Slider Fiord
Eureka Weather Station
Hazardous Waste Site
Eureka Airstrip Road
Fort Eureka (DND)
Eureka Airstrip
DND Fuel Bladders

Photo 5

Hazardous Waste Site at Eureka

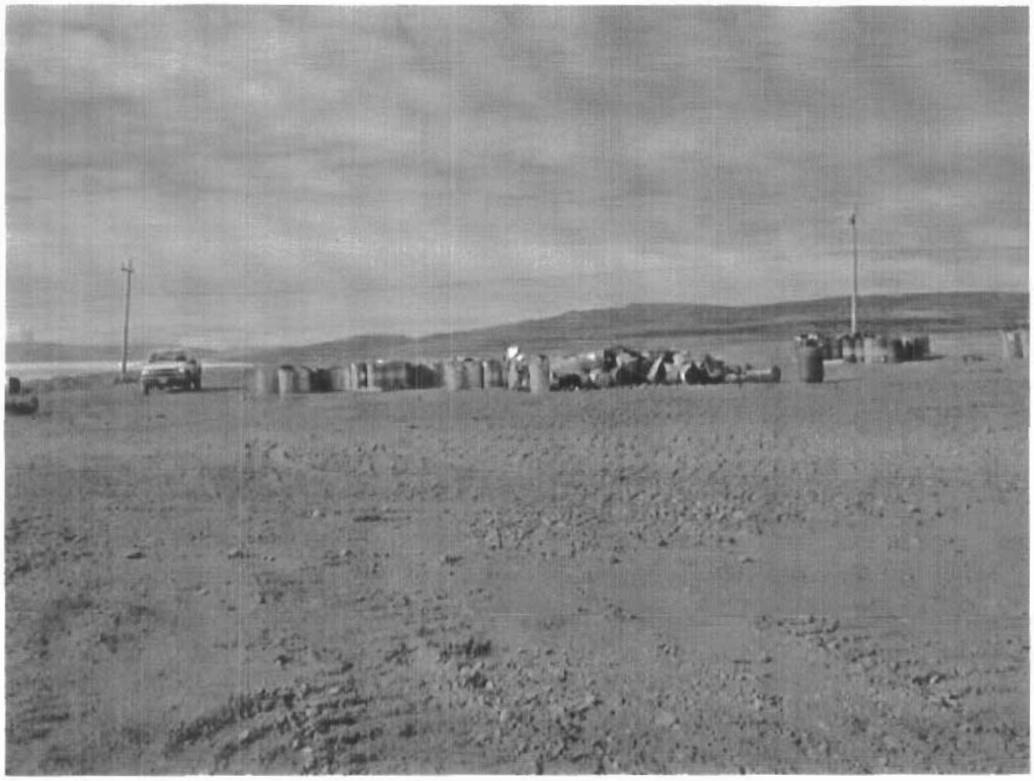


Photo 6

Photo# 7 : Exposed Debris at Abandoned West Runway Landfill

Photo# 8 : Exposed Debris at Abandoned West Runway Landfill

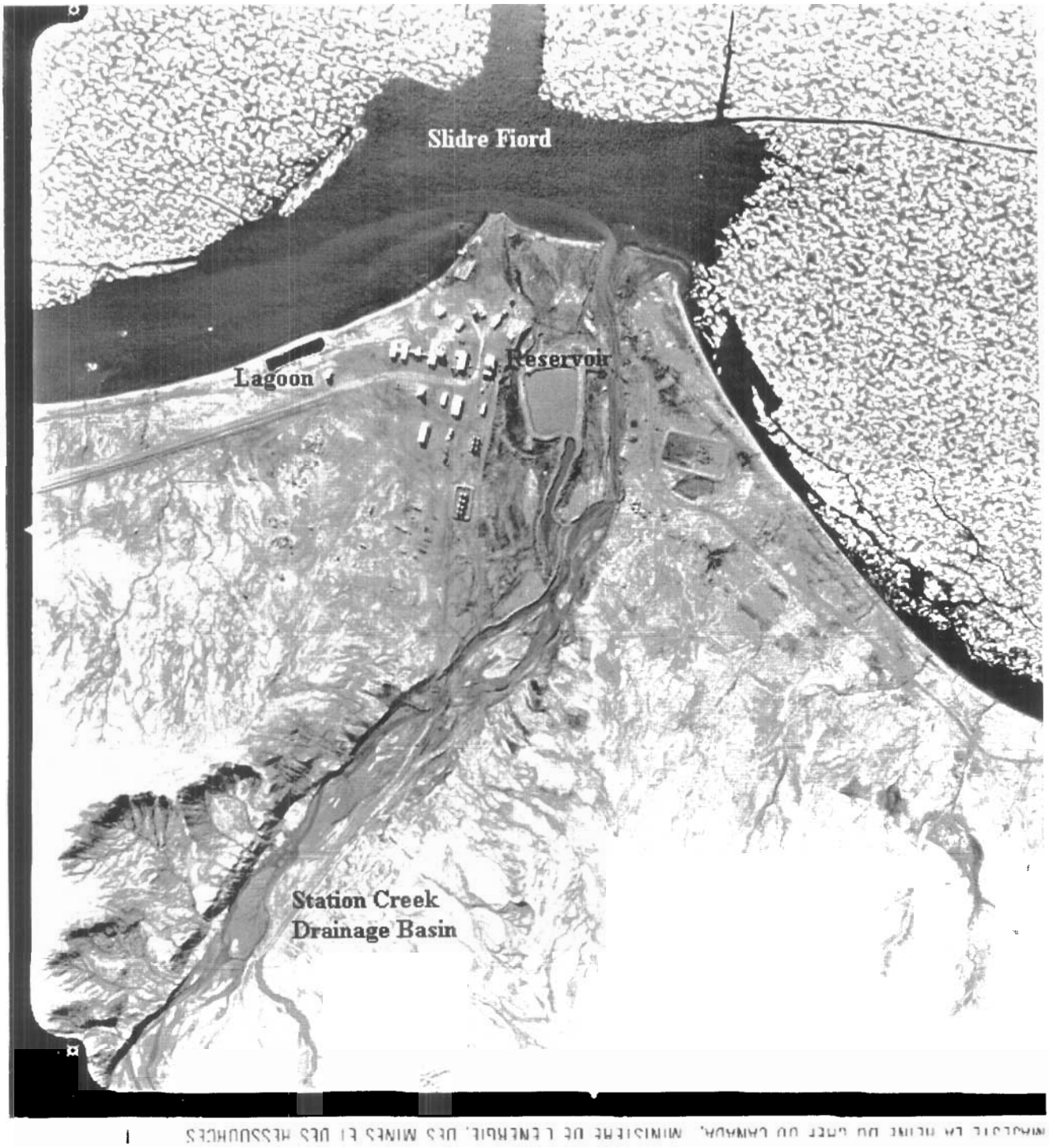
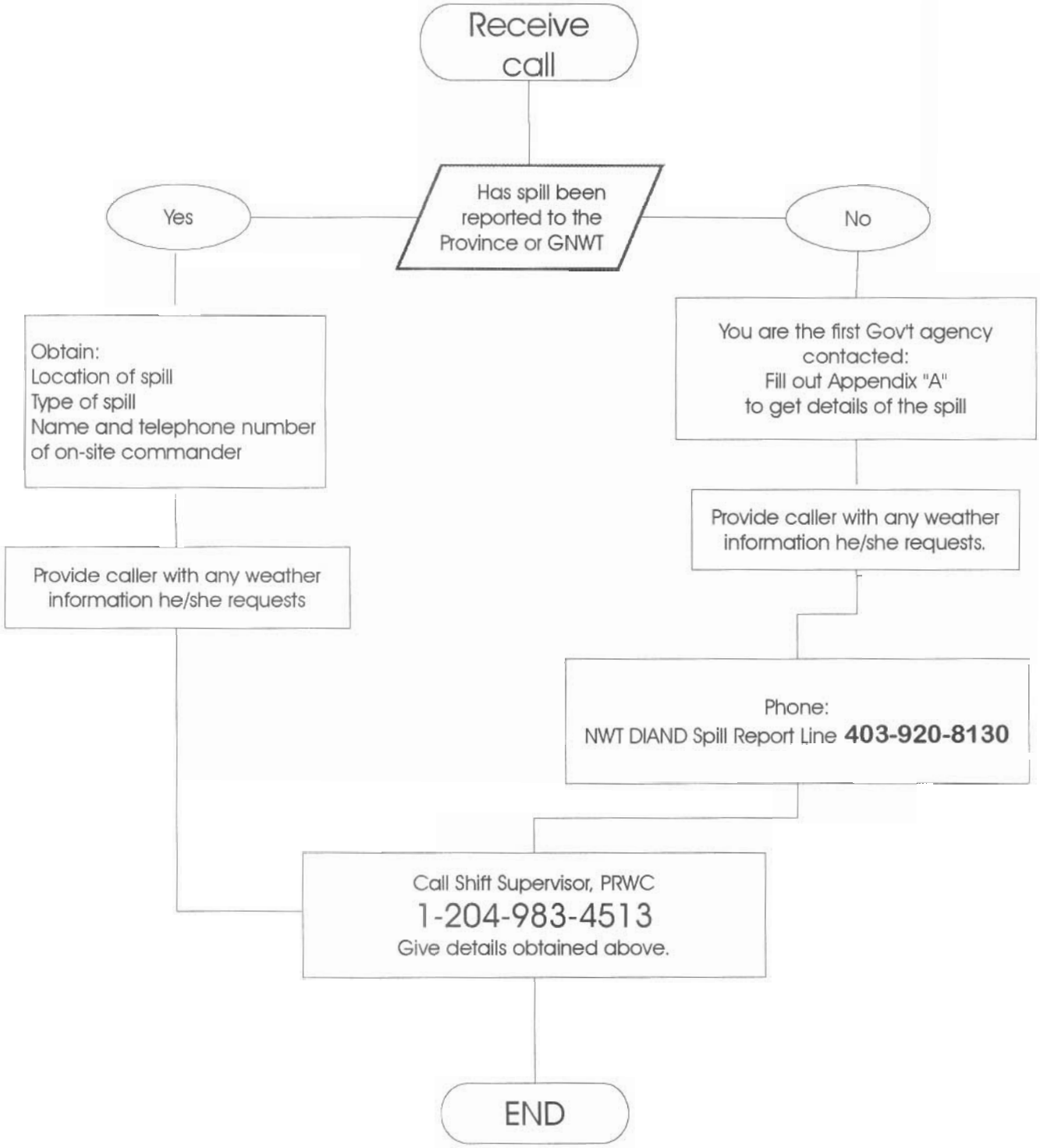

Slidre Fiord
Lagoon
Reservoir
Station Creek
Drainage Basin

Photo 9

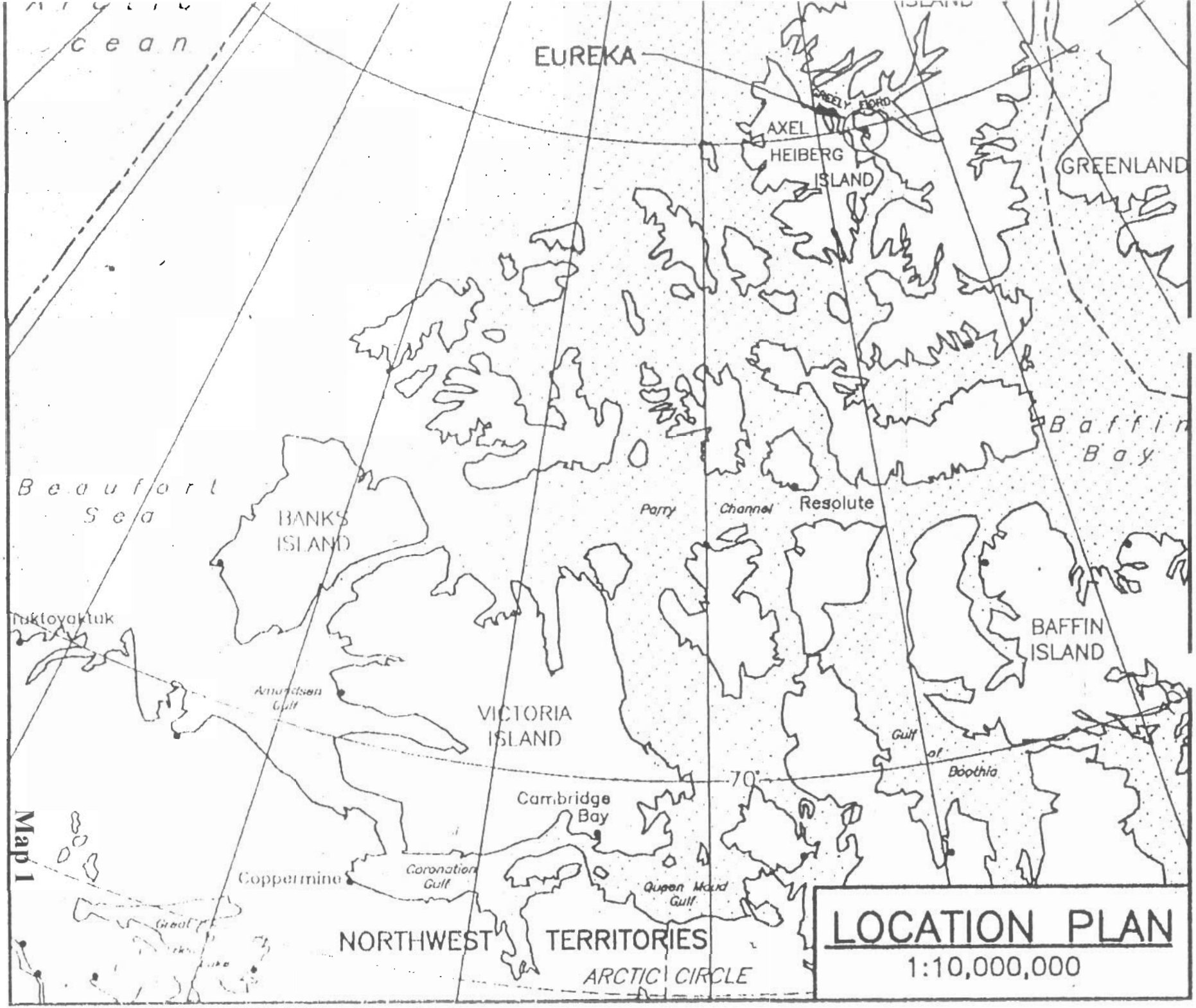
APPENDIX B

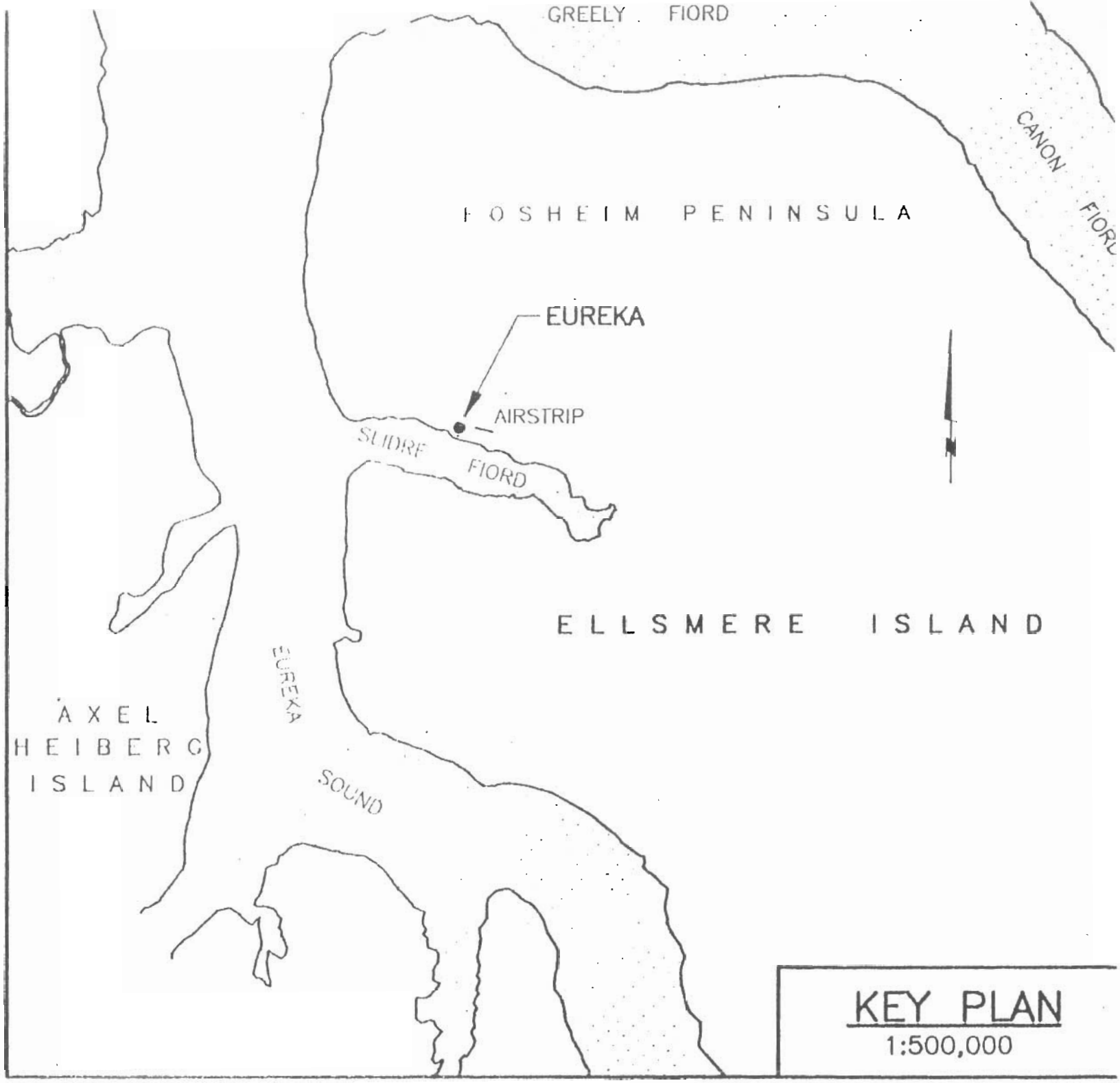
Regional Environmental Emergency Response Plan

Dicision Sheet

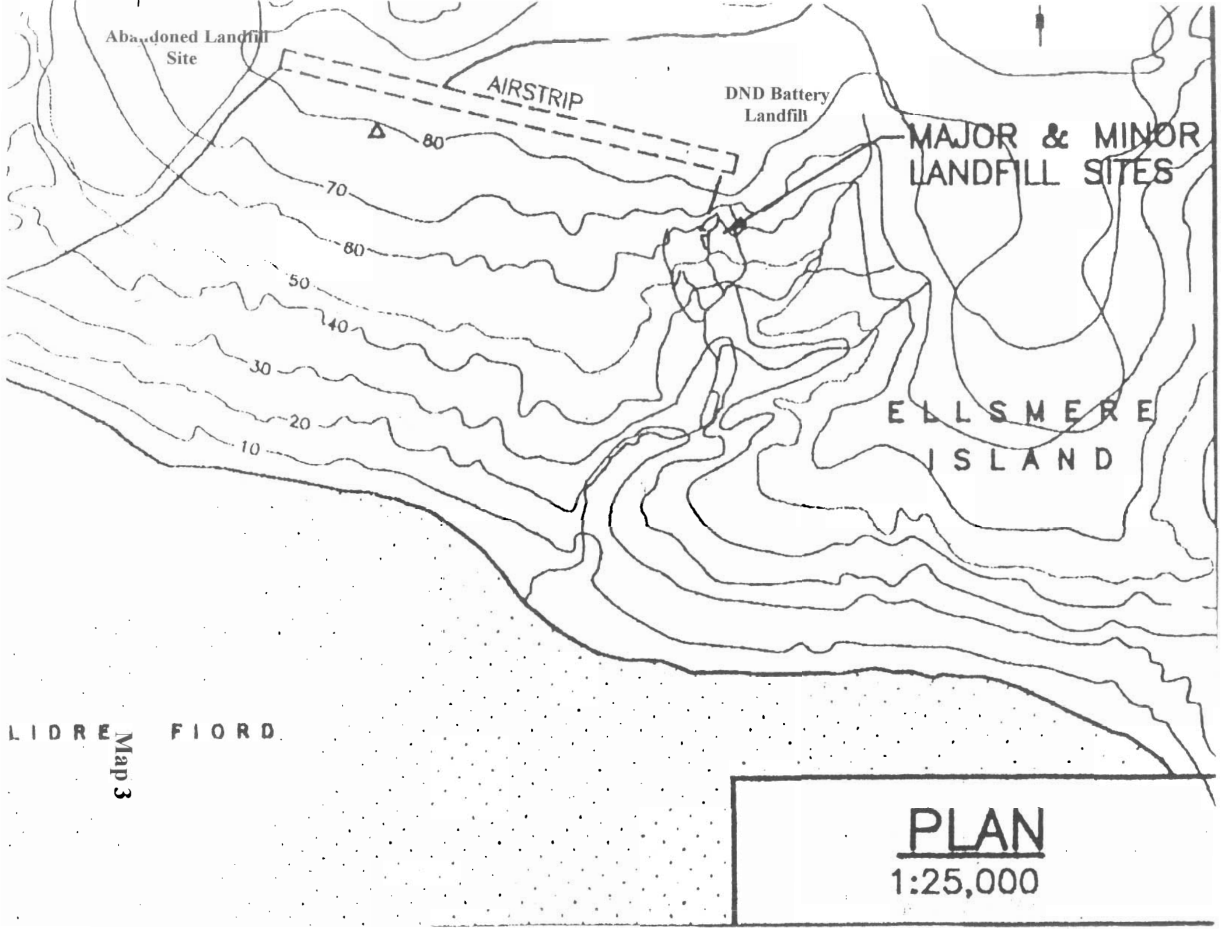


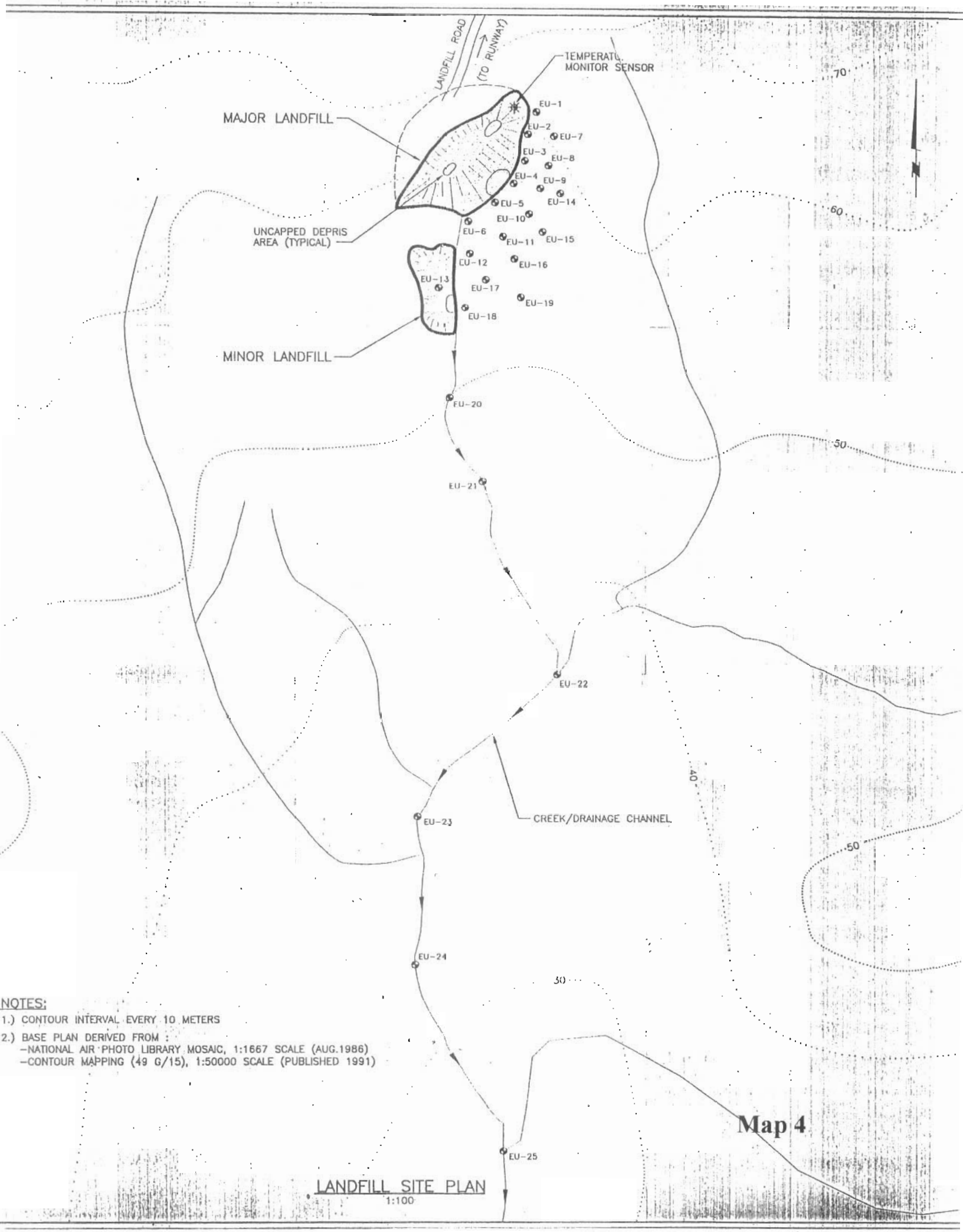
APPENDIX C


EUREKA
AXEL HEIBERG ISLAND
GREENLAND
Baffin Bay
Beaufort Sea
BANKS ISLAND
Parry Channel
Resolute
Tuktoyaktuk
BAFFIN ISLAND
VICTORIA ISLAND
Amundsen Gulf
Gulf of Boothia
70°
Cambridge Bay
Coppermine
Coronation Gulf
Queen Maud Gulf
NORTHWEST TERRITORIES
ARCTIC CIRCLE
Map 1
LOCATION PLAN
1:10,000,000


GREELY FIORD
CANON FIORD
FOSHEIM PENINSULA
EUREKA
AIRSTRIP
SUDRE FIORD
ELLSMERE ISLAND
AXEL HEIBERG ISLAND
EUREKA SOUND
KEY PLAN
1:500,000

Map 2


Abandoned Landfill Site
AIRSTRIP
DND Battery Landfill
MAJOR & MINOR LANDFILL SITES
80
70
60
50
40
30
20
10
ELLSMERE ISLAND
LIDRE FIORD
Map 3
PLAN
1:25,000



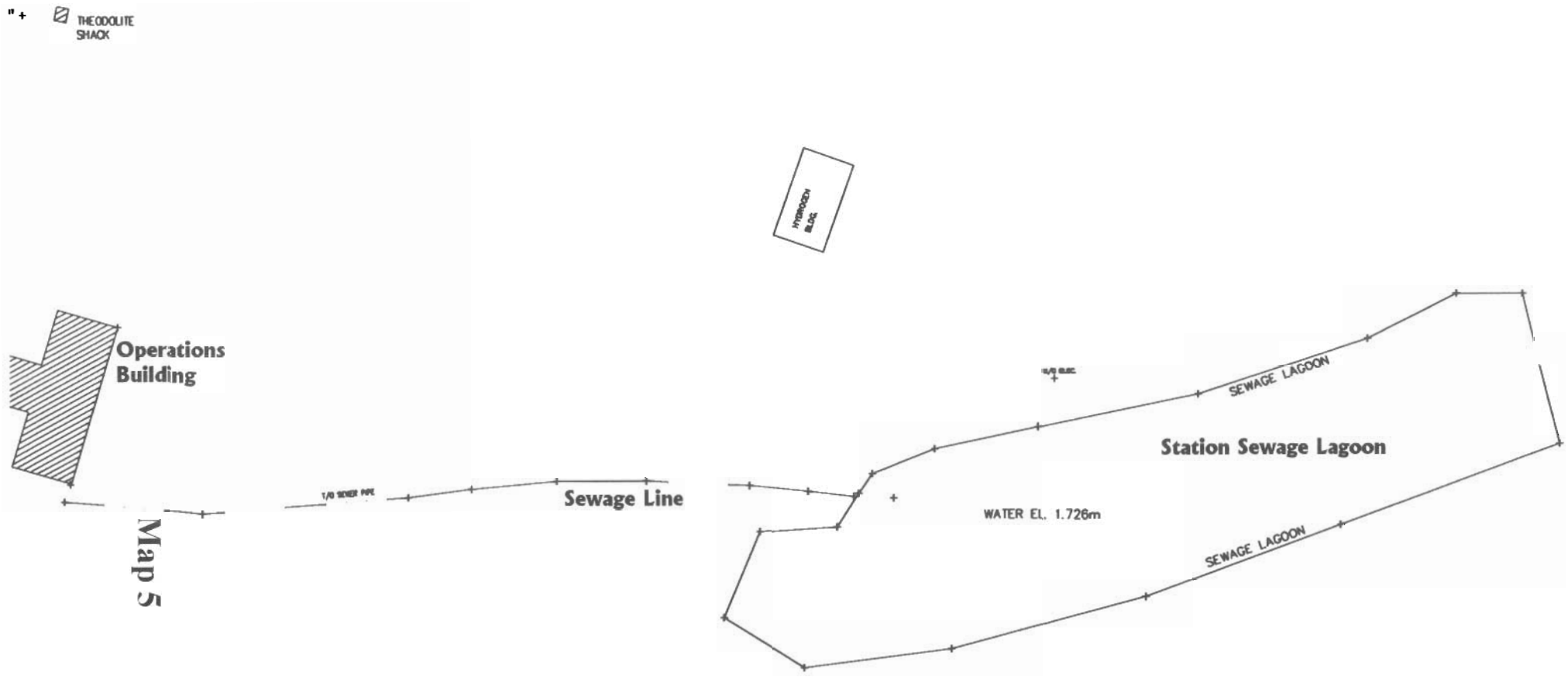
NOTES:

1.) CONTOUR INTERVAL EVERY 10 METERS

2.) BASE PLAN DERIVED FROM :
-NATIONAL AIR PHOTO LIBRARY MOSAIC, 1:1667 SCALE (AUG.1986)
-CONTOUR MAPPING (49 G/15), 1:50000 SCALE (PUBLISHED 1991)

Map 4

LANDFILL SITE PLAN
1:100


THEODOLITE SHACK
HYDROGEN BLDG.
Operations Building
Sewage Line
SEWAGE LAGOON
Station Sewage Lagoon
WATER EL. 1.726m
SEWAGE LAGOON

Map 5

APPENDIX D

September 25, 1997

Mr. Brock Goalan
Environment Canada
123 Main Street, Suite 150
Winnipeg, MN
R3C 4W2

Dear Mr. Goalan:

As we discussed on September 25, 1997, the Nunavut Water Board recommends that Environment Canada complete the necessary forms to obtain a water licence for the Eureka community. Enclosed for your review are:

- NWB Licence Application Form;
- Water Licence Application Supplementary Questionnaire for Municipalities; and
- Guidelines for the Discharge of Treated Municipal Wastewater in the NWT.

Please do not hesitate to contact this office should you require additional information or clarification on the licensing process.

Sincerely,

COPY

Dionne Filiatrault, MIT
Technical Advisor

Enclosure (3)

Eureka/c/dp

Environment Canada
Environnement Canada

PRAIRIE & NORTHERN REGION

Fax

To:	Gord Allen	**From:**	Brian Howe
Fax:	1-403-221-7998	**Pages:**	3
Phone:	1-403-292-5568	**Date:**	April 8, 1998
Re:	Eureka Water Licence	**CC:**	[Click here and type name]

☐ **Urgent** ☐ **For Review** ☐ **Please Comment** ☐ **Please Reply** ☐ **Please Recycle**

• **Comments:** As discussed I enclose the pages we require your assistance with.

Thanks.

OCCUPATIONAL & ENVIRO... CALGA...
APR 8 1998

GORDON Wm. ALLEN
ENVIRONMENTAL HEALTH OFFICER

d. Laboratory performing analysis of samples.

Name: Environmental Engineering Research Group
Address: Not known
Telephone: Not known
Fax: [613]541-6599

e. Are any changes planned in the water quality monitoring program?
__ Yes X No

If yes, describe.

NOT APPLICABLE

VII. PUBLIC CONCERNS

1. What concerns does the municipality or residents have regarding the municipal water supply or waste disposal facilities? List the concerns and describe what steps have been taken to address those concerns.

There is some concern in regards to bacteria and coliforms in water reservoir. The OIC does a pH analysis with a pH analysis kit each time the holding tanks are filled (once a month). Chlorine is added to water and pH checked.

VIII. PUBLIC HEALTH *(To be filled by the Regional Environmental Health Officer)*

1. Date: APR 08 1998

2. Municipality: CALGARY, Alberta

3. Contact: GORDON Wm. ALLEN
ENVIRONMENTAL HEALTH OFFICER
Environmental Health Officer Contact
1-403-292-5568
Telephone
1-403-221-7998
Fax #

"APPROVED"
Signed Gordon Wm. Allen
HEALTH OFFICER

4. Have there been any problems or health/environmental concerns with drinking water ?

__ Yes X No
If yes, describe

NOT APPLICABLE

5. Have there been any problems or health/environmental concerns with sewage disposal/treatment?
X No ☐ Yes
If yes, describe

NOT APPLICABLE

6. Have there been any problems or health/environmental concerns with solid waste disposal?

X No ☐ Yes If yes, describe

Monitoring Program

1. Does the Regional Health Board perform water quality sampling? X No ☐ Yes
If yes, answer questions (a) to (e)

a. Briefly describe the sampling methodology.

NOT APPLICABLE

b. Briefly describe any monitoring of wastewater effluent and leachate.

NOT APPLICABLE, monitoring of wastewater effluent and leachate not done.

C. Who is responsible for sampling ?

Name: NOT APPLICABLE

Position: NOT APPLICABLE

Telephone: NOT APPLICABLE

Fax: NOT APPLICABLE

Level of training: NOT APPLICABLE

D. Laboratory performing analysis of samples.

NOT APLLICABLE
Name
NOT APLLICABLE
Address
NOT APLLICABLE
Telephone
NOT APLLICABLE
Fax #

E. Are any changes planned in the water quality monitoring program?
__ Yes X No
If yes, describe.
NOT APLLICABLE

IX. TECHNICAL INFORMATION *(Assistance from the Regional Municipal and Community Affairs Office)*

1. Date: **NOT APPLICABLE**

2. Municipality: _____

3. Contact: _____
MACA Representative/Position
_____
Telephone
_____
Fax #

4. Population (according to most recent census results): 10 people

5. Estimated growth rate over next 5 years: Zero Growth expected

6. Has any baseline data collection and evaluation been undertaken with respect to the physical, biological, and chemical characteristics of the main water bodies in the area?
___ Yes X No

If yes, provide details below:

Not Applicable

Occupational and Environmental
Health Services
1911 Broad Street
Regina, Saskatchewan
S4P 1Y1

COPY

October 20, 1997

Brian Kahler
Head, Atmospheric Monitoring Division
Prairie and Northern Region
123 Main Street, Suite 150
Winnipeg, MB R3C 4W2

Dear Brian:

Re: Eureka Weather Station - Plumbing Vent

During my visiting to the Eureka Weather Station there was a question about the acceptability of the venting system in the sewage disposal room. A vent was installed for the main sewer line, leaving the building, which exhausts into the room. Under the National Plumbing Code of Canada all vents for a plumbing system must vent to the outside.

I spoke to a local plumbing inspector who informed me that the vent installed at the Eureka Weather Station is an auto vent, also known as a mechanical vent or cheater vent. These vents are an American design and found in their plumbing code. They however are not part of the National Plumbing Code of Canada, and have not been approved by the Canadian Standards Association (CSA) for use in Canada.

There are two reasons for the auto vent not being acceptable in Canada. In the USA auto vents are located in the attics of houses, in warm climates, where moisture build ups are not a problem. If warm moist air was released into the attic of a house in a cold climate, ice would form and structural damage would occur. The second reason auto vents have not been approved is the weak spring. The auto vent's gasket material is subject to decay, from corrosive materials in the sewage disposal system. As the seal deteriorates, the spring is not strong enough to hold back the sewer gases.

The vent at the pump should be tied into the building's plumbing system. The cold air that will back up through this vent should actually aid the flow of air through the plumbing ventilation system as it will force the warm moist sewer gases more efficiently from the system.

Please call me at 1-306-780-7165 if you have any questions on this matter.

Yours truly,

Alan Sales
Environmental Health Officer

cc: Vanda Sadilek, PSM, Edmonton

Table 1: Wastewater Effluent Quality Guidelines for Federal Facilities

PARAMETER	FEDERAL LIMIT REQUIRED*
5-day BOD	20 mg/L
Suspended Solids	25 mg/L
Fecal Coliforms	400 per 100 mL
Phosphorous	1 mg/L
Residual Chlorine	0.5 mg/L
pH	6-9
Phenols	20 ug/L
Oils and Grease	15 mg/L

Discharges to the sewer system have to comply with conditions of the Water Licence issued by the NWT Water Board under the *Northwest Territories Water Act June 1993* (previously *Northern Inland Waters Act*). The *Guidelines for the Discharge of Treated Municipal Wastewater in the North West Territories, 1992,* are used to determine the conditions of this licence.

The release of hazardous products to a water body which will adversely affect fish or fish habitat or man's use of fish, is regulated under the *Fisheries Act*.

Findings:

The vast majority of the site's wastewater is generated by the Operations Building. A storage tank within the building serves as an initial collection point for both grey and black water sewage before being pumped via an aboveground line to the sewage lagoon along the edge of Slidre Fjord, south of the Hydrogen Building. During the summer months when DND is active at Eureka, they collect wastewater and truck it directly to the lagoon for disposal. The infrequently used transient barracks has a sewage tank that must be trucked to the lagoon.

As discussed in the Eureka 2000 Environmental Assessment, a number of photo-chemicals are currently used in the dark room located in the operations building. There is currently no recycling program in place for any photochemical waste produced at the site and all liquid wastes are disposed of by down the drain disposal into the station wastewater. Chemicals identified in the photo laboratory contain small concentrations of formaldehyde, silver, ammonium thiosulfate and potassium alum.

All of these chemicals may be considered potentially harmful, however, based on consultation with Kodak Environmental Services, it is not assumed that the current small quantities of photochemical wastes produced at the facility will impact on the receiving environment. It was determined that the quantities of photochemical wastes produced at the station are considerably less than 1% of the total effluent volume and should be sufficiently diluted prior to decanting, even with direct discharge.

Silver recovery is normally undertaken prior to down the drain disposal, however, based on the quantities produced at the station this process would probably not be considered cost effective. Most of the silver released into the ocean during lagoon decanting would reportedly form sulfides and would not normally be organically available and as such should not be an environmental concern. The *Guidelines for the Discharge of Treated Municipal Wastewater in the Northwest Territories* indicate that the total concentration of silver in treated effluent must be less than 0.1 mg/L. While sample analysis of decanting effluent was not performed during the environmental audit, based on consultation with the Kodak representative it is expected that silver concentrations are well under this criteria.

The lagoon has approximately a one-year capacity and is drained by opening up a section of the retaining berm and allowing the sewage to flow into the fjord. This is typically done in July when the lagoon is at its highest level. The system was originally designed to allow liquid to flow out while leaving the treated sludge behind at the bottom of the cell, however the pipe and gate outflow installed through the berm often became plugged up and so the station was forced to use an alternate method.

The single-cell sewage lagoon is reportedly able to provide secondary treatment to station sewage under normal conditions with the annual discharge, however as it remains ice covered for much of the year, it can be expected that only minimal treatment occurs during this time. As a result of the short treatment time, and the varying discharge dates, it is likely that neither the photochemical sewage nor other wastes receive significant treatment prior to decanting into the ocean.

The sewage lagoon operation has been reviewed by Environment Canada inspectors and found that while not ideal, it was adequate for the volume of waste produced on site. The new Nunuvut Water Board had advised Environment Canada that Eureka will now require permits issued by the Water Board for the operation of their water reservoir, sewage lagoon and landfill. These permits will only be provided upon completion of an investigation of the activities at these sites. There is no indication when the inspection is to occur and, it is uncertain what standards will be utilized.

Currently, there is no sampling of the outflow prior to discharge.

Conclusions:
Although the sewage lagoon appears to meet with the approval of DOE/EP inspectors, actual treatment of the wastewater is unlikely under the current system.

Recommendations:
It is recommended that Environment Canada take the opportunity of the Eureka 2000 project to include a new sewage treatment system that will deal with wastes in a more environmentally friendly, and aesthetically pleasing, manner. The capacity of the lagoon appears to be barely enough to contain one year's waste and often must be decanted early in the spring before maximum treatment time is reached. At a minimum, alternative methods of emptying the cell should be explored in order to avoid unnecessarily introducing sediment and sludge to the fjord.

5.3 Fresh Water Use

Criteria:
The *Guidelines for Canadian Drinking Water Quality (1992),* developed by the Federal-Provincial Subcommittee on Drinking Water, establish limits based on microbiological characteristics, physical characteristics and chemical parameters. While the values set out in these guidelines are not legislated, they are intended to apply to all drinking water supplies, both private and public.

Findings:
Fresh water is collected in a reservoir west of the Powerhouse and retains water diverted from Station Creek during the spring freshet. This water is then pumped into holding tanks in the powerhouse which can hold between a two to three month supply and then is piped into the operations building where there are two 80,000 L tanks. There is no treatment of the water.

The diversion of Station Creek into the reservoir for a short period of time, usually about half a day, is reportedly done under the authority of a water licence issued by the Territorial Water Board. This activity is done annually to ensure enough fresh water is available to the weather station year round, especially during the winter season when freeze-up occurs. Heavy equipment is used to move an earthen dam in front of the stream and push it into a channel that runs directly into the reservoir. After fill-up, the diversion channel is closed off for another season.

DND also draw upon the supply during the summer by trucking water from the powerhouse to their facilities near the airstrip. The only water quality sampling currently being conducted at Eureka is being done by DND. They submit samples on an irregular basis to an analytical laboratory in Ontario, checking for the presence of hydrocarbons, total

coliforms, and *Escherichia coli* bacteria. One sample result, taken May 26, 1997 indicated the presence of total coliforms, however did not give an indication of quantity (See Appendix C).

Functionally, it is the OIC that is ultimately responsible for water quality at the station, however, operationally, duties relating to monitoring water levels, equipment, etc. fall to the contractor on site. There is no formal water conservation program in place (eg. no special fixtures to control flow, etc.), however there is a need to occasionally ration water in late winter when the supply starts to run low.

The new Nunuvut Water Board had advised Environment Canada that Eureka will now require additional permits issued by the Water Board for the operation of their water reservoir, sewage lagoon and landfill. These permits will only be provided upon completion of an investigation of the activities at these sites.

Conclusions:

While it is clearly not desirable to divert streams in virtually any environment, there is no feasible alternative in order to collect enough fresh water to support the entire station for a season. In addition, the operation has been inspected by DIAND and found to meet the restrictions of their inspectors.

The possibility that station staff may be using water that does not meet Canadian Drinking Water Standards is quite high. Action must be taken to ensure the health risks are minimized.

Recommendations:

While the Canadian Drinking Water Guidelines refer to a Maximum Acceptable Concentration of coliforms at zero organisms detectable per 100 mL, the operational definition of zero is given as not more than 10 total coliforms per 100 mL and no fecal coliforms. In addition, no two consecutive samples from the same site should show the presence of total coliform organisms.

Additional water samples need to be taken from the reservoir on a regular basis, and Environment Canada staff need to continue to submit samples even during those seasons that DND is not on site. It is recommended that the water be analyzed at least twice monthly, particularly so during the spring freshet when there is the greatest potential for contamination from runoff.