



## WOLVERINE PROJECT

## WASTE MANAGEMENT PLAN

VERSION 2009-02

Prepared for:  
Yukon Energy, Mines and Resources

Prepared by:  
Yukon Zinc Corporation  
Vancouver, British Columbia

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## TABLE OF CONTENTS

<b>1</b>	<b>Background.....</b>	<b>1</b>
1.1	Scope and Objectives .....	1
1.2	Definitions.....	2
<b>2</b>	<b>Waste Infrastructure.....</b>	<b>2</b>
2.1	Landfill.....	2
2.1.1	Incinerator .....	5
2.1.2	Waste Storage and Open Burn Area .....	5
2.2	Camp .....	6
2.3	Special Waste Storage Pad.....	6
2.4	Waste Oil Burner .....	6
2.5	Lead-Acid Battery Bins .....	7
2.6	Land Treatment Facility.....	8
<b>3</b>	<b>Solid Waste Management.....</b>	<b>8</b>
3.1	Putrescible Waste .....	11
3.1.1	Recyclable Material .....	11
3.1.2	Office and Dormitory Waste.....	11
3.2	Construction Waste .....	11
3.3	Ash from Incinerator or Open Burning.....	11
3.4	Used Tires .....	11
<b>4</b>	<b>Special Waste Management.....</b>	<b>12</b>
4.1	Waste Oil and Filters.....	13
4.2	Waste Diesel .....	13
4.3	Waste Antifreeze.....	13
4.4	Solvents and Lubricants .....	13
4.5	Used Batteries .....	14
4.6	Class 9 Waste.....	14
4.7	Biomedical Waste .....	14
4.8	Contaminated Soil and Snow from Spills.....	14

## **LIST OF FIGURES**

Figure 1: Location of Yukon Zinc Corporation's Wolverine Project.....	1
Figure 2: Location of Special Waste Storage Area, Landfill and Incinerator, and Waste Storage and Open Burn Area.....	4
Figure 3: Waste Handling Stream and Disposal Requirements .....	10

## **LIST OF TABLES**

Table 1: Handling, Storage and Disposal of Solid Waste.....	8
Table 2: Handling, Storage and Disposal of Special Waste .....	12

## **LIST OF PICTURES**

Picture 1: Active and future landfill cells for the deposition of non-putrescible waste.....	3
Picture 2: Active cell containing waste with cover material adjacent .....	3
Picture 3: High Voltage Bear Fence .....	3
Picture 4: Incinerator on right, and ash storage bin in center .....	5
Picture 5: Waste Storage Area; steel and tires .....	5
Picture 6: Open Burn Area.....	5
Picture 7: Waste oil tank (white) and Class 9 bins (black) at the Special waste storage pad .....	6
Picture 8: Waste Oil Burner in Procon Shop .....	7
Picture 9: Lead-Acid Battery Bin at the Special waste storage pad .....	7

## **LIST OF APPENDICES**

Appendix A	Wolverine Project Issued Environmental Act Permits
Appendix B	MSDS Sheets for Special Waste

# 1 Background

Yukon Zinc Corporation's (YZC) Wolverine Project (Project), located in the southeast Yukon (Figure 1), is a zinc-silver-copper-lead-gold underground mining project that will mine up to 1,700 t/d of diluted ore. The mine is expected to be in operation for a period of about nine years, commencing mid 2010. For a detailed description of all project components and project schedule, refer to the *Wolverine Project General Site Plan V2008-04* (GSP).

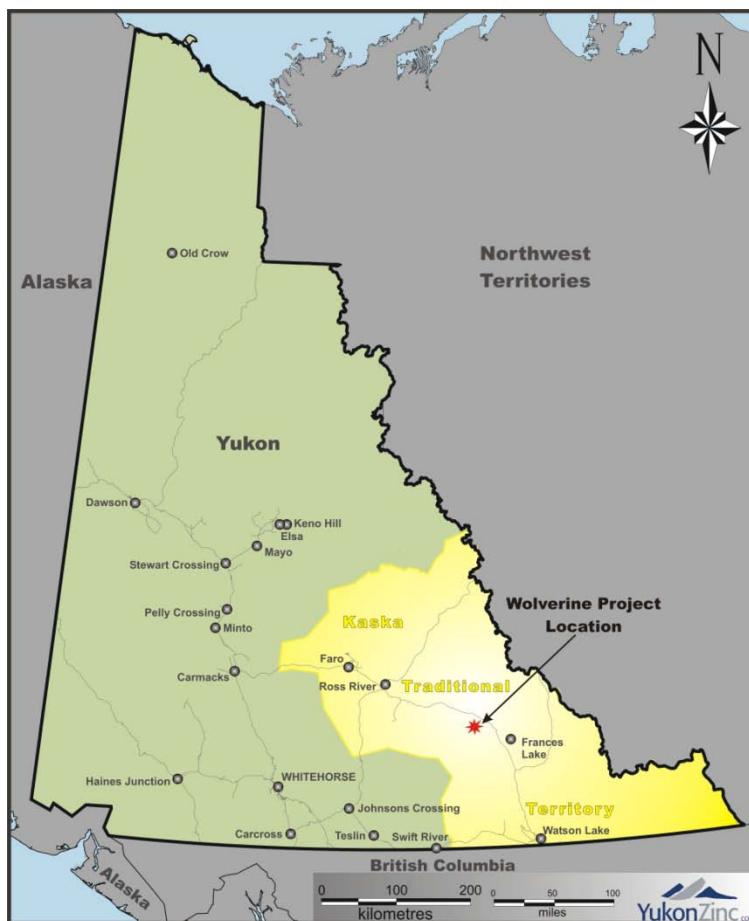


Figure 1: Location of Yukon Zinc Corporation's Wolverine Project

## 1.1 Scope and Objectives

Waste Management Plan Version 2009-02 (WMP), an Environmental Protection Plan required by Quartz Mining License QML-0006 (QML) Section 12.1, supersedes the previous version contained within GSP Appendix A. QML Section 12.1 requires that the WMP include:

- a) a description of the handling, collection, storage and disposal of waste for the various waste streams generated by the Undertaking, including non-hazardous solid wastes and special wastes; and
- b) a description of the management of water treatment sludges.

At this time, there is no sludge generation on-site as all underground mine and collected surface waters are pumped directly to the tailings facility for storage. It is not predicted that there will be any sludges until approximately 2012. YZC will revise this WMP to reflect operational changes, as necessary.

All wastes will be handled, stored and disposed of according to the appropriate regulations and permits issued under the Yukon Environment Act, including Commercial Dump Permit #81-014, Air Emissions Permit # 4201-60-02, Special Waste Permit #43-046 and Land Treatment Facility Permit #4202-24-022.

All personnel associated with waste handling, storage and disposal will be knowledgeable of the contents of this report, including the conditions and requirements of the applicable permits (included in Appendix A).

## 1.2 Definitions

For consistency in interpretation with the contents contained herein, the following terms are defined:

- **Waste** includes solid and special waste;
- **Solid waste** includes refuse, ashes, garbage, domestic waste, compost or any other waste prescribed by regulation whether or not the waste has any commercial value or is capable of being used for a useful purpose<sup>1</sup>;
- **Special waste** is a waste requiring special handling, storage, or destruction and prescribed as special waste by regulation whether or not the waste has any commercial value or is capable of being used for a useful purpose<sup>1</sup> (e.g., waste oil);
- **Putrescible Waste** contains organic matter that is capable of being decomposed and may be capable of attracting or providing food for wildlife (e.g., kitchen waste);
- **Non-putrescible Waste** means any waste that contains no more than trivial amounts of putrescible materials; examples include construction waste, cardboard, demolition debris, etc;
- **Class 9 Hazardous Wastes** are miscellaneous products, substances or organisms considered to be dangerous to life, health, property, or the natural environment<sup>2</sup>; and
- **Bear-proof container** is a container sealed to prevent the escape of attractant odours and strong enough to exclude a bear from the contents.

## 2 Waste Infrastructure

This section outlines where wastes are handled, stored and disposed of and the locations of waste infrastructure are shown on Figure 2. Access to the site is restricted to authorized personnel and therefore additional security measures are not warranted at waste storage locations.

### 2.1 Landfill

The landfill is located between the airstrip and the industrial complex. It will accommodate non-putrescible waste generated over the life of the mine and will be operated in a manner that will facilitate landfill closure at the cessation of mine operation. The landfill is a flat cleared area with cells for the burial of material (Pictures 1 and 2). The landfill contains a sea-can container to temporarily house

<sup>1</sup> Revised Statutes of the Yukon: Environment Act Part 2: *Definitions* (2002)

<sup>2</sup> Revised Statutes of the Yukon: Environment Act Part 10 Section 118: *Hazardous Substance and Pesticides* (2002)

waste generated by contractors until it is segregated by YZC Site Services for either incineration or off-site disposal or recycling.



**Picture 1: Active and future landfill cells for the deposition of non-putrescible waste**



**Picture 2: Active cell containing waste with cover material adjacent**

A sign at the entrance to the landfill lists conditions for use, emergency contacts and procedures, and items that may not be disposed of within the facility such as: hazardous wastes, acids, corrosives, solvents, oily wastes, explosives, or unsterilized biomedical waste. As per Commercial Dump Permit #81-014, there is an electric fence surrounding the landfill, which is operational from May 31 to October 31 (Pictures 3 and 4), to prevent wildlife from entering the facility.



**Picture 3: High Voltage Bear Fence**

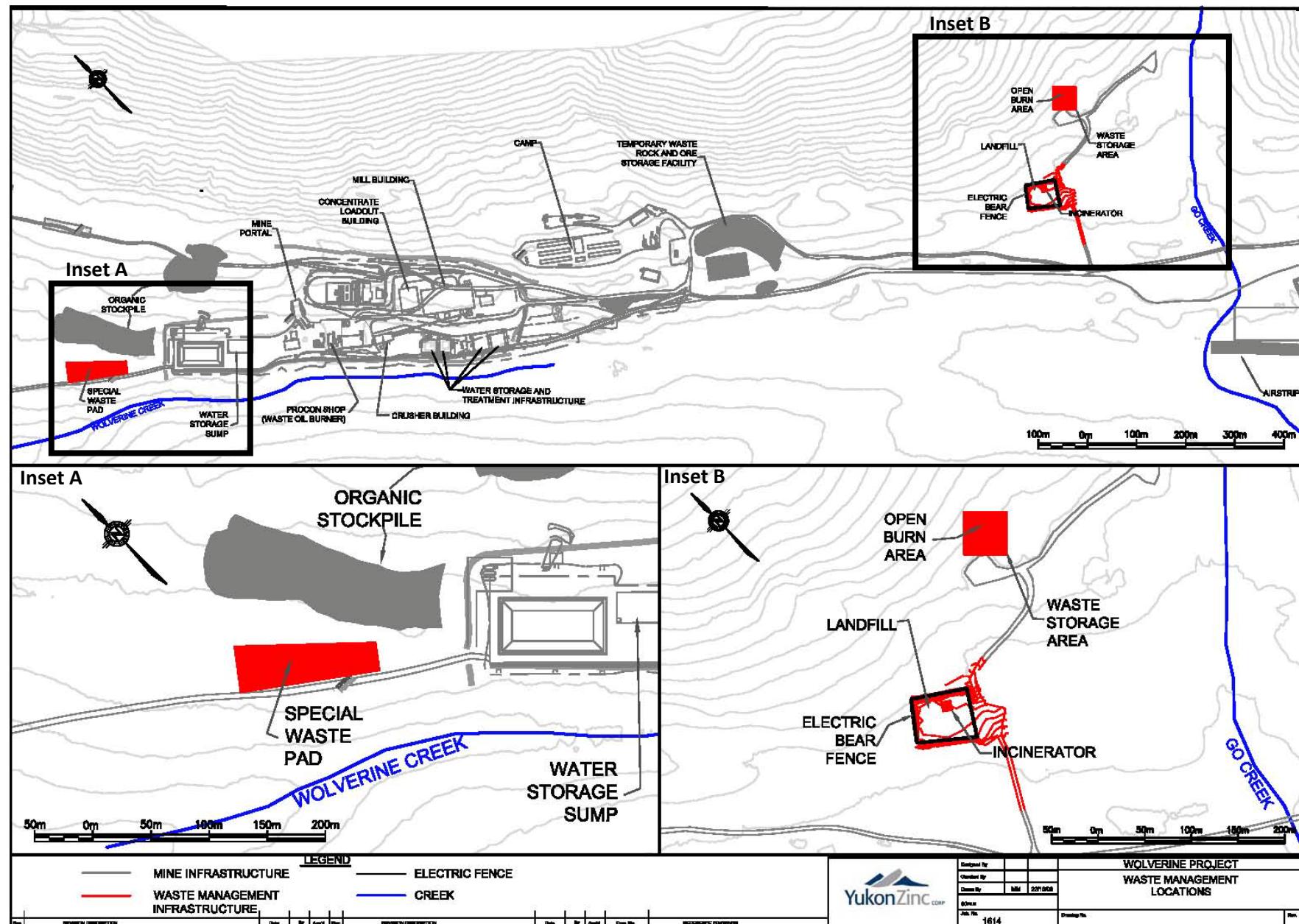
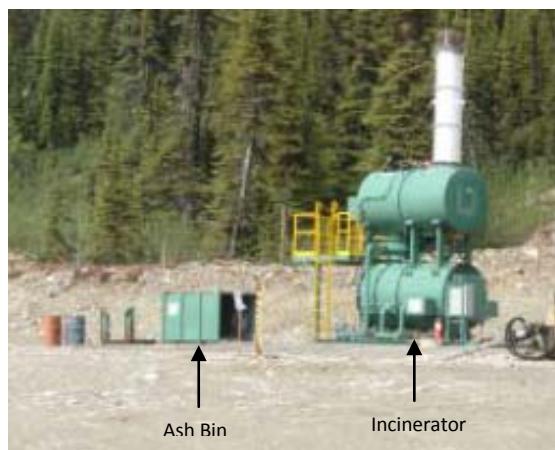


Figure 2: Location of Special Waste Storage Area, Landfill and Incinerator, and Waste Storage and Open Burn Area

### 2.1.1 Incinerator

A Westland Dual Chamber Incineration System is located within the fenced landfill area (Picture 4). The incinerator is operated by a trained YZC employee who is responsible for tracking the volume of waste incinerated daily as per Air Emissions Permit #4201-60-021 Part 4 (2) (provided in Appendix A). The ash bin is located adjacent to the incinerator and is used as a transfer station for ash obtained from the incineration of waste, prior to disposal in the landfill.



**Picture 4: Incinerator on right, and ash storage bin in center**

### 2.1.2 Waste Storage and Open Burn Area

The waste storage and open burn area is located upslope of the landfill area. The waste storage area (Picture 5) stores all recyclable and potentially re-usable items that will ultimately be shipped off-site. Signs delineate the segregated piles, which include steel, tires, wood wastes and plastics. The open burn area (Picture 6) is used to open burn up to 49 kg per day of construction waste (as per Air Emissions Permit #4201-60-021), such as scrap wood and plastic.



**Picture 5: Waste Storage Area; steel and tires**



**Picture 6: Open Burn Area**

## 2.2 Camp

The camp waste infrastructure serves the kitchen, office complex, dormitories and site vehicle parking lot. Bear-proof containers are located behind the kitchen facilities and in front of the office complex. Recycling bins for refundable beverage containers and aerosol container bins are located in the recreation hall, kitchen and all offices and dormitories. Used alkaline battery bins are located in the kitchen facilities and the Environmental Office.

## 2.3 Special Waste Storage Pad

The Special Waste Storage Pad is located east of the industrial complex area (Figure 2) and is used for the storage of waste oil and diesel (in 45 gallon drums or tanks), used 45 gallon drums, and Class 9 items (such as aerosol containers and hydraulic hoses) (Picture 7).



**Picture 7: Waste oil tank (white) and Class 9 bins (black) at the Special waste storage pad**

## 2.4 Waste Oil Burner

A Clean Burn Waste Oil Burner located in the Procon maintenance shop (Picture 8) burns waste hydrocarbons to generate heat. Waste products consumed by the burner include:

- Crankcase oil;
- Automatic Transmission Fluid;
- Hydraulic oil; and
- Fuel Oils #2 (truck diesel and heating oil), 4 (blend of diesel, distillate or residual fuel oil) and 5 (residual fuel oils (RFO) or heavy fuel oils).



**Picture 8: Waste Oil Burner in Procon Shop**

## 2.5 Lead-Acid Battery Bins

Leak proof bins for lead-acid batteries (Picture 9) are located at the Procon maintenance shop, temporary Arctic Construction Camp, and Special Waste Storage Pad.



**Picture 9: Lead-Acid Battery Bin at the Special waste storage pad**

## 2.6 Land Treatment Facility

A land treatment facility for the purposes of remediation for hydrocarbon contaminated soil is located east of the airstrip, and is permitted by Land Treatment Facility Permit #4202-24-022. Remediation areas for oil, gas and diesel hydrocarbon contaminated soil and snow are delimited in the land treatment facility. As material is remediated (i.e., meets *Yukon Contaminated Sites Regulations for Industrial Sites*), the material is removed from the facility for use in industrial activities, following approval from Yukon Environment.

## 3 Solid Waste Management

This section outlines how solid wastes are handled, stored and disposed of. Non-hazardous solid waste will be segregated into two streams: putrescible and non-putrescible wastes. Non-putrescible wastes will be further segregated into three categories: recyclable, burnable and non-burnable material. Figure 3 summarizes the waste stream handling and disposal requirements for the Project. Table 1 outlines the handling, storage and disposal of solid waste.

**Table 1: Handling, Storage and Disposal of Solid Waste**

Type	On-site Storage Location	Disposal
Kitchen Waste	Bear-proof containers	Incinerator
Beverage Containers	Recycling Bins	Off-site disposal
Office and Dormitory Garbage	Garbage Bins/Bear-proof containers	Incinerator
Untreated Wood	Open Burn Area	Open burned <sup>1</sup>
Treated Wood	Waste Storage Area	Incinerator
Heavy Plastics	Waste Storage Area	Incinerator
Light Plastics/Cardboard	Waste Storage Area	Open burned <sup>2</sup> /Incinerator
Steel	Waste Storage Area	Off-site Disposal facility
Ash from Incinerator/Open burn area	Ash Bin	Landfill
Tires (rim size < 24" diameter)	Waste Storage Area	Barrier use or off-site disposal facility
Tires (rim size > 24" diameter)	Waste Storage Area	Barrier use or land filled

1. Untreated wood products may be open burned without restriction

2. Light plastics and cardboard may be open burned up to 49 kg/day; otherwise they must be incinerated

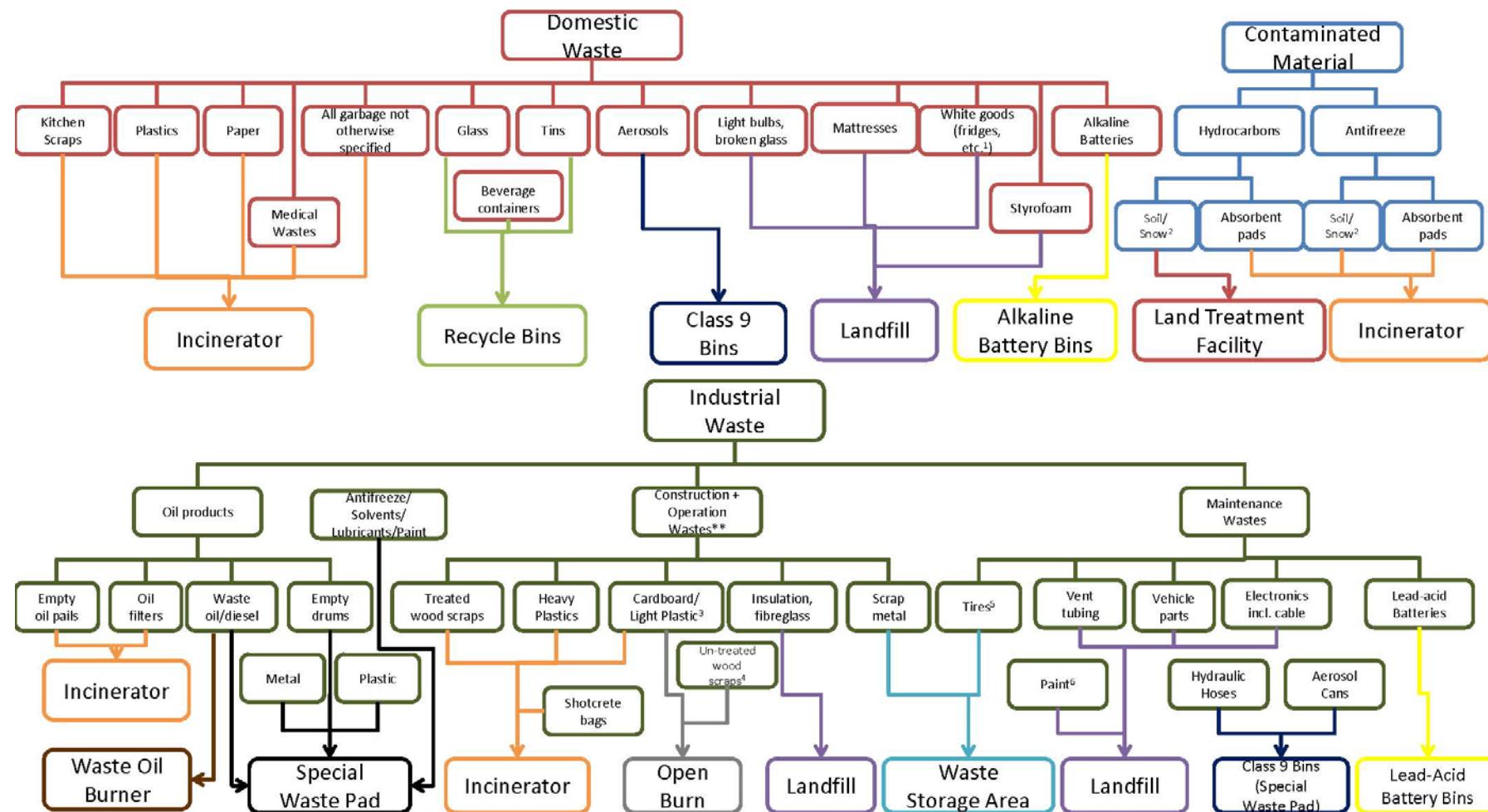
The following general procedures will be followed:

- Solid waste will be handled and disposed of in a manner that neither causes nor is likely to cause a threat to worker safety and health, or:
  - a) an adverse effect;
  - b) windblown litter to be deposited outside the property boundary of the facility; or
  - c) an attraction to wildlife.
- Solid wastes will not be stored for a period of greater than seven days prior to disposal.

- Within the landfill, cells are constructed and filled with designated material until capacity is reached whereupon a new cell is excavated. The waste material within the cell is covered weekly from April 15 to November 15 with approximately 10 cm of gravel or soil to prevent the dispersal of garbage through wind action.

YZC will incinerate hydrocarbon-contaminated adsorbent pads, domestic wastes, industrial wastes, antifreeze-contaminated soil, and treated wood products. Construction wastes, including scrap wood and plastic, will be open burned as per Air Emission Permit #4201-60-02. Waste will be incinerated and open burned or under the following permit guidelines:

- Every reasonable effort will be made to ensure a quick, hot and complete burn;
- Burning of rain-soaked solid waste will be avoided except where to delay such burning may result in attraction of wildlife or a fire hazard; and
- No waste oil, tires or aviation gasoline will be used to assist with the incineration or open burning or solid waste.



#### Notes:

1. Fluids (coolants, refrigerants, etc) will be drained from appliances and properly processed prior to transfer to the landfill
  2. Samples will be collected by the Environmental Department prior to disposal
  3. Cardboard and Light Plastics may be opened burned up to 49 kg/day
  4. Untreated wood (including brush) open burning volumes are not limited
  5. Tires with rim size >24.5" can be buried, all smaller tires may be stored at the waste storage area (for use as vehicle barriers, portal plug, etc.)
  6. Paint must be hardened to be disposed of in the landfill; otherwise paint is stored at the special waste storage pad prior to shipment offsite

**Figure 3: Waste Handling Stream and Disposal Requirements**

### **3.1 Putrescible Waste**

Putrescible waste from the kitchen facilities at the YZC and temporary construction camps will be placed into the bear-proof containers by kitchen staff, and then collected and transported by YZC Site Services twice daily for incineration to minimize wildlife attraction.

#### **3.1.1 Recyclable Material**

Recyclables must be washed to minimize wildlife attractants before storing. Refundable recyclable materials include:

- Aluminum and tin pop/juice cans
- White or other plastic beverage containers
- Glass beverage containers
- Tetra packs
- Waxed cardboard juice containers

These items will be stored in designated recycling bins until they are transported off-site, for donation to a local charity for refund.

#### **3.1.2 Office and Dormitory Waste**

Garbage bins from offices and dormitories are emptied daily by cleaning staff and transferred to bear-proof containers located behind the kitchen.

### **3.2 Construction Waste**

Burnable non-organic wastes such as cardboard and lumber will be open burned or incinerated. Metal will be segregated and stored at the waste storage area for periodic removal from site to a recycling facility. Non-hazardous solid wastes that cannot be recycled will be buried in the landfill. All contractors are responsible for dropping off all waste to the landfill sea-can container for sorting by YZC Site Services.

### **3.3 Ash from Incinerator or Open Burning**

Ash generated from both the incinerator and the open burning will be placed in the ash storage bin then landfilled. Prior to landfilling, metal will be segregated from the ash for storage at the waste storage area.

### **3.4 Used Tires**

Used tires will be collected and stored at the waste storage area. Tires not used for the purpose of protection barriers or other on-site uses will be hauled off-site and disposed of in accordance with the Yukon Used Tire Management Program<sup>3</sup>. Tires will be kept reasonably clean and not buried or burned, with the exception of tires with rim size greater than 24.5", which may be buried at the landfill.

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<sup>3</sup> <http://www.environmentyk.ca/pdf/dmrone.pdf>

## 4 Special Waste Management

This section outlines how special wastes are handled, stored and disposed of. Special wastes include waste oil, oil filters, diesel, anti-freeze, solvents and lubricants (and containers in which they are contained), aerosol containers, hydraulic hoses, batteries and biomedical wastes. Figure 3 summarizes the waste stream handling and disposal requirements for the Project. Table 2 outlines the handling, storage and disposal of special waste.

**Table 2: Handling, Storage and Disposal of Special Waste**

Type	On-site Storage Location	Disposal
Waste oil	Special waste storage pad	Off-site disposal facility
	Procon maintenance shop	Waste Oil Burner
Waste oil filters	Special waste storage pad	Incinerated
Waste diesel	Special waste storage pad	Off-site disposal facility
	Procon maintenance shop	Waste Oil Burner
Waste antifreeze	Special waste storage pad	Off-site disposal facility
Solvents/lubricants	Special waste storage pad	Off-site disposal facility
Aerosols	Class 9 bins – Special waste storage pad	Off-site disposal facility
Hydraulic hoses	Class 9 bins – Special waste storage pad	Off-site disposal facility
Lead-acid batteries	Battery bins (Procon maintenance shop/Arctic camp)	Off-site disposal facility
Alkaline batteries	Battery bins (Camp kitchen/Environmental office)	Off-site disposal facility

YZC will store special waste in the following manner to prevent endangering human and wildlife health and the environment:

- All drums, and any other portable containers containing special wastes, will be covered to prevent container degradation from the sun or contamination by water from snow or rain. They will also be stored off the ground to prevent container degradation by ground moisture.
- Incompatible substances will be stored separately to prevent contamination, fires, explosions, gaseous emissions, leaching or other discharges, or other dangerous conditions. Refer to MSDS sheets for more information (provided in Appendix B).
- The contents of all storage containers will be clearly marked.
- The residue at the bottom of any container used for the storage of dangerous goods or special wastes will not be drained to the environment. Such residue will be segregated and treated as a special waste until proven otherwise.
- During storage or transport of any special waste, the container will be closed at all times and will not be opened, handled or stored in a manner which may cause it to leak.

Stored special waste will be shipped off-site to an acceptable disposal or recycling facility and YZC will participate in Environment Yukon's annual commercial special waste collection, occurring in late summer/early fall, as appropriate.

YZC will transport and transport special waste in the following manner:

- No special wastes will be transported by YZC other than within the Project site.

- All special wastes transported off-site will be in accordance with applicable transport laws, to a facility permitted in the Yukon or other jurisdiction to receive them, by a carrier permitted in the Yukon or another jurisdiction to receive and transport special wastes. If the facility is in the Yukon, both the facility and the carrier must be permitted in the Yukon according to the Transportation of Dangerous Goods Regulations (SOR/2008-34).
- A movement control document (manifest) will be completed to document each shipment of special waste, as per Transportation of Dangerous Goods Regulations (SOR/2008-34).
- All special wastes will be transported and transferred in such a manner as to prevent their release into the environment.
- All vehicles carrying any special waste will be secured to prevent access to unauthorized personnel.

## 4.1 Waste Oil and Filters

The major sources of waste oil are from mobile equipment and power plant generators. The most common types of used oil are crank case oil, gear oil, transmission fluid, and hydraulic oil.

Waste oil will either be collected and disposed of via incineration in the Waste Oil Burner (located in the Procon maintenance shop) for the purpose of space heating, or stored at the Special waste storage pad then periodically removed from site. The volume of waste oil transported from site will be documented according to Transportation of Dangerous Goods Regulations (SOR/2008-34).

Waste oil filters will be drained of oil and incinerated in the YZC incinerator. Before disposing of waste oil filters, as much oil as possible will be eliminated from them. Steps required for proper disposal include puncturing the top of the filter, setting the filter in a tray and allowing the oil to drain for approximately 24 hours, then crushing the filter to increase waste oil recovery.

## 4.2 Waste Diesel

Waste diesel will be either stored at the Special waste storage pad then periodically removed from site, or temporarily stored at the Procon Maintenance shop and burned in the Waste Oil Burner.

## 4.3 Waste Antifreeze

Used antifreeze will be stored in containers that are leak-free and have tight closures to prevent spills, stored at the Special waste storage pad, then periodically shipped to a disposal facility.

## 4.4 Solvents and Lubricants

Small quantities of miscellaneous waste solvents and lubricants will be generated through routine site, equipment and vehicle maintenance and repairs. Solvents can be recycled (e.g., paint thinners and strippers, varsols, degreasing fluids, mineral spirits and petroleum distillates). Most of these liquids are flammable and toxic.

Solvents and lubricants will be collected and stored in appropriate drums for regular shipment to a licensed recycle or disposal facility. Containers will be covered to protect them from precipitation and will be kept separate from other waste products.

## 4.5 Used Batteries

Alkaline batteries will be placed in designated alkaline battery disposal bins, located at the YZC Camp, for collection by the Environmental Department. Lead-acid batteries from vehicles will be stored in designated leak proof bins or on lined wooden pallets, located at the Procon maintenance shop, Arctic Construction Camp, and the Special Waste Storage Pad. These will be periodically shipped to a licensed recycle or disposal facility. The following steps must be adhered to in order to prevent acid leaks and spills, and to avoid contamination of the storage site:

- Batteries will be placed on wooden pallets in secondary containment (i.e., on a liner or berm) to prevent the escape of acid.
- Before putting waste batteries on the pallet, plastic sheeting will be placed on it to completely enclose all of the batteries in a continuous sheet of plastic. All sides will be wrapped to protect the batteries from the weather and to prevent any acid from being discharged into the environment.
- Batteries will not be stacked more than three layers thick and each layer will be separated with a sheet of plywood or other suitable material.

## 4.6 Class 9 Waste

Class 9 items such as used aerosol containers and hydraulic hoses will be stored in Class 9 bins located at the special waste storage pad and periodically be removed from site for incineration at a proper facility.

## 4.7 Biomedical Waste

A small amount of biomedical waste (such as bandages) will be generated at the first aid rooms at the Procon Office, and YZC and Arctic Camps. This waste will be collected in designated purpose-built containers, and then transported by YZC Site Services to the landfill for incineration.

## 4.8 Contaminated Soil and Snow from Spills

Spills on-site may include hydrocarbons (i.e., diesel, waste oil, and hydraulic oil), antifreeze, and solvents and lubricants. These items each have specific disposal methods:

- Hydrocarbon contaminated soil and snow will be excavated and transported to the Land Treatment Facility – samples will be taken by the Environmental Department to ensure compliance with Land Treatment Facility Permit #.
- Hydrocarbon-contaminated absorbent pads will be incinerated.
- Antifreeze contaminated soil and snow will be incinerated. However, prior to incineration, samples must be sampled by the Environmental Department as per the Environment Act<sup>4</sup>.
- Antifreeze contaminated absorbent pads will be incinerated.
- Solvents and lubricants have specific disposal requirements as per the MSDS sheets provided in Appendix B.

For further information, please refer to YZC's Spill Contingency Plan V2009-02

<sup>4</sup> Revised Statutes of the Yukon: Environment Act

## **Appendix A      Wolverine Project Issued Environmental Act Permits**

- **Commercial Dump Permit #81-014**
- **Air Emissions Permit # 4201-60-021**
- **Special Waste Permit #43-046**
- **Land Treatment Facility Permit #4202-24-022**

## **Appendix B      MSDS Sheets for Special Waste**