



May 7, 2014

Ms. Violet Camsell-Blondin  
Chair  
Wek'èezhii Land and Water Board  
#1, 4905-48th Street  
Yellowknife, NT, CA X1A 2P6

Dear Ms. Camsell-Blondin:

**RE: Ekati Diamond Mine Waste Management Plan**

Dominion Diamond Ekati Corporation (DDEC) is pleased to provide the following updated Waste Management Plan. The Waste Management Plan (the Plan) and its associated plans are submitted under the current Water Licence W2012L2-0001 Part H Item 1 regarding Conditions Applying to Waste Disposal. This plan references other established DDEC plans to meet the requirements of the MVLWB Guidelines for Developing a Waste Management Plan. These plans are included as the part of the Waste Management Plan submission and include:

- Incinerator Management Plan
- Hazardous Waste Management Plan
- Solid Waste Landfill Management Plan
- Hydrocarbon Impacted Materials Management Plan

The objective of the Plan is to maintain a safe and healthy workplace at the Ekati Diamond Mine and ensure that potential adverse effects to the environment and wildlife are minimized through sound waste management practices. The Plan provides clear direction to DDEC staff, contractors and stakeholders on how waste from the Ekati Diamond Mine is managed through each of the waste streams to final disposal. This Waste Management Plan covers all activities associated with the Ekati Diamond Mine including Main Camp, Misery, and Exploration Activities.

DDEC upholds the 4 R's of waste management; Reduce, Reuse, Recycle, and Recover. Waste is preferentially avoided if possible then goes through waste reduction strategies in order of preference before final treatment and disposal.

Waste generated at the Ekati Diamond Mine is classified into two waste categories. Mineral Waste and Non-Mineral Waste. The Figure below shows the different types of waste generated at the Ekati Diamond Mine, and directs readers to the appropriate plan for detailed information on the management of that waste stream.



The above diagram demonstrates how Waste is managed at the Ekati Diamond Mine. Under Mineral Wastes, the Waste Rock and Ore Storage Management Plan is a requirement of Water Licence W2012L2-001 Part H Item 3 and the Wastewater Processed Kimberlite Management Plan is a requirement under Part H Item 2. These two management plans are submitted under the above requirements. The Incinerator Management Plan, Hazardous Waste Management Plan, Solid Waste Management Plan and Hydrocarbon Impacted Materials Management Plan under Non-Mineral Wastes, are considered documents to complete the Waste Management Plan submission.



DDEC trusts that you will find the revisions acceptable and informative. Please contact Jamie Steele, Environmental Advisor - Compliance at [jamie.steele@ekati.ddcorp.ca](mailto:jamie.steele@ekati.ddcorp.ca) or 867-880-2281 and the undersigned at [claudine.lee@ekati.ddcorp.ca](mailto:claudine.lee@ekati.ddcorp.ca) or 867-880-2232 should you have any questions.

Sincerely,

A handwritten signature in black ink that reads 'Claudine Lee'.

Claudine Lee, M.Sc. P.Geol.  
Superintendent – Environment Operations

*Attached:*

*EKA PLA.2117 Waste Management Plan  
EKA PLA.2118 Solid Waste Landfill Management Plan  
EKA PLA.2119 Hazardous Waste Management Plan  
EKA PLA.2120 Incinerator Management Plan  
EKA PLA.2121 Hydrocarbon Impacted Materials Management Plan*

## EKA PLA.2117 Waste Management Plan

<b>Version:</b>	1.0
<b>Replaces:</b>	N/A
<b>Creation Date:</b>	2014/24/04
<b>Scheduled Review Date:</b>	2015/24/04
<b>Review Date:</b>	N/A
<b>Document Team Members:</b>	Environment Advisor Compliance Environment Superintendent Operations
<b>Document Owner:</b>	Superintendent Environment Operations
<b>Document Approver:</b>	Superintendent Environment Operations
<b>Related Documents:</b>	EKA PLA.2118 Landfill Management Plan EKA PLA.2119 Hazardous Waste Management Plan EKA PLA.2120 Incinerator Management Plan EKA PLA.2122 Waste Rock and Ore Storage Management Plan EKA PLA.2123 Waste Water and Processed Kimberlite Management Plan EKA PLA.2121 Hydrocarbon Impacted Materials Management Plan EKA.PLA.2119 Hazardous Materials Management Procedure
<b>Key Contacts:</b>	Environment Advisor Compliance
<b>Change Requests:</b>	Environment Advisor Compliance
<b>Brief Description:</b>	This Waste Management Plan identifies Dominion Diamond Ekati Corporation's policy and approach to waste management at the Ekati Diamond Mine. This plan covers waste classification and directs readers to the appropriate Management Plan for detailed information on the management of that particular waste stream.

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# Corporate Statement

On April 10, 2013, Dominion Diamond Corporation (the “Company”) acquired from BHP Billiton Canada Inc. (and its various affiliates) all of BHP Billiton’s diamond assets, including BHP Billiton’s Controlling interest in the Ekati Diamond Mine as well as the associated diamond sorting and sales facilities in Yellowknife, Northwest Territories and Antwerp, Belgium. The Ekati Diamond Mine consists of the core Zone, and adjacent area hosting kimberlite pipes having both development and exploration potential. As of the closing of the transaction the Company acquired BHP Billiton’s 80% interest in the Core Zone and 58.8% interest in the Buffer Zone, with the remaining interests held by other joint venture parties. The Company’s indirect wholly-owned subsidiary, Dominion Diamond Ekati Corporation (DDEC), is the current operator of the Ekati Diamond Mine.

Dominion Diamond Corporation has assumed all of the Environmental Obligations and Agreements including the Environmental Agreement and Water Licences, Land Use Permits and other statutory obligations that this Waste Management Plan would apply.

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## Introduction

### Objective

The objective of this Waste Management Plan (the Plan) is to maintain a safe and healthy workplace at the Ekati Diamond Mine and ensure that potential adverse effects to the environment and wildlife are minimized through sound waste management practices. The Plan provides clear direction to DDEC staff, contractors and stakeholders on how waste from the Ekati Diamond Mine is managed through each of the waste streams to final disposal.

### Scope

This Waste Management Plan covers all activities associated with the Ekati Diamond Mine including Main Camp, Misery, and Exploration Activities. This plan may reference other established DDEC plans to meet the requirements of the MVLWB Guidelines for Developing a Waste Management Plan.

### Facility Description

The Ekati Diamond Mine is located at Latitude 64°, 42 minutes, Longitude 110°, 37 minutes, and approximately 300 kms northeast of Yellowknife, Northwest Territories. Access to the site is by winter road or aircraft. The facility was commissioned in October 1998. Site location and the access roads are shown in Figure 1. The Ekati Diamond Mine is located in a remote pristine area.

The main site includes an accommodation building that can house 700 people at a time, a central processing facility, a 26.4 MW power plant, ore crushing and storage facility, explosives manufacturing plant, maintenance garage, truck shop, and a fuel tank farm. In addition to the main camp, the Misery camp is located 29 kms southwest of the site. Misery has a bulk diesel storage facility. Currently Misery camp is operational and can house approximately 115 people. The layout of the Ekati main camp and the Misery camp are shown in Figure 2.

Surface mining activities at the Ekati Diamond Mine are currently underway at Fox Pit and Misery Pit. Underground mining is currently underway at the Koala and Koala North Pipes.



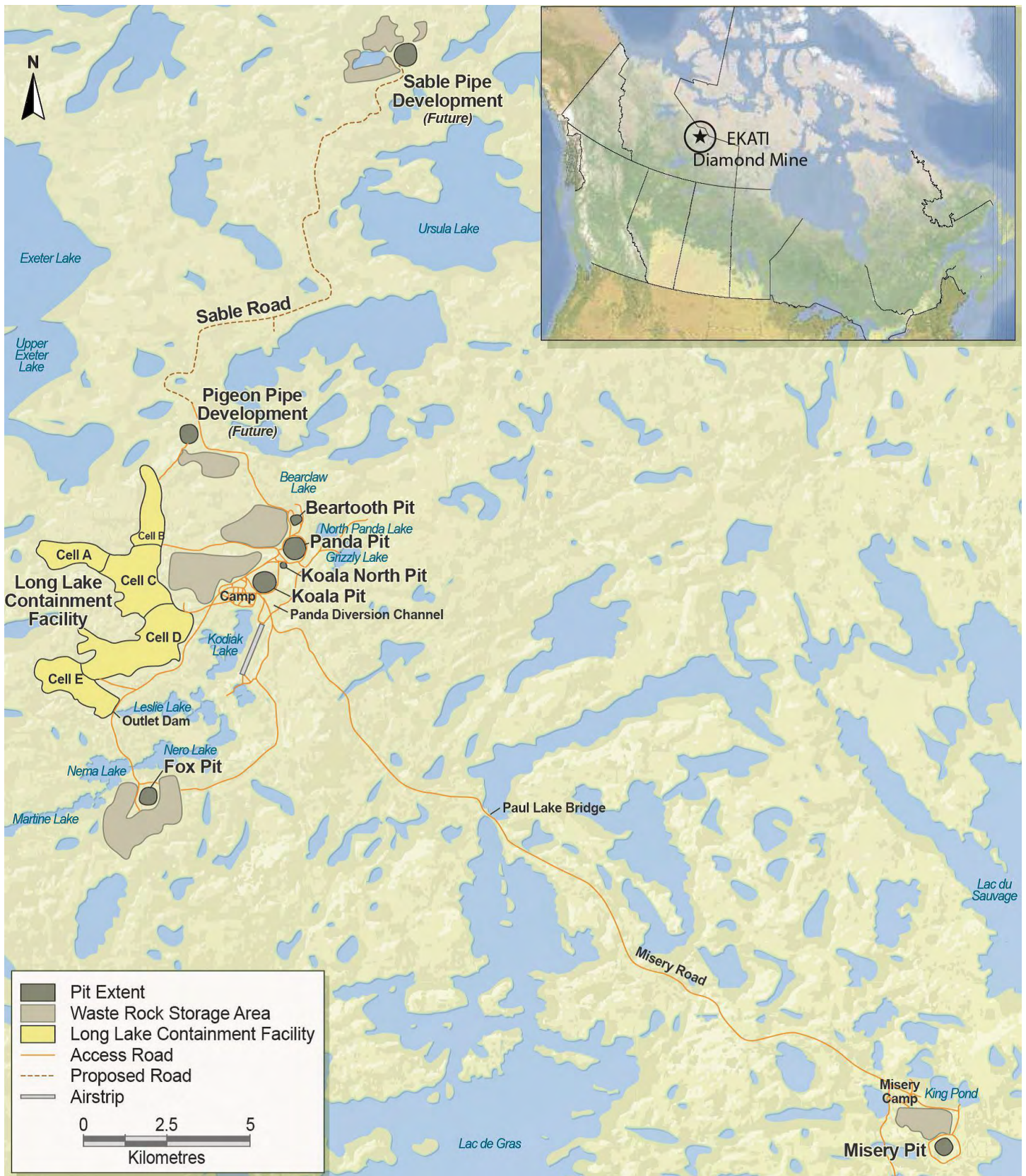


Figure 1 - Ekati Diamond Mine



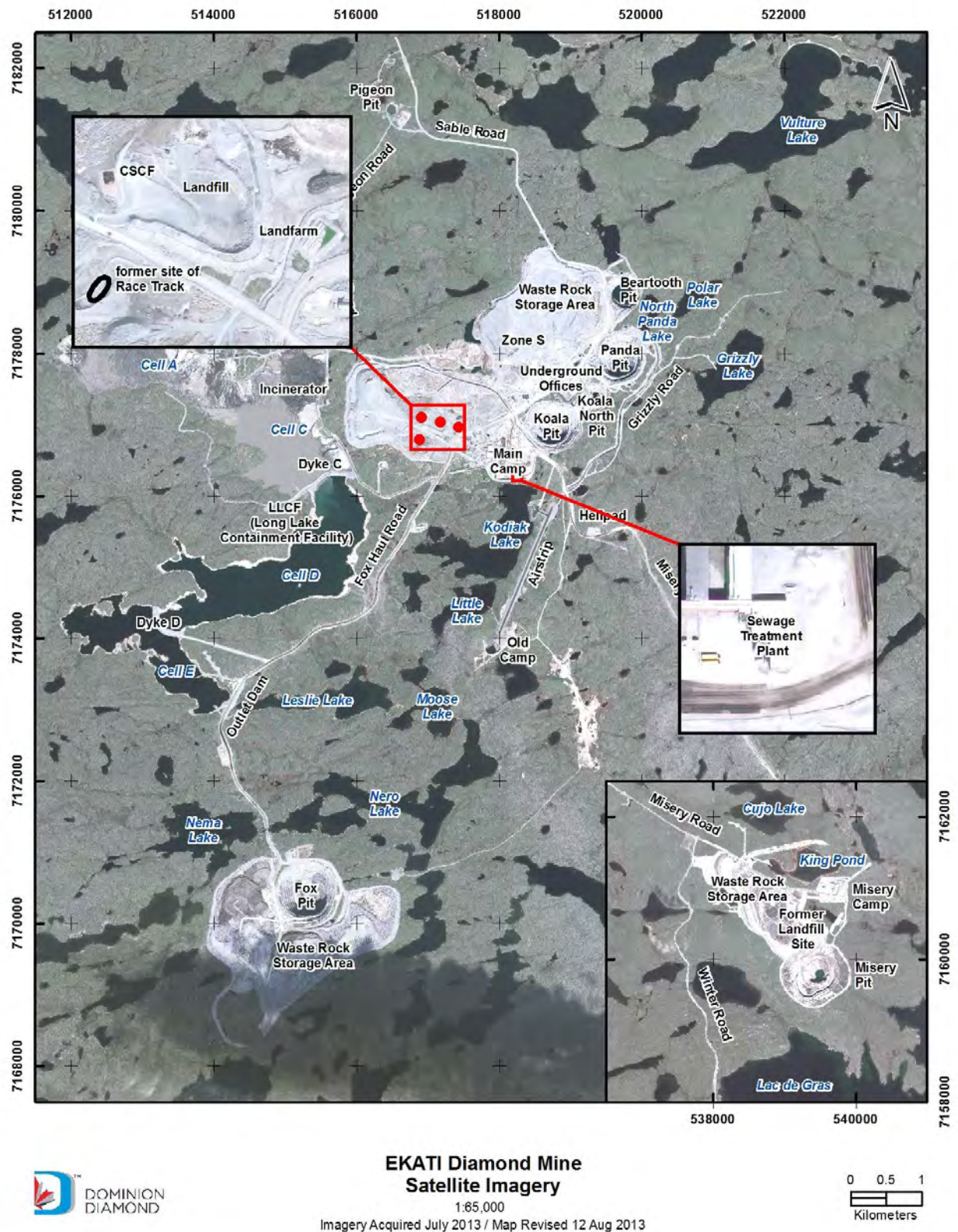


Figure 2 – Ekati Diamond Mine Site Map



# Policy



## Sustainable Development Policy

Dominion Diamond Corporation is committed to promoting a safe and healthy workplace, protecting the environment, developing local communities and delivering a high quality product.

By following the principles of accountability, teamwork, respect and stakeholder involvement, we strive to set industry standards for **sustainable development**. That means meeting people's needs now and in the future.



### Core values

Our core values show how we will try to achieve sustainable development by shifting our corporate culture and modelling positive behaviours.

#### Zero harm

**Our goal:** To build a legacy of commitment, trust and respect.

**Our approach:** To actively protect our people, the environment and our local communities.

#### Safety

**Our goal:** To work with our people to reduce and eliminate workplace injuries.

**Our approach:** To provide a safe and injury free workplace through committed leadership and working together.

#### Health

**Our goal:** To enhance the health and well-being of our people.

**Our approach:** To engage our people to promote personal health and wellness and eliminate occupational illnesses.

#### Environmental protection

**Our goal:** To protect the environment.

**Our approach:** To promote a culture of environmental stewardship and respect for the natural environment within our workforce and our communities.

#### Risk management

**Our goal:** To identify and effectively manage risk.

**Our approach:** To follow a strong process of assessment, critical control development and monitoring.

#### Community engagement

**Our goal:** To build relationships with our stakeholders and build capacity in our communities.

**Our approach:** To communicate openly and honestly, support local programs, and make real contributions in our communities.

#### Compliance

**Our goal:** To become an industry leader in compliance.

**Our approach:** To comply with all community commitments, standards, regulations and laws by promoting sharing and collaboration with our partners and stakeholders.

#### Creating value

**Our goal:** To create profit and opportunities for the benefit for our stakeholders and shareholders.

**Our approach:** To set and achieve business objectives through continuous improvement.

A handwritten signature in blue ink, reading 'R.A. Gannicott'.

Robert A. Gannicott  
Chairman & Chief Executive Officer



Figure 3 - Sustainable Development Policy

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## Approach to Waste Management

DDEC upholds the 4 R's of waste management; Reduce, Reuse, Recycle, and Recover. Waste is preferentially avoided if possible then goes through waste reduction strategies in order of preference before final treatment and disposal. The sections below outline some of the activities at the Ekati Diamond Mine to minimize environmental impact.

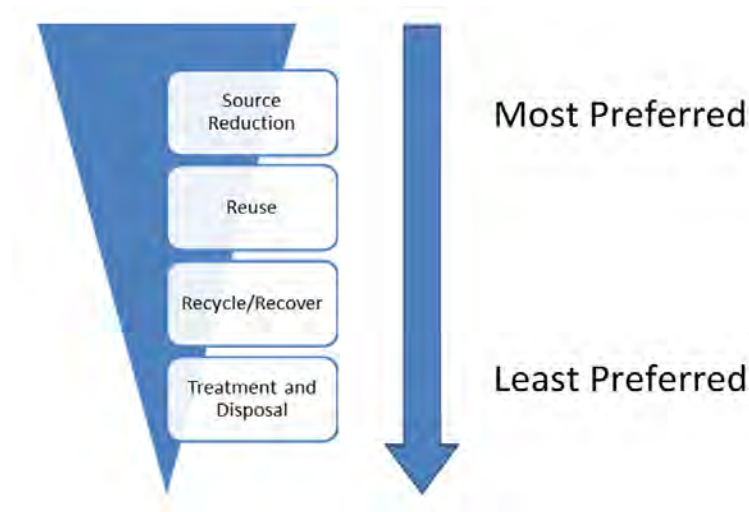


Figure 4 - Waste Management Hierarchy

### Source Reduction

Reducing waste before it is generated is the most effective and preferred method of managing waste. DDEC employs the concept of source reduction through inventory and purchasing practices as well as through our Hazardous Materials Management Procedure which allows for identification of potentially hazardous materials and examines possible substitutions for something less hazardous.

#### Examples of Source Reduction

- Purchasing materials in bulk saving handling and disposal of smaller containers,
- Employing inventory control methods, and
- Substituting less hazardous chemicals where possible.

### Reuse

Reusing materials in their original form is an effective way of waste reduction that doesn't require a lot of extra energy or cost. In an effort to reduce waste at the Ekati Diamond Mine certain wastes can be reused before disposal.

#### Examples of reuse on site:

- Managing kitchen wastes by preparing hot lunches with leftovers,

- Reusing heavy equipment tires as barriers,
- Reusing process plant water several times before disposing. The Ekati Diamond Mine has a 50:1 recycle to fresh water use ratio, and
- Sending empty drums that are in good condition off site for reuse.

## Recycle

Recycling is converting waste back into usable material. This method of waste reduction may require extra energy and cost but is still an effective way of recovering value from waste products. Several waste products are recycled every year at the Ekati Diamond Mine.

Examples of items sent off site for recycling:

- Plastics,
- Batteries,
- Filters,
- Waste Glycol, and
- Drink containers (donated to charities).

## Recover

Recovery is extracting materials or energy from waste products for other uses. Where possible energy is recovered from waste products generated at the Ekati Diamond Mine.

Examples of energy recovery:

- Waste oil used in waste oil burners to heat underground mines, and
- Waste heat from power generators is collected and used to heat underground mines

## Treatment

Treatment of waste is sometimes required to reduce impacts on the environment. Where possible some wastes are treated on site before final disposal.

Examples of on-site treatment:

- Thermal treatment of food and camp waste by incineration reducing volume and wildlife attraction,
- Primary and Secondary treatment of raw sewage in the sewage treatment building, and
- Volatilizing hydrocarbon impacted materials.



## Disposal

After implementing waste reduction strategies, there will still be some wastes requiring final disposal. Non-hazardous and inert waste is disposed of on-site in an approved disposal location. Residual waste that is not suitable for on-site disposal is packaged and shipped off-site for disposal at an approved facility according to best practice and regulatory requirements.

Examples of waste disposed of on site:

- Waste Rock (see EKA PLA.2212 Waste Rock and Ore Storage Management Plan),
- Processed Kimberlite (see EKA PLA.2123 Wastewater and Processed Kimberlite Management Plan),
- Inert non-reactive landfill waste (paper, wood, plastic) (see EKA PLA.2118 Solid Waste Landfill Management Plan),
- Mine Water (see EKA PLA.2123 Wastewater and Processed Kimberlite Management Plan), and
- Incinerator Ash (see EKA PLA.2120 Incinerator Management Plan).

Examples of waste disposal off-site:

- Hazardous Waste (see EKA PLA.2119 Hazardous Waste Management Plan),
- Oily Rags (see EKA PLA.2121 Hydrocarbon Impacted Materials Management Plan), and
- Waste hydrocarbons (see EKA PLA.2121 Hydrocarbon Impacted Materials Management Plan).

# Classification of Waste

Waste generated at the Ekati Diamond Mine is classified into 2 waste categories. Mineral Waste and Non-Mineral Waste. Figure 5 below shows the different types of waste generated at the Ekati Diamond Mine, and directs readers to the appropriate plan for detailed information on the management of that waste stream.

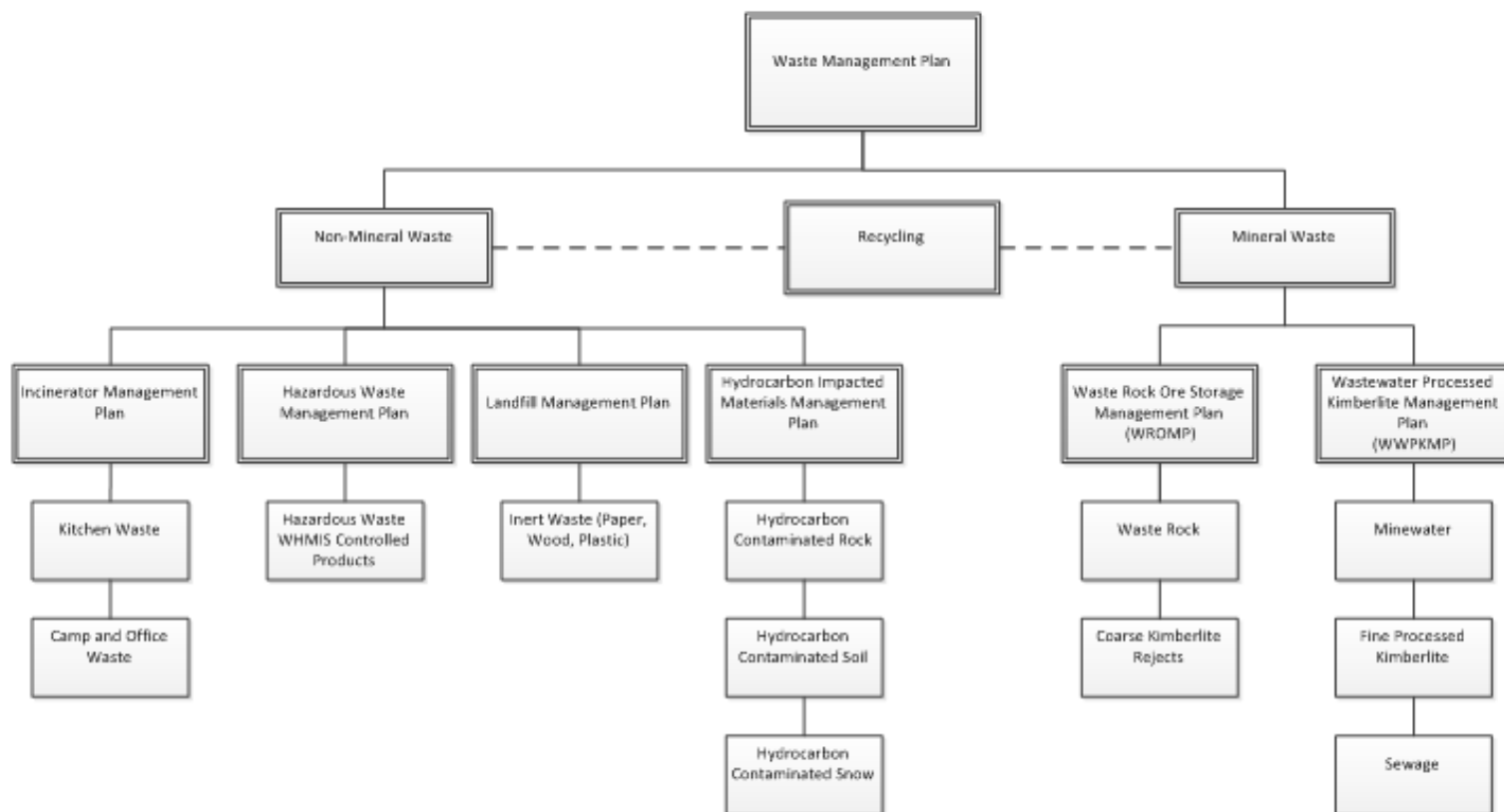


Figure 5 - Waste Classification

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## Management of Waste

The sections below outlines the management plans associated with each waste stream identified at the Ekati Diamond Mine (Figure 5). Each section contains a summary of the plan and identifies the most current version and the implemented review cycle.

### Incinerator Management Plan EKA PLA.2120

Status: Version 1.0

Completion: April 2014

Review Cycle: Annual

Accountability: Facilities and Waste Management

The Incinerator Management Plan was created to ensure the safe and efficient operation of incinerator units at the Ekati Diamond Mine. This plan includes a detailed look at the incineration waste cycle including waste segregation, collection, incinerator operation, ash management and data recording. The Incinerator Management Plan includes initiatives to minimize incinerator waste volumes as well reduce harmful stack emissions including dioxins, furans, and mercury.

### Hazardous Waste Management Plan EKA PLA.2119

Status: Version 1.0

Completion: April 2014

Review Cycle: Annual

Accountability: Facilities and Waste Management

The Hazardous Waste Management Plan outlines strategies for managing hazardous waste, and direction for staff and contractors to processes waste not suitable for the landfill through the Waste Management Team for offsite disposal.



## Landfill Management Plan EKA PLA.2118

Status: Version 1.0

Completion: April 2014

Review Cycle: Annual

Accountability: Facilities and Waste Management

The primary objective of the Landfill Management Plan is to prevent waste from entering the landfill that may attract or be harmful to wildlife or the environment. The plan outlines what wastes are suitable for disposal in the on-site landfill

## Hydrocarbon Impacted Materials Management Plan EKA PLA.2121

Status: Version 3.0

Last Update: April 2014

Review Cycle: Annual

Accountability: Environment Operations and Maintenance Services

The Hydrocarbon Impacted Materials Management Plan was created to provide a framework and guidance for the management of hydrocarbon impacted materials at the Ekati Diamond Mine. This plan identifies sources of hydrocarbon contaminated materials as well as facilities on site dedicated to treatment and disposal of hydrocarbon impacted waste.

This plan is related closely to the Spill Contingency Plan. In the event of a large spill requiring the activation of the Spill Contingency plan, hydrocarbon contaminated waste resulting from the spill response will be managed according to the Hydrocarbon Impacted Materials Management Plan.

## Waste Rock and Ore Storage Management Plan (WROMP) EKA PLA.2122

Status: Pigeon Amendment submitted to the Wek'eezhii Land and Water Board - December 2013 and approved March 2014

Last Update: Updated version to with Pigeon Amendment to be submitted to the Wek'eezhii Land and Water Board April 2014

Review Cycle: Annual

Accountability: Environment Operations

The Waste Rock and Ore Storage Management Plan examines conditions at the Ekati Diamond Mine and includes the geology, production history and descriptions of existing waste rock storage facilities. This plan discusses geochemical characterization of waste rock and Coarse Kimberlite Rejects including acid/alkaline drainage potential. This plan includes

designs of the Panda/Koala/Beartooth, Fox, Misery, and Pigeon Waste Rock Storage Areas (WRSA) and also looks at current temperature trends in the WRSA, drainage management and seepage monitoring methods in order to monitor the impact of the waste rock piles on the environment.

## Waste Water and Processed Kimberlite Management Plan (WWPKMP) EKA PLA.2123

Status: Version 4.0 Update submitted to the Wek'eezhii Land and Water Board


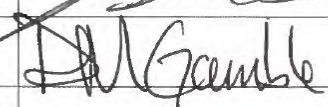
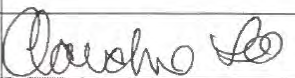
Last Update: Version 4.1 to be submitted to the Wek'eezhii Land and Water Board May 2014

Review Cycle: Annual

Accountability: Production/Processing and Environment Operations

The Waste Water and Processed Kimberlite Management Plan incorporates the placement of processed Kimberlite within the Long Lake Containment Facility and Beartooth Pit, and the site wide waste water management strategy. The Waste Water and Processed Kimberlite Management Plan is a guidance document that allows the Ekati Diamond Mine to adapt to changes in the Life of Mine Plan, processing performance of kimberlite in the process plant, and the ongoing characterization of Kimberlite being mined.

## Appendix 1 – Approval Signatures Record

REVIEWER ROLE	NAME	SIGNATURE	DATE
Environment Advisor - Compliance	Jamie Steele		Jan 29 / 14
Team Leader – Facilities and Waste Management	Rodney Gamble		Jan 29 / 14
<b>Approved By</b>			
Superintendent Environment – Operations	Claudine Lee		Jan 29 / 14



## Appendix 2 – Terms and Definitions

Term	Definition
Camp and Office Waste	Waste generated in the kitchen, offices and general refuse throughout the mine site. Hazardous materials such as aerosol cans and batteries are diverted from the Camp Waste stream. Camp waste is incinerated on site
Coarse Kimberlite Rejects (CKR)	Comprised of a mixture of sand and gravel-sized Kimberlite material remaining after the diamonds have been recovered. The grain size distribution is .5 mm to 25 mm in diameter.
DDEC	Dominion Diamond Ekati Corporation - Operator of the Ekati Diamond Mine
Fine Processed Kimberlite (FPK)	Fine processed Kimberlite is generated from the washing and screening of the ore. FPK is de-watered or "thickened" to recover process water for recycling. Remaining FPK is pumped to the Long Lake Containment Facility for disposal
Hazardous Waste	A waste which because of its quantity, concentration or characteristics may be harmful to human health or the environment when improperly treated, stored, transported or disposed
Hydrocarbon Contaminated Rock	Rock larger than 4 cm in diameter contaminated with hydrocarbons
Hydrocarbon Contaminated Soil	Rock smaller than 4 cm in diameter contaminated with hydrocarbons
Inert Waste	Waste that is not reactive or an attractant to wildlife. Inert waste consists of paper, wood, plastic, glass etc. Inert waste that is not recycled is disposed of in the Ekati Landfill
Food Waste	Waste from kitchen, food scraps, or food packaging
Landfill	Designated section of the Panda/Koala Waste Rock pile for disposal of inert waste.
Mine Water	Water collected in the open pit and underground mines.
Mineral Waste	Waste byproduct of mining. Includes waste rock, waste Kimberlite and mine water.
Non-Mineral Waste	Waste not associated with mining or processing. Includes kitchen waste, office waste and other wastes associated with the camp and construction.
Stakeholders	Person, group or organization with an interest in the project
Waste Rock	All unprocessed rock materials that are produced as a result of mining activities
WROMP	Waste Rock and Ore Storage Management Plan
WWPKMP	Waste Water and Processed Kimberlite Management Plan

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# Appendix 3 – Track Changes

Revision Number	Page Numbers	Change Affected	Date of Change

## Appendix 4 – Cross Reference to *MVLWB Guidelines for Developing a Waste Management Plan*

Guideline Requirements	Location of information in this Waste Management Plan
3.1 Introduction	
Company name, site name, and site location	See Corporate Statement on page 4, and facility description on page 4.
Effective date of the plan	See page 1
Environmental policy and how it relates to waste management	See Policy on page 7 and Approach to Waste Management on p 8
Purpose and scope of the plan including detailed waste management goals and objectives	See Scope and Objective on page 4
Description of the project for which the proponent holds a land use permit/licence	See Facility Description on page 4
Proposed location for all waste management activities, on a map to scale with GPS Co-ordinates. Where applicable show locations of historical waste management areas.	Figures 1 and 2 on pages 6 and 7 show site maps with information compliant with the MVLWB Guidelines for Developing a Waste Management Plan.
3.2 Identification of waste types	Figure 5 on page 11 shows identification and classification of waste types generated at the Ekati Diamond Mine. This figure also identifies the associated management plan.
3.3 Management of each type of waste	Information on page 12 – Management of Waste directs readers to individual management plans that contain information on management of each waste stream identified at the Ekati Diamond Mine.
3.4 Infrastructure required for waste management	This document categorizes waste generated at the Ekati Diamond Mine. Figure 5 and information of page 12 – Management of Waste directs readers to individual management plans that contain information on Waste Management Infrastructure compliant with the MVLWB Guidelines for Developing a Waste Management Plan. Additionally Figure 2 on page 6. Shows current and historical Waste Management infrastructure.



## EKA PLA.2118 Solid Waste Landfill Management Plan

<b>Version:</b>	1.0
<b>Replaces:</b>	N/A
<b>Creation Date:</b>	2014/05/05
<b>Scheduled Review Date:</b>	2015/05/05
<b>Review Date:</b>	N/A
<b>Document Team Members:</b>	Superintendent – Business Improvement/Non-Process Infrastructure Team Leader – Facilities/Waste Management
<b>Document Owner:</b>	Team Leader – Facilities/Waste Management
<b>Document Approver:</b>	Superintendent – Business Improvement/Non-Process Infrastructure
<b>Related Documents:</b>	EKA PLA.2120 Incinerator Management Plan EKA PLA.2121 Hydrocarbon Impacted Materials Management Plan EKA PLA.2119 Hazardous Waste Management Plan EKA PRO.1831 Hazardous Materials Management Procedure EKA PRO.1838 Weather Advisory Procedure
<b>Key Contacts:</b>	Superintendent – Business Improvement/Non-Process Infrastructure Team Leader – Facilities/Waste Management
<b>Change Requests:</b>	Team Leader – Facilities/Waste Management
<b>Brief Description:</b>	The Ekati Diamond Mine's Solid Waste Landfill Management Plan is Dominion Diamond Ekati Corporation's approach to solid waste disposal and provides directions for managing various waste streams. The objective is to minimize potential adverse effects to the environment, including wildlife and wildlife habitat.

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<b>4.0</b>	<b>Facility Location</b>	<b>4</b>
<b>5.0</b>	<b>Solid Waste Landfill Description</b>	<b>5</b>
<b>6.0</b>	<b>Solid Waste Landfill Operating Plan</b>	<b>6</b>
<b>7.0</b>	<b>Contingency Planning</b>	<b>7</b>

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## 1.0 - Introduction

In accordance with Dominion Diamond Corporation's Sustainable Development Policy wastes produced on the mine site will be handled, transported, stored or disposed of in a safe and responsible manner. The Solid Waste Landfill Management Plan is a comprehensive approach to the management of solid wastes that are generated on the site.

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## 2.0 - Objective

The objective of this Landfill Management Plan is to maintain a safe and healthy workplace at the Ekati Diamond Mine and ensure that potential adverse effects to the environment and wildlife are minimized through sound waste management practices. The Landfill Management Plan provides clear direction to Dominion Diamond Ekati Corporation staff, contractors and stakeholders how waste produced from operations at the Ekati Diamond Mine is managed through each of the waste streams to final disposal.

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## 3.0 - Scope

This serves as a subsection of the Waste Management Plan for the Ekati Diamond Mine site. This operating plan is to govern operations at the current solid waste landfill site and will be reviewed for applicability as the mine site further develops. This Landfill Management Plan covers all activities associated with the Ekati Diamond Mine including Main Camp, Misery, and exploration activities. This plan may reference other established Dominion Diamond Ekati Corporation plans to meet the requirements of the MVLWB Guidelines for Developing a Waste Management Plan.

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## 4.0 - Facility Location

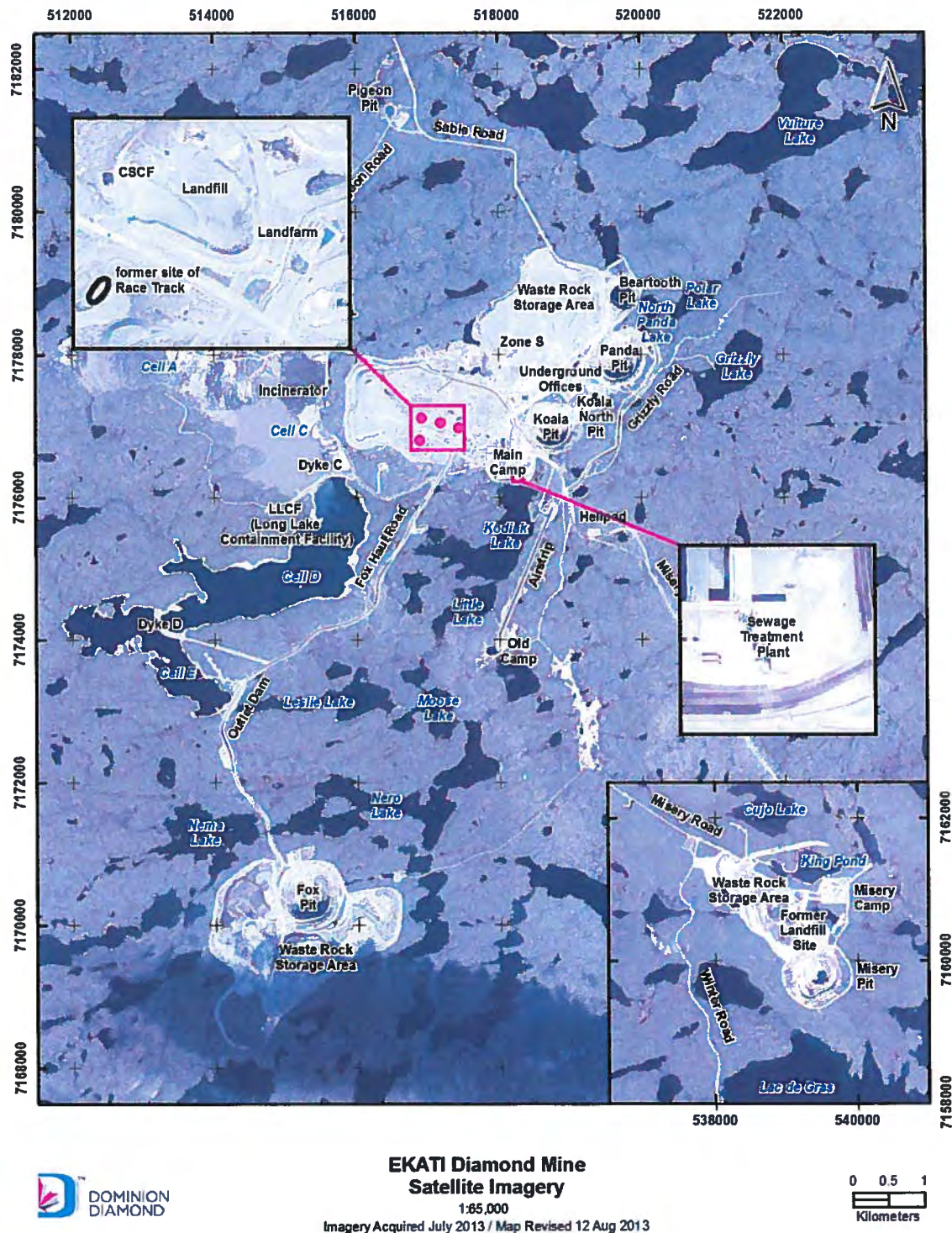


Figure 1 – Ekati Diamond Mine Site Map



## 5.0 – Solid Waste Landfill Description

The solid waste landfill was commissioned in July, 1998 and is located northwest of the Primary Crusher. This location is within the waste rock footprint of the Panda/Koala Waste Rock Storage Area. The solid waste landfill is used for the disposal of inert wastes generated as part of the operation of the mine.

In July 2002 the landfill was redesigned and is now enclosed by a ring of waste rock to minimize blowing of waste and to make it less accessible to wildlife. The ring will be filled starting at one side and working across to complete the level. The landfill will remain in the same area of the Panda/Koala Waste Rock Storage Area for the life of the mine and will be capped with a layer of coarse kimberlite rejects to minimize the possibility of spontaneous combustion.

Only inert, non-reactive solid wastes are disposed of in the landfill. These materials are delivered to the landfill by two methods:

- 1) Materials are gathered in roll on/off bins and delivered to the landfill by the Mine Services Department.

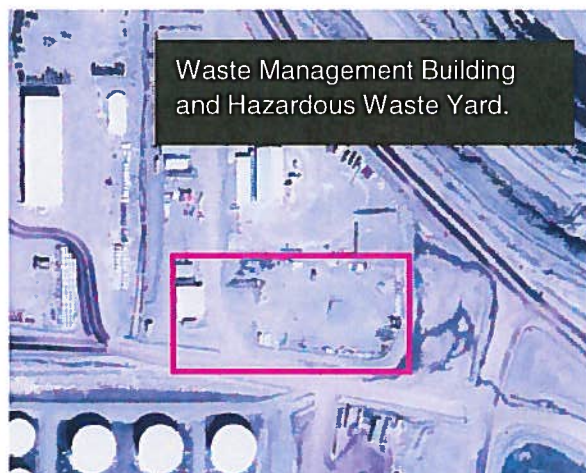
Figure 2 – Ekati landfill bin



- 2) Departments without access to roll on/off bins deliver waste to the landfill via light vehicles.

The department responsible for generating the waste is responsible for segregating the waste.

Landfill waste is compacted, contoured and covered on a regular basis using waste rock and/or coarse kimberlite rejects to minimize wildlife attraction while reducing aesthetic concerns due. Tires which are located in a different area are covered less frequently as they can be reused as impact barriers or the base of lay-down areas.



Waste that meets the criteria for one of or more of nine United Nations hazard classes must be delivered to the Waste Management Building (picture, left). In addition, waste liquid and recyclable materials must be delivered to the Waste Management Building for processing where it is identified, processed, labelled, and shipped off-site to licensed receivers. Food waste, paper and shredded cardboard material is to be delivered to the Incinerator Complex for incineration. For more information on the management of Hazardous Wastes see EKA PLA.2119.



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## 6.0 – Solid Waste Landfill Operating Plan

Daily operation of the landfill site is conducted by the Mine Services Department. The Environment and Waste Management Departments routinely audit the landfill to confirm that personnel are following the Landfill Management Plan.

Waste is unloaded at the working face of the landfill. As the levels in the landfill are filled with approved waste, the elevation will increase within the Waste Rock Storage Area. Mine Services co-ordinates and executes the compaction, contouring and covering of the waste using front-end loaders and dozers. Coarse kimberlite rejects from the process plant are used as cover material. Waste covering is completed as necessary to minimize blowing, reduce wildlife attraction, decrease the likelihood of spontaneous combustion, and reduce aesthetic concerns. A minimum cover is maintained over buried wastes at all times. The Landfill will be encapsulated in waste rock as part of reclamation at the end of mine life as outlined in DDEC's Interim Closure and Reclamation Plan.

The landfill is to be used for the disposal of non-hazardous materials that are generated as part of the operation of the mine or during construction or demolition.

### 6.1 - Inert Solid Waste

The following materials are accepted in the landfill:

- Ash,
- Incinerator residue,
- Construction waste,
- Plastics or synthetics,
- Rubber and rubber coated products,
- Conduit and insulated electrical wire,
- Siding, and
- Inert wastes arising from mine operations.

### 6.2 - Waste Not Approved for Landfill

The following materials are not accepted in the landfill:

- Hazardous waste,
- Putrescible waste,
- Food waste or waste containing food residues,
- Oily waste including oil filters or used absorbent pads,
- Used oil, fuels, lubricants or solvents,
- Grease and sludge,
- Asbestos,
- Aerosol cans,
- Paint products,
- Chemical waste,
- Lead acid batteries. and
- Salvageable or recyclable materials such as drums, vehicles and tanks.

## 6.3 – Tire Recycling Stockpile

Used light and heavy vehicle tires are stored in a designated area of the landfill. This area of the landfill is not covered until it is considered unlikely that the tires will be used in future engineering projects. The tire area is kept separate from the main body of the landfill to reduce the severity of any fire which may occur at the landfill.

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## 7.0 – Contingency Planning

The main issues for contingency planning directly related to the Landfill operations are:

- Improper disposal,
- Fire, and
- Extreme weather.

### 7.1- Improper Disposal

In the case where small amounts of unacceptable waste is found it will be picked up and relocated to the appropriate location by the Waste Management Assistants. Should larger quantities of unacceptable waste be noted in the landfill, these incidents are to be reported to the Team Leader – Facilities/Waste Management on radio channel 6 or the Environment Department staff on radio channel 9 for corrective action. An investigation of the miss directed waste will be held and from this investigation the department responsible may be identified. The department responsible is directed to initiate a cleanup as well as receiving information of proper disposal requirements. The Environment Department conducts twice weekly Landfill inspections for improper disposal. This information is reported in the Annual Wildlife Effects Monitoring Program Report.

### 7.2 – Fire

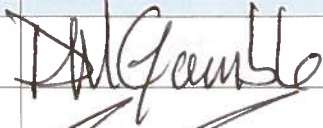
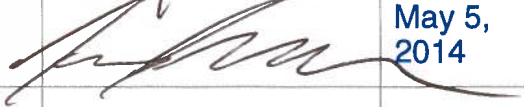
The risk of fire is best managed by prevention, however if fire breaks out or spreads to areas of waste the following actions can be taken:

- Assess the situation,
- Follow standard Ekati Diamond Mine emergency procedures to initiate response to the incident (Code 1),
- Segregate or extinguish burning waste if safe to do so using any suitable means,
- Cover flames using soil, crushed rock, coarse kimberlite rejects or snow, and
- If fire begins to spread and is out of your control move to a safe area and wait for instructions from the Emergency Response Team.

### 7.3 – Extreme Weather

Compaction of the waste will be continued through the winter months to maximize the landfill life span, minimize wildlife interaction and windblown materials. Weather Advisory Procedures are located in EKA PRO.1838.

## Approval Signatures Record

REVIEWER ROLE	NAME	SIGNATURE	DATE
Team Leader – Facilities/Waste Management	Rodney Gamble		May 5, 2014
Superintendent – Business Improvement/Non-Process Infrastructure	Howard Nowell		May 5, 2014

## EKA PLA.2119 Hazardous Waste Management Plan

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<b>Document Owner:</b>	Team Leader – Facilities/Waste Management
<b>Document Approver:</b>	Superintendent – Business Improvement/Non-Process Infrastructure
<b>Related Documents:</b>	EKA PLA.2117 Waste Management Plan EKA PLA.2118 Solid Waste Landfill Management Plan EKA PLA.2120 Incinerator Management Plan EKA PLA.2121 Hydrocarbon Impacted Materials Management Plan EKA.PRO.1831 Hazardous Materials Management Procedure
<b>Key Contacts:</b>	Superintendent – Business Improvement/Non-Process Infrastructure Team Leader – Facilities/Waste Management
<b>Change Requests:</b>	Team Leader – Facilities/Waste Management
<b>Brief Description:</b>	The Hazardous Waste Management Plan is designed to instruct generators and shippers of Hazardous Waste in proper on site delivery, packaging and shipping of wastes that are designated Hazardous.

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## 1.0 - Introduction

In accordance with Dominion Diamond Corporation's Sustainable Development Policy, Hazardous Wastes produced from mining operations on the site are to be handled, transported, stored or disposed of in a safe and responsible manner. This Hazardous Waste Management Plan is a comprehensive approach to the management of hazardous wastes from mining activities.

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## 2.0 - Objective

The objective of this Hazardous Waste Management Plan is to maintain a safe and healthy workplace at the Ekati Diamond Mine and ensure that potential adverse effects to the environment and wildlife are minimized through sound waste management practices. The Plan provides clear direction to Dominion Diamond Ekati Corporation staff, contractors and stakeholders how hazardous waste from the Ekati Diamond Mine is handled/ managed through each of the waste streams to final disposal.

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## 3.0 - Scope

This Hazardous Waste Management Plan covers procedures for handling hazardous waste produced from activities associated with the Ekati Diamond Mine including Main Camp, Misery Camp, and exploration activities. This plan is to give direction for managing a hazardous waste, which is no longer used for its original purpose and is intended for recycling, treatment, disposal or storage. This plan may reference other established Dominion Diamond Ekati Corporation plans to meet the requirements of the MVLWB Guidelines for Developing a Waste Management Plan

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## 4.0 – Hazardous Waste Management

Hazardous Waste is managed in accordance with federal and territorial regulations as well as applicable guidelines and codes of good practice. Dominion Diamond Ekati Corporation preferentially purchases non-hazardous materials. A pre-purchase program ensures all preferential purchase of non-regulated wastes. Through this program hazardous goods are evaluated and approved by the Health & Safety and Environment Departments prior to purchase. If a non-hazardous product is not available, approval will be based on using the most efficient/effective product when investigated by the product. Purchasing will only order product that has been approved.

Waste is segregated into different categories when it is generated according to the method of ultimate disposal. The current categories are as follows:

- Incinerator Waste – EKA PLA.2120
- Landfill Waste – EKA PLA.2118
- Hazardous Waste – EKA PLA.2119

The disposal location for and hazardous waste is at the Waste Management Building (Figure 1) where they are further processed. Further processing includes waste identification, bulking, shipment preparation and storage.

## 4.1 – Hazardous Waste Definition

The Government of the Northwest Territories (GNWT) has adapted the Federal Transportation of Dangerous Goods Act and Regulation which defines hazardous waste as a toxic byproduct of various processes: a byproduct of manufacturing processes or nuclear processing that is toxic and presents a potential threat to people and the environment. The nine classes are:

- Explosives,
- Gases,
- Flammable liquids,
- Flammable solids,
- Oxidizing substances and organic peroxides,
- Poisonous substances and infectious substances,
- Radioactive materials,
- Corrosive substances, and
- Miscellaneous dangerous goods.

Examples of hazardous waste at the Ekati Diamond Mine include aerosol cans, compressed gas containers, waste paint, waste fuel, medical sharps, and batteries.

## 4.2 - Regulations

The regulations governing the management of hazardous wastes are:

- Environmental Protection Act,
- NWT Waters Act, and
- NWT Public Health Act.

## 5.0 - Waste Management Building

Waste that is not incinerated or permitted for disposal in the solid waste landfill is either sent off site to be recycled or sent off site for further processing at the an approved Waste Transfer Facility in Yellowknife. Waste sent off site is preferentially recycled over other disposal options.



**Figure 1:** Waste Management Building and Hazardous Waste Yard

In general, waste that is to be sent off site is prepared for transport at the Waste Management Building. Waste Management Assistants collect segregated recyclables and hazardous waste from the operational areas on a daily basis and re-locate the waste to the Waste Management Building. Hazardous waste is also delivered by waste generators to the Waste Management Building for disposal. The waste is

immediately identified, labelled and stored safely by the Waste Management Advisor.

Once processed, the waste destined for off-site recycling/disposal is stored in the lined and bermed area at the Waste Management Hazardous Waste Yard. This area stores sealed barrels on pallets and 1,500 L totes of waste within the lined and bermed area. Inventory of the stored waste is updated weekly and sent to the Emergency Response Team (ERT) monthly in the case of a fire. This allows the ERT to respond to an incident in this area in a more informed fashion, with a current inventory of the materials stored in the yard especially when reactive and volatile chemicals/liquids are present.

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## 6.0 – Storage of Hazardous Waste

The following factors must be strictly monitored when storing hazardous wastes in the Waste Management Hazardous Waste Yard.

- Segregation,
- Ventilation,
- Climate/Environment,
- Handling,
- Security, and
- Record Keeping.

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## 7.0 – Shipping and Handling of Hazardous Waste

Hazardous waste is stored in the Waste Management Laydown Area and shipped out on the Winter Road backhauls. The trucks are loaded with the hazardous materials and shipped to a certified center for disposal or recycling. The bulk of our hazardous goods, approximately 70%, are therefore shipped in the winter months. However, if and when there is room available on the weekly Hercules planes throughout the remainder of the year, hazardous waste may be loaded into the plane to be delivered to a Waste Transfer Facility in Yellowknife. The waste is then processed and transported to certified receivers.

The Waste Management Advisor is the single point of contact for the shipping and handling of the hazardous waste. The Waste Management Advisor is responsible for receiving, identifying and placarding the waste and is also responsible for insuring the correct procedures are met for shipping the waste off site. Waste Management Advisor holds valid Transportation of Dangerous Goods (TDG) and International Air Transport Association (IATA) certification and follows these regulations to ensure compliance with federal, territorial and provincial standards.

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## 8.0 – Waste Documentation

There are three types of documents used for the disposal of hazardous wastes:

- Hazardous Waste Manifests,
- TDG Documents, and
- Corporate Records.

Waste Classification Procedures must be followed to classify the waste; once this is completed the Waste Management Advisor must create a Waste Manifest. The Waste Manifest has three sections of information with a site specific registration number associated with:

- The Generator,
- The Carrier, and
- The Receiver.

The Transportation of Dangerous Goods Regulations documents require the following information:

- TDG Shipping Name,
- Class,
- UN Number, and
- Packaging Group.


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## 9.0 – Corporate Records

Dominion Diamond Ekati Corporation keeps records of all Waste Manifests which track the off-site movement of hazardous waste. Copies of the manifests are saved for internal waste tracking purposes for hazardous materials. The copies serve as records and contain specific information about the waste production and disposal.

Disposal certificates of hazardous waste are also required by Dominion Diamond Ekati Corporation. These Certificates of Destruction serve as proof of the final destruction of the waste. These documents are provided to the Waste Management Department, matched to the original Waste Manifests, and kept as Records of compliance.

## Approval Signatures Record

REVIEWER ROLE	NAME	SIGNATURE	DATE
Team Leader – Facilities/Waste Management	Rodney Gamble		May 5, 2014
Superintendent – Business Improvement/Non-Process Infrastructure	Howard Nowell		May 5, 2014





## EKA PLA.2120 Incinerator Management Plan

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<b>Document Owner:</b>	Team Leader – Facilities/Waste Management
<b>Document Approver:</b>	Superintendent – Business Improvement/Non-Process Infrastructure
<b>Related Documents:</b>	EKA PLA.2122 Waste Rock and Ore Storage Management Plan EKA PLA.2123 Waste Water and Processed Kimberlite Management Plan EKA PLA.2121 Hydrocarbon Impacted Materials Management Plan EKA.PLA.2119 Hazardous Waste Management Plan EKA PLA.2118 Solid Waste Landfill Management Plan EKA WI 2102 .01 Incinerator Work Instruction EKA PRO.1838 Weather Advisory Procedure Technical Document for Batch Waste Incineration-Environment Canada-Jan. 2010
<b>Key Contacts:</b>	Superintendent – Business Improvement/Non-Process Infrastructure Team Leader – Facilities/Waste Management Superintendent – Environment Operations Environmental Advisor - Compliance
<b>Change Requests:</b>	Team Leader – Facilities/Waste Management
<b>Brief Description:</b>	The Ekati Incinerator Management Plan is Dominion Diamond Ekati Corporation's approach to incineration of waste and outlines directions for managing the various waste streams. The objective is to minimize potential adverse effects to people and the environment, including wildlife and wildlife habitat.

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# 1.0 Introduction

## 1.1 - Background

The Ekati Diamond Mine utilizes incineration technology to reduce the volume of burnable waste by up to 80 – 90%, manage waste streams, and reduce wildlife attractants. Burnable waste generated during the day to day operation of the mine complex is managed by the Facilities and Waste Management Team.

Recognized as an environmentally sound disposal method for municipal type wastes, incineration is utilized at facilities across Canada. The Ekati Diamond Mine is remote and has limited options to manage waste generated daily.

Incineration is a waste treatment process that involves the combustion of organic substances contained in waste materials. Incineration is an efficient means of reducing the mass and volume of waste generated. Burning these waste streams is important to reduce the impact to local wildlife to reduce scavenging around the camp.

## 1.2 - Objectives

The Incinerator Management Plan (IMP) has been created to ensure the safe and efficient operation of incinerator units at the Ekati Diamond Mine. The IMP includes a detailed look at the Ekati Diamond Mine's incineration waste cycle; from waste segregation, collection and preparation, to incinerator operation, data recording and ash management. The IMP includes initiatives to minimize incinerator waste volumes as well as reduction or elimination of specific waste streams to reduce harmful gases that are present in the stack emissions; particularly dioxins and furans. The Ekati Diamond Mine's commitment to safety will be referenced throughout the document.

The Ekati Diamond Mine is committed to operating in a sustainable manner and with the utmost integrity to enhance the positive economic, environmental and social impacts of its business while maximizing the resources of the mine as outlined in the Dominion Diamond Corporation Sustainable Development Policy. The commitment is guided by principles of social responsibility, environmental stewardship, economic sustainability, and continual improvement.

Consistent with the Ekati Diamond Mine's commitment to be a responsible operator, the objectives are described as follows:

- *Compliance with regulatory and permit requirements,*
- *Prevention of public health risk,*
- *Protection of the operator, and*
- *Reduction of emissions.*

The IMP is developed to illustrate that these objectives are built into the operational approach at the Ekati Diamond Mine from source collection of waste through to safe handling.

## 2.0 Applicable Standards and Technical Documents

### 2.1 - Introduction to Canada Wide Standards

Canada-wide Standards (CWS's) are intergovernmental agreements developed under the *Canadian Council of Ministers of the Environment (CCME)*. CWS's can include qualitative or quantitative standards, guidelines, objectives and criteria for protecting the environment and reducing risks to human health. Canada has identified dioxins, furans and mercury as emission products that need to be managed as they pose a potentially significant health and environmental threat. There are two standards available;

#### i. The Canada Wide Standards for Dioxins and Furans

Dioxins and furans have been declared 'toxic' under the *Canadian Environmental Protection Act (CEPA)*. Due to their persistent and bio-accumulative characteristics, they are slated for virtual elimination under the *Canadian Environmental Protection Act (CEPA)*, the federal *Toxic Substances Management Policy (TSMP- 1995)* and the *CCME Policy for the management of Toxic Substances (1998)*.

Table 1 below illustrates CWS guidelines for dioxins and furans.

**Table 1. Canada-Wide Standards for Dioxins and Furans (reference doc).**

Incineration Source	Dioxin/Furan Standard
<b>Municipal waste</b>	<b>80 pg I-TEQ/m<sup>3</sup></b>
Hazardous waste	80 pg I-TEQ/m <sup>3</sup>
Sewage sludge	80 pg I-TEQ/m <sup>3</sup>
Medical waste	80 pg I-TEQ/m <sup>3</sup>

pg = picogram, I-TEQ = international toxic equivalent, m<sup>3</sup> = cubic metre

#### ii. The Canada Wide Standards for Mercury Emissions

According to the CCME, waste incineration has historically been a contributing source of mercury emissions in Canada; however reductions in emissions have been confirmed since the implementation of the CWS for Mercury. Unlike dioxins and furans, mercury is not created in an incineration system; emissions are directly related to the presence of mercury in certain waste materials.



Segregation and elimination of mercury containing waste streams is the only method of eliminating or reducing mercury in stack emissions. Table 2 below illustrates CWS guidelines for mercury.

**Table 2. Canada-Wide Standard for Mercury (reference doc).**

Incineration Source	Mercury Standard
Municipal waste	20 µg/Rm <sup>3</sup>
Hazardous waste	50 µg/Rm <sup>3</sup>
Sewage sludge	70 µg/Rm <sup>3</sup>
Medical waste	20 µg/Rm <sup>3</sup>

µg = microgram, Rm<sup>3</sup> = reference cubic metre

## 2.2 - Technical Document for Batch Waste Incineration

The Technical Document for Batch Waste Incineration was issued by Environment Canada in January 2010 and is intended to act as a guideline for owners and operators of various incinerators. The document includes:

- *A discussion on the importance of reducing, reusing and recycling to divert wastes from incinerator disposal,*
- *Methods for the selection of appropriate incineration technologies to meet specific waste management requirements,*
- *Operational requirements that should allow batch waste incinerators to meet the intent of the CWS for dioxins/furans and mercury, and to reduce the release of other toxic substances,*
- *Recommendations on record keeping and reporting.*

The document focuses on batch waste incinerators ranging in size from 50 to 3,000 kg of waste per batch and recommends a six-step process for batch waste incineration.

Step 1 – Understanding 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.

## 3.0 Incinerator Management

### 3.1 - Step 1 – Understand Your Waste Stream:

Only certain wastes are acceptable for incineration at the Ekati Diamond Mine, these include:

- Food waste
- Food contaminated packaging
- Paper office waste

A waste audit was performed to determine the quantity and composition of waste that requires incineration. The information gained from the audit assisted in determining key opportunities to segregate non-burnable waste at source, reduce the amount of waste generated, re-use certain materials and recycle as much as possible before incineration.

Table 3 illustrates the typical waste stream composition.

**Table 3. Ekati Waste Stream Composition**

<b>Waste Type</b>	<b>Ekati Main Camp and Misery Camp (percentage of waste by weight)</b>
Food Waste	57
Paper	17
Plastic	21
Metal	1.5
Inappropriate waste (Rags, PPE, rubber, aerosol cans)	3.5

\*NOTE: 10 random bags from pre-determined locations were collected and sorted everyday, for a 4 day period.

During daily incinerator operation, waste is segregated at the source to ensure non-burnable waste streams do not enter the incinerator. All burnable waste is collected in transparent corn oil based bags and placed in waste containers labelled "Incinerator Waste" located throughout the Ekati Diamond Mine. Prior to loading the waste into the incinerator, the waste will be visually inspected by the incinerator operator to ensure it does not contain inappropriate waste materials. General classes of inappropriate wastes include:

- Hazardous Wastes;
- Aerosol Cans
- Oily rags;
- Electronics waste;
- Tires
- Clothing
- Batteries
- Mercury-containing materials/waste (fluorescent lamps, thermometers, thermostats);

- Asbestos waste;
- Liquid wastes including petroleum hydrocarbons and sewage;
- Metal and glass;
- Materials/wastes containing heavy metals (, pressure or chemically treated wood);
- Uncontaminated plastics, including chlorinated plastics;
- Bulky materials such as machinery parts or large metal goods such as appliances;
- Radioactive materials such as smoke detectors;
- Potentially explosive materials such as pressurized vessels, unused or ineffective explosives.
- Other hazardous materials such as organic chemicals (e.g. PCBs, pesticides) etc.

When encountered, all inappropriate waste material shall be removed where possible. If the inappropriate waste is too intermixed, the bag is to be rejected and not incinerated. Inappropriate and rejected wastes shall be stored and handled in accordance with the Hazardous Waste Management Plan.

### 3.2 - Step 2 – Select the Appropriate Incinerator (or Evaluate the Existing System).

For facilities incinerating more than 26 tonnes of waste per year, dual chamber controlled air incinerators are recommended. These systems are capable of incinerating a wide range of wastes and, when properly maintained and operated, can achieve the Canada-wide Standards for dioxins, furans and mercury.

The Ekati Diamond Mine has installed and commissioned two Westland Model CY-130-CA-O-D incinerators to effectively manage the domestic waste generated. The stated capacity is 130 kg/h using diesel as the auxiliary fuel for incineration. These incinerators manage burnable waste generated at the Ekati Diamond Mine.

### 3.3 - Step 3 – Properly Equip and Install the Incinerator.

There are special building and equipment considerations that need to be considered when installing an incineration system. Some considerations include providing a building for the incinerator to allow operators and equipment to work inside a controlled environment, as opposed to operating or working on the incinerator in extreme arctic temperatures. The building will require construction materials that are resistant to flames/heat and the building should be equipped with sufficient fresh air or air exchangers to allow operators to operate the incinerators without the need for additional respiratory protection. Note there are certain operator activities that will require additional PPE including respiratory protection such as raking waste or handling ash, despite having sufficient fresh air inside the building.

Equipment considerations include the installation of a scale to weigh waste and a data acquisition system to store operating data from the incinerator. This information gives the operators the data required to adjust and improve performance.

The incinerators, complete with a ram feeder and emission reducing Venturi scrubbers have replaced the older models that served the Ekati Diamond Mine prior. The incinerators are housed in a custom designed incinerator complex. The complex, complete with an industry leading air exchange system was designed to reduce the risk of smoke and particulate exposure to operators. The complex allows personnel to operate and repair the incinerators in a temperature controlled environment, which also improves the operation efficiency of the incinerators.

The Ekati Diamond Mine has decommissioned the CY-20-CA-D incinerator located in a separate room attached to the waste management facility. This incinerator was previously used to burn oily rags and absorbent pads and this practice has been stopped. The Ekati Diamond Mine collects oily rags and absorbent pads and transports them off site to an approved facility for disposal.

One of the two older CY-50-CA-D incinerators that previously serviced the camp was also decommissioned. These two incinerators were operated in a separate room attached to the main camp up until December 2011. The remaining incinerator has undergone repairs and is part of the contingency plan in the event that unplanned maintenance or poor weather prevents access to the incinerator complex which is located approximately 5 km from the main camp complex.

**Figure 2. New Incinerator Building**



**Figure 3. Inside the New Incinerator Building**



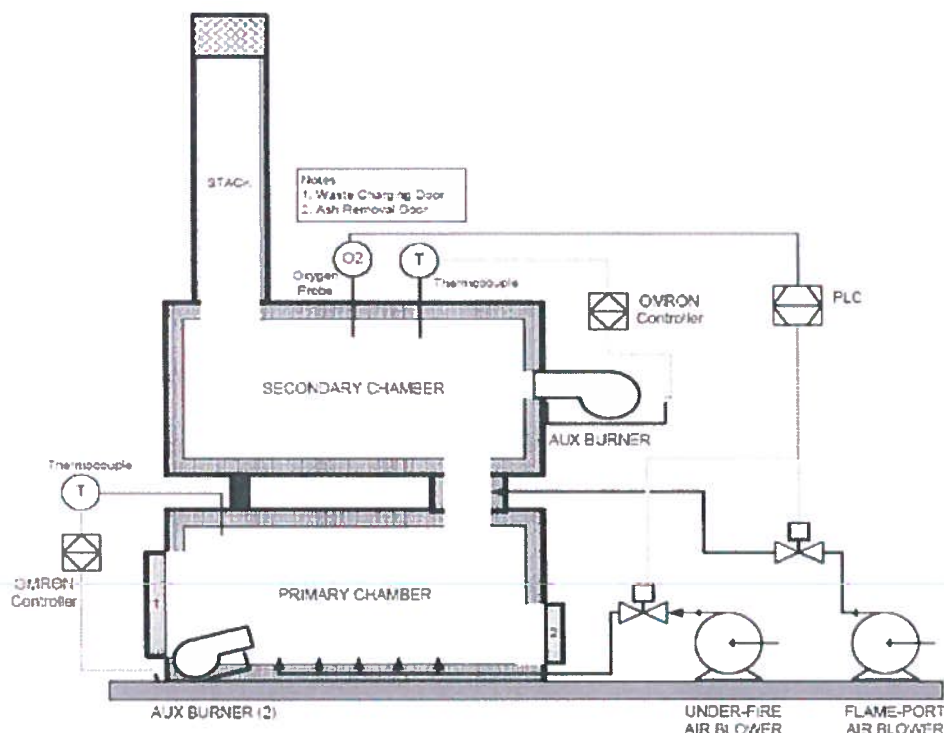
**Table 4. Information Pertaining to Ekati Diamond Mine Incinerator Models**

<b>Incinerator Model</b>	<b>Location</b>	<b>Status</b>	<b>Comments</b>
CY-130-CA-O-D w/ Venturi Scrubber	New Incinerator Building	Operational	New incinerator with a Venturi scrubbing system to reduce stack emissions
CY-130-CA-O-D w/ Venturi Scrubber	New Incinerator Building	Operational	New incinerator with a Venturi scrubbing system to reduce stack emissions
CY-50-CA-D	Accommodations Complex	Operational	Used for contingency in the event of severe weather
CY-50-CA-D	Accommodations complex	Non Operational	Unit is decommissioned and removed
CY-20-20-FA-D	Waste Management Building	Non Operational	No longer burning used rags or absorbent pads onsite, this unit is decommissioned



Figure 5 provides an overview of major components of the Westland Model CY-130-CA-O-D incinerator.

**Figure 5. Schematic of Incineration System - Model CY-130-CA-O-D**



Personnel operating or performing maintenance on the incinerator must be competently trained before working on the unit. A more detailed discussion of individual components, features and functions of the incinerator can be found in the Westland Operating and Maintenance Manual Model CY-130-CA-O-D Operating and Maintenance Manual (available onsite) and the Ekati Diamond Mine CY-130-CA-O-D Incinerator Work Instruction EKA WI 2102 .01. The Work Instruction provides detailed pictures of the specific components and required operation however, only properly trained individuals are permitted to operate the incinerator units.

### 3.4 - Step 4 – Operate the Incinerator for Optimum Combustion.

A number of considerations are taken into account to ensure the incinerators are operated safely and efficiently. Efficient operation is required to warrant complete combustion of the waste and to reduce the formation of dioxins and furans in the stack gas. As described in Section 5 Training Requirements, the Ekati Diamond Mine incinerator operators are properly trained and signed off as competent by the incinerator manufacturer to ensure the incinerators are operated as per the manufacturer's instructions. The Facilities Team Leaders partake in the training sessions so the operators can be directed in the event of operational questions or safety issues and maintain continuity with different operators.

Waste received at the incinerator complex is sorted according to the heating value (caloric value) of the waste. To facilitate this, waste is collected in transparent corn oil based bags. Food or moist waste streams will have a low caloric value whereas paper, wood, cardboard or greasy wastes will have higher caloric values.



Ekati Diamond Mine incinerators operate as a batch feed waste system in a non-continuous manner and are equipped with a ram feeder that utilizes a hydraulic arm on a steel plate to push the waste from the charging chamber into the primary chamber. The ram feeder reduces the operator's exposure to heat, smoke and possible explosions from misdirected aerosol cans when charging the incinerator. Batch incinerators are designed to accept wastes with a variety of caloric values and operate most efficiently with a "mixed" load. The incinerators are charged with a large volume of waste prior to the initiation of the burn cycle and no new waste is added after the door is sealed and the unit initiated. The operators select waste from each category and mix it to achieve the manufacturer's specified input calorific value. Care is taken on how to introduce the waste streams into the incinerator to increase the unit's efficiency. High caloric value waste (paper) is loaded first and low caloric value waste covers the high caloric waste to create a more homogenous combustion process. The door is usually opened only once half way through the burn cycle to allow the waste to be raked and turned over to ensure complete combustion.

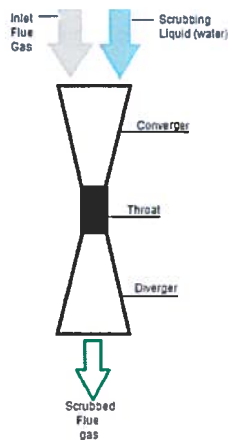
#### 3.4.1 Advantages of the batch feed system;

- Operators are able to load up to three batches a day;
- Batch operation allows greater control of temperature and air throughout the burn process to ensure the most efficient combustion of waste;
- Air turbulence can be reduced in the primary chamber so fewer particulates are released into the air from the stack emissions;
- Less raking and disruption of ash ensures the Venturi units are not overloaded with particulate matter;
- Less exposure to heat and smoke by limiting the amount of time operators are charging the incinerator with waste and raking ash;
- Units are easier to monitor and operate;
- Once waste is sealed in the primary chamber and burning, there are fewer temperature fluctuations and no new waste is added until the next cycle.

#### 3.4.2 Venturi scrubber system

Figure 6 is a schematic diagram of the wet Venturi scrubbers installed on each incinerator. The wet scrubbers use water as the scrubbing liquid. The stack gas is introduced into the converger with the water and the velocity is accelerated. Once the stack gas and water mixture reaches the throat, it is at a velocity of 200-800 km/hour to atomize the scrubbing liquid. The high turbulence causes the atomized liquid droplets to collide with the particulate matter in the flue gas. Acid gases are removed as the water droplets collide and scrub the acidic gases out of the stack gas. The efficiency of the scrubber increases as the stack gas velocity in the throat increases and is dependent on the flow rate of the scrubbing liquid (water) to the stack gas.

**Figure 6. Schematic Diagram of a Venturi Scrubber**



### 3.4.3 Dioxins and furans

Dioxins and furans can form through natural processes such as bush fires and volcanic eruptions, and great quantities are produced from human activity. Waste incineration has historically been responsible for a significant portion of the dioxins and furans emitted in Canada. Incineration is the rapid oxidation of material with the formation of heat and typically solid ash and gaseous waste products.

### 3.4.4 Dioxins and furans formation in incinerators

Dioxins and furans can form from the thermal breakdown of organic materials in the presence of transition metals and chlorinated compounds. Dioxins and furans formation takes place as the flue gas cools from the initial 1000°C to about 250°C, with peak dioxin and furan formation occurring in the range of 650°C to 250°C.

Certain operating conditions increase the potential for formation of these compounds including;

- *Improper operation;*
- *Incomplete combustion of fuel;*
- *An oxidizing atmosphere;*
- *Presence of a chlorine source (plastics contain high amounts of chlorine); and*
- *Presence of catalytic metals (copper, iron, manganese, zinc, etc.).*

### 3.4.5 Control of Dioxin and Furans from Incinerators

The Ekati Diamond Mine has selected incinerator technology that should reduce the extent to which dioxins and furans can form. This is achieved through the following mechanisms:

**Burn Control:**

*Utilize a dual chamber incinerator technology with a clear burn process to reduce erratic burn conditions and operator error.*

**Temperature and Residence Time:**

*The dual chamber system has a residence time of 2 seconds or greater at 1,000°C. This should allow all the materials to be combusted completely so that no precursors are available for dioxin and furan formation during cooling.*

**Air Pollution Control System:**

*Each incinerator is outfitted with a wet venturi scrubber that utilizes water as the scrubbing liquid. Acid gases are removed as the water droplets collide and scrub the acidic gases out of the stack gas. The efficiency of the scrubber increases as the gas velocity in the throat increases and is dependent on the flow rate of the scrubbing liquid (water) to the flue gas.*

### 3.4.6 Inspections

Routine inspections of the incinerator and associated facilities will be conducted by a competent incinerator operator prior to every use of the incinerator. Use of the Work Instruction (WI) checklists will ensure that each operator diligently operates and inspects the unit consistently. These checklists are also a source of information when trouble shooting or maintenance is required for the unit.

The inspection will include, but not necessarily be limited to:

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

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

- *Inspect refractory for large cracks (not expansion cracks);*
- *Check combustion air hole for plugging;*
- *Inspect door gaskets for damages or wear.*

### 3.4.7 Pre-Operational Checks

This WI checklist is to be completed each day prior to start-up of the incinerator. This pre-inspection ensures good housekeeping and that thorough inspections are completed on various aspects of the incinerator daily. The checklist also directs the operator to properly

weigh and document the amount of ash produced from the last burn. See the Pre-Operational Checklist (Appendix A).

### 3.4.8 Operational Checks

This checklist is done throughout the day as the incinerator is operational to monitor each of the burn cycles. Depending on volume of waste available and collection times, there are usually three burns a day. For each cycle the weight of all streams of waste are documented separately. These waste streams are divided up into the following categories: food waste, paper waste, sewage sludge and other. Non-routine waste streams must be listed and checked with the Team Leader Facilities/Waste Management in advance to ensure that the new waste is in fact “burnable” according to regulations and guidelines. This checklist also monitors the temperature throughout the burn. This can be important information when trouble shooting a problem. See the Operational Checklist (Appendix B).

### 3.4.9 Fuel Storage

The Westland Model CY-130-CA-D-O incinerator is fuelled by diesel stored in a double walled tank located inside the incinerator building. Due to the size of the tank the fuel must be checked daily and additional fuel requested in a timely manner to ensure that it does not run out of fuel mid-burn. The fuel volumes consumed are documented on the daily pre-operational checklist. The fuel storage, secondary containment and fuel delivery lines are subject to regular inspection. There are also spill kits available nearby in the event of a spill or leaking fuel line.

## 3.5 - Step 5 – Safely Handle and Dispose of Incinerator Residues.

Ash from the primary chamber and water from the scrubber system of the incinerator may contain properties that are hazardous to the health of the operator or the environment. Training and a comprehensive health, safety and environment program ensure operators are aware of the specific hazards of operating an incinerator as well as how to safely control them. Required PPE is easily accessible to the operators and they must be familiar with how to use it properly, particularly respiratory protection.

### 3.5.1 Ash Management

Ash produced from the combustion process 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 ash depends on what waste is burned and the completeness of the combustion process.

If incinerator units are operated efficiently, the volume of waste will be reduced by 80-90%. The remaining 20-10% of the material is bottom ash and will need to be removed from the primary chamber before the start of each shift. To ensure the safety of the operator, PPE,

including proper respiratory protection must be worn when handling ash. All effort should be made to disturb the ash as much as reasonably possible.

Once the primary chamber of the incinerator is cool, the incinerator operator will remove the ash from the previous day before reloading the incinerator. During ash removal, the operator will inspect and clean the combustion air holes and will inspect the burner tip and refractory for damage.

The ash is placed into a wheeled metal container that fits perfectly under the ash door to collect the ash that is raked out each morning. A heavy lid is used to ensure dust is not disturbed during the handling. Once weighed and documented, the wheeled container is placed in a temporary storage area until full. When full, this container is loaded onto a truck with a hydraulic tailgate and is transported to the landfill. A designated area has been provided for incinerator ash. The incinerator operators will regularly document the volume of ash produced from the incinerators. This tracking system was initiated in the beginning of 2012 and can provide up to the day reporting for all ash disposed in the landfill.

The Ekati Diamond Mine has implemented an ash sampling program and will sample the ash twice per year. The resulting analysis confirms that the ash does not contain any hazardous properties and is compliant with the Ekati Diamond Mine's landfill requirements. This analysis included testing for the following parameters;

- *Leachable metals;*
- *Leachable mercury;*
- *Leachable benzene, toluene, xylenes, and ethyl benzene;*
- *PH test;*
- *Paint filter test;*
- *Flash point.*

### 3.5.2 Water Management

Waste water is also produced during the incineration process. The water is used in conjunction with the Venturi scrubber system to remove as much particulate from the hot stack gases entering the Venturi scrubber system as possible. The water is sprayed through pressure nozzles that atomize the water creating a curtain of water that the hot stack gases complete with the particulate pass through; the water scrubs the particulate out of the gases and returns the water to the scrubber tank to be reused in the process. As the water continues to be used in this process it gains the particulate and becomes dirty and un-useable. At regular intervals the water is removed and replaced with fresh water as it loses its ability to be functional. The particulate contaminated water is disposed of in the Long Lake Containment Facility Cell B.



### 3.6 - Step 6 – Maintain Records and Report.

The Ekati Diamond Mine maintains detailed records for the operation of the incinerator including site specific pre-operation, operational, maintenance and monthly checklists. Records are kept on file for each burn and are available for audit. Out-of-specification situations are raised immediately and the incinerator will not be used until maintenance or remedial measures have been applied. A formal incident report must be completed if there are any out-of-specification conditions associated with the incinerator, its performance, waste or any of the emissions, ash or smoke.

To demonstrate appropriate operation and maintenance of the incinerator, the facility will maintain records containing, at minimum, 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,*
- *Records of quantities of waste incinerated,*
- *Summarized annual auxiliary fuel usage,*
- *A list of all shipments of incinerator residues (ash and water), including the weight transported and disposed of by type if necessary, and the location of the disposal site, and*
- *Results of any emissions measurements or any ash sampling data collected during the period.*

Raw data records from the operation of the incinerator are retained for at least 2 years.

A monthly waste summary report is completed by the Incinerator Operators at the end of the month. This report tracks incinerator burns per day, the weight of waste prior to the burn and the amount of waste accumulated daily. This information is entered into Excel and a chart compares the volume of waste burned to the amount of ash produced. This is a tracking tool for monitoring volumes of waste and ash. This is submitted once a month to the Departmental Managers for review.

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## 4.0 Health, Safety and General Requirements

The Ekati Diamond Mine's incinerators offer a number of upgraded safety features and emissions control systems compared to the previous units. The incinerators are now located five (5) kilometers from the accommodation complex where the camp population resides.

### 4.1 Safety Equipment and Protocol

The Ekati Diamond Mine has facilitated numerous industrial hygiene tests on the operators as well as the general air quality inside the building. While the units are in operation it has been determined that the air quality inside the building is safe and does not require the use of respirators. However, during ash handling and raking, the operators are required to wear additional PPE, including respirators.

Samples of ash were analyzed to determine if the ash is hazardous based on the presence of heavy metals. These tests have enabled the Ekati Diamond Mine's Health and Safety team to make the recommendations below which protect the health and safety of the operators and visitors to the incinerator complex.

The following personal protective equipment must be used by the operators while inside the incinerator building at all times:

- *Flame retardant coveralls with full length sleeves,*
- *CSA approved, Grade 1 safety footwear,*
- *CSA/ANSI approved safety glasses, and*
- *Hearing protection is recommended and is not a requirement.*

Visitors are required to meet all the requirements above, and are not required to wear coveralls. A safety vest replaces the requirement for coveralls.

The personal protective equipment related to specific tasks of the operation of the incinerator is as follows:

- *Ash removal and handling:*
  - *Half or full face mask with P100 particulate/acid gas/organic vapour cartridge,*
  - *Aluminized hood and suit, and*
  - *Heat resistant gloves.*
- *Waste charging:*
  - *Heat protective coveralls and gloves,*
  - *Long cuffed, puncture proof gloves, and*
  - *Half or full face mask with P100 particulate/acid gas/organic vapour cartridge.*

#### 4.1.1 Possible Hazards

The hazards that could be encountered arise from the following (not in any order of importance):

- *Contact with waste (infectious or toxic components, or sharps),*
- *Exploding aerosol cans when operators open the ash door to stir the ash,*
- *Exposure to heat, from contact with hot surface or radiation from the primary combustion chamber when the waste charging door or ash removal door is opened,*
- *Exposure to smoke/emissions when loading and raking ash, and*
- *Strain while lifting bags of waste into the ram feeder.*

The general precautionary actions include:

- *Not opening waste batches to hand sort items already bagged unless you see something that would be dangerous to burn (explosives, aerosols, batteries),*
- *Not touching hot surfaces, and minimum exposure to heat radiation through open doors,*

- *Do not open ash doors during combustion except when required to stir ash,*
- *No charging waste in mid burn, wait for next cycle,*
- *Wearing appropriate personal protective equipment for charging waste and raking the primary chamber, and minimize the time for those tasks,*
- *Allow waste to combust longer in the primary chamber before stirring waste. This will allow any aerosols that unknowingly made their way into the incinerator to explode inside the chamber reducing the possible harm to personnel,*
- *Use of magnetic signs will be used during raking to inform visitors of the respiratory risk before entering the incinerator,*
- *Ensuring additional air exchange systems are hooked up to the hood over the incinerator ash door and are operational when raking the ash,*
- *Operators emptying the ash at the landfill are required the use of the P100/acid gas/organic vapour cartridges to reduce exposure, particularly in windy conditions while dumping ash, and*
- *Bags of waste are not to weigh more than 40 lbs to ensure the safety of the operator and to ensure the bags do not rip from the weight of the garbage.*

## 4.2 Weather Event Contingency Plan

In Northern and remote locations, such as the Ekati Diamond Mine, winter storms can be severe and disrupt normal work operations. This can cause significant issues for remote camps as waste must be burned daily to maintain a balance of waste produced to waste burned. There are three levels of weather events at Ekati Diamond Mine starting with a Level 1 weather event and proceeding to a Level 3 weather event. Each level has different procedures required to be followed to ensure the health and safety of all personnel when weather conditions may make work unsafe or would impeded a rescue attempt. As such, the Ekati Diamond Mine has developed contingency plans depending on the level of weather event restricting work. The contingency plans discussed in this IMP will only consist of instructions for incinerator operators. More detailed information is provided in the Ekati Diamond Mine Incinerator Work Instruction EKA WI 2102 .01.

During a weather event the incinerator operators are to remain inside the building together and shall locate and inventory the emergency food supply and advise the Facilities Team Leader of the results. Incinerator operators are to maintain contact and check in with the team leader every hour. If the incinerator operators are directed by the Facilities Team Leader to leave the building, incinerator operators must inform the Facilities Team Leader of their departure from the incinerator complex and upon immediate arrival to the accommodations complex.

If it is determined to be too dangerous for travel due to reduced visibility and/or blowing winds causing drifts to form on the roadway, the incinerator operators may be informed to stay safely inside the incinerator complex by the Facilities Team Leader. Food and water rations, in addition to first aid and blankets are available at the incinerator complex, in the event that personnel cannot leave safely. Communications will be maintained between the incinerator operators and the Facilities Team Leader and includes hourly call-ins.

If a weather outage lasts for longer than one day or the operators are unable to safely drive to the incinerator complex, the contingency plan will commence which allows for the temporary burning of waste using the CY-50-CA-D incinerator in the accommodations complex. This will only be

implemented during rare times when severe weather prevents safe travel to the new incinerator building.

Limited volumes of garbage will be incinerated in this unit due to the lack of emission controls on older units. The CY-50-CA-D will only be used in emergency situations to ensure that garbage does not pile up and become a wildlife or human health hazard until the incinerator building can be safely accessed.

**\*\*NOTE\*\***

In the unlikely event severe weather prevents communication with the accommodations complex or any personnel for longer than 2 hours, operators are not to leave the building and shall collect emergency supplies and food and continue to attempt to contact the camp until communication is made or ERT personnel arrive. Do not attempt to drive back to camp if communication cannot be established.

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## 5.0 Training Requirements

The incinerator units, Venturi scrubbing and ram feeding systems are multifaceted and require training and an understanding of the combustion theory to operate safely and properly. If misused, the incinerators could pose significant health and safety related issues. It is therefore imperative that operators understand the risks and receive training to eliminate or reduce these risks. The manufacturer's comprehensive training program with competency assessments and sign off will ensure operators are operating the incinerators efficiently and safely.

The Ekati Diamond Mine's policy requires that the incinerator operators and the Facilities Team Leaders with the responsibility of supervising or operating the CY-130-CA-D-O incinerator to receive training on the incinerator, read and comprehend this Incinerator Management Plan, the Operating and Maintenance Manual and the Ekati Incinerator Work Instructions.

The manufacturer's comprehensive training program ensures each operator is certified to safely and efficiently operate the incinerators. This training consists of a theory component and hands on training. The theory component is essential in providing operators with the basics in the combustion theory and incinerator management.

The theory component will cover the following topics:

- Key issues and challenges in waste incineration.
- Basics of waste incineration:
  - Incineration technology,
  - Theory,
  - Basic concepts, and
  - Efficient incineration of waste.
- Key components and functions of incinerator operation:
  - Pre-checks,
  - Operation, and
  - Maintenance and Monitoring.

To successfully complete the theory portion, a grade of 80% is required. Once achieved, operators will then advance to hands on training on the incinerator and scrubber units. The training also includes identification of activity related risks, knowledge and use of job-specific PPE, as well as proper handling, storage, and disposal of all ash and waste water generated from the incinerator complex. The training is both job-specific and equipment-specific and is provided to any site personnel assigned the responsibility to oversee, inspect, maintain, or monitor the incinerator.

The theory and hands on components are performed under the supervision and direction of the manufacturer or certified trainer. If determined competent, regarding the operation and understanding of the incinerator the operator will receive certification to operate the CY-130-CA-O-D with Venturi scrubbers and ram feeder.

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## 6.0 Emissions Monitoring

As a responsible generator, the Ekati Diamond Mine has established a baseline for the air emission parameters of concern. The parameters of concern include dioxins and furans, and metals. To determine this, the Ekati Diamond Mine coordinated a certified analytical laboratory to perform stack tests on each incinerator independently. Three tests were completed for each incinerator.

In addition, the following parameters are also tested.

- Volume flow rate (out of stack),
- Stack gas temperature,
- Moisture Content,
- NO<sub>2</sub>,
- SO<sub>2</sub>,
- O<sub>2</sub>, and
- Particulates.



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## 7.0 Conclusion

The Ekati Diamond Mine is dedicated to Health, Safety, Environment and Community and continuous improvement. The Ekati Diamond Mine follows the guidelines laid out in the Technical Document for Batch Waste Incineration as issued by Environment Canada, using this document as a base for the development of best practices, training, and the implementation of improvement activities.

The Ekati Diamond Mine has focused on waste segregation and has concentrated on reducing, reusing and recycling material, as well as changing the materials that are allowed at site. The Ekati Diamond Mine has moved from plastics to corn oil, soy and bamboo products. This has reduced the amount of plastics that need to be recycled and that end up in the incinerator.

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# Appendix 1

## Pre – operational Checklist

### EKATI Incinerator Building

Date: \_\_\_\_\_

Name of Operator(s): \_\_\_\_\_

### Check the following:

- ☐ Area around incinerator Clean.
- ☐ Turn on Scrubber tank pumps for both tanks.
- ☐ Beginning on the South Unit, inspect dump stack lid seal for damage.
- ☐ Check for water flow through the venturi nozzles. **Use Face Shield for your safety.**
- ☐ Ensure that "Caution" barrier has been returned to ladder after climbing down.
- ☐ Check fuel day-tank for
  - ☐ Power Light
  - ☐ Set in "Auto" mode.
  - ☐ Sufficient fuel level (Use dip stick).

- ☐ Ensure that all 5 fuel system valves are set to open position.
- ☐ Turn on both fuel pumps.
- ☐ Open scrubber tank dirty water valve.
- ☐ Close process water make-up valve.
- ☐ Close venturi supply valve.
- ☐ Close venturi supply by-pass valve.

#### **South Unit Scrubber Water is now Draining.**

- ☐ Ensure valves on the Process Water System are open.
- ☐ Open scrubber tank dirty water valve.
- ☐ Close process water make-up valve.
- ☐ Close venturi supply valve.
- ☐ Close venturi supply by-pass valve.

#### **North Unit Scrubber Water is now Draining.**

- ☐ Rinse scrubber tank walls, pH well, mixer shaft, and scrubber pump screen with water.
- ☐ Open process water make-up valves.
- ☐ Close scrubber tank dirty water dump valve.
- ☐ Open venturi supply valve.
- ☐ Open venturi supply valve.

#### **Unit scrubber tanks are now filling with clean water.**

### **Removing ash from incinerators. DO NOT begin until venturi checks have been completed. WEAR RESPIRATOR.**

- ☐ Attach air exchanger system to the unit.
- ☐ Record weight of empty ash bucket.
- ☐ Gently remove ash from unit into ash bucket.
- ☐ Record weight of full ash bucket.
- ☐ Record final ash weight on Daily Log Sheet.

**Inspect Fire Booster Room.** Wear required PPE and scan for wildlife.

- ☐ Check Battery Voltages.
- ☐ Ensure building is heated (Most applicable in winter months).
- ☐ System should be in "AUTO" mode .
- ☐ Should not be excessive water on the floor.

**Do not tamper with the system, contact maintenance team on channel 5 with issues.**

**Inspect APU Room.** Wear required PPE and scan for wildlife.

- ☐ APU panel should be set to "AUTO" mode.
- ☐ On APU panel coolant should be warm.
- ☐ Check battery voltage on APU panel.
- ☐ Ensure building is heated (Most applicable in winter months).
- ☐ Should not be fluids/mess on the floor.

**Inspect MMC Room.** Wear required PPE and scan for wildlife.

- ☐ Ensure building is heated (Most applicable in winter months).
- ☐ Should be no water leaks.
- ☐ Should be no smoke.
- ☐ Check for visible damage to exhaust stacks.
- ☐ Thermocouples ok.
- ☐ Limit/Contact switch ok.
- ☐ Blowers inlets Clean.
- ☐ Doors and seals are ok.
- ☐ Visually check the refractory:
  - ☐ Any new bigger cracks. ☐ Yes ☐ No.
  - ☐ Pieces fell out of the refractory into the chamber. ☐ Yes ☐ No.
- ☐ Primary chamber is clean.
- ☐ Check there are no leaks in fuel lines.
- ☐ Check all fuel valves on the incinerator are open.
- ☐ Make sure there is power to the panel (See temperature control, if they are displaying numbers means power is there).

Any Other Observations :

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## Appendix 2

### Operational Checklist/Log

- ☐ Ensure Scrubber tank is full.
- ☐ Start scrubber pump and mixer.
- ☐ Adjust flow to venturi
- ☐ Shut Flame port butterfly valve, Flame port Inlet plate and Primary Burner Air Intake using cardboard (if needed).
- ☐ Place "Combustion Air Blower" timer to HOLD position to start the blowers.
- ☐ Set Secondary Burner temperature cut off at 1200 C and place "Secondary Burner" Timer to 12h to start the burner. State time \_\_\_\_\_ am.
- ☐ Check for flame and temperature rise in the Secondary Chamber temperature controller.
- ☐ Incinerator can be loaded while primary chamber is warming up.

### **First Batch of the day.**

S. No	Food Waste(wt)	Paper	Other (Specify) (wt)	Total Weight
1				

- ☐ Preheat the secondary to 700 C. State time \_\_\_\_\_ am.
- ☐ Turn ID Fan on.
- ☐ Close dump stack and observe.
- ☐ Once dump stack is closed, open flame port butterfly valve, flame port Inlet plate and Primary Burner Air Intake by removing cardboard.
- ☐ Set Primary Burner temperature cut off at 600 C and place "Primary Burner" Timer to 12h to start the burner. State time \_\_\_\_\_ am.

Take reading of Temperature of primary and secondary Chambers every 30 mins after primary was fired.

Time	Primary Chamber Temperature Present/Set	Secondary Chamber Temperature Present/Set	ID Fan	Vacuum	Scrubber Psi/Flow	PH Level	Exhaust Temp	Comments

**Any Other Observations:**

**Rake:** \_\_\_\_\_

**PH Test:** LIT \_\_\_\_\_ METER \_\_\_\_\_ @ \_\_\_\_\_ HOURS \_\_\_\_\_

### Second Batch of the Day.

S. No	Food Waste(wt)	Paper	Other (Specify) (wt)	Total Weight
2				

Take reading of Temperature of primary and secondary Chambers every 30 mins after primary was fired.

Time	Primary Chamber Temperature Present/Set	Secondary Chamber Temperature Present/Set	ID Fan	Vacuum	Scrubber Psi/Flow	PH Level	Exhaust Temp	Comments

**Any Other Observations:**

**Rake:** \_\_\_\_\_

**PH Test:** LIT: \_\_\_\_\_ METER: \_\_\_\_\_ @ \_\_\_\_\_ HOURS \_\_\_\_\_



### Third Batch of the Day.

S. No	Food Waste(wt)	Paper & Cardboard(wt)	Other (Specify) (wt)	Total Weight
3				

Take reading of Temperature of primary and secondary Chambers every 30 mins after primary was fired.

Time	Primary Chamber Temperature Present/Set	Secondary Chamber Temperature Present/Set	ID Fan	Vacuum	Scrubber Psi/Flow	PH Level	Exhaust Temp	Comments

### End of Day Settings:

Primary Burner Timer set to \_\_\_\_ hours, Secondary Burner Timer set to \_\_\_\_ hours, Combustion Air Blower Timer left at hold, ID Fan Timer set to \_\_\_\_ hours.

### Any Other Observations:

Rake: \_\_\_\_\_

PH TEST\_LIT: \_\_\_\_\_ METER: \_\_\_\_\_ @ \_\_\_\_\_ HOURS \_\_\_\_\_

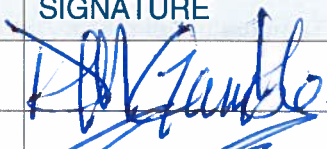

Total Burn: \_\_\_\_\_ LBS

Total Ash: \_\_\_\_\_ LBS

Ratio: \_\_\_\_\_ %

Operator Signature(s): \_\_\_\_\_

## Approval signatures record

REVIEWER ROLE	NAME	SIGNATURE	DATE
Team Leader – Facilities/Waste Management	Rodney Gamble		May 5, 2014
Superintendent – Business Improvement/Non-Process Infrastructure	Howard Nowell		May 5, 2014

## EKA PLA.2121 Hydrocarbon Impacted Materials Management Plan

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<b>Key Contacts:</b>	Environment Advisor-Compliance
<b>Change Requests:</b>	Environment Advisor-Compliance
<b>Brief Description:</b>	This document outlines the management of hydrocarbon impacted materials and defines the storage and disposal locations.

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## 1.0 Objective

This Management Plan provides the framework and guidelines for the management of hydrocarbon impacted materials. It includes a list of the types of hydrocarbon impacted materials encountered at the Ekati Diamond Mine and the appropriate disposal locations.

## 2.0 Scope

This document covers all activities associated with the Ekati Diamond Mine including Main Camp, Misery, and exploration activities. This plan may reference other established DDEC plans.

## 3.0 Introduction

The management of hydrocarbon impacted materials at the Ekati Diamond Mine is detailed in this document. Activities carried out under this plan are reported to the Wek'eezhii Land and Water Board in the Water Licence and Environmental Agreement Annual Report. Materials generated through operation of the mine are identified, and instructions regarding the management of each hydrocarbon-impacted waste stream are provided. The procedure will be reviewed and updated as warranted. The chemical composition of material at each facility for management and storage will vary over time and with treatment, and will depend on the input materials. In general, material stockpiled may contain hydrocarbons.

Efforts to reduce the generation of hydrocarbon-impacted materials are on-going at the Ekati Diamond Mine. This is done with site-based education on effective spill response and prevention, and with preventative maintenance for on-site equipment. Education efforts include:

- Initial and on-going education (presentations, posters) regarding hazards (Section 4.0), expectations around waste management segregation, and waste disposal locations. Initial education occurs during site orientation for new staff and contractors, with additional education as scheduled presentations for all departments.
- Root Cause analysis of spills with a potential Level 3 Risk Rating and Impact Criteria as defined in the Dominion Diamond Corporation's Risk Matrix. Identification of root cause can lead to the development and implementation of preventive measures.

## 4.0 Management Facilities

Approved Hydrocarbon Impacted Materials Management Facilities are located at the Ekati Diamond Mine. These facilities include storage, treatment, and disposal locations on site. An overview of these facilities can be found in Figure 1.

### 4.1 Contaminated Snow Containment Facility (CSCF)

The CSCF is located on the Panda/Koala waste rock pile (see Figure 1). It is a lined facility designed to accept hydrocarbon contaminated snow and contain the water and hydrocarbons after the snow melts. After the spring melt the bulk of the hydrocarbons are skimmed off the top of the pooled water and disposed of as contaminated oil/water through the waste management facility. The remaining contaminated water is drawn down with a vacuum truck and deposited in the long lake containment facility (see Figure 1).

The dimensions of the CSCF are approximately 27m x 27m x 1.7m with a maximum containment volume of 1,090 m<sup>3</sup>.

The facility is inspected regularly by the Ekati Environment Department to ensure integrity of containment.

#### **4.2 Landfarm**

The Landfarm is located on the Panda/Koala waste rock pile (see Figure 1). It is an engineered containment facility designed to accept hydrocarbon contaminated soil and gravel less than 4cm in diameter. This waste stream is usually generated by spills on road materials and through build-up of slimes and fines from containment sumps in the Truckshop maintenance bays.

Hydrocarbon contaminated material in the Landfarm is stockpiled in the containment area until further remediation can take place. Remediation options include landfarming (turning and bioremediation of hydrocarbons), or shipment off site for disposal at an approved facility.

Materials in the Landfarm must meet the Residential/Parkland criteria from (CCME) *Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health* before final disposal on site. Once the soils meet the CCME criteria disposal options can include usage for other projects such as reclamation or road construction or final disposal on the waste rock piles.

All materials added and removed are tracked by the Mine Services department and reported in the Annual Water Licence Report.

The dimensions of the Landfarm are approximately 50m x 90m x 1m with a maximum containment volume of 3,700m<sup>3</sup>.

The facility is inspected regularly by the Ekati Environment Department to ensure integrity of containment.

#### **4.3 Zone S**

Zone S is a management facility designed to accept hydrocarbon impacted materials greater than 4cm in diameter.

There are three Zone S locations at the Ekati Diamond Mine:

- Misery Zone S – located on the Misery Waste Rock Pile,
- Fox Zone S – located on the Fox Waste Rock Pile, and
- Panda/Koala Zone S – Located on the Panda/Koala Waste Rock Pile.

The Zone S locations accept large diameter Run of Mine (ROM) material contaminated with hydrocarbons. This waste stream is usually generated through the open pit mining process when equipment failures cause spills of hydrocarbons to contaminate blast rock as it is being excavated.

Larger diameter hydrocarbon contaminated materials in Zone S are not treated, and will become part of the waste rock pile and capped at the end of the mine life as described in the DDEC Interim Closure and Reclamation Plan.



#### **4.4 Waste Management Facility**

The Waste Management Facility is located in the Main Camp area (see Figure 1). This facility accepts hydrocarbon contaminated materials such as, used absorbents, oily rags, empty containers and all other wastes not suitable for disposal on site. Waste collected at the Waste Management Building is sent off site for further processing at an approved waste transfer facility before final disposal. More information on the Waste Management building can be found in the EKA PLA.2119 Hazardous Waste Management Plan.

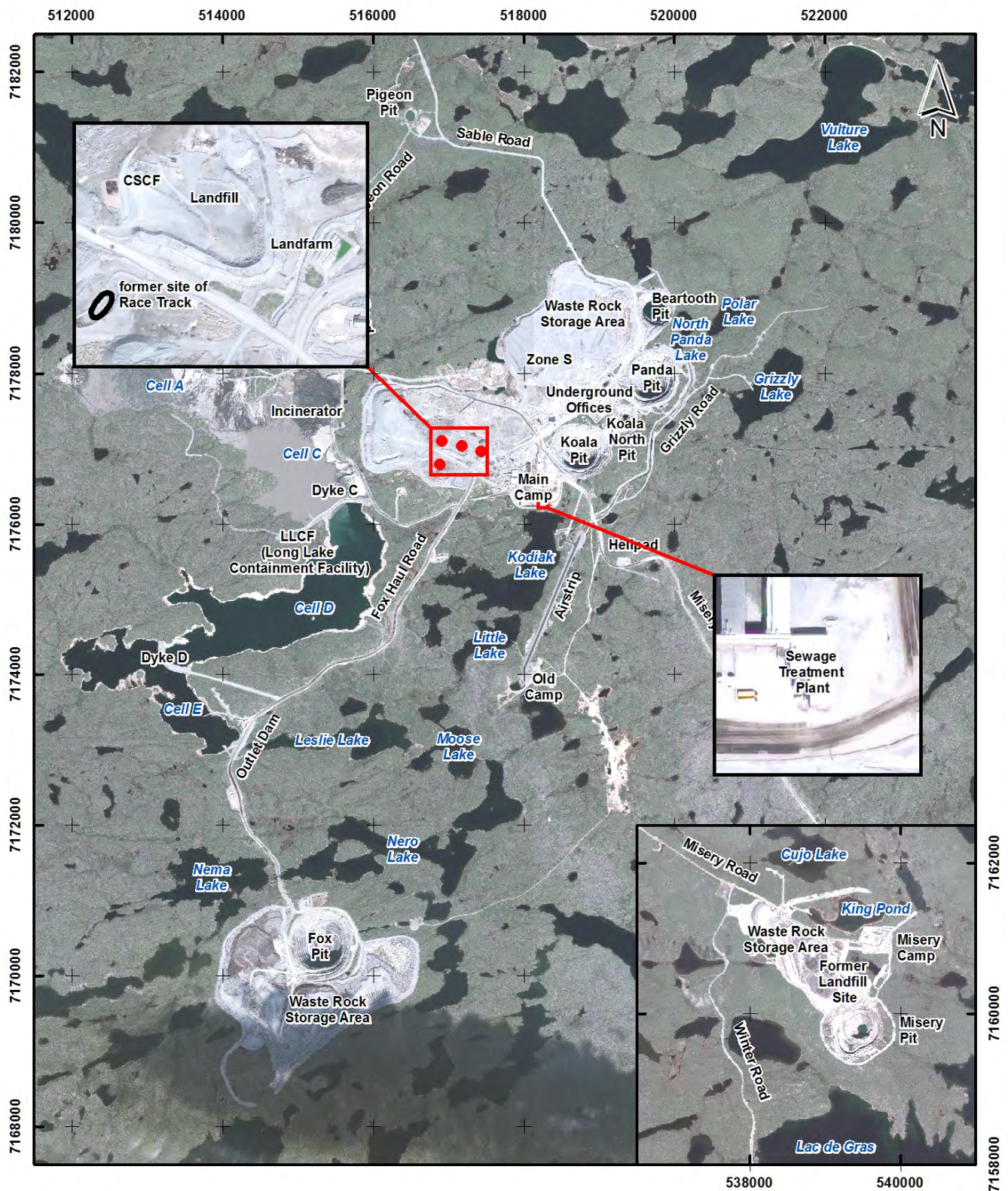
#### **4.5 Long Lake Containment Facility (LLCF)**

Hydrocarbon contaminated water is disposed of in Cell B of the LLCF (see Figure 1). Before water is disposed of in the cell it is skimmed for any free product and hydrocarbons are collected and sent off site through the Waste Management Building.

Sources of hydrocarbon contaminated water include the Landfarm, CSCF, and Truckshop sumps.

#### **4.6 Beartooth Pit**

Beartooth Pit is intended to receive contaminated water from the Underground Mines at the Ekati Diamond Mine. Contaminated water will contain traces of hydrocarbons from underground spills. This contaminated water is pumped directly to surface and piped into the Beartooth Pit.



# **EKATI Diamond Mine Satellite Imagery**

1:65,000

Imagery Acquired July 2013 / Map Revised 12 Aug 2013

0 0.5 1  
Kilometers

**Figure 1 - Hydrocarbon Impacted Materials Management Locations**



## 5.0 Hydrocarbon Impacted Materials and Disposal Locations

Table 1 below shows the types of hydrocarbon impacted waste encountered at the Ekati Diamond Mine and the appropriate disposal locations.


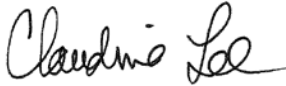
**Table 1 - Waste Stream and Disposal Locations**

Waste Stream	Disposal Location
Snow and Ice	Contaminated Snow Containment Facility
Rock and Soil <4cm in diameter	Landfarm
Rock and Soil >4cm in diameter	Zone S
Sump Water – Truck Shop and Main Camp	Long Lake Containment Facility
Underground Sumps	Beartooth Pit
Used Oil/Fuel Filters	Waste Management Building
Oily Rags/Contaminated Clothing	Waste Management Building
Used Absorbents/Floor dry	Waste Management Building
Slimes and Fines from Sumps	Landfarm
Skimmed Oil from Sumps	Waste Management Building
Empty Oil Pails and Drums	Waste Management Building

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## Appendices

### Appendix 1 – Approval Signatures Record

REVIEWER ROLE	NAME	SIGNATURE	DATE
Environment Advisor-Compliance	Jamie Steele		April 24, 2014
Environment Superintendent-Operations	Claudine Lee		April 24, 2014

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## Appendix 2 – Track Changes

REVISION NUMBER	PAGE NUMBER(S)	CHANGE AFFECTED	DATE OF CHANGE
1	All	Extensive reformatting to DDEC template	March 2014
2	3-5	Included section of management facilities	March 2014
3	7	Simplified Table 1. To show waste stream and disposal locations	March 2014
4	NA	Deleted redundant terms and definitions	March 2014
5	NA	Deleted redundant figures	March 2014
6	7	Table.1 – changed location of oily rag disposal. Oily rags are no longer incinerated.	March 2014