Baffinland Iron Mines Corporation

Incinerator Operation Procedure

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TABLE OF CONTENTS

1 PURPOSE AND SCOPE 4

2 REQUIREMENTS 4

2.1 Hazards and Additional Personal Protective Equipment (PPE) 4

2.1.1 Hazards 4

2.1.2 Personal Protective Equipment (PPE) 4

2.1.3 Safety and Environmental Equipment 4

2.2 Training and/ or Qualifications 5

2.3 General Safety Instructions 5

3 DEFINITIONS 5

4 RESPONSIBILITIES 5

4.1 MSC/PSC Site Services Supervisor 6

4.2 Incinerator Operator 6

4.3 Environment Department 6

5 PROTOCOL 7

5.1 Waste Load Design 7

5.2 Operating Instructions 8

5.2.1 General Inspection of the System 8

5.2.2 Load Waste into Primary Chamber and Close Doors 8

5.2.3 Start Burn Cycle from Control Panel 9

5.2.4 Clean out ash and Dispose 9

5.3 Daily Preventive Maintenance 10

6 REFERENCES AND RECORDS 10

1 PURPOSE AND SCOPE

Baffinland Iron Mines Corporation is committed to taking the necessary steps to ensure that the collection, handling, storage, transportation and disposal of wastes generated during the construction, operation and closure of the Mary River Project is conducted in a safe, efficient and environmentally compliant manner.

The purpose of this procedure is to provide a set of operational requirements for the safe incineration of waste in an environmentally-acceptable manner at the Mary River Project. The incineration of waste is one of a number of elements of the Mary River Project source segregation and waste management program.

2 REQUIREMENTS

2.1 HAZARDS AND ADDITIONAL PERSONAL PROTECTIVE EQUIPMENT (PPE)

2.1.1 HAZARDS

There are numerous specific hazards associated with the management of the incinerator. They include:

- Explosive Gases (aerosol cans/ batteries)
- High temperature
- Sharp objects (i.e. barrel lids, broken glass)
- Flying dust and small particles
- Potential fuel spills
- Encounter with wildlife (wildlife attractants)
- Electricity

2.1.2 PERSONAL PROTECTIVE EQUIPMENT (PPE)

- Wear Standard P.P.E. - Safety glasses, hard hat with reflective tape, safety boots, reflective vest, clothing in good condition, gloves or mitts in good condition and hearing protection if required
- Full face dust mask (such as Advantage 3000 Respirator)

2.1.3 SAFETY AND ENVIRONMENTAL EQUIPMENT

- 20lb Fire Extinguisher
- Sea cans for storage of wastes to be burnt
- Overpack drums for storage of ash
- Spill kits
- Radio Communication

2.2 Training and/ or Qualifications

Any persons who may be operating the incinerators at a Baffinland work site shall complete formal, documented training in its proper use.

2.3 General Safety Instructions

- Keep the electrical panel doors closed at all times except when performing electrical maintenance or troubleshooting.
- Allow only qualified operators to perform maintenance and troubleshooting on the machine.
- Open and lockout the Main Disconnect Switch on the electrical control panel while working on the machine.
- Do not bypass or tie down any of the door safety limit switches.
- Do not open any of the doors while the Primary or Secondary Chambers are above 200°F (93 °C).
- Do not enter the Primary Chamber unless the Emergency Stop Button is pushed.
- When opening or closing the Primary Chamber door keep clear of the door and ensure that the path for the door is clear.
- Secure the Primary Chamber door when it is open so it cannot move accidentally.
- Immediately correct any fuel leaks.
- Do not fill the Primary Chamber above the breech opening. Overfilling can result in poor burning and damage to the Incinerator.
- Be aware of component-specific safety hazards listed within each section of this manual.

3 DEFINITIONS

Refractory: Insulating ceramic liner inside the primary and secondary chambers that is able to withstand high temperatures without fusion or decomposition.

Purge Cycle: First step of the burn cycle which exhausts potentially explosive gases that could be remaining in the system and burners. The primary and secondary blowers will run to purge both chambers. The primary and secondary blower indicators on the Top View screen on the Operator Interface will say “Primary Chamber Blower On” and “Secondary Blower On”.

MSC: Mine Site Complex

PSC: Port Site Complex

4 RESPONSIBILITIES

The following roles have specific accountabilities that must be met to ensure the Mine Site Complex (MSC) and Port Site Complex (PSC) incinerators are operated in compliance with this procedure and its permit. The following roles and responsibilities shall be followed to safely and successfully operate the incinerator.

Site Services Superintendents/Supervisors are responsible for ensuring that all personnel are fully trained and competent to meet the expectations of this policy.

4.1 MSC/PSC Site Services Supervisor

The Site Services Supervisor is responsible for supervising the operation of the incinerator in accordance with this procedure. Specifically, the Site Services Supervisor shall:

- Supervise the incinerator operator in the safe execution of this procedure.
- Implementing this procedure and ensuring that Incinerator Operators are qualified and knowledgeable in the operation of the Incinerator.
- Providing Personal Protective Equipment required for the safe operation of the incinerator and the protection of workers.

4.2 Incinerator Operator

The Incinerator operator, under the general supervision of the Site Services Supervisor, is responsible for executing the following tasks at the incinerator:

- Understanding and following this Procedure, including:
    - Ensuring that no inappropriate materials are processed and that each batch contains an average mix of waste that resembles the design waste characteristics (particularly volume/weight per batch, average density, and overall heat value).
    - Understanding the commitments made by Baffinland Iron Mines to regulatory bodies, with regards to emission targets, monitoring and recording requirements.
    - Ensuring the burn cycle is long enough to allow for thorough burn-out and the generation of high-quality ash residual that is safe for disposal.
    - Minimize particulate matter (dust) emissions during ash removal and handling.
- Wearing the proper P.P.E. when operating the incinerator.

4.3 Environment Department

The Environment Department is responsible for executing the following tasks:

- Overseeing Incinerator Operations to ensure that practices are in compliance with the guidelines as set out in Baffinland's Waste Management Plan.
- Collect monthly incinerator data from the PLC.

5 PROTOCOL

5.1 WASTE LOAD DESIGN

The types of waste that can be processed in the incinerator are described in table 1. Waste materials not suitable for processing are described in table 2. When preparing a waste load, the operator shall follow these requirements:

- System capacity is 2,000 kg/day.
- Table 1 describes a typical one metric ton load. Respect proportions as much as possible.
- Prepare the load in layers: Start with cardboard or wood at the bottom, then kitchen waste, then more cardboard, etc.
- Waste shall be loose, as received and not compacted prior to loading.
- When receiving large volume of PET bottles (clear plastic), some compaction is recommended.
- The system shall not be overloaded with plastics or wood, or any other high heat value materials.
- Materials containing large air spaces (empty plastic bottles, cardboard boxes) shall be flattened before loading.
- When processing batches of very wet materials (more than 60% food waste), the burn cycle time should be increased to accommodate the additional time required to dry the waste before it can combust.
- Do not load the system with more than 25% by volume of extremely wet materials such as wet garbage.
- Unauthorized waste materials shall never be processed in the system

Table 1. Waste Materials suitable for incineration

Waste Type	Description	Origin	Proportion
Food Waste	Food, food packaging and containers, plastic and paper waste from food preparation	Kitchen and dining areas, office areas	55% or 550 kg/ton load
Domestic waste	General refuse such as paper, plastics, cans, bottles, cardboard, newsprint	Dormitory areas, recreation facilities, office areas, warehouse, plant and production facilities	30% or 300 kg/ton load
Packaging	Cardboard boxes, paper, plastic	Inbound supplies to all work	10% or 100 kg/ton load

	containers, plastic film, Styrofoam, poly-weave bags	areas	
Wood waste	Skids, pallets crates	Construction activity, inbound supplies	
Absorbents	Rags, wipes, spill cleanup materials	From all work areas	5% or 50 kg/load
Filters – Air and Fluid	Filters coated with fine particles and trapped solids, saturated with water or fluids (glycol, lube, oils, fuel)	From water treatment facility, or generated at point of maintenance of vehicles, machinery and equipment	
Biomedical waste	Bandages, dressings, gloves, swabs, syringes, sharps	Medical clinic	

Table 2. Unacceptable Waste Materials

Solid Waste	Examples
Bulky Materials	Automotive or heavy equipment parts such as engine blocks and transmissions
Non-Combustible Materials	Drywall, asbestos, bricks, concrete, soils
Radioactive Materials	Smoke detectors, laboratory wastes
Potentially Explosive Materials	Pressurized vessels including, but not limited to propane tanks, aerosol cans (deodorant, shaving, cleaning, etc) and the like. Actual explosives.
High Alkaline or High Acid Materials	By-products of industrial processes, unrefined fuels, batteries
Solvents	Solvents such as acetone, xylene, methanol

5.2 Operating Instructions

The operation of the incinerator package follows 4 general steps that take place over a 24 hour period:

5.2.1 General Inspection of the System

- Ensure that manual slide gates for each blower are in the open position for free airflow into the Primary and Secondary Chambers
- Ensure the Primary Chamber has been cleaned out, and the chamber floor is cool (less than 40 ^{o}C). If the floor is hotter than this temperature the waste may spontaneously catch on fire during loading
- Ensure that the fuel tank is full (valves, levels)
- Perform a visual inspection of the primary and secondary chambers
- If the reset light is illuminated on the primary or secondary burners, call the Maintenance department

5.2.2 Load Waste into Primary Chamber and Close Doors

- When loading the waste, avoid contact with refractory (wall modules, door jams, sills, lintel, etc.). Doing so will damage the ceramic blanket refractory
- Ensure that the waste is loaded according to the Waste Load Design
- Ensure that the waste is not blocking the burner cone and the breach between primary and secondary burners.
- Close the door

5.2.3 Start Burn Cycle from Control Panel

- Ensure that there are no faults on the panel.
- Ensure the burn time is adequate. The burn time for a one ton load respecting table 1 proportions should be of 720 minutes.
- Ensure that "Solid Waste Only" is selected on the top view.
- At the control panel, on the Panel View press the "Start System" button. The system will initiate the Purge Cycle, followed by the Burn Cycle and then ending with the Cool down Cycle.
    - Observe Systems Purge.
    - Observe Start 120 sec.
    - Observe Burners Purging.
    - Observe Primary blower + burner + secondary blower will shutdown
    - Observe Firing of Secondary Burner
    - Observe secondary chamber reach 1015 ^{o}C (within approximately one hour)
    - Observe primary burner starts + secondary blower
- Periodically check unit

5.2.4 Clean out ash and Dispose

- Once fully cooled and the temperature is below 90 ^{o}C, proceed to the Primary Chamber Clean Out procedure.
- Unlock all door latches on the access door to the Primary Chamber.
- While standing in front of the Primary Chamber door, slowly open the door to its fully open position. Secure Primary Door in the open position.
- Proceed around to the back and open up secondary chamber doors. This will help the cool down process by air flow.
- Inspect the interior for wear and inspect around the door seals to ensure the door will maintain a tight seal upon closure.
- Inspect colour of the ash:
    - If whitish-grey, burn cycle was complete.
    - If ash appears wet and dark, it should be reintroduced in the waste load of the following burn cycle.
- Remove ash and dispose in Overpack drum labelled MS-ASH-# or MP-ASH-# (MSC and MPC, respectively).

- Collect 1 liter of ash from Overpack with metal sampler jar and put in 20 L pail.
- Once the drum is full, switch to a new drum & pail and notify Environment Department.
- The Environment Dept. will take a sample of the 20L pail for analysis, and the pail can then be reused for the next drum.
- Fill out incineration ash log.
- Check the air inlet holes and remove any obstructions if necessary.
- Inspect the door seals to ensure there are no gaps between the door gasket and the door jamb
- Close the Primary Chamber access door by clamping each latch until it is tight
- Clean the inspection view port (glass) with a mild soap and water. To clean the view port, unscrew it by hand and re-tighten by hand.

5.3 Daily Preventive Maintenance

- Allow only qualified operators to perform maintenance and troubleshooting on the machine as per Eco Waste Solutions Incinerator Equipment Manual.

6 REFERENCES AND RECORDS

Nunavut Mine Health and Safety Act and Regulations

Canadian Standards Association

Baffinland Iron Mines Corporation Mary River Project Waste Management Plan for Construction, Operation and Closure, dated April 19, 2013

Nunavut Water Board Type A Water Licence No: 2AM-MRY1325

Commercial Lease No.: Q13C301