


APPENDIX L14

Landfill Maintenance and Operation Manual

(Pages L14-1 to L14-23)

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	Site Services	Document #: BAF-PH1-320-T07-0004	

Baffinland Iron Mines Corporation

Landfill Maintenance and Operation Manual

BAF-PH1-320-T07-0004


Rev 0

Prepared By: Jim Millard
Department: Environment
Title: Environmental - Manager
Date: March 17, 2015
Signature:

Approved By: Bikash Paul
Department: Site Services
Title: Site Services - Manager
Date: March 17, 2015
Signature:

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Appendix A- Potential Pollutant Sources and Best Management Practices Summary Table

Appendix B- Mine Site Non-Hazardous Solid Waste Landfill User Rules

Appendix C- Mine Site Landfill Work Instructions

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1 PURPOSE AND SCOPE

The purpose of this procedure is to ensure that non-hazardous solid wastes are disposed of in compliance with all environmental permits, licences, and authorizations, and in an efficient and safe manner.

This procedure applies to the handling, storage and disposal of all non-hazardous solid industrial waste at the Mine Site Landfill.

This procedure does not apply to hazardous and liquid industrial wastes, hauled sewage or domestic waste. Refer to Baffinland's Waste Sorting Guidelines (BAF-PH1-830-P25-0001) which clearly differentiates landfill waste from non-hazardous putrescible wastes and hazardous wastes.

This manual has been designed to be used both as a field reference document as well as a training manual for classroom and self-instruction purposes. Every employee with accountabilities and responsibilities as required by this procedure is expected to be familiar with its use at the site. This manual contains the basic knowledge regarding personnel responsibilities, safety practices, and the overall operations of the landfill. Appendix C focuses on Landfill Work Instructions and has been formatted to provide supervisors and their employees with a user-friendly method for training and implementation.

2 REQUIREMENTS

2.1 HAZARDS AND ADDITIONAL PPE (PERSONAL PROTECTIVE EQUIPMENT)

2.1.1 HAZARDS

There are numerous hazards associated with the operation and maintenance of the landfill. They include:

- Mobile equipment dangers and spills
- Flying objects (i.e. debris, broken glass)
- Dust and small particles

2.1.2 PPE

- Wear Standard PPE - Safety glasses, hard hat, safety boots and reflective vest.¹


2.1.3 SAFETY AND ENVIRONMENTAL EQUIPMENT

- Spill kits
- Radio Communication

2.2 TRAINING/ QUALIFICATIONS AND CERTIFICATIONS

¹ PPE is not required for operators inside enclosed cabs of heavy equipment.

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Any operator who may be working at the landfill shall complete the documented training in this procedure and demonstrate their understanding of their responsibilities, and of the hazards and controls. Verification of training will be kept by the Training Department.

3 RESPONSIBILITIES

The following roles have specific accountabilities that must be met to ensure the Mine Site landfill is operated in compliance with this procedure. The following roles and responsibilities of the various employees who work at the Landfill site are described below.

3.1 SITE SERVICES MANAGER/SUPERINTENDENT

- a. The Site Services Manager, or the Site Services Superintendent during the Manager's absence, is accountable for the overall operation of the landfill. Specifically, he/she shall:
- b. Organize, oversee and administer the operation of the landfill in accordance with regulatory requirements and applicable procedures.
- c. Plan and coordinate the most efficient use of landfill areas to conserve landfill space.
- d. Help develop, implement and enforce landfill specific safety regulations.
- e. Meet routinely with the Site Services Supervisors to maintain proper control of the site and to determine what, if any, problems exist or may be anticipated. Consider the following:
 - i. Operational issues;
 - ii. Regulatory Requirements;
 - iii. Equipment issues;
 - iv. Special operating instructions – e.g. inclement weather, special waste, emergencies.
- f. Schedule routine work as required – e.g. drainage channel cleaning, landfill surface repairs and litter control, etc.
- g. Ensure that the need for any special operating conditions have been planned for in advance – e.g. identification of features with stakes in advance of winter and the ground freezing.
- h. Coordinate a biannual summer earthworks inspection which shall be conducted by a geotechnical engineer.
- i. Schedule the quarterly survey requirements for volume calculations.


3.2 SITE SERVICES SUPERVISOR (MINE SITE)

The Site Services Supervisor, under the general supervision of the Site Services Manager/Superintendent, is responsible for supervising waste disposal and associated activities at the Mine Site Landfill in accordance with this procedure. Specifically, the Site Services Supervisor shall:

- a. Regularly brief the Site Services Manager/Superintendent on the status of routine operations and any special problems.
- b. Implement and enforce the landfill safety regulations and operating procedures.

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- c. Check grades and contours to ensure that refuse placement and compaction conforms to engineered specifications and designs.
- d. Maintain thorough, accurate and detailed records of landfill operations, and other related matters. Respond to incidents and inquiries promptly to ensure the landfill is operated in compliance with this procedure.
- e. Instruct all crews on critical landfill procedures and areas of concern and monitor progress.

3.3 MINE SITE LANDFILL OPERATOR/ LABOURER

The Landfill Operator/Labourer, under the general supervision of Site Services Supervisor, is responsible for executing the following tasks at the landfill. Specifically the Operator/Labourer shall:

- a. Be trained and experienced in operating the mobile heavy equipment necessary for the work.
- b. Work in conjunction with the Site Services Supervisor in executing general landfill operations according to this procedure.
- c. Maintain a level landfill base at the working face dumping area,
- d. Ensure the landfill is maintained free of windblown litter and that litter fences are appropriately placed and in good condition
- e. Employees are to report all violations of site user rules (Appendix B) to their supervisors for further action and incident reporting.

3.4 ENVIRONMENT DEPARTMENT PERSONNEL

The Environment Department will conduct weekly inspections of the Mine Site Landfill. In addition to conducting weekly inspections, Environment personnel shall:

- a. Support Site Services by providing guidance on what types of solid wastes are permitted at the Mine Site Landfill.
- b. Notify the Site Services Superintendent and/or Supervisor when non-compliance conditions are observed so that corrective action will be taken on a timely basis.
- c. Ensure that all contractors and Baffinland employees are familiar with Baffinland's waste sorting guidelines.

4 DEFINITIONS


Waste Management System: A waste management system includes all facilities, equipment and operations for the collection, handling, transportation, storage, processing and disposal of waste.

Landfill Site: Controlled site where no hazardous wastes are accepted and only specific wastes as outlined in the Mine Site Landfill approval permit are accepted. At landfill sites, the waste is regularly compacted and covered.

Mine Site Landfill: For the purpose of this document, the Mine Site Landfill has been constructed as a Non-Hazardous Solid Waste Landfill facility.

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Non-Hazardous Solid Waste: The wastes generated during the lifespan of the Project that do not present a threat to human health or the environment.

Hazardous Waste: Material that, given its quantity, concentration and composition or its corrosive, inflammable, reactive, toxic, infectious or radioactive characteristics, presents a real or potential danger to human health, safety and public well-being or poses a danger to the environment if it is not stored, treated, transported, eliminated, used or otherwise managed. Hazardous Waste are not permitted to be disposed of in the Landfill.

Domestic Waste: Domestic waste includes waste such as office paper, lunchroom supplies, washroom supplies, food waste and containers contaminated with food. Domestic waste can be considered all bagged and boxed waste originating from offices, kitchens and camps, generally suitable for disposal in the incinerator. Domestic waste are not permitted to be disposed of in the Landfill as these wastes may be an attractant to wildlife.

Empty Container: Clean, empty containers that did not previously contain hazardous material, food or compressed gas.

5 LANDFILL OPERATIONS

The Mine Site non-hazardous solid waste landfill's operation and maintenance are based on the Guidelines for the Planning, Design and Operations and Maintenance of Modified Solid Waste Sites in the Northwest Territories (the Guidelines) to ensure both the protection of the environment and the health and safety of individuals. The estimated remaining capacity of the current landfill design is approximately 5,000 m³ of waste and cover material. If additional capacity is required in the future an extension to the current design will be designed and developed.

5.1 CLASSIFICATION OF WASTE


5.1.1 ACCEPTABLE WASTES AT THE LANDFILL

Non-hazardous solid wastes acceptable for disposal at the Mine Site Landfill include the following products:

- Treated wood products² – e.g. plywood, painted wood, etc.
- Clean plastics
- Cardboard
- Bulky waste such as heavy equipment, trucks, snowmobiles and appliances. These items will be drained of all fluids (oil, fuel, hydraulic fuel; ozone depleting substances must be removed by a licensed technician) prior to disposal.

² Clean untreated wood that can't be reused should be diverted to the designated Burn Area. Please refer to BAF-PH1-300-PRO-0001 Open Burning of Untreated Wood, Cardboard and Paper Products Procedure for clean untreated wood management.

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- Concrete
- Glass
- Metal
- Non-toxic incinerator ash
- Empty containers (as defined in this procedure)

5.1.2 HAZARDOUS MATERIAL AND OTHER UNACCEPTABLE WASTES AT THE LANDFILL

Hazardous waste, liquid waste and food waste are NOT accepted at the Mine Site Landfill. They include the following:

- Liquid wastes – e.g. sewage, grey water
- Food waste and other domestic wastes
- Radio-nuclides (Radioactive waste)
- Batteries
- Infectious or medical waste
- Electronic waste – e.g. TVs, computer CRTs (screens) and computer hard drives
- All material regulated by the Transportation of Dangerous Goods Act
- All material requiring a Material Safety Data Sheet (MSDS)
- Chemicals – e.g. paint, solvents, acids, cleaning products, insecticides, etc.
- Any petroleum product – e.g. gasoline, diesel, jet A, waste oil, etc.
- Propane tanks
- All pressurized gas cylinders and aerosol cans
- Fuel drums (205 liter barrels) or other materials/containers previously containing fuel or other hydrocarbons
- Friable asbestos
- All heavy metals such as Beryllium, Cadmium, Mercury, etc.
- Scrap tires


The above list is not all inclusive. For unusual or hard to segregate waste types – e.g. multi-material waste, please contact the Environmental Department.

5.2 LANDFILL WASTE CELL CONSTRUCTION

Due to the presence of permafrost, the area method will be used to place waste in the landfill. Waste will be deposited on the ground, worked with appropriate heavy equipment, and packed against a constructed berm. Construction of the berm will be advanced with the advancing face of the landfill. The waste cell is the basic building block of the landfill. It is composed of several layers of solid waste compacted on a slope by heavy equipment and enclosed on all sides by soil. The general placement of waste will progress down-slope from the southeast rear berm wall towards the northwest end of the site. Basic instructions for constructing waste cells with acceptable materials at the Mine Site Landfill are described below in Figure 1.

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5.2.1 CONTROL OF WORKING FACE

The working face is the portion of the uncompleted cell on which additional waste is spread and compacted. The optimal working face width varies depending on the number of vehicles bringing wastes to the site and the equipment available for spreading and compacting. It should be wide enough to prevent a backlog of trucks; however, the width should not be so wide as to be impractical to operate or to expose an undue amount of refuse to the wind. The face width should be reduced by compacting and covering portions of the face as soon as a section of the cell meets the grade design. Ideally, for control of the waste exposure to wind, the width of the face should not exceed 12 m at any time.

5.2.2 EQUIPMENT MOVEMENT

Solid waste should be dumped at the toe of the working face by the collection trucks and pushed up the slope. For safety reasons, keep a minimum of 3 m separation between vehicles. The unloading area is to be maintained level and clear of waste materials.

5.2.3 SPREADING WASTE ON A SLOPE

To maximize compaction, and to provide an optimal weight distribution of the dozer, the waste should be spread up an approximate 3:1 slope in 0.3 – 0.6 m layers. Fill in any holes that develop in the face with loose waste.

5.2.4 USING GRADE STAKES


If necessary, use grade stakes to aid operators in keeping the slope of the final top fill surface at a grade of 0.5%, the slope of the cell face 3:1 and the grade of the landfill base to 0.5%, approximately.

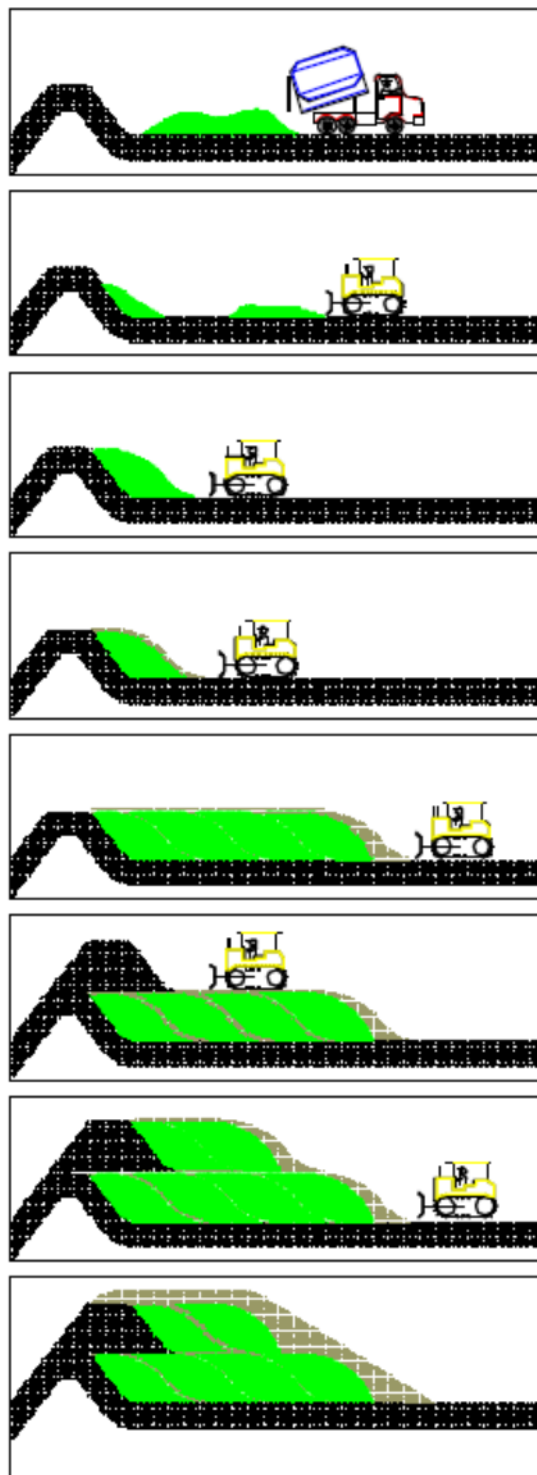
5.2.5 WASTE COMPACTION

A high degree of compaction extends the fill life, reduces cover material and long-term land requirements, reduces litter problems, and results in other beneficial effects. Good compaction is achieved by operating up and down the working face between 3 and 5 times on 0.3 - 0.6 m layers of waste until no further compaction occurs. The top deck of the cell must also be compacted by running across the top, keeping it as level as possible. This will typically occur once per week or in combination with collection frequency and nature of the waste.

5.2.6 CELL COMPLETION

Cover soil will be placed over exposed compacted waste cells or portions of waste cells. A minimum of 0.3 m of cover shall be placed over the deck and 0.1 m over the slope of the cell. Use no more fill than necessary. When the cell is completed, no waste should be visible.

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1. Build berm, 2 m high. Dump garbage near the berm. The maximum width of the working exposed face used for dumping should be as small as practical and not exceed 12 m.
2. Drive over the garbage 3 to 5 times with a dozer or other equipment as appropriate. Work the garbage up the berm a little at a time to pack it. Do this daily when material is deposited in the landfill.
3. Alternate between dumping and packing garbage until packed garbage is 2 m high, approximately.
4. When garbage at the working face is 3 m wide, cover garbage with 0.3 m of granular material over the deck of the cell and 0.1 m between cells to complete a partial cell, approximately. Repeat steps 1 - 3 across the width of the landfill until a cell is completed.
5. Repeat steps 1 to 4 until site is full. Then cover all garbage with about 0.3 m of granular material. Pack and add more granular material until top is level.
6. Build new 2 m berm on top of cells.
7. Repeat steps 1 to 5.
8. To close out site, put 0.6 m of granular material on cells then pack with bulldozer so that water runs off.

Figure 1. Waste Cell Construction for Mine Site Area Method Landfill

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5.3 COVER SOIL

5.3.1 EXCAVATION

Excavation of soil for cover material shall only be made from designated “borrow” areas. Working cover stockpiles are to be placed within the perimeter of the approved landfill pad where they will be accessible to the working face. However, they are not to be located where they may block truck travel or filling operations.

5.3.2 PLACEMENT OF FINAL CELL COVER

Use of soil for intermediate and final cover should be placed in the following manner:

- When using a dozer, push cover soil up the slope and feather it out as evenly as possible. Do not permit the tracks of the equipment to spin as you traverse the compacted slope. This action will tear up the waste and it may be necessary to compact the waste again in order to reapply the cover material.
- When a cell or portion of a cell has reached the final planned grade and width, a final cover of compacted soil should be placed. A minimum of 0.3 m of cover shall be placed over the deck and 0.1 m over the slope of the cell. Use no more fill than necessary.

5.4 HARD-TO-HANDLE WASTES

Certain wastes acceptable at the Mine Site Landfill require special handling. The following are basic methods to be used when managing hard-to-handle waste.

5.4.1 BULKY WASTE


- Crushable Items:** Such items (e.g. furniture and appliances) should be dumped at the toe of the working face if traffic permits. Use the dozer to crush the item on solid ground, and then push it to the toe of the working face. Fill in any holes with regular waste.
- Demolition Debris:** Spread out bulkier pieces of concrete, lumber, and other debris evenly at the toe of the working face. Place regular wastes on top of the demolition wastes.
- Long Items:** Long, awkward items, such as pipe, rolls of paper and plastic should be dumped at the toe of the face, placed parallel to the working face, and covered with regular waste. The dozer should be driven over these items slowly to prevent overturning.
- Large Metal Wastes:** Metal wastes, such as pipes, rolls of cable, and wires should be placed directly at its position of disposal and covered by household or demolition wastes (bridged). This will prevent unnecessary machine damage and shutdown.

5.4.2 LOW DENSITY WASTES

Waste types such as synthetic fibers, loose plastic film or foam, and rubber and plastic scraps or shavings, require special handling. These materials present problems because they rebound after being run over by the dozer. Spread the lightweight material into 1 to 2 foot deep layers, and then cover it with regular waste, compacting as usual at base of cell. These wastes should be compacted until the operator can no

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longer detect that the surface of the waste layer is being depressed more than it is rebounding. The weight of the regular waste tends to keep the low-density material down.

5.4.3 POWDERY WASTES

Wastes such as sawdust and ash also require special handling. These wastes are problems because they are stirred up by the equipment and blown by wind. Once in the air, they may be harmful to personnel if they are inhaled or contact the skin. Personnel not working in enclosed cabs should wear protective clothing and respirators if dust becomes airborne. Some powdery wastes may be wetted down with water from a water truck and then covered immediately with soil or regular refuse. This procedure will help reduce blowing and dusting of the powdery waste. If water is not available, cover the powdery wastes with soil or refuse to reduce blowing and dusting of the waste.

5.5 MAINTENANCE OF COMPLETED CELLS

5.5.1 INSPECTION OF COMPLETED AREAS

As per the Nunavut Water Board Type A Water Licence No: 2AM-MRY1325 Part D Section 19, biannual summer inspection of the landfill earthworks (e.g. berm walls and completed cell) will be completed for signs of cracks and depressions due to settlement. Cracks and settlement will be filled and compacted back to the original grade.

5.5.2 GROUNDWATER PROTECTION SYSTEM

Due to the permafrost in the area, no groundwater protection system is required.


5.5.3 SURFACE WATER FLOW AND QUALITY

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 landfill site area will be graded 0.5% to promote drainage away from the landfill and 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 fences, etc. Temporary sediment control measures will be used during all construction activities at the site. See the Surface Water and Aquatic Ecosystem Management Plan (BAF-PH1-830-P16-0026) for further details on surface water flow and quality.

5.5.4 LANDFILL GAS ASSESSMENT

Landfill gas is not expected as the deposited waste will be non-hazardous, non-organic and inert. Also, all hazardous chemicals will be diverted from the landfill waste stream and backhauled during the sealift for proper disposal at a licensed facility in Southern Canada. Therefore a landfill gas collection system will not be installed.

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5.5.5 LEACHATE CHARACTERISTICS

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. In addition, 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.

5.6 TRAFFIC CONTROL AND UNLOADING OF WASTE

5.6.1 TRAFFIC FLOW

Traffic should be kept moving at a safe, steady rate to avoid backlogs and congestion near the working face. Drivers are to back up to the toe of the slope before he/she starts to dump. The driver is to pull straight away slowly from the slope while he/she is dumping.

5.6.2 AIDS TO TRAFFIC CONTROL

Directional signs, pylons and barricades may be used to help with traffic control and directing trucks to unload the waste at the base of the cell. Ensure proper signage and barricades are in the required locations at the beginning of each day. Relocate signs and barricades as required at the end of each day so that they will be in place and ready for the next day's operation.

5.6.3 SEPARATION OF VEHICLES

Due to the risk of dump trucks and trailers overturning, only one vehicle is to be unloaded at the face at a time, this includes vehicles being unloaded by hand.

5.6.4 LOAD-ON-FIRE PROCEDURES


Loads-on-fire are wastes that are either on fire or that are smouldering or smoking within a vehicle or when deposited at the working face. In the event of Loads-on-fire, site personnel are to call Code 1 immediately (Appendix C).

5.6.5 PREVENTION OF SCAVENGING

Scavenging by employees, visitors and local people travelling through is not permitted. Scavenging in a waste pile is a safety hazard with a high risk of injury and is strictly prohibited.

5.6.6 SITE USER RULES

Landfill staff should know all site user rules and watch for violations. User rules (Appendix B) and wastes acceptable for disposal in the landfill (Appendix A) are to be posted at the entrance to the landfill and at the working face. All violation of landfill user rules shall be recorded by landfill staff and reported to the Site Services Supervisor.

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5.6.7 EMERGENCY PROCEDURES

Site personnel shall be familiar with proper emergency procedures and are expected to know their role in all possible emergency situations. Refer to the Emergency Work Instructions in Appendix C of this manual for more details.

5.7 LANDFILL ON-SITE ROADWAYS

5.7.1 ROAD CONSTRUCTION

On-site access roads for transporting waste to the working face and landfill maintenance shall only be constructed under the approval of the Environmental Manager and according to engineered design specifications.

5.7.2 ROAD MAINTENANCE

- Maintenance of Gravel Roadways:** Roadways that are made in native or filled soil and are heavily travelled require routine maintenance. These roads should be graded and re-compacted as required to re-establish proper road grades.
- Filling of Areas Where Settlement Occurs:** When all-weather roads are constructed on the tundra, settlement of the filled area may cause cracks to form in a road or cause the slope of a road to change. Cracks should be filled with material that is compatible with the roadbed. The area of a sloped road where the slope has changed drastically should be built-up with material compatible with the roadway until the desired elevation is achieved.
- Maintenance of Drainage Culverts:** All drainage culverts should be kept free of obstructions and debris. All drainage crossings should be identified with staking prior to the winter so that they can be found and opened in advance of freshet. Prior to the onset of freshet, all drainage culverts shall be opened and ready to accept water flow.

5.8 PREPARATION FOR WEATHER CONDITIONS AFFECTING LANDFILL OPERATION

Wind and white out conditions caused by storms during the winter and spring freshet may have an impact on landfill operations. The following precautions shall be followed.

5.8.1 WIND


In preparation for wind storms, the working face shall be compacted and covered as practical to reduce the width of the exposed face. Litter fences should be installed prior to windy weather and relocated as required.

5.8.2 WHITE OUT CONDITIONS CAUSED BY WINTER STORMS

Under severe white out conditions caused by some winter storms, the Site Services Manager/Superintendent may declare the landfill temporarily closed if conditions at the landfill cannot be made safe to operate.

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5.8.3 FRESHET

Prior to the spring melt of freshet the Site Services Supervisor will take the following precautions to minimize the impact of the water flow from freshet:

- a. Ensure all culverts are cleared prior to freshet.
- b. Remove all excess snow from the landfill pad and completed cell slope to minimize water accumulation on the pad.
- c. Install silt fencing or other control devices if required on drainage that contains silt as a result of landfill erosion.

5.9 INSPECTION, ENVIRONMENTAL MONITORING AND REPORTING

5.9.1 ROUTINE INSPECTIONS

Routine visual inspections will be completed every week on the Mine Site Landfill Inspection form (See the Environmental Protection Plan BAF-PH1-830-P16-0008 section 3.7) by the Environment Department for various components of the landfill, including:

- General site area
- Litter control
- Storm water runoff control
- Vector attractants
- Wildlife observations
- Wildlife signs

5.9.2 ENVIRONMENTAL MONITORING

In addition to weekly inspections, the Environment Department will conduct surface water monitoring on a seasonal basis for compliance monitoring purposes.


5.9.2.1 WATER SAMPLING

As per the Nunavut Water Board Type A Water Licence No: 2AM-MRY1325 Part F Section 22, seepage sampling will be undertaken during the open water season at two locations downstream of the landfill. Sampling parameters will include: pH, alkalinity, conductivity, total dissolved solids (TDS), total suspended solids (TSS), phenols, nutrients, anions, total organic carbon (TOC), dissolved organic carbon (DOC), total metals, total petroleum hydrocarbons, oil & grease, and trace Arsenic and Mercury. An appropriate number of samples (approximately 10% of the total number of samples) will be collected for Quality Assurance / Quality Control.

Water sampling will continue to be undertaken in the receiving water (Sheardown Lake) as part of routine affects monitoring. Groundwater monitoring is not required as the landfill is underlain by permafrost and any runoff or seepage daylight upstream of the current monitoring locations. In consideration that the landfill is situated in a permafrost area with little to no groundwater present. Thus, impacts to groundwater are not expected.

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5.9.2.2 GROUND TEMPERATURE MONITORING

It is expected that the permafrost 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 or the types of non-hazardous waste disposed in the landfill.

During regular landfill inspections, signs of ground warming will be monitored by watching for indicators such as soil creep, settling and slumping, and areas of melted snow, for example.

5.9.3 REPORTING

Annual reporting regarding the landfill will be incorporated into the Annual QIA and Nunavut Water Board Annual Report. The report will consist of information such as:


- 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
- Photographs as required

5.9.4 SUMMARY OF MONITORING AND REPORTING

Monitoring/Reporting	Frequency	Department Responsible	QA/QC
Overall Site Inspection (runoff, waste composition, litter control and placement, wildlife signs)	Weekly	Environment	Management review of records to confirm proper site operation
Volume Deposited in Landfill	Quarterly	Site Services	Management review of records to confirm proper site operation
Materials Composition of Waste	Whenever deposition occurs	Site Services	Management review of records to confirm proper site operation
Surface Water (Seepage) Sampling Downstream of Landfill	During Open Water Season	Environment	Routine QA/QC Sampling (equivalent to 10% of samples taken)
Earthworks Inspection (berm settlement, ground temperature warming, erosion, cracks, etc.)	Biannually during the summer	Site Services (Geotechnical Engineer Consultant)	Management review of report to confirm proper site operation
Landfill Report - incorporated into Annual QIA and Nunavut Water Board Annual Report	Annual	Environment	n/a

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6 REFERENCES AND RECORDS

- Nunavut Mine Health and Safety Act and Regulations
- Canadian Standards Association
- Nunavut Water Board Type A Water Licence No: 2AM-MRY1325
- Commercial Lease No.: Q13C301
- Waste Management Plan (BAF-PH1-830-P16-0028)
- Hazardous Materials and Hazardous Waste Management Plan (BAF-PH1-830-P16-0011)
- Surface Water and Aquatic Ecosystem Management Plan (BAF-PH1-830-P16-0026)
- Environmental Protection Plan (BAF-PH1-830-P16-0008, Section 3.7)
- Waste Sorting Guidelines (BAF-PH1-830-P25-0001)
- Open Burning of Untreated Wood, Cardboard and Paper Products Procedure (BAF-PH1-300-PRO-0001)

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Appendix A

Potential Pollutant Sources and Best Management Practices Summary Table

Area	Activity	Pollutant Source	Pollutant	Best Management Practices
Landfill	General landfill operations	Soil Erosion	Sediment	<ul style="list-style-type: none"> - Maintain design slopes - Repair all berm and cover areas experiencing settling or erosion - No cuts permitted into the tundra during landfill construction or operation - Silt fences installed at any drainage site experiencing sedimentation due to soil erosion
Landfill	Fueling of heavy equipment	Diesel fuel	Diesel fuel	<ul style="list-style-type: none"> - Fueling is completed in accordance with the Baffinland fueling procedure. - Personnel are trained on the procedure for fueling
Landfill	Unloading waste at landfill	Improper segregation or direction of non-permitted waste	Hazardous waste or non-permitted waste	<ul style="list-style-type: none"> - Following Baffinland's Waste Sorting Guidelines - The inspection of all landfill waste prior to unloading/disposal, as outlined in this manual.
Landfill	Unloading waste at landfill	Hazardous material spill	Hazardous waste	<ul style="list-style-type: none"> - Following the Baffinland Spill Contingency Plan when responding to spills
Landfill & Surrounding Area	General landfill operations	Landfill working face	Litter	<ul style="list-style-type: none"> - Landfill operations manual contain best management practices including: <ul style="list-style-type: none"> - Minimizing active working face - Compaction & cover plan - Use of litter fences

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Appendix B

Mine Site Non-Hazardous Solid Waste Landfill User Rules

1. **RESTRICTED ACCESS – ONLY SITE SERVICES PERSONNEL ARE ALLOWED TO ENTER THE LANDFILL FACILITY.**
2. All waste is to be inspected prior to dumping – Contact the Site Services Supervisor for pickup and inspection.
3. No liquid or hazardous waste is accepted at this landfill.
4. Vehicles shall follow posted speed limits and directions to the unloading area - **Unloading in other areas is strictly prohibited.**
5. Dump waste immediately behind the vehicle as close to the toe of the working face as possible.
6. No Unloading by Rapid Acceleration or Deceleration.
7. No scavenging is permitted.
8. No open fires or the burning of waste is allowed at the landfill.
9. All spills are to be stopped if safe to do so, and immediately reported to the Site Services Supervisor/Environment Department.
10. PPE is required to be worn at landfill area.

In case of Emergency – Immediately contact the Site Services Supervisor or call a Code 1, if necessary, providing your location, your name and the nature of the emergency.

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Appendix C

Mine Site Landfill Work Instructions

Appendix C focuses on work instructions. Specific work instructions concerning landfill operations and emergencies have been documented in order to establish standard policies and practices for Site Services personnel working at the Mine Site Landfill. These topics will be reviewed periodically at routine safety meetings, which will allow operators to keep up-to-date on any changes in standard operations. Site Services personnel are expected to be familiar and comply with the work instructions relating to their areas of responsibility.

1. General Site Maintenance

Landfills require general maintenance throughout the year in order to keep them orderly and clean. Much of this maintenance is in anticipation of permit requirements and seasonal weather changes.

- a. Access roads are to be maintained and graded to eliminate ruts, cracks and settling.
- b. Maintain drainage, keep road culverts and landfill drainage free of debris.
- c. Define a critical landfill perimeter and mark perimeter with stakes and/or signs prior to winter to facilitate identification.

2. Dust Control

Place dusty loads at the toe of the face and cover as quickly as possible.

Benefit of Compliance to Instruction:

- Compliance with operating permit
- Cleaner, safer work environment
- Reduced impact on surrounding environment

3. Litter Control

The control of litter is an essential part of our permit conditions and readily evident to all who drive by or onto the landfill. In an effort to maintain compliance with our permit and reduce the amount of time and effort required for this task, the following procedures are to be followed:

Prevention of Litter at Working Face:


- a. Minimize the length of the working face to reduce the size of the face exposed to wind. The maximum length of the exposed cell face should not exceed 12 meters at any time.
- b. Keep waste well confined at the working face to reduce the amount of waste susceptible to wind.
- c. Deposit waste at the toe of the face and spread it upward.
- d. Cover the compacted waste as soon as possible to minimize blowing litter.

Control with Litter Fences:

- a. Position fences near the working face as wind and fill operations change.
- b. Move or lengthen semi-permanent litter fences that are strung around the area to conform to filling operations and prevent migration of litter off site.

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Litter Pickup:

- Personnel are to pick any litter off the fences to prevent the fence from being clogged and subject to overturning by the wind.
- Promptly pick up any litter not trapped by the fences to prevent off-site migration.

Litter in Heavy Wind Conditions:

- Install litter fences prior to windy weather and relocate as required.
- If lightweight material cannot be contained within the site, place intermediate cover over the waste to prevent it from blowing.

Benefit of Compliance to Instruction:

- Compliance with operating permit
- Reduction in amount of litter migrating out of the landfill area
- Minimize impact to surrounding environment
- Reduce the amount of time dedicated to picking up litter

4. Vector Control

Vectors (any wildlife that carry diseases) are generally not present at a properly operated and maintained non-hazardous solid waste landfill (no domestic waste). The provisions of source segregation and waste inspection at the landfill prior to unloading waste will safeguard against vector problems. Well-compacted wastes and cover material will effectively prevent vectors from becoming attracted and burrowing into waste materials. The following are basic guidelines to ensure proper vector control on site:

- All waste is to be inspected at the landfill prior to unloading at the working face to confirm no domestic or food waste is present.
- Maintain a narrow working face and cover all un-worked areas to minimize animal foraging at the site.
- Cover waste on all unused slopes.
- Ensure good compaction of the cover material to discourage animals from burrowing through it.
- Keep equipment, storage and leisure areas free of debris and food waste to prevent vectors from establishing residence in or near areas where employees and contractors work.

Benefit of Compliance to Instruction:

- Protects the health and safety of employees
- Eliminates potential exposure pathways of disease to employees
- Reduces risk of contact with vectors and scavengers
- Maintains compliance with operating permit

5. Building and Equipment Fires

In the event of a fire, site personnel are to call Code 1 immediately


6. Fire in Load

“Fire in load” refers to a load of waste within a vehicle that is either on fire and/or smoldering or smoking prior to discharge to the landfill. In the event of Loads-on-fire, site personnel are to call Code 1 immediately.

7. Subsurface Landfill Fires

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Warning signs may include:

- Smoke and/or heat waves emanating from cracks and/or fissures;
- Localized settlement (sinkholes up to several meters in diameter);
- The odor of burning plastic/refuse may be present

BEWARE! The surrounding area may not be stable. The rapid decomposition of refuse by combustion may have created large voids underground.

Safety Procedures

1. If an area is suspected of having an underground fire, call a Code 1 and take control of the scene by blocking access to the landfill area until Mine Rescue Team personnel arrive onsite. Ensure all personnel near the suspected landfill fire are notified and/or vacated as necessary.
2. Try to stay upwind of any smoke and not breathe the fumes, if any.
3. The Mine Rescue Team Lead will evaluate the conditions and develop a plan to safely deal with the fire (Note: Pumping water into the ground may not stop the smoldering and will not prevent future fires. Smothering with dirt is the preferred option).
4. Notify the Baffinland Environment department to evaluate the incident and confirm the repair plan is in compliance with permits.
5. Once the fire is extinguished and the situation secured, look for other cracks and/or depressions in the area and schedule their repair. (They could be the source of air that allowed the fire to start originally).
6. Complete repairs to the landfill structure. Note completion of work in site log along with fire location for future reference.

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