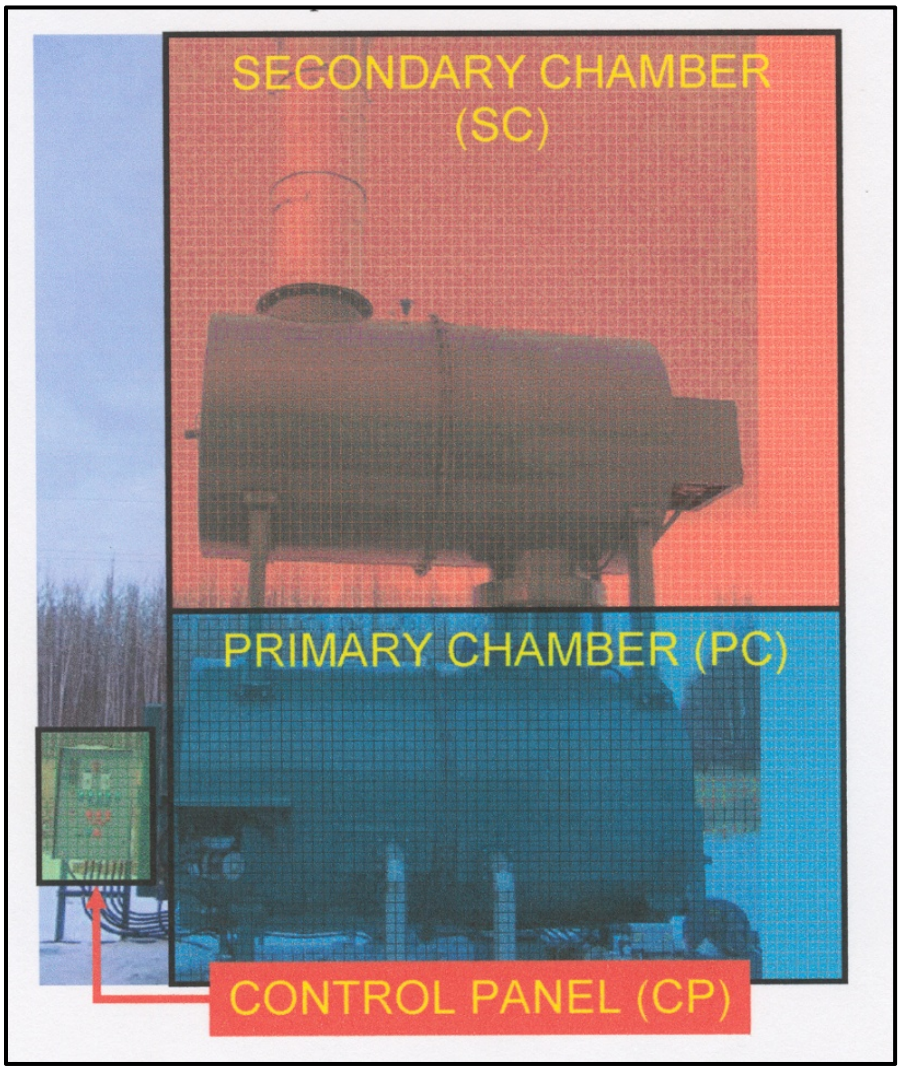


Figure 2: Overview of Model CY-100-CA-D-O Incinerator

Figure 3: Major Components of Primary & Secondary Chambers - Model CY-100-CA-D-O Incinerator

3 Operator Training & Safety

3.1 Operator Training

Persons charged with the responsibility of operating the Westland Model CY-100-CA-D-O incinerator are required to read and comprehend this SOP and the *Westland Model CY-100-CA-D-O Operating and Maintenance Manual* which is appended to this SOP as Attachment A.

In addition, an on- site training program will be developed to cover all aspects of the infrastructure associated with incinerator management , its operation, maintenance, monitoring, sample collection, preservation and record keeping. The training will also include an identification of activity related risks, knowledge and use of job specific Personal Protective Equipment (PPE), as well as training in the proper handling, storage, and disposal of all ash generated from the facility.

The training will be both job and equipment specific and will be provided to any site personnel assigned the responsibility to oversee, inspect, maintain , monitor, assess performance and report on the facilities, its discharges and discharge location. The training program will be reviewed as required by site management, with a full review of the training program completed as least once every three years.

3.2 Personal Protective Equipment

Prior to initiating any activities related to the operation of the Westland Model CY-100-CA-D-O incinerator, the operator will equip themselves with all required Personal Protective equipment.

This will include, but not necessarily be limited to the following:

- Long sleeved shirt and long pants;
- Long cuffed, puncture resistant gloves;
- CSA approved, Grade 1 safety footwear;
- CSA/ANSI approved headgear; and,
- CSA/ANSI approved safety glasses.

The personal protective equipment related to specific tasks associated with the operations of the incinerator are as follows:

- Ash removal and handling:
  - NIOSH N85 respirator
- Waste charging:
  - Heat protective clothing and gloves, and
  - CSA/ANSI approved full face shield.

3.3 Specific Health and Safety Requirements for the Model CY-100-CA-D-O Incinerator

Equipment specific hazards that could potentially be encountered during interactions with the incinerator generally arise from the following (not in any order of importance):

- Contact with waste (potentially infectious or toxic components, or sharps);
- Exposure to heat from contact with hot surface or radiation from the primary combustion chamber when the waste charging door or ash removal door is opened.

Therefore, general precautionary actions by any person coming in contact with the incinerator or its waste stream include:

- Not opening waste batches
- Not touching hot surfaces, and minimum exposure to heat radiation through open doors (charging and ash doors while combustion is taking place).
- Wearing appropriate personal protective equipment for charging waste and raking the primary chamber, and minimize the time for those tasks.
- Wearing appropriate personal protective equipment during ash removal.
- Using appropriate equipment and operators to move and transport heavy objects such as full ash containers.

4 Model CY-100-CA-D-O Incinerator Operations

4.1.1 Introduction

The following provides a discussion of the correct procedures that apply to the operation of Westland Model CY-100-CA-D-O incinerator.

4.1.2 Operational Procedures

The safe and effective operation of the Westland Model CY-100-CA-D-O incinerator is described by the sequential steps provided in Figure 4. All operators will diligently follow these steps.

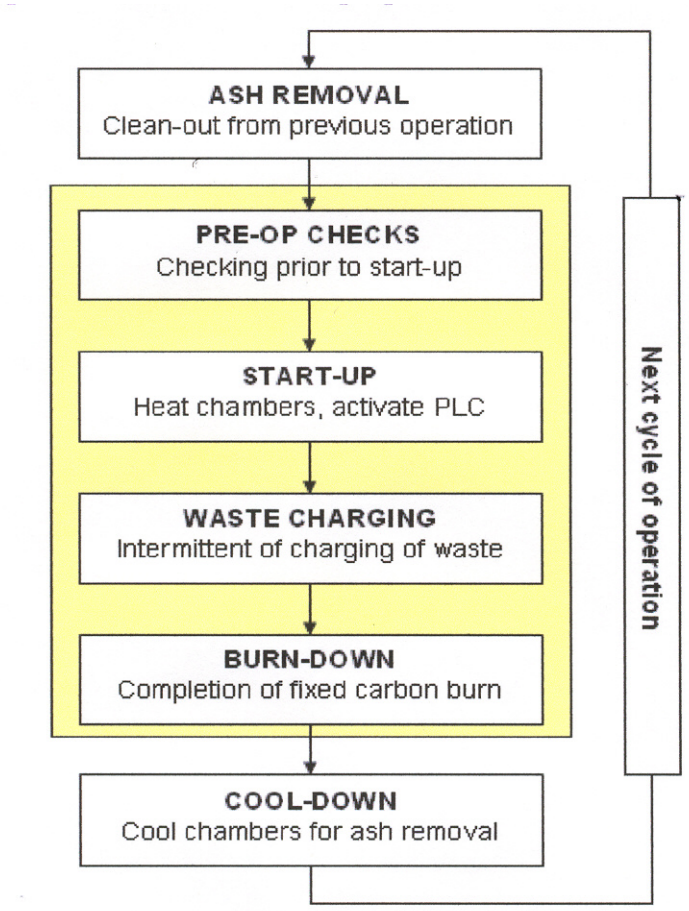


Figure 4: Model CY-100-CA-D-O Incinerator Operations Sequence

4.1.3 Waste Batch Preparation

Waste destined for incineration will be separated and bagged at its source and placed in a secure receptacle designed to prohibit access by wildlife (i.e. Bear-proof container). The material will be collected by persons designated for that purpose and immediately incinerated.

All reasonable efforts will be made by all site personnel to ensure that bagged waste destined for incineration is free of (i.e. does not contain) materials that are considered inappropriate for incineration. Materials inappropriate for incineration include, but are not necessarily be limited to:

- Cans or containers containing Aerosol (whether empty or not);
- Residual paint materials;
- Plastics of any kind;
- Batteries of any kind;
- Styrofoam of any kind;
- Tin/aluminum cans;
- Explosives of any kind;
- Sewage sludges; or,
- Metals of any kind.

The following cautionary notes must be followed:

- **NO** explosives, aerosol cans or sealed containers containing combustible liquids shall be placed in the incinerator.
- The operator shall ensure that every batch can go through the waste charging door easily, regardless of its weight. If others prepare the batches, the operator should inform them about the maximum batch size.
- Do not open batches and “rearrange” the contents.

All waste generated on site that cannot be incinerated will be managed and disposed of in an appropriate manner as described in the *Hope Bay Project – Materials Management Plan*.

4.1.4 Pre-operational Checks

The following pre-operational checks will be conducted by the operator:

- Check prevailing winds and in the event that winds are directed towards populated areas (i.e. camp) or inversion (i.e. temperature increase with altitude: a stable atmospheric condition in which air temperature increases vertically upward) are present, operator will check with supervisor before firing incinerator;
- Ensure the presence of an easily accessible fire extinguisher;
- Inspect the fire extinguisher to ensure charged and functional;

- Conduct inspection of fuel tank for leaks and containment integrity;
- Inspect fuel tank to ensure sufficient fuel for operations;
- Inspect combustion chamber to ensure chamber is empty and combustion air holes are clear;
- Inspect thermocouples (Primary & Secondary chamber);
- Inspect gasket/seal in both "charge" and "ash" door;
- Inspect refractory and under fire air holes in primary chamber;
- Inspect spark arrestor to ensure no plugging;
- Inspect power connection; and,
- Open fuel valve.

In the event that this inspection identifies an "action item" the incinerator operator will immediately inform his/her direct supervisor.

When diesel is used as incinerator fuel, it may be necessary to bleed the diesel lines (to the burners) as required.

4.1.5 Ash Removal

Typically the ash from previous operation has been left within the incinerator to cool, and ash removal is completed prior to beginning a "new" burn operation.

If the ash is to be removed, the operator shall undertake the following actions;

- Ensure that the combustion chamber is sufficiently cool.
- Do **NOT** spray water into the combustion chamber.
- While removing ash, all efforts will be made to avoid plugging the combustion air holes and damaging the burner tip.
- Use non-combustible container (i.e. a used 45 gallon drum which has been inspected to ensure no residual materials are present) to store ash.
- The use of a "remote" thermometer is recommended to check the temperatures in the various places in the primary chamber.
- Minimize dust generation – a light water spraying on ash in the container is recommended to minimize dust generation.
- Remove ash and place in appropriate container.
- Securely cover ash container.
- Label exterior of the container "Incinerator Ash" with robust label.
- Ensure appropriate disposal of ash.

4.1.6 Incinerator Start-up

The following procedures (Figure 7) shall be followed in order to initiate incineration sequence.

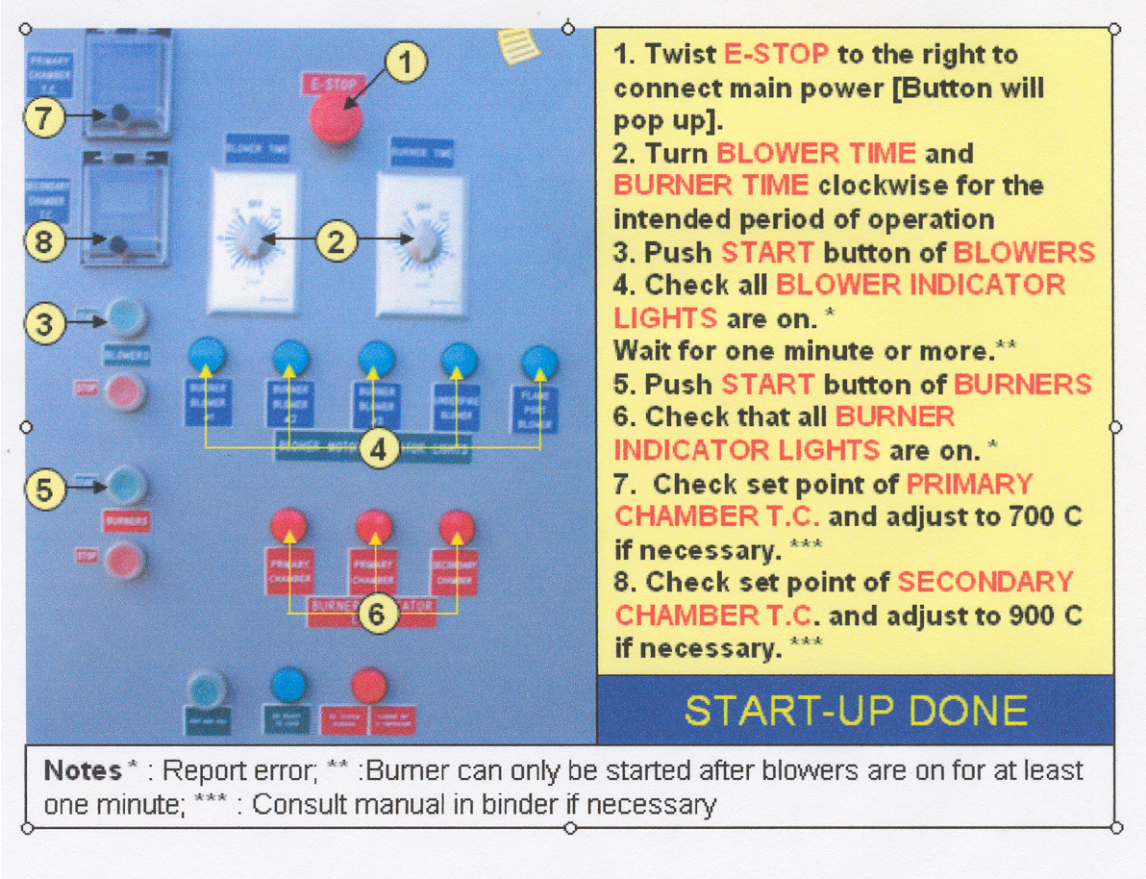


Figure 5: Model CY-100-CA-D-O Incinerator Procedures for Start-Up

Note: Temperatures in Steps 7 and 8 may be regulated: If so, the operator shall **SET THE TEMPERATURE TO THE REGULATED VALUES**

4.1.7 Waste Charging of Incinerator

The operator shall charge the incinerator in the following manner (Figure 8).

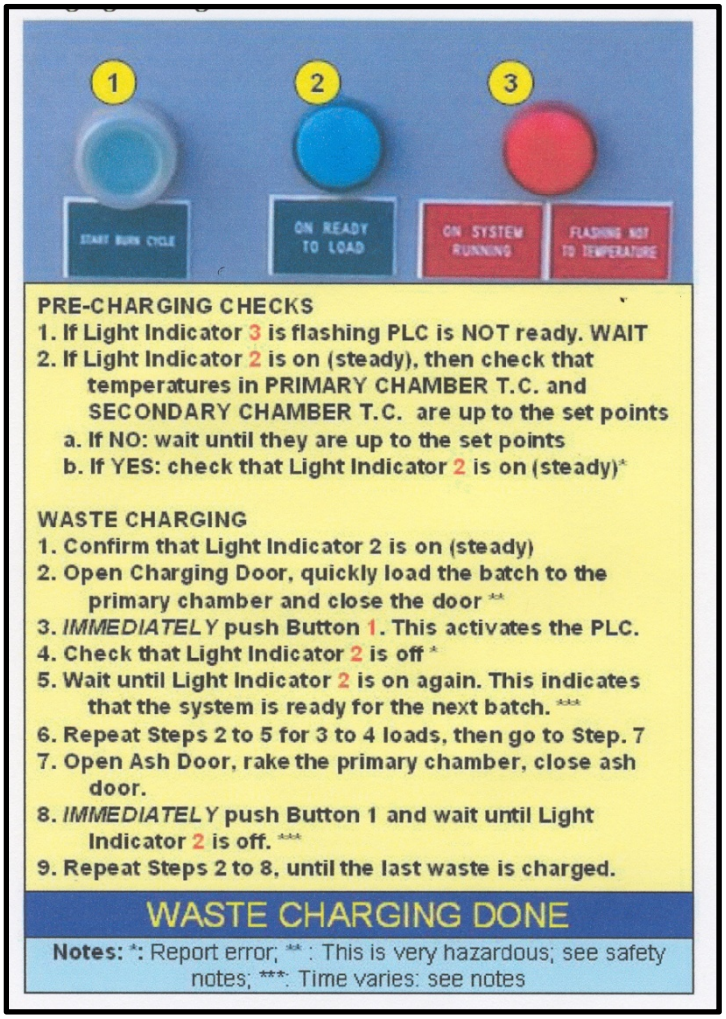


Figure 6: Model CY-100-CA-D-O Incinerator Procedures for Waste Charging

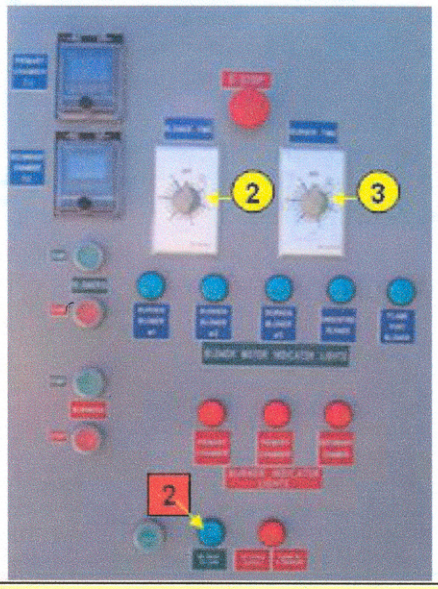
NOTE:

****** : The main danger is from exposure to heat radiation, and the waste batch catching fire before it is inside the primary chamber. Precautionary steps include: (a) Wear proper PPE, (b) Make sure waste batch can go through the charge door easily, (c) open door, charge waste and close door as quickly as possible.

*****:** The time for complete combustion varies depending on batch size, weight and composition. More than 30 minutes would be unusual. Check burning conditions from ash door or charge door. Rake if necessary [Note Step 8 above].

4.1.8 Incinerator Burn-Down

The following procedure shall be followed by the incinerator operator during burn down (Figure 9).



When the LAST batch has been charged, and the indicator light 2 is ON (steady) , indicating readiness for the non-existent batch:

1. **Rake primary chamber.**
2. **Turn BLOWER TIMER to ~ 3 hours ***
3. **Turn BURNER TIMER to 0.5 to 1 hour**
4. **Wait.**
5. **When burner time period has elapsed, then shut down fuel valve.**

BURN-DOWN DONE

Note: * : The actual time depends on how much and what kind of waste has been charged. The rule-of-thumb is

Burn-Down Time (hours) = 1 + Waste Charging time (hours)/ 3

Figure 7: Model CY-100-CA-D-O Incinerator Procedures for Burn Down

4.1.9 Incinerator Cool-Down

There is nothing to be done here, except ensuring that the incinerator is sufficiently cooled (approximately 6 – 8 hours) for the scheduled ash removal prior to the next operation of the incinerator.

5 Residuals (Ash) Management

When ash is removed from the incinerator, the operator shall undertake the following actions;

- Ensure that the combustion chamber is sufficiently cool.
- Do **NOT** spray water into the combustion chamber.
- While removing ash, all efforts will be made to avoid plugging the combustion air holes and damaging the burner tip.
- Use non-combustible container (i.e. a used 45 gallon drum which has been inspected to ensure no residual materials are present) to store ash.
- The use of a “remote” thermometer is recommended to check the temperatures in the various places in the primary chamber.
- Remove ash and place in appropriate container.
- Minimize dust generation – a light water spraying of water on the ash in the container is recommended to minimize dust generation.
- Securely cover ash container.
- Label exterior of the ash container “Incinerator Ash” with robust labelling.
- Store the securely covered ash container in an appropriate location.

Suitably labelled containers containing incinerator ash will be temporarily stored in a safe location on site until suitable transport is arranged to remove the ash for disposal in an appropriate and approved manner.

6 Model CY-100-CA-D-O Incinerator Maintenance

6.1.1 Routine Inspection and Maintenance

Routine inspections of the incinerator and associated facilities will be conducted by a qualified individual (i.e. trained operator) prior to every use of the incinerator. The inspection will include, but not necessarily be limited to:

- Inspecting all fuel lines, fuel storage facilities and secondary containment for leaks and check connections;
- Inspection of the spark arrestor to ensure no plugging;

During ash removal, the inspection will include, but not necessarily be limited to;

- Inspect refractory for large cracks (not expansion cracks)
- Check combustion air hole for plugging
- Inspect door gaskets for damages

6.1.2 Additional Maintenance and Inspection

In addition to the routine inspection and maintenance discussed in 6.1.1, the burner(s) and the blower(s) require maintenance as specified in the Westland Model CY-100-CA-D-O Operating and Maintenance Manual (Attachment A).

Table 1 provides a summary of inspections which will be conducted and the frequency of such inspections.

Table 1: Model CY-100-CA-D-O Inspections

Frequency	Component	Inspection Activity
Daily	Thermocouples (Primary & Secondary chamber)	Ensure readings are within acceptable “norms” of the primary and secondary chamber temperatures
	Contact switches	Ensure free movement and no obstruction
	Gasket/Seal in both “charge” and “ash” door	Ensure proper sealing
	Actuators (Primary & Secondary chambers)	Ensure free movement during incineration
	Refractory and under fire air holes in primary chamber	Ensure no large cracks No restriction of air holes
Weekly	Air blowers (Primary & Secondary chambers)	Ensure clean, unobstructed intakes
Monthly	External surface (Primary & Secondary chambers)	Ensure no discolouration
	Refractory in Secondary Chamber	Ensure no large cracks

In the event that the inspection identifies an "action item", operating personnel shall report the "item" to their immediate supervisor and appropriate remediation activities will be undertaken as soon as reasonably possible and as required.

6.2 Emissions Monitoring

HBML has implemented an incinerator emissions monitoring program. Under this program, emissions monitoring is conducted once per calendar year by a qualified firm retained specifically to conduct such monitoring. Monitoring includes the following parameters:

- Stack volume flow rate;
- Stack gas temperature;
- Moisture content;
- Dioxins;
- Furans; and,
- Mercury emissions.

Optional parameters for incinerator emissions monitoring will include;

- SO_2;
- NO_2
- O_2; and,
- Particulates.

The results of the emissions monitoring will be reported in the Annual Report prepared and submitted on or before March 31 of the following calendar year.

6.3 Quality Assurance/Quality Control during Monitoring

HBML will review and approve the QA/QC procedures of the qualified firm retained to conduct the air emission prior to such monitoring and provide a summary of those procedures as part of the emission monitoring reporting discussed.

6.4 Off-Specification Emissions Quality

The potential does exist for isolated, short term emissions that do not meet the discharge limits due to equipment malfunction or operator error, however, incinerator design limits the potential for such occurrences. Notwithstanding this design feature and in order to minimize the potential for such an event to happen, specific site personnel will be properly trained and assigned to regularly inspect the incinerator and to oversee the effective operation and maintenance of the facility.

Response to such an event will to identify and correct the original cause and the implementation of additional monitoring of the environment to assess the level, if any, of the impact of the discharge.

In the unlikely event that analysis does indicate that a monitoring sample exceeded the specified discharge guidelines, HBMC will, as soon as possible upon receiving the analytical results:

- Re-sample the emissions and submit the sample for appropriate analysis;
- Conduct a detailed inspection of the entire incinerator and waste stream and all associated facilities to identify the cause of the off specification discharge and ensure that the facility is operating within the prescribed parameters and operational limits;
- Correct the original cause; and,
- If necessary, implement additional monitoring to assess the level, if any, of the impact of the off specification discharge.

Due to the relatively short duration of such a condition, residual environmental effects resulting from such an event are likely to be negligible.

7 Incinerator Fuel Storage

The Westland Model CY-100-CA-D-O incinerator is fuelled by a diesel stored in tank located in immediate proximity to the incinerator.

The fuel storage, secondary containment and fuel delivery lines will be subject to regular inspection as discussed in section 4.1.4.

8 Spill Response

A site wide *Hope Bay Project – Hazardous Substances and Waste Dangerous Goods Management Plan* that covers all such materials that are or could potentially be located on the site has been developed. That plan provides material specific Standard Operating Procedures (SOPs) for the handling, transportation, storage and spill response measures for all hazardous substances and waste dangerous goods on site, including those associated with the incinerator, its fuel source and ash management.

Appropriately stocked Spill Response Kits are located in close proximity to the fuel storage area, as are relevant Material Safety Data Sheets (MSDS). The spill response kit will be inspected at least once every year to ensure that the materials are readily available and not stale dated. Any materials used from the spill kit will be replaced as soon as practical after use.

Although the potential for a spill is judged to be low, the potential does exist for such an event to happen. In any and all cases of an unanticipated discharge, spill or upset condition on the site, the policy is as follows:

1. Protect the health and safety of persons in the area.
2. Protect the environment.
3. Protect the facility and equipment.

Generally, in the event that an unanticipated discharge or spill does occur, personnel shall:

Respond Quickly Without Compromising Health and Safety

1. Identify spilled material

BE ALERT – DO NOT COMPROMISE YOUR ON SAFETY OR THAT OF OTHERS.

2. Assess the hazard of persons in the vicinity
3. Attend to injured if possible and safe to do so.
4. Assess the character of the spill
5. Inform immediate supervisor and Site Manager.
6. Stop product flow if safe to do so
7. Contain and recover spilled material as soon as possible

9 Record Keeping

A log of incinerator operations will be kept by operating personnel and will include, but not necessarily be limited to:

- Number of loads charged per day to each incinerator;
- Estimated total volume (in kilograms) of waste incinerated;
- Affirmation that pre-operational inspections (checks) were completed;
- Frequency of ash emptying;
- Estimate of total volume (in kilograms) of ash removed;
- Ash containment container type; and,
- Ash container on site storage location.

In addition, the results of the emissions monitoring will be maintained onsite and a record will be maintained on site of the number and type of ash containers and total volume (in kilograms) and all ash disposal, whether shipped off -site for appropriate disposal or disposed of on site, should approval for such disposal be realized. The results will be reported in the Annual Report prepared and submitted on or before March 31 of the following calendar year.

In addition, the site Environmental Coordinator will complete a review of this SOP at least once every three years; will update this document as required and submit the updated SOP for review and approval by the Exploration Site Superintendent.

10 Conclusion

The focus of the management and operation of the incinerators and of this *Standard Operating Procedure – Incinerator Model CY-100-CA-D-O* is on ensuring operator safety and environmental responsibility during the incineration of appropriate waste at the Hope Bay Project.

All site personnel charged with the responsibility for operating the incinerators will be appropriately trained prior to commencement of work so that they are aware of the health and safety risks associated with the incinerator and its operation.

All reasonable efforts will be made to segregate the waste stream on site to ensure that, to the extent possible only those materials suitable for incineration are burned in the incinerator, that emissions from the incinerator and residuals (ash) are managed or disposed of in an manner that protects the short-, medium- and long-term environment in the project area.

Attachment A:

Westland Model CY-100-CA-D-O Operating and Maintenance Manual

Appendix F
Incinerator Operations Checklist

INCINERATOR OPERATIONS
CHECK LIST

1	**Operator Training Completed** • SOP reviewed • Operations and Maintenance Manual reviewed
2	**Appropriate Personal Protective Equipment Employed** **General** • Heat resistant long sleeved shirt and long pants; • Long cuffed, puncture resistant gloves; • CSA approved, Grade 1 safety footwear; • CSA/ANSI approved headgear; and, • CSA/ANSI approved safety glasses. • CSA/ANSI approved full face shield **Ash Removal** • NIOSH N85 respirator
3	**Fire Extinguisher Present and Charged**
4	**Ash Removal** • Is incinerator cool • Is suitable ash container and container cover available • Is ash container label
5	**Re-Operational Checks Completed** • Is weather appropriate • Inspect fuel level, fuel tanks and connections • Inspect all door seals • Inspect chambers • Inspect air holes and blowers **DO NOT OPERATE INCINERATOR IF INSPECTION FINDS AN "ACTION ITEM"** Immediately report "Action Items" to Supervisor
6	**Incinerator pre-heated** (if required)
7	**Charging Incinerator** **DO NOT OVERLOAD BURN CHAMBER** • Place waste in incinerator • Shut door securely • Start incinerator
8	**Check that Burn is Complete** • Carefully open chamber and inspect • Rake and re-start incinerator if required • Re-charge with waste as required and re-start incinerator
9	**Allow Incinerator to Cool Before Emptying Ash** • Allow natural cooling **DO NOT SPRAY WATER IN CHAMBER TO COOL INCINERATOR**

Approved: _____ Date Posted: _____