



Parent Company of Canadian Zinc

# PRAIRIE CREEK MINE WASTE MANAGEMENT PLAN

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June, 2020

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**Preamble**

This *Waste Management Plan* applies to exploration activities at the Prairie Creek Mine site.

The following formal distribution has been made of this plan:

Mackenzie Valley Land and Water Board

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Canadian Zinc Corporation - Prairie Creek Mine Office

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NorZinc - Vancouver Office

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Additional copies and updates of this Plan may be obtained by writing to:

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## Revision History

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## Review and Approval

The following signatures indicate that the undersigned have read and agreed to the contents of this document, and that they approve and accept its distribution and use.

Description	Authority	Signature	Date
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## TABLE OF CONTENTS

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<b>LIST OF ACRONYMS .....</b>	<b>2</b>
<b>GLOSSARY .....</b>	<b>2</b>
<b>1.0 INTRODUCTION .....</b>	<b>3</b>
1.1 Company Name, Location and Mailing Address .....	3
1.2 Waste Management Principles .....	3
1.3 Purpose, Scope and Project Description .....	6
1.4 CZN Environmental Policy .....	7
1.5 Regulatory Requirements .....	7
1.5.1 Federal Legislation .....	7
1.5.2 Territorial .....	8
1.6 Project Setting .....	8
<b>2.0 IDENTIFICATION AND MANAGEMENT OF WASTE TYPES .....</b>	<b>5</b>
2.1 Waste Overview .....	5
2.2 Domestic Waste .....	5
2.2.1 Combustible Non-Hazardous Waste .....	5
2.2.2 Non-Combustible, Non-Hazardous Waste .....	7
2.3 Hazardous Waste .....	7
2.4 Recyclable Waste .....	10
2.5 Domestic Sewage .....	11
2.6 Waste Rock .....	11
2.7 Waste Explosives .....	12
2.8 Training & Certification .....	12
2.9 Environmental Mitigation and Monitoring .....	13
<b>REFERENCES .....</b>	<b>14</b>

## LIST OF TABLES IN TEXT

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Table 1: Combustible Non-Hazardous Waste .....	6
Table 2: Hazardous Waste .....	8
Table 3: Recyclable Waste .....	11

## LIST OF FIGURES IN TEXT

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Figure 1: Property Location .....	4
Figure 2: Existing Infrastructure .....	5
Figure 3: Basic Principles of Waste Management .....	6

## APPENDIX SECTIONS

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Appendix A Inspection Log

## LIST OF ACRONYMS

Acronyms/Abbreviations	Definition
AANDC	Aboriginal Affairs and Northern Development Canada
CCME	Canadian Council of Ministers of the Environment
CZN	Canadian Zinc Corporation
DFO	Department of Fisheries and Oceans
EA	Environmental Assessment (Process)
GNWT	Government of the Northwest Territories
ha	Hectare
km	Kilometre
m	Metre
m <sup>3</sup>	Cubic Metre
M	Million
Mine	Prairie Creek Mine
MVLWB	Mackenzie Valley Land and Water Board
NNPR	Nahanni National Park Reserve
NWT	Northwest Territories
TDG	Transportation of Dangerous Goods
WHMIS	Workplace Hazardous Materials Information System
WMP	Waste Management Plan
WSCC	Worker's Safety & Compensation Commission

## GLOSSARY

Combustible Non-Hazardous Waste	Waste that can be incinerated such as kitchen and food waste, cardboard, wood, paper, etc.
Domestic Waste	Domestic waste typically consists of packaging, tins, food scraps and drink containers.
Domestic Sewage	Black and grey waste water
Four Rs of Waste Management	Reduce, Reuse, Recycle, Recover
Non-Combustible Non-Hazardous Waste	Waste that cannot be burned such as scrap metal, Exposed solid rock or rock underlying loose deposits such as soil or alluvium.
Recyclable Waste	Waste that can be recycled such as beverage containers, batteries, electrical equipment, etc.

## 1.0 INTRODUCTION

This Waste Management Plan (WMP) was prepared in general accordance with the Mackenzie Valley Land and Water Board's (MVLWB 2011) Guidelines for Developing a Waste Management Plan.

The Prairie Creek Mine (the Mine) is currently being managed to support exploration activities, mine site studies and care and maintenance programs during the open water season. The property location is shown in Figure 1. The existing site infrastructure is shown in Figure 2.

### 1.1 Company Name, Location and Mailing Address

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**Prairie Creek Mine:**

Iridium 9555 Satellite Phone 1 (yellow) 011-8816-315-30998

Iridium 9505A Satellite Phone 2 (black) 011-8816-315-30997

Iridium 9505A Satellite Phone 3 (orange) 011-8816-315-30996

Ground-To-Air Radio Handheld FREQ 122.800

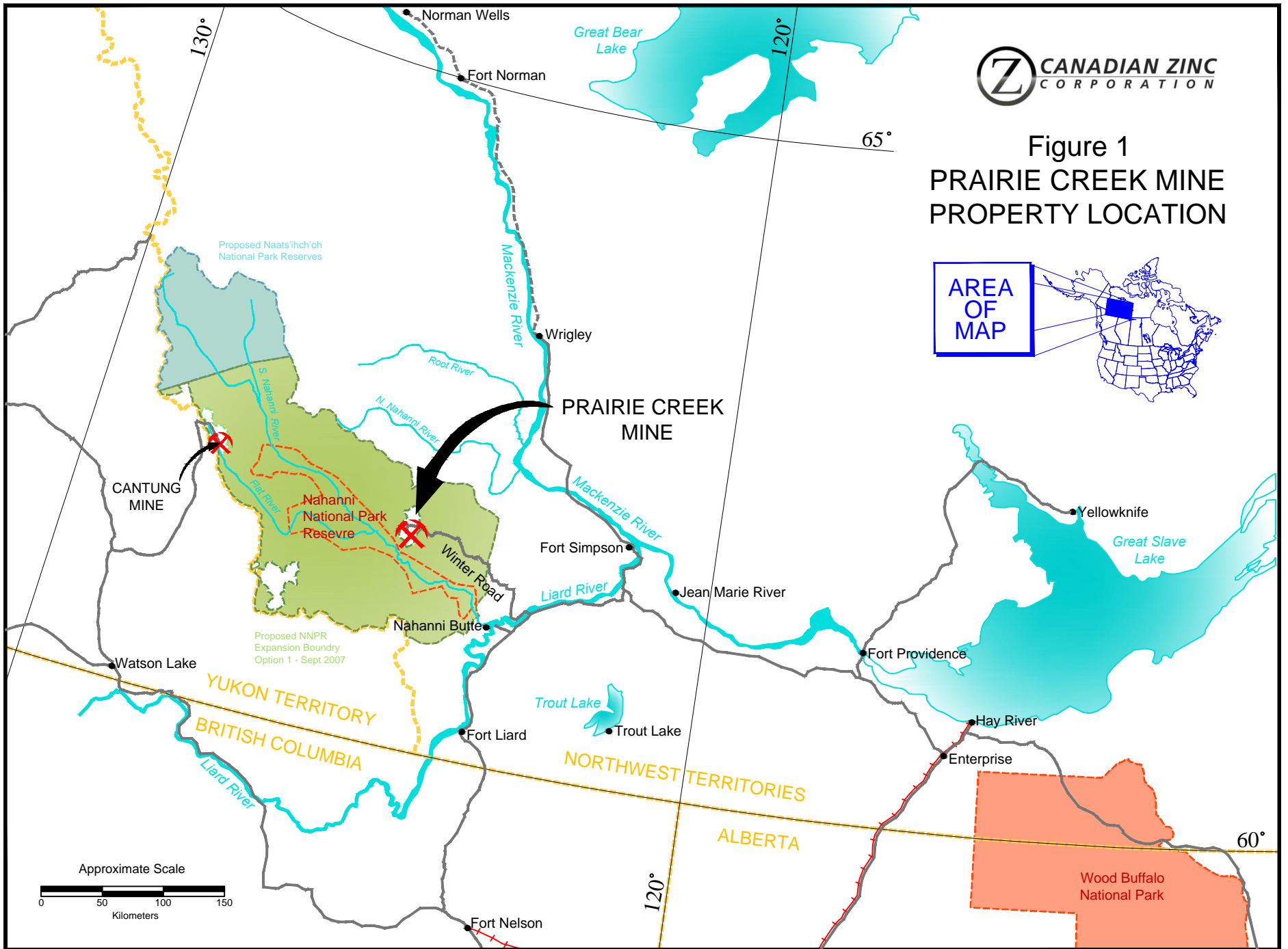
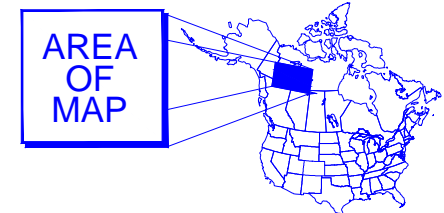
### 1.2 Waste Management Principles

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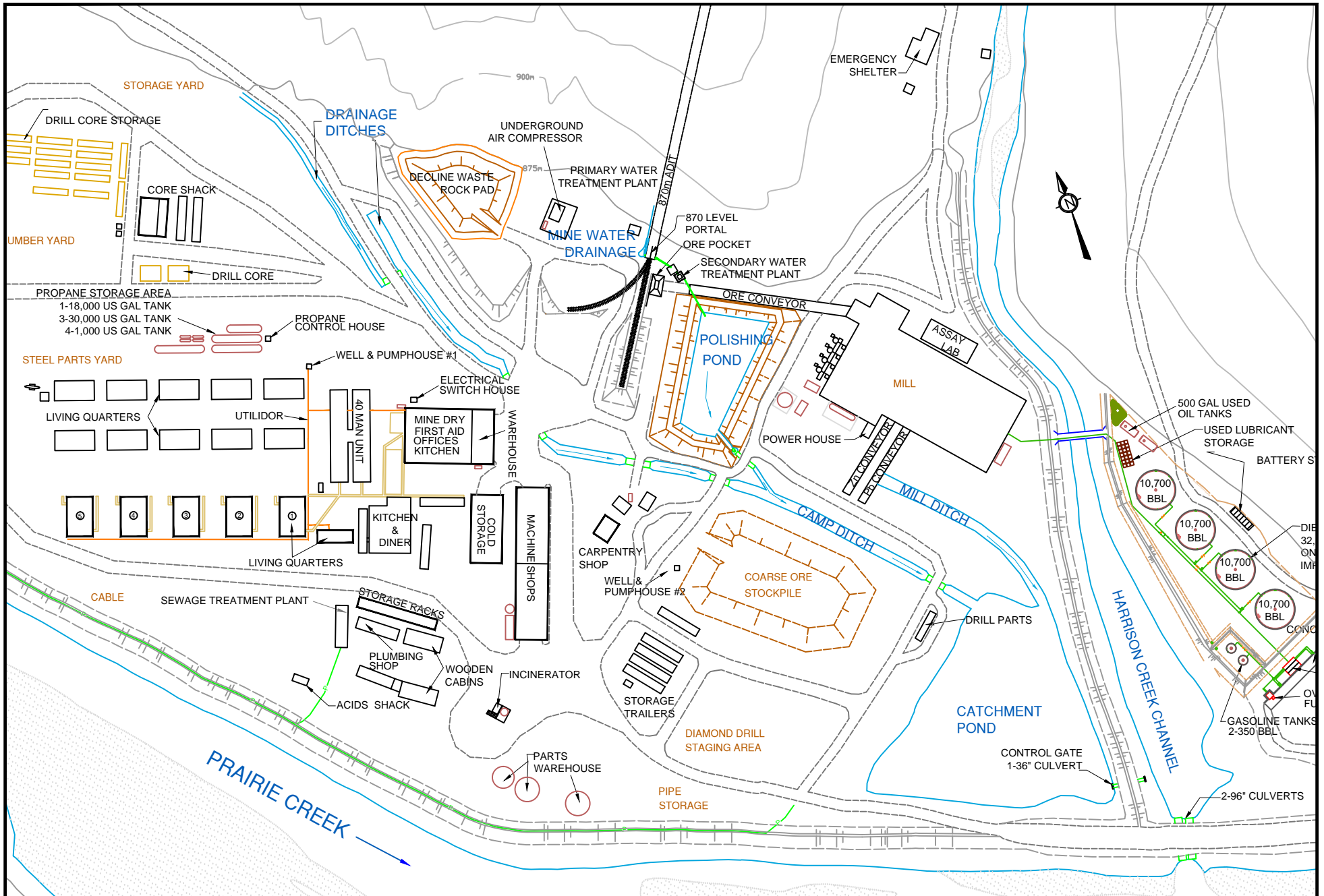
CZN is committed to undertaking waste collection, storage and disposal in a safe, efficient and environmentally responsible manner, actively encouraging and implementing the four R's of waste management, namely: waste reduction, recovery, reuse and recycling, as generally summarized in Figure 3, but subject to the limitations imposed by the fact that the site is currently only accessible by air. The WMP is a living document and once implemented, will be reviewed and updated as appropriate.



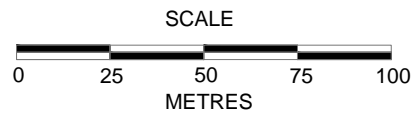
Figure 1  
PRAIRIE CREEK MINE  
PROPERTY LOCATION







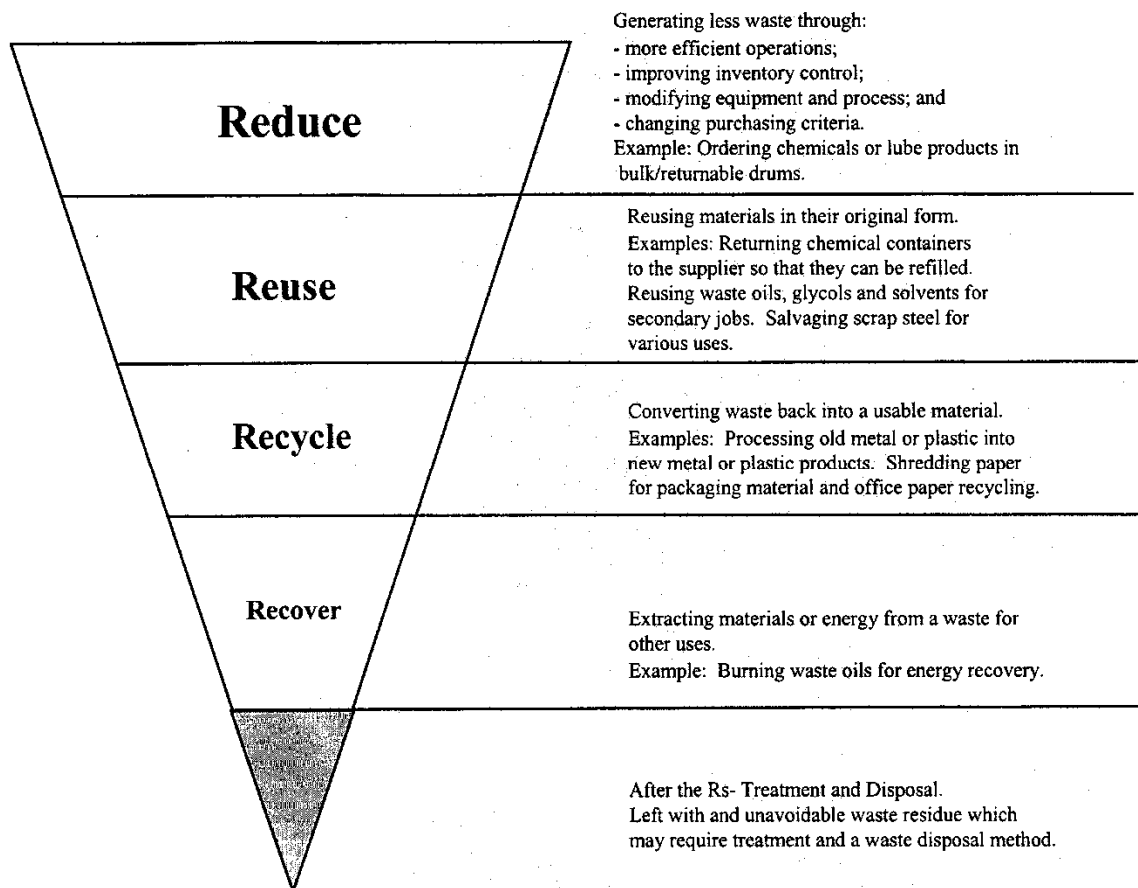
Date:	August 2012
Drawn By:	C. Reeves
Scale:	As Shown
Drawing:	Figure 2.dwg



**PRAIRIE CREEK MINE**  
**FIGURE 2:**  
**EXISTING INFRASTRUCTURE**  
**AT PRAIRIE CREEK MINE**



**Figure 3: Basic Principles of Waste Management**



### 1.3 Purpose, Scope and Project Description

The purpose and scope of CZN's Waste Management Plan (WMP) is to ensure that all wastes produced by activities associated with the care and maintenance of the Prairie Creek Mine, surface exploration drilling and/or the development of a 2<sup>nd</sup> Decline, are handled, stored or disposed of in a safe and responsible manner and comply with all applicable legislation, regulations, authorizations, permits and licenses for the duration of the Project.

To achieve this, the Plan:

- Identifies waste types potentially generated by the Project
- Identifies procedures to promote reduction, reuse, and recycling of waste materials
- Identifies practices and procedures for waste handling, collection, storage, transport, and disposal, and
- Identifies waste monitoring and mitigation procedures.

CZN may develop a second underground decline from the 880 metre level of the Mine, similar to one developed in 2007/8. Access to the 880 metre level is via the 870 portal. The Decline would be developed by a mining contractor, and at peak development approximately 30 additional personnel would be on site split between two shifts.

CZN's current liability in connection with the site is limited by the terms of the Surface Lease and attached Abandonment and Restoration Plan under which CZN holds its current interest in the Prairie Creek property. CZN has to date been conducting site activities and exploration under Surface Lease 95F/10-5-5 (the Surface Lease). An Abandonment and Restoration Plan is attached to, and forms part of, the Surface Lease (as Schedule A). Accordingly, under the terms of the Surface Lease, the reclamation obligations of CZN as lessee are limited to those obligations specified in the Abandonment and Restoration Plan. This is not an obligation to reclaim the site in its totality, but only an obligation to carry out the Abandonment and Restoration Plan. Further details are provided in our letter to the Board dated December 22, 2013 in connection with LUP MV2008D14 and Water Licence MV2008L2-002.

Further to the above, this Waste Management Plan is specific to exploration LUP's and Water Licences, and not necessarily the entire Prairie Creek Mine site.

## **1.4 CZN Environmental Policy**

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It is CZN's policy to achieve and maintain a high standard of environmental care in conducting its business as a resource company, and through its developments, contribute to sustaining society's material needs. Canadian Zinc's approach to environmental management seeks continuous improvement in performance by incorporating evolving scientific knowledge and community expectations into its operations.

Specifically, it is CZN's policy to:

- Comply with and adopt the spirit of all applicable laws, regulations and standards, and where laws do not adequately protect the environment, apply standards that minimize any adverse environmental impacts resulting from its operations, products and services.
- Communicate openly and in a timely manner with government on environmental issues, and contribute to the development of policies, legislation and regulations that may affect CZN and its operations.
- Recognize local communities as stakeholders and engage with them in a process of open engagement and timely communication regarding environmental management issues and impacts and seek to involve them in decision making and implementation.
- Ensure that employees and suppliers of goods and services are informed about this policy and that they are aware of their environmental responsibilities in relation to CZN's business.
- Develop and implement management systems to identify, control and monitor potential environmental risks arising from operations, and be prepared to respond to adversity.

## **1.5 Regulatory Requirements**

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Specific legislation, regulations and guidelines related to waste management in the Northwest Territories include:

### **1.5.1 Federal Legislation**

- Canadian *Environmental Protection Act* (1999)

- 
- *Waters Act* S.N.W.T (2014)
  - Canada –Wide Standards for Petroleum Hydrocarbons (PHC) in Soil (CCME 2001)
  - *Transportation of Dangerous Goods Act* and Regulations (1992)
  - *Work Site Hazardous Materials Information System (WHMIS) Safety Act*
  - *Territorial Lands Act* (1985)
  - *Explosives Act* (1985)
  - Technical Document for Batch Waste Incineration (Environment Canada 2009).

### **1.5.2 Territorial**

- Guidelines for Developing a Waste Management Plan (MVLWB 2011)
- Guideline for the General Management of Hazardous Waste in the NWT (RWED 1998)
- Guideline for Waste Antifreeze (RWED 1998)
- Guideline for Waste Batteries (RWED 1998)
- Guideline for Waste Solvents (RWED 1998)
- MVLWB Land Use Permit (to be issued)
- MVLWB Water Licence (to be issued)
- NWT *Environmental Protection Act* (1988)
- NWT *Public Health Act* (1988)
- NWT *Transportation of Dangerous Goods Act* (1990)
- NWT *Waters Act* (last amended April 1, 2014)
- Used Oil and Waste Fuel Management Regulations (GNWT 2003).
- Yukon Territorial Government Design Specifications for Sewage Disposal Systems (June 2016)
- Yukon Territorial Government Environmental Health Services Guidelines for Greywater Disposal at Remote Camps (March 2012)

## **1.6 Project Setting**

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The Prairie Creek Mine is located at 61° 33' north latitude and 124° 48' west longitude. The Mine is situated adjacent to Prairie Creek about 48 km upstream from its confluence with the South Nahanni River, and 7 km upstream of the point where Prairie Creek crosses the boundary of the expanded Nahanni National Park Reserve.

The mine site is at an elevation of 850 m above sea level, and is situated in topography characterized by low mountains and narrow valleys with an average relief of 300 m. Short summers are typical of the area's sub-arctic climate, where the mean annual temperature is -5°C. Annual precipitation is approximately 40 cm, most of which falls as rain.

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## 2.0 IDENTIFICATION AND MANAGEMENT OF WASTE TYPES

### 2.1 Waste Overview

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A material is considered to be a waste when it can no longer be used for its original intended purpose. The types of waste anticipated to be generated during decline and/or care and maintenance activities can be classified into the following general categories:

- Domestic Wastes (Combustible and non-combustible - non-hazardous wastes)
- Hazardous wastes
- Recyclable waste
- Domestic sewage

Activities are expected to produce small volumes of waste on an annual basis. The site previously accommodated up to 40 people during the peak of underground exploration work in 2006, and there were no issues related to waste storage and/or disposal. Waste quantities and management approaches are discussed below.

### 2.2 Domestic Waste

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Domestic waste produced by the decline development crews will consist of packaging, tins, food scraps and drink containers. Domestic waste is assumed to be produced at a rate of 2.64 kg/person/day (0.011 m<sup>3</sup>/day, 240 kg/m<sup>3</sup>). Therefore, 30 people will produce an estimated 79.2 kg/day.

#### 2.2.1 Combustible Non-Hazardous Waste

Typical combustible non-hazardous wastes include discarded materials in a solid, or semi-solid form that can be safely incinerated. Such wastes do not pose a risk to human or environmental health. This waste is temporarily stored in bins in the Administration Building until the next incinerator operation. The types of waste generated within this category include:

- Kitchen and food waste
- Corrugated cardboard
- Domestic refuse

Table 1 identifies the typical combustible non-hazardous waste types, sources, potential effects, management hierarchy, and management strategies. These types of waste have been incinerated on-site for many years. The incinerator is operated daily when the crew exceeds approximately one dozen.

The current incinerator is an unsophisticated single-chamber model dating from the Cadillac era. It is located in an open area between the Machine Shop and the Parts Warehouse (Figure 2). Operators are trained on-site by Site Managers to incinerate combustible waste, as listed above, and segregate waste not to be incinerated, such as plastics. The training is delivered in the field with an incineration demonstration. Incinerator ash is collected in plastic pails with lids, which are temporarily stored in the Machine Shop until shipping off-site for disposal by aircraft. The amount of waste incinerated can be estimated based on the actual personnel numbers on-site, and reported in Annual Report submissions.

**Table 1: Combustible Non-Hazardous Waste**

Type	Source	Potential Environmental Effects	Waste Management Hierarchy	Waste Management Strategies
Kitchen and Food Waste	<ul style="list-style-type: none"> <li>▪ Food scraps</li> <li>▪ Kitchen grease</li> <li>▪ Wrappings contaminated with food</li> <li>▪ Bagged lunches</li> </ul>	<ul style="list-style-type: none"> <li>▪ Improper storage, handling and disposal can lead to the attraction and subsequent habituation of carnivores and scavengers</li> <li>▪ Potential for litter</li> </ul>	<ul style="list-style-type: none"> <li>▪ Train kitchen staff on waste reduction</li> <li>▪ Use bulk food containers whenever possible</li> </ul>	<ul style="list-style-type: none"> <li>▪ Designated wildlife-proof food waste containers to be located at all camps</li> <li>▪ Collected daily</li> <li>▪ Stored in wildlife-proof containers prior to incineration / landfilling</li> <li>▪ Batch incineration</li> </ul>
Corrugated Cardboard	<ul style="list-style-type: none"> <li>▪ Packaging of supplies/ materials</li> </ul>	<ul style="list-style-type: none"> <li>▪ Potential for litter</li> </ul>	<ul style="list-style-type: none"> <li>▪ Order products in bulk to minimize packaging</li> <li>▪ Monitor and reduce, where possible, the amount of packaging shipped to the sites</li> <li>▪ Reuse corrugated cardboard on-site to package materials being sent off-site</li> </ul>	<ul style="list-style-type: none"> <li>▪ Stored under cover</li> <li>▪ Regular collection and incineration</li> </ul>
Domestic Refuse	<ul style="list-style-type: none"> <li>▪ Refuse (e.g., paper, plastic wrapping, fabrics, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Improper storage, handling and disposal can lead to the attraction and subsequent habituation of carnivores and scavengers</li> <li>▪ Potential for litter</li> </ul>	<ul style="list-style-type: none"> <li>▪ Domestic waste will be reduced through employee/contractor education programs, including proper separation of waste</li> </ul>	<ul style="list-style-type: none"> <li>▪ Educate employees about separating recycling and hazardous items from personal waste items</li> <li>▪ Use clear garbage bags so that cleaning staff can monitor waste sorting habits</li> <li>▪ Periodically assess domestic refuse to ensure that waste streams are being separated</li> <li>▪ Regular collection and incineration</li> </ul>

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The GNWT Lands Inspector has directed CZN to replace the incinerator with a suitable dual-chamber model once road access is available. CZN has committed to do that.

### **2.2.2 Non-Combustible, Non-Hazardous Waste**

Typical non-combustible non-hazardous waste includes discarded materials in a solid, liquid, or semi-solid form that cannot be burned or recycled. Such wastes do not pose a risk to human or environmental health. The type of waste generated within this category is primarily a limited quantity of scrap metal. Scrap metal is disposed of in a small on-site landfill. Plastics are separated and are periodically taken off-site for disposal.

## **2.3 Hazardous Waste**

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A hazardous waste is a contaminant which is a dangerous good that is no longer used for its original purpose and is intended for recycling, treatment, disposal or storage.

A hazardous waste does not include a contaminant that is:

- household in origin;
- included in class 1, Explosives or class 7, Radioactive materials of the Transportation of Dangerous Goods Regulation (TDGR);
- exempted as a small quantity;
- an empty container; or
- intended for disposal in a sewage system or by landfilling that meets the applicable standards set out in schedules I, III or IV of the Guideline for Industrial Waste discharges in the NWT.

*A small quantity is “hazardous waste that is generated in an amount that is less than 5 kilograms per month if a solid or 5 litres per month if a liquid; and where the total quantity accumulated at any one time does not exceed 5 kilograms or 5 litres. This does not apply to wastes that are mercury or in classes 2.3, 5.1 or 6.1 of TDGR. These wastes must be generated in an amount less than 1 kilogram per month if a solid or 1 litre per month if a liquid; and where the total quantity accumulated at any one time does not exceed 1 kilogram or 1 litre.”*

Table 2 identifies the hazardous waste types, sources, potential effects, management hierarchy, and management.

Hazardous materials will be stored and managed according to the Guideline for the General Management of Hazardous Waste in the NWT (ENR 1998). Where appropriate and in compliance with legislation, used oil will be incinerated. All other types of hazardous waste will be shipped to a registered hazardous waste receiver.

Approximately 100-200 L of waste oil is generated per annum from vehicle and genset maintenance. There are two 5,000 gallon storage tanks for waste oil in the Fuel Tank Farm bermed enclosure. Waste oil has historically been used as an ignition source for the incinerator.

**Table 2: Hazardous Waste**

Type	Source	Potential Environmental Effects	Waste Management Hierarchy	Estimated Yearly Quantity	Waste Management
Used Petroleum Products (oils / greases)	<ul style="list-style-type: none"> <li>Vehicles and equipment including camp generators/ pumps</li> </ul>	<ul style="list-style-type: none"> <li>Petroleum products released to water bodies can impact aquatic life and waterfowl</li> <li>Petroleum products can be toxic if ingested by wildlife</li> </ul>	<ul style="list-style-type: none"> <li>When possible waste oil will be incinerated</li> </ul>	<ul style="list-style-type: none"> <li>100-200 L</li> </ul>	<ul style="list-style-type: none"> <li>Waste oil is collected and stored in empty lubricant drums, diesel drums or tanks in the Tank Farm. Drums are stored either in the Mill or the Machine Shop</li> <li>When possible, waste oil will be incinerated</li> </ul>
Contaminated Snow/ Water/ Soil (oil/fuel)	<ul style="list-style-type: none"> <li>Fuel or oil spills on snow or soil</li> <li>Tank Farm Containment</li> </ul>	<ul style="list-style-type: none"> <li>Same as above</li> </ul>	<ul style="list-style-type: none"> <li>Spill prevention procedures to be employed</li> <li>Spill Contingency Plan to be implemented to minimize impacts of spills when they occur</li> </ul>	<ul style="list-style-type: none"> <li>1x205L drum snow/water</li> <li>1x205L drum soil</li> <li>Hundreds of L in Tank Farm containment</li> </ul>	<ul style="list-style-type: none"> <li>Contaminated snow/water stored in the Mill prior to charcoal filter treatment, testing</li> <li>Contaminated soil stored in drums on the Reagent Storage Pad</li> <li>Tank Farm containment water tested for EPH, released once results confirmed to be less than EQC</li> </ul>
Oil and Fuel Filters	<ul style="list-style-type: none"> <li>Vehicles and equipment</li> </ul>	<ul style="list-style-type: none"> <li>Same as above</li> </ul>		<ul style="list-style-type: none"> <li>20</li> </ul>	<ul style="list-style-type: none"> <li>Waste oil and fuel filters will be drained in a heated and ventilated section of the Mine. Filters will then be crushed to minimize volume and release any additional oil.</li> <li>The filters will be placed in sealed containers and labelled and stored in the Mill or Machine Shop prior to being shipped off-site to a registered hazardous waste receiver</li> </ul>
Used Sorbents and Rags	<ul style="list-style-type: none"> <li>Used in maintenance of vehicles and equipment</li> </ul>	<ul style="list-style-type: none"> <li>Same as above</li> </ul>	<ul style="list-style-type: none"> <li>When possible waste oil will be incinerated</li> </ul>	<ul style="list-style-type: none"> <li>1x20L pail</li> </ul>	<ul style="list-style-type: none"> <li>Used rags and sorbents will be incinerated after temporary storage in the Machine Shop</li> </ul>
Hydraulic Fluid	<ul style="list-style-type: none"> <li>Used in vehicles and camp equipment</li> </ul>	<ul style="list-style-type: none"> <li>Hydraulic fluid may enter the environment from spills and leaks from equipment or from improper storage and harm fish or wildlife.</li> </ul>	<ul style="list-style-type: none"> <li>Biodegradable, low toxicity hydraulic fluids will be used where practical</li> <li>Equipment will be regularly maintained to prevent spills from ruptured hydraulic fluid lines</li> </ul>	<ul style="list-style-type: none"> <li>100L</li> </ul>	<ul style="list-style-type: none"> <li>Where possible, used hydraulic fluid will be incinerated after temporary storage in the machine Shop</li> <li>Used hydraulic fluid that cannot be incinerated will be stored in the Machine Shop or Mill prior to being shipped off-site to a registered hazardous waste receiver</li> </ul>



Type	Source	Potential Environmental Effects	Waste Management Hierarchy	Estimated Yearly Quantity	Waste Management
Empty Petroleum Hydrocarbon Containers and Drums	<ul style="list-style-type: none"> <li>Packaging for oils, solvents and penetrating oils</li> </ul>	<ul style="list-style-type: none"> <li>Same as for other petroleum products</li> </ul>		<ul style="list-style-type: none"> <li>50kg</li> </ul>	<ul style="list-style-type: none"> <li>Cleaning, crushing, disposal</li> </ul>
Glycol	<ul style="list-style-type: none"> <li>Used as a coolant and antifreeze in equipment</li> </ul>	<ul style="list-style-type: none"> <li>Glycol's odour is a known wildlife attractant</li> <li>Glycol can have toxic effects on aquatic organisms and wildlife</li> </ul>	<ul style="list-style-type: none"> <li>Equipment will be regularly maintained to prevent spills from ruptured glycol lines</li> </ul>	<ul style="list-style-type: none"> <li>100L</li> </ul>	<ul style="list-style-type: none"> <li>Waste glycol is stored in clearly marked, sound, sealed containers in the Mill</li> <li>These containers will be shipped off-site to a registered hazardous waste receiver</li> </ul>
Solvents	<ul style="list-style-type: none"> <li>Used to degrease machinery in the maintenance shop</li> </ul>	<ul style="list-style-type: none"> <li>Petroleum products released to water bodies can impact aquatic life and waterfowl</li> <li>Petroleum products can be toxic if ingested by wildlife</li> </ul>	<ul style="list-style-type: none"> <li>Low toxicity solvents and physical cleaning will be used where practical</li> <li>Petroleum-based solvents will not be allowed into the environment and will be subject to the spill response plan</li> </ul>	<ul style="list-style-type: none"> <li>50L</li> </ul>	<ul style="list-style-type: none"> <li>Waste or excess solvents will be stored in clearly marked, sound, sealed containers in the Mill or in a lined, covered containment</li> <li>Storage will be maintain until road access allows transport off-site to a registered hazardous waste receiver</li> </ul>
Fluorescent Light Tubes	<ul style="list-style-type: none"> <li>Indoor lighting</li> </ul>	<ul style="list-style-type: none"> <li>Fluorescent tubes contain mercury phosphor powder and traces of lead and cadmium</li> </ul>		<ul style="list-style-type: none"> <li>10</li> </ul>	<ul style="list-style-type: none"> <li>Discarded fluorescent lights will be consolidated and stored in the Tank Farm trailer prior to being shipped off-site for disposal</li> </ul>
Electronics and Electrical Materials	<ul style="list-style-type: none"> <li>Electrical devices that cannot be repaired or recycled</li> </ul>	<ul style="list-style-type: none"> <li>Electrical waste and devices may or may not contain substances such as mercury, lead, arsenic and cadmium</li> </ul>		<ul style="list-style-type: none"> <li>50kg</li> </ul>	<ul style="list-style-type: none"> <li>CZN's staff will determine the risk of electronic devices and classify them as hazardous or non-hazardous waste and determine the appropriate method of recycling/ disposal. Temporary storage in the Administration Building</li> </ul>
Equipment Batteries	<ul style="list-style-type: none"> <li>Equipment batteries</li> </ul>	<ul style="list-style-type: none"> <li>Lead batteries (i.e., vehicle batteries) contain sulphuric acid and lead</li> <li>Rechargeable batteries (i.e., industrial, radio and transmitter batteries) usually contain either potassium hydroxide or nickel cadmium</li> </ul>	<ul style="list-style-type: none"> <li>Test batteries prior to disposal to confirm the battery is spent</li> </ul>	<ul style="list-style-type: none"> <li>100kg</li> </ul>	<ul style="list-style-type: none"> <li>Equipment batteries will be shipped off-site to a recycling facility or a registered hazardous waste receiver. Temporary storage in the Tank Farm trailer</li> </ul>

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The site has not had to manage any significant quantity of contaminated snow or water. The limited quantity has been stored in the Mill to date. Water with an oily sheen has previously been treated on-site using a charcoal filter. The water is then inspected to confirm it is clean (absence of sheen) followed by release. Henceforth, this water will be stored on-site.

Water that accumulates in the Tank Farm containment is subject to testing for extractable petroleum hydrocarbons, and once results are confirmed to be less than EQC, the water is released. The water is snowmelt and precipitation. EPH results are usually non-detect.

Localized sources of contaminated soil are collected and stored in 205 L drums, with approximately 1 drum filled per annum. The drums are currently stored on the Reagent Pad in the South Yard and covered by tarps. The soil will ultimately be treated on-site in a biocell, if one is developed for mine operations, or shipped off-site for disposal by a hazardous waste receiver south of the NWT once road access is available.

Spent fluorescent light tubes are shipped off-site for disposal, as are newer batteries. There is an historical store of large batteries in a trailer in the Tank Farm. These require road access for off-site removal.

## **2.4 Recyclable Waste**

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Recyclable wastes comprise discarded items that can potentially be made into new products. The typical types of waste generated within this category include:

- Scrap Metal
- Beverage containers (plastic, aluminum, glass, tetra packs)
- Tires
- Electronics and electrical wastes, and
- Dry cell batteries for domestic use (e.g., AAA to D cells, 6- and 9-volt batteries).

Table 3 identifies the recyclable waste types, sources, potential effects, management hierarchy, and management strategies.

Recycling is preferred over disposal as it reduces the potential environmental effects. Used beverage containers that are recyclable are stored in the Administration Building and subsequently recycled off-site, but amount to as little as a garbage bag per week. Spent tires are stored on-site in the main yard, with approximately 5 generated per annum.

Lead acid batteries greater than 1 kg and rechargeable batteries are considered a contaminant under the NWT *Environmental Protection Act* and are managed as a hazardous waste. Spent batteries are stored in a trailer at the fuel tank farm. Spent batteries number approximately 4 per annum, and are taken off-site for recycling. However, a greater number has been shipped off-site as cargo space allows to reduce the inventory left by Cadillac after their insolvency.

**Table 3: Recyclable Waste**

Type	Source	Potential Environmental Effects	Waste Management Hierarchy	Waste Management Strategies
Scrap Metal	<ul style="list-style-type: none"> <li>Camp</li> </ul>	<ul style="list-style-type: none"> <li>Unightly if left on site (visual impact)</li> <li>Wire can cause wildlife entanglement</li> </ul>	<ul style="list-style-type: none"> <li>To be consolidated and temporarily stored</li> </ul>	<ul style="list-style-type: none"> <li>Taken off site or disposed of in the on-site landfill</li> </ul>
Beverage Containers (plastic, aluminum, glass, tetra packs)	<ul style="list-style-type: none"> <li>Camp personnel drinking bottled beverages</li> </ul>	<ul style="list-style-type: none"> <li>Improper storage, handling and disposal can lead to the attraction and subsequent habituation of carnivores and scavengers</li> <li>Potential for litter</li> </ul>	<ul style="list-style-type: none"> <li>Promote the use of bulk beverages available from a beverage dispenser</li> </ul>	<ul style="list-style-type: none"> <li>Designated recycling bins for beverage containers</li> <li>Used beverage containers will be stored in wildlife-proof containers</li> </ul>
Tires	<ul style="list-style-type: none"> <li>Tires from equipment that can no longer be repaired</li> </ul>	<ul style="list-style-type: none"> <li>In certain soil and moisture conditions, tires may leach heavy metals and other additives</li> </ul>	<ul style="list-style-type: none"> <li>Tires will be repaired and reused as much as possible</li> </ul>	<ul style="list-style-type: none"> <li>Spent tires will be consolidated and stored on-site for later recycling/disposal</li> </ul>
Electronics and Electrical Materials	<ul style="list-style-type: none"> <li>Electrical devices that cannot be repaired</li> </ul>	<ul style="list-style-type: none"> <li>May contain mercury, lead, arsenic, cadmium, brominated flame retardants (BFRs), and polyvinyl chloride (PVC)</li> </ul>	<ul style="list-style-type: none"> <li>Electrical devices will be repaired when possible</li> </ul>	<ul style="list-style-type: none"> <li>Recycle</li> </ul>
Dry cell batteries	<ul style="list-style-type: none"> <li>Personal electronics (e.g., flashlights)</li> </ul>	<ul style="list-style-type: none"> <li>Older batteries may contain small amounts of lead, cadmium, and mercury. Other battery compounds like silver, zinc, and nickel may also be present.</li> </ul>	<ul style="list-style-type: none"> <li>To be collected and temporarily stored in bins</li> </ul>	<ul style="list-style-type: none"> <li>Collection and off-site recycling/disposal.</li> </ul>

## 2.5 Domestic Sewage

CZN manages domestic sewage (black and grey water) by disposal to an on-site sump (soak-away).

The ‘rule of thumb’ used to estimate sewage (black and grey water) production is 270 L/person/day. The average number of personnel on-site in 2018 was 8.5 over a period of 139 days. This equates to 2.3 m<sup>3</sup>/day of sewage, 319 m<sup>3</sup> for the year. 30 people would produce 8.1m<sup>3</sup>/day, and 2,957 m<sup>3</sup>/day in a whole year.

If significant on-site activity requires in excess of 40 personnel, the Mine’s Sewage Treatment Plant will be made operational.

## 2.6 Waste Rock

The new decline would be located sufficiently distant from the Vein to ensure the waste rock is benign. The host rocks that the exploration decline would be driven in are very similar to those of the previous decline. Carbonate limestones and shales of the Whittaker and Lower Road River Formations are projected to occur in the area of the new tunnel. The occurrence of the specific rock units are verified through wide spaced surface diamond drilling and underground mapping. The new decline would not crosscut the vein mineralization, but lie wholly within the footwall of the vein mineralization. Therefore, no mineralized material would be excavated and brought to surface.

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A 600 m long decline tunnel with dimensions 3 m by 3 m would produce 5,400 m<sup>3</sup> of waste rock. At a specific gravity of 2.7 m<sup>3</sup>/tonne, this would be 2,000 tonnes.

The benign nature of the waste rock would be confirmed with representative rock sampling and testing for ABA/metals, and leachate collection and analysis for metals, as was done for the existing decline.

Development waste rock from the new Decline would be stored on the 870 metre portal staging area with the rock from the previous program. Figure 2 shows in plan and section how the staging area and rock storage 'pad' will look after the proposed program. The existing pad would be enlarged by placing compacted soil over an extension area. The height of the existing rock pile will then be reduced by spreading the rock over the enlarged pad, followed by compaction. The rock will then be capped with a synthetic liner, with liner protection. The liner will 'cap' the existing pile and also form the base of the new pile. The liner will be sloped to a leachate collection sump. Leachate will flow from the sump in a pipeline to the present point of treatment of 870 portal water, either by gravity or by pumping.

## 2.7 Explosives

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Explosives and explosive materials may be left following completion of blasting activities, depending on the explosive type. Ammonium nitrate-fuel oil (ANFO) mixes are typically completely consumed in detonations, apart from misfires. Emulsion mixes are similarly consumed in detonations. Significant misfires usually result in the need for a secondary detonation to either complete the blast or dispose of the undetonated material. Explosive 'sticks' can also be used, which again are completely consumed in a detonation, and have the advantage of leaving no residue. Un-used explosives or explosive components can be disposed of by detonation or returned to the supplier. The selected disposal method will depend on the type of explosive, quantity, condition, and the manufacturers specifications. There is no 'waste' for disposal as such.

All destruction of explosives will be carried out by licensed blasting personnel. Destruction of large quantities of explosives will be carried out at a designated location at least 500 m from any infrastructure that could be damaged by the detonation. Personnel and other property damage will be avoided by sheltering the detonation area.

Explosives and explosive components are stored on-site either in several magazines (trailers) or underground.

Blasting personnel will adhere to the following procedures:

- Only a licensed person, or a person under the supervision of a licensed person (Explosives Contractor) is allowed to dispose of or destroy explosives.
- Use a method of disposal that provides the greatest degree of safety to personnel, protection of property and the environment; take adequate precautions to protect against injury or damage to property.
- Ensure that the method of disposal is appropriate to the type and condition of explosives.
- Follow recommended disposal method indicated by manufacturer or responsible authorities.
- Unused explosives must be removed and disposed of/recycled under the supervision of or by the Explosives Contractor.

## 2.8 Training & Certification

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As part of their orientation, all employees and contractor personnel will receive basic environmental and waste management training, including:

- 
- Reducing water use
  - Managing food wastes to minimize animal attraction
  - Reducing waste, and
  - Separating waste (recyclables, dry-cell batteries, food waste, hazardous waste).

In addition, all personnel involved in the handling of hazardous wastes will receive Workplace Hazardous Materials Information System (WHMIS), 'Personal Safety and Protection' and Emergency Response training.

## **2.9 Environmental Mitigation and Monitoring**

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Environmental mitigation measures related to waste management will be adopted. These include:

- All waste foods and human garbage will be stored in wildlife proof containers and incinerated consistent with current industry good management practices to minimize wildlife attraction and potential habituation to the local area.
- Littering will be prohibited.
- Feeding of wildlife will be prohibited.
- Adaptive management will be applied to waste management practices. If wildlife is found to be attracted to a particular site (i.e., problem wildlife) additional management practices as appropriate will be adopted.
- Employees and contractors will receive orientation on the contents of CZN's Waste Management Plan and best practices for waste management.

Waste generation and storage locations are observed by site managers mostly on a daily basis since they are in close proximity and site activities are occurring in the same area. Locations include the Administration Building, Machine Shop, Battery Trailer (Tank Farm) and the main yard. All locations are inspected at least monthly. We plan to use an Inspection Log (see Appendix A) to formalize monthly inspections and provide for record keeping. Completed logs can be provided with Annual Reports. Any items requiring attention are addressed in morning 'tail-gate' meetings and recorded on the site Daily Log. Waste locations are subject to inspection by the Lands inspector who produces inspection reports.

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## APPENDIX A

### INSPECTION LOG



## INSPECTION LOG - CHEMICAL/WASTE STORAGE, PRAIRIE CREEK MINE

CHEMICAL	STORAGE CONDITIONS	COMMENTS/ACTIONS
<b>Reagent Pad</b>		
Copper Sulphate		
Sodium Isopropyl Xanthate		
MIBC & Methanol solvent		
Dowfroth & Dowtherm glycol		
Xanthate Debris - Gravel/Dirt/Plastic		
Contaminated Soil-Hydrocarbon		
<b>Mill</b>		
Soda Ash		
Used oil, lube, solvent		
<b>Main Yard</b>		
Soda Ash (Sodium Carbonate)		
Lime (Calcium Hydroxide)		
<b>Drill Supply Trailer</b>		
Grease, soap, mud		
<b>Old Kitchen</b>		
Headlamp Batteries		
<b>Acid Shack</b>		
Acid & other chemical containers		
<b>Cold Storage</b>		
Contaminated soil, chemical		
<b>Tank Farm Trailer</b>		
Grease, batteries, paint		
<b>Machine Shop Containments</b>		
30W engine Oil		
75W90 Gear Oil		
10W engine Oil		
<b>Lube Oil Containment</b>		
Oil & lube		
<b>Water Treatment Shack</b>		
Chemicals		

Date of Inspection:

Inspector: