

**LUPIN MINE - APPLICATION FOR RENEWAL AND AMENDMENT OF LICENCE 2AM-LUP1520
FINAL CLOSURE AND RECLAMATION PLAN**

**LUPIN UYARAKHIUQVIK – TUKHIRAUT NUTANGURUTMUN IHUAQHIGIARUTOLU
LAISA 2AM-LUP1520 KINGULLIQ UMIKNIA HALUMARTIQNIALU PARNAUT**



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**NWB-kut Pitquhiliqutit Katimaniq
Juni 6, 2019
Kugluktuk, Nunavut**



NWB Technical Meeting – June 6, 2019 – Kugluktuk, NU



Lupin Mine – Status

Lupin Uyarakhiuqvik - Qanuritnia



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NWB Technical Meeting – June 6, 2019 – Kugluktuk, NU

Lupin Mine – Status

- Located approximately 285 kilometres southeast of Kugluktuk, in the Kitikmeot Region of Nunavut; accessible by air and winter ice road
- In operation from 1982 to 2005, the Lupin Mine has been in Care and Maintenance since February 2005
- Owned by Lupin Mines Incorporate (LMI), a wholly owned indirect subsidiary of Mandalay Resources Corporation
- Interim Closure and Restoration Plan submitted by LMI and approved by the Nunavut Water Board July 20, 2018

Lupin Uyarakhiuqvik - Qanuritnia

- Inilik mikhaani 285 kilaamitat nigiaa kanangnaani Kugluktuk, Kitikmeotni Nunavut; pilaqni tingmitikkut ukiumilu hikukkut apqut
- Aulatauquq talvanga 1982 tikitlugu 2005, tamna Lupin Uyarakhiuqvik Munariyauquq Ihuaghihimanialu taimanga Fibruari 2005
- Nanminiriyat tapkuatlu Lupin Uyarakhiuqvit Nanminilgit (LMI-kut), tamaitnut nanminiriyat turaqpiaqnagu ilagiyat tapkuat Mandalay Risuasis Kuapurisan
- Tatyallak Umiknia Halumartiqnialu Parnaut tuniyat tapkuat LMI-kut angiqtatlu tapkuat Nunavut Imaliriyit Katimayit Julai 20, 2018

Lupin Mine – Status

- LMI has carried out progressive reclamation under this and previously approved plans since initial ownership of the property in 2011 (through Elgin Mining and now Mandalay Resources Corporation)
- Final Closure and Reclamation Plan (FCRP) was submitted for approval July 27, 2018 with an application for licence amendment and renewal
- LMI provided notice on January 30, 2019 to Environment Climate Change Canada, with respect to the Metal and Diamond Mines Effluent Regulations, seeking closed mine status.
- The Application and FCRP completeness check and technical review have been completed.

Lupin Uyarakhiuvik - Qanuritnia

- LMI-kut atuqtai halummaqtirivalianiq atuqhugu una hivuanilu angiqtauyuq parnautit taimanga pigialihaqnianit nanminiriliqni havakviat 2011-mi (apqutigiplugit Elgin Uyarakhiuvit tatayalu Mandalay Risuasis Kuapurisan)
- Kingulliqpamik Umiknia Halumartiqnialu Parnaut (FCRP-nga) tuniyauyuq angiqtauyukhaq Julai 27, 2018 piplugu tukhiraut laisamun ihuaqhigiaqnia nutanguqnialu
- LMI-kut piqaqtitat tuhaqhit talvani Januari 30, 2019 tapkununga Avatiliriyit Hilaplu Ahianguqnia Kanata, piplugit tapkuat Haviit Qiplariktutlu Uyarakhiuvit Halumaittut Imaqta Maligait qiniqta umiknianut uyarakhiuvik qanuritnia.
- Tamna Tukhiraut tamnal FCRP-nga iniqhimakhait naunaiqni pitquhiliqutitlu naunaiyaqni iniqhimaliqitut.

Water Licence 2AM-LUP1520 Renewal and Amendment

Imaqmun Laisa 2AM-LUP1520 Nutangurut Ihuaqhigiarutlu

Application Highlights

- Request a licence term of 7 years to coincide with full closure activities followed by 5 years of post-closure monitoring
- An increase in water use from the current 5,000 m³/year to 685 m³/day for 2 years to cover increased camp requirements and industrial use, then return to 5,000 m³/year during post-closure
- Review of Licence terms and conditions, and structure to better represent the closure of the mine, non-operations, and post-closure monitoring
- Approval of the 2018 Final Closure and Reclamation Plan

Tukhiraut Tuhaquniqhauni

- Tukhiqnia laisa tikitlugu 7 ukiut nalaagut umiktauqpiqnia huliniit kinguagut 5 ukiut umiqaqtitlugu munarini
- Ilagiaqnia imaq atuqnia tatyamin 5,000 m³/ukiuq tikitlugu 685 m³/ubluq taphumunga 2 ukiuk piyanga ilagiaqnia hiniktaqvik piyaaqni havakviklu atuqnia, utiqlugulu 5,000 m³/ukiuq umikhimaliqaqtitlugu
- Naunaiyaqnia Laisa hivituni aturialgitlu, hanayangalu nakuutqiyamik piyanga umiknia uyarakhiuqvik, aulahuqnia, umiqaqtitlugulu munarinia
- Angiqtauni tapkuat 2018 Kingulliqmik Umiknia tamnal Halumaqtinqia Parnaut

Lupin Mine - Status

Lupin Uyarakhuiqvik - Qanuritnia

- Satellite view of the Lupin Mine Site
- Qangattaqhimayumin Takuyaunia tamna Lupin Uyarakhuiqvik Havakvia



Lupin Mine - Closure

Lupin Uyarakhiuqvik - Umiknia

- Draft concept of the Lupin Mine site after reclamation is complete
- Uuktut ihumaginia tamna Lupin Uyarakhiuqvik havaklvia halumartiaqtitlugu



Lupin Mine – Final Closure and Reclamation Plan

Lupin Uyarakhiuqvik – Kingulliqaq Umiknia Halumartiqnialu Plarnaut

Components of the Plan

- Executive Summary
- 1.0 Introduction
- 2.0 Project Description
- 3.0 Progressive Reclamation and Post Operational Activities
- **4.0 Permanent Closure and Reclamation**
- 5.0 Monitoring
- 6.0 Post Remediation Site and Environmental Conditions
- 7.0 Financial Security
- 8.0 References

Ilagiyai Parnautip

- Ataniuyunut Nainaqhimayut
- 1.0 Unniqtutit
- 2.0 Havaq Unniqtuta
- 3.0 Aturuiqpaliani Halumartiqni Aulahuiaqtitlugulu Huliniit
- **4.0 Umikpiaqnia Halumartiqnialu**
- 5.0 Munariyaunia
- 6.0 Halumartiaqtitlugu Havakvik Avatiliqutitlu Qanuritnit
- 7.0 Kiinauyat Nautiumatit
- 8.0 Naunaipkutat

4.0 Permanent Closure and Reclamation Umikpiaqnia Halumaqtigaunialun

Progressive Reclamation Update and Final Closure Requirements

- Underground Mine
- Tailings Impoundment
- Rock Pile
- Chemicals/Soil
- Buildings and Equipment
- Capital Expenditures and Short Term Water Treatment/Management
- Interim Care and Maintenance
- Post Closure Monitoring and Maintenance
- Mobilization/Demobilization

Aturuiqpaliayut Halumartiqni Tuhaqhit Kingulliqaqllu Umiknia Piyaqaqni

- Nunap Iluani Uyarakhiurniq
- Uyaraktaqnikut Hiamaktailini
- Uyaqat Qaliriktitni
- Avugiyauvaktut/Nuna
- Igluqpait Hanalrutitlu
- Angiyut Akiliqtutit Hivikitumutlu Aturtuq Imaq Halumaqtirut/Aulataunia
- Munariyaulaktut Ihuaqhihimanilu
- Umiqaqtitlugu Munariyaunia Ihuaqhihimanialu
- Atuliqtitni/Ituptiqni

Final Closure Requirements - Kingulliqpamik Umiknianut Piyalgit

■ Underground Mine

- Tailings Impoundment
- Rock Pile
- Chemicals/Soil
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- Post Closure Monitoring and Maintenance
- Mobilization/Demobilization

■ Nunap Iluani Uyarakhiurniq

- Uyaraktaqnikut Hiamaktailini
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- Umiqaqtitlugu Munariyaunia Ihuaqhihimanialu
- Atuliqtitni/Ituptiqni

Underground Mining

- Portal and mine openings closure (shaft, air raises)
- Crown Pillar blasting; for soil, waste rock and demolition waste disposal
- Backfill and reclaim open stopes (Crown Pillars)



Centre zone crown pillar opening
Qitqani imiktailitit angmania

Nunap Iluani Uyarakhiurniq

- Nunap iluanut itiqvia uyarakhiuviklu angmani umiknit (aniqhaktuqvit, qingait)
- Imiktailitit qartaqnit; nunanut, iqakut uyaqat ituptigatlu iqakut iqaqnit
- Kivviuhirtuqni halumartiqnilu angmanit uvingani (Imiktailitit)



Portal - Nunap Iluanut Itiqvik

Underground Mining

Nunap Iluani Uyarakhiurniq



East zone crown reclaimed 2002

Kanangnaani qanga halumartiqnia 2002

Final Closure Requirements - Kingulliqpamik Umiknianut Piyalgit

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- **Tailings Impoundment**
- Rock Pile
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- Interim Care and Maintenance
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- Mobilization/Demobilization
- Nunap Iluani Uyarakhiurniq
- Uyaraktaqnikut Hiamaktailini
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- Umiqaqtitlugu Munariyaunia Ihuaqhihimanialu
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Tailings Impoundment

- Rip Rap; MDam Completed 2017
- Flatten Slopes Pond 2 side of MDam
- Cover Tailings; approx. 199,000m² to be completed - 10,500 m² of cover applied to Cell 5 in 2018, remaining cover required of 199,000 m².
- Tailings piping removal/disposal - 4,000 m of tailings pipeline removed, 4,500m remaining
- Syphon removal/disposal (Dam 1a and JDam)
- Construct/excavate spillways for Dam 1a and JDam (including geotextile and rip rap relocated from dam slopes)
- Specialized Items (permanent instrumentation, monitoring)

Uyaraktaqnikut Hiamaktailini

- Qaliriktarniq; M Haput Inirtuq 2017
- Manikhaqni Uvinganit Tahiraq 2 mikhaani M Haput
- Hauni Uyaraktaqnikut; mikhaani 199,000m² iniqtakhat - 10,500 m² hauni atuqtat Iluani 5 2018mi, hipakua hauni piyalgit 199,000 m².
- Uyaraktaqnikut huplua ahivaqnia/iqaqnia - 4,000 m uyaraktaqnikut huplua ahivaqnia, 4,500m hipakua
- Pakpaknia ahivaqnia/iqaqnia (Haput 1a tamnalu J Haput)
- Hanayaunia/amuyuani kiviraqvit Haput 1a tamnalu J Haput (ilautitlugu maqittailit tamnalu qaliriktitnia nutaunia talvanga haput uvinganit)
- Taihimayut Hunat (ilihimainaqtukhat uukturautit, munarinit)

Tailings Impoundment

Uyaraktaqnikut Hiamaktailini



Tailings Impoundment

Uyaraktaqnikut Hiamaktailini

TCA Kuviraqvik 5 haumiani, Tahiraq 2 taliqpiani



Cell 5 to be covered, view
from MDam

Kuviraqvik 5 hauyukhaq,
takunia mikhaanit M Haput



Cell 3 and 4
Kuviraqvik 3 4-lu



Tailings Impoundment



Dam la syphons, spillway location

Haput la pakpautit, kuviraqvia inaa

Uyaraktaqnikut Hiamaktailini

KDam; Pond 2 on right
K Haput; Tahiraq 2 taliqpiani



Final Closure Requirements

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- Mobilization/Demobilization

Kingulliappaq Umiknia Piyaqaqnit

- Nunap Iluani Uyarakhiurniq
- Uyaraktaqnikut Hiamaktailini
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- Avugiyauvaktut/Nuna
- Igluqpait Hanalrutitlu
- Angiyut Akiliqtutit Hivikitumutlu Aturtuq Imaq Halumaqtirut/Aulataunia
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- Atuliqtitni/Ituptiqni

Rock Pile

- Consolidate Rock into Central Area (191,000 m³)
- Soil Cover - excavate, haul, spread and compact (303,400 m³)
- Contour area of rock left in place (303,400 m²)

Crown pillar area

Qanga imiktailit nuna



Uyaqat Qaliriktitaqni

- Katitnit Uyaqat Qitiqpanut Nuna (191,000 m³)
- Nuna Haunia - amuni, agyaqni, hiamakni naniktiqnilu (303,400 m³)
- Ayikiktitni nuna uyaqat haumiani ilini (303,400 m²)



Waste rock and piles – ballfield
Iqakut uyaqat qaliriknilu - muqpakvik

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Chemicals/soil

Buildings

Decontamination/Consolidation of Hazardous Materials

- Decontaminate: oil, fuel and glycol systems – a large amount of this work was carried during the 2018 summer and winter work program – all tanks not in use outside of the main tank have been cleaned and signed off by a professional engineer
- Removal of asbestos containing materials (sheet flooring, tiles, mastic and caulking)

Avgiyauyut/nuna

Igluqpait

Halumailruiyaqni/Katitauni

Hivuranaqtut Hunat

- Halumailruiyaqni: kinirtuq, uqhuqyuat tamnalu imaqtutikhaut havagutai – anginiqhaq aktilaq uuma havaq atuqtauyuq atuqtitlugu 2018 auya ukiungalu havat havagutai – tamaita qataqyuat atuqtaungittut hilataani taphuma atuqtauniqhaq qattaqyuq halumaqtauyut sainiqtauplutiklu havaktilluamin qauyimayiuyumin
- Ahivaqni ikittaipkutilgit hunat (iluittut natiit, natikhat, nipitirutai kuhiripkutailu)

Chemicals/soil

Hazardous Materials Removal

- Waste oils, fuels, batteries, machine shop paints/solvents etc. – the majority of waste has already been removed from site (2015, 2016, 2017 and 2018), batteries have been removed. Lab reagents have been removed in (2016, 2017 and 2018). Items currently at site will be required during reclamation

Contaminated soils and soils removal

- Load haul dump to crown pillar

Avgiyauyut/nuna

Hivuranaqtut HUnat Ahivaqni

- Iqakut kiniqtut, uqhuqyuat, paatyit, Hannavikmi minguat/halumaqtirutit ahiilu – tapkuat amihuniqhat iqakut ahivaqpagiqhimayut havakvikmin (2015, 2016, 2017 tamnalu 2018), paatyit ahivaqtauyut. Naunaiyaqvikmi avugiyauyut ahivaqtauyut talvani (2016, 2017 tamnalu 2018). HUnat tatya havakvikmi piyaqaqniat atuqtitlugu halumaqtigaunia

Halumaiqhimayut nunat nunatlu ahivaqni

- Uhiliqtutit akhaluutit imigipkutaqnut

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Buildings and Equipment

Removal of buildings

- Accommodation complex
- Hoist room and travel ways
- Shaft house
- Warehouse, Mill
- Powerhouse
- Headframe
- Airlock building and fresh air intake
- Two cold storage buildings
- Arsenic Treatment building
- Pumphouse
- Explosives Storage
- Fire house

Igluqpait Hanalrutitlu

Ahivartiqni igluqpait

- Hiniktaqviit atatyutiyut
- Nivingartiqvik igluaq aularviklu apqutai
- Anmuktaqvik igluqpak
- Uviahausi, Havikhaliuqvik
- Qulliliqutiqaqvik
- Qaliqutigiya
- Aniaviulaiyaut igluqpak qingariyauyutlu ilunmutyuta
- Malruk niglamalanut hiqluak igluqpak
- Avugiyauyut Tuqunalgit Halumaqhautit igluqpak
- Pakpautiqaqvik
- Qaqtautit Tutqumavik
- Qaptirutiqaqvik

Buildings and Equipment

Removal of buildings

- Emergency powerhouse
- Weather station/storage buildings
- Batch plant, ATV building
- Storage at laydown/airstrip
- Fuel Tanks (12 small, 15 large remain)
- Freshwater intake
- Consolidate & dump boneyard debris
- Break foundation slabs/leave in place

Igluqpait Hanalrutitlu

Ahivartiqni Igluqpait

- Irininaqtunut qulliliqutiqaqvik
- Hilalirivik/Tutqumavit igluqpait
- Katihimanit hannavik, Haantait igluqpa
- Tutqumavik iliuqaqvikmi/milvik
- Uqhuqyuqaqvit (12 mikiyut, 15 angiyut huniumaittut)
- Imirtaqqvik immiqtuivik
- Katitauni iqaqnilu hunavaluit iqakut
- ahiruqtiqni tunngaviit/aulangitni inaitni

Buildings and Equipment

Removal of buildings Ahivartiqni igluqpait



Headframe
Qulirutigiyauyuq



Main Fuel Tank Farm
Aturniqhaq Uqhuqyuqaqvik

Igluqpait Hanalrutitlu



Warehouse,
engineering offices
and shops
Uviahausi,
qauyimaiyuyut
aapisit hannavitlu



Mill
Havikhaliuqvik

Buildings and Equipment

Removal of equipment



Powerhouse
Qulliliqutiqaqvik

Igluqpait Hanalrutitlu

Ahivaqni Hanalrutit

Mill
Havikhaliuqvik



Buildings and Equipment (cont.)

- Landfill for Demolition Waste
- Reclaim approx. 12km of roads (removal of culverts, scarify roads)
- Other – grade and contour esker borrow area (180,000m²)



Tailings access road
Uyaraktaqnikut pilaqnia apqut

Igluqpait Hanalrutitlu (huli)

- Nunami Iqaqvik Ituptigaunia Iqakunut
- Halumartiqni mikhaani 12KM apqutit (ahivaqni kuukviuyut huplut, manikhaqni apqutit)
- Ahii – manikhaqni maniqamun ayyikkuhiutini qimiit iluttuqhimani (180,000m²)

Fingers Lake Esker
Tikkiit TahiQ QimiQ



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Capital Expenditures and Short Term Water Treatment/Management

- Decommission fresh water supply (pumphouse and pipeline)
- Water treatment operation tailings containment area (1.8mil m³)



Fresh water pumphouse and 6" line
Imatqiktuq pakpakvia tamnalu 6" huplu

TCA Pond 2 – Syphon and
Spillway location centre left
TCA Tahiraq 2 – Pakpakvik
Kuviraqviklu qitqa ahirtuq



Final Closure Requirements (following reclamation) Kingulliqpamik Umiknianut Piyalgit

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- Umiqaqtitlugu Munariyaunia Ihuaqhihimanialu
- Atuliqtitni/Ituptiqni

2019 - Final Year of Interim Care and Maintenance

2019 – Kingulliappaq Ukiuq Munaritlaknia Ihuaqhihimanialu

- Water management and sampling
- Geotechnical Assessment
- Final EEM Study – final program to be carried out during 2019
- HHERA to be completed – report to be finalized Oct 2019
- Imaq aulataunia naunaiyainiqlu
- Nunaliqutit Qauyihaqnit
- Kingulliappaq EEM Naunaiyaut – kingulliappaq havagut atuqtauyukhaq atuqtitlugu 2019
- HHERA iniqtigakhaq – tuhaqhitaut iniqtigakhaq Aktuupa 2019

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- Atuliqtitni/Ituptiqni

Post Closure Monitoring and Maintenance (10yr) Umiqaqtitlugu Munarinia Ihuaqhihimanialu (10 ukiut)

- Annual geotechnical inspections
- Monitoring (including maintenance)
- Site water quality monitoring (water licence)
- Ukiumun nunaqliqutit naunairtuqni
- Munarinia (ilautitlugit ihuaqhihimani)
- Havakvikmi imaq nakuunia munarinia (imaqmun laisa)

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Mobilization/Demobilization Atulirtitni/Ituptiqni

- Additional equipment mobilized to site early 2020
- Tools and equipment
- Transport/flights
- Man days/months
- Accommodations for workers
- Ilagiarutit hanalrutit atuliqtitni havakvikmun atulihagniani 2020
- Hanalrutit hanatyutitlu
- Nuktirautit/tingmitit
- Inungnut ublut/tatqiqhiutit
- Hiniktaqvit havaktinut

Lupin Project (Circa 1978)

Lupin Havakvia (Piksaliugaq 1978)



Proposed Lupin Mine site; viewing south with sewage lakes near top of photo
Uuktugauyuq Lupin Uyarakhiuqvik inaa; nigianit takunia anaqnut kuviraqvut tahiit
haniani qulaani piksa

Lupin Mine – Closure Lupin Uyarakhluqvik - Umiknia

- Draft concept of the Lupin Mine site after reclamation is complete
- Uukturaut ihumaginia Lupin Uyarakhluqvik inaa halumartiqatitlugu



Work Programs – 2019-2022

- Mandalay Resources completed an RFP process in 2018 and have an agreement in place with the successful bidder, Nahanni Construction Ltd.
- Due to delays in security refunds and permits (winter road) LMI will be in care and maintenance during the 2019 season. Some additional reclamation will also be carried out during the 2019 season by Nahanni.
- Mandalay anticipates having the final closure and reclamation plan/renewed and amended water licence process completed in the first quarter of 2020.

Havaq Havagtai – 2019-2022

- Mandalay Risuasis iniqta tamna RFP-nga pityuhiq 2018-mi angirutiqaqhunilu atuttiaqtumik uuktuqtumik, Nahanni Hanayit Nanminilgit.
- Piplugit kinguvartaqni nautiumatit maniktakhat pilarutitlu (ukiumi apqut) LMI-kut munariyaullakniaq ihuaqhihimanialu atuqtitlugu 2019 ukiunga. Ilai ilagiarutit halumartiqni atuqtauniat atuqtitlugu 2019 ukiunga tapkunanga Nahanni.
- Mandalay niriuktuq pihimania kingulliqlpaq umiknia halumartiqnialu parnaut/nutangurut ihuaqhigiaqnialu imaq laisa pityuhiq iniqnia hivulliqmi hitaumauyaqniani 2020.

Work Programs – 2019-2022

- Mobilization will start in early 2020 via the winter ice road
- The full reclamation program, as updated during the NWB final closure and reclamation process (located on the NWB ftp site), will take place during 2020 and 2021. With demobilization taking place in the first quarter of 2022.

Havaq Havagtai – 2019-2022

- Atuliqtitni pigiaqniat atulihaqniani 2020 atuqlugu hikukkut apqut
- Tamna tamaat halumartiqnia havagut, tuhaqhityutauniagut atuqtitlugu NWB-kut kingulliqpamik umiknia halummartiqnialu pityuhiq (inilik talvani NWB-kut ftp qaritauyakkuvia), atuqtauniao atuqtitlugu 2020 tamnalu 2021. Piplugit ituptiqni atuqtauni hivulliqmi hitamauyaqnian 2022.

Technical Meeting – Discussion Topics

- Closure timelines
- Tailings Impoundment Area
 - Water Quality
 - Closure configuration; tailings cover and design, dam stability and dam enhancement, spillways and natural drainage, use of rip-rap, additional cover materials, etc.
 - newly exposed tailings
- Mine site; cover specification

Pitquhiliqutiit Katimaniq – Uqauhit Pityutit

- Umiknianut pivikhait
- Uyaraktaqnikut Kuviraqvia
 - Imaq Nakuunia
 - Umiknianut titiqnit; uyaraktaqnikut hauyaunia hanatyuhikhalu, haput huniumalaitnia nakuuhivalliqnia, kuviraqvi ilitquhitlu kuukvit, atuqnia qaliriktitaqni, ilagiarutit hautyutikhat hunat, ahiilu.
 - hatqilihat uyaraktaqnikut
- Uyarakhiuqvik inaa; hauni taiyaunit

Technical Meeting – Discussion Topics (cont.) Pitquhiliqutiit Katimaniq – Uqauhit (huli)

- Geochemical Characterization
 - Acid Rock Drainage assessment
 - Potentially Acid Generating waste rock
 - Geochemical Modeling, thermal and seepage modeling
- Human Health Ecological Risk Assessment
- Post Closure Monitoring
 - Post closure monitoring plan
- Climate change consideration
- Cost estimating and security requirements
- Nunaliqutit Ilitquhiit
 - Huruilat Uyaqat Kukviuni naunaiyaqni
 - Atulaqni Huruilat Pinguqtitaiyut iqakut uyaqat
 - Nunaliqutit Uukturautit, uunaqnia maqinilu uukturautit
- Inungnut Aaniaqtailini Avatigiyanit Hivuranaqnit Naunaiyaqni
- Umiqaqtitlugu Munarini
 - Umiqaqtitlugu munarini parnaut
- Hila ahianguqnia ihumagiyauni
- Akitunit mikhautnit nautiumatitlu piyaqaqnit

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