THE STATE of ALASKA
GOVERNOR MIKE DUNLEAVY

Department of Natural Resources
DIVISION OF MINING, LAND & WATER
Mining Section
Northern Office

3700 Airport Way
Fairbanks, Alaska 99709-4699
Main: 907.451.2736
TTY: 711 or 800-770-8973
Fax: 907.451.2703

APMA F20229339- Anarraaq & Aktigiruq Exploration Program
FIELD SUMMARY REPORT

Inspection Date:	August 20, 2022
Time:	7:30AM to 10:00AM
Weather:	Partly cloudy skies mid-morning clearing later in the afternoon. Variable light winds with an average air Temperature of 49°F.
Agency Personnel:	DNR: Aaron Kruse, Stephen Buckley, William Groom, Carolyn Curley, Ben Wagner
Operator Contact:	Rebecca Hager, Emily Hart, Robert Napier
Inspection Objectives:	Annual Inspection

Operation Area:

The Anarraaq & Aktigiruq Exploration Program (A&A) is located approximately 9-miles north of the Red Dog Mine and is operated by Teck American Inc (TAI). This surface-based exploration program for lead-zinc resources, within TAI owned state claims and Nana Corp. private property, is currently helicopter supported with all temporary equipment and material flown in from the Red Dog Mine. The A&A deposit is situated west, along some of the upper reaches of Ikalukrok tributaries within the Wulik River drainage of the DeLong Mountains. Topography varies from low mountainous terrain with interstitial rocky outcroppings and talus slopes with a biomass consisting of tundra and taiga.[1] This area is a Sub-Artic environment underlain by permafrost with vegetation generally comprising of dwarf birch, willow, and other lowland type lichens, grasses and mosses typically found near the lower slopes.[2] Regional structural geology is characterized by stacked and folded thrust allochthons with upper sequences containing Jurassic or older mafic and ultramafic igneous, with lower sequences comprised of Devonian through Cretaceous clastic and chemical sedimentary rocks. Stratabound massive sulfides and barren mudstones form the main shale-hosted exhalate deposit, which is superimposed multiple times within thrust fault slices. Mineralization is syngenetic with respect to sediment deposition and is weakly enriched upward in lead relative to zinc.[3] As of 2017, the inferred mineral resource for Anarraaq is 19,440 tonnes of mill feed with 14.4% Zn, 4.2% Pb, and 91g/t Ag;[4] while the Aktigiruq exploration target estimates 80-150 million tonnes at a grade of between 16-18% Zn+Pb. Currently there has been insufficient exploration to define a mineral resource for Aktigiruq.[5]

Field Inspection Plan, Execution and Summary Schedule:

The Alaska Department of Natural Resources (ADNR) primary objectives for the field inspection were to inspect active sites which are stable and monitored or have been reclaimed. The inspection plan was designed to follow the route of the proposed road, making note of areas of interest, such as proposed material sites, current geotechnical drilling activities and ongoing exploration drilling. The inspection plan was also designed to allow

[1] Golder Associates. (2017) Geotechnical Findings and Recommendations for Aktigiruq Road Alignment. Red Dog, Alaska.
[2] Teck. (2022) Reclamation Plan Anarraaq and Aktigiruq Exploration Program. Appendix B: Phase I – Exploration Access Road and Surface Pad Construction.
[3] Williams, A., et al. (2017) Red Dog; Qanaiyaq; Hilltop; Aqqaluk; Paalaaq. USGS report: Mine site, 168 of 244 in Northwest Arctic Borough. Available at: https://mrdata.usgs.gov/ardf/show.php?labno=DL001 (Accessed: 10/19/2022).
[4] Krolak, T., Palmer, K., Lacouture, B., and Paley, N. (2017) NI 43-101 Technical Report. Red Dog Mine. Alaska, USA. Available at https://www.miningdataonline.com/reports/Red%20Dog%20Mine_TR12312016.pdf . (Accessed: 10/19/2022).
[5] Teck. (2017) Teck Increases Red Dog Production Guidance and Updates Exploration Results in the Red Dog District. News Release. Available at https://www.teck.com/news/news-releases/2017/teck-increases-red-dog-production-guidance-and-updates-exploration-results-in-the-red-dog-district- . (Accessed: 10/19/2022)

for selecting additional sites for inspection in an opportunistic fashion and as time allowed.

ADNR staff arrived via Alaska Airlines to the Red Dog air strip at approximately 4:00 pm on 18 August 2022. ADNR staff attended a safety brief of the mine and its facilities before meeting to review the inspection plan for the next two days with Rebecca Hager and Emily Hart. Inspection staff received a helicopter safety briefing on 20 August before embarking to the field. Inspections were conducted on the ground and at a low-level aerial hover.

A total of 16 drill sites within the A&A Project Area were observed or inspected (Appendix B). At the time of inspection, one geotechnical drill was in operation along with three explorations drills. Other sites included previous drill locations with platforms still in place, reclaimed drillholes, proposed material sites, and a staging area to support current helicopter supported exploration activities.

Findings

A summary of findings can be found below with descriptions of active sites that were visited. A detailed route map with drillhole locations and photos of all inspected sites with observations notes are in Appendix A.

1. Inspection of 2022 Active, Stable, or Monitored Sites

ADNR inspected the status of sixteen sites drilled between 2018-2022 considered exploration or geotechnical. An additional fourteen drillholes are listed; however, these are daughter drillholes drilled from the same collar to reduce surface impacts. Only the ID of the mother drillhole will be listed to describe the activities observed onsite. There were no observed drillholes within the scope of the field inspection that meet the requirements for plugging due to artesian conditions.

1.1 Active Geotechnical Drillhole DDH1799G (Nana Corp. Land, Figure 5)

One active geotechnical drill site was observed during this inspection along with several drilling platforms (Figures 3 & 4) and flagged stakes (Figure 2) from previous geotechnical drillhole locations. TAI proposed to use several types of drilling methods to test surficial geology (track mounted auger or sonic rig) along with core drilling to provide the necessary rock characterization. All geotechnical drilling observed in the field resides on private property and has meet the requirements under AS 27.19, Reclamation Act, mining, exploration, and reclamation projects involving less than five acres of disturbance on private land.

1.2 Active Exploration Drillhole DDH1795 (ADL 725340, Figure 7), Drillhole DDH1794 (ADL 725339, Figure 11), and Drillhole DDH1793 (ADL 725339, Figure 12)

Three active exploration core drilling sites were observed during this inspection on state land. Each location had the drill rig and essential support equipment elevated off the ground on decks to reduce impacts to the surface. Water management used solid recovery units (SRU) to separate out the cuttings and settling tanks in order to re-use drilling fluids. All cuttings are flown back to Red Dog Mine in super sacks for storage. Make up water is stored above each site within one large holding tank (Figure 14) supplied by a pump situated southeast of primary drilling activities from a small tributary of Ikalukrok Creek (Figure 16). Each exploration drill site was observed to be in compliance with the stipulations and regulations outlined in their authorized Miscellaneous Land use Permit (MLUP) for hardrock exploration activities and reclamation.

2. Decommissioned sites:

2.1 Drillhole DDH1790 (ADL 725440, Figure 9)

ADNR inspected one exploration drillhole that was recently decommissioned. All casings have been removed above the surface and topsoil contoured and respread in a manner that promotes local vegetation, no erosion concerns noted. All sites were found in acceptable condition according to AS 27.19, 11 AAC 97, and the terms of MLUP F20229339.

3. Site Structures and Support Facilities

All active drilling locations had emergency muster areas and galvanized stock tanks to hold flammable substances located away from main drilling activities for safety, Figure 17. Fly in fuel tanks were observed to be stored on wooden decks adjacent to the primary water storage, Figures 13 and 14. A lay down yard was situated south of the area of primary exploration drilling activities, Figure 6. All pipe, timber, and support equipment reside directly on the ground to reduce the impact to *in situ* conditions.

Violations

No violations of MLUP F20229339 stipulations, AS 27.19 or 11 AAC 97 were observed during the course of this inspection.

Conclusion and Recommendations

ADNR finds TAI's A&A operation is in good condition and is consistent with industry standards. The operator facilitates activities in a manner which prevents unnecessary and undue degradation of State and private land and water resources and is responsive to requests made by the Department.

All other maintenance, monitoring and repair activities shall be reported in the end of year Annual Exploration and Reclamation Report due December 31, 2022.

Inspector: _____ Date: _____

Supervisor: _____ Date: _____

Report Prepared By: A. Kruse

Appendix A

Inspection Map and Observations of Note

See Appendix B for an index of sites inspected.

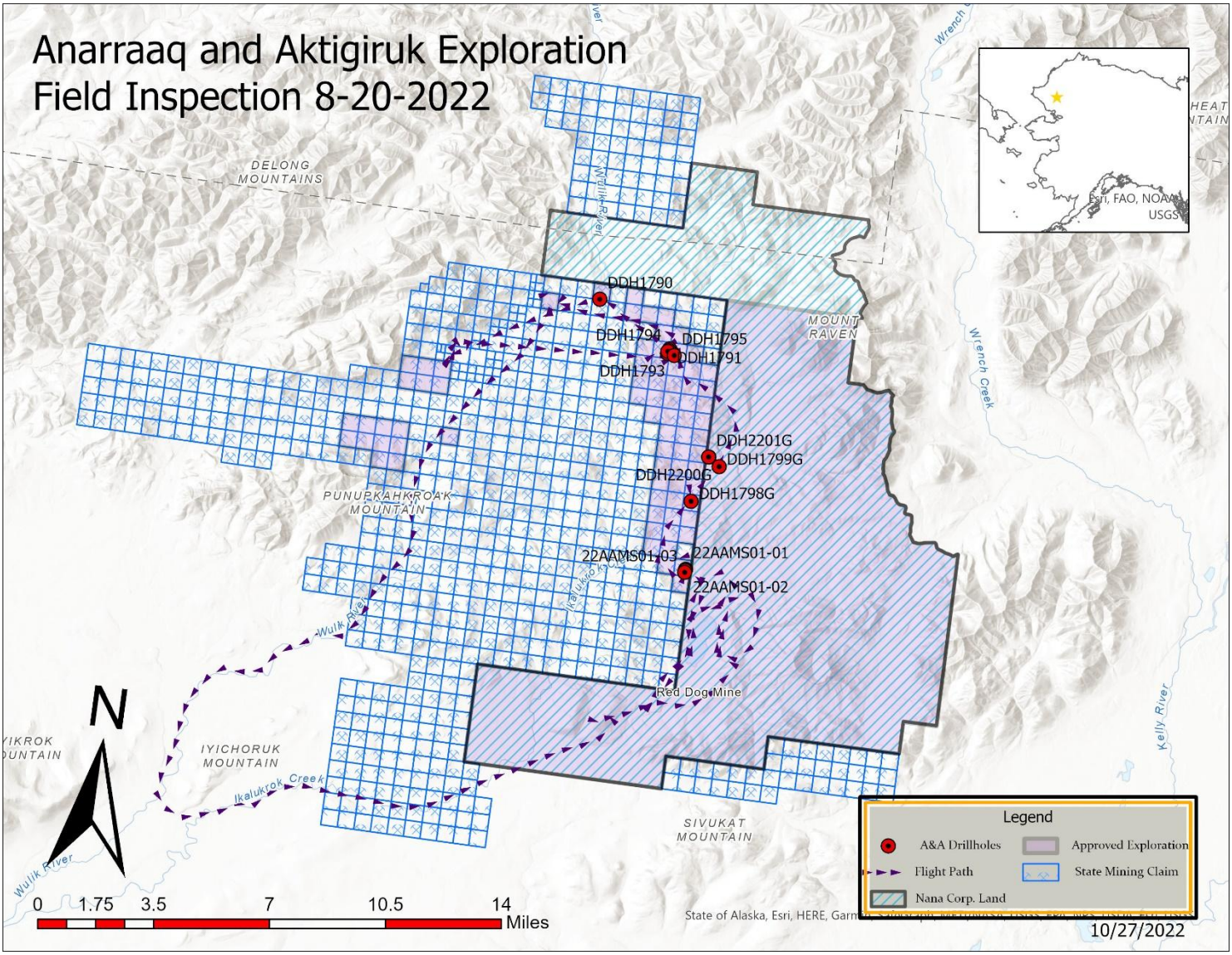

Figure 1: Map indicating the direction of the route taken for the 2022 A&A field inspection of selected drillholes.

Observations of Note August 20, 2022, Inspection

Active/ Stable Monitored
Figure 2

Drill hole ID:
22AAMS01-01
22AAMS01-02
22AAMS01-03

These marked geotechnical drillholes are located at the proposed AA-MS-1 material site.

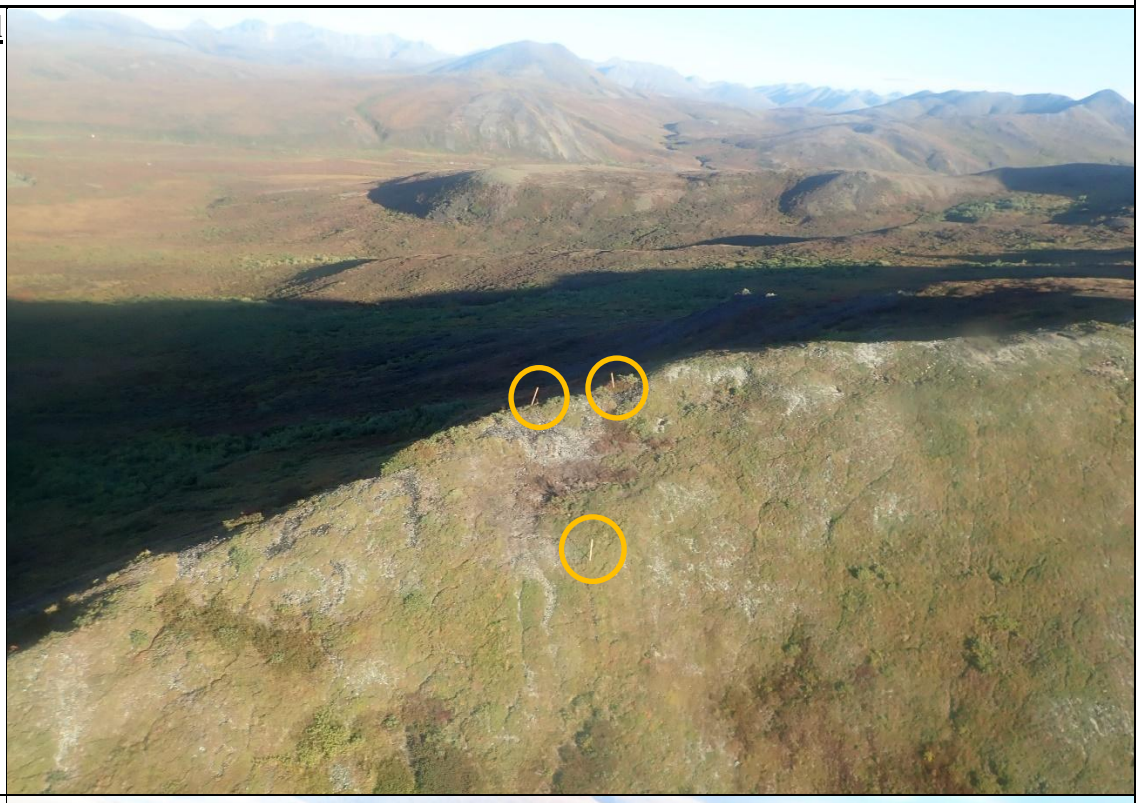

Figure 3

Drill hole ID:
DDH1798G

Geotechnical drill site platform.

Figure 4

Drill hole ID:
DDH2201G
DDH2200G

Geotechnical drill site platform.

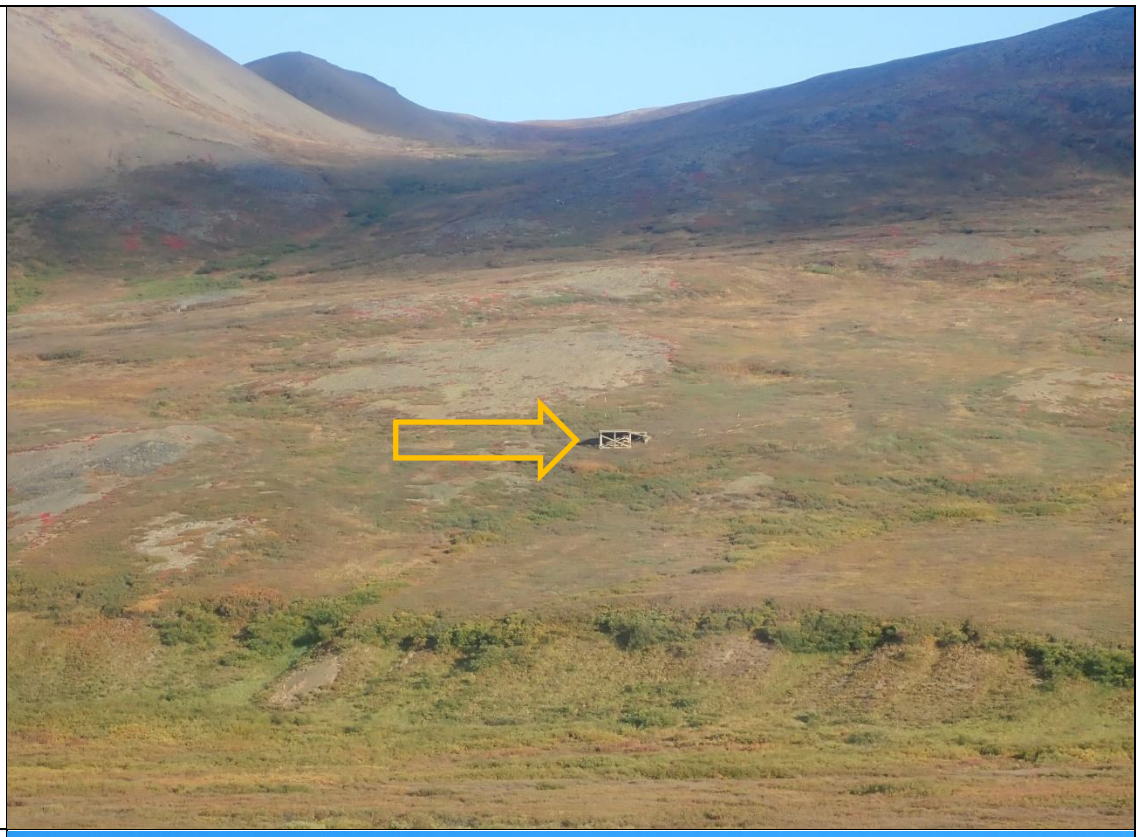

Figure 5

Drill hole ID:
DDH1799G

Active geotechnical drilling.

Figure 6
Laydown area to support exploration activities

Several drill rigs are in the background for perspective to show proximity of laydown area for current exploration activities.

Figure 7

Drill hole ID:
DDH1795
DDH1795_W020
DDH1795_W210
DDH1795_W280

Active exploration drilling.

Figure 8

Drill hole ID:
DDH1781
DDH1781_W360

Platform left in place from previous exploration activities.

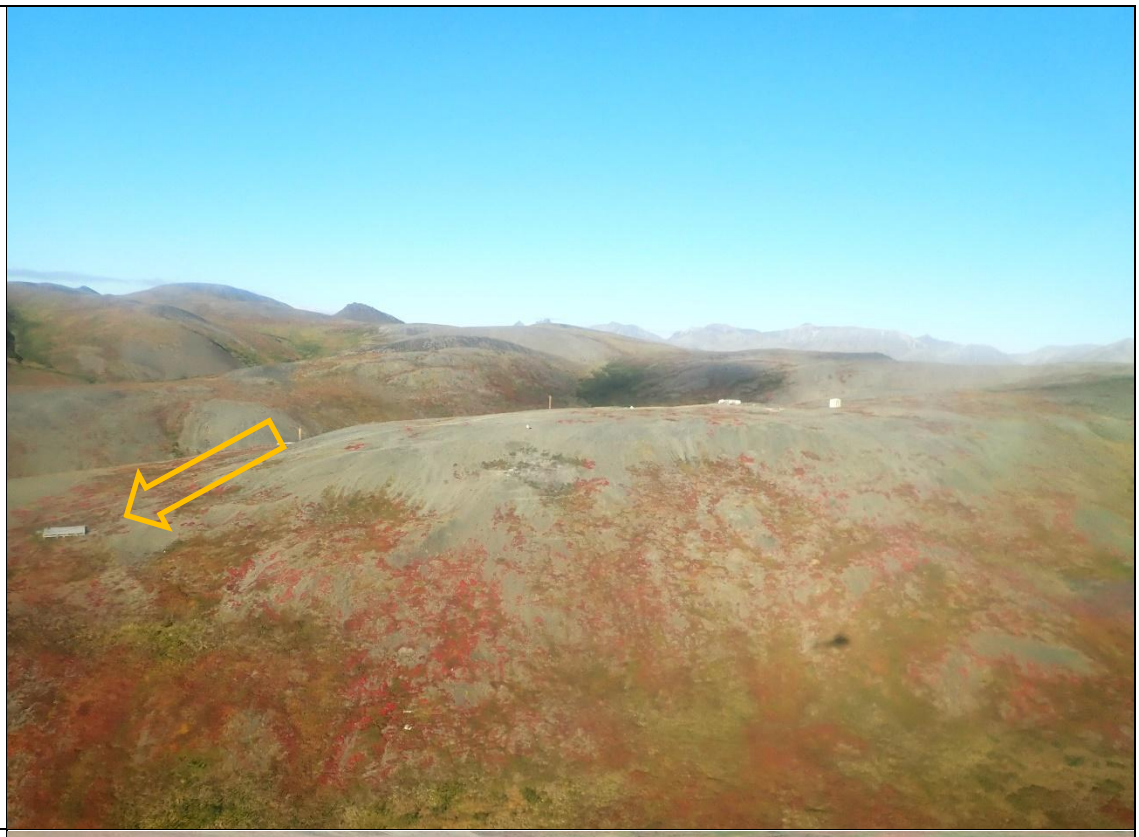

Figure 9

Drill hole ID:
DDH1790

Reclaimed drill hole. Casing has been removed and area has been restored to pre-exploration activities.

Figure 10

Drill hole ID:
DDH1780
DDH1780_W360
DDH1791
DDH1791_W090

At time of inspection, drill site was not reclaimed. No casings were observed; however, minimal contouring and preparations for revegetation are needed before the state considers reclamation is complete. It is recommended that this location be revisited during the next field inspection.

Figure 11

Drill hole ID:
DDH1794
DDH1794_W010
DDH1794_W065
DDH1794_W310

Active exploration drilling.

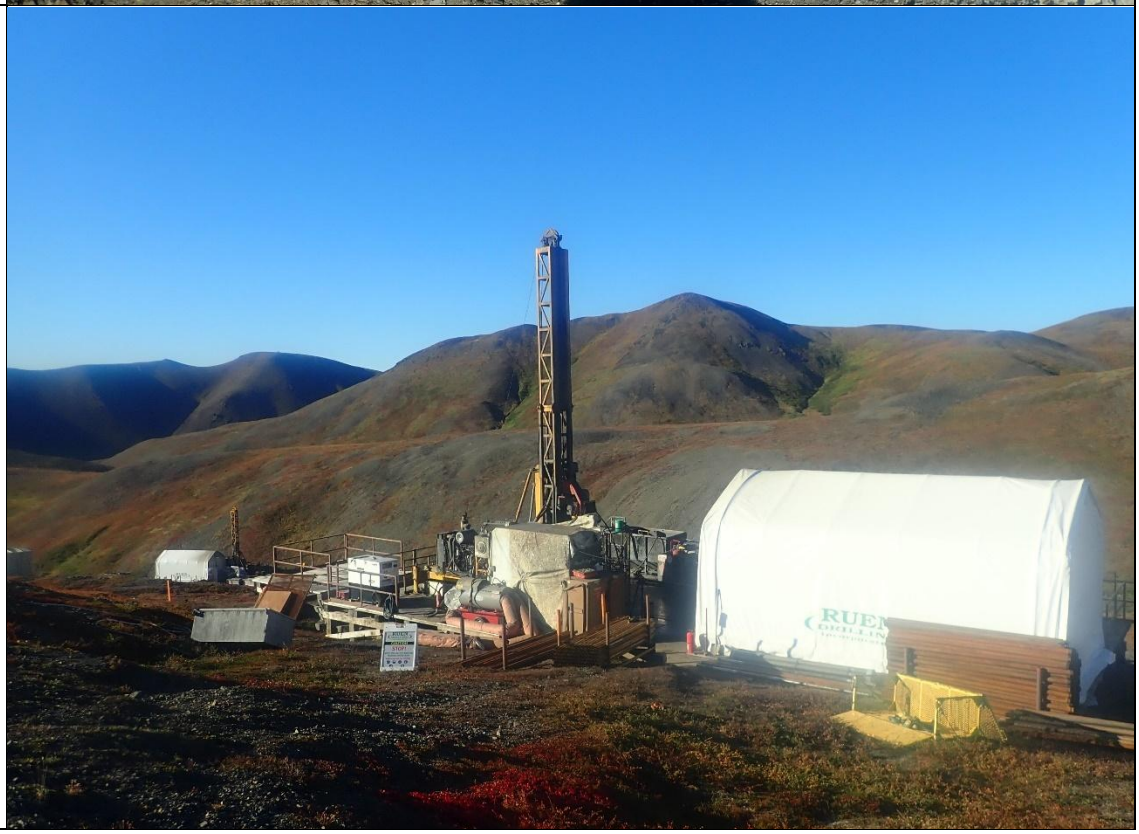

Figure 12 Drill hole ID: DDH1793 DDH1793_W220 DDH1793_W260 DDH1793_W325 Active exploration drilling.	
Figure 13 Fly in fuel tank and equipment stored within spill containment pans.	

Figure 14

Water storage tank for support of exploration core drilling.

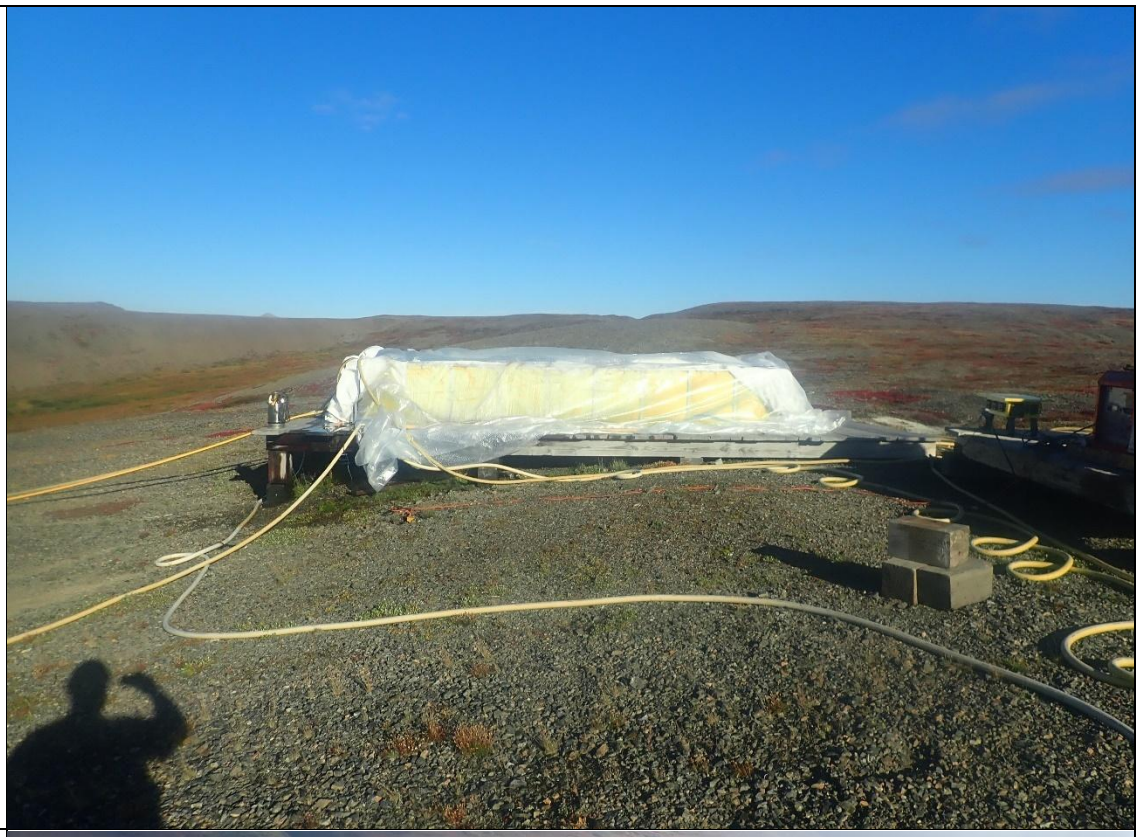

Figure 15

Drill hole ID:
DDH1779

At time of inspection, drill collars are still in place. Status of drill hole is currently unknown. Recommended to revisit site during next inspection.

Figure 16

Main water supply pump with lines running up to holding tank.

Figure 17

Typical muster point and flammable material storage located near areas of active drilling.

Appendix B

Table1: List of drillhole ID's, type and status that were documented during ADNR's field inspection. Note: the data provided by TAI within this table was on October 19, 2022, during the end of their filed season and may differ from what was documented on August 20,2022.

Drillhole ID	Type/Status	Note
22AAMS01-01	Geotechnical/Reclaimed	
22AAMS01-02	Geotechnical/Reclaimed	
22AAMS01-03	Geotechnical/Reclaimed	
DDH1798G	Geotechnical/Reclaimed	
DDH1799G	Geotechnical/Reclaimed	
DDH2200G	Geotechnical/Reclaimed	
DDH2201G	Geotechnical/Reclaimed	
DDH1795	Exploration/Reclaimed	
DDH1795_W020	Exploration/Reclaimed	
DDH1795_W210	Exploration/Reclaimed	
DDH1795_W280	Exploration/Reclaimed	
DDH1781	Exploration/Reclaimed	Needs Final Inspection
DDH1781_W180	Exploration/Reclaimed	Needs Final Inspection
DDH1781_W270	Exploration/Reclaimed	Needs Final Inspection
DDH1781_W360	Exploration/Reclaimed	Needs Final Inspection
DDH1790	Exploration/Reclaimed	Needs Final Inspection
DDH1791	Exploration/Reclaimed	Needs Final Inspection
DDH1791_W090	Exploration/Reclaimed	Needs Final Inspection
DDH1780	Exploration/Reclaimed	Needs Final Inspection
DDH1780_W360	Exploration/Reclaimed	Needs Final Inspection
DDH1794	Exploration/Not Reclaimed	
DDH1794_W010	Exploration/Not Reclaimed	
DDH1794_W065	Exploration/Not Reclaimed	
DDH1794_W310	Exploration/Not Reclaimed	
DDH1793	Exploration/Not Reclaimed	
DDH1793_W220	Exploration/Not Reclaimed	
DDH1793_W260	Exploration/Not Reclaimed	
DDH1793_W325	Exploration/Not Reclaimed	
DDH1799G	Geotechnical/ Reclaimed	
DDH1779	Exploration/Reclaimed	