

Appendix A

Task Order Description

Task Order Description

There were four original tasks included in Task Order Number 7 and are described below.

Task 1: Task Order Reports

Prepare Monthly Status Reports and the Closeout Report

Task 2: Adit Flow Monitoring

Four flow measurement modules and data loggers provided by DEQ will be installed to continuously measure volumetric discharges from four abandoned mine adits in Sand Coulee. The flow modules will be Teledyne ISCO model 2150 or equivalent. A adit discharge will be routed into a PVC discharge pipe.

Task 3: Hydrogeological Investigation

A hydrogeologic characterization will be performed to determine the aquifer characteristics of the Kootenai and Madison aquifers hydraulically upgradient (south) of Sand Coulee. The investigation will include the installation of four monitoring wells completed in the Kootenai aquifer. Well locations will be determined in consultation with DEQ. The wells are estimated to be approximately 200 feet in depth, and will be constructed using 4-inch diameter PVC. One monitoring well will be installed and completed in the Madison aquifer using 4-inch diameter PVC to an approximate depth of 500 feet. All wells will be developed and completed according to standards developed by the Montana Department of Natural Resources & Conservation (DNRC). All bid documents, bid requests, and bid evaluations will be completed. In consultation with DEQ, a drilling contractor will be selected.

Following well development, a short term, 4-hour well yield test will be performed on each well. In consultation with DEQ, a 72-hour aquifer test will be performed by pumping one of the newly constructed Kootenai aquifer monitoring wells and monitoring groundwater level fluctuations using pressure transducers installed in the remaining three Kootenai monitoring wells. Two pressure transducers provided by DEQ will be installed in two Kootenai monitoring wells for long term monitoring. Data from these two transducers will be downloaded on a monthly basis in coordination with the surface water flow monitoring as described in Task 2.

Water quality data will be collected from the 5 new monitoring wells and from the four surface water monitoring stations identified as part of Task 2 for three consecutive quarters between October 2016 and June 2017. The analysis will include field parameters, general inorganic chemistry, and selected metals. Water samples will be submitted to a DEQ-contracted laboratory.

Task 4: Report Preparation

Prepare a Source Control Investigation Report documenting field methods and presenting investigation results. The report will describe the measured flows from the monitored adits, aquifer testing and well-yield results, hydraulic properties of the Kootenai and Madison aquifers, and the hydraulic heads and saturated thickness of the Kootenai Aquifer. The report will evaluate the potential effectiveness of AMD source control resulting from groundwater

interception using a horizontal interception well and using a vertical interception well. Investigation results will incorporate the work performed under Task Order 2 pursuant to DEQ Contract No. 414026. The report will identify the recommended locations for a pilot horizontal interception well, a pilot vertical interception well, and define general design parameters for both wells, including anticipated length, borehole diameter, and well construction materials.

1.3 Modification A

During the course of the research and investigation phase completed during the fourth quarter 2016 and the first and second quarters of 2017, several significant questions were identified that required changes to the original task scope of work and were completed under the direction of DEQ. These involved changes to land ownership and new domestic wells, field location of numerous existing monitoring and domestic wells, data collection from existing wells and adit discharges, adit monitoring modifications to aid in installation of monitoring equipment, changes to the installation of flume and ultrasonic monitoring equipment, and omit installation of the Madison well. Based on these changes, a no-cost increase modification was prepared by DEQ to outline changes to and required completion schedule of Task 7. A description of Modification A includes the following:

Task 2: Adit Flow Monitoring

HydroSolutions researched and identified flow measurement equipment to continuously measure volumetric discharges from four abandoned mine adits in Sand Coulee. In coordination with DEQ, HydroSolutions ordered the necessary components and arranged for purchase. The equipment was selected to function properly for site conditions which includes elevated acidity and dissolved metals concentrations, low pH and turbidity of the mine discharges, and winter freezing conditions.

DEQ purchased the flow measurement equipment, including flumes, sensors, enclosures, and data loggers. HydroSolutions completed all necessary field work to install the flow measurement equipment, which included several site trips and earthwork to collect and route each adit discharge into the measurement area. HydroSolutions programmed the data loggers to measure and record flow on an hourly interval. All flow measurement equipment was securely installed to facilitate long-term flow monitoring. HydroSolutions verified the flow measurement equipment was functioning correctly and provide DEQ with instructions for accessing and downloading the measured data at all four locations

Task 3: Hydrogeological Investigation

Contractor inventoried private water wells and measured fluid levels to document baseline hydrologic conditions hydraulically upgradient (south) of Sand Coulee. Contractor used this information to identify target areas to intercept groundwater before it enters the abandoned mines. Contractor installed and completed four monitoring wells in the Kootenai aquifer. Well locations were determined in consultation with DEQ. The four wells were installed to depths of 85, 86, 242, and 247 feet below ground surface. Three of the wells were constructed using 4-inch diameter PVC and one well was constructed with 6-inch diameter PVC.

All groundwater monitoring wells were installed by August 30, 2017, and all wells were developed and completed by a licensed water well contractor (drilling contractor) according to statutory requirements and all regulations or other requirements developed by the Montana Department of Natural Resources & Conservation (DNRC) and the Board of Water Well Contractors.

Following well development, HydroSolutions performed a 4-hour well yield test on each well. In consultation with DEQ after review of information obtained from the 4-hour well yield tests, HydroSolutions conducted two 24-hour aquifer tests (instead of one 72-hour test) by pumping one of the newly constructed Kootenai aquifer monitoring wells and monitoring groundwater level fluctuations in the remaining three Kootenai monitoring wells and selected private wells. After completion of the two aquifers tests, data were downloaded from all transducers used in the testing.

Water quality samples were collected from each of the four new monitoring wells and from the four surface water monitoring stations identified for Task 2. Field parameters including pH, specific conductance, Eh (redox potential), alkalinity and temperature were collected and water samples were submitted to Energy Laboratories.

Task 4: Report Preparation

Draft and final versions of a Source Control Investigation Report (Report)

Document field methods and presenting investigation results.

The Report will describe the measured flows from the monitored adits, aquifer testing and well-yield results, hydraulic properties of the Kootenai and Madison aquifers, water quality data and analysis, and the hydraulic heads and saturated thickness of the Kootenai Aquifer.

The Report will evaluate the potential effectiveness of AMD source control resulting from groundwater interception using a horizontal interception well and using a vertical interception well.

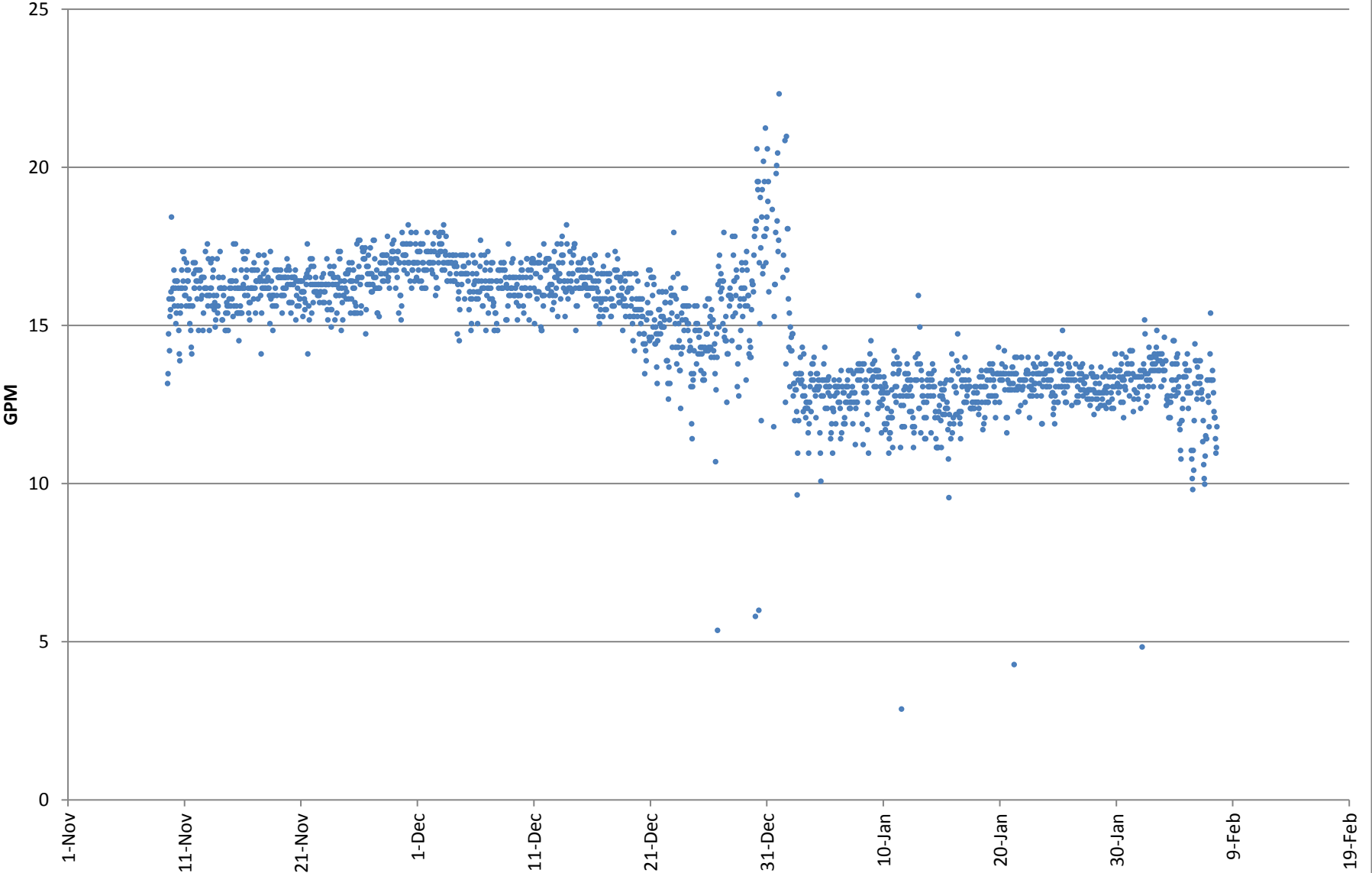
Investigation results will incorporate the work performed under Task Order 7 pursuant to DEQ Contract No. 414026.

The Report will assess feasibility and identify recommended locations for a pilot horizontal interception well, a pilot vertical interception well, and define general design parameters for both wells, including anticipated length, borehole diameter, well construction materials, identify any necessary permitting requirements and evaluate the potential of successfully securing necessary permits

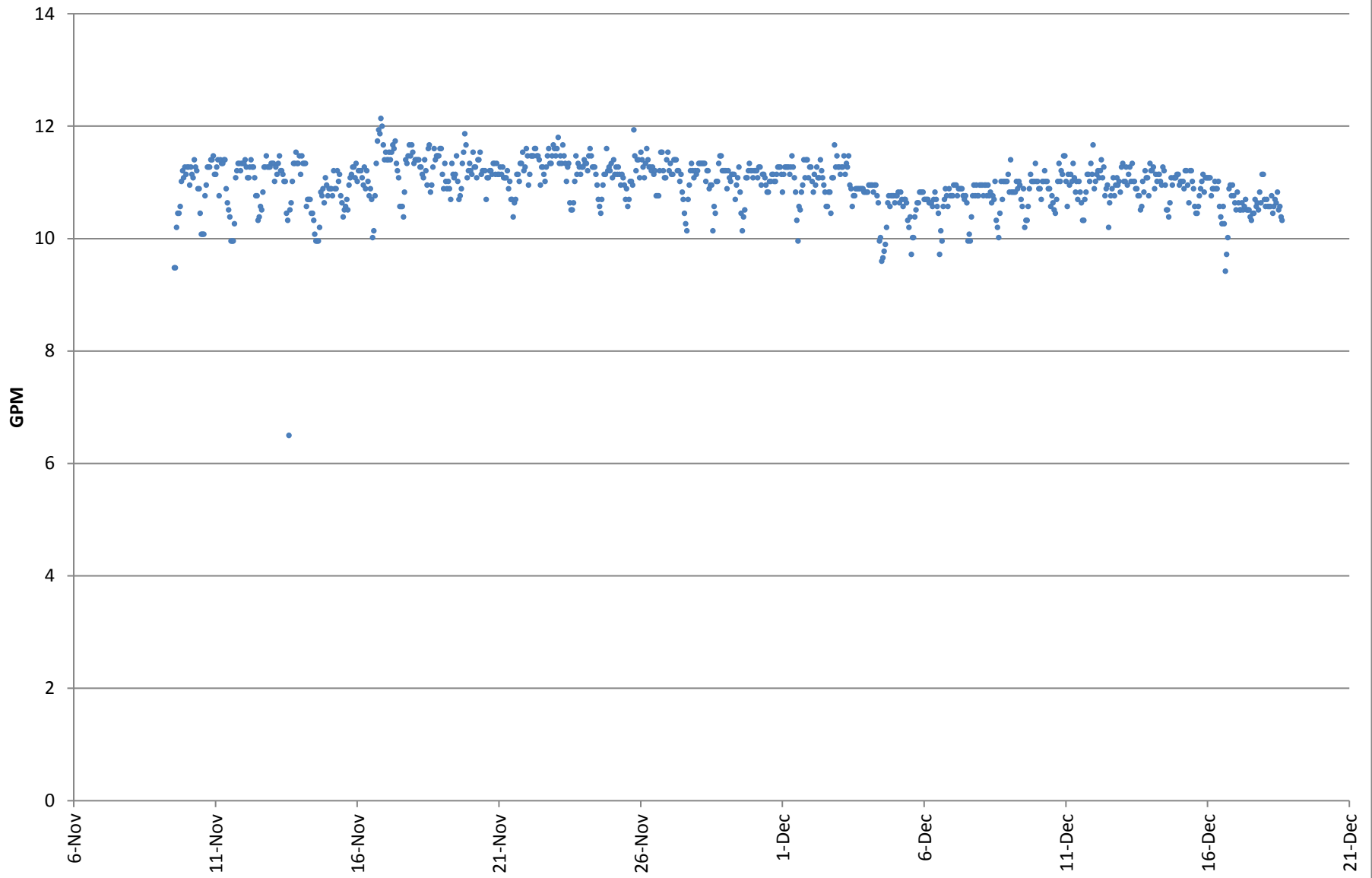
Appendix B

Adit Flow Monitoring Results

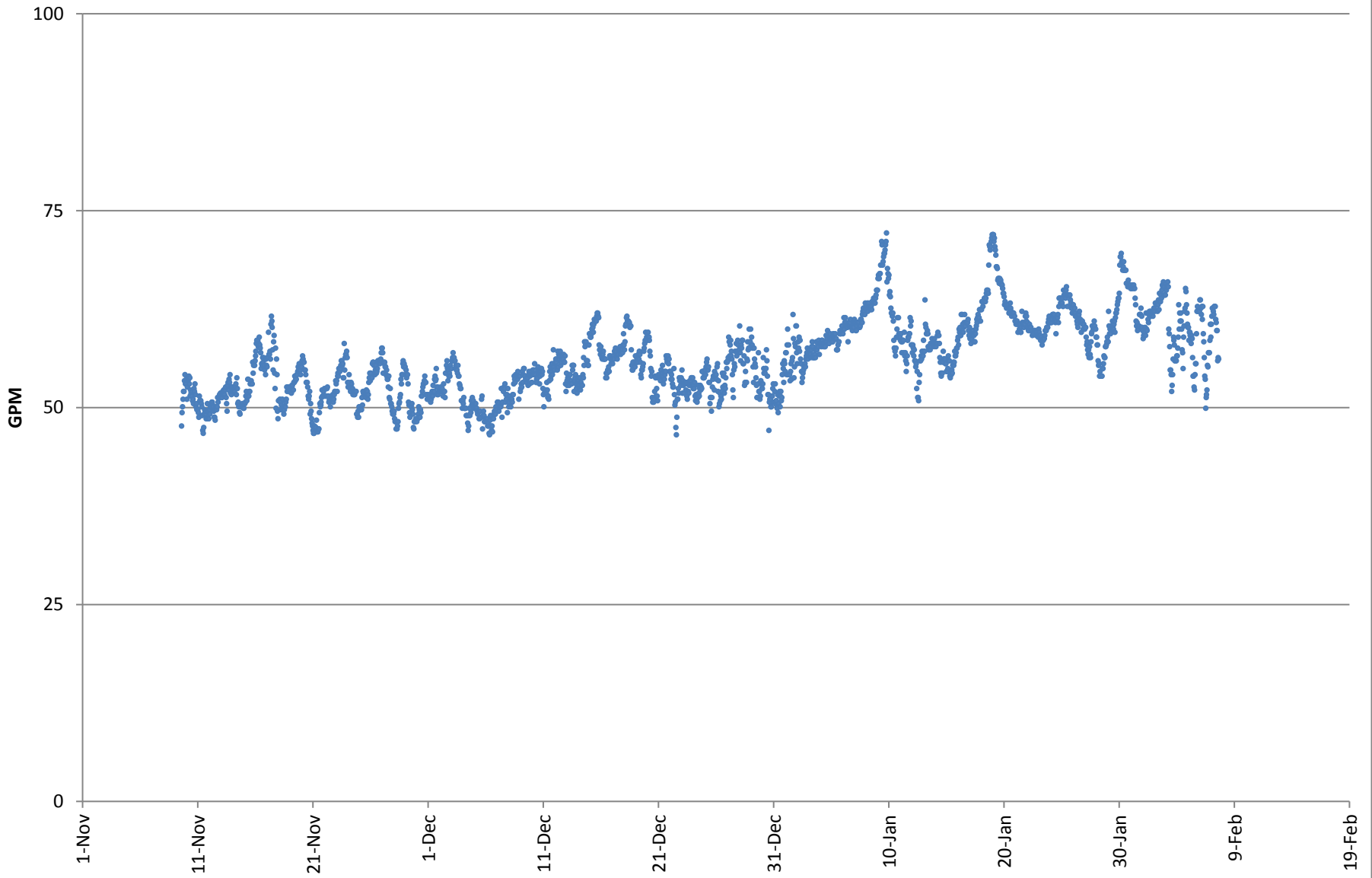
2017 - 2018 Miner's Coulee SC-1 Discharge



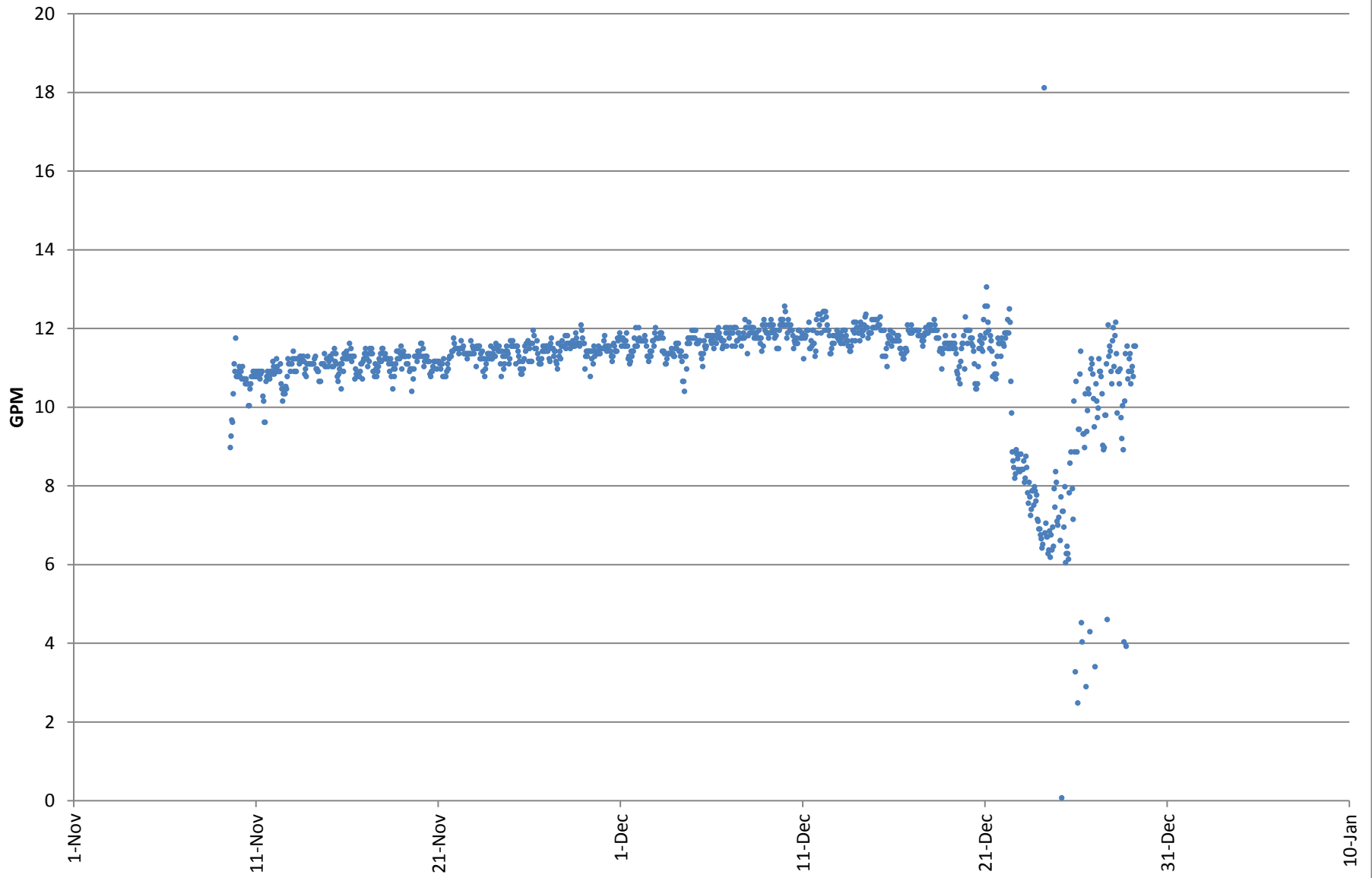
2017 SC-3A Discharge



2017-2018 Kate's Coulee SC-8 Discharge



2017 Nelson Drain SC-12 Discharge



Appendix C

Groundwater Levels

Measured Groundwater Levels at Selected Locations

Name	GWIC ID	Northing	Easting	MP Elevation (ft abmsl)	Ground Elevation (ft abmsl)	Total Depth (ft)	Date	Static Water Level (ft)	Groundwater Elevation (ft abmsl)
Surveyed Wells									
L1 Deep		1145984.269	1549663.477	3730.48	3728.57	160.5	10/12/2017	118.64	3611.84
							6/28/2017	117.88	3612.60
							8/29/2017	118.32	3612.16
							11/16/2017	116.41	3614.07
L1 Shallow		1145986.460	1549658.661	3729.50	3729.03	40.85	10/12/2017	33.18	3696.32
							6/28/2017	31.51	3697.99
							8/29/2017	32.97	3696.53
							11/16/2017	32.95	3696.55
C3 Deep	146925	1146814.393	1552183.852	3726.74	3725.39	168	10/12/2016	133.1	3593.64
C3 Medium		1146821.576	1552191.811	3726.65	3725.84	70	10/12/2016	70.21	3656.44
							6/28/2017	Dry	
C3 Shallow		1146829.118	1552199.118	3726.91	3725.86	34.75	10/12/2016	Dry	
							6/28/2017	29.09	3697.82
C4	146927	1146139.902	1551094.149	3735.49	3733.78	171	10/12/2016	167.91	3567.58
							6/28/2017	166.9	3568.59
							10/3/2017	166.79	3568.70
							11/16/2017	166.92	3568.57
C5 Deep	146929	1146633.768	1550840.701	3624.05	3624.19	75.1	10/12/2016	56.87	3567.18
							6/28/2017	54.95	3569.10
							10/3/2017	55.47	3568.58
							11/16/2017	55.63	3568.42
C5 Medium	2271	1146631.760	1550837.757	3623.83	3624.19	57	10/12/2016	46.49	3577.34
							11/16/2017	43.15	3580.68
Chartier (C7)	158294	1147952.314	1552091.619	3578.03	3575.12	NM	10/12/2016	>100	
							6/28/2017	>200	
C9	146892	1147657.722	1552629.919	3714.67	3712.42	147	10/12/2016	Dry	
							6/28/2017	Dry	
Christopher Kunkel - Kk	2272	1147471.840	1548749.806	3777.98	3778.36	NM	4/19/2017	171.86	3606.12
							11/16/2017	162.32	3615.66

Measured Groundwater Levels at Selected Locations

Name	GWIC ID	Northing	Easting	MP Elevation (ft abmsl)	Ground Elevation (ft abmsl)	Total Depth (ft)	Date	Static Water Level (ft)	Groundwater Elevation (ft abmsl)
Christopher Kunkel - Mdsn		1147275.057	1548716.362	3774.35	3780.88	NM		NM	
Harvey Larocque domestic	240458	1145636.510	1550075.244	3655.39	3653.82	80	10/12/2016 6/28/2017 10/3/2017	9.61 4.72 7.41	3645.78 3650.67 3647.98
LaRocque new domestic		1144947.965	1549505.263	3678.23	3676.92	80	10/12/2016 6/28/2017	9.7 3.36	3668.53 3674.87
LaRocque Stock 2 South	193217	1144855.692	1549568.039	3676.81	3676.81	60	10/12/2016 6/28/2017 10/3/2017 10/17/2017	11.97 5.28 10.29 8.65	3664.84 3671.53 3666.52 3668.16
LaRocque stock 1 North		1145216.824	1549648.175	3667.73	3667.73	69.8	10/12/2016 6/28/2017 10/3/2017	9.03 0.3 5.44	3658.70 3667.43 3662.29
Wylder Mdsn	186474	1148754.178	1549380.467	3719.01	3717.65	702	9/12/2016	419.94	3299.07
Wylder Shallow	184413	1148862.530	1549367.379	3713.30	3712.80	35.5	9/12/2016 6/28/2017	12 12.36	3701.30 3700.94
MW-101K		1148042.939	1549371.269	3760.02	3758.43	242	8/8/2017 8/11/2017 8/29/2017 10/3/2017 10/4/2017 11/16/2017	211.51 211.44 211.51 211.86 211.65 210.95	3548.51 3548.58 3548.51 3548.16 3548.37 3549.07
MW-102K		1144818.937	1549393.850	3681.46	3680.31	85	8/8/2017 8/29/2017 10/3/2017 10/17/2017 11/16/2017	10.12 10.79 11.59 10.89 9.47	3671.34 3670.67 3669.87 3670.57 3671.99

Measured Groundwater Levels at Selected Locations

Name	GWIC ID	Northing	Easting	MP Elevation (ft abmsl)	Ground Elevation (ft abmsl)	Total Depth (ft)	Date	Static Water Level (ft)	Groundwater Elevation (ft abmsl)
MW-103K		1146110.295	1550269.005	3648.08	3646.62	86	8/9/2017	34.3	3613.78
							8/29/2017	34.6	3613.48
							10/3/2017	35.28	3612.80
							11/16/2017	34.6	3613.48
MW-104K		1147397.048	1549672.195	3779.28	3777.63	248	8/8/2017	220.37	3558.91
							8/29/2017	220.56	3558.72
							10/3/2017	220.98	3558.30
							11/16/2017	220.07	3559.21
Chartier		1144763.143	1549521.469	3679.19	3678.59	NM	NM		
Non-Surveyed Wells									
Travis Well		47.38771	-111.18023	3577.23	3577.23	NM	11/4/2016	>200	
							6/28/2017	239.5	
C-1A	2283	47.36766	-111.19220	3818.98	3818.28	14.52	3/30/2017	Dry	
C-1B		47.36766	-111.19220	3818.63	3818.28	14.52	3/30/2017	Dry	
C-1C		47.36766	-111.19220	3818.93	3818.28	NM	3/30/2017	138.49	
C-1D		47.36766	-111.19220	3819.03	3818.28	45.81	3/30/2017	14.67	
C2A	146923	47.37010	-111.18313	3803.09	3802.24	171.71	3/30/2017	Dry	
							6/28/2017	Dry	
C2B		47.37010	-111.18313	3803.99	3802.24	18.85	3/30/2017	Dry	
							6/28/2017	Dry	
C2C		47.37010	-111.18313	3803.24	3802.24	39.87	3/30/2017	39.87	
C6 Deep	146931	47.37619	-111.17119	3786.47	3784.37	197.5	3/30/2017	193.59	
C6 Shallow		47.37619	-111.17119	3784.37	3784.37	40.3	3/29/2017	28.63	

NM - Not Measured

Appendix D

Monitoring Well Lithologic Logs



HydroSolutions®

Well / Boring Number: <u> MW-101K </u>	Township: <u> 19N </u>	Range: <u> 4E </u>
Client: <u> Montana DEQ </u>	Section: <u> 23 </u>	Qtr Qtr: <u> SWNW </u>
Project Name: <u> Sand Coulee Source Control </u>	Cascade <u> </u> County	State: <u> MT </u>

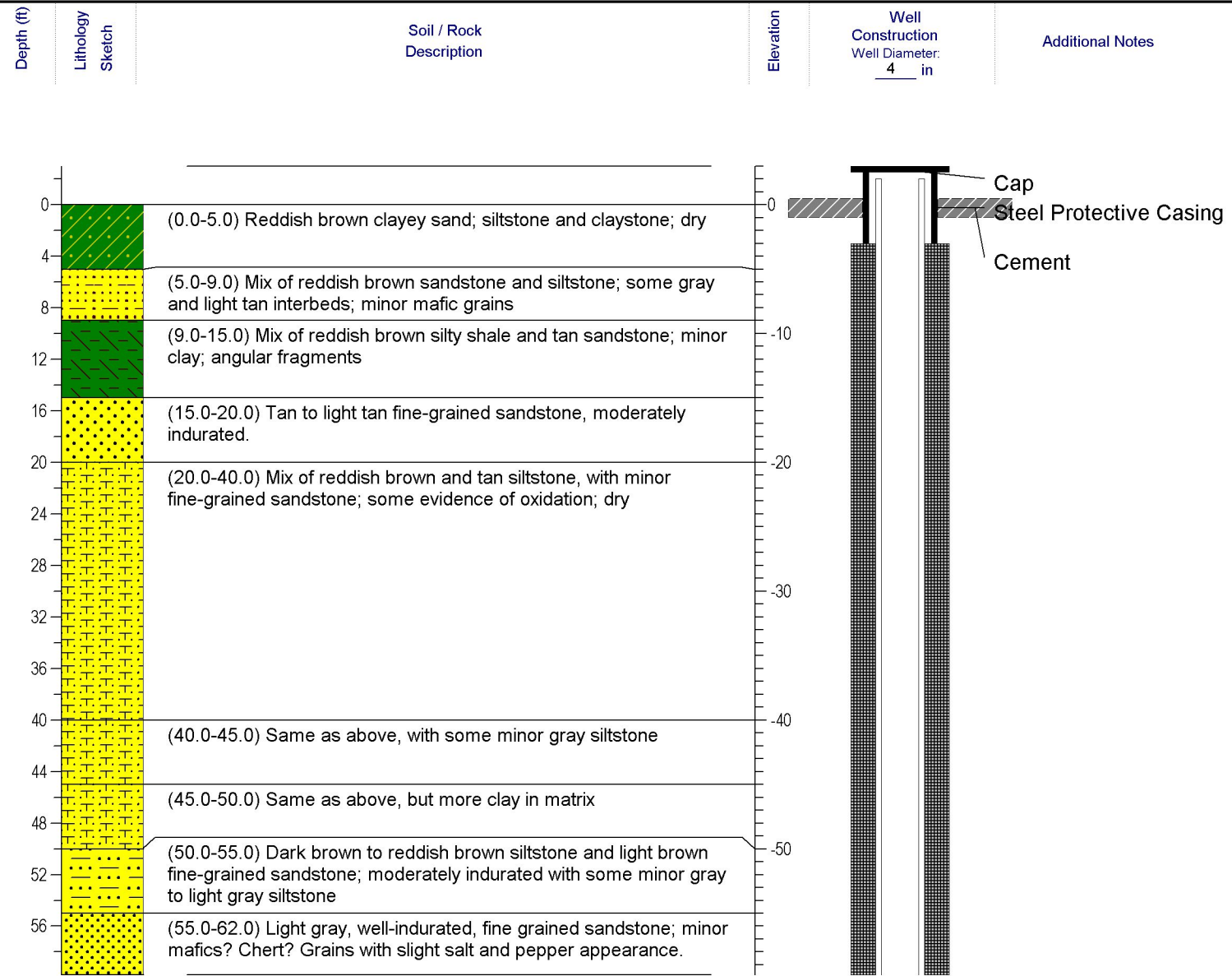
Latitude: <u> 1148042.939 </u>
Longitude: <u> 1549371.269 </u>
GL Elevation: <u> 3758.429 </u>
TOSC Elevation: <u> 3760.016 </u>
Datum used <u> Survey NAD 83 </u>

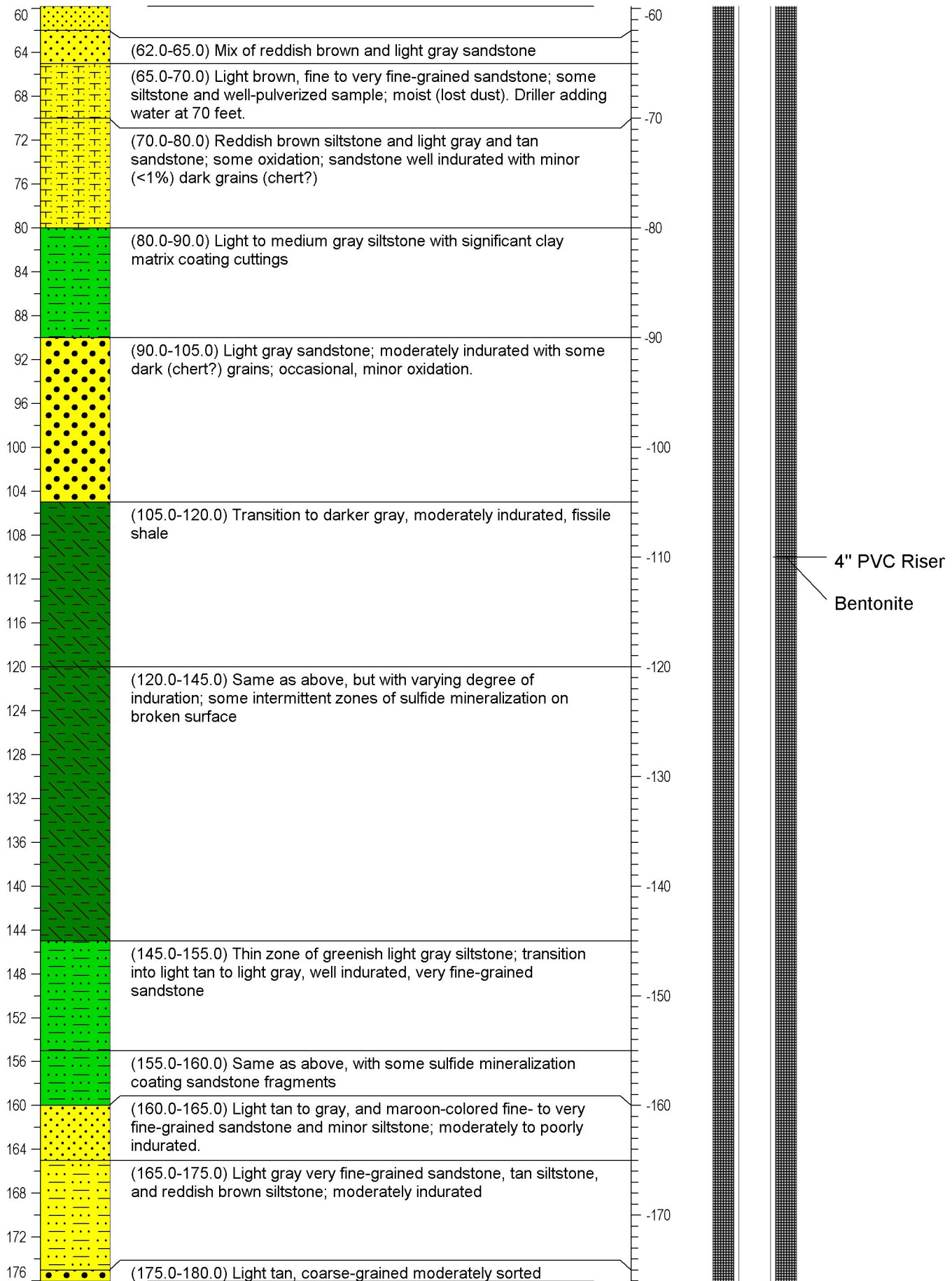
Drilling Information		Date/Time:	
Drilling Company: <u> Boland Drilling </u>	Start Drilling: <u> 08/01/2017 0810 </u>	Bore Diam (1): <u> 8 in </u>	<u> 08/01/2017 0810 </u> 0 ft to 242 ft
Drilling Method: <u> Air Rotary </u>	Bore Diam (2): <u> NA in </u>	NA	NA ft to NA ft
Driller: <u> Chris Boland </u>	Finish Drilling: <u> 08/01/2017 15:00 </u>	25	TD
Drilling Rig: <u> GardnerDenver HPS1000 Air Rotary </u>	Well Development <u> 08/11/2017 11:00 </u>	1.5	hours
Logged By: <u> D. Donohue </u>			
LogPlot by: <u> R.Svingen </u>	<u> 11/29/2017 </u>		

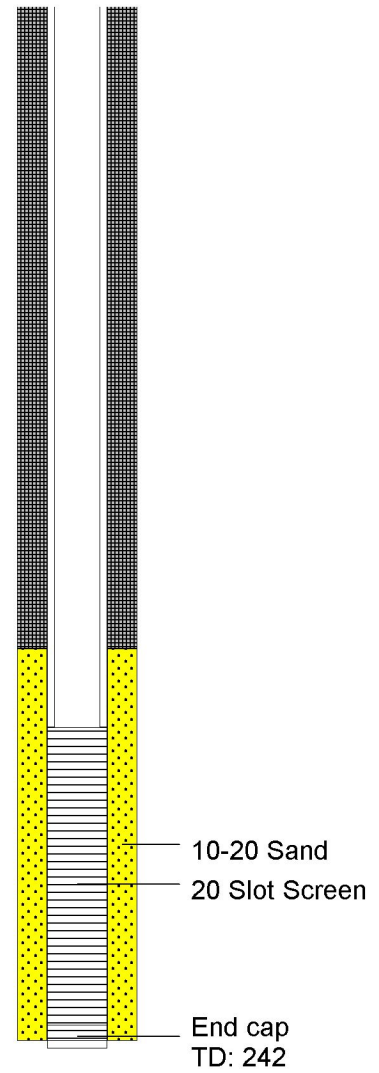
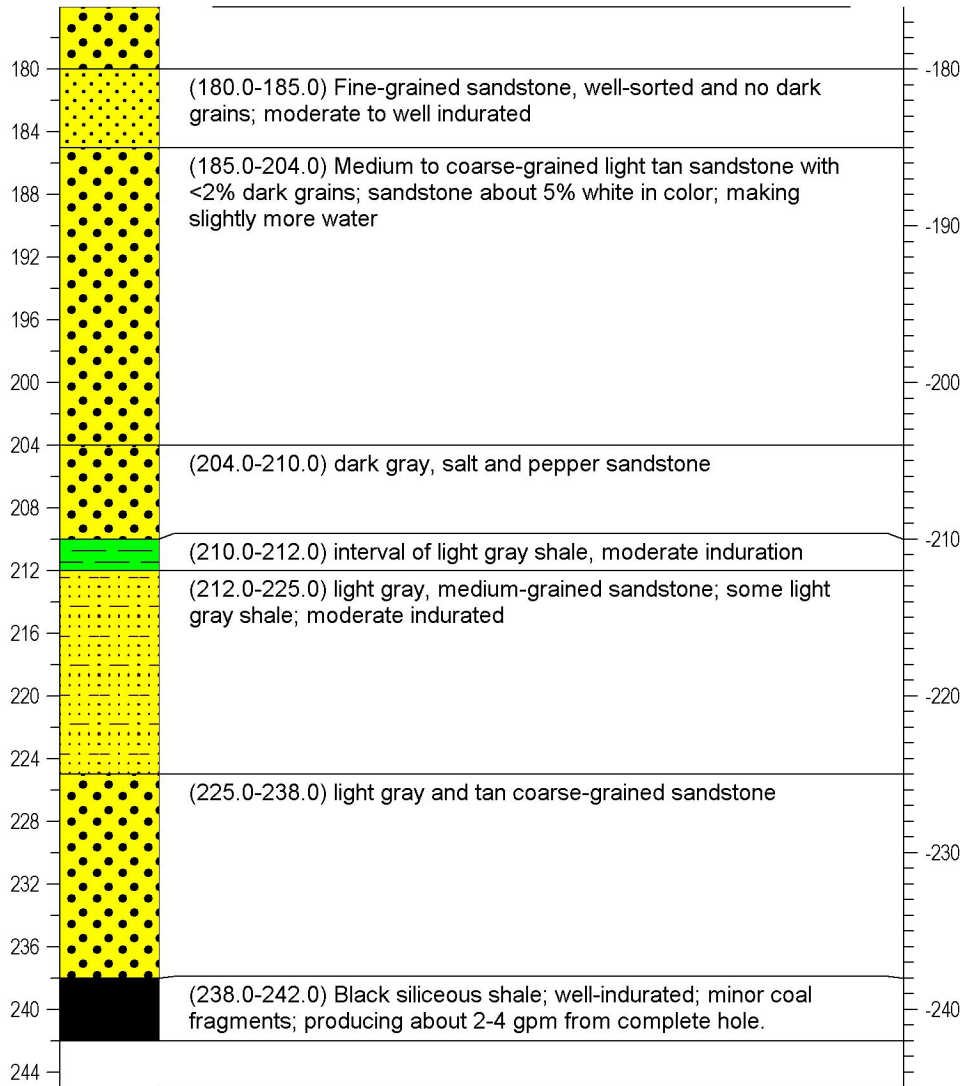
Well Construction Information			
	Dia. inches	Material	Specifications
Protective Casing:	<u> 6 </u>	<u> 6" Steel </u>	<u> 5 ft </u>
Riser Pipe:	<u> 4 </u>	<u> Sch 40 </u>	<u> 224 ft </u>
Surface Seal:		<u> Concrete </u>	<u> 1 ft Quickcrete </u>
Annular Seal:		<u> Bentonite </u>	<u> 217 ft Size: Chips </u>
Filter Sand:		<u> Silica Sand </u>	<u> 25 ft Grade: 10-20 </u>
Well Screen:	<u> 4 </u>	<u> Sch 40 </u>	<u> NA 20 slot </u>
Centralizer:		<u> Steel </u>	<u> 5 </u>
Endcap:	<u> 4 </u>	<u> Sch 40 </u>	<u> 0.2 ft </u>

Water Levels	Date/Time:	SWL ft
	<u> 08/08/2017 15:00 </u>	<u> 211.51 </u>
	<u> 10/03/2017 15:20 </u>	<u> 211.86 </u>

Comments
 Groundwater monitoring well
 Source Control Investigation









HydroSolutions®

Well / Boring Number: MW-102K
 Client: Montana DEQ
 Project Name: Sand Coulee Source Control

Township: 19N Range: 4E
 Section: 23 Qtr Qtr: NESW
 Cascade County State: MT

Latitude: 1144818.937
 Longitude: 1549393.850
 GL Elevation: 3680.313
 TOSC Elevation: 3681.456
 Datum used Survey NAD 83

Drilling Information

Drilling Company: Boland Drilling
 Drilling Method: Air Rotary
 Driller: Chris Boland
 Drilling Rig: GardnerDenver HPS1000 Air Rotary
 Logged By: D. Donohue
 LogPlot by: R.Svingen 11/30/2017

Date/Time:

Start Drilling: 08/03/2017 0810
 Bore Diam (1):(10 in) 08/03/2017 0810 0 ft to 158 ft
 Bore Diam (2):(NA in) NA NA ft to NA ft
 Finish Drilling: NA 158 TD
 Well Development 08/09/2017 15:30 1.5 hours

Well Construction Information

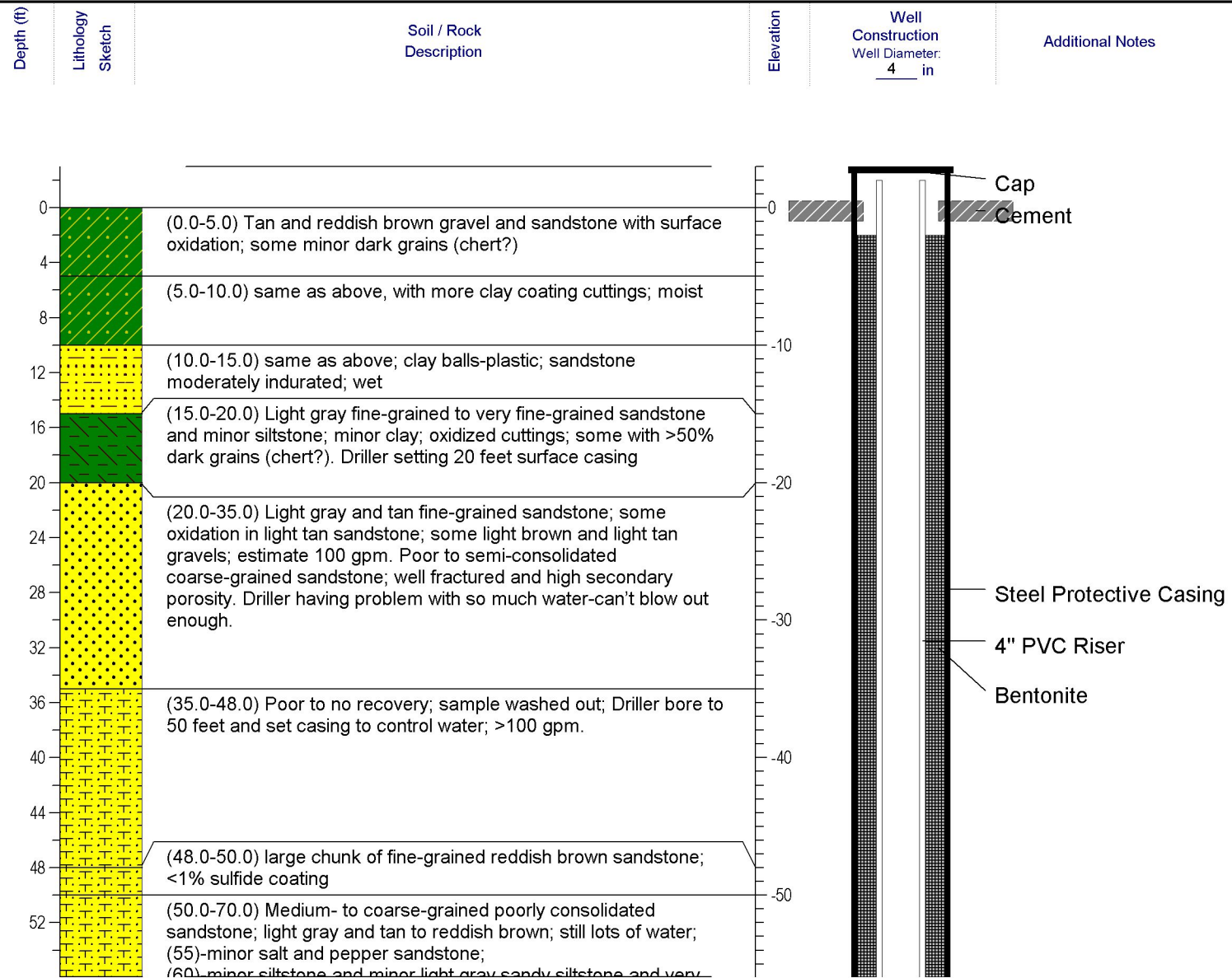
	Dia. inches	Material	Specifications
Protective Casing:	6	6" Steel	58 ft
Riser Pipe:	4	Sch 40	67 ft
Surface Seal:		Concrete	1 ft Quickcrete
Annular Seal:		Bentonite	62 ft Size: Chips
Filter Sand:	3/8"	gravel and Silica Sand	25 ft Grade: 10-20
Well Screen:	4	Sch 40	NA 20 slot
Centralizer:		NA	4 Steel
Endcap:	4	Sch 40	0.2 ft

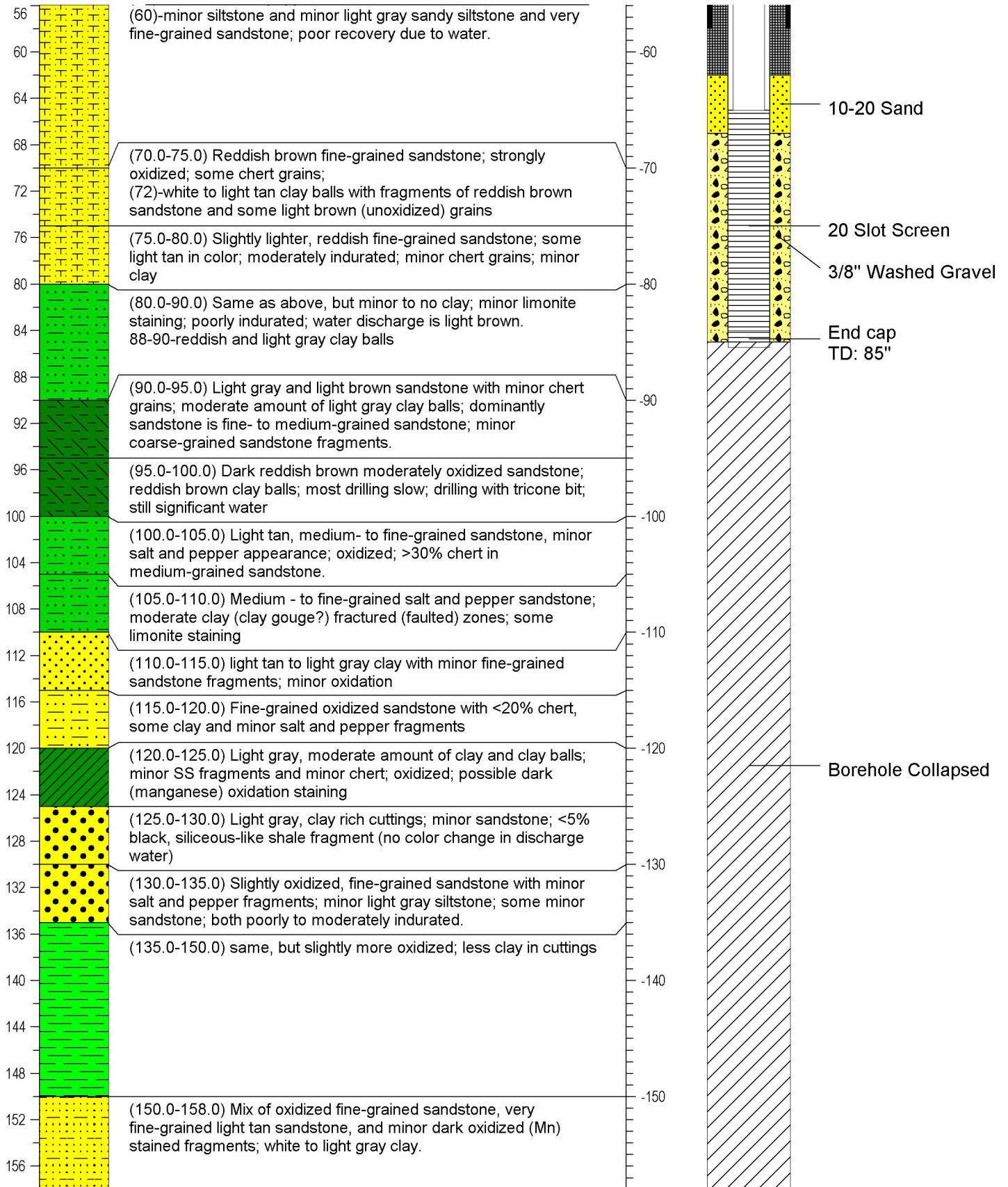
Water Levels

Date/Time:	SWL ft
08/08/2017 15:20	10.12
10/03/2017 13:10	11.59

Comments

Groundwater monitoring well
 Source Control Investigation







HydroSolutions®

Well / Boring Number: MW-103K	Township: 19N	Range: 4E
Client: Montana DEQ	Section: 23	Qtr Qtr: SESW
Project Name: Sand Coulee Source Control	Cascade County	State: MT

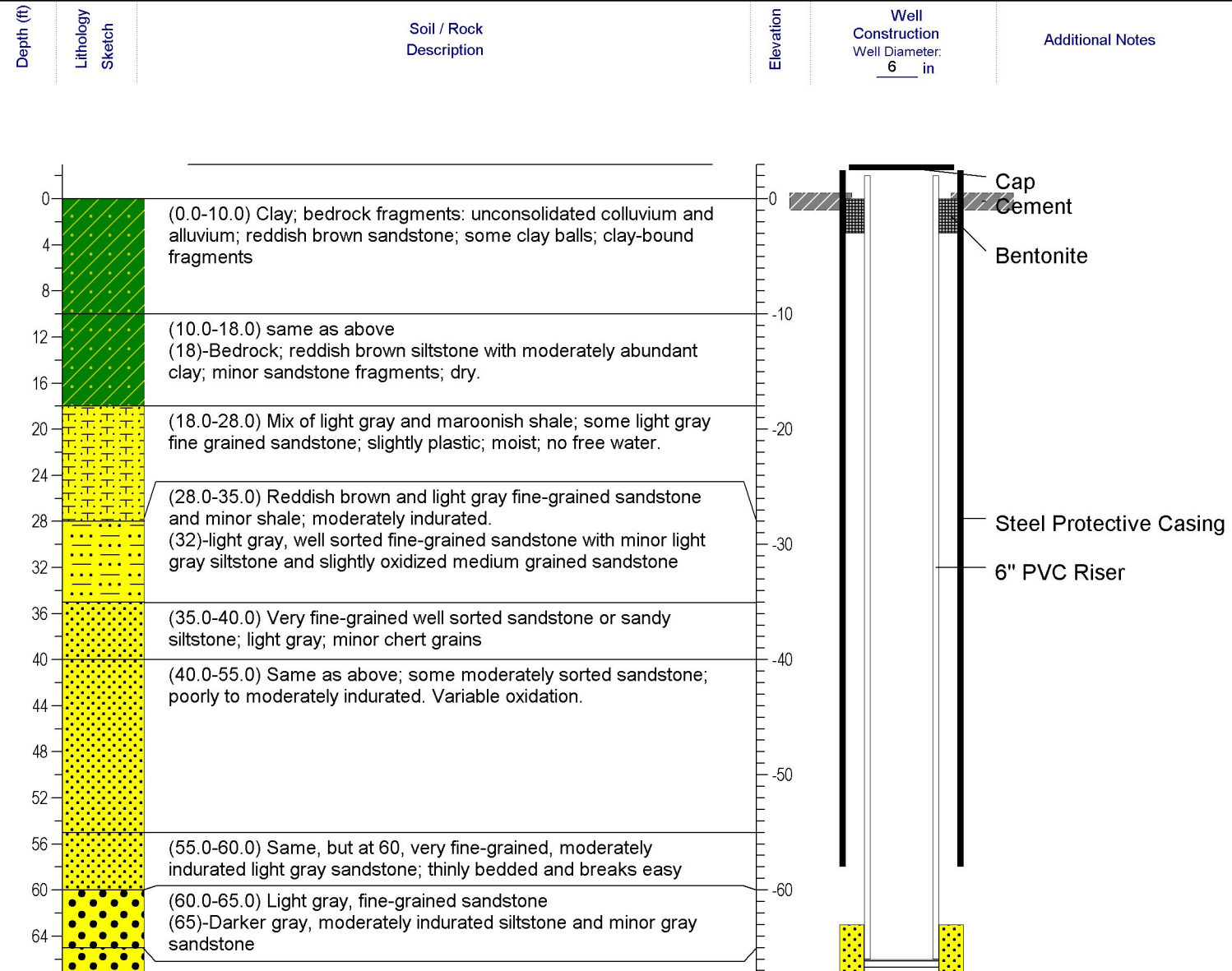
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Longitude: 1549393.850
GL Elevation: 3646.616
TOSC Elevation: 3681.456
Datum used: Survey NAD 83

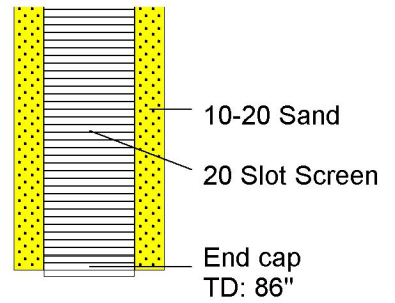
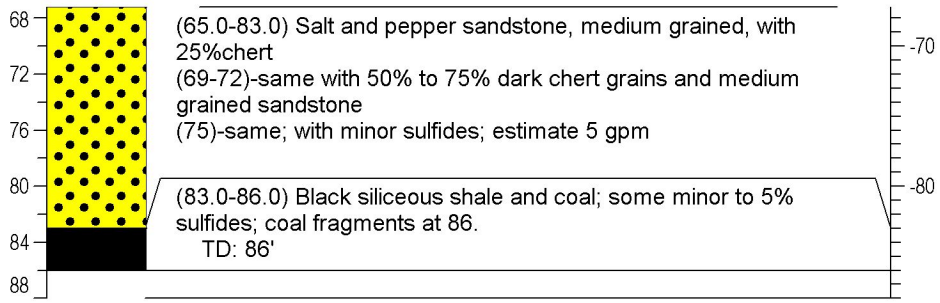
Drilling Information		Date/Time:	
Drilling Company: Boland Drilling	Start Drilling: 08/07/2017 0810	Bore Diam (1): (10 in)	08/07/2017 0810 0 ft to 86 ft
Drilling Method: Air Rotary	Bore Diam (2): (NA in)	NA	NA ft to NA ft
Driller: Chris Boland	Finish Drilling: NA		86 TD
Drilling Rig: GardnerDenver HPS1000 Air Rotary	Well Development: 08/09/2017		1.5 hours
Logged By: D. Donohue			
LogPlot by: R.Svingen 11/30/2017			

Well Construction Information			
	Dia. inches	Material	Specifications
Protective Casing:	8	10" Steel	58 ft
Riser Pipe:	6	Sch 40	60 ft
Surface Seal:		Concrete	1 ft Quickcrete
Annular Seal:		Bentonite	217 ft Size: Chips
Filter Sand:		Silica Sand	25 ft Grade: 10-20
Well Screen:	6	Sch 40	NA 20 slot
Centralizer:		Steel	3
Endcap:	6	Sch 40	0.2 ft

Water Levels	Date/Time:	SWL ft
	08/09/2017 15:25	34.30
	10/03/2017 14:10	35.28

Comments
Groundwater monitoring well
Source Control Investigation







HydroSolutions®

Well / Boring Number: MW-104K	Township: 19N	Range: 4E
Client: Montana DEQ	Section: 23	Qtr Qtr: SESW
Project Name: Sand Coulee Source Control	Cascade County	State: MT

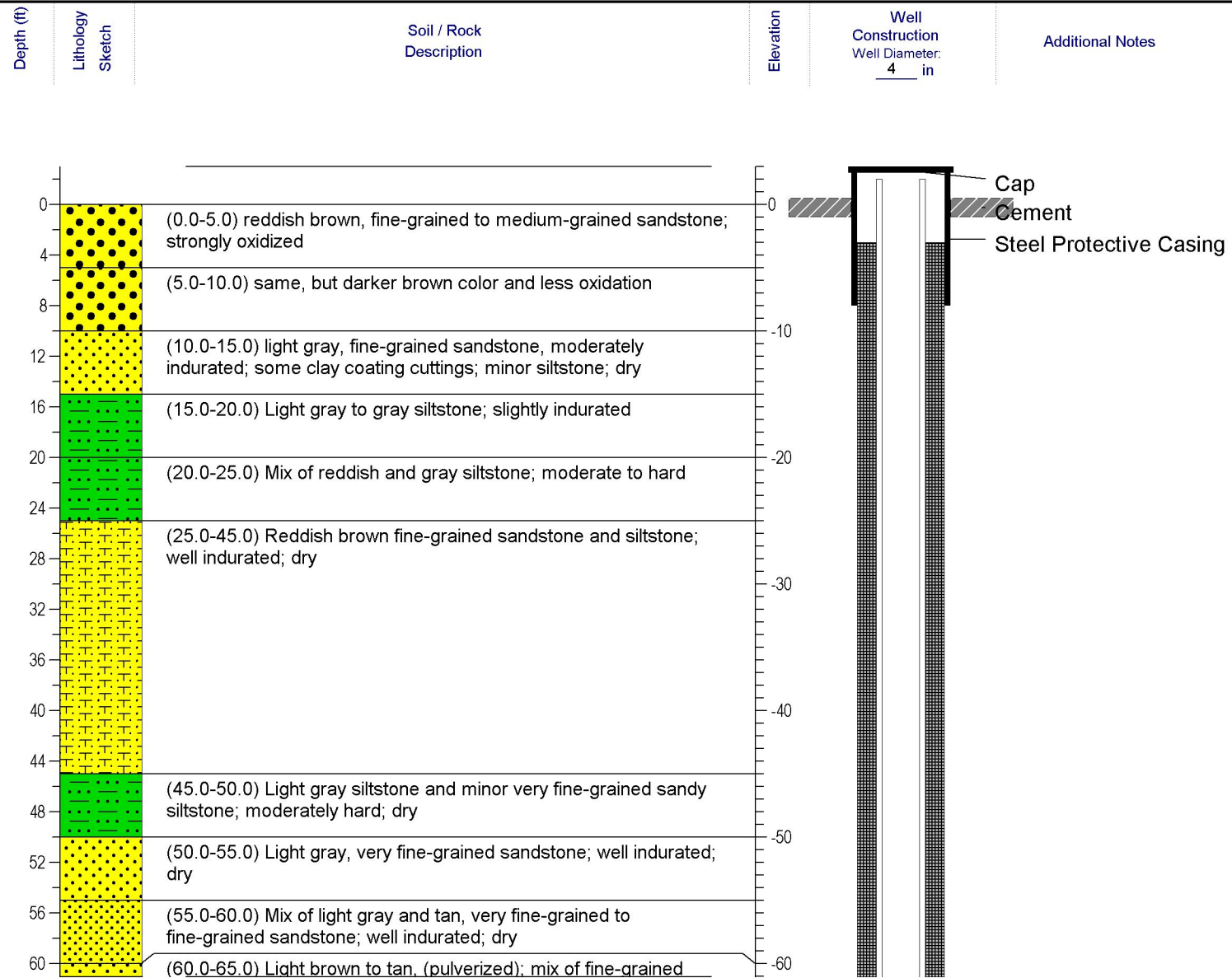
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GL Elevation: 3777.626
TOSC Elevation: 3779.278
Datum used: Survey NAD 83

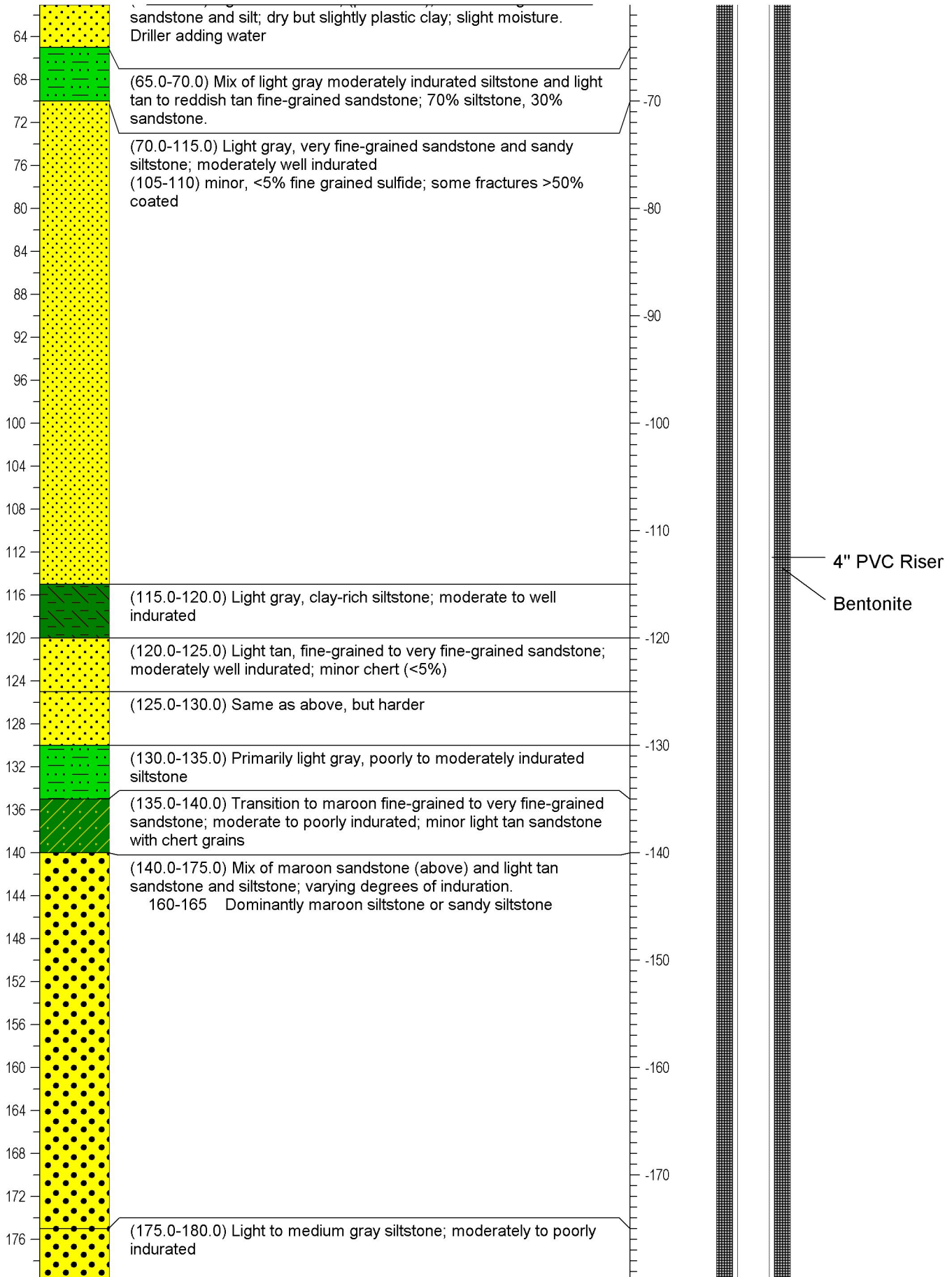
Drilling Information		Date/Time:	
Drilling Company: Boland Drilling	Start Drilling: 08/08/2017 07:45	Bore Diam (1): (8 in)	08/08/2017 07:45 0 ft to 248 ft
Drilling Method: Air Rotary	Bore Diam (2): (NA in)		NA NA ft to NA ft
Driller: Chris Boland	Finish Drilling: NA		248 TD
Drilling Rig: GardnerDenver HPS1000 Air Rotary	Well Development: 08/09/2017 15:30		1.5 hours
Logged By: D. Donohue			
LogPlot by: R.Svingen 11/30/2017			

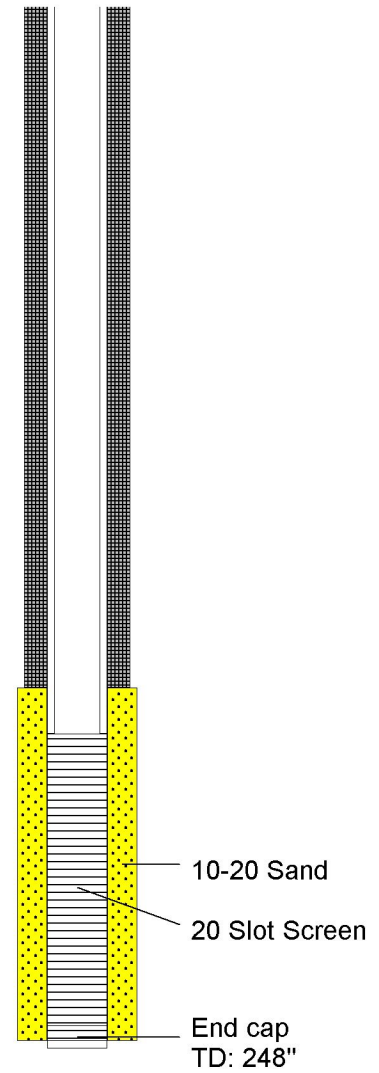
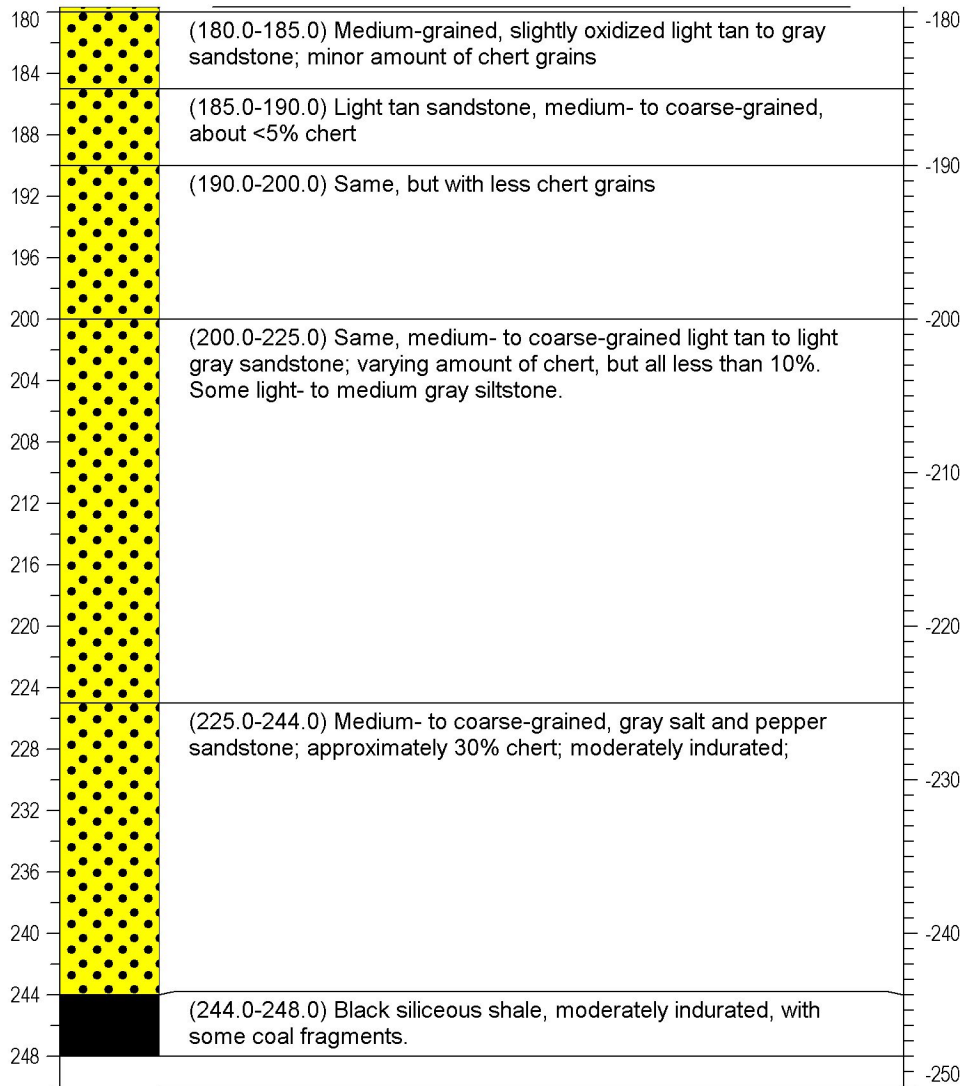
Well Construction Information			
	Dia. inches	Material	Specifications
Protective Casing:	4	6" Steel	229 ft
Riser Pipe:	4	Sch 40	224 ft
Surface Seal:		Concrete	1 ft Quickcrete
Annular Seal:		Bentonite	221 ft Size: Chips
Filter Sand:		Silica Sand	23 ft Grade: 10-20
Well Screen:	4	Sch 40	NA 20 slot
Centralizer:		Steel	5
Endcap:	4	Sch 40	0.2 ft

Water Levels	Date/Time:	SWL ft
	08/08/2017 16:20	220.37
	10/03/2017 13:10	220.98

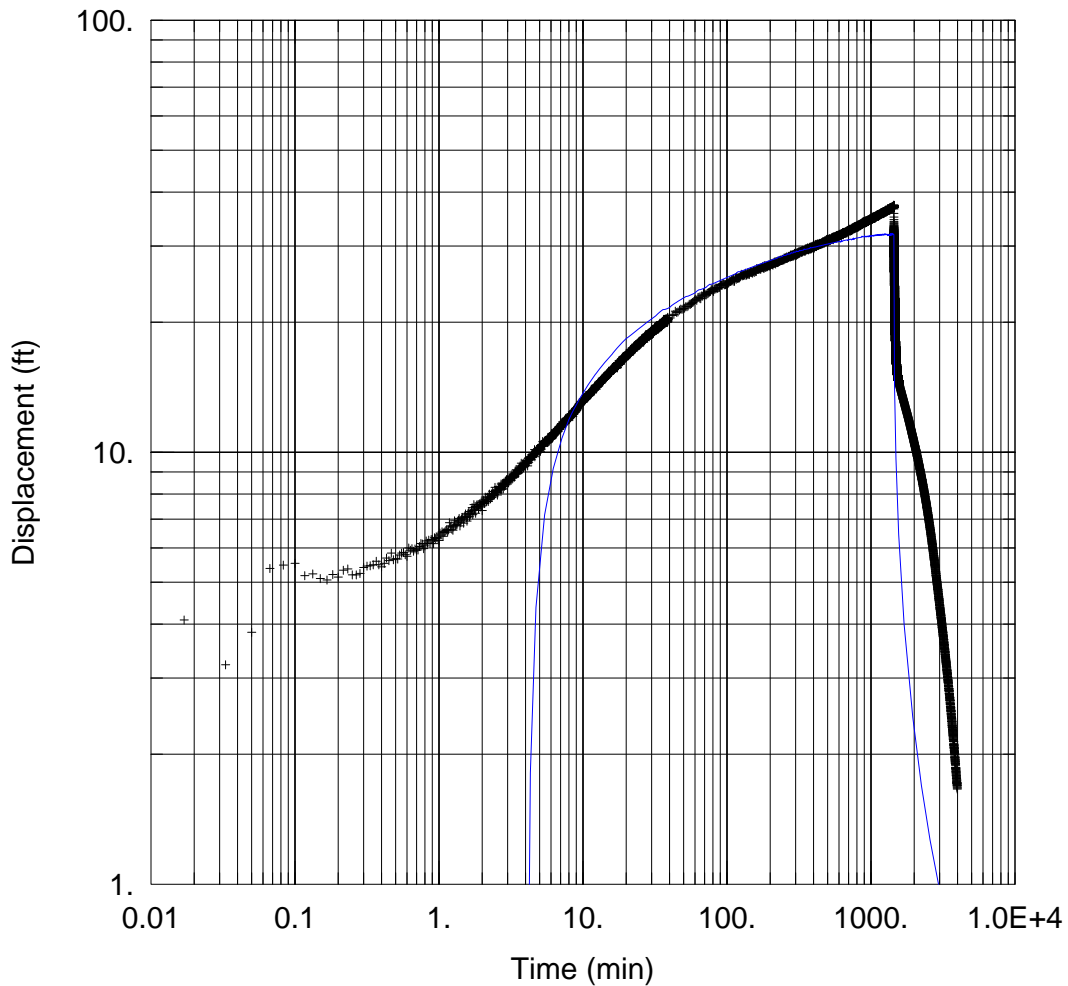
Comments
Groundwater monitoring well
Source Control Investigation







Appendix E
Aquifer Testing Graphical Logs



WELL TEST ANALYSIS

Data Set: H:\...\MW102K_24hrconfTheis.aqt

Date: 02/01/18

Time: 11:09:33

PROJECT INFORMATION

Company: HydroSolutions Inc

Client: DEQ

Location: Sand Coulee

Test Well: MW-103K

Test Date: 10/11/17

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
MW-102K	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
+ MW-102K	0	0

SOLUTION

Aquifer Model: Confined

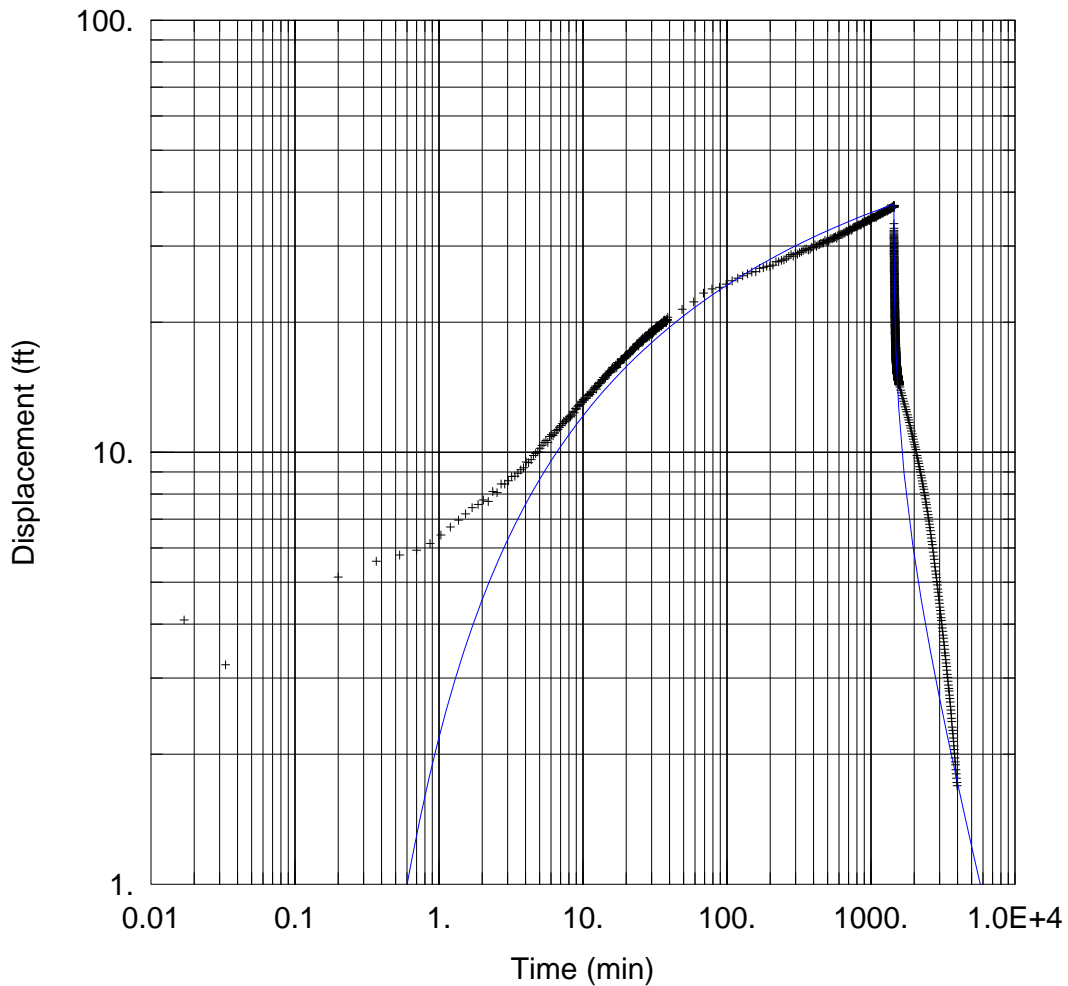
Solution Method: Theis

T = 416.8 ft²/day

S = 0.2792

Kz/Kr = 1.

b = 75. ft



WELL TEST ANALYSIS

Data Set: H:\...\MW102K_24hrHantush_Jacob_Leaky.aqt

Date: 02/01/18

Time: 10:54:52

PROJECT INFORMATION

Company: HydroSolutions Inc

Client: DEQ

Location: Sand Coulee

Test Well: MW-103K

Test Date: 10/11/17

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
MW-102K	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
+ MW-102K	0	0

SOLUTION

Aquifer Model: Leaky

Solution Method: Hantush-Jacob

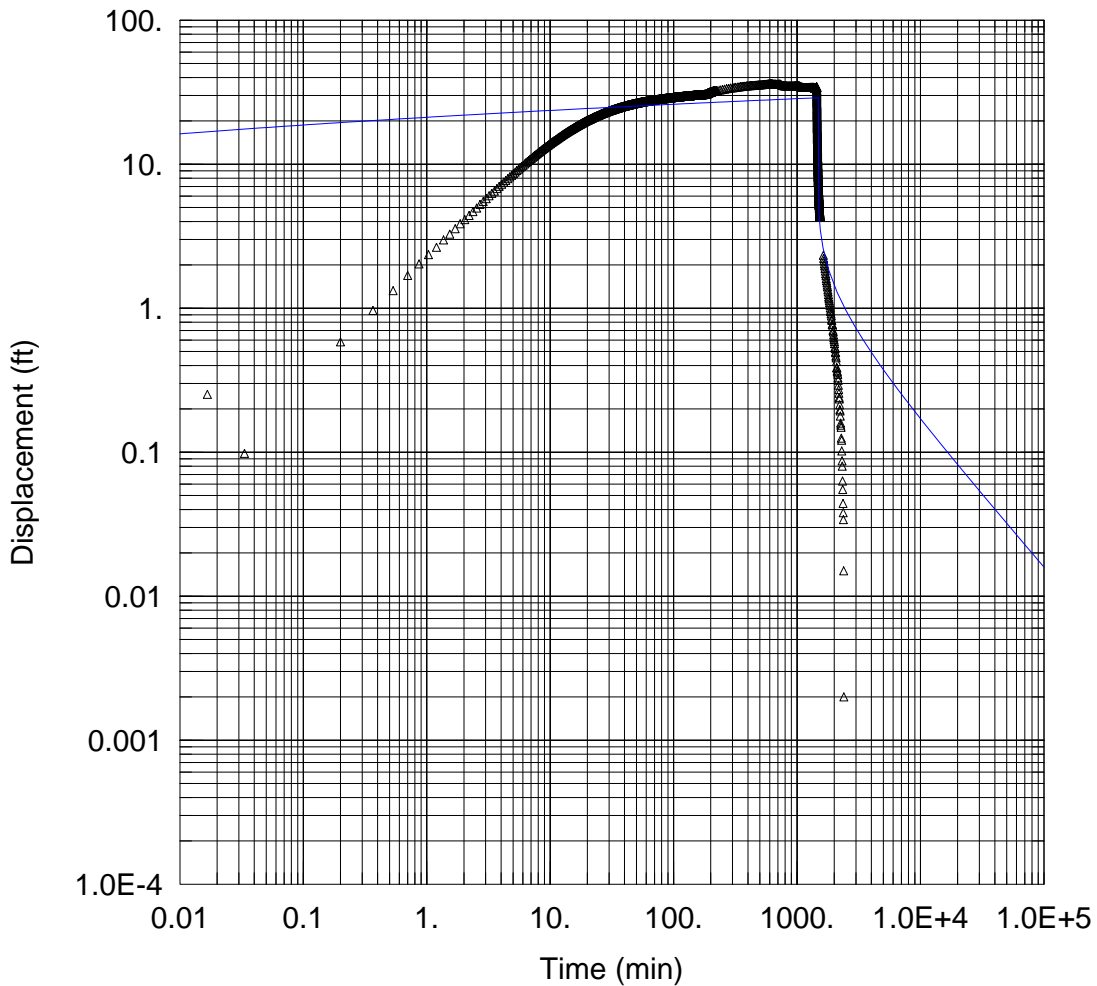
T = 381.5 ft²/day

S = 6.554

1/B = 3.03E-5 ft⁻¹

Kz/Kr = 1.

b = 75. ft



WELL TEST ANALYSIS

Data Set: H:\...\MW103K_24hr_final_TheisConf.aqt

Date: 02/01/18

Time: 10:59:46

PROJECT INFORMATION

Company: HydroSolutions Inc

Client: DEQ

Location: Sand Coulee

Test Well: MW-103K

Test Date: 10/11/17

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
MW-103K_PW	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
△ MW-103K_PW	0	0

SOLUTION

Aquifer Model: Confined

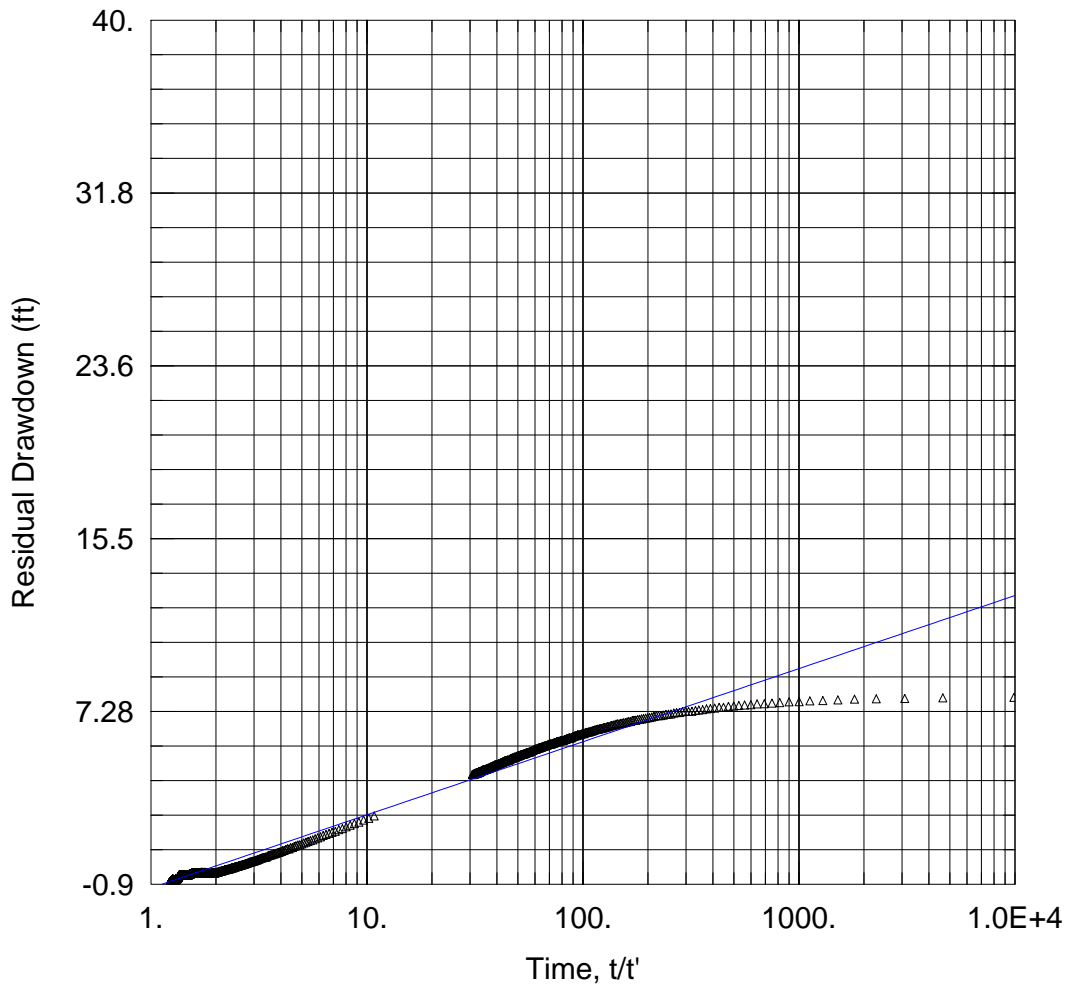
Solution Method: Theis

T = 38.83 ft²/day

S = 8.053E-10

Kz/Kr = 0.1949

b = 52. ft



WELL TEST ANALYSIS

Data Set: H:\...\MW103K_24hr_final_TheisConf_recov.aqt
 Date: 02/01/18 Time: 11:04:17

PROJECT INFORMATION

Company: HydroSolutions Inc
 Client: DEQ
 Location: Sand Coulee
 Test Well: MW-103K
 Test Date: 10/11/17

AQUIFER DATA

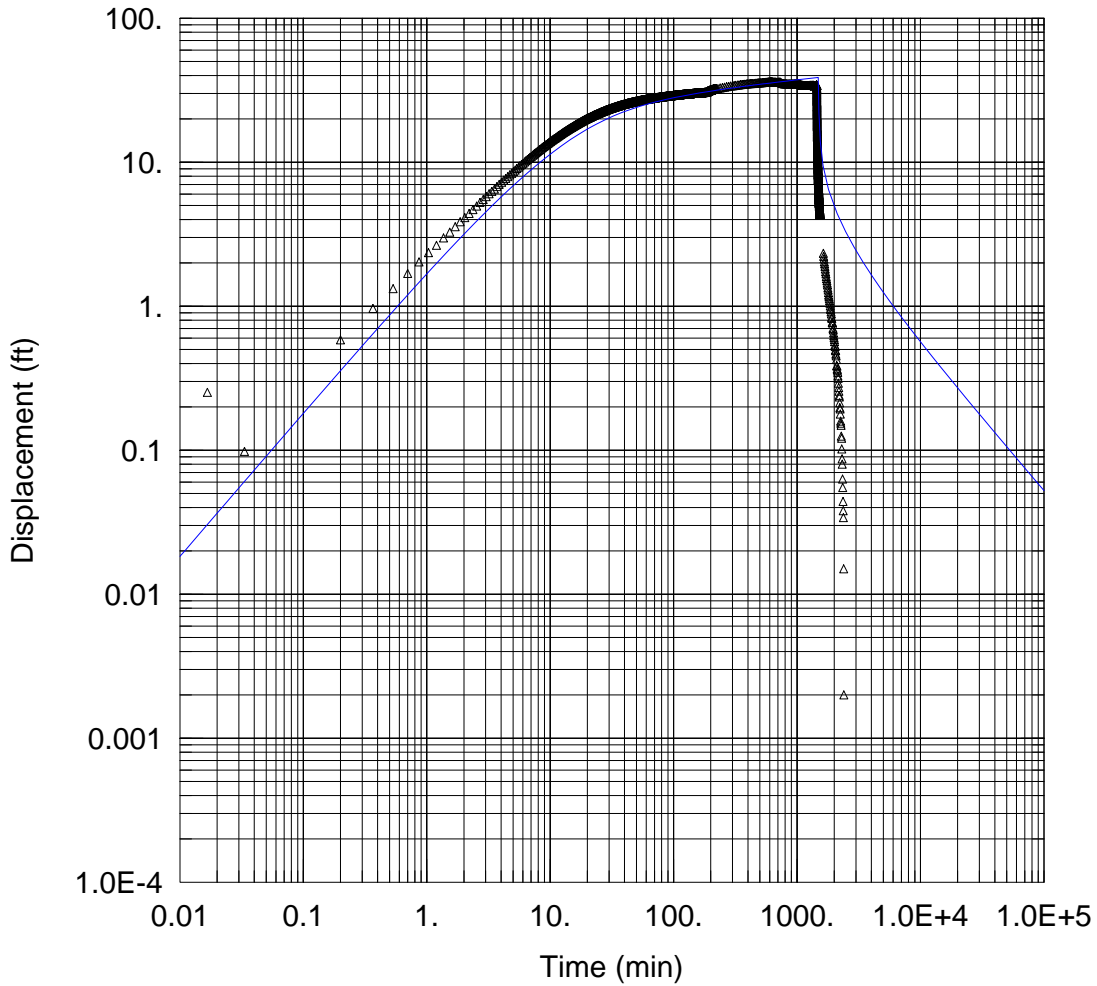
Saturated Thickness: 52. ft Anisotropy Ratio (Kz/Kr): 0.1949

WELL DATA

Pumping Wells			Observation Wells		
Well Name	X (ft)	Y (ft)	Well Name	X (ft)	Y (ft)
MW-103K_PW	0	0	△ MW-103K_PW	0	0

SOLUTION

Aquifer Model: Confined Solution Method: Theis (Recovery)
 $T = 27.53 \text{ ft}^2/\text{day}$ $S/S' = 2.047$



WELL TEST ANALYSIS

Data Set: H:\...\MW103K_24hr_final_TheisConf_papadopoulos_cooper.aqt
 Date: 02/01/18 Time: 11:03:07

PROJECT INFORMATION

Company: HydroSolutions Inc
 Client: DEQ
 Location: Sand Coulee
 Test Well: MW-103K
 Test Date: 10/11/17

AQUIFER DATA

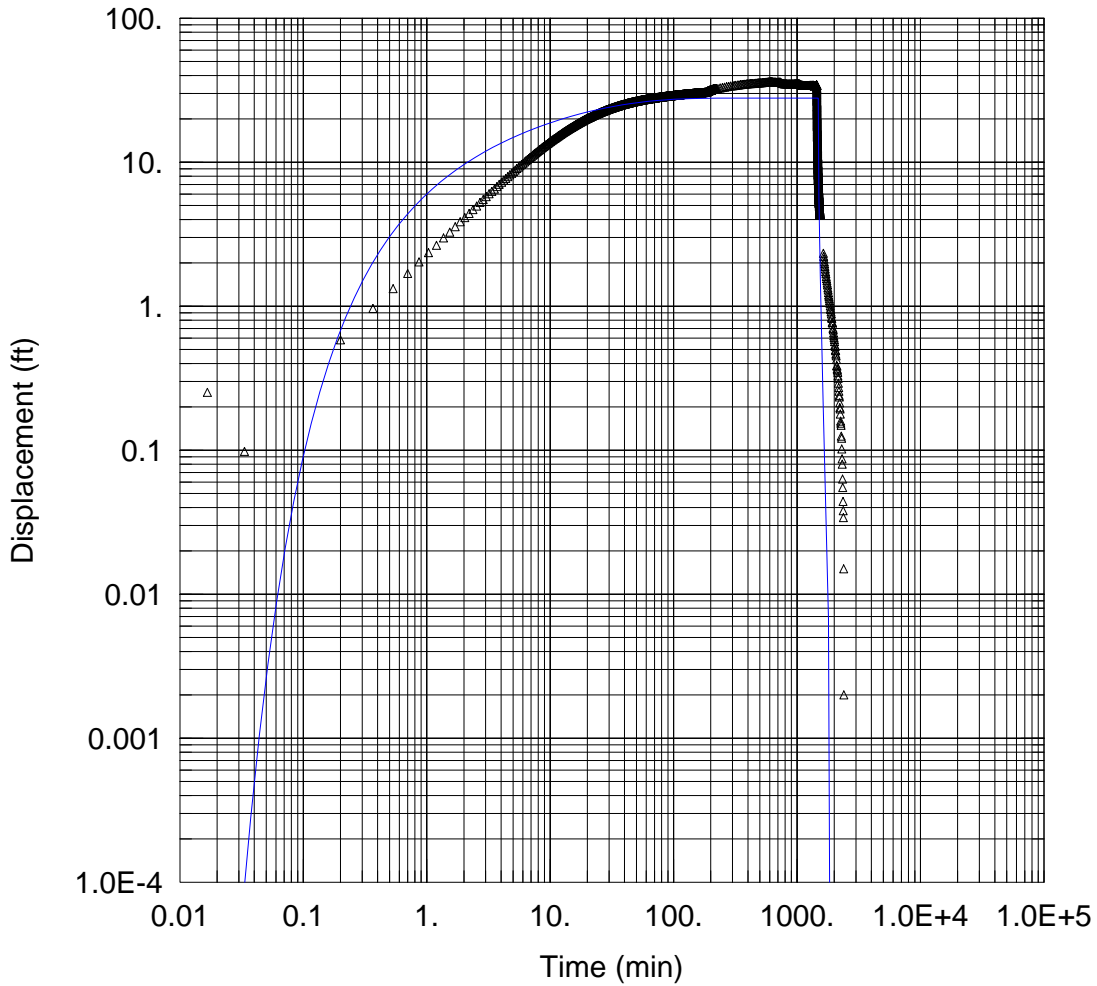
Saturated Thickness: 52. ft Anisotropy Ratio (Kz/Kr): 0.1949

WELL DATA

Pumping Wells			Observation Wells		
Well Name	X (ft)	Y (ft)	Well Name	X (ft)	Y (ft)
MW-103K_PW	0	0	△ MW-103K_PW	0	0

SOLUTION

Aquifer Model: Confined Solution Method: Papadopoulos-Cooper
 $T = 11.79 \text{ ft}^2/\text{day}$ $S = 0.002406$
 $r(w) = 0.42 \text{ ft}$ $r(c) = 0.25 \text{ ft}$



WELL TEST ANALYSIS

Data Set: H:\...\MW103K_24hr_final_Hantush_Jacob_Leaky.aqt
 Date: 02/01/18 Time: 10:58:29

PROJECT INFORMATION

Company: HydroSolutions Inc
 Client: DEQ
 Location: Sand Coulee
 Test Well: MW-103K
 Test Date: 10/11/17

WELL DATA

Pumping Wells			Observation Wells		
Well Name	X (ft)	Y (ft)	Well Name	X (ft)	Y (ft)
MW-103K_PW	0	0	△ MW-103K_PW	0	0

SOLUTION

Aquifer Model: <u>Leaky</u> $T = 6.253 \text{ ft}^2/\text{day}$ $1/B = 0.3301 \text{ ft}^{-1}$ $b = 52. \text{ ft}$	Solution Method: <u>Hantush-Jacob</u> $S = 0.0291$ $Kz/Kr = 0.1949$
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Appendix F
Analytical Laboratory Reports



ANALYTICAL SUMMARY REPORT

November 13, 2017

MT DEQ-Abandoned Mines
PO Box 200901
Helena, MT 59620-0901

Work Order: H17110040

Project Name: Sand Coulee Source Control

Energy Laboratories Inc Helena MT received the following 4 samples for MT DEQ-Abandoned Mines on 11/2/2017 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H17110040-001	SC-3A	10/31/17 14:20	11/02/17	Aqueous	Metals by ICP/ICPMS, Total Acidity, Total as CaCO3 Conductivity Fluoride Hardness Anions by Ion Chromatography pH Metals Digestion by EPA 200.2 Solids, Total Dissolved
H17110040-002	SC-1	10/31/17 14:45	11/02/17	Aqueous	Same As Above
H17110040-003	SC-12	10/31/17 15:25	11/02/17	Aqueous	Same As Above
H17110040-004	SC-8	10/31/17 16:00	11/02/17	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:



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Abandoned Mines
Project: Sand Coulee Source Control
Lab ID: H17110040-001
Client Sample ID: SC-3A

Report Date: 11/13/17
Collection Date: 10/31/17 14:20
Date Received: 11/02/17
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	2.6	s.u.	H	0.1		A4500-H B	11/02/17 15:22 / SRW
Solids, Total Dissolved TDS @ 180 C	6210	mg/L	D	70		A2540 C	11/03/17 14:22 / SRW
INORGANICS							
Acidity, Total as CaCO3	3400	mg/L		4.0		A2310 B	11/03/17 09:29 / SRW
Chloride	5	mg/L		1		E300.0	11/03/17 05:05 / kmd
Sulfate	4500	mg/L	D	2		E300.0	11/03/17 05:05 / kmd
Fluoride	ND	mg/L		0.1	4	A4500-F C	11/03/17 10:02 / kmd
Hardness as CaCO3	824	mg/L		1		A2340 B	11/10/17 11:07 / sld
METALS, TOTAL							
Aluminum	347	mg/L	D	0.04		E200.7	11/06/17 12:49 / sld
Antimony	ND	mg/L		0.0005		E200.8	11/06/17 16:07 / dck
Arsenic	0.011	mg/L		0.001		E200.8	11/06/17 16:07 / dck
Barium	ND	mg/L		0.003		E200.8	11/06/17 16:07 / dck
Beryllium	0.039	mg/L	D	0.005		E200.8	11/09/17 16:18 / dck
Cadmium	0.0548	mg/L	D	0.00005		E200.8	11/06/17 16:07 / dck
Calcium	149	mg/L		1		E200.7	11/06/17 12:49 / sld
Chromium	0.136	mg/L		0.005		E200.8	11/06/17 16:07 / dck
Copper	0.082	mg/L		0.002		E200.8	11/06/17 16:07 / dck
Iron	322	mg/L		0.02		E200.7	11/06/17 12:49 / sld
Lead	0.0016	mg/L		0.0003		E200.8	11/08/17 13:12 / dck
Magnesium	110	mg/L		1		E200.7	11/06/17 12:49 / sld
Manganese	1.56	mg/L		0.001		E200.7	11/06/17 12:49 / sld
Nickel	2.66	mg/L	D	0.003		E200.7	11/06/17 12:49 / sld
Potassium	ND	mg/L		1		E200.7	11/06/17 12:49 / sld
Selenium	0.002	mg/L		0.001		E200.8	11/08/17 13:12 / dck
Sodium	20	mg/L		1		E200.7	11/06/17 12:49 / sld
Strontium	0.99	mg/L		0.01		E200.7	11/06/17 12:49 / sld
Thallium	0.0016	mg/L		0.0002		E200.8	11/08/17 13:12 / dck
Zinc	11.5	mg/L		0.008		E200.7	11/06/17 12:49 / 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 DEQ-Abandoned Mines
Project: Sand Coulee Source Control
Lab ID: H17110040-002
Client Sample ID: SC-1

Report Date: 11/13/17
Collection Date: 10/31/17 14:45
Date Received: 11/02/17
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	2.6	s.u.	H	0.1		A4500-H B	11/02/17 15:24 / SRW
Solids, Total Dissolved TDS @ 180 C	13000	mg/L	D	100		A2540 C	11/03/17 14:23 / SRW
INORGANICS							
Acidity, Total as CaCO3	7500	mg/L		4.0		A2310 B	11/03/17 09:29 / SRW
Chloride	2	mg/L		1		E300.0	11/03/17 05:20 / kmd
Sulfate	9570	mg/L	D	5		E300.0	11/03/17 05:20 / kmd
Fluoride	ND	mg/L		0.1	4	A4500-F C	11/03/17 10:08 / kmd
Hardness as CaCO3	1160	mg/L		1		A2340 B	11/10/17 11:07 / sld
METALS, TOTAL							
Aluminum	764	mg/L	D	0.1		E200.7	11/06/17 12:57 / sld
Antimony	ND	mg/L		0.0005		E200.8	11/06/17 16:08 / dck
Arsenic	0.022	mg/L		0.001		E200.8	11/06/17 16:08 / dck
Barium	ND	mg/L		0.003		E200.8	11/06/17 16:08 / dck
Beryllium	0.083	mg/L	D	0.005		E200.8	11/09/17 16:20 / dck
Cadmium	0.0820	mg/L	D	0.00004		E200.8	11/06/17 16:08 / dck
Calcium	187	mg/L		1		E200.7	11/06/17 12:57 / sld
Chromium	0.304	mg/L		0.005		E200.8	11/06/17 16:08 / dck
Copper	0.136	mg/L		0.002		E200.8	11/06/17 16:08 / dck
Iron	756	mg/L		0.02		E200.7	11/06/17 12:57 / sld
Lead	0.0004	mg/L		0.0003		E200.8	11/06/17 16:08 / dck
Magnesium	168	mg/L		1		E200.7	11/06/17 12:57 / sld
Manganese	2.58	mg/L	D	0.003		E200.7	11/06/17 12:57 / sld
Nickel	5.20	mg/L	D	0.007		E200.7	11/06/17 12:57 / sld
Potassium	ND	mg/L		1		E200.7	11/06/17 12:57 / sld
Selenium	0.002	mg/L		0.001		E200.8	11/08/17 13:14 / dck
Sodium	16	mg/L		1		E200.7	11/06/17 12:57 / sld
Strontium	0.95	mg/L		0.01		E200.7	11/06/17 12:57 / sld
Thallium	0.0006	mg/L		0.0002		E200.8	11/08/17 13:14 / dck
Zinc	20.5	mg/L		0.008		E200.7	11/06/17 12:57 / 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 DEQ-Abandoned Mines
Project: Sand Coulee Source Control
Lab ID: H17110040-003
Client Sample ID: SC-12

Report Date: 11/13/17
Collection Date: 10/31/17 15:25
Date Received: 11/02/17
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	2.5	s.u.	H	0.1		A4500-H B	11/02/17 15:26 / SRW
Solids, Total Dissolved TDS @ 180 C	15200	mg/L	D	100		A2540 C	11/03/17 14:23 / SRW
INORGANICS							
Acidity, Total as CaCO3	9100	mg/L		4.0		A2310 B	11/03/17 09:29 / SRW
Chloride	2	mg/L		1		E300.0	11/03/17 05:35 / kmd
Sulfate	11400	mg/L	D	5		E300.0	11/03/17 05:35 / kmd
Fluoride	ND	mg/L		0.1	4	A4500-F C	11/03/17 10:14 / kmd
Hardness as CaCO3	1240	mg/L		1		A2340 B	11/10/17 11:07 / sld
METALS, TOTAL							
Aluminum	875	mg/L	D	0.1		E200.7	11/06/17 13:04 / sld
Antimony	ND	mg/L		0.0005		E200.8	11/06/17 16:10 / dck
Arsenic	0.048	mg/L		0.001		E200.8	11/06/17 16:10 / dck
Barium	ND	mg/L		0.003		E200.8	11/06/17 16:10 / dck
Beryllium	0.100	mg/L	D	0.005		E200.8	11/09/17 16:22 / dck
Cadmium	0.115	mg/L	D	0.00004		E200.8	11/06/17 16:10 / dck
Calcium	183	mg/L		1		E200.7	11/06/17 13:04 / sld
Chromium	0.309	mg/L		0.005		E200.8	11/06/17 16:10 / dck
Copper	0.298	mg/L		0.002		E200.8	11/06/17 16:10 / dck
Iron	1070	mg/L		0.02		E200.7	11/06/17 13:04 / sld
Lead	0.0006	mg/L		0.0003		E200.8	11/06/17 16:10 / dck
Magnesium	191	mg/L		1		E200.7	11/06/17 13:04 / sld
Manganese	5.80	mg/L	D	0.003		E200.7	11/06/17 13:04 / sld
Nickel	3.84	mg/L	D	0.007		E200.7	11/06/17 13:04 / sld
Potassium	ND	mg/L		1		E200.7	11/06/17 13:04 / sld
Selenium	0.002	mg/L		0.001		E200.8	11/08/17 13:16 / dck
Sodium	19	mg/L		1		E200.7	11/06/17 13:04 / sld
Strontium	1.32	mg/L		0.01		E200.7	11/06/17 13:04 / sld
Thallium	0.0019	mg/L		0.0002		E200.8	11/08/17 13:16 / dck
Zinc	13.6	mg/L		0.008		E200.7	11/06/17 13:04 / 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 DEQ-Abandoned Mines
Project: Sand Coulee Source Control
Lab ID: H17110040-004
Client Sample ID: SC-8

Report Date: 11/13/17
Collection Date: 10/31/17 16:00
Date Received: 11/02/17
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	3.8	s.u.	H	0.1		A4500-H B	11/02/17 15:28 / SRW
Solids, Total Dissolved TDS @ 180 C	3340	mg/L	D	70		A2540 C	11/03/17 14:23 / SRW
INORGANICS							
Acidity, Total as CaCO3	1400	mg/L		4.0		A2310 B	11/03/17 09:30 / SRW
Chloride	4	mg/L		1		E300.0	11/03/17 05:49 / kmd
Sulfate	2330	mg/L		1		E300.0	11/03/17 05:49 / kmd
Fluoride	ND	mg/L		0.1	4	A4500-F C	11/03/17 10:19 / kmd
Hardness as CaCO3	778	mg/L		1		A2340 B	11/09/17 14:31 / sld
METALS, TOTAL							
Aluminum	157	mg/L	D	0.02		E200.7	11/06/17 13:12 / sld
Antimony	ND	mg/L		0.0005		E200.8	11/06/17 16:12 / dck
Arsenic	0.024	mg/L		0.001		E200.8	11/06/17 16:12 / dck
Barium	0.014	mg/L		0.003		E200.8	11/06/17 16:12 / dck
Beryllium	0.0218	mg/L		0.0008		E200.8	11/08/17 20:51 / dck
Cadmium	0.00649	mg/L		0.00003		E200.8	11/06/17 16:12 / dck
Calcium	130	mg/L		1		E200.7	11/06/17 13:12 / sld
Chromium	0.022	mg/L		0.005		E200.8	11/06/17 16:12 / dck
Copper	ND	mg/L		0.002		E200.8	11/06/17 16:12 / dck
Iron	201	mg/L		0.02		E200.7	11/06/17 13:12 / sld
Lead	0.0018	mg/L		0.0003		E200.8	11/06/17 16:12 / dck
Magnesium	110	mg/L		1		E200.7	11/06/17 13:12 / sld
Manganese	0.958	mg/L		0.001		E200.7	11/06/17 13:12 / sld
Nickel	1.15	mg/L		0.002		E200.7	11/06/17 13:12 / sld
Potassium	4	mg/L		1		E200.7	11/06/17 13:12 / sld
Selenium	ND	mg/L		0.001		E200.8	11/08/17 13:18 / dck
Sodium	25	mg/L		1		E200.7	11/06/17 13:12 / sld
Strontium	0.99	mg/L		0.01		E200.7	11/06/17 13:12 / sld
Thallium	0.0011	mg/L		0.0002		E200.8	11/06/17 16:12 / dck
Zinc	4.67	mg/L		0.008		E200.7	11/06/17 13:12 / 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 DEQ-Abandoned Mines

Report Date: 11/13/17

Project: Sand Coulee Source Control

Work Order: H17110040

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2310 B								Batch: ACID171103_A		
Lab ID: H17110040-001A DUP	Sample Duplicate					Run: MISC WC_171103A			11/03/17 09:29	
Acidity, Total as CaCO3	3400	mg/L	4.0					0.3	10	
Lab ID: LCS	Laboratory Control Sample					Run: MISC WC_171103A			11/03/17 09:29	
Acidity, Total as CaCO3	1300	mg/L	4.0	98	90	110				
Lab ID: MBLK	Method Blank					Run: MISC WC_171103A			11/03/17 09:29	
Acidity, Total as CaCO3	3	mg/L								

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Abandoned Mines
Project: Sand Coulee Source Control

Report Date: 11/13/17
Work Order: H17110040

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2540 C								Batch: TDS171103A		
Lab ID: MB-1_171103A		Method Blank						Run: ACCU-124 (14410200)_17110		11/03/17 14:22
Solids, Total Dissolved TDS @ 180 C		ND	mg/L	2						
Lab ID: LCS-2_171103A		Laboratory Control Sample						Run: ACCU-124 (14410200)_17110		11/03/17 14:22
Solids, Total Dissolved TDS @ 180 C		2000	mg/L	20	100	90	110			
Lab ID: H17110040-001A DUP		Sample Duplicate						Run: ACCU-124 (14410200)_17110		11/03/17 14:22
Solids, Total Dissolved TDS @ 180 C		6210	mg/L	67				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 DEQ-Abandoned Mines
Project: Sand Coulee Source Control

Report Date: 11/13/17
Work Order: H17110040

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500-F C								Analytical Run: MANTECH 2_171103A		
Lab ID: ICV		Initial Calibration Verification Standard								11/03/17 09:26
Fluoride		0.8	mg/L	0.1	100	90	110			
Method: A4500-F C										Batch: R129945
Lab ID: MBLK		Method Blank					Run: MANTECH 2_171103A			11/03/17 09:32
Fluoride		0.02	mg/L	0.01						
Lab ID: H17110033-001AMS		Sample Matrix Spike					Run: MANTECH 2_171103A			11/03/17 09:41
Fluoride		1.9	mg/L	0.1	87	85	115			
Lab ID: H17110034-001ADUP		Sample Duplicate					Run: MANTECH 2_171103A			11/03/17 09:50
Fluoride		0.8	mg/L	0.1				2.4	10	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Abandoned Mines
Project: Sand Coulee Source Control

Report Date: 11/13/17
Work Order: H17110040

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500-H B								Analytical Run: PHSC_101-H_171102A		
Lab ID: pH 7		Initial Calibration Verification Standard								11/02/17 08:51
pH		7.0	s.u.	0.1	99	98	102			
Lab ID: CCV - pH 7		Continuing Calibration Verification Standard								11/02/17 14:41
pH		7.0	s.u.	0.1	100	98	102			
Method: A4500-H B										Batch: R129860
Lab ID: H17110037-006ADUP		Sample Duplicate								11/02/17 15:18
pH		4.2	s.u.	0.1				0.2	3	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Abandoned Mines

Report Date: 11/13/17

Project: Sand Coulee Source Control

Work Order: H17110040

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7								Analytical Run: ICP2-HE_171106A		
Lab ID: ICV	10	Initial Calibration Verification Standard							11/06/17 09:24	
Aluminum		4.09	mg/L	0.10	102	95	105			
Calcium		39.6	mg/L	1.0	99	95	105			
Iron		4.00	mg/L	0.020	100	95	105			
Magnesium		39.6	mg/L	1.0	99	95	105			
Manganese		3.99	mg/L	0.010	100	95	105			
Nickel		0.812	mg/L	0.010	101	95	105			
Potassium		40.6	mg/L	1.0	101	95	105			
Sodium		40.6	mg/L	1.0	102	95	105			
Strontium		0.808	mg/L	0.10	101	95	105			
Zinc		0.800	mg/L	0.010	100	95	105			
Lab ID: CCV-1	10	Continuing Calibration Verification Standard							11/06/17 09:28	
Aluminum		2.57	mg/L	0.10	103	95	105			
Calcium		25.0	mg/L	1.0	100	95	105			
Iron		2.52	mg/L	0.020	101	95	105			
Magnesium		24.6	mg/L	1.0	98	95	105			
Manganese		2.50	mg/L	0.010	100	95	105			
Nickel		2.53	mg/L	0.010	101	95	105			
Potassium		26.0	mg/L	1.0	104	95	105			
Sodium		26.1	mg/L	1.0	105	95	105			
Strontium		2.55	mg/L	0.10	102	95	105			
Zinc		2.51	mg/L	0.010	100	95	105			
Lab ID: ICSA	10	Interference Check Sample A							11/06/17 09:39	
Aluminum		533	mg/L	0.10	107	80	120			
Calcium		471	mg/L	1.0	94	80	120			
Iron		185	mg/L	0.020	92	80	120			
Magnesium		530	mg/L	1.0	106	80	120			
Manganese		0.00770	mg/L	0.010		0	0			
Nickel		0.00522	mg/L	0.010		0	0			
Potassium		0.00174	mg/L	1.0		0	0			
Sodium		0.0261	mg/L	1.0		0	0			
Strontium		0.00471	mg/L	0.10		0	0			
Zinc		-0.00110	mg/L	0.010		0	0			
Lab ID: ICSAB	10	Interference Check Sample AB							11/06/17 09:43	
Aluminum		544	mg/L	0.10	109	80	120			
Calcium		469	mg/L	1.0	94	80	120			
Iron		185	mg/L	0.020	92	80	120			
Magnesium		529	mg/L	1.0	106	80	120			
Manganese		0.495	mg/L	0.010	99	80	120			
Nickel		0.955	mg/L	0.010	95	80	120			
Potassium		19.9	mg/L	1.0	100	80	120			
Sodium		19.8	mg/L	1.0	99	80	120			
Strontium		1.04	mg/L	0.10	104	80	120			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Abandoned Mines
Project: Sand Coulee Source Control

Report Date: 11/13/17
Work Order: H17110040

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7 Analytical Run: ICP2-HE_171106A										
Lab ID: ICSAB	10	Interference Check Sample AB								11/06/17 09:43
Zinc		1.00	mg/L	0.010	100	80	120			
Lab ID: CCV 11/06/17 12:30										
	10	Continuing Calibration Verification Standard								
Aluminum		2.65	mg/L	0.10	106	90	110			
Calcium		25.1	mg/L	1.0	100	90	110			
Iron		2.58	mg/L	0.020	103	90	110			
Magnesium		24.9	mg/L	1.0	100	90	110			
Manganese		2.51	mg/L	0.010	100	90	110			
Nickel		2.56	mg/L	0.010	102	90	110			
Potassium		26.4	mg/L	1.0	106	90	110			
Sodium		26.7	mg/L	1.0	107	90	110			
Strontium		2.63	mg/L	0.10	105	90	110			
Zinc		2.55	mg/L	0.010	102	90	110			
Method: E200.7 Batch: 39418										
Lab ID: MB-39418	10	Method Blank								11/06/17 11:07
		Run: ICP2-HE_171106A								
Aluminum		ND	mg/L	0.003						
Calcium		0.06	mg/L	0.01						
Iron		ND	mg/L	0.003						
Magnesium		ND	mg/L	0.009						
Manganese		ND	mg/L	0.0006						
Nickel		ND	mg/L	0.001						
Potassium		ND	mg/L	0.05						
Sodium		0.05	mg/L	0.02						
Strontium		0.0003	mg/L	0.0002						
Zinc		0.003	mg/L	0.001						
Lab ID: LCS-39418	10	Laboratory Control Sample								11/06/17 11:11
		Run: ICP2-HE_171106A								
Aluminum		2.46	mg/L	0.030	98	85	115			
Calcium		24.2	mg/L	1.0	97	85	115			
Iron		2.44	mg/L	0.020	98	85	115			
Magnesium		24.1	mg/L	1.0	96	85	115			
Manganese		2.40	mg/L	0.0010	96	85	115			
Nickel		0.487	mg/L	0.0050	97	85	115			
Potassium		25.5	mg/L	1.0	102	85	115			
Sodium		25.6	mg/L	1.0	102	85	115			
Strontium		0.496	mg/L	0.010	99	85	115			
Zinc		0.491	mg/L	0.010	98	85	115			
Lab ID: H17110042-002ADIL	10	Serial Dilution								11/06/17 11:52
		Run: ICP2-HE_171106A								
Aluminum		0.0239	mg/L	0.030		0	0		10	N
Calcium		21.0	mg/L	1.0		0	0	5.7	10	
Iron		0.186	mg/L	0.020		0	0		10	N
Magnesium		5.47	mg/L	1.0		0	0	7.7	10	
Manganese		0.00994	mg/L	0.0031		0	0		10	N

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

N - The analyte concentration was not sufficiently high to calculate a RPD for the serial dilution test.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Abandoned Mines
Project: Sand Coulee Source Control

Report Date: 11/13/17
Work Order: H17110040

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7 Batch: 39418										
Lab ID:	H17110042-002ADIL	10	Serial Dilution							
						Run: ICP2-HE_171106A				11/06/17 11:52
Nickel		0.0128	mg/L	0.0071		0	0		10	N
Potassium		0.804	mg/L	1.0		0	0		10	N
Sodium		4.19	mg/L	1.0		0	0	0.4	10	
Strontium		0.129	mg/L	0.010		0	0	4.6	10	
Zinc		0.134	mg/L	0.010		0	0		10	N
Lab ID:	H17110034-001CMS3	10	Sample Matrix Spike							
						Run: ICP2-HE_171106A				11/06/17 12:23
Aluminum		2.48	mg/L	0.033	97	70	130			
Calcium		411	mg/L	1.0		70	130			A
Iron		2.48	mg/L	0.029	97	70	130			
Magnesium		607	mg/L	1.0		70	130			A
Manganese		2.74	mg/L	0.0063	95	70	130			
Nickel		0.464	mg/L	0.014	93	70	130			
Potassium		41.7	mg/L	1.0	101	70	130			
Sodium		6580	mg/L	2.5		70	130			A
Strontium		10.6	mg/L	0.010		70	130			A
Zinc		0.516	mg/L	0.014	100	70	130			
Lab ID:	H17110034-001CMSD	10	Sample Matrix Spike Duplicate							
						Run: ICP2-HE_171106A				11/06/17 12:27
Aluminum		2.52	mg/L	0.033	99	70	130	1.8	20	
Calcium		410	mg/L	1.0		70	130	0.1	20	A
Iron		2.50	mg/L	0.029	98	70	130	0.8	20	
Magnesium		608	mg/L	1.0		70	130	0.2	20	A
Manganese		2.77	mg/L	0.0063	96	70	130	1.2	20	
Nickel		0.494	mg/L	0.014	99	70	130	6.3	20	
Potassium		42.0	mg/L	1.0	103	70	130	0.8	20	
Sodium		6600	mg/L	2.5		70	130	0.3	20	A
Strontium		10.6	mg/L	0.010		70	130	0.0	20	A
Zinc		0.522	mg/L	0.014	101	70	130	1.1	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.

N - The analyte concentration was not sufficiently high to calculate a RPD for the serial dilution test.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Abandoned Mines
Project: Sand Coulee Source Control

Report Date: 11/13/17
Work Order: H17110040

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8		Analytical Run: ICPMS205-H_171106A								
Lab ID: ICSA	8	Interference Check Sample A							11/06/17 09:31	
Antimony		0.000156	mg/L	0.050						
Arsenic		-1.77E-05	mg/L	0.0050						
Barium		6.08E-05	mg/L	0.10						
Cadmium		9.40E-06	mg/L	0.0010						
Chromium		0.000965	mg/L	0.010						
Copper		0.000165	mg/L	0.010						
Lead		0.000213	mg/L	0.010						
Thallium		-4.96E-06	mg/L	0.10						
Lab ID: ICSAB	8	Interference Check Sample AB							11/06/17 09:33	
Antimony		6.90E-05	mg/L	0.050		0	0			
Arsenic		0.0114	mg/L	0.0050	114	70	130			
Barium		0.000179	mg/L	0.10		0	0			
Cadmium		0.0110	mg/L	0.0010	110	70	130			
Chromium		0.0232	mg/L	0.010	116	70	130			
Copper		0.0220	mg/L	0.010	110	70	130			
Lead		0.000210	mg/L	0.010		0	0			
Thallium		-1.91E-05	mg/L	0.10		0	0			
Lab ID: ICV	8	Initial Calibration Verification Standard							11/06/17 09:41	
Antimony		0.0604	mg/L	0.050	101	90	110			
Arsenic		0.0588	mg/L	0.0050	98	90	110			
Barium		0.0597	mg/L	0.10	99	90	110			
Cadmium		0.0296	mg/L	0.0010	99	90	110			
Chromium		0.0590	mg/L	0.010	98	90	110			
Copper		0.0588	mg/L	0.010	98	90	110			
Lead		0.0577	mg/L	0.010	96	90	110			
Thallium		0.0574	mg/L	0.10	96	90	110			
Method: E200.8		Batch: 39418								
Lab ID: MB-39418	10	Method Blank							Run: ICPMS205-H_171106A 11/06/17 10:46	
Antimony		ND	mg/L	5E-05						
Arsenic		ND	mg/L	6E-05						
Barium		ND	mg/L	7E-05						
Beryllium		ND	mg/L	0.0001						
Cadmium		1E-05	mg/L	1.0E-05						
Chromium		0.0002	mg/L	5E-05						
Copper		ND	mg/L	7E-05						
Lead		ND	mg/L	9E-06						
Selenium		ND	mg/L	3E-05						
Thallium		ND	mg/L	7E-06						
Lab ID: LCS-39418	10	Laboratory Control Sample							Run: ICPMS205-H_171106A 11/06/17 11:08	
Antimony		0.506	mg/L	0.0010	101	85	115			
Arsenic		0.481	mg/L	0.0010	96	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 DEQ-Abandoned Mines
Project: Sand Coulee Source Control

Report Date: 11/13/17
Work Order: H17110040

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8 Batch: 39418										
Lab ID: LCS-39418	10	Laboratory Control Sample					Run: ICPMS205-H_171106A			11/06/17 11:08
Barium		0.484	mg/L	0.050	97	85	115			
Beryllium		0.232	mg/L	0.0010	93	85	115			
Cadmium		0.236	mg/L	0.0010	94	85	115			
Chromium		0.488	mg/L	0.0050	98	85	115			
Copper		0.477	mg/L	0.0050	95	85	115			
Lead		0.474	mg/L	0.0010	95	85	115			
Selenium		0.460	mg/L	0.0010	92	85	115			
Thallium		0.463	mg/L	0.00050	93	85	115			
Lab ID: H17110034-001CMS3	10	Sample Matrix Spike					Run: ICPMS205-H_171106A			11/06/17 15:19
Antimony		0.526	mg/L	0.0010	105	70	130			
Arsenic		0.490	mg/L	0.0010	98	70	130			
Barium		0.411	mg/L	0.050	81	70	130			
Beryllium		0.185	mg/L	0.0010	74	70	130			
Cadmium		0.233	mg/L	0.0010	93	70	130			
Chromium		0.461	mg/L	0.0050	92	70	130			
Copper		0.436	mg/L	0.0050	87	70	130			
Lead		0.453	mg/L	0.0010	91	70	130			
Selenium		0.504	mg/L	0.0010	100	70	130			
Thallium		0.482	mg/L	0.00050	96	70	130			
Lab ID: H17110034-001CMSD	10	Sample Matrix Spike Duplicate					Run: ICPMS205-H_171106A			11/06/17 15:21
Antimony		0.550	mg/L	0.0010	110	70	130	4.6	20	
Arsenic		0.513	mg/L	0.0010	103	70	130	4.6	20	
Barium		0.403	mg/L	0.050	79	70	130	1.9	20	
Beryllium		0.184	mg/L	0.0010	74	70	130	0.7	20	
Cadmium		0.247	mg/L	0.0010	99	70	130	5.5	20	
Chromium		0.474	mg/L	0.0050	95	70	130	2.9	20	
Copper		0.451	mg/L	0.0050	90	70	130	3.4	20	
Lead		0.471	mg/L	0.0010	94	70	130	4.0	20	
Selenium		0.515	mg/L	0.0010	102	70	130	2.2	20	
Thallium		0.512	mg/L	0.00050	102	70	130	6.0	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Abandoned Mines
Project: Sand Coulee Source Control

Report Date: 11/13/17
Work Order: H17110040

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8								Analytical Run: ICPMS205-H_171108B		
Lab ID: ICV	4	Initial Calibration Verification Standard								11/08/17 10:32
Beryllium		0.0291	mg/L	0.0010	97	90	110			
Lead		0.0581	mg/L	0.010	97	90	110			
Selenium		0.0577	mg/L	0.0050	96	90	110			
Thallium		0.0572	mg/L	0.10	95	90	110			
Lab ID: ICSA	4	Interference Check Sample A								11/08/17 10:34
Beryllium		8.07E-06	mg/L	0.0010						
Lead		0.000221	mg/L	0.010						
Selenium		6.99E-05	mg/L	0.0050						
Thallium		3.55E-05	mg/L	0.10						
Lab ID: ICSAB	4	Interference Check Sample AB								11/08/17 10:36
Beryllium		8.44E-06	mg/L	0.0010		0	0			
Lead		0.000218	mg/L	0.010		0	0			
Selenium		0.0112	mg/L	0.0050	112	70	130			
Thallium		1.19E-05	mg/L	0.10		0	0			
Lab ID: ICV	4	Initial Calibration Verification Standard								11/08/17 17:21
Beryllium		0.0289	mg/L	0.0010	96	90	110			
Lead		0.0594	mg/L	0.010	99	90	110			
Selenium		0.0596	mg/L	0.0050	99	90	110			
Thallium		0.0579	mg/L	0.10	96	90	110			
Lab ID: ICSA	4	Interference Check Sample A								11/08/17 17:23
Beryllium		3.68E-05	mg/L	0.0010						
Lead		0.000222	mg/L	0.010						
Selenium		5.40E-05	mg/L	0.0050						
Thallium		2.98E-05	mg/L	0.10						
Lab ID: ICSAB	4	Interference Check Sample AB								11/08/17 17:25
Beryllium		-8.95E-06	mg/L	0.0010		0	0			
Lead		0.000223	mg/L	0.010		0	0			
Selenium		0.0116	mg/L	0.0050	116	70	130			
Thallium		1.52E-05	mg/L	0.10		0	0			
Method: E200.8								Batch: 39418		
Lab ID: MB-39418	10	Method Blank						Run: ICPMS205-H_171108B		11/08/17 12:54
Antimony		7E-05	mg/L	5E-05						
Arsenic		0.0001	mg/L	6E-05						
Barium		0.0002	mg/L	7E-05						
Beryllium		ND	mg/L	0.0001						
Cadmium		9E-05	mg/L	1.0E-05						
Chromium		0.0002	mg/L	5E-05						
Copper		0.0003	mg/L	7E-05						
Lead		9E-05	mg/L	9E-06						
Selenium		8E-05	mg/L	3E-05						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Abandoned Mines
Project: Sand Coulee Source Control

Report Date: 11/13/17
Work Order: H17110040

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8 Batch: 39418										
Lab ID: MB-39418	10	Method Blank								
Thallium		4E-05	mg/L	7E-06						Run: ICPMS205-H_171108B 11/08/17 12:54
Method: E200.8 Analytical Run: ICPMS205-H_171109B										
Lab ID: ICV		Initial Calibration Verification Standard								11/09/17 11:20
Beryllium		0.0289	mg/L	0.0010	96	90	110			
Lab ID: ICSA		Interference Check Sample A								11/09/17 11:22
Beryllium		-1.73E-05	mg/L	0.0010						
Lab ID: ICSAB		Interference Check Sample AB								11/09/17 11:24
Beryllium		-1.72E-05	mg/L	0.0010		0	0			
Method: E200.8 Batch: 39418										
Lab ID: MB-39418	10	Method Blank								Run: ICPMS205-H_171109B 11/09/17 16:10
Antimony		ND	mg/L	5E-05						
Arsenic		ND	mg/L	6E-05						
Barium		ND	mg/L	7E-05						
Beryllium		ND	mg/L	0.0001						
Cadmium		4E-05	mg/L	1.0E-05						
Chromium		0.0003	mg/L	5E-05						
Copper		0.0003	mg/L	7E-05						
Lead		4E-05	mg/L	9E-06						
Selenium		ND	mg/L	3E-05						
Thallium		ND	mg/L	7E-06						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Abandoned Mines
Project: Sand Coulee Source Control

Report Date: 11/13/17
Work Order: H17110040

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E300.0 Analytical Run: IC METROHM_171102A										
Lab ID: ICV	2	Initial Calibration Verification Standard								11/02/17 15:00
Chloride		101	mg/L	1.0	101	90	110			
Sulfate		403	mg/L	1.0	101	90	110			
Lab ID: CCV	2	Continuing Calibration Verification Standard								11/03/17 02:55
Chloride		50.8	mg/L	1.0	102	90	110			
Sulfate		203	mg/L	1.0	102	90	110			
Method: E300.0 Batch: R129915										
Lab ID: ICB	2	Method Blank								Run: IC METROHM_171102A 11/02/17 14:46
Chloride		ND	mg/L	0.008						
Sulfate		ND	mg/L	0.08						
Lab ID: LFB	2	Laboratory Fortified Blank								Run: IC METROHM_171102A 11/02/17 15:15
Chloride		24.5	mg/L	1.0	98	90	110			
Sulfate		98.3	mg/L	1.0	98	90	110			
Lab ID: H17110040-004AMS	2	Sample Matrix Spike								Run: IC METROHM_171102A 11/03/17 06:04
Chloride		256	mg/L	1.0	101	90	110			
Sulfate		3330	mg/L	1.1	99	90	110			
Lab ID: H17110040-004AMSD	2	Sample Matrix Spike Duplicate								Run: IC METROHM_171102A 11/03/17 06:18
Chloride		254	mg/L	1.0	100	90	110	0.6	20	
Sulfate		3300	mg/L	1.1	97	90	110	0.7	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.



Work Order Receipt Checklist

MT DEQ-Abandoned Mines

H17110040

Login completed by: Jessica C. Smith

Date Received: 11/2/2017

Reviewed by: BL2000\rtooke

Received by: RAT

Reviewed Date: 11/3/2017

Carrier name: Hand Del

Shipping container/cooler in good condition?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Present <input type="checkbox"/>
Custody seals intact on all shipping container(s)/cooler(s)?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Present <input checked="" type="checkbox"/>
Custody seals intact on all sample bottles?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Present <input checked="" type="checkbox"/>
Chain of custody present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody signed when relinquished and received?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody agrees with sample labels?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Samples in proper container/bottle?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sample containers intact?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sufficient sample volume for indicated test?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Temp Blank received in all shipping container(s)/cooler(s)?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Applicable <input type="checkbox"/>
Container/Temp Blank temperature:	2.4°C On Ice		
Water - VOA vials have zero headspace?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	No VOA vials submitted <input checked="" type="checkbox"/>
Water - pH acceptable upon receipt?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Applicable <input type="checkbox"/>

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:

Temp blank was received frozen, temp taken from sample. JCS 11/2/2017



Trust our People. Trust our Data.

Chain of Custody & Analytical Request Record

www.energylab.com

Account Information (Billing Information)

Company/Name: **DECC**
 Contact: **Tom Henderson**
 Phone: _____
 Mailing Address: _____
 City, State, Zip: _____
 Email: **thenderson@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
 Page ____ of ____
 Send email also to
 Rye@Svingen
 Rye@hydrosci.com

Project Information

Project Name, PWSID, Permit, etc.: **Sand Culee Source Control**
 Sampler Name: **Rye Svingen** Sampler Phone: **406.671.2946**
 Sample Origin State: **MT** EPA/State Compliance: Yes No
 MINING CLIENTS, please indicate sample type:
 *If one 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 - Solids
- V - Vegetation
- B - Bioassay
- O - Other
- DW - Drinking Water

Analysis Requested

See Attached	
---------------------	--

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

EL LAB ID: **H1710040**
 Laboratory Use Only

Sample Identification (Name, Location, Interval, etc.)	Collection		Number of Containers	Matrix (See Codes Above)	Analysis Requested	Signature
	Date	Time				
1 SC-3A	10/31/17	1420	2	W		
2 SC-1		1445	1			
3 SC-12		1525	1			
4 SC-26		1600	1			
5						
6						
7						
8						
9						
10						

Custody Record MUST be signed by (print) **Rye Svingen** Date/Time **11/2/17 11:01** Signature _____
 Received by (print) _____ Date/Time _____ Signature _____

Shipped By **Hand** Cooler ID(s) **Y** Custody Seals **Y** Intact **Y** Receipt Temp **24** °C Temp Blank **N** On Ice **N** Payment Type **Cash** Amount \$ _____ Receipt Number (cash/check only) _____

LABORATORY USE ONLY
 Received by Laboratory (print) _____ Date/Time **11/2/17 12:07** Signature _____
 Payment Type **Cash** 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.

~~Please run the following analyses on water sample MW 102K:~~

PHYSICAL PROPERTIES

pH ✓

TDS ✓

INORGANICS

Acidity, Total as CaCO₃ ✓

~~Alkalinity, Total as CaCO₃ ✓~~

Calcium, Magnesium, and Hardness as CaCO₃

Sulfate, Chloride, and Fluoride ✓

Sodium and Potassium ✓

Metals, ~~Dissolved~~ Total

Aluminum ✓

Antimony ✓

Arsenic ✓

Barium ✓

Beryllium ✓

Cadmium ✓

Chromium ✓

Copper ✓

Iron ✓

Lead ✓

Manganese ✓

Nickel ✓

Selenium ✓

Strontium ✓

Thallium ✓

Zinc ✓

Report Hardness

~~_____~~



ANALYTICAL SUMMARY REPORT

January 02, 2018

MT DEQ-Abandoned Mines
PO Box 200901
Helena, MT 59620-0901

Work Order: H17120178

Project Name: Sand Coulee Source Control

Energy Laboratories Inc Helena MT received the following 1 sample for MT DEQ-Abandoned Mines on 12/12/2017 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H17120178-001	101K	12/11/17 13:53	12/12/17	Aqueous	Metals by ICP/ICPMS, Dissolved Alkalinity Conductivity Services Provided by Lab Fluoride Hardness Anions by Ion Chromatography pH Preparation, Dissolved Filtration

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:



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Abandoned Mines
Project: Sand Coulee Source Control
Lab ID: H17120178-001
Client Sample ID: 101K

Report Date: 01/02/18
Collection Date: 12/11/17 13:53
Date Received: 12/12/17
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	8.2	s.u.	H	0.1		A4500-H B	12/12/17 14:07 / SRW
INORGANICS							
Alkalinity, Total as CaCO3	330	mg/L		4		A2320 B	12/19/17 10:18 / SRW
Chloride	8	mg/L		1		E300.0	12/12/17 21:16 / SRW
Sulfate	96	mg/L		1		E300.0	12/19/17 21:18 / SRW
Fluoride	0.8	mg/L		0.1	4	A4500-F C	12/14/17 10:17 / kmd
Hardness as CaCO3	367	mg/L		1		A2340 B	12/20/17 12:15 / abc
METALS, DISSOLVED							
Aluminum	ND	mg/L		0.009		E200.8	12/22/17 16:03 / sld
Antimony	0.0005	mg/L		0.0005		E200.8	12/21/17 22:14 / dck
Arsenic	0.006	mg/L		0.001		E200.8	12/21/17 22:14 / dck
Barium	0.041	mg/L		0.003		E200.8	12/21/17 22:14 / dck
Beryllium	ND	mg/L		0.0008		E200.8	12/21/17 22:14 / dck
Cadmium	ND	mg/L		0.00003		E200.8	12/21/17 22:14 / dck
Calcium	67	mg/L		1		E200.7	12/20/17 12:15 / sld
Chromium	ND	mg/L		0.005		E200.8	12/21/17 22:14 / dck
Copper	ND	mg/L		0.002		E200.8	12/21/17 22:14 / dck
Iron	ND	mg/L		0.02		E200.7	12/15/17 12:31 / sld
Lead	ND	mg/L		0.0003		E200.8	12/21/17 22:14 / dck
Magnesium	49	mg/L		1		E200.7	12/20/17 12:15 / sld
Manganese	0.026	mg/L		0.001		E200.8	12/21/17 22:14 / dck
Nickel	0.007	mg/L		0.002		E200.8	12/21/17 22:14 / dck
Potassium	3	mg/L		1		E200.7	12/15/17 12:31 / sld
Selenium	ND	mg/L		0.001		E200.8	12/21/17 22:14 / dck
Sodium	15	mg/L		1		E200.7	12/15/17 12:31 / sld
Strontium	0.44	mg/L		0.01		E200.7	12/15/17 12:31 / sld
Thallium	ND	mg/L		0.0002		E200.8	12/21/17 22:14 / dck
Zinc	ND	mg/L		0.008		E200.8	12/21/17 22:14 / dck

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level.
QCL - Quality control limit. 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 DEQ-Abandoned Mines
Project: Sand Coulee Source Control

Report Date: 01/02/18
Work Order: H17120178

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2320 B										Batch: R131091
Lab ID: MBLK		Method Blank								Run: PHSC_101-H_171219A 12/19/17 10:00
Alkalinity, Total as CaCO3	2	mg/L		0.7						
Lab ID: LCS		Laboratory Control Sample								Run: PHSC_101-H_171219A 12/19/17 10:06
Alkalinity, Total as CaCO3	590	mg/L		4.0	98	90	110			
Lab ID: H17120178-001ADUP		Sample Duplicate								Run: PHSC_101-H_171219A 12/19/17 10:29
Alkalinity, Total as CaCO3	340	mg/L		4.0				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 DEQ-Abandoned Mines
Project: Sand Coulee Source Control

Report Date: 01/02/18
Work Order: H17120178

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500-F C								Analytical Run: MANTECH 2_171214A		
Lab ID: ICV		Initial Calibration Verification Standard								12/14/17 09:43
Fluoride		0.8	mg/L	0.1	100	90	110			
Method: A4500-F C										Batch: R131005
Lab ID: MBLK		Method Blank					Run: MANTECH 2_171214A			12/14/17 09:49
Fluoride		0.02	mg/L	0.01						
Lab ID: H17120224-001AMS		Sample Matrix Spike					Run: MANTECH 2_171214A			12/14/17 10:00
Fluoride		1.2	mg/L	0.1	106	85	115			
Lab ID: H17120224-002ADUP		Sample Duplicate					Run: MANTECH 2_171214A			12/14/17 10:12
Fluoride		0.2	mg/L	0.1				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 DEQ-Abandoned Mines
Project: Sand Coulee Source Control

Report Date: 01/02/18
Work Order: H17120178

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500-H B								Analytical Run: PHSC_101-H_171212A		
Lab ID: pH 7		Initial Calibration Verification Standard								12/12/17 08:45
pH		7.0	s.u.	0.1	100	98	102			
Lab ID: CCV - pH 7		Continuing Calibration Verification Standard								12/12/17 11:11
pH		7.0	s.u.	0.1	100	98	102			
Method: A4500-H B										Batch: R130912
Lab ID: H17120178-001ADUP		Sample Duplicate								Run: PHSC_101-H_171212A 12/12/17 14:09
pH		8.2	s.u.	0.1				0.1	3	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Abandoned Mines
Project: Sand Coulee Source Control

Report Date: 01/02/18
Work Order: H17120178

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7 Analytical Run: ICP2-HE_171215A										
Lab ID: ICV	4	Initial Calibration Verification Standard								12/15/17 10:23
Iron		3.90	mg/L	0.020	98	95	105			
Potassium		39.8	mg/L	1.0	99	95	105			
Sodium		39.9	mg/L	1.0	100	95	105			
Strontium		0.787	mg/L	0.10	98	95	105			
Lab ID: CCV-1	4	Continuing Calibration Verification Standard								12/15/17 10:27
Iron		2.47	mg/L	0.020	99	95	105			
Potassium		24.7	mg/L	1.0	99	95	105			
Sodium		24.7	mg/L	1.0	99	95	105			
Strontium		2.48	mg/L	0.10	99	95	105			
Lab ID: ICSA	4	Interference Check Sample A								12/15/17 10:38
Iron		177	mg/L	0.020	89	80	120			
Potassium		-0.00528	mg/L	1.0		0	0			
Sodium		0.00893	mg/L	1.0		0	0			
Strontium		0.00459	mg/L	0.10		0	0			
Lab ID: ICSAB	4	Interference Check Sample AB								12/15/17 10:42
Iron		175	mg/L	0.020	88	80	120			
Potassium		20.1	mg/L	1.0	101	80	120			
Sodium		20.3	mg/L	1.0	101	80	120			
Strontium		0.976	mg/L	0.10	98	80	120			
Lab ID: CCV	4	Continuing Calibration Verification Standard								12/15/17 11:58
Iron		2.33	mg/L	0.020	93	90	110			
Potassium		26.5	mg/L	1.0	106	90	110			
Sodium		27.2	mg/L	1.0	109	90	110			
Strontium		2.42	mg/L	0.10	97	90	110			
Method: E200.7 Batch: R131063										
Lab ID: MB	4	Method Blank								Run: ICP2-HE_171215A 12/15/17 10:50
Iron		ND	mg/L	0.002						
Potassium		ND	mg/L	0.05						
Sodium		ND	mg/L	0.02						
Strontium		ND	mg/L	0.0001						
Lab ID: LFB	4	Laboratory Fortified Blank								Run: ICP2-HE_171215A 12/15/17 10:53
Iron		4.81	mg/L	0.020	96	85	115			
Potassium		47.7	mg/L	1.0	95	85	115			
Sodium		47.7	mg/L	1.0	95	85	115			
Strontium		0.950	mg/L	0.10	95	85	115			
Lab ID: H17120208-002DMS2	4	Sample Matrix Spike								Run: ICP2-HE_171215A 12/15/17 12:58
Iron		9.24	mg/L	0.020	92	70	130			
Potassium		110	mg/L	1.0	106	70	130			
Sodium		643	mg/L	1.0		70	130			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 DEQ-Abandoned Mines
Project: Sand Coulee Source Control

Report Date: 01/02/18
Work Order: H17120178

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7 Batch: R131063										
Lab ID: H17120208-002DMS2	4	Sample Matrix Spike								
Strontium		4.55	mg/L	0.010	93	70	130			
Run: ICP2-HE_171215A 12/15/17 12:58										
Lab ID: H17120208-002DMSD	4	Sample Matrix Spike Duplicate								
Iron		9.19	mg/L	0.020	92	70	130	0.5	20	
Potassium		105	mg/L	1.0	101	70	130	4.6	20	
Sodium		620	mg/L	1.0		70	130	3.6	20	A
Strontium		4.47	mg/L	0.010	89	70	130	1.8	20	
Run: ICP2-HE_171215A 12/15/17 13:02										
Method: E200.7 Analytical Run: ICP2-HE_171220A										
Lab ID: ICV	2	Initial Calibration Verification Standard								
Calcium		39.3	mg/L	1.0	98	95	105			
Magnesium		38.8	mg/L	1.0	97	95	105			
12/20/17 11:11										
Lab ID: CCV-1	2	Continuing Calibration Verification Standard								
Calcium		24.9	mg/L	1.0	100	95	105			
Magnesium		24.2	mg/L	1.0	97	95	105			
12/20/17 11:15										
Lab ID: ICSA	2	Interference Check Sample A								
Calcium		414	mg/L	1.0	83	80	120			
Magnesium		473	mg/L	1.0	95	80	120			
12/20/17 11:26										
Lab ID: ICSAB	2	Interference Check Sample AB								
Calcium		418	mg/L	1.0	84	80	120			
Magnesium		478	mg/L	1.0	96	80	120			
12/20/17 11:30										
Lab ID: CCV	2	Continuing Calibration Verification Standard								
Calcium		23.4	mg/L	1.0	94	90	110			
Magnesium		22.9	mg/L	1.0	92	90	110			
12/20/17 12:00										
Method: E200.7 Batch: R131158										
Lab ID: MB	2	Method Blank								
Calcium		0.02	mg/L	0.01						
Magnesium		0.007	mg/L	0.005						
Run: ICP2-HE_171220A 12/20/17 11:38										
Lab ID: LFB	2	Laboratory Fortified Blank								
Calcium		45.4	mg/L	1.0	91	85	115			
Magnesium		46.1	mg/L	1.0	92	85	115			
Run: ICP2-HE_171220A 12/20/17 11:42										
Lab ID: H17120178-001BMS2	2	Sample Matrix Spike								
Calcium		112	mg/L	1.0	91	70	130			
Magnesium		96.4	mg/L	1.0	96	70	130			
Run: ICP2-HE_171220A 12/20/17 12:23										
Lab ID: H17120178-001BMSD	2	Sample Matrix Spike Duplicate								
Calcium		110	mg/L	1.0	87	70	130	1.8	20	
Magnesium		95.0	mg/L	1.0	93	70	130	1.6	20	
Run: ICP2-HE_171220A 12/20/17 12:26										

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 DEQ-Abandoned Mines
Project: Sand Coulee Source Control

Report Date: 01/02/18
Work Order: H17120178

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual	
Method: E200.8							Analytical Run: ICPMS205-H_171221B				
Lab ID: ICV	13	Initial Calibration Verification Standard									12/21/17 10:02
Antimony		0.0568	mg/L	0.050	95	90	110				
Arsenic		0.0578	mg/L	0.0050	96	90	110				
Barium		0.0583	mg/L	0.10	97	90	110				
Beryllium		0.0298	mg/L	0.0010	99	90	110				
Cadmium		0.0290	mg/L	0.0010	97	90	110				
Chromium		0.0581	mg/L	0.010	97	90	110				
Copper		0.0590	mg/L	0.010	98	90	110				
Lead		0.0572	mg/L	0.010	95	90	110				
Manganese		0.293	mg/L	0.010	98	90	110				
Nickel		0.0595	mg/L	0.010	99	90	110				
Selenium		0.0583	mg/L	0.0050	97	90	110				
Thallium		0.0594	mg/L	0.10	99	90	110				
Zinc		0.0598	mg/L	0.010	100	90	110				
Lab ID: ICSA	13	Interference Check Sample A									12/21/17 10:05
Antimony		0.00133	mg/L	0.050							
Arsenic		0.000167	mg/L	0.0050							
Barium		0.000146	mg/L	0.10							
Beryllium		3.96E-05	mg/L	0.0010							
Cadmium		8.30E-05	mg/L	0.0010							
Chromium		0.00110	mg/L	0.010							
Copper		0.000177	mg/L	0.010							
Lead		0.000314	mg/L	0.010							
Manganese		0.000505	mg/L	0.010							
Nickel		0.000639	mg/L	0.010							
Selenium		0.000778	mg/L	0.0050							
Thallium		0.000145	mg/L	0.10							
Zinc		0.00113	mg/L	0.010							
Lab ID: ICSAB	13	Interference Check Sample AB									12/21/17 10:08
Antimony		0.000472	mg/L	0.050		0	0				
Arsenic		0.0107	mg/L	0.0050	107	70	130				
Barium		0.000102	mg/L	0.10		0	0				
Beryllium		2.54E-05	mg/L	0.0010		0	0				
Cadmium		0.0103	mg/L	0.0010	103	70	130				
Chromium		0.0216	mg/L	0.010	108	70	130				
Copper		0.0205	mg/L	0.010	102	70	130				
Lead		0.000236	mg/L	0.010		0	0				
Manganese		0.0210	mg/L	0.010	105	70	130				
Nickel		0.0209	mg/L	0.010	105	70	130				
Selenium		0.0108	mg/L	0.0050	108	70	130				
Thallium		5.27E-05	mg/L	0.10		0	0				
Zinc		0.0114	mg/L	0.010	114	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 DEQ-Abandoned Mines
Project: Sand Coulee Source Control

Report Date: 01/02/18
Work Order: H17120178

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8								Analytical Run: ICPMS205-H_171221B		
Lab ID: ICV	13	Initial Calibration Verification Standard								12/21/17 16:46
Antimony		0.0584	mg/L	0.050	97	90	110			
Arsenic		0.0590	mg/L	0.0050	98	90	110			
Barium		0.0593	mg/L	0.10	99	90	110			
Beryllium		0.0281	mg/L	0.0010	94	90	110			
Cadmium		0.0296	mg/L	0.0010	99	90	110			
Chromium		0.0588	mg/L	0.010	98	90	110			
Copper		0.0594	mg/L	0.010	99	90	110			
Lead		0.0556	mg/L	0.010	93	90	110			
Manganese		0.298	mg/L	0.010	100	90	110			
Nickel		0.0594	mg/L	0.010	99	90	110			
Selenium		0.0578	mg/L	0.0050	96	90	110			
Thallium		0.0602	mg/L	0.10	100	90	110			
Zinc		0.0607	mg/L	0.010	101	90	110			
Lab ID: ICSA	13	Interference Check Sample A								12/21/17 16:48
Antimony		0.00137	mg/L	0.050						
Arsenic		6.35E-05	mg/L	0.0050						
Barium		0.000172	mg/L	0.10						
Beryllium		5.80E-05	mg/L	0.0010						
Cadmium		3.20E-05	mg/L	0.0010						
Chromium		0.00118	mg/L	0.010						
Copper		0.000162	mg/L	0.010						
Lead		0.000301	mg/L	0.010						
Manganese		0.000416	mg/L	0.010						
Nickel		0.000628	mg/L	0.010						
Selenium		0.000688	mg/L	0.0050						
Thallium		0.000127	mg/L	0.10						
Zinc		0.000955	mg/L	0.010						
Lab ID: ICSAB	13	Interference Check Sample AB								12/21/17 16:51
Antimony		0.000617	mg/L	0.050		0	0			
Arsenic		0.0110	mg/L	0.0050	110	70	130			
Barium		0.000269	mg/L	0.10		0	0			
Beryllium		0.000157	mg/L	0.0010		0	0			
Cadmium		0.0106	mg/L	0.0010	106	70	130			
Chromium		0.0221	mg/L	0.010	111	70	130			
Copper		0.0207	mg/L	0.010	103	70	130			
Lead		0.000388	mg/L	0.010		0	0			
Manganese		0.0216	mg/L	0.010	108	70	130			
Nickel		0.0211	mg/L	0.010	106	70	130			
Selenium		0.0112	mg/L	0.0050	112	70	130			
Thallium		0.000183	mg/L	0.10		0	0			
Zinc		0.0115	mg/L	0.010	115	70	130			

Method: E200.8 Batch: R131208

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Abandoned Mines

Report Date: 01/02/18

Project: Sand Coulee Source Control

Work Order: H17120178

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8										Batch: R131208
Lab ID: LRB	13	Method Blank					Run: ICPMS205-H_171221B			12/21/17 10:22
Antimony		0.0001	mg/L	2E-05						
Arsenic		ND	mg/L	2E-05						
Barium		7E-05	mg/L	2E-05						
Beryllium		ND	mg/L	8E-05						
Cadmium		ND	mg/L	2E-05						
Chromium		ND	mg/L	3E-05						
Copper		0.0002	mg/L	4E-05						
Lead		2E-05	mg/L	1E-05						
Manganese		0.003	mg/L	3E-05						
Nickel		4E-05	mg/L	3E-05						
Selenium		ND	mg/L	3E-05						
Thallium		3E-05	mg/L	5E-06						
Zinc		0.0004	mg/L	0.0001						
Lab ID: LFB	13	Laboratory Fortified Blank					Run: ICPMS205-H_171221B			12/21/17 10:25
Antimony		0.0483	mg/L	0.050	96	85	115			
Arsenic		0.0492	mg/L	0.0050	98	85	115			
Barium		0.0485	mg/L	0.10	97	85	115			
Beryllium		0.0507	mg/L	0.0010	101	85	115			
Cadmium		0.0487	mg/L	0.0010	97	85	115			
Chromium		0.0492	mg/L	0.010	98	85	115			
Copper		0.0515	mg/L	0.010	102	85	115			
Lead		0.0479	mg/L	0.010	96	85	115			
Manganese		0.0492	mg/L	0.010	92	85	115			
Nickel		0.0505	mg/L	0.010	101	85	115			
Selenium		0.0483	mg/L	0.0050	97	85	115			
Thallium		0.0503	mg/L	0.10	100	85	115			
Zinc		0.0502	mg/L	0.010	100	85	115			
Lab ID: H17120208-001DMS	13	Sample Matrix Spike					Run: ICPMS205-H_171221B			12/21/17 22:23
Antimony		0.0495	mg/L	0.0010	99	70	130			
Arsenic		0.0537	mg/L	0.0010	103	70	130			
Barium		0.566	mg/L	0.050		70	130			A
Beryllium		0.0444	mg/L	0.0010	89	70	130			
Cadmium		0.0469	mg/L	0.0010	94	70	130			
Chromium		0.0470	mg/L	0.0050	94	70	130			
Copper		0.0466	mg/L	0.0050	92	70	130			
Lead		0.0446	mg/L	0.0010	89	70	130			
Manganese		0.996	mg/L	0.0010		70	130			A
Nickel		0.0463	mg/L	0.0050	92	70	130			
Selenium		0.0481	mg/L	0.0010	96	70	130			
Thallium		0.0502	mg/L	0.00050	100	70	130			
Zinc		0.0606	mg/L	0.010	98	70	130			

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 DEQ-Abandoned Mines
Project: Sand Coulee Source Control

Report Date: 01/02/18
Work Order: H17120178

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8 Batch: R131208										
Lab ID:	H17120208-001DMSD	13 Sample Matrix Spike Duplicate			Run: ICPMS205-H_171221B				12/21/17 22:25	
Antimony		0.0497	mg/L	0.0010	99	70	130	0.4	20	
Arsenic		0.0540	mg/L	0.0010	103	70	130	0.6	20	
Barium		0.563	mg/L	0.050		70	130	0.5	20	A
Beryllium		0.0439	mg/L	0.0010	88	70	130	1.1	20	
Cadmium		0.0467	mg/L	0.0010	93	70	130	0.4	20	
Chromium		0.0475	mg/L	0.0050	95	70	130	1.0	20	
Copper		0.0471	mg/L	0.0050	93	70	130	1.1	20	
Lead		0.0449	mg/L	0.0010	90	70	130	0.6	20	
Manganese		0.991	mg/L	0.0010		70	130	0.5	20	A
Nickel		0.0471	mg/L	0.0050	93	70	130	1.8	20	
Selenium		0.0495	mg/L	0.0010	99	70	130	2.9	20	
Thallium		0.0504	mg/L	0.00050	101	70	130	0.5	20	
Zinc		0.0617	mg/L	0.010	100	70	130	1.7	20	
Method: E200.8 Analytical Run: ICPMS205-H_171222B										
Lab ID:	ICV	Initial Calibration Verification Standard							12/22/17 10:44	
Aluminum		0.303	mg/L	0.10	101	90	110			
Lab ID:	ICSA	Interference Check Sample A							12/22/17 10:47	
Aluminum		42.6	mg/L	0.10	106	70	130			
Lab ID:	ICV	Initial Calibration Verification Standard							12/22/17 11:29	
Aluminum		0.293	mg/L	0.10	98	90	110			
Lab ID:	ICSA	Interference Check Sample A							12/22/17 11:32	
Aluminum		43.1	mg/L	0.10	108	70	130			
Lab ID:	ICSAB	Interference Check Sample AB							12/22/17 11:35	
Aluminum		42.2	mg/L	0.10	105	70	130			
Method: E200.8 Batch: R131247										
Lab ID:	LRB	Method Blank			Run: ICPMS205-H_171222B				12/22/17 11:49	
Aluminum		0.004	mg/L	0.0007						
Lab ID:	LFB	Laboratory Fortified Blank			Run: ICPMS205-H_171222B				12/22/17 11:51	
Aluminum		0.0511	mg/L	0.10	95	85	115			
Lab ID:	H17120169-002BMS	Sample Matrix Spike			Run: ICPMS205-H_171222B				12/22/17 15:38	
Aluminum		0.0660	mg/L	0.030	72	70	130			
Lab ID:	H17120169-002BMSD	Sample Matrix Spike Duplicate			Run: ICPMS205-H_171222B				12/22/17 15:41	
Aluminum		0.0541	mg/L	0.030	48	70	130	20	20	S

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.

S - Spike recovery outside of advisory limits.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Abandoned Mines
Project: Sand Coulee Source Control

Report Date: 01/02/18
Work Order: H17120178

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual	
Method: E300.0 Analytical Run: IC METROHM_171212A											
Lab ID: ICV		Initial Calibration Verification Standard									12/12/17 11:47
Chloride		103	mg/L	1.0	103	90	110				
Lab ID: CCV		Continuing Calibration Verification Standard									12/12/17 19:48
Chloride		51.1	mg/L	1.0	102	90	110				
Method: E300.0 Batch: R130972											
Lab ID: ICB		Method Blank									Run: IC METROHM_171212A 12/12/17 11:33
Chloride		ND	mg/L	0.008							
Lab ID: LFB		Laboratory Fortified Blank									Run: IC METROHM_171212A 12/12/17 12:02
Chloride		24.6	mg/L	1.0	98	90	110				
Lab ID: H17120178-001AMS		Sample Matrix Spike									Run: IC METROHM_171212A 12/12/17 21:30
Chloride		33.6	mg/L	1.0	104	90	110				
Lab ID: H17120178-001AMSD		Sample Matrix Spike Duplicate									Run: IC METROHM_171212A 12/12/17 21:45
Chloride		33.4	mg/L	1.0	103	90	110	0.4	20		
Method: E300.0 Analytical Run: IC METROHM_171219A											
Lab ID: ICV		Initial Calibration Verification Standard									12/19/17 09:24
Sulfate		412	mg/L	1.0	103	90	110				
Lab ID: CCV		Continuing Calibration Verification Standard									12/19/17 19:51
Sulfate		202	mg/L	1.0	101	90	110				
Method: E300.0 Batch: R131138											
Lab ID: ICB		Method Blank									Run: IC METROHM_171219A 12/19/17 09:09
Sulfate		ND	mg/L	0.08							
Lab ID: LFB		Laboratory Fortified Blank									Run: IC METROHM_171219A 12/19/17 09:38
Sulfate		99.6	mg/L	1.0	100	90	110				
Lab ID: H17120178-001AMS		Sample Matrix Spike									Run: IC METROHM_171219A 12/19/17 21:33
Sulfate		198	mg/L	1.0	102	90	110				
Lab ID: H17120178-001AMSD		Sample Matrix Spike Duplicate									Run: IC METROHM_171219A 12/19/17 21:47
Sulfate		199	mg/L	1.0	103	90	110	0.4	20		

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.



Work Order Receipt Checklist

MT DEQ-Abandoned Mines

H17120178

Login completed by: Jessica C. Smith

Date Received: 12/12/2017

Reviewed by: BL2000\rtooke

Received by: TLL

Reviewed Date: 12/13/2017

Carrier name: Hand Del

Shipping container/cooler in good condition?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Present <input type="checkbox"/>
Custody seals intact on all shipping container(s)/cooler(s)?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Present <input checked="" type="checkbox"/>
Custody seals intact on all sample bottles?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Present <input checked="" type="checkbox"/>
Chain of custody present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody signed when relinquished and received?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody agrees with sample labels?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Samples in proper container/bottle?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sample containers intact?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sufficient sample volume for indicated test?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Temp Blank received in all shipping container(s)/cooler(s)?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Applicable <input type="checkbox"/>
Container/Temp Blank temperature:	4.3°C On Ice		
Water - VOA vials have zero headspace?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	No VOA vials submitted <input checked="" type="checkbox"/>
Water - pH acceptable upon receipt?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	Not Applicable <input type="checkbox"/>

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:

Sample 101K for Dissolved Metals/Hardness was subsampled, filtered, and preserved to pH <2 with 2 mL of Nitric acid per 250 mL in the laboratory. According to 40CFR136, samples for Dissolved Metals should be filtered and preserved within 15 minutes of collection. Original metals bottle was preserved before filtration and per client that one should not be used. JCS 12/12/2107

Chain of Custody & Analytical Request Record

www.energylab.com

Account Information (Billing Information)

Company Name: **DEA - AML**
 Contact: **Tom Henderson**
 Phone: **444-6492**
 Mailing Address:
 City, State, Zip:
 Email: **thenderson@mt.gov**
 Receive Invoice: Hard Copy Email
 Purchase Order: Hard Copy Email
 Quote: Bottle Order

Report Information (if different than Account Information)

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

Project Information

Project Name, PWSID, Permit, etc.: **Sand Cove Severe Control**
 Sampler Name: **Sam Estabrook** Sampler Phone: **444-6492**
 Sample Origin State: **MT** EPA/State Compliance: Yes No
 MINING CLIENTS, please indicate sample type:
 If one 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

Analysis Requested

Work Order 50405
TH
TH
TH
TH

See Attached

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		Number of Containers (See Codes Above)	Matrix (See Codes Above)	Analysis Requested	Signature	Date/Time
	Date	Time					
1 101K	12/11/17	1353	2	W	X	<i>[Signature]</i>	12/11/17 9:42
2							
3							
4							
5							
6							
7							
8							
9							
10							

Custody Record MUST be signed
 Relinquished by (print): **Tom Henderson** Date/Time: **12/13/17 1422** Signature: *[Signature]*
 Relinquished by (print): **TH** Date/Time: **12/13/17 1422** Signature: *[Signature]*

Shipped By: **Hand** Cooler ID(s): **Y** Custody Seats: **Y (N) C B** Intact: **Y (N)** Receipt Temp: **4.3 °C** Temp Blank: **Y (N)** On Ice: **Y (N)**
 Received by Laboratory (print): **TH** Date/Time: **12/11/17 9:42** Signature: *[Signature]*
 Payment Type: **CC** Cash Check Amount: \$ **17120178** Receipt Number (cash/check only): **17120178**

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.



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Abandoned Mines
Project: Sand Coulee Source Control
Lab ID: H17100405-001
Client Sample ID: MW102K

Report Date: 10/30/17
Collection Date: 10/18/17 12:00
Date Received: 10/19/17
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.3	s.u.	H	0.1		A4500-H B	10/19/17 14:09 / kmd
INORGANICS							
Alkalinity, Total as CaCO ₃	390	mg/L		4		A2320 B	10/20/17 09:06 / SRW
Chloride	22	mg/L		1		E300.0	10/20/17 10:09 / SRW
Sulfate	83	mg/L		1		E300.0	10/20/17 10:09 / SRW
Fluoride	0.9	mg/L		0.1	4	A4500-F C	10/20/17 09:10 / kmd
Hardness as CaCO ₃	489	mg/L		1		A2340 B	10/30/17 08:36 / sid
METALS, DISSOLVED							
Aluminum	ND	mg/L		0.009		E200.8	10/26/17 21:18 / dck
Antimony	ND	mg/L		0.0005		E200.8	10/25/17 17:21 / dck
Arsenic	ND	mg/L		0.001		E200.8	10/25/17 17:21 / dck
Barium	0.068	mg/L		0.003		E200.8	10/25/17 17:21 / dck
Beryllium	ND	mg/L		0.0008		E200.8	10/25/17 17:21 / dck
Cadmium	ND	mg/L		0.00003		E200.8	10/26/17 21:18 / dck
Calcium	90	mg/L		1		E200.7	10/27/17 14:25 / sid
Chromium	ND	mg/L		0.005		E200.8	10/25/17 17:21 / dck
Copper	ND	mg/L		0.002		E200.8	10/25/17 17:21 / dck
Iron	ND	mg/L		0.02		E200.8	10/25/17 17:21 / dck
Lead	ND	mg/L		0.0003		E200.8	10/25/17 17:21 / dck
Magnesium	64	mg/L		1		E200.7	10/27/17 14:25 / sid
Manganese	0.061	mg/L		0.001		E200.8	10/25/17 17:21 / dck
Nickel	ND	mg/L		0.002		E200.8	10/25/17 17:21 / dck
Potassium	4	mg/L		1		E200.8	10/25/17 17:21 / dck
Selenium	0.001	mg/L		0.001		E200.8	10/25/17 17:21 / dck
Sodium	19	mg/L		1		E200.8	10/26/17 21:18 / dck
Strontium	0.47	mg/L		0.01		E200.8	10/25/17 17:21 / dck
Thallium	ND	mg/L		0.0002		E200.8	10/25/17 17:21 / dck
Zinc	ND	mg/L		0.008		E200.8	10/25/17 17:21 / dck

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



ANALYTICAL SUMMARY REPORT

October 30, 2017

MT DEQ-Abandoned Mines
PO Box 200901
Helena, MT 59620-0901

Work Order: H17100405

Project Name: Sand Coulee Source Control

Energy Laboratories Inc Helena MT received the following 1 sample for MT DEQ-Abandoned Mines on 10/19/2017 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H17100405-001	MW102K	10/18/17 12:00	10/19/17	Aqueous	Metals by ICP/ICPMS, Dissolved Alkalinity Conductivity Fluoride Hardness Anions by Ion Chromatography pH

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:



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Abandoned Mines
Project: Sand Coulee Source Control
Lab ID: H17100405-001
Client Sample ID: MW102K

Report Date: 10/30/17
Collection Date: 10/18/17 12:00
Date Received: 10/19/17
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.3	s.u.	H	0.1		A4500-H B	10/19/17 14:09 / kmd
INORGANICS							
Alkalinity, Total as CaCO3	390	mg/L		4		A2320 B	10/20/17 09:06 / SRW
Chloride	22	mg/L		1		E300.0	10/20/17 10:09 / SRW
Sulfate	83	mg/L		1		E300.0	10/20/17 10:09 / SRW
Fluoride	0.9	mg/L		0.1	4	A4500-F C	10/20/17 09:10 / kmd
Hardness as CaCO3	489	mg/L		1		A2340 B	10/30/17 08:36 / sld
METALS, DISSOLVED							
Aluminum	ND	mg/L		0.009		E200.8	10/26/17 21:18 / dck
Antimony	ND	mg/L		0.0005		E200.8	10/25/17 17:21 / dck
Arsenic	ND	mg/L		0.001		E200.8	10/25/17 17:21 / dck
Barium	0.068	mg/L		0.003		E200.8	10/25/17 17:21 / dck
Beryllium	ND	mg/L		0.0008		E200.8	10/25/17 17:21 / dck
Cadmium	ND	mg/L		0.00003		E200.8	10/26/17 21:18 / dck
Calcium	90	mg/L		1		E200.7	10/27/17 14:25 / sld
Chromium	ND	mg/L		0.005		E200.8	10/25/17 17:21 / dck
Copper	ND	mg/L		0.002		E200.8	10/25/17 17:21 / dck
Iron	ND	mg/L		0.02		E200.8	10/25/17 17:21 / dck
Lead	ND	mg/L		0.0003		E200.8	10/25/17 17:21 / dck
Magnesium	64	mg/L		1		E200.7	10/27/17 14:25 / sld
Manganese	0.061	mg/L		0.001		E200.8	10/25/17 17:21 / dck
Nickel	ND	mg/L		0.002		E200.8	10/25/17 17:21 / dck
Potassium	4	mg/L		1		E200.8	10/25/17 17:21 / dck
Selenium	0.001	mg/L		0.001		E200.8	10/25/17 17:21 / dck
Sodium	19	mg/L		1		E200.8	10/26/17 21:18 / dck
Strontium	0.47	mg/L		0.01		E200.8	10/25/17 17:21 / dck
Thallium	ND	mg/L		0.0002		E200.8	10/25/17 17:21 / dck
Zinc	ND	mg/L		0.008		E200.8	10/25/17 17:21 / dck

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level.
QCL - Quality control limit. 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 DEQ-Abandoned Mines
Project: Sand Coulee Source Control

Report Date: 10/30/17
Work Order: H17100405

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2320 B										Batch: R129487
Lab ID: MBLK		Method Blank								Run: PHSC_101-H_171020A 10/20/17 08:49
Alkalinity, Total as CaCO3	2		mg/L	0.7						
Lab ID: LCS		Laboratory Control Sample								Run: PHSC_101-H_171020A 10/20/17 08:55
Alkalinity, Total as CaCO3	580		mg/L	4.0	96	90	110			
Lab ID: H17100405-001ADUP		Sample Duplicate								Run: PHSC_101-H_171020A 10/20/17 09:16
Alkalinity, Total as CaCO3	400		mg/L	4.0				2.8	10	
Lab ID: H17100428-015ADUP		Sample Duplicate								Run: PHSC_101-H_171020A 10/20/17 11:11
Alkalinity, Total as CaCO3	140		mg/L	4.0				0.9	10	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Abandoned Mines
Project: Sand Coulee Source Control

Report Date: 10/30/17
Work Order: H17100405

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500-F C								Analytical Run: MANTECH 2_171019B		
Lab ID: ICV	Initial Calibration Verification Standard									
Fluoride		0.8	mg/L	0.1	100	90	110			10/20/17 08:59
Method: A4500-F C								Batch: R129513		
Lab ID: MBLK	Method Blank									
Fluoride		0.02	mg/L	0.01						Run: MANTECH 2_171019B 10/20/17 09:05
Lab ID: H17100405-001AMS	Sample Matrix Spike									
Fluoride		1.9	mg/L	0.1	102	85	115			Run: MANTECH 2_171019B 10/20/17 09:15
Lab ID: H17100428-001ADUP	Sample Duplicate									
Fluoride		0.1	mg/L	0.1				0.0	10	Run: MANTECH 2_171019B 10/20/17 09:27
Lab ID: H17100428-010ADUP	Sample Duplicate									
Fluoride		0.3	mg/L	0.1				0.0	10	Run: MANTECH 2_171019B 10/20/17 10:36

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Abandoned Mines
Project: Sand Coulee Source Control

Report Date: 10/30/17
Work Order: H17100405

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500-H B								Analytical Run: PHSC_101-H_171019A		
Lab ID: pH 7		Initial Calibration Verification Standard								10/19/17 08:34
pH		7.0	s.u.	0.1	99	98	102			
Lab ID: CCV - pH 7		Continuing Calibration Verification Standard								10/19/17 13:44
pH		7.0	s.u.	0.1	100	98	102			
Method: A4500-H B										Batch: R129446
Lab ID: H17100414-019BDUP		Sample Duplicate								10/19/17 13:57
pH		9.0	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 DEQ-Abandoned Mines
Project: Sand Coulee Source Control

Report Date: 10/30/17
Work Order: H17100405

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual	
Method: E200.7 Analytical Run: ICP2-HE_171027B											
Lab ID: ICV	2	Initial Calibration Verification Standard									10/27/17 09:42
Calcium		39.2	mg/L	1.0	98	95	105				
Magnesium		39.1	mg/L	1.0	98	95	105				
Lab ID: CCV-1	2	Continuing Calibration Verification Standard									10/27/17 09:46
Calcium		25.1	mg/L	1.0	101	95	105				
Magnesium		24.5	mg/L	1.0	98	95	105				
Lab ID: ICSA	2	Interference Check Sample A									10/27/17 09:57
Calcium		452	mg/L	1.0	90	80	120				
Magnesium		508	mg/L	1.0	102	80	120				
Lab ID: ICSAB	2	Interference Check Sample AB									10/27/17 10:01
Calcium		474	mg/L	1.0	95	80	120				
Magnesium		534	mg/L	1.0	107	80	120				
Lab ID: CCV	2	Continuing Calibration Verification Standard									10/27/17 14:02
Calcium		25.3	mg/L	1.0	101	90	110				
Magnesium		24.5	mg/L	1.0	98	90	110				
Method: E200.7 Batch: R129739											
Lab ID: MB	2	Method Blank									Run: ICP2-HE_171027B 10/27/17 10:08
Calcium		0.03	mg/L	0.01							
Magnesium		0.008	mg/L	0.005							
Lab ID: LFB	2	Laboratory Fortified Blank									Run: ICP2-HE_171027B 10/27/17 10:12
Calcium		51.5	mg/L	1.0	103	85	115				
Magnesium		52.7	mg/L	1.0	105	85	115				
Lab ID: H17100405-001BMS2	2	Sample Matrix Spike									Run: ICP2-HE_171027B 10/27/17 14:32
Calcium		132	mg/L	1.0	85	70	130				
Magnesium		110	mg/L	1.0	91	70	130				
Lab ID: H17100405-001BMSD	2	Sample Matrix Spike Duplicate									Run: ICP2-HE_171027B 10/27/17 14:36
Calcium		140	mg/L	1.0	100	70	130	5.6	20		
Magnesium		117	mg/L	1.0	105	70	130	6.4	20		

Qualifiers:

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ND - Not detected at the reporting limit.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Abandoned Mines
Project: Sand Coulee Source Control

Report Date: 10/30/17
Work Order: H17100405

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8								Analytical Run: ICPMS205-H_171025A		
Lab ID: ICV	15	Initial Calibration Verification Standard								10/25/17 10:01
Antimony		0.0629	mg/L	0.050	105	90	110			
Arsenic		0.0601	mg/L	0.0050	100	90	110			
Barium		0.0615	mg/L	0.10	102	90	110			
Beryllium		0.0302	mg/L	0.0010	101	90	110			
Chromium		0.0609	mg/L	0.010	102	90	110			
Copper		0.0610	mg/L	0.010	102	90	110			
Iron		0.310	mg/L	0.020	103	90	110			
Lead		0.0603	mg/L	0.010	101	90	110			
Manganese		0.309	mg/L	0.010	103	90	110			
Nickel		0.0619	mg/L	0.010	103	90	110			
Potassium		3.11	mg/L	0.50	104	90	110			
Selenium		0.0582	mg/L	0.0050	97	90	110			
Strontium		0.0605	mg/L	0.10	101	90	110			
Thallium		0.0600	mg/L	0.10	100	90	110			
Zinc		0.0621	mg/L	0.010	104	90	110			
Lab ID: ICSA	15	Interference Check Sample A								10/25/17 10:03
Antimony		0.000277	mg/L	0.050						
Arsenic		1.84E-05	mg/L	0.0050						
Barium		0.000102	mg/L	0.10						
Beryllium		-3.33E-05	mg/L	0.0010						
Chromium		0.000967	mg/L	0.010						
Copper		0.000202	mg/L	0.010						
Iron		96.8	mg/L	0.020	97	70	130			
Lead		0.000204	mg/L	0.010						
Manganese		0.000227	mg/L	0.010						
Nickel		4.97E-05	mg/L	0.010						
Potassium		38.3	mg/L	0.50	96	70	130			
Selenium		0.000102	mg/L	0.0050						
Strontium		0.000366	mg/L	0.10						
Thallium		-1.01E-05	mg/L	0.10						
Zinc		0.000827	mg/L	0.010						
Lab ID: ICSAB	15	Interference Check Sample AB								10/25/17 10:05
Antimony		9.06E-05	mg/L	0.050		0	0			
Arsenic		0.0114	mg/L	0.0050	114	70	130			
Barium		0.000259	mg/L	0.10		0	0			
Beryllium		-3.40E-05	mg/L	0.0010		0	0			
Chromium		0.0230	mg/L	0.010	115	70	130			
Copper		0.0221	mg/L	0.010	110	70	130			
Iron		96.9	mg/L	0.020	97	70	130			
Lead		0.000190	mg/L	0.010		0	0			
Manganese		0.0225	mg/L	0.010	112	70	130			
Nickel		0.0220	mg/L	0.010	110	70	130			

Qualifiers:

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QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Abandoned Mines
Project: Sand Coulee Source Control

Report Date: 10/30/17
Work Order: H17100405

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8								Analytical Run: ICPMS205-H_171025A		
Lab ID: ICSAB	15	Interference Check Sample AB								10/25/17 10:05
Potassium		38.4	mg/L	0.50	96	70	130			
Selenium		0.0112	mg/L	0.0050	112	70	130			
Strontium		0.000412	mg/L	0.10		0	0			
Thallium		-3.66E-05	mg/L	0.10		0	0			
Zinc		0.0121	mg/L	0.010	121	70	130			
Lab ID: ICV	15	Initial Calibration Verification Standard								10/25/17 16:05
Antimony		0.0596	mg/L	0.050	99	90	110			
Arsenic		0.0577	mg/L	0.0050	96	90	110			
Barium		0.0593	mg/L	0.10	99	90	110			
Beryllium		0.0296	mg/L	0.0010	99	90	110			
Chromium		0.0589	mg/L	0.010	98	90	110			
Copper		0.0591	mg/L	0.010	98	90	110			
Iron		0.296	mg/L	0.020	99	90	110			
Lead		0.0578	mg/L	0.010	96	90	110			
Manganese		0.297	mg/L	0.010	99	90	110			
Nickel		0.0600	mg/L	0.010	100	90	110			
Potassium		3.00	mg/L	0.50	100	90	110			
Selenium		0.0578	mg/L	0.0050	96	90	110			
Strontium		0.0586	mg/L	0.10	98	90	110			
Thallium		0.0562	mg/L	0.10	94	90	110			
Zinc		0.0602	mg/L	0.010	100	90	110			
Lab ID: ICSA	15	Interference Check Sample A								10/25/17 16:07
Antimony		0.000277	mg/L	0.050						
Arsenic		2.51E-05	mg/L	0.0050						
Barium		0.000120	mg/L	0.10						
Beryllium		3.33E-05	mg/L	0.0010						
Chromium		0.00101	mg/L	0.010						
Copper		0.000221	mg/L	0.010						
Iron		98.3	mg/L	0.020	98	70	130			
Lead		0.000222	mg/L	0.010						
Manganese		0.000214	mg/L	0.010						
Nickel		0.000440	mg/L	0.010						
Potassium		39.4	mg/L	0.50	99	70	130			
Selenium		0.000102	mg/L	0.0050						
Strontium		0.000435	mg/L	0.10						
Thallium		2.70E-05	mg/L	0.10						
Zinc		0.000901	mg/L	0.010						
Lab ID: ICSAB	15	Interference Check Sample AB								10/25/17 16:09
Antimony		0.000116	mg/L	0.050		0	0			
Arsenic		0.0114	mg/L	0.0050	114	70	130			
Barium		0.000212	mg/L	0.10		0	0			
Beryllium		4.74E-05	mg/L	0.0010		0	0			

Qualifiers:

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QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Abandoned Mines
Project: Sand Coulee Source Control

Report Date: 10/30/17
Work Order: H17100405

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual	
Method: E200.8										Analytical Run: ICPMS205-H_171025A	
Lab ID: ICSAB	15	Interference Check Sample AB							10/25/17 16:09		
Chromium		0.0235	mg/L	0.010	118	70	130				
Copper		0.0222	mg/L	0.010	111	70	130				
Iron		98.6	mg/L	0.020	99	70	130				
Lead		0.000213	mg/L	0.010		0	0				
Manganese		0.0225	mg/L	0.010	113	70	130				
Nickel		0.0226	mg/L	0.010	113	70	130				
Potassium		39.3	mg/L	0.50	98	70	130				
Selenium		0.0111	mg/L	0.0050	111	70	130				
Strontium		0.000375	mg/L	0.10		0	0				
Thallium		1.46E-06	mg/L	0.10		0	0				
Zinc		0.0122	mg/L	0.010	122	70	130				
Method: E200.8										Batch: R129639	
Lab ID: LFB	15	Laboratory Fortified Blank							Run: ICPMS205-H_171025A 10/25/17 10:47		
Antimony		0.0518	mg/L	0.050	104	85	115				
Arsenic		0.0511	mg/L	0.0050	102	85	115				
Barium		0.0512	mg/L	0.10	102	85	115				
Beryllium		0.0538	mg/L	0.0010	108	85	115				
Chromium		0.0511	mg/L	0.010	102	85	115				
Copper		0.0526	mg/L	0.010	104	85	115				
Iron		0.157	mg/L	0.020	105	85	115				
Lead		0.0504	mg/L	0.010	101	85	115				
Manganese		0.0518	mg/L	0.010	103	85	115				
Nickel		0.0522	mg/L	0.010	104	85	115				
Potassium		1.00	mg/L	0.50	100	85	115				
Selenium		0.0500	mg/L	0.0050	100	85	115				
Strontium		0.0518	mg/L	0.10	104	85	115				
Thallium		0.0504	mg/L	0.10	101	85	115				
Zinc		0.0544	mg/L	0.010	108	85	115				
Lab ID: LRB	15	Method Blank							Run: ICPMS205-H_171025A 10/25/17 17:07		
Antimony		ND	mg/L	2E-05							
Arsenic		ND	mg/L	2E-05							
Barium		ND	mg/L	2E-05							
Beryllium		ND	mg/L	8E-05							
Chromium		3E-05	mg/L	3E-05							
Copper		ND	mg/L	4E-05							
Iron		ND	mg/L	0.002							
Lead		1E-05	mg/L	1E-05							
Manganese		ND	mg/L	3E-05							
Nickel		ND	mg/L	3E-05							
Potassium		ND	mg/L	0.009							
Selenium		4E-05	mg/L	3E-05							
Strontium		ND	mg/L	2E-05							

Qualifiers:

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QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Abandoned Mines
Project: Sand Coulee Source Control

Report Date: 10/30/17
Work Order: H17100405

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8 Batch: R129639										
Lab ID: LRB	15	Method Blank								
Thallium		ND	mg/L	5E-06						
Zinc		0.0006	mg/L	0.0001						
Run: ICPMS205-H_171025A 10/25/17 17:07										
Lab ID: H17100198-012BMS	15	Sample Matrix Spike								
Antimony		0.0480	mg/L	0.0010	94	70	130			
Arsenic		0.0784	mg/L	0.0010	99	70	130			
Barium		0.0625	mg/L	0.050	92	70	130			
Beryllium		0.0471	mg/L	0.0010	94	70	130			
Chromium		0.0477	mg/L	0.0050	95	70	130			
Copper		0.0486	mg/L	0.0050	95	70	130			
Iron		0.144	mg/L	0.020	96	70	130			
Lead		0.0476	mg/L	0.0010	95	70	130			
Manganese		0.0512	mg/L	0.0010	95	70	130			
Nickel		0.0479	mg/L	0.0050	96	70	130			
Potassium		4.98	mg/L	1.0	100	70	130			
Selenium		0.0473	mg/L	0.0010	94	70	130			
Strontium		0.505	mg/L	0.010		70	130			A
Thallium		0.0466	mg/L	0.00050	93	70	130			
Zinc		0.0556	mg/L	0.010	98	70	130			
Run: ICPMS205-H_171025A 10/25/17 17:29										
Lab ID: H17100198-012BMSD	15	Sample Matrix Spike Duplicate								
Antimony		0.0494	mg/L	0.0010	97	70	130	2.9	20	
Arsenic		0.0800	mg/L	0.0010	102	70	130	2.0	20	
Barium		0.0647	mg/L	0.050	97	70	130	3.4	20	
Beryllium		0.0484	mg/L	0.0010	97	70	130	2.9	20	
Chromium		0.0492	mg/L	0.0050	98	70	130	3.1	20	
Copper		0.0498	mg/L	0.0050	98	70	130	2.4	20	
Iron		0.147	mg/L	0.020	98	70	130	2.4	20	
Lead		0.0484	mg/L	0.0010	97	70	130	1.6	20	
Manganese		0.0534	mg/L	0.0010	100	70	130	4.2	20	
Nickel		0.0491	mg/L	0.0050	98	70	130	2.6	20	
Potassium		5.08	mg/L	1.0	110	70	130	1.9	20	
Selenium		0.0494	mg/L	0.0010	98	70	130	4.3	20	
Strontium		0.513	mg/L	0.010		70	130	1.6	20	A
Thallium		0.0473	mg/L	0.00050	95	70	130	1.6	20	
Zinc		0.0580	mg/L	0.010	103	70	130	4.1	20	
Run: ICPMS205-H_171025A 10/25/17 17:31										

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 DEQ-Abandoned Mines
Project: Sand Coulee Source Control

Report Date: 10/30/17
Work Order: H17100405

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8								Analytical Run: ICPMS205-H_171026A		
Lab ID: ICV	3	Initial Calibration Verification Standard								10/26/17 09:26
Aluminum		0.301	mg/L	0.10	100	90	110			
Cadmium		0.0291	mg/L	0.0010	97	90	110			
Sodium		2.90	mg/L	0.50	97	90	110			
Lab ID: ICSA	3	Interference Check Sample A								10/26/17 09:28
Aluminum		41.2	mg/L	0.10	103	70	130			
Cadmium		2.42E-05	mg/L	0.0010						
Sodium		98.2	mg/L	0.50	98	70	130			
Lab ID: ICSAB	3	Interference Check Sample AB								10/26/17 09:30
Aluminum		42.9	mg/L	0.10	107	70	130			
Cadmium		0.0109	mg/L	0.0010	109	70	130			
Sodium		98.5	mg/L	0.50	99	70	130			
Lab ID: ICV	3	Initial Calibration Verification Standard								10/26/17 14:41
Aluminum		0.294	mg/L	0.10	98	90	110			
Cadmium		0.0292	mg/L	0.0010	97	90	110			
Sodium		3.00	mg/L	0.50	100	90	110			
Lab ID: ICSA	3	Interference Check Sample A								10/26/17 14:43
Aluminum		38.6	mg/L	0.10	96	70	130			
Cadmium		7.26E-06	mg/L	0.0010						
Sodium		97.8	mg/L	0.50	98	70	130			
Lab ID: ICSAB	3	Interference Check Sample AB								10/26/17 14:45
Aluminum		38.4	mg/L	0.10	96	70	130			
Cadmium		0.0110	mg/L	0.0010	110	70	130			
Sodium		98.3	mg/L	0.50	98	70	130			
Method: E200.8								Batch: R129659		
Lab ID: LRB	3	Method Blank								Run: ICPMS205-H_171026A 10/26/17 09:45
Aluminum		ND	mg/L	0.0007						
Cadmium		ND	mg/L	2E-05						
Sodium		ND	mg/L	0.006						
Lab ID: LFB	3	Laboratory Fortified Blank								Run: ICPMS205-H_171026A 10/26/17 09:47
Aluminum		0.0471	mg/L	0.10	94	85	115			
Cadmium		0.0480	mg/L	0.0010	96	85	115			
Sodium		0.864	mg/L	0.50	86	85	115			
Lab ID: H17100428-014BMS	3	Sample Matrix Spike								Run: ICPMS205-H_171026A 10/26/17 21:44
Aluminum		0.0445	mg/L	0.030	89	70	130			
Cadmium		0.0526	mg/L	0.0010	105	70	130			
Sodium		10.0	mg/L	1.0		70	130			A
Lab ID: H17100428-014BMSD	3	Sample Matrix Spike Duplicate								Run: ICPMS205-H_171026A 10/26/17 21:46
Aluminum		0.0442	mg/L	0.030	88	70	130	0.7	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.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Abandoned Mines
Project: Sand Coulee Source Control

Report Date: 10/30/17
Work Order: H17100405

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8										Batch: R129659
Lab ID: H17100428-014BMSD	3	Sample Matrix Spike Duplicate					Run: ICPMS205-H_171026A			10/26/17 21:46
Cadmium		0.0503	mg/L	0.0010	101	70	130	4.4	20	
Sodium		9.63	mg/L	1.0		70	130	4.2	20	A

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

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QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Abandoned Mines
Project: Sand Coulee Source Control

Report Date: 10/30/17
Work Order: H17100405

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual	
Method: E300.0 Analytical Run: IC METROHM_171019A											
Lab ID: ICV	2	Initial Calibration Verification Standard									10/19/17 09:29
Chloride		101	mg/L	1.0	101	90	110				
Sulfate		416	mg/L	1.0	104	90	110				
Lab ID: CCV	2	Continuing Calibration Verification Standard									10/20/17 07:27
Chloride		53.8	mg/L	1.0	108	90	110				
Sulfate		220	mg/L	1.0	110	90	110				
Method: E300.0 Batch: R129504											
Lab ID: ICB	2	Method Blank									Run: IC METROHM_171019A 10/19/17 09:16
Chloride		0.01	mg/L	0.008							
Sulfate		ND	mg/L	0.08							
Lab ID: LFB	2	Laboratory Fortified Blank									Run: IC METROHM_171019A 10/19/17 09:43
Chloride		24.1	mg/L	1.0	96	90	110				
Sulfate		99.0	mg/L	1.0	99	90	110				
Lab ID: H17100405-001AMS	2	Sample Matrix Spike									Run: IC METROHM_171019A 10/20/17 10:23
Chloride		48.0	mg/L	1.0	105	90	110				
Sulfate		189	mg/L	1.0	106	90	110				
Lab ID: H17100405-001AMSD	2	Sample Matrix Spike Duplicate									Run: IC METROHM_171019A 10/20/17 10:36
Chloride		48.0	mg/L	1.0	105	90	110	0.2	20		
Sulfate		189	mg/L	1.0	107	90	110	0.1	20		

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.



Work Order Receipt Checklist

MT DEQ-Abandoned Mines

H17100405

Login completed by: Jessica C. Smith

Date Received: 10/19/2017

Reviewed by: BL2000\rtooke

Received by: TLL

Reviewed Date: 10/24/2017

Carrier name: Hand Del

Shipping container/cooler in good condition?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Present <input type="checkbox"/>
Custody seals intact on all shipping container(s)/cooler(s)?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Present <input checked="" type="checkbox"/>
Custody seals intact on all sample bottles?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Present <input checked="" type="checkbox"/>
Chain of custody present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody signed when relinquished and received?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody agrees with sample labels?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
Samples in proper container/bottle?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sample containers intact?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sufficient sample volume for indicated test?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Temp Blank received in all shipping container(s)/cooler(s)?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Applicable <input type="checkbox"/>
Container/Temp Blank temperature:	1.0°C On Ice		
Water - VOA vials have zero headspace?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	No VOA vials submitted <input checked="" type="checkbox"/>
Water - pH acceptable upon receipt?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Applicable <input type="checkbox"/>

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:

ID on COC is MW102K -ID on sample is MW-102K. Used ID from COC. JCS 10/19/2017 Do not analyze for acidity per T. Henderson. wj 10/24/17



Trust our People. Trust our Data.

Chain of Custody & Analytical Request Record

www.energylab.com

Account Information (Billing Information)

Company Name: DFC
 Contact: Tom Henderson
 Phone: _____
 Mailing Address: _____
 City, State, Zip: _____
 Email: Henderson.t@dfc.com
 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/Forms: LEVEL IV NELAC EDD/EDT (contact laboratory) Other _____

Project Information

Project Name, PWSID, Permit, etc.: Sand Cooler Service Contract
 Sampler Name: Russ Sington Sampler Phone: 406 6712446
 Sample Origin State: MT EPA/State Compliance: Yes No
 MINING CLIENTS, please indicate sample type:
 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

Analysis Requested

Per email Tom Henderson (attached)

See Attached

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

EU LAB ID
 Laboratory Use Only
H17100405

Sample Identification (Name, Location, Interval, etc.)	Collection		Number of Containers (See Codes Above)	Matrix (See Codes Above)	Analysis Requested	Signature (TAT)
	Date	Time				
1 <u>MU102K</u>	<u>10/17/17</u>	<u>1200</u>	<u>2</u>	<u>W</u>	<u>Per email Tom Henderson (attached)</u>	<u>[Signature]</u>
2						
3						
4						
5						
6						
7						
8						
9						
10						

Custody Record MUST be signed by: Russ Sington Date/TIME: 10/17/17 1745 Signature: [Signature]
 Requisitioned by (print): Tom Henderson Date/TIME: 10/17/17 0908 Signature: [Signature]
 Rejected by (print): Tom Henderson Date/TIME: 10/17/17 1745 Signature: [Signature]
 Reported by Laboratory (print): Tom Henderson Date/TIME: 10/17/17 1745 Signature: [Signature]

Shipped By: Hard Cooler ID(s): Y Custody Seals: Y N C B Intact: Y N Receipt Temp: 1.0 °C Temp Blank: Y N Office: Y N Laboratory Use ONLY
 Payment Type: Cash 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.

Please run the following analyses on water sample MW-102K:

PHYSICAL PROPERTIES

pH ✓

INORGANICS

Acidity, Total as CaCO₃ ✓

Alkalinity, Total as CaCO₃ ✓

Calcium, Magnesium, and Hardness as CaCO₃

Sulfate, Chloride, and Fluoride ✓

Sodium and Potassium ✓

Metals, Dissolved

Aluminum ✓

Antimony ✓

Arsenic ✓

Barium ✓

Beryllium ✓

Cadmium ✓

Chromium ✓

Copper ✓

Iron ✓

Lead ✓

Manganese ✓

Nickel ✓

Selenium ✓

Strontium ✓

Thallium ✓

Zinc ✓



ANALYTICAL SUMMARY REPORT

October 25, 2017

MT DEQ-Abandoned Mines
PO Box 200901
Helena, MT 59620-0901

Work Order: H17100299

Project Name: Sand Coulee Source Control

Energy Laboratories Inc Helena MT received the following 1 sample for MT DEQ-Abandoned Mines on 10/13/2017 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H17100299-001	MW-103K	10/12/17 11:25	10/13/17	Aqueous	Metals by ICP/ICPMS, Dissolved Alkalinity Conductivity Fluoride Anions by Ion Chromatography pH

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:



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Abandoned Mines
Project: Sand Coulee Source Control
Lab ID: H17100299-001
Client Sample ID: MW-103K

Report Date: 10/25/17
Collection Date: 10/12/17 11:25
Date Received: 10/13/17
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	7.2	s.u.	H	0.1		A4500-H B	10/13/17 16:14 / kmd
INORGANICS							
Alkalinity, Total as CaCO3	370	mg/L		4		A2320 B	10/16/17 14:27 / kmd
Chloride	15	mg/L		1		E300.0	10/14/17 18:13 / SRW
Sulfate	98	mg/L		1		E300.0	10/14/17 18:13 / SRW
Fluoride	0.8	mg/L		0.1	4	A4500-F C	10/16/17 12:24 / kmd
METALS, DISSOLVED							
Aluminum	ND	mg/L		0.009		E200.8	10/22/17 20:26 / sld
Antimony	ND	mg/L		0.0005		E200.8	10/22/17 20:26 / sld
Arsenic	0.006	mg/L		0.001		E200.8	10/22/17 20:26 / sld
Barium	0.067	mg/L		0.003		E200.8	10/22/17 20:26 / sld
Beryllium	ND	mg/L		0.0008		E200.8	10/22/17 20:26 / sld
Cadmium	0.00034	mg/L		0.00003		E200.8	10/24/17 16:57 / dck
Calcium	89	mg/L		1		E200.7	10/17/17 16:47 / sld
Chromium	ND	mg/L		0.01		E200.8	10/22/17 20:26 / sld
Copper	0.007	mg/L		0.002		E200.8	10/22/17 20:26 / sld
Iron	0.05	mg/L		0.02		E200.8	10/22/17 20:26 / sld
Lead	0.0015	mg/L		0.0003		E200.8	10/22/17 20:26 / sld
Magnesium	59	mg/L		1		E200.7	10/17/17 16:47 / sld
Manganese	0.016	mg/L		0.001		E200.8	10/22/17 20:26 / sld
Nickel	0.016	mg/L		0.002		E200.8	10/24/17 16:57 / dck
Potassium	4	mg/L		1		E200.7	10/17/17 16:47 / sld
Selenium	0.001	mg/L		0.001		E200.8	10/22/17 20:26 / sld
Sodium	17	mg/L		1		E200.7	10/17/17 16:47 / sld
Strontium	0.48	mg/L		0.02		E200.8	10/22/17 20:26 / sld
Thallium	ND	mg/L		0.0002		E200.8	10/22/17 20:26 / sld
Zinc	0.045	mg/L		0.008		E200.8	10/22/17 20:26 / sld

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level.
QCL - Quality control limit. 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 DEQ-Abandoned Mines
Project: Sand Coulee Source Control

Report Date: 10/25/17
Work Order: H17100299

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2320 B										Batch: R129329
Lab ID: MBLK		Method Blank								Run: PHSC_101-H_171016A 10/16/17 12:48
Alkalinity, Total as CaCO3	2	mg/L		0.7						
Lab ID: LCS		Laboratory Control Sample								Run: PHSC_101-H_171016A 10/16/17 12:54
Alkalinity, Total as CaCO3	570	mg/L		4.0	96	90	110			
Lab ID: H17100299-001ADUP		Sample Duplicate								Run: PHSC_101-H_171016A 10/16/17 14:38
Alkalinity, Total as CaCO3	380	mg/L		4.0				2.3	10	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Abandoned Mines
Project: Sand Coulee Source Control

Report Date: 10/25/17
Work Order: H17100299

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500-F C								Analytical Run: MANTECH 2_171016A		
Lab ID: ICV		Initial Calibration Verification Standard								10/16/17 10:08
Fluoride		0.8	mg/L	0.1	100	90	110			
Lab ID: CCV 2								Continuing Calibration Verification Standard		
Fluoride		1.0	mg/L	0.1	105	90	110			10/16/17 11:28
Method: A4500-F C								Batch: R129347		
Lab ID: MBLK		Method Blank					Run: MANTECH 2_171016A			10/16/17 10:13
Fluoride		0.02	mg/L	0.01						
Lab ID: H17100262-001AMS		Sample Matrix Spike					Run: MANTECH 2_171016A			10/16/17 10:24
Fluoride		1.1	mg/L	0.1	109	85	115			
Lab ID: H17100262-002ADUP		Sample Duplicate					Run: MANTECH 2_171016A			10/16/17 10:36
Fluoride		0.0	mg/L	0.1						10
Lab ID: H17100262-011ADUP		Sample Duplicate					Run: MANTECH 2_171016A			10/16/17 11:45
Fluoride		0.0	mg/L	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 DEQ-Abandoned Mines
Project: Sand Coulee Source Control

Report Date: 10/25/17
Work Order: H17100299

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500-H B										Analytical Run: PHSC_101-H_171013A
Lab ID: pH 7		Initial Calibration Verification Standard								10/13/17 08:40
pH		7.0	s.u.	0.1	99	98	102			
Lab ID: CCV - pH 7		Continuing Calibration Verification Standard								10/13/17 10:11
pH		7.0	s.u.	0.1	100	98	102			
Method: A4500-H B										Batch: R129289
Lab ID: H17100299-001ADUP		Sample Duplicate								10/13/17 16:16
pH		7.2	s.u.	0.1				0.0	3	Run: PHSC_101-H_171013A

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Abandoned Mines
Project: Sand Coulee Source Control

Report Date: 10/25/17
Work Order: H17100299

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7 Analytical Run: ICP2-HE_171017B										
Lab ID: ICV	4	Initial Calibration Verification Standard								10/17/17 10:24
Calcium		39.1	mg/L	1.0	98	95	105			
Magnesium		39.3	mg/L	1.0	98	95	105			
Potassium		40.4	mg/L	1.0	101	95	105			
Sodium		40.4	mg/L	1.0	101	95	105			
Lab ID: CCV-1	4	Continuing Calibration Verification Standard								10/17/17 10:28
Calcium		24.6	mg/L	1.0	98	95	105			
Magnesium		24.3	mg/L	1.0	97	95	105			
Potassium		25.1	mg/L	1.0	100	95	105			
Sodium		25.1	mg/L	1.0	100	95	105			
Lab ID: ICSA	4	Interference Check Sample A								10/17/17 10:39
Calcium		429	mg/L	1.0	86	80	120			
Magnesium		481	mg/L	1.0	96	80	120			
Potassium		-0.0130	mg/L	1.0		0	0			
Sodium		0.0393	mg/L	1.0		0	0			
Lab ID: ICSAB	4	Interference Check Sample AB								10/17/17 10:43
Calcium		426	mg/L	1.0	85	80	120			
Magnesium		477	mg/L	1.0	95	80	120			
Potassium		20.7	mg/L	1.0	103	80	120			
Sodium		21.1	mg/L	1.0	106	80	120			
Lab ID: CCV	4	Continuing Calibration Verification Standard								10/17/17 16:21
Calcium		24.4	mg/L	1.0	98	90	110			
Magnesium		23.8	mg/L	1.0	95	90	110			
Potassium		24.0	mg/L	1.0	96	90	110			
Sodium		24.2	mg/L	1.0	97	90	110			
Method: E200.7 Batch: R129394										
Lab ID: MB	4	Method Blank								Run: ICP2-HE_171017B 10/17/17 10:51
Calcium		0.04	mg/L	0.01						
Magnesium		0.02	mg/L	0.005						
Potassium		ND	mg/L	0.05						
Sodium		ND	mg/L	0.02						
Lab ID: LFB	4	Laboratory Fortified Blank								Run: ICP2-HE_171017B 10/17/17 10:54
Calcium		47.0	mg/L	1.0	94	85	115			
Magnesium		47.8	mg/L	1.0	96	85	115			
Potassium		50.9	mg/L	1.0	102	85	115			
Sodium		51.3	mg/L	1.0	103	85	115			
Lab ID: H17100316-002BMS2	4	Sample Matrix Spike								Run: ICP2-HE_171017B 10/17/17 17:03
Calcium		62.9	mg/L	1.0	97	70	130			
Magnesium		55.5	mg/L	1.0	99	70	130			
Potassium		49.4	mg/L	1.0	97	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 DEQ-Abandoned Mines

Report Date: 10/25/17

Project: Sand Coulee Source Control

Work Order: H17100299

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7 Batch: R129394										
Lab ID: H17100316-002BMS2	4	Sample Matrix Spike								
Sodium		51.5	mg/L	1.0	97	70	130			10/17/17 17:03
Run: ICP2-HE_171017B										
Lab ID: H17100316-002BMSD	4	Sample Matrix Spike Duplicate								
Calcium		63.0	mg/L	1.0	97	70	130	0.2	20	10/17/17 17:14
Magnesium		55.5	mg/L	1.0	99	70	130	0.0	20	
Potassium		49.9	mg/L	1.0	98	70	130	1.0	20	
Sodium		52.0	mg/L	1.0	98	70	130	0.9	20	
Run: ICP2-HE_171017B										

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Abandoned Mines

Report Date: 10/25/17

Project: Sand Coulee Source Control

Work Order: H17100299

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual	
Method: E200.8								Analytical Run: ICPMS205-H_171022B			
Lab ID: ICV	14 Initial Calibration Verification Standard								10/22/17 16:14		
Aluminum		0.286	mg/L	0.10	95	90	110				
Antimony		0.0594	mg/L	0.050	99	90	110				
Arsenic		0.0589	mg/L	0.0050	98	90	110				
Barium		0.0584	mg/L	0.10	97	90	110				
Beryllium		0.0297	mg/L	0.0010	99	90	110				
Chromium		0.0593	mg/L	0.010	99	90	110				
Copper		0.0589	mg/L	0.010	98	90	110				
Iron		0.303	mg/L	0.020	101	90	110				
Lead		0.0569	mg/L	0.010	95	90	110				
Manganese		0.299	mg/L	0.010	100	90	110				
Selenium		0.0580	mg/L	0.0050	97	90	110				
Strontium		0.0582	mg/L	0.10	97	90	110				
Thallium		0.0575	mg/L	0.10	96	90	110				
Zinc		0.0606	mg/L	0.010	101	90	110				
Lab ID: ICSA	14 Interference Check Sample A								10/22/17 16:16		
Aluminum		42.0	mg/L	0.10	105	70	130				
Antimony		0.000199	mg/L	0.050							
Arsenic		4.24E-05	mg/L	0.0050							
Barium		0.000101	mg/L	0.10							
Beryllium		2.33E-05	mg/L	0.0010							
Chromium		0.00106	mg/L	0.010							
Copper		0.000253	mg/L	0.010							
Iron		105	mg/L	0.020	105	70	130				
Lead		0.000230	mg/L	0.010							
Manganese		0.000301	mg/L	0.010							
Selenium		6.51E-05	mg/L	0.0050							
Strontium		0.000420	mg/L	0.10							
Thallium		2.23E-07	mg/L	0.10							
Zinc		0.000962	mg/L	0.010							
Lab ID: ICSAB	14 Interference Check Sample AB								10/22/17 16:18		
Aluminum		39.9	mg/L	0.10	100	70	130				
Antimony		9.28E-05	mg/L	0.050		0	0				
Arsenic		0.0118	mg/L	0.0050	118	70	130				
Barium		0.000480	mg/L	0.10		0	0				
Beryllium		-5.42E-05	mg/L	0.0010		0	0				
Chromium		0.0238	mg/L	0.010	119	70	130				
Copper		0.0226	mg/L	0.010	113	70	130				
Iron		101	mg/L	0.020	101	70	130				
Lead		0.000211	mg/L	0.010		0	0				
Manganese		0.0230	mg/L	0.010	115	70	130				
Selenium		0.0114	mg/L	0.0050	115	70	130				
Strontium		0.000425	mg/L	0.10		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 DEQ-Abandoned Mines
Project: Sand Coulee Source Control

Report Date: 10/25/17
Work Order: H17100299

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual	
Method: E200.8		Analytical Run: ICPMS205-H_171022B									
Lab ID: ICSAB	14	Interference Check Sample AB							10/22/17 16:18		
Thallium		-2.22E-05	mg/L	0.10		0	0				
Zinc		0.0125	mg/L	0.010	125	70	130				

Method: E200.8		Batch: R129538									
Lab ID: LRB	14	Method Blank							Run: ICPMS205-H_171022B 10/22/17 16:42		
Aluminum		ND	mg/L	0.0007							
Antimony		2E-05	mg/L	2E-05							
Arsenic		ND	mg/L	2E-05							
Barium		ND	mg/L	2E-05							
Beryllium		ND	mg/L	8E-05							
Chromium		ND	mg/L	3E-05							
Copper		ND	mg/L	4E-05							
Iron		ND	mg/L	0.002							
Lead		1E-05	mg/L	1E-05							
Manganese		ND	mg/L	3E-05							
Selenium		ND	mg/L	3E-05							
Strontium		ND	mg/L	2E-05							
Thallium		ND	mg/L	5E-06							
Zinc		ND	mg/L	0.0001							

Lab ID: LFB	14	Laboratory Fortified Blank							Run: ICPMS205-H_171022B 10/22/17 16:44		
Aluminum		0.0460	mg/L	0.10	92	85	115				
Antimony		0.0493	mg/L	0.050	99	85	115				
Arsenic		0.0493	mg/L	0.0050	99	85	115				
Barium		0.0500	mg/L	0.10	100	85	115				
Beryllium		0.0485	mg/L	0.0010	97	85	115				
Chromium		0.0498	mg/L	0.010	100	85	115				
Copper		0.0498	mg/L	0.010	100	85	115				
Iron		0.150	mg/L	0.020	100	85	115				
Lead		0.0487	mg/L	0.010	97	85	115				
Manganese		0.0498	mg/L	0.010	100	85	115				
Selenium		0.0492	mg/L	0.0050	98	85	115				
Strontium		0.0500	mg/L	0.10	100	85	115				
Thallium		0.0482	mg/L	0.10	96	85	115				
Zinc		0.0508	mg/L	0.010	102	85	115				

Lab ID: H17100293-001BMS	14	Sample Matrix Spike							Run: ICPMS205-H_171022B 10/22/17 20:06		
Aluminum		0.0499	mg/L	0.030	100	70	130				
Antimony		0.0506	mg/L	0.0010	101	70	130				
Arsenic		0.0512	mg/L	0.0010	101	70	130				
Barium		0.348	mg/L	0.050		70	130			A	
Beryllium		0.0518	mg/L	0.0010	104	70	130				
Chromium		0.0503	mg/L	0.0050	99	70	130				
Copper		0.0500	mg/L	0.0050	98	70	130				
Iron		0.148	mg/L	0.020	99	70	130				

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 DEQ-Abandoned Mines
Project: Sand Coulee Source Control

Report Date: 10/25/17
Work Order: H17100299

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8 Batch: R129538										
Lab ID: H17100293-001BMS	14	Sample Matrix Spike			Run: ICPMS205-H_171022B				10/22/17 20:06	
Lead		0.0495	mg/L	0.0010	99	70	130			
Manganese		0.0504	mg/L	0.0010	100	70	130			
Selenium		0.0508	mg/L	0.0010	101	70	130			
Strontium		0.162	mg/L	0.010	98	70	130			
Thallium		0.0497	mg/L	0.00050	99	70	130			
Zinc		0.0518	mg/L	0.010	101	70	130			
Lab ID: H17100293-001BMSD	14	Sample Matrix Spike Duplicate			Run: ICPMS205-H_171022B				10/22/17 20:08	
Aluminum		0.0490	mg/L	0.030	98	70	130	1.9	20	
Antimony		0.0506	mg/L	0.0010	101	70	130	0.2	20	
Arsenic		0.0515	mg/L	0.0010	102	70	130	0.5	20	
Barium		0.347	mg/L	0.050		70	130	0.0	20	A
Beryllium		0.0505	mg/L	0.0010	101	70	130	2.4	20	
Chromium		0.0504	mg/L	0.0050	99	70	130	0.1	20	
Copper		0.0503	mg/L	0.0050	99	70	130	0.7	20	
Iron		0.148	mg/L	0.020	99	70	130	0.2	20	
Lead		0.0495	mg/L	0.0010	99	70	130	0.0	20	
Manganese		0.0499	mg/L	0.0010	99	70	130	0.9	20	
Selenium		0.0514	mg/L	0.0010	102	70	130	1.0	20	
Strontium		0.163	mg/L	0.010	100	70	130	0.5	20	
Thallium		0.0497	mg/L	0.00050	99	70	130	0.0	20	
Zinc		0.0513	mg/L	0.010	100	70	130	0.9	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.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Abandoned Mines
Project: Sand Coulee Source Control

Report Date: 10/25/17
Work Order: H17100299

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual	
Method: E200.8							Analytical Run: ICPMS205-H_171024A				
Lab ID: ICV	2	Initial Calibration Verification Standard								10/24/17 13:14	
Cadmium		0.0290	mg/L	0.0010	97	90	110				
Nickel		0.0589	mg/L	0.010	98	90	110				
Lab ID: ICSA	2	Interference Check Sample A								10/24/17 13:16	
Cadmium		1.93E-05	mg/L	0.0010							
Nickel		0.000115	mg/L	0.010							
Lab ID: ICSAB	2	Interference Check Sample AB								10/24/17 13:18	
Cadmium		0.0110	mg/L	0.0010	110	70	130				
Nickel		0.0225	mg/L	0.010	112	70	130				
Method: E200.8							Batch: R129607				
Lab ID: LRB	2	Method Blank								10/24/17 13:33	
Cadmium		ND	mg/L	2E-05							
Nickel		ND	mg/L	3E-05							
Lab ID: LFB	2	Laboratory Fortified Blank								10/24/17 13:36	
Cadmium		0.0490	mg/L	0.0010	98	85	115				
Nickel		0.0497	mg/L	0.010	99	85	115				
Lab ID: H17100293-002BMS	2	Sample Matrix Spike								10/24/17 16:35	
Cadmium		0.0483	mg/L	0.0010	96	70	130				
Nickel		0.0651	mg/L	0.0050	95	70	130				
Lab ID: H17100293-002BMSD	2	Sample Matrix Spike Duplicate								10/24/17 16:37	
Cadmium		0.0484	mg/L	0.0010	96	70	130	0.1	20		
Nickel		0.0652	mg/L	0.0050	96	70	130	0.1	20		

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Abandoned Mines
Project: Sand Coulee Source Control

Report Date: 10/25/17
Work Order: H17100299

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual	
Method: E300.0 Analytical Run: IC METROHM_171013A											
Lab ID: ICV	2	Initial Calibration Verification Standard									10/13/17 10:18
Chloride		102	mg/L	1.0	102	90	110				
Sulfate		420	mg/L	1.0	105	90	110				
Lab ID: CCV	2	Continuing Calibration Verification Standard									10/14/17 15:44
Chloride		52.5	mg/L	1.0	105	90	110				
Sulfate		214	mg/L	1.0	107	90	110				
Method: E300.0 Batch: R129330											
Lab ID: ICB	2	Method Blank									Run: IC METROHM_171013A 10/13/17 10:05
Chloride		0.01	mg/L	0.008							
Sulfate		ND	mg/L	0.08							
Lab ID: LFB	2	Laboratory Fortified Blank									Run: IC METROHM_171013A 10/13/17 10:32
Chloride		24.1	mg/L	1.0	96	90	110				
Sulfate		98.5	mg/L	1.0	98	90	110				
Lab ID: H17100291-009HMS	2	Sample Matrix Spike									Run: IC METROHM_171013A 10/14/17 16:52
Chloride		25.5	mg/L	1.0	102	90	110				
Sulfate		105	mg/L	1.0	105	90	110				
Lab ID: H17100291-009HMSD	2	Sample Matrix Spike Duplicate									Run: IC METROHM_171013A 10/14/17 17:05
Chloride		25.5	mg/L	1.0	102	90	110	0.0	20		
Sulfate		105	mg/L	1.0	105	90	110	0.1	20		

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.



Work Order Receipt Checklist

MT DEQ-Abandoned Mines

H17100299

Login completed by: Jessica C. Smith

Date Received: 10/13/2017

Reviewed by: BL2000\wjohnson

Received by: TLL

Reviewed Date: 10/18/2017

Carrier name: Hand Del

Shipping container/cooler in good condition?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Present <input type="checkbox"/>
Custody seals intact on all shipping container(s)/cooler(s)?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Present <input checked="" type="checkbox"/>
Custody seals intact on all sample bottles?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Present <input checked="" type="checkbox"/>
Chain of custody present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody signed when relinquished and received?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody agrees with sample labels?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Samples in proper container/bottle?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sample containers intact?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sufficient sample volume for indicated test?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Temp Blank received in all shipping container(s)/cooler(s)?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Applicable <input type="checkbox"/>
Container/Temp Blank temperature:	1.3°C On Ice		
Water - VOA vials have zero headspace?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	No VOA vials submitted <input checked="" type="checkbox"/>
Water - pH acceptable upon receipt?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Applicable <input type="checkbox"/>

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:

Per client Acidity does not need to be analyzed. wj 10/16/17

Chain of Custody & Analytical Request Record

www.energylab.com

Account Information (Billing Information)

Company/Name: Mortons DEQ
 Contact: Tom Henderson
 Phone: 444-6492
 Mailing Address: 1825 Cedar St.
 City, State, Zip: Heleno MT 59601
 Email: thenderson@mt.deq
 Receive Invoice: Hard Copy Email
 Purchase Order: Quote Report Hard Copy Email
 Bottle Order:

Report Information (if different than Account Information)

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

Matrix Codes

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

Analysis Requested

Per Tom Henderson 7/13/01

Comments

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

See Attached

ELI LAB ID Laboratory Use Only
 H17100299

RUSH TAT

Project Name, PWSID, Permit, etc.: Sand Colic Source Control
 Sampler Name: Tom Henderson
 Sampler Phone: 444-6492
 Sample Origin State: MT
 EPA/State Compliance: Yes No
 MINING CLIENTS, please indicate sample type:
 If one has been processed or refined, call before sending.
 Byproduct 11 (e)2 material Unprocessed ore (NOT ground or refined)*

Sample Identification (Name, Location, Interval, etc.)	Collection		Number of Containers (See Codes Above)	Matrix	Analysis Requested	Comments
	Date	Time				
1 <u>MW-103K</u>	<u>10/12/17</u>	<u>11:25</u>	<u>2</u>	<u>W</u>	<u>X</u>	
2						
3						
4						
5						
6						
7						
8						
9						
10						

Custody Record MUST be signed
 Relinquished by (print): Tom Henderson Date/Time: 10/13/17 11:45 Signature: [Signature]
 Relinquished by (print): _____ Date/Time: _____ Signature: _____

Shipped By: Hand Cooler ID(s): 9 Custody Seats: Y N C B Intact: Y N Receipt Temp: 1.3 °C Temp Blank: Y N Qc/ice: Y N
 Received by (print): [Signature] Date/Time: 10/13/17 11:45 Signature: [Signature]
 Received by (print): _____ Date/Time: _____ Signature: _____
 Payment Type: Cash Amount: \$ _____ Receipt Number (cash/check only): _____

LABORATORY USE 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.

Tracy Lorash

From: Henderson, Thomas <THenderson@mt.gov>
Sent: Friday, October 13, 2017 1:45 PM
To: Wanda Johnson; tlorash@energylab.com
Subject: Water sample MW-103K

Please run the following analyses on water sample MW-103K, delivered at 1145 this morning:

PHYSICAL PROPERTIES
pH

INORGANICS

Acidity, Total as CaCO₃ ✓
Alkalinity, Total as CaCO₃ ✓
Calcium, Magnesium, and Hardness as CaCO₃
Sulfate, Chloride, and Fluoride
Sodium and Potassium

Metals, Dissolved

Aluminum ✓
Antimony ✓
Arsenic ✓
Barium ✓
Beryllium ✓
Cadmium ✓
Chromium ✓
Copper ✓
Iron ✓
Lead ✓
Manganese ✓
Nickel ✓
Selenium ✓
Strontium ✓
Thallium ✓
Zinc ✓

Thank you!

Tom

Tom Henderson
Abandoned Mines Section
Montana DEQ Remediation Division
(406) 444-6492
thenderson@mt.gov

Appendix G

Survey Results

BASIS OF CONTROL

HORIZONTAL DATUM: NAD83 (NA2011) (EPOCH 2010.0000).

MONTANA STATE PLANE COORDINATE SYSTEM INTERNATIONAL FEET

ALL DISTANCES, BEARINGS AND COORDINATES ARE GRID VALUES

VERTICAL DATUM: NAVD88 US SURVEY FEET

1	1148315.606	1551809.737	3675.911	SURV PPC
2	1147402.107	1549631.567	3779.513	PROP ALCAP2" KENDALL 18576S
2000	1147395.763	1549671.239	3777.357	GRND
2001	1147396.132	1549671.674	3777.626	CONC
2002	1147397.048	1549672.195	3779.278	WELL MW-104K
2003	1148615.877	1553032.162	3557.985	SC-3A - MINE ADIT
2004	1148626.337	1553022.268	3553.198	CL STRM
2005	1148640.232	1553008.483	3550.832	TOP DAM
2006	1148640.227	1553009.241	3550.163	INVERT PIPE
2007	1148644.577	1553001.924	3550.104	OUTLET
2008	1148653.230	1552990.476	3547.747	OUTLET
2009	1150208.126	1552708.347	3537.563	SC-8 - MINE ADIT
2010	1150230.610	1552726.352	3535.929	K_BOTTOM 1
2011	1150158.625	1552439.325	3557.058	K_BOTTOM 2
2012	1150161.629	1552195.650	3569.466	K_BOTTOM 3
2013	1150151.722	1552216.639	3567.629	GRND
2014	1150141.119	1552261.102	3566.294	GRND
2015	1150141.381	1552313.152	3562.861	GRND
2016	1150142.623	1552364.065	3560.808	GRND
2017	1150153.715	1552408.022	3558.180	GRND
2018	1150158.332	1552441.400	3556.460	GRND
2019	1150169.094	1552472.040	3550.949	GRND
2020	1150173.965	1552478.735	3541.833	GRND @POOL
2021	1150202.992	1552527.013	3541.816	GRND
2022	1150233.509	1552569.575	3541.068	GRND
2023	1150236.657	1552613.339	3539.326	GRND
2024	1150238.377	1552667.167	3537.417	GRND
2025	1150215.477	1552782.141	3532.952	GRND
2026	1150215.464	1552782.679	3533.269	WEIR
2027	1150203.516	1552839.633	3529.541	GRND
2028	1150201.952	1552905.925	3528.763	GRND
2029	1147473.982	1548749.864	3778.361	GRND
2030	1147471.840	1548749.806	3777.977	KUNKEL - 2 WELLS - MW - PRIVATE SHALLOW
2031	1147275.057	1548716.362	3774.348	KUNKEL - 2 WELLS - MW - PRIVATE DEEP
2032	1147275.418	1548715.836	3780.877	TOP CONC
2033	1147275.918	1548715.836	3780.477	GRND
2034	1145985.705	1549663.106	3728.567	GRND
2035	1145984.269	1549663.477	3730.482	L1 DEEP - MW L1-172
2036	1145986.460	1549658.661	3729.498	L1-40
2037	1145986.129	1549658.894	3729.029	GRND
2040	1145216.824	1549648.175	3667.729	LARAQUE STOCK NORTH
2043	1144855.692	1549568.039	3676.807	LARAQUE STOCK SOUTH
2044	1144816.179	1549392.883	3679.828	GRND
2045	1144818.011	1549393.705	3680.313	CONC
2046	1144818.937	1549393.850	3681.456	MW-102K

BASIS OF CONTROL

HORIZONTAL DATUM: NAD83 (NA2011) (EPOCH 2010.0000).

MONTANA STATE PLANE COORDINATE SYSTEM INTERNATIONAL FEET

ALL DISTANCES, BEARINGS AND COORDINATES ARE GRID VALUES

VERTICAL DATUM: NAVD88 US SURVEY FEET

2047	1144762.311	1549520.760	3678.594	GRND
2048	1144763.143	1549521.469	3679.187	WELL CHARTIER ON-LIP
2049	1144749.233	1549552.019	3676.767	GRND
2050	1144947.483	1549504.940	3676.917	GRND
2051	1144947.965	1549505.263	3678.226	WELL LAROQUE DOMESTIC SOUTH ON-LIP
2052	1144954.228	1549644.305	3670.532	GRND
2053	1145106.063	1549704.825	3668.381	GRND
2054	1145380.781	1549808.935	3660.072	GRND
2055	1145551.263	1549884.170	3656.225	SC_BOTTOM 9
2056	1145616.666	1550095.737	3651.681	GRND
2057	1145635.659	1550073.839	3653.819	GRND
2058	1145636.510	1550075.244	3655.391	HARVEY LA ROCQUE DOMESTIC - MW - PRIVATE
2059	1145734.453	1550172.868	3649.990	GRND
2060	1145801.394	1550135.048	3648.621	GRND
2061	1145865.849	1550226.078	3646.376	GRND
2062	1145959.793	1550363.382	3644.192	GRND
2063	1146110.295	1550269.005	3648.081	MW-103K
2064	1146108.750	1550268.011	3646.202	GRND
2065	1146109.151	1550268.541	3646.616	CONC
2066	1146147.350	1550447.272	3639.179	SC_BOTTOM 8
2067	1146192.685	1550388.884	3637.823	GRND
2068	1146138.496	1551093.378	3733.784	GRND
2069	1146139.902	1551094.149	3735.489	C4 - MW
2070	1146349.138	1550626.842	3629.519	SC_BOTTOM 7
2071	1146432.045	1550658.591	3628.338	GRND
2072	1146468.987	1550675.837	3626.942	GRND
2073	1146641.425	1550709.301	3624.864	GRND
2074	1146708.242	1550808.240	3620.443	SC_BOTTOM 6
2075	1146631.760	1550837.757	3623.825	C5 - MW SHALLOW
2076	1146633.768	1550840.701	3624.054	C5 DEEP - MW
2077	1146633.698	1550837.843	3624.190	GRND
2078	1146604.949	1550964.480	3615.551	GRND
2079	1146602.861	1551038.817	3613.826	GRND
2080	1146667.931	1551186.103	3612.026	GRND
2081	1146735.557	1551228.234	3610.196	GRND
2082	1147001.981	1551156.993	3605.676	GRND
2083	1147085.245	1551149.727	3603.849	SC_BOTTOM 5
2084	1147083.201	1551165.516	3605.060	SINKHOLE
2085	1147171.503	1551234.354	3601.379	GRND
2086	1147206.470	1551376.071	3597.766	GRND
2087	1147336.241	1551439.669	3594.016	GRND
2088	1147368.652	1551493.749	3592.240	SC_BOTTOM 4
2089	1147391.042	1551621.332	3589.342	GRND
2090	1147456.601	1551636.331	3586.724	SC_BOTTOM 3
2091	1147503.368	1551699.446	3584.862	GRND
2092	1147574.526	1551742.525	3583.443	GRND

BASIS OF CONTROL

HORIZONTAL DATUM: NAD83 (NA2011) (EPOCH 2010.0000).

MONTANA STATE PLANE COORDINATE SYSTEM INTERNATIONAL FEET

ALL DISTANCES, BEARINGS AND COORDINATES ARE GRID VALUES

VERTICAL DATUM: NAVD88 US SURVEY FEET

2093	1147595.080	1551765.058	3583.045	SC_BOTTOM 2
2094	1147633.794	1551911.856	3580.636	GRND
2095	1147951.656	1552090.414	3575.123	GRND
2096	1147952.314	1552091.619	3578.034	C7 - MW
2097	1146829.118	1552199.118	3726.914	C3 SHALLOW - MW
2098	1146821.576	1552191.811	3726.645	C3 MEDIUM - MW
2099	1146828.622	1552198.628	3725.863	GRND
2100	1146821.615	1552191.332	3725.836	GRND
2101	1146813.404	1552182.835	3725.385	GRND
2102	1146814.393	1552183.852	3726.744	C3 DEEP - MW
2103	1147656.507	1552629.073	3712.419	GRND
2104	1147657.722	1552629.919	3714.672	MW C9
2105	1147536.977	1553268.437	3574.584	SC-1 - MINE ADIT @TOP-CONC
2106	1147545.701	1553259.154	3571.225	INVERT
2107	1151387.773	1554684.150	3546.890	SC-12 - MINE ADIT @BOTTOM-CONC
2108	1151389.348	1554679.487	3547.617	INVERT
2109	1148862.530	1549367.379	3713.300	WYLDER - NORTH
2110	1148861.237	1549366.491	3712.143	GRND
2111	1148861.545	1549366.878	3712.797	CONC
2112	1148754.178	1549380.467	3719.012	WYLDER - SOUTH @LIP
2113	1148754.433	1549380.904	3717.649	GRND
2114	1148042.939	1549371.269	3760.016	MW-101K
2115	1148041.761	1549369.811	3758.063	GRND
2116	1148042.235	1549370.156	3758.429	CONC
2300	1148650.637	1552859.909	3548.306	CL STREAM
2301	1148653.240	1552808.291	3550.978	CL STREAM
2302	1148577.982	1552719.391	3552.362	CL STREAM
2303	1148461.346	1552557.006	3554.468	CL STREAM
2304	1148393.197	1552468.584	3557.323	CL STREAM
2305	1148336.778	1552389.986	3565.328	CL STREAM
2306	1148149.319	1552311.069	3566.197	CL STREAM
2307	1148069.788	1552259.982	3565.586	CL STREAM
2308	1148004.344	1552234.184	3566.597	CL STREAM
2309	1147952.372	1552173.447	3568.329	CL STREAM
2310	1147931.942	1552108.284	3570.526	CL STREAM
2311	1147939.679	1552056.490	3571.997	CL STREAM
2312	1147949.951	1551977.665	3574.106	CL STREAM
2313	1147927.089	1551941.462	3574.886	CL STREAM
2314	1147869.612	1551932.995	3575.778	CL STREAM
2315	1147797.273	1551934.190	3576.606	CL STREAM
2316	1147727.112	1551937.816	3579.237	CL STREAM
2317	1147692.925	1551931.930	3579.871	CL STREAM

#4627.12088.01

SAND COULEE
DEQ

MW-101K - #2114
 WYLDER SOUTH - #2112
 WYLDER NORTH - #2109

ADIT SC12 @ IE CONC PIPE - #2107

MW 104K - #2002

KUNKEL SHALLOW - #2030

KUNKEL MADDISON - #2031

LAROQUE LI 172 - #2035

LAROQUE LI 40 - #2036

LAROQUE STOCK N = 5' FROM #2038 + 055

↳ 280-20 = #2040 - CALC

LAROQUE STOCKS = 5' FROM #2041 + 025

↳ 315-35 = #2042 - CALC*

MW-102K - #2046

SHARTEK WELL ON LIP - #2048

SOUTH - LAROQUE DOMESTIC ON LIP - #2051

NORTH - LAROQUE DOMESTIC - #2058

MW 103K - #2063

C4 - MW #2069

C5 Shallow #2075

C5 Deep #2076

MW C7 - #2096

MW C3 SHALLOW #2097

ADIT - SC3A #2003 @ SPRING DAYLIGHT

ADIT - SC8 #2009 @ SPRING DAYLIGHT

MW C3 MEDIUM - #2098

MW C3 DEEP - #2102

MW C9 - #2104

ADIT - SC1 - #2105 @ TOP CONC

① 2017-11-16, THURS 40
T. REED/F. MERCILL
TEAM RB/RIO/TSC3

WIND

Te 1 SUEV PPC

MU 1688 M 554 FT 5538 FT

A @ 9:17 AM ↓ @ 2:00 PM

STAT FILE: 22653200

#1 = SET 1/2" x 18" q REB W/ PPC

ON E. SIDE OF RD @ TURNOUT

MID SLOPE - 4' WEST OF CORNER POST

~~** ASSUMED X, Y, Z @ CP #1~~

~~LAT: 47-23-15 ³⁷⁴¹¹ N~~

~~LONG: 111-10-59 ⁷⁴⁴²⁴ W~~

~~EL HT: 3615 ⁶³⁸~~

OPUS @ #1

✓ 47-23-15 ³²⁷⁵⁶

✓ 111-10-59 ⁷⁰⁶¹⁹

✓ #0 3630 ⁷¹⁴⁵

#2 = FND 2" q ALCAP STAMPED:

"KENDALL LAND SURVEY

PROPERTY CORNER 185765"

ON E. SIDE RD S. FACE OF PP.

#2000-2116

TOPO

2300-2317