Transport Canada | Transports Canada

Prairie and Northern Region
Programs Branch
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Your file Votre référence
N4L3-1571
Our file Notre référence
SK-7184-1

July 30, 2001

Rita Becker
Licensing Administrator
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NT
X0E 1J0

Dear Ms. Becker:

Further to our submission of the *Resolute Bay Airport Landfill Environmental Site Investigation* (April 1999) on June 6, 2000, please find enclosed the *Resolute Bay Airport Landfill 2000 Summary Report* (March 2001). This report summarizes the site investigation which was conducted by Transport Canada in July 2000 at the Resolute Bay Airport Landfill.

If you have any questions or concerns, please call me at (780)-495-3980.

Sincerely,

for

Timothy Johnson
Environmental Compliance Officer
Environmental Affairs
Programs, Prairie & Northern Region
Ph: (780)-495-3980
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Encl.

Canada

RESOLUTE BAY AIRPORT
LANDFILL
2000 SUMMARY REPORT

Transport Canada, Prairie and Northern Region
Programs, Environmental Affairs
March 2001

Executive Summary

In 2000 Transport Canada Prairie and Northern Region (TC-PNR) implemented an environmental monitoring program at the decommissioned Resolute Bay Airport landfill site. The monitoring program was designed as a follow-up to an earlier study commissioned by Transport Canada (TC), the "Environmental Site Investigation (ESI) of the Resolute Bay Airport Landfill (1998)" conducted by Dillon Consulting. The purpose of the ESI was to study the landfill site to identify the condition of the landfill, and to determine if any changes were occurring at the site.

The ESI did not identify any major non-compliance issues, although concerns about potential health hazards related to chemicals used in past airport operations that may have been disposed of in the landfill were addressed. In addition to the ESI a community consultation meeting was held in November of 1998. At the meeting local residents of Resolute Bay expressed concern over the potential for contamination down gradient of the landfill site and near the ocean.

In response to the above concerns TC conducted a site investigation at the Resolute Bay Airport landfill in July 2000. The investigation included sampling various matrices (soil, water, sediment) at the landfill and down gradient of the landfill. The goals of the site investigation were to:

- obtain further analytical data from the landfill site,
- monitor the site for potential contaminant migration,
- obtain representative data down gradient of the site, and
- assess potential impacts on the environment down gradient of the site.

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1.0 Introduction

Transport Canada conducted a site investigation at the Resolute Bay Airport landfill in July 2000. The investigation included sampling various matrices (soil, water, sediment) at the landfill and down gradient of the landfill. The goals of the site investigation were to:

- obtain further analytical data from the landfill site,
- monitor the site for potential contaminant migration,
- obtain representative data down gradient of the site, and
- assess potential impacts on the environment down gradient of the site.

The purpose of this report is to review the analytical data collected to ensure that materials in the landfill are not adversely affecting the surrounding environment.

2.0 Site Description

2.1 Historical Information

Historically the Resolute Bay Airport landfill was used by TC and contractors for disposal of airport and construction wastes. Aerial photographs and historical records show the presence of wastes at the site from as early as 1969. From these records it appears as though development of the landfill started west of the landfill access road. The landfill was officially closed in November 1996; the site was leveled and capped with several meters of crushed rock.

2.2 Location

The Hamlet of Resolute Bay is located on the south shore of Cornwallis Island approximately 900 km south of the Arctic Circle. Resolute Bay operates as "a center for transportation, communication, and administration for the Arctic" (Environmental Baseline Study (EBS)-Dillon, 1996), as well as being the home for the Polar Continental Shelf Research Station. One of the most economically significant components of the local environment is domestic harvesting of marine species such as beluga whales, walruses, and seals. Domestic harvesting is an essential part of the Inuit lifestyle.

The Resolute Bay Airport landfill is located approximately 10 km from the Hamlet of Resolute Bay and roughly 3 km from the Resolute Bay Airport facilities. There are no developments within several hundred meters of the landfill. Refer to Appendix A for diagrams of the area.

2.3 Site Features

Resolute Bay's sewage disposal lagoons are located immediately adjacent to the landfill. The sewage lagoons are unlined and treatment of the wastewater is accomplished through overland flow to the west and down gradient of the landfill (ESI-Dillon, 1998). An abandoned asbestos burial site is also located on the landfill property. The local community does not use groundwater from this site or adjacent sites.

The approximate "thickness of waste material in the landfill is in the order of 10 m (30 ft)" (EBS-Dillon, 1996). The type of wastes present include (EBS-Dillon, 1996):

- construction debris / abandoned equipment,
- food,
- office waste,
- scrap metals / drums,
- asbestos materials,
- possible hazardous waste,
- contaminated soils, and
- wood scraps.

3.0 Methodology

3.1 Project Description

Transport Canada -Prairie and Northern Region implemented an environmental monitoring program at the Resolute Bay Airport landfill in July 2000. The purposes of the monitoring program are to:

- gather analytical data from the landfill and surrounding areas, and
- assess the data to ensure that the contents of the landfill are not migrating from the site, and that any discharges are within regulatory criteria and are not deleterious.

Monitoring activities consisted of a site investigation at the landfill, which included sampling at four locations. The following table provides information on the sampling locations, sampling matrix, and site characteristics.

Site	Matrix	Approximate Location	Site Characteristics
Site 1	soil	• 36 meters down slope of the landfill	• silt-clay soil • standing water in previous test hole had a light blue tint
Site 2	freshwater	• a stream 324 meters down slope of the landfill	• light blue tint in standing water
Site 3	sediment	• a stream 324 meters down slope of the landfill	• light blue tint in standing water
Site 4	saltwater	• a natural water discharge into the ocean directly west of the landfill	

- approximate elevation of the landfill is 60 m above sea level (ESI-Dillon, 1998).

3.2 Sampling Activities & Parameters

Standard environmental sampling procedures were used following ***The Inspector's Field Sampling Manual***, Environment Canada 1995. Timothy Johnson, Environmental Compliance Officer, TC-PNR conducted the sampling. A composite sample was collected at each site to represent the area. All samples were submitted to Norwest Labs, Edmonton for analysis. Norwest Labs is a Canadian Association for Environmental Analytical Laboratories (CAEAL) approved lab, refer to Appendix B for a copy of the lab results including Quality Control and Quality Assurance data.

Sampling parameters were selected based on regulatory criteria and for comparison to the Dillon 1998 ESI sampling data. Parameters selected for soil and sediment analysis included:

- benzene, toluene, ethylene, and xylene (BTEX),

- total purgeable hydrocarbons (TPH),
- total extractable hydrocarbons (TEH),
- metals,
- phenols, polychlorinated bi-phenols (PCB's),
- pesticide screen,
- microtox, and
- detailed salinity.

Parameters selected for the water analysis included:

- BTEX,
- TPH,
- TEH,
- metals,
- PCB's,
- pesticide screen,
- microtox,
- glycol's, and
- routine water.

3.3 Regulatory Criteria

For the purpose of this report the Canadian Council of the Ministers of the Environment (CCME), Commercial/Industrial guidelines are referenced. This selection is based on site characteristics and for comparison to the standards used in the Dillon 1998 ESI.

Soil : **Environmental Remediation Guidelines**, Government of the Northwest Territories 1998.
Interim Soil Quality Guidelines, Commercial/Industrial Criteria, Canadian Council of Ministers of the Environment, 1999.

Water: **Interim Water Quality Guidelines**, Freshwater Aquatic Life, Canadian Council of Ministers of the Environment, 1999.
Canadian Drinking Water Quality Guideline, 6th Edition, Health Canada 1996.

4.0 Results & Discussion

4.1 Mircotox and Hydrocarbon Analysis

A Microtox test is a screening tool used for a variety of toxicity testing applications. The Microtox test determines if the substance is deleterious, the results are expressed on a pass/fail basis. All the samples passed the Microtox test.

The samples were all below the CCME criteria for hydrocarbon analysis. This indicates that none of the samples pose an environmental risk for hydrocarbon contamination. The TEH level of the sediment sample was significantly higher than the soil sample. The higher value may be the result of localized contamination from a previous deposit of one of the many drums that was left in the area. Sediment samples will be collected in 2001 to confirm this value.

Table 1 shows the Microtox and hydrocarbon results for the soil and sediment samples and Table 2 shows results for the freshwater and salt water samples.

Table 1. Microtox and Hydrocarbon Analysis, Soil and Sediment Samples

Sampling Parameter	Interim Canadian Soil Quality Guidelines Commercial /Industrial (mg/kg), 1999	Site 1 Soil	Site 2 Sediment
Microtox	pass/fail	pass	pass
Benzene	5	<0.02	<0.02
Toluene	0.8	<0.02	<0.02
Ethylbenzene	20	<0.02	<0.02
Xylene	17	<0.02	<0.02
TPH (C5-C10)	*	<0.1	<0.1
TEH (C10-C40+)	*	<10	**142**
Total Petroleum Hydrocarbons	2500	10.18	142.18

- results are expressed in ppm.

* no CCME criteria

Table 2. Microtox and Hydrocarbon Analysis, Freshwater and Saltwater Samples

Sampling Parameters	Canadian Environmental Quality Guidelines for the Protection of Aquatic Life, Freshwater (ug/l), 1999	Canadian Guidelines for Drinking Water Quality (mg/l), 1998	Site 2 Freshwater	Site 3 Saltwater
Microtox	pass/fail	pass/fail	pass	pass
Benzene	370	0.005	<0.001	<0.001
Toluene	2.0	0.1	<0.001	<0.001
Ethylbenzene	90	≤ 0.0024	<0.001	<0.001
Xylene	*	≤ 0.3	<0.001	<0.001
TPH (c5-c10)	*	*	<0.01	<0.01
TEH (c11-c40+)	*	*	<0.1	<0.1

- results are in ppm

* no regulatory criteria

4.2 Metal Concentration Analysis

Many metals are toxic to the environment and to humans therefore concentrations of these metals in the soil or water can present an environmental and / or human health risk. Metal concentrations for all the samples were under the CCME guidelines, indicating that metal contamination is not a problem at this site. Refer to Tables 3 and 4 for the metal concentration analysis.

Table 3. Metal Concentrations, Soil and Sediment Samples

Sampling Parameter	Interim Canadian Soil Quality Guidelines Commercial /Industrial (mg/kg), 1999	Site 1 Soil	Site 2 Sediment
Antimony	49	<0.3	0.35
Arsenic	12	1.1	0.99
Barium	2000	19.0	13.4
Cadium	8	0.12	0.10
Chromium	87	3.68	4.40
Cobalt	300	1.10	0.838
Copper	100	2.37	2.57
Lead	commercial 260 / industrial 600	2.37	2.57
Mercury	commercial 260 / industrial 30	<0.01	<0.01
Molybdenum	40	0.568	0.45
Nickel	500	3.32	2.83
Selenium	10	<0.2	<0.2
Thallium	1	<0.2	<0.2
Tin	300	1.2	1.1
Vanadium	130	5.38	5.18
Zinc	380	16.3	12.3

- results are expressed in ug/g

Table 4. Metal Concentrations, Freshwater and Saltwater Samples

Sampling Parameters	Canadian Environmental Quality Guidelines for the Protection of Aquatic Life, Freshwater (ug/l), 1999	Canadian Guidelines for Drinking Water Quality (mg/l), 1998	Site 2 Freshwater	Site 3 Saltwater
Aluminum (trace)	5-100	*	0.0214	0.022
Arsenic	5	0.025	<0.01	<0.01
Cadmium	0.017	0.005	0.00063	0.00019
Chromium (trace)	*	0.05	0.0014	<0.0009
Copper	2	0.01	0.007	<0.001
Iron	300	<0.3	0.094	0.027
Lead (trace)	1	0.010	0.0010	0.0004
Mercury	0.1	0.0001	0.00002	<0.00001
Nickel	25-150	*	0.004	0.003
Selenium	1	0.01	<0.000	<0.0002
Silver	0.1	*	0.00010	0.00010
Zinc	30	≤ 5.0	0.0169	<0.0007

- results in mg/L

* no CCME criteria

4.3 Polychlorinated Bi-Phenols (PCB), Phenols , pH and EC Analysis

The sediment and soil samples were analyzed for PCB's, phenols, pH, and EC. These results are provided in Table 5. The freshwater and saltwater samples were analyzed for PCB's, pH and EC; see Table 6. Results from all these analysis are within the CCME guidelines.

Table 5. PCB's, Phenols, pH, and EC, Soil and Sediment Samples

Sampling Parameter	Interim Canadian Soil Quality Guidelines Commercial /Industrial (mg/kg), 1999	Site 1 Soil	Site 2 Sediment
PCB's (ppm)	33	<0.1	<0.1
Phenols (mg/kg)	3.8	0.09	0.080
EC (conductivity) (dS/m)	maximum 4	0.37	0.96
pH	6-8	7.7	7.14

Table 6. PCB's, pH, and EC, Freshwater and Saltwater Samples

Sampling Parameters	Canadian Environmental Quality Guidelines for the Protection of Aquatic Life, Freshwater (ug/l), 1999	Canadian Guidelines for Drinking Water Quality (mg/l), 1998	Site 2 Freshwater	Site 3 Saltwater
PCB's (ppm)	*	*	<0.1	<0.1
pH	6.5-9	6.5-8.5	7.82	8.1
EC (conductivity) (us/m)	*	*	311	4690

* no CCME criteria

4.4 Pesticide Screen Analysis

Lastly, all the samples were screened for pesticides. Pesticides can be toxic to birds, animals and humans. Pesticide levels in the samples were at the lowest detectable limits, indicating that pesticides are not leaching from the soil. Refer to Tables 7 and 8 for the pesticide parameters and results.

Table 7. Pesticide Screen, Soil and Sediment Samples

Sampling Parameter	Site 1 Soil	Site 2 Sediment
Atrazine	<0.005	<0.005
Bromacil	<0.02	<0.02
Chlorotoluron	<0.02	<0.02
Cyanazine	<0.02	<0.02
Diuron	<0.02	<0.02
Fenuron	<0.02	<0.02
Isoproturon	<0.02	<0.02
Linuron	<0.02	<0.02
Methabenzthiazuron	<0.02	<0.02
Metobromuron	<0.02	<0.02
Metoxuron	<0.02	<0.02
Simazine	<0.02	<0.02
Tebuthiuron	<0.005	<0.005

- results in ppm

Table 8. Pesticide Screen, Freshwater and Saltwater Samples

Sampling Parameters	Canadian Environmental Quality Guidelines for the Protection of Aquatic Life, Freshwater (ug/l), 1999	Canadian Guidelines for Drinking Water Quality (mg/l), 1998	Site 2 Freshwater	Site 3 Saltwater
Atrazine	1.8	0.005	<1	<1
Bromacil	5.0	*	<1	<1
Chlorotoluron	*	*	<1	<1
Cyanazine	2.0	0.01	<1	<1
Diuron	*	0.2	<1	<1
Fenuron	*	*	<1	<1
Isoproturon	*	*	<1	<1
Linuron	7.0	*	<1	<1
Methabenznthiazuron	*	*	<1	<1
Metobromuron	*	*	<1	<1
Metoxuron	*	*	<1	<1
Simazine	10.0	0.01	<1	<1
Tebuthiuron	1.6		<1	<1

- results in ppb

* no CCME criteria

4.5 Glycol Analysis

The water samples were analyzed for glycol's which are present in de-icing fluids used on aircraft. Glycol levels were found to be at the lowest detectable limit, suggesting that glycol contamination is not a concern at this site. Table 9 shows the glycol results for the freshwater and saltwater samples.

Table 9. Glycol Results

Sampling Parameters	Canadian Environmental Quality Guidelines for the Protection of Aquatic Life, Freshwater (ug/l), 1999	Site 2 Freshwater	Site 3 Saltwater
Ethylene glycol	192 000	<10	<10
Propylene glycol	*	<10	<10
Diethylene glycol	500 000	<10	<10
Triethylene glycol	*	<10	<10
Tetrathylene glycol	*	<10	<10

* no CCME criteria

5.0 Conclusions

In July 2000 a site investigation was conducted at the Resolute Bay Airport landfill. The site was sampled to determine if there was contaminant migration from the landfill site, to ensure that any discharges are within regulatory criteria, and to ensure that discharges are not deleterious. The laboratory results indicated that any leachate discharge occurring at the site is not deleterious; as determined by the microtox results. Lab results for other contaminants found in the samples are significantly lower then the levels set by federal and territorial regulatory standards and the CCME guidelines. The site will be monitored to ensure the local environment remains unaffected.

Appendix A

Diagrams of Resolute Bay Airport Landfill
(all diagrams were taken from the Dillon 1998 ESI)

Resolute Bay, NWT

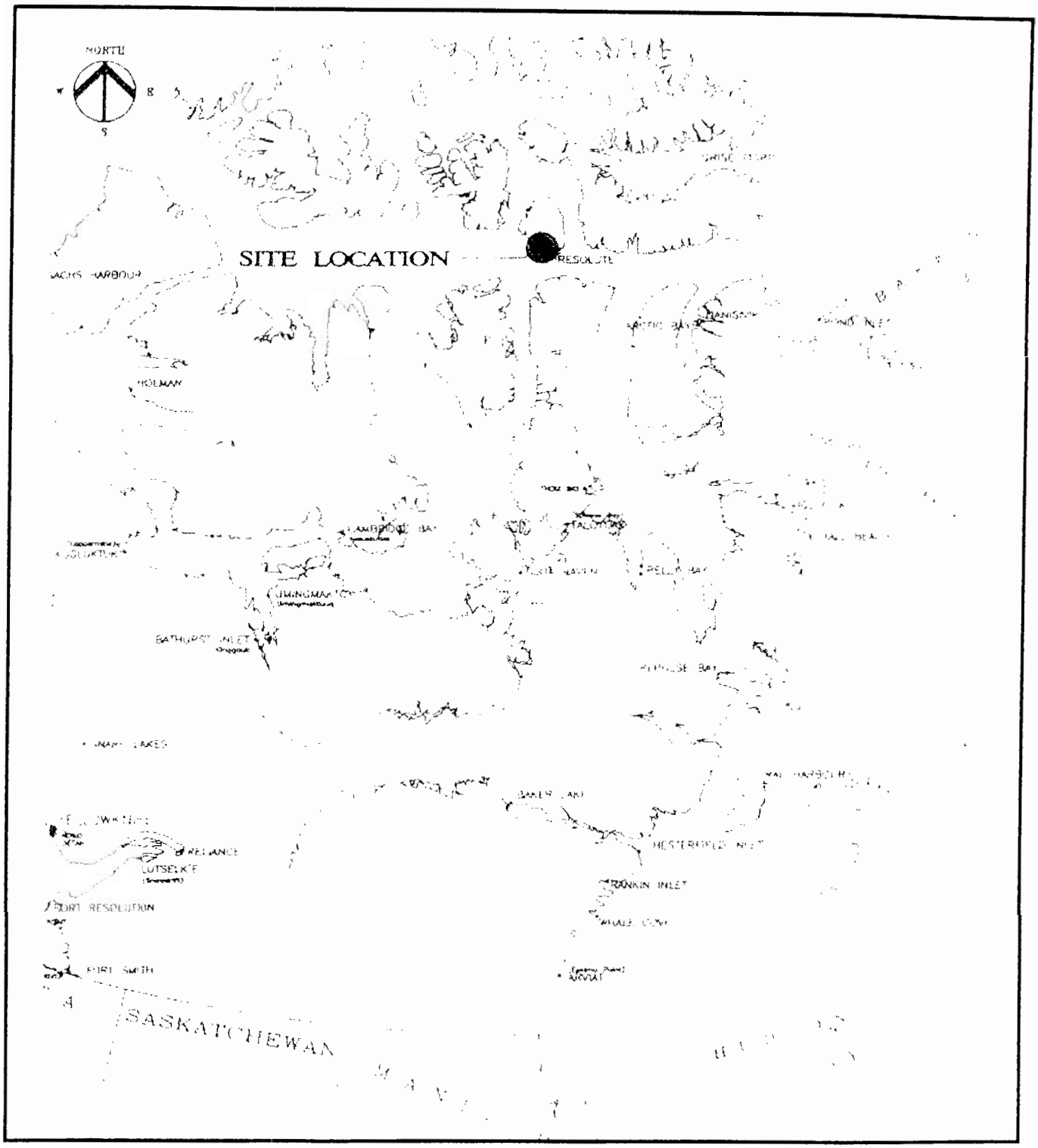

Figure was adapted from the Dillon 1998 ESI

Resolute Bay Airport Landfill

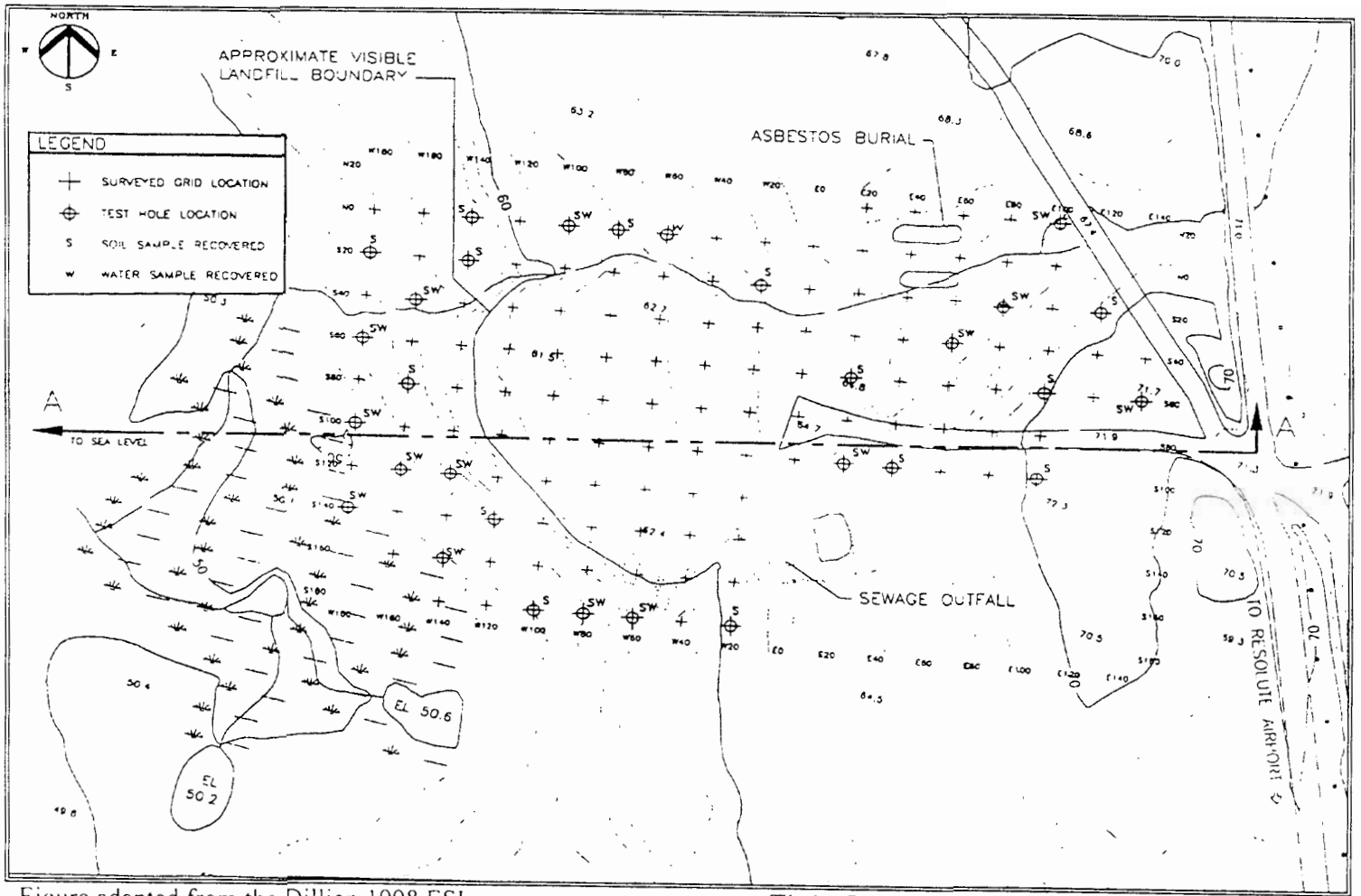

Figure adapted from the Dillion 1998 ESI

Tittle: Resolute Bay Landfill
Project: Resolute Bay Airport, Resolute NWT

Resolute Bay Landfill, Cross Section

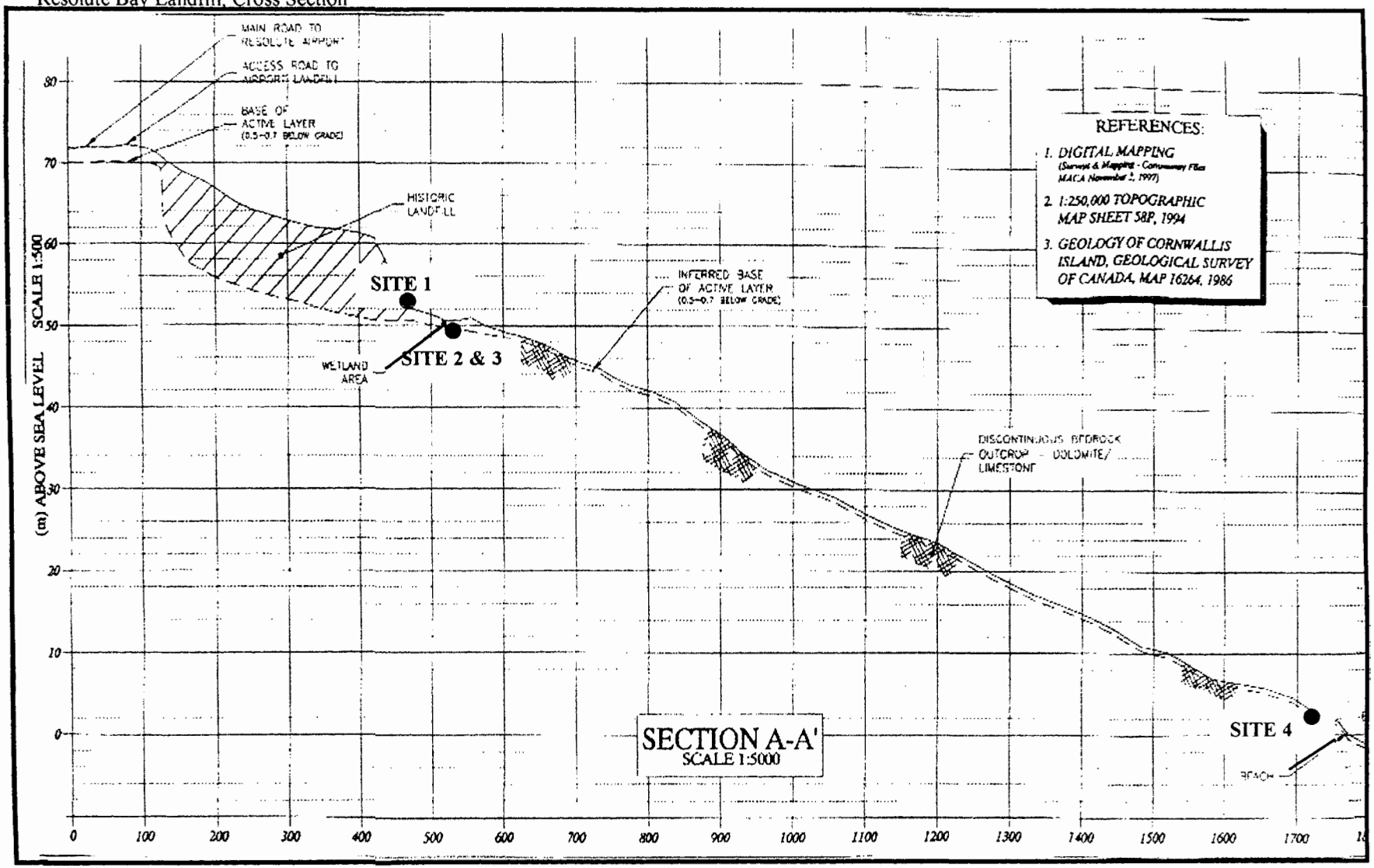

Figure adapted from the Dillon 1998 ESI