APPENDIX C.2

GEOTECHNICAL INSPECTIONS

APPENDIX C.2.1

2017 GEOTECHNICAL INSPECTION NO. 1

October 12, 2017

Sean Joseph
Senior Technical Advisor, NWB
P.O. Box 119
Gjoa Haven, NU X0B 1J0

RE: Submission of 2017 Geotechnical Inspection Report No. 1 (Aug. 2017)

Under Part D, Item 18 of Baffinland Iron Mines Corporation's (Baffinland) Type "A" Water Licence 2AM-MRY1325 Amendment No. 1 (Water Licence), there is a requirement to conduct biannual geotechnical inspections of specified Mary River Project (the 'Project") infrastructure. Part D, Item 18, of the Water Licence states that:

> "The Licensee shall conduct inspections of the earthworks and geological and hydrological regimes of the Project biannually during the summer or as otherwise approved by the Board in writing. The inspection shall be conducted by a Geotechnical Engineer and the inspection report shall be submitted to the Board within sixty (60) days of the inspection, including a cover letter from the Licensee outlining an implementation plan to respond to the Engineer's recommendations."

The first biannual geotechnical field inspection for 2017 was conducted by Barry Martin of Barry H. Martin Consulting Engineer and Architect (BMCE) of Timmins, Ontario. The focus of the inspection was on the Water Licence related infrastructure located at the main camp sites, known as the Mary River Mine Site and Milne Port. Mr. Barry Martin has been conducting annual geotechnical inspections for the Project since 2008. The attached report covers the first inspection that was conducted between August 1st and 10th, 2017.

During the August 2017 inspection, the following site facilities were inspected:

Mary River Mine Site

- Generator Fuel Storage Facility Containment
- Polishing/Waste Stabilization Pond No. 1
- Polishing/Waste Stabilization Ponds Nos. 2 and 3
- Helicopter Fuel Cell Containment
- Enviro-Tank Storage (MS-HWB-1)
- Hazardous Waste Storage (MS-HWB-2)
- Barrel Fuel Containment (MS-HWB-3 and MS-HWB-4)
- Stove Oil Storage (MS-HWB-5)
- Hazardous Waste Containment (MS-HWB-6)
- Bulk Fuel Storage Containment (MS-HWB-7)
- Jet Fuel Tank and Pump Containment
- Solid Waste Disposal Site (Landfill)
- Mine Site Steel Fuel Tank Farm Containment

- Quarry (QMR2)
- Crusher Pad Drainage Containment
- Waste Pile Drainage Containment
- Jet “A” Aircraft Containment

Milne Port

- Loading Area Contaminated Storage (MP-HWB-1)
- Hazardous Waste Storage (MP-HWB-3, and MP-HWB-4)
- Fuel Tank Farm
- New Sewage Effluent Pond (PWSP)
- Land Farm
- Contaminated Snow Containment
- Ore Stockpile Pad Sedimentation Ponds (East and West)
- Quarry (Q1)
- Fuelling Facility Containment

Site plans for the Mary River Mine Site and Milne Port showing most structures reviewed are included in the inspection report (refer to Attachment 1).

The attached report (refer to Attachment 1) presents the findings of the August 2017 inspection and recommendations for the aforementioned structures. The following subsections of this letter summarize Baffinland’s plan for implementing recommendations. Where this is no mention of particular infrastructure, there were no concerns identified by BMCE for same.

Recommendations for the Mary River Mine Site Infrastructure

Enviro Tank Storage (Now MS-HWB-1)

We recommend that the geotextile over the liner be checked and the granular cover be made good prior to continuing use of this cell.

Baffinland Action: The cell is currently not being used and has been left empty. The Site Services Department supervisors are aware that this area shall not be used for the storage of hazardous waste or substances until it has been repaired. It is currently not being used. Alternatively, this facility may be decommissioned.

Crusher Pad Drainage Containment

The conduit under the road at the north end should be sealed and revisions made to direct water from this area to the catchment ditch.

Baffinland Action: Drainage for this area will be evaluated and if it is deemed that the surface water drainage is impacted by the crusher pad then the drainage route will be revised to redirect the surface water to the containment ditch prior to the end of June 2018.

Hazardous Waste Containment (MS-HWB-6)

We have no recommendations with respect to this structure other than making repairs to the damaged enviroliner.

Baffinland Action: Baffinland will repair the torn liner by the end June 2018. In the meantime, stormwater and snowmelt of the small containment berm will not be allowed to reach the height of the tear.

Recommendations for Milne Port Infrastructure

Landfarm Containment

We recommend that the remaining dyke structure without protective cover over it be covered as per the design drawings. This however, is not an absolute requirement.

Baffinland Action: Baffinland will endeavor to place a protective cover of material over the exposed areas but notes that this is not requirement for the engineered lined containment area. Access areas have existing protective covers for the liner.

Sedimentation Pond East

We recommend review of the use of a ballast (possibly tires) on the exposed liner at the dyke to prevent wind uplift.

Baffinland Action: Baffinland will review ballast currently used on the exposed liner and place additional used tire ballast, if deemed required, by the end of November 2016 to prevent potential wind uplift/damage.

Sedimentation Pond West

We have no concerns other than that of possible wind damage to the liner and recommend the use of tires as ballast.

Baffinland Action: Baffinland will review ballast currently used on the exposed liner and place additional used tire ballast, if deemed required, by the end of November 2016 to prevent potential wind uplift/damage.

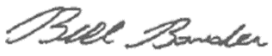
Loading Area Contaminated Storage (MP-HWB-1)

We have no recommendations with respect to this structure other than to repair the tear identified.

Baffinland Action: Baffinland will repair the torn liner by the end June 2018. In the meantime, stormwater and snowmelt in the berm will not be allowed to reach the height of the tear.

We trust that this submittal meets the requirements for geotechnical inspections as outlined in the Water Licence. Should you have any questions, please do not hesitate to contact the undersigned or Christopher Murray.

Regards,



William Bowden
Environmental Superintendent
Attachments:

Attachment 1: 2017 Geotechnical Inspection Report No. 1 (August 2017)

Cc: Stephen Williamson Bathory (Qikiqtani Inuit Association)
David Hohnstein (NWB)
Jonathan Mesher (INAC)
Todd Burlingame, Tim Sewell, Christopher Murray, Sylvain Proulx, Gordon Mudryk (Baffinland)

Attachment 1

2017 Geotechnical Inspection Report No. 1 (August 2017)

BHM Project No. 17-118

BAFFINLAND IRON MINES CORPORATION

ANNUAL GEOTECHNICAL INSPECTIONS
MARY RIVER PROJECT
FIRST INSPECTION OF TWO
August 2017

Prepared for:
Mr. Jeff Bush
Site Services Superintendent
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2275 Upper Middle Road East, Suite 300
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August 15, 2017

Baffinland Iron Mines Corporation
2275 Upper Middle Road East, Suite 300
Oakville, Ontario
L6H 0C3

Attention: Jeff Bush
jeff.bush@baffinland.com

RE: ANNUAL GEOTECHNICAL INSPECTIONS
BAFFINLAND IRON MINES CORPORATION
OUR REFERENCE NO. 17-118

1.0 INTRODUCTION

Barry H. Martin, P. Eng., Consulting Engineer, completed the ninth annual water licence geotechnical inspection of the following on-site engineered facilities as required by Licence No. 2AM-MRY 1325 of the Nunavut Water Board:

Pit Walls
Quarries
Landfills
Land Farms
Bulk Fuel Storage Facilities
Sediment Ponds
Collection Ponds
Polishing and Waste Stabilization Ponds

The inspection that took place August 1st to August 10th is the first phase of a biannual inspection to be carried out within the open water shipping season at the two Baffinland sites, in Mary River at the mine site, and at Milne Inlet at the port facility.

The inspections were carried out in accordance with the guidelines set out in "Dam Safety Guidelines 2007" as published by the Canadian Dam Association.

The inspections were completed by Mr. Barry H. Martin, P. Eng., the design Engineer for the initial containment facilities both at Mary River and Milne Inlet, the runway extension, initial bridges on the connecting road, the solid waste disposal site as well as continuing construction of select mine infrastructure.

The eight previous annual water licences geotechnical inspections were completed by Mr. Martin. You shall note that Hazardous Waste Containment Structures have been assigned new designations in the report as compared to previous years and are now identified by both the new designation and the past descriptive designation

The facilities inspected are as per the following:

Mary River Site

Bulk Fuel Storage Containment (MS-HWB-7)
Generator Fuel Storage Facility Containment
Polishing/Waste Stabilization Pond No. 1
Polishing/Waste Stabilization Ponds Nos. 2 and 3 (constructed as a two-cell structure)
Helicopter Fuel Cell Containment
Barrel Fuel Containment (constructed as a two-cell structure)(MS-HWB-3 and MS-HWB-4)
Hazardous Waste Storage (MS-HWB-2)
Enviro-Tank Storage (constructed contiguous with hazardous waste storage and stove oil storage) (MS-HWB-1)
Stove Oil Storage (MS-HWB-5)
Jet Fuel Tank and Pump Containment
Solid Waste Disposal Site
Mine Site Steel Fuel Tank Farm Containment
Quarry (QMR2)
Crusher Pad Drainage Containment
Waste Pile Drainage Containment
Jet "A" Aircraft Containment
Hazardous Waste Containment (MS-HWB-6)

A site plan for the Mary River site showing most structures reviewed is attached.

Milne Inlet Site

Hazardous Waste Storage (constructed as a two-cell structure) (MP-HWB-3, and MP-HWB-4,)
Fuel Tank Farm
New Sewage Effluent Pond (PWSP)
Land Farm
Contaminated Snow Containment
Sediment Ponds East and West
Quarry (Q1)
Loading Area Contaminated Storage (MP-HWB-1)
Fuelling Facility Containment

A site plan for the Milne Inlet site showing most structures reviewed is attached.

2.0 METHODOLOGY FOR INSPECTION

The geotechnical inspector was Barry H. Martin, P. Eng., who also reviewed the two sites in the past 8 years just as the annual shipping season commenced with the arrival of the first ship into port. This particular inspection took place just as the shipping season commenced. It may be noted that the "ice out" this season was later by up to one week than previous years.

The inspections primarily focused on the following aspects:

1. The structures were inspected for conformance with the design basis as presented in "as constructed" and "as-built" drawings (provided in the first and subsequent reports).

2. The structures were specifically inspected for settlement, cracking, and seepage through the berms.

3. The areas around the structures were examined for evidence of seepage.

4. Quarry walls were reviewed for relative stability. I note that the quarries are active removal areas and long term stability was not yet established.

5. New structures under construction were reviewed for conformity with design drawings.

6. Photographs were taken to document observations made during the inspection and are attached.

3.0 MARY RIVER CAMP

3.01 General

There was rain at the Mary River site for a number of days and hence the integrity of the containments could be verified by the water ponding in the containment.

A monitoring program is in place to test storm water that does accumulate within the containment structures. As reviewed, the water that does not meet the water licence effluent requirements is treated on site prior to release. For small amounts, the water is pumped out and transported to where treatment takes place.

At the Bulk Fuel Storage Facility Containment (MS-HWB-7), the water that collects within the dyke is treated at the end of the containment structure. At the time of this inspection, the treatment was actively taking place.

As with the report in previous years there are some new code names assigned to the containment structures.

Bladders and associated piping have been removed from the Bulk Fuel Storage Containment (Exploration Phase Bladder Farm). The Bulk Fuel Storage Containment is currently being used to store barrels of fuel, lubricant cubes, and a large fuel tank at this time. The north end of the berm is being used to store hydrocarbon contaminated water.

3.02 Bulk Fuel Storage Facility (Exploration Phase Bladder Farm)

General Conditions

The Bulk Fuel Storage Facility still exists but it is no longer utilized as a bulk fuel storage facility. There are a number of full fuel barrels and lubricant cubes now stored within the berms, as well as a large fuel tank.

The granular cover over the geotextile liner is still in place within the containment structure and a fair amount of water at one end awaiting treatment.

There is now a ramp over the south end of the containment to permit access over the dyke for placing barrels and cubes for storage.

At the south end, the access is through the former fuel unloading area

Stability

At the time of this initial review, water had not been removed from within the containment and water was ponding above the level of the gravel within the bottom of the containment at the north end of the facility.

At the load-out end of the facility there was water ponding within the dykes. At the former fuel unloading area at the north end there is water ponding within the dykes.

The soil structure is considered stable in the present condition and is in conformance with the design basis for the facility.

The presence of water within the structure and at the load-out area is an indication of the integrity of the liner.

The dykes have been built up last year to reinforce the concept of no loader travel over the dykes.

Recommendations

We have no recommendations with respect to this containment structure.

3.03 Generator Fuel Storage Containment (Exploration Phase)

This particular containment structure is planned to be decommissioned. The fuel bladder that was contained within the dyke has been removed.

The granular fill over the geotextile and liner shall require landfarming with the material from the bulk fuel storage facility.

There is no indication that the liner is compromised and decommissioning should proceed when the ponding water has been removed and granular cover is either moved to a land farm or other containment. There is water ponding within the structure confirming the integrity of the containment.

3.04 Polishing/Waste Stabilization Pond #1

General Conditions

PWSP No. 1 continues to be utilized as a holding facility for sewage plant effluent that does not meet water effluent quality criteria.

Currently the pond is being used primarily as a repository for off spec sewage and sewage sludge forming in lift stations.

The supernatant from PWSP No. 1 is periodically decanted to PWSPs Nos. 2 and 3 where it is tested and treated as required to meet Water Licence effluent requirements.

At the time of our visit there was approximately fifty percent of capacity to accommodate further sewage and the structure readily conforms to its design intent.

Stability

Our review of this area around the pond, at the base of the slopes, showed no sign of seepage and hence we conclude that the liner has been effective in containing sewage and there are no tears or ruptures in the membrane, excepting some minor tears from past activity at the top of the dyke well above the allowable effluent level in the structure in the horizontal portion of the membrane.

A review of the top of the dyke showed no indication of cracking or settlement which would indicate stresses within the structure.

Many of the tears that had occurred in the liner on the top of the dyke have been patched during the period between reviews in 2008 and 2009 and are holding well. As well, there are no signs of weather related deterioration of the liner where it is exposed.

There appears to be no sign of erosion of the dykes, even with the precipitation that has occurred over the lifetime of the facility.

The minor settlements have had little effect on the integrity of the structure.

Recommendations

We have no recommendations with respect to this containment facility.

3.05 Polishing Ponds/Waste Stabilization Ponds #2 and #3

General Conditions

The structure was designed and constructed as a two-cell structure.

The supernatant from PWSP #1 is currently discharged to PWSPs Nos. 2 and 3. The treated effluent is tested for Water Licence effluent requirements, treated if necessary, and discharged to the environment.

At the time of our visit there was considerable freeboard to accommodate further sewage and the structure readily conforms to its design intent. One cell was almost empty and contained less than one foot of liquid. The second cell was operating at 50% of capacity. The empty cell has not been utilized since 2016.

Stability

Our review of the area around the pond at the base of the slopes showed no sign of seepage and hence we conclude that the liner has been effective in containing the sewage and there are no tears or ruptures in the membrane.

Longitudinal cracking which appeared in the dykes of PWSP #3 due to the melt of permafrost wedges in 2009 has not reoccurred and we consider this structure to be stable in its present condition.

Monitoring points have been set upon the top of the dyke and have been monitored since 2009. Settlements have occurred since that time. These settlements have not led to any stress cracks in the structure. Monitoring was discontinued two years ago.

There appears to be no sign of erosion of the dykes and plants are continuing to seed themselves on the dykes. This growth is minimal, however.

The small bubbles that were observed under the liner at the time of the last year's first inspection have returned.

Recommendations

We have no recommendations with respect to this containment facility.

3.06 Helicopter Fuel Tank Containment

General Conditions

The structure was designed and constructed as a single cell structure that contains a 1000 gal fuel storage tank.

The structure currently conforms to its design intent.

In the past, a liner clad wood curb had been added to the top of the berm to prevent the erosion of gravel off the berm, caused by pulling the fuel hose from within the dyke out to the helicopters to provide them with fuel.

As it was the intent of the mine to use fuel that was available in barrels, a temporary cell has once again been constructed with a one piece liner. It measures 16' x 16' x 10" and can readily contain the four fuel drums it contains.

Stability

Our review of the area around the pond at the base of the slopes showed no sign of seepage.

A review of the exterior and the top of the berms showed no sign of cracking or settlement which would indicate stress within the structure.

The structure is considered to be stable in its present condition and contains water that attests to its integrity.

Recommendations

We have no recommendations with respect to this structure.

3.07 Barrel Fuel Containment (Now MS-HWB-3 and MS-HWB-4)

General Conditions

This particular structure which we called "Barrel Fuel Containment" in our previous inspection reports is a two-cell structure which is currently used to accommodate contaminated waste in the east cell and barrels of fuel in the west cell.

Stability

Our review of the area around this containment structure showed no sign of seepage. There is water ponding in this structure attesting to its integrity.

A review of the exterior and top of the dyke showed no sign of cracking or settlement which would indicate stresses within the structure.

The structure is considered to be stable in its present condition.

Recommendations

We have no recommendations at this time.

3.08 Hazardous Waste Storage (Now MS-HWB-2)

General Conditions

This particular cell was constructed contiguous with an existing cell, which is referred to on site as the "Enviro Tank Storage", from drawings by our office in 2010 and conforms to our drawings. It is also contiguous with the Stove Oil Storage cell.

This structure contains hazardous waste.

Stability

Our review of the area around this cell at the base of the slopes, showed no sign of seepage. There is water ponding in this structure.

The structure appears to be stable in its present condition. The water in the cell confirms the integrity of the liner.

Recommendations

There are no recommendations at this time.

3.09 Enviro Tank Storage (Now MS-HWB-1)

General Conditions

This particular structure is constructed contiguous with the Hazardous Waste Storage constructed in 2010 and the Stove Oil Storage cell. It is currently not being utilized and access is blocked.

Stability

Last year there was concern for the integrity of this cell as the cell was dry and the geotextile was exposed from heavy traffic during our initial inspection. During our second inspection, the cell was holding a small amount of water confirming limited integrity of the liner.

The cell was dry last year during the second inspection raising concerns anew on the integrity of the liner. This inspection showed minor water present.

Recommendations

We recommend that the geotextile over the liner be checked and the granular cover be made good prior to continuing use of this cell

3.10 Stove Oil Storage (Now MS-HWB-5)

General Conditions

This particular structure had been used to store barrels of stove fuel in 2011.

The structure again contains barrels of stove oil and some cubes of lubricant.

This structure was constructed in accordance with a standardized drawing provided by this office utilizing a one piece liner.

Stability

Our review of the exterior at the base of the dyke showed no sign of seepage. This shows that there is reasonably little chance of tearing or rupture of the membrane having taken place.

A review of the exterior and the top of the dyke showed no sign of cracking or settlement which would indicate stresses with the structure.

There is water contained within the cell confirming the integrity of the liner.

The structure is considered to be stable in its present condition.

3.11 Jet Fuel Tank and Pump Containment

General Conditions

This particular structure was reconstructed based on our recommendations of the 2012 Geotechnical Inspection.

The construction was completed in accordance with our recommendations for such structures and the liner was constructed as a one piece liner with geotextile protection on both sides and gravel over the geotextile as protection.

The construction appears proper and the structure is in good condition.

Minor water ponding confirms the integrity of the liner.

At this time as in our earlier inspection report last year, the jet fuel tank and pump have been removed and the cell is empty.

Stability

Our review of the area around the cell at the base of the slopes showed no sign of seepage and water is ponding within the cell.

The structure is stable in its present condition.

Recommendations

There are no recommendations at this time.

3.12 Solid Waste Disposal Site (Non-Hazardous Waste Landfill)

The solid waste disposal site is currently entering the second phase of its construction. The first lift of solid waste has been placed and covered fully and appears to be doing exactly what it was proposed to do at the design stage. Since our inspections last year, the first lift has been expanded. However much of the expansion is being relocated to a second lift.

Work is currently continuing on building a berm on three sides of the disposal site at a level above the existing lift in advance of placing another lift The berm is being constructed as per the berm on the first level that served well over the several years. Waste is now being placed within the berm.

Much of the thick cover has been removed from the first lift to accommodate the second lift.

There has been a fence structure of sections of screen and pallets to control wind blown waste from leaving the activity area of the waste disposal site.

3.13 Mine Site Steel Fuel Tank Farm Containment

General Conditions

All work now appears to be complete.

There is water ponding in the bottom of the containment confirming the integrity of the liner. This ponding of water is now well above the cover on the bottom of the containment.

Stability

All work appears to have been completed in accordance with drawings and we have no concerns with the stability of this containment structure.

Recommendations

We currently have no recommendations with respect to this containment structure.

3.14 Quarry QMR2

General Conditions

The quarry has well defined benches. The quarry faces at the benches are clean except in one end where some subsidences have occurred. This is the fracture zone noted in the last review.

Care must be taken while quarrying in the unstable fracture zone.

3.15 Crusher Pad Drainage Containment

General Conditions

Although there was no moisture flowing to the catchment pond, it is evident that the ditches in place and the containment pond are operating as intended. However, there is one low area at the north end where minor drainage bypasses the containment by flowing under the road through a pipe (conduit) used for electrical wires.

Stability

The structure has been completed in accordance with drawings included in our last report in a most satisfactory manner.

Recommendations

The conduit under the road at the north end should be sealed and revisions made to direct water from this area to the catchment ditch.

3.16 Waste Stockpile Drainage Containment

Stability

The dyke appears stable at this time.

This particular structure has now been completed. The structure is in place with all past recommendations having been satisfied. The outfall hose to pump the supernatant water over to the Mary River watershed is in place with the pump in place on the dyke.

3.17 Jet “A” Fuel Containment

General Conditions

This cell was constructed to replace the containment structure near the Weatherhaven Camp.

This cell now contains two double walled tanks and is located north of the air terminal buildings.

Stability

The cell was constructed using a one piece enviroliner with geotextile and was constructed in accordance with standardized drawings prepared in the past for such construction by our office.

There is water ponding in the bottom of the cell confirming the integrity of the liner.

There were no signs of cracking of the dykes. A granular ramp has been constructed over the dyke to facilitate access for snow removal

Recommendations

We have no recommendations with respect to this structure.

3.18 Hazardous Waste Containment (MS-HWB-6)

General Conditions

Although it was constructed in 2012, we had not reported on it until 2015.

It is located near the incinerator and is utilized to store barrels of ash and waste from the incinerator. It is, however, empty at this time.

Stability

The cell was constructed utilizing a one piece enviroliner with geotextile and was constructed in accordance with standardized drawings prepared in the past for such construction by our office.

There is water ponding in the bottom of the cell confirming the integrity of the liner. This water is currently in the form of ice.

There were 3 locations where the enviroliner is damaged near the top of the dyke.

Recommendations

We have no recommendations with respect to this structure other than making repairs to the damaged enviroliner

3.19 Overview

This report is the first phase of the ninth annual Geotechnical Inspection at Mary River and Milne Inlet completed by this author on behalf of Baffinland Iron Mines Corporation and the third year of reporting covering the first of two inspections in one shipping season.

As set out in our past reports, there has been little or no erosion taken place from wind or rain and the dykes constructed of the sand/gravel soil have remained stable at slopes of 3:1 and 4:1.

As noted last year, there are only just now signs of settlement appearing at PSWP's 1, 2 and 3. The settlements are not differential settlements of the dykes but are minor overall settlements of the total structures with respect to the surrounding area.

These settlements appear to be settlements within the one metre ± active layer above the permafrost and are of little concern as the PWSP's are temporary structures and the settlements have no effect on the dyke stability.

It is expected that many of the structures that form the basis for the inspections set out in the biannual Geotechnical inspections shall be decommissioned as the mine facilities are finalized.

A number of these structures at Mary River are awaiting the construction of a land farm facility to facilitate the disposal of contaminated granular fill from the bottom of containment cells.

We recommend that where clear water has collected from rainfall and no contamination exists that the water be decanted.

Mary River Photos

1. Bulk Fuel Storage Facility (MS-HWB-7)

2. Generator Fuel Containment

3. PSWP #1

4. PWSP #2

5. PWSP #3

6. Helicopter Fuel Tank Containment

7. Temporary Helicopter Fuel Containment

8. Barrel Fuel Containment MS-HWB-4

9. Barrel Fuel Containment MS-HWB-5

10. Hazardous Waste Storage (MS-HWB-2)

11. Envirotank Storage MS-HWB-5

12. Stove Oil Storage MS-HWB-1

13. Jet Fuel Tank and Pump Containment

14. Solid Waste Disposal Site

15. Mine Site Steel Fuel Tank Farm Containment

16. Mary River Quarry (QMR2)

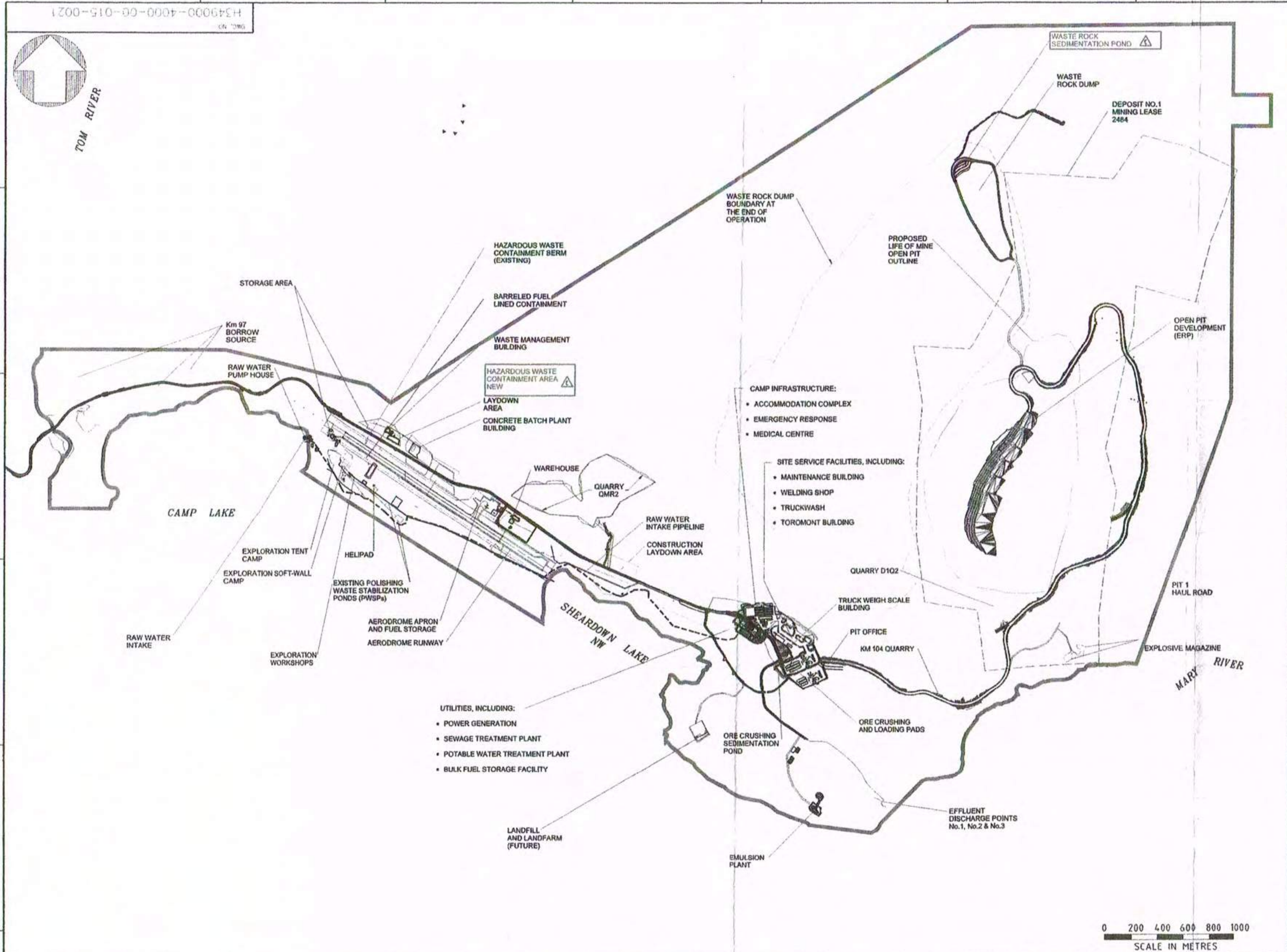
17. Crusher Pad Drainage Containment

18. Waste Pile Drainage Containment

19. Jet A Fuel Containment

20. Hazardous Waste Containment (MS-HWB-6)

Mary River Drawing


H349000-4000-00-015-0021
TOM RIVER
CAMP LAKE
STORAGE AREA
Km 97 BORROW SOURCE
RAW WATER PUMP HOUSE
HAZARDOUS WASTE CONTAINMENT BERM (EXISTING)
BARRELED FUEL LINED CONTAINMENT
WASTE MANAGEMENT BUILDING
HAZARDOUS WASTE CONTAINMENT AREA NEW
LAYDOWN AREA
CONCRETE BATCH PLANT BUILDING
WAREHOUSE
QUARRY QMR2
RAW WATER INTAKE PIPELINE
CONSTRUCTION LAYDOWN AREA
EXPLORATION TENT CAMP
EXPLORATION SOFT-WALL CAMP
HELIPAD
EXISTING POLISHING WASTE STABILIZATION PONDS (PWSPs)
AERODROME APRON AND FUEL STORAGE
AERODROME RUNWAY
RAW WATER INTAKE
EXPLORATION WORKSHOPS
SHEARDOWN NW LAKE
WASTE ROCK DUMP BOUNDARY AT THE END OF OPERATION
CAMP INFRASTRUCTURE:
• ACCOMMODATION COMPLEX
• EMERGENCY RESPONSE
• MEDICAL CENTRE
SITE SERVICE FACILITIES, INCLUDING:
• MAINTENANCE BUILDING
• WELDING SHOP
• TRUCKWASH
• TOROMONT BUILDING
QUARRY D1Q2
TRUCK WEIGH SCALE BUILDING
PIT OFFICE
KM 104 QUARRY
ORE CRUSHING AND LOADING PADS
ORE CRUSHING SEDIMENTATION POND
UTILITIES, INCLUDING:
• POWER GENERATION
• SEWAGE TREATMENT PLANT
• POTABLE WATER TREATMENT PLANT
• BULK FUEL STORAGE FACILITY
LANDFILL AND LANDFARM (FUTURE)
EMULSION PLANT
EFFLUENT DISCHARGE POINTS No.1, No.2 & No.3
WASTE ROCK SEDIMENTATION POND
WASTE ROCK DUMP
DEPOSIT NO.1 MINING LEASE 2484
PROPOSED LIFE OF MINE OPEN PIT OUTLINE
OPEN PIT DEVELOPMENT (ERP)
PIT 1 HAUL ROAD
EXPLOSIVE MAGAZINE
MARY RIVER
0 200 400 600 800 1000
SCALE IN METRES

MILNE PORT

MINE SITE

KEYPLAN

FOR INFORMATION

NOTES:

1. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
2. 2016 WORK SHOWN IN RED TEXT.

LEGEND:

WATER	BORROW AREA	RIVER/STREAM/DRAINAGE	COMMERCIAL LEASE
QUARRY	ROAD	RAW WATER INTAKE PIPELINE	PROJECT DEVELOPMENT AREA

REV	ISSUE FOR	AUTH BY	DATE
C	ISSUED FOR USE	M.B. J.B.	2015-10-15
B	ISSUE FOR USE	S.M. T.M.	2014-12-10
A	ISSUE FOR USE	C.L. A.G.	2014-10-31

ISSUE AUTHORIZATION

HATCH

DESIGNED BY C. LEISTNER DATE 2014-10-21
DRAWN BY J. BAJAGIC DATE 2014-10-21
CHECKED BY S. POTTER DATE 2014-10-21
DISCIP. ENGR. A. GRZEGORCZYK DATE 2014-10-21
PROJ. DES. COORD. T. THERTELL DATE 2014-10-21
PROJ. ENGR. J. CLELAND DATE 2014-10-21
PROJ. MGR J. CLELAND DATE 2014-10-21

Baffinland

MARY RIVER PROJECT

MINE SITE
INFRASTRUCTURE FOOTPRINT
WORK PLAN 2016

SCALE 1:15000 OR AS NOTED
DWG. NO. H349000-4000-00-015-0021
REV C

ORIGINAL SHEET SIZE: ISO A1 (841 x 594)

4.0 MILNE INLET

4.01 General

There are still changes taking place at Milne Inlet, even since our last inspection in September/October of last year.

Recent work has just been completed to correct deficiencies/incomplete work at the entrances to the sedimentation ponds.

4.02 Hazardous Waste Storage (MP-HWB-3, MP-HWB-4)

General Conditions

This particular structure has been constructed as a two-cell structure and is now only utilized to store sea cans that contain scraps of enviroliner and geotextile removed from the decommissioning of the exploration phase bulk fuel bladder farm.

A new hazardous waste storage facility has now been constructed near the loadout area for storing hazardous waste to be shipped out and is in full operation as in last year's report HWB-5 is now decommissioned.

Stability

There is water ponding in both cells of the original structure This confirms the integrity of the enviroliner at this time in these two cells.

Our review of the area around the dykes, at the base of the slopes, showed no sign of seepage. The structure is considered stable.

Recommendations

We have no recommendations with respect to the use of these two cells at this time.

4.03 Fuel Tank Farm

General Conditions

Since both 2012 and 2013 the fuel tank farm has been expanded considerably with the addition of a number of new tanks. No tanks have been added since last season but there is room to place additional tanks.

Two sumps are planned to be installed in the north end (low end) of the containment. Water is currently ponding in the low end of the containment, confirming the integrity of the enviroliner.

Stability

All containment dykes are in excellent condition and there is no sign of weakness.

Recommendations

We have no recommendations with respect to the containment at this time.

4.04 New Effluent Pond (PWSP)

General Conditions

This pond was put into operation in 2014.

The containment pond was operating at less than fifty percent of capacity at the time of our inspection.

Stability

We noted no sign of weakness in any of the construction.

Recommendations

We have no recommendations with respect to the use of this structure having no negative comments on the construction of this structure.

4.05 Landfarm Containment

General Conditions

The landfarm containment is complete except for soil cover on the dykes in the area of the sump.

The landfarm was constructed to accommodate approximately 9000 m^3 of hydrocarbon contaminated soil and seasonal water accumulations.

At the time of our inspection, the landfarm was in operation and some sorting of contaminated materials had taken place. Since our last inspection, there is still minor sorting to take place including the removal of some waste and contaminated waste.

There is still some contaminated waste in the landfarm in addition to contaminated soil. No land farming or treatment of contaminated soil has taken place.

It appears as though the structure has been constructed in accordance with good construction practice for structures of this type.

Stability

The structure appears stable as constructed.

Recommendations

We recommend that the remaining dyke structure without protective cover over it be covered as per the design drawings. This however, is not an absolute requirement.

There are no changes in the structure since our last inspection.

4.06 Contaminated Snow Containment

General Conditions

The construction of the contaminated snow containment structure is contiguous with the east end of the landfarm.

It appears as though the structure has been constructed in accordance with good construction practice for structures of this type.

The snow containment facility has a containment volume of 929 m^3 based on estimates of volume provided by the owner and only a small percentage of the capacity is utilized.

The structure has been constructed with good quality control.

Stability

The structure appears stable as constructed.

Recommendations

We have no recommendations with respect to this construction at this time. The structure appears as it did in our September/October review in 2016.

4.07 Sedimentation Pond East

General Conditions

The construction of this sedimentation pond for drainage from the east side of the site is complete.

The basin is shaped and the liner has been installed throughout the basin from inlet to the berms on the north side of the basin.

There has been no cover placed over the liner to this point although some tire ballast has been placed over the liner on the north side.

The two inlets to the pond have very recently been upgraded and the enviroliner has been repaired at these locations.

Stability

We have concerns over the stability of the liner on this pond and recommend the possibility of further tire ballast over the liner which appears possibly subject to wind damage. This shall provide a function for used tires.

Recommendations

We recommend review of the use of a ballast (possibly tires) on the exposed liner at the dyke to prevent wind uplift.

4.08 Sedimentation Pond West

General Conditions

The construction of this sedimentation pond for drainage from the west side of the site is now complete with repairs recommended in our report of last year having been completed.

The inlet where the water was being conducted under the liner has been made good and the inlet has been reconstructed.

Stability

We have some concern over the stability of the liner on this pond as we have with the east pond and further recommend that used tire ballast be considered.

Recommendations

We have no concerns other than that of possible wind damage to the liner and recommend the use of tires as ballast.

4.09 Quarry (Q1)

General Conditions

The quarry was just commencing activity at the time of our review and all blasted rock had been removed from the quarry site.

Stability

Rock faces appear stable.

A rock berm has been placed along the face. I assume this is to contain falling rock during the cleaning of the upper face prior to blasting. This is an excellent idea.

Recommendations

We have no recommendations to be made with respect to the quarry.

4.10 Loading Area Contaminated Storage (Now MP-HWB-1)

General Conditions

This area has been constructed near the loading dock to facilitate assembly of hazardous materials for shipment out

Most hazardous waste has now been removed from the containment and shipped out.

Construction appears to have taken place in accordance with standardized drawings prepared in the past

Stability

Construction appears stable. However there is one exposed tear in the liner at the dyke that requires repair.

Recommendations

We have no recommendations with respect to this structure other than to repair the tear.

4.11 Fuelling Facility Containment

General Condition

A new fueling facility for the fueling of B trains is under construction utilizing design drawings prepared by our office.

Work conforms to the design drawing.

4.12 Overview

Work on containment structures except for maintenance appears complete.

Respectfully submitted,

Barry H. Martin, P. Eng., MRAIC

REGISTERED PROFESSIONAL ENGINEER
B.H. MARTIN
LICENSEE
NWT/NU

Milne Inlet Photos

21. Hazardous Waste Storage (MP-HWB-4)

22. Hazardous Waste Storage (MP-HWB-3)

23. Fuel Tank Farm

24. Sewage Effluent Pond (PWSP)

25. Land Farm Containment

26. Contaminated Snow Containment

27. Sedimentation Pond East

28. Sedimentation Pond East - Liner at south inlet

29. Sedimentation Pond West

30. Milne Quarry (Q1)

31. Loading Area Contaminated Storage (MP-HWB-1)

32. Fuelling Facility (OHT Laydown)

Milne Inlet Drawing

H349000-2000-00-015-0021

MILNE INLET

AANDC NUNAVUT LEASE 47H/16-1-2

SHIPLOADER

ORE DOCK

ORE STOCKPILE SETTLING PONDS

FUTURE AIRSTRIP

ORE STOCKPILE PAD

ADDITIONAL LAYDOWN AREA ⚠

POTABLE WATER SUPPLY

CONVERT EXISTING CONCRETE BATCH PLANT BUILDING TO MAINTENANCE BUILDING ⚠

PHILLIPS CREEK

FUTURE POLISHING WASTE STABILIZATION POND

TOTE ROAD

SEALIFT BARGE LANDING AREA

RAMP TO BEACH

FUEL TANK FARM

EFFLUENT DISCHARGE LOCATION
N 7976341
E 503639

HAZARDOUS WASTE BERMS

LAYDOWN AREA

SERVICES AREA PAD
SITE FACILITIES, INCLUDING:

- MAINTENANCE BUILDING
- WELDING SHOP BUILDING
- WORKSHOP OFFICE BUILDING
- TOROMONT MAINTENANCE BUILDING

POWER GENERATORS

INCINERATOR HAZARDOUS WASTE BERM

POLISHING WASTE STABILIZATION POND

EXISTING HAZARDOUS WASTE BERM

MATRIX CAMP

CAMP INFRASTRUCTURE PAD
SITE FACILITIES, INCLUDING:

- ACCOMMODATION COMPLEX
- EMERGENCY RESPONSE OFFICE
- EMERGENCY RESPONSE GARAGE
- SEWAGE TREATMENT PLANT
- POTABLE WATER TREATMENT PLANT
- WASTE MANAGEMENT FACILITY

LAND FARM

ROCK QUARRY N0.1 BOUNDARY

EXTENT OF QUARRY Q1

PERMITTED OPEN BURN PIT AREA

KM2 BORROW AREAS

MILNE PORT

MINE SITE

KLYP_AN

EXISTING HTO CABIN

FOR INFORMATION

NOTES:

1. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
2. 2016 WORK SHOWN IN RED TEXT.

0 50 100 150 200 250
SCALE IN METRES

LEGEND:

- WATER
- QUARRY
- COMMERCIAL LEASE
- AANDC LEASE 47H/16-1-2
- RIVER/STREAM/DRAINAGE
- ROAD
- PROJECT DEVELOPMENT AREA
- BORROW AREAS

REV.	ISSUE FOR	AUTH. BY	DATE
D	ISSUED FOR USE	M.B.	J.B. 2015.10.15
C	ISSUE FOR USE	S.M.	T.M. 2014-12-10
B	ISSUE FOR USE	C.L.	T.M. 2014-10-31
A	ISSUE FOR USE	C.L.	A.G. 2014-06-19

ISSUE AUTHORIZATION

HATCH

DESIGNED BY: C. LEISTNER DATE 2014-10-20	DRAWN BY: J. BAJACIC DATE 2014-10-20
CHECKED BY: S. POTTER DATE 2014-10-20	DISCIP. ENGR.: A. GRZEGORCZYK DATE 2014-10-20
PROJ. DES. COORD.: T. THERTELL DATE 2014-10-20	PROJ. ENGR.: J. CLELAND DATE 2014-06-19
PROJ. MGR.: J. CLELAND DATE 2014-06-19	

Baffinland

MARY RIVER PROJECT

MILNE PORT
INFRASTRUCTURE FOOTPRINT
WORK PLAN 2016

SCALE: 1:5000 OR AS NOTED

DWG. NO. H349000-2000-00-015-0021

REV. D

APPENDIX C.2.2

2017 GEOTECHNICAL INSPECTION NO. 2

November 30, 2017

Sean Joseph
Senior Technical Advisor, NWB
P.O. Box 119
Gjoa Haven, NU X0B 1J0

RE: Submission of 2017 Geotechnical Inspection Report No. 2 (Oct. 2017)

Please find enclosed the Geotechnical Inspection report titled *Annual Geotechnical Inspections, Mary River Project, Second Inspection of Two* dated 29 November 2017 and prepared by Barry H. Martin Consulting Engineer and Architect (BMCE) of Timmins, Ontario, on behalf of Baffinland Iron Mines Corporation (Baffinland) for the Mary River Project (the 'Project"). This report was prepared as required under Part D of Baffinland's Type "A" Water Licence 2AM-MRY1325 Amendment No. 1 (Water Licence), which states that:

> "*The Licensee shall conduct inspections of the earthworks and geological and hydrological regimes of the Project biannually during the summer or as otherwise approved by the Board in writing. The inspection shall be conducted by a Geotechnical Engineer and the inspection report shall be submitted to the Board within sixty (60) days of the inspection, including a cover letter from the Licensee outlining an implementation plan to respond to the Engineer's recommendations*."

The second geotechnical field inspection for 2017 was conducted by Mr. Barry Martin of BMCE. The focus of the inspection was on the Water Licence related infrastructure located at the main camp sites, known as the Mary River Mine Site and Milne Port, and select infrastructure along the Milne Inlet Tote Road. Mr. Barry Martin has been conducting annual geotechnical inspections for the Project since 2008. The attached report (Attachment 1) covers the second inspection that was conducted between September 27th and October 3rd, 2017.

During the inspection, the following infrastructure and facilities were inspected:

Mary River Mine Site

- Generator Fuel Storage Facility Containment
- Polishing/Waste Stabilization Pond No. 1
- Polishing/Waste Stabilization Ponds Nos. 2 and 3
- Helicopter Fuel Cell Containment
- Enviro-Tank Storage (MS-HWB-1)
- Hazardous Waste Storage (MS-HWB-2)
- Barrel Fuel Containment (MS-HWB-3 and MS-HWB-4)
- Stove Oil Storage (MS-HWB-5)
- Hazardous Waste Containment (MS-HWB-6)
- Bulk Fuel Storage Containment (MS-HWB-7)

Mary River Mine Site cont'd

- Jet Fuel Tank and Pump Containment
- Non-Hazardous Waste Landfill
- Mine Site Steel Fuel Tank Farm Containment
- Quarry (QMR2)
- Crusher Pad Drainage Containment (MS-06)
- Waste Rock Stockpile Pond (MS-08)
- Jet "A" Aircraft Containment

Milne Port

- Loading Area Contaminated Storage (MP-HWB-1)
- Hazardous Waste Storage (MP-HWB-3, and MP-HWB-4)
- Milne Port Bulk Fuel Storage Facility (MP-03)
- New Sewage Effluent Pond (PWSP)
- Landfarm Containment
- Contaminated Snow Containment
- Milne Port Ore Stockpile Sedimentation Pond East (MP-05)
- Milne Port Ore Stockpile Sedimentation Pond West (MP-06)
- Quarry (Q1)
- Fuelling Facility Containment

Tote Road

- Bridge Abutments
- Rock Shatter Utilized as Fill Material for Roadways and Culverts
- Slope Stablization at Km 90 to 93

Maps for the Mary River Mine Site, Milne Port and Milne Inlet Tote Road that show most of structures reviewed during the inspection are included in the inspection report (Attachment 1).

The attached inspection report (Attachment 1) presents the findings of the second 2017 geotechnical inspection and recommendations for the aforementioned structures. The following subsections of this letter summarize Baffinland's plan for implementing recommendations. Where this is no mention of particular infrastructure, there were no concerns identified by BMCE during the inspection.

<u>Recommendations for the Mary River Mine Site Infrastructure</u>

Enviro Tank Storage (MS-HWB-1)

We recommend that the geotextile over the liner be checked and the granular cover be made good prior to continuing use of this cell.

<u>Baffinland Action:</u> The cell is currently not being used and has been left empty. The Site Services Department supervisors are aware that this area shall not be used for the storage of hazardous waste or substances until it has been repaired. Alternatively, this facility may be decommissioned.

Waste Rock Stockpile Pond (MS-08)

When weather permits, the integrity of the existing pond should be restored.

Baffinland Action: Baffinland continues to develop an action plan to address outstanding concerns regarding the Waste Rock Stockpile Facility. Golder Associates have been retained to assist with the management of water and waste rock for the Project's waste rock stockpile facility. Once finalized, the action plan will be submitted to the NWB for review and approval.

Recommendations for Milne Port Infrastructure

Landfarm Containment

We recommend that the remaining dyke structure without protective cover over it be covered as per the design drawings. This however, is not an absolute requirement.

Baffinland Action: Baffinland will endeavor to place a protective cover of material over the exposed liner but notes that this is not requirement for the engineered lined containment area. Accessible areas within the containment have a layer of material protecting the underlying liner.

Milne Port Ore Stockpile Sedimentation Pond East (MP-05)

We recommend review of the use of a ballast (possibly tires) on the exposed liner at the dyke to prevent wind uplift.

Baffinland Action: Baffinland will review ballast currently used on the exposed liner and place additional used tire ballast, as required, by the end of December 2017 to prevent potential wind uplift/damage.

Milne Port Ore Stockpile Sedimentation Pond West (MP-06)

We have no concerns other than that of possible wind damage to the liner and recommend the use of tires as ballast.

Baffinland Action: Baffinland will review ballast currently used on the exposed liner and place additional used tire ballast, as required, by the end of December 2017 to prevent potential wind uplift/damage.

Recommendations for Milne Inlet Tote Road Infrastructure

Tote Road Bridge Abutments

I [Barry Martin] recommend reconstruction of the abutment formed with metal containment utilizing double the length parallel to the road and 50% wider containment. Due to the concerns of ACROW as to maintain clearance between the concrete abutments and the ends of the trusses, this clearance must be checked annually. I [Barry Martin] recommend that consideration be given to having the trucks come to a full stop at least 50 metres from each end of the bridges. The braking action of the ore haulers does put undue stress upon the road bed which is transferred to the concrete abutments near the top of the abutments.

Baffinland Action: ACROW Ltd. has been contracted by Baffinland to conduct an assessment of the Tote Road bridges and associated abutments. Baffinland is currently reviewing Mr. Martin's recommendations in concert with the recommendations provided by ACROW.

We trust that this submittal meets the requirements for geotechnical inspections as outlined in the Water Licence. Should you have any questions, please do not hesitate to contact the undersigned or Christopher Murray.

Regards,

Connor Devereaux
Environmental Superintendent

Attachments:
Attachment 1: 2017 Geotechnical Inspection Report No. 2 (November 2017)

Cc: Stephen Williamson Bathory (Qikiqtani Inuit Association)
David Hohnstein (NWB)
Jonathan Mesher, Sarah Forté (INAC)
Todd Burlingame, Tim Sewell, Christopher Murray, Sylvain Proulx, Gordon Mudryk (Baffinland)

Attachment 1

2017 Geotechnical Inspection Report No. 2 (November 2017)

BHM Project No. 17-118

BAFFINLAND IRON MINES CORPORATION

ANNUAL GEOTECHNICAL INSPECTIONS
MARY RIVER PROJECT
SECOND INSPECTION OF TWO
November2017

Prepared for:
Mr. Jeff Bush
Site Services Superintendent
Baffinland Iron Mines Corporation
2275 Upper Middle Road East, Suite 300
Oakville, Ontario L6H 0C3

Barry H. Martin, P. Eng., MRAIC, Consulting Engineer and Architect
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INDEX

5.0 MILNE INLET TOTE RAOD

5.01 General
5.02 Bridge Abutments
5.03 Rock Shatter Utilized as Fill Material at Road and Culverts
5.04 Slope Stabilization at km 90 - 93

Tote Road Photos
Tote Road Drawing

November 29th, 2017

Baffinland Iron Mines Corporation
2275 Upper Middle Road East, Suite 300
Oakville, Ontario
L6H 0C3

Attention: Jeff Bush
jeff.bush@baffinland.com

RE: ANNUAL GEOTECHNICAL INSPECTIONS
BAFFINLAND IRON MINES CORPORATION
OUR REFERENCE NO. 17-118

1.0 INTRODUCTION

Barry H. Martin, P. Eng., Consulting Engineer, completed the eighth annual water licence geotechnical inspection of the following on-site engineered facilities as required by Licence No. 2AM-MRY 1325 of the Nunavut Water Board:

Pit Walls
Quarries
Landfills
Land Farms
Bulk Fuel Storage Facilities
Sediment Ponds
Collection Ponds
Polishing and Waste Stabilization Ponds

The inspection that took place September 27th to October 3rd, 2017, is the second phase of a biannual inspection to be carried out within the open water shipping season at the two Baffinland sites, in Mary River at the mine site, and at Milne Inlet at the port facility, as well as the Milne Inlet Tote Road joining the two sites.

The inspections were carried out in accordance with the guidelines set out in "Dam Safety Guidelines 2007" as published by the Canadian Dam Association.

The inspections were completed by Mr. Barry H. Martin, P. Eng., the design Engineer for the initial containment facilities both at Mary River and Milne Inlet, the runway extension, initial bridges on the connecting road, the solid waste disposal site as well as continuing construction of select mine infrastructure.

The eight previous annual water licences geotechnical inspections were completed by Mr. Martin. You shall note that Hazardous Waste Containment Structures have been assigned new designations in the report as compared to previous years and are now identified by both the new designation and the past descriptive designation.

The facilities inspected are as per the following:

1.01 Mary River Site

Bulk Fuel Storage Containment (MS-HWB-7)
Generator Fuel Storage Facility Containment
Polishing/Waste Stabilization Pond No. 1
Polishing/Waste Stabilization Ponds Nos. 2 and 3 (constructed as a two-cell structure)
Helicopter Fuel Cell Containment
Barrel Fuel Containment (constructed as a two-cell structure) (MS-HWB-3 and MS-HWB-4)
Hazardous Waste Storage (MS-HWB-2)
Enviro-Tank Storage (constructed contiguous with hazardous waste storage and stove oil storage) (MS-HWB-1)
Stove Oil Storage (MS-HWB-5)
Jet Fuel Tank and Pump Containment
Non-hazardous Waste Landfill
Mine Site Steel Fuel Tank Farm Containment
Quarry (QMR2)
Crusher Pad Drainage Containment (MS-06)
Waste Rock stockpile pond (MS-08)
Jet "A" Aircraft Containment
Hazardous Waste Containment (MS-HWB-6)

A site plan for the Mary River site showing most structures reviewed is attached.

1.02 Milne Inlet Site

Hazardous Waste Storage (constructed as a two-cell structure) (MP-HWB-3, and MP-HWB-4)
Fuel Tank Farm (MP-03)
New Sewage Effluent Pond (PWSP)
Land Farm (MP-04)
Contaminated Snow Containment (MP-04a)
Milne Port Ore Stockpile Ponds East & West (MP-05 & MP-06)
Quarry (Q1)
Loading Area Contaminated Storage (MP-HWB-1)
Fuelling Facility Containment

A site plan for the Milne Inlet site showing most structures reviewed is attached.

1.03 Milne Inlet Tote Road

Bridge Abutments at km 17, km 62, km 80 and km 97

Cut at km 76

Slope Stabilization at km 90-93.

A map setting out the roadway from Milne Inlet to Mary River is attached.

2.0 METHODOLOGY FOR INSPECTION

The geotechnical inspector was Barry H. Martin, P. Eng., who also reviewed the two sites in the past 8 years just as the annual shipping season commenced with the arrival of the first ship into port. This inspection was planned to take place at the end of the shipping season. This particular inspection took place just as the shipping season ended.

The inspections primarily focused on the following aspects:

1. The structures were inspected for conformance with the design basis as presented in "as constructed" and "as-built" drawings (provided in the first and subsequent reports).

2. The structures were specifically inspected for settlement, cracking, and seepage through the berms.

3. The areas around the structures were examined for evidence of seepage.

4. Quarry walls were reviewed for relative stability. I note that the quarries are active removal areas and long term stability was not yet established.

5. New structures under construction were reviewed for conformity with design drawings.

6. Photographs were taken to document observations made during the inspection and are attached.

3.0 MARY RIVER CAMP

3.01 General

There was freezing weather with wind at the Mary River site and some snow, and hence the integrity of the containments could be verified by the frozen water ponding in the containment.

A monitoring program is in place to test storm water that does accumulate within the containment structures. As reviewed, the water that does not meet the water licence effluent requirements is treated on site prior to release. For small amounts the water is pumped out and transported to where treatment takes place.

As with the report in previous years there are some new code names assigned to the containment structures.

3.02 Bulk Fuel Storage Facility (Exploration Phase Bladder Farm) (MS-HWB-7)

General Conditions

At the Bulk Fuel Storage Facility Containment (MS-HWB-07), the water that collects within the dyke is treated at the end of the containment structure. At the time of this inspection, the treatment operation was not actively taking place.

The Bulk Fuel Storage Facility still exists but it is no longer utilized as a bulk fuel storage facility. There are a number of full fuel barrels and lubricant cubes now stored within the berms, as well as a large fuel tank.

There is now a ramp over the south end of the containment to permit access over the dyke for placing barrels and cubes for storage.

At the south end, the access is through the former fuel unloading area

Stability

At the time of this second review, some water remained from the treatment that occurred in the summer. A significant amount of water was treated from MS-HWB-7 this year. Water was ponding above the level of the gravel within the bottom of the containment at the north end of the facility. This water is just beginning to freeze.

At the load-out end of the facility there was water ponding within the dykes. At the former fuel unloading area at the south end there is water ponding within the dykes.

The soil structure is considered stable in the present condition and is in conformance with the design basis for the facility.

The presence of ice and water within the structure and at the load-out area is an indication of the integrity of the liner.

The dykes have been built up last year to reinforce the concept of no loader travel over the dykes.

Recommendations

We have no recommendations with respect to this containment structure.

3.03 Generator Fuel Storage Containment (Exploration Phase)

This particular containment structure is planned to be decommissioned. The fuel bladder that was contained within the dyke has been removed.

The granular fill over the geotextile and liner shall require landfarming with the material from the bulk fuel storage facility.

There is no indication that the liner is compromised and decommissioning should proceed when the ponding water has been removed and the granular cover is either moved to a land farm or other containment. There is water ponding within the structure confirming the integrity of the containment.

3.04 Polishing/Waste Stabilization Pond #1

General Conditions

PWSP No. 1 continues to be utilized as a holding facility for sewage plant effluent that does not meet water effluent quality criteria.

Currently the pond is being used primarily as a repository for off spec sewage and sewage sludge forming in lift stations.

The supernatant from PWSP No. 1 is periodically decanted to PWSPs Nos. 2 and 3 where it is tested and treated as required to meet Water Licence effluent requirements.

At the time of our visit there was approximately fifty percent of capacity to accommodate further sewage and the structure readily conforms to its design intent.

Stability

Our review of this area around the pond at the base of the slopes showed no sign of seepage and hence we conclude that the liner has been effective in containing sewage and there are no tears or ruptures in the membrane, excepting some minor tears from past activity at the top of the dyke well above the allowable effluent level in the structure in the horizontal portion of the membrane.

A review of the top of the dyke showed no indication of cracking or settlement which would indicate stresses within the structure.

Many of the tears that had occurred in the liner on the top of the dyke have been patched during the period between reviews in 2008 and 2009 and are holding well. As well, there are no signs of weather related deterioration of the liner where it is exposed.

There appears to be no sign of erosion of the dykes, even with the precipitation that has occurred over the lifetime of the facility.

The minor settlements have had little effect on the integrity of the structure.

Recommendations

We have no recommendations with respect to this containment facility.

3.05 Polishing Ponds/Waste Stabilization Ponds #2 and #3

General Conditions

The structure was designed and constructed as a two-cell structure.

The supernatant from PWSP #1 is currently discharged to PWSPs Nos. 2 and 3. The treated effluent is tested for Water Licence effluent requirements, treated if necessary, and discharged to the environment.

At the time of our visit there was considerable freeboard to accommodate further sewage and the

structure readily conforms to its design intent. One cell was almost empty and contained less than one foot of liquid. The second cell was operating at 50% of capacity. The empty cell has not been utilized since 2016.

Stability

Our review of the area around the pond at the base of the slopes showed no sign of seepage and hence we conclude that the liner has been effective in containing the sewage and there are no tears or ruptures in the membrane.

Longitudinal cracking which appeared in the dykes of PWSP #3 due to the melt of permafrost wedges in 2009 has not reoccurred and we consider this structure to be stable in its present condition.

Monitoring points had been set upon the top of the dyke and had been monitored since 2009. Settlements have occurred since that time. These settlements have not led to any stress cracks in the structure. Monitoring of top of berm elevation was discontinued two years ago.

There appears to be no sign of erosion of the dykes and plants are continuing to seed themselves on the dykes. This growth is minimal, however.

The small bubbles that were observed under the liner at the time of the last year's first inspection have returned.

Recommendations

We have no recommendations with respect to this containment facility.

3.06 Helicopter Fuel Tank Containment

General Conditions

The structure was designed and constructed as a single cell structure that contains a 1000 gal fuel storage tank.

The structure currently conforms to its design intent.

In the past, a liner clad wood curb had been added to the top of the berm to prevent the erosion of gravel off the berm, caused by pulling the fuel hose from within the dyke out to the helicopters to provide them with fuel.

As it was the intent of the mine to use fuel that was available in barrels, a temporary cell has once again been constructed with a one piece liner. It measures 16' x 16' x 10' and can readily contain a number of drums as are currently placed in this containment.

Stability

Our review of the area around the containment at the base of the slopes showed no sign of seepage.

A review of the exterior and the top of the berms showed no sign of cracking or settlement which would indicate stress within the structure.

The structure is considered to be stable in its present condition and contains frozen water that attests to its integrity.

Recommendations

We have no recommendations with respect to this structure.

3.07 Barrel Fuel Containment (MS-HWB-3 and MS-HWB-4)

General Conditions

This particular structure which we called “Barrel Fuel Containment” in our previous inspection reports is a two-cell structure which is currently used to accommodate contaminated waste in the east cell and barrels of fuel in the west cell.

Stability

Our review of the area around this containment structure showed no sign of seepage. There is frozen water ponding in this structure attesting to its integrity.

A review of the exterior and top of the dyke showed no sign of cracking or settlement which would indicate stresses within the structure.

The structure is considered to be stable in its present condition.

Recommendations

We have no recommendations at this time.

3.08 Hazardous Waste Storage (MS-HWB-2)

General Conditions

This particular cell was constructed contiguous with an existing cell, which is referred to on site as the “Enviro Tank Storage”, from drawings by our office in 2010 and conforms to our drawings. It is also contiguous with the Stove Oil Storage cell.

This structure contains hazardous waste.

Stability

Our review of the area around this cell at the base of the slopes, showed no sign of seepage. There is frozen water ponding in this structure.

The structure appears to be stable in its present condition. The frozen water in the cell confirms the integrity of the liner.

Recommendations

There are no recommendations at this time.

3.09 Enviro Tank Storage (MS-HWB-1)

General Conditions

This particular structure is constructed contiguous with the Hazardous Waste Storage constructed in 2010 and the Stove Oil Storage cell. It is currently not being utilized and access is blocked.

Stability

Last year there was concern for the integrity of this cell as the cell was dry and the geotextile was exposed from heavy traffic during our initial inspection. During our second inspection, the cell was holding a small amount of water confirming limited integrity of the liner.

The cell was dry last year during the second inspection raising concerns anew on the integrity of the liner. This inspection showed minor water present.

Recommendations

We recommend that the geotextile over the liner be checked and the granular cover be made good prior to continuing use of this cell.

3.10 Stove Oil Storage (MS-HWB-5)

General Conditions

The structure contains barrels of stove oil and some cubes of lubricant.

This structure was constructed in accordance with a standardized drawing provided by this office utilizing a one-piece liner.

Stability

Our review of the exterior at the base of the dyke showed no sign of seepage. This shows that there is reasonably little chance of tearing or rupture of the membrane having taken place.

A review of the exterior and the top of the dyke showed no sign of cracking or settlement which would indicate stresses with the structure.

There is frozen water contained within the cell confirming the integrity of the liner.

The structure is considered to be stable in its present condition.

3.11 Jet Fuel Tank and Pump Containment

General Conditions

This particular structure was reconstructed based on our recommendation of the 2012 Geotechnical Inspection.

The construction was completed in accordance with our recommendations for such structures and the liner was constructed as a one-piece liner with geotextile protection on both sides and gravel over the geotextile as protection.

The construction appears proper and the structure is in good condition.

Frozen water ponding confirms the integrity of the liner.

At this time as in our earlier inspection report last year, the jet fuel tank and pump have been removed and the cell is empty.

Stability

Our review of the area around the cell at the base of the slopes showed no sign of seepage and frozen water is ponding within the cell.
.
The structure is stable in its present condition.

Recommendations

There are no recommendations at this time.

3.12 Non-Hazardous Waste Landfill

The solid waste disposal site is currently in the second phase of its construction. The first lift of solid waste has been placed and covered fully and appears to be doing exactly what it was proposed to do at the design stage. Since our inspections last year, the first lift has been expanded.

Work is currently continuing on building a berm on three sides of the disposal site at a level above the existing lift in advance of placing another lift. The berm is being constructed as per the berm on the first level that served well over the several years. Waste is now being placed within the berm.

The thick cover has been removed from the first lift to accommodate the second lift.

There has been a fence structure of sections of screen and pallets to control blowing waste at the activity area of the waste disposal site.

Recommendations

There are no recommendations at this time.

3.13 Mine Site Steel Fuel Tank Farm Containment

General Conditions

All work now appears to be complete.

There is frozen water ponding in the bottom of the containment confirming the integrity of the liner. This ponding of water is well above the cover on the bottom of the containment.

Stability

All work appears to have been completed in accordance with drawings and we have no concerns with the stability of this containment structure.

Recommendations

We have no recommendations for this containment at this time.

3.14 Quarry QMR2

General Conditions

The quarry has well defined benches. The quarry faces at the benches are clean.

The quarry is active at this time and drilling had just taken place in advance of a major blast at the top end of the quarry. Large boulders have now been around what shall become the new edge of the quarry at the top of the hill.

Recommendations

There are no recommendations at this time.

3.15 Ore Stockpile Stormwater Pond (MS-06)

General Conditions

Although there was no moisture flowing to the catchment pond, it is evident that the ditches in place and the containment pond are operating as intended.

Stability

The structure has been completed in accordance with drawings included in our last reports in a most satisfactory manner.

Recommendations

We have no recommendations for this containment at this time.

3.16 Waste Rock Stockpile Pond (MS-08)

General Conditions

As we were inspecting the drainage containment, we were advised that tests on the water in the catchment area had shown the water to have a low pH.

At the time of our inspection at the top of the hill a sudden snow storm covered the area so we could not readily review the additional catchment “sumps” and ditches placed to catch water not contained by the original ditches and containment. Baffinland continues to investigate the seepage observed originating from the toe of the Waste Rock Sedimentation Pond in 2017.

Stability

Revisions to this facility are expected to be made following a review by the Mine Operations at the site.

Recommendations

When weather permits, the integrity of the existing pond should be restored.

3.17 Jet "A" Fuel Containment

General Conditions

This cell was constructed to replace the containment structure near the Weatherhaven Camp.

This cell now contains two double walled tanks and is located north of the air terminal buildings.

Stability

The cell was constructed using a one piece enviroliner with geotextile and was constructed in accordance with standardized drawings prepared in the past for such construction by our office.

There is frozen water ponding in the bottom of the cell confirming the integrity of the liner.

There were no signs of cracking of the dykes.

3.18 Hazardous Waste Containment (MS-HWB-6)

General Conditions

Although it was constructed in 2012, we had not reported on it until 2015.

It is located near the incinerator and is utilized to store barrels of ash from the incinerator.

Stability

The cell was constructed utilizing a one piece enviroliner with geotextile and was constructed in accordance with standardized drawings prepared in the past for such construction by our office.

There is water ponding in the bottom of the cell confirming the integrity of the liner. This water currently in the form of ice.

There were 3 locations where the enviroliner was damaged near the top of the dyke, where repairs have taken place.

Recommendations

We have no recommendations with respect to this structure.

3.19 Overview

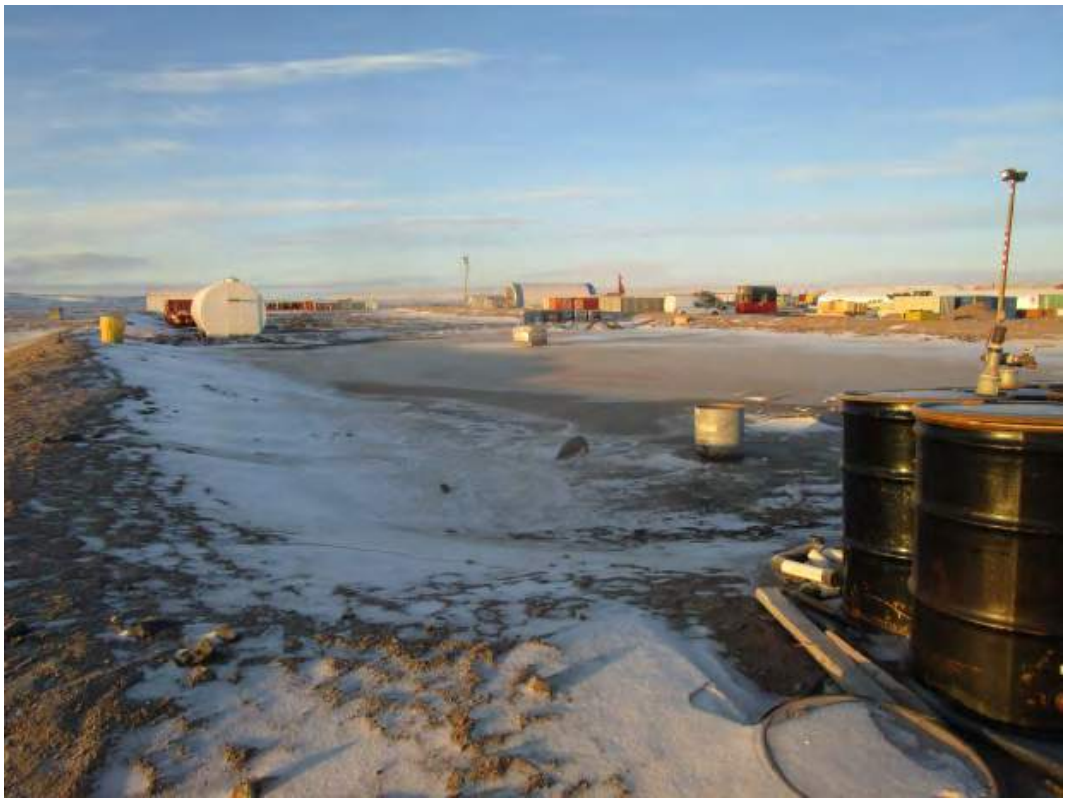
This report is the second phase of the ninth annual Geotechnical Inspection at Mary River and Milne Inlet completed by this author on behalf of Baffinland Iron Mines Corporation and the third year of reporting, covering the second of two inspections in one shipping season.

As set out in our past reports, there has been little or no erosion taken place from wind or rain and the dykes constructed of the sand/gravel soil have remained stable at slopes of 3:1 and 4:1.

As noted last year, there are only just now signs of settlement appearing at PSWP's 1, 2 and 3. The settlements are not differential settlements of the dykes but are minor overall settlements of the total structures with respect to the surrounding area.

These settlements appear to be settlements within the one metre ± active layer above the permafrost and are of little concern as the PWSP's are temporary structures and the settlements have no effect on the dyke stability.

MARY RIVER PHOTOS



1. Bulk Fuel Storage Facility. (MS-HWB-7)

2. Generator Fuel Containment.

3. PWSP 1

4. PWSP 2

5. PWSP 3

6. Helicopter Fuel Tank Containment.

7. Temporary Helicopter Fuel Containment.

8. Barrel Fuel Containment. (MS-HWB-03)

9. Barrel Fuel Containment. (MS-HWB-04)

10. Hazardous Waste Storage. (MS-HWB-02)

11. Envirotank Storage (MS-HWB-01)

12. Stove Oil Storage. (MS-HWB-05)

13. Jet Fuel Tank and Pump Containment.

14. Non-Hazardous Waste Landfill.

15. Mine Site Steel Fuel Tank Farm Containment.

16. Mary River Quarry (QMR 2)

17. Ore Stockpile Stormwater Pond (MS-06)

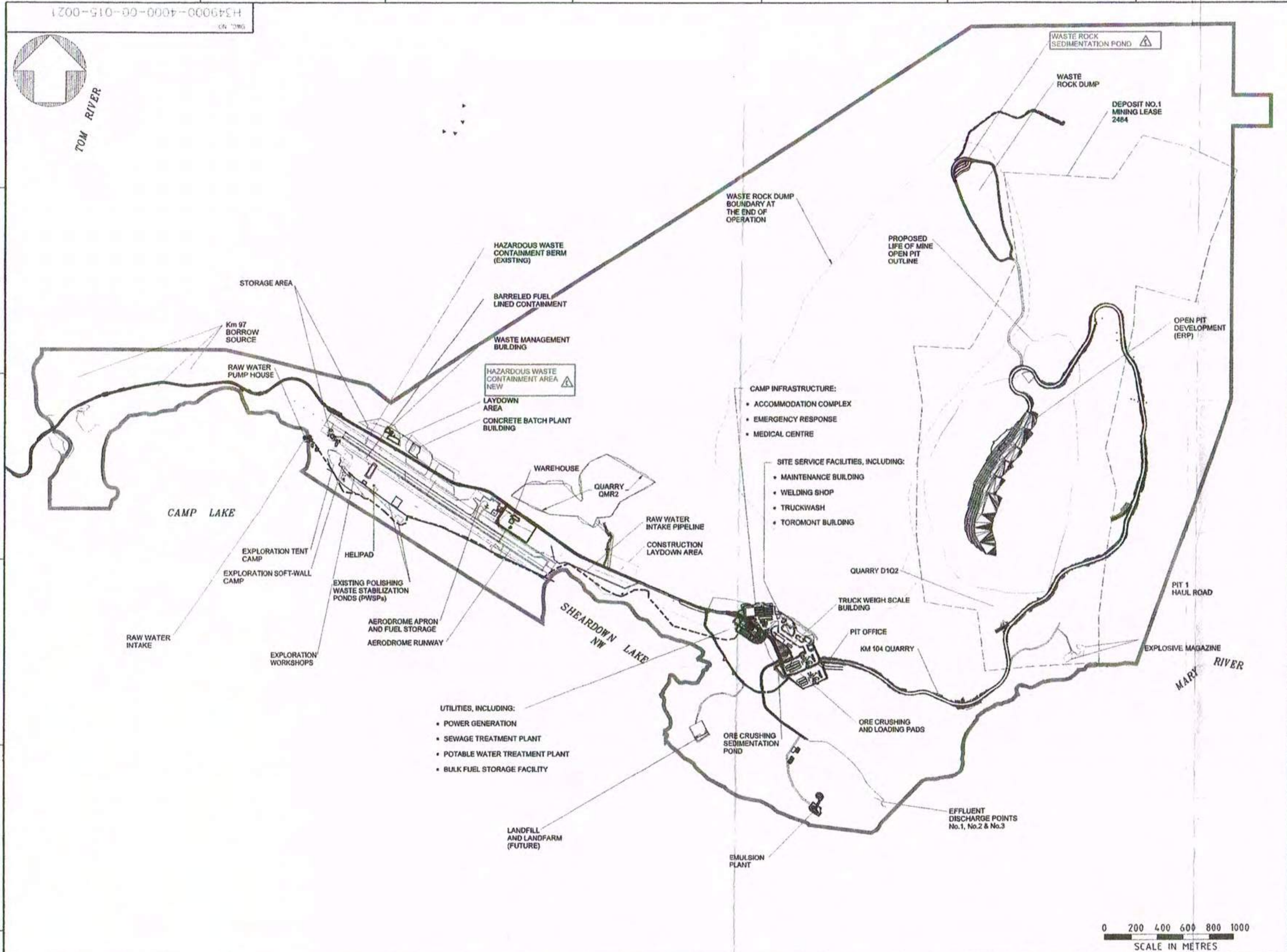
18. Waste Rock Stockpile Pond (MS-08) (Snow) See Drawing.

19. Jet ‘A’ Fuel Containment.

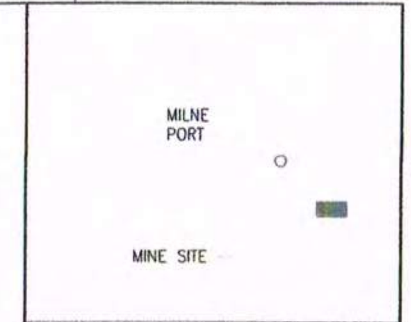
20. Hazardous Waste Containment (MS-HWB-6).

MARY RIVER DRAWINGS

H349000-4000-00-015-0021



TOM RIVER
CAMP LAKE
SHEARDOWN NW LAKE
MARY RIVER
WASTE ROCK SEDIMENTATION POND
WASTE ROCK DUMP
DEPOSIT NO.1 MINING LEASE 2484
WASTE ROCK DUMP BOUNDARY AT THE END OF OPERATION
PROPOSED LIFE OF MINE OPEN PIT OUTLINE
OPEN PIT DEVELOPMENT (ERP)
HAZARDOUS WASTE CONTAINMENT BERM (EXISTING)
BARRELED FUEL LINED CONTAINMENT
WASTE MANAGEMENT BUILDING
HAZARDOUS WASTE CONTAINMENT AREA NEW
LAYDOWN AREA
CONCRETE BATCH PLANT BUILDING
STORAGE AREA
Km 97 BORROW SOURCE
RAW WATER PUMP HOUSE
WAREHOUSE
QUARRY QMR2
RAW WATER INTAKE PIPELINE
CONSTRUCTION LAYDOWN AREA
CAMP INFRASTRUCTURE:
• ACCOMMODATION COMPLEX
• EMERGENCY RESPONSE
• MEDICAL CENTRE
SITE SERVICE FACILITIES, INCLUDING:
• MAINTENANCE BUILDING
• WELDING SHOP
• TRUCKWASH
• TOROMONT BUILDING
QUARRY D1Q2
TRUCK WEIGH SCALE BUILDING
PIT OFFICE
KM 104 QUARRY
PIT 1 HAUL ROAD
EXPLOSIVE MAGAZINE
EXPLORATION TENT CAMP
EXPLORATION SOFT-WALL CAMP
HELIPAD
EXISTING POLISHING WASTE STABILIZATION PONDS (PWSPs)
AERODROME APRON AND FUEL STORAGE
AERODROME RUNWAY
RAW WATER INTAKE
EXPLORATION WORKSHOPS
UTILITIES, INCLUDING:
• POWER GENERATION
• SEWAGE TREATMENT PLANT
• POTABLE WATER TREATMENT PLANT
• BULK FUEL STORAGE FACILITY
ORE CRUSHING SEDIMENTATION POND
ORE CRUSHING AND LOADING PADS
EFFLUENT DISCHARGE POINTS No.1, No.2 & No.3
LANDFILL AND LANDFARM (FUTURE)
EMULSION PLANT
0 200 400 600 800 1000
SCALE IN METRES



KEYPLAN

FOR INFORMATION

NOTES:

1. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
2. 2016 WORK SHOWN IN RED TEXT.

LEGEND:

WATER
QUARRY
BORROW AREA
ROAD
RIVER/STREAM/DRAINAGE
RAW WATER INTAKE PIPELINE
COMMERCIAL LEASE
PROJECT DEVELOPMENT AREA

REV	ISSUE FOR	AUTH BY		DATE
C	ISSUED FOR USE	M.B.	J.B.	2015-10-15
B	ISSUE FOR USE	S.M.	T.M.	2014-12-10
A	ISSUE FOR USE	C.L.	A.G.	2014-10-31

ISSUE AUTHORIZATION

HATCH

DESIGNED BY C. LEISTNER DATE 2014-10-21	DRAWN BY J. BAJAGIC DATE 2014-10-21
CHECKED BY S. POTTER DATE 2014-10-21	DISCIP. ENGR. A. GRZEGORCZYK DATE 2014-10-21
PROJ. DES. COORD. T. THERTELL DATE 2014-10-21	PROJ. ENGR. J. CLELAND DATE 2014-10-21
PROJ. MGR. J. CLELAND DATE 2014-10-21	

Baffinland

MARY RIVER PROJECT

MINE SITE
INFRASTRUCTURE FOOTPRINT
WORK PLAN 2016

SCALE 1:15000 OR AS NOTED

DWG. NO. H349000-4000-00-015-0021

REV C

ORIGINAL SHEET SIZE: ISO A1 (841 x 594)

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4.0 MILNE INLET

4.01 General

There are still changes taking place at Milne Inlet, even since our last inspection in July/August of this year.

Work has been completed this season to correct deficiencies/incomplete work at the entrances to the sedimentation ponds.

4.02 Hazardous Waste Storage (MP-HWB-3, MP-HWB-4)

General Conditions

This particular structure has been constructed as a two-cell structure and is now only utilized to store sea cans that contain scraps of enviroliner and geotextile removed from the decommissioning of the exploration phase bulk fuel bladder farm.

Stability

There is frozen water ponding in both cells of the original structure This confirms the integrity of the enviroliner at this time in these two cells.

Our review of the area around the dykes, at the base of the slopes, showed no sign of seepage. The structure is considered stable.

Recommendations

We have no recommendations with respect to the use of these two cells at this time.

4.03 Fuel Tank Farm (MP-03)

General Conditions

Since both 2012 and 2013 the fuel tank farm has been expanded considerably with the addition of a number of new tanks.

Two sumps have been installed in the north end (low end) of the containment. Water is currently ponding in the low end of the containment, confirming the integrity of the enviroliner.

Stability

All containment dykes are in excellent condition and there is no sign of weakness.

Recommendations

We have no recommendations with respect to the containment at this time.

4.04 New Effluent Pond (MP-01a)

General Conditions

This pond was put into operation in 2014.

The containment pond was operating at less than fifty percent of capacity at the time of our inspection.

Stability

We noted no sign of weakness in any of the construction.

Recommendations

We have no recommendations with respect to the use of this structure having no negative comments on the construction of this structure.

4.05 Landfarm Containment (MP-04)

General Conditions

The landfarm containment is complete except for soil cover on the dykes in the area of the sump.

The landfarm was constructed to accommodate approximately 9000m^3 of hyrocoarbon contaminated soil and seasonal water accumulations.

At the time of our inspection, the landfarm was in operation and sorting of contaminated materials had taken place. Since our last inspection, there is still minor sorting to take place including the removal of some waste and contaminated waste.

It appears as though the structure has been constructed in accordance with good construction practice for structures of this type.

Stability

The structure appears stable as constructed.

Recommendations

We recommend that the remaining dyke structure without protective cover over it be covered as per the design drawings. This however, is not an absolute requirement.

There are no changes in the structure since our last inspection.

4.06 Contaminated Snow Containment (MP-04a)

General Conditions

The construction of the contaminated snow containment structure is contiguous with the east end of the landfarm.

It appears as though the structure has been constructed in accordance with good construction practice for structures of this type.

The snow containment facility has a containment volume of 929 m^3 based on estimates of volume provided by the owner and only a small percentage of the capacity is utilized.

The structure has been constructed with good quality control.

Stability

The structure appears stable as constructed.

Recommendations

We have no recommendations with respect to this construction at this time. The structure appears as it did in our July/August review of this year.

4.07 Milne Port Ore Stockpile Sedimentation Pond East (MP-05)

General Conditions

The construction of this sedimentation pond for drainage from the east side of the site is complete.

The basin is shaped and the liner has been installed throughout the basin from inlet to the berms on the north side of the basin.

There has been no cover placed over the liner to this point although some tire ballast has been placed over the liner on the north side.

The two inlets to the pond have very recently been upgraded and the enviroliner has been repaired at these locations. This was performed at the end of July, 2017.

Stability

We have concerns over the stability of the liner on this pond and recommend the possibility of further tire ballast over the liner which appears possibly subject to wind damage. This shall provide a function for used tires

Recommendations

We recommend review of the use of a ballast (possibly tires) on the exposed liner at the dyke to prevent wind uplift.

4.08 Milne Port Ore Stockpile Sedimentation Pond West (MP-06)

General Conditions

The construction of this sedimentation pond for drainage from the west side of the site is now complete with repairs recommended in our report of last year having been completed.

The inlet where the inlet where possible water infiltration was occurring was addressed at the end of July, 2017, and the inlet has been reconstructed.

Stability

We have some concern over the stability of the liner on this pond as we have with the east pond and further recommend that used tire ballast be considered.

Recommendations

We have no concerns other than that of possible wind damage to the liner and recommend the use of tires as ballast.

We recommend that the ditch that conducts water from the east side of the pond be reviewed to ensure water is conducted to the pond readily.

4.09 Quarry (Q1)

General Conditions

The quarry was active at the time of our review.

Stability

Rock faces appear stable.

A rock berm has been placed along the face. I assume this is to contain falling rock during the cleaning of the upper face prior to blasting. This an excellent idea.

Recommendations

We have no recommendations to be made with respect to the quarry.

4.10 Loading Area Contaminated Storage (MP-HWP-1)

General Conditions

This area has been constructed near the loading dock to facilitate assembly of hazardous materials for shipment out.

Most hazardous waste has now been removed from the containment and shipped out.

Construction appears to have taken place in accordance with standardized drawings prepared in the past.

Stability

Construction appears stable.

Recommendations

We have no recommendations with respect to this structure.

4.11 Fuelling Facility Containment

General Condition

A new fueling facility for the fueling of B trains is in place with construction utilizing design drawings prepared by our office.

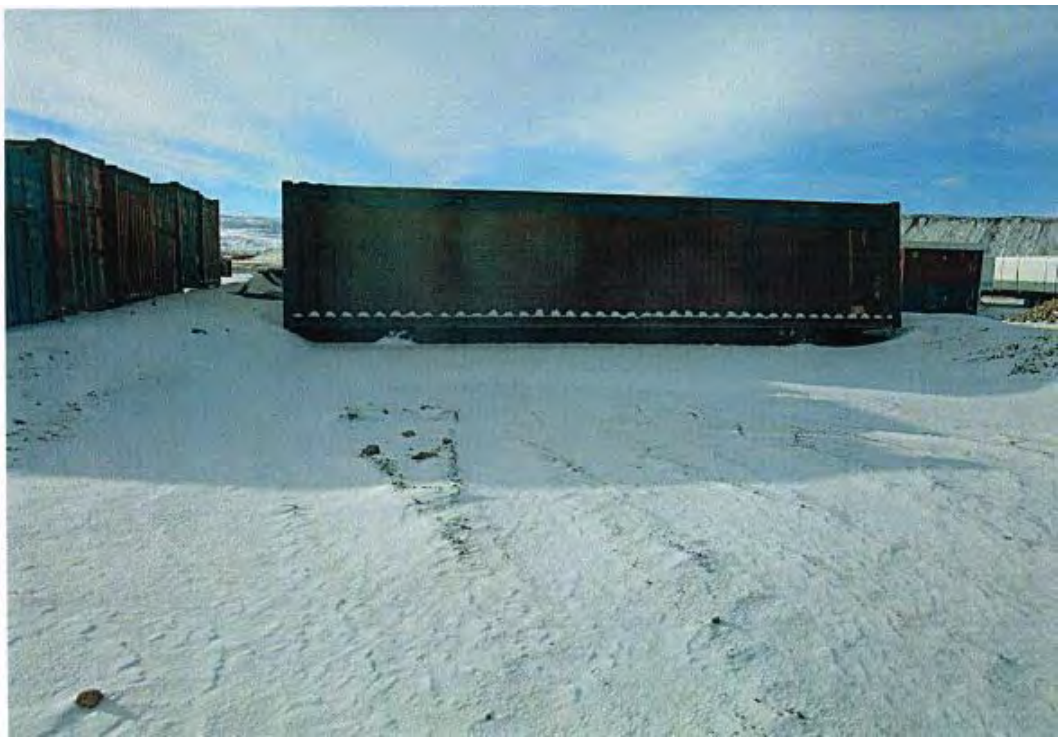
Work conforms to the design drawing.

4.12 Overview

Work on containment structures except for maintenance appears complete.

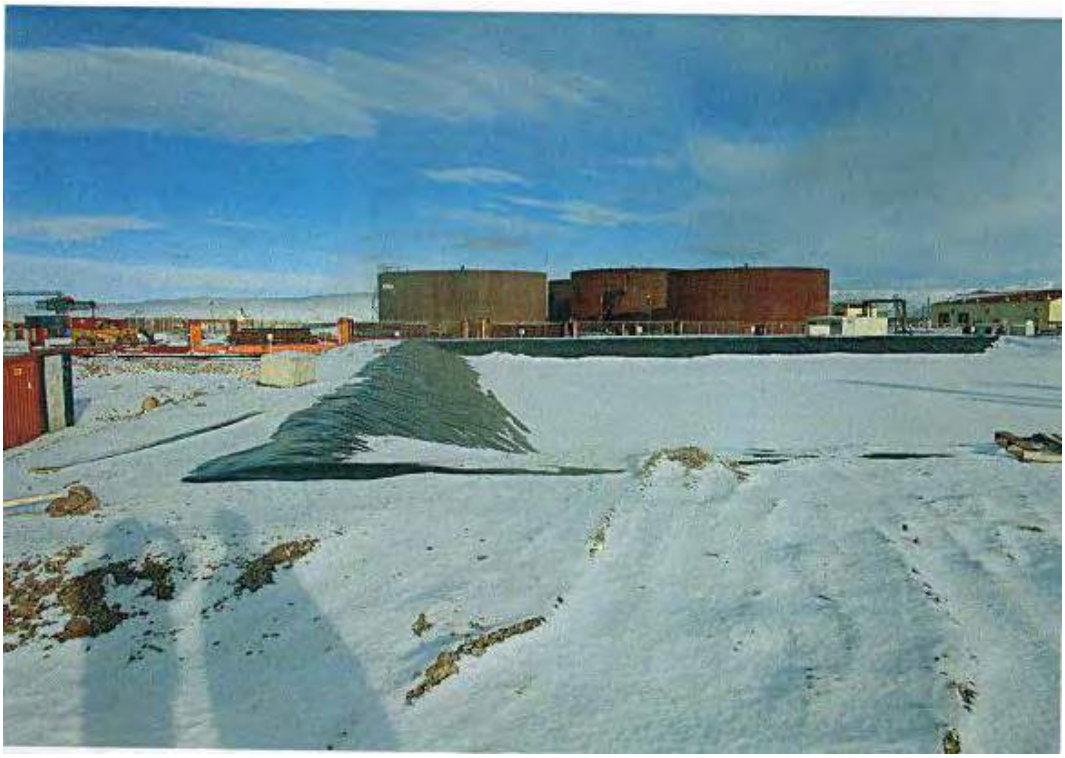
MILNE INLET PHOTOS

21. Hazardous Waste Storage (MP-HWB-3)



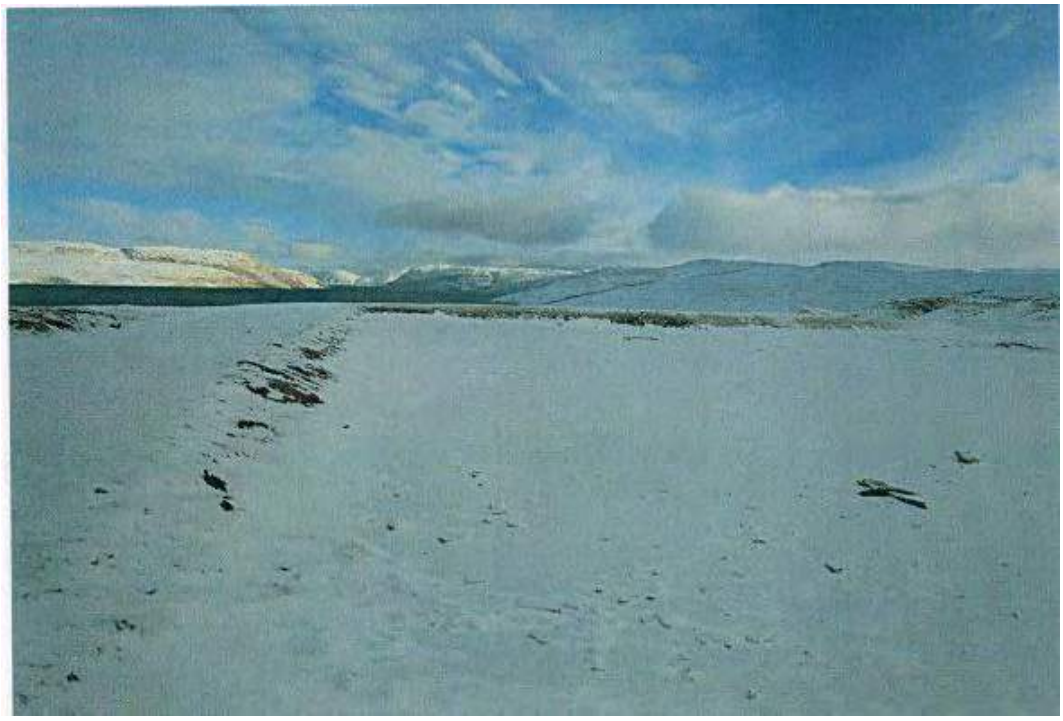
22. Hazardous Waste Storage (MP-HWB-4)

23. Fuel Tank Farm (MP-03)



24. Milne Inlet Sewage Effluent Pond (PWSP)

25. Land Farm Containment (MP-04)

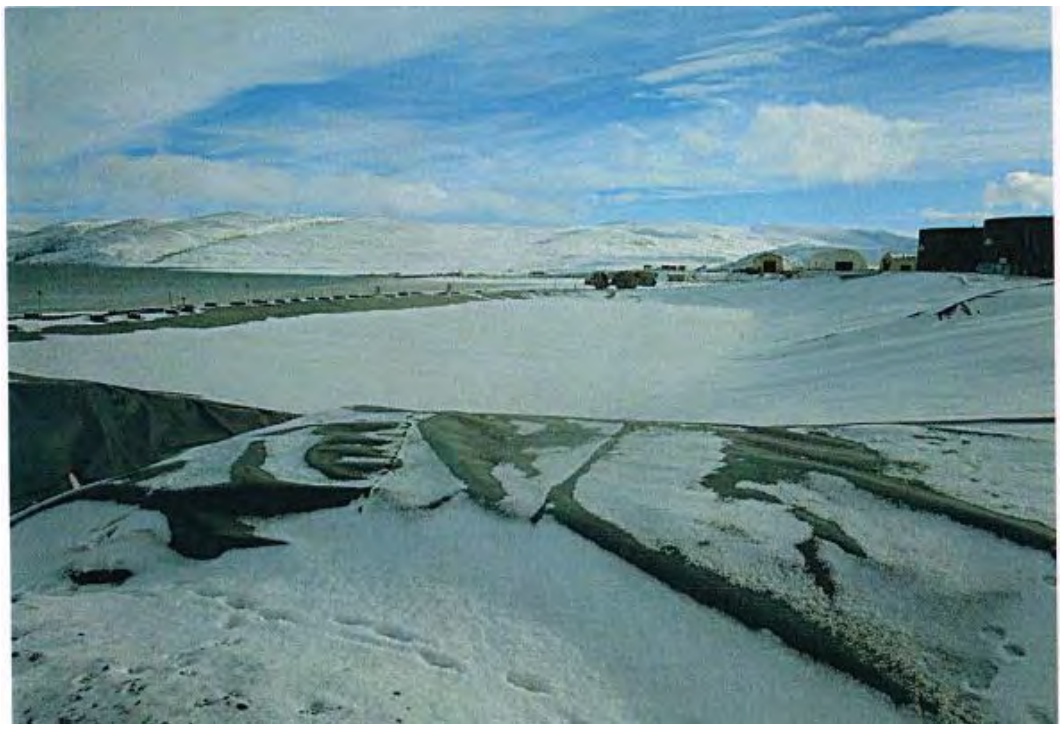


26. Contaminated Snow Containment (MP-04a)

27. Milne Inlet Quarry (Q1)

28. Loading Area Containment Storage (MP-HWB-1)

29. Fueling Facility Containment



30. Milne Port Ore Stockpile Sedimentation Pond East (MP-05)

31. Milne Port Ore Stockpile Sedimentation Pond West (MP-06)

MILNE INLET DRAWING

H349000-2000-00-015-0021

MILNE INLET

AANDC NUNAVUT LEASE 47H/16-1-2

SHIPLOADER

ORE DOCK

ORE STOCKPILE SETTLING PONDS

FUTURE AIRSTRIP

ORE STOCKPILE PAD

ADDITIONAL LAYDOWN AREA ⚠

POTABLE WATER SUPPLY

CONVERT EXISTING CONCRETE BATCH PLANT BUILDING TO MAINTENANCE BUILDING ⚠

PHILLIPS CREEK

FUTURE POLISHING WASTE STABILIZATION POND

TOTE ROAD

SEALIFT BARGE LANDING AREA

RAMP TO BEACH

FUEL TANK FARM

EFFLUENT DISCHARGE LOCATION
N 7976341
E 503639

HAZARDOUS WASTE BERMS

LAYDOWN AREA

SERVICES AREA PAD
SITE FACILITIES, INCLUDING:

- MAINTENANCE BUILDING
- WELDING SHOP BUILDING
- WORKSHOP OFFICE BUILDING
- TOROMONT MAINTENANCE BUILDING

POWER GENERATORS

INCINERATOR HAZARDOUS WASTE BERM

POLISHING WASTE STABILIZATION POND

EXISTING HAZARDOUS WASTE BERM

MATRIX CAMP

CAMP INFRASTRUCTURE PAD
SITE FACILITIES, INCLUDING:

- ACCOMMODATION COMPLEX
- EMERGENCY RESPONSE OFFICE
- EMERGENCY RESPONSE GARAGE
- SEWAGE TREATMENT PLANT
- POTABLE WATER TREATMENT PLANT
- WASTE MANAGEMENT FACILITY

LAND FARM

ROCK QUARRY N0.1 BOUNDARY

EXTENT OF QUARRY Q1

PERMITTED OPEN BURN PIT AREA

KM2 BORROW AREAS

MILNE PORT

MINE SITE

KLYP_AN

EXISTING HTO CABIN

FOR INFORMATION

NOTES:

1. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
2. 2016 WORK SHOWN IN RED TEXT.

0 50 100 150 200 250
SCALE IN METRES

LEGEND:

- WATER
- QUARRY
- COMMERCIAL LEASE
- AANDC LEASE 47H/16-1-2
- RIVER/STREAM/DRAINAGE
- ROAD
- PROJECT DEVELOPMENT AREA
- BORROW AREAS

REV.	ISSUE FOR	AUTH. BY	DATE
D	ISSUED FOR USE	M.B.	J.B. 2015.10.15
C	ISSUE FOR USE	S.M.	T.M. 2014-12-10
B	ISSUE FOR USE	C.L.	T.M. 2014-10-31
A	ISSUE FOR USE	C.L.	A.G. 2014-06-19

ISSUE AUTHORIZATION

HATCH

DESIGNED BY: C. LEISTNER DATE 2014-10-20	DRAWN BY: J. BAJACIC DATE 2014-10-20
CHECKED BY: S. POTTER DATE 2014-10-20	DISCIP. ENGR.: A. GRZEGORCZYK DATE 2014-10-20
PROJ. DES. COORD.: T. THERTELL DATE 2014-10-20	PROJ. ENGR.: J. CLELAND DATE 2014-06-19
PROJ. MGR.: J. CLELAND DATE 2014-06-19	

Baffinland

MARY RIVER PROJECT

MILNE PORT
INFRASTRUCTURE FOOTPRINT
WORK PLAN 2016

SCALE: 1:5000 OR AS NOTED

DWG. NO. H349000-2000-00-015-0021

REV. D

5.0 MILNE INLET TOTE ROAD

5.01 General

In this site inspection, we have been asked to review and comment on a number of areas of construction on the roadway, including condition of the bridge abutments at km 17, km 62, km 80 and km 97 as well as the quarried material being used for roadway fill and the slope stabilization efforts using armor stone/rip rap in the area of km 90 - 93.

Note that representatives of the bridge designers, ACROW, were on site and were reviewing the ends of the bridge trusses with respect to their displacement from the abutments I understand that they are submitting a report on this.

5.02 Bridge Abutments

The bridge abutments are constructed as what appears to be reinforced masonry where the end of the bridge trusses bear with metal framed containment to contain the sloping fill at the side of the roadway fill.

We understand that it is critical to maintain a clearance between the ends of the bridge trusses and the concrete part of the abutments. The ACROW inspectors were on site to check for this conformity.

From my preliminary review it appears the bridge trusses and the abutments conform to the design requirements, but I leave this in the hands of ACROW. Note the gaps evident in the photos.

The side containment of fill at the abutments appear to be gravity type structures that are now tilting because they are too small.

We've reviewed the remaining sea can bridge abutments. These abutments had been removed flush with adjacent ground in all but one area where no deformation had occurred. Where the abutments were flush with adjacent ground, there was no indication hat deformations had taken place while the sea can bridge was active.

We have no current concerns with the stability of what remains of the sea can bridge abutments.

The concrete abutments at this time appear stable, but as can be seen the metal crib portions of the abutments appear are not holding in place as shown in the photos.

Recommendation

I recommend reconstruction of the abutment formed with metal containment utilizing double the length parallel to the road and 50% wider containment.

Due to the concerns of ACROW as to maintain clearance between the concrete abutments and the ends of the trusses, this clearance must be checked annually.

I recommend that consideration be given to having the trucks come to a full stop at least 50 metres from each end of the bridges. The braking action of the ore haulers does put undue stress upon the road bed which is transferred to the concrete abutments near the top of the abutments.

5.03 Rock Shatter Utilized as Fill Material on the Road

Where fill has been required to widen roads, rock shatter from a road cut area has been utilized.

This rock is a sedimentary rock and is blasted out as "slabs" which do not interlock in the fill structure well and as a result cannot be placed at 1:1 slopes on the edge of the fill.

Recommendation

At fill areas, the slope at the edge of the road should be constructed at a 1 ½ to 1 to 2:1 slope giving a lower slope angle.

As well this material should not be utilized directly against culvert structures which should be bedded 4 sides in sand or gravel compacted in place.

5.04 Slope Stabilization at km 90 - 93

We reviewed the areas at kilometer 90 to 93 where armor stone has been placed at the base of the slopes and rip rap on geotextile has been placed above the armor stone on the slope.

Recommendation

The methodology appears good; however, we recommend that a non-woven geotextile be utilized.

Respectfully submitted,

Barry H. Martin, P. Eng., MRAIC

REGISTERED PROFESSIONAL ENGINEER
B.H. MARTIN
LICENSEE
NWT/NU

ROADWAY PHOTOS

32. Bridge Abutment @ km 97 (Note Space)

33. Bridge Abutment @ km 63 (Note Space)

34. Bridge Abutment @ km 80 (Note Space)

35. Typical Rock Used as Fill from km 76

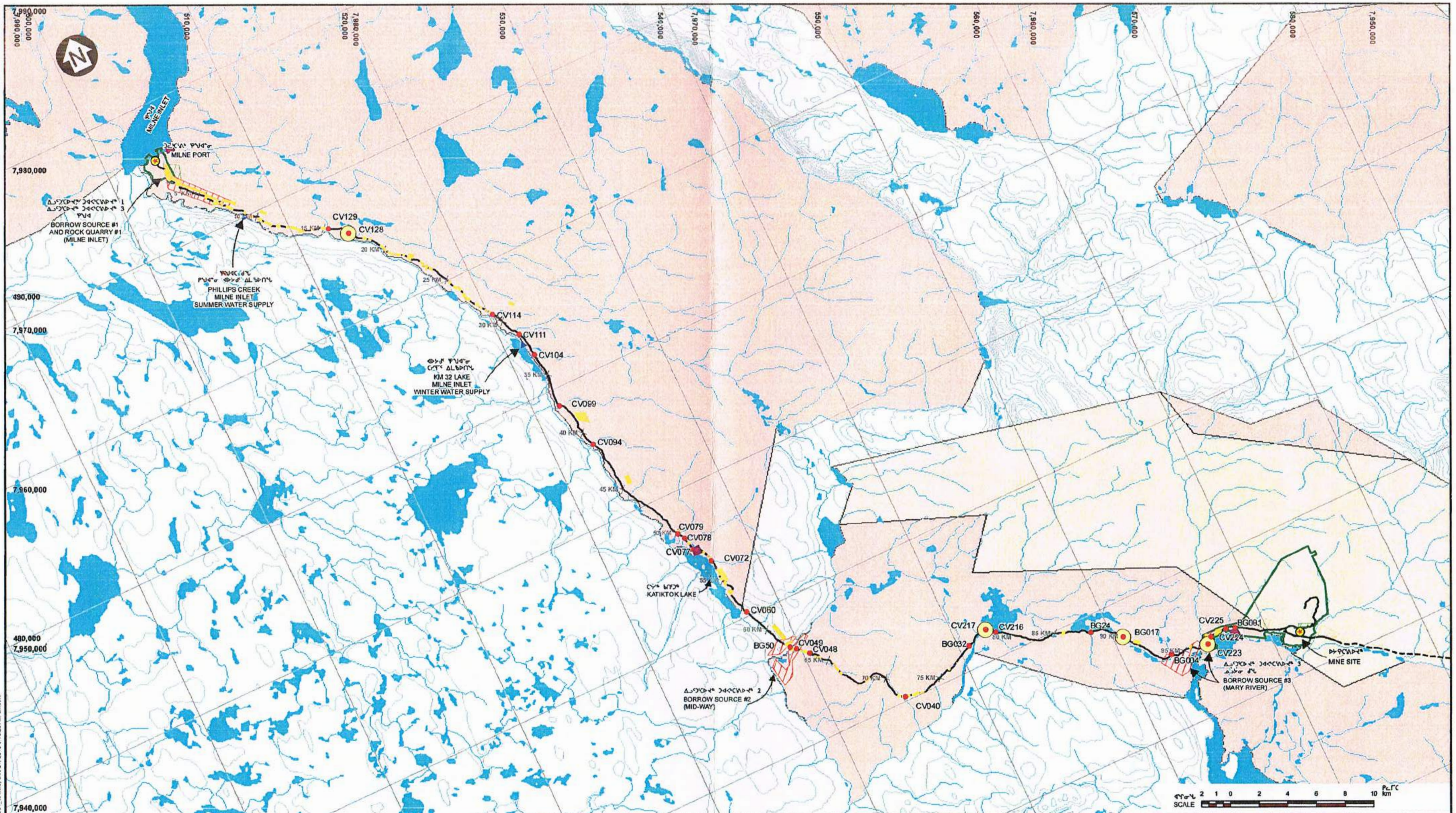
36. Typical Rock Used as Fill from km 76

37. Armor Stone Used in Road Cut Area km 91

38. Armor Stone Used in Road Cut Area km 91

39. Sea can bridge abutments no longer in use. Note there is no deformation.

ROADWAY DRAWING



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LEGEND:

- WATER
- RIVER/STREAM/DRAINAGE
- MILNE INLET TOTE ROAD
- PROPOSED RAILWAY ALIGNMENT
- QUARRY AND BORROW LOCATION (PROPOSED)
- QUARRY AND BORROW LOCATION (EXISTING)
- CAMP
- MILNE INLET WATER SUPPLY
- CROSSINGS SUBJECT TO AN AUTHORIZATION UNDER THE *FISHERIES ACT*
- CROSSINGS SUBJECT TO AN APPROVAL UNDER THE *NAVIGABLE WATERS PROTECTION ACT*
- EXISTING BORROW AREA LEASE BOUNDARY (IOL COMMERCIAL LEASE)
- EXISTING ROCK QUARRY LEASE BOUNDARY (IOL COMMERCIAL LEASE)
- IOL SURFACE AND SUBSURFACE INCLUDING MINERALS
- IOL SURFACE ONLY EXCLUDING MINERALS
- POTENTIAL QUARRY DEVELOPMENT AREA
- POTENTIAL DISTURBANCE AREA

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	16DEC'10	ISSUED WITH REPORT	RAC	ASM	RAC	KDE

NOTES:

1. BASE MAP: HER MAJESTY THE QUEEN IN RIGHTS OF CANADA, DEPARTMENT OF NATURAL RESOURCES, (2004).
2. COORDINATE GRID IS UTM (NAD83) ZONE 17 AND IS IN METRES.
3. CONTOURS ARE IN METRES. CONTOUR INTERVAL VARIES
4. QUARRY AND BORROW AREA DATA ACQUIRED FROM AMEC DATA EXCHANGE (SEPTEMBER 7, 2010).

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

MILNE INLET TOTE ROAD

Knight Piésold CONSULTING

P/A NO.	REF NO.	FIGURE	REV
NB102-181/25	8	3-2.2	0