WASTE MANAGEMENT IMPLEMENTATION PLAN

Presented to:

Baffinland
Iron Mines Corporation

Cheryl Wray, Environmental Coordinator

Prepared by:

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QIKIQTAALUK ENVIRONMENTAL

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Written by: _____

Jacques Dion, T.A.Sc.

Reviewed by: _____

Philippe Simon, P.Eng. Ph.D

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TABLE OF CONTENTS

1. Introduction

Baffinland is committed to remediate areas impacted by former exploration work done during the 1960's and by its current exploration activities. In order to comply with this obligation, Baffinland hired Qikiqtaaluk Environmental to develop and execute a waste management program for solid and hazardous waste located in the area of the main camp and also at the Milne Inlet site. Baffinland also manifested their intention to perform the clean-up on 2 others sites located in Nanisivik and Pond Inlet.

A representative of QE visited the Mary River and Milne Inlet sites during the first week of March in order to get a general understanding of the location and condition of hazardous and non-hazardous waste storage areas. This visit did not include the Pond Inlet and Nanisivik. Baffinland explained that waste from Nanisivik was mainly old bags of salt mixed with sand. A marine shipping container and a few empty drums (~ 150 units) are present at Pond Inlet.
As Part 1 of the mandate, a second visit was done by a representative of QE between June 30th and July 7th. The objective of this visit was to collect different information to propose and implement a waste management plan; the field assessment was performed to;

- Evaluate the volume of all type of wastes found on Baffinland mine sites.
- Assess the condition of packaging in order to comply with part 5 of the Transport of Dangerous Good Regulations.
- Identify the different sources, composition and type of waste.
- Estimate the quantity of empty drums to crush and dispose
- Verify the way that waste are identified, labelled and codified
- Identify priority that should apply based on storage condition
- Evaluate the effort required to manage the current waste inventory
- Suggest actions on site that could be initiated immediately

Since there was only one visit of a cargo sealift in Milne Inlet for the 2008 summer in August, it was suggested to begin as soon as possible the preparation for the shipment of some hazardous waste ready for disposal. The priority of action was established based on potential hazard of spillage or leaking on the ground. Many drums of waste hydrocarbon liquids were stored in sound barrels suitable for transport. The preparation for marine shipment requires drums to be strapped and braced on pallets. Hazardous waste were also adequately identified and labelled in accordance of TDG requirements. The transfer of HW from Mary River to Milne Inlet began in Mid-July.

The crushing and compacting of drums was another initiative that was implemented during the first week of July. A few thousand empty drums were stored on different sites around Mary River camp site; this action allowed reducing substantially the volume and space required for storage. The landfilling of crushed drums is not permitted on the mine site; therefore they were palletized and prepared for shipment to a disposal facility down south.
A hazardous waste specialist from QE came on Mary River site July 5th to initiate the packaging and preparation for transport and disposal of hazardous waste and crushed drums. The present waste management plan will describe the actions already implemented and other works that should be done later in the season.

2. Waste Management Implementation Plan

As part of its mandate, QE proposes a waste management program for the environmental remediation of hazardous and non-hazardous waste. This plan includes the following information:

- Identification and location of hazardous and non hazardous waste storage areas
- Inventory of all categories of waste found in storage areas
- Verification of the regulatory requirements for all type of waste
- Classification of hazardous waste based on TDG and IMO regulations
- Estimation of packaging equipments required for hazardous waste
- Evaluation of the volume of solid waste for landfill space
- Identification and proposal for on-site volume reduction techniques
- Proposal of a waste management tracking procedure
- Description of equipment required and packaging procedures for transport by marine vessel

3. Mary river site - Identification of the current hazardous and non-hazardous storage areas

Around the Mary River Camp site, there are 4 different locations where hazardous and non-hazardous are found.

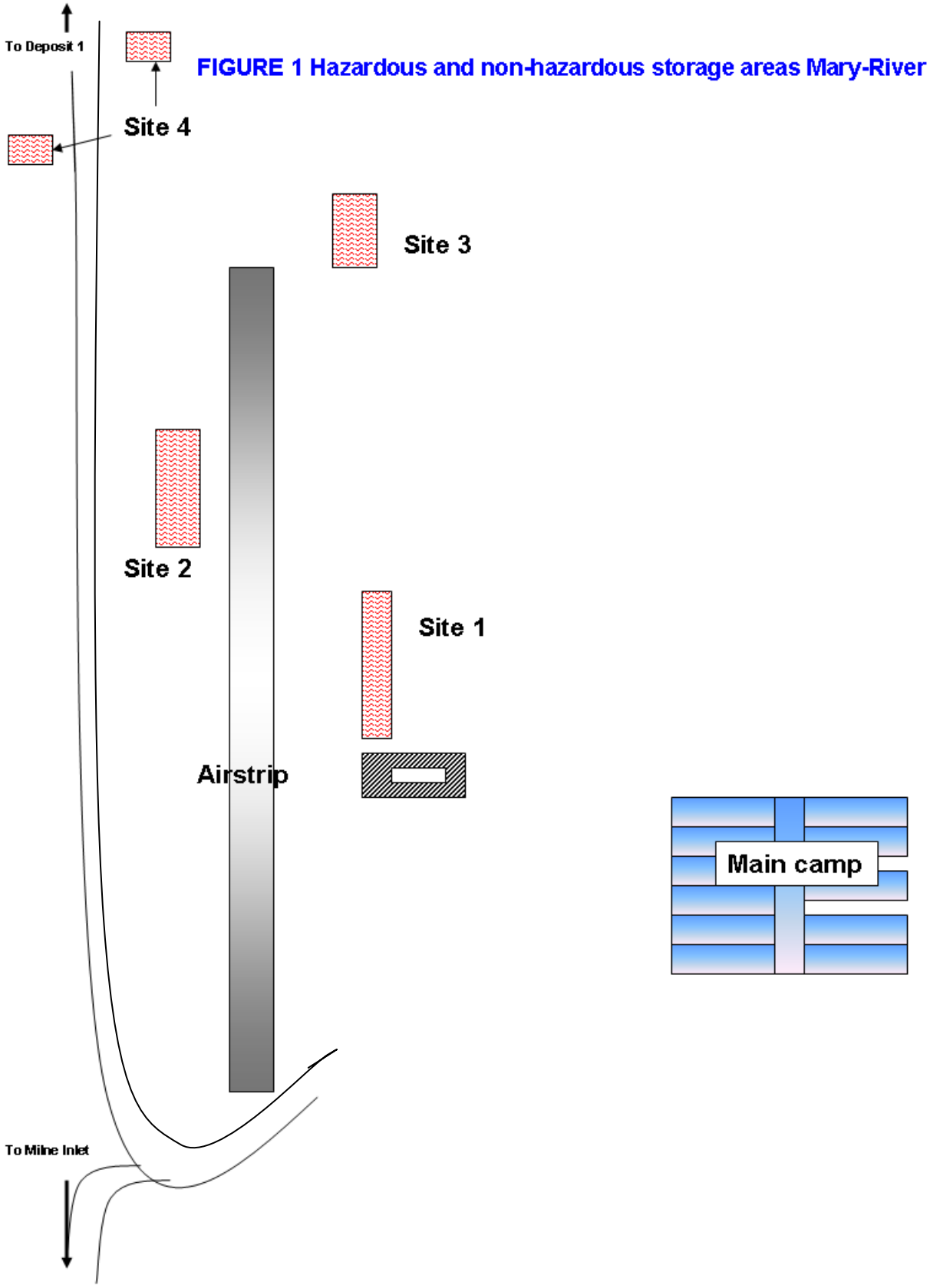


FIGURE 1 Hazardous and non-hazardous storage areas Mary-River

3.1 Mary River, Description of storage sites

3.1.1 Site 1 Near the Main camp

This site is located between the Main camp and the airstrip, waste are grouped in different piles. Most of the wastes located there are classified as hazardous waste. All drums of hazardous waste that were suitable for transport were strapped and braced in preparation to off-site disposal. Table 1 shows the list of HW ready to ship. The table 2 describes other HW already on pallets that need to be strapped and braced prior to shipment. HW's that still need preparation (table 3) are grouped on 108 pallets.

Table 1 HW from site 1 ready to ship

WASTE DESCRIPTION	TYPE OF PACKAGING	TDG SHIPPING NAME	UN	CLASS	QUANTITY (drums)
fuel (Diesel, jet fuel & water)	Drums	Waste fuel	UN1202		315 on 69 pallets
Contaminated water	Drums	Waste toxic liquid, NOS (water with fuel)	UN2810		23
Oil	Drums	Waste oil N/R	N/R	N/R	28
Gazoline	Drums	Waste gasoline	UN1203		12
Coolant	Drums	Waste coolant N/R	N/R	N/R	2
Lead batteries	Wooden crate	Batteries, wet filled with acid	UN2794		1
Crushed drums	Pallets	N/R	N/R	N/R	67

Table 2 HW on Site 1 that need to be strapped and braced (all marked and labelled)

WASTE DESCRIPTION	TYPE OF PACKAGING	TDG SHIPPING NAME	UN	CLASS	QUANTITY
fuel (Diesel, jet fuel & water)	Drums	Waste fuel	1202		56
crushed 45 gals metal drum	Pallets	N/R	N/R	N/R	93
Hydrocarbon Contaminated soil	Quatrex bags	N/R	N/R	N/R	1

Other hazardous waste still remaining on Site 1 will need repackaging in proper containers prior to be moved and transported off-site. Baffinland have already ordered 600 Salvage drums and 400 Quatrex bags that will be delivered on the 2008 summer sealift. The repackaging will be done after reception of these UN containers. The Table 3 describes other HW from site 1 that cannot ship without being transferred in proper packaging in 2008. All HW listed in table 3 (except waste fuel) are not TDG regulated.

Table 3 Remaining HW Site 1 needs repackaging

WASTE DESCRIPTION	CURRENT PACKAGING	QUANTITY	QUATREX BAGS	SALVAGE DRUMS
Oil, P50, contaminated soil	**20 litres pails**	**257**	**10**	
Oily contaminated water	**Drums without cover**	**9**		**8**
Contaminated soil	**Drums without cover**	**39**	**8**	
Oily absorbant pads	**Drums without cover**	**17**	**5**	
Oil filters	**Drums without cover**	**7**		**5**
Waste fuel  **UN1202**	**Drums in bad conditions**	**3**		**3**
Empty drums (kept for reuse)	**If crushed (will require 32 pallets)**	**~ 700**		

Other types of waste or scrapped materials were found in 7 drums on site 1, these solids wastes are not considered as hazardous. These drums contain scrap metal, air filters and ash from the incinerator. The content of these drums can be empty into the future landfill.

3.1.2 Site 2 Other side of the airstrip (commonly called Canadian Tire)

This site is actually used to store solid wastes and miscellaneous debris; the table 4 lists each type of solid wastes that are acceptable for landfill on site. Many solid waste stored on this site were produced during the exploration activities done in the beginning of 60's. There is some hazardous waste or regulated materials that will need to be repackaged and shipped off-site. Hazardous wastes from this site are described in Table 5. There were approximately 2500 empty drums that were removed from this site in July and transported to the barrel processing area for crushing.

Table 4 Solid wastes inventoried from Site 2

DESCRIPTION OF WASTE	CURRENTLY PACKAGING	QUANTITY	MANAGEMENT OPTIONS
Ash from incinerator	45 gals metal drum with top cover cut	461	Landfil
Metal scrap	45 gals metal drum with top cover cut	9	Compact and landfil
Metal scrap	Old snowmobile, vehicle parts, ect.	2000 M^3	Compact and landfil
Air filter	45 gals metal drum with top cover cut	3	Landfil
Wooden scrap	45 gals metal drum with top cover cut	4	Landfil, shred, incinerate or reuse (see note 1)
Wooden scrap	Bulk and white bags	2000 M^3	Landfill, shred, incinerate or reuse (see note 1)
Scrap ATV and Ranger	Bulk	10	Keep for parts or ship for reuse off-site

Note 1 Shredded wood can be used as organic amendment for biological treatment of hydrocarbon contaminated soil.

Table 5 List of Hazardous waste and dangerous goods from Site 2

WASTE DESCRIPTION	CURRENT PACKAGING	QUANTITY	QUATREX BAGS	SALVAGE DRUMS
Calcium Chloride 77%	1 M^3 bags	25	40	
Waste oil	Old Quatrex bags 20 litres pails	2	2 need repackaging	
Contaminated soil	Drums without cover	27	8	
Contaminated water	Drums without cover	16		16 or close top drums
Waste oil	20 litres pails	N/A	8	
Old empty drums crushed	Drums from 60's	420		3
Empty drums	N/A	100		
Mix of water and contaminated soil	~ 800 litres tubs	7		25
Oil filters	Open top drums	4		3
Contaminated water	Drums without cover	15		15
Waste fuel UN1202	Drums in bad conditions	5		5
Empty Propane tank UN 1978	Some missing caps Need to be labelled	45		
Empty Acetylene tank UN1001	Some missing caps Need to be labelled	14		
Empty Oxygen tank UN1072	Some missing caps Need to be labelled	5		

3.1.3 Site 3 South of airstrip

This site contains many old bags of Calcium chloride that need to be repackaged prior to disposal. Many drums of sewage liquid contaminated with fuel are also located on this site. All these waste, except domestic solid waste, will be sent for disposal off-site after repackaging. The table 3 describes the inventory found on this site. All HW from this site are not TDG regulated.

Table 6 Inventory of waste Site 3

WASTE DESCRIPTION	CURRENT PACKAGING	QUANTITY	QUATREX BAGS REQUIRED	OVERSIZE REQUIRED
Calcium Chloride 77%	1000 liters bags (super sacs)	101	120	
Calcium Chloride 77%	568 liters Rubbermaid open tub	4		
Sanitary & fuel waste	45 gals metal drum with top cover removed	73		73
Sanitary & fuel waste	Open top metal tub (1000 liters est.)	1		5
Gasoline contaminated water	Gasoline tank (500 liters est.)	1		3 close top drums
Domestic solid waste	Bulk	100 M^3	LANDFILL	

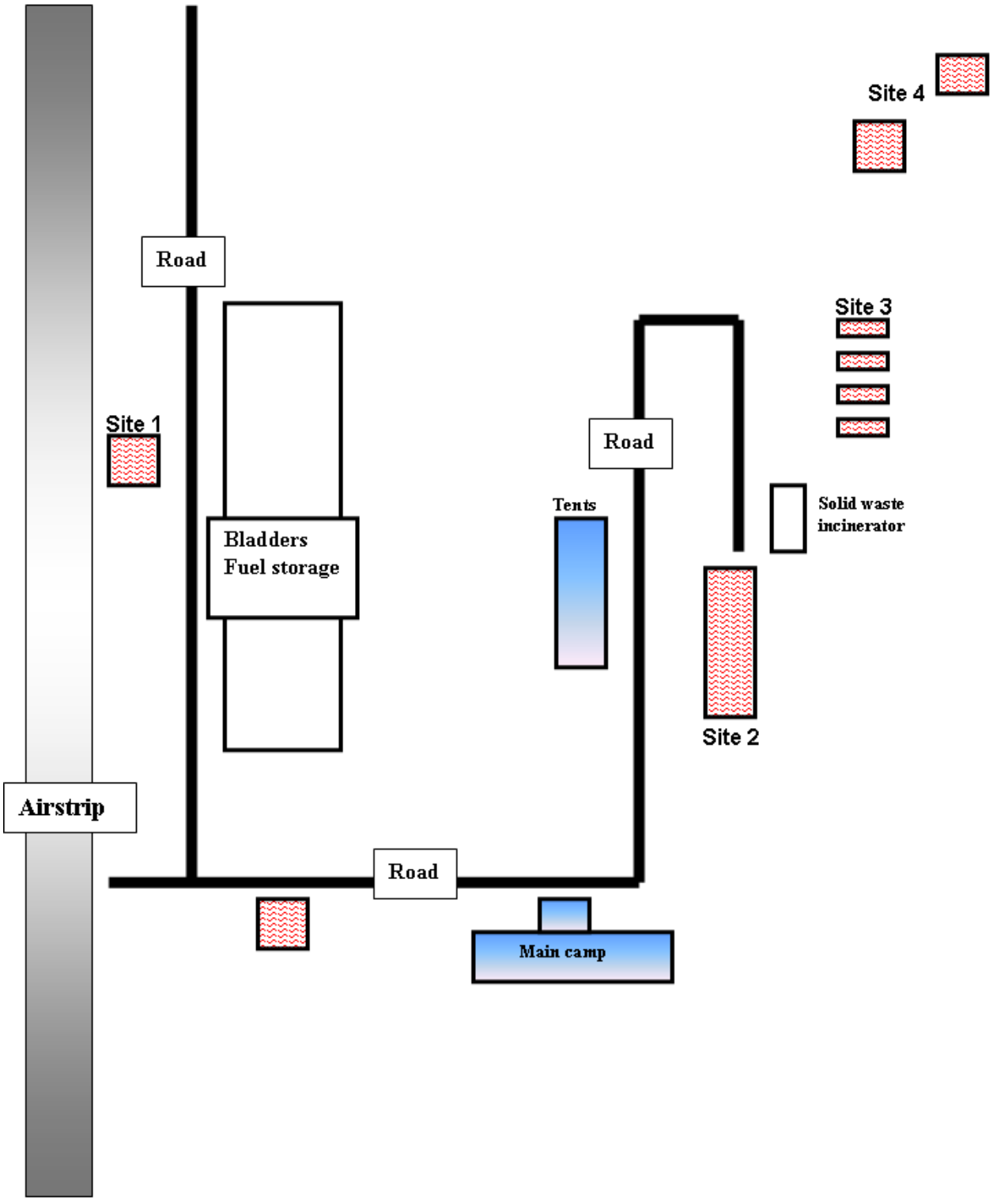
3.1.4 Site 4 Small deposit behind gravel pit and old buildings south of airstrip

There are 131 drums stored at 3 different small locations. These drums of waste were produced during the former exploration activities in the beginning of 60's. Drums content are mainly domestic solid waste and ash. Content of these drums will be suitable for landfill on site.

4. Milne Inlet - Identification of the current hazardous and non-hazardous storage areas

Around the Milne Inlet camp facilities, there are few small areas used for the storage of waste. Most of the hazardous wastes located in Milne Inlet were not ready to ship by the time this report was done. Some of them should be prepared when the QE hazmat specialist will be there around mid-August. The **figure 2** shows the layout of storage around the site.

FIGURE 2 Hazardous and non-hazardous storage areas Milne Inlet



4.1 Site 1 East of airstrip

This area is the only place where hazardous wastes are ready to ship. The inventory of this storage site is listed at the Table 7.

Table 7 Hazardous waste ready for shipment Milne Inlet

DESCRIPTION	TYPE OF PACKAGE	QUANTITY	STATUS
Waste oil	Cube tote tank (1000 lt)	35	ready for shipping on sealift
Waste oil	Cube tote tank (1000 lt)	4	ready for shipping on sealift
Waste oil	Cube tote tank (1000 lt)	1	ready for shipping on sealift,
Waste fuel	45 gals close top metal drum	39	ready for shipping on sealift,
Dust remover	45 gals close top plastic drum	4	ready for shipping on sealift,
Waste oil	Quatrex tote bag (1 cu. Yd.)	2	ready for shipping on sealift,

4.2 Site 2 Main hazardous waste storage

This area is located about 75 meters east side of the tents area. Hazardous wastes located in this area will need to be labelled, strapped and braced prior to be shipped. The table 9 list the inventory of HW located there that will eventually be shipped off-site (except ash from incinerator). There are close to 1000 empty drums that were kept on this site for fuel transfer to Mary River.

Table 9 List of hazardous waste to be packaged and labelled

DESCRIPTION	CONTAINER TYPE	QUANTITY	QUATREX REQUIRED	OVERSIZE REQUIRED	ACTIONS REQUIRED
Contaminated soil	Quatrex tote bag	22	5		to be check,label, & steel strap, 15 palettes required
Lead batteries (TDG regulated)	Quatrex tote bag	1			Label Class 8 UN2794 (F.P. 35˚C cc)
Grease	Quatrex tote bag	2			need label, & steel strap
Anionic polyacrylamide copolymer	Pails in Quatrex tote bag	4			Steel strap only required
Calcium chloride	Quatrex tote bag	1			Steel strap only required
Waste oil	Quatrex tote bag	4			steel strap
Dust remover	Drum in Quatrex tote bag	1		1	Transfer drum in oversize
Calcium chloride	5 gallons pail	11			need label, & steel strap
Sodium carbonate	5 gallons pail	1			need label, & steel strap
Calcium chloride	45 gals close top drum	3		2	
Waste Fuel (TDG regulated)	45 gals close top drum	126		8	Label class 3 UN1202 (F.P. 35˚C cc)
Oil filters	45 gals close top drum	10		3	
Contaminated soil	45 gals close top drum	111	28		All to be transferred in Quatrex bags
Water, oil & absorbant pad	45 gals close top drum	13		13	
Oily contaminated soil & water	45 gals close top drum	4			need label, & steel strap
Metals	45 gals close top drum	2			to be crushed
Waste Gasoline & water (TDG regulated)	45 gals close top drum	2		2	Class 3 UN1203 (F.P. -40˚C cc)
Waste Gasoline (TDG regulated)	45 gals close top drum	8		1	Class 3 UN1203 (F.P. -40˚C cc)
Sanitary waste	45 gals close top drum	23		23	
Ash from incinerator	45 gals close top drum	53			for landfill
Grease	45 gals close top drum	3			
Absorbant pads + water, fuel & oil	45 gals close top drum	15		15	
EK-35 (dust removal for road)	45 gals close top drum	210			Can't be use as permit requirements
Hydrocarbons contaminated water	45 gals close top drum	30		30	
Camping Propane tank (TDG regulated)	5 gals pails	1			Class 2.2 UN1978
Aerosol (TDG regulated)	45 gals close top drum	1		1	Class 2.1 UN1950

4.3 Sea containers

The Sea container 3050365 contains gas cylinders (6 propane, 23 acetylene, 4 oxygen) that will require being disposed off-site. Prior to the shipment, cylinders caps will need to be put on some of them. There are also 2 other sea containers sitting near the dump site containing crushed drums that will need to be disposed off-site.

4.4 Dump site

There are 33 drums with open lid containing hydrocarbon contaminated soil that will require to be transferred in Quatrex bags and dispose off-site. At the north-east of the dump, there are 11 drums of sewage waste that need to be repackaged in oversize drums and ship off-site. Some other solid waste (woods, scrap metal are also present in this area. Volume of solid waste located in this area is estimated to be 500 M^3.

5. Estimated quantity of packaging equipments required for the current inventory

Baffinland has ordered 600 oversize drums and 400 Quatrex bags that will be delivered on the 2008 summer sealift. For the actual need, the estimate quantity of repackaging containers will be as following;

- Oversize : 275 units
- Quatrex bags : 250 units

6. Waste management plan - List of priorities

During summer 2008, actions were made by Baffinland to reduce the volume of hazardous waste on site. The priority was given to hydrocarbon liquid waste due to the higher risk of incident with potential impact on soil and water quality. Many remaining waste still need to be repackaged with the new hazardous waste containers ordered by Baffinland. The following table define the actions that should be done in a close future and suggest the priority that should be considered by the management in their planning. Priorities of actions are rated from 1 to 5, when 1 represents the highest priority.

Actions proposed	Priority					Comments
	1	2	3	4	5	
Complete strapping, bracing and labelling	■					For HW not already strapped and braced
Consider the possibility of shipping oily water	■					Oily water will freeze causing damaged drums
Prepare hazardous waste inventory for shipment	■					Inventory HW to dispose for manifest requirements
Tracking of HW during loading on ship	■					Confirm inventory loaded with NEAS
Set up a new HW storage area (2 sites)	■					Find accessible areas away from sensitive habitats
Designate a waste management supervisor on site	■					Should be responsible of storage site and waste tracking
Buy a water treatment system for oily water	■					Oil-water separator, carbon and absorbant filters
Begin the repackaging of liquid HW		■				With the use of oversize drums
Perform soil sampling from former HW storage site		■				If contamination, transfer soil in Quatrex bags
Construction of the landfill		■				Will allow to finalize the clean-up of temporary dump site
Begin the repackaging of contaminated soil			■			With the use of Quatrex bags
Initiate the repackaging of calcium chloride			■			With the use of Quatrex bags
Built wood crates for storage of gas cylinders to be shipped			■			Order caps for old one, 3/4 crates with cylinders shoulders visible
Establish a procedure for waste codification and labelling			■			HW must be identified at the source when produced
Consolidate on one site solid waste for future landfill			■			Sort by type of waste (ash, debris, scrap metal and wood)
Consider the implementation of a waste oil treatment system			■			Integral system with waste oil incinerator
Set-up a logbook for HW current inventory				■		The logbook should be kept up to date and review weekly
Consider the purchasing of a wood shredder				■		Wood chips could be incinerated or reuse as soil amendment
Consider the construction of a landfarming platform				■		For the treatment on site of hydrocarbon contaminated soil
Set up a program session for people involved with HW					■	To inform about procedure of storage and identification of HW
Establish procedure to reduce the production of HW					■	Avoid water in fuel drums, empty barrels properly, ect.
Recover scrap ATV and Ranger for shipping back					■	Some of these equipments still have values

APPENDIX A

Photos of Hazardous and non-hazardous storage sites

Mary River and Milne Inlet

Drums of liquid HW prior to packaging Site 1 Mary River

Cube tote of waste oil Site 1 Mary River

Pails of waste oil on pallets and in bags Site 1 Mary River

Bags of Calcium Chloride Site 4 Mary River

Old gas cylinders Site 2 Mary River

Empty drums Site 2 Mary River

Drum crushing and preparation of HW for shipment Mary River

Hazardous waste storage site Milne Inlet

Old gas cylinders in sea can Milne Inlet

Solid waste debris for landfill Milne Inlet