WASTE MANAGEMENT PLAN

KIYUK LAKE PROJECT

2011

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APPENDICES

1. INTRODUCTION

Prosperity Goldfields Corp will be following a waste management plan in order to safely dispose of waste. The aim of this plan is as follows

- Minimize and mitigate against any potential environmental impacts
- Compliance with water license and land use permit terms and conditions
- Compliance with Federal and Territorial legislation

2. WASTE MANAGEMENT IN NUNAVUT

In Nunavut, the Environmental Protection Division of the Department of the Environment is the agency responsible for ensuring the proper management of waste.

The following acts and regulations guide the division in working toward environmental protection in Nunavut. Links to these acts can be found on the Government of Nunavut's Department of Environment Website under Environmental Protection Legislation:

http://env.gov.nu.ca/node/82

Acts

Environmental Protection Act (EPA)

Environmental Protection Act: Summary Document

Environmental Rights Act (ERA)

Pesticide Act (PA)

Guideline Documents

The following guidelines have been developed to help compliance with Environmental Protection Legislation and Regulations.

Environmental Guideline for the Burning and Incineration of Solid Waste (2011)

Environmental Guideline for the Operation of Wood-Burning Appliances

Dust Suppression

General Management of Hazardous Wastes (2010)

Industrial Projects on Commissioner's Lands

Industrial Waste Discharges Into Municipal Waste and Sewage Treatment Facilities (2011)

Ozone Depleting Substances (2011)

Contaminated Site Remediation Property Owners Guide

Contaminated Site Remediation (2010)

Sulphur Dioxide & Suspended Particulates

Waste Antifreeze (2011)

Waste Asbestos (2011)

Waste Paint (2010)

Waste Solvent (2011)

Waste Batteries (2011)

Heating Oil Tank Stand Modifications for Fibreglass Tanks **(**NWT Housing Corporation)

Regulations

Spill Planning and Reporting Regulations

A Guide to Spill Contingency Planning & Reporting

Asphalt Paving Industry Emission Regulations

Pesticide Regulations

Policies

Waste Lead Policy

Management of fluorescent Lamp Tubes

3. WASTE SORTING

Waste at the camp will be sorted and safely and disposed of appropriately.

Hazardous wastes will be shipped to Manitoba for recycling and/or disposal at licensed facilities. Hazardous waste includes used oil, oil filters, paint, chemicals and batteries. See the Hazardous Waste Management Plan in Section 5.

Non-hazardous waste includes food, wood, cardboard, plastic, rubber, glass, cans and empty fuel drums.

All wastes will be separated/sorted and disposed of as follow:

Combustible wastes – will be incinerated in the incinerator on site.

On rare occasions and upon approval of the Nunavut Water Board, untreated wood and large pieces of cardboard may be burned in a controlled open burn according to the GN Municipal Solid Wastes Suitable for Open Burning Guidelines, refer to Appendix I in the Abandonment and Reclamation Plan.

Scrap metal – will be removed from site and taken to Manitoba for disposal.

Non-combustible inert wastes – will be removed from site and taken to Manitoba for disposal.

Non-combustible waste oil and oily rags – will be shipped from site in a sealed drum and taken to Winnipeg, MB.

4. INCINERATION GUIDELINES AND MANAGEMENT PLAN

1. GUIDELINES

- Wear gloves before handling any waste
- Separate waste into combustible and non-combustible waste at the source
- Burn food wastes daily to avoid accumulation of garbage
- Ensure ashes are cleaned out before each burn and stored in an empty drum to be sealed and shipped off site to an approved landfill
- Never leave the incinerator unattended while burning
- Ensure area around the incinerator is clean and tidy

The incinerator will be used to burn the following wastes:

- Kitchen wastes
- Paper and cardboard
- Other combustible waste
- Pacto bags

Waste should not to be stored at the incinerator and the area around the incinerator must be kept clean and tidy and free from waste at all times to avoid attracting wildlife including foxes, wolverines and bears. Excess kitchen wastes that cannot be handled immediately by the incinerator should be temporarily stored in a secure area where wildlife cannot access it.

Incinerator ash will be subject to being blown away so it must immediately be securely stored when removed from the incinerator.

DO NOT BURN THE FOLLOWING:

- **Styrofoam**
- **Plastics**
- **Waste oil**
- **Waste hydrocarbons**
- **Wood treated with preservatives**
- **Batteries**
- **Aerosols**
- **Wastes containing mercury, dioxins and furans**
- **Wastes contaminated with hydrocarbons such as oil filters etc.**
- **Paint and paint cans**

INCINERATOR MANAGEMENT PLAN

The management plan is based on the following documents:

INCINER8 Operator and Installation Manual (APPENDIX I)

Incinerator Record Form (APPENDIX II)

Executive Summary and Overview of the Environment Canada Technical Document of Batch Waste Incineration (2010) (APPENDIXI III)

Environmental Guideline for the Burning and Incineration of Solid Waste (2011) (APPENDIX IV)

Environment Canada Technical Document of Batch Waste Incineration (2010)

Canadian Environmental Protection Act

Federal Clean Air Act

Government of Nunavut Environmental Guideline for Air Quality – Sulphur Dioxide and Suspended Particulates (January 2002)

This incinerator management plan details safe operation and maintenance of the forced air dual-chamber incinerator including:

- Ash removal
- Pre-operational checks
- Waste batch preparation
- Incineration and Shut down
- Daily Routine Inspection and Maintenance
- Scheduled Maintenance

Whenever possible wastes on site should be reduced, reused or recycled rather than incinerated.

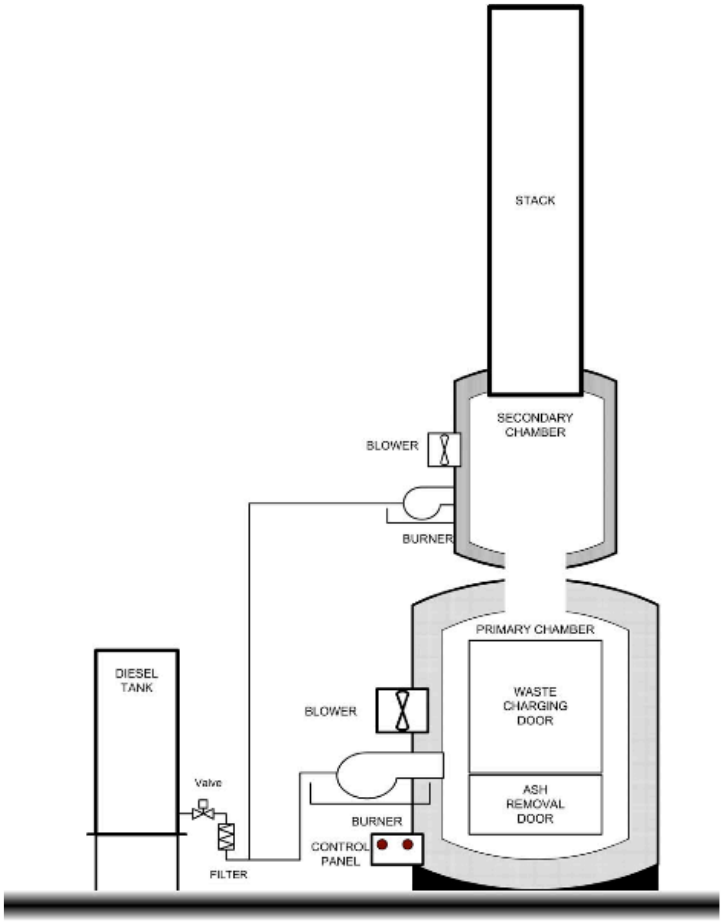


Figure 1: Schematic Diagram of Forced Air Dual-Chamber Design

REQUIRED EQUIPMENT

Steel- toed boots

Long cuffed puncture resistant gloves

Safety glasses

Hardhat

Shovel

Rake

Batch Poker

Electronic scales

Fire response equipment

PERSONAL PROTECTIVE EQUIPMENT

- Ash removal and handling – Full face shield and dust mask
- Feeding incinerator – heat resistant clothing or apron and full face shield

QUALIFICATIONS AND TRAINING

- WHMIS
- Completion of the on-site Waste Management training program
- On-site emergency and spill response training

INSTRUCTIONS

STEP	INSTRUCTION	HAZARD OR PROBLEM	MINIMIZE OR FIX
	Ash Removal The ash from previous operation is left to cool, and ash removal is done first prior to next operation.		
1	Wear personal protective equipment (gloves, face shield and dust mask) and have equipment ready such as a rake and shovel for removing ash from chamber.		
2	Make sure combustion chamber is sufficiently cool (Do NOT spray water into the combustion chamber).	Burns to the hands and body	Let chamber cool to prevent burns
3	While removing ash, avoid plugging the combustion air holes and damaging the burner tip.	Prevention of combustion from plugging the air holes with ash	Be aware of air holes when removing ash

4	Use non-combustible metal waste container with a lid. Weigh empty waste container prior to filling with ash and record on an Incinerator Record Form.	Fire if ash is too hot	Use a metal container
5	Turn off all power to the incinerator before opening the primary chamber door.	Electrocution	Turn off and unplug incinerator
6	Open Ash Removal Door and shovel ash into waste container being careful to minimize dust generation. Light water spraying on ash in the waste container is OK to minimize dust generation when removing from the primary chamber. Material that was not completely reduced to ash should be placed into the primary chamber for the next burn cycle. Close lid on waste container prior to moving.	Inhalation of airborne dust Clogging of chamber and prevention of incineration, if water is added to the chamber.	Dust mask and full-face shield to prevent dust inhalation. Only add water to the waste container, not the chamber.
7	Weigh ash in waste container prior to disposal and record on Incinerator Record Form.		
8	Transport ash in lidded waste container to storage area for transport.	Wind erosion of ash	Cover ash immediately in preparation for transport

	Pre-operational Checks		
1	Walk around incinerator to ensure that no rubbish is close to incinerator in the area of high heat.	Waste too close may burn	Keep waste out of zone of high heat
2	Check fuel tank to ensure there is enough fuel	Not enough fuel causing incomplete or partial burn	Fill fuel tank prior to each operation
3	Open fuel valve	If fuel valve is shut, combustion will not occur	Check before operation
4	Re-check that combustion chamber is empty and combustion air hoses are clear	If chamber is not empty, a batch may not fit entirely; if hoses are not clear, combustion will not occur	Check before operation
5	Connect electrical plug	Incinerator will not be able to pump diesel and therefore will not operate	Check before operation
6	Prime pump if necessary		
7	Ensure that the handling equipment is at the incinerator before operating.		

	Waste Batch Preparation		
1	Only prepare a batch for the incinerator of wastes suitable to incinerate. **Do not incinerate explosives, aerosol cans, batteries or containers containing combustible liquids.**	Incompatible wastes will produce visible stack emissions.	Only burn approved wastes.
2	Determine how wet / moist the waste is and mix with drier wastes. Do not mix anymore than 25% (one quarter of the batch) with wet kitchen waste.	Too wet and the waste will not burn completely and will require more auxiliary fuel (diesel) to burn.	Mix wet wastes with dry wastes to assist with combustion.
3	Make sure that every batch prepared can go through the Waste Charging Door and will not overload the Chamber.	Incomplete burn if overloaded or too large a load	Ensure batch is correct size.
4	Weigh waste batch prior to incineration and record Incinerator Record Form. Record the types of wastes that make up the batch on the Incinerator Record Form.		
	Incineration and Shut Down		
1	Pre-heat the combustion chambers to at least 850^{o}C and then select the off switch	Chambers will not heat properly; Waste will not combust completely	Close doors; preheat chambers
2	Load waste to the Primary Chamber through the Waste Charging Door; only fill to 60% of the chambers volume.	Overfilling and therefore not completely combusting	Do not overfill
3	Start incineration by closing the door and locking it. Restart the burner by setting the switch to “Main On” and adjusting the burn time to the desired time, usually 30-60 minutes depending on the amount of waste loaded. The	Incomplete combustion	Ensure door is sealed an appropriate timers set

	fan should be set for a minimum of 6 hours after the burn cycle is completed. Reheat the chamber to a minimum of 850°C. The temperature should be monitored so that it does not exceed 1000°C in the secondary chamber, which can cause damage to the lining. Do not add waste to the chamber once incineration has started.		
4	Check status: set timers off, open waste charging door, inspect and rake if necessary	Burns to the hands and body	Wear appropriate Personal protective Equipment
5	If combustion is not complete, repeat Steps 3 and 4 until it is or leave to cool and remove waste that has not been incinerated, once ash is cool, for next burn cycle.		
6	To shut down, make sure all timers are off, unplug electrical connection, and turn off fuel valve.	Unplanned operation	Shut down all required items
7	Let ash cool before removing. See Ash Removal Instruction.		
8	At the end of every shift, give the completed Incinerator Record Form to the Supervisor for entry into the Waste Database.		

MAINTENANCE

STEP	INSTRUCTION	HAZARD OR PROBLEM	CONTROL OR FIX
	Daily routine inspection and maintenance To be completed by operator before every use.		
1	Check fuel lines for leak and check connections	Leads to incomplete incineration	Inspect before each use

2	Check spark arrestor to ensure no plugging	Leads to incomplete incineration	Inspect before each use
3	During ash removal, inspect refractory for large cracks (not expansion cracks)	Leads to incomplete incineration	Inspect before each use
4	Inspect door gaskets for damages	Leads to incomplete incineration	Inspect before each use
5	Check combustion air hole for plugging	Leads to incomplete incineration	Inspect before each use
	Scheduled Maintenance Monthly and annual maintenance is required to be performed by a qualified individual or service agency licensed or certified to install and provide technical service to oil heating systems.		
	See the INCINER8 Operator and Installation Manual for specific maintenance requirements.		

ISSUES

STEP	INSTRUCTION	HAZARD OR PROBLEM	CONTROL OR FIX
	Low-temperature operating problems		
1	During extreme low temperatures, issues may occur with incomplete incineration.	Extreme low temperatures	Do not operate, wait until weather improves
	Visible stack emissions		
1	Visible emissions from the stack indicate that the combustion process is not correct. Emissions increase when: • Temperature in the secondary chamber is too low • Not enough air for the waste being burnt • Too much air into the primary or secondary chambers • Excessive negative draft • Incompatible waste for incineration such as plastics.	Visible stack emissions	Adjust incinerator accordingly to prevent emissions
	High fuel consumption occurs when the operator is trying to burn extremely moist waste, or when too much air is added to the system.	Excess fuel used for combustion	Ensure that moist waste is distributed amongst the batches; check to ensure that there are no leaks in the combustion chambers.

5. HAZARDOUS WASTE MANAGEMENT

The Environmental Protection Division of the Department of the Environment is the agency responsible for ensuring the proper management of hazardous waste and other contaminants in Nunavut. The Environmental Protection Act, which prohibits the discharge of contaminants to the environment and allows the Minister to make sure that appropriate management measures are in place.

The summary below is based on the Environmental Guideline for the General Management of Hazardous Waste (Appendix V).

Other legislation that applies to the storage, handling and transport of hazardous material can is listed in Appendix VI.

1. Hazardous Waste IN CAMP

Hazardous waste will be appropriately stored in a separate area before being shipped south for disposal at licensed facilities. Hazardous waste includes used oil; oil filters, used absorbent materials, oily or greasy rags, antifreeze, paint, chemicals, batteries and used grease.

The *Transportation of Dangerous Goods Act (Canada)* requires that personnel involved in shipping and control of hazardous materials be trained in the application of the Act.

The bulk of the hazardous material at the Kiyuk Lake camp will be petroleum products.

Alternatives to hazardous products will be investigated and used if feasible.

A list of the hazardous materials and quantities will be maintained at the office at the Kiyuk Lake Camp in the format below:

Product Name	Storage Location	Approximate Volume at Present	Maximum Volume Stored

2.Hazardous Waste CLASSIFICATION

Hazardous waste is classified using a system developed under the *Transportation of Dangerous Goods Act (Canada)*. Wastes are consigned to one of nine classes based on their chemical, physical or biological properties.

From **Transportation of Dangerous Goods Act, 1992 (S.C. 1992, c. 34)**

Class 1 — Explosives, including explosives within the meaning of the *Explosives Act*

Class 2 — Gases: compressed, deeply refrigerated, liquefied or dissolved under pressure

Class 3 — Flammable and combustible liquids

Class 4 — Flammable solids; substances liable to spontaneous combustion; substances That on contact with water emit flammable gases

Class 5 — Oxidizing substances; organic peroxides

Class 6 — Poisonous (toxic) and infectious substances

Class 7 — Nuclear substances, within the meaning of the *Nuclear Safety and Control Act*, that are radioactive

Class 8 — Corrosives

Class 9 — Miscellaneous products, substances or organisms considered by the Governor in Council to be dangerous to life, health, property or the environment when handled, offered for transport or transported and prescribed to be included in this class.

3. Hazardous Waste STORAGE AND TRANSPORTATION

Storage is considered the containment of a hazardous waste for transport and is a temporary measure; it is NOT an acceptable long –term management of hazardous waste.

Hazardous materials will be labeled in accordance with regulations. MSDS sheets will be available for all hazardous materials and located in a binder in the office as well as in a binder in the storage area. The MSDS sheets can also be found in the Appendices of the Spill Prevention and Response Plan.

All persons who will be handling hazardous materials will be trained appropriately.

Hazardous material will be stored in a safe, dry manner with clear labeling and secondary containment. All storage areas will be clearly identified with proper labeling and signage and will be regularly inspected.

Storage areas for fuel and chemicals will be inspected daily during camp operations. Inspections will be recorded with the date, time, person and name of the person conducting the inspection.

All hazardous material will be stored a minimum of 31 m from the high water mark of any water body.

For transportation each waste should be classified in one of the 9 classes and then identified using a specific "UN" number assigned under the *Transportation of Dangerous Good Regulations.*

A waste manifest example can be found in APPENDIX VII.

The registration numbers for hazardous waste generator and carrier will be filled out in camp as below:

6. HAZARDOUS WASTE NUMBERS

HAZARDOUS WASTE GENERATOR	
HAZARDOUS WASTE CARRIER	
HAZARDOUS WASTE RECEIVER GFL Environmental Winnipeg, MB	MBR04811

7. GOVERNEMENT CONTACTS

Government of Nunavut

Environmental Protection Division

Department of Environment

Inuksugait Plaza

P.O. Box 1000, Station 1360

Iqaluit, Nunavut X0A 0H0

Telephone: (867) 975-7729 Fax: (867) 975--7739

Motor Vehicles Division

Department of Economic Development and

Transportation

P.O. Box 10

Gjoa Haven, Nunavut X0B 1J0

Telephone: (867) 360-4615 Fax: (867) 360-4619

Workers' Safety and Compensation Commission

P.O. Box 669

Baron Building/1091

Iqaluit, Nunavut X0A 0H0

Telephone: 1-877-404-4407 (toll free) Fax: 1-866-

979-8501

Department of Community and Government

Services (all Divisions)

P.O. Box 1000, Station 700

4th Floor, W.G. Brown Building

Iqaluit, Nunavut X0A 0H0

Telephone: (867) 975-5400 Fax: (867) 975-5305

Office of Chief Medical Health Officer of Health

Department of Health and Social Services

P.O. Box 1000, Station 1000

Iqaluit, Nunavut X0A 0H0

Telephone: (867) 975-5774 Fax: (867) 975-5755

Government of Canada

Indian and Northern Affairs Nunavut Region

P.O. Box 2200

Iqaluit, Nunavut X0A 0H0

Telephone: (867) 975-4500 Fax: (867) 975-4560

Environment Canada (NWT and Nunavut)

5019 52nd Street

Yellowknife, Northwest Territories X1A 1T5

Telephone: (867) 669-4730 Fax: (867) 873-8185

Department of Transport Road, Rail, Marine, Air

P.O. Box 8550

344 Edmonton Street

Winnipeg, Manitoba R3C 1P6

Telephone: 1-888-463-0521 (toll free)

Fax: (204) 983-8992 Road, Rail and Marine only

Fax: (204) 983-1734 Air only

8. PROJECT CONTACTS

• **CONTACT**	• **TELEPHONE NUMBER**
• NWT/NU 24 hour Spill Line	• (867) 920-8130
• INAC Water Resource Officer, Iqaluit	• (867) 975-4295
• Environment Canada	• (867) 975-4644
• Government of Nunavut Department of Environment, Robert Eno	• (867) 975-7729
• Kivalliq Inuit Association	• (867) 645-5725
• DFO	• (867) 979-8007
• PGC, Quinton Hennigh Project Manager	• (720) 938-1945
• Arviat RCMP	• (867) 857-0123/1111
• Nunavut Water Board	• (867) 360-6338
• Treeline Lodge Camp-24 hour-Garry or Shawn Gurke	• (519) 609 6057

APPENDIX I

INCINER8 OPERATOR AND INSTALLATION MANUAL

INCINER 8

SUMMARY

-The INCINER 8 units are controlled air incinerators utilizing a secondary burn chamber.

-High temperatures are achieved (<850°C)

-Residency time at high temperature (<2 sec)

-Due to their extreme stability, dioxins and similar gas components can only

Be totally destroyed by:

-Homogenous high temperature (< 850°C)

-Excess of oxygen (<6 %)

-Sufficient residence time at high temperature (<2 sec)

INCINER8 incinerators are designed the way all 3 conditions are fulfilled.

This way we are preventing dioxins to “crack” into smaller but reactive

ones, which reform into new dioxin molecules, especially in the presence of

heavy metals, acting as catalysts. (Reformation and “de novo” formation).

INCINER8

Incinerator

Model A400/A600/A850

Operator & Installation Manual

Revised January 2010.

Index

1. General

1.1. Information

Used symbols

Warning!
In case of ignoring warnings there might be possibility of causing injury or equipment damage.

Advice!
This symbol indicates important precautions.
This symbol directs you to a necessary action.

Responsibility

Warning!
We don't accept responsibility for any damage or injuries caused by neglecting these instructions!
Purchased equipment is in compliance with EU regulations. Treatment and handling of equipment is end-user's responsibility.

1.2. Handling the incinerator in accordance with it's purpose.

INCINER8 incinerators are made by existing technology and regulations of safety measures. Nevertheless, because of improper usage and handling some serious injures for user or other person, as well as physical damage to equipment or other goods may occur.

INCINER8 incinerators are intended for incineration of animal waste and animal carcases, as well as for energy recycling from incineration heat. (This is optional equipment). Any usage of incinerator beside mentioned is considered as improper, and end-user takes full responsibility for possible damages and injuries.

Proper usage of incinerator also considers installation, maintenance and service of equipment as described in this manual.

1.3. CE certificate

MACHINE LISTED BELOW HAS BEEN TESTED BY MANUFACTURER IN FACTORY BEFORE DISPATCH

######

PRODUCTION DATE: _____

CONFORMS TO ALL SAFETY NORMS WHEN USED ACCORDINGLY
"CE DECLARATION OF CONFORMITY"
"CE DECLARATION DE CONFORMITE"
"CE DECLARACION OF CONFORMIDAD"
"CE ATTESTATO DI CONFORMITA"
"EG- KONFORM IT A TSERKLARUNG"

Inciner8 Ltd
Inciner8 House
Balmoral business Centre
Balmoral Drive
Southport
PR9 8PZ
England

Has declared that the machinery described:
Declares que les machines descrits:
Declaramos que la maquinaria descrita:
Dichiara che la macchina di seguito descrito:
Bestatigt daB die hierunter beschreibt Maschine:

Model (Modele; Modelo; Modello; Modell) : A400 CE INCINERATOR. C/W MAX P15 TL OIL BURNER

Serial Number (Numero de Serie; Numero de Fabricacion; Numero di Serie; Registriernummer) : IN 54##/ 07000509##

Conforms to the following directives:
Est conforme aux Directives suiventes:
Es conforme a las Directivas seguientes:
E conforme alle disposizioni contenute nelle seguenti direttive:
Ist gemaB folgenden Richtlinien hergestellt worden:

1. BS EN 746-2:1997
   (industrial thermoprocessing equipment – part 2. Safety requirements for combustion and handling systems)
1. Low Voltage Directive 73/23/EEC

Directive Basse Tension
Directive Baja Tension
Direttiva Sulla Bassa Tensione
Niedrige Sapnnung – Richtlinie Diretivas

2. EMC Compatibility Regulation 89/336/EEC
Directive CEM
Directiva CEM
Direttiva Compatibilita Elettromagnetica
Elektromanetische Vereinbarkeit – Richtlinie Directive EMC

3. Machinery Directive 89/392/EEC (including amendment)
Directive Securite Machines
Directiva Seguridad Maquinas
Direttiva Macchine
Maschinen – Richtlinie Directiva De Maquinario

ISO9001 WCS UKAS QUALITY MANAGEMENT
Certificate No. 6596

2. Safety

2.1 Safety measures

Installation and adjustments

Installation and adjustments of your incinerator, as well as service and maintenance must be done only by approved professionals. The End-user is responsible for identifying one or more persons which will be trained to operate the incinerator. Only trained person is approved for handling incinerator. All fittings, electricity, gas, oil or water intakes must be done by professionals certified for such works, and in compliance with local regulations. Professionals must provide all necessary documentation.

Gas or oil smell

If gas or oil smell appears the following actions must be taken:

- Do not use electricity switches in area of potential danger
- Smoking is not allowed in area of potential danger,
- Gas or oil vent must be closed,
- Ensure a flow of fresh air in whole area,
- If needed, call local gas or oil distributor

Changes made to Incinerator or its surrounding

Changes are not allowed on next elements:

- On incinerator itself
- On gas, oil, water or electricity lines
- On chimneys
- On pumps for water heating device
- On safety vents
- On surrounding of incinerator that my influence its working

Explosive and flammable materials

Explosive and flammable materials must not be stored or incinerated near or in the incinerator.

Maintenance

Service of your incinerator must be done at least once per year or every 500 working hours. For that purpose use qualified service personnel. During the warranty period, service and maintenance of incinerator must be done by certified technical service that incinerator provider recommends.
A certified burner professional should do Service and maintenance of burners every 1000 hours.
See chapter 6. Maintenance for detailed description of periodical Maintenance procedures.

2.2 Incinerator safety precautions

Corrosion protection

Do not use sprays, dilutors, cleaning agents or other materials that contain chlorine, acids, or other aggressive materials on or near your incinerator. Under some conditions such material may cause corrosion, discolouration and un-repairable damage.
Under influence of high temperature colour on some parts of incinerator will change it's appearance. These changes are especially visible on the stainless steel chimney, but it doesn't influence incinerator quality.

Electrical generating unit in case of electricity loss. (Generator)

Assuming that Approved technical service has installed the incinerator and its connections to the electricity supply. You must ensure a continuous power supply. For that reason, you can connect a generator unit in case of electricity loss. All characteristics of connected generating unit must comply with characteristics of electricity mains. Your approved service can give you advice related to that.

Warning! In the unlikely event that you have complete power failure during the operation of your incinerator, the withdrawal of the burner from its blast tube is essential.
Failure to do this will result in serious damage to your unit.

Warning!

Incinerator, during the
• first start,
• checking,
• normal working,
can be started only with closed lid and fully mounted chimney.

3.

3.1. Content of shipment

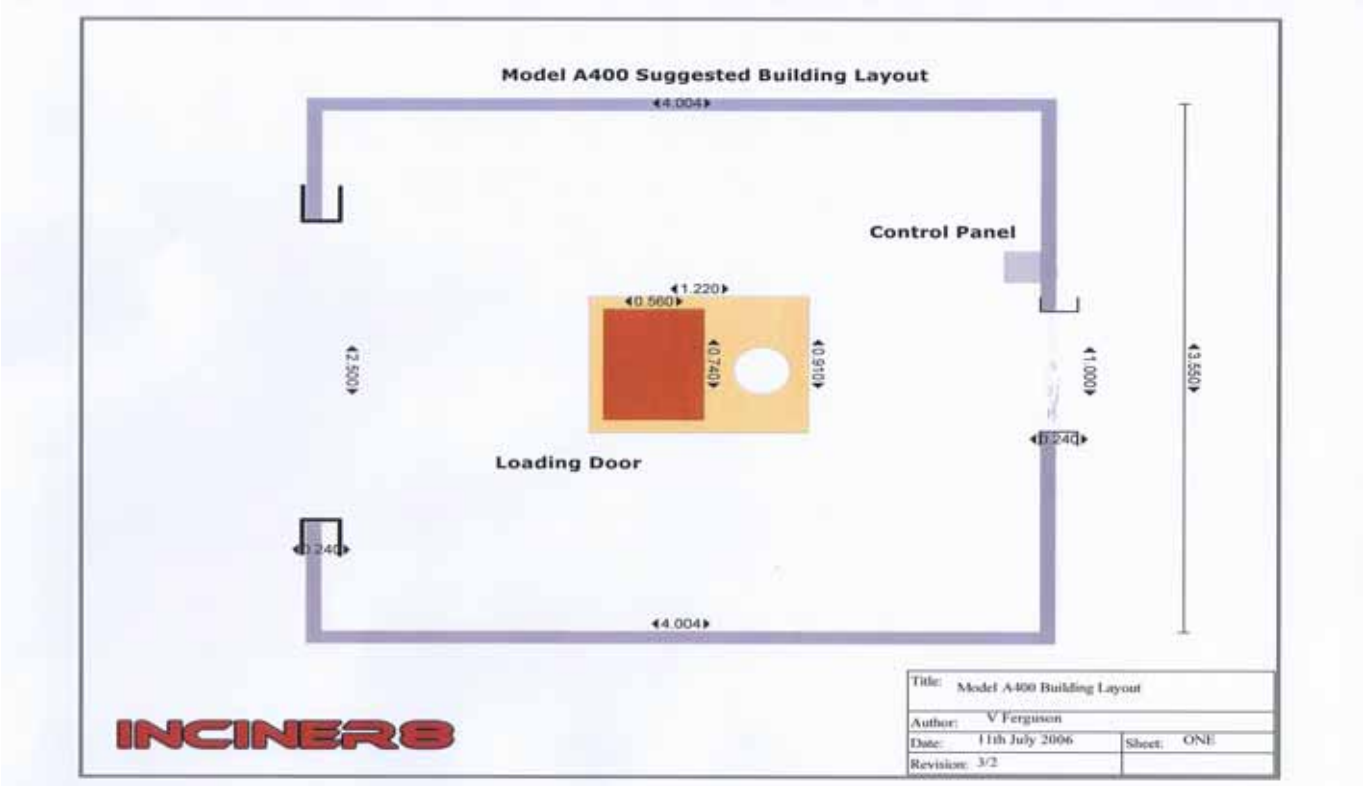
Incinerator shipment contains the following items:

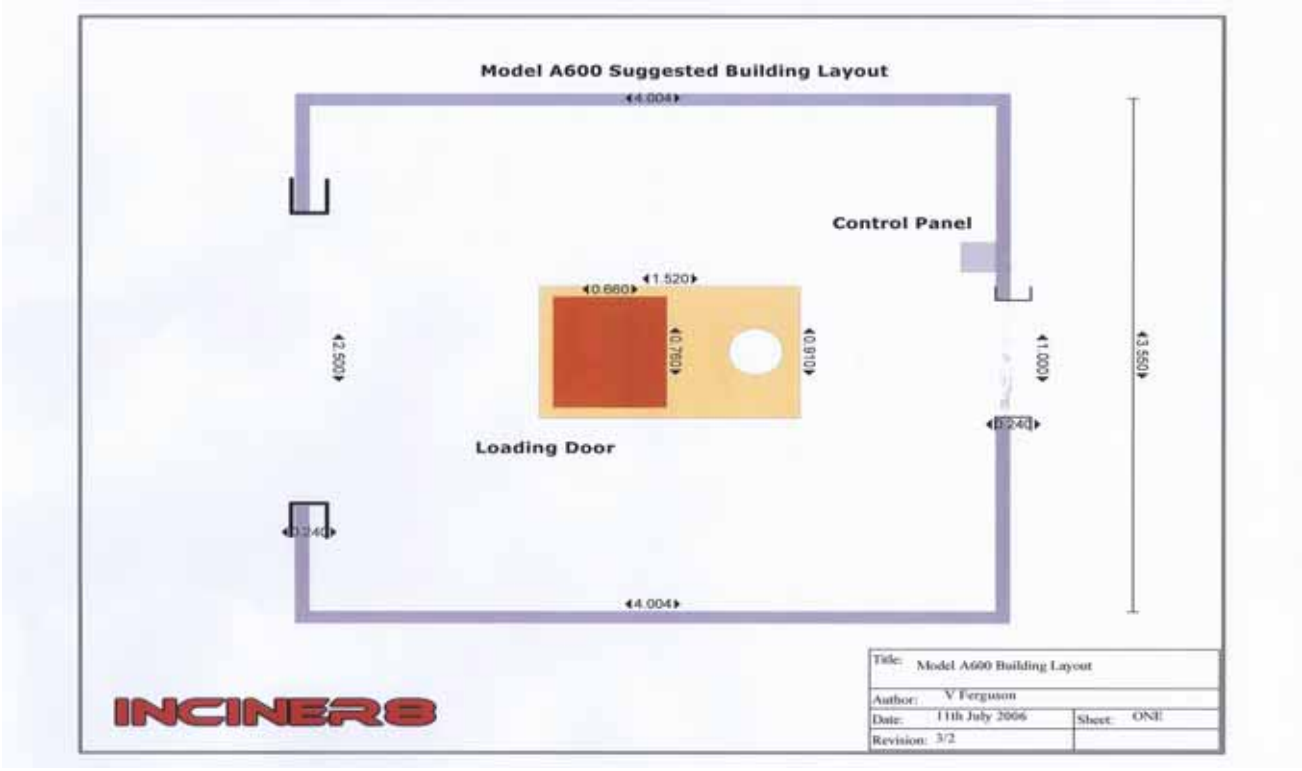
- Incinerator Body
- Secondary / DEFRA or DEFRA(2) Chamber (if applicable)
- Stainless steel stack & stack cap
- Control panel
- Box or boxes with burners and accessories
- Counterbalance weight
- M10 Nuts & Bolts
- Sealing kit
- Self Drill Screws
- Door handle

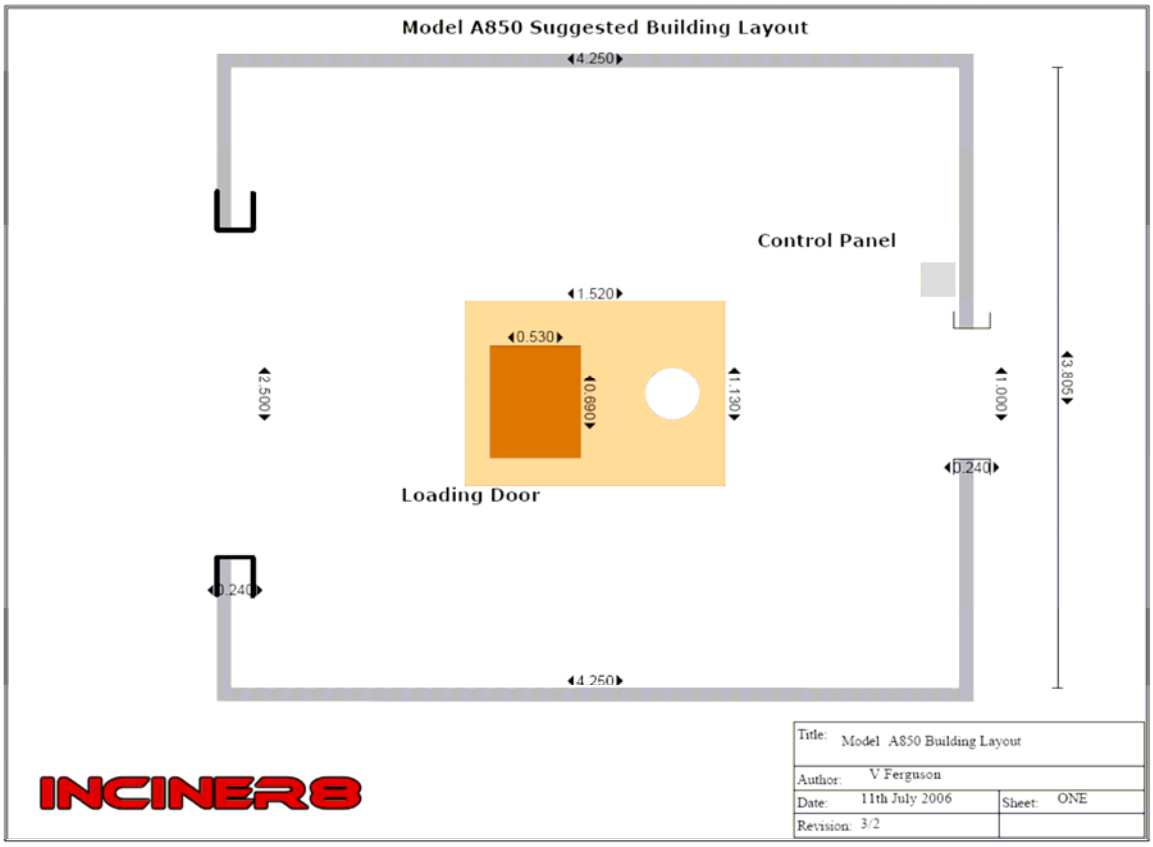
3.2. Site preparation

Floor must be solid, and levelled. Concrete or asphalt floor is preferred for installation.
All fuel and electrical installations should be done according to local regulations.

Suggested Building layouts are shown in the next pictures:







Picture 5: Suggested building layout

3.3 Incinerator assembly

Remove all packaging, including pallet and steel strapping.
Position Incinerator on appropriate base.

Warning!

Use appropriate lifting equipment.
Lifting or moving of incinerator parts with inadequate equipment can cause injuries and/or equipment damage.

Advice!
Remove the counterbalance weights from the packaged position.
Open the chamber door, and remove all the contents from the chamber.

Install chimney.

For Standard models install the Stainless Stack Cap onto the Stainless Stack.

Using the Self Drill Screws fasten the stack cap.

Install chimney.

For standard installation go to page 11.

For Secondary Chamber Installation.

Advice!

Install the Transition Plate on to the stack of the unit.

Seal the transitional plate using the mastic provided. (If not already done at factory.)

Seal the Transition Plate with Fire Rope and/or Mastic.

Install Secondary Chamber

Bolt secondary chamber on using M10 Bolt.

Install Stack Cap onto the Stainless Steel Stack and place complete stack onto the chamber.

For secondary chamber only installation go to page 11.

For DEFRA and DEFRA (2) Chambers.

Warning! Use appropriate lifting equipment.
Lifting or moving of incinerator parts with inadequate equipment can cause injuries and/or equipment damage

Install the DEFRA or DEFRA (2) Chamber

Seal the DEFRA & DEFRA (2) Chamber to the Transition Plate with Fire Rope and/or Mastic & Bolt on using nuts and bolts provided.

Install Stainless Stack Cap onto Stainless Stack and bolt chimney onto DEFRA chamber

Door handle

Fit the door handle using the four M10 nuts and bolts and lock into position.

Fit counterbalance arms.

Install the counterbalance weights.

The counterbalance weights should be set so the door is easy to lift but not forcing the door to open on its own.

Advice.

Ensure that the door is also sealed completely when the door is closed.
Ensure that all nuts and bolts are tight before proceeding with installation of burners.

Installation of Burners

For standard units.

Remove the burner from its box.(oil or gas)

Remove the blast tube from the burner.

Thread M8 bolts into the burner mount.

Place the gasket onto the bolts and insert the blast tube.

Mount the Burner

Slide the burner gently into the blast tube and twist into position.

For oil burners.

Connect the fuel pipes.

Connect the fuel pipes to the fuel supply, these should be installed by a qualified / competent fitter.

Warning!

For all gas installations follow the same procedure as above to mount the burner but the gas supply should be installed by a fully qualified gas engineer with the appropriate locally required certification.

For burner specification and detailed information about the burners, see Ecoflam Manual.

For Secondary and DEFRA (A)2 Versions.

Mount the blast tube using the same procedure as for the main chamber.

Mount the burner and install fuel pipes.

Control Panel

Warning!

Please note that it is essential to use an authorised technician for the electrical and fuel installation.

Control Panel

(CE 2 Temperature control)

PLEASE NOTE THE ABOVE CONTROL PANEL IS FOR TWO BURNER VERSIONS ONLY.

USER SETTINGS OF THE INCINER8 CB1001 COMBINED TEMPERATURE AND TIMER CONTROLLER

1.Introduction.

The controller is a combined temperature and timer control, it's function is to control the exit temperature of the incinerator and to control the burn time. Please note after the burn time has completed the burner/s' fans will operate for 6 hours after the burn timed period. The burner/s' fans operate after firing to assist with the cooling of the incinerator and to protect the burner/s from suffering damage due to reverberated heat from the refractory lining of the incinerator.

2.Layout of controller.

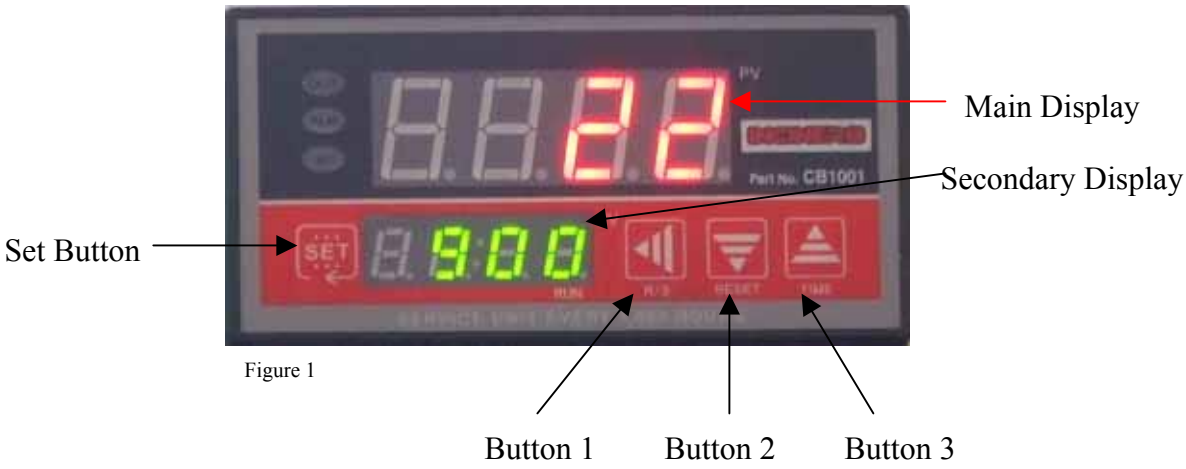


Figure 1

3. Changing the set point.

1. Press the set button, the display will change as per figure 2 below. the temperature is changed by altering each digit individually. The digit which can be altered is highlighted brighter than the others.
2. Select the digit which needs changing by using button 1.
3. Button 2 will increase the value and Button 3 will decrease the value.
4. When the desired temperature has been selected press the Set button.
5. The display will change to figure 3, if you require to alter the timer then go to section 4, line 2. If not press the set button again and the display will return to figure 1, note if you have altered the temperature the new temperature will be shown in the secondary display.

Figure 2

4. Changing the timer.

1. Press the set button twice, the display will change as per figure 2 below. the time is changed by altering each digit individually. The digit which can be altered is highlighted brighter than the others.
2. Select the digit which needs changing by using button 1.
3. Button 2 will increase the value and Button 3 will decrease the value.
4. When the desired time has been selected press the Set button.
5. The display will change to figure 3

Figure 3

5. Changing the display value in the secondary display.

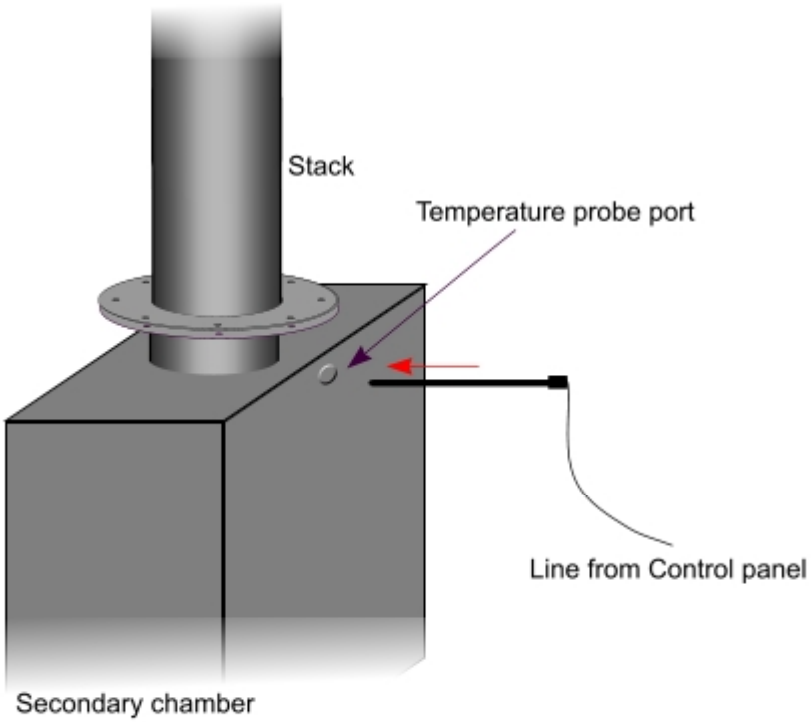
The default display value is the set point. To change the display to the timer, press button 3 once.

6. Resetting the timer.

When timer has completed the timed period the time value is shown as in figure 4. To reset the timer press button 2 for 5 seconds.

Figure 4

Slide the temperature probe into the temperature probe port on the top back of the secondary chamber as shown on next picture:

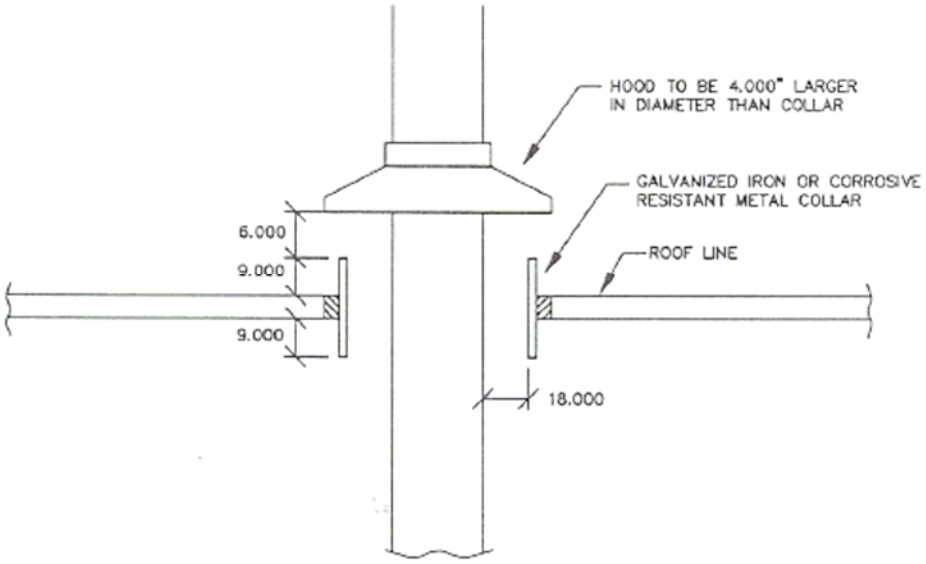


Picture 15: Temperature probe

Once you have successfully installed your burners, your fuel supplies are all connected Construct chimney connection with facility roof as shown on next picture:

COMBUSTIBLE ROOF CONSTRUCTION DIAGRAM

1. DIMENSIONS ARE MINIMUM DISTANCES
2. BASED ON NFPA 82
3. CONSULT LOCAL BUILDING CODES
4. STOCK SHOULD EXTEND NOT LESS THAN 10 FT. HIGHER THAN ANY BUILDING WITHIN 25 FT.



Picture 10: Combustible roof

Warning!

Failure to present installation log will void warranty
(See chapter 7. for installation and maintenance logs)

4. Commissioning and start up procedures

Incinerator should now be ready for start-up.

Warning!

1. **It is imperative that the refractory has been cured (see page 19 for details)**
2. **All pipe work must be checked for leaks and should be free from dirt and debris.**
3. **Welding slag needs to be removed and the pipe work should be completely clear of any obstruction.**
4. **It is important that the burner is set correctly by adjusting the air / fuel flow. When looking at the burner flame it should not be producing black smoke at the ends of the flames, small adjustments should be made to lean the flame so that it is clean.**

Warning!

Failure to cure refractory before using will void warranty
(See refractory curing procedure)

In the production of your Incinerator, specific amounts of water have been added to the materials, and it is very important that the refractory curing process has been done before first use. During the refractory curing process, your incinerator will be completely dried and prepared for use. It is normal to expect some steam or water coming out of the incinerator during the refractory curing procedure. After the curing process has been done, some hairline cracks may be visible inside the chamber.

Start refractory curing procedure as described on page22.

5. Curing process

Refractory Curing Procedure

Curing process should be done with MAIN burner only.

Start Burner and burn for	5 minutes	DO NOT EXCEED 400°C.
Allow to cool for	15 minutes	
Burn	5 minutes	
Cool	15 minutes	
Burn	15 minutes	
Cool	15 minutes	
Burn	15 minutes	
Cool	15 minutes	
Burn	30 minutes	
Cool	15 minutes	
Burn	30 minutes	
Cool	15 minutes	
Burn	1 hour	
Cool	15 minutes	
Burn	1 hour	
Cool	15 minutes	
Burn	2 hours	
Cool	15 minutes	
Burn	3+ hours	INCREASE TEMPERATURE AT 50° C PER HOUR TO OPERATING TEMPERATURE OF 850°C.
Total Time	**18 hours**	

There will be hairline cracks and minor scaling of the refractory when curing is completed. This is a normal result of the curing process

5.1 Operation procedure

1. The incinerator should not be modified in any way not in keeping with the manufacturers instructions, this will not only void warranty but will possibly fail to meet EU legislation

2. Dedicated tools should be used for use with the incinerator only, and not be used elsewhere.

3. Remove ashes before loading the incinerator.

4. Select the 'Main on' switch to ignite the burner whilst the primary chamber is completely empty.

5. Once the temperature reaches in excess of 850 deg C displayed on the temperature readout, select the 'Off' setting on the switch.

6. NOW LOAD THE INCINERATOR. Keep the waste away from the burner port.

DO NOT OVERFILL THE INCINERATOR.

7. Lock the unit door to ensure that no one can inadvertently access the chamber during the burn

8. RE-START BURNER by setting the switch to 'Main on' and adjusting the timer to the desired burn time, reheat the chamber back to min 850 degree c.

9. If you have purchased a version with temperature control the main burner will turn off at the chosen set point and will reignite when the temperature drops 35° below the set point.

10. It is imperative to regularly check the temperature monitor so that it does not exceed 1000 deg C in the secondary chamber otherwise this can cause damage to the lining.

11. The burner will AUTOMATICALLY STOP FIRING when the chosen burn time is completed. The fan should remain on for a minimum of 6 hours after the burn cycle.

12. For the best results BURN DAILY TO A WHITE ASH

13. Do not store carcasses in the incinerator chamber. 'singe and burn' does not constitute an approved pre-incineration storage process.

14. In case of any form of breakdown, shut down the incinerator immediately and remove the burners.

15. It is important in the unlikely event of a breakdown that the customer has a valid contingency plan in order to dispose of animal-by-product safely and within the confines of the 'animal-by-product act'.

16. To comply with the 'animal-by-product act', the operator must monitor and record the temperature in 10% of all 'burns', i.e. 1 in every 10. This should be done by recording the temperature every 2 hours. The record book needs to be kept on site for inspection.

5.2 Incinerators - Recommended Maintenance Programme

Periodic inspection and servicing of the units is required to maintain optimum operation

We recommend the following schedule:-

Assuming the unit has been installed and tested by a suitably qualified oil / gas/ electrical engineer.

1st service (post installation check up) after 50 hours of operation

Regular service/ inspection 1000 hours or annually, whichever is the sooner. (see attached example service sheet, fig 2)

Main Chamber

- ⇒ Open the chamber door and check around the rim of the chamber for leakage, this is normally easily visible as there may be blackening beyond the area where the door seats. If there is blackening and therefore leakage, then the fire rope around the door / lid should be checked and replaced if damaged. Close the door and inspect for any signs of gaps when tightly closed. Adjustments may need to be made to the locking catch to tighten the seal, also the counterbalance weights may need to be adjusted so that they allow the lid to sit firmly, (normally the lid should be balanced, allowing easy opening and closing with one hand).
- ⇒ Check for leak tightness of the unit ensuring all waste gas travels up the chimney.
- ⇒ Check the integrity of the main chamber refractory lining. When the unit is cool, it is normal to see hairline cracks, these disappear when the unit is hot. Any large chips or cracks can be simply filled with an approved fire cement (approved to 1500 deg C).
- ⇒ Check the burner outlet hole and make sure that the area is clear from any debris and that the integrity of the refractory liner is good.
- ⇒ Check all around the outside of the chamber for any bent or buckled steel (this can arise from corroded internal refractory lining. Any damage needs to be investigated and resolved internally before making any external repairs or welds.
- ⇒ Check all external bolts for corrosion (especially if unit is located outside) and replace where necessary.
- ⇒ Discolouration of the stainless chimney stack is normal, although watch for corrosion where the stack meets the steel chamber (especially where units are located inside but the stack is incorrectly fitted through the roof allowing water to run down the outer skin of the chimney).
- ⇒ Check for leaks in all pipe-work and gas supply
- ⇒ All safety shut off valves and safety guards should be inspected.
- ⇒ A temperature and combustion analysis should be performed to ensure that there is no deterioration of incinerator performance
- ⇒ Timers should be calibrated to ensure that they reflect a true reading and ensure that the safety cut off applies.
- ⇒ Check burners for correct setting (see installation manual on set up procedures), the air / fuel mix should be set so that there is no black smoke at the flame tips and there is not excessive fuel use.

Where necessary it is possible to remove any corrosion or discolouration (normally on units kept outside) using a wire brush and rust remover. The unit can be re-sprayed in those places (using heat resistant paint available from Inciner8)

Warning!

5.3 DAILY CHECKS BEFORE INCINERATION BEGINS WILL HELP PROLONG THE LIFE OF YOUR INCINERATOR.

ADVICE In order to have your unit in good working condition, check daily for:

- Damage to the fire rope under the lid. Replace
- Abnormal damage to the refractory lining.
- Scorch damage to the external steelwork.
- Check all fuel and power connections.
- Visible damage to the chimney.

6. Maintenance

In this chapter there is a list of monthly and yearly maintenance procedures that has to be done.

6.1 Monthly maintenance procedures

In order to have your unit in good working condition, every month it has to be checked for:

- Damage to the fire rope under the lid
- Visible damage to the chimney
- Visible damages to the outside body of the incinerator (corrosion of metal parts, discolorations, leaks)
- Condition of temperature probe
- Condition of fuel and electrical installation

Customer has to keep logs about all maintenance procedures, with his comments.

6.2 Yearly service procedures

In order to have unit in good working condition it has to be serviced once per year (or every 1000 hours, whatever comes first):

- Replace fire rope under the lid
- Adjust counterbalance so lid is balanced and sealed
- Do parallel measurement of temperature probe (if regulated by law)
- The burner should be serviced by an approved professional
- Check sealing between each individual part of chimney (including secondary chamber)

Customer must keep logs about all service procedures, with his comments.

Warning!

Failure to present maintenance and service procedure logs will void warranty
(See chapter 8 with maintenance logs)

7. Installation log

Inciner8 Incinerator Model_____ S/n:_____

Installation Location:
Installed by: Date:
Sold By:
Refractory curing done by:
Comments:

8. Maintenance log

Inciner8 Incinerator Model _____ S/n:_____

Action	Date	Comments	Done by
Installation			
Monthly check			
Monthly check			
Monthly check			
Monthly check			
Monthly check			
Monthly check			
Monthly check			
Monthly check			
Monthly check			
Monthly check			
Monthly check			
Monthly check			
Service			
Service			
Service			

9. Limited Warranty

Warranty

Inciner8 Ltd, warrantor, warrants to the original purchaser of one (1) year or 1000 hours (whichever comes first) from date of purchase or delivery to original purchaser, products manufactured / supplied by it which are installed and operated according to Warrantor's instructions that are furnished and/or are available to purchaser upon request, and installed according to other applicable federal, state, government and local codes or regulations and upon substantiation that said products were installed correctly, were not abused and are defective. The exact nature of said warranty and exclusive remedy for breach by warrantor is as follows:-

Warrantor will refund or credit to purchasers account an amount equal to the original purchase price or at warrantors option repair or replace at Warrantors expense, products found to be defective in workmanship or material. If a problem occurs which the purchaser believes is covered by his warranty, then the purchaser shall contact the seller giving the seller sufficient information to enable a resolution of the problem. If the seller is unable or unwilling to resolve the problem and the purchaser is still convinced that it is covered by the warranty the purchaser should contact the manufacturer at the address listed in the following paragraph and provide a description in writing of the problem and the attempts made to resolve it. 'Seller' as used herein shall mean the dealer or distributor from whom the product was purchased.

No product or part thereof may be returned pursuant to this warranty without first receiving specific written permission to do so. All requests should be addressed to Inciner8 Ltd, Inciner8 House, Balmoral Business Centre, Balmoral Drive, Southport PR9 8PZ, United Kingdom, requesting specific authority for returning merchandise pursuant to this warranty with reasons for the request.

Limitations

Products which are abused or neglected are not covered under this warranty, including overfilling / overheating units, or covering burner outlets (please refer to manual for usage instructions). Warrantor shall not be responsible for the costs of removal or reinstallation of its products and shall not be liable for transportation costs to and from its plant. Further. Warrantor shall not be liable for replacement, repair or refund for component parts not manufactured by it.

Failure to cure the refractory (see manual) will immediately void the warranty.

Use of parts for modification or repair of the unit or any component not authorised or supplied by Inciner8 Ltd, specifically for this product shall void the warranty.

Implied warranties of merchantability and fitness for a particular purpose are limited to the same period of time as this express limited one (1) year warranty and are specifically disclaimed thereafter.

Items Not Covered Under Warranty

Nozzles (burner)
Fire rope
Temperature Probe

Inciner8 Ltd shall not be liable for any incidental, consequential, special or contingent damages or expenses arising directly or indirectly from any defect in the product hereby warranted.

The warranty shall be VOID if solvents or other highly inflammable fluids such as but not limited to Benzene, methyl ethyl, ketones, toluene, xylene or naphtha are burned in or mixed with oil for burning in used oil fired burning heaters or furnaces.

Inciner8 Ltd is not responsible for any undertaking, representation, or warranty made by any dealer, distribution, or other persons, beyond those expressly set forth in this warranty.

9. Contact Numbers.

Approved Service :-

INCINER8 House, Balmoral Drive,
Southport PR9 8PZ, United Kingdom
Tel: +44 (0) 1704506506 Fax: +44 (0) 1704506666

APPENDIX II

INCINERATOR RECORD FORM

Date	Start Time	Batch No.	Type of Waste in Batch (e.g. 20% kitchen waste, 80% office waste)	Before Incineration Weight (Waste)			Max Temp (˚C) during Burn Cycle	Min Temp (˚C) during Burn Cycle	After Incineration Weight (Ash)			Finish Time
				A Empty Container Weight (kg)	**B** Total Pre-incineration Weight (kg)	**C** Actual Waste Weight (kg) **(B-A = C)**			**D** Empty Container Weight (kg)	**E** Total Post-incineration Weight (kg)	**F** Actual Ash Weight (kg) **(E-D = F)**	

APPENDIX III

EXECUTIVE SUMMARY AND OVERVIEW OF THE ENVIRONMENT CANADA TECHNICAL DOCUMENT OF BATCH WASTE INCINERATION (2010)

Environment Canada Environnement Canada

Technical Document for Batch Waste Incineration:

Executive Summary and Overview of the Six-Step Process for Batch Waste Incineration

January 2010

Canada

Acknowledgements:
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Aussi disponible en français.

EXECUTIVE SUMMARY

Incineration is recognized as an effective and environmentally sound disposal method for a wide range of wastes, and is used in facilities and jurisdictions across Canada. Waste generators located in remote areas may have limited options for cost-effective and environmentally sound waste management, and incineration may therefore be considered an appropriate waste management option. Remote commercial activities, such as exploration and development of natural resources, can create large volumes and varieties of wastes that must be managed appropriately. Residual wastes from industry, research activities, and the health care sector may require thermal treatment as an environmentally sound method to control the spread of disease from plants, animals or humans. Furthermore, there are certain locations in Canada where incinerating waste is an important means of avoiding potentially dangerous interactions between humans and wildlife. In all cases, reduction and diversion should be the primary waste management objectives, prior to considering any disposal option.

There are, however, some important potential environmental concerns associated with waste incineration that must be addressed through proper equipment selection, operation, maintenance and record keeping. These include potential releases of mercury, as well as dioxins and furans (PCDD/F), which are persistent organic pollutants (POPs). Mercury and POPs bio-accumulate in the environment and may cause adverse effects to human health and the environment. They can also be transported over long ranges; data from measurements in the North reveal concentrations far greater than what might be explained by local production. Dioxins/furans can be generated when inadequate incineration technology is used or when an incinerator is improperly operated. Mercury is not created in an incineration system; emissions are directly related to the presence of mercury in certain waste materials. Therefore, the best method to control mercury emissions is to limit the quantity of mercury in the waste fed to the incinerator.

The *Stockholm Convention on Persistent Organic Pollutants (POPs)* (which entered into force in May 2004 and to which Canada is a Party), identifies incineration as a potential source of POPs, and establishes a range of measures to reduce and, where feasible, eliminate their release. It also requires that the best available techniques (BAT) and best environmental practices (BEP) be applied for both new and substantially modified sources of POPs. Additionally, the Canadian Council of Ministers of the Environment (CCME) adopted the Canada-wide Standards for Dioxins and Furans in 2001, identifying incineration for action to reduce emissions, and adopting specific air emission standards. The CCME also adopted the Canada-wide Standards for Mercury Emissions in 2000 which include limits on mercury emissions from incinerators. Both mercury and dioxins/furans are on the List of Toxic Substances in Schedule 1 of the *Canadian Environmental Protection Act, 1999* (CEPA 1999).

The Technical Document for Batch Waste Incineration was developed to provide guidance for owners and operators on proper system selection, operation, maintenance and record keeping, with the goals of achieving the intent of the Canada-wide Standards for dioxins/furans and mercury, and reducing releases of other toxic substances. The document includes:

- A discussion of the importance of reducing, reusing and recycling to divert wastes from disposal;
- Methods for the selection of appropriate incineration technologies to meet specific waste management requirements;
- Operational requirements that should allow batch incinerators to meet the intent of the Canada-wide Standards for dioxins/furans and mercury, and to reduce the release of other toxic substances; and

- Recommendations on record keeping and reporting.

This Technical Document focuses on minimizing dioxins/furans and mercury emissions from batch waste incinerator systems ranging in size from 50 kg to 3000 kg of waste/batch, the latter representing the largest batch incinerator currently in use in Canada. Batch waste incinerators are those that operate in a non-continuous manner (i.e. they are charged with waste prior to the initiation of the burn cycle, and the door remains closed until the ash has cooled inside the primary chamber). Air emission testing completed by Environment Canada in 2002 using a modern Canadian-built batch waste incinerator demonstrated that, when properly operated and maintained, these systems are capable of meeting the Canada-wide Standards for dioxins/furans (80 pg I-TEQ/Rm^3 @ 11% O_2) and mercury (20 µg/Rm^3 @ 11% O_2). Stack testing can be carried out as required by the regulatory authorities (e.g. federal, provincial/territorial) to verify that these standards are met.

The Technical Document recommends and describes a six-step process for batch waste incineration:

Step 1 – Understand Your Waste Stream
Step 2 – Select the Appropriate Incinerator (or Evaluate the Existing System)
Step 3 – Properly Equip and Install the Incinerator
Step 4 – Operate the Incinerator for Optimum Combustion
Step 5 – Safely Handle and Dispose of Incinerator Residues
Step 6 – Maintain Records and Report

This process will assist owners and operators of batch waste incinerators to achieve the intent of the Canada-wide Standards for dioxins/furans and mercury, and reduce the potential for releases of other toxic substances to the environment.

OVERVIEW OF THE SIX-STEP PROCESS FOR BATCH WASTE INCINERATION

Step 1: Understand Your Waste Stream

The first step in managing waste is to understand the quantity and composition of the waste that is generated. A waste audit should be completed, where practical, to:

- Determine the quantity of waste generated in the various parts of an operation;
- Characterize the waste from each type of operation;
- Examine the waste stream to determine what opportunities exist for:
    - Reducing the quantity of waste generated;
    - Reusing materials; and
    - Recycling as much as possible before considering disposal.

Where waste audits are not practical, it is still necessary to develop an estimate of the waste quantities and characteristics before a strategy for waste diversion and disposal can be completed. Owners should investigate waste generation and diversion data from similar operations/facilities in order to estimate the waste types and quantities that will be generated at their own facilities. Sources of such information may include industry associations, waste industry consultants, provincial/territorial authorities and other regulatory bodies.

Based on the results of the waste audit/characterization, an assessment of appropriate disposal options should be undertaken. Where possible, disposal alternatives (other than incineration) for the residual waste stream (i.e. post 3Rs – Reduce, Reuse, Recycle) should be examined. When assessing disposal options, it is important to note that waste should neither be open-burned nor burned in a barrel. In both cases, the appropriate temperatures for a clean burn will not be achieved, and toxic contaminants, in particular dioxins and furans, will be released.

Step 2: Select the Appropriate Incinerator (or Evaluate the Existing System)

The characteristics of the residual waste stream destined for incineration should be incorporated into a call for proposals from incinerator manufacturers. Specifying the quantity and composition of the waste stream will ensure that proposals include suitable incinerators. It should be noted that incinerators built for a specific waste stream, such as animal carcasses, liquid wastes and hazardous wastes, are available and should be used as required.

For facilities with existing incinerators, owners/operators should reassess the suitability of the existing system to manage the current waste stream.

For facilities incinerating **more than 26 tonnes of waste per year,** dual chamber controlled air incinerators are the recommended configuration. These systems are capable of incinerating a wide range of wastes and, when properly maintained and operated, will achieve emissions of PCDD/F and mercury below the level of the Canada-wide Standards. These systems should be equipped with a large secondary chamber sized to provide a residence time of at least one second at a temperature higher than $1000^{O}C$, to ensure complete combustion and minimize PCDD/F emissions.

For facilities incinerating **less than 26 tonnes of waste per year**, “determined efforts”

as defined in the Canada-wide Standards for dioxins and furans[1] should be undertaken. Should circumstances restrict the ability to use a dual-chamber incinerator with a large secondary chamber, a single chamber incinerator with an afterburner should be used. It should be noted that such systems are less likely to be able to meet the emission standards than dual chamber incinerators.

Step 3: Properly Equip and Install the Incinerator

Building Considerations

- Incinerators should be installed inside a building to protect the equipment and the operators from weather conditions.
- In designing the installation site, care should be taken to maximize clearance between incinerator components, including the stack, and combustible construction materials.
- Insulation should be used to protect combustible building materials.
- The building should be equipped with sufficient fresh air inlet capacity for the incinerator. Both combustion air and dilution air for the barometric damper are required. Care should be taken to introduce air in a manner that does not lead to low-temperature operating problems.

Equipment Considerations

The incinerator system should come complete with the following equipment to monitor and record performance parameters:

- A scale to measure the weight of all materials charged to the incinerator; and
- A computerized process control and data acquisition system to store operating data from the incinerator.

Operational data should be collected and stored, at a minimum, every minute that the system is operating. The intent is to be able to summarize operating parameters during start-up, operation and cool-down for every cycle. If the required operating conditions are not achieved these data will allow the operators, the manufacturers and the regulator to identify the contributing factors for the failure. From this information, operating procedures can be adjusted to improve performance. Provisions should be made for the manufacturers to be able to remotely access and review the operating data for trouble shooting purposes.

It is highly recommended that batch incinerators not be equipped with heat recovery devices. The temperature of the stack gases in heat recovery systems will be lower than in systems without heat recovery, and may be in a temperature range that can lead to the formation of greater quantities of PCDD/F. Similarly, air pollution control systems are not recommended for batch waste incineration systems to control PCDD/F emissions. Stack gases should be released directly to the atmosphere at temperatures higher than 700^{O}C to reduce the chances of the inadvertent formation of PCDD/F through the *de novo* synthesis process.

If it is necessary to introduce additional waste to the incinerator during the burn cycle, the incinerator should be equipped with a ram charge system to limit the disruption of combustion in the primary chamber during the waste charging process.

[1] Available on-line at: http://www.ccme.ca/ourwork/air.html?category_id=97

Step 4: Operate the Incinerator for Optimum Combustion

Operational Considerations

Wastes received at the incinerator building should be separated according to their heating value characteristics: wet or low-energy wastes (e.g. food waste); mixed wastes with average energy values; and other materials with high energy values, such as oily waste materials. To facilitate this separation, all waste should be collected in transparent bags. To further assist with separation, wastes could be collected in coloured-coded bags.

Batch incinerators are designed to accept wastes within a specified range of energy (i.e. calorific) values. The operator should select waste from each category and mix it to achieve the manufacturer's specified input calorific value. Each bag should be weighed, its source should be noted, and the total weight of each category should be tallied before completing the loading. This information should be recorded by the computerized data acquisition equipment installed with the incinerator. (Refer to step 6 for further record keeping requirements).

Batch incinerator systems have limited charging capacity (both in terms of waste quantity and the calorific value of the waste charge). To assist the operator with the charging task, particularly for smaller incinerators, several batches could be weighed and placed in their own containers prior to loading the incinerator. The same weighing and logging procedures should be used for each batch and, once recorded, the batch can be charged when appropriate.

When the incinerator is charged with the appropriate mix and quantity of waste, the operator should close the door, ensure all interlocks are engaged, and start the burn cycle. The operator should observe the burn for at least 15 minutes after ignition of the primary chamber burner to ensure the volatility of the waste charged is not creating too much gas for the secondary chamber to handle. The rate of combustion can be slowed by reducing the quantity of under-fired air. The primary chamber should be operated in the temperature range specified by the manufacturer (typically $500^{O}C$ to $800^{O}C$).

When satisfied that the burn is proceeding in a controlled manner, the operator may leave the incinerator area while the equipment completes the burn cycle.

The burn cycle should not be interrupted by opening the charging door until after the burn is complete and the unit has cooled down. No additional waste should be added to the primary chamber unless the incinerator is equipped with an appropriate ram feed device.

When the burn is complete and the unit has cooled, the operator should open the door only when wearing protective equipment such as gloves, dust mask, face shield and goggles.

The operator should remove the ash from the previous burn cycle before reloading the incinerator. Any unburned materials found in the ash should be recharged to the primary chamber after the operator has cleaned the air ports, and before putting a fresh charge into the incinerator.

Training Considerations

Operators should be properly trained by the incinerator manufacturer. The training course should include, as a minimum, the following elements:

- System safety including identification of hazards that the operator should recognize;
- Waste characterisation and how waste composition can affect operation;
- Loading limitations, including materials that should NOT be charged to the incinerator, and the allowable quantities of different types of wastes that can be charged;
- Start-up procedures for the incinerator and the normal operation cycle;
- Operation and adjustment of the incinerator to maximise performance;
- Clean out procedures at the end of the cycle;
- Troubleshooting procedures;
- Maintenance schedule; and
- Record keeping and reporting.

Managers should be involved in the training session so that continuity can be maintained with different operators.

Step 5: Safely Handle and Dispose of Incinerator Residues

Ash from the primary chamber of the incinerator can contain materials deleterious to the operator's health and the environment. Operators should use personal protective equipment when handling this material. The material should be carefully removed from the hearth and placed in covered metal containers suitable for transporting the ash to an approved disposal site. The operator should weigh, and maintain records of, the quantity of ash produced.

Step 6: Maintain Records and Report

To demonstrate appropriate operation and maintenance of the incinerator, the facility should maintain records and prepare an annual report containing at least the following information:

- A list of all staff who have been trained to operate the incinerator; type of training conducted and by whom; dates of the training; dates of any refresher courses;
- All preventative maintenance activities undertaken on the equipment;
- Records of operation of the incinerator - in electronic format with full data backup;
- Summarized annual auxiliary fuel usage;
- A list of all shipments of incinerator residues, including the weight transported and disposed of by type if necessary, and the location of the disposal site;
- Results of any emissions measurements or any ash sampling data collected during the period.

All raw data records from the operation of the incinerator should be retained for inspection by the appropriate authorities for the period designated by those authorities, or for at least 2 years. The owner should work with the incinerator manufacturer or supplier and the regulators to determine the appropriate level of summary data that should be sent to the regulatory body (e.g. federal, provincial/territorial). The reports should be approved by the facility's senior management before submission.

APPENDIX IV

ENVIRONMENTAL GUIDELINE FOR THE BURNING AND INCINERTION OF SOLID WASTE (2011)

Environmental Guideline for the

Burning and Incineration of Solid Waste

Department of Environment
Government of Nunavut

GUIDELINE: BURNING AND INCINERATION OF SOLID WASTE

Original: October 2010

This Guideline has been prepared by the Department of Environment's Environmental Protection Division and approved by the Minister of Environment under the authority of Section 2.2 of the *Environmental Protection Act.*

This Guideline is not an official statement of the law and is provided for guidance only. Its intent is to increase the awareness and understanding of the risks, hazards and best management practices associated with the burning and incineration of solid waste. This Guideline does not replace the need for the owner or person in charge, management or control of a solid waste to comply with all applicable legislation and to consult with Nunavut's Department of Environment, other regulatory authorities and qualified persons with expertise in the management of solid waste.

Copies of this Guideline are available upon request from:

Department of Environment
Government of Nunavut
P.O. Box 1000, Station 1360, Iqaluit, NU, X0A 0H0
Electronic version of the Guideline is available at http://env.gov.nu.ca/programareas/environmentprotection

Cover Photos: Nunavut Department of Environment (left and bottom right), Indian and Northern Affairs Canada (top right)

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Introduction

People living and working in Nunavut often have limited options available for cost effective and environmentally sound management of household and other solid waste. The widespread presence of permafrost, lack of adequate cover material and remote locations make open burning and incineration a common and widespread practice to reduce the volume of solid waste and make it less of an attractant to wildlife. A wide variety of combustion methods are used ranging from open burning on the ground to high temperature dual-chamber commercial incinerators. Generally, high temperature incinerators are more expensive to purchase and operate and cause less pollution than do the less expensive and lower temperature methods. However, high temperature incinerators can safely dispose of a wider variety of waste than can the lower temperature open burning and modified burn barrel methods.

The Guideline for the Burning and Incineration of Solid Waste (the Guideline) is not intended to promote or endorse the burning and incineration of solid waste. It is intended to be a resource for traditional, field and commercial camp operators, communities and others considering incineration as an element of their solid waste management program. It examines waste burning and incineration methods that are used in Nunavut, their hazards and risks and outlines best management practices that can reduce the impacts of incineration on the environment, reduce human-wildlife interactions and ensure worker and public health and safety. This Guideline does not address incineration of biomedical waste, hazardous waste and sewage sludge. The management of these wastes requires specific equipment, operational controls and training that are beyond the scope of the current document.

The *Environmental Protection Act* enables the Government of Nunavut to implement measures to preserve, protect and enhance the quality of the environment. Section 2.2 of the *Act* provides the Minister with authority to develop, coordinate, and administer the Guideline.

The Guideline is not an official statement of the law. For further information and guidance, the owner or person in charge, management or control of a solid waste is encouraged to review all applicable legislation and consult the Department of Environment, other regulatory agencies or qualified persons with expertise in the management of solid waste.

1.1 Definitions

Biomedical Waste — Any solid or liquid waste which may present a threat of infection to humans including non-liquid tissue, body parts, blood or blood products and body fluids, laboratory and veterinary waste which contains human disease-causing agents, and discarded sharps (i.e. needles).

Bottom Ash — The coarse non-combustible and unburned material which remains at the burn site after burning is complete. This includes materials remaining in the burn chamber, exhaust piping and pollution control devices where such devices are used.

Commercial Camp	A temporary, seasonal or multi-year facility with a capacity greater than 15 people and which has been established for research, commercial or industrial purposes. A commercial camp does not include a traditional camp or field camp.
Commissioner's Land	Lands that have been transferred by Order-in-Council to the Government of Nunavut. This includes roadways and land subject to block land transfers. Most Commissioner's Land is located within municipalities.
Contaminant	Any noise, heat, vibration or substance and includes such other substance as the Minister may prescribe that, where discharged into the environment, (a) endangers the health, safety or welfare of persons, (b) interferes or is likely to interfere with normal enjoyment of life or property, (c) endangers the health of animal life, or (d) causes or is likely to cause damage to plant life or to property.
Determined Effort	The ongoing review of opportunities for reductions and the implementation of changes or emission control upgrades that are technically and economically feasible and which result in on-going reductions in emissions. Determined efforts include the development and implementation of waste management planning which is focussed on pollution prevention.
De Novo Synthesis	The creation of complex molecules from simple molecules.
Environment	The components of the Earth and includes (a) air, land and water, (b) all layers of the atmosphere, (c) all organic and inorganic matter and living organisms, and (d) the interacting natural systems that include components referred to in paragraphs (a) to (c) above.
Field Camp	A temporary, seasonal or multi-year facility consisting of tents or other similar structures with a capacity of 15 people or less and which has been established for research, commercial or industrial purposes. A field camp does not include a traditional camp or commercial camp.
Fly Ash	Unburned material that is emitted into the air in the form of smoke or fine particulate matter during the burning process.
Hazardous Waste	A contaminant that is a dangerous good and is no longer wanted or is unusable for its original intended purpose and is intended for storage, recycling, treatment or disposal.
Incineration	A treatment technology involving the destruction of waste by controlled burning at high temperatures.

Incinerator	A device or structure intended primarily to incinerate waste for the purpose of reducing its volume, destroying a hazardous substance in the waste or destroying an infectious substance in the waste. An incinerator has means to control the burning and ventilation processes.
Inspector	A person appointed under subsection 3(2) of the *Environmental Protection Act* and includes the Chief Environmental Protection Officer.
Modified Burn Barrel	A metal drum or other non-combustible container used to burn waste that has been affixed with devices or features which provide for enhanced heat generation, heat retention and holding time.
Open Burning	Burning of waste with limited or no control of the burn process and where the fly ash is emitted directly into the air without passing through an exhaust pipe. For clarity, open burning includes burning on the open ground or using an unmodified burn barrel.
Qualified Person	A person who has an appropriate level of knowledge and experience in all relevant aspects of waste management.
Responsible Party	The owner or person in charge, management or control of the waste.
Smoke	The gases, particulate matter and all other products of combustion emitted into the atmosphere when a substance or material is burned including dust, sparks, ash, soot, cinders and fumes.
Solid Waste	Unwanted solid materials discarded from a household (i.e. single or multiple residential dwellings, other similar permanent or temporary dwellings), institutional (i.e. schools, government facilities, hospitals and health centres), commercial (i.e. stores, restaurants) or industrial (i.e. mineral, oil and gas exploration and development) facility. For clarity, solid waste does not include biomedical waste, hazardous waste or sewage sludge.
Traditional Camp	A temporary or seasonal camp used primarily for camping, hunting, fishing or other traditional or cultural activities. A traditional camp does not include a field camp or commercial camp.
Unmodified Burn Barrel	A metal drum or other non-combustible container used to burn waste that has not been affixed with devices or features which provide for enhanced heat generation, heat retention and holding time.
Untreated Wood	Wood that has not been chemically impregnated, painted or similarly modified to improve resistance to insects or weathering.
Waste Audit	An inventory or study of the amount and type of waste that is produced at a location.

1.2 Roles and Responsibilities

1.2.1 Department of Environment

The Environmental Protection Division is the key environmental agency responsible for ensuring the proper management of solid waste and other contaminants on Commissioner's Land, including their proper disposal. Authority is derived from the *Environmental Protection Act*, which prohibits the discharge of contaminants to the environment and enables the Minister to undertake actions to ensure appropriate management measures are in place. Although programs and services are applied primarily to activities taking place on Commissioner's and municipal lands and to Government of Nunavut undertakings, the *Environmental Protection Act* may be applied to the whole of the territory where other controlling legislation, standards and guidelines do not exist. A complete listing of relevant legislation and guidelines can be obtained by contacting the Department of Environment or by visiting the web site at http://env.gov.nu.ca/programareas/environmentprotection.

The Wildlife Management Division is responsible for managing wildlife in Nunavut. Section 90 of the *Wildlife Act* prohibits the intentional feeding of wildlife and the placement of any food or garbage where there is a reasonable likelihood that it would attract wildlife. Once wildlife has been 'conditioned' to obtaining food associated with human activities, it can become dangerous and often will have to be destroyed. Further information on ways to reduce contact between wildlife and humans can be obtained by contacting the local Conservation Officer or by visiting the web site at http://env.gov.nu.ca/programareas/wildlife.

The Department of Environment will provide advice and guidance on the burning and incineration of solid waste. However, it remains the responsibility of the owner or person in charge, management or control of the solid waste to ensure compliance with all applicable statutes, regulations, standards, guidelines and local by-laws.

1.2.2 Generators of Solid Waste

The generator, or responsible party, is the owner or person in charge, management or control of the solid waste at the time it is produced or of the facility that produces the waste. The responsible party must ensure the waste is properly and safely managed from the time it is generated to its final disposal. This is referred to as managing the waste from cradle-to-grave.

Contractors may manage solid waste on behalf of the responsible party. However, the responsible party remains liable for ensuring the method of management complies with all applicable statutes, regulations, standards, guidelines and local by-laws. If the contractor does not comply with the requirements of the *Environmental Protection Act* or *Wildlife Act* and is charged with a violation while managing the waste, the responsible party may also be charged.

1.2.3 Other Regulatory Agencies

Other regulatory agencies may have to be consulted regarding the burning and incineration of solid waste as there may be other environmental or public and worker health and safety issues to consider. Some of the other agencies include:

Workers' Safety and Compensation Commission

The Workers' Safety and Compensation Commission is responsible for promoting and regulating worker and workplace health and safety in Nunavut. The Commission derives its authority from the *Workers' Compensation Act* and *Safety Act* which require an employer to maintain a safe workplace and ensure the safety and well being of workers.

Department of Community and Government Services

The Department of Community and Government Services is responsible under the *Commissioners' Lands Act* for the issuance of land leases, reserves, licenses and permits on Commissioner's Lands. The Department, in cooperation with communities, is also responsible for the planning and funding of municipal solid waste and sewage disposal facilities in most Nunavut communities.

The Office of the Fire Marshal is responsible for delivering fire and life safety programs including reviewing plans to ensure incinerators and other heating devices comply with all legislation, codes and standards. The Office of the Fire Marshal derives its authority from the *Fire Prevention Act*, National Fire Code and National Building Code.

Department of Health and Social Services

Activities related to the burning and incineration of solid waste may have an impact on public health. The Office of the Chief Medical Officer of Health and Regional Environmental Health Officers should be consulted regarding legislated requirements under the *Public Health Act.*

Indian and Northern Affairs Canada

Indian and Northern Affairs Canada is responsible under the *Territorial Lands Act* and *Nunavut Waters and Nunavut Surface Rights Tribunal Act* for the management of federal lands and waters, including the impact solid waste may have on the quality of these lands and waters.

Local Municipal Governments

The role of municipal governments is important in the proper local management of solid waste. Under the Nunavut Land Claims Agreement, municipalities are entitled to control their own municipal disposal sites. Local environmental and safety standards are determined, in part, by how the property is designated under municipal government development plans (i.e. land use zoning). Solid waste may be deposited into municipal landfill sites only with the consent of the local government. The local fire department may also be called upon if a fire or other public safety issue is identified.

Co-management Boards and Agencies

Co-management boards and agencies established under the Nunavut Land Claim Agreement have broad authority for land use planning, impact assessment and the administration of land and water. Activities involving the burning and incineration of solid waste may be controlled through the setting of terms and conditions in plans, permits and licenses issued by the Nunavut Water Board and other co-management boards and agencies.

Waste Burning and Incineration

2.1 The Combustion Process

The combustion, or burning, of solid waste proceeds through a series of separate stages. Water is first driven from the unburned waste by heat produced from waste burning nearby or from an auxiliary burner. As the waste heats up, carbon and other substances are released from the waste and converted into burnable gases. This is referred to as gasification. These gases are then able to mix with oxygen. If the temperature inside the burn chamber is high enough and maintained for a long enough period of time, the hot gases are completely converted into water vapour and carbon dioxide, which is then released into the air. If the temperature inside the burn chamber is not high enough and the burn time is too short, complete conversion of the burnable gases does not occur and visible smoke is released into the air. Another result of low burn temperatures is the creation of pollutants that were not originally present. This process is known as *de novo* synthesis. Dioxins, furans and other complex chemical pollutants can be formed through this process.

Ash produced from combustion takes the form of either fly ash or bottom ash. Fly ash is the fine particles carried away in the form of smoke while bottom ash is the coarse non-combustible and unburned material that remains after the burn is complete. The type and amount of pollutants in the fly and bottom ash depend upon what waste is burned and completeness of the combustion process.

The completeness of combustion is determined by all of the following factors:

Temperature

The temperature generated is a function of the heating value of the waste and auxiliary fuel, incinerator or burn unit design, air supply and combustion control. Complete combustion requires high temperatures. Generally, temperatures that exceed 650^{o}C with a holding time of 1-2 seconds will cause complete combustion of most food and other common household waste. Segregation of waste is required when using these low temperature methods. Dual chamber incinerators, which are designed to burn complex mixtures of waste, hazardous waste and biomedical waste, must provide a temperature higher than 1000^{o}C and holding time of at least one second to ensure complete combustion and minimize dioxin and furan emissions. When these high temperatures and holding times are achieved, waste will be completely burned and ash, smoke and pollutant concentrations will be minimized.

Because exhaust gas temperatures vary from ambient to greater than 1000°C each time a batch waste incinerator is used, optional air pollution control systems with evaporative cooling towers and scrubbers are seldom recommended. However, it may be necessary to employ these systems with large continuous feed incinerators if additional cleaning of exhaust gas is required by regulatory authorities.

Holding Time

Complete combustion takes time. Holding time, otherwise known as retention or residence time, is the length of time available to ensure the complete mixing of air and fuel, and thus the complete burning of waste. Low temperatures, low heating values of the waste and reduced turbulence require that the holding time be increased to complete the combustion process.

Turbulence

The turbulent mixing of burnable gases with sufficient oxygen is needed to promote good contact between the burning waste and incoming air. This will help in achieving the high temperatures at which waste can be completely burned. The amount of mixing is influenced by the shape and size of the burn chamber and how the air is injected. Passive under-fire ventilation achieved using a modified burn barrel does not result in sufficient turbulence for the burning of a wide variety of waste. Also, it is important not to overfill the burn chamber as airflow may be blocked and the amount of turbulence further reduced. The more advanced incineration designs provide effective turbulence through the forced introduction of air directly into hot zones.

Composition of the Waste

The heating value, wetness and chemical properties of the waste affect the combustion process and the pollutants that are contained in the resulting smoke and ash. The higher the burn temperature, holding time and turbulence that are achieved, the less effect the composition of the waste has on completeness of the burn.

2.2 Pollutants of Concern

Open burning and the improper incineration of solid waste can result in environmental, health and safety hazards from the pollutants found in smoke and exhaust gases and in the bottom ash. These pollutants may either be found in the original waste itself, or may be created through *de novo* synthesis if sufficient temperature, holding time and turbulence is not achieved in the burn chamber. Extreme care must be exercised when burning or incinerating solid waste.

Many different types of pollutants can be released during burning and incineration. A few of these pollutants include acid gases, trace metals, fine particulates and persistent organic compounds. Acid gases such as hydrogen chloride and sulphur oxides result from burning waste that has high levels of chlorine and sulphur (i.e. plastics). Mercury, lead and cadmium are examples of trace metals found in both fly and bottom ash when batteries are burned. Fine particulates are the very small particles found in smoke created by incomplete combustion and can cause respiratory irritation in humans and wildlife.

Dioxins and furans are persistent organic pollutants that have drawn the most attention in recent years because they have been linked to certain types of cancers, liver problems, impairment of the immune, endocrine and reproductive systems and effects on the fetal nervous system. They persist in the environment for long periods of time, bioaccumulate in plants and animals and result predominantly from human activity and have been identified for ‘virtual elimination’ in Canada under the federal Toxic Substances Management Policy. The incineration of solid waste accounts for almost 25% of the dioxin and furan emissions in Canada each year. They are formed in trace amounts by *de novo* synthesis during the low temperature burning of waste containing organic compounds and chlorine (i.e. chlorinated plastic, PVC pipe, marine driftwood).

The most effective ways to reduce or minimize the release of pollutants is to segregate the waste before burning and achieve sufficient temperatures, holding time and turbulence in the burn chamber. Open burning and improperly designed and operated burn barrels produce more smoke and pollutants, including dioxins and furans, than does an incinerator capable of achieving complete combustion.

2.3 Burning and Incineration Methods

The type of burning method is a major factor in determining what type of waste can be safely and effectively burned. Burning and incineration methods commonly used in Nunavut include open burning on the ground, modified burn barrels and various mechanical incineration systems. Each method is discussed separately in the following sections. Other methods include burn cages, burn boxes and air curtain incinerators. These methods are not discussed as they are not widely used in Nunavut.

2.3.1 Open Burning

Open burning means the burning of waste where the burned gases, smoke and fly ash is emitted directly into the air without first passing through an exhaust pipe. This method includes burning solid waste directly on the open ground or in unmodified burn barrels. Open burning provides the operator with limited or no control over the combustion process and as a result, often does not achieve the temperatures or holding time needed for complete combustion of the waste to occur. This results in the formation of potentially hazardous pollutants and ash, which are likely to impact nearby land and water. Food waste that is not completely burned can also be a powerful attractant for animals.

The open burning of solid waste remains a common practice in Nunavut. With few exceptions (refer to section 3.2) it is the policy of the Department of Environment to eliminate or control open burning of mixed solid waste to the extent practicable and to encourage more acceptable methods of disposal and incineration.

2.3.2 Modified Burn Barrel

A modified burn barrel is a metal drum or other non-combustible container that has been affixed with devices or features which result in higher burn temperatures, enhanced heat retention and a longer holding time than does open burning. These modifications include a 'metal basket' or grate to suspend the burning waste and vents or holes cut above the bottom of the barrel. These features provide for enhanced passive under-fire ventilation which promotes good contact between the waste being burned and incoming air. Other features include a hinged top and exhaust pipe attached to the top or side of the barrel. These help to increase heat retention and holding time inside the burn chamber. The hinged top also allows easy loading of waste while the removable basket enables access to the unburned bottom ash.

Figure 1 – Modified Burn Barrel

Although modified burn barrels are an improvement over open burning, it is likely insufficient burn temperatures, turbulence and holding time will result in smoke and incomplete combustion of the waste. Other common problems include overfilling the unit and loading waste that should not be burned (refer to section 3.2). The

process may also not completely burn wet or frozen masses of waste and the resulting partly burned food waste may still attract animals.

Modified burn barrels can be built using commonly available materials. They can either be pre-built locally or transported to the site for assembly. Basic operating instructions are provided in section 4.2 and construction plans are provided in Appendix 2.

2.3.3 Incineration

Solid waste incinerators are engineered systems that are capable of routinely achieving burn temperatures in excess of 1000^{o}C and a holding time of at least one second. Properly designed and operated incinerators are able to effectively and safely destroy a wide range of waste. Only incinerators designed for burning mixed municipal solid waste are discussed in the guideline. The incineration of hazardous and biomedical waste and sewage sludge requires specific equipment, operational controls and training that are beyond the scope of the current document.

Incinerators are described based upon the number of burn chambers they have and the amount of air provided to each chamber. They may also be described based upon how waste is fed into the primary burn chamber.

Dual-Chamber Starved Air System	The primary burn chamber receives less air than is needed to achieve full combustion. Gases from this incomplete combustion then pass into a second burn chamber where sufficient air is injected and complete combustion is achieved.
Single Chamber Excess Air System	More than a sufficient amount of air (as much as 50% more than the amount of air needed) is injected into the primary burn chamber to achieve complete combustion of the waste.
Continuous Feed Incinerator	An incineration process that is in a continuous burn cycle. A continuous feed incinerator operates without interruption throughout the operating hours of the facility by having waste continually added to the primary burn chamber.
Batch Feed Incinerator	An incineration process that is not in a continuous or mass burning cycle. A batch feed incinerator is charged with a discrete quantity or single load of waste at the beginning of the burn cycle.

Dual-chamber controlled air batch feed systems currently operate at several remote industrial locations in northern Canada and Alaska. Although they are generally considered to have the highest qualities of all the incinerators and open burning methods mentioned, they must be designed for the type and quantity of waste to be burned. Too little heat and holding time will not allow waste to burn properly; too much heat will damage the incinerator.

Figure 2 illustrates the design of a typical batch feed dual-chamber controlled air incinerator. The main features of this type of incinerator are:

- Batch operation allows greater control of temperature and air throughout the burn process.
- Air turbulence can be reduced in the primary chamber so fewer particulates are released into the air from the stack.
- Although a wide range of wastes can be destroyed, waste may have to be segregated and remixed in order to achieve a uniform heating value close to the design point of the incinerator.
- Externally supplied fuel and electricity are needed for the burners and forced air ventilation.
- A properly operating dual-chamber controlled air system will reduce problems with animal attraction as the production of bottom and fly ash and smoke is minimized.

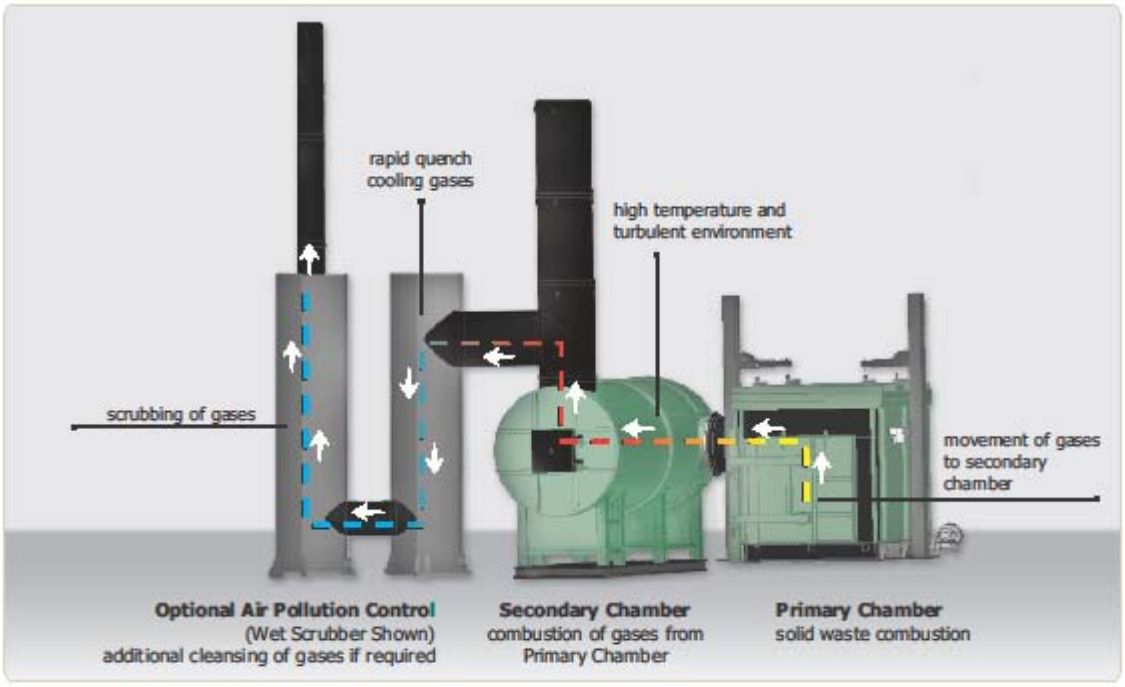

Figure 2 – Typical Batch Feed Dual-Chamber Controlled Air Incinerator with Optional Air Pollution Controls
Illustration courtesy of Eco Waste Solutions

Section 2.3.3 is intended to provide the reader with a brief introduction to incinerators. It is not intended to provide information suitable for the selection or operation of an incineration system. Any person considering the purchase of an incineration system should first consult the system's manufacturer or other qualified persons with expertise in the incineration of solid waste.

2.4 Environmental Standards

2.4.1 Air Emissions

Air emission standards establish limits on the amount of contaminants that can be released into the atmosphere. These standards are expressed as a concentration in the exhaust gases leaving the stack and are capable of being achieved using generally available technology or waste diversion practices. The following emission standards apply to solid waste incinerators operating in Nunavut and have been adopted from the Canadian Council of Ministers of the Environment (CCME) Canada-Wide Standards for

Dioxins and Furans and Mercury Emissions, respectively. Similar standards for the open burning of solid waste and modified burn barrels have not been established.

For existing, new or expanding solid waste incinerators the maximum concentration[1] of dioxins, furans and mercury in the exhaust gases from the stack are provided in Table 1.

Table 1. Air Emission Standards for Solid Waste Incinerators

Parameter	Numeric Standard	Explanation
Dioxins and Furans	80 pg I-TEQ/cubic metre	Unit of measure is picograms of International Toxicity Equivalents per cubic metre of air
Mercury	20 µg/Rcubic metre	Unit of measure is micrograms per Reference cubic metre (the volume of gas adjusted to 25°C and 101.3 kilopascals)

Opacity is the degree to which the exhaust gases reduce the transmission of light and obscure the view of any object in the background. It is expressed as a percentage representing the extent to which an object viewed through the gases is obscured. Although not an emission standard, opacity provides an indication of the general performance of the incinerator during normal operation[2]. Opacity in the incinerator stack should not exceed 5%. While it is not anticipated that opacity levels would exceed 1% to 2% under normal operation, values greater than 5% indicate the incinerator is not performing properly and additional performance evaluation and adjustment is required.

Less than 5% Opacity | 20%-30% Opacity | 90%-100% Opacity

Figure 3 - Examples of Smoke Opacity Ratings
The opacity ratings are estimates and are provided for illustrative purposes only
Centre and right photos courtesy of GNWT Department of Environment and Natural Resources

[1] Stack concentrations are always corrected to 11% oxygen content for reporting purposes.
[2] The time during which optimum designed temperature is maintained in the burn chamber, and excludes 'startup' and 'cool down' operations.

2.4.2 Bottom Ash

The *Environmental Guideline for Industrial Waste Discharges* establishes criteria for determining whether process residuals[3] are suitable for disposal in landfill sites in Nunavut. For the purpose of this Guideline, process residuals include bottom ash from industrial and commercial incinerators. The Toxicity Characteristic Leaching Procedure Test method 1311 (US EPA) is the preferred method to analyze the residuals as this test is designed to simulate the processes a material would be subjected to if placed in a landfill.

Refer to the *Environmental Guideline for Industrial Waste Discharges* for criteria and additional information on the management of process residuals.

[3] Process residuals are the solid, semi-solid or sludge waste resulting from industrial operations.

Best Management Practices

Best management practices are methods and techniques that have been shown to be effective in preventing or reducing pollution. They include policies, prohibitions of practices, maintenance and monitoring procedures and other management practices adopted by the responsible party. Implementing best management practices together with using best available technology is an effective means of reducing costs, reducing pollution and reducing a parties' legal liabilities.

3.1 Waste Management Planning

The generator of a waste is responsible for its safe management from cradle-to-grave. Using raw materials efficiently and reducing the amount of waste generated is the most important step in waste management planning. For example, through improved waste management planning, it may be possible to reduce or eliminate the need to burn or incinerate waste altogether. Undertaking a waste audit will help to identify the type and amount of waste being generated, the costs of current management options and examine opportunities for better managing the waste. This information will also enable the generator to implement a waste management regime that is tailored to its own unique needs, location and circumstances.

Even with improved waste reduction measures in place there will be waste generated. Waste by its nature is usually a mixture of different unwanted materials. The segregation and diversion of different types of waste is an effective way to reduce the amount of waste requiring costly handling, storage, treatment and disposal. Segregation also enables the reuse of certain types of waste for a different purpose. Reuse activities may be undertaken either on-site or off-site.

Treatment and disposal is the last step in effective waste management and should be undertaken only after all other practical reduction and reuse options have been examined. A wide variety of treatment and disposal options exist and each must be examined before deciding on a final method, regardless of whether waste is to treated and disposed of on-site or off-site. If burning and incineration is the method of choice, equipment must be designed and sized accordingly to accommodate the type and quantity of waste being produced. As described in the following section, open burning and modified burn barrels are capable of safely destroying a limited number of types of waste. While incinerators are capable of safely destroying a wider range of waste, many types of waste must still be diverted. Because of this, on-site segregation becomes a critical component of any waste management plan.

Overall, the following principles should be used to guide responsible solid waste management planning:

- Know your waste by conducting a waste audit.
- Reduce the amount of solid waste produced by implementing strategic purchasing policies that focus on the substitution or reduction of purchased products as well as product design, composition and durability.
- Reuse waste where different purposes can be identified.
- Segregate and divert mixed waste streams enabling waste to be reused or recycled, thereby reducing the amount of waste to be disposed of.
- All practical disposal methods should be examined. Burning and incineration of waste should be considered only where other practical methods do not exist.

- If burning and incineration is used, the equipment chosen should be designed and sized to accommodate the waste produced and result in the complete combustion of the waste.

3.2 Wastes That Can be Burned or Incinerated

Complete combustion converts waste into inert bottom ash with minimal creation of smoke, fly ash and hazardous gases. Several factors influence this process including the heating value, wetness and chemical composition of the waste itself, operating conditions in the burn chamber (i.e. temperature, holding time and turbulence) and operator skill.

The burning method used is important in determining what can safely be burned. Certain wastes can only be incinerated using equipment that has been specifically designed and equipped with sufficient air pollution controls and that achieve specific air emission standards. For example, waste containing chlorinated compounds (i.e. chlorinated solvents and plastics, PVC piping, wood treated with pentachlorophenol or PCB-amended paint, marine driftwood) must be separated from other waste as their burning will result in the *de novo* creation and emission of various dioxin and furan compounds. Waste containing mercury (i.e. batteries, thermostats and fluorescent light bulbs) and other heavy metals (i.e. lead acid batteries, wood treated with lead paint) should not be burned as the mercury and heavy metals will not be destroyed. Other waste that should not be burned unless using specially designed incinerators include used lubricating oil, hydrocarbon contaminated soil, biomedical waste, sewage sludge or any other waste specifically prohibited by the Department of Environment.

Table 2 provides a listing of common wastes that can be burned and those that require special consideration and treatment. Note that open burning, modified burn barrels and incineration are identified as separate columns in the table and that different restrictions apply depending upon which method is used. In general, more restrictions apply to open burning than to modified burn barrels because of the incomplete combustion achieved. Fewer restrictions apply to incineration because of the operator's ability to control the combustion process.

Non-combustible materials such as metal and glass do not burn and will rob heat away from waste that can be destroyed by burning. Combustible waste should be separated from non-combustible waste before being loaded into the burn chamber.

3.3 Keeping Waste Dry

Typical garbage and food waste is at least 20% moisture. Anything that can be done to reduce the moisture of waste burned will decrease the amount of smoke produced and increase the completeness of combustion. Waste should be covered or stored inside sheds or other secure buildings to keep rain and snow out of the waste. This will also lessen the opportunity for wildlife to access the waste. If wet waste must be burned, the wet waste should be mixed or layered with dry waste to reduce the overall moisture content of the waste burned. Mixing or layering waste in this manner is particularly important when loading wet solid waste into a modified burn barrel.

Table 2. Waste That Can be Burned or Incinerated

Waste Type	Method		
	Open Burning	Modified Burn Barrel	Dual-Chamber Incinerator
Paper products	✓	✓	✓
Paperboard packing including boxboard and cardboard	✓	✓	✓
Untreated wood including lumber and plywood	✓	✓	✓
Food waste		✓	✓
Food packaging and natural fiber textiles		✓	✓
Plastic and Styrofoam except plastic containing chlorine[4]			✓
Painted wood except wood painted with lead or PCB-amended paint			✓
Wood treated with creosote or tar oil			✓
Hydrocarbon spill absorbents			✓
Animal carcasses except those affected by disease-causing agents			✓

The following waste requires special consideration. It is not to be burned or incinerated unless the equipment used has sufficient air pollution controls, meets specific air emission standards and has been specifically designed to safely incinerate the waste product.

Hydrocarbon contaminated soil
Radioactive waste including smoke detectors
Organic compounds containing chlorine including plastics, solvents, PVC piping and marine driftwood
Pesticides
Items containing mercury, lead or other heavy metals including paint, computer equipment and fluorescent bulbs
Batteries
Explosives
Pressurized cans, cylinders or other containers that may explode when heated
Synthetic fiber textiles
Biomedical waste and animal carcasses affected by disease-causing agents
Wood treated with pentachlorophenol, inorganic preservatives, lead paint or PCB-amended paint
Sewage sludge
Tires
Used lubricating oil
Waste fuel except limited quantities used solely as a starting fuel
Construction and demolition waste including roofing materials, electrical wire and insulation

3.4 Locating the Facility

Distance from sensitive areas (i.e. camp, work site, drinking water supply) and prevailing wind direction are important factors to consider when locating any facility that burns waste. The facility should be kept at least 100 metres from any surface water body. Although the objective is to minimize pollutants being released to the air, the site should be selected so that any resulting emissions are adequately dispersed. This includes locating the burn facility away from areas or features that may trap smoke close to the

[4] Chlorinated plastic materials are identified by the number "3" associated with the mobius loop symbol. 

ground (i.e. located in a valley). Avoid burning waste if people will be living or working within the plume of the smoke. The facility should be located on stable and level ground. A gravel, rocky outcrop or other area free of combustible materials and vegetation should be chosen to avoid accidently starting a tundra fire.

3.5 Maximizing Combustion Efficiency

Avoid smoldering fires when open burning. Burn only dry wood, paper and paperboard packing and periodically add additional waste to the fire in order to maintain high burn temperatures until all waste has been destroyed. The use of deep or steep-walled 'pits' should be avoided as this will prevent the necessary turbulent mixing of oxygen with the burnable gases.

More smoke and other pollutants are released into the air during the 'start-up' and 'cool down' phases of the burn cycle than when high temperatures are maintained in the burn chamber. As a result, the desired operating temperature should be achieved as quickly as possible. A rapid 'start-up' can be achieved in a modified burn barrel by first loading the chamber with dry wood and paper products. Food and other acceptable waste can then be carefully added once the fire is actively burning. Overfilling the 'metal basket' in a burn barrel will also prevent the turbulent mixing of burnable gases and oxygen, and should be avoided.

Modern batch feed incinerators are designed with primary and auxiliary burners to achieve and maintain the necessary high burn temperatures. Additional waste should only be added to these incinerators once the 'cool down' phase has been completed.

3.6 Ash Management

The management of bottom ash and other unburned residue is an integral part of sound waste management and the ash will need to be disposed of. Extreme care must be exercised when handling ash because of its physical (i.e. glass, nails) and chemical hazards. Use closed or covered containers when moving or transporting bottom ash from the modified burn barrel or incinerator to the final disposal site. This will minimize physical contact with the ash and any release of fine ash particles to the environment.

Avoid handling bottom ash until it is completely cool. Hot ash and embers can cause painful skin burns and should never be buried or landfilled as they could cause unburned waste in the disposal area to catch fire.

Bottom ash from the open burning of paper, paperboard packing and untreated wood waste or unburned materials from modified burn barrels used to burn paper, paperboard packing, untreated wood, food waste, food packaging and natural fiber textiles is suitable for burial in a designated pit or municipal landfill. Because incinerators can be used to destroy a wider variety of waste and the subsequent ash may contain a wider variety of toxic residues, bottom ash from an incinerator is suitable for burial only where it meets the criteria set out in section 3.2 of the *Environmental Guideline for Industrial Waste Discharges*. Waste originating from outside a municipality and meeting the criteria may be deposited in municipal landfills only with the consent of the local government. Any bottom ash not meeting the criteria set out in section 3.2 of the *Environmental Guideline for Industrial Waste Discharges* is considered to be a hazardous waste. This ash is not suitable for landfilling and its

management must comply with the *Environmental Guideline for the General Management of Hazardous Waste*.

Because food waste has high moisture content, bottom ash from modified burn barrels loaded with these wastes may have to be re-mixed with dry waste and burned again to ensure any food scraps are sufficiently destroyed and do not attract animals.

3.7 Monitoring and Record Keeping

Modified burn barrels and incinerators should be inspected for signs of leakage, corrosion or other physical defects before each burn cycle. Repairs must be completed before the equipment is used again to ensure the health and safety of the operator, nearby people and the environment.

Open burning and modified burn barrels tend to produce smoke. Burning dry waste, high burn temperatures and sufficient air mixing with the burnable gases will reduce, but not eliminate, the amount of smoke and other pollutants that are generated. Large quantities of dark smoke indicate problems and inefficiencies with the combustion process and the generation of pollutants. Keep records of how much and what waste was burned, how the waste was loaded into the 'metal basket', the amount of smoke and bottom ash generated, how the fire was started and any other information that would help remind the operator of what worked well, and what didn't. These records would also assist the Department of Environment or other regulatory agencies if they were to receive complaints of nuisance smoke.

The operation of incinerators should be monitored using on-line instruments capable of continuously measuring the combustion process and stack emissions. The most basic measurement associated with the combustion process is temperature in both the primary and secondary burn chambers. Temperature readings outside of the normal range can warn the operator that the system is not working properly. Carbon monoxide and oxygen levels in the burn chambers are also useful indicators of combustion efficiency. In-stack monitoring provides the operator with information on the combustion process and on pollutants being released to the environment. A continuous opacity monitor can be installed in incinerator stacks to monitor emissions quantity. Additional in-stack sampling and monitoring (i.e. hydrogen chloride, dioxins, furans, mercury) may be required depending upon the type and quantity of waste being incinerated. Each process and in-stack monitor should be equipped with visible and audible alarms to warn operators of poor incinerator operation.

Written records should be kept by incinerator operators of what waste is burned, when and how much. Other record keeping requirements may include:

- Operating data including readings from the process and emissions monitoring instruments.
- Weather conditions (i.e. air temperature and wind speed) at the time the incinerator is being operated.
- Repairs and maintenance performed on the incinerator and monitoring instruments.
- Major changes in operation.
- Quantity, condition and disposal location of the collected bottom ash.
- Operator training.

Records should be maintained on-site throughout the operational life of the facility and be made available to Inspectors and other regulatory officials upon request.

3.8 Operator Training

The cornerstone of ensuring proper and safe operation of any equipment is operator training. Facility owners must ensure qualified operators are available and have been properly trained to operate the equipment under both normal and emergency conditions. This will help to ensure the continued operation and maintenance of the equipment and facility, protection of the environment and the continued health and safety of the operator and nearby people. In particular, operators of incinerators should be trained in the following areas:

- Physical and mechanical features of the equipment and facility.
- Operation and trouble-shooting procedures.
- Environmental and safety concerns related to operation of the facility.
- Spill and fire emergency response procedures.
- Emergency and accident reporting procedures including the NWT/Nunavut 24-Hour Spill Report Line at (867) 920-8130.

Every incinerator manufacturer has its own approach to designing and building incinerators. Operators should be qualified and trained to safely operate the specific make and model of incinerator they are expected to operate.

The Application of Burning and Incineration

The Department of Environment does not promote or endorse the burning and incineration of solid waste. This method of waste management should be implemented only once the owner or operator has made reasonable and determined efforts to implement sound waste management planning. Opportunities to reduce or eliminate the need for burning and incineration through changes in purchasing practices, reuse, recycling, segregation and diversion, and other changes or emission control upgrades that would result in emission reductions, must be reviewed periodically and implemented where practical. This includes waste being kept dry to maximize combustion efficiency and operators being trained in the safe operation of the equipment. Refer to section 3 for additional information on best management practices.

This section provides guidance on the application of burning and incineration of solid waste. Four source categories have been identified including municipalities, traditional camps, field camps and commercial camps. The burning and incineration of solid waste may also be controlled through permits and licenses issued by Nunavut's co-management boards, Indian and Northern Affairs Canada and other regulatory agencies. These permits and licenses must be complied with at all times.

4.1 Municipalities

The burning of unsegregated, or mixed, solid waste within a municipality by open burning or using a modified burn barrel must not occur under any circumstances. Today's household garbage contains many materials which, when burned at low temperature, release high levels of particulates, acid gases, heavy metals, carbon monoxide, dioxins, furans and other chemicals, some of which may cause cancer.

Segregated municipal solid waste that is conditionally suitable for open burning include paper products, paperboard packing and untreated wood waste only. Refer to section 3.2 for further information on what waste can and cannot be burned. This open burning may only take place when the following conditions are met:

- The paper, paperboard packing and untreated wood waste is segregated from other waste and burned in a controlled manner and at a site which is separate from the working landfill or other combustible materials so the fire cannot spread to adjacent areas.
- The waste is kept dry or covered to the extent practicable prior to burning.
- Burning takes place only on days when winds are light and blowing away from the community.
- Waste is burned in manageable volumes so the open fire does not get out of control.
- The fire is started and attended at all times by authorized and qualified municipal personnel.
- Where applicable, authority to burn is first obtained from the municipality or other regulatory agencies.

Written records of open burning should be maintained by the municipality. These record what was burned, when and how much, location, weather conditions at the time and any other relevant information that would help remind the operator of what worked well, and what didn't. These records are to be made available for review upon request by an Inspector.

Bottom ash from the open burning of paper, paperboard packing and untreated wood waste is suitable for burial in an approved landfill site. Refer to section 3.6 for further information on the management of bottom ash.

4.2 Traditional Camps and Field Camps

For the purposes of the Guideline, a **traditional camp** is a temporary or seasonal camp used primarily for camping, hunting, fishing or other traditional or cultural activities. A **field camp** is a temporary, seasonal or multi-year facility consisting of tents or other similar structures with a capacity of 15 people or less and which has been established for research, commercial or industrial purposes.

Food and food packaging waste make up a significant portion of the kitchen garbage produced at a traditional or field camp. This waste is a powerful attractant for animals and must be segregated daily and stored in wildlife-proof containers for frequent removal to an approved disposal site. Where it is impractical to dispose of this waste in a municipal or industrial landfill, a properly constructed and operated modified burn barrel can be used to burn wood waste, food waste, food packaging and natural fiber textiles. Noncombustible items and items that may explode or cause toxic fumes such as empty aerosol cans, kitchen cleaning powders and sprays, treated or painted wood and batteries must not be burned. Refer to section 3.2 for further information on what waste can and cannot be burned in a modified burn barrel.

Modified burn barrels are able to achieve higher burn temperatures and produce less smoke than open burning when they are properly constructed and operated. Below are some easy-to-do actions to ensure modified burn barrels are used safely, waste is burned to the greatest extent possible and odours are reduced.

- Inspect the equipment for signs of leakage, corrosion or other physical defects before each burn cycle. Any necessary repairs must be completed before the equipment is used.
- Do not overfill the 'metal basket' as air will be unable to mix properly with the waste. The result will be a smouldering, low temperature burn and a lot of smoke. Burn often if a large quantity of waste is generated.
- Burn only dry waste. If wet waste must be burned, mix or batch the waste with other waste that has a low moisture content and high heating value (i.e. dry wood). This will help ensure the slow-burning wet fuel is completely burned. Carefully adding wet waste to an already hot fire or layering slow burning waste with fast burning waste will also help ensure the complete combustion of all waste.
- Burn only combustible waste. Burning non-combustible waste (i.e. metal, glass, wire) will rob the fire of valuable heat. Non-combustible and other waste that cannot be burned should be segregated and removed from the site for disposal on a regular basis.
- Locate the modified burn barrel in a place predominantly downwind of the camp site or burn only on days when the wind is blowing away from the camp.
- Ensure the modified burn barrel is located on gravel, rocky outcrop or other area free of combustible materials and vegetation to avoid accidently starting a tundra fire.
- A modified burn barrel should not be used unless a responsible adult is available to monitor and watch over it until the fire has completely cooled.

Appendix 2 provides detailed construction drawings for a modified burn barrel. The Department of Environment will consider other designs if they provide an equivalent level of environmental protection.

Records should be maintained on how much and what waste is burned, how waste was loaded into the burn chamber, how the fire was started and other information that would help remind the operator of what worked well, and what didn't. These records are to be made available for review upon request by an Inspector.

Bottom ash from the burning of paper, paperboard packing, untreated wood waste, food waste, food packaging and natural fiber textiles in a modified burn barrel is suitable for burial in a designated pit or municipal landfill site. Consent to use the landfill should first be obtained from the local government. Because food waste is often wet or frozen, it may not be completely burned the first time. The ash should be re-mixed with dry waste if food scraps remain and burned again to ensure buried ash does not attract animals. Bottom ash must be completely cooled before it can be safely handled and disposed of. Refer to section 3.6 for further information on the management of bottom ash.

4.3 Commercial Camps

For the purpose of the Guideline, a **commercial camp** is a temporary, seasonal or multi-year facility with a capacity greater than 15 people and which has been established for research, commercial or industrial purposes (i.e. mineral, oil and gas exploration and development, scientific research). A commercial camp does not include a traditional camp or field camp.

Commercial camps generally produce a wide range of solid waste materials. These include paper and wood products, kitchen waste including food scraps and packaging, construction and demolition debris, batteries, tires, waste fuel, used lubricating oil, hydrocarbon contaminated soil and absorbent materials and many others. Many camps are remote while some are large, multi-year facilities producing a significant volume of waste over their operational life. For these reasons, camp operators may choose to manage waste on-site, rather than transporting the large quantities of waste to a commercial waste disposal facility or pre-existing approved landfill. Whatever method is chosen, the waste must be segregated daily and stored in wildlife-proof containers in order to reduce human-wildlife interactions.

A dual-chamber controlled air incinerator must be used if waste is to be burned on-site at commercial camps[5]. Use of a modified burn barrel is not acceptable because of the quantity of combustible waste normally produced. Incinerators must be designed and sized for the type and quantity of waste to be managed. Manufacturer's operating instructions must be followed at all times to ensure designed temperature, holding time and turbulence conditions are achieved and to avoid damage to the facility. When operating during winter months, care must be taken because cold air introduced into the primary and secondary chambers may make it difficult for normal operating temperatures to be achieved. Operators must be properly trained and qualified to operate the equipment under both normal and emergency conditions. Camp owners are strongly encouraged to consult system manufacturers or other qualified persons with expertise before purchasing an incinerator.

[5] Equipment that differs from the recommended technologies will be considered if it can be demonstrated to provide an equivalent level of environmental protection.

Additional guidance on the selection of incinerator technologies and their operational requirements can be obtained by referring to Environment Canada's *Technical Document for Batch Waste Incineration,* which is available at http://www.ec.gc.ca/gdd-mw/default.asp?lang=En&n=F53EDE13-1.

Although a wide range of wastes can be destroyed using high temperature incineration, determined efforts must be made to reduce the quantity and type of waste generated and to implement other changes which would result in reductions in air emissions. Refer to section 3.2 for further information on what waste can and cannot be burned.

The installation and operation of monitoring and control systems is critical for the proper and safe operation of an incinerator. Key operational parameters must be monitored using on-line instruments capable of continuously measuring the combustion process and stack emissions quality. These instruments should be equipped with visible and audible alarms and be on-line whenever the incinerator is in operation, including 'start-up' and 'cool down' phases. Table 3 lists the monitoring and control systems required for an incinerator. Requirements differ based upon the quantity of waste expected to be burned[6].

Table 3. Incinerator Monitoring and Control Systems

System Description	Quantity of Waste Burned	
	Less than 26 Tonnes per Year	Greater than 26 Tonnes per Year
Weight and composition of feedstock waste on a batch basis	✓	✓
Temperature in the primary and secondary chambers	✓	✓
Opacity in the stack	✓	✓
Oxygen and carbon monoxide in the primary and secondary chambers		✓
Hydrogen chloride, dioxins and furans in the stack[7]	✓	✓

Monitoring and control data should be recorded each time a burn cycle is completed. Records are to be maintained for the operational life of the incinerator and made available for review upon request by an Inspector.

Bottom ash and other solid residue collected from the incinerator is suitable for burial where it meets the criteria set out in section 3.2 of the *Environmental Guideline for Industrial Waste Discharges* or in accordance with land use permits and water licenses issued by Nunavut's co-management boards and Indian and Northern Affairs Canada. Where bottom ash meets the criteria and is to be disposed of into a municipal landfill, the quantity transported off-site must be recorded and the consent of the local municipal government first be obtained. Bottom ash not meeting the criteria set out in section 3.2 of the *Environmental Guideline for Industrial Waste Discharges* is considered to be a hazardous waste and must be managed in accordance with the *Environmental Guideline for the General Management of Hazardous Waste*.

[6] The CCME Canada-Wide Standard for Dioxins and Furans Emissions from Waste Incinerators and Coastal Pulp and Paper Boilers (2001) established a criterion of 26 tonnes per year to distinguish between a 'small facility' and 'large facility' incinerator.
[7] Stack sampling for hydrogen chloride, dioxins and furans must be conducted annually if incinerator feedstock includes organic compounds that contain chlorine (i.e. chlorinated solvents and plastics, PVC piping and marine driftwood).

Conclusion

This is a general introduction to the practice of burning and incinerating solid waste. It is not intended to promote or endorse the practice but to provide the reader with information on the risks, hazards and best management practices associated with this activity. It also provides specific guidance on the application of burning and incinerating solid waste should this practice be undertaken by municipalities and operators of traditional, field and commercial camps.

Familiarity with the Guideline does not replace the need for the owner or person in charge, management or control of the solid waste to comply with all applicable federal and territorial legislation and municipal by-laws. The burning and incineration of solid waste may be controlled through permits and licenses issued by Nunavut's co-management boards, Indian and Northern Affairs Canada and other regulatory agencies. These permits and licenses must be complied with at all times.

For additional information on the management of solid waste, or to obtain a complete listing of available guidelines, contact the Department of Environment at:

Environmental Protection Division
Department of Environment
Government of Nunavut
Inuksugait Plaza, Box 1000, Station 1360
Iqaluit, Nunavut, X0A 0H0

Phone: (867) 975-7729
Fax: (867) 975-7739
Email: EnvironmentalProtection@gov.nu.ca
Website: http://env.gov.nu.ca/programareas/environmentprotection

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APPENDICES

APPENDIX 1 - *ENVIRONMENTAL PROTECTION ACT*

The following are excerpts from the *Environmental Protection Act*

1. "Contaminant" means any noise, heat, vibration or substance and includes such other substance as the Minister may prescribe that, where discharged into the environment,
   (a) endangers the health, safety or welfare of persons,
   (b) interferes or is likely to interfere with normal enjoyment of life or property,
   (c) endangers the health of animal life, or
   (d) causes or is likely to cause damage to plant life or to property;

   "Discharge" includes, but not so as to limit the meaning, any pumping, pouring, throwing, dumping, emitting, burning, spraying, spreading, leaking, spilling, or escaping;

   "Environment" means the components of the Earth and includes
   (a) air, land and water,
   (b) all layers of the atmosphere,
   (c) all organic and inorganic matter and living organisms, and
   (d) the interacting natural systems that include components referred to in paragraphs (a) to (c).

   "Inspector" means a person appointed under subsection 3(2) and includes the Chief Environmental Protection Officer.

2.2 The Minister may
   (a) establish, operate and maintain stations to monitor the quality of the environment in the Territories;
   (b) conduct research studies, conferences and training programs relating to contaminants and to the preservation, protection or enhancement of the environment;
   (c) develop, co-ordinate and administer policies, standards, guidelines and codes of practice relating to the preservation, protection or enhancement of the environment;
   (d) collect, publish and distribute information relating to contaminants and to the preservation, protection or enhancement of the environment:

3. (1) The Minister shall appoint a Chief Environmental Protection Officer who shall administer and enforce this Act and the regulations.

   (2) The Chief Environmental Protection Officer may appoint inspectors and shall specify in the appointment the powers that may be exercised and the duties that may be performed by the inspector under this Act and regulations.

5. (1) Subject to subsection (3), no person shall discharge or permit the discharge of a contaminant into the environment.

   (3) Subsection (1) does not apply where the person who discharged the contaminant or permitted the discharge of the contaminant establishes that
   (a) the discharge is authorized by this Act or the regulations or by an order issued under this Act or the regulations;
   (b) the contaminant has been used solely for domestic purposes and was discharged from within a dwelling house;
   (c) the contaminant was discharged from the exhaust system of a vehicle;

(d) the discharge of the contaminant resulted from the burning of leaves, foliage, wood, crops or stubble for domestic or agricultural purposes;
(e) the discharge of the contaminant resulted from burning for land clearing or land grading;
(f) the discharge of the contaminant resulted from a fire set by a public official for habitat management of silviculture purposes;
(g) the contaminant was discharged for the purposes of combating a forest fire;
(h) the contaminant is a soil particle or grit discharged in the course of agriculture or horticulture; or
(i) the contaminant is a pesticide classified and labelled as "domestic" under the *Pest Control Products Regulations* (Canada).

(4) The exceptions set out in subsection (3) do not apply where a person discharges a contaminant that the inspector has reasonable grounds to believe is not usually associated with a discharge from the excepted activity.

5.1. Where a discharge of a contaminant into the environment in contravention of this Act or the regulations or the provisions of a permit or license issued under this Act or the regulations occurs or a reasonable likelihood of such a discharge exists, every person causing or contributing to the discharge or increasing the likelihood of such a discharge, and the owner or the person in charge, management or control of the contaminant before its discharge or likely discharge, shall immediately:
(a) subject to any regulations, report the discharge or likely discharge to the person or office designated by the regulations;
(b) take all reasonable measures consistent with public safety to stop the discharge, repair any damage caused by the discharge and prevent or eliminate any danger to life, health, property or the environment that results or may be reasonably expected to result from the discharge or likely discharge; and
(c) make a reasonable effort to notify every member of the public who may be adversely affected by the discharge or likely discharge.

6. **(**1) Where an inspector believes on reasonable grounds that a discharge of a contaminant in contravention of this Act or the regulations or a provision of a permit or license issued under this Act or the regulations has occurred or is occurring, the inspector may issue an order requiring any person causing or contributing to the discharge or the owner or the person in charge, management or control of the contaminant to stop the discharge by the date named in the order.

7. (1) Notwithstanding section 6, where a person discharges or permits the discharge of a contaminant into the environment, an inspector may order that person to repair or remedy any injury or damage to the environment that results from the discharge.

(2) Where a person fails or neglects to repair or remedy any injury or damage to the environment in accordance with an order made under subsection (1) or where immediate remedial measures are required to protect the environment, the Chief Environmental Protection Officer may cause to be carried out the measures that he or she considers necessary to repair or remedy an injury or damage to the environment that results from any discharge.

APPENDIX 2 – MODIFIED BURN BARREL DESIGN AND SPECIFICATIONS

A modified burn barrel is constructed from a metal drum or other non-combustible container. The modifications result in greater heat generation and retention, better mixing of the waste with incoming air and longer holding time inside the barrel. Together, these modifications result in more complete combustion of the solid waste than does open burning on the ground or in a pit.

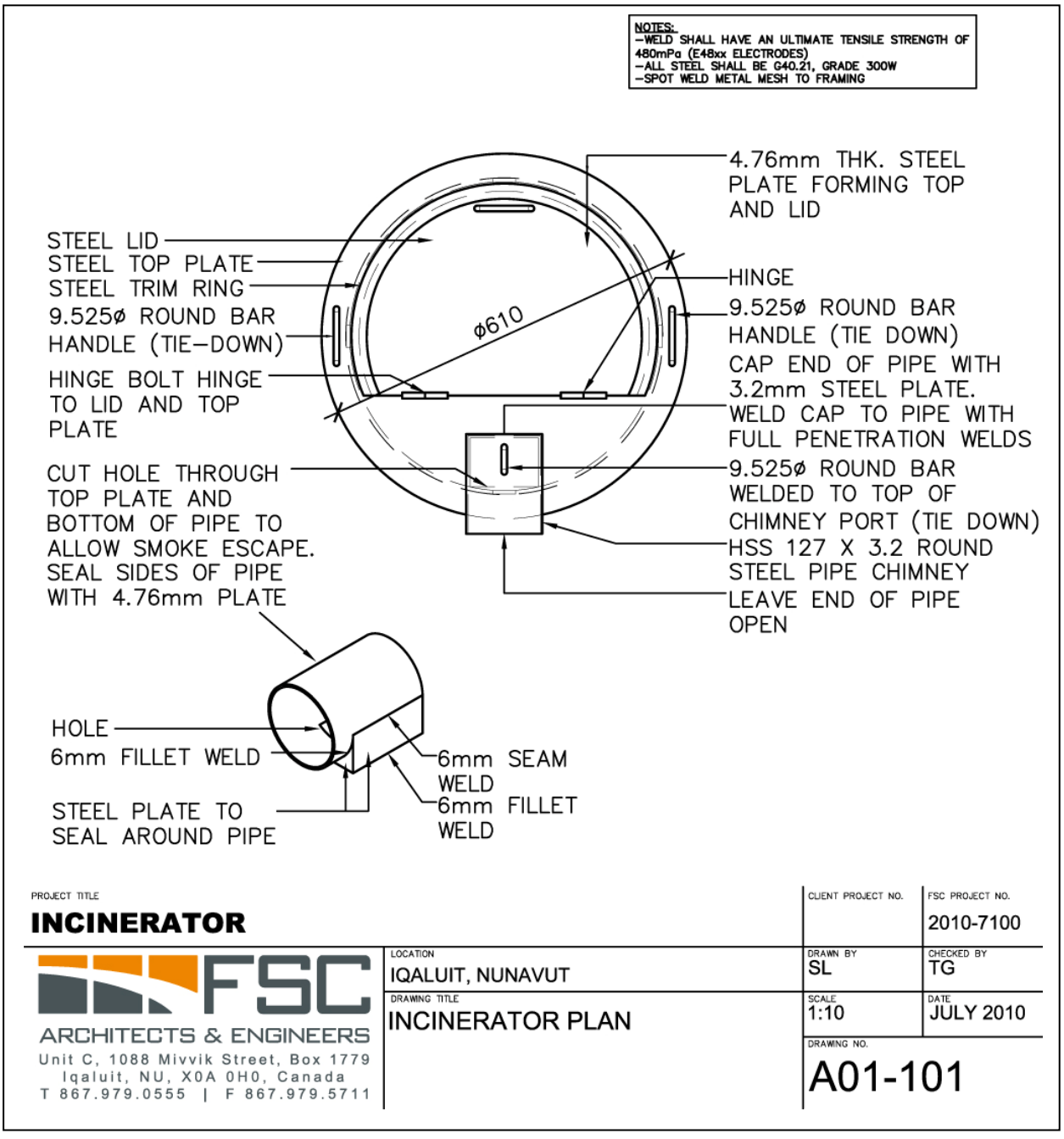
Placing a metal screen over the top of the exhaust pipe may be required to prevent sparks and hot ash from escaping.

A hinged top helps to capture heat and enables easy loading of waste.

A stove pipe attached to the top or side of the barrel allows smoke to escape and creates an effective draft.

A metal basket or grate suspends the burning waste and enables mixing with the incoming air. The removable basket also enables access to any unburned ash that may collect in the bottom of the barrel.

Vents or holes cut above the bottom of the barrel enable fresh air to mix with waste inside the metal basket.


NOTES:
-WELD SHALL HAVE AN ULTIMATE TENSILE STRENGTH OF 480mPa (E48xx ELECTRODES)
-ALL STEEL SHALL BE G40.21, GRADE 300W
-SPOT WELD METAL MESH TO FRAMING
4.76mm THK. STEEL PLATE FORMING TOP AND LID
STEEL LID
STEEL TOP PLATE
STEEL TRIM RING
9.525ø ROUND BAR HANDLE (TIE-DOWN)
HINGE BOLT HINGE TO LID AND TOP PLATE
ø610
HINGE
9.525ø ROUND BAR HANDLE (TIE DOWN)
CAP END OF PIPE WITH 3.2mm STEEL PLATE. WELD CAP TO PIPE WITH FULL PENETRATION WELDS
9.525ø ROUND BAR WELDED TO TOP OF CHIMNEY PORT (TIE DOWN)
HSS 127 X 3.2 ROUND STEEL PIPE CHIMNEY
LEAVE END OF PIPE OPEN
CUT HOLE THROUGH TOP PLATE AND BOTTOM OF PIPE TO ALLOW SMOKE ESCAPE. SEAL SIDES OF PIPE WITH 4.76mm PLATE
HOLE
6mm FILLET WELD
STEEL PLATE TO SEAL AROUND PIPE
6mm SEAM WELD
6mm FILLET WELD
PROJECT TITLE
INCINERATOR
CLIENT PROJECT NO.
FSC PROJECT NO.
2010-7100
FSC
ARCHITECTS & ENGINEERS
Unit C, 1088 Mivvik Street, Box 1779
Iqaluit, NU, X0A 0H0, Canada
T 867.979.0555 | F 867.979.5711
LOCATION
IQALUIT, NUNAVUT
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SL
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DRAWING TITLE
INCINERATOR PLAN
SCALE
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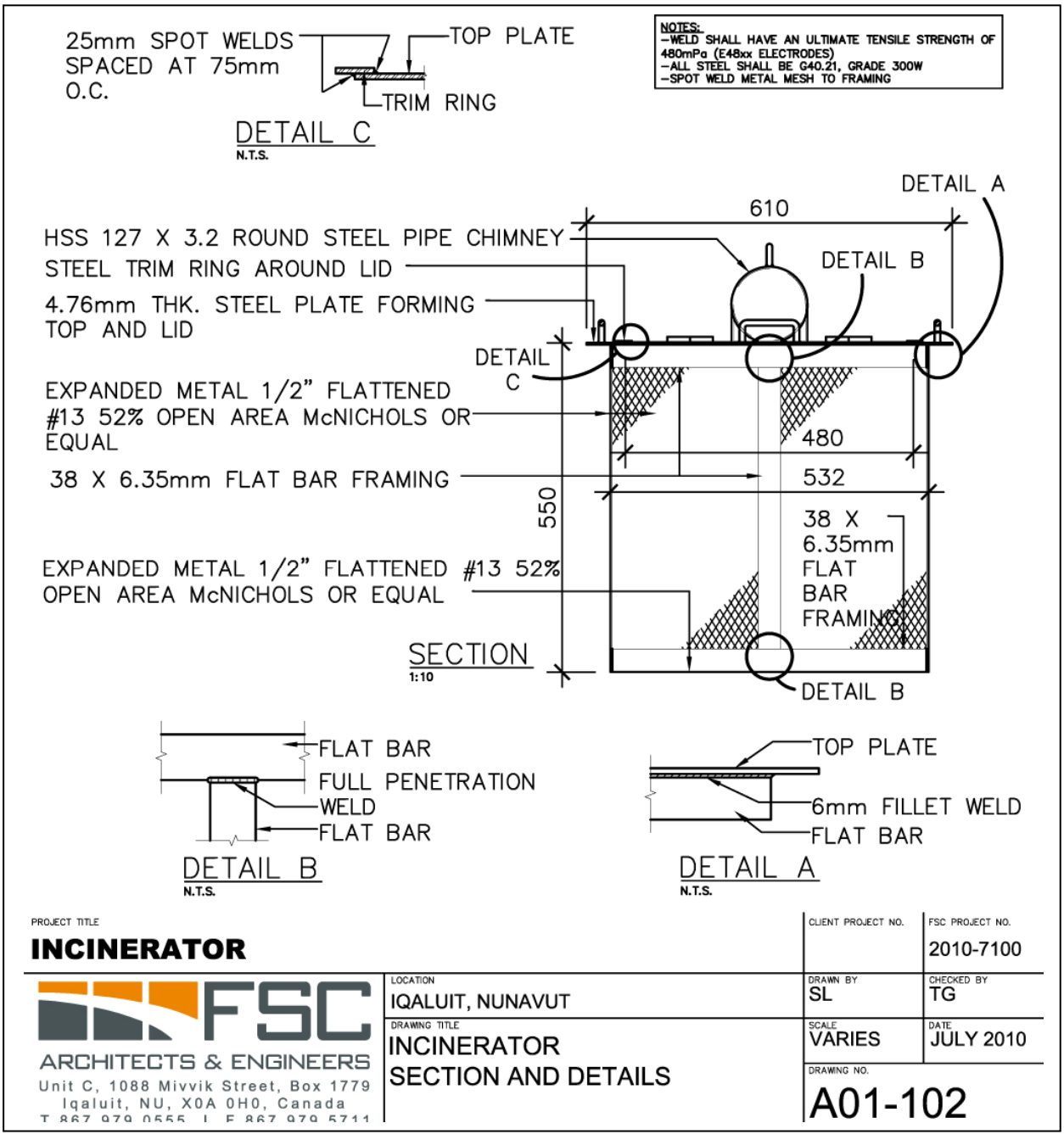
DATE
JULY 2010
DRAWING NO.
A01-101


25mm SPOT WELDS SPACED AT 75mm O.C.
TOP PLATE
TRIM RING
DETAIL C
N.T.S.
NOTES:
-WELD SHALL HAVE AN ULTIMATE TENSILE STRENGTH OF 480mPa (E48xx ELECTRODES)
-ALL STEEL SHALL BE G40.21, GRADE 300W
-SPOT WELD METAL MESH TO FRAMING
DETAIL A
610
HSS 127 X 3.2 ROUND STEEL PIPE CHIMNEY
STEEL TRIM RING AROUND LID
4.76mm THK. STEEL PLATE FORMING TOP AND LID
DETAIL B
DETAIL C
EXPANDED METAL 1/2" FLATTENED #13 52% OPEN AREA McNICHOLS OR EQUAL
480
38 X 6.35mm FLAT BAR FRAMING
532
550
38 X 6.35mm FLAT BAR FRAMING
EXPANDED METAL 1/2" FLATTENED #13 52% OPEN AREA McNICHOLS OR EQUAL
SECTION
1:10
DETAIL B
FLAT BAR
FULL PENETRATION WELD
FLAT BAR
DETAIL B
N.T.S.
TOP PLATE
6mm FILLET WELD
FLAT BAR
DETAIL A
N.T.S.
PROJECT TITLE
INCINERATOR
CLIENT PROJECT NO.
FSC PROJECT NO.
2010-7100
FSC
ARCHITECTS & ENGINEERS
Unit C, 1088 Mivvik Street, Box 1779
Iqaluit, NU, X0A 0H0, Canada
T 867 979 0555 I F 867 979 5711
LOCATION
IQALUIT, NUNAVUT
DRAWN BY
SL
CHECKED BY
TG
DRAWING TITLE
INCINERATOR
SECTION AND DETAILS
SCALE
VARIES
DATE
JULY 2010
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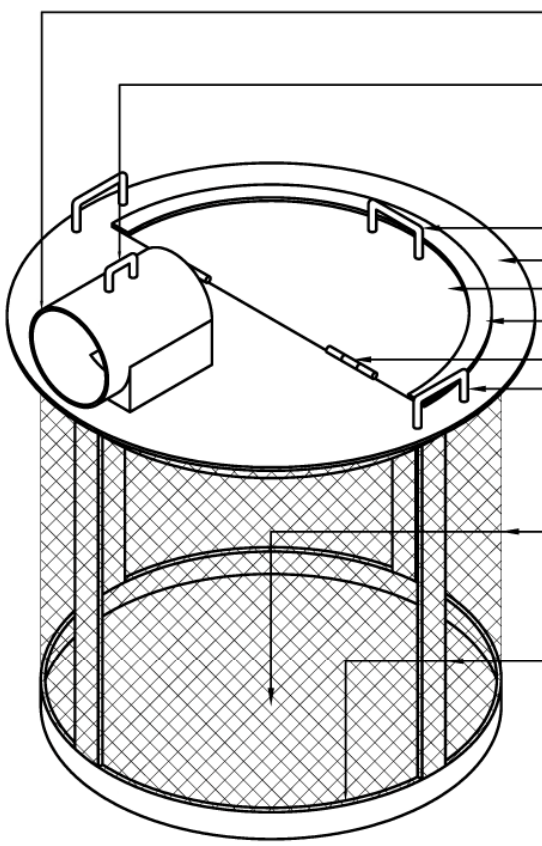
A01-102



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CLIENT PROJECT NO.

FSC PROJECT NO.
2010-7100

FSC
ARCHITECTS & ENGINEERS
Unit C, 1088 Mivvik Street, Box 1779
Iqaluit, NU, X0A 0H0, Canada
T 867.979.0555 | F 867.979.5711

LOCATION
IQALUIT, NUNAVUT

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SL

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APPENDIX V

ENVIRONMENTAL GUIDELINE FOR THE GENERAL MANAGEMENT OF HAZARDOUS WASTE

Environmental Guideline for the

General Management of Hazardous Waste

Department of Environment
Government of Nunavut

GUIDELINE: GENERAL MANAGEMENT OF HAZARDOUS WASTE

Original: April 1999
Revised: January 2002
April 2010
October 2010

This Guideline has been prepared by the Department of Environment's Environmental Protection Division and approved by the Minister of Environment under the authority of Section 2.2 of the *Environmental Protection Act.*

This Guideline is not an official statement of the law and is provided for guidance only. Its intent is to increase the awareness and understanding of the risks and hazards associated with hazardous waste and to assist in its proper management. This Guideline does not replace the need for the owner or person in charge, management or control of a hazardous waste to comply with all applicable legislation and to consult with Nunavut's Department of Environment, other regulatory authorities and qualified persons with expertise in the management of hazardous waste.

Copies of this Guideline are available upon request from:

Department of Environment
Government of Nunavut
P.O. Box 1000, Station 1360, Iqaluit, NU, X0A 0H0
Electronic version of the Guideline is available at http://env.gov.nu.ca/programareas/environmentprotection

Cover Photos: E. Paquin

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Introduction

'Waste' is a term used to describe materials that are no longer wanted or are unusable for their original intended purpose. Many different types of waste are generated each day in Nunavut by industry and small business, hospitals and health centers, schools and individuals during the normal course of carrying out daily activities. Some types of waste pose greater risks than others because of their chemical, physical and biological properties. These wastes are generally referred to as being a 'hazardous waste'. Examples of hazardous waste include discarded paint, used solvents, motor and lubricating oil, cleaning compounds, certain building construction and demolition waste and products with an expired shelf life. They will generally exhibit one or more of the following characteristics - ignitable (i.e. flammable), reactive, corrosive or toxic. Hazardous waste often requires that specific management measures be taken to ensure the health and safety of the environment, workers and the general public.

The purpose of the Environmental Guideline for the General Management of Hazardous Waste (the Guideline) is to ensure the safe, effective and efficient management of hazardous waste in Nunavut. It provides information to generators, carriers and receivers of hazardous waste on its hazards, how best to reduce or eliminate the effects it can have on the environment, worker and public safety and guidance on its storage, registration and transportation.

The *Environmental Protection Act* enables the Government of Nunavut to implement measures that preserve, protect and enhance the quality of the environment. Section 2.2 of the *Act* provides the Minister with authority to develop, coordinate, and administer the Guideline.

The Guideline is not an official statement of the law. For further information and guidance, the owner or person in charge, management or control of a hazardous waste is encouraged to review all applicable legislation and consult the Department of Environment, other regulatory agencies or qualified persons with expertise in hazardous waste management.

1.1 Definitions

Carrier	A person who accepts hazardous waste for transportation or transports hazardous waste, whether or not for hire or reward. A carrier is also referred to as a transporter of hazardous waste.
Commercial	Actions undertaken for hire or reward.
Commissioner's Land	Lands that have been transferred by Order-in-Council to the Government of Nunavut. This includes roadways and land subject to block land transfers. Most Commissioner's Land is located within municipalities.
Consignee	A person to whom hazardous waste is being or is intended to be transported. A consignee is also referred to as a receiver of hazardous waste.

Consignor	A person who has possession of hazardous waste immediately before it is transported. A consignor may also be a generator of hazardous waste.
Contaminant	Any noise, heat, vibration or substance and includes such other substance as the Minister may prescribe that, where discharged into the environment, (a) endangers the health, safety or welfare of persons, (b) interferes or is likely to interfere with normal enjoyment of life or property, (c) endangers the health of animal life, or (d) causes or is likely to cause damage to plant life or to property.
Dangerous Good	Any product, substance or organism included by its nature or by the *Transportation of Dangerous Goods Regulations* in any of the classes listed in the Schedule provided in the *Transportation of Dangerous Goods Act* (Canada).
Empty Container	A container that previously held a hazardous waste and has been emptied to the greatest extent practical or triple rinsed with an appropriate cleaning agent. This does not include containers that previously contained mercury or Class 2.3, 5.1 or 6.1 materials.
Environment	Means the components of the Earth and includes (a) air, land and water, (b) all layers of the atmosphere, (c) all organic and inorganic matter and living organisms, and (d) the interacting natural systems that include components referred to in paragraphs (a) to (c) above.
Generator	The owner or person in charge, management or control of a hazardous waste at the time it is generated or a facility that generates a hazardous waste. A generator may also be a consignor of hazardous waste.
Hazardous Waste	A contaminant that is a dangerous good and is no longer wanted or is unusable for its original intended purpose and is intended for storage, recycling, treatment or disposal. A hazardous waste does not include a contaminant that is (a) household in origin; (b) exempted as a small quantity; (c) returned directly to a manufacturer or supplier of the product, substance or organism for reprocessing, repackaging or resale for any reason; (d) an empty container; or (e) intended for disposal in a landfill or a sewage treatment facility and meets the applicable standards set out in the Environmental Guideline for Industrial Waste Discharges.

Hazardous Waste Management Facility	A commercial facility used for the collection, storage, transfer, treatment, recycling or disposal of a hazardous waste. For clarity, a hazardous waste management facility does not include a municipal landfill or sewage lagoon.
Incompatible Hazardous Waste	A hazardous waste that, when in contact with another substance or hazardous waste under normal circumstances, reacts to produce heat, gas, fire, explosion or a corrosive or toxic substance.
Landfilling	The intentional depositing or placement of waste in or on land for the purposes of disposal.
Long-term Storage	The storage of hazardous waste for a period of 180 days or more.
Manifest	The manifest as set out in Schedule IX to the *Export and Import of Hazardous Waste and Hazardous Recyclables Regulations* under the *Canadian Environmental Protection Act* (Canada).
Minister	The Minister of Environment of the Government of Nunavut.
Qualified Person	A person who has an appropriate level of knowledge and experience in all relevant aspects of hazardous waste management.
Receiver	A person to whom hazardous waste is being or is intended to be transported. A receiver is also referred to as a consignee of hazardous waste.
Responsible Party	The owner or person in charge, management or control of the hazardous waste.
Small Quantity	Hazardous waste that is generated in an amount that is less than five kilograms per month if a solid or less than five litres per month if a liquid, and where the total quantity accumulated at any one time does not exceed five kilograms or five litres. This does not include hazardous waste that is mercury or Class 2.3, 5.1 or 6.1 materials. These wastes must be generated in an amount that is less than one kilogram per month if a solid or less than one litre per month if a liquid, and where the total quantity accumulated at any one time does not exceed one kilogram or one litre.
Transport Authority	The statute and regulations controlling the management of hazardous waste under that mode of transport. These include (a) Road and Rail - *Transportation of Dangerous Goods Act* (Canada) and *Regulations; Interprovincial Movement of Hazardous Waste Regulations* (CEPA) and *Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations* (CEPA). (b) Air – *International Air Transport Association (IATA) Dangerous Goods Regulations* and *International Civil Aviation Organization* (ICAO) *Technical Instructions;* and

(c) Marine – *International Maritime Dangerous Goods Code* (IMDG).

Transfer	The temporary storage of hazardous waste for a period of 179 days or less for the purpose of changing from one vehicle or means of transportation to another.
Transporter	A person who accepts hazardous waste for transportation or transports hazardous waste, whether or not for hire or reward. A transporter is also referred to as a carrier of hazardous waste.
Waste Audit	An inventory or study of the amount and type of waste that is produced at a location.

1.2 Roles and Responsibilities

1.2.1 Environmental Protection Division

The Environmental Protection Division of the Department of Environment is the key environmental agency responsible for ensuring the proper management of hazardous waste and other contaminants on Commissioner's Land. Authority is derived from the *Environmental Protection Act*, which prohibits the discharge of contaminants to the environment and enables the Minister to undertake actions to ensure appropriate management measures are in place. Although programs and services are applied primarily to activities taking place on Commissioner's and municipal lands and to Government of Nunavut undertakings, the *Environmental Protection Act* may be applied to the whole of the territory where other controlling legislation, standards and guidelines do not exist. A complete listing of relevant legislation and guidelines can be obtained by contacting the Department of Environment or by visiting the web site at http://env.gov.nu.ca/programareas/environmentprotection.

The Department of Environment will provide advice and guidance on the proper management of hazardous waste. However, it remains the responsibility of the owner or person in charge, management or control of the hazardous waste to ensure compliance with all applicable statutes, regulations, standards, guidelines and local by-laws.

1.2.2 Generators of Hazardous Waste

The generator is the owner or person in charge, management or control of the hazardous waste at the time it is produced or of the facility that produces the hazardous waste. The generator is responsible for any and all hazardous waste produced and must ensure the hazardous waste is properly and safely managed from the time it is generated to its final disposal. This is referred to as managing the waste from cradle-to-grave.

Contractors may manage hazardous waste on behalf of the generator. However, the generator remains responsible for determining whether the waste is hazardous and ensuring the method of management complies with all applicable statutes, regulations, standards, guidelines and local by-laws. If the contractor does not comply with the requirements of the *Environmental Protection Act* and is charged with a violation while managing the waste, the generator may also be held liable.

The basic responsibilities of a hazardous waste generator in Nunavut are:

- Registering with the Department of Environment as a generator of hazardous waste.
- Registering the facility with the Department of Environment as a hazardous waste management facility where the facility is used for commercial purposes and is intended for the storage of hazardous waste for a period of 180 days or more, where stored quantities exceed the criteria set out in Appendix 8 or where hazardous waste is recycled, treated or disposed of in quantities in any single month that exceed a 'small quantity'.
- Classifying and labeling hazardous waste in accordance with the Transport Authority.
- Managing the hazardous waste in accordance with the Guideline, *Environmental Protection Act, Fire Prevention Act*, *Safety Act, Public Health Act* and all other applicable statutes, regulations, standards, guidelines and local by-laws.
- Reusing, recycling, treating or disposing of the hazardous waste in a proper and safe manner.
- Where the hazardous waste is transported off-site, completing Part A of the waste manifest form and retaining a copy for two years, using a registered hazardous waste carrier to transport the waste and sending the waste to a registered receiver or hazardous waste management facility.
- Ensuring staff are trained and qualified to safely handle the hazardous waste.
- Filing a spill contingency plan with the Minister where stored quantities of hazardous waste exceed the criteria set out in Schedule A of the *Spill Contingency Planning and Reporting Regulations*.
- Reporting any spill immediately to the NWT/Nunavut Spill Report Line at (867) 920-8130.

Further information and application forms for registering as a generator or a hazardous waste management facility are available from the Department of Environment. Refer to sections 3.2.1 and 3.2.2 and Appendices 4 and 7 for further information.

1.2.3 Carriers of Hazardous Waste

Hazardous waste must be transported in accordance with the appropriate Transport Authority: Road and Rail - *Transportation of Dangerous Goods Act* (Canada) and *Regulations, Interprovincial Movement of Hazardous Waste Regulations* (CEPA) and *Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations* (CEPA)*;* Air – *International Air Transport Association (IATA) Dangerous Goods Regulations* and *International Civil Aviation Organization* (ICAO) *Technical Instructions;* and Marine – *International Maritime Dangerous Goods Code* (IMDG).

Carriers operating in Nunavut must be registered with the Department of Environment before transporting hazardous waste. Other basic responsibilities of hazardous waste carriers are:

- Placarding and labeling all transport vehicles and containers in accordance with the appropriate Transport Authority.
- Completing Part B of the waste manifest form and retaining a copy for two years.
- Accepting hazardous waste only from registered generators and safely transporting hazardous waste only to a registered receiver or hazardous waste management facility.
- Ensuring staff are trained and qualified to safely transport hazardous waste.
- Reporting any spill immediately to the NWT/Nunavut Spill Report Line at (867) 920-8130.

Further information and application forms for registering as a hazardous waste carrier are available from the Department of Environment. Refer to section 3.2.1 and Appendix 5 for further information.

1.2.4 Receivers of Hazardous Waste

Any person receiving or accepting hazardous waste in Nunavut for the purpose of storage, transfer, reuse, recycling, treatment or disposal must be registered with the Department of Environment as a hazardous waste receiver. The facility must also be registered as a hazardous waste management facility where it is used for commercial purposes and is used to store hazardous waste for a period of 180 days or more, store quantities that exceed the criteria set out in Appendix 8 or hazardous waste is recycled, treated or disposed of in quantities in any single month that exceed a 'small quantity'. Other basic responsibilities of hazardous waste receivers in Nunavut are:

- Handling and storing the hazardous waste in accordance with the Guideline, *Environmental Protection Act, Fire Prevention Act*, *Safety Act, Public Health Act* and all other applicable statutes, regulations, standards, guidelines and local by-laws.
- Reusing, recycling, treating or disposing of the hazardous waste in a proper and safe manner.
- Completing Part C of the waste manifest form and retaining a copy for two years.
- Accepting hazardous waste only from registered generators and carriers.
- Ensuring staff are trained and qualified to safely handle hazardous waste.
- Filing a spill contingency plan with the Minister where stored quantities of hazardous waste exceed the criteria set out in Schedule A of the *Spill Contingency Planning and Reporting Regulations*.
- Reporting any spill immediately to the NWT/Nunavut Spill Report Line at (867) 920-8130.

Further information and application forms for registering as a receiver or hazardous waste management facility are available from the Department of Environment. Refer to sections 3.2.1 and 3.2.2 and Appendices 6 and 7 for further information.

1.2.5 Other Regulatory Agencies

Other regulatory agencies may have to be consulted regarding the management of hazardous waste as there may be other environmental or public and worker health and safety issues to consider. Some of the other agencies include:

Department of Economic Development and Transportation

The Motor Vehicles Division is responsible for ensuring the safe transport of hazardous waste and other dangerous goods by road through administration of the *Transportation of Dangerous Goods Act*. The Department is also responsible under the *Motor Vehicles Act* for driver licensing and various other vehicle and load safety matters.

Workers' Safety and Compensation Commission

The Workers' Safety and Compensation Commission is responsible for promoting and regulating worker and workplace health and safety in Nunavut. The Commission derives its authority from the *Workers' Compensation Act* and *Safety Act* which require an employer to maintain a safe workplace and ensure the safety and well being of workers. The Workplace Hazardous Materials Information System, or WHMIS, requires information be provided to workers on the safe use of any hazardous material used in the workplace. All hazardous waste generators, carriers and receivers should consult the Prevention Services Division for further information and guidance.

Department of Community and Government Services

The Department of Community and Government Services is responsible under the *Commissioners' Lands Act* for the issuance of land leases, reserves, licenses and permits on Commissioner's Lands. The Department, in cooperation with communities, is also responsible for the planning and funding of municipal solid waste and sewage disposal facilities in most Nunavut communities. Emergency planning responsibilities under the *Emergency Measures Act* include developing territorial emergency response plans, coordinating emergency operations at the territorial and regional levels and supporting community emergency response operations.

The Office of the Fire Marshal is responsible for ensuring the safe storage, handling and use of flammable and combustible liquids and materials. The Office of the Fire Marshal derives its authority from the *Fire Prevention Act*, National Fire Code and National Building Code.

Department of Health and Social Services

Activities related to the generation, storage, transportation, treatment and disposal of hazardous waste may have an impact on public health. The Office of the Chief Medical Officer of Health and Regional Environmental Health Officers should be consulted regarding legislated requirements under the *Public Health Act.*

Environment Canada

Environment Canada is responsible under the *Canadian Environmental Protection Act* for ensuring the safe management of designated hazardous waste at federal facilities and on federal lands. The management, disposal and export of polychlorinated biphenyl (PCB) waste is controlled under the *PCB Regulations*, the *Federal Mobile PCB Treatment and Destruction Regulations* and the *PCB Waste Export Regulations*. The interprovincial and international transport of waste is controlled under the *Interprovincial Movement of Hazardous Waste Regulations* and the *Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations*. Environment Canada is also responsible for administering the pollution prevention provisions of the federal *Fisheries Act*.

Indian and Northern Affairs Canada

Indian and Northern Affairs Canada is responsible under the *Territorial Lands Act* and *Nunavut Waters and Nunavut Surface Rights Tribunal Act* for the management of federal lands and waters in Nunavut, including the impact hazardous waste may have on the quality of these lands and waters.

Natural Resources Canada

The *Explosives Act* provides Natural Resources Canada with authority to manage explosives in Canada, including waste explosives. The Canadian Nuclear Safety Commission, which reports to Parliament through the Minister of Natural Resources, administers the safe handling and disposal of radioactive materials and licenses institutions and companies to possess and use radioactive materials under the *Nuclear Safety and Control Act* and *Nuclear Liability Act.*

Local Municipal Governments

The role of municipal governments is important in the proper local management of hazardous waste. Under the Nunavut Land Claim Agreement, municipalities are entitled to control their own municipal disposal sites. Hazardous waste may be deposited into municipal landfill sites and sewage treatment facilities only with the consent of the local government. Local environmental and safety standards are determined, in part, by how the property is designated under municipal government development plans (i.e. land use zoning). The local fire department may also be called upon if a fire or other public safety issue is identified.

Co-management Boards and Agencies

Co-management boards and agencies established under the Nunavut Land Claim Agreement have broad authority for land use planning, impact assessment and the administration of land and water. Activities involving hazardous waste may be controlled through the setting of terms and conditions in plans, licenses and permits issued by the Nunavut Water Board and other co-management boards and agencies.

Appendix 3 provides further assistance in determining the primary regulatory agency contact for managing hazardous waste in Nunavut.

Appendix 11 provides mailing addresses, phone and fax numbers for each of the regulatory agencies.

Management of Hazardous Waste

2.1 What is Hazardous Waste?

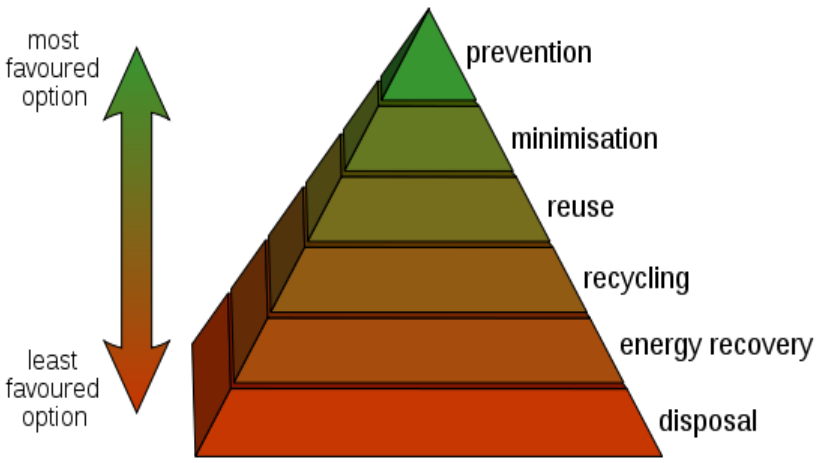
Hazardous waste is unwanted material or products that can cause illness or death to people, plants and animals. It may be a liquid, solid, sludge or gas and contain chemicals, heavy metals, radioactives, infectious organisms or other toxic substances. It may be a single product or a combination of many hazardous and non-hazardous materials (i.e. mixed waste). Its harmful effects may exist for a relatively short period of time (i.e. oil-based paint before hardening) or continue for hundreds of years. It can persist in soil, water and sediment (i.e. radioactive materials) or bioaccumulate in plants and animals (i.e. mercury, PCBs).

Hazardous waste is generated by everybody. Households commonly generate unwanted gasoline, brake and windshield wiper fluid, cleaning supplies, paints and paint thinners, lead acid batteries, used computer equipment and construction materials (i.e. asbestos), pesticides and others. Hospitals and nursing stations generate unwanted needles and waste human tissue, body fluids and biotic cultures. Business and industry generate many different types of hazardous waste including used motor and lubricating oil, cleaning solvent, drilling fluid and cuttings and mine tailings.

2.2 Waste Management

Proper waste management simply makes good sense. Minimizing or eliminating the generation of hazardous and other waste helps to reduce the hazards and costs associated with its handling, storage, transport, recycling, treatment and disposal. It also reduces the impacts waste could have on the environment, human and worker health and safety and reduces the global emission of greenhouse gases by minimizing the use of raw materials. Another term commonly used to describe activities that reduce the amount of material entering a waste stream or being released to the environment is 'pollution prevention'.

Once a waste is created, the generator is responsible for its safe management from cradle-to-grave. Waste generators can prevent pollution and reduce costs by implementing various waste reduction, reuse and recycling programs through changes to operational procedures, maintenance practices and raw material use. Treating and disposing of waste either locally or outside of Nunavut should be considered only if reuse and recycling options are not available or practical.



2.2.1 Reduce and Minimize – the first option

Using raw materials efficiently and reducing the amount of waste generated is the first and most important step in effective waste management. Both environmentally and economically, consuming less is the most fundamental and effective step to reducing waste.

A waste audit should be undertaken to inventory and study the waste produced at a location or business. The audit should identify the type and amount of waste being generated, the costs of current management methods including handling, storage, treatment, transport and disposal, and examine opportunities and set targets for reducing or reusing waste. These opportunities include awareness and education, the substitution or reduction of purchased raw materials, production redesign, process changes and improved maintenance activities. Other opportunities include purchasing products that are durable or are manufactured from environmentally-friendly materials (i.e. biodegradable or post-consumer materials), avoiding products that are designed for single or short life usage and buying only the quantity that is needed. Effective communications is critical to the success of any waste reduction program.

2.2.2 Reuse and Recycle

Even with effective waste reduction measures in place there will be waste generated. Reusing the waste product for a different but related purpose (reuse) or producing a new product from the original material (recycle) is an effective way to reduce the volume of waste. The waste audit should identify whether opportunities are available for reusing or recycling waste within the generating facility. Alternatively, other local or distant users may be found to reuse or recycle the waste that would otherwise require treatment or disposal.

The Department of Environment encourages the reuse and recycling of hazardous and other waste in the following ways:

- Local reuse and recycle programs are available in various communities for some types of hazardous waste including used oil and waste fuel. Generators should contact the Department of Environment or local municipal government for the names of registered waste receivers or other opportunities to reuse or recycle wastes locally.
- Waste exchanges and associations offer opportunities for waste generators to transfer unwanted, overstocked, obsolete, damaged, contaminated and post-dated material to another person or company that can use it. In some cases, the receiving company will purchase the waste from the generator. Appendix 10 provides a listing of several waste exchanges and associations in Canada.

2.2.3 Treatment and Disposal in Nunavut

Treatment and disposal of a hazardous waste is the last step in effective waste management and should be undertaken only after all other practical reuse and recycle options have been examined.

Treatment covers a broad spectrum of activities. It includes any method, technique or process that will change the physical, chemical or biological character or composition of a hazardous waste so as to reduce its volume, neutralize or make the waste less hazardous and make it safer to transport or store

prior to its disposal. In some cases, more than one process may be required to treat the waste. Facilities in Nunavut at which hazardous waste is stored, treated, recycled or disposed of for commercial purposes must be registered as a hazardous waste management facility. The owner or operator of a facility should refer to section 3.2.2 and Appendix 7 for further information.

It is a contravention of the *Environmental Protection Act* for hazardous waste to be abandoned or disposed of on land or into water in Nunavut. Although a detailed discussion on specific hazardous waste disposal methods is beyond the scope of the Guideline, the following are general points for consideration:

- Hazardous waste must not be mixed or diluted with another substance, or divided into smaller quantities, simply to avoid meeting the definition of a hazardous waste.
- The generator is responsible for determining how hazardous waste can be safely disposed of and to comply with all applicable statutes, regulations, standards, guidelines and local by-laws. The Department of Environment will provide advice and guidance on the management of hazardous waste. Other sources of information and assistance include:
    - Manufacturer or distributor of the new product;
    - Manufacturer's Material Safety Data Sheets (MSDS); and
    - Waste exchanges and associations, other regulatory authorities, waste management consultants and other qualified persons with expertise in the management of hazardous waste.
- Hazardous waste that meets standards set out in the Environmental Guideline for Industrial Waste Discharges may be directed to municipal landfills and sewage treatment systems for disposal. The local municipal government must be consulted and consent to the use of their facility prior to the waste being disposed. Waste that does not meet the standards set out in the Environmental Guideline for Industrial Waste Discharges must be treated prior to disposal or transported to a facility that is registered to accept the waste.
- The open burning of hazardous waste is not an acceptable practice as toxic substances may be released into the atmosphere.
- Incompatible hazardous waste should not be mixed, combined or stored together in the same container as new hazards may be created. Combining or mixing one waste with another waste may also prevent its reuse or recycling and increase disposal costs.
- Containers that previously held a hazardous waste must be emptied to the greatest extent practical or triple rinsed with an appropriate cleaning agent prior to disposal. The rinsings must then also be managed according to their waste characteristics. Cleaned containers should be rendered unusable by puncturing or crushing prior to disposal to prevent their reuse. This is especially important for containers that could be reused for water or food storage.

The Department of Environment will consider alternate hazardous waste management and disposal measures that provide an equivalent level of environmental protection to those identified in this Guideline.

2.2.4 Treatment and Disposal Outside Nunavut

Hazardous waste can be sent to a receiver or hazardous waste management facility located outside of Nunavut only where the receiver or facility has been registered in the receiving province or territory to

accept that waste. The generator must comply with all applicable statutes, regulations, standards, guidelines and local by-laws of the receiving jurisdiction.

Within Canada, Environment Canada monitors and controls the interprovincial movement of hazardous waste under the *Interprovincial Movement of Hazardous Waste Regulations*. Waste manifests must accompany each shipment of waste in accordance with the Transport Authorities' requirements. Generators and carriers should refer to section 3.3 of the Guideline for additional information on transport and waste manifest requirements.

The international movement of hazardous waste is controlled under the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. Known simply as the Basel Convention, it is an international treaty to control and reduce the transfer of hazardous waste from developed to less developed countries. Environment Canada monitors and controls the international movement of hazardous waste under the *Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations*.

A listing of Canadian waste management facilities may be obtained by contacting the waste exchanges and other organizations listed in Appendix 10.

General Requirements

Hazardous waste is classified using the system developed under the *Transportation of Dangerous Goods Act (Canada)*. Wastes are categorized into one of nine classes according to their chemical, physical or biological properties. Each waste, or group of similar wastes, is then identified using a specific 'UN' number assigned under the *Transportation of Dangerous Goods Regulations*. Refer to Appendix 2 for additional information on dangerous goods classifications.

3.1 Storage

Storage refers to containment of a hazardous waste for transport, or while awaiting treatment and disposal. Except under extraordinary circumstances (i.e. radioactive materials), storage should always be considered as a temporary measure and is not acceptable for the long-term management of hazardous waste.

Recognition of the incompatibility of different wastes during storage is important in order to avoid the possibility of violent, explosive reactions and toxic fumes. Various systems have been developed to ensure compatible storage including the 'Hazardous Waste Compatibility Chart' adopted by the United States' Environmental Protection Agency[1].

3.1.1 Containers

Hazardous waste storage containers are designed to hold, store and transport small quantities of waste. Many different types of containers are available (i.e. barrels, bottles, bags and boxes) and are made from a variety of materials (i.e. aluminum, plastic, steel, and stainless steel). Selecting the proper container requires an understanding of the properties of the waste to be stored. If transport is to be undertaken, the generator should consult the Transport Authority to confirm the container meets all legislated requirements.

The following are additional general points for consideration:

- Hazardous waste should be stored in their original containers where possible or in containers specially manufactured for the purpose of storing hazardous waste. The containers must be sound, sealable and not damaged or leaking.
- Containers should be clearly labeled to identify their contents according to requirements of the Workplace Hazardous Materials Information System (WHMIS) and the relevant Transport Authority, if transport is planned.
- Small quantities of compatible hazardous waste should be bulked into 16 gauge or equivalent metal or plastic 205 litre (45 gallon) drums for the purpose of secondary containment.
- Containers should be closed and sealed at all times, except while waste is being added or removed.

[1] EPA-600/2-80-076 April 1980. A Method for Determining the Compatibility of Chemical Mixtures.

3.1.2 Facilities

A hazardous waste storage facility is a specially designed building or area that helps to ensure the safe and secure storage of hazardous waste. Detailed storage facility building designs are beyond the scope of the Guideline. The Department of Environment or other qualified person should be consulted prior to designing and constructing a storage facility.

The following are general points to consider when establishing a storage facility:

- The facility should meet all local and territorial siting and construction requirements and be readily accessible for fire fighting and other emergency responses. The local Fire Chief should be advised of the storage facility and its contents for emergency planning and response purposes.
- The facility should be secure. Access should be limited where practical to employees who have been trained in safety and emergency procedures. These procedures should be documented and a copy made available to those employees who have access to the facility.
- Inspections of the facility and stored wastes should be performed and recorded at least once every week.
- Containers should be placed so that each can readily and easily be inspected for signs of leakage, corrosion or deterioration. Leaking, corroded or deteriorated containers should immediately be removed and their contents transferred to a sound container.
- Records should be maintained indicating the type and quantity of waste being stored along with the date, type and quantity of hazardous waste brought into or removed from the facility.
- Drainage into and from the storage facility site should be controlled to prevent spills or leaks from leaving the site and to prevent run-off from entering the site.
- All waste should be stored on a firm working surface that is impervious to leaks.
- Incompatible waste must be stored in a manner that contact in the event of a spill or accidental release is not possible.
- Emergency response plans should be developed in cooperation with local emergency response personnel and emergency response equipment should be locally available in the event of a spill, fire or other emergency situation.

Where the facility is used for commercial purposes and is used to store hazardous waste for periods of 180 days or more or the quantity of waste stored on-site exceeds the criteria set out in Appendix 8, the facility must be registered with the Department of Environment as a hazardous waste management facility.

3.2 Registration

3.2.1 Hazardous Waste Generators, Carriers and Receivers

Generators, carriers and receivers of hazardous waste must be registered before undertaking activities involving these wastes. Completion of the approved form and submission of accurate information enables the Department of Environment to quickly complete the registration process. Registration enables the government to track the generation, transport and disposal of hazardous waste in Nunavut. It also provides assurance that the company has the necessary emergency response and spill

contingency plans in place should an accident or other incident occur involving a hazardous waste. Upon registration, the applicant will be assigned a unique identification number. This number is required in order to complete the waste manifest form.

Appendices 4, 5 and 6 provide samples of registration forms required for generators, carriers and receivers to apply for registration in Nunavut. Original forms and users' guides are available from Nunavut's Department of Environment or by downloading through the department's web site. Incomplete applications will result in delays in completing the registration process.

Generators and receivers of hazardous waste located in Nunavut must be registered with the Department of Environment. Carriers may be registered either in Nunavut or in the province or territory in which the company is based.

3.2.2 Hazardous Waste Management Facilities

A hazardous waste management facility is a facility or specially-designated area that is used for the collection, storage, transfer, treatment, recycling or disposal of hazardous waste for commercial purposes. Where the facility is used solely for the collection, storage or transfer of hazardous waste, the facility must be registered where waste is stored for a period of 180 days or more or the quantities exceed those set out in Appendix 8 of the Guideline. Where the facility is to be used for the treatment, recycling or disposal of hazardous waste, the facility must be registered where the quantity treated, recycled or disposed of in any single month exceeds a 'small quantity'.

The collection, storage, transfer, treatment, recycling or disposal of hazardous waste on behalf of a third-party does not remove the obligation of the owner or operator of a hazardous waste management facility to register the facility.

Appendix 7 includes a sample of the registration form required for the owner or operator of a hazardous waste management facility to apply for registration of the facility. The owner or operator may obtain an original form and users' guide by contacting Nunavut's Department of Environment or by downloading through the department's web site. Incomplete applications will result in delays in completing the registration process.

Registration of a hazardous waste management facility does not remove the obligation to comply with all other applicable municipal, territorial and federal statutes, regulations, standards, guidelines and by-laws. Guidance on planning for and achieving territorial environmental requirements for new industrial projects may be found in the *Environmental Guideline for Industrial Projects on Commissioner's Lands.*

3.3 Transportation

Carriers must ensure hazardous waste is packaged, documented, labeled and placarded in compliance with the method of transport used - road, rail, air or marine. A completed waste manifest must accompany each shipment of hazardous waste. Completion of the manifest together with proper marking and placarding of containers and vehicles enables police, ambulance, fire and other first responders to react effectively and safely in the event of a spill or other accident involving hazardous waste while in transit.

The transport of hazardous waste by road in Canada is controlled under the territorial and federal *Transportation of Dangerous Goods Acts* and the federal *Interprovincial Movement of Hazardous Waste Regulations* and *Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations.* These Acts and Regulations require that personnel are trained, containers and transport vehicles are labeled and placarded and a completed waste manifest accompanies each shipment. The generator, carrier and receiver must each complete their portion of the manifest form and provide copies to the Department of Environment at various stages in the transport process. Refer to Appendix 9 for a copy of the manifest. Original manifest forms are available from Nunavut's Department of Environment and completion instructions are included on the reverse side of each manifest. Further assistance in completing a waste manifest may be obtained by referring to the *User's Guide for the Hazardous Waste Manifest* produced by Environment Canada or by contacting the Motor Vehicles Division of the Department of Economic Development and Transportation.

The International Air Transport Association (IATA) requires that all shipments of hazardous wastes tendered to air carriers be accompanied by the IATA Shipper's Declaration of Dangerous Goods. The consignor is responsible for completion of the form in accordance with IATA requirements and to ensure all packaging, placarding and labeling is consistent with the product being transported.

The International Marine Dangerous Goods Code requires use of the International Marine Organization's Multimodal Dangerous Goods Form when transporting dangerous goods or hazardous waste by ship or barge.

Further information on transporting hazardous waste by air or marine can be obtained by contacting Transport Canada. Information and instructions on manifesting, placarding and labeling hazardous waste commonly generated in Nunavut can be obtained by referring to waste-specific guidelines produced by the Department of Environment. A complete listing of guidelines is available at http://env.gov.nu.ca/programareas/environmentprotection.

Conclusion

This is a general introduction to the risks associated with hazardous waste and is intended to inform the reader about the proper handling, storage and transportation of hazardous waste in Nunavut. Detailed guidance on the management of specific waste types can be obtained by referring to other guidelines developed by the Department of Environment.

For additional information on the management of hazardous waste, or to obtain a complete listing of available guidelines, contact the Department of Environment at:

Environmental Protection Division
Department of Environment
Government of Nunavut
Inuksugait Plaza, Box 1000, Station 1360
Iqaluit, Nunavut, X0A 0H0

Phone: (867) 975-7729
Fax: (867) 975-7739
Email: EnvironmentalProtection@gov.nu.ca
Website: http://env.gov.nu.ca/programareas/environmentprotection

References

Government of Alberta, Department of Environment. Alberta Users Guide for Waste Managers, (Catalogue # ENV-266-O/P).

Government of Alberta, Department of Environment. Hazardous Waste Storage Guidelines, (1988).

Government of the Northwest Territories, Department of Environment and Natural Resources. User's Guide for Hazardous Waste Movement Documents in the NWT, (2009).

Government of the Northwest Territories, Department of Municipal and Community Affairs. Guidelines for the Planning, Design, Operations and Maintenance of Modified Solid Waste Sites in the Northwest Territories, (2003).

Government of Nunavut, Department of Environment. Environmental Guideline for General Management of Hazardous Waste, (2002).

Government of Nunavut, Department of Environment. Environmental Guideline for Industrial Projects on Commissioner's Lands, (2002).

Government of Nunavut, Department of Environment. Environmental Guideline for Industrial Waste Discharges, (2002).

APPENDICES

APPENDIX 1 - *ENVIRONMENTAL PROTECTION ACT*

The following are excerpts from the *Environmental Protection Act*

1. "Contaminant" means any noise, heat, vibration or substance and includes such other substance as the Minister may prescribe that, where discharged into the environment,
   (a) endangers the health, safety or welfare of persons,
   (b) interferes or is likely to interfere with normal enjoyment of life or property,
   (c) endangers the health of animal life, or
   (d) causes or is likely to cause damage to plant life or to property;

   "Discharge" includes, but not so as to limit the meaning, any pumping, pouring, throwing, dumping, emitting, burning, spraying, spreading, leaking, spilling, or escaping;

   "Environment" means the components of the Earth and includes
   (a) air, land and water,
   (b) all layers of the atmosphere,
   (c) all organic and inorganic matter and living organisms, and
   (d) the interacting natural systems that include components referred to in paragraphs (a) to (c).

   "Inspector" means a person appointed under subsection 3(2) and includes the Chief Environmental Protection Officer.

2.2 The Minister may
   (a) establish, operate and maintain stations to monitor the quality of the environment in the Territories;
   (b) conduct research studies, conferences and training programs relating to contaminants and to the preservation, protection or enhancement of the environment;
   (c) develop, co-ordinate and administer policies, standards, guidelines and codes of practice relating to the preservation, protection or enhancement of the environment;
   (d) collect, publish and distribute information relating to contaminants and to the preservation, protection or enhancement of the environment:

3. (1) The Minister shall appoint a Chief Environmental Protection Officer who shall administer and enforce this Act and the regulations.

   (2) The Chief Environmental Protection Officer may appoint inspectors and shall specify in the appointment the powers that may be exercised and the duties that may be performed by the inspector under this Act and regulations.

5. (1) Subject to subsection (3), no person shall discharge or permit the discharge of a contaminant into the environment.

   (3) Subsection (1) does not apply where the person who discharged the contaminant or permitted the discharge of the contaminant establishes that
   (a) the discharge is authorized by this Act or the regulations or by an order issued under this Act or the regulations;
   (b) the contaminant has been used solely for domestic purposes and was discharged from within a dwelling house;
   (c) the contaminant was discharged from the exhaust system of a vehicle;
   (d) the discharge of the contaminant resulted from the burning of leaves, foliage, wood, crops or stubble for domestic or agricultural purposes;

(e) the discharge of the contaminant resulted from burning for land clearing or land grading;
(f) the discharge of the contaminant resulted from a fire set by a public official for habitat management of silviculture purposes;
(g) the contaminant was discharged for the purposes of combating a forest fire;
(h) the contaminant is a soil particle or grit discharged in the course of agriculture or horticulture; or
(i) the contaminant is a pesticide classified and labelled as "domestic" under the *Pest Control Products Regulations* (Canada).

(4) The exceptions set out in subsection (3) do not apply where a person discharges a contaminant that the inspector has reasonable grounds to believe is not usually associated with a discharge from the excepted activity.

5.1. Where a discharge of a contaminant into the environment in contravention of this Act or the regulations or the provisions of a permit or license issued under this Act or the regulations occurs or a reasonable likelihood of such a discharge exists, every person causing or contributing to the discharge or increasing the likelihood of such a discharge, and the owner or the person in charge, management or control of the contaminant before its discharge or likely discharge, shall immediately:
(a) subject to any regulations, report the discharge or likely discharge to the person or office designated by the regulations;
(b) take all reasonable measures consistent with public safety to stop the discharge, repair any damage caused by the discharge and prevent or eliminate any danger to life, health, property or the environment that results or may be reasonably expected to result from the discharge or likely discharge; and
(c) make a reasonable effort to notify every member of the public who may be adversely affected by the discharge or likely discharge.

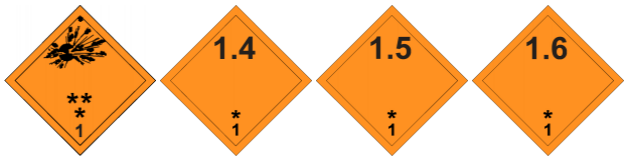
6. **(**1) Where an inspector believes on reasonable grounds that a discharge of a contaminant in contravention of this Act or the regulations or a provision of a permit or license issued under this Act or the regulations has occurred or is occurring, the inspector may issue an order requiring any person causing or contributing to the discharge or the owner or the person in charge, management or control of the contaminant to stop the discharge by the date named in the order.

7. (1) Notwithstanding section 6, where a person discharges or permits the discharge of a contaminant into the environment, an inspector may order that person to repair or remedy any injury or damage to the environment that results from the discharge.

(2) Where a person fails or neglects to repair or remedy any injury or damage to the environment in accordance with an order made under subsection (1) or where immediate remedial measures are required to protect the environment, the Chief Environmental Protection Officer may cause to be carried out the measures that he or she considers necessary to repair or remedy an injury or damage to the environment that results from any discharge.

APPENDIX 2 - DANGEROUS GOODS CLASSIFICATIONS

Class 1 – Explosives[1]



Class 2 – Compressed Gases
Division 2.1 – Flammable Gases
Division 2.2 – Non-flammable and Non-toxic Gases
Division 2.3 – Poison Gases

Class 3 - Flammable Liquids

Class 4 – Flammable Solids
Division 4.1 – Flammable Solids
Division 4.2 – Spontaneously Combustible
Division 4.3 – Water Reactive

Class 5 - Oxidizing Substances and Organic Peroxides
Division 5.1 – Oxidizing Substances
Division 5.2 – Organic Peroxides

Class 6 - Toxic and Infectious Substances
Division 6.1 – Toxic Substances
Division 6.2 – Infectious Substances

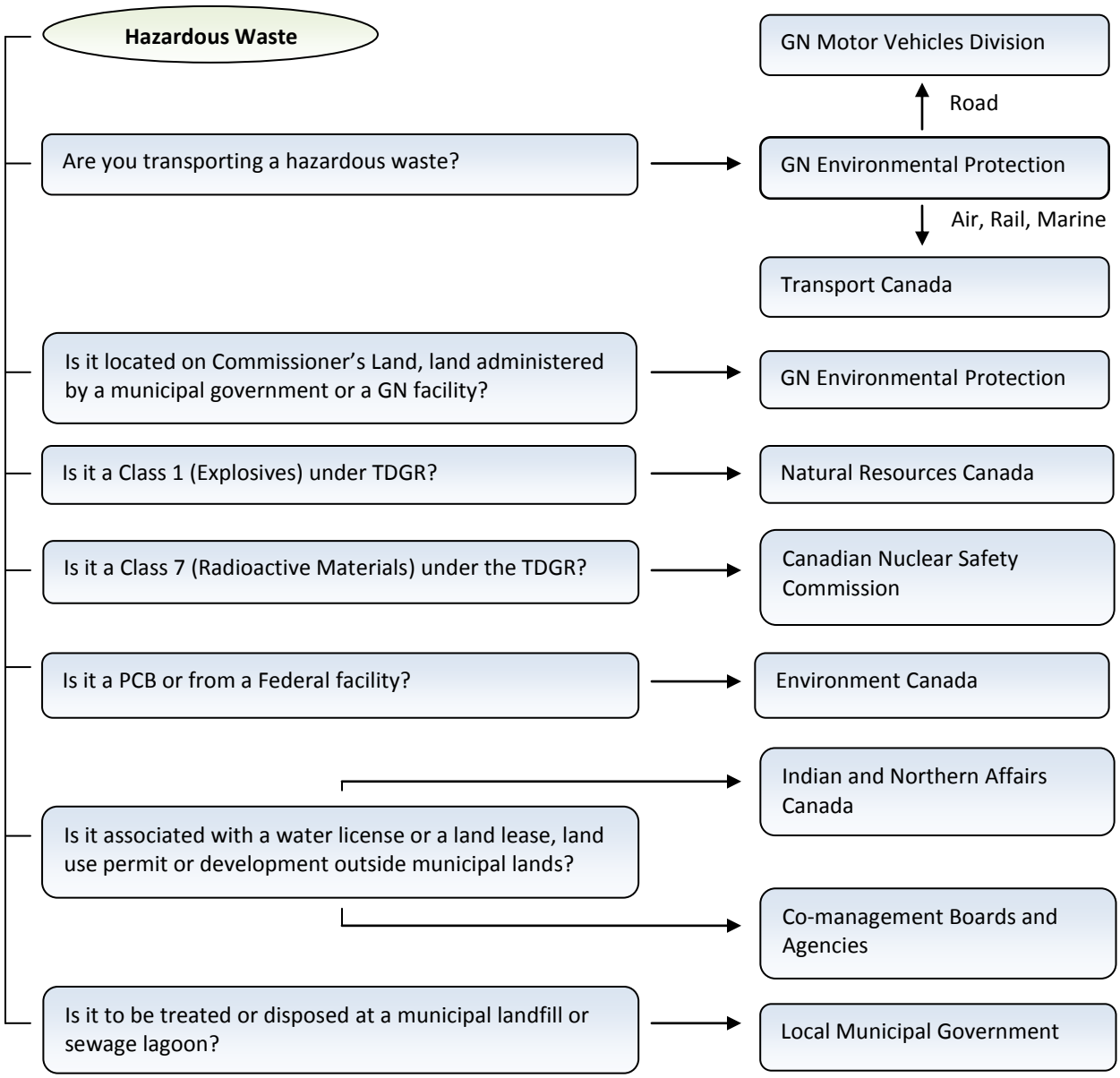
Class 7 - Radioactive Materials[2]

Class 8 - Corrosives

Class 9 - Miscellaneous

1. Class 1 substances (Explosives) are regulated by Natural Resources Canada under the *Explosives Act*.
2. Class 7 substances (Radioactive Materials) are regulated by the Canadian Nuclear Safety Commission under the *Nuclear Safety and Control Act* and *Nuclear Liability Act*.

APPENDIX 3 - DETERMINING REGULATORY AGENCY CONTACTS



APPENDIX 4 – REGISTRATION FORM – HAZARDOUS WASTE GENERATOR

A copy of the generator registration form and users' guide is available by contacting the Department of Environment or by downloading at http://env.gov.nu.ca/programareas/environmentprotection.

Instructions

1. The following information must be provided in order to register as a hazardous waste generator in Nunavut and to obtain a generator number. Incomplete applications will be returned to the applicant.
2. Completed registration forms are to be forwarded to the Manager of Pollution Control, Department of Environment, Government of Nunavut, Box 1000, Station 1360, Iqaluit, Nunavut, X0A 0H0. Electronic registration forms are preferred and may be forwarded to EnvironmentalProtection@gov.nu.ca.
3. Use additional pages to provide information as required.
4. Applicants should refer to the accompanying users' guide for further assistance on completing the generator registration form.

Section 1 - Identification

Generator (Legal Name) _____

Mailing Address _____ Postal Code _____

Principle Contact Person _____ Title _____

Phone _____ Email _____

Alternate Contact Person _____ Title _____

Phone _____ Email _____

Section 2 - Description of Waste Generated (provide a separate table if required)

Site Location(s) where Waste is Generated _____

Shipping Name (Description)	TDG Number	TDG Class	Quantity Generated each Month (L or Kg)	Frequency of Generation

Section 3 - Waste Management Information

General Type of Business _____

Source of Waste _____

Hazardous Waste Carrier(s) Used _____

Hazardous Waste Receiver(s) Used _____

Do you have an approved Emergency Response and Spill Contingency Plan? Yes ____ (attach copy) No _____

Section 4 - Certification

I certify that the information provided on this form is correct, accurate and complete.

Signature of Contact Person _____ Date (dd/mm/yy) _____

Print Name of Contact Person _____ Title _____

Phone _____ Email _____

For Department Use Only
Generator Number NUG# _____ Approved by _____ Date _____

APPENDIX 5 – REGISTRATION FORM – HAZARDOUS WASTE CARRIER

A copy of the carrier registration form and users' guide is available by contacting the Department of Environment or by downloading at http://env.gov.nu.ca/programareas/environmentprotection.

Instructions

1. The following information must be provided in order to register as a hazardous waste carrier in Nunavut and to obtain a carrier number. Incomplete applications will be returned to the applicant.
2. Completed registration forms are to be forwarded to the Manager of Pollution Control, Department of Environment, Government of Nunavut, Box 1000, Station 1360, Iqaluit, Nunavut, X0A 0H0. Electronic registration forms are preferred and may be forwarded to EnvironmentalProtection@gov.nu.ca.
3. Use additional pages to provide information as required.
4. Applicants should refer to the accompanying users' guide for further assistance on completing the carrier registration form.

Section 1 - Identification

Carrier (Legal Name) _____

Corporate Address _____

Site (Dispatch) Address _____

Principle Contact Person _____ Title _____

Phone _____ Email _____

Alternate Contact Person _____ Title _____

Phone _____ Email _____

Section 2 - Description of Waste Transported (provide a separate table if required)

Shipping Name (Description)	TDG Number	TDG Class	Quantity Transported each Month (L or Kg)	Frequency of Transport

Section 3 - Waste Management Information

Mode of Transport (check all that apply) Road _____ Rail _____ Marine _____ Air _____

Hazardous Waste Generator(s) Used _____

Hazardous Waste Receiver(s) Used _____

Do you have an approved Emergency Response and Spill Contingency Plan? Yes _____ (attach copy) No _____

Section 4 - Certification

I certify that the information provided on this form is correct, accurate and complete.

Signature of Contact Person _____ Date (dd/mm/yy) _____

Print Name of Contact Person _____ Title _____

Phone _____ Email _____

For Department Use Only
Carrier Number NUC# _____ Approved by _____ Date _____

APPENDIX 6 – REGISTRATION FORM – HAZARDOUS WASTE RECEIVER

A copy of the receiver registration form and users' guide is available by contacting the Department of Environment or by downloading at http://env.gov.nu.ca/programareas/environmentprotection.

Instructions

1. The following information must be provided in order to register as a hazardous waste receiver in Nunavut and to obtain a receiver number. Incomplete applications will be returned to the applicant.
2. A receiver who operates a commercial business for the purpose of collecting, storing, transferring, treating, recycling or disposing of hazardous waste may be required to register the facility as a hazardous waste management facility. Refer to section 3.2.2 of the *Environmental Guideline for the General Management of Hazardous Waste* for further information.
3. Completed registration forms are to be forwarded to the Manager of Pollution Control, Department of Environment, Government of Nunavut, Box 1000, Station 1360, Iqaluit, Nunavut, X0A 0H0. Electronic registration forms are preferred and may be forwarded to EnvironmentalProtection@gov.nu.ca.
4. Use additional pages to provide information as required.
5. Applicants should refer to the accompanying users' guide for further assistance on completing the receiver registration form.

Section 1 - Identification

Receiver (Legal Name) _____

Mailing Address _____ Postal Code _____

Principle Contact Person _____ Title _____

Phone _____ Email _____

Alternate Contact Person _____ Title _____

Phone _____ Email _____

Section 2 - Description of Waste Received (provide a separate table if required)

Site Location(s) where Waste is Received _____

Shipping Name (Description)	TDG Number	TDG Class	Quantity Received each Month (L or Kg)	Frequency of Acceptance

Attach a brief description of the proposed facility.

Section 3 - Waste Management Information

General Type of Business _____

General Type of Activity _____

Hazardous Waste Generator(s) Used _____

Hazardous Waste Carriers(s) Used _____

Hazardous Waste Management Facilities Used _____

Do you have an approved Emergency Response and Spill Contingency Plan? Yes _____ (attach copy) No _____

Section 4 - Certification

I certify that the information provided on this form is correct, accurate and complete.

Signature of Contact Person _____ Date (dd/mm/yy) _____

Print Name of Contact Person _____ Title _____

Phone _____ Email _____

For Department Use Only
Receiver Number NUR# _____ Approved by _____ Date _____

APPENDIX 7
REGISTRATION FORM – HAZARDOUS WASTE MANAGEMENT FACILITY

A copy of the management facility registration form and users' guide is available by contacting the Department of Environment or by downloading at http://env.gov.nu.ca/programareas/environmentprotection.

Instructions

1. The following information must be provided in order to register as a hazardous waste management facility in Nunavut and obtain a management facility number. Incomplete applications will be returned to the applicant.
2. Completed registration forms are to be forwarded to the Manager of Pollution Control, Department of Environment, Government of Nunavut, Box 1000, Station 1360, Iqaluit, Nunavut, X0A 0H0. Electronic registration forms are preferred and may be forwarded to EnvironmentalProtection@gov.nu.ca.
3. Use additional pages to provide information as required.
4. Applicants should refer to the accompanying users' guide for further assistance on completing the management facility registration form.

Section 1 - Identification

Applicant (Legal Name) _____

Corporate Address _____

Facility Address _____

Principle Contact Person _____ Title _____

Phone _____ Email _____

Alternate Contact Person _____ Title _____

Phone _____ Email _____

Section 2 - Description of Waste to be Managed (provide a separate table if required)

Site Location(s) where Waste is Managed _____

Shipping Name (Description)	TDG Number	TDG Class	Quantity Managed each Month (L or Kg)	Frequency of Acceptance

Attach a complete description of the proposed facility, safety measures, equipment and management processes to be used. Include engineered drawing where applicable.

Section 3 - Waste Management Information

General Type of Business (check all that apply) Receiver of Waste _____ Manage Self-generated Waste _____

Type of Activity (check all that apply) Collect and Store _____ Transfer _____

Treat _____ Recycle _____ Dispose _____

Hazardous Waste Generator(s) Used _____

Hazardous Waste Carriers(s) Used _____

Do you have an approved Emergency Response and Spill Contingency Plan? Yes _____ (attach copy) No _____

Section 4 - Certification

I certify that the information provided on this form is correct, accurate and complete.

Signature of Contact Person _____ Date (dd/mm/yy) _____

Print Name of Contact Person _____ Title _____

Phone _____ Email _____

For Department Use Only
Management Facility Number NUF# _____ Approved by _____ Date _____

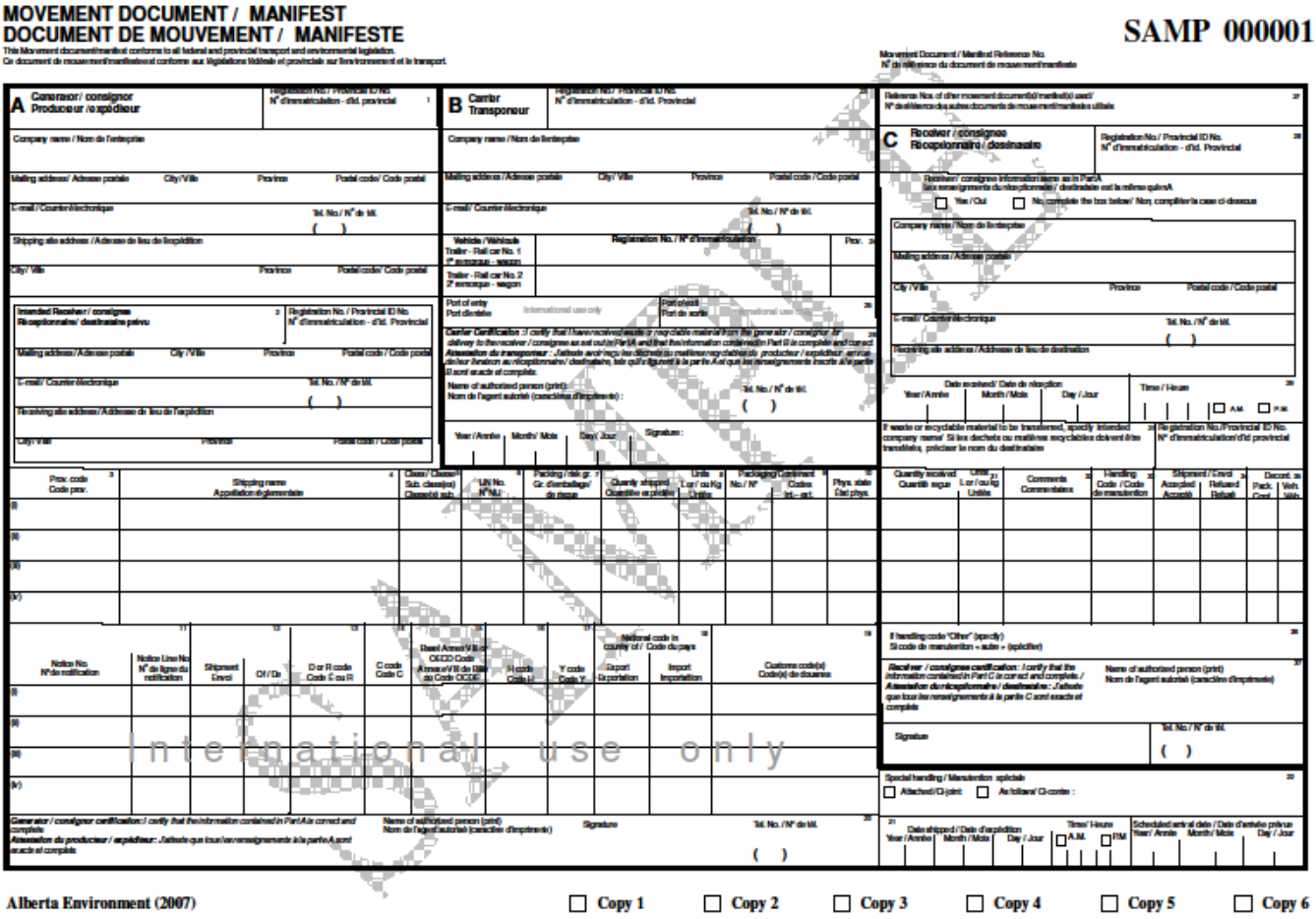
APPENDIX 8 - CRITERIA FOR REGISTERING A HAZARDOUS WASTE MANAGEMENT FACILITY

A facility must be registered with the Department of Environment as a hazardous waste management facility where it is used for commercial purposes to store hazardous waste for a period of 180 days or more or the quantity of hazardous waste[1] stored on-site at any one time exceeds the criteria established in the following table. Where the facility is to be used for the treatment, recycling or disposal of hazardous waste, the facility must be registered as a hazardous waste management facility where the quantity treated, recycled or disposed of each month exceeds a 'small quantity'[2].

	Description	**Quantity[3] (Kg or L)**
Class 1	Explosives	50
Class 2	Division 2.1 – Flammable Gases	500[4]
	Division 2.2 – Non-flammable and Non-toxic Gases	5000[4]
	Division 2.3 – Poison Gases	200[4]
Class 3	Flammable Liquids	4000
Class 4	Division 4.1 – Flammable Solids	5000
	Division 4.2 – Spontaneously Combustible	1000
	Division 4.3 – Water Reactive	500
Class 5	Division 5.1 – Oxidizing Substances	1000
	Division 5.2 – Organic Peroxides	50
Class 6	Division 6.1 – Toxic Substances	1000
	Division 6.2 – Infectious Substances	500[4]
Class 7	Radioactive Materials	Any amount
Class 8	Corrosives	1000
Class 9	Miscellaneous	1000
	PCB Materials	50
	Environmentally Hazardous Substance Solid – UN3077	5000
All Classes	Total Aggregate Quantity	5000

1. Applies to hazardous waste only and not to dangerous goods.
2. Small quantity means hazardous waste that is generated in an amount that is less than five kilograms per month if a solid or less than five litres per month if a liquid, and where the total quantity accumulated at any one time does not exceed five kilograms or five litres. This does not include hazardous waste that is mercury or Class 2.3, 5.1 or 6.1 materials. These wastes must be generated in an amount that is less than one kilogram per month if a solid or less than one litre per month if a liquid, and where the total quantity accumulated at any one time does not exceed one kilogram or one litre.
3. Quantity applies to solids when expressed in kilograms (kg) and liquids when expressed in litres (L).
4. Total liquid capacity of the container.

APPENDIX 9 – HAZARDOUS WASTE MANIFEST



MOVEMENT DOCUMENT / MANIFEST
DOCUMENT DE MOUVEMENT / MANIFESTE

SAMP 000001

This Movement document/manifest conforms to all federal and provincial transport and environmental legislation.
Ce document de mouvement/manifeste est conforme aux législations fédérale et provinciale sur l'environnement et le transport.

Movement Document / Manifest Reference No.
N° de référence du document de mouvement/manifeste

A Generator / consignor
Producteur / expéditeur

Registration No./ Provincial ID No.
N° d'immatriculation - d'id. provincial

Company name / Nom de l'entreprise

Mailing address/ Adresse postale | City/ Ville | Province | Postal code/ Code postal

E-mail / Courriel électronique | Tel. No. / N° de tél.

Shipping site address / Adresse de lieu de l'expédition

City/ Ville | Province | Postal code/ Code postal

Intended Receiver / consignee
Récipiendaire/ destinataire prévu

Registration No. / Provincial ID No.
N° d'immatriculation - d'id. Provincial

Mailing address/ Adresse postale | City/ Ville | Province | Postal code / Code postal

E-mail/ Courriel électronique | Tel. No. / N° de tél.

Receiving site address / Address de lieu de l'expédition

City/ Ville | Province | Postal code / Code postal

B Carrier
Transporteur

Registration No./ Provincial ID No.
N° d'immatriculation - d'id. Provincial

Company name / Nom de l'entreprise

Mailing address / Adresse postale | City/ Ville | Province | Postal code / Code postal

E-mail/ Courriel électronique | Tel. No. / N° de tél.

Vehicle / Véhicule
Trailer - Rail car No. 1
1er remorque - wagon
Trailer - Rail car No. 2
2e remorque - wagon

Registration No. / N° d'immatriculation | Prov.

Port of entry
Port d'entrée
International use only
Port of exit
Port de sortie
International use only

Carrier Certification: I certify that I have received waste or recyclable material from the generator / consignor for delivery to the receiver / consignee as set out in Part A and that the information contained in Part B is complete and correct.
Attestation du transporteur : J'atteste avoir reçu les déchets ou matières recyclables du producteur / expéditeur en vue de leur livraison au récipiendaire / destinataire, tels qu'ils figurent à la partie A et que les renseignements inscrits à la partie B sont exacts et complets.

Name of authorized person (print)
Nom de l'agent autorisé (caractères d'imprimerie) :

Tel. No. / N° de tél.

Year / Année | Month / Mois | Day / Jour | Signature :

C Receiver / consignee
Récipiendaire / destinataire

Reference Nos. of other movement document(s)/ manifest(s) used/
N° de référence des autres documents de mouvement/ manifestes utilisés

Registration No./ Provincial ID No.
N° d'immatriculation - d'id. Provincial

Receiver/ consignee information same as in Part A.
Les renseignements du récipiendaire / destinataire sont la même que ceux de la partie A.

Yes / Oui | No, complete the box below / Non, compléter la case ci-dessous

Company name / Nom de l'entreprise

Mailing address / Adresse postale

City / Ville | Province | Postal code / Code postal

E-mail/ Courriel électronique | Tel. No. / N° de tél.

Receiving site address / Address de lieu de destination

Date received/ Date de réception
Year / Année | Month / Mois | Day / Jour

Time / Heure
A.M. | P.M.

If waste or recyclable material to be transferred, specify intended company name/ Si les déchets ou matières recyclables doivent être transférés, préciser le nom du destinataire

Registration No./Provincial ID No.
N° d'immatriculation/d'id provincial

Prov. code Code prov.	Shipping name Appellation réglementaire	Class/ Classe Sub. class(es) Classe(s) sub.	UN No. N° NU	Packing / Risk gr. Gr. d'emballage/ de risque	Quantity shipped Quantité expédiée	Units L or / ou Kg Unités	Packaging/ Contained No. / N°	Packaging/ Contained Codes Int. – ext.	Phys. state Etat phys.
(i)									
(ii)									
(iii)									
(iv)									

Quantity received Quantité reçue	Units L or / ou Kg Unités	Comments Commentaires	Handling Code / Code de manutention	Shipment / Load Accepted Accepté	Shipment / Load Refused Refusé	Decont. as Pack. Cont.	Decont. as Veh. Véh.

Notice No. N° de notification	Notice Line No. N° de ligne de notification	Shipment Load	Of / De	D or R code Code D ou R	C code Code C	Basel Annex VIII or OECD Code Annexe VIII de Bâle ou Code OCDE	H code Code H	Y code Code Y	National code in country of / Code du pays Export Exportation	National code in country of / Code du pays Import Importation	Customs code(s) Code(s) de douane
(i)											
(ii)											
(iii)											
(iv)											

If handling code "Other" (specify)
Si code de manutention « autre » (spécifier)

Receiver / consignee certification: I certify that the information contained in Part C is correct and complete. / Attestation du récipiendaire / destinataire : J'atteste que tous les renseignements à la partie C sont exacts et complets

Name of authorized person (print)
Nom de l'agent autorisé (caractères d'imprimerie)

Signature | Tel. No. / N° de tél.

Special handling / Manutention spéciale
Attached / Ci-joint | As follows / Ci-contre :

Generator / consignor certification: I certify that the information contained in Part A is correct and complete.
Attestation du producteur / expéditeur : J'atteste que tous les renseignements à la partie A sont exacts et complets

Name of authorized person (print)
Nom de l'agent autorisé (caractères d'imprimerie)

Signature | Tel. No. / N° de tél.

Date shipped / Date d'expédition
Year / Année | Month / Mois | Day / Jour

Time / Heure
A.M. | P.M.

Scheduled arrival date / Date d'arrivée prévue
Year/ Année | Month / Mois | Day / Jour

International use only

Alberta Environment (2007)

Copy 1 | Copy 2 | Copy 3 | Copy 4 | Copy 5 | Copy 6

APPENDIX 10 - WASTE EXCHANGES AND ASSOCIATIONS

The concept of exchanging waste began in Canada in the 1980s. It involves the transfer of unwanted, overstocked, obsolete, damaged, contaminated or post-dated material and waste to another company or person who would reuse it. Various waste exchanges and associations have been established in Canada to facilitate these transfers. Several, but not all, waste exchanges and associations are listed below.

Northern Territories Water and Waste Association
201, 4817- 49 Street
Yellowknife, Northwest Territories X1A 3S7
(867) 873-4325
http://www.ntwwa.com

Recycling Council of British Columbia
Unit #10, 119 West Pender Street
Vancouver, British Columbia V6B 1S5
(604) 683-6009
http://www.rcbc.bc.ca

Alberta Waste Materials Exchange
Building #350, 6815 Eighth Street NE
Calgary, Alberta T2E 7H7
(403) 297-7505

Calgary Materials Exchange
809 Fourth Avenue NE
Calgary, Alberta T2P 0K5
(403) 230-1443
http://www.cmex.ca

Saskatchewan Waste Materials Exchange
515 Henderson Drive.
Regina, Saskatchewan S4N 5X1
(306) 787-9800

Manitoba Waste Exchange
1329 Niakwa Road
Winnipeg, Manitoba R2J 3T4
(204) 257-3891

Ontario Waste Exchange
OCETA 63 Polson Street, 2nd floor
Toronto, Ontario M5A 1A4
(416) 778-4199
http://www.owe.org

Canadian Waste Materials Exchange
2395 Spearman Drive
Mississauga, Ontario L5K 1B3
(416) 822-4111

Canadian Chemical Exchange
900 Blondin
Ste-Adele, Quebec J0R 1L0
(450) 229-6511
http://www.stobec.com

Quebec Waste Materials Exchange
14 Place du Commerce, Bureau 350
Le-des-Squeurs, Quebec H3E 1T5
(514) 762-9012

APPENDIX 11 – GOVERNMENT CONTACTS

Government of Nunavut

Environmental Protection Division
Department of Environment
Inuksugait Plaza
P.O. Box 1000, Station 1360
Iqaluit, Nunavut X0A 0H0
Telephone: (867) 975-7729 Fax: (867) 975-7739

Workers' Safety and Compensation Commission
P.O. Box 669
Baron Building/1091
Iqaluit, Nunavut X0A 0H0
Telephone: 1-877-404-4407 (toll free) Fax: 1-866-979-8501

Office of Chief Medical Health Officer of Health
Department of Health and Social Services
P.O. Box 1000, Station 1000
Iqaluit, Nunavut X0A 0H0
Telephone: (867) 975-5774 Fax: (867) 975-5755

Motor Vehicles Division
Department of Economic Development and Transportation
P.O. Box 10
Gjoa Haven, Nunavut X0B 1J0
Telephone: (867) 360-4615 Fax: (867) 360-4619

Department of Community and Government Services (all Divisions)
P.O. Box 1000, Station 700
4th Floor, W.G. Brown Building
Iqaluit, Nunavut X0A 0H0
Telephone: (867) 975-5400 Fax: (867) 975-5305

Government of Canada

Indian and Northern Affairs – Nunavut Region
P.O. Box 2200
Iqaluit, Nunavut X0A 0H0
Telephone: (867) 975-4500 Fax: (867) 975-4560

Department of Transport – Road, Rail, Marine, Air
P.O. Box 8550
344 Edmonton Street
Winnipeg, Manitoba R3C 1P6
Telephone: 1-888-463-0521 (toll free)
Fax: (204) 983-8992 Road, Rail and Marine only
Fax: (204) 983-1734 Air only

Environment Canada (NWT and Nunavut)
5019 52nd Street
Yellowknife, Northwest Territories X1A 1T5
Telephone: (867) 669-4730 Fax: (867) 873-8185

APPENDIX VI

HAZARDOUS MATERIAL RELELVANT LEGISLATION

List of further legislation that applies to the storage, handling and transport of hazardous materials:

Canadian Environmental Protection Act (CEPA)

Fire Prevention Act

Safety Act

Public Health Act

Spill Contingency Planning and Reporting Regulations

Transportation of Dangerous Goods Act (Canada)

Interprovincial Movement of Hazardous Waste Regulations (CEPA)

Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations (CEPA)

International Air Transport Association (IATA) Dangerous Goods Regulations

International Civil Aviation Organization (ICAO) Technical Instructions

Workers' Compensation Act

WHIMIS (Workplace Hazardous Materials Information System)

National Fire Code

Fisheries Act

Territorial Lands Act

Nunavut Waters and Nunavut Surface Rights Tribunal Act

For additional information on the management of hazardous waste, or to obtain a complete listing of available guidelines, contact the Department of Environment at:

Environmental Protection Division

Department of Environment

Government of Nunavut

Inuksugait Plaza, Box 1000, Station 1360

Iqaluit, Nunavut, X0A 0H0

Phone: (867) 975-7729

Fax: (867) 975-7739

Email: EnvironmentalProtection@gov.nu.ca

Website: http://env.gov.nu.ca/programareas/environmentprotection

APPENDIX VII

SAMPLE WASTE MANIFEST

MOVEMENT DOCUMENT / MANIFEST
DOCUMENT DE MOUVEMENT / MANIFESTE

This Movement document/manifest conforms to all federal and provincial transport and environmental legislation.
Ce document de mouvement/manifeste est conforme aux législations fédérale et provinciale sur l'environnement et le transport.

SAMP 000001

Movement Document / Manifest Reference No.
N° de référence du document de mouvement/manifeste

A Generator / consignor / Producteur / expéditeur

Registration No. / Provincial ID No. / N° d'immatriculation - d'id. provincial 1

Company name / Nom de l'entreprise

Mailing address / Adresse postale | City / Ville | Province | Postal code / Code postal

E-mail / Courrier électronique | Tel. No. / N° de tél. ( )

Shipping site address / Adresse de lieu de l'expédition

City / Ville | Province | Postal code / Code postal

Intended Receiver / consignee / Réceptionnaire / destinataire prévu 2

Registration No. / Provincial ID No. / N° d'immatriculation - d'id. Provincial

Mailing address / Adresse postale | City / Ville | Province | Postal code / Code postal

E-mail / Courrier électronique | Tel. No. / N° de tél. ( )

Receiving site address / Addresse de lieu de l'expédition

City / Ville | Province | Postal code / Code postal

B Carrier / Transporteur

Registration No. / Provincial ID No. / N° d'immatriculation - d'id. Provincial 23

Company name / Nom de l'entreprise

Mailing address / Adresse postale | City / Ville | Province | Postal code / Code postal

E-mail / Courrier électronique | Tel. No. / N° de tél. ( )

Vehicle / Véhicule	Registration No. / N° d'immatriculation	Prov. 24
Trailer - Rail car No. 1 / 1re remorque - wagon		
Trailer - Rail car No. 2 / 2e remorque - wagon		

Port of entry / Port d'entrée — International use only | Port of exit / Port de sortie — International use only 25

Carrier Certification : *I certify that I have received waste or recyclable material from the generator / consignor for delivery to the receiver / consignee as set out in Part A and that the information contained in Part B is complete and correct.*
Attestation du transporteur *: J'atteste avoir reçu les déchets ou matières recyclables du producteur / expéditeur en vue de leur livraison au réceptionnaire / destinataire, tels qu'ils figurent à la partie A et que les renseignements inscrits à la partie B sont exacts et complets.* 26

Name of authorized person (print): / Nom de l'agent autoriré (caractères d'imprimerie) : | Tel. No. / N° de tél. ( )

Year / Année | Month / Mois | Day / Jour | Signature :

Reference Nos. of other movement document(s)/manifest(s) used / N° de référence des autres documents de mouvement/manifestes utilisés 27

C Receiver / consignee / Réceptionnaire / destinataire

Registration No. / Provincial ID No. / N° d'immatriculation - d'id. Provincial 28

Receiver / consignee information same as in Part A
Les renseignments du réceptionnaire / destinataire est la même qu'en A
☐ Yes / Oui ☐ No, complete the box below / Non, compléter la case ci-dessous

Company name / Nom de l'entreprise

Mailing address / Adresse postale

City / Ville | Province | Postal code / Code postal

E-mail / Courrier électronique | Tel. No. / N° de tél. ( )

Receiving site address / Addresse de lieu de destination

Date received / Date de réception — Year / Année | Month / Mois | Day / Jour | Time / Heure ☐ A.M. ☐ P.M. 29

If waste or recyclable material to be transferred, specify intended company name/ Si les dechets ou matières recyclables doivent être transférés, préciser le nom du destinataire 31 | Registration No./Provincial ID No. / N° d'immatriculation/d'id provincial

Prov. code / Code prov. 3	Shipping name / Appellation réglementaire 4	Class / Classe Sub. class(es) / Classe(s) sub. 5	UN No. / N°NU 6	Packing / risk gr. / Gr. d'emballage/ de risque 7	Quantiy shipped / Quantitée expédiée 8	Units / L or / ou Kg / Unités 8	Packaging / No. / N° 9	Contenant Codes / Int.– ext. 9	Phys. state / État phys. 10
(i)									
(ii)									
(iii)									
(iv)									

Quantity received / Quantité reçue 31	Units / L or / ou Kg / Unités 31	Comments / Commentaires 32	Handling Code / Code de manutention 33	Shipment / Envoi Accepted / Accepté 34	Shipment / Envoi Refused / Refusé 34	Decont. 35 Pack. / Cont.	Decont. 35 Veh. / Véh.

Notice No. / N° de notification 11	Notice Line No / N° de ligne du notification 11	Shipment / Envoi 12	Of / De 12	D or R code / Code É ou R 13	C code / Code C 14	Basel Annex VIII or OECD Code / Annexe VIII de Bâle ou Code OCDE 15	H code / Code H 16	Y code / Code Y 17	National code in country of / Code du pays: Export / Exportation 18	Import / Importattion 18	Customs code(s) / Code(s) de douanes 19
(i)											
(ii)											
(iii)											
(iv)											

If handling code "Other" (specify) / Si code de manutention « autre » (spécifier) 36

Generator / consignor certification : *I certify that the information contained in Part A is correct and complete.*
Attestation du producteur / expéditeur: *J'atteste que tous les renseignements à la partie A sont exacts et complets.*

Name of authorized person (print) / Nom de l'agent autorisé (caractère d'imprimerie) | Signature | Tel. No. / N° de tél. ( ) 20

Receiver / consignee certification *: I certify that the information contained in Part C is correct and complete. /*
Attestation du réceptionnaire / destinataire : *J'atteste que tous les renseignements à la partie C sont exacts et complets.* 37

Name of authorized person (print) / Nom de l'agent autorisé (caractère d'imprimerie)

Signature | Tel. No. / N° de tél. ( )

Special handling / Manutention spéciale 22
☐ Attached /Ci-joint: ☐ As follows/ Ci-contre :

Date shipped / Date d'expédition 21 — Year / Année | Month / Mois | Day / Jour | Time / Heure ☐ A.M. ☐ P.M

Scheduled arrival date / Date d'arrivée prévue — Year / Année | Month / Mois | Day / Jour

Alberta Environment (2007)

☐ Copy 1 ☐ Copy 2 ☐ Copy 3 ☐ Copy 4 ☐ Copy 5 ☐ Copy 6

APPROPRIATE AUTHORITIES / AUTORITÉS RESPONSABLES *EMERGENCY NUMBER / *NUMÉRO D'URGENCE

International Shipments/ Expéditions internationales

Waste Management Division
Environment Canada
Place Montcalm, 6th Floor
70 Crémazie Street
GATINEAU QC K1A 0H3
(819) 997-3377

Direction de la gestion des déchets
Environnement Canada
Place Montcalm, 6e étage
70, rue Crémazie
GATINEAU (Québec) K1A 0H3
(819) 997-3377

Provincial Authorities / Autorités provinciales

Alberta
***1-800-222-6514**
Alberta Environment
Strategic Policy Branch
10th Floor, Oxbridge Place
9820 - 106 Street
Edmonton, AB T5K 2J6
(780) 427-0637

British Columbia
***1-800-663-3458**
Colombie-Britannique
Ministry of Environment
Environmental Management Branch
Public Safety & Prevention Initiative
P.O. Box 9342, Stn Prov Govt
Victoria BC V8W 9M1
(250) 387-2049

Manitoba
***204-945-2100**
Manitoba Conservation
Headquarters Operations
Box 46, 200 Saulteaux Cres
Winnipeg MB R3J 3W3

Newfoundland and Labrador
***709-729-1771/6483**
Terre-Neuve et Labrado
Department of Environment
Pollution Prevention Division
Confederation Building, West Block
P.O. Box 8700
St. John's NF A1B 4J6
(709) 729-2556

New Brunswick
***1-800-565-1633**
Nouveau-Brunswick
Department of the Environment and Local Government
Approvals Branch
P.O. Box 6000
Fredericton NB E3B 5H1
(506) 444-4599

Northwest Territories
Territoires du Nord-Ouest
***867-920-8130**
Environmental Protection Division
Department of Environment and Natural Resources
P.O. Box 1320
Yellowknife NT X1A 2L9
(867) 873-7654

Nova Scotia
***1-800-565-1633**
Nouvelle-Écosse
Nova Scotia Department of Environment and Labour
5151 Terminal Road, 5th Floor
PO Box 697
Halifax, NS B3J 2T8
(902) 424-5300

Ontario
***1-800-268-6060**
Ministry of the Environment
Environmental Monitoring & Reporting Branch
"Area M"
135 St. Clair Avenue West
Toronto ON M4V 1P5
(416) 235-6259

Prince Edward Island
***1-800-565-1633**
Île-du-Prince-Édouard
Department of Environment, Energy and Forestry
P.O. Box 2000
Charlottetown PEI C1A 7N8
(902) 368-5000

Québec
***1-866-694-5454**
Ministère du Développement durable, de l'Environnement et des Parcs
Urgence environnement
5199 Sherbrooke est, Bureau 3860
Montréal QC H1T 3X9

Saskatchewan
*** 1-800-667-7525**
Environmental Protection Branch
Saskatchewan Environment and Resource Management
3211 Albert Street
Regina SK S4S 5W6
(306) 787-0016

Yukon Environment
***867-667-7244**
Environment Yukon
Environmental Programs Branch (V-8)
Box 2703
Whitehorse, YT
Y1A 2C6
867-667-5683

Nunavut
867-920-8130
Environmental Protection Division
Department of Environment
P.O. Box 1000, Stn. 1360
Iqaluit, Nunavut, X0A 0H0
(867) 975-5900

Each Party shall ensure that the information on all copies is legible and indelibly printed.
1. Generator / consignor completes Part A and has the carrier complete Part B.
2. Generator / consignor detaches Copy 1 and sends Copy 1 or a copy of Copy 1 to the appropriate authority of the province or territory of origin and of the province or territory of destination, and Environment Canada for international shipments.
3. Generator / consignor retains Copy 2.
4. Carrier carries the remaining four copies (Copies 3, 4, 5, 6) along with the shipment.
5. Upon delivery of the shipment to the receiver / consignee, the carrier gives the four copies to the receiver / consignee's authorized representative.
6. Receiver / consignee completes Part C and sends Copy 3 or a copy of Copy 3 to the appropriate authority of the province or territory of origin and of the province or territory of destination and Environment Canada for international shipments. He also distributes Copies 4 and 6 to the carrier and generator / consignee, and keeps Copy 5.
7. If more than four hazardous wastes from the same generator / consignor are to be shipped to the same intended receiver / consignee in the same shipment, additional movement documents / manifests are to be completed. The first movement document / manifest reference number must be indicated on the additional movement document / manifest form(s) by the person completing the additional form(s).
8. If more than one carrier is utilized additional movement documents / manifests may need to be completed. Check with appropriate jurisdictions to determine if additional movement documents / manifest are required.

All domestic shipments must comply with applicable provincial/territorial legislation and regulations.
International shipments must comply with the *Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations.*

Les parties doivent s'assurer que les renseignements contenus sur toutes les copies soient lisibles et imprimée de façon indélébile.
1. Le producteur ou l'expéditeur remplit la partie A et fait remplir la partie B par le transporteur.
2. Le producteur ou l'expéditeur détache la copie 1 et envoie la copie 1, ou une copie de celle-ci, à 1) l'autorité responsable de la province ou du territoire d'origine, 2) l'autorité responsable de la province ou du territoire de destination, et 3) Environnement Canada pour les envois internationaux.
3. Le producteur ou l'expéditeur conserve la copie 2.
4. Le transporteur conserve les quatre autres copies (Copies 3, 4, 5, 6) et les transporte avec l'envoi
5. Sur livraison de l'envoi au réceptionnaire ou destinataire, le transporteur remet les quatre copies au représentant autorisé du réceptionnaire ou destinataire.
6. Le réceptionnaire ou le destinataire remplit la partie C et envoie la copie 3, ou une copie de celle-ci, à 1) l'autorité responsable de la province ou du territoire d'origine, 2) l'autorité responsable de la province ou du territoire de destination et 3) Environnement Canada pour les envois internationaux. Il distribue également les copies 4 et 6 au transporteur ainsi qu'au producteur ou à l'expéditeur, et conserve la copie 5.
7. Lorsque plus de quatre déchets dangereux du même producteur ou expéditeur sont envoyés au même réceptionnaire ou destinataire visé dans le même envoi, il y a lieu de remplir des documents de mouvement/manifestes supplémentaires. La personne qui remplit les formulaires supplémentaires doit indiquer le numéro de référence du premier document de mouvement /manifeste.
8. Lorsque plus d'un transporteur est utilisé, il est possible de devoir remplir des documents de mouvement /manifestes supplémentaires. Vérifiez auprès des juridictions appropriées si vous devez remplir des documents de mouvements/manifestes additionnels.

Tous les envois nationaux doivent respecter la législation et les règlements provinciaux et territoriaux applicables.
Les envois internationaux doivent se conformer au *Règlement sur l'exportation et l'importation de déchets dangereux et de matières recyclables dangereuses.*

INSTRUCTIONS FOR COMPLETING EACH PART ON THE MOVEMENT DOCUMENT or MANIFEST

Part A.
Box 1: **Identify** company name, registration no. / provincial ID no., mailing address, email address, telephone number and shipping site address.
Box 2: **Identify** intended receiver / consignee's company name, registration no. / provincial ID no., mailing address, email address, telephone number and receiving site address.
Box 3: **Identify** provincial code, if applicable.
Boxes 4, 5, 6 and 7: **List** in accordance with TDGR, the proper shipping name or description, the primary class and subsidiary class or classes, the UN number and the packing group code (**I** great danger; **II** medium danger; **III** minor danger) or the risk group.
Box 8: **Identify** the quantity shipped and units in kg or L.
Box 9: **Identify** the number and type of packaging (Int. Ext. Code) (**01** drum; **02** tank; **03** bulk; **04** carton; **05** bag; **06** roll off or lugger; **07** other).
Box 10: **Identify** the physical state. For **international shipments**, identify the LSPG Code.
Boxes 10 and 11 to 19: For **international codes**, please refer to User Guide to Implementation, www.ec.gc.ca/tmb/eng/guides_e.html.
Box 21: **Identify** time and date shipped and the scheduled arrival date.
Box 22: **Identify** special handling and emergency instructions.
Box 20: The generator / consignor's authorized representative shall print his/her name and telephone number, and sign the form certifying that the information given in Part A is correct and complete.

Part B.
Box 23: **Identify** company name, registration no. / provincial ID no., mailing address, email address and the telephone number.
Box 24: **Identify** vehicle trailer license number and province or territory of registration.
Box 25: **Identify** port of entry into or exit out of Canada.
Box 26: The carrier's authorized representative shall print his/her name and telephone number and sign the form certifying that the hazardous wastes or hazardous recyclable materials have been received from the generator/consignor for delivery to the intended receiver / consignee and the information given in Part B is complete and correct.

Part C.
Box 28: **Identify** company name, registration no. / provincial ID no., business address, email address, telephone number and receiving site address.
Box 29: **Identify** date and time shipment received.
Box 30: If transferred to another receiver / consignee, **identify** company name and provincial ID no.
Box 31: **Identify** the quantity received and the units in kg or L.
Box 32: **Identify** any shipment discrepancy problems.
Boxes 33 and 36: **Identify** the final handling method (**01** storage, **02** thermal treatment, **03** chemical treatment, **04** physical treatment, **05** biological treatment, **06** secure landfill, **07** recycling, **08** solidification, **09** other [specify])
Box 34: **Indicate** whether or not the shipment was accepted or refused.
Box 35: **Identify** whether decontamination of packaging or the vehicle has been carried out by checking the appropriate box.
Box 37: The receiver / consignee's authorized representative shall print his/her name and telephone number and sign the form certifying that the information given in Part C is correct and complete.

DIRECTIVES POUR REMPLIR CHAQUE PARTIE DU DOCUMENT DE MOUVEMENT ou DU MANIFESTE

Partie A.
Encadré 1 : **Indiquez** le nom de la compagnie, le n° d'immatriculation/d'id provincial, l'adresse postale, le courrier électronique, le numéro de téléphone et l'adresse du lieu de l'expédition.
Encadré 2 : **Indiquez** le nom de compagnie du réceptionnaire ou destinataire visé, le n° d'immatriculation/d'id provincial, l'adresse postale, le courrier électronique, le numéro de téléphone et le lieu de destination.
Encadré 3 : **Indiquez** le code provincial, s'il y a lieu.
Encadrés 4, 5, 6 et 7: **Indiquez,** conformément au RTMD, le nom et la description exacts de l'envoi, la classe primaire et la classe ou les classes subsidiaires, le numéro de l'UN et le code du groupe d'emballage (**I** un niveau de danger élevé; **II** un niveau de danger moyen; **III** un niveau de danger faible) ou du groupe de risques.
Encadré 8 : **Indiquez** la quantité envoyée et les unités en kg ou en L.
Encadré 9 : **Indiquez** le numéro et le type d'emballage (Code int.-ext.) (**01** baril; **02** citerne; **03** vrac; **04** caisse de carton; **05** sac; **06** conteneur sur châssis ou godet; **07** autre).
Encadré 10 : **Indiquez** l'état physique. Pour les **envois innternationaux**, indiquez le Code LSPG.
Encadré 10 et 11 à 19 : Pour les **codes internationaux**, veuillez vous reporter au Guide de l'application, www.ec.gc.ca/tmb/fra/guides_f.html
Encadré 21 : **Indiquez** l'heure et la date de l'envoi et la date prévue d'arrivée.
Encadré 22 : **Indiquez** s'il y a manutention spéciale et les directives en cas d'urgence.
Encadré 20 : Le représentant autorisé doit écrire son nom en lettres moulées et son numéro de téléphone et signer le formulaire attestant que les renseignements contenus dans la partie A sont exacts et complets.

Partie B.
Encadré 23 : **Indiquez** le nom de la compagnie, le n° d'immatriculation/d'id provincial, l'adresse postale, le courrier électronique et le numéro de téléphone.
Encadré 24 : **Indiquez** le numéro d'immatriculation de la remorque du véhicule et de la province ou du territoire d'enregistrement.
Encadré 25 : **Indiquez** le point d'entrée au Canada et de sortie du Canada.
Encadré 26 : Le représentant autorisé du transporteur doit écrire son nom en lettres moulées et son numéro de téléphone et signer le formulaire attestant d'avoir reçu les déchets dangereux ou les matières recyclables dangereuses du producteur ou expéditeur en vue de leur livraison au réceptionnaire ou au destinataire et que les renseignements contenus dans la Partie B sont exacts et complets.

Partie C.
Encadré 28 : **Indiquez** le nom de la compagnie, le n° d'immatriculation/d'id provincial, l'adresse commerciale, le courrier électronique, le numéro de téléphone et l'adresse du lieu de destination.
Encadré 29 : **Indiquez** la date et l'heure de réception de l'envoi.
Encadré 30 : Lorsque l'envoi est transféré à un autre réceptionnaire ou destinataire, **indiquez** le nom de la compagnie et le n° d'immatriculation/d'id provincial.
Encadré 31 : **Indiquez** la quantité reçue et les unités en kg ou L.
Encadré 32 : **Indiquez** tout problème de divergence dans la livraison.
Encadrés 33 et 36 : **Indiquez** la méthode finale de manutention (**01** entreposage, **02** traitement thermique, **03** traitement chimique **04** traitement physique, **05** traitement biologique, **06** lieu d'enfouissement sécuritaire, **07** recyclage, **08** solidification, **09** autre [spécifiez])
Encadré 34 : **Indiquez** si l'envoi a effectivement été accepté ou refusé;
Encadré 35 **: Indiquez** si la décontamination de l'emballage ou du véhicule a été effectuée en cochant la case correspondante
Encadré 37 : Le représentant autorisé du réceptionnaire ou destinataire doit écrire son nom en lettres moulées et son numéro de téléphone, et signer le formulaire attestant que les renseignements donnés dans la partie C sont exacts et complets.