

Government of the Northwest Territories

Department of Environment and Natural Resources

Municipal Hazardous Waste Inventory Beaufort Delta/ Arctic Pilot Project
SC437531



Technical Report
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1. INTRODUCTION

Due to a number of factors various Northern communities have been storing hazardous waste from the Industrial Commercial and Institutional (ICI) as well as residents at local municipal landfills. This project was developed to take a current inventory of hazardous and non-landfillable waste in each community focusing on material that was not inventoried previously. From the waste inventory a cost estimate is required to accommodate packaging, transportation, and disposal. Additionally there will be provision of guidance on proper management of hazardous waste. By collecting and providing an inventory, cost estimate and waste management guidance communities have an opportunity to remove existing knowledge barriers to assist with the future management of waste.

KBL Environmental Ltd. (KBL) was retained by the Government of the Northwest Territories – Department of Environment and Natural Resources (GNWT) to re-visit communities within the Delta to better identify waste materials that were not able to be identified in March of 2013. KBL mobilized two teams to inventory the nature, means of containment, size and quantity of hazardous waste located in each of the eight communities in the Beaufort Delta region. The teams consisted of the following KBL personnel highlighting the communities visited by each team.

TEAM 1		
KBL PERSONNEL	Krystal Malkin	Keegan Hnatiw
COMMUNITY	Paulatuk	
	Inuvik	
	Ulukhaktok *	
	Sachs Harbour *	

TEAM 2 - Ground Mobilization Communities		
KBL PERSONNEL	Doug Dawley	Brandon Frederick
COMMUNITY	Aklavik	
	Tuktoyaktuk	
	Tsiigehtchic	
	Fort McPherson	

* Due to flight cancellations and delays Ulukhaktok and Sachs Harbour site visits have been postponed at this time.

2. HAZARDOUS WASTE MANAGEMENT

The following information is pertinent to the responsible management of hazardous waste. The practices highlighted below will help minimize risk, and decrease the cost associated with management of wastes. It is important that waste is properly characterized, labeled, segregated and stored as waste as well as using inventory management system in communities or at landfills. The communities can refer to these steps for guidance in their future management of hazardous and non-landfillable waste. To support proper waste classification, segregation, consolidation and transportation attached as Appendix A are KBL generated Standard Operating Procedures (SOP's).

2.1 Characterization

Characterization of waste is the first step to identifying chemical characteristics. It is important to establish early in the process if waste contains any hazardous properties including: corrosive, flammable or toxic to name the most common. This will determine if a waste is a dangerous good or not. If the waste is a dangerous good and will be leaving the site where it was generated, Federal Acts and Regulations will pertain to the waste and how it is to be handled and prepared for transportation. It is beneficial to characterize and label materials at the time it is generated as this is the time that the most information about a waste is available. For example if a maintenance

garage has a drum that is being utilized for fluid changes and it is known that antifreeze and oil is combined into a drum, it is best to note that and label prior to transporting to a storage area.

In the situation that an unknown drum must be classified, KBL has developed a SOP titled “Classification and Inventory of Unknown Drums”. This document provides the step by step instructions to allow individuals to safely open and classify a drum of unknown contents. The SOP highlights the following items: an outside container assessment, a visual inspection of container contents, a field analysis, laboratory analysis (if needed) and labeling instructions as included in Appendix A.

2.2 Labeling

Once the waste has been properly classified, each waste will require a label that provides information regarding the contents of the container. If the waste is considered to have hazardous properties, additional information will need to be provided including the following:

- Proper Shipping Name
- UN or PIN number
- Hazard Class

A sample of a KBL Hazardous waste label can be seen below. KBL has also included a section for an internal handling code, drum number (if applicable) and generator name.

HAZARDOUS WASTE

PROPER SHIPPING NAME: _____

PIN: _____ CLASS: _____

Packing Group: _____ DRUM NO.: _____

GENERATOR: _____

Waste specific labeling requirements can differ depending on the mode of transport that is selected to transport the waste off the generator’s site. Waste shipments, including those containing dangerous goods can be shipped via road/rail, marine vessel or air. Rail and road (ground) shipments are regulated by the Transportation of Dangerous Goods Regulations Act (TDGR), maritime shipments are governed under the International Maritime Dangerous Goods Code (IMDG) and air shipments are regulated by International Air Transport Authority (IATA).

Personnel labeling containers should be provided with WHMIS training for additional information regarding labeling of goods for storage as well as the applicable Dangerous Goods training if they will be responsible for transporting the material.

2.3 Segregation & Storage

Proper segregation and storage of waste is required to ensure the health and safety of community residents, prevention of environmentally adverse effects as well as to ensure environmental compliance. Waste should be segregated by waste type and stored to ensure no drums are leaking or could pose an environmental impact. Prior to storage, all containers should be sealed, inspected for leaks or container integrity, labeled, palletized and inventoried if a tracking system is in place.

The Guideline for the General Management of Hazardous Waste for the GNWT is an excellent resource highlighting the general requirements for storage containers. According to Section 3 of the Guide; Hazardous waste should be stored in containers according to the following:

- In the original containers, where possible, or in containers manufactured for the purpose of storing hazardous waste. The containers must be sound, sealable and not damaged or leaking. The Transport Authority regulates container specifications.
- Clearly labelled according to the requirements of the Work Site Hazardous Materials Information System (WHMIS) of the Safety Act or the relevant Transport Authority, if transport is planned.
- Bulked into 16 gauge or equivalent metal or plastic 205 litre drums, as appropriate.
- The containers should be sealed or closed at all times, unless in use.

Additionally, there should be enough space between the palletized drums or containers so that a walk around inspection can be performed routinely to ensure no leaks or failures of the containers while in storage. Empty drums should be sealed with bungs and neatly stacked on their sides to ensure moisture and precipitation cannot enter the drum. This can lead to increased disposal costs as any contaminated water collected in empty drums will increase waste handling and disposal costs.

Proper drum segregation should be practiced to ensure that two or more waste streams do not interact with each other. Some waste streams are so incompatible, fires, explosions or toxic vapours can be produced. KBL has created a SOP for Waste Segregation that includes an explanation on how to properly use a Waste Segregation Chart as included in Appendix A.

2.4 Inventory Management

Inventory Management is an important step in managing all types of waste, especially hazardous wastes generated by a community. Periodic inventories should be conducted and maintained so the community is aware of what type of waste and how much of it is accumulating in their landfills and municipal shops. In addition to allowing a community to keep track of the volumes and types of wastes they are temporarily storing, this information will allow them to prioritize and budget for proper waste management in their communities. The storage of hazardous wastes is only considered a temporary option. Ultimately all hazardous waste generated by a community will eventually have to be managed locally or removed and transported to an approved waste handling facility.

Inventory Management will identify what wastes are predominant and can lead to developing initiatives to reduce or eliminate certain waste streams. With routine inventories, communities will be able to monitor waste volumes and success or failure of a program. In the rare event of a landfill or community garage fire, this inventory could provide valuable safety information to first responders arriving at the fire. 100 empty drums or 100 full drums of fuel can have significant consequences in the event of an emergency situation in a remote location.

3. COMMUNITIES SUMMARY

3.1 Aklavik

The hazardous waste in Aklavik was located at the solid waste facility (N68°14'0.6 W 135° 2' 26.5) and the town maintenance garage (N68° 13' 3.49 W135° 0' 19.95). The hazardous waste storage area at the landfill was located in the area where general refuse is dumped. In both locations it appeared that waste was being dropped in general locations based on container type however there was no signage indicating where to drop off specific waste streams and waste was unorganized and scattered. Some drums were buried underneath appliances as well as tanks. There was no waste material at site that was palletized and immediately suitable for transport.

3.2 Fort McPherson

Hazardous waste was located at a designated location adjacent to the McPherson municipal solid waste facility (N67° 28' 17.44 W 134° 38' 9.90). Signage was present to provide direction to specific locations where hazardous waste was stored. The waste had been palletized to prepare for transport, however it was noted that there was multiple drums that were not suitable to transport. Pails that were identified on the previous assessment had been consolidated into larger means of containment.

3.3 Inuvik

The community of Inuvik stores all their waste at the landfill (N68° 20' 56.80 W133° 40' 41.61). Inuvik does have segregated and signed areas for various waste streams. There are local contractors who routinely pick up the batteries and propane tanks that accumulate over time. Local industry is expected to dispose of their own waste and this initiative has greatly reduced the number of hazardous waste drums stored at the landfill.

3.4 Paulatuk

The community of Paulatuk stored the majority of their drums at the landfill, some drums were easily accessible on the plateau of the landfill (N69° 20' 23.34 W124° 6' 20.89) and others were discovered in the lower portion of the landfill (N69° 20' 20.66 W124° 6' 21.02). A small volume of drums and cylinders were also being stored next to the municipal shop (N62° 27' 24.16 W114° 24' 39.22). This community was very outgoing in support of the Beaufort/Delta Inventory Project.

3.5 Sachs Harbour

Due to flight cancellations we were unable to complete the site visit to Sachs Harbour.

3.6 Tsiigehtchic

Hazardous waste was located at the municipal solid waste facility (N67° 26' 42.61 W133° 42' 48.74). The hazardous waste storage area was located in a berm and protected from vehicles/equipment. It was evident that effort was taken to keep waste segregated and accessible through signage and ongoing inspection and management. The town foreman was knowledgeable and had a good understanding of hazardous waste stored at site. Technicians were able to check the fluid levels in scrap vehicles and confirm that fluids had been drained from the vehicles. The majority of drums were palletized and ready for transportation.

3.7 Tuktoyaktuk

Hazardous waste was located at the municipal solid waste facility (N69° 25' 12.49 W133° 1' 30.03) and the town maintenance garage (N69° 26' 13.69 W133° 2' 5.47). The majority of drums had been staged prior to our arrival for ease of identification. The storage area was organized and segregation was evident.

3.8 Ulukhaktok

Due to flight cancellations we were unable to complete the site visit to Ulukhatok.

3.9 Recommendations

The following are general recommendations that can in whole or partially be adopted and implemented at all of the visited communities in the Beaufort Delta region:

- Designated staff of foreman should have WHIMIS, TDG, IMDG and or IATA training so that they can gain the knowledge with chemical hazards, classification and packaging of waste for transportation.
- Designate an easily accessible area of the landfill for the storage of containers and provide signage to assist residents in proper segregation of waste.
- In the designated area construct a cell that is lined with berms and clear signage
- Ensure that containers are clearly labeled using appropriate stickers with contents written on the side of the container in paint pen in the case the label is faded or removed
- Inspect containers prior to placement and segregate waste based on container type and ensure that they are upright with lids or bungs secured
- Provide an area for special wastes including; batteries, paints, oily pails, chemical pails and propane tanks so they don't get mixed with incompatible materials
- Provide an area for appliances to keep them protected from equipment/vehicles damage
- Empty drums should be sealed with bungs and stacked neatly on their sides
- Ensure all drums with contents are stored upright /sealed with bungs and all empty drums are sealed and stored on their sides
- Consolidate smaller volumes of like waste into one drum to reduce the number of drums with less than ½ full contents
- Perform regular inspections and inventories of the labeled and stored wastes

4. HAZARDOUS WASTE

4.1 Waste Inventory

KBL worked with community government representatives to identify locations within the community that hazardous waste was stored. Once these areas were determined an inventory of waste at each location was documented identifying the nature, means of containment, size and quantity and geographic coordinates of the waste.

A detailed waste inventory is included as Appendix C and photomontage with pictures from each community are included as Appendix D.

Table 1: General waste inventory

Description	Unit	Quantity	Notes
Aklavik			
Drummed Waste	205L	311	Includes 277 empty drums in pile
Pails of Waste	20L	46	Quantity of pails indicated is what was visible
Lead Acid Batteries	Each	9	Quantity of lead acid batteries found at landfill
Lead Acid Batteries	Crate	1	4x4x4 crate of lead acid batteries at the maintenance garage
Fuel Tanks	Each	58	Estimated quantity of home heating fuel tanks in large pile
Fridges / Freezers	Each	65	Estimated quantity of appliances piled and snow covered
Vehicles	Each	9	Estimated quantity of vehicles in heavy snow area
Fort McPherson			
Drummed Waste	205L	73	

Pails of Waste	20L	60	Misc Paint related materials
Totes of Waste	1100L Tote	4	
Lead Acid Batteries	Each	8	
Tanks	10,000L	2	Estimated 10,000L tanks containing used oil
Tank	30,000L	1	Estimated 30,000L tank w/ secondary containing used oil
Fridges/Freezers	Each	250	
Vehicles	Each	12	Light duty vehicles
Inuvik			
Drummed Waste	205L	29	
Drums with Residuals	205L	80	Estimated quantity of drums with residuals
Pails of Waste	20L	171	Pails had hydrocarbon based waste and paint
Totes with Waste	1,100L	1	
Lead Acid Batteries	Each	5	
Cylinders	20 lb	13	
White Goods	Each	201	CFC (halons) removed from appliances
Large Vehicles	Each	10	5 Ton service vehicles
Paulatuk			
Drummed Waste	205L	356	
Drums with Residuals	205L	298	Number of empty drums
Pails of Waste	20L	11	
Sleds / ATV's	Each	300	It is believed that fluids were not removed
Vehicles	Each	36	Estimated 25-30 light duty vehicles, 6 heavy duty vehicles
Home Heating Fuel Tanks	Each	20	20 tanks were visible
Appliances	Each	150	Estimated quantity of appliances
Cylinders	20lbs	14	
Cylinders	100lbs	37	
Sachs Harbour			
Drummed Waste	205L	468	An estimated 400 drums were not accessible to be identified
Vehicles	Each	30-40	Estimated 30-40 vehicles
Cylinders	100lbs	3	
Transformer	Each	1	
Tsiigehtchic			
Drummed Waste	205L	172	
Pails of Waste	20L	133	
Lead Acid Batteries	Each	16	
Vehicles	Each	48	2 light duty, ~45 crushed vehicles and 1 heavy equipment
Fridges/Freezers	Each	54	35 appliances with Freon, 19 appliances without Freon
Home Heating Fuel Tanks	Each	31	
Tank	10,000L	1	10,000L tank on stand, unable to confirm contents
Tuktoyaktuk			
Drummed Waste	205L	40	
Pails of Waste	20L	85	
Tote of Waste	1,100L	3	
Cylinders	20lbs	11	
Home Heating Fuel Tanks	Each	52	
Vehicles	Each	27	25 light duty vehicles, 1 school bus, 1 heavy equipment
Ulukhaktok			
Drummed Waste	205L	65	
Drums with Residuals	205L	9	
Lead Acid Batteries	Crate	1	

Vehicles	Each	20-25	Estimated 20-25 light duty vehicles
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Note: The above inventory incorporates inventories completed in March 2013 with the recent inventory completed in October 2013. Inventories for Sachs Harbour and Ulukhaktok are based on the March 2013 inventory only as technicians were unable to mobilize to these communities.

4.2 Packaging, Transportation & Disposal Cost Estimate

Pricing hereinafter includes all costs associated with packaging, transportation and disposal of inventoried waste from each community. Cost estimates budget for a Project Manager, Environmental Technician, two local Laborers and equipment to support each community to prepare material for transportation. After review of potential waste facilities it was concluded that the closest registered receiving facility is KBL in Whitehorse. The facility is regulated by Environment Yukon Permit #81-050 to receive, generate and with transport Special (Hazardous) Waste.

Due to the remote nature of some of the communities a combination of transportation options will be utilized to move the materials in the most economic fashion. The cost estimate has been based on completion of work during the summer months to expedite the required onsite work. Hazardous waste that is not currently in suitable condition to transport has been separated to include the additional time and resources that will be required to prepare material for shipment. A twenty percent contingency has been incorporated into the final price to accommodate potential unforeseen circumstances associated to Northern work as well as contents of drums based on conditions during the inventory.

Table 2: Estimated pricing for repackaging, transportation and disposal services

Description	Notes	Estimated Total
Aklavik		
Resource Mobilization, Demobilization & Subsistence	4 staff for 3 days	\$17,100
Contracting Services	Staging + Loading	\$5,400
Transportation	Maritime + Road	\$14,134
Disposal – Suitable For Transport	KBL Whitehorse	\$28,595
Disposal – Not Suitable For Transport	Includes extra time and materials	\$10,925
		Subtotal \$76,154
Fort McPherson		
Resource Mobilization, Demobilization & Subsistence	4 staff for 3 days	\$17,100
Contracting Services	Equipment for staging and loading	\$5,400
Transportation	Maritime + Road	\$12,958
Disposal – Suitable For Transport	KBL Whitehorse	\$41,010
Disposal – Not Suitable For Transport	Includes extra time and materials	\$13,255
		Subtotal \$89,723
Inuvik		
Resource Mobilization, Demobilization & Subsistence	4 staff for 3 days	\$17,100
Contracting Services	Equipment for staging and loading	\$5,400
Transportation	Maritime + Road	\$14,662
Disposal – Suitable For Transport	KBL Whitehorse	\$42,685
Disposal – Not Suitable For Transport	Includes extra time and materials	\$14,292
		Subtotal \$94,139
Tuktoyaktuk		
Resource Mobilization, Demobilization & Subsistence	4 staff for 3 days	\$17,100
Contracting Services	Equipment for staging and loading	\$5,400

Transportation	Maritime + Road	\$4,876
Disposal – Suitable For Transport	KBL Whitehorse	\$42,630
Disposal – Not Suitable For Transport	Includes extra time and materials	\$5,085
		Subtotal \$75,091
Tsiigehtchic		
Resource Mobilization, Demobilization & Subsistence	4 staff for 2 days	\$11,485
Contracting Services	Equipment for staging and loading	\$3,600
Transportation	Road	\$19,510
Disposal – Suitable For Transport	KBL Whitehorse	\$73,395
Disposal – Not Suitable For Transport	Includes extra time and materials	\$9,137
		Subtotal \$117,127
Sachs Harbour		
Resource Mobilization, Demobilization & Subsistence	4 staff for 4 days	\$25,168
Contracting Services	Equipment for staging and loading	\$7,200
Transportation	Maritime + Road	\$44,175
Disposal – Suitable For Transport	KBL Whitehorse	\$40,065
Disposal – Not Suitable For Transport	Includes extra time and materials	\$45,636
		Subtotal \$162,244
Paulatuk		
Resource Mobilization, Demobilization & Subsistence	4 staff for 4 days	\$25,168
Contracting Services	Equipment for staging and loading	\$7,200
Transportation	Maritime + Road	\$89,981
Disposal – Suitable For Transport	KBL Whitehorse	\$228,610
Disposal – Not Suitable For Transport	Includes extra time and materials	\$15,501
		Subtotal \$366,460
Ulukhaktok		
Resource Mobilization, Demobilization & Subsistence	4 staff for 2 days	\$16,125
Contracting Services	Loader + Bobcat	\$3,600
Transportation	Maritime + Road	\$12,600
Disposal – Suitable For Transport	KBL Whitehorse	\$33,005
Disposal – Not Suitable For Transport	Includes extra time and materials	\$1,769
		Subtotal \$67,099
		Estimated Total: \$1,048,037
		20% Contingency: \$1,257,644

Note: Above pricing is based on completion of the March 2013 inventory and October 2013 inventory. Sachs Harbour and Ulukhaktok will be revised upon completion of a second inventory.

5. CONCLUSION

Based on the defined scope of work the project was successful with the completion of a detailed inventory of Hazardous Waste located in the six communities within the Beaufort Delta region. Work was conducted in October 2013 which assisted completion of onsite inventories however presented challenges in order to mobilize to each community.

The information collected through this project will be useful to the communities to better understand their current inventory of hazardous waste, costs associated with the management of these wastes and areas that could be improved in the current management of hazardous waste. The communities that illustrated increased participation

will benefit from exposure to technical staff and discussions of best practices in the field of hazardous waste management.