34	70	28
210	136	74	71	28
334	136	198	72	28
290	136	154	73	28
217	136	81	74	28
135	136	-1	74	29
210	170	40	75	29
334	170	164	76	29
290	170	120	77	29
217	170	47	78	29
135	170	-35	78	30
334	210	124	79	30
290	210	80	80	30
217	210	7	81	30
135	210	-75	81	31
290	334	-44	81	32
217	334	-117	81	33
135	334	-199	81	34
217	290	-73	81	35
135	290	-155	81	36

135	217	-82	81	37

S Statistic = 81 - 37 = 44

Tied Group	Value	Members
1	170	2
2	140	2

Time Period	Observations
3/27/2013	1
6/11/2013	1
9/26/2013	1
12/18/2013	1
10/17/2014	1
1/21/2015	1
4/28/2015	1
8/20/2015	1
11/12/2015	1
4/19/2016	1
12/1/2016	1
5/24/2017	1
10/3/2017	1
1/9/2018	1
4/25/2018	1
7/10/2018	1

There are 0 time periods with multiple data

A = 36
B = 0
C = 0
D = 0
E = 4
F = 0
a = 8880
b = 30240
c = 480
Group Variance = 491.333
Z-Score = 1.9399
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|1.9399| <= 1.97737 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Chloride
Location: Anthony
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
170	150	20	1	0
140	150	-10	1	1
140	150	-10	1	2
160	150	10	2	2
173	150	23	3	2
189	150	39	4	2
181	150	31	5	2
205	150	55	6	2
136	150	-14	6	3
170	150	20	7	3
210	150	60	8	3
334	150	184	9	3
290	150	140	10	3
217	150	67	11	3
135	150	-15	11	4
140	170	-30	11	5
140	170	-30	11	6
160	170	-10	11	7
173	170	3	12	7
189	170	19	13	7
181	170	11	14	7
205	170	35	15	7
136	170	-34	15	8
170	170	0	15	8
210	170	40	16	8
334	170	164	17	8
290	170	120	18	8
217	170	47	19	8
135	170	-35	19	9
140	140	0	19	9
160	140	20	20	9
173	140	33	21	9
189	140	49	22	9
181	140	41	23	9
205	140	65	24	9
136	140	-4	24	10
170	140	30	25	10
210	140	70	26	10
334	140	194	27	10
290	140	150	28	10
217	140	77	29	10
135	140	-5	29	11
160	140	20	30	11
173	140	33	31	11
189	140	49	32	11
181	140	41	33	11
205	140	65	34	11
136	140	-4	34	12
170	140	30	35	12
210	140	70	36	12
334	140	194	37	12
290	140	150	38	12
217	140	77	39	12
135	140	-5	39	13
173	160	13	40	13
189	160	29	41	13
181	160	21	42	13

205	160	45	43	13
136	160	-24	43	14
170	160	10	44	14
210	160	50	45	14
334	160	174	46	14
290	160	130	47	14
217	160	57	48	14
135	160	-25	48	15
189	173	16	49	15
181	173	8	50	15
205	173	32	51	15
136	173	-37	51	16
170	173	-3	51	17
210	173	37	52	17
334	173	161	53	17
290	173	117	54	17
217	173	44	55	17
135	173	-38	55	18
181	189	-8	55	19
205	189	16	56	19
136	189	-53	56	20
170	189	-19	56	21
210	189	21	57	21
334	189	145	58	21
290	189	101	59	21
217	189	28	60	21
135	189	-54	60	22
205	181	24	61	22
136	181	-45	61	23
170	181	-11	61	24
210	181	29	62	24
334	181	153	63	24
290	181	109	64	24
217	181	36	65	24
135	181	-46	65	25
136	205	-69	65	26
170	205	-35	65	27
210	205	5	66	27
334	205	129	67	27
290	205	85	68	27
217	205	12	69	27
135	205	-70	69	28
170	136	34	70	28
210	136	74	71	28
334	136	198	72	28
290	136	154	73	28
217	136	81	74	28
135	136	-1	74	29
210	170	40	75	29
334	170	164	76	29
290	170	120	77	29
217	170	47	78	29
135	170	-35	78	30
334	210	124	79	30
290	210	80	80	30
217	210	7	81	30
135	210	-75	81	31
290	334	-44	81	32
217	334	-117	81	33
135	334	-199	81	34
217	290	-73	81	35
135	290	-155	81	36

135	217	-82	81	37

S Statistic = 81 - 37 = 44

Tied Group	Value	Members
1	170	2
2	140	2

Time Period	Observations
3/27/2013	1
6/11/2013	1
9/26/2013	1
12/18/2013	1
10/17/2014	1
1/21/2015	1
4/28/2015	1
8/20/2015	1
11/12/2015	1
4/19/2016	1
12/1/2016	1
5/24/2017	1
10/3/2017	1
1/9/2018	1
4/25/2018	1
7/10/2018	1

There are 0 time periods with multiple data

A = 36
B = 0
C = 0
D = 0
E = 4
F = 0
a = 8880
b = 30240
c = 480
Group Variance = 491.333
Z-Score = 1.9399
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|1.9399| <= 1.97737 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Specific Conductivity, Lab
Location: Anthony
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
1040	1050	-10	0	1
964	1050	-86	0	2
1070	1050	20	1	2
1040	1050	-10	1	3
1080	1050	30	2	3
1140	1050	90	3	3
1120	1050	70	4	3
1180	1050	130	5	3
1030	1050	-20	5	4
1090	1050	40	6	4
1230	1050	180	7	4
1540	1050	490	8	4
1470	1050	420	9	4
1230	1050	180	10	4
938	1050	-112	10	5
964	1040	-76	10	6
1070	1040	30	11	6
1040	1040	0	11	6
1080	1040	40	12	6
1140	1040	100	13	6
1120	1040	80	14	6
1180	1040	140	15	6
1030	1040	-10	15	7
1090	1040	50	16	7
1230	1040	190	17	7
1540	1040	500	18	7
1470	1040	430	19	7
1230	1040	190	20	7
938	1040	-102	20	8
1070	964	106	21	8
1040	964	76	22	8
1080	964	116	23	8
1140	964	176	24	8
1120	964	156	25	8
1180	964	216	26	8
1030	964	66	27	8
1090	964	126	28	8
1230	964	266	29	8
1540	964	576	30	8
1470	964	506	31	8
1230	964	266	32	8
938	964	-26	32	9
1040	1070	-30	32	10
1080	1070	10	33	10
1140	1070	70	34	10
1120	1070	50	35	10
1180	1070	110	36	10
1030	1070	-40	36	11
1090	1070	20	37	11
1230	1070	160	38	11
1540	1070	470	39	11
1470	1070	400	40	11
1230	1070	160	41	11
938	1070	-132	41	12
1080	1040	40	42	12
1140	1040	100	43	12
1120	1040	80	44	12

1180	1040	140	45	12
1030	1040	-10	45	13
1090	1040	50	46	13
1230	1040	190	47	13
1540	1040	500	48	13
1470	1040	430	49	13
1230	1040	190	50	13
938	1040	-102	50	14
1140	1080	60	51	14
1120	1080	40	52	14
1180	1080	100	53	14
1030	1080	-50	53	15
1090	1080	10	54	15
1230	1080	150	55	15
1540	1080	460	56	15
1470	1080	390	57	15
1230	1080	150	58	15
938	1080	-142	58	16
1120	1140	-20	58	17
1180	1140	40	59	17
1030	1140	-110	59	18
1090	1140	-50	59	19
1230	1140	90	60	19
1540	1140	400	61	19
1470	1140	330	62	19
1230	1140	90	63	19
938	1140	-202	63	20
1180	1120	60	64	20
1030	1120	-90	64	21
1090	1120	-30	64	22
1230	1120	110	65	22
1540	1120	420	66	22
1470	1120	350	67	22
1230	1120	110	68	22
938	1120	-182	68	23
1030	1180	-150	68	24
1090	1180	-90	68	25
1230	1180	50	69	25
1540	1180	360	70	25
1470	1180	290	71	25
1230	1180	50	72	25
938	1180	-242	72	26
1090	1030	60	73	26
1230	1030	200	74	26
1540	1030	510	75	26
1470	1030	440	76	26
1230	1030	200	77	26
938	1030	-92	77	27
1230	1090	140	78	27
1540	1090	450	79	27
1470	1090	380	80	27
1230	1090	140	81	27
938	1090	-152	81	28
1540	1230	310	82	28
1470	1230	240	83	28
1230	1230	0	83	28
938	1230	-292	83	29
1470	1540	-70	83	30
1230	1540	-310	83	31
938	1540	-602	83	32
1230	1470	-240	83	33
938	1470	-532	83	34

938	1230	-292	83	35

S Statistic = 83 - 35 = 48

Tied Group	Value	Members
1	1040	2
2	1230	2

Time Period	Observations
3/27/2013	1
6/11/2013	1
9/26/2013	1
12/18/2013	1
10/17/2014	1
1/21/2015	1
4/28/2015	1
8/20/2015	1
11/12/2015	1
4/19/2016	1
12/1/2016	1
5/24/2017	1
10/3/2017	1
1/9/2018	1
4/25/2018	1
7/10/2018	1

There are 0 time periods with multiple data

A = 36
B = 0
C = 0
D = 0
E = 4
F = 0
a = 8880
b = 30240
c = 480
Group Variance = 491.333
Z-Score = 2.12036
Comparison Level at 95% confidence level = 1.65463 (upward trend)
2.12036 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis
Parameter: Total Dissolved Solids
Location: Anthony
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
504	509	-5	0	1
520	509	11	1	1
543	509	34	2	1
561	509	52	3	1
594	509	85	4	1
628	509	119	5	1
619	509	110	6	1
677	509	168	7	1
590	509	81	8	1
636	509	127	9	1
726	509	217	10	1
934	509	425	11	1
806	509	297	12	1
676	509	167	13	1
525	509	16	14	1
520	504	16	15	1
543	504	39	16	1
561	504	57	17	1
594	504	90	18	1
628	504	124	19	1
619	504	115	20	1
677	504	173	21	1
590	504	86	22	1
636	504	132	23	1
726	504	222	24	1
934	504	430	25	1
806	504	302	26	1
676	504	172	27	1
525	504	21	28	1
543	520	23	29	1
561	520	41	30	1
594	520	74	31	1
628	520	108	32	1
619	520	99	33	1
677	520	157	34	1
590	520	70	35	1
636	520	116	36	1
726	520	206	37	1
934	520	414	38	1
806	520	286	39	1
676	520	156	40	1
525	520	5	41	1
561	543	18	42	1
594	543	51	43	1
628	543	85	44	1
619	543	76	45	1
677	543	134	46	1
590	543	47	47	1
636	543	93	48	1
726	543	183	49	1
934	543	391	50	1
806	543	263	51	1
676	543	133	52	1
525	543	-18	52	2
594	561	33	53	2
628	561	67	54	2
619	561	58	55	2

677	561	116	56	2
590	561	29	57	2
636	561	75	58	2
726	561	165	59	2
934	561	373	60	2
806	561	245	61	2
676	561	115	62	2
525	561	-36	62	3
628	594	34	63	3
619	594	25	64	3
677	594	83	65	3
590	594	-4	65	4
636	594	42	66	4
726	594	132	67	4
934	594	340	68	4
806	594	212	69	4
676	594	82	70	4
525	594	-69	70	5
619	628	-9	70	6
677	628	49	71	6
590	628	-38	71	7
636	628	8	72	7
726	628	98	73	7
934	628	306	74	7
806	628	178	75	7
676	628	48	76	7
525	628	-103	76	8
677	619	58	77	8
590	619	-29	77	9
636	619	17	78	9
726	619	107	79	9
934	619	315	80	9
806	619	187	81	9
676	619	57	82	9
525	619	-94	82	10
590	677	-87	82	11
636	677	-41	82	12
726	677	49	83	12
934	677	257	84	12
806	677	129	85	12
676	677	-1	85	13
525	677	-152	85	14
636	590	46	86	14
726	590	136	87	14
934	590	344	88	14
806	590	216	89	14
676	590	86	90	14
525	590	-65	90	15
726	636	90	91	15
934	636	298	92	15
806	636	170	93	15
676	636	40	94	15
525	636	-111	94	16
934	726	208	95	16
806	726	80	96	16
676	726	-50	96	17
525	726	-201	96	18
806	934	-128	96	19
676	934	-258	96	20
525	934	-409	96	21
676	806	-130	96	22
525	806	-281	96	23

525	676	-151	96	24

S Statistic = 96 - 24 = 72

Tied Group	Value	Members

Time Period	Observations
3/27/2013	1
6/11/2013	1
9/26/2013	1
12/18/2013	1
10/17/2014	1
1/21/2015	1
4/28/2015	1
8/20/2015	1
11/12/2015	1
4/19/2016	1
12/1/2016	1
5/24/2017	1
10/3/2017	1
1/9/2018	1
4/25/2018	1
7/10/2018	1

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0
a = 8880
b = 30240
c = 480
Group Variance = 493.333
Z-Score = 3.1966
Comparison Level at 95% confidence level = 1.65463 (upward trend)
3.1966 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

Parameter: Chloride
Location: Haun Shallow
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
190	190	0	0	0
200	190	10	1	0
260	190	70	2	0
870	190	680	3	0
586	190	396	4	0
881	190	691	5	0
730	190	540	6	0
404	190	214	7	0
297	190	107	8	0
550	190	360	9	0
760	190	570	10	0
981	190	791	11	0
511	190	321	12	0
200	190	10	13	0
260	190	70	14	0
870	190	680	15	0
586	190	396	16	0
881	190	691	17	0
730	190	540	18	0
404	190	214	19	0
297	190	107	20	0
550	190	360	21	0
760	190	570	22	0
981	190	791	23	0
511	190	321	24	0
260	200	60	25	0
870	200	670	26	0
586	200	386	27	0
881	200	681	28	0
730	200	530	29	0
404	200	204	30	0
297	200	97	31	0
550	200	350	32	0
760	200	560	33	0
981	200	781	34	0
511	200	311	35	0
870	260	610	36	0
586	260	326	37	0
881	260	621	38	0
730	260	470	39	0
404	260	144	40	0
297	260	37	41	0
550	260	290	42	0
760	260	500	43	0
981	260	721	44	0
511	260	251	45	0
586	870	-284	45	1
881	870	11	46	1
730	870	-140	46	2
404	870	-466	46	3
297	870	-573	46	4
550	870	-320	46	5
760	870	-110	46	6
981	870	111	47	6
511	870	-359	47	7
881	586	295	48	7

730	586	144	49	7
404	586	-182	49	8
297	586	-289	49	9
550	586	-36	49	10
760	586	174	50	10
981	586	395	51	10
511	586	-75	51	11
730	881	-151	51	12
404	881	-477	51	13
297	881	-584	51	14
550	881	-331	51	15
760	881	-121	51	16
981	881	100	52	16
511	881	-370	52	17
404	730	-326	52	18
297	730	-433	52	19
550	730	-180	52	20
760	730	30	53	20
981	730	251	54	20
511	730	-219	54	21
297	404	-107	54	22
550	404	146	55	22
760	404	356	56	22
981	404	577	57	22
511	404	107	58	22
550	297	253	59	22
760	297	463	60	22
981	297	684	61	22
511	297	214	62	22
760	550	210	63	22
981	550	431	64	22
511	550	-39	64	23
981	760	221	65	23
511	760	-249	65	24
511	981	-470	65	25

S Statistic = 65 - 25 = 40

Tied Group	Value	Members
1	190	2

Time Period	Observations
3/27/2013	1
6/11/2013	1
9/26/2013	1
12/18/2013	1
10/16/2014	1
1/21/2015	1
4/28/2015	1
8/20/2015	1
11/12/2015	1
4/19/2016	1
12/1/2016	1
5/24/2017	1
10/3/2017	1
1/9/2018	1

There are 0 time periods with multiple data

A = 18
B = 0
C = 0
D = 0
E = 2

F = 0
a = 6006
b = 19656
c = 364
Group Variance = 332.667
Z-Score = 2.13826
Comparison Level at 95% confidence level = 1.65463 (upward trend)
2.13826 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

Parameter: Specific Conductivity, Lab
Location: Haun Shallow
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
1050	1140	-90	0	1
1090	1140	-50	0	2
1320	1140	180	1	2
3130	1140	1990	2	2
2280	1140	1140	3	2
3250	1140	2110	4	2
2810	1140	1670	5	2
1760	1140	620	6	2
1400	1140	260	7	2
2300	1140	1160	8	2
3090	1140	1950	9	2
3550	1140	2410	10	2
2220	1140	1080	11	2
1090	1050	40	12	2
1320	1050	270	13	2
3130	1050	2080	14	2
2280	1050	1230	15	2
3250	1050	2200	16	2
2810	1050	1760	17	2
1760	1050	710	18	2
1400	1050	350	19	2
2300	1050	1250	20	2
3090	1050	2040	21	2
3550	1050	2500	22	2
2220	1050	1170	23	2
1320	1090	230	24	2
3130	1090	2040	25	2
2280	1090	1190	26	2
3250	1090	2160	27	2
2810	1090	1720	28	2
1760	1090	670	29	2
1400	1090	310	30	2
2300	1090	1210	31	2
3090	1090	2000	32	2
3550	1090	2460	33	2
2220	1090	1130	34	2
3130	1320	1810	35	2
2280	1320	960	36	2
3250	1320	1930	37	2
2810	1320	1490	38	2
1760	1320	440	39	2
1400	1320	80	40	2
2300	1320	980	41	2
3090	1320	1770	42	2
3550	1320	2230	43	2
2220	1320	900	44	2
2280	3130	-850	44	3
3250	3130	120	45	3
2810	3130	-320	45	4
1760	3130	-1370	45	5
1400	3130	-1730	45	6
2300	3130	-830	45	7
3090	3130	-40	45	8
3550	3130	420	46	8
2220	3130	-910	46	9
3250	2280	970	47	9

2810	2280	530	48	9
1760	2280	-520	48	10
1400	2280	-880	48	11
2300	2280	20	49	11
3090	2280	810	50	11
3550	2280	1270	51	11
2220	2280	-60	51	12
2810	3250	-440	51	13
1760	3250	-1490	51	14
1400	3250	-1850	51	15
2300	3250	-950	51	16
3090	3250	-160	51	17
3550	3250	300	52	17
2220	3250	-1030	52	18
1760	2810	-1050	52	19
1400	2810	-1410	52	20
2300	2810	-510	52	21
3090	2810	280	53	21
3550	2810	740	54	21
2220	2810	-590	54	22
1400	1760	-360	54	23
2300	1760	540	55	23
3090	1760	1330	56	23
3550	1760	1790	57	23
2220	1760	460	58	23
2300	1400	900	59	23
3090	1400	1690	60	23
3550	1400	2150	61	23
2220	1400	820	62	23
3090	2300	790	63	23
3550	2300	1250	64	23
2220	2300	-80	64	24
3550	3090	460	65	24
2220	3090	-870	65	25
2220	3550	-1330	65	26

S Statistic = 65 - 26 = 39

Tied Group	Value	Members
Time Period		**Observations**
3/27/2013		1
6/11/2013		1
9/26/2013		1
12/18/2013		1
10/16/2014		1
1/21/2015		1
4/28/2015		1
8/20/2015		1
11/12/2015		1
4/19/2016		1
12/1/2016		1
5/24/2017		1
10/3/2017		1
1/9/2018		1

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0

a = 6006
b = 19656
c = 364
Group Variance = 333.667
Z-Score = 2.08031
Comparison Level at 95% confidence level = 1.65463 (upward trend)
2.08031 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

Parameter: Total Dissolved Solids
Location: Haun Shallow
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
533	579	-46	0	1
588	579	9	1	1
652	579	73	2	1
1800	579	1221	3	1
1260	579	681	4	1
1810	579	1231	5	1
1510	579	931	6	1
939	579	360	7	1
749	579	170	8	1
1320	579	741	9	1
1730	579	1151	10	1
2020	579	1441	11	1
1140	579	561	12	1
588	533	55	13	1
652	533	119	14	1
1800	533	1267	15	1
1260	533	727	16	1
1810	533	1277	17	1
1510	533	977	18	1
939	533	406	19	1
749	533	216	20	1
1320	533	787	21	1
1730	533	1197	22	1
2020	533	1487	23	1
1140	533	607	24	1
652	588	64	25	1
1800	588	1212	26	1
1260	588	672	27	1
1810	588	1222	28	1
1510	588	922	29	1
939	588	351	30	1
749	588	161	31	1
1320	588	732	32	1
1730	588	1142	33	1
2020	588	1432	34	1
1140	588	552	35	1
1800	652	1148	36	1
1260	652	608	37	1
1810	652	1158	38	1
1510	652	858	39	1
939	652	287	40	1
749	652	97	41	1
1320	652	668	42	1
1730	652	1078	43	1
2020	652	1368	44	1
1140	652	488	45	1
1260	1800	-540	45	2
1810	1800	10	46	2
1510	1800	-290	46	3
939	1800	-861	46	4
749	1800	-1051	46	5
1320	1800	-480	46	6
1730	1800	-70	46	7
2020	1800	220	47	7
1140	1800	-660	47	8
1810	1260	550	48	8

1510	1260	250	49	8
939	1260	-321	49	9
749	1260	-511	49	10
1320	1260	60	50	10
1730	1260	470	51	10
2020	1260	760	52	10
1140	1260	-120	52	11
1510	1810	-300	52	12
939	1810	-871	52	13
749	1810	-1061	52	14
1320	1810	-490	52	15
1730	1810	-80	52	16
2020	1810	210	53	16
1140	1810	-670	53	17
939	1510	-571	53	18
749	1510	-761	53	19
1320	1510	-190	53	20
1730	1510	220	54	20
2020	1510	510	55	20
1140	1510	-370	55	21
749	939	-190	55	22
1320	939	381	56	22
1730	939	791	57	22
2020	939	1081	58	22
1140	939	201	59	22
1320	749	571	60	22
1730	749	981	61	22
2020	749	1271	62	22
1140	749	391	63	22
1730	1320	410	64	22
2020	1320	700	65	22
1140	1320	-180	65	23
2020	1730	290	66	23
1140	1730	-590	66	24
1140	2020	-880	66	25

S Statistic = 66 - 25 = 41

Tied Group	Value	Members

Time Period	Observations
3/27/2013	1
6/11/2013	1
9/26/2013	1
12/18/2013	1
10/16/2014	1
1/21/2015	1
4/28/2015	1
8/20/2015	1
11/12/2015	1
4/19/2016	1
12/1/2016	1
5/24/2017	1
10/3/2017	1
1/9/2018	1

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0

a = 6006
b = 19656
c = 364
Group Variance = 333.667
Z-Score = 2.1898
Comparison Level at 95% confidence level = 1.65463 (upward trend)
2.1898 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

Parameter: Chloride
Location: MDT Plains Shop
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
260	12	248	1	0
400	12	388	2	0
490	12	478	3	0
1400	12	1388	4	0
770	12	758	5	0
760	12	748	6	0
500	12	488	7	0
261	12	249	8	0
307	12	295	9	0
369	12	357	10	0
297	12	285	11	0
243	12	231	12	0
300	12	288	13	0
540	12	528	14	0
470	12	458	15	0
259	12	247	16	0
167	12	155	17	0
302	12	290	18	0
400	260	140	19	0
490	260	230	20	0
1400	260	1140	21	0
770	260	510	22	0
760	260	500	23	0
500	260	240	24	0
261	260	1	25	0
307	260	47	26	0
369	260	109	27	0
297	260	37	28	0
243	260	-17	28	1
300	260	40	29	1
540	260	280	30	1
470	260	210	31	1
259	260	-1	31	2
167	260	-93	31	3
302	260	42	32	3
490	400	90	33	3
1400	400	1000	34	3
770	400	370	35	3
760	400	360	36	3
500	400	100	37	3
261	400	-139	37	4
307	400	-93	37	5
369	400	-31	37	6
297	400	-103	37	7
243	400	-157	37	8
300	400	-100	37	9
540	400	140	38	9
470	400	70	39	9
259	400	-141	39	10
167	400	-233	39	11
302	400	-98	39	12
1400	490	910	40	12
770	490	280	41	12
760	490	270	42	12
500	490	10	43	12
261	490	-229	43	13
307	490	-183	43	14
369	490	-121	43	15

297	490	-193	43	16
243	490	-247	43	17
300	490	-190	43	18
540	490	50	44	18
470	490	-20	44	19
259	490	-231	44	20
167	490	-323	44	21
302	490	-188	44	22
770	1400	-630	44	23
760	1400	-640	44	24
500	1400	-900	44	25
261	1400	-1139	44	26
307	1400	-1093	44	27
369	1400	-1031	44	28
297	1400	-1103	44	29
243	1400	-1157	44	30
300	1400	-1100	44	31
540	1400	-860	44	32
470	1400	-930	44	33
259	1400	-1141	44	34
167	1400	-1233	44	35
302	1400	-1098	44	36
760	770	-10	44	37
500	770	-270	44	38
261	770	-509	44	39
307	770	-463	44	40
369	770	-401	44	41
297	770	-473	44	42
243	770	-527	44	43
300	770	-470	44	44
540	770	-230	44	45
470	770	-300	44	46
259	770	-511	44	47
167	770	-603	44	48
302	770	-468	44	49
500	760	-260	44	50
261	760	-499	44	51
307	760	-453	44	52
369	760	-391	44	53
297	760	-463	44	54
243	760	-517	44	55
300	760	-460	44	56
540	760	-220	44	57
470	760	-290	44	58
259	760	-501	44	59
167	760	-593	44	60
302	760	-458	44	61
261	500	-239	44	62
307	500	-193	44	63
369	500	-131	44	64
297	500	-203	44	65
243	500	-257	44	66
300	500	-200	44	67
540	500	40	45	67
470	500	-30	45	68
259	500	-241	45	69
167	500	-333	45	70
302	500	-198	45	71
307	261	46	46	71
369	261	108	47	71
297	261	36	48	71
243	261	-18	48	72
300	261	39	49	72
540	261	279	50	72
470	261	209	51	72
259	261	-2	51	73

167	261	-94	51	74
302	261	41	52	74
369	307	62	53	74
297	307	-10	53	75
243	307	-64	53	76
300	307	-7	53	77
540	307	233	54	77
470	307	163	55	77
259	307	-48	55	78
167	307	-140	55	79
302	307	-5	55	80
297	369	-72	55	81
243	369	-126	55	82
300	369	-69	55	83
540	369	171	56	83
470	369	101	57	83
259	369	-110	57	84
167	369	-202	57	85
302	369	-67	57	86
243	297	-54	57	87
300	297	3	58	87
540	297	243	59	87
470	297	173	60	87
259	297	-38	60	88
167	297	-130	60	89
302	297	5	61	89
300	243	57	62	89
540	243	297	63	89
470	243	227	64	89
259	243	16	65	89
167	243	-76	65	90
302	243	59	66	90
540	300	240	67	90
470	300	170	68	90
259	300	-41	68	91
167	300	-133	68	92
302	300	2	69	92
470	540	-70	69	93
259	540	-281	69	94
167	540	-373	69	95
302	540	-238	69	96
259	470	-211	69	97
167	470	-303	69	98
302	470	-168	69	99
167	259	-92	69	100
302	259	43	70	100
302	167	135	71	100

S Statistic = 71 - 100 = -29

Tied Group	Value	Members
Time Period		**Observations**
11/27/1996		1
7/16/2012		1
9/27/2012		1
3/27/2013		1
6/11/2013		1
9/26/2013		1
12/18/2013		1
10/16/2014		1

1/20/2015	1
4/28/2015	1
8/20/2015	1
11/12/2015	1
4/19/2016	1
12/1/2016	1
5/24/2017	1
10/3/2017	1
1/9/2018	1
4/25/2018	1
7/10/2018	1

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0
a = 14706
b = 52326
c = 684
Group Variance = 817
Z-Score = -0.979596
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|-0.979596| <= 1.97737 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Specific Conductivity, Lab
Location: MDT Plains Shop
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
1250	435	815	1	0
1660	435	1225	2	0
2050	435	1615	3	0
4550	435	4115	4	0
2730	435	2295	5	0
2910	435	2475	6	0
2000	435	1565	7	0
1350	435	915	8	0
1440	435	1005	9	0
1630	435	1195	10	0
1340	435	905	11	0
1220	435	785	12	0
1460	435	1025	13	0
2290	435	1855	14	0
1960	435	1525	15	0
1340	435	905	16	0
1000	435	565	17	0
1480	435	1045	18	0
1660	1250	410	19	0
2050	1250	800	20	0
4550	1250	3300	21	0
2730	1250	1480	22	0
2910	1250	1660	23	0
2000	1250	750	24	0
1350	1250	100	25	0
1440	1250	190	26	0
1630	1250	380	27	0
1340	1250	90	28	0
1220	1250	-30	28	1
1460	1250	210	29	1
2290	1250	1040	30	1
1960	1250	710	31	1
1340	1250	90	32	1
1000	1250	-250	32	2
1480	1250	230	33	2
2050	1660	390	34	2
4550	1660	2890	35	2
2730	1660	1070	36	2
2910	1660	1250	37	2
2000	1660	340	38	2
1350	1660	-310	38	3
1440	1660	-220	38	4
1630	1660	-30	38	5
1340	1660	-320	38	6
1220	1660	-440	38	7
1460	1660	-200	38	8
2290	1660	630	39	8
1960	1660	300	40	8
1340	1660	-320	40	9
1000	1660	-660	40	10
1480	1660	-180	40	11
4550	2050	2500	41	11
2730	2050	680	42	11
2910	2050	860	43	11
2000	2050	-50	43	12
1350	2050	-700	43	13
1440	2050	-610	43	14
1630	2050	-420	43	15

1340	2050	-710	43	16
1220	2050	-830	43	17
1460	2050	-590	43	18
2290	2050	240	44	18
1960	2050	-90	44	19
1340	2050	-710	44	20
1000	2050	-1050	44	21
1480	2050	-570	44	22
2730	4550	-1820	44	23
2910	4550	-1640	44	24
2000	4550	-2550	44	25
1350	4550	-3200	44	26
1440	4550	-3110	44	27
1630	4550	-2920	44	28
1340	4550	-3210	44	29
1220	4550	-3330	44	30
1460	4550	-3090	44	31
2290	4550	-2260	44	32
1960	4550	-2590	44	33
1340	4550	-3210	44	34
1000	4550	-3550	44	35
1480	4550	-3070	44	36
2910	2730	180	45	36
2000	2730	-730	45	37
1350	2730	-1380	45	38
1440	2730	-1290	45	39
1630	2730	-1100	45	40
1340	2730	-1390	45	41
1220	2730	-1510	45	42
1460	2730	-1270	45	43
2290	2730	-440	45	44
1960	2730	-770	45	45
1340	2730	-1390	45	46
1000	2730	-1730	45	47
1480	2730	-1250	45	48
2000	2910	-910	45	49
1350	2910	-1560	45	50
1440	2910	-1470	45	51
1630	2910	-1280	45	52
1340	2910	-1570	45	53
1220	2910	-1690	45	54
1460	2910	-1450	45	55
2290	2910	-620	45	56
1960	2910	-950	45	57
1340	2910	-1570	45	58
1000	2910	-1910	45	59
1480	2910	-1430	45	60
1350	2000	-650	45	61
1440	2000	-560	45	62
1630	2000	-370	45	63
1340	2000	-660	45	64
1220	2000	-780	45	65
1460	2000	-540	45	66
2290	2000	290	46	66
1960	2000	-40	46	67
1340	2000	-660	46	68
1000	2000	-1000	46	69
1480	2000	-520	46	70
1440	1350	90	47	70
1630	1350	280	48	70
1340	1350	-10	48	71
1220	1350	-130	48	72
1460	1350	110	49	72
2290	1350	940	50	72
1960	1350	610	51	72
1340	1350	-10	51	73

1000	1350	-350	51	74
1480	1350	130	52	74
1630	1440	190	53	74
1340	1440	-100	53	75
1220	1440	-220	53	76
1460	1440	20	54	76
2290	1440	850	55	76
1960	1440	520	56	76
1340	1440	-100	56	77
1000	1440	-440	56	78
1480	1440	40	57	78
1340	1630	-290	57	79
1220	1630	-410	57	80
1460	1630	-170	57	81
2290	1630	660	58	81
1960	1630	330	59	81
1340	1630	-290	59	82
1000	1630	-630	59	83
1480	1630	-150	59	84
1220	1340	-120	59	85
1460	1340	120	60	85
2290	1340	950	61	85
1960	1340	620	62	85
1340	1340	0	62	85
1000	1340	-340	62	86
1480	1340	140	63	86
1460	1220	240	64	86
2290	1220	1070	65	86
1960	1220	740	66	86
1340	1220	120	67	86
1000	1220	-220	67	87
1480	1220	260	68	87
2290	1460	830	69	87
1960	1460	500	70	87
1340	1460	-120	70	88
1000	1460	-460	70	89
1480	1460	20	71	89
1960	2290	-330	71	90
1340	2290	-950	71	91
1000	2290	-1290	71	92
1480	2290	-810	71	93
1340	1960	-620	71	94
1000	1960	-960	71	95
1480	1960	-480	71	96
1000	1340	-340	71	97
1480	1340	140	72	97
1480	1000	480	73	97

S Statistic = 73 - 97 = -24

Tied Group	Value	Members
1	1340	2

Time Period	Observations
11/27/1996	1
7/16/2012	1
9/27/2012	1
3/27/2013	1
6/11/2013	1
9/26/2013	1
12/18/2013	1

10/16/2014	1
1/20/2015	1
4/28/2015	1
8/20/2015	1
11/12/2015	1
4/19/2016	1
12/1/2016	1
5/24/2017	1
10/3/2017	1
1/9/2018	1
4/25/2018	1
7/10/2018	1

There are 0 time periods with multiple data

A = 18
B = 0
C = 0
D = 0
E = 2
F = 0
a = 14706
b = 52326
c = 684
Group Variance = 816
Z-Score = -0.805161
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|-0.805161| <= 1.97737 indicating no evidence of a trend

Mann-Kendall Trend Analysis
Parameter: Total Dissolved Solids
Location: MDT Plains Shop
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
688	221	467	1	0
911	221	690	2	0
876	221	655	3	0
2440	221	2219	4	0
1460	221	1239	5	0
1430	221	1209	6	0
1050	221	829	7	0
711	221	490	8	0
738	221	517	9	0
871	221	650	10	0
720	221	499	11	0
659	221	438	12	0
802	221	581	13	0
1420	221	1199	14	0
1060	221	839	15	0
697	221	476	16	0
549	221	328	17	0
784	221	563	18	0
911	688	223	19	0
876	688	188	20	0
2440	688	1752	21	0
1460	688	772	22	0
1430	688	742	23	0
1050	688	362	24	0
711	688	23	25	0
738	688	50	26	0
871	688	183	27	0
720	688	32	28	0
659	688	-29	28	1
802	688	114	29	1
1420	688	732	30	1
1060	688	372	31	1
697	688	9	32	1
549	688	-139	32	2
784	688	96	33	2
876	911	-35	33	3
2440	911	1529	34	3
1460	911	549	35	3
1430	911	519	36	3
1050	911	139	37	3
711	911	-200	37	4
738	911	-173	37	5
871	911	-40	37	6
720	911	-191	37	7
659	911	-252	37	8
802	911	-109	37	9
1420	911	509	38	9
1060	911	149	39	9
697	911	-214	39	10
549	911	-362	39	11
784	911	-127	39	12
2440	876	1564	40	12
1460	876	584	41	12
1430	876	554	42	12
1050	876	174	43	12
711	876	-165	43	13
738	876	-138	43	14
871	876	-5	43	15

720	876	-156	43	16
659	876	-217	43	17
802	876	-74	43	18
1420	876	544	44	18
1060	876	184	45	18
697	876	-179	45	19
549	876	-327	45	20
784	876	-92	45	21
1460	2440	-980	45	22
1430	2440	-1010	45	23
1050	2440	-1390	45	24
711	2440	-1729	45	25
738	2440	-1702	45	26
871	2440	-1569	45	27
720	2440	-1720	45	28
659	2440	-1781	45	29
802	2440	-1638	45	30
1420	2440	-1020	45	31
1060	2440	-1380	45	32
697	2440	-1743	45	33
549	2440	-1891	45	34
784	2440	-1656	45	35
1430	1460	-30	45	36
1050	1460	-410	45	37
711	1460	-749	45	38
738	1460	-722	45	39
871	1460	-589	45	40
720	1460	-740	45	41
659	1460	-801	45	42
802	1460	-658	45	43
1420	1460	-40	45	44
1060	1460	-400	45	45
697	1460	-763	45	46
549	1460	-911	45	47
784	1460	-676	45	48
1050	1430	-380	45	49
711	1430	-719	45	50
738	1430	-692	45	51
871	1430	-559	45	52
720	1430	-710	45	53
659	1430	-771	45	54
802	1430	-628	45	55
1420	1430	-10	45	56
1060	1430	-370	45	57
697	1430	-733	45	58
549	1430	-881	45	59
784	1430	-646	45	60
711	1050	-339	45	61
738	1050	-312	45	62
871	1050	-179	45	63
720	1050	-330	45	64
659	1050	-391	45	65
802	1050	-248	45	66
1420	1050	370	46	66
1060	1050	10	47	66
697	1050	-353	47	67
549	1050	-501	47	68
784	1050	-266	47	69
738	711	27	48	69
871	711	160	49	69
720	711	9	50	69
659	711	-52	50	70
802	711	91	51	70
1420	711	709	52	70
1060	711	349	53	70
697	711	-14	53	71

549	711	-162	53	72
784	711	73	54	72
871	738	133	55	72
720	738	-18	55	73
659	738	-79	55	74
802	738	64	56	74
1420	738	682	57	74
1060	738	322	58	74
697	738	-41	58	75
549	738	-189	58	76
784	738	46	59	76
720	871	-151	59	77
659	871	-212	59	78
802	871	-69	59	79
1420	871	549	60	79
1060	871	189	61	79
697	871	-174	61	80
549	871	-322	61	81
784	871	-87	61	82
659	720	-61	61	83
802	720	82	62	83
1420	720	700	63	83
1060	720	340	64	83
697	720	-23	64	84
549	720	-171	64	85
784	720	64	65	85
802	659	143	66	85
1420	659	761	67	85
1060	659	401	68	85
697	659	38	69	85
549	659	-110	69	86
784	659	125	70	86
1420	802	618	71	86
1060	802	258	72	86
697	802	-105	72	87
549	802	-253	72	88
784	802	-18	72	89
1060	1420	-360	72	90
697	1420	-723	72	91
549	1420	-871	72	92
784	1420	-636	72	93
697	1060	-363	72	94
549	1060	-511	72	95
784	1060	-276	72	96
549	697	-148	72	97
784	697	87	73	97
784	549	235	74	97

S Statistic = 74 - 97 = -23

Tied Group	Value	Members
Time Period		**Observations**
11/27/1996		1
7/16/2012		1
9/27/2012		1
3/27/2013		1
6/11/2013		1
9/26/2013		1
12/18/2013		1
10/16/2014		1

1/20/2015	1
4/28/2015	1
8/20/2015	1
11/12/2015	1
4/19/2016	1
12/1/2016	1
5/24/2017	1
10/3/2017	1
1/9/2018	1
4/25/2018	1
7/10/2018	1

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0
a = 14706
b = 52326
c = 684
Group Variance = 817
Z-Score = -0.769683
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|-0.769683| <= 1.97737 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Chloride
Location: Merideth
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
58	270	-212	0	1
29	270	-241	0	2
160	270	-110	0	3
160	270	-110	0	4
27	270	-243	0	5
27	270	-243	0	6
156	270	-114	0	7
40	270	-230	0	8
27	270	-243	0	9
27	270	-243	0	10
21	270	-249	0	11
56	270	-214	0	12
270	270	0	0	12
111	270	-159	0	13
34	270	-236	0	14
30	270	-240	0	15
229	270	-41	0	16
230	270	-40	0	17
29	58	-29	0	18
160	58	102	1	18
160	58	102	2	18
27	58	-31	2	19
27	58	-31	2	20
156	58	98	3	20
40	58	-18	3	21
27	58	-31	3	22
27	58	-31	3	23
21	58	-37	3	24
56	58	-2	3	25
270	58	212	4	25
111	58	53	5	25
34	58	-24	5	26
30	58	-28	5	27
229	58	171	6	27
230	58	172	7	27
160	29	131	8	27
160	29	131	9	27
27	29	-2	9	28
27	29	-2	9	29
156	29	127	10	29
40	29	11	11	29
27	29	-2	11	30
27	29	-2	11	31
21	29	-8	11	32
56	29	27	12	32
270	29	241	13	32
111	29	82	14	32
34	29	5	15	32
30	29	1	16	32
229	29	200	17	32
230	29	201	18	32
160	160	Same Date	18	32
27	160	-133	18	33
27	160	-133	18	34
156	160	-4	18	35
40	160	-120	18	36
27	160	-133	18	37
27	160	-133	18	38

21	160	-139	18	39
56	160	-104	18	40
270	160	110	19	40
111	160	-49	19	41
34	160	-126	19	42
30	160	-130	19	43
229	160	69	20	43
230	160	70	21	43
27	160	-133	21	44
27	160	-133	21	45
156	160	-4	21	46
40	160	-120	21	47
27	160	-133	21	48
27	160	-133	21	49
21	160	-139	21	50
56	160	-104	21	51
270	160	110	22	51
111	160	-49	22	52
34	160	-126	22	53
30	160	-130	22	54
229	160	69	23	54
230	160	70	24	54
27	27	Same Date	24	54
156	27	129	25	54
40	27	13	26	54
27	27	0	26	54
27	27	0	26	54
21	27	-6	26	55
56	27	29	27	55
270	27	243	28	55
111	27	84	29	55
34	27	7	30	55
30	27	3	31	55
229	27	202	32	55
230	27	203	33	55
156	27	129	34	55
40	27	13	35	55
27	27	0	35	55
27	27	0	35	55
21	27	-6	35	56
56	27	29	36	56
270	27	243	37	56
111	27	84	38	56
34	27	7	39	56
30	27	3	40	56
229	27	202	41	56
230	27	203	42	56
40	156	-116	42	57
27	156	-129	42	58
27	156	-129	42	59
21	156	-135	42	60
56	156	-100	42	61
270	156	114	43	61
111	156	-45	43	62
34	156	-122	43	63
30	156	-126	43	64
229	156	73	44	64
230	156	74	45	64
27	40	-13	45	65
27	40	-13	45	66
21	40	-19	45	67
56	40	16	46	67
270	40	230	47	67
111	40	71	48	67
34	40	-6	48	68
30	40	-10	48	69

229	40	189	49	69
230	40	190	50	69
27	27	Same Date	50	69
21	27	-6	50	70
56	27	29	51	70
270	27	243	52	70
111	27	84	53	70
34	27	7	54	70
30	27	3	55	70
229	27	202	56	70
230	27	203	57	70
21	27	-6	57	71
56	27	29	58	71
270	27	243	59	71
111	27	84	60	71
34	27	7	61	71
30	27	3	62	71
229	27	202	63	71
230	27	203	64	71
56	21	35	65	71
270	21	249	66	71
111	21	90	67	71
34	21	13	68	71
30	21	9	69	71
229	21	208	70	71
230	21	209	71	71
270	56	214	72	71
111	56	55	73	71
34	56	-22	73	72
30	56	-26	73	73
229	56	173	74	73
230	56	174	75	73
111	270	-159	75	74
34	270	-236	75	75
30	270	-240	75	76
229	270	-41	75	77
230	270	-40	75	78
34	111	-77	75	79
30	111	-81	75	80
229	111	118	76	80
230	111	119	77	80
30	34	-4	77	81
229	34	195	78	81
230	34	196	79	81
229	30	199	80	81
230	30	200	81	81
230	229	1	82	81

S Statistic = 82 - 81 = 1

Tied Group	Value	Members
1	270	2
2	160	2
3	27	4

Time Period	Observations
6/11/2013	1
9/26/2013	1
12/18/2013	1
10/17/2014	2
1/21/2015	2

4/28/2015	1
8/20/2015	1
11/12/2015	2
4/19/2016	1
12/1/2016	1
5/24/2017	1
10/3/2017	1
1/9/2018	1
4/25/2018	1
6/14/2018	1
7/10/2018	1

There are 3 time periods with multiple data

A = 192
B = 54
C = 24
D = 0
E = 16
F = 6
a = 14706
b = 52326
c = 684
Group Variance = 803.474
Z-Score = 0
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|0| <= 1.97737 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Specific Conductivity, Lab
Location: Merideth
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
641	1280	-639	0	1
600	1280	-680	0	2
989	1280	-291	0	3
989	1280	-291	0	4
557	1280	-723	0	5
557	1280	-723	0	6
961	1280	-319	0	7
595	1280	-685	0	8
557	1280	-723	0	9
557	1280	-723	0	10
517	1280	-763	0	11
636	1280	-644	0	12
1400	1280	120	1	12
827	1280	-453	1	13
588	1280	-692	1	14
515	1280	-765	1	15
1230	1280	-50	1	16
1230	1280	-50	1	17
600	641	-41	1	18
989	641	348	2	18
989	641	348	3	18
557	641	-84	3	19
557	641	-84	3	20
961	641	320	4	20
595	641	-46	4	21
557	641	-84	4	22
557	641	-84	4	23
517	641	-124	4	24
636	641	-5	4	25
1400	641	759	5	25
827	641	186	6	25
588	641	-53	6	26
515	641	-126	6	27
1230	641	589	7	27
1230	641	589	8	27
989	600	389	9	27
989	600	389	10	27
557	600	-43	10	28
557	600	-43	10	29
961	600	361	11	29
595	600	-5	11	30
557	600	-43	11	31
557	600	-43	11	32
517	600	-83	11	33
636	600	36	12	33
1400	600	800	13	33
827	600	227	14	33
588	600	-12	14	34
515	600	-85	14	35
1230	600	630	15	35
1230	600	630	16	35
989	989	Same Date	16	35
557	989	-432	16	36
557	989	-432	16	37
961	989	-28	16	38
595	989	-394	16	39
557	989	-432	16	40
557	989	-432	16	41

517	989	-472	16	42
636	989	-353	16	43
1400	989	411	17	43
827	989	-162	17	44
588	989	-401	17	45
515	989	-474	17	46
1230	989	241	18	46
1230	989	241	19	46
557	989	-432	19	47
557	989	-432	19	48
961	989	-28	19	49
595	989	-394	19	50
557	989	-432	19	51
557	989	-432	19	52
517	989	-472	19	53
636	989	-353	19	54
1400	989	411	20	54
827	989	-162	20	55
588	989	-401	20	56
515	989	-474	20	57
1230	989	241	21	57
1230	989	241	22	57
557	557	Same Date	22	57
961	557	404	23	57
595	557	38	24	57
557	557	0	24	57
557	557	0	24	57
517	557	-40	24	58
636	557	79	25	58
1400	557	843	26	58
827	557	270	27	58
588	557	31	28	58
515	557	-42	28	59
1230	557	673	29	59
1230	557	673	30	59
961	557	404	31	59
595	557	38	32	59
557	557	0	32	59
557	557	0	32	59
517	557	-40	32	60
636	557	79	33	60
1400	557	843	34	60
827	557	270	35	60
588	557	31	36	60
515	557	-42	36	61
1230	557	673	37	61
1230	557	673	38	61
595	961	-366	38	62
557	961	-404	38	63
557	961	-404	38	64
517	961	-444	38	65
636	961	-325	38	66
1400	961	439	39	66
827	961	-134	39	67
588	961	-373	39	68
515	961	-446	39	69
1230	961	269	40	69
1230	961	269	41	69
557	595	-38	41	70
557	595	-38	41	71
517	595	-78	41	72
636	595	41	42	72
1400	595	805	43	72
827	595	232	44	72
588	595	-7	44	73
515	595	-80	44	74

1230	595	635	45	74
1230	595	635	46	74
557	557	Same Date	46	74
517	557	-40	46	75
636	557	79	47	75
1400	557	843	48	75
827	557	270	49	75
588	557	31	50	75
515	557	-42	50	76
1230	557	673	51	76
1230	557	673	52	76
517	557	-40	52	77
636	557	79	53	77
1400	557	843	54	77
827	557	270	55	77
588	557	31	56	77
515	557	-42	56	78
1230	557	673	57	78
1230	557	673	58	78
636	517	119	59	78
1400	517	883	60	78
827	517	310	61	78
588	517	71	62	78
515	517	-2	62	79
1230	517	713	63	79
1230	517	713	64	79
1400	636	764	65	79
827	636	191	66	79
588	636	-48	66	80
515	636	-121	66	81
1230	636	594	67	81
1230	636	594	68	81
827	1400	-573	68	82
588	1400	-812	68	83
515	1400	-885	68	84
1230	1400	-170	68	85
1230	1400	-170	68	86
588	827	-239	68	87
515	827	-312	68	88
1230	827	403	69	88
1230	827	403	70	88
515	588	-73	70	89
1230	588	642	71	89
1230	588	642	72	89
1230	515	715	73	89
1230	515	715	74	89
1230	1230	0	74	89

S Statistic = 74 - 89 = -15

Tied Group	Value	Members
1	989	2
2	557	4
3	1230	2

Time Period	Observations
6/11/2013	1
9/26/2013	1
12/18/2013	1
10/17/2014	2
1/21/2015	2

4/28/2015	1
8/20/2015	1
11/12/2015	2
4/19/2016	1
12/1/2016	1
5/24/2017	1
10/3/2017	1
1/9/2018	1
4/25/2018	1
6/14/2018	1
7/10/2018	1

There are 3 time periods with multiple data

A = 192
B = 54
C = 24
D = 0
E = 16
F = 6
a = 14706
b = 52326
c = 684
Group Variance = 803.474
Z-Score = -0.493904
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|-0.493904| <= 1.97737 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Total Dissolved Solids
Location: Merideth
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
356	641	-285	0	1
308	641	-333	0	2
519	641	-122	0	3
525	641	-116	0	4
316	641	-325	0	5
318	641	-323	0	6
526	641	-115	0	7
340	641	-301	0	8
317	641	-324	0	9
320	641	-321	0	10
299	641	-342	0	11
376	641	-265	0	12
871	641	230	1	12
451	641	-190	1	13
320	641	-321	1	14
289	641	-352	1	15
686	641	45	2	15
722	641	81	3	15
308	356	-48	3	16
519	356	163	4	16
525	356	169	5	16
316	356	-40	5	17
318	356	-38	5	18
526	356	170	6	18
340	356	-16	6	19
317	356	-39	6	20
320	356	-36	6	21
299	356	-57	6	22
376	356	20	7	22
871	356	515	8	22
451	356	95	9	22
320	356	-36	9	23
289	356	-67	9	24
686	356	330	10	24
722	356	366	11	24
519	308	211	12	24
525	308	217	13	24
316	308	8	14	24
318	308	10	15	24
526	308	218	16	24
340	308	32	17	24
317	308	9	18	24
320	308	12	19	24
299	308	-9	19	25
376	308	68	20	25
871	308	563	21	25
451	308	143	22	25
320	308	12	23	25
289	308	-19	23	26
686	308	378	24	26
722	308	414	25	26
525	519	Same Date	25	26
316	519	-203	25	27
318	519	-201	25	28
526	519	7	26	28
340	519	-179	26	29
317	519	-202	26	30
320	519	-199	26	31

299	519	-220	26	32
376	519	-143	26	33
871	519	352	27	33
451	519	-68	27	34
320	519	-199	27	35
289	519	-230	27	36
686	519	167	28	36
722	519	203	29	36
316	525	-209	29	37
318	525	-207	29	38
526	525	1	30	38
340	525	-185	30	39
317	525	-208	30	40
320	525	-205	30	41
299	525	-226	30	42
376	525	-149	30	43
871	525	346	31	43
451	525	-74	31	44
320	525	-205	31	45
289	525	-236	31	46
686	525	161	32	46
722	525	197	33	46
318	316	Same Date	33	46
526	316	210	34	46
340	316	24	35	46
317	316	1	36	46
320	316	4	37	46
299	316	-17	37	47
376	316	60	38	47
871	316	555	39	47
451	316	135	40	47
320	316	4	41	47
289	316	-27	41	48
686	316	370	42	48
722	316	406	43	48
526	318	208	44	48
340	318	22	45	48
317	318	-1	45	49
320	318	2	46	49
299	318	-19	46	50
376	318	58	47	50
871	318	553	48	50
451	318	133	49	50
320	318	2	50	50
289	318	-29	50	51
686	318	368	51	51
722	318	404	52	51
340	526	-186	52	52
317	526	-209	52	53
320	526	-206	52	54
299	526	-227	52	55
376	526	-150	52	56
871	526	345	53	56
451	526	-75	53	57
320	526	-206	53	58
289	526	-237	53	59
686	526	160	54	59
722	526	196	55	59
317	340	-23	55	60
320	340	-20	55	61
299	340	-41	55	62
376	340	36	56	62
871	340	531	57	62
451	340	111	58	62
320	340	-20	58	63
289	340	-51	58	64

686	340	346	59	64
722	340	382	60	64
320	317	Same Date	60	64
299	317	-18	60	65
376	317	59	61	65
871	317	554	62	65
451	317	134	63	65
320	317	3	64	65
289	317	-28	64	66
686	317	369	65	66
722	317	405	66	66
299	320	-21	66	67
376	320	56	67	67
871	320	551	68	67
451	320	131	69	67
320	320	0	69	67
289	320	-31	69	68
686	320	366	70	68
722	320	402	71	68
376	299	77	72	68
871	299	572	73	68
451	299	152	74	68
320	299	21	75	68
289	299	-10	75	69
686	299	387	76	69
722	299	423	77	69
871	376	495	78	69
451	376	75	79	69
320	376	-56	79	70
289	376	-87	79	71
686	376	310	80	71
722	376	346	81	71
451	871	-420	81	72
320	871	-551	81	73
289	871	-582	81	74
686	871	-185	81	75
722	871	-149	81	76
320	451	-131	81	77
289	451	-162	81	78
686	451	235	82	78
722	451	271	83	78
289	320	-31	83	79
686	320	366	84	79
722	320	402	85	79
686	289	397	86	79
722	289	433	87	79
722	686	36	88	79

S Statistic = 88 - 79 = 9

Tied Group	Value	Members
1	320	2

Time Period	Observations
6/11/2013	1
9/26/2013	1
12/18/2013	1
10/17/2014	2
1/21/2015	2
4/28/2015	1
8/20/2015	1

11/12/2015	2
4/19/2016	1
12/1/2016	1
5/24/2017	1
10/3/2017	1
1/9/2018	1
4/25/2018	1
6/14/2018	1
7/10/2018	1

There are 3 time periods with multiple data

A = 18
B = 54
C = 0
D = 0
E = 2
F = 6
a = 14706
b = 52326
c = 684
Group Variance = 813.018
Z-Score = 0.280569
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|0.280569| <= 1.97737 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Chloride
Location: Sears
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
37	43	-6	0	1
70	43	27	1	1
49	43	6	2	1
69	43	26	3	1
69	43	26	4	1
42	43	-1	4	2
43	43	0	4	2
28	43	-15	4	3
98	43	55	5	3
33	43	-10	5	4
40	43	-3	5	5
178	43	135	6	5
70	37	33	7	5
49	37	12	8	5
69	37	32	9	5
69	37	32	10	5
42	37	5	11	5
43	37	6	12	5
28	37	-9	12	6
98	37	61	13	6
33	37	-4	13	7
40	37	3	14	7
178	37	141	15	7
49	70	-21	15	8
69	70	-1	15	9
69	70	-1	15	10
42	70	-28	15	11
43	70	-27	15	12
28	70	-42	15	13
98	70	28	16	13
33	70	-37	16	14
40	70	-30	16	15
178	70	108	17	15
69	49	20	18	15
69	49	20	19	15
42	49	-7	19	16
43	49	-6	19	17
28	49	-21	19	18
98	49	49	20	18
33	49	-16	20	19
40	49	-9	20	20
178	49	129	21	20
69	69	Same Date	21	20
42	69	-27	21	21
43	69	-26	21	22
28	69	-41	21	23
98	69	29	22	23
33	69	-36	22	24
40	69	-29	22	25
178	69	109	23	25
42	69	-27	23	26
43	69	-26	23	27
28	69	-41	23	28
98	69	29	24	28
33	69	-36	24	29
40	69	-29	24	30

178	69	109	25	30
43	42	Same Date	25	30
28	42	-14	25	31
98	42	56	26	31
33	42	-9	26	32
40	42	-2	26	33
178	42	136	27	33
28	43	-15	27	34
98	43	55	28	34
33	43	-10	28	35
40	43	-3	28	36
178	43	135	29	36
98	28	70	30	36
33	28	5	31	36
40	28	12	32	36
178	28	150	33	36
33	98	-65	33	37
40	98	-58	33	38
178	98	80	34	38
40	33	7	35	38
178	33	145	36	38
178	40	138	37	38

S Statistic = 37 - 38 = -1

Tied Group	Value	Members
1	43	2
2	69	2

Time Period	Observations
9/26/2013	1
12/18/2013	1
10/16/2014	1
1/20/2015	1
4/28/2015	2
8/20/2015	2
4/19/2016	1
5/24/2017	1
10/3/2017	1
4/25/2018	1
7/10/2018	1

There are 2 time periods with multiple data

A = 36
B = 36
C = 0
D = 0
E = 4
F = 4
a = 4836
b = 15444
c = 312
Group Variance = 264.718
Z-Score = 0
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|0| <= 1.97737 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Specific Conductivity, Lab
Location: Sears
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
642	613	29	1	0
700	613	87	2	0
645	613	32	3	0
739	613	126	4	0
740	613	127	5	0
626	613	13	6	0
629	613	16	7	0
572	613	-41	7	1
908	613	295	8	1
582	613	-31	8	2
591	613	-22	8	3
1150	613	537	9	3
700	642	58	10	3
645	642	3	11	3
739	642	97	12	3
740	642	98	13	3
626	642	-16	13	4
629	642	-13	13	5
572	642	-70	13	6
908	642	266	14	6
582	642	-60	14	7
591	642	-51	14	8
1150	642	508	15	8
645	700	-55	15	9
739	700	39	16	9
740	700	40	17	9
626	700	-74	17	10
629	700	-71	17	11
572	700	-128	17	12
908	700	208	18	12
582	700	-118	18	13
591	700	-109	18	14
1150	700	450	19	14
739	645	94	20	14
740	645	95	21	14
626	645	-19	21	15
629	645	-16	21	16
572	645	-73	21	17
908	645	263	22	17
582	645	-63	22	18
591	645	-54	22	19
1150	645	505	23	19
740	739	Same Date	23	19
626	739	-113	23	20
629	739	-110	23	21
572	739	-167	23	22
908	739	169	24	22
582	739	-157	24	23
591	739	-148	24	24
1150	739	411	25	24
626	740	-114	25	25
629	740	-111	25	26
572	740	-168	25	27
908	740	168	26	27
582	740	-158	26	28
591	740	-149	26	29

1150	740	410	27	29
629	626	Same Date	27	29
572	626	-54	27	30
908	626	282	28	30
582	626	-44	28	31
591	626	-35	28	32
1150	626	524	29	32
572	629	-57	29	33
908	629	279	30	33
582	629	-47	30	34
591	629	-38	30	35
1150	629	521	31	35
908	572	336	32	35
582	572	10	33	35
591	572	19	34	35
1150	572	578	35	35
582	908	-326	35	36
591	908	-317	35	37
1150	908	242	36	37
591	582	9	37	37
1150	582	568	38	37
1150	591	559	39	37

S Statistic = 39 - 37 = 2

Tied Group	Value	Members
Time Period		**Observations**
9/26/2013		1
12/18/2013		1
10/16/2014		1
1/20/2015		1
4/28/2015		2
8/20/2015		2
4/19/2016		1
5/24/2017		1
10/3/2017		1
4/25/2018		1
7/10/2018		1

There are 2 time periods with multiple data

A = 0
B = 36
C = 0
D = 0
E = 0
F = 4
a = 4836
b = 15444
c = 312
Group Variance = 266.667
Z-Score = 0.0612372
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|0.0612372| <= 1.97737 indicating no evidence of a trend

Mann-Kendall Trend Analysis
Parameter: Total Dissolved Solids
Location: Sears
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
326	346	-20	0	1
388	346	42	1	1
363	346	17	2	1
398	346	52	3	1
410	346	64	4	1
346	346	0	4	1
347	346	1	5	1
324	346	-22	5	2
533	346	187	6	2
331	346	-15	6	3
327	346	-19	6	4
680	346	334	7	4
388	326	62	8	4
363	326	37	9	4
398	326	72	10	4
410	326	84	11	4
346	326	20	12	4
347	326	21	13	4
324	326	-2	13	5
533	326	207	14	5
331	326	5	15	5
327	326	1	16	5
680	326	354	17	5
363	388	-25	17	6
398	388	10	18	6
410	388	22	19	6
346	388	-42	19	7
347	388	-41	19	8
324	388	-64	19	9
533	388	145	20	9
331	388	-57	20	10
327	388	-61	20	11
680	388	292	21	11
398	363	35	22	11
410	363	47	23	11
346	363	-17	23	12
347	363	-16	23	13
324	363	-39	23	14
533	363	170	24	14
331	363	-32	24	15
327	363	-36	24	16
680	363	317	25	16
410	398	Same Date	25	16
346	398	-52	25	17
347	398	-51	25	18
324	398	-74	25	19
533	398	135	26	19
331	398	-67	26	20
327	398	-71	26	21
680	398	282	27	21
346	410	-64	27	22
347	410	-63	27	23
324	410	-86	27	24
533	410	123	28	24
331	410	-79	28	25
327	410	-83	28	26

680	410	270	29	26
347	346	Same Date	29	26
324	346	-22	29	27
533	346	187	30	27
331	346	-15	30	28
327	346	-19	30	29
680	346	334	31	29
324	347	-23	31	30
533	347	186	32	30
331	347	-16	32	31
327	347	-20	32	32
680	347	333	33	32
533	324	209	34	32
331	324	7	35	32
327	324	3	36	32
680	324	356	37	32
331	533	-202	37	33
327	533	-206	37	34
680	533	147	38	34
327	331	-4	38	35
680	331	349	39	35
680	327	353	40	35

S Statistic = 40 - 35 = 5

Tied Group	Value	Members
1	346	2

Time Period	Observations
9/26/2013	1
12/18/2013	1
10/16/2014	1
1/20/2015	1
4/28/2015	2
8/20/2015	2
4/19/2016	1
5/24/2017	1
10/3/2017	1
4/25/2018	1
7/10/2018	1

There are 2 time periods with multiple data

A = 18
B = 36
C = 0
D = 0
E = 2
F = 4
a = 4836
b = 15444
c = 312
Group Variance = 265.692
Z-Score = 0.245398
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|0.245398| <= 1.97737 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Chloride
Location: Weeks Shallow
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
160	180	-20	0	1
170	180	-10	0	2
150	180	-30	0	3
130	180	-50	0	4
460	180	280	1	4
580	180	400	2	4
358	180	178	3	4
255	180	75	4	4
266	180	86	5	4
370	180	190	6	4
1200	180	1020	7	4
829	180	649	8	4
576	180	396	9	4
170	160	10	10	4
150	160	-10	10	5
130	160	-30	10	6
460	160	300	11	6
580	160	420	12	6
358	160	198	13	6
255	160	95	14	6
266	160	106	15	6
370	160	210	16	6
1200	160	1040	17	6
829	160	669	18	6
576	160	416	19	6
150	170	-20	19	7
130	170	-40	19	8
460	170	290	20	8
580	170	410	21	8
358	170	188	22	8
255	170	85	23	8
266	170	96	24	8
370	170	200	25	8
1200	170	1030	26	8
829	170	659	27	8
576	170	406	28	8
130	150	-20	28	9
460	150	310	29	9
580	150	430	30	9
358	150	208	31	9
255	150	105	32	9
266	150	116	33	9
370	150	220	34	9
1200	150	1050	35	9
829	150	679	36	9
576	150	426	37	9
460	130	330	38	9
580	130	450	39	9
358	130	228	40	9
255	130	125	41	9
266	130	136	42	9
370	130	240	43	9
1200	130	1070	44	9
829	130	699	45	9
576	130	446	46	9
580	460	120	47	9

358	460	-102	47	10
255	460	-205	47	11
266	460	-194	47	12
370	460	-90	47	13
1200	460	740	48	13
829	460	369	49	13
576	460	116	50	13
358	580	-222	50	14
255	580	-325	50	15
266	580	-314	50	16
370	580	-210	50	17
1200	580	620	51	17
829	580	249	52	17
576	580	-4	52	18
255	358	-103	52	19
266	358	-92	52	20
370	358	12	53	20
1200	358	842	54	20
829	358	471	55	20
576	358	218	56	20
266	255	11	57	20
370	255	115	58	20
1200	255	945	59	20
829	255	574	60	20
576	255	321	61	20
370	266	104	62	20
1200	266	934	63	20
829	266	563	64	20
576	266	310	65	20
1200	370	830	66	20
829	370	459	67	20
576	370	206	68	20
829	1200	-371	68	21
576	1200	-624	68	22
576	829	-253	68	23

S Statistic = 68 - 23 = 45

Tied Group	Value	Members
Time Period		**Observations**
10/23/2012		1
3/27/2013		1
6/11/2013		1
9/26/2013		1
12/18/2013		1
10/16/2014		1
4/28/2015		1
8/20/2015		1
11/12/2015		1
4/29/2016		1
12/1/2016		1
5/24/2017		1
8/25/2017		1
1/9/2018		1

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0

a = 6006
b = 19656
c = 364
Group Variance = 333.667
Z-Score = 2.40878
Comparison Level at 95% confidence level = 1.65463 (upward trend)
2.40878 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

Parameter: Specific Conductivity, Lab
Location: Weeks Shallow
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
978	988	-10	0	1
982	988	-6	0	2
912	988	-76	0	3
905	988	-83	0	4
1840	988	852	1	4
2250	988	1262	2	4
1580	988	592	3	4
1220	988	232	4	4
1280	988	292	5	4
1650	988	662	6	4
3760	988	2772	7	4
3260	988	2272	8	4
2370	988	1382	9	4
982	978	4	10	4
912	978	-66	10	5
905	978	-73	10	6
1840	978	862	11	6
2250	978	1272	12	6
1580	978	602	13	6
1220	978	242	14	6
1280	978	302	15	6
1650	978	672	16	6
3760	978	2782	17	6
3260	978	2282	18	6
2370	978	1392	19	6
912	982	-70	19	7
905	982	-77	19	8
1840	982	858	20	8
2250	982	1268	21	8
1580	982	598	22	8
1220	982	238	23	8
1280	982	298	24	8
1650	982	668	25	8
3760	982	2778	26	8
3260	982	2278	27	8
2370	982	1388	28	8
905	912	-7	28	9
1840	912	928	29	9
2250	912	1338	30	9
1580	912	668	31	9
1220	912	308	32	9
1280	912	368	33	9
1650	912	738	34	9
3760	912	2848	35	9
3260	912	2348	36	9
2370	912	1458	37	9
1840	905	935	38	9
2250	905	1345	39	9
1580	905	675	40	9
1220	905	315	41	9
1280	905	375	42	9
1650	905	745	43	9
3760	905	2855	44	9
3260	905	2355	45	9
2370	905	1465	46	9
2250	1840	410	47	9

1580	1840	-260	47	10
1220	1840	-620	47	11
1280	1840	-560	47	12
1650	1840	-190	47	13
3760	1840	1920	48	13
3260	1840	1420	49	13
2370	1840	530	50	13
1580	2250	-670	50	14
1220	2250	-1030	50	15
1280	2250	-970	50	16
1650	2250	-600	50	17
3760	2250	1510	51	17
3260	2250	1010	52	17
2370	2250	120	53	17
1220	1580	-360	53	18
1280	1580	-300	53	19
1650	1580	70	54	19
3760	1580	2180	55	19
3260	1580	1680	56	19
2370	1580	790	57	19
1280	1220	60	58	19
1650	1220	430	59	19
3760	1220	2540	60	19
3260	1220	2040	61	19
2370	1220	1150	62	19
1650	1280	370	63	19
3760	1280	2480	64	19
3260	1280	1980	65	19
2370	1280	1090	66	19
3760	1650	2110	67	19
3260	1650	1610	68	19
2370	1650	720	69	19
3260	3760	-500	69	20
2370	3760	-1390	69	21
2370	3260	-890	69	22

S Statistic = 69 - 22 = 47

Tied Group	Value	Members
Time Period		**Observations**
10/23/2012		1
3/27/2013		1
6/11/2013		1
9/26/2013		1
12/18/2013		1
10/16/2014		1
4/28/2015		1
8/20/2015		1
11/12/2015		1
4/29/2016		1
12/1/2016		1
5/24/2017		1
8/25/2017		1
1/9/2018		1

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0

a = 6006
b = 19656
c = 364
Group Variance = 333.667
Z-Score = 2.51826
Comparison Level at 95% confidence level = 1.65463 (upward trend)
2.51826 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

Parameter: Total Dissolved Solids
Location: Weeks Shallow
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
505	496	9	1	0
483	496	-13	1	1
466	496	-30	1	2
453	496	-43	1	3
1030	496	534	2	3
1250	496	754	3	3
885	496	389	4	3
666	496	170	5	3
715	496	219	6	3
979	496	483	7	3
2300	496	1804	8	3
1860	496	1364	9	3
1310	496	814	10	3
483	505	-22	10	4
466	505	-39	10	5
453	505	-52	10	6
1030	505	525	11	6
1250	505	745	12	6
885	505	380	13	6
666	505	161	14	6
715	505	210	15	6
979	505	474	16	6
2300	505	1795	17	6
1860	505	1355	18	6
1310	505	805	19	6
466	483	-17	19	7
453	483	-30	19	8
1030	483	547	20	8
1250	483	767	21	8
885	483	402	22	8
666	483	183	23	8
715	483	232	24	8
979	483	496	25	8
2300	483	1817	26	8
1860	483	1377	27	8
1310	483	827	28	8
453	466	-13	28	9
1030	466	564	29	9
1250	466	784	30	9
885	466	419	31	9
666	466	200	32	9
715	466	249	33	9
979	466	513	34	9
2300	466	1834	35	9
1860	466	1394	36	9
1310	466	844	37	9
1030	453	577	38	9
1250	453	797	39	9
885	453	432	40	9
666	453	213	41	9
715	453	262	42	9
979	453	526	43	9
2300	453	1847	44	9
1860	453	1407	45	9
1310	453	857	46	9
1250	1030	220	47	9

885	1030	-145	47	10
666	1030	-364	47	11
715	1030	-315	47	12
979	1030	-51	47	13
2300	1030	1270	48	13
1860	1030	830	49	13
1310	1030	280	50	13
885	1250	-365	50	14
666	1250	-584	50	15
715	1250	-535	50	16
979	1250	-271	50	17
2300	1250	1050	51	17
1860	1250	610	52	17
1310	1250	60	53	17
666	885	-219	53	18
715	885	-170	53	19
979	885	94	54	19
2300	885	1415	55	19
1860	885	975	56	19
1310	885	425	57	19
715	666	49	58	19
979	666	313	59	19
2300	666	1634	60	19
1860	666	1194	61	19
1310	666	644	62	19
979	715	264	63	19
2300	715	1585	64	19
1860	715	1145	65	19
1310	715	595	66	19
2300	979	1321	67	19
1860	979	881	68	19
1310	979	331	69	19
1860	2300	-440	69	20
1310	2300	-990	69	21
1310	1860	-550	69	22

S Statistic = 69 - 22 = 47

Tied Group	Value	Members

Time Period	Observations
10/23/2012	1
3/27/2013	1
6/11/2013	1
9/26/2013	1
12/18/2013	1
10/16/2014	1
4/28/2015	1
8/20/2015	1
11/12/2015	1
4/29/2016	1
12/1/2016	1
5/24/2017	1
8/25/2017	1
1/9/2018	1

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0

a = 6006
b = 19656
c = 364
Group Variance = 333.667
Z-Score = 2.51826
Comparison Level at 95% confidence level = 1.65463 (upward trend)
2.51826 > 1.65463 indicating an upward trend