



26 May 2021

Mike McCrum, Contracting Officer's Representative
Bureau of Land Management (BLM), Alaska State Office
222 W. 7th Ave #13 Anchorage, Alaska 99513
Email: mmcrum@blm.gov

**SUBJECT: 2021 Groundwater and Surface Water Baseline Monitoring Work Plan
Addendum, Red Devil Mine, Alaska**

Dear Mr. Euler and Mr. McCrum,

This memorandum serves as a 2021 Addendum to the *2019 Groundwater and Surface Water Baseline Monitoring Work Plan (2019 Baseline Monitoring Work Plan; BLM, 2019)* and the *2020 Addendum (BLM, 2020)*. The *2019 Baseline Monitoring Work Plan* established procedures for baseline monitoring of groundwater and surface water at the Red Devil Mine Site, including a *Field Sampling Plan (FSP)* and *Quality Assurance Project Plan (QAPP)*. The methods, data quality objectives, and the majority of the quality assurance/quality control measures to be employed during 2021 baseline monitoring are defined in the 2019 work plan and the 2020 addendum. The number of wells to be sampled and the list of analytical parameters have been reduced to reflect the shift in project objectives from characterization to baseline monitoring. This Addendum describes main elements of the 2021 baseline monitoring effort.

Sundance appreciates the opportunity to complete this project. If you have any questions or concerns regarding this Addendum, please contact me at (949) 284-6002 or jconsoletti@sundance-inc.net with any questions regarding this memorandum.

Sincerely,

John Consoletti

John Consoletti, P.E., PMP
Program Manager
Sundance Consulting Inc.

1.0 PROJECT SCOPE AND OBJECTIVES

Sundance will conduct the field data collection in two different sampling events: one in early June and the second in September. The spring sampling event will be conducted shortly after spring breakup when surface runoff and water table elevation is at or near the annual maximum. The fall sampling event will be conducted during early fall when stream flow is typically approaching a minimum prior to freeze up and water table elevations begin seasonal decline.

1.1 GROUNDWATER MONITORING

Sundance will complete the following scope:

1. Mobilize to the project site all personnel, equipment, and material needed to perform monitoring activities.
2. Measure depth to static water level at all monitoring wells listed in Table 1, including those wells that are not scheduled for sampling collection. Depth to water measurements will be completed for all wells within a 24-hour period during both the spring and fall sampling events. Data will also be downloaded from transducers installed in the monitoring wells designated as such in Table 1 during the same 24-hour period.
3. Collect groundwater and surface water samples following methods and protocols defined in the *2019 Baseline Monitoring Work Plan* (BLM, 2019) and *2020 Addendum* (BLM, 2020). Note that some monitoring wells in Table 1 will not be sampled. Surface water sampling stations are listed in Table 2.
4. Transport all samples to the laboratory under chain of custody such that laboratory analysis is performed within holding times prescribed for all analytical methods.
5. Coordinate with the BLM at least once a week while data collection is ongoing.
6. Demobilize personnel, equipment, and material from the site at completion of field data collection period.

**Table 1. Baseline Groundwater Monitoring Well Summary
Base Scope of Work**

Monitoring Well ID	Collect Sample	Bladder Pump	Transducer	Northing	Easting
MW01		X		6848472.892	588897.3617
MW03				6848581.065	588979.8349
MW04				6848564.133	588907.3826
MW06	X			6848656.180	588995.1024
MW07				6848393.712	588891.9008
MW08				6848354.155	588997.7221
MW09	X	X		6848491.702	588970.2143
MW10	X	X		6848470.815	588950.2887
MW11				6848454.172	588935.9930
MW12				6848354.269	588742.4843
MW13				6848408.425	588879.9700

Monitoring Well ID	Collect Sample	Bladder Pump	Transducer	Northing	Easting
MW16	X			6848553.570	588947.8710
MW17	X			6848551.484	588948.1433
MW18				6848531.638	588988.1867
MW19				6848571.165	589025.1547
MW20				6848592.800	588967.1091
MW21				6848622.174	589000.2127
MW22				6848638.537	589022.4639
MW23				6848688.270	589038.5637
MW24				6848641.681	588975.4127
MW25				6848629.149	588940.7024
MW26	X	X		6848622.444	588918.9978
MW27	X	X		6848587.889	588919.2896
MW28	X	X		6848585.430	588917.8712
MW29	X	X		6848700.653	588897.0048
MW30				6848630.777	588855.5862
MW31				6848717.532	588561.9681
MW32				6848725.007	589122.1639
MW33	X			6848780.504	589096.4901
MW34				6848558.600	589074.0454
MW35				6848567.313	589075.9173
MW36				6848564.717	589084.2718
MW39				6848849.533	588651.3045
MW40	X	X		6848767.128	588726.9626
MW42	X	X		6848618.255	588792.7568
MW43	X	X		6848605.028	588834.4352
MW44	X	X		6848863.449	588738.0061
MW45	X	X		6848923.057	588700.9894
MW46	X	X		6848994.838	588631.5805
MW47	X	X		6849057.390	588604.4875
MW48				6848841.960	588787.3862
MW49	X	X		6848819.986	588882.4892
MW50	X	X	X	6848912.827	588629.5502
MW51	X	X	X	6848980.258	588580.2529
MW52	X	X		6849032.846	588522.5802
MW53	X	X	X	6848849.577	588568.7948
MW54	X	X	X	6848903.625	588517.9083
MW55	X			6848988.233	588449.4053
MW56	X	X	X	6848851.666	588696.7599

Monitoring Well ID	Collect Sample	Bladder Pump	Transducer	Northing	Easting
MW57	X	X	X	6848793.412	588612.8689
MW58	X	X	X	6848819.169	588496.7913
MW59	X	X	X	6848851.296	588656.2038

ID – Identification

MW – Monitoring Well

Note: During static water level measurements, Sundance will measure the elevation difference between the top of casing to adjacent ground surface. The measured difference shall be reported with water table elevation results as a check on impacts of seasonal frost heave on monitoring well casing elevation.

Northing and Easting are Alaska State Plane coordinates.

1.2 SURFACE WATER MONITORING IN RED DEVIL CREEK

Sundance will conduct surface water monitoring to evaluate discharge rate and surface water quality at five locations on lower Red Devil Creek. The descriptions, location identifiers and coordinates of the five sampling stations are summarized in Table 2.

**Table 2. Baseline Surface Water Monitoring Locations
Base Scope of Work**

Location ID	Description	Northing	Easting
RD10SW	Red Devil Creek, downstream of the reservoir, upstream of the NTCRA.	588731.8	6848384
RD15SW	Red Devil Creek, new station immediately downstream of the newly aligned section (post-NTCRA) of Red Devil Creek, near the former baseline monitoring station RD13SW	588644.3	6848088
RD05SW	Seep on left bank of Red Devil Creek	589100.3	6848801
RD06SW	Red Devil Creek, near Settling Pond #3	589135.7	6848761
RD08SW	Red Devil Creek, near the confluence of Red Devil Creek and Kuskokwim River, downstream of sediment trap constructed during the NTCRA	589133.4	6848790

NTCRA – non-time critical removal action

RD – Red Devil Mine

SW – Surface water

1.3 LABORATORY ANALYSIS

The parameters demonstrated as most significant contributors to overall risk at Red Devil Mine are the primary focus of baseline monitoring. The number of samples to be sent off site for laboratory analyses and analytical methods to be applied to those samples are summarized in Table 3 and Table 4.

**Table 3. Groundwater Analytical Summary
Base Scope of Work**

Analysis	Method	Primary Samples	Field Duplicate	Rinsate	Field Blank	Trip Blank	Total Samples
Total TAL Metals	EPA 6010B/6020A	28	3	*	*		31
Total Low-Level Mercury	EPA 1631	28	3	*	*	*	31
Dissolved Low-Level Mercury	EPA 1631	28	3	1*	1*	3*	36

EPA – U.S. Environmental Protection Agency

TAL – Target Analyte List

Note: Eurofins Frontier Global Sciences, LLC (Eurofins TestAmerica) will be the primary lab for all analyses except EPA 1631 for low-level mercury, which they are subcontracting to Eurofins Frontier Specialty (a separate subsidiary)

* reduced from 2020 Addendum (Dissolved Mercury increased to 1 trip blank per cooler)

Table 4 Surface Water Analytical Summary

Analysis	Method	Primary Samples	Field Duplicate	Rinsate	Field Blank	Trip Blank	Total Samples
Total TAL Metals	EPA 6010B/6020A	5	1	1*	1		8
Total Low-Level Mercury	EPA 1631	5	1	1*	1	*	8
TSS	EPA 160.2	5	1		*		6
TDS	EPA 160.1	5	1		*		6
Inorganic Ions (Cl, F, SO ₄)	EPA 300.0	5	1	1*	*		7
Nitrate-Nitrite as N	EPA 353.2	5	1	1*	*		7
Alkalinity as CO ₃ /HCO ₃	EPA 310.1	5	1	1*	*		7

EPA – U.S. Environmental Protection Agency

TAL – Target Analyte List

TDS – total dissolved solids

TSS – total suspended solids

Note: All low-level mercury containers for surface water and groundwater will be contained together in separate coolers and the trip blank will be preserved with nitric acid and analyzed for using EPA Method 7470A, if necessary, for QA/QC.

* reduced from 2020 Addendum. Mercury samples to be included with groundwater.

1.4 SCHEDULE

Sundance scheduled field activities are expected to take place in June and September 2021 and take approximately one week to complete.

1.5 FIELD QUALITY CONTROL SAMPLES AND FREQUENCY



QC samples may include trip blanks, field blanks, rinsate blanks, and field duplicates, which are submitted blind to the laboratory. Field QC samples and frequency will be collected in accordance with the *2019 Baseline Monitoring Work Plan* (BLM, 2019) and *2020 Addendum* (BLM, 2020) with the exceptions as noted in Table 3 and Table 4.

2.0 REFERENCES

U.S. Department of the Interior Bureau of Land Management (BLM), 2019. *Final Work Plan 2019 Groundwater and Surface Water Baseline Monitoring, Red Devil Mine, Alaska*. Prepared by Ecology and Environment Inc. (E.&E.), May 2019.

BLM, 2020. *Addendum to the Final Work Plan 2019 Groundwater and Surface Water Baseline Monitoring, Red Devil Mine, Alaska*. 2020.