Environment Canada Environnement Canada

OPERATING PROCEDURES FOR DEPARTMENTS/AGENCIES/PRIVATE SECTOR RESIDING/WORKING ON EUREKA LAND RESERVE

— Eureka High Arctic Weather Station —

Prepared by Environment Canada
Assets, Contracting and Environmental Management Directorate (ACEMD)

February, 2010

Canada

Control Page

On receipt of revisions and/or amendments, the Assets, Contracting and Environmental Management Directorate (ACEMD) shall complete this control page to ensure that the Operating Procedures for Departments/Agencies/Private Sector Residing/Working on Eureka Land Reserve at Eureka High Arctic Weather Station (HAWS) is always current and consistently reflects the operations and activities taking place on site.

Version	Date in Force	Expiry Date	Description / Purpose
1	April 1, 2010		Operating Procedures

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Introduction

The Eureka Weather Station and the facilities that support it are located on crown land in the Nunavut Territory. The original Land Reserve established between INAC and Transport Canada was transferred to Environment Canada in 1977. The station is the only permanent non-military facility this far north and has become a base and staging point for scientific research and expeditions into the Canadian polar region. As the land reserve holder Environment Canada is responsible for any impacts on the land and ultimately its abandonment and restoration. Environment Canada is responsible for other departments/agencies/private sector residing/working on its reserve. Activities on the land reserve are subject to a number of acts and regulations as well as limitations resulting from the limited size and resources available to operate this self contained facility.

Visitors to Eureka

The Eureka Weather Station is operated by Environment Canada as a Weather Station and a base for scientific research in the high arctic. Space, resources and support at the station are limited. During busy seasons they are stretched to the limit. For this reason the number of visitors to the station and their activities must be limited and controlled.

a) All visitors and contractors travelling to Eureka must complete the following documents (see Appendix A):
    i) Application Form - Release, Waiver and Assumption of Risk and Indemnity
    ii) Visitor Permit Request Form
b) Except in the case of an emergency visitors must receive approval prior to arrival at the site.
c) Meals, accommodation and support from the site will be charged according to the current Schedule of Fees (see Appendix A) unless other arrangements have been made.

Health and Safety

Environment Canada is dedicated to providing and maintaining a safe and healthful environment for employees, contractors and visitors, protecting the public and preserving Environment Canada's assets and property. The Eureka Weather Station is located hundreds of kilometers from the nearest medical facility. In an emergency situation it can take 8 hours or longer for a sick or injured person to be transported to hospital. All personnel are ultimately responsible for their own safety. Safety is Environment Canada's first and highest priority.

a) Upon arrival all visitors are required to attend a safety briefing.
b) Site Safety and Emergency Contingency Plans are defined in the Eureka Site Safety & Emergency Contingency Plans document (see Appendix B). All employees of departments/agencies/private sector residing/working in Eureka are

expected to become familiar with this document and apply it in their activities.

i) Procedures covered include:
   (1) Fire Response
   (2) First Aid, CPR and Medical Emergencies
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Nunavut Water Board

Environment Canada holds a license with the NWB under article 13.7.5 of the Agreement between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in Right of Canada. The terms and conditions of this license govern the use of water and disposal of waste by all parties residing/working on the Eureka land reserve. Regular inspections are

conducted to ensure that the conditions of the license are being followed.

a) As a condition of the license Environment Canada submits an annual report to the NWB describing activities related to the following:
   i) Water use and methods of obtaining water
   ii) Waste disposal activities, sewage management and solid and hazardous waste management
   iii) List of unauthorized discharges and action taken
   iv) Revisions to Spill Contingency Plan
   v) Progressive Reclamation Work Undertaken
   vi) Revisions to the Abandonment and Restoration Plan
   vii) Results of monitoring program
   viii) Any other details on water use or waste disposal requested by the Board by November 1 of the year being reported
   ix) Any responses or follow-up actions on inspection/compliance reports
   x) Any additional comments or information for the Board to consider

b) All departments/agencies/private sector residing/working in Eureka must report to Environment Canada on any activity requiring the use of water and/or disposal of all types of waste.

c) The NWB license required Environment Canada to develop the following plans to direct activities on the land reserve (see Appendix C):
   i) Oil Pollution Emergency Plan for Land Spills
   ii) Summary of Operations and Maintenance Procedures for Drinking Water, Sewage, Solid Waste Disposal and Waste Treatment Facilities.
   iii) Interim Abandonment and Restoration Plan
   iv) Sludge Disposal Plan
   v) Quality Assurance & Quality Control Program

d) All departments/agencies/private sector residing/working in Eureka are responsible to become familiar with and follow plans related to their activities.

Water and Waste

Potable water and facilities for disposing of waste of all kinds are very limited in Eureka. Water is pumped from Station Creek into a water reservoir during the spring runoff in June and July. The quantity of water available is dependent on the amount of precipitation received during the previous winter. Dry winters severely limit water availability and can lead to water rationing. Waste water is held in a sewage lagoon. The current lagoon has been estimated to be large enough to accommodate a population of 21 persons. This severely limits the number of people the station can house.

a) Potable Water

i) The potable water system and water usage is managed, administered and maintained by Environment Canada. All water usage must be in

accordance with the Summary of Operations and Maintenance Procedures for Drinking Water, Sewage, Solid Waste Disposal and Waste Treatment Facilities (see Appendix C). Unless authorized by Environment Canada no other department/agencies/private sector is allowed to take water from any source on the Environment Canada land reserve. Water use must be pre-approved by Environment Canada.

(1) Current list of approved water users includes:
   (a) Environment Canada
   (b) Department of National Defence
   (c) CANDAC

b) Waste Water Handling System

i) The waste water handling system is managed, administered and maintained by Environment Canada. All waste water must be disposed according to the Summary of Operations and Maintenance Procedures for Drinking Water, Sewage, Solid Waste Disposal and Waste Treatment Facilities (see Appendix C). Unless authorized by Environment Canada no other department/agencies/private sector is allowed to dispose of waste water on the Environment Canada land reserve. Waste water disposal must be pre-approved by Environment Canada.

(1) Current list of approved waste water system users includes:
   (a) Environment Canada
   (b) Department of National Defence
   (c) CANDAC

c) Solid Waste Handling

i) The disposal of solid waste is managed, administered and maintained by Environment Canada. All solid waste must be disposed of according to the Summary of Operations and Maintenance Procedures for Drinking Water, Sewage, Solid Waste Disposal and Waste Treatment Facilities (see Appendix C). Unless authorized by Environment Canada no other department/agencies/private sector is allowed to dispose of solid waste on the Environment Canada land reserve. Unauthorized waste is to be removed from Eureka and disposed of in accordance with governing regulations. Solid waste disposal on Environment Canada land reserve must be pre-approved by Environment Canada.

(1) Current list of approved solid waste disposal users includes:
   (a) Environment Canada
   (b) Department of National Defence
   (c) CANDAC
   (d) PCSP

d) Active solid waste disposal sites:

i) Crushed Barrel landfill:
- South of runway and east of Fort Eureka.
- Used for disposal of crushed barrels

ii) Ex Situ biotreatment cells:
- South of runway and east of Fort Eureka.
- Used for treatment of contaminated soil

iii) East landfill:
- East end of runway
- Used for non-food solid waste

iv) Ash landfill
- East end of runway
- Used for disposal of incinerator ash

v) Environment Canada Incinerator
- At main camp north of Environment Canada warehouse
- Incinerator is only to be operated by trained personnel authorized by Environment Canada
- Used to incinerate food and other organic waste

vi) Asbestos landfill
- East end of runway
- Used for disposal of asbestos demolition waste

e) Hazardous Materials

i) Hazardous materials are **NOT** to be dumped in the active landfill but disposed of according to disposal procedures in the Summary of Operations and Maintenance Procedures for Drinking Water, Sewage, Solid Waste Disposal and Waste Treatment Facilities (see Appendix C) or taken off site and disposed of in accordance with governing regulations.

ii) All hazardous materials must be removed from equipment that is scheduled to be landfilled (batteries, fuel, oils, asbestos, lead, PCB, etc)

iii) Waste batteries must be neutralized and shipped out for proper disposal

f) All departments, agencies and private companies residing/working on *the Eureka Land Reserve are required to:*

i) Inform Environment Canada at least 60 days in advance of any activities involving use of water or disposal of liquid, solid or hazardous wastes. **Approval for use or disposal must be received prior to the activity proceeding**.

ii) Provide to Environment Canada in writing quantities of water used and the quantity and description of waste disposed.

iii) Inform Environment Canada in writing of any unauthorized discharge of waste and cleanup action taken.

iv) Use applicable forms for application for use and disposal reporting (see Appendix D).

Fuel Storage

Fuel storage and handling on Federal Government Land is regulated under the Canadian Environmental Protection Act; Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations, Workplace Hazardous Materials Information System and for mobile tanks the Transportation of Dangerous Goods regulations. All departments, agencies and private companies storing or transporting Petroleum Products or Allied Petroleum Products on the Eureka Land Reserve must comply with these regulations.

a) Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations

i) All storage tanks must be registered and bear a registration number before filling.

ii) All departments, agencies and private companies storing fuel on the Eureka Land Reserve must provide Environment Canada with a copy of their Emergency Response Plan

iii) All departments, agencies and private companies storing fuel on the Eureka Land Reserve must provide Environment Canada with copies of evidence of initial fuel tank registry, all reports required under the regulations (Fuel Tank Decommissioning, verification of compliance, tank inspection reports, etc.) (report templates are available from Environment Canada - see Appendix D)

iv) The regulation and supporting information is available at: http://www.ec.gc.ca/st-rs/default.asp?lang=En&n=EA46E5E0-1

b) Workplace Hazardous Materials Information System

i) All fuel storage tanks and associated piping must be labelled and current MSDS documents made available according to WHMIS requirements.

ii) The WHMIS is available at: http://www.hc-sc.gc.ca/ewh-semt/occup-travail/whmis-simdut/index-eng.php

c) Transportation of Dangerous Goods Regulation

i) Portable tanks greater than 450 L capacity for transporting Diesel Fuel, Heating Oil and Jet A must meet the requirement of the Transportation of Dangerous Goods regulation.

ii) TDG regulation is available at: http://www.tc.gc.ca/tdg/publications/menu.htm

d) Drummed Petroleum and Allied Petroleum Products

i) All departments, agencies and private companies wishing to store drummed petroleum and allied petroleum products on the Eureka Land Reserve are required to:

(1) Inform Environment Canada of the quantity and type of product requiring storage at least 60 days in advance of delivery. Approval to store drums must be received prior to delivery. If support is needed from Environment Canada to handle drums, arrangements must be made at the time of the request for storage. Drums will be handled by Environment Canada at the owner's cost. Charges will be according to the current Schedule of Fees unless other arrangements have been made.

(2) Locate drums only at locations designated by Environment Canada for this purpose.

(3) Provide secondary containment for all drums installed.

(4) Install secondary containment according to manufacturers recommendations. Information on secondary containment must be provided to Environment Canada with drum storage request and approved prior to delivery.

(5) Inspect and repair or replace secondary containment annually to ensure it is intact, free of standing water and otherwise operational.

(6) Ensure that contaminated water and product collected in secondary containment is disposed of according to governing regulations.

(7) Clearly mark all drums with name of end user.

(8) Ensure that drums meet all regulatory requirements for the contained product and all regulatory labels are intact.

(9) Provide Environment Canada with current MSDS for product.

(10) Only use new drums free of defects.

(11) Inspect drums annually to ensure they are in good order, seals are intact and are not leaking.

(12) Move product from all defective or leaking drums into new drums free of defect and arrange with Environment Canada for proper disposal of defective drums.

ii) List of departments, agencies and private companies currently approved to store drums at Eureka:

(a) Ken Borek Air Lines
(b) NRCAN
(c) DND
(d) PCSP
(e) SIFEC
(f) Aziz
(g) Parks Canada
(h) GNWT
(i) Vale Inco
(j) Vanco (Catlin) Arctic Survey
(k) Art Mortvedt
(l) Douglas DeVries

e) Drum Disposal

i) Empty drums will be crushed and landfilled by Environment Canada at owner's cost. Drum crushing and disposal cost will be according to the current schedule of fees unless other arrangements have been made.

ii) DND do their own drum crushing.

f) Spills

i) All spills shall be handled according to the Emergency Response Plan.

ii) All spills shall be reported to Environment Canada in writing and the report shall be completed by the owner of the equipment that caused the spill (drums, machinery, etc..)

iii) Clean-up shall be started immediately by the owner of the spill. Use of Environment Canada equipment and personnel will be at owner's cost. Equipment and labour will be charged according to the current schedule of fees unless other arrangements have been made.

iv) Work will be done to the satisfaction of Environment Canada.

v) Final report shall be provided to Environment Canada for submittal to NWB or the report can be sent directly to NWB with a copy provided to Environment Canada.

vi) All spills must be reported as required by the CEPA Fuel Storage Regulations.

g) Fuel Tank Farm and Diesel Fuel Dispenser

i) The Fuel Tank Farm and diesel fuel dispenser is managed, administered and maintained by Environment Canada. Unless authorized by Environment Canada no other department/agencies/private sector is allowed access to the tank farm and dispenser for their activities. Usage must be pre-approved by Environment Canada. Inform Environment Canada of the quantity of diesel fuel required at least 60 days in advance of use. Approval to use Environment Canada diesel fuel must be received prior to use. Approval is dependent on availability and is not guaranteed. The cost of diesel fuel will be charged according to the current Schedule of Fees unless other arrangements have been made.

(1) Current list of approved tank farm users includes:

(a) Environment Canada

(b) DND

(c) CANDAC.

h) Gasoline Tank and Dispenser

i) The Gasoline Tank and dispensing pump is managed, administered and maintained by Environment Canada. Unless authorized by Environment Canada no other department/agencies/private sector is allowed access to the gasoline tank and dispensing pump for their activities. Usage must be pre-approved by Environment Canada. Inform Environment Canada of the quantity of gasoline required at least 60 days in advance of use. **Approval to use Environment Canada gasoline must be received prior to use. Approval is dependent on availability and is not guaranteed.** The cost of gasoline will be charged according to the current Schedule of Fees unless other arrangements have been made.

ii) Current list of approved gasoline tank users includes:

(1) Environment Canada
(2) DND
(3) CANDAC

Electrical Power

All electrical power at Eureka is generated by diesel powered electrical generators. The quantity of power available is limited by the capacity of the electrical generators and the quantity of fuel available to power them. Power usage must be limited to ensure that available fuel will last until it can be replenished during the annual resupply with sufficient reserve in the event that the ice breaker is not able to reach Eureka to deliver fuel.

i) The electrical generators are managed, administered and maintained by Environment Canada. Unless authorized by Environment Canada no other department/agencies/private sector is allowed access to electrical power for their activities. Inform Environment Canada at least 60 days in advance of any activities involving use of electrical power. **Approval for use must be received prior to the activity proceeding.** Provision must be made to meter power usage. The cost of electricity will be charged according to the current Schedule of Fees unless other arrangements have been made.

ii) Current list of approved electrical power users includes:
(1) Environment Canada
(2) DND
(3) CANDAC.
(4) NRCAN
(5) NavCanada
(6) University of New Brunswick

Runway

The Eureka runway is a private runway managed, administered and maintained by Environment Canada. Except for the annual sealift all people and goods arrive in Eureka by air. The runway is essential to all activities taking place in Eureka. The runway must be maintained and protected from damage. Recent warmer summers have caused soft spots to develop. As a result usage during the summer has been limited to smaller lighter aircraft.

a) Landings/Take-offs
i) Note in NOTAM: Any aircraft with total weight over and above 65,000lbs cannot safely land on runways 10 and 28 between July 1st and August 31st due to runway softness.
ii) Landing fees will be charged to all according to the current schedule of fees unless other arrangements have been made.

New construction and modification of existing structures on Eureka Land Reserve

Environment Canada is ultimately responsible for all activities taking place on the land reserve including health and safety, environmental impact and final abandonment and restoration. As a Federal Government facility all construction must meet federal regulations. Environment Canada is also committed to following territorial building, electrical, plumbing, etc. codes.

a) Environment Canada Property Management must be informed of any planned new construction and modification of existing structures at the design development stage at least 6 months prior to construction. Notice of planned construction must include:
    i) Purpose of construction project
    ii) Description of final approach to be implemented
    iii) Preliminary Site Plan
    iv) Proposed schedule
b) **Environment Canada Property Management must approve the plan prior to any commitment on the part of the department, agency or private company planning the work.**
c) All construction projects where applicable must meet the requirements of the Canadian Environmental Assessment Act.
d) All construction must be designed and built to meet all current codes governing construction in the Nunavut Territory as well as applicable Federal Regulations.
e) Environment Canada must be provided with As-built drawings, Operations & Maintenance Manuals, Standard Operating Procedures and Health & Safety plans once construction is completed.

Appendix A

Visitors Guide, Vistor Permit Application
Release, Waiver and Assumption of Risk and Indemnity
Schedule of Fees

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Welcome

to the

updated December 2009

Canada

PREFACE

This manual was prepared by MSC staff at Eureka early in 1993 and updated in 2009

The purpose of this manual is to provide travellers to Eureka with a flavour of what they can expect and what will be expected of them once they reach their destination. It is our hope that this manual provides useful information to you. Any questions, comments or suggestions that can improve the quality of this manual can be forwarded to:

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1. INTRODUCTION

1.1 GEOGRAPHY AND GEOLOGY

The Arctic is characterised by its land. The tundra, which extends from the tree line northwards, covers one-quarter of Canada's surface. The ground remains frozen year round with only the top few feet thawing in the summer to allow vegetation to grow. This frozen ground is known as permafrost and it underlies all of the Canadian Arctic. Permafrost is ground which stays below the temperature of zero degrees Celsius for more than two years. Changes in climate will cause changes in permafrost.

There are four geological areas in the Arctic: the Canadian Shield, the Arctic Platform, the Innuitian Orogen and the Arctic Coastal Plain - each giving a different character to the Arctic.

The Canadian Shield, the foundation of the North American continent, is composed of granites, gneisses, ancient sediments, and volcanics. Much of the land is exposed bedrock, either worn down and glacially scarred or lightly mantled by glacial drift. The Shield contains thousands of lakes and many mountain ranges with peaks of 1,000 metres on south Baffin Island to over 1,800 metres on Ellesmere Island.

The Arctic Platform is a broad, geologically stable zone of flat-lying sedimentary rock built layer upon layer. Where exposed, cliffs and hillsides show successive layers of limestone, dolomites, shale, and other sediments. The Arctic Platform land surface is mainly composed of weathered bedrock and glacial deposits. Elevations are low, averaging between 100 and 200 metres.

The Innuitian Orogen is a mountain-building area where accumulated sediments have been folded, faulted and elevated at the edges of the shield and the Platform. The landscape is oriented in successive ridge or mountain lines that run roughly northeast to Southwest. The mountainous part has peaks above 1,100 metres which are often covered by ice-caps. The glacier summits have heights of 2,000 to 2,900 metres.

The Arctic Coastal Plain is the narrow seaward edge of the low islands in the western High Arctic. Its level sediments slope gently into the sea. The land surfaces do not rise far above sea level.

1.2 WEATHER AND CLIMATE

Generally, the Arctic has continuous daylight from spring to fall and night lasts from fall to spring. The Arctic receives its energy in the form of solar radiation, during the daylight months. Because of its high latitude, the sun does not rise high in the Arctic sky. The sun's rays are dispersed, reducing the intensity of energy that reaches the surface. In winter, the land loses energy. In summer, the Arctic atmosphere is heated very little and in winter it is significantly cooled. If it were not for general atmospheric circulation and ocean currents, the Arctic would grow colder and colder.

Hemispherical air circulation patterns determine the Arctic climate. The winter pattern of air flow is generally influenced by a zone of low pressure, with a counter clockwise circulation, centred south of Greenland and a high pressure cell with an associated clockwise circulation of dense, cold air over the Mackenzie and nearby Arctic Ocean. Both pressure systems contribute to a persistent outflow of cold Arctic air from the snow and ice southeast across the archipelago mainland and Hudson Bay into eastern Canada. This pattern effectively prevents any incursion of warmer air. Mean midwinter temperatures range from -22 degrees Celsius to -27 degrees Celsius on the mainland and Baffin Island, to averages of -30 degrees Celsius to -35 degrees Celsius in the High Arctic. Extremes of -40 degrees to -50 degrees Celsius exist and can persist for days and even weeks. The wind intensifies the effect of the cold.. The central Arctic and Baffin Island have average wind speeds of 15 to 20 km/hr which blow 90 percent of the time. The High Arctic Islands are calmer with weaker winds of 10 km/hr. The wind speeds are stronger in winter and combined with low temperatures they produce a marked wind chill.

In summertime, the low pressure cell weakens and moves over Baffin Bay and Hudson Strait. Storms which have crossed the continent pour into the cell. Stormy weather is common in the eastern Arctic. The winter high pressure cell retreats and weakens considerably. With the return of daylight, snow and ice begin to melt by late May or early June. Some snow and ice remain in the High Arctic Archipelago and on the Arctic Ocean. The air does not warm much due to the large areas of frigid ocean water. Most of the Arctic has a mean temperature of less than 10 degrees Celsius in the warmest month, July. The interior has averages above 10 degrees with records into the 30 degree Celsius range. The extreme north has midsummer means of 4 degrees Celsius.

The Arctic is one of the driest regions on the globe. Cold Arctic air does not hold much water vapour. The mainland and south Baffin Island receive the most precipitation with ranges of 20 to 50 cm per annum. Most of the Arctic Islands, especially those in the north and west, are very dry, receiving about 10 cm of precipitation. Snow accounts for 60 to 70% of the precipitation and covers the ground for 8 to 10 months of the year.

1.3 PREHISTORY

Archaeological evidence has placed inhabitants in the High Arctic and Northwest Greenland since 2000 BC. It is believed these settlers originated from the west, perhaps Siberia, and moved along sea routes opened by retreating ice sheets. The climate is thought to have been slightly warmer than it is today.

These first settlers of the Far North are referred to as Palaeo-Eskimo. Their camp sites were small and were probably occupied for only a few days, as they had to keep moving in order to find food. Muskoxen was their primary source of food.

At about the same time, on the southern islands and northern mainland, lived another culture, the Pre-Dorset. The Pre-Dorset people had a more settled lifestyle, as their camps were larger. Those along the coasts hunted seals, walrus and whales with hand held harpoons. Those in the central Arctic hunted caribou and muskoxen, and fished in the many rivers and lakes.

From these early peoples emerged the Dorset culture, somewhere between 800 B.C. and A.D. 1500. The

Dorset culture was technologically more advanced than its ancestors. A cooling climate necessitated hunting through the ice which led to better tools such as double-holed, closed-socket harpoon heads and snow knives. The Dorset culture is thought to have originated the igloo, due to the extended time they spent on sea ice. They also built semi-permanent dwellings on land - houses walled with boulders and turf.

The Dorset period had an interesting feature - an increase in artistic activity. Small carvings of animals, birds and humans made of bone, ivory and stone are found at Dorset sites. Their meaning is unknown but they are thought to have been used in magic and rituals.

The Dorset culture disappeared around A.D. 1200. The reasons are not clear but the demise of the Dorset people coincides with the arrival of a new population, the Thule.

The Thule, ancestors of the Inuit, moved into the area from Alaska. They were experienced sea hunters, as the Bering Sea is relatively ice free for a long period of time. They introduced many new items to the North including skin boats, kayaks and the larger, open umiak, as well as advanced tools for hunting. The Thule moved easily across the land with the use of dog-sleds, and used the dogs in hunting polar bears. During the summer, the Thule hunted whales and other sea mammals. In the winter, they lived in permanent houses made of boulders and whale bones.

Around A.D. 1500 the climate began to cool. The amount of sea ice increased, and marine mammals, such as whales, retreated further south. The Thule followed, abandoning the High Arctic Islands to settle on the mainland and southern islands. By the time the white man ventured onto the frozen land, the Thule period had ended and the Inuit then inhabited the land.

1.4 ENVIRONMENTAL STEWARDSHIP

One can not overemphasize the fragility of the Arctic Environment. Human activity of any kind can have a significant impact on the environment and the rate of recovery is exceedingly slow. We have become more aware in recent years of our responsibilities towards the protection and enhancement of the environment. While working in the Arctic, it is paramount that we keep these responsibilities in mind at all times.

Whether you are working on the land or enjoying its natural beauties on your day off, please ensure that all your refuse is brought back to the station. For those of you that may have access to all-terrain vehicles as part of your work, please operate these vehicles in a responsible manner by avoiding the unspoiled tundra. Tracks left by all-terrain vehicles can persist on the tundra for decades. Not only are they unsightly but even the normal operation of an all-terrain vehicle on the tundra can damage the thin layer of organic material, rendering it incapable of sustaining vegetation.

The Arctic is teeming with wildlife of many varieties. Most of the birds and animals have not had any experience with humans. Their natural curiosity is often mistaken for tameness. Please enjoy the wildlife in all its variety but do not disrupt their natural lives. Especially, do not feed the animals or approach them too closely.

2. EUREKA

2.1 GETTING TO KNOW THE PLACE

2.1.1 Station History

Eureka, the first JAWS (Joint Arctic Weather Station), was established on April 7, 1947 when the United States Army Air Force flew in materials which had been assembled at Thule, Greenland the previous year. Although much of the land was rough, rising to 2,000 or 3,000 feet, the most satisfactory location appeared to be in Slidre Fiord on Ellesmere Island, centrally located at latitude 80 00' 00" N., longitude 85 56'25"W. Within the fiord, the ice was quite smooth. Protected by hills from the prevailing north westerly winds, it is surrounded by low rolling country and is in the vicinity of two rivers, which promise fresh water in summer. A six man joint Canadian/American staff erected Jamesway huts as temporary buildings to house themselves and their equipment, while starting and maintaining a program of weather observations. The station personnel landed at Slidre Fiord at 11 a.m. with one of these buildings on board. By 7 p.m. the building was up and heated, radio equipment and facilities for weather observations were in operation and hot meals were available for personnel.

A land airstrip was considered very desirable in the event of a medical emergency and to provide against the possibility that ice would not freeze smooth in the fiord near the station every year. Accordingly, two small tractors, a roller, harrow grader and hydraulic pan were airlifted to the station in May. The six men at the station constructed an airstrip during July, while maintaining full weather observations and radio schedules at the station.

An icebreaker reached the Eureka Weather Station on August 9, 1947. This ship brought some permanent buildings, additional equipment, a year's supply of consumable stores, and two additional men for station staff. Work was immediately begun on erecting the permanent buildings and all were completed prior to the dark period and cold weather in winter. Additional buildings were added in subsequent years to provide more space and additional facilities.

Eureka facilities have been upgraded and are now used for many expeditions to the North Pole. The opening of the new National Parks Reserve on Northern Ellesmere in September 1989 has also increased visitors and transients during the summer months.

A Research Support Opportunity (RSO) at Eureka for graduate students in environmental research was established in 1987 by the Minister of Environment to help encourage field research in the High Arctic Islands.

2.1.2 Geology

Eureka, "Garden Spot of the Arctic", is without a doubt one of the most beautiful spots in the Arctic. Located on Fonsheim Peninsula, on the north shore of Slidre Fjord, between Station Creek and Blacktop Creek, the surrounding area is comprised of gentle rolling hills. However, easily visible from the station is some of the mountainous terrain that Ellesmere Island is famous for.

A few kilometres to the north, Blacktop Ridge has peaks of up to 825 metres. Cape Hare, across the Fiord, reaches 550 metres. Sawtooth Range, located 65 kilometres to the east, has peaks up to 1200 metres. The clarity of the Arctic air would convince you that this range is much closer. Axel Heiberg Island, located 20 kilometres across Eureka Sound, to the west, is also visible on most days.
The rock formations around Eureka are quite unique, and the area is known for its Rose rocks and calcite formations. To the southwest, on Axel Heiberg Island, prehistoric petrified forest remains.

2.1.3 Climate and Weather

Due to its northern location, Eureka experiences periods of full daylight and full darkness. 24 hour daylight begins April 13 and is present until August 28. The dark season runs from October 21 to February 20. Transitional periods occur in spring when days draw longer and in fall when daylight hours decrease.

The temperature remains below zero for most of the year. July is the warmest month with a daily mean of +4 degrees Celsius. The record high is +20.7 degrees Celsius. The coldest month is February with a daily mean of -37 degrees Celsius. The record low is -55.3 degrees Celsius.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average daily max	-33.1	-35.0	-34.1	-23.9	-7.6	4.4	8.4	5.4	-5.5	-18.6	-28.6	-31.0
Average daily min	-40.3	-42.0	-40.9	-32.2	-14.5	-0.7	2.4	0.6	-11.4	-26.1	-35.6	-38.1

The area around Eureka is classified as a desert and most of the precipitation is in the form of snow which may fall at any time of the year.

2.1.4 Wildlife

The wildlife around Eureka is plentiful. Hares, foxes, wolves and muskoxen are often seen in and around the station. Seals can often be spotted sunning themselves on the ice during light season. Peary Caribou, Polar Bears and lemmings are seen occasionally, while weasels are spotted only once in awhile.

The Arctic is a bird watchers paradise as many species come to nest or stop here for awhile before continuing further north. Bird species sighted in the Eureka area include yeagers, Arctic terns, snow buntings, gulls, ptarmigan, snowy owls, ruddy turnstones, snow geese, ducks, Brandt's, hawks and ravens.

Hunting of animals or birds is not permitted without a license from the territorial government or a local Hunter's and Trapper's Association.

Due to the ever-present danger of rabies, visitors and staff are cautioned not to feed the animals. Always keep in mind that these are wild animals, no matter how cute and fluffy they may be.

2.1.5 Flora

Eureka is known as the garden spot of the Arctic. Even though the climate is very dry with little precipitation falling and a short summer season, many colourful flowers manage to grow. If you look carefully you might even spot a few tufts of grass.

The vegetation has been forced to adapt to a harsh environment. The growing season is short and there is always a chance of frost. The plants remain close to the ground and have a shallow root system due to the permafrost. The stems are fuzzy to insulate them against the cold.

In Eureka, a variety of plants may be found: purple saxifrage, mountain avens, locoweed, arctic poppies, daisies, arctic willow and the ever pesky dandelion.

Since permafrost restricts drainage, the ground becomes water logged and marshes develop. Arctic cotton is only found in these very wet areas.

2.2 STATION ACTIVITIES

2.2.1 The Staff

The normal Meteorological Service of Canada (MSC) staff complement at Eureka Weather Station comprises of:

- Station Program Manager (SPM)
- Senior Aerological Observer (SAO)
- 2 Meteorological Technicians
- 1 Cook
- 1 Handyperson

In addition, two contracted employees, a heavy equipment operator (HEO), and a mechanic (MDG) are on site to maintain the buildings, electrical generating systems, all station vehicles, runway, and road systems. There is also usually one CANDAC (Canadian Network for the Detection of Atmospheric Change) operator on site to take care of the PEARL (Polar Environmental Atmospheric Research Laboratory), ØPAL (Zero Altitude PEARL Auxiliary Location**)** and SAFIRE (The Surface and Atmospheric Flux, Irradiance, Radiation Extension Site).

2.2.2 Buildings, Power Generation, and Water Supply

2.2.2.1 Buildings and accommodations

The main operations' building also includes a barracks section. There are 16 rooms in this complex. Normally the staff occupy between –eight and nine rooms. Visitors are then housed in the remaining rooms. If there are more visitors than rooms (a common occurrence), the guests will either be placed two or more to a room. Only the staff rooms have private bathrooms. There is, however, a central male and female washroom in the main facility to accommodate residents.
The Operations building, main barracks, garage and power house are heated by a heat recovery system using waste heat from the electrical generators. This system has resulted in a substantial savings in heating costs. Other buildings on the site are shown below.

2`

2.2.2.2 Generators

The station electrical needs are supplied by the powerhouse. There are three 410 kWh Cummings generators. It is possible to run two units in parallel to share the loads when the need arises. Staff and visitors are cautioned to conserve energy and keep power consumption to a minimum, especially during winter. Fuel is limited and is only re-supplied once a year by ship.

2.2.2.3 Water Supply

One of the few drawbacks to Eureka is the lack of a fresh water supply. A small man-made lagoon has been built beside Station Creek. During the "spring runoff", the water from the creek is pumped into this lagoon. Whenever required, the station will then pump the water into any one of its three large primary

storage tanks with chlorine automatically added while pumping. Later on, the water is then transferred into two secondary holding tanks and piped throughout the station. Water shortages towards the end of winter are not uncommon, and water rationing is always a distinct possibility. Guests are always cautioned to keep this fact in mind at all times and to **CONSERVE** water. A reverse osmosis system in the main complex produces good drinking water to all the washrooms, dining room & kitchen area, while all the water has been passed through a water softening system to remove the large amounts of calcium that is present in the water.

2.2.2.4 Airport

MSC operates and maintains a 4800 ft. gravel airstrip. Airport facilities and navaid equipment are minimal and no fuel sales are available. If you require aviation fuel (Turbo Diesel) in Eureka you will have to purchase it from an airline company in Resolute (Kenn Borek) and have them bring in your fuel in advance of your visit. There is no AvGas for sale in Eureka and little, if any in Resolute.

A Navaid is a navigational aid, usually an electronic device to help pilots navigate aircraft to certain points of reference.

2.2.3 Transportation - aircraft, local vehicles

2.2.3.1 Transportation to Eureka

Arrival to Eureka is usually via Canadian North or First Air from Edmonton to Yellowknife, then Canadian North to Cambridge Bay and then Kenn Borek Air to Resolute Bay, or First Air out of Ottawa to Resolute via Iqaluit. Staff will catch a chartered Summit Air flight out of Yellowknife to Eureka on the monthly produce flight or on any other available flight to the area. Visitors, who are not travelling to Eureka in support of the station operations, must charter a plane from Resolute.

During the light season there is an increase in aircraft activity into and around Eureka, which facilitates arriving or departing as there are more flights to choose from. The dark season sees a marked decrease and for many months the only plane is the monthly produce flight.

2.2.3.2 Transportation on site

The MSC has several vehicles at Eureka. There are several 3/4 ton pickups and passenger vans, two snowmobiles, two ATV's, a Track Truck, and several mountain bikes. These vehicles are for MSC personnel only. ATV's are not for rent. The keys are left in the vehicles to facilitate easy access in case of fire or other emergency. This is not an invitation to use the vehicle. If transportation is needed, a request has to go through the SPM and it will be arranged.

2.2.4. Available Services

2.2.4.1 Mail service

Stamps may be purchased from the small, but well equipped, post office on site. Usually one of the staff undertakes the duties of the Post Office and is in charge of processing the incoming/outgoing mail.
Eureka's mailing address is:

Eureka Weather Station
Eureka, Nunavut
X0A 0G0

Mail arrives and departs at least every 4 weeks on the produce charter. On many occasions other incoming planes are kind enough to bring mail to the great delight of all the staff.

2.2.4.2 Medical Facilities

A limited stock of medical supplies is on site. If you are not feeling well, please report to the SPM who will offer assistance if required. The nearest medical attention is through Resolute Bay Nursing Station. The nearest hospital is located in Iqaluit or Yellowknife. If you require regular medication, bring enough to last your entire tour. The medical supply is not a drug store, but for emergency use only. Persons having allergies or a chronic medical condition, such as diabetes, etc., are requested to inform the SPM in confidence so that emergency diagnoses will be simplified.

2.2.4.3 Customs and Immigration

The SPM is also the customs officer. Therefore, if you are arriving from outside the country you are required to make a declaration to the SPM (general and personal declaration).

2.2.4.4 Shopping

Eureka has a variety of souvenirs which are always in high demand. Credit cards are not accepted but money can be transferred to the Staion Fund account via internet. There is a limited supply of personal item so make sure you bring your own, toothpaste and shampoo.

2.2.4.5 Fishing License

If you would like to try your hand at fishing for arctic char in the Park, a fishing license may be bought from the Wildlife Officer in Resolute.

2.2.5 Recreation

Living in a remote part of the world offers Arctic employees ample opportunity to engage in outdoor activities. For those who enjoy the outdoors, Eureka offers beautiful scenery for the hiker and photographer. Fossils, rocks and Arctic flowers can be collected. There are a few sets of cross-country skis and snowshoes available. Often there is an iceberg close to the station which can be conquered. There are video games, music and books for those who seek their leisure indoors. Typical recreation equipment includes a pool table, shuffle board, table tennis, chess, checkers, cards, darts, etc. Some equipment is also provided for outdoor sports such as softball and soccer. A satellite dish provides live television channels but signal strength and reliability of equipment is not always good so frequent outages are common. There are several VCRs & DVDs on site and many movies to view. If you are into fitness, there is a small exercise and weight room on site. Internet access is available but bandwidth is limited and the connection speed is comparable to 56K.

2.2.6 Communications

Weather data from the Eureka Weather Station is transmitted via LAN through the Skull Point satellite link. The backup system consists of modem use through phone line or by Iridium phone.

There is a telephone line to Winnipeg that is more or less reliable. Internet and e-mail access for the staff is available in the Expedition room.

Since there is only one phone line, personal calls are restricted to after business hours. There is a fax machine in the office, for your convenience.

Numbers are:	Phone: (613) 945-3145 (dial tone)	ext. 4460 (for SPM)
		ext. 4461 (for Wx Office or SAO)
		ext. 4446 (for Rec. Room)

ext. 4497 (for PEARL)

Fax: (613) 945-3145 (pause) ext. 4455

Iridium : 011 8816 314 67594
email: eurekawxstn@ec.gc.ca

2.3 STATION OPERATIONS

2.3.1 Medical clearance

Before departing from the south, all staff are required to pass a medical. A visit to the dentist is also a must. Visitors are reminded that there are no doctors or hospitals in Eureka and if you must take a prescription drug please bring a sufficient amount to cover your stay as these can not be purchased in Eureka.

2.3.2 Visitor Permit Application

Before being permitted to visit Eureka and use our services, all visitors must first obtain permission from:

Shelley Rourie
Aerological and Surface Operations Programs Section
Environment Canada
Suite 150 - 123 Main Street
Winnipeg, MB R3C 4W2
Phone: (204) 983-6038
Fax to: (204) 984-2072
Email: Shelley.Rourie@ec.gc.ca

Visitors are asked to keep in mind that Eureka is not a resort, it is a Weather Station. Luxuries found in a hotel are NOT available here.

2.3.3 Costs of provided services:

Cost of accommodations and services are published annually on our Schedule of Fees.
Current public rates are:

Meals	**Public Rate**
Breakfast	55.00
Lunch	55.00
Dinner	120.00
Accommodations	
Per Bed Day	250.00
Comprehensive Daily Charge	480.00
Daily Station Usage Fee (Shower & Laundry) per person	20.00

Electricity per kWh	1.143
Fuel Drum Disposal	30.00
Labour Per Hour (3 hour minimum may apply)	150.00
Vehicle per hour Light Wheeled Vehicle with Driver	150.00
Heavy Equipment with Driver	
Grader	230.00
Front End Loader	230.00
Bull Dozer	270.00
Aircraft Movements	
Light Aircraft	140.00
Heavy Aircraft	415.00
Diesel & Mo Gas (per litre)	**N/A**

If you require office space, please inform the SPM. A quiet work location is not always possible but the SPM will do his/her best to accommodate the request.

2.3.4 Time Zone
Eureka operates under Eastern Standard Time year round.

2.3.5 Meal Hours

Monday to Saturday	Breakfast	07:30 to 08:00
	Lunch	12:00 to 12:30
	Supper	17:00 to 17:30
Sunday	Brunch	11:00 to 11:30
	Supper	17:00 to 17:30

All times are local. Occasionally, the number of people on site may require that meals be served in two shifts of one half hour each. Staff and visitors will be notified of any changes.

NOTE: ALL INSIDE AREAS ARE NON-SMOKING EXCEPT THE SMOKING TV ROOM.

2.3.6 HAWS Code of Conduct

Employees of MSC and other residents of this station are assured of:

- A safe and healthy workplace and living conditions.
- An atmosphere free of harassment and one in which they are guaranteed personal dignity.
- The right of personal choice provided that it does not compromise the above.

In order to promote these principles all residents and guests are expected to abide by the following guidelines:

A) PERSONAL HEALTH. Wherever possible remain healthy (proper rest, diet, exercise, hygiene, annual

checkups, etc). If a concern arises, share this in confidence with the SPM in order that he/she can assist you should it become necessary.

B) PROMOTE SAFETY. 'Safety First' should be an underlying principle for all activities, whether at work or play. Be particularly alert when working alone, when exposed to the elements or when working with flammable substances. Medical attention is at least three hours away and you can die from a minor injury.

C) DRUGS & ALCOHOL. Illegal drugs or substances are prohibited at this station. While the consumption of alcoholic beverages outside of the workplace and during nonworking hours is permitted, moderation is encouraged and expected. A person who is intoxicated will be of little help during an emergency..

D) ENVIRONMENT. All residents are expected to conduct their activities in a fashion which will result in minimal damage to the natural environment or aggravation to wildlife.

E) HOUSE RULES. The station staff have a number of official 'house rules' for the benefit of all residents. Some of the items covered include: recreational equipment, quiet hours or areas, non-smoking areas, housekeeping chores, etc. All staff and visitors to the station are expected to become familiar with these practices and to abide by them.

2.3.7 Fire regulations

know where the exits and extinguishers are.

In the event of a fire:

-activate fire alarm
-everyone proceeds to front vestibule
-if you are in your room:
    1) feel door, if warm, break the room window and exit through window
    2) in case room is filled with smoke, drop down on your hands and knees and crawl low under the smoke to the nearest exit.
    3) ensure all doors are closed

To keep the risks of a fire to a minimum, SMOKING IN BED IS NOT ALLOWED. Please smoke only in the designated smoking room.

2.3.8 Arctic clothing

MSC staff are issued arctic wear before coming up. This includes an arctic parka, ski pants, winter safety boots and mitts. It is wise to bring a toque and/or face mask, scarf, ear muffs, long johns, wool socks and extra mitts or gloves as they are easily misplaced.

Visitors are also encouraged to purchase arctic wear as the winter jackets worn in southern Canada ARE NOT warm enough for an Arctic winter. A lighter jacket is suggested for the warmer months, although temperatures can still fall to near zero at times during the summer.

Anyone travelling to the station by plane from September to May must wear arctic clothes or carry them in hand as a safety measure.

2.3.9 Procedures when venturing away from station

Before leaving the station for a hike or drive always check the current weather conditions. Tell the

meteorological technician on duty where you plan to go and how long you expect to be gone. Bring a portable walkie-talkie with you and check in regularly. If the wind picks up and/or dark clouds appear, turn back and return to the station immediately. Snow, blowing snow and fog can reduce visibility to near zero very fast. Hiking with a 'buddy' is a wise idea. Check in at the weather office when you return to the station.

When taking a vehicle ensure that it has fuel and check the oil and tires. Perform a radio check on the VHF radio to ensure it functions properly. Make sure the vehicle contains a shovel, flashlight, safety gear and first aid kit. Bring your arctic issue with you as you might have to walk back to the station if the vehicle breaks down, although it is recommended that you stay with the vehicle. Always get permission from the SPM before taking a vehicle.

2.3.10 Emergency conditions

Upon arrival at the station, the SPM will brief you on procedures to follow in the event of an emergency. An emergency consists of fires, polar bear sightings, power failures - anything that may endanger the lives of the people at the station. Use your common sense and report anything suspicious or worrisome to the SPM.

2.3.11 Items to bring

Blankets, sheets, pillows, towels, face cloths and soap are provided for. Anything else is your own personal choice. It is a good idea when arriving to bring a carry on bag with toiletries, and a change or two of clothing, as delayed luggage can occur. It can take up to 3 weeks for personal effects to catch up with you.

For long tours, a personal MP3 or CD player is an excellent idea. Naturally, your MSC arctic gear is a must, but a light jacket for summer and spring is helpful. As the snowmobile is frequently used, a ski mask can be quite useful. Sunglasses are necessary for spring until fall as the glare from the snow can be painful. Bug spray is handy, but can be supplied locally. A good digital camera is handy, as the wildlife is numerous and the scenery beautiful. A supply of cash is helpful for purchases.

It's a good idea to consider correspondence courses or some hobby to help you pass the time.

2.4 WEATHER AND SCIENTIFIC PROGRAMS

2.4.1 Weather Program

2.4.1.1 Hourly Weather - Eureka operates an hourly surface weather observing program, providing hourly observations for the period 0600Z-0300Z (1 am to 10 pm Local Standard Time). Special observations are done between the hours of 1100Z and 2100Z (6 am to 4 pm Local Standard Time) in support of aviation forecasting and climate data services.

2.4.1.2 Synoptic Weather - Observations and measurements of meteorological data are made every six hours in support of forecasting both nationally and internationally.

2.4.1.3 Aerological Soundings - Two weather balloons are released per day, the first at 11:15Z, and the second at 23:15Z. The balloon carries an electronic instrument aloft. The data collected is then used by the forecasting system nationally and internationally. Additionally, once per week an ozone sounding is done in conjunction with the 23:15Z flight to determine ozone concentrations in the upper atmosphere.

2.4.2 Additional Programs

2.4.2.1 Radiation - Eureka currently has two radiation instruments which monitor solar, atmospheric, and terrestrial radiation (RF1 & RF4).

2.4.2.2 Sunshine – Bright sunshine is no longer recorded.

2.4.2.3 Snow Survey - Done twice monthly to determine density and other properties of snow cover.

2.4.2.4 Geomagnetic Monitoring - A magnetometer is located on site which records data about the earth's magnetic field.

2.4.2.5 Ice Thickness - Measurements of sea ice thickness are taken in Slidre Fjord during the winter period.

2.4.2.6 Freeze-up/Break-up - Daily shore observations are made to determine the state of the spring and fall ice flow.

2.4.2.7 PEARL (Polar Environment Research Laboratory) & **ØPAL (Zero Altitude PEARL Auxiliary Location)** - Located at Eureka, and formerly known as the ASTRO (Arctic Stratospheric Ozone Observatory) Lab, PEARL became fully operational in 1993. It was a world class ozone research facility owned and operated by Environment Canada and played an important role in the global monitoring and understanding of stratospheric ozone. The modern facility is located 14 km West of Eureka at 600 meter elevation and became a centre for international research hosting scientists from around the world conducting studies on ozone depletion, UV radiation, stratospheric aerosols (Japanese), and trace gases associated with ozone depletion. Measurements taken at ASTRO provided the first evidence of the catalytic destruction of ozone by ClO (hypochlorite) during cold stratospheric temperatures associated with the Arctic vortex. The ozone observatory enabled Canada to take its place in a new global network of highly sophisticated ozone-measuring stations. Operations at the ASTRO Observatory were closed due to financial constraints, however, the observatory is being revitalized through funding awarded to CANDAC by the Canada Foundation for Innovation to lead a research consortium and expand research activities with the MSC and others at the old ASTRO facility. The Canadian Network for the Detection of Atmospheric Change (CANDAC), a Canadian university consortium has a great interest in using the facility in collaboration with researchers from the Meteorological Service of Canada and others to gain better insight into the atmospheric chemistry of the stratosphere. The university research consortium (CANDAC) is comprised of researchers from the University of Toronto, Dalhousie University, University of Waterloo, University of New Brunswick, University of Saskatchewan and the Centre of GeoSpace Studies.

In 2005, the Polar Environment Atmospheric Research Laboratory (PEARL, formerly ASTRO) became a continuously operating research-level station with a large complement of instrumentation for measuring atmospheric properties from the ground to around 100km. Complimenting PEARL is the Zero altitude PEARL Auxiliary Location (ØPAL), which was constructed close to the weather station in 2005. The two observatories rely on the facilities at Eureka for life support and other infrastructure needs.

2.5 THINGS TO DO AND SEE

For the history buff, there are several known archaeological sites along the north shore of Slidre Fiord, three of which are situated just west of Eureka, along the old road to Skull Point. These three sites were recorded in 1977, but since that time they have been largely destroyed due to construction activity. The nearest site to Eureka originally consisted of approximately 25 tent rings, food caches, and hearths. Today only nine features have survived. The site belongs to the Thule Inuit cultural period. Two other sites are located closer to Skull Point. One is a Thule tent ring with associated food caches, and the other consists of a food cache with a possible tent ring of unknown cultural affiliation. Other feature sites are located along Slidre

Fiord about 6 km east of the station. Please do not disrupt the sites as they are historic.

For the amateur geologist or rock collector, Eureka is abundant in fossils, rose rocks and the very observant may find pieces of petrified wood.

For the sport minded individual, hiking is very popular as there are numerous areas to explore. two and a half miles northeast of the station is an old airstrip that was used in the early days of Eureka. To the east of the station are the oil exploration trails that go to the end of the fiord. These trails are very scenic. To the west, located are the Skull Point hills and PEARL. Six miles northeast there is Black Top Ridge with a magnificent view from its 2700 foot altitude.

2.6 OTHER GOVERNMENT AGENCIES

2.6.1 Department of National Defence (DND)

2.6.1.1 OPERATION (Op) NEVUS

DND occupies a new facility at the air strip during the short summer season. Every year during the months of May, June and July, the military increases the population of Eureka. They come to do maintenance on the communication system between Alert, Eureka, and Skull Point. Work and maintenance is also done on the road from the weather station to Skull Point and to re-supply fuel caches between Eureka and Alert.

The military contingency varies from 40 up to 90 personnel at certain times of the season. There are helicopters, twin otters, Buffalo, and Hercules aircraft sometimes on site. A small crew returns in September to close and winterize 'Fort Eureka'.

2.6.1.2 Skull Point, Satellite Communication Station

Skull Point is an unmanned satellite communication station operated by DND that links Eureka, ASTRO Lab and Alert to the outside world.

Because communication satellites are orbiting the Earth over the equator, Skull Point (10 km west of the station) is the most northern location (80 deg. N) from which satellite signals can be picked up. From there the signals are transmitted to Alert, Eureka, and the Astro Lab via microwave, as illustrated on Figure #1, below.
To increase the reception of the satellite signals (known as a diversity system), a second satellite dish has been installed higher on the mountain dominating Skull Point, at an altitude of approximately 1200 feet. This site is called Upper Paradise and works in parallel with Skull Point in receiving the satellite's signals.

Six microwave radios are needed to relay satellite signals to Alert. These relays are situated at approximately equal distances from each other and are positioned on the most prominent points in their area in order to clear any obstructions - microwave being line of site transmission only. These relays close the 500 kilometre gap between Skull Point and Alert, and are powered by batteries which need to be replaced once a year. Located in one of the most remote areas of the world, these relays can only be accessed by helicopter during the light season.

Because of its location, a direct microwave link between the Astro Lab and Skull Point is not possible. Therefore, communication between Astro and Skull Point are done via Eureka which serves as a hub

repeater between the two stations.

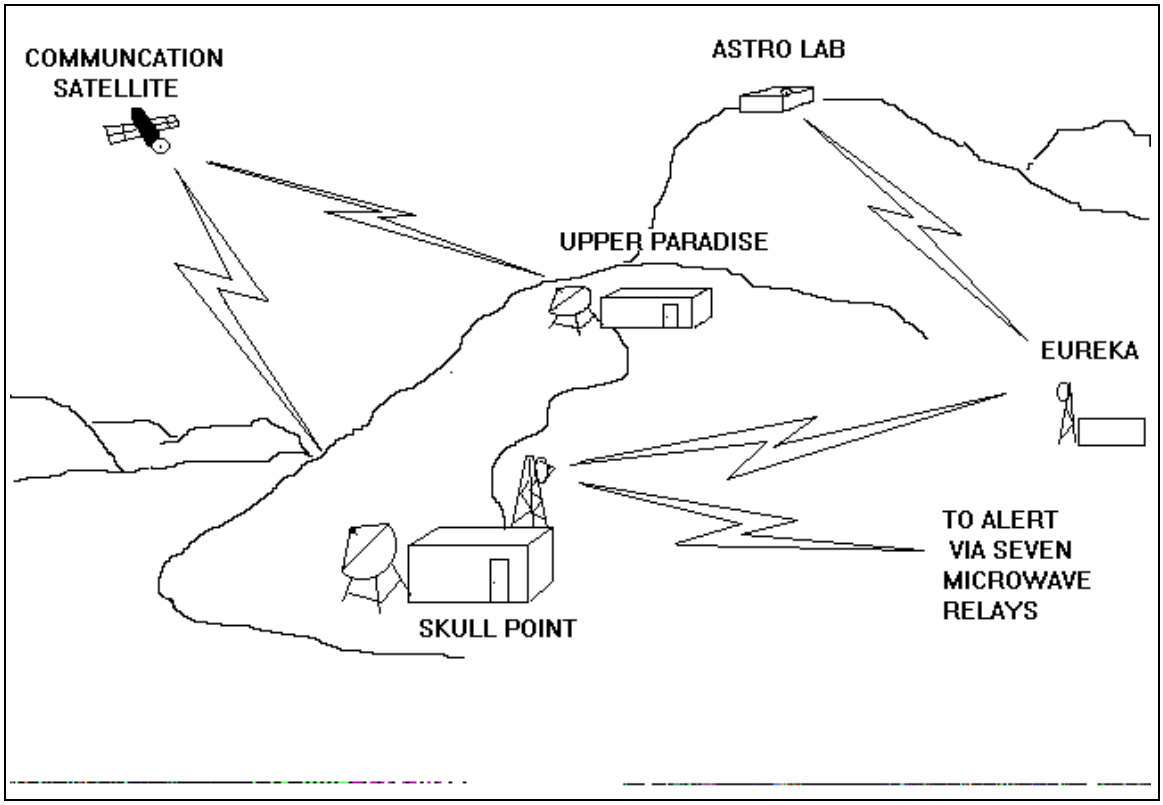

Figure # 1

2.6.2 NRCan Polar Continental Shelf Program (PCSP)

PCSP is a government agency dedicated to helping those who wish to do scientific studies in the Arctic. Every summer they set up camp in Eureka and use it as a base of operations to the many camps on the surrounding islands. PCSP supplies air support and government grants to graduate students in the sciences so they can then spend a summer researching their theses in the Arctic.

2.7 SPECIAL EVENTS AND HAPPENINGS

2.7.1 Sea Lift

Between late August and the middle of September the northern re-supply ship via Canadian Coast Guard icebreaker arrives in Eureka. It brings a years supply of bulk diesel, aviation fuel, vehicles, equipment, building materials, dry goods and non-perishable items such as soap, cleaning supplies, facial tissue, toilet paper, oils, lubricants, etc.

2.7.2 Trips and Expeditions

Eureka's proximity to Axel Heiberg Island and Ellesmere National Park Reserve makes it a major jumping off point for the many scientific and tourist expeditions in the area. In addition, Eureka is the farthest north permanent civilian site. Hence, the many assaults on the North Pole generally pass through Eureka to the final jumping off point at Ward Hunt Island. The re-supply planes for the expeditions must refuel at Eureka.

2.8 SPECIAL INTERESTS IN THE VICINITY

2.8.1 Geodetic Hills - Axel Heiberg Island

In 1985, Geological Survey of Canada geologists discovered a fossil forest site near the Geodetic Hills on Axel Heiberg Island, about 50 km west of Eureka. Fossil forests are groups of tree stumps preserved virtually in growth position. The first discovery of fossil forests in the Canadian Arctic was in the beds of Cenozoic age in 1886. It was only at this time that geologists realized the significance of the preserved wood. To date, there have been a total of five fossil forests found on Ellesmere Island and Axel Heiberg Island.

Studies of these ancient forests help to indicate the geography, climate and ecological character of the area during the time when the forests thrived. The region had a hilly, mountainous landscape with unconnected sedimentary basins. The climate was temperate to warm temperate with rich vegetation and large floodplains that suggest there was abundant precipitation with mild winters and warm summers. The regional flora consisted of lowland or floodplain forests and presumably more widespread, mixed woodland and shrub land. The forests were rich with evergreen and deciduous conifers as well as angiosperms.

An outstanding characteristic of the Geodetic Hills and Hot Weather Creek sites is the style of preservation of the wood and floor litter. Much of the woody tissue is retained such that the appearance and other properties of the organic material remain similar to those of the original materials. In fact, the wood is so well preserved that it will burn like fresh firewood.

Flood events are assumed to have caused the sudden overwhelming burial of the forests. There was no evidence of bacterial or fungal decay, so degradation through hydrolysis is likely. The relative proportions of lignin and cellulose found in the fossil wood are similar to those of historical, waterlogged wood suggesting a similar history of immersion in anaerobic bog water for long periods of time.

(Information was compiled from AES documentation and the following reference: Tertiary Fossil Forests of the Geodetic Hills Axel Heiberg Island Arctic Archipelago. Geological Survey of Canada bulletin 403)

2.8.2 Quttinirpaaq National Park

Established in 1988 as Ellesmere Island National Park Reserve (NPR), it became Quttinirpaaq National Park in 2001 following implementation of the Inuit Impact and Benefit Agreement for National parks under the Nunavut Land Claim Agreement. Encompassing Canada's northernmost lands, Quttinirpaaq National Park is an enclave of sedimentary mountain ranges, ice caps, glaciers, fjords and fertile Arctic oases. The park covers 37,775 square kilometres on northern Ellesmere Island and is Canada's second largest national park. Arctic Hare, Muskoxen, Peary Caribou and about 30 species of birds can be seen in the park. You should be prepared to exercise no-trace camping to maintain the wilderness value and sensitive features of the area. Due to its remote northerly location, visitor facilities and services are few in the park reserve. Trails, bridges and other hiker facilities are virtually non-existent. Only base camps offer emergency shelter.

For further information contact:

Chief Park Warden
Quttinirpaaq National Park
Nunavut Field Unit, Parks Canada
Iqaluit, NU
X0A 0H0
Ph. (867) 975-4673
Fax (867) 975-4674
Email : nunavut.info@pc.gc.ca

2.8.3 Alert

Canadian Forces Station (CFS) Alert is the most northern permanently inhabited settlement in the world. It is situated on the Northeastern tip of Ellesmere Island. Alert was first settled in the early 1950s as a weather station of the Joint Arctic Weather Station System (JAWS). The Canadian military station was established in 1958 and has been expanding ever since.

The Alert weather station has a staff of two - an SPM and a meteorological technician. They are responsible for two daily aerological flights, a weekly ozone flight and various other programs. Surface weather was automated in the summer of 1991.

The population of Alert is approximately 60 people - military, civilian employees of DND and employees of Environment Canada.

CFS Alert is an operational unit of the Supplementary Radio System (SRS) of Canadian Forces Communication Command. It participates in the standard research program involving radio transmission and reception in the high latitudes, as well as providing a high frequency direction finding capability for search and rescue.

Environment Canada Environnement Canada

PRAIRIE & NORTHERN REGION

HIGH ARCTIC WEATHER STATION

Visitor Permit Application

Visitors to Environment Canada High Arctic Weather Stations are required to complete the following documents:

i) Application Form - Release, Waiver and Assumption of Risk and Indemnity
ii) Visitor Permit Request Form

Once completed both forms should be sent by mail, fax or e-mail to:

Aerological and Surface Operational Programs
Environment Canada
Suite 150 - 123 Main Street
Winnipeg, MB R3C 4W2

Fax: 204-984-2072

E-mail: john.maciver@ec.gc.ca

Canada

Environment Canada Environnement Canada

RELEASE, WAIVER AND ASSUMPTION OF RISK AND INDEMNITY

I, (We)* _____

(individual or organization name)

hereby acknowledge and agree that in consideration of being granted use of the facilities owned and/or operated by Environment Canada:

1. I (We) do hereby release, Her Majesty the Queen in right of Canada, Her heirs, successors, officers, employees, servants, independent contractors and agents from all liability, and do hereby waive as against Her Majesty the Queen in right of Canada, Her heirs, successors, officers, employees, servants, independent contractors and agents, all recourse, claims, causes of action of any kind whatsoever, in respect of all personal injuries or property losses which I (We) may suffer arising out of or connected with the use of the facilities, aircraft, and vehicles, owned and/or operated by employees, independent contractors or agents of Environment Canada, except when such injuries or losses may have been caused by the willful acts or by the negligence of Her Majesty the Queen in right of Canada, Her heirs, successors, officers, employees, servants, independent contractors and agents.

2. And, I (We) do hereby acknowledge and agree:

a) that Arctic visitors are exposed to many risks and hazards, some of which are inherent in the very nature of the Arctic operations itself, others which result from but not limited to human error and negligence on the part of persons involved in operating and maintaining the facilities;

b) that, as a result of the aforesaid risks and hazards, I (We) as a user may suffer serious personal injury, even death, as well as property loss;

c) that some of the aforesaid risks and hazards are foreseeable, but others are not;

d) that I (We) understand that any fuel (aviation or motor) that may be purchased at Eureka, will be at our own risk and take full responsibility for its use. I (We) will not hold Environment Canada, Her Majesty the Queen in right of Canada, Her heirs, successors, officers, employees, servants, independent contractors and agents liable for any consequences it may cause.

e) that I (We) nevertheless, freely and voluntarily, assume all the aforesaid risks and hazards, and that, accordingly, my (our) use of the facilities, aircraft, and vehicles, owned and/or operated by employees, independent contractors or agents of Environment Canada shall be entirely at my own risk;

f) that I (We) understand that neither Her Majesty the Queen in right of Canada, Her heirs, successors, officers, employees, servants, independent contractors and agents assume any responsibility whatsoever for my safety during the course of my (our) use of the facilities, aircraft, and vehicles, owned and/or operated by employees, independent contractors or agents of Environment Canada;

g) that I (We) have carefully read this **RELEASE, WAIVER AND ASSUMPTION OF RISK AND INDEMNITY** agreement, that I (We) fully understand same and that I (We) am (are) freely and voluntarily executing same;

h) that I (We) understand clearly that by signing this **RELEASE, WAIVER AND ASSUMPTION OF RISK AND INDEMNITY** agreement that I (We) will be forever prevented from suing or otherwise claiming against Her Majesty the Queen in right of Canada, Her heirs, successors, officers, employees, servants, independent contractors and agents and do hereby indemnify Her Majesty the Queen in right of Canada, Her heirs, successors, officers, employees, servants, independent contractors and agents for any loss or damage connected with any property loss or personal injury that maybe sustained as a result of the use of the facilities owned and/or operated by employees, independent contractors or agents of Environment Canada, except where such loss or injury is caused solely or

partly by negligence on the part of the heirs, successors, officers, employees, servants, independent contractors and agents to any of the persons who are by virtue of this **RELEASE, WAIVER AND ASSUMPTION OF RISK AND INDEMNITY** entitled to the use of the said facilities;

i) that I (We) understand clearly that personal firearms are not allowed on the station at any time. Firearms brought onto the station for use in legitimate scientific research are to be used for that purpose only. All firearms are to be reported to the Station Program Manager upon arrival;

j) that I (We) understand clearly that Environment Canada, would not permit use of the facilities, aircraft, and vehicles, owned and/or operated by employees, independent contractors or agents of Environment Canada, unless I (We) signed this **RELEASE, WAIVER AND ASSUMPTION OF RISK** agreement;

k) that this **RELEASE, WAIVER AND ASSUMPTION OF RISK** agreement is binding on myself (ourselves), heirs executors, administrators, personal representatives and assigns.

DATED this day of _____, 20__, at

APPLICANT'S NAME (Please print) WITNESS

X X

APPLICANT'S SIGNATURE WITNESS

NAMES OF MEMBERS IN PARTY:

Environment Canada Environnement Canada

VISITOR PERMIT REQUEST FORM
HIGH ARCTIC WEATHER STATIONS
ENVIRONMENT CANADA

APPLICANT	
MAILING ADDRESS PHONE NO./FAX NO EMAIL	
PURPOSE OF VISIT	

IDENTIFICATION:

If you are identified with IPY, (International Polar Year), provide the following information:

IPY project number _____

Attach a letter of endorsement from either the lead of the internationally approved program in which you are involved, and/or the Canadian IPY National Committee, and/or your country of origin IPY National Committee.

You are required to self identify in which category you belong.

Continuing Research Programs _____
(On going studies that have been on-going at Eureka in previous years and not necessarily IPY accredited)

Canadians in IPY endorsed research _____

Non-Canadians in IPY endorsed research _____

Canadian Researchers _____

Non-Canadian researchers _____

Tourists _____

VISITOR PERMIT REQUEST FORM
HIGH ARCTIC WEATHER STATIONS
ENVIRONMENT CANADA

Canada

Environment Canada Environnement Canada

Total Number in Party	Number of Males: Number of Females:
Anticipated Arrival **Date & Time**	
Anticipated Departure **Date & Time**	
Length of Stay	

Services Requested as per attached Schedule of Fees:

Calculated Costs as per attached Schedule of Fees: $

*Payment must be made by credit card, either by Master Card or Visa only at the time of visit.
All other forms will require advance payment.

NAME OF CARRIER:

VISIT SPECIFICS:

(e.g. Joe Brown & 3 techs, Dept. of Energy, fuel/power audit of station power system for Environment Canada.)

Canada

Environment Canada | Environnement Canada

Eureka Weather Station
User Charges

April 01, 2009 – March 31, 2010

	Public Rate	OGD
Meals*		
Breakfast	55.00	45.00
Lunch	55.00	45.00
Dinner	120.00	95.00
Accommodations		
Per Bed per Night	250.00	175.00
Comprehensive Daily Charge	**480.00**	**360.00**
Daily Station Usage Fee (Shower & Laundry) per person	20.00	15.00
Hydro per KWH	1.143	0.704
Drum Handling Fee	30.00	30.00
Labour Per Hour (3 hour minimum may apply)	150.00	90.00
Vehicle per hour including driver		
Light Wheeled Vehicle (Transportation to or from airstrip - 1 hour minimum either way)	150.00	105.00
Grader	230.00	140.00
Front End Loader	230.00	140.00
Bull Dozer	270.00	185.00
Aircraft Movements (each per landing or take off)		
Light Aircraft	140.00	115.00
Heavy Aircraft	415.00	345.00
Diesel & Mo Gas (per litre)	N/A	5.00

Updated – 30 Nov 2007

Canada

Appendix B

Site Safety & Emergency Contingency Plans

Environment
Canada

23

EUREKA WEATHER STATION

80°00'N 85°56'W

EUREKA
SITE SAFETY
&
EMERGENCY
CONTINGENCY
PLANS

Updated July 2004

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Environment Canada

Eureka Site Safety and Emergency Contingency Plan

Safety and loss Prevention

Policy Statement

Environment Canada is dedicated to providing and maintaining a safe and healthful environment for employees, contractors and visitors, protecting the public and preserving Environment Canada's assets and property.

At Eureka, our most valuable resource are the people who work here.

Injuries can be prevented. To achieve this goal, every reasonable effort shall be made to comply with all government regulations pertaining to safety and health issues and to utilize the principles of accident and loss prevention in the management of all activities and programs. An effective Safety and Health Program will be carried out.

Specifically, it is management's responsibility to identify, control and/or eliminate known hazards which can result in personal injury, illness, property damage, fire, breach of security, negative environmental impact or any other form of controllable loss.

All personnel are ultimately responsible for their own safety by complying with legislative, government, company and industry standards, as well as by promptly reporting all unsafe acts or conditions to supervisors. Supervisors are responsible for taking immediate action to solve such problems. Personnel are encouraged to promote safety of their fellow employees and transients.

Environment Canada is sincerely interested in everyone's safety. It is Environment Canada's policy to provide safe equipment, adequate tools, training and necessary protective equipment. It is everyone's responsibility to follow the rules of safety as established for their protection and the protection of others, and use the protective devices that are provided.

The success of our safety and loss prevention program requires the dedication, commitment, involvement and participation of all personnel working together to achieve this common goal.

Dated: _____ _____

Station Program Manager

Atmospheric Monitoring Division
Prairie and Northern Region
Eureka Weather Station
X0A 0G0
(204) 984-6376 [pause for dial tone]4460
Internet: Eurekawxstn@EC.GC.CA

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Environment
Canada

Eureka Site Safety and Emergency Contingency Plan

SAFETY PHILOSPHY

Demonstrating Leadership

Environment Canada is committed to providing a safe and healthy work environment for all personnel.

Our Goal Is Zero Accidents

Safety is an integral part of Environment Canada's operation. Environment Canada is committed to the goal of zero accidents. No work is so important that it can not be done safely.

Responsibility and Awareness

Safety is a management responsibility. Senior management is responsible for planning, implementing and monitoring the safety and loss prevention program. Each staff member then has specific responsibilities for safe work.

These responsibilities are defined for the manager, contractors and tradesman, all of whom are accountable in turn for safety within their own jurisdictions. Finally, all employees, contractors, clients, subcontractors and visitors are responsible for their own safety. As well, they share the responsibility for the safety of other personnel.

Working Together For Success

Safety cannot be "delegated' to staff specialists. The staff specialists support management by assisting in site training, serving as trained and knowledgeable observers, providing administrative assistance, monitoring, evaluating and scoring the success of the safety program. While this role is important, commitment and active participation by everyone, everyday, is necessary if we are to achieve the level of safety excellence that Environment Canada expects.

Dated: _____ _____

Station Program Manager

Environment
Canada

Eureka Site Safety and Emergency Contingency Plan

ENVIRONMENTAL POLICY STATEMENT

Environment Canada considers environmental protection to be an important and integral part of conducting business. One of Environment Canada's guiding principles states:

"We are careful to take the environment into consideration in our decision making"

Environment Canada's Environmental Policy is to:

- minimize hazards to public health,
- protect the environment from adverse effects of our operations,
- comply with all legislated standards and regulations,
- assess potential environmental risks,
- evaluate and monitor environmental performance to applicable standards,
- work with industry, government and workers to maintain environmental awareness, and
- maintain effective reporting

Dated: _____ _____

Station Program Manager

Atmospheric Monitoring Division
Prairie and Northern Region
Eureka Weather Station
X0A 0G0
(204) 984-6376 [pause for dial tone}4460
Internet: Eurekawxstn@EC.GC.CA

Eureka Site Safety and Emergency Contingency Plan

RESPONSIBILITIES AND ENFORCEMENT

All employees, contractors, sub-trades, consultants and visitors are encouraged to review and understand these requirements.

Every new employee, contractor and sub-trade shall be given a site safety orientation prior to commencing work.

Health and SAFETY MEETINGS

Purpose:
The purpose of Health and Safety meetings is to provide a method for the dissemination of information to all employees and contractors regarding safety and health issues.

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Regular Health and Safety meetings demonstrate Environment Canada's concern for the lives and well being of its employees. Health and Safety meetings help build a cooperative climate by providing employees with the opportunity to contribute ideas, and to make suggestions that may improve quality, productivity, morale, and safety.

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Safety education is required of all employees at all levels within the organization. Environment Canada has a formalized training program to prevent accidents and to train employees to do their job safely. Scheduled Health and Safety meetings, will be conducted at least 9 times per year unless circumstances dictate more frequent meetings.

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Responsibilities:
The Station program manager will ensure that all staff and contractors attend these Safety Meetings.

Employees and contractors are required to attend all Safety Meetings. In the event an employee misses a Safety Meeting, the employee shall be given individual instruction by the SPM concerning what was discussed/covered.

The SAO will maintain a log of what was discussed and who attended the meeting on the 'Safety Meeting' sheet appendix . This information shall be turned over to the regional Health & Safety officer.

The Regional Health and Safety officer shall be a resource for safety and health discussion topics, and shall keep all documentation of all training at a central location.

Procedure:
For greatest effectiveness, cover subjects that most interest the employees, permanent contractors as well as any other persons who may be affected. These topics might include accidents, inspection results, the safety program, or a work procedure, environmental health and safety awareness and hazard identification. with staff and All persons are encouraged to generate suggestions during the safety meetings.

ACCIDENT/INCIDENT INVESTIGATION

All incidents with the potential of loss or injury shall be reported to the Station Program manager immediately. He/she will initiate an investigation and implement corrective action.

In most cases, an accident report remains internal, but when serious injury or property damage occurs, external agencies must be notified in accordance with local regulations.

- Injury - government health and safety agency
- Environmental - government environmental protection agency

The Station program Manager's preliminary investigation and documentation is most important and should be carried out immediately to preserve evidence.

EMERGENCY ACTION CONTINGENCY PLANS

Purpose:

To establish the policy and procedures regarding management's and employee's response to various emergency situations. Examples of an emergency are fire, medical, aircraft distress, power failure and hazardous material spill.

Overview:

The procedures cover the following topics:

1. Fire Response
2. First Aid, CPR and Medical Emergencies
3. Aircraft and Inflight Emergencies
4. Power Generation Failure
5. Hazardous Material Spill Response
6. Polar Bear Encounters

Policy:

Environment Canada has developed plans that address emergency situations that may arise in Eureka and which may threaten human health and safety, damage Environment Canada's asset and/or the environment. The Station Program Manager is responsible for implementing the Emergency Action Contingency Plans. These Emergency Action Plans will meet the following objectives:

1. Provide a means of notifying employees, customers and local authorities of an emergency situation.

2. Provide for a safe and orderly method of evacuation of employees and transients from the premises.

3. Account for all employees who occupied the premises at the time of evacuation, should one occur.

FIRE RESPONSE

EMERGENCY FIRE ORDERS:

ALARM BELLS:

- All personnel and transients shall respond to all Fire alarm bells.
- Staff shall report to the Weather office.
- Transient personnel shall report to the front door vestibule.
- SPM or SAO will ensure all personnel are accounted for

IN CASE OF FIRE:

- Sound the alarm by pulling the nearest **PULL STATION**.
- If safe to do so. Attempt to extinguish the fire with the appropriate type of extinguishers.
- If the fire is uncontrollable, exercise **PLAN OF ESCAPE**.

PLAN OF ESCAPE:

- Before opening any inside door, feel its surface, if warm, use alternate exits
- In case of smoke, stay close to the floor; breathe shallowly through a cloth (wet if possible). Used Smoke hoods if needed.
- Keep doors closed.
- Exit building as quickly as possible and proceed to the **NEW GARAGE**.

FIRST AID, CPR & MEDICAL EMERGENCIES

First Aid Kits and Emergency Trauma Equipment

First Aid Kits are situated in all heated buildings and vehicles and is there for the use in the treatment of minor scratches, burns, headaches, nausea, etc. All employees shall know the location of the First Aid Kit and shall notify the SPM if they need to use the First Aid Kit. The SAO shall inspect First Aid Kits on a monthly basis to insure that they are filled and complete.

Emergency first response equipment (Trauma Kit, Defibrillator, Medical Oxygen, Back Board and Extrication Device) are readily accessible by the front door of the main complex for quick deployment.

FIRST AID PROCEDURES AND INSTRUCTIONS

Minor First Aid Treatment

Persons requiring medical treatment for non-serious injuries will see the Station Program Manager. If an employee has a work related injury or illnesses that requires professional medical assistance, they shall notify the SPM and let him/her know before they receive this assistance. If they fail to notify their supervisor, they may not be eligible for Worker's Compensation benefits to pay for doctor's bills and/or lost wages.

If an employee sustains an injury or is involved in an accident requiring minor first aid treatment, they shall:

- Inform the SPM.
- Administer first aid treatment to the injury or wound.
- If a first aid kit is used, indicate usage on the accident investigation report.
-
- Provide details for the completion of the accident investigation report.

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Non-Emergency Medical Treatment

For non-emergency medical treatment, notify the SPM who will decide whether the medical treatment can be taken care of locally or with consultation with the nurse in Resolute what actions should be taken.

Emergency Medical Treatment

If a person has an medical emergency or sustains a severe injury requiring emergency treatment:

- Call for help and/or seek assistance.
- Notify SPM immediately
- determine the extent of the injury(s) or ailments as quickly as possible
- follow First Aid procedures
- Call the nurse in Resolute (867) 252-3844 and inform her of the situation
- Or call Iqaluit Health Clinic (867) 979-5306
- administer treatment as per instructions from the nurse
- arrange for a med-evac if necessary - Kenn Borek Air in Resolute (867) 252-3845
- prepare patient for transport
- provide details for the completion of the accident investigation report.

Normally, initial first aid will be provided by the SPM or site staff for injuries, however when DND are here in the summer you may want to ask their Medics to assist.

Emergency First Aid Response
Procedures for Life Threatening Injuries

Responsibilities of first person on scene:

a) Scene safety and initial assessment of injury(s).
b) Call/phone/run for help and/or seek assistance from the Weather Office 4461.
c) Determine the extent of injury(s) or ailments as quickly as possible.
d) Follow First Aid procedures.
e) Stay on the scene until relieved by more qualified First Aid/medical personnel.
f) All calls from the media regarding any Medical Emergency incident in Eureka will be directed to the ASOP Head, Mr. Ken Wowryk. At no time will staff answer questions over the phone.

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Responsibilities of the Operation Technician upon notification of Life Threatening Injury:

a) Notify the Station Program manager immediately.
b) Station Program Manager's phone number is 4460. It rings in his office and room.
c) The on duty weather technician should keep a detailed log of calls made, to whom and times once he has been informed an Emergency First Aid incident has occurred.
d) The Operation Technician should not become involved with the First Aid response until there is someone qualified to take over his/her on duty responsibilities. Your own state of mind and fatigue must be considered.
e) All calls from the media regarding any Medical Emergency incident in Eureka will be directed to the ASOP Head, Mr. Ken Wowryk, 9-3-9-983-4385.
f) At no time will staff answer questions over the phone to the Media.

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Responsibilities of the SPM to follow upon notification of Life Threatening Injury:

a) Review the First Aid scene.
b) If required call a more qualified person; DND Medic or Resolute Nurse.
c) DND medic at 4466. Summer months (May - Aug) during Op Hurricane.
d) Resolute Nursing Station at 9-3-1-867-252-3844 or Iqaluit Health Clinic at 9-3-1-867-979-5306.
e) Administer treatment as per instructions from the Nurse in Resolute/DND medic.
g) All calls from the media regarding any Medical Emergency incident in Eureka will be directed to the ASOP Head, Mr. Ken Wowryk, 9-3-9-983-4385.
h) At no time will staff answer questions over the phone to the Media.

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Canada Labour Code II
Duties of Employees: 126. (3) No employee is personally liable for anything done or omitted to be done in goodfaith by the employee when the employee is assisting the employer, as requested by the employer, in providing first-aid or in carrying out any other emergency measure.

The clause limits the liability for employees who are carrying out first-aid and similar duties (fire wardens etc) on behalf of the employer. Employers are to ensure that these duties are identified and that participation is voluntary.

Management is ultimately responsible for staff well being and must be kept informed when there has been a critical incident. If you have determined that a critical incident has occurred, refer to the critical incident response guide. This guide should be located beside your phone at all times.

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Responsibilities of Management:

a) Ensure each employee has as a minimum of First Aid training, Standard First Aid with Level "C" CPR.
b) Each employee, upon their initial orientation of the station or during their annual orientation, shall be made familiar with the locations of all First Aid Kits in all the buildings and in all the vehicles.
c) Each employee upon their initial orientation of the station or during their annual orientation shall be made familiar with the location of the Trauma Kit, Defibrillator, Medical Oxygen, Back board, and Extrication Device as well as the contents of the Trauma Kit. (i.e. burn gel packs)

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AIRCRAFT AND INFLIGHT EMERGENCIES

Aircraft Accident at Eureka

If an aircraft incident/accident occurs at the Eureka airport, the following step should be taken immediately:

1. the SPM will be notified who in turn will determine the seriousness and location of the aircraft accident/incident
2. should the accident be of a serious nature, and the accident scene is readily accessible, all available staff will be notified and deployed to assist with fire suppression and first aid.
3. the Met Tech on duty will notify FSS North Bay of the situation.

NOTIFICATION

Upon receipt of information that an aircraft is in a state of emergency, missing or has been involved in an accident, North Bay FSS should be contacted immediately **(800) 300-8300** and all pertinent information relayed to them.

Types of Emergency Conditions

Distress - A condition of being threatened by grave and/or imminent danger and of requiring immediate assistance.

Urgency - A condition concerning safety of the aircraft or other vehicle, someone on board or within sight, but does not require immediate assistance/

Accident - the event of an aircraft accident occurring on or off the airport

PERTINENT INFORMATION

To facilitate transmission and ensure that the most important basic information is obtained early, the following information should be obtained from the aircraft in distress:

1. call sign of aircraft
2. nature of the distress condition and kind of assistance required
3. intentions of the person in command
4. particulars of its position (airspeed, altitude, heading)
5. number of persons on board and injuries
6. any other information

or, in the case of accident:

1. type, nationality and registration marks of aircraft
2. name of owner, operator and person or company who chartered (if any) of aircraft
3. name of pilot in command of aircraft
4. date and time of accident
5. last point of departure with reference to some easily defined geographical point
6. position of the aircraft with reference to some easily defined geographical point
7. where did accident occur (on or off runway, if known)
8. number of persons on board (if known)
9. number of persons killed or seriously injured (if known)
10. condition of aircraft (if observed)

11. weather conditions at time of accident
12. condition of runway at time of accident
13. what kind of assistance in needed
14. any other information

POWER GENERATION FAILURE

BACKGROUND

The Eureka Weather Station is a self contained site located in Canada's High Arctic on Ellesmere Island. All life support systems (electrical power generation, heat, water and sewage etc.) are located on site and are owned and operated by Environment Canada. A mechanic and heavy equipment operator are on site to perform all minor and preventative maintenance on systems.

This contingency plan is meant to address the personnel and facility issues that will arise in the event of a life support system failure. Communications and aerological equipment are covered under other contingency plans both regionally and nationally.

The station is located in a very isolated area of the high Arctic. For nine months of the year sub-freezing temperatures are experienced and for 4 months, total darkness. The loss of generated electrical power will require swift action to ensure that personnel remain safe and the facility integrity is not compromised. Damage to the station infrastructure could occur within hours should the power plant stop producing heat and electricity. Replacement of this facility would be extremely costly ($10 - $20 M). Although the risk of this happening has been mitigated by thorough research into potential problem areas.

Action Plan

Should a power failure occur during sub freezing temperatures and cannot be restored within 6 hours, the following action plan must be put into effect immediately to ensure the safety and security of personnel and to maintain station integrity.

Personnel, Contractors and Visitors

- The new garage will be utilized to house all persons. The use of portable emergency Honda generators to provide limited power as well as using Herman Nelsons or space heaters for heat.
- An adequate supply of food is on hand and water shall be ready to be transported to the new garage. Blankets, pillows and mattresses shall also be ready to transport to the new garage if required.
- Portable washroom facilities are available.
- Kenn Borek Air Services in Resolute Bay are to be contacted **(867) 252-3845** and advised to be ready to transport personnel from Eureka to Resolute if required.

Facilities

- Portable generators will be used to power the fuel furnaces in the main complex. These furnaces should be adequate to maintain heat in this structure. All non essential plumbing will be shut off and drained.
- A Herman Nelson heater shall be used to maintain heat in the water storage building.
- A Herman Nelson heater shall be used to maintain heat in the bulk food storage area of the warehouse building.
- The hydrogen generator will have the water supply drained to ensure no damage happens to this unit.
- The Heat recovery system shall be drained to ensure no damage occurs.

Communications

Communications should be available via the Iridium satellite phone located in the Weather Office or the phone line located at Upper Paradise or Skull Point.

Leitrim telephone support contacts:
In the event of telephone, internet or microwave link problems call the numbers below. Do not use the order wire unless all else fails. If the microwave link between the station and Skull point fails, use the Iridium phone.

If during Leitrim business hours (Mon. - Fri. 7:00 am to 4:00 PM):
93-1- (613) 945-5404 / 5440 or 91-5404 / 5440 ask for Chester McAdams (if he is around)

If during after hours or on weekends:
93-1-(613) 945-5411 and ask the Duty Tech to get a hold of the Com Systems Duty Tech at:

Pager # 719-4464 or you can try calling the Com Systems Duty Tech's pager directly at:

93-1- (613) 719-4464 or 91-98-719-4464 (Chester may be on call with the pager)

Runway

Backup flarepots will be used to light the runway.

HAZAROUDS MATERIAL SPILL RESPONSE

Purpose:

To establish the policy and procedures regarding Management and employee response and actions to a hazardous material spill or leak.

Policy:

Environmental laws dictate the specific handling and disposal methods of hazardous materials. Failure to comply with these laws can be very costly as well as environmentally negligent. Environment Canada will fully comply with all laws and regulations pertaining to the handling and disposal methods of hazardous materials. Environment Canada will train all employees in the proper procedures to follow and what to do when they encounter a hazardous spill or leak.

Overview:

There are four classifications of hazardous chemicals that employees will likely come into contact with. These are:

IGNITABLES---TOXICS---CAUSTICS---REACTIVES

IGNITABLES- Ignitable products are either flammable or combustible. A spill of this nature creates two problems: one involving the potential for explosion and/or fire, and the other is the pollution of the environment. Examples are gasoline, paint thinners, petroleum solvents, alcohol, and adhesives.

TOXICS- These products are poisonous to the body and can cause illness or death. Examples are anti-freeze, paint, insecticides, fertilizer, and cleaning fluids.

CAUSTICS- A caustic is anything that burns, strongly irritates, corrodes or simply destroys the skin. Examples are acids and lye, such as drain cleaners.

REACTIVES- These products react violently when mixed with other products. The most common example is dry or liquid chlorine.

Procedure:

Regardless of the nature of the spill, and before starting any cleanup activities, the employee(s) shall always secure the area around the spill. This is to include asking all other unnecessary employees and personnel to move a safe distance away from the spill site. The SPM will be notified as quickly as possible of any spill.

The following steps will be taken if a spill occurs:

1. identify the cause of spill
2. identify the type of contaminant spilled and quantity spilled
3. assess the risk
4. if feasible, attempt to stop the leak and/or control it (drum patch kits in loader, and both pickups)
5. attempt to contain, recover, clean-up and dispose of spilled contaminate by deploying spill response equipment (mini spill kit in white pick-up & major spill kit equipment in the yellow building down on the beach shore)

6. ensure all personnel wears PPE (inside tote)
7. waste clean up materials (sorbant rags) to be placed in garbage bags or waste oil drums
8. contaminated soil to be disposed of in contaminated soil pit on south side of airstrip
9. report spill to the G.N.W.T. 24 Hour Spill Report Line by calling **(867) 920-8130**

The SPM shall review this plan annually.

OIL POLLUTION EMERGENCY PLAN

Introduction

Purpose

This Environment Canada (EC) Oil Pollution Emergency Plan is designed to facilitate efficient cleanup (or dispersion) of water based spills of Arctic Diesel P-60 at the Eureka Weather Station. Even though the probability of a spill is low, it is Environment Canada's policy to be prepared for such an incident, and that designated staff take appropriate actions.

The principal objectives of the Oil Pollution Emergency Plan are to:

1) Provide readily accessible emergency information to management, cleanup crews and government agencies in the event of a spill

2) Comply with Environment Canada's Eureka Waste Management Plan

3) Comply with federal and territorial regulations pertaining to the preparation of contingency plans and notification requirements

4) Comply with Emergency Prevention, Preparedness and Response for Oil Spill Response in Arctic Waters

5) Promote the safe and effective recovery or dispersion of spilled materials

6) Minimize the environmental impacts of spills to water

7) Facilitate the management of wastes according to environmental legislation

Scope

This plan addresses the organization of the Eureka Weather Station spill response team and emergency measures. The Oil Spill Plan is a supporting document of Eureka's Site Safety & Emergency Contingency Plan. Since Eureka receives diesel fuel by Canadian Coast Guard icebreaker, it is thus regulated under the 1994 Amendments to the Canada Shipping Act. For this reason, this Plan is drafted to comply with the *Standards for Oil Handling Facility Oil Pollution Emergency Plans* (June, 1994) issued by the Canadian Coast Guard, but it is also designed to maximize its usefulness to responders.

Alerting and notification procedures and cleanup strategies are outlined along with the duties and responsibilities of key personnel. Emergency contacts are listed for Environment Canada and other government agencies.

ENVIRONMENTAL POLICY AND PHILOSOPHIY FOR SPILL RESPONSE

Environment Canada (EC) is committed to the protection of the environment and sustainable development of the resources under its stewardship. EC will work with other government agencies to identify and address issues of environmental concern in all aspects of its Eureka operations.

Environment Canada is committed to:

1. Assessing and evaluating environmental, health and safety risks in connection with its operations on an ongoing basis;

2. Allocating sufficient resources to ensure continuing compliance with environmental responsibilities;

3. Meeting or surpassing all applicable environmental, health and safety regulations;

4. Establishing internal and external audit and reporting procedures necessary to monitor environmental performance and improve environmental practices; and

5. Promote environmental awareness among its employees and communicating its environmental performance both internally and to the public.

Health and Safety programs established by the Eureka facility will be followed during the loading/unloading of oil from a ship as well as during any oil pollution incident response;

All oil spill response equipment and spill clean up equipment have been made readily accessible for immediate deployment on the beach;

At all times during the unloading of oil from a ship, a minimum of one (1) person who has been trained in the procedures required under the CSA including spill response, will be on duty;

The Beachmaster in charge of the transfer operation has the full authority to stop the operation if he deems it unsafe for any reason and is expected to take such action;

In the event of an oil pollution incident at Eureka, the Station Program Manager would be the On-Scene Commander and request that the CCG Beachmaster immediately take action to contain or control the released product as quickly as possible providing this can be done safely;

The Eureka facility will conduct appropriate training and assist with exercises in accordance with the regulations generated by CCG;

A preventive maintenance schedule will be established and followed for safety and response equipment in order to ensure that it is always in a state of readiness;

Any discharge of product, regardless of size, will require the immediate shutdown of the transfer operation;

The transfer operation will not begin until;

- there are enough personnel on site to manage the transfer operation and the oil pollution incident response as separate entities;
- consultation between a senior officer on the ship and appropriate representative of the facility has determined that it is safe to resume transfer operations.

CURRENT OPERATIONS

Environment Canada, Meteorological Service of Canada (MSC) own and operate one bulk fuel storage handling facility at Eureka. Eureka is located on the Ellesmere Island on the north shore of Slidre Fiord at 79 degrees 59 minutes 17 seconds North Latitude and 85 degrees 56 minutes 35 seconds West Longitude. The facility is relatively new (built in 1992) well maintained and patrolled daily as part of the standard maintenance/protection program.

The facility has ten fuel storage tanks, one large, 769,000 litres and nine tanks with a capacity of 58,000 litres each, for a total storage capacity of 1,291,000 litres. Fuel is delivered annually by Canadian Coast Guard Icebreaker. The icebreaker stands off approximately 300 to 1,000 feet and connects a 4 inch floating hose to the shore manifold of the facility. The fuel is then pumped through the floating hose to the fixed 4 inch pipeline, which runs approximately 500 metres from the shore to the fuel storage tanks.

Re-supply usually occurs in August or early September. The prevailing winds are generally Westerly at 15kmh in August and South Easterly at 15kmh in September. Slidre Fjord, on which Eureka is situated, runs from east to west. The tides are minimal (one foot) with little or no current. These conditions will allow for an immediate response to a spill from the delivery vessel or the floating hose. The shoreline is gently sloping and is a mix of sand and gravel, allowing for deployment of small support vessels and equipment. There is adequate daylight during re-supply and the station can provide limited accommodation for extra responders. Communications should not be a problem as the station has both regular & Iridium telephones, fax and computer links available. Arrangements for extra food supplies will have to be put in place for response groups from the south and a personnel rotation schedule will be required for a major spill.

The shore side 4 inch line to the tank farm must be closely monitored during re-supply operations to watch for leaks or spills which could escape into the fresh water supply for the station.

The tank farm is modern, and located in a lined, bermed area. The only danger would be a catastrophic, multiple tank failure which would overflow or wash out the berm allowing escaping oil to flow downhill to the creek which supplies the station freshwater.

It is customary to utilize the smaller tanks, on a rotating basis, for heat and power generation and then re-fill the tanks from the large tank prior to the icebreaker's arrival, so that the annual re-supply may be stored in one tank. This procedure drastically lowers the potential for tank overfills, in that only one tank must be monitored during loading and eliminates the continual switch over from tank to tank. The average re-supply is six hundred thousand (600,000) litres, or slightly less than one half of the storage capacity of the facility.

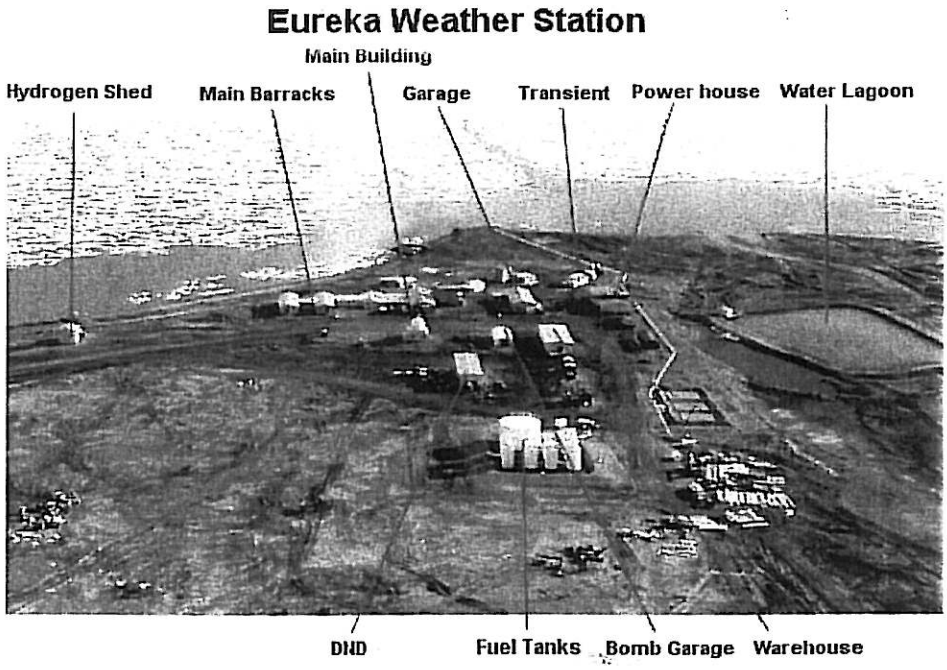
The areas identified as potentially problematic in the event of a spill from the shore side supply line or the tank farm itself are primarily due to their location. The four inch line and the tank farm are located on the side of a small hill, at the bottom of this hill is the fresh water lagoon for potable water supply to the station at Eureka. This lagoon is supplied from a small creek which skirts it and empties into Slidre Fjord. A spill or tank failure would run downhill into the creek or fresh water lagoon and escape to the ocean.

Aviation fuels, are delivered in standard drums at the same time as the bulk fuel. The aviation fuels which number approximately one thousand drums are stored in fuel dumps near the airport. These drums belong to MSC, Department of National Defense, Polar Continental Shelf, and First Air. The drum storage area is at the edge of a gently sloping hill that drops to a creek. This creek supplies fresh water to the station.

Drummed gasoline and lubricants which are also delivered at re-supply are well marked, separated and stored in a flat area. Consequently, these drums should pose no problem for containment and rapid clean-up in event of a spill.

The most probable spill situation is a leak in the hose during transfer. Based on the prevailing winds at the delivery times the response for planning purposes would be to deflect the oil into shore where recovery can take place from shore.

According to the OHF Standards, Eureka would be categorized as a Level One Facility, with a maximum oil transfer rate of 150m³/h. Consequently, a potential spill size of two (2) tonne could occur when two (2) - four hundred (400) foot lengths of four (4) inch floating hose are used.



Appendix C

Nunavut Water Board Plans

Oil Pollution Emergency Plan for Land Spills

Summary of Operations and Maintenance

Procedures for Drinking Water, Sewage, Solid Waste Disposal and Waste Treatment Facilities

Interim Abandonment and Restoration Plan

Sludge Disposal Plan

Quality Assurance & Quality Control Program

EMERGENCY PLAN

FOR PETROLEUM AND ALLIED PETROLEUM PRODUCTS

— Eureka High Arctic Weather Station —

Prepared by: District 3, Property Management Division
Assets, Contracting and Environmental Management Directorate (ACEMD)
Environment Canada

April 1, 2010

CONTROL PAGE

On receipt of revisions and/or amendments, District 3, Property Management Division shall complete this control page to ensure that the Emergency Plan for Storage Tank Systems of Petroleum and Allied Petroleum Products at Eureka High Arctic Weather Station (HAWS) is always current and consistently reflects the operations and activities taking place on site.

Version	Description / Purpose	Date in Force	Revision Date	Revised By:	Approved By:
1	Original Plan	April 1, 2010			

TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

ACRONYMS

ACEMD	Assets, Contracting and Environmental Management Directorate
C	Celsius
CCG	Canadian Coast Guard
CEPA	Canadian Environmental Protection Act
CPR	Cardiopulmonary Resuscitation
DSD	Nunavut Department of Sustainable Development
EC	Environment Canada
HAWS	High Arctic Weather Station
INAC	Indian and Northern Affairs Canada
L	Liters
Licence	Nunavut Water Board Licence No. 3BC-EUR0611
M	Meters
MSDS	Material Safety Data Sheets
OSC	On-Scene Commander
PEARL	Polar Environmental Atmospheric Research Lab
PPE	Personal Protective Equipment
PSI	Pounds per square inch
SPM	Station Program Manager
WHMIS	Workplace Hazardous Materials Information System

1. INTRODUCTION

Figure 1: Eureka High Arctic Weather Station, Eureka, NU

1.1 Context

Spills of petroleum and allied petroleum products cannot be entirely prevented; however, the impacts of spills can be minimized by training and establishing a predetermined line of response and action plan. The remoteness of Eureka HAWS coupled with the environmental sensitivity of the region underline the necessity for good spill contingency planning.

This Eureka Petroleum and Allied Petroleum Product Emergency Plan (Plan) applies to the Eureka High Arctic Weather Station (HAWS) located in Eureka, Nunavut. The HAWS is located on the north side of Slidre Fjord, at the northwestern tip of Fosheim Peninsula on Ellesmere Island. HAWS is owned and operated by the Meteorological Service of Canada. Although remote, the Eureka HAWS is a hub of activity for Environment Canada, the Department of National Defence, the Polar Continental Shelf Program, and the Polar Environment Atmospheric Research Lab (PEARL).

The site is accessed primarily by air with an all season air strip located about 1.5 km northeast of the site. An annual sea lift is conducted to provide Eureka HAWS with petroleum products to generate electricity, heat and operate motorized vehicles, pumps, snowmobiles, etc.

1.2 Purpose and Objectives of the Plan

The purpose of the Plan is to provide for a safe, timely, effective and coordinated response by Environment Canada personnel to petroleum and allied petroleum-related spill incidents at Eureka HAWS

The principle objectives of the Plan are to:

1) Protect Environment Canada (EC) employees, other persons working at or visiting Eureka HAWS and the environment by meeting or surpassing all applicable environmental and health and safety legislation, licenses, policies, codes of practice and plans (See Appendix A for the major requirements of the preceding); and
2) Provide detailed information and guidance on actions important for the prevention of spills and procedures to detect and respond to them when they occur.
3) Identify potential emergency situations
4) Minimize the impact of emergencies
5) Continually improve response procedures

2. ADMINISTRATION

2.1 Effective Date of Emergency Plan

April 1, 2010

2.2 Plan Distribution List

This Plan and all subsequent updates shall be issued to (see Appendix B):

1) Environment Canada – Station Program Manager Nunavut;
2) Environment Canada – Head Aerological & Surface Operational Programs Winnipeg, Manitoba;
3) Environment Canada – Manager, District 3 Property Management, Ottawa, Ontario;
4) Environment Canada – Environmental Compliance Officer, Ottawa, Ontario;
5) Department of Environment, Government of Nunavut; and
6) Nunavut Water Board, Gjoa Haven, Nunavut.

2.3 Plan Review and Maintenance

Manager, District 3 Property Management is responsible for the maintenance and update of the Plan.

The Plan shall be reviewed and updated:

1) **Annually**, taking into account changes in the applicable regulatory regimes, environmental factors and any petroleum and allied petroleum-related infrastructural changes at Eureka HAWS; and/or
2) **Following** a spill greater than 100 L; and/or
3) **Following** a spill of any amount that reaches water (DFO Regulation); and/or
4) the identification of any inadequacies in the Plan or in its implementation.

Changes in phone numbers, names of individuals etc. that do not affect the intent of the Plan are to be made on an annual basis. Plan updates shall be made in accordance with the above requirements. With each modification to the Plan, the Control Page shall be update and re-issued as per the Distribution List.

2.4 Response to Media and Public Inquiries

Media inquiries of Eureka or other EC staff concerning petroleum spills at Eureka should be directed to Environment Canada - Media Relations (see Appendix B). The Prairie and Northern Region's Communications Unit will coordinate a response to the inquiries.

3. EUREKA SITE CONDITIONS

This section provides a description of the:

1) Types of petroleum and allied petroleum products at Eureka;
1) Hazards associated with petroleum products;
2) Petroleum and allied petroleum systems at Eureka;
3) Location and maximum expected quantities of the petroleum products or allied petroleum products stored at Eureka at any time during any calendar year; and
4) Characteristics of Eureka and the surrounding area that may increase the risk of harm to the environment or of danger to human life or health.

3.1 Types of Petroleum and Allied Petroleum Products at Eureka

1) Diesel fuel which is used to generate electricity and heat as well as fuel diesel motorized equipment;
2) Gasoline to fuel automobiles, pumps and snowmobiles;
3) Hydraulic fluids, greases, etc. for equipment and vehicles;
4) Aviation Fuel for aircraft;
5) Diesel engine oil for equipment and vehicles;
6) Hydraulic fluids for equipment and vehicles;
7) Glycol for equipment and vehicles; and
8) Petroleum and allied petroleum wastes.

3.2 Hazards of Petroleum Products

Material Safety Development Sheets (MSDS) are provided in Appendix C and Appendix D for diesel and gasoline respectively. These outline in detail the properties of the diesel and gasoline fuel on site at Eureka for the year 2009.

3.3 Description of Eureka's Petroleum and Allied Petroleum Product Systems

3.3.1 Diesel System

Diesel fuel is shipped to Eureka HAWS by a Canadian Coast Guard (CCG) ice breaker. The ice breaker anchors approximately 100 to 300 metres off-shore, and using a floating hose, connects to a land based pipe system to pump the oil to the tank farm (See Appendix E for details).

3.3.2 Gasoline System

Gasoline is brought on shore in 205 L drums. Approximately ten drums are required to fill the 2,273L gasoline tank which is located just south of the tank farm. The average yearly consumption of gasoline is approximately 3,000 L (See Appendix F for details).

3.3.3 Other Petroleum and Allied Products Systems

Much of the barrel petroleum and allied petroleum products that arrive each year on the ice breaker are for agencies/customers other than EC. Further, other than for a few days following the departure of the ice breaker, most of the barrel products are not stored at the EC site but rather on the north apron of the runway near the DND facility. These products include diesel engine oil, solvents, and hydraulic fluids. In addition, there could be up to 4000 barrels of other agencies/customer's aviation fuel.

Finally, EC and other agencies/customers site operations result in Eureka accumulating up to 80 barrels of waste oil and waste aviation fuel which are stored at EC's Petroleum and Allied Petroleum Barrel Storage Area.

3.4 Location of Petroleum and Allied Petroleum Products and Systems at Eureka

The location of Eureka's petroleum and allied petroleum products are identified in Figure 2.

Legend

1: *Transmitter Tank EC-00001195*
2: *Barrel Storage Area*
3: *Tank Farm EC-00001218*
4: *Diesel Dispenser*
5: *Gasoline Tank EC-00001251*
6: *Incinerator Tank EC-00001214*
7: *Warehouse Tank EC-00001146*
***8**: Maintenance Tank EC-00001212*

Figure 2: Location of Eureka's Petroleum and Allied Petroleum Products

3.5 Diesel and Gasoline Tank Systems at Eureka, HAWS

Table 1 documents the characteristics of Eureka's, HAWS diesel and gasoline tank systems.

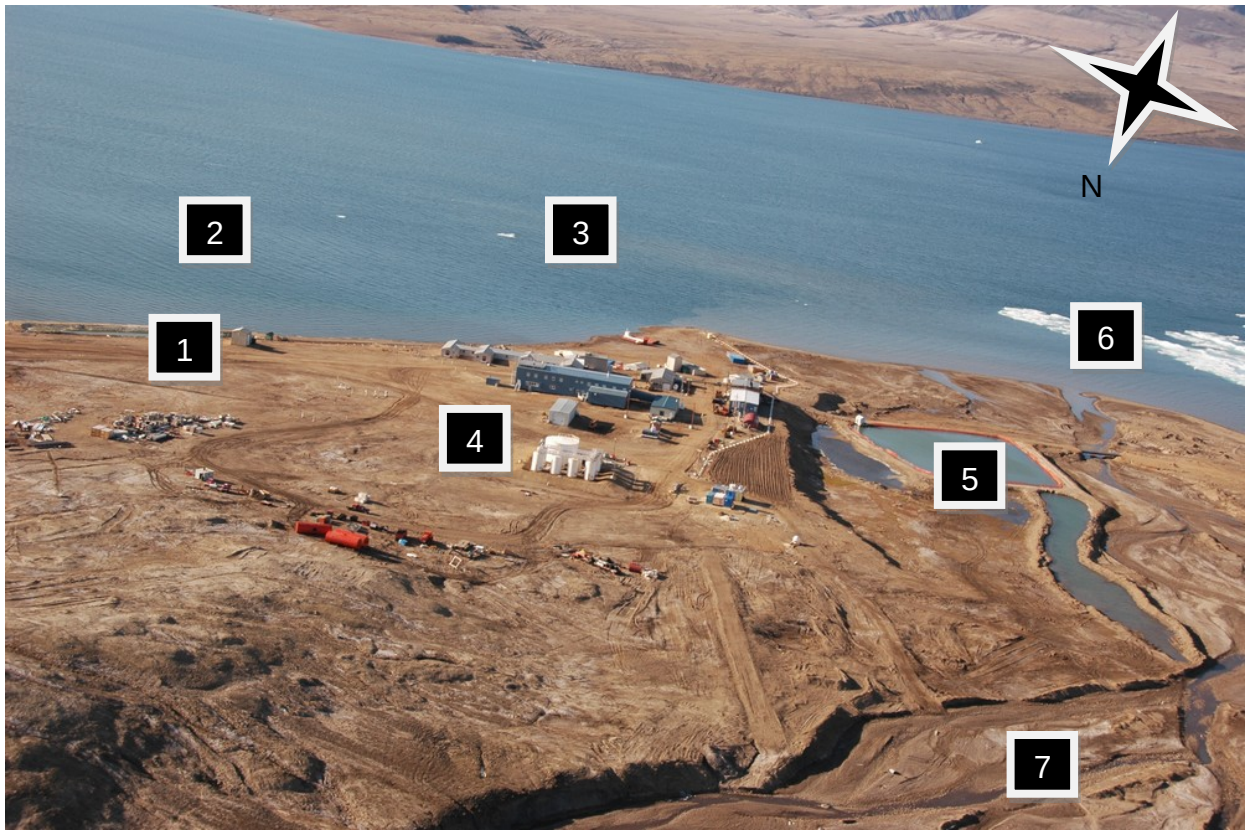
Table 1: Volumes and locations of tanks containing petroleum materials

EC Registration Number	Fuel	Tank Storage Volume	Number of Tanks	Containment Type	Maximum Tank Capacity*	Storage Location and Uses
EC-00001218	Diesel Fuel	770,000 L	1	Single-Walled Tank with impermeable liner and berm (110%)	693,000 L	Tank Farm
EC-00001218	Diesel Fuel	60,000 L	9	Single-Walled Tanks with impermeable liner and berm	54,000 L x 9	Tank Farm
EC-00001195	Diesel Fuel	9,000 L	1	Double-Walled Tank	8,100 L	Transmitter Building, Heating
EC-00001212	Diesel Fuel	9,000 L	1	Double-Walled Tank	8,100 L	Old Maintenance Garage, Heating
EC-00001146	Diesel Fuel	9,000 L	1	Double-Walled Tank	8,100 L	Warehouse, Heating
EC-00001124	Diesel Fuel	9,000 L	1	Double-Walled Tank	8,100 L	Incinerator, Burning
N/A	Diesel Fuel	1,100 L	2	Single-Walled Tanks	990 L x 2	Generator Building, Electrical Generation
N/A	Diesel Fuel	2,273 L	1	Double-Walled Mobile Tank	2,046 L	Employed to transfer diesel to Transmitter Building, Old Maintenance Garage, Warehouse & Incinerator
EC-00001251	Gasoline	2,273 L	1	Double-Walled Tank	2,045 L	South and adjacent to Tank Farm, vehicle fuel, snowmobiles, small generators

*Tanks are only filled to 90% of their capacity to accommodate any possible volume expansion due to a rise in temperature.

3.6 Receptors

There are a number of receptors at Eureka that could be adversely affected by a spill of petroleum or allied petroleum products. Figure 3 illustrates the location of the principle environmental, human and economic receptors at Eureka.



Legend

1: *Sewage Lagoon*
2: *Slidre Fjord*
3: *CCG Ice breaker location*
4: *Buildings*
5: *Freshwater lagoon*
6: *Station Creek delta*
7: *Station Creek*
**Note: Prevailing winds travel W in Aug and NE in Sept.*

Figure 3: Location of environmental, human and economic receptors at Eureka

3.7 Climatic Conditions

The prevailing climatic conditions in Eureka are:

1) Wind – the prevailing wind is from the west during late summer and east for the remainder of the year;
2) Temperatures – well below freezing for the majority of the year (September to July);
3) Snow cover – snow is present for 9-10 months of the year; and
4) Ice – ice conditions are such that only an icebreaker can perform the annual re-supply. Resupply is usually conducted in August or September.

3.8 Topography

The topography at Eureka determines the direction and speed of spilled petroleum and allied petroleum products. Figure 4 illustrates a shallow north to south slope (10 M in 450 M or approximately 2%) in the land from the base of the tank farm to the Fjord and a steep slope of the land just to the west of the pipeline.

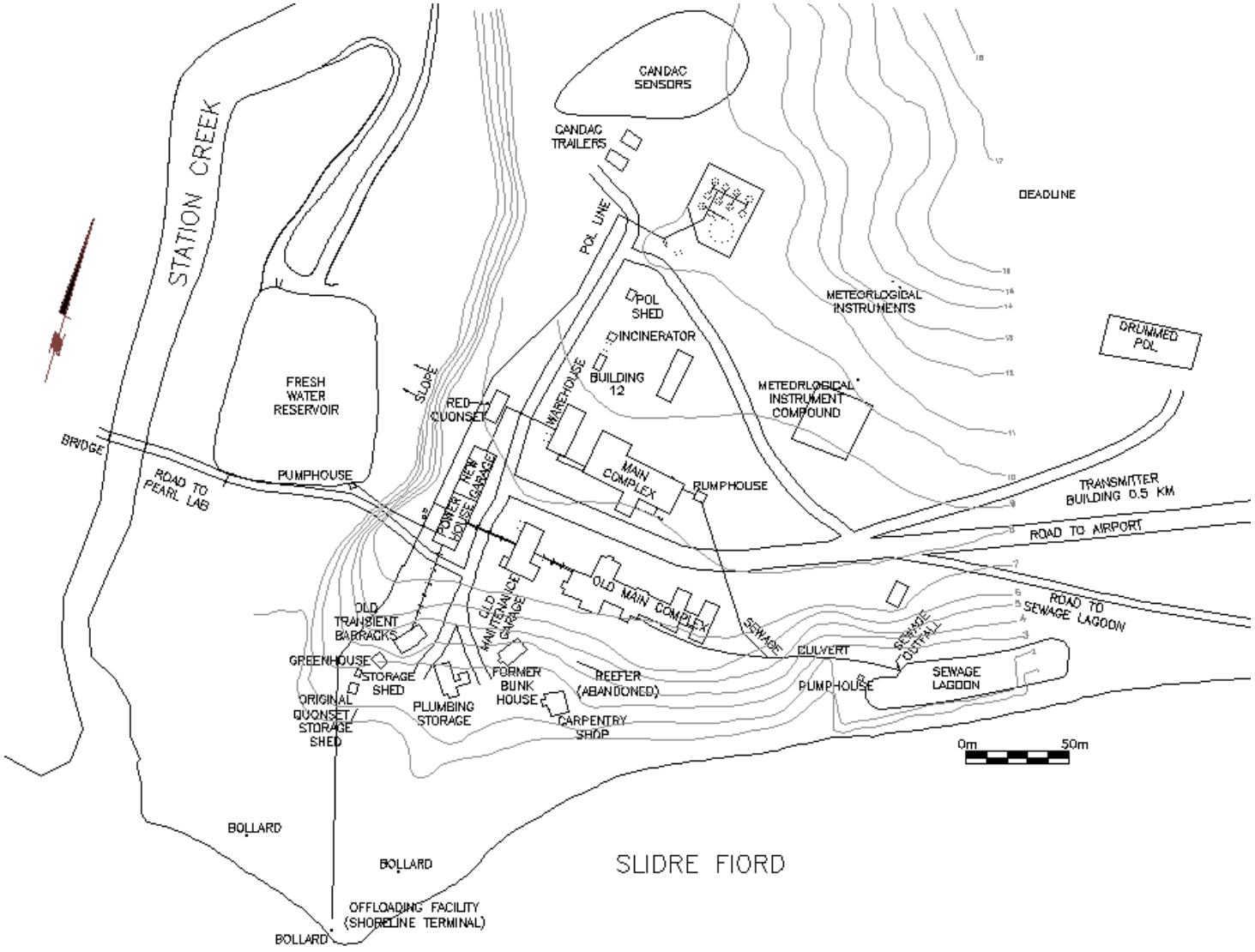
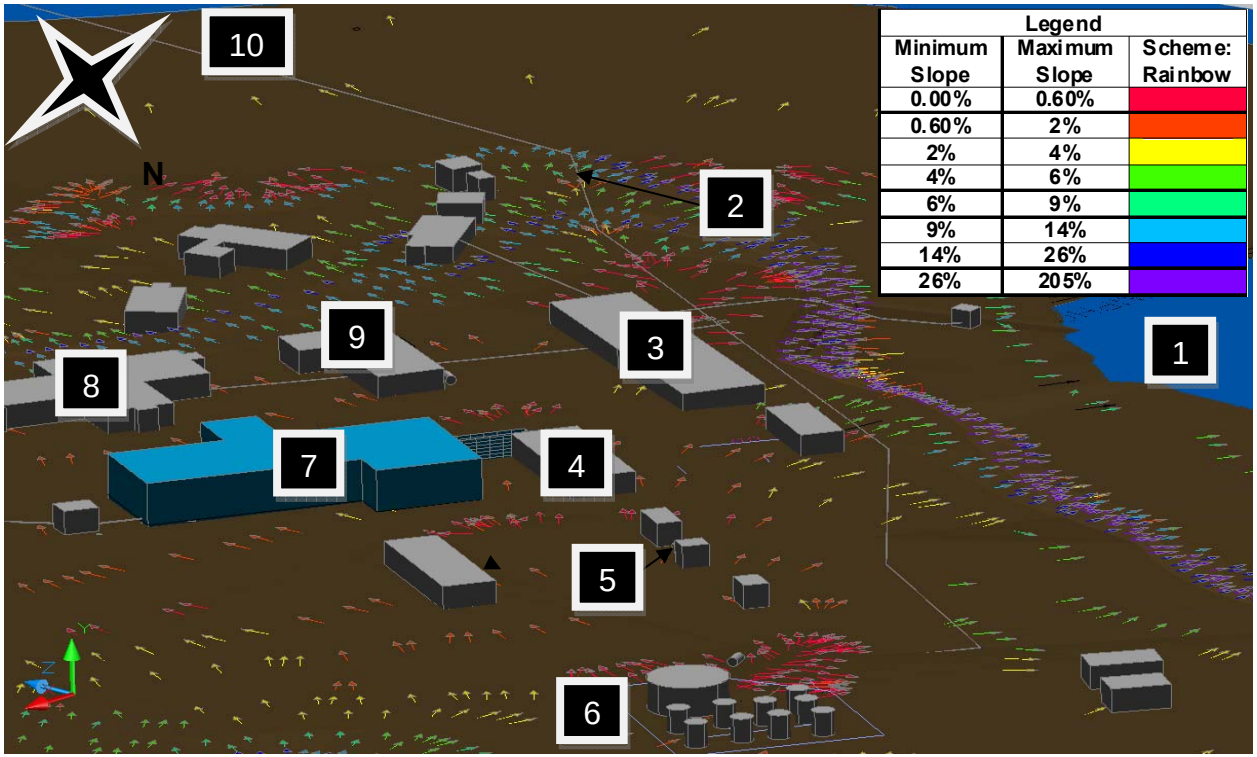


Figure 4: Topographical Map of Eureka

Figure 5 illustrates the Eureka's HAWS topography and direction of flow of possible discharges at Eureka HAWS.



Legend

1: *Freshwater Lagoon*
2: *Pipeline*
3: *Powerhouse*
4: *Warehouse*
5: *Incinerator*
6: *Tank Farm*
7: *Main Complex*
***8**: Old Main Complex*
***9**: Old Maintenance Garage*
***10**: Slidre Fjord*

Figure 5: Topography and flow transport model at Eureka

4. POTENTIAL SPILL SCENARIOS AND ENVIRONMENTAL IMPACTS

4.1 Likelihood of Spills at Eureka

Environment Canada's *Summary of Spill Events in Canada, 1984-1995* provides a review of all spill trends in Canada for the period indicated.

The report has a number of key findings:

1) The top five reasons for spills are equipment failure, human error, corrosion, material failure and storm or flood.
2) The environmental medium most frequently affect by spills is land.
3) The main reported consequences of spills are vegetation and property damage.
4) Fifty-eight percent of the total number of reported spills involved petroleum products.

The likely causes ("what" went wrong) of federal spills are pipe leaks (19% of spills), above-ground tank leaks (15%), container leaks (12%) and overflows (8%). The report recommends material storage as an area in which to focus prevention efforts.
The likely reasons ("why" it went wrong) for spills in the government (all governments) sector are: storm - flood (25%), equipment failure (22%), and human error (10%).

4.2 Overview of Non-Marine Spill Scenarios

Table 2 presents the principle petroleum products stored on site. For each, the table lists potential discharge events with associated discharge volumes and directions. The most likely discharge volume is indicated and the spill clean-up procedures will focus on spills of this quantity. A worst case scenario is also presented. Specific discharge rates are not indicated for each fuel type as these would vary from a few minutes to several hours, based on the source of leak or puncture.

Table 2: List of petroleum materials, potential discharge events, potential discharge volumes and direction of potential discharge

Material (sources)	Potential Discharge Event	Discharge Volume	Possible directions of discharge and susceptible receptors
Diesel	Over filling of portable tank or diesel vehicles from diesel dispenser Leaking pipeline (outside tank farm) to diesel dispenser and motorized valve inside tank farm stuck open	• Likely < 100L • Worst Case ~ 50,000L **(dispenser connected to 60,000L tank)**	Appendix G
	Over filling of 9,000L tanks from portable tank	• Likely: < 100 L • Worst Case: ~ 2000 L **(portable tank contains ~ 2000L)**	Appendix J, (Maintenance Tank) Appendix K (Warehouse Tank) Appendix L (Incinerator Tank)
	Leaking from any of the 10 tanks in Tank Farm	• Likely: < 100L • Possible: > 100 L to < 50,00L • Worst Case: ~ 700,000L **(largest single tank is ~ 700,000 L)**	Appendix G (Tank Farm)
	Leaking from pipeline during sea lift	• Likely: < 100L • Worst Case: ~ 25,000L **{volume of pipe (~ 270 M) between check valve at power house and tank farm}**	Appendix H (North End Pipeline) Appendix I (South End Pipeline)
	Leaking pipeline (outside tank farm) to power house and motorized valve inside tank farm stuck open	• Likely: < 100L • Worst Case: ~ 50,000L **(power house connected to 60,000L tank)**	Appendix H (North End Pipeline)
Gasoline	Over filling of gasoline tank or vehicles south of Tank Farm	• Likely: < 100L • Worst Case: ~ 200L **(volume of gasoline barrel)**	Appendix G (Tank Farm)
Jet A Fuel, Gasoline, Hydraulic Fluid, Glycol, Waste Petroleum	Piercing of 205L barrel	• Likely: < 100L • Worst Case: ~ 200L **(volume of barrel)**	Appendix M (Barrel Storage Area)
	Dropping of pallet of 205L barrels following sea-lift	• Likely < 100L • Worst Case ~ 800L **(pallet of 4 barrels dropped during transport)**	Appendix I (South End Pipeline)

4.3 Potential Impacts of Petroleum and Allied Petroleum Spills

Petroleum and allied petroleum products may be harmful to wildlife and aquatic life. They are not readily biodegradable and have the potential for bioaccumulation in the environment. Diesel burns slowly and thus the risk to the environment is reduced during recovery as burn can be more readily contained compared to a volatile fuel like gasoline.

Overall, for all hazardous materials discussed above, impacts are lower during winter. Snow is a natural sorbent and ice can form a barrier limiting or eliminating soil or water contamination; thus spills can be more readily recovered when identified and reported.

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5. SPILL PREVENTION

Planning for an emergency situation is imperative because of the hazardous nature of the petroleum and allied petroleum materials and the circumstances detailed in sub-section 3.2.

These realities magnify the importance of focusing on preventative measures to minimize the likelihood of a spill in the first place and thereby provide for the safety of Eureka's personnel and the local environment.

5.1 Preventative Measures

5.1.1 Re-supply Measures

Due to the quantity of diesel fuel delivered and its transfer across open water to the shore piping system, the annual bulk transfer by ship offloading poses the greatest risk to the environment at Eureka. The following procedures are currently in place to mitigate the risks of a spill during re-supply:

1) Preliminary inspections of infrastructure before oil transfer operations commence:

    a) Coast Guard confirms that the transfer hose from ship to shore-line has been certified and conducts a pressure test on it.
    b) Coast Guard verifies the integrity of the ships mooring lines.
    c) EC personnel & Coast Guard inspect the pipeline & valves from the shore to the tank farm and review procedures to be implemented for possible spill scenarios.

2) Restrictions on fuel transfer from ship to diesel tank system:

    a) *If no ice in Slidre Fjord.* No transfer of fuel is permitted under the following environmental conditions:

        i) Wind speed greater than 15 knots; and
        ii) Other unacceptable conditions which increase the likelihood of a spill or impede the ability of the oil handling facility to respond in the event of an incident in the judgment of the CCG.

    b) *If light to medium new year ice conditions in Slidre Fjord.* No transfer of fuel is permitted under the following environmental conditions:

        i) Wind speed greater than 10 knots;

ii) Other unacceptable conditions which increase the likelihood of a spill or impede the ability of the oil handling facility to respond in the event of an incident in the judgment of the CCG; and
iii) Should ice flows pose a risk for damage to the floating transfer hose, and such ice flows cannot be easily diverted away from the transfer hose by CCG zodiacs or landing craft, contact will be made immediately to the CCG icebreaker to shut down the transfer of fuel. Upon draining the transfer hose of all fuel, the hose will be disconnected from the ship and will not be reconnected until ice flows do not pose any immediate problems

c) *If heavy new year ice conditions in Slidre Fjord.* No transfer of fuel is permitted under the following environmental conditions:

i) Wind speed greater than 10 knots;
ii) Other unacceptable conditions which increase the likelihood of a spill or impede the ability of the oil handling facility to respond in the event of an incident in the judgment of the CCG; and
iii) Should ice flows pose a risk for damage to the floating transfer hose, and such ice flows cannot be easily diverted away from the transfer hose by CCG zodiacs or landing craft, contact will be made immediately to the CCG icebreaker to shut down the transfer of fuel. Upon draining the transfer hose of all fuel, the hose will be disconnected from the ship and will not be reconnected until ice flows do not pose any immediate problems.

3) Safety measures implemented on-land during diesel fuel transfer

The fuel is delivered to the tank at a pressure of approximately 30 - 80 psi which is well below the pressure capabilities of the hose and pipeline systems.

4) Single diesel tank filling procedure

The annual re-supply is only pumped into the 770,000L storage tank (any residual oil contained within the 770,000 L tank having been conveyed to the other 60,000 L tanks prior to re-supply). This procedure significantly lowers the potential for tank overfills, in that only one tank must be monitored during loading and eliminates a problematic procedure of continually switching from tank to tank during the re-supply process.

5) Monitoring procedures during re-supply

The following individuals are in constant radio contact throughout the approximately 14-24 hour transfer which takes place in August or September:

a) The Captain of the Coast Guard ship;

b) The Captain's Coast Guard counterpart (the Beachmaster) on the beach where the hose from the ship meets the fixed pipeline on land;
c) An EC contract personnel and/or the Beachmaster patrolling the pipeline; and
d) An EC contract personnel and/or the Beachmaster at the 770,000 L tank or any of the 9 - 60,000 L tanks observing the mechanical float level and comparing that observation with a physical measuring of the level of the fuel in the tank by manual dipping. The 770,000 L tank or any of the 9 - 60,000 L tanks are closely monitored during the filling process to ensure there is a minimum of 10% of its capacity remaining to accommodate any possible volume expansion due to a rise in temperature.

5.1.2 Secondary Containment Measures

Secondary containment is provided for all tanks, either in the form of double-walled tanks, or in the case of the tank farm, a berm with high density polyethylene synthetic impermeable liner providing 110% of the capacity of the 770,000 L tank. The berm is inspected yearly and, if necessary, repaired to ensure its integrity.

5.1.3 Regular Monitoring Measures

On a 24/7 basis, EC's site (inside and outside buildings – except the tank farm) is patrolled by EC personnel to monitor, by sight or smell, for fuel leaks.

On a regular basis:

1) The meters on all tanks at the tank farm are read to identify potential leaks;
2) The accuracy of the tank meters is confirmed by lowering a measuring tape to gauge the fuel depth (see Figure 6). This latter reading for each tank is compared to the corresponding tank meter reading to determine if there are any discrepancies;
3) A check is made to confirm that all tank valves are closed except the ones in use;
4) A regular check is made of the motorized valve at the tank farm that opens the pipeline from one of the 60,000 L tank farm diesel fuel tanks to the powerhouse or the dispensing pump when there is a demand for diesel. It is critical that this motorized valve is operational and does not "freeze" in the open position which would cause the previously mentioned sections of the pipeline to be 'charged'. If these sections of the pipeline became damaged while the valve was in the open position, a maximum of 60,000 L tank of diesel could spill onto the land. The motorized valve must be visually checked regularly to ensure the heater is working (no frost on the heater & flag is in right direction indicating valve is off when there is no demand for fuel);
5) All tanks and associated pipelines are checked; and
6) The secondary containment area inside the berm of the tank farm is scrutinized to confirm that are no pools of oil collecting.

Figure 6: Measuring Tank Levels by Dipping

5.1.4 Diesel Fuel Conveyance Safety Measures

Tank Farm diesel is only conveyed via the piping system to the power house/diesel dispenser from 60,000 L tanks. This measure ensures that, if:

1) the motorized valve (discussed above) fails to close, leaving the piping system "charged" and
2) there is a break in the piping system outside the tank farm,

the potential oil spill is limited to ~ 50,000 L and not 700,000 L.

5.1.5 Diesel and Gasoline Dispensing Safety Measures

The nozzles on the diesel dispenser and gasoline tank are constructed with self-serve safety devices to ensure that fuel can only be delivered if a human is present.

5.2 Additional Preventative Initiatives Recently Implemented

For a list of recently initiated preventative measures, see Appendix N.

5.3 Training

Training/instruction will assist in the prevention of petroleum and allied petroleum spills and the mitigation of associated health effects.

5.3.1 General Health and Safety Training

All EC employees and contractors are trained in the following:

1) Workplace Hazardous Materials Information System (WHMIS);
2) First Aid and CPR; and
3) Transportation of Dangerous Goods

A MSDS binder, containing MSDS sheets on all hazardous substances present at Eureka, is located in the front of the vestibule of the main complex. Each building has a MSDS binder containing MSDS sheets for substances contained in that building.

A Workplace Hazardous Materials Information System (WHMIS) manual is located in the front vestibule of the main complex.

Training for employees who may be involved in inspection of fuel tank systems, fuel transfer operations and/or response to a spill is currently being developed. Training will include live exercises.

6. SPILL CONTINGENCY

This section is divided into four sections:

1) Major roles and responsibilities
2) health, safety and environmental measures common to all spill events;
3) responses to a spill in a non-marine environment; and
4) responses to a spill in a marine environment.

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6.1 Major Roles and Responsibilities

6.1.1 Eureka Station Program Manager

The Station Program Manager occupies the pivot role in the operations at Eureka HAWS, in general and a response to a petroleum-related spill, in particular:

1) Gathering personnel and resources and deploying and directing them in stopping, controlling, containing, storing and disposing of the spent petroleum product;
2) Communicating details of the spill to the Spill Response Centre and EC's Manager, District 3 Property Management, if spill > 100 L;
3) Providing medical care to any injured persons;
4) Providing regular updates to ACEMD on containment and cleanup activities; and
5) Completing and submitting a spill report form.

6.1.2 Manager, District 3 Property Management

Upon spill notification, Manager, District 3 Property Management is responsible for public relations, insurance and legal issues relating to an incident, as well as ongoing liaison with other Government Departments and Governments.

In the event that the spill cannot be handled internally, then Manager, District 3 Property Management will request assistance from the Nunavut Government's Department of Sustainable Development (DSD) to provide the appropriate expertise to deal with a large spill at Eureka. In the meantime, Eureka staff will use best efforts to contain and control the spill by deploying its equipment in the spill area. However, once DSD or their contractor arrives on site, they may utilize any equipment currently deployed in addition to any equipment that they may have brought with them.

In the case of a major spill involving potentially large expenditure for cleanup costs and contentious claims from third parties, specialized legal counsel will be consulted. Manager, District 3 Property Management will be responsible for arranging for legal advice

6.2 Spill Response Resources & Equipment

The location of the spill kits is illustrated in Figure 7 below. For a list of all the resources and equipment available to respond to a spill, see Appendix O.

Figure 7: Location of spill kits at Eureka

6.3 Health and Safety Measures

The following health and safety measures apply to both marine and non-marine spill scenarios

6.3.1 Site Control

In the event of a petroleum or allied petroleum product discharge, an immediate assessment shall be made to ensure that the site is secure. Any incident involving spills or leaks can attract curious onlookers, and therefore all non-authorized personnel shall be kept well outside any hazardous area. Only those directly involved in the containment, control or cleanup of the discharge shall be allowed in the general vicinity of the discharge.

6.3.2 Fires

In the event of a fire, fire extinguishers, fire hoses, axes and pull stations can be accessed throughout all major buildings on site.

6.3.3 Slippery Rocks, Decks or Other West Surfaces

Any person working in the vicinity of the shoreline shall wear oil-resistant rubber, steel-toed safety boots.

6.3.4 Working Around Water

All personnel working in close proximity to the water shall wear the appropriate Personal Flotation Devices (PFDs). Persons working on shore do not have to wear PFDs.

6.3.5 Buddy System

A buddy system shall be observed at all times when workers are in the discharge area or working on vessels. Persons shall work within sight of their assigned partner at all times.

6.3.6 Personnel Protective Equipment (PPE) Requirements

The following outlines the personnel protective equipment requirements for Eureka:

1) Selection of outer PPE shall be based on the potential for whole body contact with the product. A potential for repeated contact shall require rain gear (top and bottoms). Clothing shall be kept zippered when handling dangerous materials;
2) Personnel carrying out work where high body-contact with the spilled substance could take place, shall tape the suit over their gloves and boots;
3) Personnel with limited skin contact potential may wear disposable clean guard garments or equivalent. Personnel with no exposure potential (inspectors, monitors, etc.) need not wear protective clothing;
4) All personnel shall wear safety glasses (regular glasses are satisfactory); and
5) Personnel handling contaminated materials shall wear outer chemical resistant gloves. Sleeves shall be taped whenever handling contaminated wet materials.

6.3.7 Protection of Personnel

Any significant spills of volatile products can cause a significant threat to personnel if the vapour plume approaches a populated area. Based on the wind direction a determination of the potential area of impact shall be made and personnel shall be notified of any potential hazard.

6.3.8 Decontamination

In the event of a spill, decontamination stations may be established in the vicinity of a contaminated area. The configuration of the decontamination stations shall be such that the personnel shall pass through one of the stations prior to leaving the contaminated area. If necessary, the stations may be surrounded by a berm and lined with plastic sheeting. Special purpose washing solutions may be placed near the discharge area. All washing solutions shall be clearly marked.

6.3.9 Waste Petroleum and Allied Petroleum Storage

Secondary containment for waste petroleum and allied petroleum products awaiting disposal is provided in the form of salvage drums, crates constructed with plastic lining or secondary containment pallets at the Barrel Storage Area.

In all cases, the disposed material is:

1) Packaged and labelled; and
2) Accompanied by a manifest

in conformity with regulatory requirements (see Appendix A). Copies of manifests are retained and filed at Eureka.

6.4 Non-Marine Spill Response

This section provides:

1) A spill response chart (see Figure 8); and
2) Detailed procedures for responding to non-marine oil spills.

6.4.1 Spill Response Organization & Roles & Responsibilities

The reduction in the number and severity of spills is facilitated by a comprehensive and clearly articulated spill response organization. Figure 8 outlines the flow chart of response in the event of a spill. The details of the roles and responsibilities are explained in the subsequent sub-sections

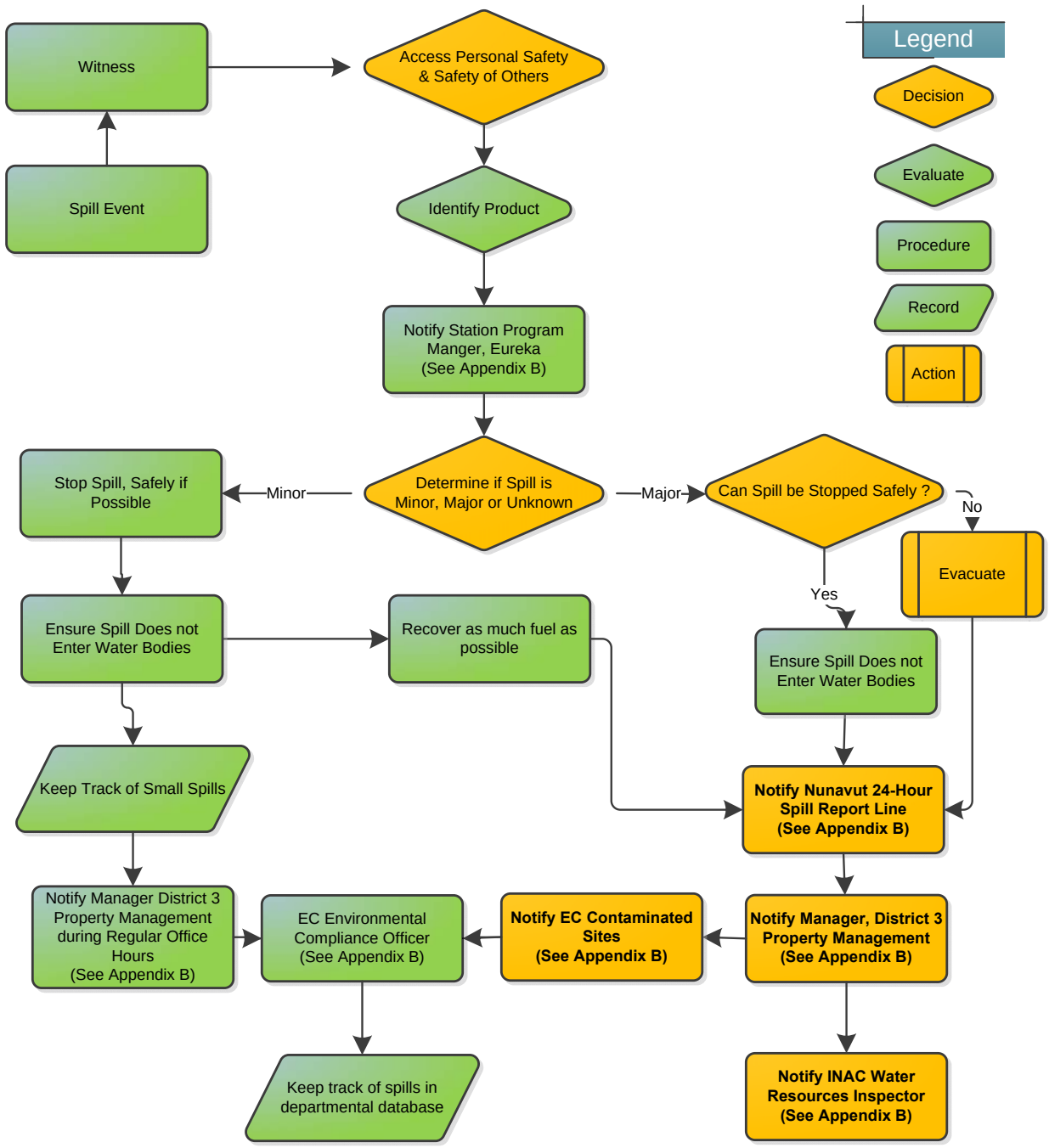

Figure 8: Response Organization for a Non-Marine Petroleum Spill

6.4.2 Procedures for Initial Actions

In the event of a spill, without exception, the health and safety of persons at Eureka is the first priority.

1) Ensure personal safety and that of others.
2) Assess spill hazards and risks.
3) No matter what the volume is, notify Eureka - Station Program Manager. (see Appendix B)
4) Remove all sources of ignition.
5) Stop the spill if safely possible e.g. shut off pump, patch leaking hole. Use the contents of the nearest spill kit to aid in stopping the spill if it is safe to do so.
6) Tyvek suits and chemical master gloves are located in the spill kit and should be worn immediately if there is any risk of being in contact with fuel.
7) Contain the spill.

6.4.3 Procedures for Spill Reporting

An immediately reportable petroleum spill is defined as a release of greater than 100 L (A spill of any amount must be reported if it affects a body of water). These types of spills must be reported to:

1) The Canada Environmental Emergencies Notification System 24-Hour Spill Report Line - Nunavut (see Appendix B);
2) Environment Canada's Environmental Protection Branch (Yellowknife) (see Appendix B); and
3) The Indian and Northern Affairs Canada Water Resources Inspector (see Appendix B).

Any spills less than this quantity do not need to be reported immediately to the spill reporting line. Rather, these minor spills should be tracked and documented by Eureka and submitted to the Nunavut Water Board in Environment Canada's Annual Report to the Board and to Environment Canada – Environmental Compliance Officer (see Appendix B). If the spill affects a body of water it must be reported to the DFO/CCG Emergency Line (see Appendix B).

If there is any doubt that the quantity spilled exceeds reportable levels, the spill should be reported to the Canada Environmental Emergencies Notification System 24-Hour Spill Report Line - Nunavut (see Appendix B).

See **Appendix B** for all Spill Emergency Telephone Numbers.

Following gaining control and containment of the spill, the Station Program Manager (SPM) must complete and submit the Environment Canada and Nunavut spill report forms (See Appendix P & Appendix Q, respectively).

6.4.4 Procedures for Containing and Controlling the Spill

Initiate spill containment by first determining what will be affected by the spill.

1) Assess speed and direction of spill and cause of movement (water, wind and slope).
2) Determine best location for containing spill, avoiding any water bodies.

6.4.5 Procedures for Containment of Petroleum Products Spilled on Land, Water, Ice and Snow

6.4.5.1 Procedures for Containment of Spills on Land

Spills on land include spills on rock, gravel, soil and/or vegetation. It is important to note that soil is a natural sorbent, thus spills on soil are generally less serious then spills on water as contaminated soil can be more easily recovered. Generally spills on land occur during the late spring, summer or fall when snow cover is at a minimum. It is important that all measures be undertaken to avoid spills reaching open water bodies.

1) Dykes

Dykes can be created using soil surrounding a spill on land. These dykes are constructed around the perimeter or down slope of the spilled fuel. A dyke needs to be built up to a size that will ensure containment of the maximum quantity of fuel that may reach it. A plastic tarp can be placed on and at the base of the dyke such that fuel can pool up and subsequently be removed with sorbent materials or by pump into barrels or bags. If the spill is migrating very slowly a dyke may not be necessary and sorbents can be used to soak up fuels before they migrate away from the source of the spill.

2) Trenches

Trenches can be dug out to contain spills as long as the top layer of soil is thawed. Shovels, pick axes or a loader can be used depending on the size of trench required. It is recommended that the trench be dug to the bedrock or permafrost, which will then provide containment layer for the spilled fuel. Fuel can then be recovered using a pump or sorbent materials.

6.4.5.2 Procedures for Containment of Spills on Land that reach a body of water

Spills that reach water such as Station Creek at Eureka are the most serious types of spills as they can negatively impact water quality and aquatic life. All measures need to be undertaken to contain spills on open water.

1) Booms

Booms are commonly used to recover fuel floating on the surface of lakes or slow moving streams. They are released from the shore of a water body to create a circle around the spill. If the spill is away from the shoreline a boat will need to be used to reach the spill, then the boom can be set out. More than one boom may be used at once. Booms may also be used in streams and should be set out at an angle to the current. Booms are designed to float and have sorbent materials built into them to absorb fuels at the edge of the boom. Fuel contained within the circle of the boom will need to be recovered using sorbent materials or pumps and placed into barrels or bags for disposal.

2) Weirs

Weirs can be used to contain spills in streams and to prevent further migration downstream. Plywood or other materials found on site can be placed into and across the width of the stream, such that water can still flow under the weir. Spilled fuel will float on the water surface and be contained at the foot of the weir. It can then be removed using sorbents, booms or pumps and placed into barrels or plastic bags.

3) Barriers

In some situations barriers made of netting or fence material can be installed across a stream, and sorbent materials placed at the base to absorb spilled fuel. Sorbents will need to be replaced as soon as they are saturated. Water will be allowed to flow through. This is very similar to the weir option discussed above. Note that in some cases, it may be appropriate to burn fuel or to let volatile fuels such as gasoline evaporate after containment on the water surface. This should only be undertaken in consultation with, and after approval from the INAC or lead agency Inspector.

6.4.5.3 Procedures for Containment of Spills on Ice

Spills on ice are generally the easiest spills to contain due to the predominantly impermeable nature of the ice. For small spills, sorbent materials are used to soak up spilled fuel. Remaining contaminated ice/slush can be scraped and shovelled into a plastic bag or barrel. However, all possible attempts should be made to prevent spills from entering ice covered waters as no easy method exists for containment and recovery of spills if they seep under ice.

1) Dykes

Dykes can be used to contain fuel spills on ice. By collecting surrounding snow, compacting it and mounding it to form a dyke down slope of the spill, a barrier is created thus helping to contain the spill. If the quantity of spill is fairly large, a plastic tarp can be placed over the dyke such that the spill pools at the base of the dyke. The collected fuel can then be pumped into barrels or collected with sorbent materials.

2) Trenches

For significant spills on ice, trenches can be cut into the ice surrounding and/or down slope of the spill such that fuel is allowed to pool in the trench. It can then be removed via pump into barrels, collected with sorbent materials, or mixed with snow and shovelled into barrels or bags.

3) Burning

Burning should only be considered if other approaches are not feasible, and is only to be undertaken with the permission of the Indian and Northern Affairs Canada (INAC) or lead agency Inspector.

6.4.5.4 Procedures for Containment of Spills on Snow

Snow is a natural sorbent, thus as with spills on soil, spilled fuel can be more easily recovered. Generally, small spills on snow can be easily cleaned up by raking and shovelling the contaminated snow into plastic bags or empty barrels, and storing these at an approved location.

1) Dykes

Dykes can be used to contain fuel spills on snow. By compacting snow down slope from the spill, and mounding it to form a dyke, a barrier or berm is created thus helping to contain the spill. If the quantity of spill is fairly large, a plastic tarp can be placed over the dyke such that the spill pools at the base of the dyke. The collected fuel/snow mixture can then be shovelled into barrels or bags, or collected with sorbent materials.

6.4.5.5 Procedures for Transferring, Storing and Managing Petroleum Spill Wastes

In most cases, spill cleanups are initiated at the far end of the spill and contained moving toward the centre of the spill. Sorbent socks and pads are generally used for small spill cleanup. A pump with attached fuel transfer hose can suction spills from leaking containers or large accumulations on land or ice, and direct these larger quantities into empty drums. Hand tools such as cans, shovels, and rakes are also very effective for small spills or hard to reach areas. Heavy equipment can be used if deemed necessary, and given space and time constraints.

Used sorbent materials are to be placed in plastic bags for future disposal. All materials mentioned in this section are available in the spill kits located at Eureka. Following clean up, any tools or equipment used will be properly washed and decontaminated, or replaced if this is not possible.

For most of the containment procedures outlined above, spilled petroleum products and materials used for containment will be placed into empty waste oil containers and sealed for proper disposal at an approved disposal facility.

6.5 Marine Spill Response (During Resupply)

This section of the Plan is designed to enable Eureka personnel to be prepared for and respond to marine based spills of diesel fuel at Eureka HAWS during the annual sea lift operation.

6.5.1 Spill Response Organization & Roles & Responsibilities

The reduction in the number and severity of spills is facilitated by a comprehensive and clearly articulated spill response organization. Figure 9 outlines the flow chart of response in the event of a marine spill.

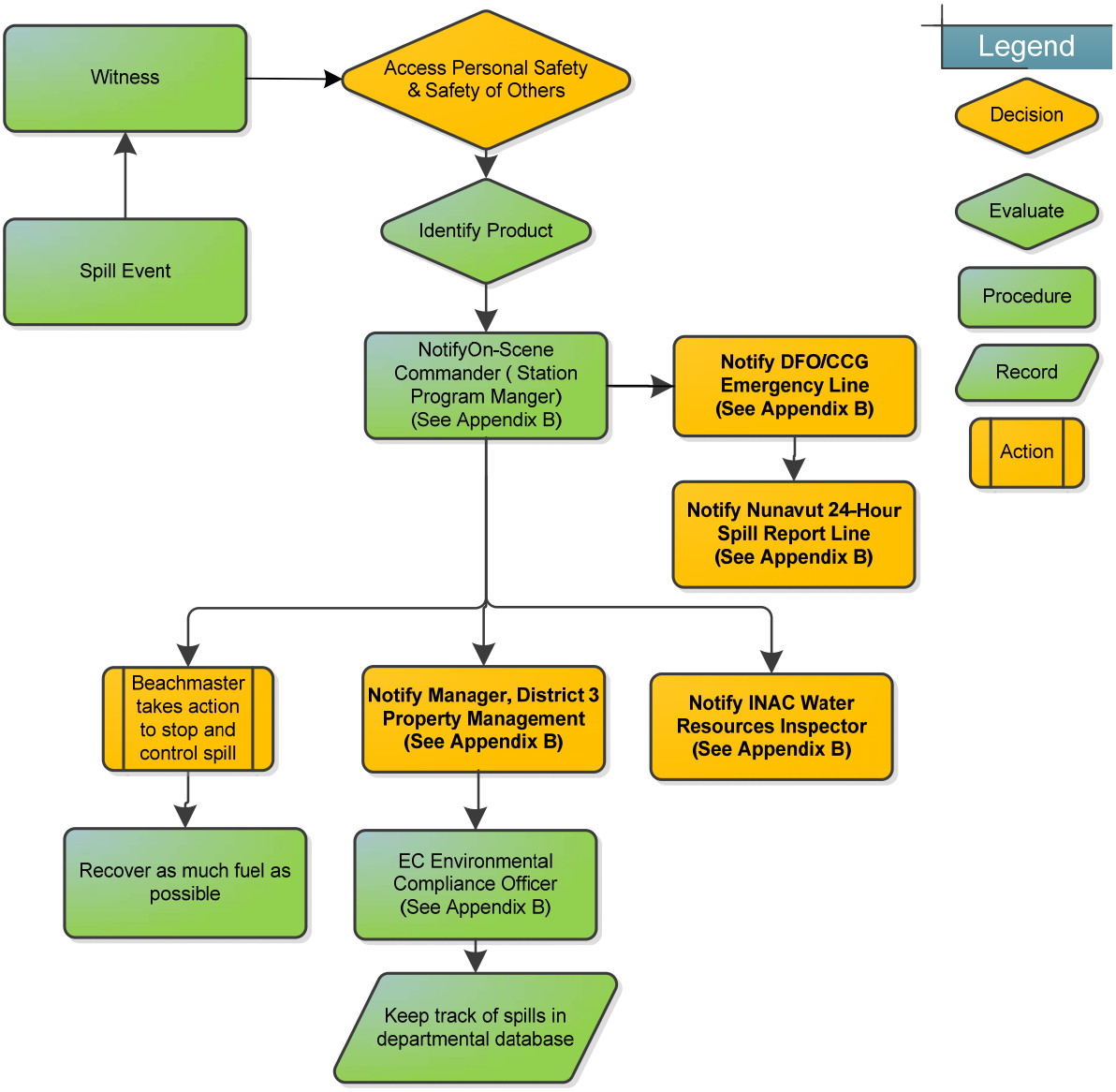

Figure 9: Response Organizations for a Marine Petroleum Spill

6.5.2 Steps Initiated Prior to Arrival of Coast Guard Ship

1) All of the equipment (see Appendix O) is pre-staged and ready for deployment prior to the CCG icebreaker's arrival
2) The containment boom is stored in a shack located on the shore edge to allow for quick deployment onto the water by CCG water craft.
3) Tow lines connected to either end of the boom will allow CCG water craft to connect to the boom and encircle a spill and direct it away from sensitive areas
4) Pipeline from shore to Tank Farm has been pressure tested

5) Any oil remaining in the 770,000 L tank has been transferred to other tanks within the Tank Farm

6.5.3 Steps Initiated Following Arrival of Coast Guard Ship

1) The Beach Master assumes control of the transfer operation and has full authority to stop the operation if he deems it unsafe for any reason and is expected to take such action
2) There are sufficient personnel on site to manage the transfer operation and any subsequent oil pollution incident

6.5.4 Steps Initiated Following a Marine Spill Incident

The health and safety of persons at Eureka is the first priority

1) In the event of a marine oil pollution incident, the Station Program Manager assumes the responsibility of the On-Scene Commander (OSC) and will request the Beach Master to immediately take action to contain or control the released product as quickly as possible providing this can be done safely.
2) Ensure personal safety and that of others.
3) Assess spill hazards and risks.
4) No matter what the volume is, notify Eureka – Station Program Manager (see Appendix B); and
5) Remove all sources of ignition.
6) Stop the spill if safely possible e.g. shut off pump, patch leaking hole. Use the contents of the nearest spill kit to aid in stopping the spill if it is safe to do so.
7) Tyvek suits and chemical master gloves are located in the spill kit and should be worn immediately if there is any risk of being in contact with fuel.
8) Contain the spill.
9) Determine the direction of any winds. If from the east, the following actions should be initiated to protect the Arctic Tern nesting grounds located at the delta approximately 200 M west of the connection of the floating transfer hose to the shore side pipeline:
    a. Scare any birds in the area
    b. If containment of the spill is ineffective, the boom should be relocated to protect the shoreline along the delta

6.5.5 Procedures for Containing and Controlling the Spill

1) Beachmaster will contact the icebreaker immediately to shut down the transfer of fuel.
2) Onshore valves will be immediately closed to prevent any back flow from the pipeline in the event the check valve fails.
3) Area will be secured.

4) CCG will deploy the containment booms downwind and down current to contain the spilled fuel.
5) If deployment of the containment boom is unsafe, ineffective or impractical the fuel spill will be dispersed into deep water by high pressure water hoses from the CCG ship for natural dissipation.
6) If the containment is ineffective, the boom will be relocated to protect the shoreline along the delta.
7) Attempt will be made to adsorb as much of the spill as possible by skimming the water surface with the sorbent booms and soaking up the remainder of the spill with absorbent rolls

6.5.6 Procedures for Spill Reporting

An immediately reportable petroleum spill on water is defined as a release of any amount. It must be reported to:

1) Canada Environmental Emergencies Notification System 24-Hour Spill Report Line - Nunavut (see Appendix B);
2) Environmental Protection Branch (Yellowknife) (see Appendix B);
3) Department of Fisheries and Oceans/Canadian Coast Guard Emergency Line (see Appendix B)

Spills should be tracked, documented and submitted to the Nunavut Water Board in Environment Canada's Annual Report to the Board and to the Environment Canada – Environmental Compliance Officer (see Appendix B).

See Appendix B for Emergency Spill Telephone Numbers.

Following gaining control and containment of the spill, the Station Program Manager must complete and submit the Environment Canada and Nunavut spill report forms (See Appendix P & Appendix Q, respectively).

6.6 Procedures for Transferring, Storing and Managing Petroleum Spill Wastes

Sorbent socks and pads are generally used for small spill cleanup. A pump with attached fuel transfer hose can suction spills from leaking containers or large accumulations on land or ice, and direct these larger quantities into empty drums. Hand tools such as cans, shovels, and rakes are also very effective for small spills or hard to reach areas. Heavy equipment can be used if deemed necessary, and given space and time constraints.

Used sorbent materials are to be placed in plastic bags for future disposal. All materials mentioned in this section are available in the spill kits located at Eureka. Following clean up, any tools or equipment used will be properly washed and decontaminated, or replaced if this is not possible.

For most of the containment procedures outlined above, spilled petroleum products and materials used for containment will be placed into empty waste oil containers and sealed for proper disposal at an approved disposal facility.

6.7 Procedures for Restoring Affected Areas

Once a spill has been contained it will be managed according to the Environment Canada's *Summary of Operations And Maintenance Procedures For Drinking Water, Sewage, Solid Waste Disposal and Waste Treatment Facilities – Eureka High Arctic Weather Station, 2009. Environment Canada – Environmental Programs, Contaminated Sites should be* consulted for advice (see Appendix B)
.

6.8 Procedures for Disposal

Petroleum products collected from spill events are sent by sealift to Safety-Kleen (Quebec) Ltd.,85 rue de Hambourg, Saint-Augustin-de Desmaures, QC G3A 1S6.

Waste glycol is sent by sealift to Safety-Kleen (Quebec) Ltd.

APPENDIX A: FEDERAL AND TERRITORIAL LEGAL AND POLICY REQUIREMENTS

Environmental, Health & Safety Legislation, Policies, Agreements, etc.	Major Provisions	Reference
Federal Legislation		
Canada Occupational Health and Safety Regulation, Part X – Hazardous Substances	• Records of hazardous substances • Hazard investigation • Storage, handling & use • Warnings of hazardous materials • Employee education • Control of hazards	http://www.canlii.org/en/ca/laws/regu/sor-86-304/latest/sor-86-304.html#PART_X_HAZARDOUS_SUBSTANCES_415404
Canada Shipping Act	• Response Measures (s.180) • Requirements of Oil Handling Facilities (s.168)	http://www.tc.gc.ca/media/documents/acts-regulations/C-10.15-acts.pdf
Canadian Environmental Protection Act (Part 8) (CEPA)	• Petroleum is a hazardous substance • Reporting of spills • Remedial measures	http://laws.justice.gc.ca/eng/C-15.31/page-7.html#anchorbo-ga:l_9-gb:s_212
Controlled Products Regulations	• MSDS • Labels • Classes of controlled products	http://laws.justice.gc.ca/en/H-3/SOR-88-66/index.html
Environmental Emergency Regulations	• Waste information • Emergency environmental plan	http://www.ec.gc.ca/ee-ue/Default.asp?lang=En&n=E3A506F8-1
Environmental Enforcement Act	Once it is in force • Penalties for environmental offences • liabilities and duties of corporate directors and officers	Not presently on-line
Export and Import of Hazardous Wastes Regulations	• Release of substances • List of toxic substances	http://laws.justice.gc.ca/eng/C-15.31/index.html
Fisheries Act	• Prohibitions • Duties of persons handling hazardous waste	http://laws.justice.gc.ca/en/showdoc/cs/F-14/bo-ga:s_78/20090730/en#anchorbo-ga:s_78
Hazardous Products Act	• Designates diesel and gasoline as hazardous products	http://laws.justice.gc.ca/en/H-3/
Interprovincial Movement of Hazardous Waste Regulations	• Manifests	http://www.canlii.org/en/ca/laws/regu/sor-2002-301/latest/sor-2002-301.html
Migratory Birds Convention Act	• Prohibitions	http://laws.justice.gc.ca/eng/M-

Environmental, Health & Safety Legislation, Policies, Agreements, etc.	Major Provisions	Reference
		7.01/page-3.html#anchorbo-ga:s_5
Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations	• S.30-31 • Technical standards related to tank systems holding petroleum or allied petroleum products • Emergency Plan Requirements	http://www.ec.gc.ca/st-rs/default.asp?lang=En&n=06EF27CF-1
Transportation of Dangerous Goods Act and Regulations	• Transport manifest • Identify & classify waste • Packaging • Labelling	http://www.tc.gc.ca/tdg/clear/tofc.htm
Nunavut Water Board Licence No. 3BC-EUR0611	• Part H • Requirement for a Spill Contingency Plan • Plan requirements	On File
Nunavut Legislation		
Safety Act (Nunavut)	• Safety duties of employers • Safety duties of employees • Powers and duties of safety operators	http://www.wcb.nt.ca/your_wcb/Legislation/Safety%20Act%20-%20Nunavut.pdf
Spill Contingency Planning and Reporting Regulations (Nunavut)	• Requirement for a Spill Contingency Plan • Spill Report Form	http://www.canlii.org/en/nt/laws/regu/nwt-reg-068-93/latest/nwt-reg-068-93.html
Work Site Hazardous Materials Information System Regulations (Nunavut)	• Worker education • Hazardous material labels	http://www.wcb.nt.ca/your_wcb/Legislation/Work_Site_Hazard_Mater_Info_Syst.pdf
Federal Policy		
Environment Canada's Sustainable Development Strategy 2007-2009	• EC Commitments	http://www.ec.gc.ca/sd-dd_consult/PDF/DPR2007Table_eng.pdf
Codes of Practice/Guidelines		
Canadian Labour Code II	• Duties of employer • Duties of employees	http://laws.justice.gc.ca/en/L-2/
Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products	• Registration and approval of tank systems • Design and installation • Monitoring and leak detection • Operation and maintenance • Withdrawal of systems	https://secure.encryptedtransactions.com/dfocus/ccme/eng/detail.cfm?sku=CCM-2017-00-00-0&selectedCat=CCM-CON-
National Building Code	• Safety • Health • Accessibility • Fire and Structural Protection of Buildings	http://www.nationalcodes.ca/nbc/index_e.shtml

Environmental, Health & Safety Legislation, Policies, Agreements, etc.	Major Provisions	Reference
National Fire Code	• Safety • Health • Fire Protection of Buildings and Facilities	http://www.nationalcodes.ca/nfc/index_e.shtml
Technical Guidelines for Above Ground Storage Tank Systems that contain Petroleum Products and Allied Petroleum Products	• Regulatory requirements • Timelines for existing systems • Leak detection & monitoring • Record keeping	http://www.ec.gc.ca/st-rs/default.asp?lang=En&n=400DB49F-1
Implementation Guidelines for Part 8 of the Environmental Protection Act 1999 – Environmental Emergency Plans	• Emergency reporting requirements • Compliance and enforcement	http://www.ec.gc.ca/CEPARegistry/guidelines/impl_guid/toc.cfm

APPENDIX B: SPILL EMERGENCY TELEPHONE NUMBERS

EUREKA EMERGENCY CONTACTS & TELEPHONE #'s

CONTACT	Telephone Numbers
Medical Assistance	
Nurse (Resolute Bay)	(867) 252-3844
Doctor (Iqaluit Hospital)	(867) 979-5306
Medical Evacuation, Kenn Borek Air (Resolute)	(867) 252-3845
Spill Reporting Centers	
Canada Environmental Emergencies Notification System 24-Hour Spill Report Line - Nunavut	(867) 920-8130
Department of Fisheries and Oceans/Canadian Coast Guard Emergency Line	1-800-565-1633
National Environmental Emergency Centre	(819) 997-3742 or 1-866-845-6037
Environmental Protection Branch (Yellowknife)	Working Hours (867) 669-4700 After Working Hours (867) 920-5131
Federal	
Environment Canada – Station Program Manager, Eureka, NU	(613) 945-3145 Ext: 4460
Environment Canada – Head Aerological & Surface Operational Programs, Winnipeg, MB	(204) 984-4385
Environment Canada – Manager, District 3 Property Management, Ottawa, ON	(613) 949-8555
Environment Canada – Environmental Compliance Officer, Environmental Programs, Property Management Division, Ottawa, ON	(613) 949-1795
Environment Canada – Environmental Programs, Contaminated Sites	(613) 949-7699
Nunavut Water Board, Gjoa Haven, NU	(867) 360-6338
Prairie Weather Centre Shift Supervisor	(204) 983-4513
Indian & Northern Affairs Canada, Iqaluit, NU	(867) 669-2761
Indian and Northern Affairs Canada Water Resources Inspector	(867) 975-4298
HRSDC (Human Resources and Skills Development Canada)	Working Hours1-866-713-4397 After Working Hours 1-866-713-4397

Territorial	
Department of Environment, Government of Nunavut	(867) 975-5900
Eureka	
DND (Eureka)	(613) 945-3145 (Ext: 4469 or 4450)
Polar Continental Shelf Program - Resolute	(867) 252-3872
Polar Environment Atmospheric Research Lab	(716) 803-6470 Ext: 100
Media & Public Enquiries	
Environment Canada - Media Relations	1-888-908-8008 or media@ec.gc.ca
Prairie & Northern Region's Communications Unit	(780) 951-8721

APPENDIX C: 2009 MSDS SHEETS FOR DIESEL STORED IN EUREKA'S STORAGE TANK SYSTEM

A MSDS binder, containing MSDS sheets on all hazardous substances present at Eureka, is located in the front of the vestibule of the main complex. Each building has a MSDS binder containing MSDS sheets for substances contained in that building.

LOW SULPHUR DIESEL CP-43 320-043
Revision Number: 01

Les Petroles Therrien inc.

Material Safety Data Sheet

Effective Date: 2009-09-02
Supersedes: 2006-04-27

Class B3 Combustible Liquid

Class D2B Other Toxic Effects - Skin Irritant

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT:	**LOW SULPHUR DIESEL CP-43**
SYNONYMS:	Diesel Automotive Gas Oil
PRODUCT USE:	Fuel Solvent
MSDS Number:	320-043

MANUFACTURER
Les Pétroles Therrien inc.
P.O. Box 428
1000, Lemire Boulevard
Drummondville, QC Canada
J2B 8G6

TELEPHONE NUMBERS

Petro-T Emergency Number	1-800-567-8213
For general information:	(819) 474-2626
For MSDS information:	(819) 474-2626

This MSDS was prepared by the Toxicology and Product Stewardship Section of Petro-T inc.

2. COMPOSITION/INFORMATION ON INGREDIENTS

Component Name	CAS Number	% Range	WHMIS Controlled
Fuels, Diesel, No. 2	68476-34-6	100	Yes

See Section 8 for Occupational Exposure Guidelines.

3. HAZARDS IDENTIFICATION

Physical Description: Liquid Clear To Yellow Hydrocarbon Odour

Routes of Exposure: Exposure will most likely occur through skin contact or inhalation.
Hazards:

Vapour concentrations above the recommended exposure level are irritating to the eyes and respiratory tract, may cause headaches and dizziness, are anesthetic and may have other central nervous system effects.
Combustible Liquid.
Irritating to skin.
Vapours are moderately irritating to the eyes.
Ingestion may result in vomiting. Avoid aspiration of vomitus into lungs as small quantities may result in aspiration pneumonitis.
Vapours are moderately irritating to the respiratory passages.

Handling: Eliminate all ignition sources.
Avoid prolonged exposure to vapours.
Wear suitable gloves and eye protection.
Bond and ground transfer containers and equipment to avoid static accumulation.
Empty containers are hazardous, may contain flammable / explosive dusts, liquid residue or vapours. Keep away from sparks and open flames.

For further information on health effects, see Section 11.

4. FIRST AID

Eyes: Flush eyes with water for at least 15 minutes while holding eyelids open. If irritation occurs and persists, obtain medical attention.

Skin: Wash contaminated skin with mild soap and water for 15 minutes. If irritation occurs and persists, obtain medical attention.

Ingestion: DO NOT INDUCE VOMITING! OBTAIN MEDICAL ATTENTION IMMEDIATELY. Guard against aspiration into lungs by having the individual turn on to their left side. If vomiting occurs spontaneously keep head below hips to prevent aspiration of liquid into the lungs. Do not give anything by mouth to an unconscious person.

Inhalation: Remove victim from further exposure and restore breathing, if required. Obtain medical attention.

Notes to Physician: The main hazard following accidental ingestion is aspiration of the liquid into the lungs producing chemical pneumonitis. If more than 2.0 mL/kg has been ingested, vomiting should be induced with supervision. If symptoms such as loss of gag reflex, convulsions or unconsciousness occur before vomiting, gastric lavage with a cuffed endotracheal tube should be considered.

5. FIRE FIGHTING MEASURES

Extinguishing Media: Dry Chemical
Carbon Dioxide
Foam
Water Fog

Firefighting Instructions: Caution - Combustible. Do not use a direct stream of water as it may spread fire. Do not enter confined fire space without adequate protective clothing and an approved positive pressure self-contained breathing apparatus. Vapour forms a flammable/explosive mixture with air between upper and lower flammable limits. Vapours may travel along ground and flashback along vapour trail may occur. Avoid inhalation of smoke. Product will float and can be reignited on surface of water. Delayed lung damage can be experienced after exposure to combustion products, sometimes hours after the exposure.

Hazardous Combustion Products: A complex mixture of airborne solid, liquid, particulates and gases will evolve when this material undergoes pyrolysis or combustion. Carbon dioxide, carbon monoxide and unidentified organic compounds may be formed upon combustion.

6. ACCIDENTAL RELEASE MEASURES

Issue warning "Combustible". Eliminate all ignition sources. Isolate hazard area and restrict access. Handling equipment must be grounded. Try to work upwind of spill. Avoid direct contact with material. Wear appropriate breathing apparatus (if applicable) and protective clothing. Stop leak only if safe to do so. Dike and contain land spills; contain water spills by booming. Use water fog to knock down vapours; contain runoff. Absorb residue or small spills with absorbent material and remove to non-leaking containers for disposal. Recommended materials: Clay or Sand Flush area with water to remove trace residue. Dispose of recovered material as noted under Disposal Considerations. Notify appropriate environmental agency(ies).

7. HANDLING AND STORAGE

Handling: Combustible. Avoid excessive heat, sparks, open flames and all other sources of ignition. Fixed equipment as well as transfer containers and equipment should be grounded to prevent accumulation of static charge. Vapours are heavier than air and will settle and collect in low areas and pits, displacing breathing air. Extinguish pilot lights, cigarettes and turn off other sources of ignition prior to use and until all vapours are gone. Vapours may accumulate and travel to distant ignition sources and flashback. Do not cut, drill, grind, weld or perform similar operations on or near containers. Empty containers are hazardous, may contain flammable/explosive dusts, residues or vapours. Do not pressurize drum containers to empty them. Wash with soap and water prior to eating, drinking, smoking, applying cosmetics or using toilet facilities. Launder contaminated clothing prior to reuse. Use good personal hygiene.

Storage: Store in a cool, dry, well ventilated area, away from heat and ignition sources. Keep container tightly closed.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

THE FOLLOWING INFORMATION, WHILE APPROPRIATE FOR THIS PRODUCT, IS GENERAL IN NATURE. THE SELECTION OF PERSONAL PROTECTIVE EQUIPMENT WILL VARY DEPENDING ON THE CONDITIONS OF USE.

OCCUPATIONAL EXPOSURE LIMITS (Current ACGIH TLV/TWA unless otherwise noted):

Diesel fuel, as total hydrocarbons: 100 mg/m3
Skin Notation: Absorption through skin, eyes and mucous membranes may contribute significantly to the total exposure.

Mechanical Ventilation: Concentrations in air should be maintained below the recommended threshold limit value if unprotected personnel are involved. Use explosion-proof ventilation as required to control vapour concentrations. Make up air should always be supplied to balance air exhausted (either generally or locally). For personnel entry into confined spaces (i.e. bulk storage tanks) a proper confined space entry procedure must be followed including ventilation and testing of tank atmosphere. Local ventilation recommended where mechanical ventilation is ineffective in controlling airborne concentrations below the recommended occupational exposure limit.

PERSONAL PROTECTIVE EQUIPMENT:

Eye Protection: Chemical safety goggles and/or full face shield to protect eyes and face, if product is handled such that it could be splashed into eyes. Provide an eyewash station in the area.

Skin Protection: Impervious gloves (viton, nitrile) should be worn at all times when handling this material. In confined spaces or where the risk of skin exposure is much higher, impervious clothing should be worn. Safety showers should be available for emergency use.

Respiratory Protection: If exposure exceeds occupational exposure limits, use an appropriate NIOSH-approved respirator. Use a NIOSH-approved chemical cartridge respirator with organic vapour cartridges or use a NIOSH-approved supplied-air respirator. For high airborne concentrations, use a NIOSH-approved supplied-air respirator, either self-contained or airline breathing apparatus, operated in positive pressure mode.

9. PHYSICAL DATA

Physical State:	Liquid
Appearance:	Clear To Yellow
Odour:	Hydrocarbon Odour
Odour Threshold:	Not available
Freezing/Pour Point:	Cloud Point-43 °C
Boiling Point:	150 - 330 °C
Density:	< 850 kg/m3 @ 15 °C
Vapour Density (Air = 1):	Not available
Vapour Pressure (absolute):	Not available
pH:	Not available
Flash Point:	Pensky-Martens CC > 40 °C
Lower Explosion Limit:	1 % (vol.)
Upper Explosion Limit:	6 % (vol.)
Autoignition Temperature:	250 °C
Viscosity:	1.3 - 2.1 cSt @ 40 °C
Evaporation Rate (n-BuAc = 1):	Not available
Partition Coefficient (log K_{ow}):	Not available
Water Solubility:	Insoluble
Other Solvents:	Hydrocarbon Solvents

10. STABILITY AND REACTIVITY

Chemically Stable:	Yes
Hazardous Polymerization:	No
Sensitive to Mechanical Impact:	No
Sensitive to Static Discharge:	Yes

Hazardous Decomposition Products:	Thermal decomposition products are highly dependent on combustion conditions.
Incompatible Materials:	Avoid strong oxidizing agents.
Conditions of Reactivity:	Avoid excessive heat, open flames and all ignition sources.

11. TOXICOLOGICAL INFORMATION

Ingredient (or Product if not specified)	**Toxicological Data**
Fuels, Diesel, No. 2	LD50 Dermal Rabbit > 5000 mg/kg LD50 Oral Rat = 9000 mg/kg

Routes of Exposure:	Exposure will most likely occur through skin contact or inhalation.
Irritancy:	This product is expected to be irritating to skin but is not predicted to be a skin sensitizer.
Acute Toxicity:	Vapour concentrations above the recommended exposure level are irritating to the eyes and respiratory tract, may cause headaches and dizziness, are anesthetic and may have other central nervous system effects.
Chronic Effects:	Prolonged and repeated contact with skin can cause defatting and drying of the skin resulting in skin irritation and dermatitis. Prolonged exposure to high vapour concentration can cause headache, dizziness, nausea, blurred vision and central nervous system depression.
Pre-existing Conditions:	Pre-existing eye, skin and respiratory disorders may be aggravated by exposure to this product.
Carcinogenicity and Mutagenicity:	The International Agency for Research on Cancer (IARC) considers that this product is not classifiable as to its carcinogenicity to humans. Middle distillates have caused skin cancers in laboratory animals when applied repeatedly and left in place between applications. This effect is believed to be caused by the continuous irritation of the skin. Good personal hygiene should be maintained to avoid this risk. The American Conference of Governmental Industrial Hygienists (ACGIH) has classified this product as A3 - confirmed animal carcinogen with unknown relevance to humans.

12. ECOLOGICAL INFORMATION

Do not allow product or runoff from fire control to enter storm or sanitary sewers, lakes, rivers, streams, or public waterways. Block off drains and ditches. Provincial regulations require and federal regulations may require that environmental and/or other agencies be notified of a spill incident. Spill area must be cleaned and restored to original condition or to the satisfaction of authorities. May cause physical fouling of aquatic organisms.

Biodegradability:	Not readily biodegradable.
Bioaccumulation:	Potential for bioaccumulation.
Partition Coefficient (log K_{ow}):	Not available

Aquatic Toxicity

May be harmful to aquatic life.

Ingredient:	**Toxicological Data**
Fuels, Diesel, No. 2	EL50 - growth rate Algae (72hr) 10 - 100 mg/L. EL50 Daphnia Magna (48hr) 10 - 100 mg/L. LL50 (WAF method) Rainbow Trout (96hr) 10 - 100 mg/L.

Definition(s): LL and EL are the lethal loading concentration and effective loading concentration respectively. The concentration represents the amount of substance added to the system to obtain a toxic concentration. They replace the traditional LC and EC for low solubility substances.
WAF is the water accommodated fraction. A slightly soluble hydrocarbon is stirred into water and the insoluble portions are removed. The remaining solution is the water accommodated fraction.

13. DISPOSAL CONSIDERATIONS

Waste management priorities (depending on volumes and concentration of waste) are: 1. recycle (reprocess), 2. energy recovery (cement kilns, thermal power generation), 3. incineration, 4. disposal at a licenced waste disposal facility. Do not attempt to combust waste on-site. Incinerate at a licenced waste disposal site with approval of environmental authority.

14. TRANSPORTATION INFORMATION

Canadian Road and Rail Shipping Classification:

UN Number	UN1202
Proper Shipping Name	DIESEL FUEL
Hazard Class	Class 3 Flammable Liquids
Packing Group	PG III
Additional Information	Not Regulated in Containers Less Than or Equal to 450 Litres.
Shipping Description	DIESEL FUEL Class 3 UN1202 PG III Not Regulated in Containers Less Than or Equal to 450 Litres.

15. REGULATORY INFORMATION

This product has been classified in accordance with the hazard criteria of the *Controlled Products Regulations* (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Class:	Class B3 Combustible Liquid Class D2B Other Toxic Effects - Skin Irritant
DSL/NDSL Status:	This product, or all components, are listed on the Domestic Substances List, as required under the Canadian Environmental Protection Act.
Other Regulatory Status:	No Canadian federal standards.

16. ADDITIONAL INFORMATION

LABEL STATEMENTS

Hazard Statement :	Combustible Liquid. Irritating to skin.
Handling Statement:	Eliminate all ignition sources. Avoid prolonged exposure to vapours. Wear suitable gloves and eye protection. Bond and ground transfer containers and equipment to avoid static accumulation. Empty containers are hazardous, may contain flammable / explosive dusts, liquid residue or vapours. Keep away from sparks and open flames.
First Aid Statement :	Wash contaminated skin with soap and water. Flush eyes with water. If overcome by vapours remove to fresh air. Do not induce vomiting. Obtain medical attention.
Revisions:	This MSDS has been reviewed and updated. Changes have been made to: Section 1 Section 3 Section 5 Section 8 Section 9 Section 12

APPENDIX D: 2009 MSDS SHEETS FOR GASOLINE STORED IN EUREKA'S STORAGE TANK SYSTEM

A MSDS binder, containing MSDS sheets on all hazardous substances present at Eureka, is located in the front of the vestibule of the main complex. Each building has a MSDS binder containing MSDS sheets for substances contained in that building.

Material Safety Data Sheet

PETRO-CANADA

WHMIS (Pictograms)	WHMIS (Classification)	Protective Clothing	TDG (pictograms)
	B-2, D-2A, D-2B		

Section 1. Chemical Product and Company Identification

Product Name	**GASOLINE, UNLEADED**	**Code**	W102E, SAP: 102 to 117
Synonym	Regular, Unleaded Gasoline (US Grade), Mid-Grade, Plus, Super, WinterGas, SummerGas, Supreme, SuperClean WinterGas, RegularClean, PlusClean, Premium, marked or dyed gasoline, Super Premium (94 RO), TQRUL, transitional quality regular unleaded, BOB, Blendstock for Oxygenate Blending	**Validated on**	**5/14/2008.**
Manufacturer	PETRO-CANADA P.O. Box 2844 150 – 6th Avenue South-West Calgary, Alberta T2P 3E3	**In case of Emergency**	Petro-Canada: 403-296-3000 Canutec Transportation: 613-996-6666 Poison Control Centre: Consult local telephone directory for emergency number(s).
Material Uses	Unleaded gasoline is used in spark ignition engines including motor vehicles, inboard and outboard boat engines, small engines such as chain saws and lawn mowers, and recreational vehicles.		

Section 2. Composition and Information on Ingredients

			Exposure Limits (ACGIH)		
Name	**CAS #**	**% (W/W)**	**TLV-TWA(8 h)**	**STEL**	**CEILING**
Gasoline	86290-81-5	85-100	300 ppm	500 ppm	Not established
Benzene	71-43-2	<1.5	0.5 ppm	2.5 ppm	Not established

Manufacturer Recommendation	Not applicable
Other Exposure Limits	Consult local, state, provincial or territory authorities for acceptable exposure limits.

Section 3. Hazards Identification.

Potential Health Effects	Flammable liquid. Exercise caution when handling this material. May cause cancer. May cause heritable genetic effects (mutagenicity). This product contains an ingredient or ingredients, which have been shown to cause chronic toxic effects. Contact with this product may cause skin irritation. Inhalation of this product may cause respiratory tract irritation and Central Nervous System (CNS) Depression, symptoms of which may include; weakness, dizziness, slurred speech, drowsiness, unconsciousness and in cases of severe overexposure; coma and death. Ingestion of this product may cause gastro-intestinal irritation. Aspiration of this product may result in severe irritation or burns to the respiratory tract. For more information refer to Section 11 of this MSDS.

Section 4. First Aid Measures

Eye Contact	Avoid direct contact. Quickly and gently blot or brush chemical off the face. Immediately flush the contaminated eye(s) with lukewarm, gently flowing water for 5 minutes, while holding the eyelid(s) open. Obtain medical advice.
Skin Contact	Avoid direct contact. Wear chemical protective clothing if necessary. As quickly as possible, remove contaminated clothing, shoes and leather goods (e.g., watchbands, belts, etc.). Quickly and gently, blot or brush away excess chemical. Immediately wash with lukewarm, gently flowing water and non-abrasive soap for 15-20 minutes. Immediately obtain medical attention. Completely decontaminate clothing, shoes and leather goods before reuse or discard.
Inhalation	Take proper precautions to ensure your own safety before attempting rescue (e.g. wear appropriate protective equipment). If breathing has stopped, trained personnel should begin artificial respiration (AR) or, if the heart has stopped, immediately start cardiopulmonary resuscitation (CPR) or automated external defibrillation (AED). Quickly transport victim to an emergency care facility.
Ingestion	NEVER give anything by mouth if victim is rapidly losing consciousness, or is unconscious or convulsing. Have victim rinse mouth thoroughly with water. DO NOT INDUCE VOMITING. Have victim drink 60 to 240 mL (2 to 8 oz.) of water. If vomiting occurs naturally, have victim lean forward to reduce risk of aspiration. Have victim rinse mouth with water again. If breathing has stopped, trained personnel should begin artificial respiration (AR) or, if the heart has stopped, immediately start cardiopulmonary resuscitation (CPR) or automated external defibrillation (AED). Quickly transport victim to an emergency care facility.

Continued on Next Page *Internet: www.petro-canada.ca/msds* *Available in French*

Note to Physician	Not available

Section 5. Fire-fighting Measures

Flammability	Flammable liquid (NFPA).	**Flammable Limits**	Lower: 1.3%; Upper: 7.6% (NFPA).
Flash Points	Closed cup: -50 to -38°C (-58 to -36.4°F) [Tagliabue]	**Auto-Ignition Temperature**	257°C (495°F) (NFPA).
Fire Hazards in Presence of Various Substances	Extremely flammable in presence of open flames, sparks, and heat. Vapours are heavier than air and may travel considerable distance to sources of ignition and flash back. Rapid escape of vapour may generate static charge causing ignition. May accumulate in confined spaces.	**Explosion Hazards in Presence of Various Substances**	Do not cut, weld, heat, drill or pressurize empty container. Containers may explode in heat of fire. Vapours may form explosive mixtures with air.
Products of Combustion	Carbon oxides (CO, CO2), nitrogen oxides (NOx), polynuclear aromatic hydrocarbons, phenols, smoke and irritating vapours as products of incomplete combustion. See Section 11 (Other Considerations) for information regarding the toxicity of the combustion products.		
Fire Fighting Media and Instructions	NAERG2004 GUIDE 128, Flammable liquids (Non-polar/Water-immiscible). CAUTION: This product has a very low flash point: Use of water spray when fighting fire may be inefficient. If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also consider initial evacuation for 800 meters (1/2 mile) in all directions. SMALL FIRES: Dry chemical, CO2, water spray or regular foam. LARGE FIRES: Water spray, fog or regular foam. Do not use straight streams. Move containers from fire area if you can do it without risk. Fires Involving Tanks or Car/Trailer Loads: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting devices or any discolouration of tank. ALWAYS stay away from the ends of tanks. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible withdraw from area and let fire burn. Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters' protective clothing will only provide limited protection.		

Section 6. Accidental Release Measures

Material Release or Spill	IN THE EVENT OF A LARGE SPILL CONSIDER THE FOLLOWING CONTROL MEASURES: Consult current National Emergency Response Guide Book (NAERG) for appropriate spill measures if necessary. Extinguish all ignition sources. Stop leak if safe to do so. Evacuate non-essential personnel. Ventilate area. Dike spilled material. Use appropriate inert absorbent material to absorb spilled product. Collect used absorbent for later disposal. Ensure clean-up personnel wear appropriate personal protective equipment. Avoid contact with spilled material. Avoid contaminating sewers, streams, rivers and other water courses with spilled material. Avoid breathing vapours or mists of material. Ground and bond all equipment used to clean up the spilled material, as it may be a static accumulator. Notify appropriate authorities immediately.

Section 7. Handling and Storage

Handling	FLAMMABLE MATERIAL. Handle with care. Avoid contact with any sources of ignition, flames, heat, and sparks. Avoid skin contact. Avoid eye contact. Avoid inhalation of product vapours or mists. Wear proper personal protective equipment (See Section 8). Empty containers may contain product residue. Do not pressurize, cut, heat, or weld empty containers. Do not reuse containers without commercial cleaning and/or reconditioning. Personnel who handle this material should practice good personal hygiene during and after handling to help prevent accidental ingestion of this product. Ensure all equipment is grounded/bonded. Avoid confined spaces and areas with poor ventilation. Do not ingest this product.
Storage	Store as flammable material. Store away from incompatible and reactive materials (See section 5 and 10). Store away from heat and sources of ignition. Store in dry, cool, well-ventilated area. Keep container tightly closed. Ensure the storage containers are grounded/bonded. Avoid direct sunlight.

Section 8. Exposure Controls/Personal Protection

Engineering Controls	For normal application, special ventilation is not necessary. If user's operations generate vapours or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit. Make-up air should always be supplied to balance air removed by exhaust ventilation. Ensure that eyewash station and safety shower are close to work-station.
Personal Protection	- ***The selection of personal protective equipment varies, depending upon conditions of use.***
Eyes	As a minimum, safety glasses with side shields should be worn when handling this material.
Body	If this material may come in contact with the body during handling and use, we recommend wearing appropriate protective clothing to prevent contact with the skin. (Contact your PPE provider for more information.)
Respiratory	A NIOSH-approved air-purifying respirator with an organic vapour cartridge or canister may be permissible under certain circumstances where airborne concentrations are expected to exceed exposure limits. Protection provided by air-purifying respirators is limited. Use a positive-pressure, air-supplied respirator if there is any potential for uncontrolled release, exposure levels are unknown, or any other circumstances where air-purifying respirators may not provide adequate protection.

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Hands	If this material may come in contact with the hands during handling and use, we recommend wearing gloves of the following material(s): polyvinyl alcohol (PVA), fluoro-elastomer. Consult your PPE provider for breakthrough times and the specific glove that is best for you based on your use patterns.
Feet	Wear appropriate footwear to prevent product from coming in contact with feet and skin.

Section 9. Physical and Chemical Properties

Physical State and Appearance	Clear liquid.	**Viscosity**	Not available.
Colour	Clear to slightly yellow or green, undyed liquid. May be dyed red for taxation purposes.	**Pour Point**	Not applicable.
Odour	Gasoline	**Softening Point**	Not applicable.
Odour Threshold	Less than 1 ppm.	**Dropping Point**	Not applicable.
Boiling Point	25 to 220°C (77 to 428°F) (ASTM D86)	**Penetration**	Not applicable.
Density	0.685 - 0.80 kg/L @ 15°C (59°F).	**Oil / Water Dist. Coefficient**	Not available
Vapour Density	3 to 4 (Air = 1) (NFPA).	**Ionicity (in water)**	Not available
Vapour Pressure	<107 kPa @ 37.8°C (100°F)	**Dispersion Properties**	Not available
Volatility	Volatile.	**Solubility**	Hydrocarbon components virtually insoluble in water. Soluble in alcohol, ether, chloroform, and benzene. Dissolves fats, oils and natural resins.

Section 10. Stability and Reactivity

Corrosivity	Non corrosive.		
Stability	The product is stable under normal handling and storage conditions.	**Hazardous Polymerization**	Will not occur under normal working conditions.
Incompatible Substances / Conditions to Avoid	Reactive with oxidizing agents and acids.	**Decomposition Products**	May release COx, NOx, phenols, polynuclear aromatic hydrocarbons, smoke and irritating vapours when heated to decomposition.

Section 11. Toxicological Information

Routes of Entry	Skin contact, eye contact, inhalation, and ingestion.
Acute Lethality	Gasoline (8006-61-9): Acute Oral toxicity (LD50): 13600 mg/kg (rat) Acute Dermal toxicity (LD50): >5000 mg/kg (rabbit) Benzene (71-43-2): Acute Oral toxicity (LD50): 930 mg/kg (rat) Acute Dermal toxicity (LD50): >9400 mg/kg (rabbit) Acute Inhalation toxicity (LC50): 13229 ppm/4h (rat)
Chronic or Other Toxic Effects	
Dermal Route:	Contact may cause skin irritation. Prolonged or repeated contact may defat and dry skin, and cause dermatitis.
Inhalation Route:	Inhalation of this product may cause respiratory tract irritation. Inhalation of this product may cause Central Nervous System (CNS) Depression, symptoms of which may include; weakness, dizziness, slurred speech, drowsiness, unconsciousness and in cases of severe overexposure; coma and death.
Oral Route:	Ingestion of this product may cause gastro-intestinal irritation. Aspiration of this product may result in severe irritation or burns to the respiratory tract. Ingestion of this product may cause Central Nervous System (CNS) Depression, symptoms of which may include; weakness, dizziness, slurred speech, drowsiness, unconsciousness and in cases of severe overexposure; coma and death.
Eye Irritation/Inflammation:	Short-term exposure is expected to cause only slight irritation, if any.
Immunotoxicity:	Not available
Skin Sensitization:	Contact with this product is not expected to cause skin sensitization, based upon the available data and the known hazards of the components.
Respiratory Tract Sensitization:	Contact with this product is not expected to cause respiratory tract sensitization, based upon the available data and the known hazards of the components.
Mutagenic:	This product contains a component(s) at >= 0.1% that has been shown to cause mutagenicity in laboratory tests. Therefore, this product is considered to be a mutagen. (Benzene)

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Reproductive Toxicity:	This product is not known to contain any components at >= 0.1% that have been shown to cause reproductive toxicity. Therefore, based upon the available data and the known hazards of the components, this product is not expected to be a reproductive toxin.
Teratogenicity/Embryotoxicity:	This product is not known to contain any components at >= 0.1% that have been shown to cause teratogenicity and/or embryotoxicity. Therefore, based upon the available data and the known hazards of the components, this product is not expected to be a teratogen/embryotoxin.
Carcinogenicity (ACGIH):	This product contains the following chemical(s) at >=0.1% that are listed as carcinogenic compounds. Therefore this product is considered to be carcinogenic. [Considered to be A1 by the ACGIH. Benzene (71-43-2)] [Considered to be A3 by the ACGIH. Gasoline (8006-61-9)]
Carcinogenicity (IARC):	This product contains the following chemical(s) at >=0.1% that are listed as carcinogenic compounds. Therefore this product is considered to be carcinogenic. [Considered to be carcinogenic to humans (group 1) by IARC. Benzene (71-43-2)] [Considered to be carcinogenic to humans (group 2B) by IARC. Gasoline (8006-61-9)]
Carcinogenicity (NTP):	This product contains the following chemical(s) at >=0.1% that are listed as carcinogenic compounds. Therefore this product is considered to be carcinogenic. [Known to be a human carcinogen according to NTP. Benzene (71-43-2)]
Carcinogenicity (IRIS):	This product contains the following chemical(s) at >=0.1% that are listed as carcinogenic compounds. Therefore this product is considered to be carcinogenic. [Considered to be carcinogenic by IRIS. Benzene (71-43-2)]
Carcinogenicity (OSHA):	This product contains the following chemical(s) at >=0.1% that are listed as carcinogenic compounds. Therefore this product is considered to be carcinogenic. [Considered to be carcinogenic by OSHA. Benzene (71-43-2)]
Other Considerations	Gasoline engine exhaust is possibly carcinogenic to humans (IARC Group 2B).

Section 12. Ecological Information

Environmental Fate	Not available	**Persistance/ Bioaccumulation Potential**	Not available
BOD5 and COD	Not available	**Products of Biodegradation**	Not available
Additional Remarks	No additional remark.		

Section 13. Disposal Considerations

Waste Disposal	Spent/ used/ waste product may meet the requirements of a hazardous waste. Consult your local or regional authorities. Ensure that waste management processes are in compliance with government requirements and local disposal regulations.

Section 14. Transport Information

TDG Classification	GASOLINE, 3, UN1203, PGII (CL-TDG)	**Special Provisions for Transport**	See Transportation of Dangerous Goods Regulations.

Section 15. Regulatory Information

Other Regulations	This product is acceptable for use under the provisions of WHMIS-CPR. All components of this formulation are listed on the CEPA-DSL (Domestic Substances List). All components of this formulation are listed on the US EPA-TSCA Inventory. All components of this product are on the European Inventory of Existing Commercial Chemical Substances (EINECS). This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR. Please contact Product Safety for more information.		
DSD/DPD (Europe)	Not evaluated.	**HCS (U.S.A.)**	CLASS: Contains material which may cause cancer. CLASS: Flammable liquid having a flash point lower than 37.8°C (100°F). CLASS: Irritating substance. CLASS: Target organ effects.
ADR (Europe) (Pictograms)	NOT EVALUATED FOR EUROPEAN TRANSPORT NON ÉVALUÉ POUR LE TRANSPORT EUROPÉEN.	**DOT (U.S.A) (Pictograms)**	Not evaluated for transport Non évalué pour le transport

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HMIS (U.S.A.)		NFPA (U.S.A.)		Rating
Health Hazard	2*	Health 2	3 Fire Hazard	0 Insignificant
Fire Hazard	3		0 Reactivity	1 Slight
Reactivity	0		Specific hazard	2 Moderate
Personal Protection	H			3 High
				4 Extreme

Section 16. Other Information

References Available upon request.
TMMC Marque de commerce de Petro-Canada - Trademark

Glossary

ACGIH - American Conference of Governmental Industrial Hygienists
ADR - Agreement on Dangerous goods by Road (Europe)
ASTM - American Society for Testing and Materials
BOD5 - Biological Oxygen Demand in 5 days
CAS - Chemical Abstract Services
CEPA - Canadian Environmental Protection Act
CERCLA - Comprehensive Environmental Response, Compensation and Liability Act
CFR - Code of Federal Regulations
CHIP - Chemical Hazard Information and Packaging Approved Supply List
COD - Chemical Oxygen Demand
CPR - Controlled Products Regulations
DOT - Department of Transportation (U.S.A.)
DSCL - Dangerous Substances Classification and Labeling (Europe)
DSD/DPD - Dangerous Substance or Dangerous Preparations Directives (Europe)
DSL - Domestic Substance List (Canada)
EEC/EU - European Economic Community/European Union
EINECS - European Inventory of Existing Commercial Chemical Substances
EPCRA - Emergency Planning And Community Right-To-Know Act
FDA - Food and Drug Administration
FIFRA - Federal Insecticide, Fungicide, and Rodenticide Act
HCS - Hazardous Communication System
HMIS - Hazardous Material Information System
IARC - International Agency for Research on Cancer
IRIS - Integrated Risk Information System
LD50/LC50 - Lethal Dose/Concentration kill 50%
LDLo/LCLo - Lowest Published Lethal Dose/Concentration
NFPA - National Fire Prevention Association
NIOSH - National Institute for Occupational Safety & Health
NPRI - National Pollutant Release Inventory
NSNR - New Substances Notification Regulations (Canada)
NTP - National Toxicology Program
OSHA - Occupational Safety & Health Administration
PEL - Permissible Exposure Limit
RCRA - Resource Conservation and Recovery Act
SARA - Superfund Amendments and Reorganization Act
STEL - Short Term Exposure Limit (15 minutes)
TDG - Transportation Dangerous Goods (Canada)
TDLo/TCLo - Lowest Published Toxic Dose/Concentration
TLV-TWA - Threshold Limit Value-Time Weighted Average
TLm - Median Tolerance Limit
TSCA - Toxic Substances Control Act
USEPA - United States Environmental Protection Agency
USP - United States Pharmacopoeia
WHMIS - Workplace Hazardous Material Information System

For Copy of MSDS
Internet: www.petro-canada.ca/msds

Canada-wide: telephone: 1-800-668-0220; fax: 1-800-837-1228

For Product Safety Information: (905) 804-4752

Prepared by Product Safety - JDW on 5/14/2008.

Data entry by Product Safety - JDW.

To the best of our knowledge, the information contained herein is accurate. However, neither the above named supplier nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

APPENDIX E: EUREKA'S DIESEL FUEL SYSTEM

Prior to the annual arrival of the CCG ice breaker, any remaining diesel in the 770,000 L tank is pumped to one or more of the 9 x 60,000 L tanks. Diesel fuel is then conveyed to the tank farm from the CCG ice breaker via the piping system to the 770,000 L tank. If there is still excess capacity in the 60,000 L tanks, diesel will be pumped into those tanks from the 770,000 tank and the 770,000 L tank will then be filled to tank capacity. Approximately 500,000 - 900,000 L of diesel are conveyed to Eureka's tank farm each year.

Only the 60,000 L tanks deliver fuel. When a 60,000 L tank is emptied, it is filled by gravity feed from the 770,000 L tank. From the 60,000 L tanks, it travels to:

1) Two tanks at the generator building (via pipeline; and
2) The diesel dispenser (just south of the tank farm) where it is pumped into the portable tank, which is employed to transport diesel to the 4 x 9,000 L tanks and to Fort Eureka's & Skull Point's 20,000 L fuel tanks.

Due to the geographic location of Eureka HAWS and the restrictions that could be caused by severe ice seasons, Eureka always stores diesel fuel for the generator for two years with the hope that, if the ice breaker cannot bring fuel one year, it will be able to do so the following year. Yearly consumption of diesel for the generators and other various uses throughout the station ranges from 500,000 to 700,000 L.

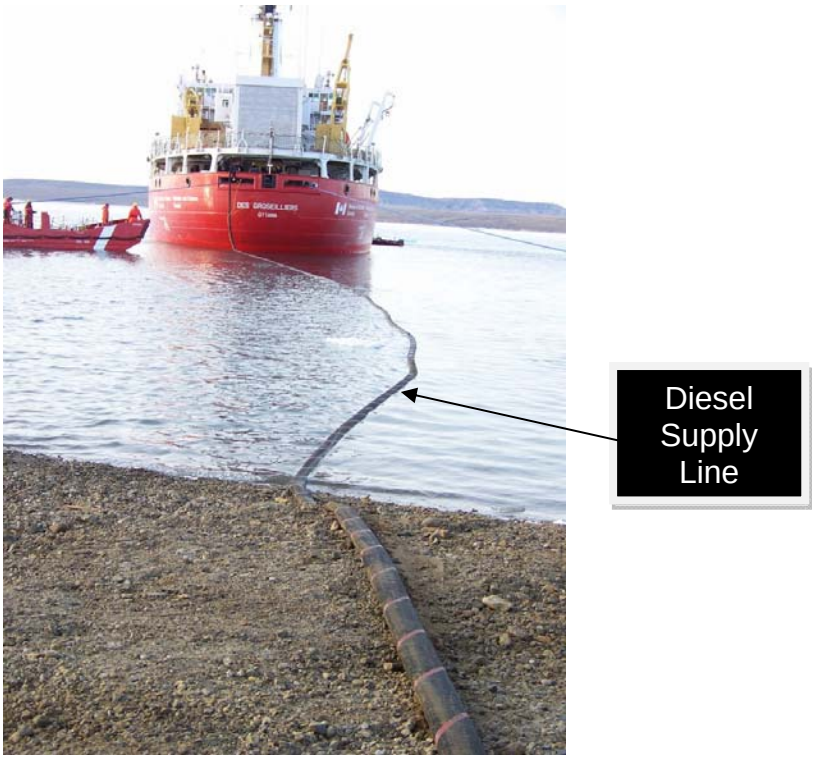


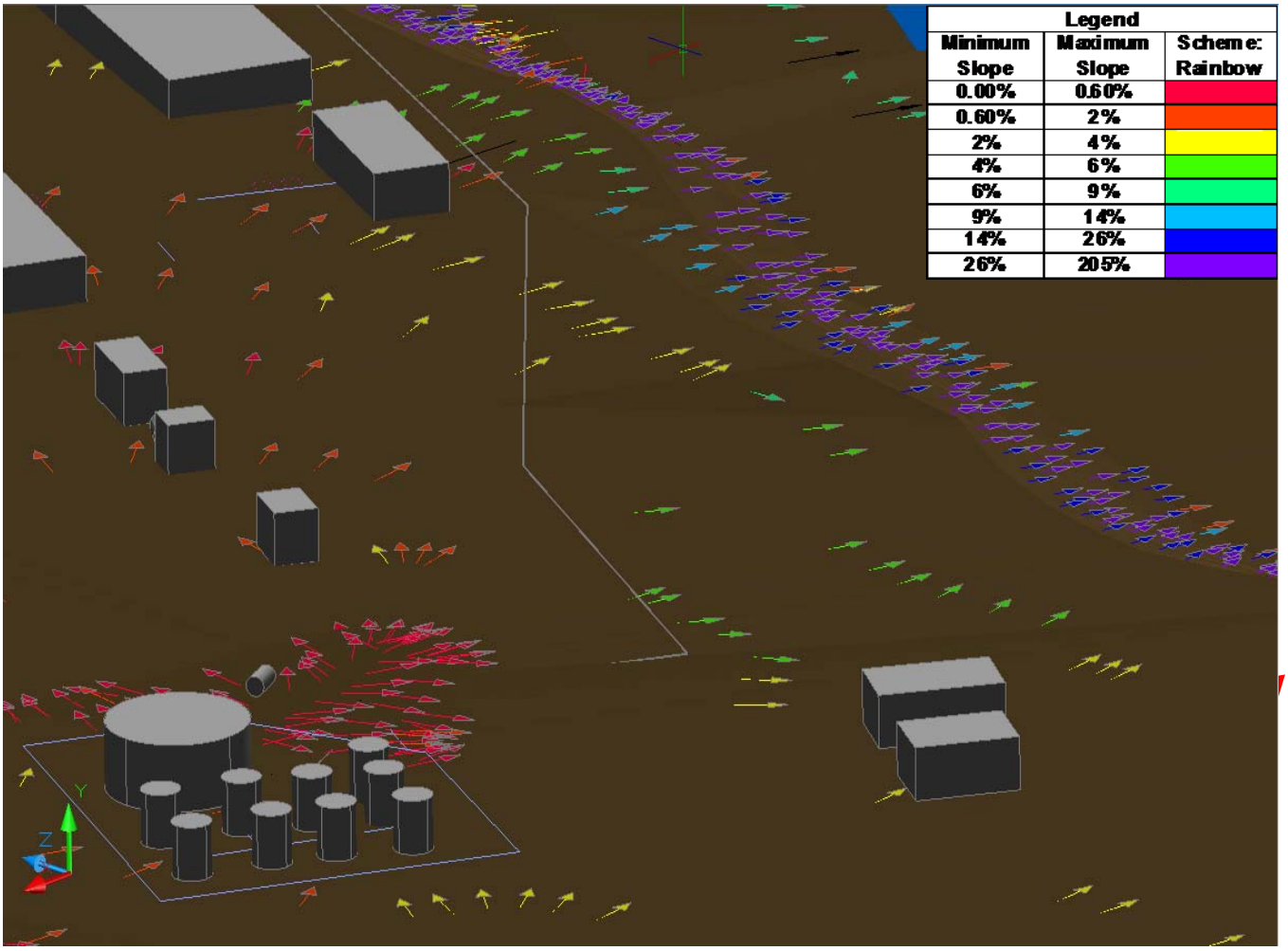
Figure 10: Supply Ship Delivering Diesel Fuel to Eureka

APPENDIX F: EUREKA'S HAWS GASOLINE FUEL SYSTEM

Ten to fifteen barrels of gasoline are brought to Eureka HAWS on the sea-lift each year. The barrels are lifted by a crane on the ship onto a barge which delivers the barrels to the shore (Figure 4). From the barge they are placed on land by a crane located on shore. From the shore, the barrels are conveyed by a loader to the Barrel Storage Area east of the buildings (see Figure 2 and Appendix M) until they are needed to refill the 2,273 L tank. The barrels are brought to the tank by a loader and the contained gasoline is pumped into the gasoline tank.

Figure 11: Transfer of drummed petroleum products to Eureka HAWS

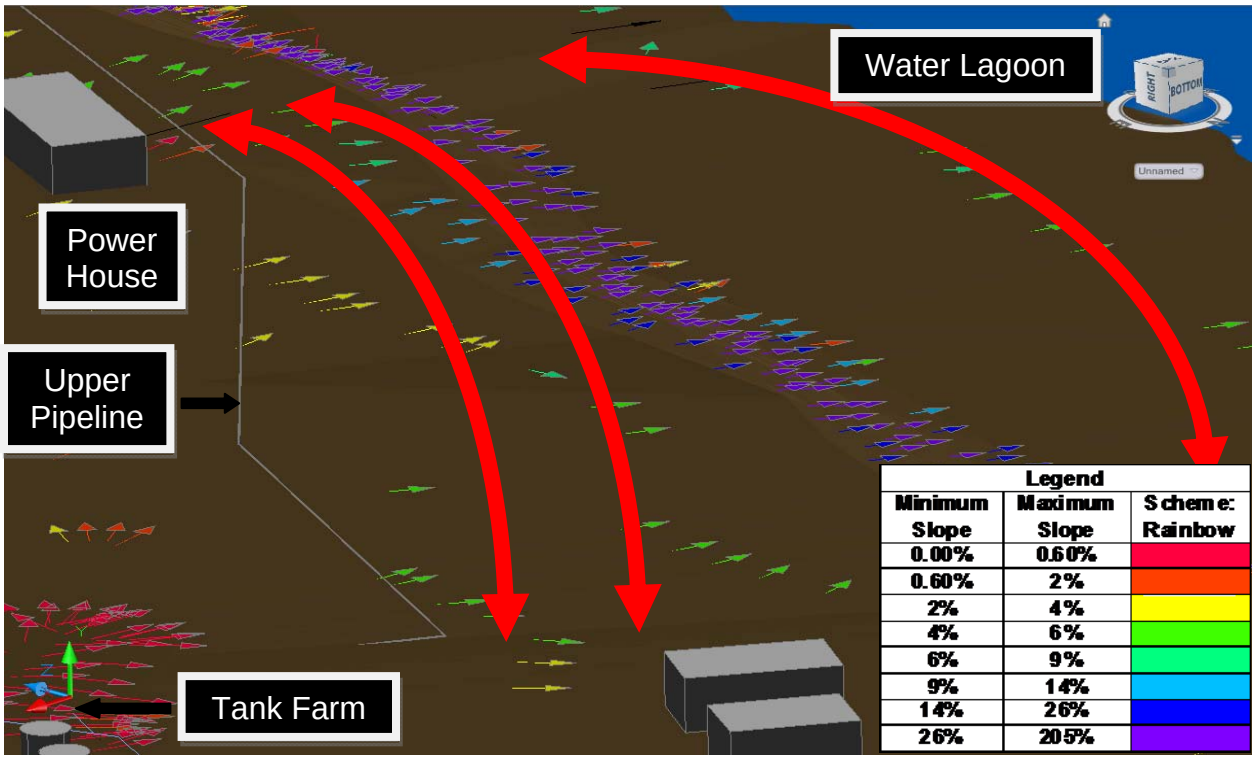
APPENDIX G: TANK FARM: DIRECTION OF POTENTIAL DISCHARGE



Direction of potential discharge from tank farm, diesel dispenser, gasoline tank and possible locations of barriers to prevent contamination of water lagoon

- Individual arrows indicate direction of flow of petroleum spill
- Red lines with arrows indicate possible locations of barriers (piled snow, booms, etc.) to prevent petroleum fluid from reaching water lagoon
- Distance from tank farm, diesel dispenser and gasoline tank to ridge is ~ 85 M
- Distance from ridge to water lagoon is an additional ~ 30 M

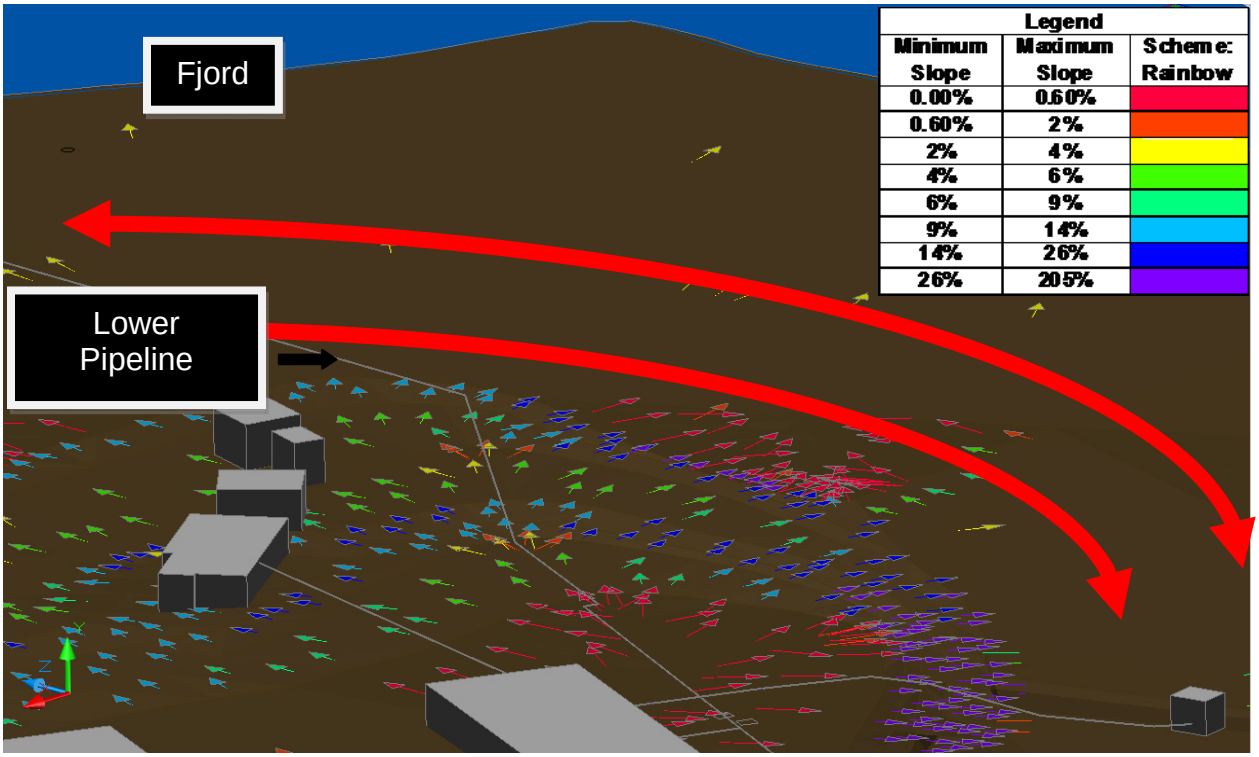
APPENDIX H: NORTH END OF PIPELINE: DIRECTION OF POTENTIAL DISCHARGE



Direction of potential discharge from upper end (north end) of pipeline and possible locations of barriers to prevent contamination of water lagoon

- Individual arrows indicate direction of flow of petroleum spill
- Red lines with arrows indicate possible locations of barriers (piled snow, booms, etc.) to prevent petroleum fluid from reaching water lagoon
- Distance from ridge to water lagoon is ~ 30 M

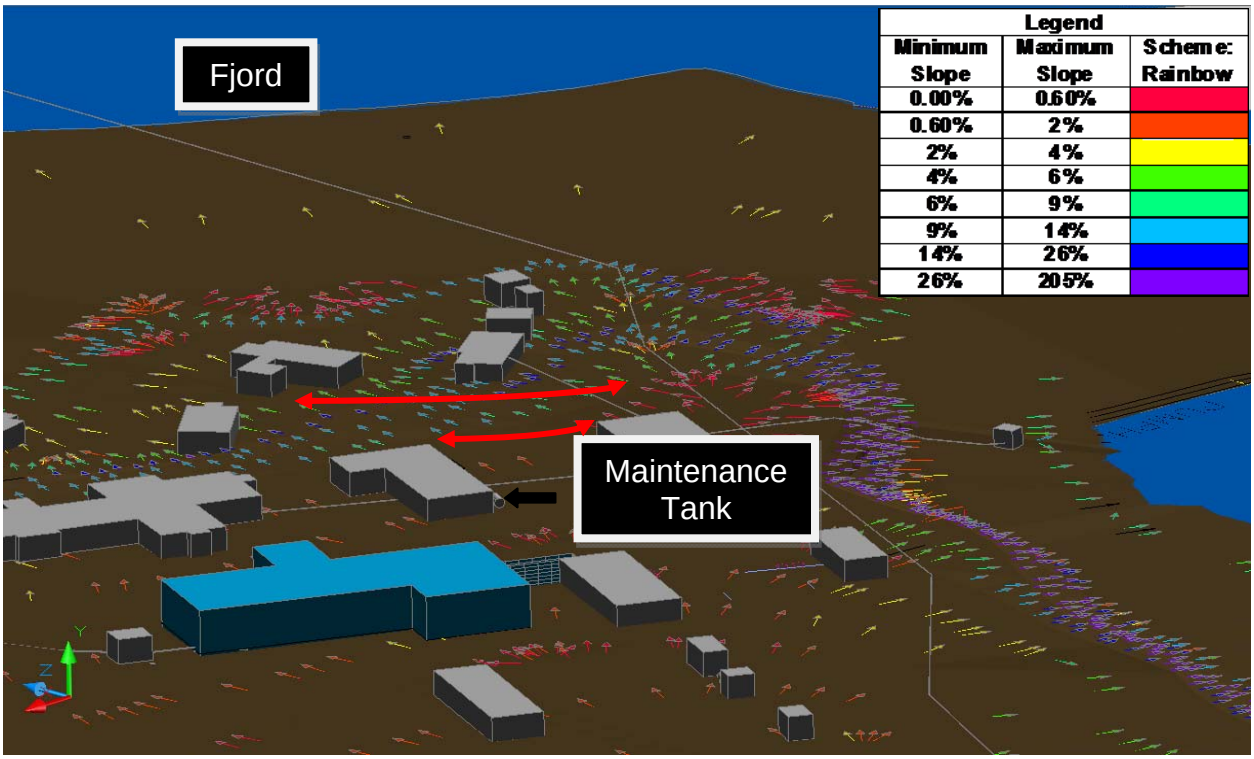
APPENDIX I: SOUTH END OF PIPELINE: DIRECTION OF POTENTIAL DISCHARGE



Direction of potential discharge from lower end (south end) of pipeline and possible locations of barriers to prevent contamination of Fjord

- Individual arrows indicate direction of flow of petroleum spill
- Red lines with arrows indicate possible locations of barriers (piled snow, booms, etc.) to prevent petroleum fluid from reaching the Fjord

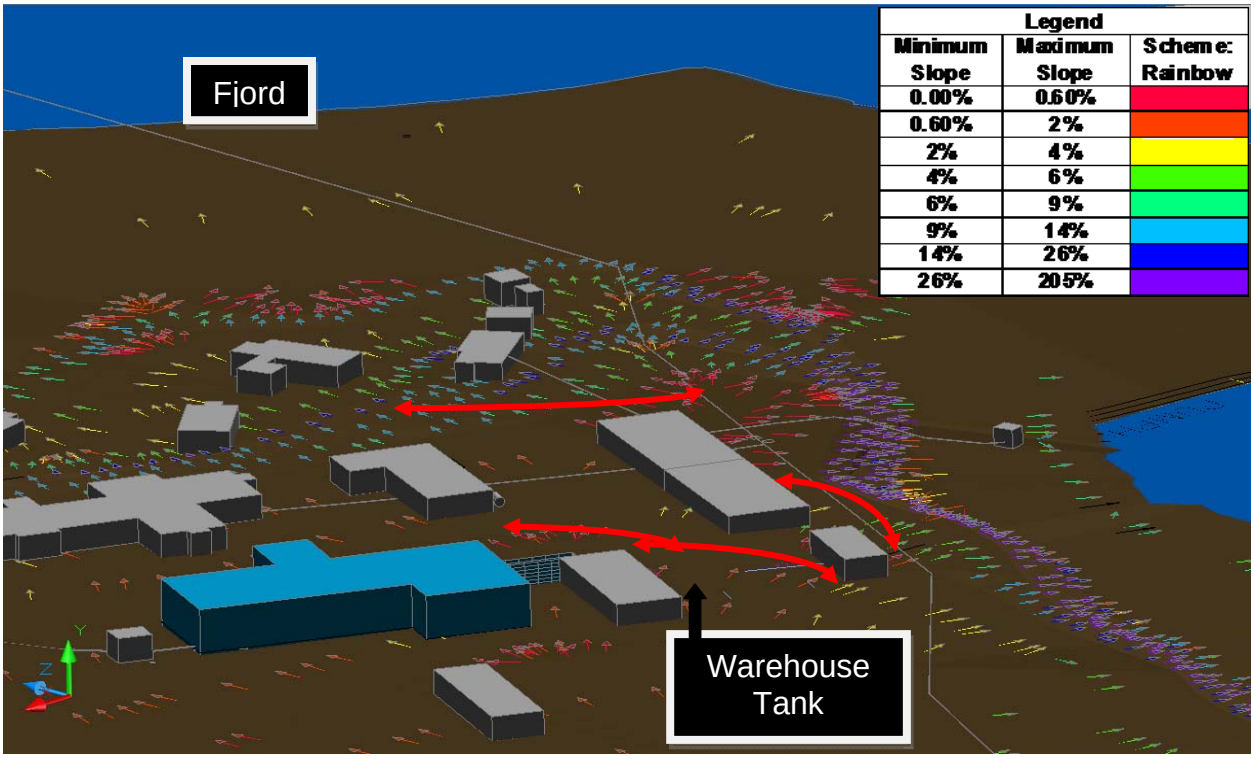
APPENDIX J: MAINTENANCE TANK: DIRECTION OF POTENTIAL DISCHARGE



Direction of potential discharge from maintenance tank and possible locations of barriers to prevent contamination of Fjord

- Individual arrows indicate direction of flow of petroleum spill
- Red lines with arrows indicate possible locations of barriers (piled snow, booms, etc.) to prevent petroleum fluid from reaching the Fjord
- Distance from Maintenance Tank to Fjord is ~ 200 M

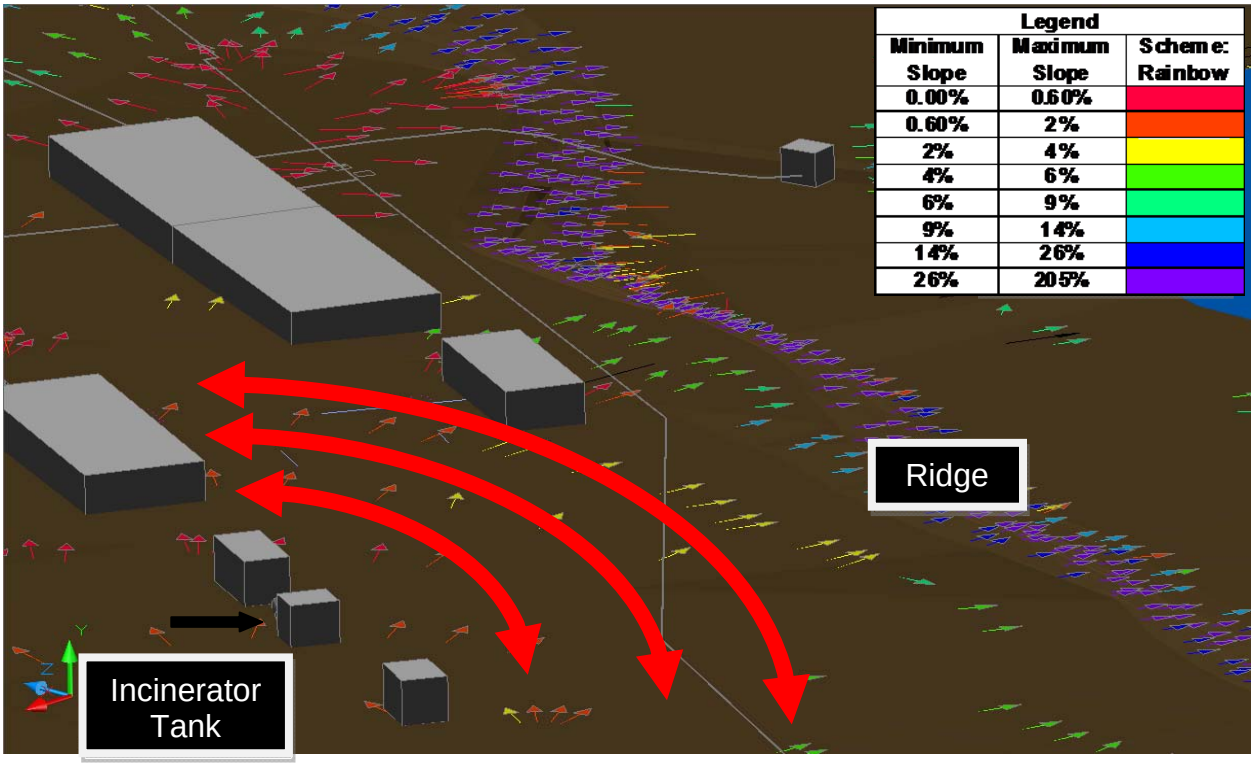
APPENDIX K: WAREHOUSE TANK: DIRECTION OF POTENTIAL DISCHARGE



Direction of potential discharge from warehouse tank and possible locations of barriers to prevent contamination of Fjord.

- Individual arrows indicate direction of flow of petroleum spill
- Red lines with arrows indicate possible locations of barriers (piled snow, booms, etc.) to prevent petroleum fluid from reaching the Fjord
- Distance from Warehouse Tank to Fjord is ~ 250 M

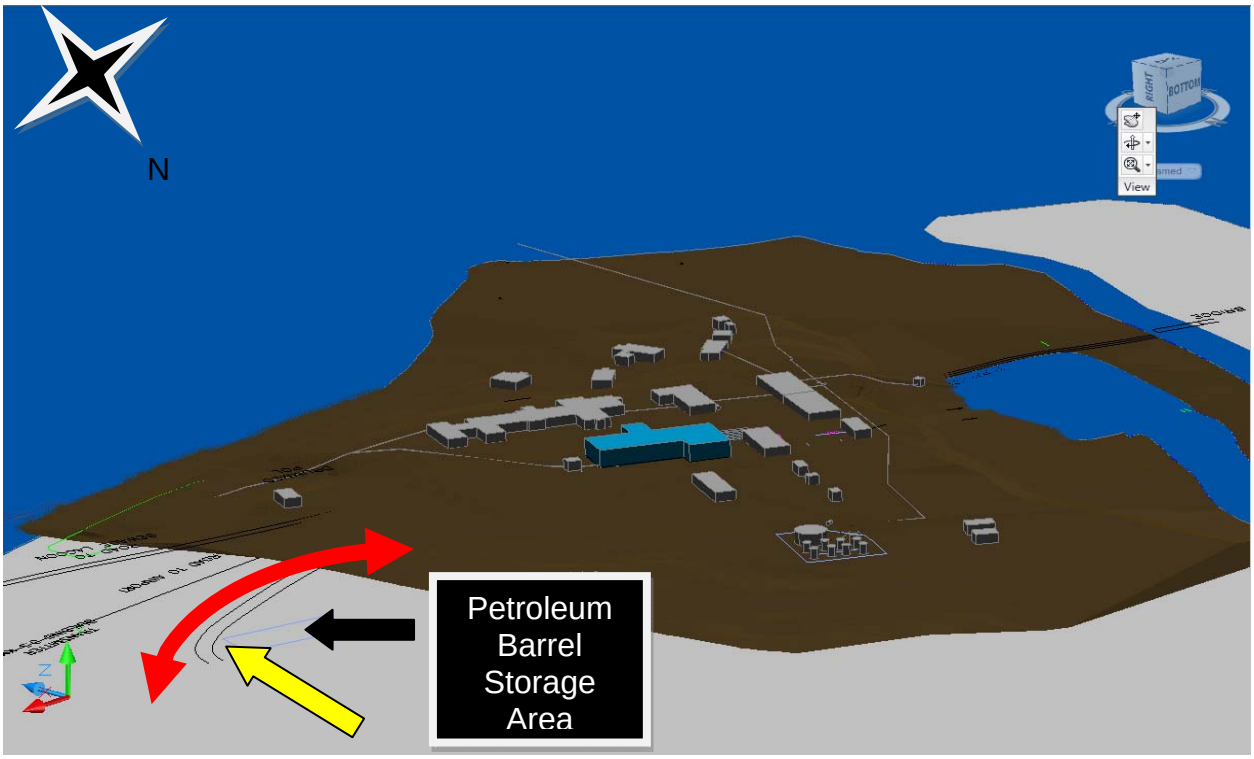
APPENDIX L: INCINERATOR TANK: DIRECTION OF POTENTIAL DISCHARGE



Direction of potential discharge from incinerator tank and possible locations of barriers to prevent contamination of water lagoon

- Individual arrows indicate direction of flow of petroleum spill
- Red lines with arrows indicate possible locations of barriers (piled snow, booms, etc.) to prevent petroleum fluid from reaching the Fjord
- Distance from Incinerator Tank to Water Lagoon is ~ 120 M

APPENDIX M: BARREL STORAGE AREA: DIRECTION OF POTENTIAL DISCHARGE



Direction of potential discharge from barrel storage area and possible locations of barriers to prevent contamination of water lagoon

- Yellow arrow indicates direction of flow of petroleum spill
- Red line with arrows indicate possible location of barrier (piled snow, booms, etc.) to prevent petroleum fluid from reaching the Fjord

APPENDIX N: PREVENTATIVE INITIATIVES COMPLETED OR UNDERWAY

1) Fuel tank farm inspected according to API 653.
2) Fuel tanks inspected with respect to compliance with June, 2008 *Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations.*
3) Fuel tank registration completed in accordance with requirements of above *Regulations* and tanks tagged accordingly.
4) Fuel tanks have been labelled to ensure that the fuel contained therein is properly identified pursuant to Workers Hazardous Materials Information System (WHMIS). Labelling of the tanks and piping for the tank farm has been delayed until repainting is complete in summer 2010. Labels are on site
5) Risk analysis conducted of spills associated with fuel transfer and storage areas.
6) A contract to replace existing hoses in time for the 2010 sealift and provide annual testing and certification is being established.
7) Fuel tanks and associated pipe line will be stripped and repainted. Lead based paint to be sent south for disposal as hazardous material.
8) The mobile tank now has a spill kit.

APPENDIX O: SPILL RESPONSE RESOURCES & EQUIPMENT

The following is a list of Environment Canada equipment on site at Eureka:

1) 2 - 50’ x 24” Containment booms
2) 2 - 5/8” x 100’ Tow Lines
3) 5 - Sorbent Booms (not packages)
4) 5 - Sorbent Rolls
5) 1 - 1000 gallon Port-A-Tank
6) 4 - Hollow Back Round Point Shovels
7) 4 - Rakes
8) 1 - 10 lb. Sledge Hammer
9) 1 - Fire Axe
10) 100 - heavy duty oil spill garbage bags
11) 2 - Portable Honda Generators
12) 6 - portable/mobile radios (167.7 MHz)
13) 1 - Air/Ground base Station (122.8 MHz & 121.5 MHz)
14) 4 - Fire Extinguishers
15) 1 - CAT IT28B Loader
16) 1 - Case 721D Loader

The following could be provided in case of emergency by the Canadian Coast Guard:

1) 1 - Canadian Coast Guard Motorized Landing Craft (LCM)
2) 1 - Canadian Coast Guard Dumb Barge

The following is a list of personal protective equipment (PPE) on site:

1) 10 - goggles
2) 10 - pair nitrile/natural rubber gloves
3) 10 - pair Tyvek Coveralls
4) 6 - set 3 piece rain suits
5) 6 - pair rubber safety boots

APPENDIX P: ENVIRONMENT CANADA SPILL REPORT FORM

Environnement Canada Environment Canada

Spill Report

Internal use only

All releases of petroleum product or allied product MUST be reported by telephone as soon as possible.

This form should be completed by the owner, operator, or the person responsible for managing the response.

Date of Incident :	**Time of Incident:**	**EC Property:**
_____	_____	_____
Weather Conditions:		
_____		

Owner Name:_____ **Division and Direction:** _____

Telephone Number: _____

Operator Name:_____ **Telephone Number:** _____

Reported by:_____ **Signature:**_____

EC Tank Registration Number, if applicable:	EC-_____	EC-_____
Type of Fuel:	_____	
Source of Spill:	Storage Tank ☐ Barrel/Drums ☐ Pumping Operation ☐	Vehicle ☐ Other: _____
How much fuel spilled?	Litres:_____	**If more than 100L, this report SHALL be faxed or scanned to the federal authority with 48 hours.**

Property Management Division, ACEMD

Canada

Environnement Canada Environment Canada

Spill Report

Internal use only

Description of the spill:	Location of spill:	_____
		_____
	Surface or approximate area affected:	_____
	Is the spill contained?	YES ☐ NO ☐
Release Site Description:	Surface at Site:	☐ Paved ☐ Gravel ☐ Vegetation ☐ Concrete Surface
What waterways are in the vicinity of the product release (if applicable)?	_____	
	_____	

Did you contact the appropriate federal authority spill action centres?[1]	YES ☐ NO ☐	Which centre did you contact? _____
Who at EC spill center did you talk to?	Name: _____	Function: _____
	Date: _____	
Incident Number:	_____	
Was a 3rd party property affected by the release?	YES ☐ NO ☐	If yes, who: _____

[1] Refer to PDF Canadian Environmental Emergencies Notification System

Property Management Division, ACEMD

Canada

Environnement Canada Environment Canada

Spill Report

Internal use only

What mitigating measures did you take?	☐ Stop the flow of product ☐ Turned off pumping unit (if applicable) or close manifold valve ☐ Eliminated all sources of ignition ☐ Secured the area ☐ Put on goggles and petroleum resistant gloves and boots ☐ Used absorbents located in storage units to contain and clean up all product ☐ Placed all absorbents in metal drums for disposal ☐ Transport drums to a secure area within facility for temporary storage ☐ Made arrangements to dispose of contaminated materials at an authorized disposal site Other:_____		
Is it possible to keep the system running?	YES ☐	NO ☐	
Is someone supposed to come and fix anything?	YES ☐	NO ☐	If yes, who: _____ _____ _____
The organizations that were notified and / or are involved as well as other relevant information:	_____ _____ _____ _____ _____		

Property Management Division, ACEMD

Canada

Environnement Canada Environment Canada

Spill Report

Internal use only

Property Management Division, ACEMD

Canada

APPENDIX Q: SPILL REPORTING FORM: NUNAVUT GOVERNMENT

Please visit http://www.gov.nu.ca/env/ntnuspill.pdf for the full form.

REFERENCES

1. Eureka Site Safety and Emergency Contingency Plans, Environment Canada, August 2009.
2. Guidelines for Spill Contingency Planning, Indian and Northern Affairs Canada, April 2007.
3. Nunavut Water Board Licence No. 3BC-EUR0611 issued to Environment Canada by the Nunavut Water Board, February 6, 2006.
4. Oil Pollution Emergency Plan for Fuel Transfer at Eureka HAWS, Environment Canada, July 2006.
5. Oil Pollution Emergency Plan for Land Spills, - Eureka High Arctic Weather Station – in support of the Nunavut Water Board Licence No. 3BC-EUR0611, Environment Canada, March 2009.
6. Summary of Operations and Maintenance Procedures for Sewage, Solid Waste Disposal and Waste Treatment Facilities – Eureka High Arctic Weather Station – in support of the Nunavut Water Board Licence No. 3BC-EUR0611, Environment Canada, March 2009.
7. Summary of Spill Events in Canada, 1984-1995, Environment Canada.

Environment Canada Environnement Canada

SUMMARY OF OPERATIONS AND MAINTENANCE PROCEDURES FOR DRINKING WATER, SEWAGE, SOLID WASTE DISPOSAL AND WASTE TREATMENT FACILITIES

— Eureka High Arctic Weather Station —

In support of the
Nunavut Water Board License
No. 3BC-EUR0611

Prepared by Environment Canada
Assets, Contracting and Environmental Management Directorate (ACEMD)

February, 2010

Canada

Control Page

On receipt of revisions and/or amendments, the Assets, Contracting and Environmental Management Directorate (ACEMD) shall complete this control page to ensure that the Summary of Operations and Maintenance Procedures for Sewage, Solid Waste Disposal and Treatment Facilities at Eureka High Arctic Weather Station (HAWS) is always current and consistently reflects the operations and activities taking place on site.

Version	Date in Force	Expiry Date	Description / Purpose
1	November. 23rd, 2007	November 22nd , 2008	Original Summary
2	March 3, 2009	March 3, 2010	Eureka Water License, II. General Considerations, ss. D(ii) Water License Inspection, Nov. 27, 2007 Station Program Manager Review
3	February 16, 2010	February 16, 2011	Update Hazardous Waste Disposal Update Appendices to reflect current practice

Table of Contents

Acronyms and Symbols

ACEMD	Assets, Contracting and Environmental Management Directorate
BOD	Biochemical oxygen demand
CFC	Chlorofluorocarbon
DIAND	Department of Indian Affairs and Northern Development
HAWS	High Arctic Weather Station
L	Liter
m	Metre
m^3	Cubic metre
N	North
PCBs	Polychlorinated biphenyls
PEARL	Polar Environment Atmospheric Research Lab
pH	Measure of acidity or alkalinity
PWGSC	Public Works and Government Services Canada
UV	Ultraviolet
W	West

1. Introduction

This document has been produced to satisfy the requirement of the Nunavut Water Board for the terms of water license number 3BC-EUR0611, part G, section 1:

"1. The Licensee, shall, within sixty (60) days of the issuance of this License, submit to the Board for approval, an Operation and Maintenance Manual in accordance with the "Guidelines for Preparing an Operational and Maintenance Manual for Sewage and Solid Waste Disposal Facilities", October 1996. The scope of the Plan shall be expanded to include the operation and maintenance of the Water Supply Facilities".

The Eureka High Arctic Weather Station (HAWS) is located on the north side of Slidre Fjord, at the north-western tip of Fosheum Peninsula on Ellesmere Island at 80^{o} 0' N and 85^{o}56' W.

The Eureka HAWS is a weather monitoring facility. It is operated by Environment Canada, and has been in operation since 1947. The Eureka HAWS is a centre of activity for Environment Canada, the Department of National Defence, the Polar Continental Shelf Project, and the Polar Environment Atmospheric Research Lab (PEARL). Most of the work is carried out in the short Arctic summer – June, July and August. The number of people located on-site varies between 8 and 40 (this includes the members of the Department of National Defence).

2. Operational Practices for Drinking Water

At Eureka HAWS, drinking water is obtained from a fresh water lagoon located near Station Creek, which is a stream, located immediately to the west of the main Station that carries melt water from ice and snow in the Arctic spring (May and June). No inhabitants reside in the Station Creek watershed.

Some concern has been raised in the past with regards to the runoff from the abandoned dump site that is located at the west end of the runway. The runoff from this part of the airport runway does flow into the Station Creek drainage basin during the spring season. But the potential for any contaminants affecting the water quality of the Creek is very low.

The Creek flows for about three to four months in an average year. The water lagoon is filled by pumping water from the Creek, after the spring runoff has slowed down and the water is running clear of suspended solids. The volume of the water in the impoundment must be sufficient to supply the Eureka HAWS needs throughout the year. It is estimated that the impoundment holds approximately 12,000 m^3 of water. Daily consumption of water for a location such as Eureka HAWS has been estimated to be 290 L per person per day (Smith and Nahir, 2000). The volumes of water used in 2005 to 2007 by the Eureka HAWS are shown in Table 1.

Table 1. Volume of water used by Eureka HAWS from 2005 to 2008.

Month	Volume (m^3)			
	2005	2006	2007	2008
January	104.9	22	131.9	126.9
February	109.9	136.5	106.3	178.0
March	187.5	102.1	222.6	271.4
April	63.7	73.6	209.2	236.3
May	220.6	196.6	273.8	410.7
June	266.9	191.3	325.6	499.7
July	309.6	102.4	319.3	423.3
August	234.3	84.4	167.7	163.3
September	234.9	77.8	153.9	221.1
October	69.4	106.7	n/a	183.1
November	71.5	106.4	n/a	103.9
December	78.1	107.9	n/a	159.9
Annual Total	**1951.3**	**1307.7**	**1910.3**	**2977.6**

n/a = not available

Periodic (yearly and monthly) analysis of water samples collected from the impoundment, holding tanks and from inside the Eureka HAWS indicate that the chlorination, filtration, ultraviolet (UV) and reverse-osmosis treatments of the raw water provides good quality water to the station.

Monthly drinking water sampling and analysis is carried out on-site to assess the acceptance of the treated water and to ensure no threat to the staff's health.

A schematic of the water distribution system is shown in Figure 1.

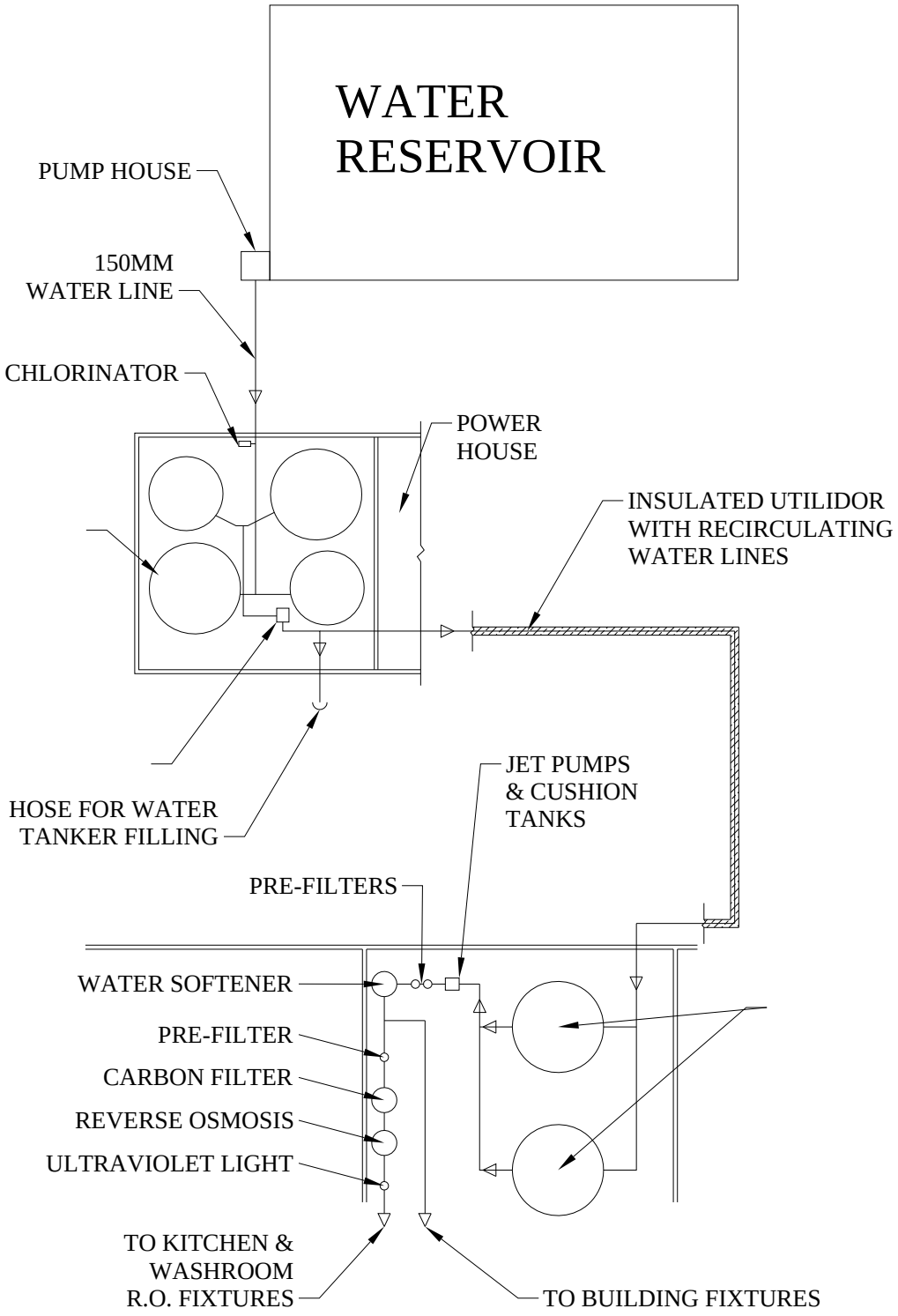


Figure 1. Water distribution system at Eureka HAWS.

3. Management of Wastewater

The following section describes the management of wastewater at Eureka HAWS.

3.1 General Description of the System

The wastewater and sewage lagoon at the Eureka HAWS is a single cell, engineered retention lagoon and is located to the south of the complex in the immediate vicinity of the Fjord (Figure 2). The volume of the lagoon was estimated as follows, by using the known dimensions and by integrating these in a formula by Smith and Nahir, 2000 (Table 2):

Table 2. Lagoon Dimensions at Eureka HAWS.

Length	
Length – South Side	100.6 m
Length – North Side	89.8 m
Average Length	**95.2 m**

Width	
Width – East Side	19.7 m
Width – West Side	24.9 m
Average Width	**22.3 m**

Depth	
Average Depth	**2.0 m**

Estimation of volume of the lagoon

Volume = Length x Width x Depth
= 95.2 m x 22.3 m x 1.05 m
= 2229 m^3
= 2.23 x 10^6 L

Maximum Daily Flow Rate (to fill the lagoon) = $\frac{\text{Volume}}{365 \text{ days}}$
= $\frac{2.23 \times 10^6 \text{L}}{365 \text{ days}}$
= 6109.6 L/day

It is estimated that a person will use 290 liters per day of water and therefore:

= $\frac{6109.6 \text{ L/day}}{290 \text{ L/day}}$
= waste from 21 people will fill the lagoon

Figure 2. Wastewater treatment cell at Eureka HAWS.

3.2 Collection into the System

Due to the closed nature of the system, it is expected that the volume of wastewater produced will be virtually the same as the volume of the water used.

The collection of the wastewater throughout the Station occurs by gravity. All piping is located within warm portions of the facility. The wastewater is then collected in a storage tank in a separate building at the northeast corner of the complex. The collected wastewater is intermittently pumped to the lagoon when the volume of the liquid in the holding tank reaches a preset level.

3.3 Treatment and Discharge of the System

Wastewater is pumped to the lagoon where solids are allowed to settle and limited decomposition takes place. A sump area was excavated in the bottom of the lagoon. This allows a large pump to be placed below the level of the actual bottom of the lagoon and pump out the content into the Fjord. The sewage lagoon is usually emptied twice a year – at the beginning of July and the end of August. In early July, the sewage lagoon needs to be emptied as it is filled to capacity. Lagoon is decanted a second time at the end of August prior to freezing to ensure that the lagoon is completely empty prior to entering the winter season.

Figure 3. Lagoon Prior to emptying.

Figure 4. Sampling of effluent.

The decanting process normally takes about 48 hours. Wastewater samples are collected at the discharge pipe. Samples of wastewater are taken when lagoon is 2/3 (16 hours) & 1/3 (32 hours) decanted and sent to lab for analysis within 24 hours.

The samples are analyzed for biochemical oxygen demand (BOD_5), total suspended solids, ammonia, fecal coliforms, pH, metals, oil and grease and total phenols.

4. Landfill Strategy

4.1 Introduction

4.1.1 Purpose

This manual has been produced to assist Eureka personnel in the proper operation and maintenance of the Weather Station's land fill disposal facilities.

4.1.2 Site Setting

The Eureka HAWS is located on the north side of Slidre Fiord, at the south-western tip of Fosheim Peninsula, Ellesmere Island, Nunavut at site coordinates 79^{o} 59' 41"N and 85^{o} 48' 48"W (see Appendix1[1]). It is located in the Eureka Hills Eco-region, within the Northern Arctic Eco-zone and the topography of the area is rolling and ridged, reaching altitudes of no more than 1000 m above sea level. Soils in the Site area are primarily a sand/gravel fill underlain by silty, sandy clays. Permfafrost is present with an active layer ranging between 0.6 and 1.2 m in thickness. The climate is cold and dry; mean annual temperatures range from -30.5^{o}C in winter to 0.5^{o}C in summer. Annual precipitation ranges between 50 to 75 mm. The prevailing winds are from the west.

The main portion of the Site occupies an area immediately east of Station Creek and contains approximately 17 buildings with associated infrastructure. An airstrip is located approximately 1.5 km northeast of the main site. The Site is located on a hillside sloping down from the airstrip, levelling out where most facilities are located before sloping down further to the ocean. A 20 km road to the north connects the Site with an experimental facility, the former ASTRO Lab, now known as the PEARL Facility (Polar Environment Atmospheric Research Laboratory).

The total area of the occupied Site is approximately 2.23 hectares and is held under INAC Land Use Permit #1021. The permit was initially established in 1955 and was apparently expanded to its current size of approximately 4744 hectares in 1972.

4.1.3 Population Projection

While the population varies, particularly in the summer, the average population is about 10 and is not expected to change in the foreseeable future.

4.1.4 Contact List

Rai LeCotey/Al Gaudet Eureka Wx Stn, eurekawxstn@ec.gc.ca
Station Program Manager
Eureka Weather Station
Nunavut, NU
Tel: 613.945.3145 Ext 4460

4.2 Background

4.2.1 Context

Solid waste management at Eureka is a challenge for the following reasons:

- Extreme cold;
- Isolation;
- High cost of transportation; and
- Tiny population

Eureka is a weather station located at 80^{o} N with, as indicated above, a population of approximately 10 people. The site is only accessible by air and sea. Personnel, mail, freight and food are flown in to Eureka on a monthly basis. Once a year, a Canadian Coast Guard ice breaker brings supplies in late August. Any materials sent out from Eureka for disposal or recycling on the return trip of the Coast Guard must remain in the Arctic port of Nanisivik for one year before it can be sent south.
Notwithstanding the constraints that the above place on normal waste management practices, Eureka is committed to practices of procurement of green products, diversion from land fill sites, reuse and recycling.

4.2.2 Solid Waste Generation

- 10-12 bags of kitchen wastes are generated weekly. Based on an evaluation of the garbage log of 2006, each person in Eureka generates approximately 8 kg of waste per day.
- Significant volumes of cardboard boxes and wooden pallets are generated from the packaging material that accompanies the food.
- Currently approximately 1000 L of waste oil is produced each year on site, and together with other miscellaneous petroleum products, are currently stored in empty 205 L drums in a storage compound between the airstrip and main complex.
- Miscellaneous chemicals such as solvents and glycols are placed in empty barrels until filled.

4.3 Landfill Locations

(See Appendix 2[2])

4.3.1 East Landfill

This landfill is used to contain non-organic/non-hazardous waste that cannot be incinerated and is located at the east end of the landing strip (79^{o} 59.484'N and 85^{o} 46.335'W). Ash from the incinerator is also landfilled at this location.

4.3.2. Ash Landfill

The ash landfill also receives ash from the incineration of kitchen wastes although since 2000 there has been little ash deposited at this site. It is located south of the airstrip and slightly west of the South Landfill (79^{o} 59.534'N and 85^{o} 47.865'W).

4.3.3 Asbestos Landfill

The asbestos landfill is adjacent to the ash land fill (79^{o} 59.531'N and 85^{o} 46.838'W). This landfill receives any asbestos removed from buildings on site.

4.3.4 West Landfill

This site is closed (79^{o}59.844'N and 85^{o}51.125'W). It contains kitchen waste and buried fuel drums.

4.3.5 Crushed Barrel Landfill

This site is located south of the runway (79^{o} 59.374'N and 85^{o} 55.586'W) but west of the South Landfill.

4.3.6 History of Existing Landfills

An extensive, but unsuccessful, effort was undertaken to locate historical plans and drawings of the landfills at Eureka.

4.4 Operation and Maintenance of Solid Waste

4.4.1 Site Description

As previously noted, the major active landfills are just south of the east end of the landing strip. They are approximately 1.3 km from the Fjord. As the drainage from the above disposal grounds flows in the direction of the Fjord, there is concern that the surface runoff and leachate could reach the Fjord. As required by the Surveillance Monitoring Program, pursuant to Eureka's water licence, Eureka monitors the runoff during periods of flow.

4.4.2 Waste Separation

Eureka's waste is separated into organic (kitchen waste), non-organic (cans, bottles, old vehicles, etc.), construction and demolition (wood, asbestos, etc.) and hazardous (waste oil, hydraulic fluids, batteries, oxygen depleting substances, old window and door frames with lead paint, etc). It should be noted that Eureka uses green products (nonhazardous and biodegradable) when possible (See Appendix 3[3]).

4.5 Disposal Procedures

4.5.1 Organic Waste

Organic and burnable waste is disposed of in a state of the art incinerator which was installed in 2008 and which meets the latest Environment Canada requirements. As mentioned previously, two to three times a week, the heavy equipment operator takes between 10-12 bags to the incinerator for burning which includes food cans. The ash generated by the burning is packaged in clean 205 L barrels (approximately 24/year) and moved with heavy equipment to the storage compound where it is free from disturbance. In the summer months, the ash (without the barrels) is deposited in a cell of the East Landfill and capped with 0.3 m of gravel capping material at a 3:1 slope.

4.5.2 Non-Organic, Non-Hazardous Waste

Non-organic and non-hazardous waste that cannot be incinerated is deposited in the East Landfill. The waste deposited in this land fill includes tires, construction materials (drywall, siding, wood, steel, tin, ash from incinerator), old vehicles and equipment (drained of fluids and batteries removed), wire, cable, tin, steel, copper, aluminum, empty compressed gas cylinders, plastics. Capping consists of 0.3 m of compacted native soils scraped from the surrounding gully.

4.5.3 Asbestos Waste

The limited amount of asbestos generated is double-bagged, placed in the Asbestos Landfill and covered with 1.5 m of gravel capping material and its location recorded so that subsurface soils will not be disturbed in the future.

4.5.4 Empty Drums

Any remaining liquid in empty drums is collected as hazardous material; the drums are then crushed, placed in the Crushed Barrel Landfill and covered with 1.5 m of gravel capping material

4.5.5 Hazardous Waste

- Secondary containment of hazardous materials awaiting disposal is provided in the form of salvage drums, crates, constructed with plastic lining or secondary containment pallets.
- Used oil is shipped as retrograde cargo on the annual sea lift to a certified recycling depot in the south.
- Used jet fuel is shipped as retrograde cargo on the annual sea lift to a certified recycling depot in the south. EC is currently seeking a waste fuel burner which is capable of burning fuel that contains water.
- When sufficient batteries are collected (~ 2-3 pallets), they are shipped as retrograde cargo on the annual sea lift to a certified recycling depot in the south.

- Waste glycol is shipped out on sealifts or flights of “opportunity” to Safety-Kleen (Quebec) Ltd. 85 rue de Hambourg, Saint-Augustin-de Desmaures, QC, G3A 1S6.
- Ozone depleting substances are shipped out on flights of “opportunity” to a certified depot in the south.

4.6 Maintenance

There is not a problem with windblown debris because most material subject to being carried by the wind is either incinerated or fully covered in the summer. Appropriate signage is posted.

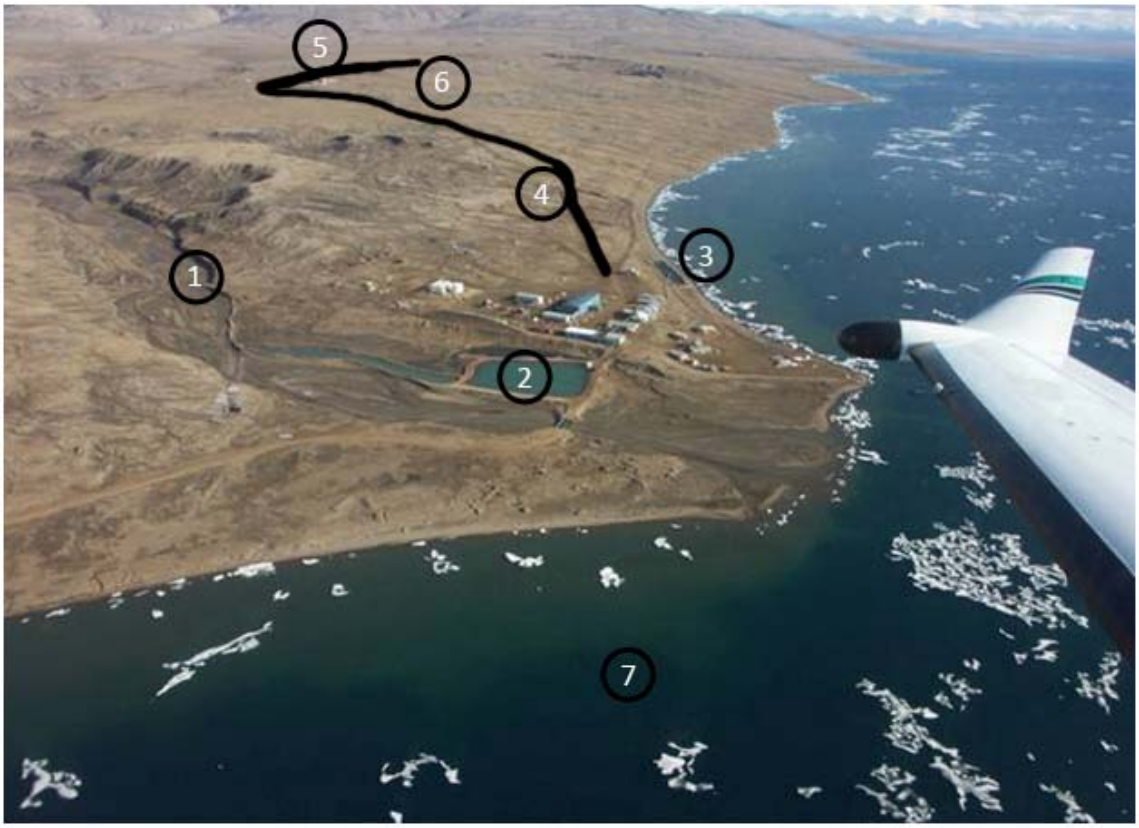
Odour control is also not a problem because all organic waste is incinerated.

Outdoor burning is not carried out in Eureka in conformity with the Nunavut Water Board’s direction unless the incinerator breaks down or a “bulk” burning {eg. sealift crates & pallets (non pressure treated wood), cardboard} is carried out. In both of the preceding situations, DIAND’s Inspector is informed.

4.7 Records

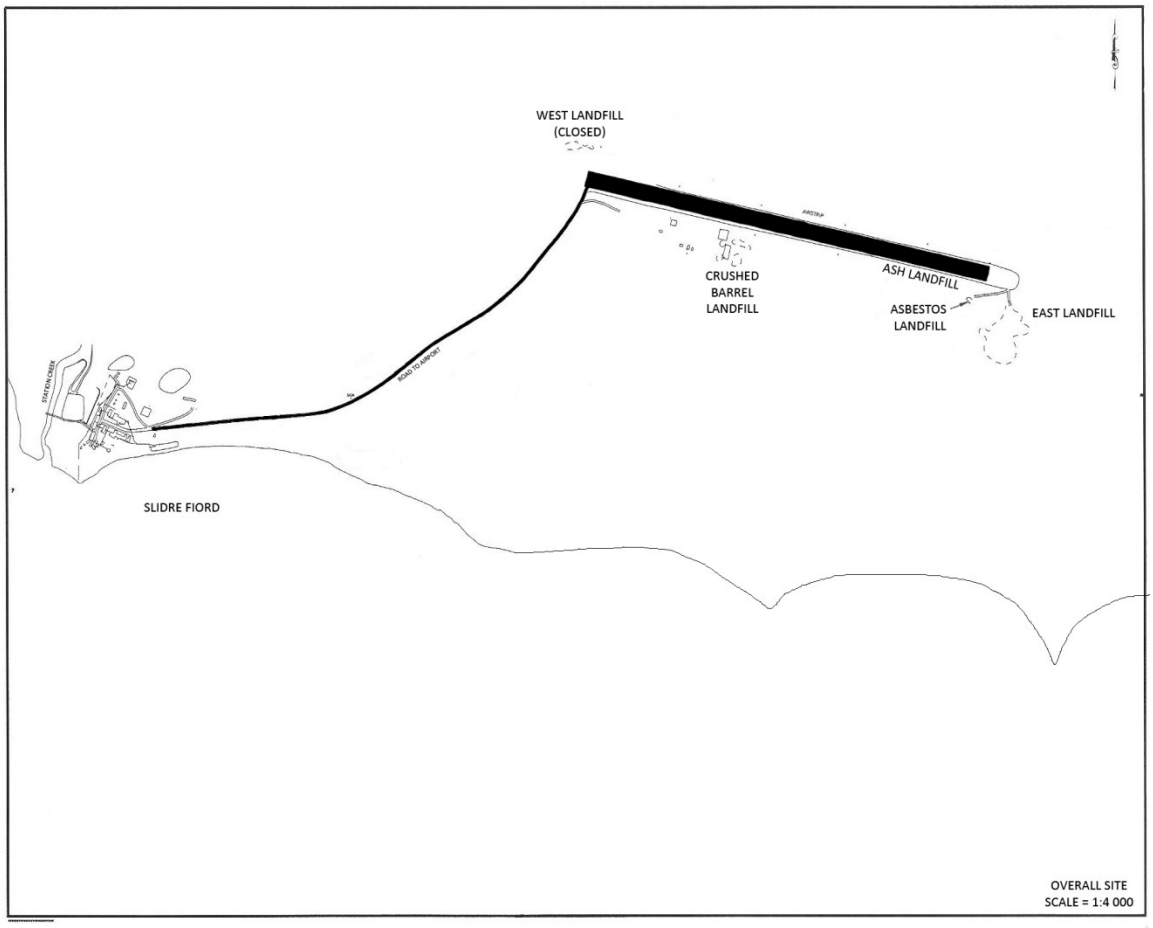
- Quantities of garbage generated are recorded monthly.
- MSDS sheets are available for viewing by personnel.
- Maintenance of landfills are recorded and described under Progressive Reclamation Work Undertaken in Eureka’s Annual Report to the Water Board.
- Manifests are obtained and filed for shipments of hazardous material.
- Annual inspections by DIAND are recorded and a response is forwarded to DIAND and the Water Board.

Appendix 1: Eureka Weather Station, Nunavut



1. STATION CREEK
2. WATER SUPPLY LAGOON
3. SEWAGE LAGOON
4. ROAD TO RUNWAY
5. RUNWAY
6. EAST, ASBESTOS, ASH LANDFILLS
7. SLIDRE FIORD

Appendix 2: Locations of Eureka's Landfills



5. References

Duong, D. and R. Kent (1996). *Guidelines for the Preparation of an Operation and Maintenance Manual for Sewage and Solid Waste Disposal Facilities in the Northwest Territories*. Government of the Northwest Territories, Municipal and Community Affairs Community Development.

Environmental Services, Public Works and Government Services Canada (Western and Northern Region) (1998). *Waste Management Plan for Eureka High Arctic Weather Station*. A report prepared for Atmospheric Environment Services, Environment Canada, Prairie and Northern Region.

Smith, D.W. and M. Nahir (2000). *Study of the Wastewater and Water Supply systems at the Eureka Weather Station*. A report prepared for Atmospheric Services, Environment Canada by Public Works and Government Services Canada, Western Region.

Environment Canada Environnement Canada

INTERIM ABANDONMENT & RESTORATION PLAN

- Eureka High Arctic Weather Station –

In support of the
Nunavut Water Board License
No. 3BC-EUR0611

Prepared by Environment Canada
Assets, Contracting and Environmental Management Directorate (ACEMD)

March 2009

Canada

CONTROL PAGE

On receipt of revisions and/or amendments, the Assets, Contracting and Environmental Management Directorate (ACEMD) shall complete this control page to ensure that the Interim Abandonment & Restoration Plan is always current and consistently reflects the operations and activities taking place on site.

Revision Number	Date Inserted	Description	Signature

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ACRONYMS AND SYMBOLS

ACEMB	Assets, Contracting and Environmental Management Directorate
CCME	Canadian Council of Ministers of the Environment
EA	Environmental Assessment
EC	Environment Canada
NRC	National Research Council Canada
ODS	Oxygen Depleting Substances
PCB	Polychlorinated Biphenyls
PHC	Petroleum Hydrocarbons
POL	Petroleum, Oil, Liquids
PWGSC	Public Works Government Services Canada
SOP	Standard Operating Procedure

PART I: INTRODUCTION:

BACKGROUND:

All facilities must eventually cease their activities, either temporarily or permanently. When such operations cease, the owner and operator must close the facility in a way that ensures it will not pose a future threat to human health and the environment. Therefore, an Abandonment and Restoration Plan is used to achieve "clean closure."

PURPOSE:

The purpose of this interim Abandonment and Restoration Plan (the Plan) is to provide:

- Conceptual detail on the reclamation of the components of the Eureka site which will not be closed until near the end of its useful life; and
- Operational detail for components which are to be progressively reclaimed now or in the near future.

APPROACH TO PLAN:

The approach taken to develop this Plan is underpinned by the Environment Canada's (EC) commitment to the following global objectives:

- Physical Stability: remaining items will be constructed or modified at closure to be physically stable such that they do not erode, subside or move from their intended location.

- Chemically Stability: remaining items will be chemically stable; the remaining chemical constituents should not endanger public, wildlife or environmental health and safety.

- Future Use and Aesthetics: the site will be compatible with the surrounding lands once abandonment activities have been completed.

The specific actions of the Plan to remediate each of the facility components are, in turn, based on more detailed objectives formulated to achieve the above global intentions. The Plan is an evolutionary document and thus reclamation activities will be more fully described as new information is made available from progressive restoration activities (and associated studies), associated environmental assessments and monitoring results of the aforementioned restoration activities.

The following considerations were considered in the development, evolution and implementation of Eureka's Abandonment and Restoration Plan:

- Respect all historical agreements and obligations in a fair manner;
- Ensure consistency with federal guidelines for the management of contaminated sites;
- Apply simple, practical remedial solutions wherever possible, with flexibility as necessary to adjust to site-specific conditions when they become evident;
- Take into account the warming of the Arctic; and
- Directions from the Nunavut Water Board and inspection reports provided by the Department of Indian and Northern Affairs.

PART II: SITE DESCRIPTION

The Eureka High Arctic Weather Station (HAWS) is located on the north side of Slidre Fjord, at the northwestern tip of Fosheim Peninsula, Ellesmere Island, Nunavut at site coordinates 79°59'41"N and 85°48'48"W.

The total area of the occupied Site is approximately 2.23 ha.

BIOPHYSICAL ENVIRONMENT

PHYSIOGRAPHIC DESCRIPTION:

It is located in the Eureka Hills Eco-region, within the Northern Arctic Ecozone and the topography of the area is rolling and ridged, reaching altitudes of no more than 1000 m above sea level.

Soils in the Site area are primarily a sand/gravel fill underlain by silty, sandy clays.

Permafrost is present with an active layer ranging between 0.6 and 1.2 m in thickness.

CLIMATE

The climate is cold and dry; mean annual temperatures range from -30°C in winter to 0.5°C in summer. Annual precipitation ranges between 50 to 150 mm.

FAUNA

Fauna include must, oxen, Arctic wolves, Arctic foxes, Arctic hares, and lemmings. In addition, summer nesting geese, ducks, owls, loons, ravens, gulls and many other smaller birds nest, raise their young and return south in August.

CURRENT ENVIRONMENTAL CONDITIONS

A Study conducted in 2006 (NRC) provided a list of sites with the highest contamination levels and/or sites which had 100% of their respective samples test above CCME guideline criteria. These sites were:

- North Airstrip Apron
- Sewage Lagoon
- Barrel Dump

A 2007 Environmental Site Assessment (EA) identified the following at Eureka:

- 16 areas of potential environmental concern
- Potentially contaminated environmental media identified at
    - Fuel tank farm (old and new)
    - Powerhouse
    - DND warehouse fuel tank vicinity
    - Bulky debris landfill east of airstrip

CURRENT PERMITS, LICENCES HELD

- Nunavut Water Board Licence No. 3BC-EUR0611 (See Appendix)

PART III: THE PLAN

The Plan consists of the following elements:

1. specific abandonment and restoration objectives and actions to be taken to achieve those objectives for each of the facility components for both temporary and permanent closure;
2. details of measures to be employed for progressive restoration;
3. monitoring program to be employed in recording the success of on-going restoration activities;
4. description of the final landscape and how aesthetic concerns will be factored into the restoration process; and
5. post-closure treatment potentially required for drainage water that is not acceptable for discharge.

TEMPORARY CLOSURE

In the context of Eureka, temporary closure refers to the shutting down operations for a period of time with the intention of resuming operations in the future. The period of shutdown could be for a week or longer and would be a function of political, economic, environmental or social.

To ensure that this component of the Eureka site does not become a source of contamination or a safety hazard to wildlife and humans during temporary closure periods.

The political (sovereignty) and environmental (climate) roles played by Eureka make it unlikely that Eureka will ever be abandoned. Notwithstanding, the basic abandonment and restoration objective would be to ensure that the various components of the Eureka site do not become a source of contamination or a safety hazard to wildlife and humans during temporary closure periods. Environment Canada will ensure that the following general conditions are met:

- Sufficient staff are on-site to protect the health and safety of humans, wildlife and the environment and the expertise is made available to care for the site and any potential problems that may arise;
- Sufficient equipment and supplies are left on site for any maintenance or reclamation activities that may need to be implemented;
- Access to the site, buildings and other structures will be secured and restricted to authorized personnel only;
- All legislated requirements (eg. Provisions of water licence) will be complied; and
- Warning signs continue to be posted where appropriate.

TEMPORARY CLOSURE PLAN - EUREKA		
Site Component	**Specific Abandonment and Restoration Objective**	**Actions to be taken to achieve Objective**
• Operations & Barracks Buildings • Maintenance garage • Warehouses • Shops & other buildings • Pumphouse • Electrical, plumbing & carpentry facilities • Powerhouse	• To ensure that this component of the Eureka site does not become a source of contamination or a safety hazard to wildlife and humans during temporary closure periods.	• Develop Standard Operating Procedures (SOP) for temporary closure for each building;
• Water reservoir • Water diversion area	• To ensure that this component of the Eureka site does not become a source of contamination or a safety hazard to wildlife and humans during temporary closure periods.	• Develop an SOP to ensure that water diversion area is closed before any temporary closure of the site
• Contaminated (oil, fuel, chemicals) sites	• To ensure that this component of the Eureka site does not become a source of contamination or a safety hazard to wildlife and humans during temporary closure periods.	• Identify all open conduits in and around the contaminated sites • Develop an SOP to ensure that any open conduits (monitoring wells, open pits, etc.) are closed and secure
• Infrastructure (eg. airstrip, electrical power supply	• To ensure that this component of the Eureka	• Develop Standard Operating Procedures for temporary closure;

TEMPORARY CLOSURE PLAN - EUREKA		
Site Component	**Specific Abandonment and Restoration Objective**	**Actions to be taken to achieve Objective**
systems, culverts, barge landings, sewage lagoon piping, water supply piping and associated infrastructure)	site does not become a source of contamination or a safety hazard to wildlife and humans during temporary closure periods.	
• Hazardous materials (eg. POL Fluids, PCB containing material, ODS containing equipment, batteries, asbestos; compressed gas cylinders; lead-based paint)	• To ensure that this component of the Eureka site does not become a source of contamination or a safety hazard to wildlife and humans during temporary closure periods.	• Determine temporary storage requirements of all hazardous materials • Develop Temporary Storage Plan for hazardous materials
• Sewage lagoon	• To ensure that this component of the Eureka site does not become a source of contamination or a safety hazard to wildlife and humans during temporary closure periods.	• Identify all influent channels into sewage lagoon • Develop SOP to ensure that all influent channels are closed during temporary closure periods
• Incinerator	• To ensure that this component of the Eureka site does not become a source of contamination or a safety hazard to wildlife and humans	• Determine temporary storage requirements for incinerator • Develop SOP for temporary shut-down and storage of incinerator

TEMPORARY CLOSURE PLAN - EUREKA		
Site Component	**Specific Abandonment and Restoration Objective**	**Actions to be taken to achieve Objective**
	during temporary closure periods.	
• Solid Waste Landfill Sites	• To ensure that this component of the Eureka site does not become a source of contamination or a safety hazard to wildlife and humans during temporary closure periods.	• Identify all open conduits in and around the contaminated sites • Develop an SOP to ensure that any open conduits (monitoring wells, open pits, etc.) are closed and secure
• Barrels	• To ensure that this component of the Eureka site does not become a source of contamination or a safety hazard to wildlife and humans during temporary closure periods.	• Apply general health and safety principles to ensure barrels do not pose a threat

PERMANENT CLOSURE AND RECLAMATION

The following Permanent Closure and Reclamation Plan outlines specific abandonment and restoration objectives and actions to be taken to achieve those objectives for each of the facility components for permanent closure. Actions currently being undertaken to remediate some site components (progressive restoration) are indicated by dates contained within brackets.

PERMANENT CLOSURE AND RECLAMATION PLAN		
Site Component	**Specific Abandonment and Restoration Objective**	**Actions to be taken to achieve Objective**
• Operations & Barracks Buildings • Maintenance garage • Warehouses • Shops & other buildings • Pumphouse • Electrical, plumbing & carpentry facilities • Powerhouse	• To ensure that this component of the Eureka site does not become a source of contamination or a safety hazard to wildlife and humans during temporary closure periods. • To return area to its original state	• Federal Heritage Building Review of following Eureka buildings (2009) o Older Operations Complex (1963) o Old Garage (1963) o Hydrogen Building (1963) o Transient Barracks (1947) o Plumbing Building (1947) o Bunkhouse (1947) o Carpentry Shop (1947) o Greenhouse (1947) o Electrical Storage Building 9 (1947) o CWS Storage Building 19 (1947) o Eureka International (Strip Shack) (1947) • Conduct inventory of contents and building construction materials (2009) • Consult with stakeholders to determine their storage requirements (2009) • Decide which buildings can be declared surplus (2010) • Retain the services of a qualified engineer to produce a Demolition Waste Disposal Plan (2011) • Conduct an Environmental Assessment (2012) • Obtain any necessary approvals [eg. new landfill site(s)] (2013)

PERMANENT CLOSURE AND RECLAMATION PLAN		
Site Component	**Specific Abandonment and Restoration Objective**	**Actions to be taken to achieve Objective**
		• Develop tender documents for the decommissioning of the buildings (2013) • Determine successful candidate to implement Demolition Waste Disposal Plan (2013) • Begin implementation of Demolition Waste Disposal Plan (2014) • Conduct site grading
• Water reservoir • Water diversion area	• To ensure that this component of the Eureka site does not become a source of contamination or a safety hazard to wildlife and humans during temporary closure periods. • To return area to its original state	• Prepare decommissioning plan • Conduct an Environmental Assessment • Conduct site grading
• Contaminated (oil, fuel, chemicals) sites	• To ensure that this component of the Eureka site does not become a source of contamination or a safety hazard to wildlife and humans during temporary closure periods. • To restore in such a fashion as to facilitate the natural use by wildlife	• Site Assessment; listing and geographical extent of contamination based on EA Phase I and Geophysical Study; completed • Reconnaissance Testing Program; performed on all sites identified in EA Phase I Study to confirm nature and extent of contamination and any leachate issues; (2009) • Risk-Based Analysis to determine which specific contaminated sites should be subjected to detailed and systematic testing; (2009) • Detailed Testing Program on specific sites identified in the Risk-Based Analysis to accurately determine nature, extent and rate of movement of contamination; (2010) • Risk-Based Analysis to prioritize sites for remediation; (2010) • Development of a Remediation Plan; (2011)

PERMANENT CLOSURE AND RECLAMATION PLAN		
Site Component	**Specific Abandonment and Restoration Objective**	**Actions to be taken to achieve Objective**
		• Conduct and Environmental Assessment, (2011) • Request for federal funding; 2011 • Begin implementation of Remediation Plan; (2012) • Post Remediation Monitoring (location and frequency based on recommendations flowing from detailed testing program and risk-based analysis)
• Infrastructure (eg. airstrip, electrical power supply systems, culverts, barge landings, sewage lagoon piping, water supply piping and associated infrastructure)	• To ensure that this component of the Eureka site does not become a source of contamination or a safety hazard to wildlife and humans during temporary closure periods. • To recycle and reuse • To restore natural drainage patterns where surface infrastructure has been removed • To restore in such a fashion as to facilitate the natural use by wildlife	• Conduct inventory of materials • Consult with stakeholders to determine their storage requirements • Decide which infrastructure can be declared surplus • Retain the services of a qualified engineer to produce a Demolition Waste Disposal Plan • Conduct an Environmental Assessment • Obtain any necessary approvals [eg. new landfill site(s)] • Develop tender documents for the decommissioning of the infrastructure • Determine successful candidate to implement Demolition Waste Disposal Plan • Begin implementation of Demolition Waste Disposal Plan • Conduct site grading
• Hazardous materials (eg. POL Fluids, PCB containing material, ODS containing equipment, batteries, asbestos; compressed gas cylinders; lead-based	• To ensure that this component of the Eureka site does not become a source of contamination or a safety hazard to wildlife and humans	• Conduct inventory of contents materials • Consult with stakeholders to determine their storage requirements • Decide which materials can be declared surplus • Determine waste disposal approach • Obtain any necessary approvals [eg. new landfill site(s)] • Develop tender documents for landfilling/hauling of hazardous waste

PERMANENT CLOSURE AND RECLAMATION PLAN		
Site Component	**Specific Abandonment and Restoration Objective**	**Actions to be taken to achieve Objective**
paint)	during temporary closure periods. • To recycle and reuse	• Determine successful candidate to implement hazardous waste cleanup • Begin implementation
• Sewage lagoon	• To ensure that this component of the Eureka site does not become a source of contamination or a safety hazard to wildlife and humans during temporary closure periods. • To return area to its original state by grading it to match local topography and to facilitate re-vegetation where appropriate	• Conduct options analysis for sewage treatment & disposal at Eureka (2009) • EC decision on preferred option (2009) • If, on the basis of the preceding preferred option, it is decided to: o close the existing lagoon; or o remove the existing sludge, the services of a qualified engineer will be obtained to determine whether the lagoon is/is not highly contaminated and to recommend a remediation option(s) which may include the following: o the lagoon may be backfilled and shaped to blend in with existing contours provided that measures are applied for leachate control; o the sludge may be de-watered (eg. evaporation allowed to take place) and the dried residue removed and disposed of on-site in an engineered land fill; or o the de-watered sludge may be containerized and land filled to preclude contact with the Arctic ecosystem.(2010) • Award consultant contract to provide information for drafting the design build performance documents for new sewage treatment system (eg. water/wastewater mass balance report) (2010) • Draft and complete design build performance documents, including sludge treatment plan (2010) • Develop tender documents for the Design-Build contract (2010)

PERMANENT CLOSURE AND RECLAMATION PLAN		
Site Component	**Specific Abandonment and Restoration Objective**	**Actions to be taken to achieve Objective**
		• Close Design-Build contract (2011) • Conduct Environmental Assessment (2011) • Award Design-Build Contract (2011) • Sewage Treatment System shipped and installed at Eureka (2011) • Remediate existing lagoon (2012) • Post monitoring [location of monitoring sites and frequency of monitoring will be based on engineers recommendations (above)]
• Incinerator	• To ensure that this component of the Eureka site does not become a source of contamination or a safety hazard to wildlife and humans during temporary closure periods. • To recycle and reuse	• Removed from the site and re-used
• Solid Waste Landfill Sites	• To ensure that this component of the Eureka site does not become a source of contamination or a safety hazard to wildlife and humans during temporary closure periods. • To return area to its original state	• Site Assessment; listing and geographical extent of contamination based on EA Phase I and Geophysical Study; completed • Reconnaissance Testing Program; performed on all sites identified in EA Phase I Study to confirm nature and extent of contamination and any leachate issues; (2009) • Risk-Based Analysis to determine which specific contaminated sites should be subjected to detailed and systematic testing; (2009) • Detailed Testing Program on specific sites identified in the Risk-Based Analysis to accurately determine nature, extent and rate of movement of contamination; (2010) • Risk-Based Analysis to prioritize sites for remediation; (2010) • Development of a Remediation Plan; (2011)

PERMANENT CLOSURE AND RECLAMATION PLAN		
Site Component	**Specific Abandonment and Restoration Objective**	**Actions to be taken to achieve Objective**
		• Conduct and Environmental Assessment, (2011) • Request for federal funding; 2011 • Begin implementation of Remediation Plan; (2012) • Post Remediation Monitoring (location and frequency based on recommendations flowing from detailed testing program and risk-based analysis)
• Barrels	• To ensure that this component of the Eureka site does not become a source of contamination or a safety hazard to wildlife and humans during temporary closure periods.	• empty barrels will be crushed and disposed in an on-site engineered landfill • filled or partially filled barrels will be inspected and tested if necessary and disposed of appropriately (off-site or incineration). The empty barrels will be rinsed, crushed and disposed on-site in an engineered landfill. The spent rinse liquid will be treated with absorbent material and disposed as hazardous material • buried empty barrels will be inspected to determine if any of the barrels contain material. If the barrels are found to be empty, the area will be stabilized through compaction to crush any corroded barrels. A cover of borrow material will be placed over the area and compacted.

MONITORING OF ON-GOING RESTORATION ACTIVITIES

A monitoring program will be carried out to record the progress of progressive restoration activities. Monitoring activities may include visual inspection to determine if:

- water is ponding on the landfill cover
- the landfill cover is eroding
- frost action is occurring
- the permafrost is developing within the landfill consistent with the design

Monitoring of the contaminated sites will follow a pre-established program and will occur at regular intervals following closure of the site. Contaminated areas that have been excavated will be confirmed clean by field screening methods and samples taken for laboratory confirmation. Once it has been demonstrated that the site is physically and chemically stable, the frequency of monitoring will be reduced. Physical stability will be established as a minimum through visual inspection and may include instrumentation for thermal monitoring. Chemical stability will be confirmed through the collection of suitable samples from around the site.

The details of the pre-established monitoring program (the location of monitoring stations and frequency and duration of monitoring) will be a function of the recommendations of the engineer and will be outlined in subsequent revisions to this document following Detailed Testing Program and the Risk-Based Analyses of the sites (eg. proximity to sensitive receptors) in question.

FINAL LANDSCAPE: SITE GRADING & AESTHETICS

Disturbed areas will be graded and shaped to blend in with the natural contours and to eliminate potential hazards for wildlife, humans accessing the site in the future.

To facilitate physical stability improve the aesthetics of sites subjected to progressive restoration, EC will begin re-vegetation efforts, where appropriate, immediately following such restoration. Consideration will be given to:

- Seeding areas with native seed mixes
- Applying stockpiled soil or growth medium to a depth sufficient to maintain root growth and nutrient requirements
- Incorporation of organic materials based upon local soil assessment
- Establishing temporary or permanent windbreaks
- Transplanting vegetation will be lost to progressive restoration activities
- Placing gravel on sites to discourage vegetation growth where desired.

TREATMENT OF UNACCEPTABLE DISCHARGE FOLLOWING PROGRESSIVE RESTORATION/CLOSURE

In the event that drainage water from any reclaimed facility is not acceptable for discharge, EC would retain the services of a qualified engineer to recommend measures, based on a risk-based analysis, to ensure that human and environmental safety were not jeopardized.

REFERENCES

1. Mine Site Reclamation Guidelines for the Northwest Territories, Indian and Northern Affairs Canada, Yellowknife, NWT, January 2006
2. Abandoned Military Site Remediation Protocol, Indian and Northern Affairs Canada, March 2005
3. Phase I Environmental Site Assessment Eureka High Arctic Weather Station, Eureka, Nunavut, Public Works and Government Services Canada, February 2007
4. Eureka High Arctic Weather Station Geophysical Investigation, Eureka, NU, EBA Engineering Consultants, Edmonton, AB, May 2008
5. Contaminated Sites Remediation Framework, Environment Canada

APPENDIX: EUREKA WATER LICENCE

P.O. Box 119
Gjoa Haven, NU X0B 1J0
Tel: (867) 360-6338
Fax: (867) 360-6369

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NUNAVUT WATER BOARD
NUNAVUT IMALIRIYIN KATIMAYINGI

DECISION

LICENCE NUMBER: 3BC-EUR0611 -Type "B"

This is the decision of the Nunavut Water Board (NWB) with respect to an application for a renewal of Licence dated February 21, 2005 made by:

ENVIRONMENT CANADA

to allow for the use of water, disposal of waste and the handing or storage of petroleum products or hazardous materials for the Eureka Weather Station located within the North Baffin Region, Nunavut (latitude 80°00'N and longitude 85°56'W).

DECISION

After having been satisfied that the application was exempt from the requirement for screening by the Nunavut Impact Review Board in accordance with Schedule 12.1, Paragraph 5 of the *Nunavut Land Claim Agreement* (NLCA), the NWB decided that the application could proceed through the regulatory process. In accordance with S.55.1 of the *Nunavut Waters and Nunavut Surface Rights Tribunal Act (NWNSRTA)* and Article 13 of the *NLCA*, public notice of the application was given and interested persons were invited to make representations to the NWB.

After reviewing the submission of the Applicant and representations made by interested persons, the NWB, having given due regard to the facts and circumstances, the merits of the submissions made to it and to the purpose, scope and intent of the *NLCA* and of the *NWNSRTA*, decided to waive the requirement to hold a public hearing and furthermore to delegate its authority to approve the application to the Chief Administrative Officer pursuant to S. 13.7.5 of the *NLCA* and S. 49(a) of the *NWNSRTA* and determined that:

Licence Number 3BC-EUR0611 -Type "B" be issued subject to the terms and conditions contained therein. (Motion #: 2005-31)

SIGNED this 6th day of Fcbruary, 2006 at Gjoa Haven, NU.

Philippe di Pizzo
Chief Administrative Officer

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I. INTRODUCTION

On February 21, 2005 a water licence application was filed with the Nunavut Water Board by Public Works and Government Services Canada's Environmental Services group on behalf of Environment Canada, for water use, waste disposal activities and the handing or storage of petroleum products or hazardous materials associated with Environment Canada's Eureka High Arctic Weather Station (HAWS) located within the North Baffin Region, Nunavut (latitude 80°00'N and longitude 85°56'W). After having been satisfied that the application was exempt from the requirement for screening by the Nunavut Impact Review Board in accordance with Schedule 12.1, Paragraph 5 of the *Nunavut Land Claim Agreement (NLCA)*, the NWB decided that the application could proceed through the regulatory process.

In accordance with S.55.1 of the *Nunavut Waters and Nunavut Surface Rights Tribunal Act (NWNSRTA)* and Article 13 of the *NLCA*, public notice of the application was given and interested persons were invited to make representations to the NWB. No public concerns were expressed, and after reviewing the submission of the Applicant and representations made by interested persons, the NWB, having given due regard to the facts and circumstances, the merits of the submissions made to it and to the purpose, scope and intent of the *NLCA* and of the *NWNSRTA*, decided to waive the requirement to hold a public hearing and furthermore to delegate its authority to approve the application to the Chief Administrative Officer pursuant to S.13.7.5 of the *NLCA* and S.49(a) of the *NWNSRTA*.

II. GENERAL CONSIDERATIONS

A. Term of the Licence

In accordance with the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* S. 45, the NWB may issue a licence for a term not exceeding twenty-five years. The Applicant has indicated that the project is ongoing with an unknown completion date. The NWB believes that a term of five years is appropriate. The licence term will allow the Licensee to properly carry out the terms and conditions of the licence and will ensure that sufficient time is given to permit the Licensee to develop, submit and implement the plans, (eg. The Operations and Maintenance Plan), to the satisfaction of the NWB.

B. Annual Report

The requirements imposed on the Licensee in this licence are for the purpose of ensuring that the NWB has an accurate annual update of water use and depositions of waste during a calendar year. This information is maintained on the public registry and is available to any interested parties upon request. The Annual Report shall be submitted by the Licensee as per Part B, Item 2.

C. Water Use

Environment Canada commissioned a study in 1999 to address concerns with respect to the water supply and wastewater disposal systems. The study concluded that the water system has been used to capacity in the past and an increase in water availability was needed. System changes included the use of methods to increase the water availability and water conservation methods within the facilities. Tanks for the storage of potable water were incorporated into the system.

The Facility currently acquires its water from Station Creek, via pump and intake, to the facility storage on a seasonal basis during the summer. The water supply and storage was investigated in July, 1999 and recommendations were provided to the NWB for an alternative method of seasonally obtaining water to replenish the fresh water reservoir. Water is pumped to the reservoir over an approximate one month period and allows for continuous flow within the creek and eliminates the use of the diversion dam method previously used to re-charge the reservoir. The associated potential for degradation of the diversion and silting of the reservoir no longer exists. Potable water for the facility is passed through a reverse osmosis system and chlorinated prior to use for drinking and food preparation

D. Deposit of Waste

i. Sewage

The Eureka HAWS facility is considered a moderate to heavy use facility based on the recommendations of the Northern Remote Site Protocols, 1999, developed for the Nunavut Impact Review Board. The full time residents of the facility are low, below 20, however the year round staffing brings the annual person days above 5,000. Taking this criteria into consideration, the facility is required to meet secondary treatment standards, eliminating the use of pit privies and honey bag systems. The HAWS facility utilizes a single stage sewage lagoon system for treatment. The "Study of the Wastewater and Water Supply Systems at the Eureka Weather Station, 1999" indicated that the effluent from the lagoon is of high quality, although could be improved by the addition of primary cell at the front end of the system and the removal of sludge from the existing storage cell. The concern with the sudden discharge of effluent being released in a matter of hours has been partially addressed through the use of a pump system to the Slidre Fiord over a period of days. The Licensee is encouraged to continue investigation into minimizing the effects of the discharge of effluent by extending the release period and reducing the daily flow volume. Further to the study, in 2003 a sump area was excavated within the existing lagoon to accommodate the pump intake and reduce the amount of sedimentation (Total Suspended Solids) that is released from the lagoon during pumping. Where sewage sludge or solids are removed from the facility for disposal, the Licensee shall dispose of the sludge as approved in the Sludge Disposal Plan required in Part D, Item 9.

ii. Sewage Effluent Quality Parameters

Discharges from the sewage lagoon must comply with the "Guidelines for the Discharge of Treated Municipal Wastewater in the Northwest Territories, 1992", prepared for the N.W.T. Water Board. Limits have been imposed for Biochemical Oxygen Demand (BOD) and Suspended Solids (TSS) and the Licensee must comply with these limits. Monitoring for fecal coliform bacteria has not been included as is indicated in Table 4.1 and Note (g) of the above Guideline, where discharge is into a Bay or Fjord and there is no direct effect upon a fishery or water contact recreation.

The HAWS is a Federal facility and as such, the Licensee is encouraged to achieve the recommendations set out in the Environment Canada document *"An Approach for Assessing and Managing Wastewater Effluent Quality for Federal Facilities - Final Report, June 1, 2000"* prepared for the Federal Committee on Environmental Management Systems / Wastewater Working Group, Environmental Quality Branch, Environment Canada. These guidelines are presented in Table 1 of Document's Appendix A. The Additional monitoring requirements have been included in this Licence to assist in the characterization and evaluation of the effluent quality.

The applicant has indicated in the application that the darkroom facility has been decommissioned and the possibility of discharging silver with the treated sewage effluent has been eliminated. Therefore, the requirement for monitoring and meeting effluent quality for silver has been removed.

iii. Solid Waste

Solid waste is currently disposed of at a facility located within a small valley on the southeast side of the runway, and approximately 1.4 km from Slidre Fiord. The landfill is operated on a "cell by cell" basis. New cells have been identified adjacent to the existing cell that will become operational as existing cells become filled. The Licensee, in the application questionnaire, indicated that a new "Landfill Strategy" has been implemented with the Plan forthcoming. This item is to be addressed through the Facility's Operations and Maintenance Plan complete with a schedule for implementation.

iv. Operations and Maintenance Plan

Licence NWB4EUR9904 was issued with conditions under Part G pertaining to the submission of a Plan for the "Operation and Maintenance of the Sewage and Solid Waste Disposal Facilities" (O&M Plan). This Plan had not been received by the NWB during the Licence term April 1, 1999 through to April 1, 2004. Having been given adequate time in which to submit the Plan, the NWB requests that the Licensee prepare and submit the required Plan as per Part G, Item 1 of this Licence.

The O&M Plan should also address the design specifications for the water and waste facilities, including the operational freeboard requirements for all containment structures. The Application Questionnaire indicated that the design freeboard for the wastewater lagoon was 0.5 metres. The Licensee is required to maintain a minimum freeboard of 1.0 metre, as per Part D, Item 6, unless otherwise recommended by a qualified geotechnical engineer and approved by the Board.

E. Modifications and Construction

The Application's supporting documents indicated that there was construction of new facilities that have taken place during the previous Licence term as well as the presence of a "treatment cell" on site evidenced by the results provided for hydrocarbon analyses. The NWB reminds the Licensee, in accordance with Part F, Item 4, that notification of modifications or construction is required in writing to the Board, should the Licensee propose modifications to the facility.

During the review of the Application, there were a number of discrepancies identified with respect to the water storage capacity, fresh water volumes required for transfer and water consumption of the facility, as well as the treated effluent volume and capacity of the sewage lagoon system. As there are currently no records on file with the NWB and no engineered drawings or plans were submitted with the application, the NWB requests that this information be provided to the Board as per Part F, Item 7.

F. Spill Contingency Planning

The Board generally requires that all Licensees prepare a comprehensive Spill Contingency Plan to establish a state of readiness to ensure a prompt and effective response to possible spills or system failure events.

The fuel storage facility at the Eureka High Arctic Weather Station has a capacity of approximately 1.3 million litres within the fuel tank farm (installed in 1992) and an additional 270,000 litres in three 90,000 litre fuel storage bladders present from the previous fuel storage system. Approximately 550,000 litres of fuel is delivered annually by sealift, typically in early September and delivered to the facility via pipeline from the barge. Other miscellaneous piping services the Facility. Five 9,000 litre Enviro-Safe tanks were purchased to replace the current day tanks located around the site, for emergency and backup use only.

The site-specific spill contingency plan will assist the Licensee in responding to emergencies such that the impacts to water in particular and the environment and public health in general are minimized. The Plan submitted by the Licensee has been approved by the Board, with the requirement that additional information be submitted as an addendum to the approved Plan as per Part H, Item 1 of this license.

G. Abandonment and Restoration (A&R)

To ensure that all facilities are reclaimed in an appropriate manner upon abandonment, the NWB requires Licensees to prepare and submit an Abandonment and Restoration Plan. This requirement applies to the existing and abandoned facilities that are or were operated by the Licensee.

The Abandonment and Restoration Plan for the West Airstrip Landfill was submitted along with the Annual Report for the year 2000, by letter dated October 3, 2001. The Plan has been reviewed and is acceptable to the NWB. The NWB requests that a final report of restoration activities under the Plan be submitted under Part I, Item 7. In the event that additional work remains, an addendum to the Plan is to be submitted that includes a work schedule for completion of the planned restoration.

In addition, the NWB requests that an Interim Abandonment and Restoration Plan be submitted that will conceptually address the final abandonment of the facility. This Plan is to be prepared and submitted to the NWB for approval as per Part I, Item 1 of this Licence.

H. Monitoring Program

The Monitoring Program is established to collect data on water quality to assess the effectiveness of treatment for protection of public health and to assess potential impacts to the environment associated with the waste disposal facilities. Parameters in addition to those that are regulated under Part D are included in the Monitoring Program in order to assist in the characterization and evaluation of treatment and potential impacts to the receiving environment.

LICENCE 3BC-EUR0611 –Type "B"

Pursuant to the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* and the *Agreement Between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in Right of Canada*, the Nunavut Water Board, hereinafter referred to as the Board, hereby grants to

ENVIRONMENT CANADA
(Licensee)

of

9345-49th STREET, EDMONTON, ALBERTA T6B 2L8
for EUREKA WEATHER STATION, EUREKA NU, X0A 0G0
(Mailing Address)

hereinafter called the Licensee, the right to alter, divert or otherwise use water for a period subject to restrictions and conditions contained within this licence:

Licence Number: **3BC-EUR0611 - Type "B"**

Water Management Area: **NUNAVUT 04**

Location: **EUREKA WEATHER STATION, QIKIQTANI REGION, NUNAVUT**

Purpose: **WATER USE, WASTE DISPOSAL AND PETROLEUM STORAGE**

Classification of Undertaking: **MUNICIPAL UNDERTAKING – Weather Station**

Quantity of Water Not to Exceed: **10,000 CUBIC METRES ANNUALLY**

Date of Licence: **FEBRUARY 6, 2006**

Expiry Date of Licence: **JANUARY 30, 2011**

Dated this 6th day of February 2006 at Gjoa Haven, NU.

Philippe di Pizzo
Chief Administrative Officer

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PART A: SCOPE, DEFINITIONS AND ENFORCEMENT

1. Scope

This Licence allows for the use of water, the disposal of waste and handing or storage of petroleum products or hazardous materials for an undertaking classified as a Municipal undertaking at the Eureka High Arctic Weather Station, located approximately 425 km north northwest of Grise Fiord, within the Qikiqtani Region, Nunavut (latitude 80°N and longitude 85°56'W);

i. This Licence is issued subject to the conditions contained herein with respect to the taking of water and the depositing of waste of any type in any waters or in any place under any conditions where such waste or any other waste that results from the deposits of such waste may enter any waters. Whenever new Regulations are made or existing Regulations are amended by the Governor in Council under the Nunavut Waters and Nunavut Surface Rights Tribunal Act, or other statutes imposing more stringent conditions relating to the quantity or type of waste that may be so deposited or under which any such waste may be so deposited, this Licence shall be deemed, upon promulgation of such Regulations, to be subject to such requirements; and;

ii. Compliance with the terms and conditions of this Licence does not absolve the Licensee from responsibility for compliance with the requirements of all applicable Federal, Territorial and Municipal legislation.

2. Definitions

In this Licence: **3BC-EUR0611 -Type "B"**

"Act" means the *Nunavut Waters and Nunavut Surface Rights Tribunal Act;*

"Amendment" means a change to original terms and conditions of this licence requiring correction, addition or deletion of specific terms and conditions of the licence; modifications inconsistent with the terms of the set terms and conditions of the Licence;

"Appurtenant Undertaking" means an undertaking in relation to which a use of waters or a deposit of waste is permitted by a licence issued by the Board;

"Board" means the Nunavut Water Board established under the *Nunavut Land Claims Agreement* and the *Nunavut Waters and Nunavut Surface Rights Tribunal Act;*

"Chief Administrative Officer" means the Executive Director of the Nunavut Water Board;

"Engineer" means a professional engineer registered to practice in Nunavut in accordance with the Engineering, Geological and Geophysical Act (Nunavut) S.N.W.T. 1998, c.38, s.5;

"Greywater" means all liquid wastes from showers, baths, sinks, kitchens and domestic washing facilities, but does not include toilet wastes;

"Inspector" means an Inspector designated by the Minister under Section 85 (1) of the *Act*;

"Licensee" means the holder of this Licence

"Modification" means an alteration to a physical work that introduces a new structure or eliminates an existing structure and does not alter the purpose or function of the work, but does not include an expansion;

"Nunavut Land Claims Agreement" (NLCA) means the *"Agreement Between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in right of Canada"*, including its preamble and schedules, and any amendments to that agreement made pursuant to it;

"Sewage" means all toilet wastes and greywater;

"Sewage Disposal Facilities" means the area comprised of the engineered structures designed to contain and treat sewage and provide controlled release of treated effluent as described in the application submitted February 21, 2005;

"Solid Waste Disposal Facilities" comprises the area and associated structures designed to contain solid, non-hazardous, non-combustible waste as described in the application submitted February 21, 2005;

"Spill Contingency Plan" means a Plan developed to deal with unforeseen petroleum and chemical events that may occur during the operations conducted under the Licence;

"Toilet Wastes" means all human excreta and associated products, but does not include greywater;

"Waste" means, as defined in S.4 of the *Act*, any substance that, by itself or in combination with other substances found in water, would have the effect of altering the quality of any water to which the substance is added to an extent that is detrimental to its use by people or by any animal, fish or plant, or any water that would have that effect because of the quantity or concentration of the substances contained in it or because it has been treated or changed, by heat or other means;

"Water Supply Facilities" means the area and associated intake infrastructure at Station Creek, the reservoir, storage tanks and piping as described in the application submitted February 21, 2005;

3. Enforcement

i. Failure to comply with this Licence will be a violation of the *Act*, subjecting the Licensee to the enforcement measures and the penalties provided for in the *Act*;

ii. All inspection and enforcement services regarding this Licence will be provided by Inspectors appointed under the *Act*; and

iii. For the purpose of enforcing this Licence and with respect to the use of water and deposit or discharge of waste by the licensee, Inspectors appointed under the *Act*, hold all powers, privileges and protections that are conferred upon them by the *Act* or by other applicable law.

PART B: GENERAL CONDITIONS

1. The Water use fee is not required in accordance with the Act.

2. Licensee shall file an Annual Report on the appurtenant undertaking with the Board not later than March 31st of the year following the calendar year being reported which shall contain, but not be limited to the following information:

i. A summary report of water use and waste disposal activities;
ii. Tabular summaries of all data generated under the Monitoring Program;
iii. Monthly and annual quantities in cubic metres of fresh water obtained from all sources;
iv. The monthly and annual quantities in cubic metres of each and all waste discharged;
v. A summary of modifications and/or major maintenance work carried out on the Water Supply and Waste Disposal Facilities, including all associated structures and facilities;

vi. A list of unauthorized discharges and a summary of follow-up actions taken;
vii. A summary of any abandonment and restoration work completed during the year and an outline of any work anticipated for the next year;
viii. A summary of all on-site facilities, past, present and proposed for the future, the current use of these facilities and any future plans for remediation and removal of facilities;
ix. A summary of any studies requested by the Board that related to waste disposal, water use or reclamation, and a brief description of any future studies planned;
x. Revisions to Manuals and Plans submitted under the Licence, including the Operations and Maintenance Manual, Spill Contingency Plan and the Abandonment and Restoration Plan; and
xi. Any other details on water use or waste disposal requested by the Board by November 1 of the year being reported.

3. The Licensee shall notify the NWB of any changes in operating plans or conditions associated with this project at least thirty (30) days prior to any such change.

4. The Licensee shall install flow meters or other such devices, or implement suitable methods required for the measuring of water volumes and wastes discharged, to be operated and maintained to the satisfaction of an Inspector.

5. The Licensee shall have posted the necessary signs, where possible, to identify the stations of the "Monitoring Program" and to inform the public of the location of the Water Supply and Waste Disposal Facilities. All postings shall be located and maintained to the satisfaction of an Inspector.

6. If the Licensee contemplates the renewal of Licence No. 3BC-EUR0611, it is the responsibility of the Licensee to apply to the NWB for its renewal. The past performance of the Licensee, new documentation and information, and issues raised during a public hearing, if the NWB is required to hold one, will be used to determine the terms and conditions of the Licence renewal. Note that if the Licence expires before the NWB issues a new one, then water use and waste disposal must cease, or the Licensee will be in contravention of the Nunavut Land Claims Agreement. The NWB recommends that an application for the renewal of Licence No. 3BC-EUR0611 be filed at least three months before the Licence expiry date.

7. If Licence No. 3BC-EUR0611 requires an amendment, a public hearing may be required. The Licensee should submit applications for amendment as soon as possible to give the NWB sufficient time to go through the amendment process. The process may vary depending on the scope of the amendment requested.

8. This Licence is not assignable except as provided in Section 44 of the *Act*.

9. The Licensee shall ensure a copy of this Licence is maintained at the site of operations at

all times. Any communication with respect to this Licence shall be made in writing to the attention of:

(i) **Chief Administrative Officer:**
Executive Director
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU X0B 1J0
Telephone: (867) 360-6338
Fax: (867) 360-6369

(ii) **Inspector Contact:**
Water Resources Officer
Nunavut District, Nunavut Region
P.O. Box 100
Iqaluit, NU X0A 0H0
Telephone: (867) 975-4298
Fax: (867) 979-6445

10. The Licensee shall submit one paper copy and one electronic copy of all reports, studies, and plans to the Board. Reports or studies submitted to the Board by the Licensee shall include a detailed executive summary in Inuktitut.

PART C: CONDITIONS APPLYING TO WATER USE

1. The Licensee shall obtain all water for domestic purposes using the Water Supply Facilities, up to a maximum of 10,000 cubic metres annually.

2. The Licensee shall equip all water intake hoses with a screen of an appropriate mesh size to ensure that there is no entrainment of fish and shall withdraw water at a rate such that fish do not become impinged on the screen.

3. The Licensee shall maintain the Water Supply Facilities to the satisfaction of the Inspector.

4. A freeboard of 1.0 metre, or as recommended by a qualified geotechnical engineer and as approved by the Board, shall be maintained at all dykes and earthfill structures associated with the Water Supply Facilities.

5. The Licensee shall not remove any material from below the ordinary high water mark of any water body.

6. The Licensee shall not do anything that will cause erosion to the banks of any body of water and shall provide necessary controls to prevent such erosion.

7. Sediment and erosion control measures shall be implemented prior to and maintained during the operation to prevent entry of sediment into water.

PART D: CONDITIONS APPLYING TO WASTE DISPOSAL

1. The Licensee shall locate areas designated for waste disposal at least thirty (30) metres above the ordinary high water mark of any water body such that the quality, quantity or flow of water is not impaired, unless otherwise authorized by the Board.

2. No open burning of domestic waste is permitted.

3. The Licensee shall incinerate all combustible waste, and shall ensure that all hazardous wastes, waste oil generated through the course of the operation are backhauled and disposed of at an approved waste disposal site.

4. The Licensee shall dispose of and contain all non-combustible solid wastes at the Solid Waste Disposal Facilities or as otherwise approved by the Board.

5. The Licensee shall direct all Sewage to the Sewage Disposal Facilities or as otherwise approved by the Board.

6. All sewage effluent discharged from the Sewage Disposal Facilities at "Monitoring Program" Station Number EUR-3 shall meet the following effluent quality standards:

Parameter	MAC-Maximum Average Concentration (mg/L)
Biochemical Oxygen Demand (BOD_5)	100
Total Suspended Solids (TSS)	120
The waste discharged shall have a pH between 6 and 9, and no visible sheen of oil and grease.	

Reference: Guidelines for the Discharge of Treated Municipal Wastes, 1992; Table 4.1

7. A freeboard of 1.0 metre, or as recommended by a qualified geotechnical engineer and as approved by the Board, shall be maintained at all dykes and earthfill structures associated with the Water Supply Facilities.

8. The Licensee shall advise the Inspector at least ten (10) days prior to initiating decant of the sewage lagoon.

9. The Licensee shall maintain the Sewage Disposal Facilities to the satisfaction of the Inspector and operated in such a manner as to prevent structural failure.

10. Should the Licensee require the removal and disposal of sludge from the Sewage Disposal Facilities, a Sludge Disposal Plan shall be submitted to the Board for approval, at least ninety (90) days prior to commencing the work.

11. If the Plan referred to in Part D, Item 9 is not approved, the Licensee shall make the necessary revisions and resubmit the Plan within sixty (60) days following notification from the Board.

12. The Licensee shall annually review the approved Plan referred to in Part D, Item 9 and if needed, modify the Plan to reflect changes in operation and/or technology. Revisions shall be submitted with the Annual Report as an addendum to the Plan for the approval of the Board in accordance with Part B, Item 2(x).

PART E: CONDITIONS APPLYING TO INFRASTRUCTURES, ACCESS AND OPERATIONS

1. The Licensee shall not erect infrastructure or store material on the surface of frozen streams or lakes except what is for immediate use. All infrastructure shall be located such as to minimize impacts on surface drainage.

2. The Licensee shall not conduct any land based activity within thirty (30) metres of the ordinary high water mark of any water body, unless otherwise approved by the Board.

3. All activities shall be conducted in such a way as to minimize impacts on surface drainage and the Licensee shall immediately undertake any corrective measures in the event of any impacts on surface drainage.

4. Winter lake and stream crossings, including ice bridges, shall be constructed entirely of water, ice or snow; stream crossings shall be removed or notched prior to spring break-up.

5. With respect to access road, pad construction or other earthworks, the deposition of debris or sediment into any water body is prohibited. These materials shall be disposed of above the ordinary high water mark in such a fashion that they do not enter the water.

PART F: CONDITIONS APPLYING TO MODIFICATIONS AND CONSTRUCTION

1. Prior to construction or modification of any dams, dykes or structures intended to contain, withhold, divert or retain water or wastes, the Licensee shall submit to the Board for approval design drawings stamped by a qualified Engineer.

2. The Licensee may, without written consent from the Board, carry out construction referred to in Part F, Item 1, provided that such construction is consistent with the terms of this License and the following requirements are met:

   i. the Licensee has notified the Board in writing of such proposed construction at least sixty (60) days prior to commencing construction;

   ii. such construction does not place the Licensee in contravention of the License or the *Act*;

   iii. the Board has not, during the sixty (60) days following notification of the proposed construction, informed the Licensee that review of the proposal will require more than sixty (60) days; and

   iv. the Board has not rejected the proposed construction.

3. Construction, for which all of the conditions referred to in Part F, Item 2 have not been met, can be carried out only with written approval from the Board.

4. The Licensee may, without written consent from the Board, carry out modifications to the Water Supply Facilities and Waste Disposal Facilities provided that such modifications are consistent with the terms of this License and the following requirements are met:

   i. the Licensee has notified the Board in writing of such proposed modifications at least sixty (60) days prior to beginning the Modifications;

   ii. such Modifications do not place the Licensee in contravention of the License or the *Act*;

   iii. the Board has not, during the sixty (60) days following notification of the proposed Modifications, informed the Licensee that review of the proposal will require more than sixty (60) days; and

   iv. the Board has not rejected the proposed modifications.

5. Modifications, for which all of the conditions referred to in Part F, Item 4 have not been

met, can be carried out only with written approval from the Board.

6. The Licensee shall provide as-built plans and drawings of the construction and/or modifications referred to in this Part within ninety (90) days of completion of the construction or modification. These plans and drawings shall be stamped by an Engineer.

7. The Licensee shall submit, within six (6) months of issuance of this Licence, historical as-built plans and drawings for the existing Water Supply Facilities, the Sewage Treatment Facilities, the Petroleum, Oil, and Lubricant Storage Facilities.

PART G: CONDITIONS APPLYING TO OPERATION AND MAINTENANCE

1. The Licensee shall, within sixty (60) days of the issuance of this Licence, submit to the Board for approval, an Operation and Maintenance Manual in accordance with the "Guidelines for Preparing an Operation and Maintenance Manual for Sewage and Solid Waste Disposal Facilities", October 1996. The scope of the Plan shall be expanded to include the operation and maintenance of the Water Supply Facilities.

2. If the Plan referred to in Part G, Item 1 is not approved, the Licensee shall make the necessary revisions and resubmit the Manual within sixty (60) days following notification from the Board.

3. The Licensee shall annually review the approved Manual referred to in Part G, Item 1 and if needed, modify the Manual to reflect changes in operation and/or technology. Revisions shall be submitted with the Annual Report as an addendum to the Manual for the approval of the Board in accordance with Part B, Item 2(x).

4. The Licensee shall annually review the approved Operation and Maintenance Plan for the Sewage and Solid Waste Disposal Facilities and modify as necessary to reflect changes in personnel, operations and/or technology. Any proposed modifications shall be submitted to the Board as an addendum to the original plan in accordance with Part B, Item 2(x).

5. The Licensee shall undertake a geotechnical inspection, to be completed within twenty four (24) months of issuance of this Licence, of all facilities that are intended to contain water, fuel or waste, by a qualified geotechnical engineer during the summer. The Geotechnical Engineer's report shall be filed with the NWB within sixty (60) days of completing the inspection and be accompanied by a cover letter from the Licensee outlining an implementation plan to respond to the engineer's recommendations.

PART H: CONDITIONS APPLYING TO SPILL CONTINGENCY PLANNING

1. The Licensee shall, within sixty (60) days of issuance of this licence, submit to the Board an addendum to the approved Spill Contingency Plan that is to include the following:

   i. The preparation date of the Plan, revisions and when the effective period of the Plan should be indicated. An active, expanded Table of Contents with page numbering assists in locating information;

   ii. The main contact name, position and phone number of the overall person in charge at the facility (ie Station Officer in Charge) and the name and contact number for the person responsible (ie Regional Manager, Atmospheric Environment Branch);

   iii. Although it is stated that the Canadian Coast Guard will be responsible for any spills that may occur on water during re-supply, the Plan should include information and responses to spills on land that may enter nearby water bodies (ie Station Creek);

   iv. The Plan requires a topographical map of suitable scale that indicates the components of the site, facility locations (not limited to buildings, water and sewer services, electrical power generation, fuel storage, emergency response equipment and spill kit storage) and surrounding sensitive habitat and surface flow direction to aid in spill management;

   v. Section 6.0 Response Organization and 9.0 Response Activities, appears to indicate that in the case of a larger spill incident, the Government of Nunavut, Department of Sustainable Development would be called to provide the appropriate expertise and assume the lead role in the clean-up efforts with the facility assisting the DSD. This role should be clarified/confirmed;

   vi. Section 9.0 is to be expanded to include spills on land that have the potential to, or become spills into water, as the site is located within close proximity to both inland fresh waters and marine environments. Also, discussion on possible spills resulting from the refueling of equipment or of the many emergency tanks located around the site needs to be addressed;

   vii. Consistency in Section and subsection numbering is required; Section 9.0 does not have a system consistent with the document;

   viii. Section 10.0 to include the notification of the DIAND Water Resources Inspector at (867) 975-4298 following the occurrence of any spill of chemicals, petroleum products or waste associated with the project;

ix. Include Nunavut contact information for Environment Canada, Iqaluit – 867-975-4644; Environment Canada Emergency – 867-920-5131, 24hr pager staffed by EC Emergencies enforcement personnel, DIAND Water Resources Inspector – 867-975-4298. Others include Department of Fisheries and Oceans, Iqaluit; local or Regional health (Environmental Health Officer, Iqaluit – 867-975-4815) and RCMP;

x. Appendix "A" requires spill scenarios that include spills that may occur onto land, snow, ice and water and demonstrate the ability to effectively control, contain and clean-up potential spills associated with the operation of the facility; and

xi. Section 9.0, under Product Knowledge, indicates that the necessary MSDS's are available to the personnel. To complete the Spill Contingency Plan, up-to-date MSDS information for petroleum and chemical products stored on site should be made available in an appendix.

2. If the addendum referred to in Part H, Item 1 is not accepted, the Licensee shall make the necessary changes and resubmit the addendum within thirty (30) days following notification from the Board.

3. The Licensee shall annually review the approved Spill Contingency Plan and modify as necessary to reflect changes in personnel, operations and/or technology. Any proposed modifications shall be submitted to the Board as an addendum to the original plan in accordance with Part B, Item 2(x).

4. The Licensee shall ensure that any chemicals, petroleum products or wastes associated with the project do not enter water. All sumps and fuel caches shall be located a minimum of thirty (30) metres above the ordinary high water mark of any adjacent water body and inspected on a regular basis. The Licensee is encouraged to use some form of secondary containment.

5. The Licensee shall ensure that any equipment maintenance and servicing be conducted only in designated areas and shall implement special procedures (such as the use of drip pans) to manage fluids, waste and contain potential spills.

6. If during the term of this Licence, an unauthorized discharge of waste occurs, or if such a discharge is foreseeable, the Licensee shall:

i. Employ the Spill Contingency Plan;

ii. Report the spill immediately to the 24-Hour Spill Line at (867) 920-8130 and to the DIAND Water Resources Inspector at (867) 975-4298; and

iii. Submit to the DIAND Water Resources Inspector on each occurrence, a detailed

report including the GPS location, no later than thirty (30) days after initially reporting the event.

PART I: CONDITIONS APPLYING TO ABANDONMENT AND RESTORATION

1. The Licensee shall submit to the Board for approval, within nine (9) months of issuance of this Licence, an **Interim Abandonment and Restoration Plan,** which shall include but not be limited to the following:

   a) Specific abandonment and restoration objectives for each site component as follows:

      i. Operations and Barracks Buildings, old and new;

      ii. Maintenance Garage;

      iii. Warehouses;

      iv. Shops and other outbuildings;

      v. Water Diversion areas, water reservoir, pumphouse and associated water storage tank areas and piping;

      vi. Electrical, plumbing and carpentry facilities (storage);

      vii. All petroleum product and chemical storage areas including the main fuel tank farm, fuel bladders, fuel pipelines and associated sea-lift infrastructure;

      viii. Airstrip;

      ix. Any other areas potentially contaminated with hazardous materials including the used battery storage area, fueling stations and smaller fuel storage locations (buildings, emergency etc);

      x. Powerhouse;

      xi. Sewage Lagoon and associated infrastructure and piping;

      xii. Incinerator;

      xiii. Solid Waste landfill sites; major, minor and abandoned; and

xiv. Any other facilities not described above.

b) A description of remediation objectives and measures or actions to be taken to achieve the objectives for each of the facility components.

c) A detailed description of the final desired landscape, with emphasis on the restoration of stream banks and surface drainage over the restored components;

d) A description of the process to be employed for progressive restoration, and the details of restoration scheduling and procedures for coordinating restoration activities with the overall closure sequence;

e) A description of any post-closure treatment potentially required for drainage water that is not acceptable for discharge from any of the reclaimed facility components;

f) A description of the monitoring program to be employed in recording the progress of activities as they relate to on-going restoration needs. Sampling and testing protocols for determining the success of restoration measures undertaken should be documented. The program shall include, but not be limited to, the following;

i. Methods, timing and details respecting the replacement of materials removed due to contamination and general re-contouring of the project area;

ii. Stability of surface drainage channel(s) over reclaimed surfaces;

iii. Monitoring of surface water quality and runoff from the project area under a water management plan; and

iv. Success of applying restoration research results.

g) Details of closure measures proposed in the event of a premature or temporary shutdown at any time during the term of the Licence

h) An explanation of how aesthetic concerns will play a role in restoration;

2. The Licensee shall annually review the approved Plan referred to in Part I, Item 1 and if needed, modify the Plan to reflect changes in operation and/or technology. Revisions shall be submitted with the Annual Report as an addendum to the Plan for the approval of the Board in accordance with per Part B, Item 2(x);

3. At least three (3) years prior to final abandonment, the Licensee shall submit to the Board for approval, a Final Abandonment and Restoration Plan. The Plan shall include in addition to the content of the Interim Plan, but not be limited to the following:

   a) A description of contaminated soils identified at the site through a completed Phase II Environmental Assessment and the procedures to mitigate the contamination;

   b) A summary of existing data for background levels of metals in the area, and identification of needs for verification of data;

   c) A description of restoration activities outlined in the "Interim" Abandonment and Restoration Plan;

   d) An implementation schedule for the completion of restoration; and

   e) A detailed monitoring program.

4. If the Plans referred to in Part I, Item 1 and Part I, Item 3 are not approved by the Board, the Licensee shall revise the individual Plan and resubmit within sixty (60) days following notification from the Board.

5. The Licensee shall implement the Final Abandonment and Restoration Plan as approved by the Board.

6. The Licensee shall complete the restoration work within the time schedule specified in the approved Plan, or as subsequently revised and approved by the Board.

7. The Licensee shall submit, within nine (9) months of the issuance of this Licence, a Final Report on the Reclamation of the West Airstrip Landfill. This report shall detail the activities that have been completed, an overview of current monitoring, a summary analysis of the results to date and an outline of long term monitoring needs.

8. The Licensee shall endeavor to carry out progressive reclamation for any components of the project no longer required for the Licensee's operations.

9. All disturbed areas shall be stabilized and re-vegetated as required, upon completion of work, and restored to a pre-disturbed state.

10. The Licensee shall notify the Board of its intention to proceed with final abandonment of the undertaking at least six (6) months prior to the planned dates of closure.

PART J: CONDITIONS APPLYING TO THE MONITORING PROGRAM

1. The Licensee shall measure and record, in cubic metres, the daily quantities of water pumped from Station Creek during the annual recharge of the Eureka water reservoir.

2. The Licensee shall measure and record in cubic metres the monthly quantities of water utilized for facility operations, for all purposes.

3. The Licensee shall measure and record in cubic metres the daily quantities of effluent pumped from the Sewage Disposal Facility (Lagoon) during release to the environment.

4. The Licensee shall determine the GPS co-ordinates (in degrees, minutes and seconds of latitude and longitude) of all locations where sources of water are utilized for all purposes.

5. The Licensee shall determine the GPS co-ordinates (in degrees, minutes and seconds of latitude and longitude) of all locations where wastes associated with camp operations are deposited.

6. The Licensee shall have posted and maintain the necessary signs, where possible, to identify the stations of the "Monitoring Program". All postings shall be located and maintained to the satisfaction of an Inspector.

7. The Licensee shall submit to the Board for approval, within three (3) months of the issuance of this Licence, a Quality Assurance/Quality Control (QA/QC) Plan, based on the principals of the INAC "QA/QC Guidelines for Licensees", that addresses the field and laboratory procedures and requirements needed to carry out the monitoring program.

8. If the Plan referred to in Part J, Item 7 is not approved by the Board, the Licensee shall revise and resubmit the Plan within sixty (60) days following notification from the Board.

9. The Licensee shall annually review the approved QA/QC Plan and modify the Plan as necessary. Proposed changes shall be submitted as an addendum, to be included within the Annual Report as per Part B, Item 2(x).

10. The Licensee shall implement the Plan referred to in Part J, Item 7 as approved by the Board.

11. Sampling and analyses shall be performed as outlined in the requirements of Table No.1, or as otherwise approved by the Board.

12. The Licensee shall submit to the Board within ninety (90) days of issuance of this Licence, a proposal for revisions to the monitoring program outlined in Table 1. The proposal shall address additional monitoring requirements for any on-site facilities, active

or remediated, not listed in Table 1. This proposal will include verification of landfarming hydrocarbon contaminated materials at the facility.

13. All sampling, sample preservation and analyses shall be conducted in accordance with methods prescribed in the current edition of "Standard Methods for the Examination of Water and Wastewater", or by such other methods approved by the Board.

14. All analyses shall be performed in a laboratory approved by the Board.

15. Additional sampling and analysis may be requested by an Inspector.

16. The Licensee shall include all of the data and information required by the "Monitoring Program" in the Licensee's Annual Report, as required per Part B, Item 2.

17. Modifications to the Monitoring Program may be made only upon written approval of the Chief Administrative Officer.

Table No.1 Monitoring Program Stations and Requirements

Station	Description	Analysis Requirements	Frequency	Flow Measurement	Other
EUR-1	Raw Water Supply Prior to Treatment	Not applicable	M	✓	
EUR-2	Runoff from the Solid Waste Disposal Facilities	Suspended Solids; pH and Conductivity; Major Cations; Nutrients; sulphate; O&G; Total Phenols; ; Total Metals; Total Mercury;	F		
EUR-3	Discharge from Sewage Lagoon, prior to entering the ocean	Wastewater; conductivity; Major Cations; Nutrients; Sulphate; O&G; Total Phenols	F2	✓	
		Quantity in cubic metres of sewage solids removed from the sewage disposal facility			

Frequency: M=Monthly; F=During periods of Flow; F2=During periods of Flow near the beginning and end of discharge;

Analytical Parameters

Individual Parameters = pH, Conductivity, Total Suspended Solids; Sulphate
Major Cations = calcium, magnesium, potassium, sodium
Nutrients = Ammonia-Nitrogen, Nitrate/Nitrite, Phosphorus
Total Metals – ICP Metal Scan (minimum 20 element scan to include Arsenic, cadmium, chromium, copper, iron, lead, nickel, zinc),
Total Mercury (minimum detection of 0.2 ppb)
Oil and Grease (O&G)
Phenolic Compounds in Water = Total Phenols
WasteWater = pH, Total Suspended Solids, Biochemical Oxygen Demand

Environment Canada Environnement Canada

EUREKA SLUDGE DISPOSAL PLAN

- Eureka High Arctic Weather Station –

In support of the
Nunavut Water Board License
No. 3BC-EUR0611

Prepared by Environment Canada
Assets, Contracting and Environmental Management Directorate (ACEMD)

March 2009

Canada

CONTROL PAGE

On receipt of revisions and/or amendments, the Assets, Contracting and Environmental Management Directorate (ACEMD) shall complete this control page to ensure that the Eureka Sludge Disposal Plan is always current and consistently reflects the operations and activities taking place on site.

Revision Number	Date Inserted	Description	Signature

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ACRONYMS AND SYMBOLS

ACEMB	Assets, Contracting and Environmental Management Directorate
MSC	Meteorological Service of Canada, Environment Canada
CCME	Canadian Council of Ministers of the Environment
EC	Environment Canada
DIAND	Department of Indian Affairs and Northern Development
DND	Department of National Defence
m	Metres
NRC	National Research Council Canada

1. PREAMBLE

This report applies to the Eureka Sewage Lagoon (latitude 79^0 59' 23" N, longitude 85^0 50' 11" W) located in Eureka, NU (latitude 79^0 59' 41" N, longitude 85^0 48' 48" W) and is a requirement of subsection D.10 of the Nunavut Water Board Licence No. **3BC-EUR0611.**

The following formal distribution will be made of this report:
Nunavut Water Board
Andrew Keim (Inspector, DIAND)

To request additional information, please contact:
Tim Rauch
Project Manager
Environment Canada
District 3 – Property Management
P.O. Box 14257
Lac Du Bonnet, MB R0E 1A0

2. INTRODUCTION

The Sewage Lagoon is located on the east end of the MSC Weather Station and southeast of the Hydrogen Balloon Release building, on the shores of Slidre Fjord. The lagoon is approximately 75 m x 14 m and is separated from the fjord by a 3 m wide berm. Grey and black water from the AES Operations building is pumped into the lagoon via an aboveground pipe. The lagoon is drained once a year when it reaches capacity, usually in July. The land slopes toward the south and the fjord.

3. CONTEXT

1. Part D, item #10 of Environment Canada's Water Licence states:
   Should the Licensee require the removal and disposal of sludge from the Sewage Disposal Facilities, a Sludge Disposal Plan shall be submitted to the Board for approval, at least ninety (90) days prior to commencing the work.
2. The sludge in the existing lagoon was sampled and analyzed in the summer of 2006 by the National Research Council's Biotechnology Research Institute (NRC). Concentrations of selected elements were determined to be above existing Canadian Sediment Guidelines for the Protection of Aquatic Life (CCME). DND and EC are currently confirming the data and are investigating the reasons for the elevated levels.
3. EC has initiated an "options" analysis for sewage treatment and disposal at Eureka, NU, the results of which are expected in 2009.

4. SLUDGE DISPOSAL PLAN

Decisions by EC subsequent to the previously mentioned sewage treatment and disposal options analysis may have implications for the current sewage lagoon and its sludge. If it is decided to:

- close the existing lagoon; or
- remove the existing sludge,

the services of a qualified engineer will be obtained to determine whether the lagoon is/is not highly contaminated and to recommend a remediation option(s) which may include the following:

  - the lagoon may be de-watered (eg. evaporation allowed to take place), backfilled and shaped to blend in with existing contours provided that measures are applied for leachate control;
  - the sludge may be de-watered and the dried residue removed and disposed of on-site in an engineered land fill; or
  - the de-watered sludge may be containerized and land filled to preclude contact with the Arctic ecosystem.

5. REFERENCE

National Research Council Canada, Biotechnology Research Institute, *Characterization of Contaminated Sites at CFS-Alert and CFS-Eureka, Nunavut*, 2007

Environment Canada Environnement Canada

QUALITY ASSURANCE (QA) AND QUALITY CONTROL (QC) PROGRAM

— Eureka High Arctic Weather Station —

In support of the
Nunavut Water Board License
No. 3BC-EUR0611

Prepared by Environment Canada
Assets, Contracting and Environmental Management Directorate (ACEMD)

November, 2007

Canada

Control Page

On receipt of revisions and/or amendments, the Assets, Contracting and Environmental Management Directorate (ACEMD) shall complete this control page to ensure that the Quality Assurance (QA) and Quality Control (QC) Program at Eureka High Arctic Weather Station (HAWS) is always current and consistently reflects the operations and activities taking place on site.

Version	Date in Force	Expiry Date	Description / Purpose
1	November. 23rd, 2007	November 22nd , 2008	Original Program

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Acronyms

ACEMD	Assets, Contracting and Environmental Management Directorate
HAWS	High Arctic Weather Station
PEARL	Polar Environment Atmospheric Research Lab
pH	Measure of acidity and alkalinity
QA	Quality Assurance
QC	Quality Control
SNMP	Surveillance Network Monitoring Program
UV	Ultraviolet

1. Introduction

This document has been prepared in response to the requirements of the Nunavut Water Board License number 3BC-EUR0611, issued to Environment Canada on February 6, 2006. Specifically, this document satisfies the requirements set out in the above mentioned license, Part J, point 7, which states:

"The Licensee shall submit to the Board for approval, within three (3) months of the issuance of this Licence, a Quality Assurance/Quality Control (QA/QC) Plan, based on the principals of the INAC "QA/QC Guidelines for Licensees", that addresses the field and laboratory procedures and requirements needed to carry out the monitoring program."

The requirements of the Nunavut Water Board License number 3BC-EUR0611specifically target Environmnet Canada's Eureka High Arctic Weather Station (HAWS) which is located on the north side of Slidre Fjord, at the north-western tip of Fosheum Peninsula on Ellesmere Island at 80^{o} 0' N and 85^{o}56' W.

Eureka HAWS is a weather monitoring facility that has been in operation since 1947. The Eureka HAWS is a centre of activity for Environment Canada, the Department of National Defence, the Polar Continental Shelf Project, and the Polar Environment Atmospheric Research Lab (PEARL). Most of the work is carried out in the short Arctic summer – June, July and August. The number of people located on-site varies between 8 and 40 (this includes the members of the Department of National Defence).

2. Program Objectives

This document will ensure that water samples collected in the field, as part of the requirements of the water licence, accurately reflect the physical and chemical nature of the water tested. The procedures described below refer to samples that are collected for:

1. Assessment of the quality of drinking water. Some analyses may be done on site and some may be contracted out.
2. Assessment of the quality of wastewater discharge.
3. Assessment of the quality of runoff from disposal site of solid waste.

The interpretation of QA/QCs for the purpose of this document follows those specified in the report entitled “Quality assurance (QA) and Quality control (QC) Guidelines for use by class “B” licensees in collecting representative water samples in the field and for submission of a QA/QC plan (INAC, 1996).

To ensure a common understanding of these two terms, a definition for each is provided below:

- ***Quality Assurance****:* is the system of activities designed to better ensure that quality control is done effectively.

- ***Quality Control***: is the use of established procedures to achieve standards of measurement for the three principal components of quality: precision, accuracy and reliability.

3. Sample Collection

The following section describes the various locations and methods used for collecting samples at Eureka HAWS.

3.1 Location

A number of locations were selected for collecting sample. They are described in further details below.

3.1.1 Raw Water Supply and Drinking Water

For the purpose of the Surveillance Network Monitoring Program (SNMP) four sampling stations have been identified:

1. Tank room before filtration
2. Tap in the weather office
3. Reverse osmosis in the weather office
4. Kitchen tap

The first sampling station is located in the tank room, before the filtration. It is representative of a raw source water, whereas the other three stations are representative of water following treatment, prior to being used for the various needs at Eureka HAWS.

3.1.2 Assessment of Runoff from the Solid Waste Disposal Facilities

Water samples and one soil sample are collected to assess the runoff from the solid waste disposal facilities. Water samples are collected to assess the water quality of the runoff/ponds at the bottom of the soil treatment cell.

3.1.3 Discharge from the Sewage Lagoon

The samples for the SNMP are collected at the end of the discharge pipe that is used to empty the sewage lagoon. It is also set at a certain distance downstream from the discharge point to assess the water quality in the mixing zone.

3.2 Sampling Equipment

No specialized equipment is required to collect the water and soil samples. All bottles are provided by the laboratory which carries out the analysis of the samples.

3.3 Sampling Methods

The following section describes the various sampling methods used at Eureka HAWS.

3.3.1 Raw and Treated Drinking Water

The sampling methods and description of the analysis are provided in Appendix A. The Board did not provide any specifications with respect to sampling or analysis requirements for this media.

3.3.2 Solid Waste Disposal Facilities

No specialized sampling methods are used for the collection of these samples. No field blanks or duplicates have been collected in 2005 or 2006. All future sampling events shall contain at least one set of field duplicates.

3.3.3 Discharge from Sewage Lagoon

A collection container is used to collect sufficient samples from the discharge pipe to fill the necessary sampling bottles. The container is rinsed three times prior to filling for the purpose of collecting the required sample. The samples from the mixing zone located downstream of the discharge point are collected directly into the required bottles (see section 4.1).

4. Sample Handling

The following section describes the procedures for handling the samples collected at Eureka HAWS.

4.1 Preservation

The samples of raw and treated drinking water do not require any preservation since all related tests are carried out on-site. Also, there is no specified holding time for these samples.

The samples collected from the solid waste disposal area are preserved using the following methods:

Table 1. Methods for preserving samples collected from the solid waste disposal area.

Bottle	Preservative	Parameter
500 mL plastic bottle	Nitric acid	Total metals
1 L glass bottle	None	BTEX, total volatile hydrocarbons and total extractable hydrocarbons

The samples collected from the sewage lagoon discharge and mixing zone are preserved using the following methods:

Table 2. Methods for preserving samples collected from the sewage lagoon discharge and mixing zone.

Bottle	Preservative	Parameter
500 mL plastic bottle	None	TSS and nitrate-nitrite (as N)
250 mL plastic bottle	50 mL 20% nitric acid	Total silver
1 L plastic bottle	None	BOD
250 sterilized plastic bottle	Sodium thiosulfate	Fecal coliform
100 amber glass bottle	1 ml 1:1 sulfuric acid	Phenols
500 mL plastic bottle	2 mL 1:1 sulfuric acid	Ammonia-N, TKN, P

4.2 Sample Identification

The samples of drinking water collected at the four points identified in Section 3.1.1 shall be clearly labelled using consistent terminology.

The samples from the treatment cell and from the solid waste disposal facility shall be identified by labels in the following manner:

From Treatment cell: Eureka-TC-Year-sample #
An example: **Eureka-TC-2007-1**

From sewage lagoon discharge:
For samples collected from sewage pipe discharge: Eureka-WW-SL-Year-sample #
An example: **Eureka-WW-SL-2007-1**

For samples collected from mixing zone: Eureka-WW-MZ-Year-sample #
An example: **Eureka-WW-MZ-2007-1**

All sampling points shall be clearly identified using GPS positioning or clear narrative descriptive accompanied by as many photographs as necessary to ensure that identical sampling location can be used in the following year(s).

A clear Chain of Custody record shall be generated at the time of sampling, and shall be part of the final report describing the sampling and results by either Environment Canada personnel or by contractors. The record shall contain the following information:

- Identification of sampling site – general and specific (example: Eureka – Waste Water);
- Sample ID;
- Date and time of Collection;
- Name and affiliation of person(s) collecting the samples;
- Size of sample container;
- Analysis required; and
- Name and signature of all individuals involved in the chain of possession.

4.3 Transportation

Samples from all media shall be stored on-site in appropriate storage containers (coolers with ice packs is ideal). The samples shall not be frozen unless this is identified by the laboratory that shall be carrying out the analysis.

For some analysis (i.e. bacteriological analyses), it is imperative that the samples reach a laboratory in a specified time period. The sampling shall then have to be timed to coincide with a plane going to the location where the samples shall be analyzed. The samples, when shipped, shall be well packed to protect them from any harm along the way, especially if glass bottles are used. Also, if required, a label shall be attached to the container to indicate what is contained in the container and if any special care is required (i.e. keeping the container cool).

5. Laboratory Analyses

The following section describes the requirements relating to the laboratory analyses of the samples collected at Eureka HAWS.

5.1 Laboratory Accreditation

Analysis of all samples collected for the Eureka Haws SNMP, in support of the water license shall be carried out by an accredited laboratory, ideally accredited

by the Canadian Association for Environmental Analytical Laboratories (C.A.E.A.L). The laboratory shall provide a certificate of their accreditation along with a copy of the methods used to analyze the samples and a copy of their QA/QC methods that were in place when the analyses were being carried out.

5.2 Detection Limits

The laboratory shall provide detection limits for all of the methods that are used for the analysis of the samples.

5.3 Laboratory Methods

As stated in section 5.1, the laboratory shall provide a copy of the methods used to analyze the samples.

6. Reporting Requirements

Eureka HAWS shall select two sampling points in their SNMP and shall collect duplicate samples at these sampling points. These shall serve as internal/external check for Eureka HAWS and the commercial laboratory.

Each full report for the SNMP shall consist of the following (electronic or hard copy format):

1. Objective – shall include who was doing the sampling, dates, site conditions.
2. Description of sampling – equipment and sample containers used
3. Identification of sampling point locations – GPS co-ordinates, photographs, narrative description, etc.
4. List of samples collected, method of collection, preservation and transportation methods.
5. Identification of laboratory that shall carry out the analysis of samples, letter of accreditation of the laboratory, description of methods used or clear references to already published methods that are being used for the analysis, method detection limits and full QA/QC used when analysing the samples.

All results shall be presented in a tabular format (electronic or hard copy) and shall include any special conditions that were associated with sample collection, transportation or analysis.

7. References

Department of Indian and Northern Affairs Canada, Water Resources Division and the Northwest Territories Water Board (1996). *Quality assurance (QA) and Quality control (QC) Guidelines for use by class "B" licensees in collecting representative water samples in the field and for submission of a QA/QC plan*.

Appendix A

Methods Used by Eureka HAWS for

Monthly Testing of Drinking Water

MONTHLY WATER TESTING

Sample Locations: **Weather Office Water Tap**
Weather Office Reverse Osmosis Tap
Kitchen Tap
Tank Room Before Filtration – around back of first tank

All Water Testing supplies are kept in SAO office.

Regularly check expiry dates of all products, order new supplies as required. Further water testing and ordering information can be found in filing cabinet.

* Pre-heat incubator for the Colilert Test as it takes a while. First remove Quanti-Tray Comparator and thermometer, ensure it's plugged in, then turn on power bar. Insert thermometer into hole on top of incubator. Dial should be set to around four, as marked on front. Allow it to warm up to 35°C ± 0.5°C.

CHLORINE TEST (FREE & TOTAL)

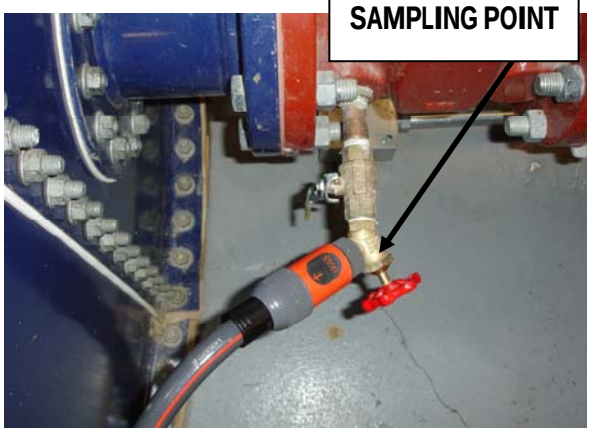
You Will Need: HACH Chlorine Test Kit
Distilled water
Kimwipes

Procedure Notes:

Inside the Test Kit are complete instructions in the **Pocket Colorimeter Instruction Manual pages 1-16 to 1-19**. The kit also contains one cell marked for use as the 'Sample', one for 'Total' and one for 'Free'.

Between samples thoroughly cleanse the inside of sample bottles and lids with distilled water. Be sure to zero the Colorimeter before the next test. Also wipe water and fingerprints from the outside of bottles before placing into cell compartment.

Allowable levels < 0.2 mg/L



pH TEST

You Will Need: HACH Pocket Pal pH Tester (in Test Kit)

100mL Nalgene beaker
Distilled water

Buffer Solution

Procedure Notes:

Press On/Off switch at top of pH Tester to turn it on, remove protective cap from bottom.

Calibrate: fill beaker with 60-80mL of pH 7.0 Buffer Solution. Immerse tester in solution, gently stir for several seconds. When the digital display stabilizes, read the pH value (should be 7.0).

Rinse the bottom of tester with distilled water. Obtain pH values for the four sample points in the same manner as above.

Periodically adjust Tester calibration. Refer to card in the HACH Test Kit for maintenance and other information. If Buffer Solution was frozen during shipping just shake to ensure it is mixed.

Allowable levels 6.5 to 8.5

COLILERT TEST

Colilert simultaneously detects coliforms and E.coli in water. When total coliforms metabolize Colilert's nutrient indicator, the sample turns yellow. When E.coli metabolize Colilert's nutrient indicator, the sample fluoresces.

You will Need: Four sterile IDEXX 120mL vessels with Sodium Thiosulphate
Four Colilert Snap Packs containing white powder
Four Quanti-Trays

Procedure:

Switch the IDEXX Sealer on to warm it up. Power switch is located on the back. The amber light on front will illuminate. Once both the amber and green lights are on the Sealer is ready to go. Ensure the Input Shelf is attached to the front, and pull unit away from the wall to allow room for the sealed tray to exit.

Label vessels and Quanti-Trays for each of the four locations.

At each sample point allow water to run 5 minutes, fill vessel to 100mL line – do not touch faucet to bottle.

Add contents of one Snap Pack to each sample. Tightly secure lid and shake sample until powder is dissolved.

Pour entire contents of sample bottles into Quanti-Trays. To open Quant-Tray: Hold with bubble packs facing palm, squeeze the edges so the backing and tray separates.

As you fill each Quanti-Tray, seal it in the IDEXX Quanti-Tray Sealer. Place a Quanti-Tray into the Rubber Insert. Place Insert (groove end first) onto the Input Shelf. Slide into Sealer until the motor grabs and draws it in.

Should you need to reverse the movement of the tray, hit the Reverse button (this should not be done unless necessary).

In $\approx$15 seconds the Tray and Insert should come out the back of the Sealer, and the Quanti-Tray will be sealed.

Once all four Quanti-Trays have been sealed properly, turn off sealer. Place the stacked trays into the incubator once the temperature has stabilized at 35°C. Incubate for 24 hours.

<u>After 24 hours...</u>

Check samples against the Quanti-Tray Comparator using the Results Interpretation table (below). Count the number of positive wells and refer to the MPN table provided.

Look for fluorescence with a 6-watt, 365 nm, UV light (beside SAO printer). Hold light within 5 inches of the sample, in a dark environment.

Results Interpretation Table:

Appearance	Result
Less yellow than the comparator	Negative for total coliforms and E.coli
Yellow ≥ the comparator	Positive for total coliforms
Yellow and fluorescence ≥ the comparator	Positive for E.coli

Appendix D

Application, Report and Inspection Forms

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE
TEL: (867) 920-8130
FAX: (867) 873-6924
EMAIL: spills@gov.nt.ca

REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR	REPORT TIME	☐ ORIGINAL SPILL REPORT, OR ☐ UPDATE # _____ TO THE ORIGINAL SPILL REPORT	REPORT NUMBER _____-_____
B	OCCURRENCE DATE: MONTH – DAY – YEAR	OCCURRENCE TIME		

C	LAND USE PERMIT NUMBER (IF APPLICABLE)	WATER LICENCE NUMBER (IF APPLICABLE)
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION	REGION ☐ NWT ☐ NUNAVUT ☐ ADJACENT JURISDICTION OR OCEAN
E	LATITUDE DEGREES MINUTES SECONDS	LONGITUDE DEGREES MINUTES SECONDS

F	RESPONSIBLE PARTY OR VESSEL NAME	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION	
G	ANY CONTRACTOR INVOLVED	CONTRACTOR ADDRESS OR OFFICE LOCATION	
H	PRODUCT SPILLED	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES	U.N. NUMBER
	SECOND PRODUCT SPILLED (IF APPLICABLE)	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES	U.N. NUMBER
I	SPILL SOURCE	SPILL CAUSE	AREA OF CONTAMINATION IN SQUARE METRES
J	FACTORS AFFECTING SPILL OR RECOVERY	DESCRIBE ANY ASSISTANCE REQUIRED	HAZARDS TO PERSONS, PROPERTY OR EQUIPMENT
K	ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS		

L	REPORTED TO SPILL LINE BY	POSITION	EMPLOYER	LOCATION CALLING FROM	TELEPHONE
M	ANY ALTERNATE CONTACT	POSITION	EMPLOYER	ALTERNATE CONTACT LOCATION	ALTERNATE TELEPHONE

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY	POSITION STATION OPERATOR	EMPLOYER	LOCATION CALLED YELLOWKNIFE, NT	REPORT LINE NUMBER (867) 920-8130

LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC

SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN

FILE STATUS ☐ OPEN ☐ CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			

Instructions for Completing the NT-NU Spill Report Form

This form can be filled out electronically and e-mailed as an attachment to spills@gov.nt.ca. Until further notice, please verify receipt of e-mail transmissions with a follow-up telephone call to the spill line. Forms can also be printed and faxed to the spill line at 867-873-6924. Spills can still be phoned in by calling collect at 867-920-8130.

A. Report Date/Time	The actual date and time that the spill was reported to the spill line. If the spill is phoned in, the Spill Line will fill this out. **Please do not fill in the Report Number**: the spill line will assign a number after the spill is reported.
B. Occurrence Date/Time	Indicate, to the best of your knowledge, the exact date and time that the spill occurred. Not to be confused with the report date and time (see above).
C. Land Use Permit Number /Water Licence Number	This only needs to be filled in if the activity has been licenced by the Nunavut Water Board and/or if a Land Use Permit has been issued. Applies primarily to mines and mineral exploration sites.
D. Geographic Place Name	In most cases, this will be the name of the city or town in which the spill occurred. For remote locations – outside of human habitations – identify the most prominent geographic feature, such as a lake or mountain and/or the distance and direction from the nearest population center. **You must include the geographic coordinates** (Refer to Section E).
E. Geographic Coordinates	This only needs to be filled out if the spill occurred outside of an established community such as a mine site. Please note that the location should be stated in degrees, minutes and seconds of Latitude and Longitude.
F. Responsible Party Or Vessel Name	This is the person who was in management/control/ownership of the substance at the time that it was spilled. In the case of a spill from a ship/vessel, include the name of the ship/vessel. Please include full address, telephone number and e-mail. Use box K if there is insufficient space. **Please note that, the owner of the spilled substance is ultimately responsible for any spills of that substance, regardless of who may have actually caused the spill.**
G. Contractor involved?	Were there any other parties/contractors involved? An example would be a construction company who is undertaking work on behalf of the owner of the spilled substance and who may have contributed to, or directly caused the spill and/or is responding to the spill.
H. Product Spilled	Identify the product spilled; most commonly, it is gasoline, diesel fuel or sewage. For other substances, avoid trade names. Wherever possible, use the chemical name of the substance and further, identify the product using the four digit UN number (eg: UN1203 for gasoline; UN1202 for diesel fuel; UN1863 for Jet A & B)
I. Spill Source	Identify the source of the spill: truck, ship, home heating fuel tank and, if known, the cause (eg: fuel tank overfill, leaking tank; ship ran aground; traffic accident, vandalism, storm, etc.). Provide an estimate of the extent of the contaminated/impacted area (eg: 10 m^2)
J. Factors Affecting Spill	Any factors which might make it difficult to clean up the spill: rough terrain, bad weather, remote location, lack of equipment. Do you require advice and/or assistance with the cleanup operation? Identify any hazards to persons, property or equipment: for example, a gasoline spill beside a daycare centre would pose a safety hazard to children. Use box K if there is insufficient space.
K. Additional Information	Provide any additional, pertinent details about the spill, such as any peculiar/unique hazards associated with the spilled material. State what action is being taken towards cleaning up the spill; disposal of spilled material; notification of affected parties. If necessary, append additional sheets to the spill report. Number the pages in the same format found in the lower right hand corner of the spill form: eg. “Page 1 of 2", “Page 2 of 2" etc. **Please number the pages to ensure that recipients can be certain that they received all pertinent documents.** If only the spill report form was filled out, number the form as “Page 1 of 1".
L. Reported to Spill Line by	Include your full name, employer, contact number and the location from which you are reporting the spill. Use box K if there is insufficient space.
M. Alternate Contact	Identify any alternate contacts. This information assists regulatory agencies to obtain additional information if they cannot reach the individual who reported the spill.
N. Report Line Use Only	**Leave Blank**. This box is for the **Spill Line’s use only**.

Environment Canada **Environnement Canada**

Assets, Contracting and Environmental Management Directorate
District 3 - Property Management

EUREKA, NU – HIGH ARCTIC WEATHER STATION
USE OF ELECTRICITY APPROVAL APPLICATION

Name of Department / Agency / Organization:							Date:	Day/Month/Year				
Applicant:	Name					Title						
Mailing Address:	Address:			City:			Province/State:		Postal/ZIP Code:			
	Telephone:			Fax:			E-Mail:					
Proposed Electricity Usage												
Description:	Provide a brief description of activity requiring electrical power											
Quantity (KWH):	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Signature of Applicant:	Signature								Date (Day/Month/Year)			
TO BE COMPLETED BY ENVIRONMENT CANADA ONLY												
APPROVED ☐	NOT APPROVED ☐			LIMITED/CONDITIONAL APPROVAL ☐								
Explanation:	Reason for not approving or description of limitations/conditions on approval											
Responsible Manger:	Signature								Date (Day/Month/Year)			
Forward Application to:	Manager, District 3 Property Management Environment Canada 335 River Road Ottawa Ontario K1A 0H3 Tel: (613) 949-8555 Fax: (613) 949-9017											

Environment Canada **Environnement Canada**

Assets, Contracting and Environmental Management Directorate
District 3 - Property Management

EUREKA, NU – HIGH ARCTIC WEATHER STATION
USE OF ELECTRICITY REPORT

Proposed Electricity Usage												
Name of Department / Agency / Organization:						Date:	Day/Month/Year					
Applicant:	Name					Title						
Mailing Address:	Address:			City:			Province/State:		Postal/ZIP Code:			
	Telephone:			Fax:			E-Mail:					
Date of Approval for Use of Electrical Power:	Day/Month/Year											
Electricity Usage												
Usage for Month (KWH):	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Comments:	Further describe power usage (optional)											
Signature of Representative:	Signature								Date (Day/Month/Year)			
Forward Report to:	Manager, District 3 Property Management Environment Canada 335 River Road Ottawa Ontario K1A 0H3 Tel: (613) 949-8555 Fax: (613) 949-9017											

Environment Canada **Environnement Canada**

Assets, Contracting and Environmental Management Directorate
District 3 - Property Management

EUREKA, NU – HIGH ARCTIC WEATHER STATION
USE OF WATER AND WASTE DISPOSAL APPROVAL APPLICATION

Name of Department / Agency / Organization:					Date:	Day/Month/Year						
Representative:	Name			Title								
Mailing Address:	Address:		City:		Province/State:	Postal/ZIP Code:						
	Telephone:		Fax:		E-Mail:							
Proposed Water Usage												
Description:	Provide a brief description of activity requiring water											
Quantity (Litres):	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Source of Water:	Station Creek ☐	Water Reservoir ☐	Settling Tanks ☐	Potable Tanks ☐	Other (Specify):							
Proposed Waste Disposal												
Description:	Provide a brief description of activity generating waste for disposal											
Type and Quantity of Waste:	Waste Water (including human waste):	Description of Waste and expected quantity										
	Solid:	Description of Waste and expected quantity										
	Hazardous:	Description of Waste and expected quantity										
	Other:	Description of Waste and expected quantity										
Signature of Applicant:	Signature				Date (Day/Month/Year)							
TO BE COMPLETED BY ENVIRONMENT CANADA ONLY												
APPROVED ☐	NOT APPROVED ☐	LIMITED/CONDITIONAL APPROVAL ☐										
Explanation:	Reason for not approving or description of limitations/conditions on approval											
Responsible Manger:	Signature				Date (Day/Month/Year)							
Forward Application to:	Manager, District 3 Property Management Environment Canada 335 River Road Ottawa Ontario K1A 0H3 Tel: (613) 949-8555 Fax: (613) 949-9017											

Environment Canada **Environnement Canada**

Assets, Contracting and Environmental Management Directorate
District 3 - Property Management

EUREKA, NU – HIGH ARCTIC WEATHER STATION
USE OF WATER AND WASTE DISPOSAL REPORT

Name of Department / Agency / Organization:						Date:	Day/Month/Year					
Representative:	Name			Title								
Mailing Address:	Address:		City:		Province/State:		Postal/ZIP Code:					
	Telephone:		Fax:		E-Mail:							
Date of Approval for Water Use:	Day/Month/Year		**Date of Approval for Waste Disposal:**		Day/Month/Year							
Water Usage												
Quantity (Litres):	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Source of Water:	Station Creek ☐	Water Reservoir ☐	Settling Tanks ☐	Potable Tanks ☐	Other (Specify):							
Comments:	Further describe water usage (method of measurement etc.)											
Waste Disposal												
Type and Quantity of Waste:	Waste Water (including human waste):	Description of Waste and quantity disposed										
	Solid:	Description of Waste and quantity disposed										
	Hazardous:	Description of Waste and quantity disposed										
	Other:	Description of Waste and quantity disposed										
Comments:	Further describe waste disposal activities (method of measurement etc.)											
Signature of Representative:	Signature					Date (Day/Month/Year)						
Forward Report to:	Manager, District 3 Property Management Environment Canada 335 River Road Ottawa Ontario K1A 0H3 Tel: (613) 949-8555 Fax: (613) 949-9017											

Fax or Mail Form to **Environmental Compliance**, 335 River Road, Ottawa, Ontario, K1A 3H0.
Fax Number: (613)990-8861. Phone Number: (613) 949-1795.

VERIFICATION OF COMPLIANCE

Registration Number: EC-_____

Facility Name: _____

ARMS[1] Number, if applicable: _____

Managers are requested to submit the *Verification of Compliance Form* to **Environmental Compliance** upon completion of a new petroleum tank installation project after June 12, 2008, or upon upgrading a petroleum tank system, to satisfy the requirements of CEPA-197. This *Verification of Compliance* is a confirmation that the construction was completed as CEPA require.

Confirmation is accepted from any of the related parties listed below. Please complete the Form and mail or fax it to **Environmental Compliance**, 335 River Road, Ottawa, Ontario, K1A 3H0. Fax Number: (613)990-8861. Phone Number: (613) 949-1795.

A Registration Application Form or a printed copy of the FIRSTS Identification should be included with this document.

This Form may be filled by:

- ☐ An engineer involved in the project design
- ☐ Certified contractor assigned to the project

"I certify that the construction was completed in accordance with the CEPA-197"

_____ _____
Print Name Company Name

_____ _____
Date of Inspection Signature

Verification of Compliance **ACCEPTED**[2] By Programs or District Manager

_____ _____
Print Name of Manager Signature

_____
Date of confirmation of Compliance

[1] ARMS Number is the **A**utomated **R**eal Property **M**anagement **S**ystem available at:
http://infolane.ec.gc.ca/arms/Login.cfm?lang=Eng&Browser=MSIE
[2] Please note that this Form is as per Internal Policy

Monthly FSTS Inspection Checklist

Facility: _____ **EC Fuel Tank System # :_____**

Month:_____ **Inspected by:_____**

Levels of tank (L)		
Tank 1		
Tank 2		
Tank 3		
Tank 4		
Tank 5		
	Y or N	**Comments**
Is there any evidence of product leakage?		
Is there any evidence of damage to any of the tank system equipment?		
Is the tank system adequately protected from damage?		
If applicable, is there any leakage at the fuel pump: fittings, belts or filters?		
If applicable, does fuel pump unit come on line and dispense product with no hesitation or unusual		

sounds?		
Is there nothing broken on any of the connections or the piping?		
Is there any evidence of leaks at any fittings, elbows or joint of the aboveground piping?		
Is the fill pipe locked?		
Is the tank vent clear of obstructions?		
For double wall tank, was there a leak alarm, where applicable, or evidence of a leak in the interstitial space of the double walled tank since the last inspection?		
Is there any water or other liquid in the sumps?		
Is there non fuel in the secondary containment around the tank or in the drip pan?		
Are valves operated properly?		
Are WHMIS labels, placards and EC Registration tags are in place?		

Monthly Inventory	Estimated percentage of tank full: _____ %	Does fuel level inventory indicate a leak since last inspection based on expected fuel consumption? _____
Is the system working properly?		
Are there any required actions?		

Monthly FSTS Inspection Checklist

Facility: _____ **EC Fuel Tank System # :_____**

Month:_____ **Inspected by:_____**

Levels of tank (L)		
Tank 1		
Tank 2		
Tank 3		
Tank 4		
Tank 5		
	Y or N	**Comments**
Is there any evidence of product leakage?		
Is there any evidence of damage to any of the tank system equipment?		
Is the tank system adequately protected from damage?		
If applicable, is there any leakage at the fuel pump: fittings, belts or filters?		
If applicable, does fuel pump unit come on line and dispense product with no hesitation or unusual		

sounds?		
Is there nothing broken on any of the connections or the piping?		
Is there any evidence of leaks at any fittings, elbows or joint of the aboveground piping?		
Is the fill pipe locked?		
Is the tank vent clear of obstructions?		
For double wall tank, was there a leak alarm, where applicable, or evidence of a leak in the interstitial space of the double walled tank since the last inspection?		
Is there any water or other liquid in the sumps?		
Is there non fuel in the secondary containment around the tank or in the drip pan?		
Are valves operated properly?		
Are WHMIS labels, placards and EC Registration tags are in place?		

Monthly Inventory	Estimated percentage of tank full: _____ %	Does fuel level inventory indicate a leak since last inspection based on expected fuel consumption? _____
Is the system working properly?		
Are there any required actions?		

Fax or Mail Application to **Environmental Compliance**, 335 River Road, Ottawa, Ontario, K1A 3H0.
Fax Number: (613)990-8861. Phone Number: (613) 949-1795.

Fuel Tank Decommissioning Report

For ***Environmental Compliance*** Only	
Date Received :	_____
ARMS Number :	_____
SECTION 1 : Site Information	
Facility Name :	_____
Address :	_____
City and Postal Code :	_____
Program or District Manager Name :	_____
Site/Facility Manager or Contractor Name:	_____
SECTION 2 : Tank Owner Information (Specify <u>if different</u> than Environment Canada, i.e., leased)	
Name :	_____
Address :	_____
City and Postal Code :	_____
Telephone:	_____
Organization :	_____

Fax or Mail Application to **Environmental Compliance**, 335 River Road, Ottawa, Ontario, K1A 3H0.
Fax Number: (613)990-8861. Phone Number: (613) 949-1795.

SECTION 3 : Tank System Removal Information

EC Registration Number	**Reason for Removal:** (Specify Section of CEPA-197 or other such as facility closing, etc.)	**Tank System Replaced: Yes or No** (If Yes, specify the applicable or revised EC Registration Number)

SECTION 4 : Entity/Agent performing the Tank System Decommissioning

Name and Organization:	_____ _____
Address :	_____
City and Postal Code :	_____
Telephone:	_____
Proof of qualification of general and/or his/her subcontractor:	_____ _____

Fax or Mail Application to **Environmental Compliance**, 335 River Road, Ottawa, Ontario, K1A 3H0.
Fax Number: (613)990-8861. Phone Number: (613) 949-1795.

SECTION 5 : Site Contamination Information, if applicable

Was any contamination or spill encountered during removal or decommissioning?	☐ **Yes** ☐ **No**
Was Environment Canada Spill Incident Centre notified?	☐ **Yes** _____ **YY/MM/DD** ☐ **No**
Was a site subsurface investigation conducted?	☐ **Yes** _____ **YY/MM/DD** ☐ **No** _____ **(Planned: YY/MM/DD)**
If Yes, who did the investigation?	_____
Was remediation/ clean-up work conducted at the site?	☐ **Yes** _____ **YY/MM/DD** ☐ **No** _____ **(Planned: YY/MM/DD)**
If Yes, who did the remediation?	_____

Comments:

_____

_____

_____

Program or District Manager Signature: _____	_____ (YY/MM/DD)

API Tank & Site Survey Form

Please check your tank type below:

☐ Fixed Roof
☐ External Floating Roof
☐ Internal Floating Roof
☐ No Roof
Date of Site Survey:
Conducted by:

SITE INFORMATION

Department or Agency: _____

Address: _____

_____

City: _____

Province -Territory: _____ Postal Code: _____

SITE CONTACT

Name: _____ Title: _____

Contact Phone: _____ Fax: _____

Site Address: _____

_____

City: _____

Province -Territory: _____ Postal Code: _____

1. GENERAL INFORMATION

1.1. Type of Inspection & Product Data:

Floor Only ☐
Full API Inspection ☐
Is cleaning required? Yes ☐ No ☐
What is the product in the tank?

_____
API Gravity _____
Anticipated amount of Sludge _____

1.2. Tank Information:

Tank ID _____
Tank Age _____
Diameter _____
Height _____
Tank Construction Material _____
Roof Type: Fixed ☐ EFR ☐ IFR ☐
Fixed type? Cone ☐ Dome ☐
Umbrella ☐ Other ☐ _____
IFR type? Alum Pontoon ☐
Steel Pan ☐ Other ☐ _____
If EFR, is there a ladder? Yes ☐ No ☐
Condition: _____
Floating Roof Seal Type (if applicable):

_____
Roof Condition? _____
Number of Roof Manways _____
Roof Manway Dimensions _____
Roof Manway Bolt Condition _____
Manway restrictions (internal, i.e. ladders, roof drains)?

_____

Tank Ladder:
Vertical ☐ Circular ☐ None ☐
Railing: Yes ☐ No ☐
Platform: Yes ☐ No ☐
Double Shell Yes ☐ No ☐
Double/Second Bottom Yes ☐ No ☐
When was it installed? _____
Tank Lining Yes ☐ No ☐
Type _____
When was it installed? _____
Cathodic Protection? Yes ☐ No ☐
Internal or External? Yes ☐ No ☐
Sloped Floor? Yes ☐ No ☐
Is the tank insulated? Yes ☐ No ☐
Type of insulation _____
Heaters? Yes ☐ No ☐
If yes, what kind? Bayonet ☐ Coil ☐
Other Internal Obstructions?

_____
Access to Shell Lower Course:
Stairs Side _____
Vegetation around Tank?
Yes ☐ No ☐
Standing Water around Tank?
Yes ☐ No ☐

1.3. Tank Foundation:

Earth ☐
Surface preparation

_____

_____
Concrete Ringwall ☐
Concrete Pad. ☐

1.4. Containment / Dike:

None ☐
If Other, explain _____

API Tank & Site Survey Form

1.5. Proximity to Groundwater or Waterway:

Less than _____ Yards ☐
Less than 100 Yards ☐
Greater Than 100 Yards ☐

1.6. Utilities:

Sanitation _____
Lighting _____
Power required: 480v / 3Φ / 50amp

1.7. Site Information:

For refueling truck:
Road Access _____
Outside Berm Access _____
Inside Berm Access _____
Staging Distance to Tank _____
Crane Supplied: owner ☐ Customer ☐
Crane Access _____

2. SITE DOCUMENTS

If applicable, obtain the following documents.

2.1. Any site specific safety procedures? Yes ☐ No ☐
If yes, explain. _____
2.2. Any site specific training requirements Yes ☐ No ☐
If yes, explain. _____
2.3. MSDS sheets for all materials in the tanks to be inspected completed ☐
2.4. Tank drawings (Blue prints) completed ☐
If none, provide site contact information of responsible engineer:
Name: _____ Number: _____
Name: _____ Number: _____
2.5. Any other applicable documents? Yes ☐ No ☐
If yes, explain. _____

3. SPECIAL PRECAUTIONS/CONSIDERATIONS

3.1. If breathing air or other support equipment is required to complete the work who will supply the equipment? owner ☐ Customer ☐

3.2. Are any special closure devices required in manways or other locations to provide a vapor barrier? Yes ☐ No ☐
If yes, please explain. _____

3.3. Is an inert blanket required in the vapor space? Yes ☐ No ☐

3.4. If testing, are there any plant specific conditions required? Yes ☐ No ☐
If yes, please explain. _____
_____

3.5. Are there decontamination facilities on site? Yes ☐ No ☐

3.6. Are any other site specific precautions applicable? Yes ☐ No ☐
If yes, please explain. _____
_____

API Tank & Site Survey Form

4. OPERATIONS

4.1. When does the client want to begin inspection(s) and/or cleaning?_____

4.2. What is the anticipated product level at the time of the inspection? _____

4.3. Are there any site operational constraints to the inspection schedule?

Work Hours? Yes ☐ No ☐
Weather? Yes ☐ No ☐
Union Issues? Yes ☐ No ☐
Other? Yes ☐ No ☐
If yes, please explain. _____
_____
_____

5. REGULATIONS & PERMITTING

5.1. Any special permitting requirements? Yes ☐ No ☐
If yes, please explain. _____

5.2. Date and results of last cleaning: _____
_____

5.3. Date and results of last inspection **(please attach previous report)**_____

5.4. Why are you inspecting the tank? _____
_____

5.5. What jurisdiction do your tanks fall under?
American Petroleum Institute ☐ Federal ☐
Other ☐_____Territory-Province ☐ [specify]

5.6. Which specific regulations apply? (if any): _____

5.7. Owner tank procedures-policy (ies) apply? (if any): _____