

BAFFINLAND IRON MINES CORPORATION MARY RIVER PROJECT

BULK SAMPLING PROGRAM LANDFILL SITE DESIGN (REF. NO. NB102-00181/10-6)

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EXECUTIVE SUMMARY

Baffinland Iron Mines Corporation development is undertaking a Bulk Sampling Program as part of the development of the Mary River Project. Non-hazardous waste generated from the project is currently disposed of in accordance with the regulatory requirements. A new, permanent landfill site is required because the existing, temporary waste management system is not adequate to support the needs of the Bulk Sampling Program a new, permanent landfill site is required.

Based on discussions with the Nunavut Water Board (NWB), the Bulk Sample Landfill Site is considered to be a modified landfill. The landfill has been designed in accordance with the "Guidelines for the Planning, Design, Operations and Maintenance of Modified Solid Waste Sites in the Northwest Territories". The Guidelines state that all new landfills should be planned based on a 40 year planning horizon. However, due to the short-term nature of the Bulk Sampling Program, the landfill has been planned based on 2 years of operations plus 1 year of closure activities. The estimated capacity for the proposed landfill is 5,000 m³. Additional capacity could however be available at this site. Toxic or hazardous wastes will be disposed of off site at an approved facility.

An options review was completed to determine the optimum location for the landfill site based on the requirements of the Guidelines. The preferred location is southeast of the upper basin of Sheardown Lake. Due to the granular nature of the existing foundation soils and the presence of permafrost, it was determined that the slope stability of the perimeter berms and bearing capacity of the foundation soils would be adequate for the landfill.

The area method will be used for waste disposal wherein a low height berm will be constructed along two sides of the landfill site and then waste will be disposed of against the berms and directly onto the ground downstream of the berms. Sand and gravel will be used as the cover material. In order to achieve permafrost encapsulation in the landfill site, the final cover will be thicker than the active layer. Appropriate surface water, erosion and sediment control measures will be implemented during operations. No fencing will be required as the inert waste should not attract wildlife and public access to the area is restricted.

An operations and maintenance manual will be completed for the landfill site in accordance with the requirements of the NWB, prior to waste deposition. In addition, an internal monitoring and reporting program will be established. This monitoring program will be conducted in conjunction with other programs currently in place for the project. The landfill is not expected to change the quality of the surface water runoff in the area due to the inert nature of the waste and small landfill footprint. Also due to the permafrost in the area, no groundwater protection system has been included. In addition, landfill gas is not expected to be an issue as the deposited waste will be



non-hazardous, non-organic and inert. Therefore a landfill gas collection system will not be installed in the landfill site.

As part of the operations of the facility the overall annual report will include information on the landfill consisting of volume of waste deposited, landfill site development, monitoring results, remaining life expectancy, details of any operational problems and measures taken to resolve any operational problems and select photographs.

Final closure of the landfill site will be conducted in a manner which ensures long-term protection of the environment. In addition, the NWB will be notified at least 6 months in advance of the landfill site closure and provided a post-closure inspection checklist including inspection frequency, list and description of items to be inspected and compliance requirements. Once the final cover is in good shape and post-closure monitoring shows the landfill is physically stable, Baffinland will submit a report to the NWB requesting cessation of the post-closure inspections.



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BAFFINLAND IRON MINES CORPORATION MARY RIVER PROJECT

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SECTION 1.0 - INTRODUCTION

1.1 PROJECT BACKGROUND

Baffinland Iron Mines Corporation (Baffinland) is developing its Mary River iron ore deposits in the North Baffin region of Nunavut, Canada. The location of the Mary River Project is shown on Figure 1.1. Site coordinates are approximately Latitude 71°20' north and Longitude 79°14' west.

Baffinland is currently undertaking advanced exploration at the Mary River Project site, consisting of delineation drilling of the iron ore deposit. Baffinland started mineral exploration activities at the Mary River Project in 2004.

1.2 BULK SAMPLING PROGRAM

Baffinland is undertaking a Bulk Sampling Program in 2007 and 2008 in order to prove the marketability of the Mary River Project ore and secure long-term customers. The program includes the extraction of 250,000 t of iron ore from two small open pits from Deposit No. 1 and the provision of the material to potential customers.

The Bulk Sampling Program involves upgrades to the existing Tote Road to support haul truck traffic, construction of a larger camp to support the program and development of a small landfill site. An ore stockpile will be required at Milne Inlet and in August 2008 the ore will be loaded on ships for transport to steel mills in Europe.

1.3 EXISTING WASTE MANAGEMENT OPERATIONS

Non-hazardous waste generated from the Mary River Project is currently disposed of in a safe manner and in accordance with the regulatory requirements. The non-hazardous waste is salvaged to the greatest extent possible. The majority of non-hazardous waste which cannot be salvaged is incinerated. Baffinland operates an incinerator that is located near the existing airstrip.

Currently, ashes from the incineration process as well as any non-hazardous waste which isn't salvaged or incinerated is temporarily stored in a laydown area near the airstrip. The overall site plan including the location of the incinerator and temporary waste storage area is shown on Figure 1.2 and Drawing No. 101. The incinerator has been in operation since 2004.



1.4 SCOPE OF REPORT

The existing, temporary waste management system is not adequate to support the needs of the Bulk Sampling Program. Therefore, a new, permanent landfill site is required. Based on discussions with the Nunavut Water Board (NWB), the Bulk Sample Landfill Site is considered to be a modified landfill. Therefore, the landfill has been designed in accordance with the "Guidelines for the Planning, Design, Operations and Maintenance of Modified Solid Waste Sites in the Northwest Territories" (Ferguson, Simek Clark Engineers & Architects, 2003) (the Guidelines).

This report presents the landfill design for the Bulk Sampling Program. The report discusses the siting criteria and other design criteria, details on the waste (i.e. composition, volumes), disposal method and monitoring programs.



SECTION 2.0 - PLANNING OF THE LANDFILL SITE

2.1 GENERAL

As indicated in the previous section, a permanent landfill site is required for the Mary River Project. Non-hazardous waste, including ashes from the incineration process and waste which cannot be salvage or incinerated will be deposited in the new landfill site. This section discusses the physical characteristics of the waste, reasoning for the landfill location, operational monitoring requirements and geotechnical characteristics of the site.

2.2 <u>SOLID WASTE PHYSICAL CHARACTERISTICS</u>

Non-hazardous wastes will report to the landfill from the Mary River Camp as well as from remote support camps. Various physical characteristics for the waste were determined as part of the design process for the landfill. These include the waste volume and density, materials composition and compaction rates. Each of these is discussed below.

2.2.1 Waste Volume

The design quantity for the landfill site was selected based on estimated waste volumes for similar projects. In the Screening Document (Knight Piésold, 2006) the volume of waste material to be placed in the landfill as a result of the Bulk Sampling Program, including waste currently stored in the temporary area and the camps noted above, was estimated to be 2,000 m³. This volume is based on the projected schedule for the Bulk Sampling Program of 2 years. Using this volume plus cover material and some room for contingency, the estimated capacity for the proposed landfill is 5,000 m³.

2.2.2 Waste Density

The Guidelines state that a density of 0.099 t/m³ is acceptable for uncompacted waste in the Northwest Territories (NWT). The density of waste within the landfill site will most likely be greater than this due to the high percentage of high density materials, such as scrap steel and plastics.

2.2.3 Materials Composition

As indicated above, the majority of the non-hazardous waste being produced at the Mary River Project is either salvaged or incinerated. The remainder of the non-hazardous waste will be deposited in the landfill and mainly consists of scrap steel, plastics and ashes from the incineration process. Hazardous wastes will not be deposited in the landfill. Therefore, the landfill will contain non-combustible, non-hazardous solid industrial waste, ashes and sand and gravel cover material. Bulky wastes from the 1960s exploration program, currently being stored in the temporary laydown area, will be inspected for any hazardous contents and will also be placed into the proposed landfill if acceptable. Any hazardous wastes encountered will be disposed of as indicated in the next sub-section.



2.2.4 Hazardous and Bulky Wastes

The following wastes will not be accepted at the landfill:

- Liquid industrial wastes
- Wastes that are toxic or hazardous in nature

Liquid industrial wastes will be disposed of in accordance with the Used Oil and Waste Fuel Management Regulations (NWT, January 2000). Toxic or hazardous wastes will be disposed of off site at an approved facility, in accordance with the Guideline: General Management of Hazardous Waste in Nunavut (Nunavut, January 2002).

Bulky wastes which cannot feasibly be salvaged may be deposited into the landfill site. These items will be drained of all fluids (i.e. fuel, hydraulic fluids, oils) prior to disposal. The fluids will be disposed of in the same manner as liquid industrial wastes or hazardous wastes, as applicable.

2.2.5 Compaction Rates

A compaction rate of 3:1 is recommended for a modified landfill, as indicated in the Guidelines. Due to the high density materials to be deposited into the landfill, a conservative compaction rate of 1:1 has been used.

2.3 PLANNING HORIZON

The Guidelines state that all new landfills should be planned based on a 40 year planning horizon. However, due to the short-term nature of the Bulk Sampling Program, the landfill has been planned based on 2 years of operations plus 1 year of closure activities. Additional capacity could be available at this site if required in the future.

2.4 WASTE COLLECTION FREQUENCY AND PRACTICES

Waste will be collected by designated Baffinland employees and disposed of in the landfill on a regular basis. Waste will be transported by pickup truck/all terrain vehicle or dump truck, depending on the size and nature of the waste.

2.5 SITING OF THE LANDFILL

An options review was completed to determine the optimum location for the landfill site based on the requirements of Section 2 of the Guidelines. The preferred location is southeast of the upper basin of Sheardown Lake as shown on Figure 1.2. The area is undisturbed and gently slopes towards Sheardown Lake.

The location was selected using the Guidelines and specific Bulk Sampling Program related requirements. The specific rationale for the preferred landfill site location is as follows:



Criterion (From The Guidelines)	Details					
Area sufficient for a facility with a capacity for	The landfill has been sized for the 2 year life					
at least a 40-year life	of the Bulk Sampling Program and 1 year of					
	closure. Additional capacity could be					
	available at this site if required in the future.					
Areas in flood plain	The landfill is not located in a floodplain.					
Climatic conditions of region; geological and	These have been considered and taken into					
terrain conditions of site	account in the design.					
Cover material availability	Cover material will come from a local borrow					
	source (as shown on Drawing No. 101).					
Distance from airport to avoid hazard to	The landfill site is located approximately					
aircraft from scavenging birds	1.5 km from the end of the airstrip. Due to					
	the inert nature of the waste, Transport					
	Canada has indicated that a minimum					
	distance of 1 km is required.					
Distance from community to avoid	The landfill is on the far side of a low hill from					
unsightliness, odour, and smoke	the mine site infrastructure and is not highly					
	visible from the main road. No communities					
	are near.					
Distance from community to minimize	The access road has been located to					
construction and maintenance costs of	minimize these. The site is located less than					
access road	1 km from the proposed Bulk Sampling					
	Program stockpile area to reduce the					
	footprint of the operations and to keep the					
	access road short. No communities are					
	near.					
Distance from housing	The landfill is at least 450 m from any place					
	of accommodation (i.e. Mary River Camp).					
	The landfill is more than 2 km from the camp					
	to reduce any possible visual impacts, as					
	well as noise from equipment.					
Distance from public roads, railways, right-of-	N/A no public roads, railways, right-of-ways					
ways and cemeteries	or cemeteries are present in the proposed					
	landfill site area.					
Distance from surface water to minimize	The landfill is more than 30 m from the high					
fisheries habitat impacts	water mark for Sheardown Lake and any					
	potential fish habitat streams.					
Distance from tree line	N/A					
Geotechnical features of the site	These have been considered. Drillhole					
	MRL 004 encountered bedrock at 2 m depth.					



Criterion (From The Guidelines)	Details				
Located to ensure protection of drinking	The landfill site is located in a separate				
water	watershed from the drinking water source,				
	ensuring that the water supply for the Bulk				
	Sampling Program, Camp Lake, will not be				
	impacted by the landfill.				
Located to ensure protection of	Fisheries and wildlife studies of the project				
national/territorial parks, game and wildlife	area have been completed and the landfill				
reserves, special fisheries areas	has been sited in consideration of these				
	studies. The stream which the landfill site				
	access road crosses is not fish habitat.				
Minimize impacts to land, birds, animals,	The waste will be inert and therefore should				
vegetation	not impact these. Programs will be put in				
	place to monitor this.				
Zoning	N/A				
Wind direction	N/A as no significant odours are expected to				
	originate from the landfill.				
Snow Accumulation	This has been considered. If necessary,				
	snow fences will be installed to help minimize				
	snow drifting.				

In addition to the above criterion, the limits of the landfill site and access road will remain a minimum of 33 m away from any recorded archaeological sites.

The proposed location of the landfill was submitted to Transport Canada for approval. Transport Canada indicated that the landfill may be placed within 3 km of the airstrip since the landfill will not attract birds which may be potentially harmful to aircraft.

2.6 MONITORING

2.6.1 Groundwater

According to the Guidelines, groundwater monitoring is not required as the population to be served by the landfill will be less than 1000 (refer to Table 2.4 of the Guidelines). In addition, the landfill will be situated in a permafrost area and so there is essentially no groundwater present as it is frozen or extremely deep below surface. Therefore, impacts to groundwater are not expected.

2.6.2 Surface Water

Surface water in the area of the landfill generally flows towards Sheardown Lake.

Extensive surface water monitoring has been ongoing at the Mary River Project site since 2004. There are 5 stream surface water monitoring locations situated within 400 m of the proposed landfill site, as shown on Figure 1.2. In addition there are 8 monitoring



locations on Sheardown Lake, 3 in the east basin and 5 in the west basin. These monitoring locations include downstream and receiving body locations. There are no waterbodies upstream of the landfill site.

The surface water sampling generally takes place on a seasonal basis and the samples are analysed by Accutest Laboratories Ltd. in Ottawa and ALS Laboratory Group in Vancouver (metals only).

The landfill is not expected to change the quality of the surface water runoff in the area due to the inert nature of the waste and small landfill footprint.

The site topography is shown on Figure 1.2 and in more detail on Drawing No. 500. The site drainage for the area surrounding the landfill site during operations and following closure will be relatively unchanged from the existing conditions. All surface water runoff from the site currently flows to Sheardown Lake and it will continue to flow there after the landfill site is constructed.

2.7 GEOTECHNICAL INVESTIGATION PROGRAM

The Mary River Project is located in the high arctic at approximately Latitude 71°20' north and Longitude 79°14' west. It is within the zone of continuous permafrost. Permafrost in the Mary River Project area can reach thicknesses of up to 500 m. The active layer extends from ground surface to depths of approximately 1 to 2.5 m. In coarser overburden with limited organic cover, the thickness of the active layer is anticipated to vary between 1.5 and 2.5 m based on a review of preliminary thermistor data collected in 2007. In finer materials or where organic cover is present, an active layer less than 1 m may be present.

A drilling program was completed for a proposed railway loop and included one drillhole (MRL 004) within the limits of the proposed landfill site. This drillhole was completed in June 2006 to identify the subsurface conditions in the area and a copy of the log is provided in Appendix A. The investigation program is described in detail in the Knight Piésold report "Rail Infrastructure - 2006 Site Investigation Summary Report" (2007).

The subsurface conditions recorded for drillhole MRL 004 is as follows:

- 0 to 1 m organics
- 1 to 2 m till
- 2 to 16.6 m sandstone bedrock

Groundwater was not encountered as the area is underlain by permafrost. Based on the conditions recorded in drillhole MRL 004, an active layer thickness of 1 m has been assumed for the landfill site.



SECTION 3.0 - LANDFILL DESIGN

3.1 GENERAL

The landfill design was completed as specified by the Guidelines as described below. The project site layout, including the borrow source for the cover material, is shown on Drawing No. 101. Plans of the various stages of the landfill (i.e. pre-development, operations and closure) as well as sections and details of the landfill site are shown on Drawing Nos. 500 and 501.

3.2 DESIGN LIFE

The Guidelines stipulate that a modified landfill must be designed for a minimum 40-year life. However, due to the short-term nature of the Bulk Sampling Program, a design life of approximately 3 years, including closure, was used.

3.3 PERMAFROST ENCAPSULATION DURING OPERATION AND CLOSURE

In order to achieve permafrost encapsulation in the landfill site, the final cover will be thicker than the active layer. Based on an active layer approximately 1 m thick, the final cover will be 1.5 m thick.

3.4 WASTE DISPOSAL METHOD

The area method will be used for waste disposal. As shown on Drawing Nos. 500 and 501, low height berms (2 m high) will be constructed along two sides of the landfill site and then waste will be disposed of against the berms and directly onto the ground downstream of the berms. Heavy equipment, such as a bulldozer, will pack the waste against the berms.

Sand and gravel will be used as the cover material for the landfill site. This cover material will come from the Mary River borrow area located approximately 4 km northwest of the landfill site as shown on Drawing No. 101. The operational cover will be approximately 0.1 m thick between cells and approximately 0.3 m thick over the cells. This cover will be placed during the spring or fall or when the waste deposited is 3 m wide.

The placement of waste will progress down slope towards the northwest end of the site. Once waste has been disposed of over the entire area, the entire area will be covered with 0.3 m of cover material. The cover material will be compacted and graded until the surface is level. Then a second 2 m high berm will be constructed on top of the material and the process will begin again. Further details, including the sequence of activities, are provided on Drawing No. 501.

3.5 FENCING

No fencing will be required as the inert waste should not attract wildlife and public access to the area is restricted. Also, waste will either be too heavy to blow away (i.e. scrap steel) or will consist of ashes which will be placed into containers prior to being brought to the landfill site. If it is determined that fencing is required, a temporary snow fence will be installed for operations.



3.6 SIGNAGE

Signs will be posted at all access points to the area to advise those working on the Bulk Sampling Program, and the public, that the site is being used for solid waste disposal. If applicable, hours of operation, emergency numbers, recycling information, etc., may be included on the signs.

3.7 WATER

3.7.1 Surface Water Flow

Flowing surface water will be prevented from entering the landfill site by the construction of a berm along the upper end of the site (i.e. the berm constructed above for waste placement) and berms along the sides of the site. The berms will be constructed as shown on Drawing No. 500, with a maximum height of 2 m, upstream (inside) side slopes of 3H:1V and downstream (outside) side slopes of 2H:1V. The crest width of the berms will depend on the equipment available. The landfill site area will be graded as required to promote drainage away from the landfill and to prevent pooling of water within the landfill or against the berms.

Appropriate erosion and sediment control measures will be implemented as required through the use of silt curtains/fences, etc. Temporary sediment control measures will be used during all construction activities at the site.

3.7.2 Surface Water Quality

As indicated above, surface water monitoring will continue on a seasonal basis at the locations shown on Figure 1.2.

3.8 GEOTECHNICAL ASSESSMENT

Due to the granular nature of the existing foundation soils and the presence of permafrost, it was determined that the slope stability of the perimeter berms and bearing capacity of the foundation soils would be adequate for the landfill. It was also felt that differential settlement of the foundation soils would not be an issue.

If settlement of the perimeter berms occurs, additional fill will be placed in the settled area to bring the berm crest back up to grade.

3.9 <u>LEACHATE CHARACTERISTICS</u>

Leachate is not expected as the waste to be deposited in the landfill will be relatively dry, inert and non-hazardous. Therefore no leachate collection system has been included in the design.

Also as indicated above, a perimeter berm will be constructed surrounding the landfill site. This will redirect surface runoff originating upstream of the landfill site, thereby minimizing the amount of water which might infiltrate the deposited waste.



3.10 GROUNDWATER PROTECTION SYSTEM

Due to the permafrost in the area, no groundwater protection system has been included.

3.11 LANDFILL GAS ASSESSMENT

Landfill gas is not expected to be an issue as the deposited waste will be non-hazardous, non-organic and inert. Also all chemicals will be diverted for proper hazardous waste disposal. Therefore a landfill gas collection system will not be installed in the landfill site.



SECTION 4.0 - SITE PREPARATION

4.1 SURVEY

A survey of the landfill site area will be completed after all site preparation work is completed and prior to construction of the initial berm and placement of any waste. The survey will be used to assist in estimating the volume of waste deposited in the landfill.

4.2 SITE PREPARATION OF LANDFILL AREA

Prior to any placement of waste, the existing ground within the landfill site limits will be filled and graded as required to provide a gently sloping surface. Low areas will be filled with sand and gravel material and the entire area will be graded to promote drainage away from the landfill and towards Sheardown Lake.

4.3 ACCESS ROAD

An access road will be constructed from the existing Tote Road to the proposed landfill site. The road will be constructed by placing approximately 1 m of granular fill, approximately 6 m wide, over the proposed alignment. There will be one small stream crossing along the road alignment which will consist of culverts sized accordingly for the upstream catchment area. This stream has already been assessed as not being fish habitat.



SECTION 5.0 - OPERATIONS, MAINTENANCE AND MONITORING

5.1 OPERATIONS AND MAINTENANCE MANUAL

An operations and maintenance manual will be completed for the landfill site in accordance with the requirements of the NWB, prior to waste deposition. The operations and maintenance manual will include but may not be limited to the following:

- A general description of how the landfill site is to be operated and maintained
- A proposed schedule for when specific operating and maintenance activities are to be conducted (i.e. seasonal surface water sampling, routine visual inspections, berm inspections, etc.)
- A list of who is responsible for completing each item scheduled above
- Location of the landfill and proximity to receiving waters
- A description of the cover material to be used as well as the source for the material and how it will be placed
- Runoff and drainage control within and around the landfill, including erosion and sediment control and proposed restoration measures for erosion which occurs
- Treatment measures for contaminated drainage (although this is not seen as an issue)
- Prevention of windblown debris (although this is not seen as an issue)
- Method and frequency of site maintenance

This manual will assist landfill site operators in establishing a proper waste management system and in ensuring that the system operates efficiently and in accordance with the Guidelines. Some additional details of the operation and maintenance of the landfill, as well as monitoring, are provided in the following sections.

5.2 PLACEMENT OF WASTE

As indicated above, the area method will be used to place the waste in the landfill. Once the first layer is complete and covered, a second layer will be formed. The sequence of actions is shown on Drawing No. 501.

The following measures will be taken during the landfill operations:

- Compaction of the waste (if required depending on the nature of the waste) will be undertaken
 typically once per week or in combination with collection frequency, depending on the nature of
 the waste. Generally, the waste will be worked and compacted as they are dumped.
- Operations will be undertaken to minimize close-out requirements
- Cover material will be placed to a thickness of 0.1 m between cells, 0.3 m on the surface of cells, and 1.5 m for closure



5.3 MONITORING PROCEDURES DURING OPERATIONS

An internal monitoring and reporting program will be established for the project which will include but may not be limited to the following:

- The environmental policy
- Roles, responsibilities and authorities
- Significant environmental aspects
- Legal requirements
- Training
- Communication within the organization
- Communication with regulatory authorities
- Emergency response
- Monitoring and measurement
- Audits
- Records management

Further details are provided in the following sections. This monitoring program will be conducted in conjunction with other programs currently in place for the project (i.e. as outlined in the Comprehensive Environmental Monitoring Plan (CEMP) dated October 4, 2007).

5.3.1 Volume

Records will be kept of the volume of waste and cover materials placed in the landfill. The annual volume of waste disposed of in the landfill will be determined based on these records. This annual volume may be confirmed through the use of survey information.

5.3.2 Materials Composition

The variety of materials that will be reporting to the landfill is limited as the majority of waste for the Bulk Sampling Program is either salvaged/recycled or incinerated. Therefore materials composition studies will not be undertaken as part of the Bulk Sampling Program to determine if a higher percentage of the waste can be diverted from the landfill. However, records will be kept of the nature of the waste and cover materials placed in the landfill.

5.3.3 <u>Hazardous Waste Storage</u>

As indicated above, there will be no hazardous wastes entering the landfill site. These will be disposed of in accordance with applicable regulations and/or off site at approved facilities.

5.3.4 Water and Soil Sampling

The "Guidance Manual on Sampling, Analysis and Data Management for Contaminated Sites" (CCME, 1993) will be followed for all water and soil quality monitoring. Surface water



sampling will continue at the locations shown on Figure 1.2 on a seasonal basis. A soil sampling program will be initiated at several locations around the landfill site prior to construction of the initial perimeter berm.

5.3.5 Ground Temperature Monitoring

It is expected that the active layer will progress into the landfill waste and cover material. Therefore, ground temperatures are not expected to increase due to the presence of the landfill and the types of non-hazardous waste disposed of in the landfill.

During regular landfill inspections, signs of ground warming will be monitored by watching for evidence of soil creep, for example.

5.3.6 Leachate Monitoring

Leachate production from the landfill is not expected based on the relatively dry, inert nature of the waste to be placed in the landfill. However, leachate monitoring will be completed in conjunction with the surface water monitoring program discussed above to confirm the negligible levels of leachate production.

5.3.7 <u>Inspections and Maintenance</u>

Routine visual inspections will be completed for various components of the landfill, including the berms, fencing (if installed), etc. If required, maintenance will be completed as soon as possible. Records will be kept of all inspections and maintenance measures completed and will form part of the annual landfill site report.

5.4 <u>ANNUAL SITE REPORT</u>

An annual report will be completed for the overall project and will include information on the landfill, consisting of the following information:

- Total volume of waste deposited in the landfill site during the previous calendar year
- Progression of the landfill site development, indicating the landfill site location currently in use, and any areas that have been closed
- Monitoring results
- Remaining life expectancy of the landfill site
- Details of operational problems encountered during the year and the measures taken to resolve the operational problems
- Photographs



SECTION 6.0 - CLOSURE

6.1 **GENERAL**

Final closure of the landfill site will be conducted in a manner which ensures long-term protection of the environment, as discussed below. In addition, the NWB will be notified at least 6 months in advance of the landfill site closure.

6.2 CLOSURE REPORT

A Closure Report will be produced for the landfill and submitted for approval at least 6 months prior to closure. The report will include discussions on the following:

- Future land use
- Leachate prevention and monitoring
- An implementation schedule
- Mapping which shows all disturbed areas, borrow material areas and site facilities
- Consideration of altered drainage patterns
- Type and source of cover materials
- Infrastructure and equipment removal (as applicable)
- Hazardous wastes including waste oil (if applicable)
- Contaminated site remediation (if applicable)

6.3 GRADING AND CAPPING

The closure cover will consist of a 1.5 m thick soil cover over the entire surface of the landfill. The cover will be compacted and contoured to shed precipitation from the surface. It is anticipated that this cover will comprise 1.5 m of sand and gravel material. The entire area will then be allowed to revegetate naturally.

6.4 SURVEY

A final survey of the landfill site will be completed after completion of the closure cover. The survey will include any designated waste disposal areas, etc.

6.5 REGISTRATION

The landfill site will be identified as a Modified Solid Waste Management Facility on the land title documents.

6.6 SIGNS

A sign will be posted to advise people that the site is closed and indicate an alternate facility for waste disposal.



SECTION 7.0 - POST CLOSURE

7.1 <u>INSPECTIONS</u>

A post-closure inspection checklist will be filed with the NWB at least 6 months prior to closure. The checklist will include the following:

- Inspection frequency
- · List and description of items to be inspected
- Compliance requirements

The cover material will be allowed to settle and will be regraded as required to prevent standing water on the cover. Perimeter berms will be inspected regularly to ensure they are performing as designed.

Once the final cover is in good shape and Baffinland will submit a report to the NWB requesting cessation of the post-closure inspections.

7.2 MONITORING

The monitoring program established during operations will continue into the post-closure period until it can be shown that the site is no longer releasing contaminants (i.e. metals, hydrocarbons although neither are expected due to inert nature of the waste), if previously detected, or that the site has reached an equilibrium state in which contaminant release poses no unacceptable risk to the environment.

Once one of the above conditions applies and provided the final cover is in good shape and the vegetation is developing sufficiently, as discussed above, Baffinland will submit a report to the NWB requesting cessation of the post-closure monitoring.

7.3 POST-CLOSURE REPORT

A post-closure report will be prepared summarizing the results of site inspections and monitoring, including maintenance completed. The post-closure report will include the following:

- The results and an interpretive analysis of the results of all leachate, surface water and soil cover monitoring, including justification to cease the monitoring and inspection programs
- An assessment of the operation, maintenance and performance of, and a discussion of corrective action taken concerning the final cover i.e. erosion and/or vegetative cover and control, treatment, disposal and monitoring facilities for leachate and surface water
- Photographs



SECTION 8.0 - REFERENCES

- Canadian Council of Ministers of the Environment, 1993. <u>Guidance Manual on Sampling</u>, <u>Analysis and Data Management for Contaminated Sites</u>, Volume I: Main Report and Volume II: Analytical Method Summaries. Winnipeg, Manitoba.
- 2. Ferguson, Simek Clark Engineers & Architects, 2003. <u>Guidelines for the Planning, Design, Operations and Maintenance of Modified Solid Waste Sites in the Northwest Territories</u>. April 21, 2003. Yellowknife, Northwest Territories.
- Government of the Northwest Territories. <u>Environmental Protection Act. Used Oil and Waste Fuel Management Regulations (Draft)</u>. Regulation 037. March 16, 2000. Yellowknife, Northwest Territories.
- 4. Government of the Nunavut. <u>Guideline: General Management of Hazardous Waste in Nunavut.</u> January 2002. Nunavut.
- Knight Piésold Ltd., 2006. <u>Baffinland Iron Mines Corporation, Mary River Project, Bulk Sampling Program, Environmental Screening Document</u>, Volume I Report and Volume II Appendices, Ref. No. NB102-00181/6-1, Rev. 0. November 20, 2006. North Bay, Ontario.
- 6. Knight Piésold Ltd., 2007. <u>Baffinland Iron Mines Corporation, Mary River Project, Bulk Sampling Program, Rail Infrastructure 2006 Site Investigation Summary Report, Ref. No. NB102-00181/3-3, Rev. 0. March 26, 2007. North Bay, Ontario.</u>
- 7. Knight Piésold Ltd., 2007. <u>Baffinland Iron Mines Corporation, Mary River Project, Comprehensive Environmental Monitoring Plan, Ref. No. NB102-00181/10-3, Rev. 0. October 4, 2007. North Bay, Ontario.</u>



SECTION 9.0 - CERTIFICATION

S.R. AIKEN

LICENSEE

This report was prepared, reviewed and approved by the undersigned.

Prepared by:

Deena M.M. Duff, P.Eng.

Senior Engineer

Reviewed by:

Steven R. Aiken, P.Eng.

Manager Environmental Services

PERMIT TO PRACTICE KNIGHT PIESOLD LTD.

Signature

Date November 13/2007

PERMIT NUMBER: P 547

The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

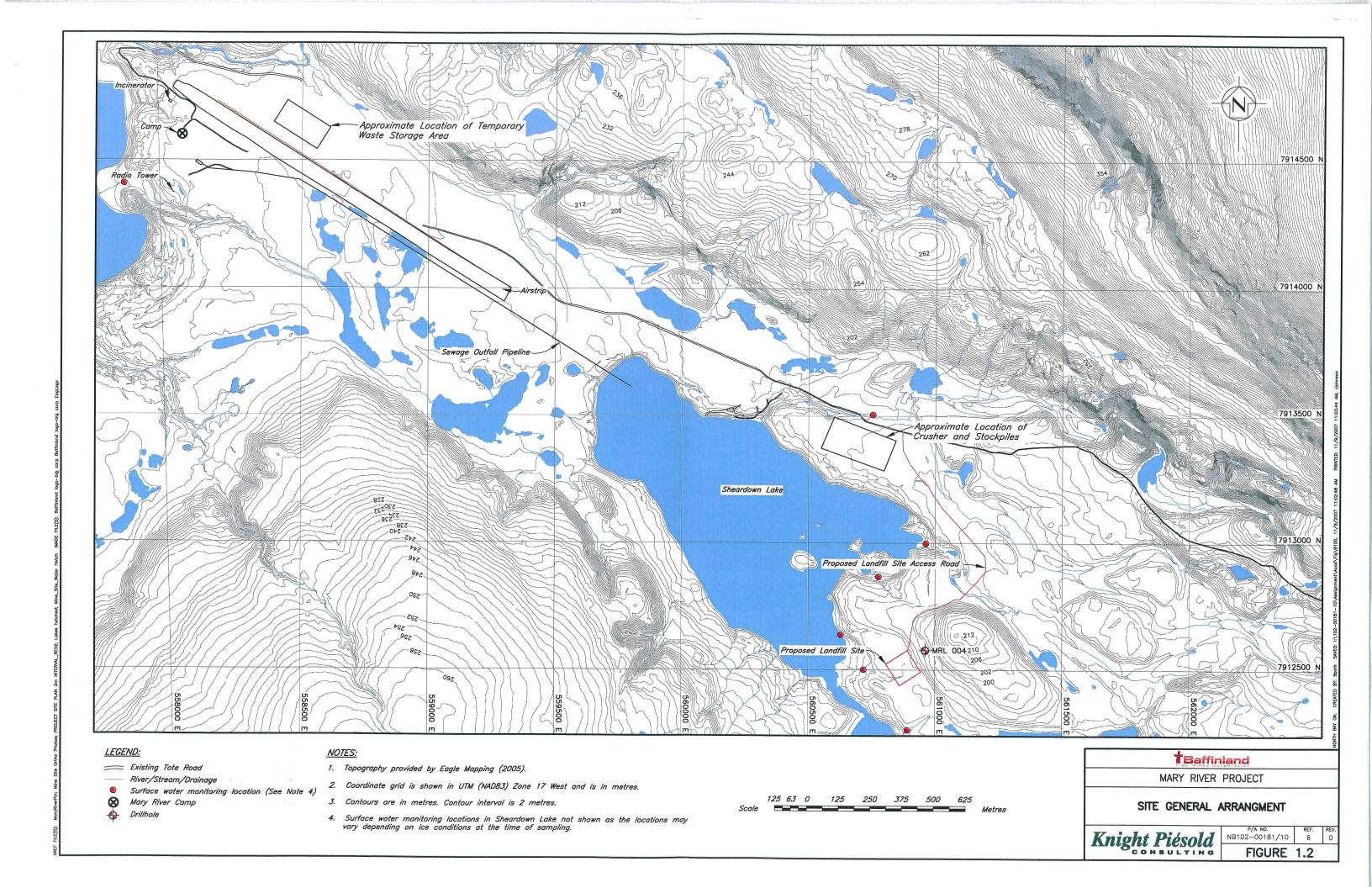
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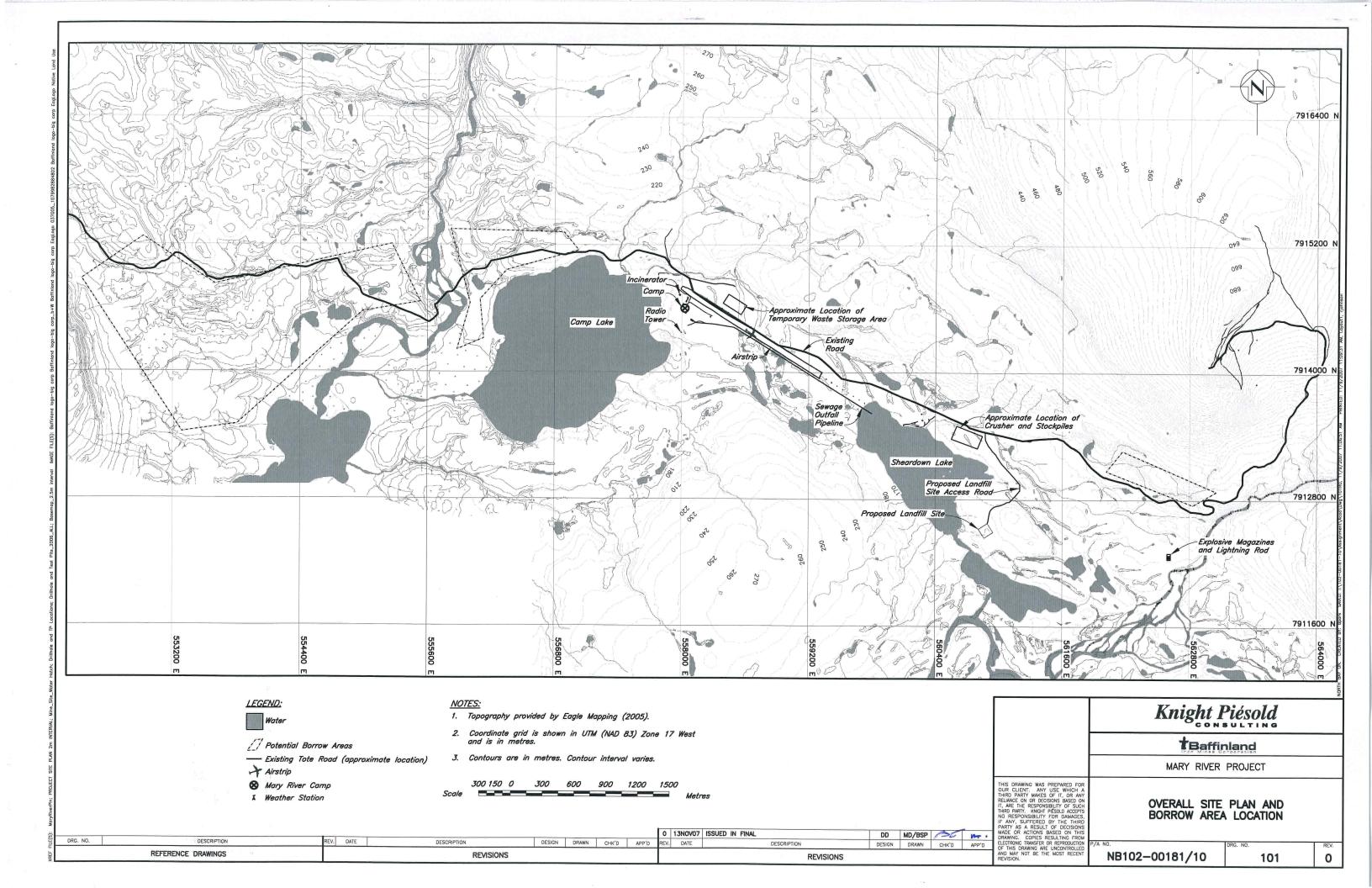
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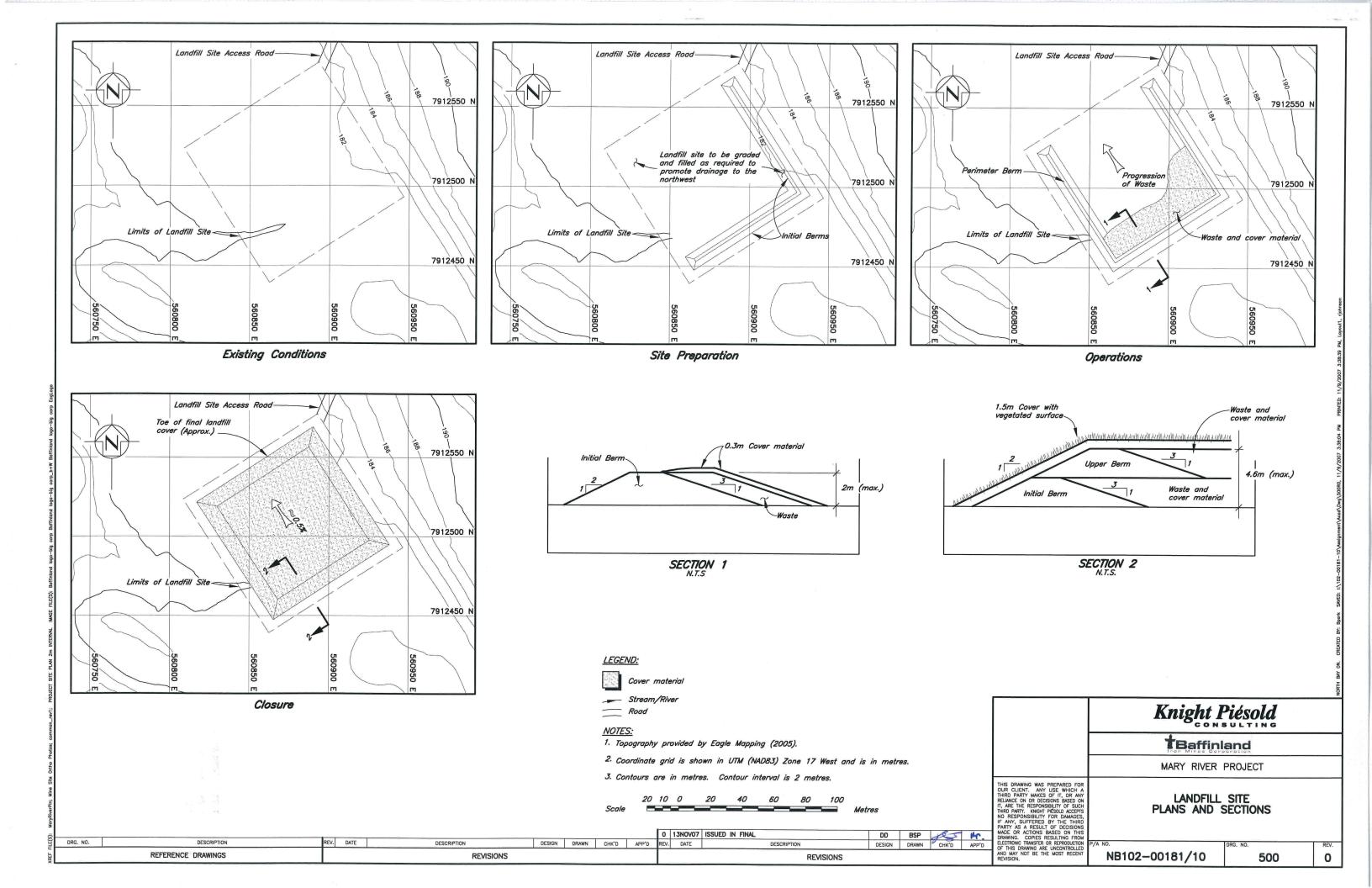
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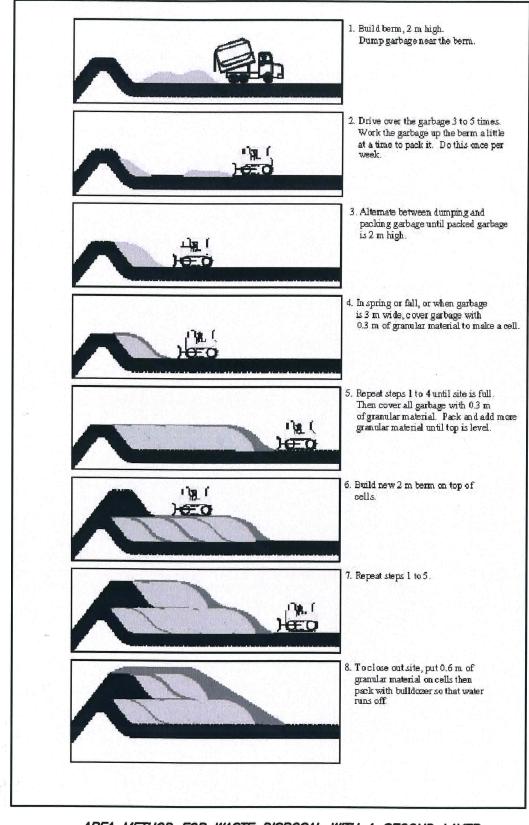
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FIGURE 1.1









AREA METHOD FOR WASTE DISPOSAL WITH A SECOND LAYER

REVISIONS

NOTES:

1. Information taken from "Guidelines for the Planning, Design, Operations and Maintenance of Modified Landfill Sites in the NWT" (Ferguson, Simek Clark Engineers & Architects, 2003).

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		Knight I	Piésold	
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APPENDIX A MRL 004 DRILLHOLE LOG

MRL Drillhole Log

1 page

• (Previously issued with report Ref. No. NB102-00181/3-3, Rev. 0)

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