DA 006

ENVIRONMENTAL CLEAN-UP STUDY

OF

21 DEW STATION SITES IN CANADA

FINAL REPORT: DRAFT

VOLUME 4
BAR 2
Shingle Point, Yukon Territory

UMA Engineering Ltd.
Engineers, Planners & Surveyors

In association with

Hardy BBT Limited
CONSULTING ENGINEERING & ENVIRONMENTAL SERVICES

Jacques
Whitford Group

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1.0 INTRODUCTION

1.1 BACKGROUND AND OBJECTIVES

UMA Engineering Limited (UMA) in association with Hardy BBT Ltd. (HBT) and Jacques Whitford and Associates Limited (JWA) was commissioned in the spring of 1990 by the Canadian Commercial Corporation (CCC) on behalf of the United States Air Force (USAF) to carry out an environmental clean-up study of 21 DEW Station Sites in Canada.

The overall purpose of this study is to identify and investigate areas of the 21 DEW Station Sites as they have been affected by past waste disposal and spills. In addition, the objective of the study is to determine and evaluate decommissioning alternatives for waste disposal and spill areas, and facility demolition debris (including associated hazardous or toxic materials). Details of the overall study objectives are provided in Volume 2 (Section 1.3)

The study consisted of four phases generally following the National Guidelines for Decommissioning Industrial Sites (DOE 8505-5; July 1989). These include:

(1) Phase I - a literature review of baseline environmental conditions and existing data on waste materials, spills and facilities at each site.
(2) Phase II/III - a combined field reconnaissance, field sample collection, and sample analysis for each site.
(3) Phase IV - a risk assessment for each station and the development of decommissioning options.

Details of these phases are provided in Volume 2 (Section 1.3). The final report for this study is provided in 24 volumes as follows:

(1) Volume 1 - Executive Summary.
(2) Volume 2 - General Information.
(3) Volumes 3-23 - Specific DEW Station Reports.
(4) Volume 24 - Quality Assurance and Quality Control.

This Volume (Volume 4) is a specific DEW Station report that presents all four phases pertaining to BAR-2, Shingle Point. An overview of the site based on a review of existing literature is presented in Section 2.0. Section 3.0 provides a description of the biophysical environment, including heritage resources and land use. Section 4.0 describes the site infrastructure. Sections 5.0 and 6.0 provide the findings of the field survey. In Section 5.0, the asbestos, paint and PCB findings are presented. In Section 6.0, the results of soil and water sampling are summarized for background conditions, landfills, POL areas, pallet lines, outfall areas, and stain areas near building proximities. Section 7.0 provides recommendations on facility clean-up and decommissioning. References cited are listed in Volume 2.

1.2 FIELDWORK AND SAMPLING

Field work at BAR-2 took place between August 9 and 11, 1990. A brief reconnaissance was completed initially. This was followed by sampling in selected areas.

Data showing the number of water, soil, paint, asbestos, and PCB oil samples taken at BAR-2 are provided in Table 1.1. Sample site descriptions are presented in Appendix B.

The general approach to field survey and laboratory analysis are described in Volume 2, Section 3.2. Quality assurance and quality control measures are described in Volume 24.

Table 1.1

Number of Samples Taken and Analyzed

SAMPLE TYPE	NUMBER OF SAMPLES TAKEN*	SAMPLES ANALYZED*		SAMPLES NOT ANALYZED*
		FIRST ROUND	SECOND ROUND	
Soil	33	29	3	1
Water	7	7	0	0
Paint	4	4	0	0
Asbestos	3	3	0	0
Transformer Oil	1	1	0	0

* Does not include duplicates or replicates

1.3 DATA ASSESSMENT CRITERIA

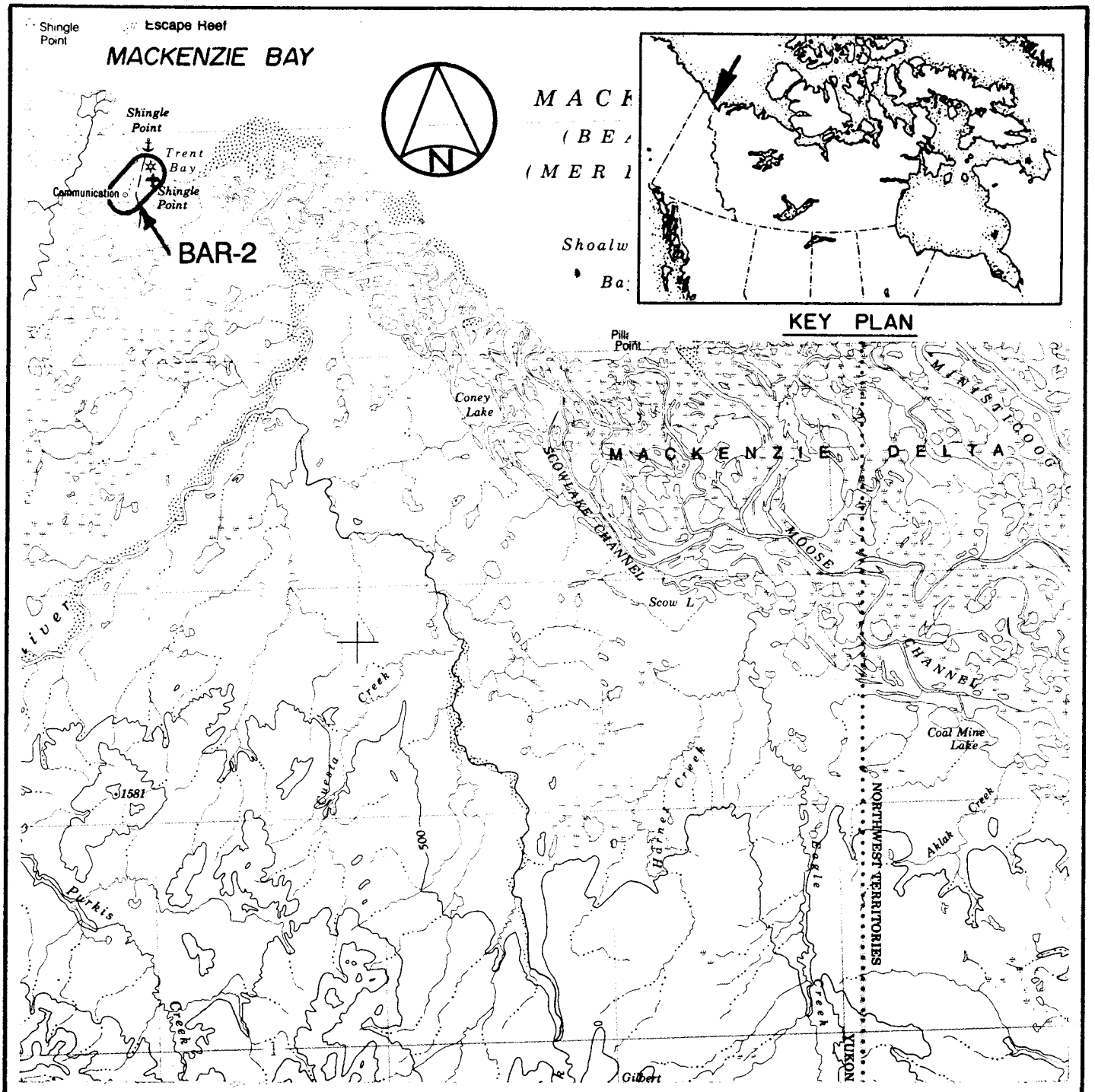
Indicator criteria analyzed were screened using the Quebec Soil/Water Guidelines. If the concentration of metals was above the 50 percent Level A Quebec Soil/Water Guidelines, or organic compounds were detected, the results were defined as relevant and used in the baseline risk assessment. If the concentration exceeded the Quebec Level B or C Guideline, it was also noted. Typical laboratory contaminants, discussed in Volume 2, were not considered in the risk assessment.

2.0 SITE OVERVIEW

BAR-2 Shingle Point is located on the Arctic Ocean on the western edge of the Mackenzie Delta at 68° 55' 34" north latitude and 137° 15' 55" west longitude. The station is about 2 km inland on the coastal plain of the Blow River Delta area of the Beaufort Sea. The nearest community with an aircraft charter base and a full range of commercial and public services is Inuvik, 165 km to the southeast. Figure 2.1 shows the general location of the station in the area and provides some climate and access information.

BAR-2 was an auxiliary station within the original DEW Station system. It will be down-sized and will continue to operate with permanent staff as a NWS Long Range Radar Station. The location of various buildings and activity areas that are on the station lands are provided in Section 3.0. Further site specific information about the facilities and the regional environment is provided in the Phase I Report of this study.

The DEW facilities not required for the NWS operation will be treated as abandoned and the area restored under the DND/DIAND 1989 Memorandum of Understanding for the restoration of Distant Early Warning and North Warning System Sites; as discussed in Volume 2, Section 1.0.



STATION DATA

LATITUDE: 68° 55' 34" N
LONGITUDE: 137° 15' 55" W
ELEVATION: 45 m
MEAN RAINFALL: 126 mm
MEAN SNOWFALL: 91 cm
ACCESS: AIR - CHARTER
WATER - BARGE SEA LIFT

BAR-2 SHINGLE POINT

LOCATION PLAN

SCALE: 1:250,000

FIGURE 2.1

3.0 DESCRIPTION OF BIOPHYSICAL ENVIRONMENT

3.1 CLIMATE

BAR-2 is located approximately 2 km inland, 45 m asl on the Yukon Coastal Plain. The area is bounded to the west and east by the Running and Blow Rivers, and to the northeast by Mackenzie Bay. Table 3.1 presents climatic normals for the site.

3.1.1 PRECIPITATION

Mean total annual precipitation is 214.3 mm; 126.5 mm of which falls as rain and 90.8 cm as snow. Approximately 58 d/yr have measurable precipitation, primarily from June to November. The greatest amount of rainfall in 24 h, 56.6 mm, occurred in August, while that of snowfall, 17.8 cm, fell in November.

3.1.2 TEMPERATURE

Mean annual temperature is -10.4 °C. Generally July is the warmest month averaging 15.9 °C, while December through March experience temperatures as low as -30 °C. Extreme maximums near 30 °C can occur from June through August and minimums of -50 °C from December to February.

3.1.3 WIND AND FOG

The mean annual wind speed is 17.7 km/h with the highest mean monthly wind speed of 26.4 km/h. Winds are predominantly from the northwest and are strongest in winter. Wind speeds exceed 20 km/h 20 percent of the year, 30 km/h 14 percent of the year, and 40 km/h 10 percent of the year. Wind speeds exceeding 84 km/h have been recorded.

Data on fog and cloud cover conditions are not available for this site.

3.2 GEOLOGY

3.2.1 OVERVIEW

BAR-2 Shingle Point is located on the Yukon Coastal Plain. The area is bounded to the west and east by the Running and Blow Rivers, and to the northeast by Mackenzie Bay (Figure 2.1). There are no bedrock exposures within the study area, but the area is believed to be underlain by Tertiary and Cretaceous shales, mudstones, sandstones, and conglomerates. Most of this area was glaciated by ice moving west from the Mackenzie Valley during the Buckland Glaciation during the early Wisconsinan age.

The stratigraphic sequence at Blow River typically consists of approximately 0.6 m of post-Buckland peat, overlying approximately 2 m of Buckland till which overlaps 9 m of pre-Buckland interbedded sand, silt and gravel. This overlays up to 12 m of earlier oxidized till and an unmeasured thickness of oxidized gravels over Tertiary or Cretaceous shales (Rampton 1982).

3.2.2 TERRAIN UNITS

The terrain units in the vicinity of the facilities are provided in Figure 3.1. The terrain units are described in the following sections.

Table 3.1

Climate Normals for BAR-2 Shingle Point

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Precipitation													
Mean Rainfall	0.0	0.0	0.0	0.0	2.2	22.3	40.3	43.1	17.7	0.8	0.1	0.0	126.5
Mean Snowfall	6.6	4.3	5.9	8.9	6.4	2.2	0.2	2.8	11.2	25.3	11.9	5.1	90.8
Mean Total	6.6	4.3	5.1	6.5	9.0	24.5	40.5	45.9	28.7	26.1	12.0	5.1	214.3
1 No. Days w/meas rain	0	0	0	0	1	6	8	9	5	0	0	0	29
No. Days w/meas snow	3	3	3	4	3	1	*	1	4	10	6	4	42
No. Days w/meas precip	3	3	3	4	3	6	8	10	8	10	6	4	68
Greatest rain in 24 hrs	T	0.0	0.0	T	13.0	31.2	27.9	56.6	26.2	12.7	1.0	0.0	56.6
Greatest snow in 24 hrs	15.2	7.6	10.2	14.0	12.7	11.0	3.8	9.1	12.7	14.0	17.8	9.0	17.8
Greatest precip in 24 hrs	15.2	7.6	10.2	14.0	13.0	31.4	27.9	56.6	26.2	14.0	17.8	9.0	56.6
Temperature (C)													
Mean Daily Max	-20.9	-23.3	-20.9	-12.2	-1.0	9.5	15.9	13.1	5.3	-5.6	-14.7	-19.9	-6.2
Mean Daily Min	-30.5	-31.5	-29.5	-21.3	-8.3	0.9	6.0	4.4	-1.3	-11.5	-22.6	-28.5	-14.5
Mean Daily	-26.1	-27.3	-25.2	-16.8	-4.7	5.3	11.0	8.8	2.0	-8.6	-18.6	-24.1	-10.4
Extreme Max	1.7	1.7	5.0	8.9	20.0	28.3	28.9	30.1	21.1	15.0	7.8	1.7	30.1
Extreme Min	-51.1	-52.2	-45.6	-38.9	-30.6	-15.0	-6.7	-5.6	-18.9	-32.0	-42.8	-47.2	-52.2

Wind

Mean Wind Speed (km/hr) and prevailing direction — Not applicable for this site

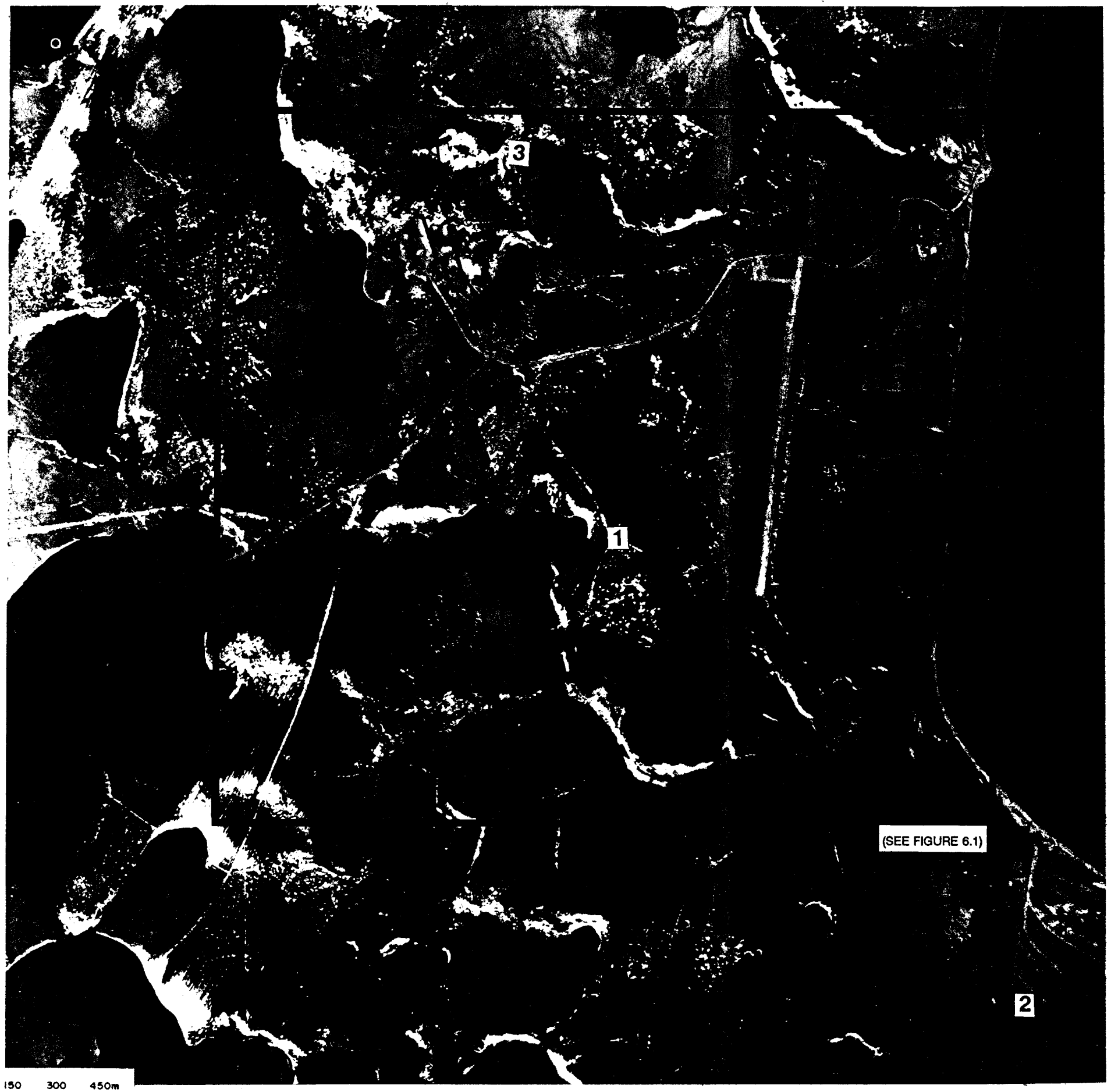
Mean Vector Speed (km/hr) and direction

1. measurable rain > 0.2 mm — rainfall in mm
   measurable snow >0.2 cm — snowfall in cm
   measurable precipitation >0.2 mm water equivalent — total precip in mm water equivalent

T = trace

M = missing data

* less than 0.5 greater than 0.0



LEGEND:

- DRAINAGE (KNOWN)
- DRAINAGE (INFERRED)
- TERRAIN/GEOLOGICAL BOUNDARY
- TERRAIN/GEOLOGICAL BOUNDARY (INFERRED)
- SCARP (TICKED ON DOWN SLOPE SIDE)

BAR-2 SHINGLE POINT

GEOLOGICAL OVERVIEW MAP

FIGURE 3.1

3.2.2.1 TERRAIN UNIT 1

Terrain Unit 1, which includes all the facilities, is characteristic of a gently rolling moraine. The surface expression is relatively flat with regional slopes of 5-10 percent to the north. The area contains a number of shallow lakes and ponds. In the vicinity of the landfill site the predominant feature is a flat-bottomed valley and underfit stream. This valley is oriented north-south and contains a small stream running north. The other major feature within the area is a ravine which trends northeast-southwest to the north of the runway. This ravine contains coarse textured material, possibly of fluvial origin. Approximately 500 m to the north of the shore-storage tanks the terrain slopes strongly at up to 40 percent down to the coast.

The water supply lake is on the southern edge of the rolling moraine where a stream-cut escarpment separates the rolling moraine from an extensive glacio-lacustrine plain (Unit 3) (Rampton 1982).

3.2.2.2 TERRAIN UNIT 2

Terrain Unit 2 is the delta plain of the Blow River and is separated from Unit 1 by an escarpment. This is the western edge of the MacKenzie Delta complex.

3.2.2.3 TERRAIN UNIT 3

Terrain Unit 3 is a small glacio-lacustrine plain to the north of the northwest end of the airstrip. It is bounded to the west by the flood plain of the Running River and otherwise surrounded by Terrain Unit 1. Surface materials are silt, clay and fine sand.

3.3 HYDROLOGY

The topography and drainage of BAR-2 and surrounding area are shown in Figure 3.1. The BAR-2 Module Train is located on a topographical high at an elevation of 50 m asl. Average slope toward the coast, situated northeast of the Module Train, is 2-3 percent.

Regionally, the BAR-2 facilities are located in a series of small coastal watersheds bounded to the south and west by the much larger Running River watershed, and to the east by the larger Blow River watershed.

Several lakes are present in the vicinity of the site and these range up to approximately 1.4 km^2 in area. Much of the site surface drainage moves through relatively flat organic terrain. Terrain of this type is often present around the lakes and sometimes connects adjacent lakes. Several well-defined streams are also present, however, these are generally confined by steep-sided ravines, typical of permafrost areas (Figure 3.1).

The area encompassing the BAR-2 facilities lies within four local drainage systems. The headwaters of the first system encompasses two lakes located 200 m south and 500 m southwest of the Module Train (Figure 3.1). These water bodies are connected by an area of organic terrain. The lake nearest the Module Train has an indistinct outflow along the northern side from which water is conducted to the area northeast of the Module Train. In this area, which includes two small lakes, the sewage effluent from the facility is released. Approximately 800 m northeast of the Module Train the drainage enters a well-defined stream channel and continues northwestward to the coast. The confluence between this stream and a tributary stream, draining a largely undisturbed area to the west of the site, is located approximately 600 m from the coast.

A second drainage system is immediately to the west of the first and originates along the northeastern edge of the Airstrip (Figure 3.1). Drainage is at first indistinct but a well-defined channel flow begins approximately 200 m southeast of the Lumber and Vehicle Storage area. From there, the stream continues in a northerly direction, passing along the toe of a suspected landfill, before reaching the coast.

Flow from the headwaters of the third system enters a channel approximately 1.7 km south of the east end of the Airstrip (Figure 3.1). From there the stream flows in a northeasterly and then northerly direction, toward the coast. Within 400 m of the coastline, the stream flows along the toe of the present landfill. The stream flows into Mackenzie Bay at a point immediately to the west of the Blow River Delta.

One active and one abandoned landfill are located at the BAR-2 station. Drainage is distinctly toward the streams at the base of the respective landfills. The drainage from the aactive landfill is initially eastward where it meets a stream and travels northerly to the sea. The drainage from the abandoned landfill is initiallynorthwest where it meets a stream and travels northeast toward the sea.

The fourth drainage system is located to the south and east (Figure 3.1). It encompasses the largest lake in the area, which is also the water supply for the station. In terms of site facilities, only the water supply and a section of the water supply access road are located in this watershed. The headwater area lies to the west of the water supply lake and drains towards it. From the outflow at the east end of the lake, drainage passes through another large lake and then into a stream channel that becomes well-defined within 1 km northeast of the second lake. The stream flows in a northerly direction and flows across the western extremity of the Blow River Delta for approximately 1 km before reaching Mackenzie Bay.

3.4 FLORA

This area is typical of low-Arctic tundra and is characterized by a nearly continuous cover of vegetation with patches of willow (*Salix* spp.) up to 4 m in height in sheltered valleys. *Alnus* spp. also occur in these valleys and in isolated locations around the station. Low-lying areas are moderately to poorly drained, with a nearly continuous cover of sedge (*Carex* spp.), occasional patches of willow, birches (*Betula* spp.), ericaceous shrubs, and *Sphagnum* spp. moss. More upland sites are characterized by *Vaccinium vitus-idaea*, birches, *Ledum* spp., and *Scirpus* spp., with occasional patches of willow, *Epilobium* spp., *Rubus chamaemorus*, *Pedicularis* spp., grasses, and sedges. The driest sites are on hilltops where lichens, birches, and *Ledum* spp. dominate with occasional patches of *V. vitis-idaea* and *R. chamaemorus*.

Disturbed areas in the vicinity of the station are characterized by willow, *Epilobium latifolium*, *Potentilla* spp., and grasses. *Rumex* spp.; *Armetia* spp, and *Descurainia* spp. were observed at some of these locations.

3.5 FAUNA

3.5.1 LARGE MAMMALS

Shingle Point lies outside management zones for muskox (*Ovibos moschatus*) as the species is known to occur only infrequently (Urquhart 1982). Animals in the area are probably from an introduction of muskox along Alaska's north coast in 1969 to 1970 (Wiken *et al.* 1981).

Caribou (*Rangifer tarandus granti*) in this region are part of the Porcupine Caribou herd which ranges across the Yukon and the Northwest Territories. The lack of observations and sign observed during the site visit indicated that they are not common in the immediate vicinity of Shingle Point.

Polar bears (*Ursus maritimus*) in this area are within Management Zone H which includes the Beaufort Sea and Amundsen Gulf (Schweinsburg *et al.* 1981). Demaster *et al.* (1980) estimated the total population of the zone in 1977 to 1978 at approximately 2,100 animals. Bears are known to inhabit the southern Beaufort during freeze-up and move northward with retreating ice floes during summer (Schweinsburg *et al.* 1981). Polar bears from eastern Alaska are known to migrate through the northwest coast in mid-April (Lentfer 1983). Most maternity denning in the Western

Arctic occurs along the west and south coasts of Banks Island and to a lesser degree on the western peninsulas of Victoria Island with a little denning on the mainland coast (Stirling *et al.* 1975). Records of polar bear encounters at this station were not available. Regardless, it appears that such incidents are rare, particularly when compared to the eastern DEW Station sites (Stenhouse *et al.* 1988).

Grizzly bears (*Ursus arctos horribilis*) occur throughout the majority of mainland Northwest Territories (Britton and Graves 1985) and have been observed at this DEW Station. Probable tracks of a grizzly bear were found on the Running River Delta during the site visit. Black bears (*U. americanus*) are also known to occur in this region of the Northwest Territories (Banfield 1974) but there were no records of human-black bear interaction at this station.

3.5.2 OTHER TERRESTRIAL MAMMALS

Fresh tracks and droppings indicated that Arctic fox (*Alopex lagopus*) were visiting the site. These animals are probably attracted by artificial food sources (landfill, litter) as foraging around construction camps is common (Eberhardt *et al.* 1982). Home range size of territories overlapping petroleum development facilities in the arctic have been reported as 20.8 km^2 and 3.7 km^2, for adults and juveniles respectively (Eberhardt *et al.* 1982).

A wolverine (*Gulo gulo*) has been observed at this site (Monenco Eyretechnics Group 1987). An arctic ground squirrel (*Spermophilus parryii*) was observed near the station during the site visit. The species is restricted to burrowing in gravel or sandy hillocks where good drainage prevents permafrost from developing near the surface (Banfield 1974).

3.5.3 MARINE MAMMALS

Beaufort Sea beluga whale (*Delphinapterus leucas*) populations are discrete from Eastern Canadian Arctic populations. The Mackenzie River delta stock of belugas summer in the southeastern Beaufort Sea region, primarily in the estuary of the Mackenzie River (Fraker and Fraker 1979; 1981; 1982). McLaren and Davis (1985) recorded 28 belugas in the shallow (<10 m) waters of Mackenzie Bay and 11 individuals in the shallow estuarine waters along the north side of Richards Island, at the mouth of the Mackenzie River. Belugas begin arriving at the summering areas in May and June. Certain specific coastal areas (see above) within the general summering areas are traditionally occupied during mid-summer, generally from late July or early August to late August (Sergeant 1973; Finley 1976; Fraker 1979). At this time, most beluga sightings are in shallow coastal waters, especially in the estuary of the Mackenzie River. It is estimated that 7,000 beluga whales enter the estuary in late June and early July and leave in late July and August (Fraker 1980; Fraker and Fraker 1981; 1982).

Bowhead whales *(Balaena mysticetus)* winter in the Bering Sea and migrate eastward into the Beaufort Sea between late April and early June (Davis *et al.* 1980). Overall, the distribution of bowhead whales can show great inter-annual variation (McLaren and Davis 1985). In late August 1983, they observed a large concentration between Shingle Point and Kay Point. The density of animals at the surface in this area (371 km^2) was extremely high (5.79/1,000 km^2). Bowhead whales have also been seen within a few kilometres of the shoreline in September (McLaren and Davis 1985).

The ringed seal (*Phoca hispida*) is the most widespread species of marine mammal in the Canadian Arctic and is usually a permanent resident in most of its range (Davis *et al.* 1980). Ringed seals have been observed up to 70 km offshore of the Tuktoyaktuk Peninsula in early September (McLaren and Davis 1980).

3.5.4 RAPTORS

Shingle Point is located approximately 100 km north of Campbell Lake which is an area of special interest to the Department of Renewable Resources, Government of the Northwest Territories (Ferguson 1987). Campbell Lake is known to be an important nesting area for the endangered *anatum* sub-species of the Peregrine Falcon (*Falco peregrinus*). A Golden Eagle (*Aquila chrysaetos*) was observed on three occasions along the beach and at the mouth of Running River, 4 km north of the site. This species is considered scarce across its range (Godfrey 1986). Snowy Owl (*Nyctea scandiaca*), Gyrfalcon (*Falco rusticolus*), and Rough-legged Hawk (*Buteo lagopus*) are also known to occur in this region (Searing *et al.* 1975, Godfrey 1986).

3.5.5 WATERFOWL

All four species of loons are known to breed in the southeastern portion of the Beaufort Sea but only Arctic (*Gavia arctica*) and Red-throated Loons (*G. stellata*) are regarded as common (Searing *et al.* 1975). Three Arctic Loons were observed on a pond immediately south of the station with a pair of Tundra Swans (*Cygnus columbianus*) and a brood of Green-winged Teal (*Anas crecca*). Swans occur commonly and occasionally as an abundant breeder along the southern coast of the Beaufort Sea (Review by Searing *et al.* 1975). This area is known to be important for nesting and staging area for swans, dabbling ducks, Lesser Snow Geese (*Chen caerulescens*), Brant (*Branta bernicla*), and White-fronted Geese (*Anser albifrons frontalis*) (Searing *et al.* 1975; Martel *et al.* 1984). King (*Somateria spectabilis*) and Common Eider Ducks (*S. mollissima*) have been observed in large concentrations in this region of the Beaufort Sea during aerial surveys (Searing *et al.* 1975).

3.5.6 OTHER AVIFAUNA

Thirty species of shorebirds are known to occur regularly along the Beaufort Sea coast (Searing *et al.* 1975) and many were frequently observed during the site visit. Ravens (*Corvus corax*) were also observed at Shingle Point. Avifauna were particularly common in the taller willows within the small valleys at Shingle Point. Sign and observations of Willow Ptarmigan (*Lagopus lagopus*) were also recorded in these valleys and elsewhere in conjunction with the occurrence of willow.

Thirty-five Glaucous Gulls (*Larus hyperboreus*) were observed at Shingle Point. These were likely from a reported colony on the nearby Escape Reef. There were infrequent sightings of Parasitic Jaeger (*Stercorarius parasiticus*) but not Long-tailed Jaeger (*S. longicaudus*) or Pomarine Jaegar (*S. pomarinus*) although all three species likely occur in the region (Godfrey 1986).

3.5.7 FISH

Shingle Point is close to the Mackenzie River and estuary and is strongly influenced by the seasonal characteristics of water flow, water temperature and salinity of this system. In particular, the seasonal patterns of fish in the study area are a function of proximity to anadromous fish migration routes, spawning and overwintering areas. In a study of nearshore fish species of the Yukon coast, Kendel et al. (1975) captured 21 species of which seven were marine, five were anadromous and nine were freshwater. Of these, arctic cisco (*Coregonus autumnalis*), arctic char (*Salvelinus alpinus*), arctic flounder (*Liopsetta glacialis*), boreal smelt (*Osmerus eperlanus*), fourhorn sculpin (*Myoxocephalus quadricornis*) lake whitefish (*Coregonus clupeaformis*), inconnu (*Stenodus leuchthys nelma*), and least cisco (*Coregonus sardinella*) were represented in significant numbers. McAllister (1962) lists an additional 15 species of non-commercial fish from the Western Arctic. Kendel *et al.* (1975) recorded high catches of fish at Shingle Point. Overall, species diversity in the study area is low. However, of all the stations occupied on the Yukon coast, Shingle Point had the highest concentration of fish, yielding a catch-per-unit effort four times that of any other station. This large

concentration of fish is known to occur from Shingle Point east to the Mackenzie River (Kendel et al. 1975).

Percy (1976) reported capturing sculpins from the vicinity of Shingle Point and immediately following Mackenzie River break-up, while coastal waters were still ice-infested. Least ciscos were abundant at Shingle Point west of the delta.

3.6 HERITAGE RESOURCES

The immediate area of the station and the coast between the western part of the Blow River delta and the western edge of the Running River delta were surveyed for archaeological sites. The assumed location of previously identified site NfVd 1 was revisited; the contents of the site do not correspond with the previously identified remains, however. On the Running River delta, another previously recorded site complex was revisited. It consists of a log cabin associated with a gold mine operation, a cemetery containing a minimum of seven graves, and unidentified driftwood features which may also represent grave locations. One prehistoric site was recorded west of the water supply lake. The prehistoric site consists of a single chert flake. Historical sites are identified on Figure 3.2.

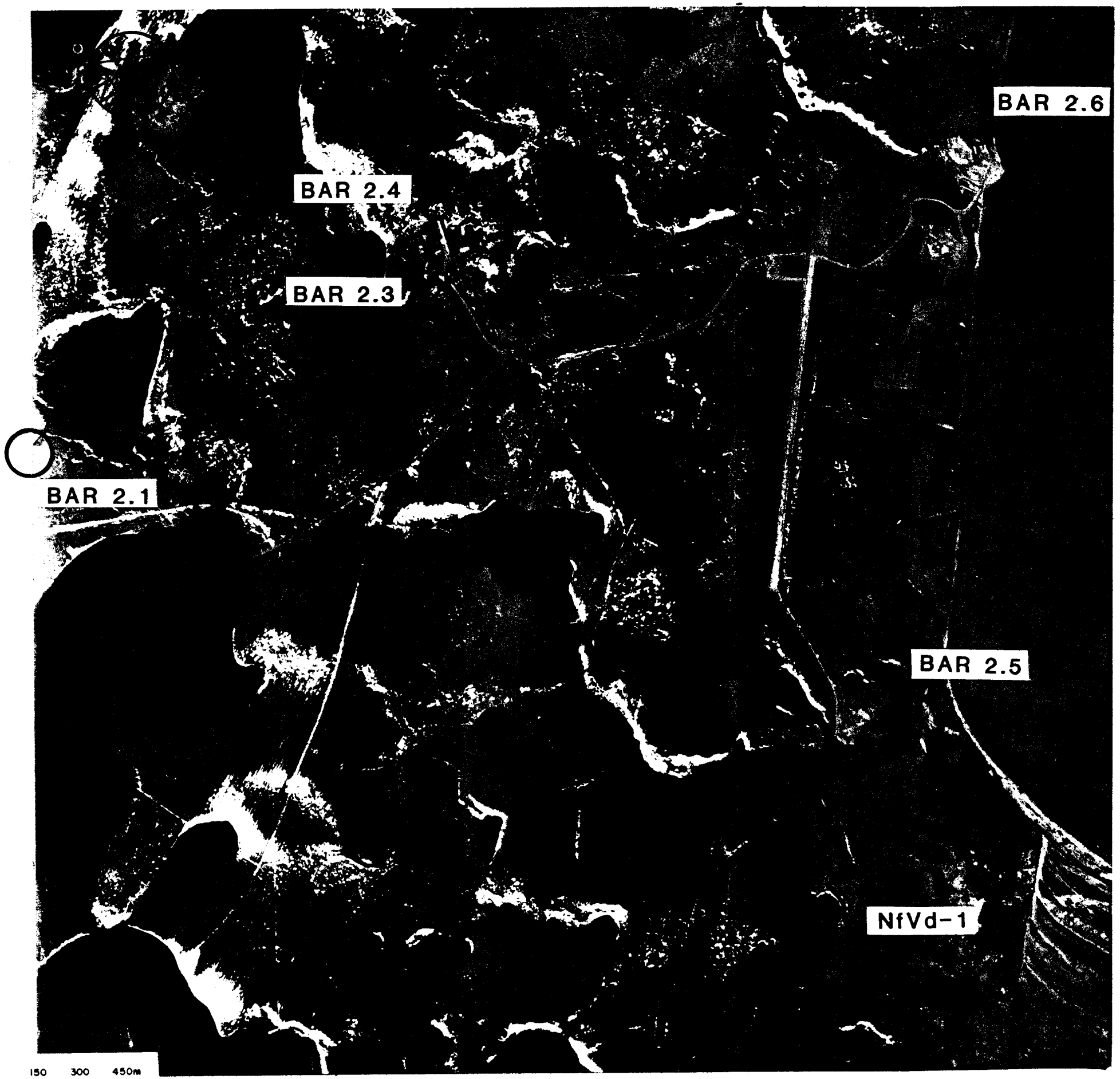
Nine features, all of which appear to relate to relatively recent historical activity and potentially to the presence of the DEW Station were also observed. In the immediate area of the station, three recent features were observed. They consist of a cluster of bricks, stove parts, and asbestos shingles which were identified as an ice-house and the remains of a structure by a station employee. These features may all represent habitation remains associated with early Inuit employment at the station. On the delta of the Running River, the historic features consist of debris from plywood sheds, in the same vicinity of a similar structure currently being built, and a wind break of driftwood. Both are considered to be relatively recent in origin. Between the deltas of the Blow River and the Running River, recent historic features noted consisted of localized scatters of the remains of driftwood and boards associated with tent pole supports at three locations, and an area of boards and logs associated with tin cans, oil drums, and rubber pieces. A current Inuit fishing camp is located on the outer portion of the Running River delta.

Only the site complex on the Running River delta consisting of a log cabin and two cemeteries are of concern. It is recommended that this area be avoided by all activity. The remaining features are generally small and of low visibility; impact from disturbance will likely be minimal. However, the quantity, nature, and variety of cultural remains observed at, and in the vicinity of, this station indicate that the site contains good archaeological potential. Therefore, it is recommended that additional archaeological study be conducted at this station prior to decommissioning or other related disturbance.

A separate report documenting the heritage resources study on the site has been filed with the Yukon Heritage Branch, with copies to the USAF and DND (UMA 1991).

3.7 LAND USE

No special conservation land status has been designated at this site.



BAR-2 SHINGLE POINT

ARCHAEOLOGICAL SAMPLE MAP

FIGURE 3.2

4.0 SITE INFRASTRUCTURE

4.1 BUILDINGS

The facilities and earthworks at BAR-2, Shingle Point, are described in detail in the Base Civil Engineering (BCE) data, which are presented in Appendix A. Based on the verification of the BCE data conducted during the on-site inspection, Figure 4.1 was prepared to illustrate the locations of the facilities.

4.2 STORAGE AND DISTRIBUTION

BAR-2 had 3 diesel tanks, 3 Mogas tanks and 5 JP-4 tanks. The complete details of these ten storage tanks are described in Table 4.1:

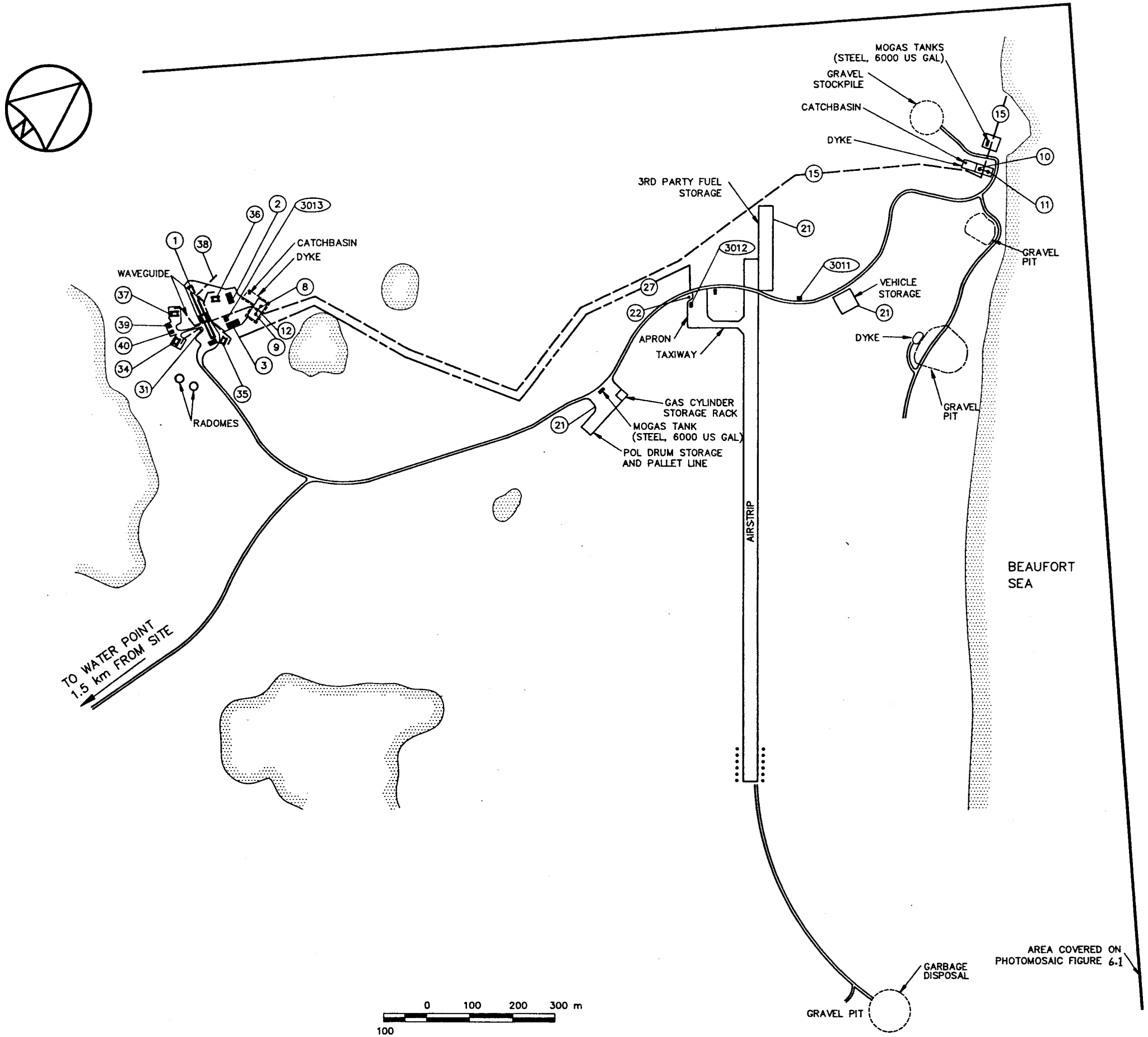
Table 4.1

Fuel Storage Facilities

1.	Diesel Oil: Total Capacity	885 m^3
	a) Building Site Area 3 steel tanks (295 ea)	885 m^3
2.	Mogas: Total Capacity	54 m^3
	a) Building Site Area 2 steel tanks (27 ea)	54 m^3
3.	JP-4: Total Capacity	627 m^3
	a) Hangar 4 steel tanks (83 ea)	332 m^3
	b) Building Site Area 1 steel tank (295)	295 m^3

4.3 WASTE TREATMENT

BAR-2 Shingle Point uses a sewage lagoon in addition to partial primary treatment. The external sanitary sewer system consists of a 8 cm sewer line 80 m long that transfers sewage from the module train to outfall. The internal sewage distribution system, located in the module train consists of a 9550 L steel holding tank, a grease trap, sump tanks, and pumps, a sewage ejector pump, plumbing latrine fixtures, piping, and valves.



FACILITIES INDEX:

(1) MODULE TRAIN
(2) GARAGE
(3) WAREHOUSE
(8) DIESEL FUEL TANK (STEEL, 65,000 US GAL)
(9) DIESEL FUEL TANK (STEEL, 65,000 US GAL)
(10) DIESEL FUEL TANK (STEEL, 65,000 US GAL)
(11) DIESEL FUEL TANK (STEEL, 65,000 US GAL)
(12) POL PUMPHOUSE
(15) POL LINE
(21) OPEN STORAGE AREA
(22) BEACON LIGHT
(27) PRIMARY POWER CABLE (UG)
(31) MASTER TV ANTENNA
(34) COMMUNICATION "BILLBOARD"
(35) COMMUNICATION "BILLBOARD"
(36) COMMUNICATION "BILLBOARD"
(37) COMMUNICATION "BILLBOARD"
(38) SEWER LINE
(39) STORAGE SHED (ROBERTSON BLDG.)
(40) STORAGE SHED (ROBERTSON BLDG.)
(3011) STORAGE SHED (TEMP., POL)
(3012) STORAGE SHED (TEMP., ATB)
(3013) STORAGE SHED (TEMP., QML)

NOTE:

1. FOR OVERALL SITE PHOTOMOSAIC COVERAGE SEE FIGURE 3.1.
2. THE FACILITIES SHOWN ARE TAKEN FROM THE AVAILABLE AS-BUILT SITE DRAWINGS AND THE CURRENT BCE DATA (1989), AND AS VERIFIED ON SITE.
3. NUMBERED FACILITIES ARE AS GIVEN IN THE FACILITIES INDEX IN THE BCE DATA.

BAR-2 SHINGLE POINT

SITE PLAN

FIGURE 4.1

4.4 HAZARDOUS MATERIAL STATUS

The following hazardous materials were included in the initial retrograde reports for sealift.

- Fifteen empty cylinders, which had contained Class 2 compressed gases including acetylene, mapp gas, nitrogen, and oxygen.
- Twenty-eight drums of waste petroleum products and 500 empty drums. Waste petroleum and the residue probably found in the empty drums are Class 3 flammable liquids.
- Two drums of asbestos-containing material.

4.5 SPILL HISTORY

Two spills were noted in the spill records reviewed:

(1) On May 29, 1989, approximately 50 gal o DFA leaked onto the ground under an ATCO trailer. The spill was contained with pearlite absorbent.

(2) On September 21, 1989, approximately 250 L of jet fuel sprayed onto the ground covering about 80 sq. ft. No action was taken and as of September 27, 1989, the puddles of fuel had soaked into the ground or evaporated.

5.0 ASBESTOS, PAINT AND PCB RESULTS

5.1 ASBESTOS

5.1.1 RECORD REVIEW

An asbestos survey was carried out on March 31, 1990. Table 5.1 presented below summarizes the location, type, and quantity of asbestos at the site as per the survey.

Table 5.1

Asbestos Survey

LOCATION	TYPE	QUANTITY
Module Train	Pipe Sheet	1362 m^2 160 m^2
Garage	Sheet	16 m^2
Warehouse	Sheet	74 m^2
Hangar	Sheet	30 m^2

5.1.2 FIELD SURVEY

Three samples of insulating material were obtained to be tested for asbestos content during the 1990 site sampling trip. During decommissioning, asbestos materials will require special handling and disposal.

5.1.3 ANALYTICAL RESULTS

The results of analyses are presented in Table 5.2. Samples B2-302 and B2-306 from Module 1-A and the Garage, respectively, contain from 10 to 30 percent chrysotile asbestos. Sample B2-304 contained 90 to 100 percent chrysotile asbestos.

5.2 PAINT

5.2.1 FIELD SURVEY

Five paint samples were obtained from representative areas within the interior of the BAR-2 facilities on August 5, 1990. These areas included the Warehouse, the Module Train and the Garage.

5.2.2 ANALYTICAL RESULTS

Results of analysis of paint samples for metals are presented in Table 5.3. Samples B2-301, B2-303 and B2-305 contain metal concentrations within typical ranges for industrial, oil-based paints. Concentrations of lead, chromium and cadmium (5,600 mg/kg, 1,300 mg/kg and 17 mg/kg, respectively) are elevated in sample B2-307 which was taken from the floor of the office in the Garage. These metals may be

Table 5.2

Asbestos Analysis

SAMPLE	PRESENT	ASBESTOS	TYPE	BUILDING	LOCATION	TYPE
B2-302	Yes	10-30%	Chrysotile	Module Train FAC 01	Overhead Heat Exchanger in Module 1A	Pipe
B2-304	Yes	90-100%	Chrysotile	Module Train FAC 01	Overhead Pipe in Dark Room	Pipe
B2-306	Yes	10-30%	Chrysotile	Garage FAC 02	Generator Exhaust System	Pipe

Table 5.3

Paint Survey Data

INDICATOR CHEMICAL	MDL (mg/kg)	B2-301	B2-303	B2-305	B2-307
Arsenic	0.1	0.2	15	4.8	0.4
Selenium	0.5	<	3	0.8	<
Mercury	0.05	0.14	5.4	0.81	0.18
Barium	1	110	1100	1100	79
Beryllium	0.5	<	<	<	<
Cadmium	1	3	3	7	17
Chromium	1	79	190	120	1300
Lead	10	1500	2500	270	5600
Nickel	5	<	11	10	10
Silver	5	<	<	<	<
LOCATION		Warehouse FAC 03	Module Train FAC 01	Module Train FAC 01	Garage FAC 02
AREA		Section 2-3 Diesel Engine Bed	Powerhouse Floor Near Diesel Engine	Laundry Room Floor	Office Floor

MDL = Method Detection Limit

elevated at this location due to exhaust residues from vehicles parked in the building. The high metal values are typical of industrial paints. The painted materials may require special handling as described in Volume 2.

5.3 PCB

5.3.1 RECORD REVIEW

The most recent PCB inventory was conducted on January 25, 1990. A list of the equipment suspected of containing PCB's as of January 25, 1990 is summarized in Table 5.4.

Table 5.4

PCB Inventory

AREA	TRANSFORMERS	CAPACITORS	TOTAL MISC. PCB(Kg)
Receiver Room	364	38	29087.03
Surveillance Room	24	87	1016.77
Emergency Radio Room	1	1	12.5
Air Terminal Building	1		274.73
Transmitter Room	12	24	35.56

Note: 118 litres of fluids and 21 components were noted to contain suspect PCBs.

5.3.2 FIELD SURVEY

The single dielectric fluid sample collected at the site from the Runway Light Regulator in the Air Terminal Building (B2-ATB), contained PCB at a concentration of 63 ppm.

6.0 SITE ASSESSMENT AND CLEAN-UP OPTIONS

Evaluation of the relevance of indicator chemical concentrations found at specific locations at this station is based on the site assessment strategy outlined in Volume 2. The strategy consisted of:

(1) Comparison of laboratory data to background soil and water indicator chemical concentrations.

(2) Comparison of laboratory data to Quebec Sil/Water Guidelines as per Section 1.3.

(3) Assessment of risk to human health and the environment from specific locations (landfills, sewage outfalls and others).

The following subsections address each location and stain area on the site and present options for clean-up. Results of soil and water analyses for the site are presented in Appendix B. Quality assurance and quality control of the analytical data appears in Appendix C. Risk assessment for the site is presented in detail in Appendix E.

6.1 SITE RISK ASSESSMENT SUMMARY

Results from the BAR-2 site exposure assessment were integrated in order to characterize the site-specific risk. As described in Volume 2, Section 3.0, the methods for characterizing non-carcinogenic risk are different from those used for carcinogenic risk. The quantification of BAR-2 site risk has therefore been segregated according to these categories.

Results have been summarized in Appendix D and as may be seen the total carcinogenic risk was estimated at 5×10^{-6}. Based on the U.S. EPA site remediation goal of reducing cancer risks below 10^{-4}, the BAR-2 carcinogenic risk is considered very low. The principal contributor was arsenic intake from the dermal contact of soil and inhalation pathways as shown in the distribution of risk given in Figure E-2.

The BAR-2 site worker non-carcinogenic hazard index results are summarized in Table E-7. As may be seen dermal contact of soil contributed the largest amount to the risk index. Arsenic was the most significant contaminant as shown in the distribution of hazard quotients given in Figure E-3. The hazard index totals 1×10^{-2} which is much less than the unity criteria and therefore non-carcinogenic risk is considered small.

Non-carcinogenic risks for the worker again will be less than those estimated above for the native due to the reduced exposure.

The estimated contaminant intakes for caribou and grasses were compared to estimated safe values to characterize risk in a method similar to that used for human non-carcinogenic risk assessment. The sum of all hazard quotients in caribou was significantly smaller than the unity criterion and therefore caribou risks are considered small. Likewise, the hazard quotients for PCBs, arsenic, and nickel in grasses were less than unity. The lead hazard quotient for grasses was near unity and therefore there may be potential risks to plant health in the locations identified in Subsection E-2.2. The estimated intakes for the remaining contaminants were small, however, toxicity information was not available and therefore risks could not be quantified.

6.1.1 SITE BACKGROUND CONDITIONS

Sample site locations are presented in Figure 6.1. Also indicated is information on elevated parameters at specific sample sites.

LEGEND

1ST ROUND TESTS RESULTS	2ND ROUND TESTS RESULTS	
HPBVM	H P B V M	MULTIPLE PARAMETERS DETECTED
M	M	METALS DETECTED
B	B	BNA - BASE, NEUTRAL, ACID EXTRACTABLES DETECTED
H	H	HYDROCARBONS DETECTED
V	V	VOLATILES DETECTED
P	P	PCB DETECTED
⬠	☐	SAMPLE TESTED AND NO PARAMETERS DETECTED
○		SAMPLE TAKEN BUT NOT ANALYZED
B2 - 040		SOIL SAMPLE NUMBER
B2 - C		WATER SAMPLE NUMBER

BAR-2 SHINGLE POINT

STATION AREA SAMPLE SITES AND PARAMETERS IDENTIFIED

FIGURE 6.1

6.1.2 VISUAL OBSERVATIONS AND SAMPLE LOCATIONS

There were no apparent sources of background contamination in the area. A small abandoned community was located approximately 4 km to the northwest of the site, at the mouth of the Running River.

One water sample (B2-E) (Appendices A and B) was taken to provide an indication of background water chemistry in the vicinity of the site. The sample was obtained from a pond located approximately 1 km east of the water supply lake. There were no disturbances in the vicinity of the pond and the surrounding topography isolates it from developed areas of the site.

One soil sample (B2-1104) was taken to provide an indication of background chemistry of mineral soils in the area. The sample was taken 0.5 km north of the POL 2 storage facility, at the top of a northeast facing slope, approximately 60 m above the gravelly sand beach.

Another background soil sample, (B2-1105) representative of organic soils in the area, was collected at a location approximately 0.8 m southeast of Landfill B.

Sample locations are provided in Figure 6.1.

6.1.3 ANALYTICAL RESULTS

Concentrations in the background water sample (B2-E) were above detection limits for barium. At 0.02 mg/l, barium is below the drinking water criterion and within the range of normal surface waters in Canada, as outlined in Volume 2.

Soil sample in which the concentration of indicator chemicals exceeded the study criteria are presented in Table 6.1.

Soil sample B2-1104 had barium and arsenic concentrations of 200 and 14 mg/kg, respectively. Concentrations of nickel (34 mg/kg) and selenium (0.7 mg/kg) also exceeded the study criteria.

Total petroleum hydrocarbons (TPH) were detected in B2-1104 at a concentration of 20 mg/kg, less than the study criteria, but still noteworthy since the sample location was not in the vicinity of a source of petroleum hydrocarbons. It is possible that laboratory analysis for petroleum hydrocarbon has detected animal or vegetal hydrocarbons occurring naturally in the sample.

Several volatile organics were detected in B2-1104 but at extremely low levels which are indicative of trace contamination of the sample during sampling or analysis. Phenanthrene, a PAH compound (semi-volatile), was detected at a concentration of 0.19 mg/kg which exceeds the study criteria. Benzyl butyl phthalate was also detected but, as outlined in Volume 2, trace contamination with phthalates is common to many of the samples and is due to sample contact with plastic during sampling and analysis.

In B2-1105, arsenic (5 mg/kg), selenium and mercury (0.8 and 0.18 mg/kg, respectively) and barium concentrations (210 mg/kg) exceed the study criteria.

Analysis indicated that six types of volatile organic chemicals were detected in B2-1105 but analysis of method blanks indicates that four of these were probably introduced during analysis. Traces of Cl4-ethylene and 1,1,2,2-Cl4-ethane (0.002 and 0.014 mg/kg, respectively) were also detected in this sample. Although these parameters were not detected in the method blank, at these low concentrations it is probable that they are due to contamination of the sample by plastics either during sampling or analysis.

Table 6.1

Relevant Soil Results: Background

INDICATOR CHEMICALS (mg/kg)	B2-1104	B2-1105 B2-1105R B2-1105D B2-1105D*	TYPICAL RANGES **
Arsenic	14	5	1.5-21.0
Selenium	0.7	0.8	0.1-1.4
Mercury	0.08	0.18	0.1-0.5
Barium	200	210	150-1500
Berillium	<0.5	<0.5	1.0-2.0
Cadmium	<1	<1	<1.0
Chromium	23	11	11.6-189
Lead	<10	<10	10.0-50.0
Nickel	34	20	5.0-9.0
Silver	<5	<5	0.03-0.09
TPH	20	<5	n/a
PCB	<0.01	<0.01	n/a
4-Nitrophenol	<0.14	0.48	n/a
Phenanthrene	0.19	<0.13	n/a

TPH = Total Petroleum Hydrocarbon
PCB = Polychlorinated Biphenyls
n/a = Not Available
* Where duplicate and/or replicate analysis is availalbe the highest value is quoted.
** Kabata - Pendias and Pendias (1984)

6.2 LANDFILLS

There are two landfills at the BAR-2 site and they are indentified as Landfill A and Landfill B.

6.2.1 ACTIVE LANDFILL (A)

6.2.1.1 VISUAL OBSERVATIONS AND SAMPLE LOCATIONS

The Landfill A site is located 700 m east of end of the runway on the side of a flat-bottomed valley (Plate 2). The valley is oriented north-south and slopes gradually towards the ocean, 600 m to the north. A small stream runs north along the bottom of the valley, approximately 50 m from the toe of the landfill. A gravel borrow area is located to the south, adjacent to the landfill (Figure 3.1). The landfill was approximately 350 m long, and 30 m wide, with a maximum depth of approximately seven metres. Slope angles of the landfill ranged from 10 to 35 percent, with drainage from the landfill flowing directly into the valley. Debris was apparent along the exposed face of the landfill and included both domestic refuse and industrial type refuse such as drums, scrap metal, and discarded heavy equipment. Rust coloured leachate and staining were noted in isolated locations in the landfill (Plate 3). The soil encountered was predominantly granular with the inclusion of clay and silt in some areas.

Water samples, B2-A and B2-B(D), (Appendix C) were collected from the stream which runs along the bottom of the landfill (Figure 6.1). They were taken at a point which was eastward of the northern extreme of the landfill and therefore downgradient of the portion of the stream that receives landfill leachate and runoff.
Thirteen soil samples were taken in the vicinity of the landfill. All sample locations are provided in Figure 6.1.

6.2.1.2 ANALYTICAL RESULTS

Samples in which the concentration of indicator chemicals exceeded the study criteria are presented in Table 6.2.

Analytical results indicate the presence of volatile organic compounds at levels in excess of the study criteria in water samples B2-A(D) and B2-B(D), (Appendix C).

Full or partial analysis was done on soil samples from nine of the 13 sample sites in the vicinity of the landfill. Most of the samples contained arsenic and cadmium concentrations which exceeded the study criteria, but similar to background levels. Barium and nickel concentrations exceeded the study criteria but were also comparable to background levels. Several samples contained metal concentrations that were greater than background values and greater than evaluation criteria. Mercury in B2-1011, at 0.61 mg/kg, was approximately three times the study criterion. Lead concentrations were greater than the study criterion in four samples: B2-1007 at 40 mg/kg, B2-1004 at 120 mg/kg and B2-1005 at 61 mg/kg (B2-1011 was not analyzed).

TPH was detected in relatively low concentrations in B2-1008 and B2-1012 (6 and 3 mg/kg, respectively). PCB was detected in six of the sample at concentrations ranging from 0.03 to 0.92 mg/kg. Evidence of contamination was not noted for the remaining organic parameters for which analyses were performed.

6.2.1.3 EVALUATION OF RISK ASSESSMENT AND ANALYTICAL RESULTS

The results of the risk assessment show that carcinogenic and non-carcinogenic risks are below the levels established for this study, and no indicator chemicals were identified above the Quebec B guideline.

Table 6.2

Relevant Soil Results: Landfill A

INDICATOR CHEMICALS	LEVEL A	BACKGROUND	B2-1001	B2-1002	B2-1003 B2-1003R*
(mg/kg)					
Arsenic	10	14	9.3	8.3	8.2
Mercury	0.2	0.18	N.R.	N.R.	N.R.
Lead	50	<10	N/A	N.R.	N/A
PCB	0.1	n/a	N/A	N.R.	N/A

INDICATOR CHEMICALS	LEVEL A	BACKGROUND	B2-1004	B2-1005	B2-1006	B2-1007
(mg/kg)						
Arsenic	10	14	11	14	10	13
Mercury	0.2	0.18	0.13	N.R.	N/A	N/A
Lead	50	<10	120	61	N.R.	40
PCB	0.1	n/a	0.05	0.05	0.03	0.03

INDICATOR CHEMICALS	LEVEL A	BACKGROUND	B2-1008	B2-1009D B2-1010D	B2-1011 2-1011R *	B2-1012
(mg/kg)						
Arsenic	10	14	24	11	11	20
Mercury	0.2	0.18	N/A	0.1	0.61	N/A
Lead	50	N.R.	N/A	N/A	N/A	N.R.
PCB	0.1	n/a	0.06	N.R.	0.92	N.R.

N.R. = Not Relevant

n/a = Not Available

N/A = Not Analyzed

PCB = Polychlorinated Biphenyls

* Where duplicate and/or replicate analysis is available the highest value is reported.

6.2.1.4 CLEAN-UP OPTIONS

There were many waste materials and debris scattered about the site. These materials should be removed and the site recontoured, covered with clean fill materials and vegetated, if necessary, to control erosion.

If reduction of risk is deemed desirable, soils can be removed, encapsulated, treated, or covered, as applicable.

6.2.2 LANDFILL (B)

6.2.2.1 VISUAL OBSERVATIONS AND SAMPLE LOCATIONS

The Landfill B site is at the edge of a shallow ravine 600 m northeast of the airstrip. This site was not confirmed as a landfill.Drainage from this area is to the north along the slope of the ravine, towards the POL 2 facility. The slope angles vary from 7 to 28 percent. Ponded water was noted downstream of the dump location. The soil encountered was generally granular, ranging from sandy gravel to gravelly sand.

6.2.2.2 ANALYTICAL RESULTS

Sample locations are provided in Figure 6.1.

Water sample B2-D was taken from the stream which flows along the toe of the landfill.

Full or partial analysis was performed for samples from all three soil sample locations and the single water sample location associated with Landfill B. Two soil samples were taken along the toe of the landfill (B2-1102 and B2-1103) and one was taken at a location which appeared to be on top of the mass of filled material (B2-1011).

The soil samples consisted of either gravelly sand or sandy gravel. With one exception, all of the samples contained concentrations of the analyzed parameters that were comparable to background values. The exception was in the case of PCB in samples B2-1102 and B2-1103 taken along the toe of the landfill (0.2 and 0.02 mg/kg, respectively). Sample B2-1102 exceeds the study criterion.

Analytical results indicate no contamination of the stream (B2-D) by any of the parameters for which analyses were performed.

6.2.2.3 EVALUATION OF RISK ASSESSMENT AND ANALYTICAL RESULTS

The results of the risk assessment show that carcinogenic and non-carcinogenic risks are below the levels established for this study, and no indicator chemicals were identified above the Quebec B guideline.

6.2.2.4 CLEAN-UP OPTIONS

There were some waste materials and debris scattered about the site. These materials should be removed and the site recontoured, covered with clean fill materials and vegetated, if necessary, to control erosion.

If reduction of risk is deemed desirable, soils can be removed, encapsulated, treated, or covered, as applicable.

6.3 POL AREAS

6.3.1 POL 1

6.3.1.1 VISUAL OBSERVATIONS AND SAMPLE LOCATIONS

POL 1 storage facilities are located 100 m north of the module train and consist of two 295 m^3 diesel tanks (Plate 4). General drainage in this area is to the north and northeast (Figure 3.1). Within the catch basin and immediately outside the berm walls, the soils encountered were a silty gravel with some sand. At greater distances, this was overlain by organic soil. The tanks were elevated on a gravel pad above the catch basin, which was partially filled with water; ponded water was also noted outside the berm walls. A slight sheen was noted on the surface of the water inside the basin. The northwest wall of the catch basin berm showed some signs of sloughing.

Soil samples were collected at four locations in the vicinity of POL 1. Water from the catch basin was sampled for volatile organic compounds.

Sample locations are provided in Figure 6.1.

6.3.1.2 ANALYTICAL RESULTS

Samples in which the concentration of indicator chemicals exceeded the study criteria are presented in Table 6.3.

Both B2-1014 and B2-1015 contained nickel at concentrations (43 and 39 mg/kg, respectively) above background levels and exceed the study criterion.

All four of the soil samples contained detectable levels of TPH, two of which (270 mg/kg in B2-1014 and 110 mg/kg in B2-1017) exceeded the study criterion. PCB was detected in B2-1014 and B2-1017 (0.07 and 0.03 mg/kg respectively) and in the former sample the concentration exceeds the study criterion.

B2-1014 contained levels of eleven PAH constituents that ranged from marginally greater than the study criterion (0.11 mg/kg for anthracene) to several times greater (1.1 mg/kg for pyrene). One PAH constituent (pyrene 0.05) was detected in B2-1017 at a level greater than the background range and exceeded the study criterion.

Analysis for volatile organic compounds in the water sample taken from the catch basin (B2-G) did not indicate contamination by these compounds.

6.3.1.3 EVALUATION OF RISK ASSESSMENT AND ANALYTICAL RESULTS

The results of the risk assessment show that carcinogenic and non-carcinogenic risks are below the levels established for this study, and no indicator chemicals were identified above the Quebec B guideline.

6.3.1.4 CLEAN-UP OPTIONS

No clean-up of the site is required. After tankage has been removed the gravel pads and dykes should be recontoured, covered with clean fill materials and vegetated, if necessary, to control erosion.

If reduction of risk is deemed desirable, soils can be removed, encapsulated, treated, or covered, as applicable.

Table 6.3

Relevant Soil Results: POL 1

INDICATOR CHEMICALS (mg/kg)	LEVEL A	BACKGROUND	B2-1014	B2-1015	B2-1016 B2-1016R*	B2-1017 B2-1017L*
Lead	50	<10	N/A	N.R.	N.R.	N.R.
Nickel	50	34	43	39	28	N.R.
TPH	100	N/A	270	16	3	110
PCB	0.1	N/A	0.07	N.R.	N.R.	0.03
PAH's	0.1	N/A	0.11-1.1	N.R.	N.R.	0.08

N.R. = Not Relevant

N/A = Not Available

TPH = Total Petroleum Hydrocarbons

PCB = Polychlorinated Biphenyls

PAH = Polyaromatic Hydrocarbons

* Where duplicate and/or replicate analysis is available the highest value is reported.

6.3.2 POL 2

6.3.2.1 VISUAL OBSERVATIONS AND SAMPLE LOCATIONS

The POL 2 storage facilities (two 295 m^3 diesel) are located 600 m northeast of the airstrip, within 40 m of the shoreline (Plate 6). The shoreline in this area was characterized by a wide cobble beach, and a steep exposed slope which rose approximately 30 m to the elevation of inland areas. The storage pad and general area was situated on the beach approximately 5 m asl. Staining and odours were noted on a small area of the tank pad. Due to the coarse nature of the fill material on the pad, only two samples were taken. North and west of these facilities, extending to the beach, the material encountered consists of cobble-sized gravel. A small stream which drains the upper slopes of a ravine runs past these POL facilities.

Two soil sampling sites were located in the vicinity of POL 2. Sample B2-1025 was collected from the surface of the tank pad adjacent to Tank 10 and B2-1013 was taken from the side of the catch basin excavated at the southwest end of the tank pad.

A water sample (B2-C) was collected downgradient from POL 2 from a stream that flows past the southeast side of the facility.

Sample locations are provided in Figure 6.1.

6.3.2.2 ANALYTICAL RESULTS

Samples in which the concentration of indicator chemicals exceeded the study criteria are presented in Table 6.4.

Lead was elevated to above the Level B criterion in B2-1025 (1,900 mg/kg) and above the study criterion in B2-1013 (96 mg/kg).

B2-1025 contained a TPH concentration of 250 mg/kg. Both samples contained levels of PCB (0.04 mg/kg in B2-1013).

Contamination was not found in Sample B2-C.

Table 6.4

Relevant Soil Results: POL 2

INDICATOR CHEMICAL (mg/kg)	LEVEL B	BACKGROUND	B2-1013 B2-1013L*	B2-1025
Lead	200	N.R.	96	1900
TPH	1000	N/A	N.R.	250
PCB	1	N/A	0.04	0.06

N.R. = Not Relevant
N/A = Not Analyzed
TPH = Total Petroleum Hydrocarbons
PCB = Polychlorinated Biphenyls

* Where duplicate and/or replicate analysis is available the highest value is reported.

6.3.2.3 EVALUATION OF RISK ASSESSMENT AND ANALYTICAL RESULTS

The results of the risk assessment show that carcinogenic and non-carcinogenic risks are below the levels established for this study, but that levels of lead were identified at above the Quebec B guideline. Further sampling should be undertaken to determine the full extent of elevated lead in soil at this location.

6.3.2.4 CLEAN-UP OPTIONS

After further sampling has achieved closure, appropriate clean-up options, as discussed in Volume 2, can be implemented

6.4 PALLET LINE AREAS

6.4.1 PALLET LINE 1

6.4.1.1 VISUAL OBSERVATIONS AND SAMPLE LOCATIONS

Due to the availability of gravel on this site, the storage pad was generally in good condition. It was located 1 km northeast of the main module and contained approximately 75 drums which contained alcohol, varsol, gear oil, lube oil and propylene glycol. Staining was noted on the storage pad in three distinct areas, each covering approximately 3 m^3. Ponds of water along the north edge of the storage pad had an oily sheen, and stressed vegetation was noted in the vicinity.

A water sample (B2-F) was collected from a small pond located in boggy terrain adjacent to the eastern corner of the storage pad. Soil chemistry in this area was characterized by samples collected at four locations (B2-1021, B2-1022, B2-1023 and B2-1024).

Sample locations are provided in Figure 6.1.

6.4.1.2 ANALYTICAL RESULTS

Samples in which the concentration of indicator chemicals exceeded the study criteria are presented in Table 6.5.

Sample B2-1021 was taken on the southeast side of the pad and contained chromium (40 mg/kg) which exceeded the study criterion and lead (160 mg/kg) in excess of the study criterion. Nickel concentrations were greater than the study criterion for all the samples, but only marginally greater than the background range. TPH level exceeded the study criterion in B2-1023 (86 mg/kg) which was collected 10 m beyond the northeast side of the pad.

Two volatile organic compounds were detected in B2-1024, taken approximately in the centre of the pad, but both compounds were present at concentrations below the study criteria.

One PAH compound was detected in each of samples B2-1021 (pyrene 0.28 mg/kg) and B2-1024 (pertachlorophenal 0.32 mg/kg) at concentrations above the study criterion.

B2-1024 contained pentachlorophenol (0.32 mg/kg) at greater than the study criterion and the water sample from the pond near the storage pad contained phenol at a concentration greater than the Canadian Drinking Water Guidelines (CCREM).

Table 6.5

Relevant Soil Results: PL 1

INDICATOR CHEMICALS (mg/kg)	LEVEL A	BACKGROUND	B2-1021	B2-1022 B2-1022R*	B2-1023	B2-1024
Chromium	50	N.R.	40	28	N.R.	N.R.
Lead	50	N.R.	160	N.R.	N.R.	N.R.
TPH	100	N/A	N.R.	N.R.	86	N.R.
Pentachlorophenol	0.1	N/A	N.R.	N.R.	N.R.	0.32
Pyrene	0.1	N/A	0.28	N.R.	N.R.	N.R.

N.R. = Not Relevant

N/A = Not Available

TPH = Total Petroleum Hydrocarbons

* Where duplicate and/or replicate analysis is available the highest value is reported.

6.4.1.3 EVALUATION OF RISK ASSESSMENT AND ANALYTICAL RESULTS

The results of the risk assessment show that carcinogenic and non-carcinogenic risks are below the levels established for this study, and no indicator chemicals were identified above the Quebec B guideline.

6.4.1.4 CLEAN-UP OPTIONS

There were some waste materials and debris scattered about the site. These materials should be removed and the site recontoured, covered with clean fill materials and vegetated, if necessary, to control erosion.

If reduction of risk is deemed desirable, soils can be removed, encapsulated, treated, or covered, as applicable.

6.4.2 PALLET LINE 2

6.4.2.1 VISUAL OBSERVATIONS AND SAMPLE LOCATIONS

Pallet Line 2 is located immediately northwest of the airstrip (Figure 6.1). Inspection of the area revealed no signs of contamination. This may be in part due to the cobble sized, free draining granular fill material used. Due to the nature of the material encountered, no samples were taken in this area.

6.4.2.2 ANALYTICAL RESULTS

Due to the nature of the material encountered, no samples were taken in this area.

6.4.2.3 CLEAN-UP OPTIONS

There were some waste materials and debris scattered about the site. These materials should be removed and the site recontoured, covered with clean fill materials and vegetated, if necessary, to control erosion.

If reduction of risk is deemed desirable, soils can be removed, encapsulated, treated, or covered, as applicable.

6.5 OUTFALL AREAS

6.5.1 SEWAGE OUTFALL

6.5.1.1 VISUAL OBSERVATIONS AND SAMPLE LOCATIONS

The sewage outfall area was located 200 m north of main module (Plate 1). Sewage is discharged directly onto organic terrain and disperses along local drainage channels and over the surface. The organic layer was approximately 30 cm thick, with the inclusion of clay at a depth of 15 cm. Permafrost was encountered at 30 cm. The area has experienced eutrophication, as indicated by the lush vegetation and the occurrence of *Senecio* spp. which are characteristic of outfall areas. Some stressed vegetation was noted in the vicinity of the outfall.

The sample site was located on the slope of the gravel pad which forms the general compound area. Soil samples were collected at three locations in the vicinity of the sewage outfall: B2-1027, a field replicate, was taken 10 m northwest of the outfall and B2-1028 was taken 10 m west of the outfall; B2-1029 and B2-1030(D) (field duplicate) and were taken 20 m north of the module train and three meters east of the outfall line. Samples from all of these locations were submitted for full or partial analysis.

Sample locations are provided in Figure 6.1.

6.5.1.2 ANALYTICAL RESULTS

Samples in which concentration of indicator chemicals exceeded the study criteria are presented in Table 6.6.

In samples B2-1027 (0.18 mg/kg) and B2-1028 (0.51 mg/kg), levels of PCB are in excess of the study criterion, while the concentration in B2-1029 (0.05 mg/kg) equals 50 percent of the criterion.

TPH was detected in sample B2-1028 but, at a concentration of 8 mg/kg, was below the study criteria.

Table 6.6

Relevant Soil Results: Sewage Outfall

INDICATOR CHEMICALS (mg/kg)	LEVEL A	BACKGROUND	B2-1027 B2-1027R*	B2-1028	B2-1029 B2-1030D
PCB	0.1	<0.01	0.18	0.51	0.05

* Where duplicate and/or replicate analysis is available the highest value is quoted

PCB = Polychlorinated Biphenyls

6.5.1.3 EVALUATION OF RISK ASSESSMENT AND ANALYTICAL RESULTS

The results of the risk assessment show that carcinogenic and non-carcinogenic risks are below the levels established for this study, and no indicator chemicals were identified above the Quebec B guideline.

6.5.1.4 CLEAN-UP OPTIONS

No clean-up of this area is required.

If reduction of risk is deemed desirable, soils can be removed, encapsulated, treated, or covered, as applicable.

6.6 BUILDING PROXIMITIES

6.6.1 STAIN AREA 1

6.6.1.1 VISUAL OBSERVATIONS AND SAMPLE LOCATIONS

An area of darkly stained ground approximately 2 m^2 was noted at the southwest corner of the powerhouse. Staining was also noted in a small area near the garage.

Soil samples were taken at three locations in the general proximity of the site buildings. B2-1018 was taken adjacent to the east end of the module train. B2-1019 and B2-1020(D) (field duplicate) were taken beyond the east side of the main pad on

Table 6.7

Relevant Soil Results: Stain Area 1

INDICATOR CHEMICALS (mg/kg)	LEVEL A	BACKGROUND	B2-1018 B2-1018L*	B2-1019 B2-1019L B2-1020D*	B2-1026
Lead	50	<10	N.R.	34	N.R.
PCB	0.1	N/A	0.27	0.28	0.04
Phenanthrene	0.1	0.19	N.R.	0.28	N.R.
Pyrene	0.1	N/A	N.R.	0.18	0.08

N.R. = Not Relevant

N/A = Not Analyzed

PCB = Polychlorinated Biphenyls

* Where duplicate and/or replicate analysis is available the highest value is quoted.

which the general compound area is located. The third soil sample (B2-1026) was taken 12 m northwest of the maintenance garage, at the toe of the main pad.

6.6.1.2 ANALYTICAL RESULTS

Samples in which the concentration of indicator chemicals exceeded the study criteria are presented in Table 6.7.

Lead concentration in soil was elevated above the study criterion in B2-1019 (34 mg/kg).

TPH was detected in B2-1018 (41 mg/kg) and B2-1020(D) (3 mg/kg), but at levels that were less than the study criterion.

PCB was detected at all three sampling locations, and in B2-1019 (0.28 mg/kg) and B2-1020(D) (0.23 mg/kg), was in excess of the study criterion.

B2-1020(D) (a duplicate of B2-1019) contained two PAH compounds (pyrene and fluoranthene) at levels above the study criteria.

6.6.1.3 EVALUATION OF RISK ASSESSMENT AND ANALYTICAL RESULTS

The results of the risk assessment show that carcinogenic and non-carcinogenic risks are below the levels established for this study, and no indicator chemicals were identified above the Quebec B guideline.

6.6.1.4 CLEAN-UP OPTIONS

No clean-up of this area is required.

If reduction of risk is deemed desirable, soils can be removed, encapsulated, treated, or covered, as applicable.

7.0 FACILITY CLEAN-UP AND DECOMMISSIONING

7.1 OVERVIEW

This is a North Warning System Long Range Radar Site, which will continue to be manned. As a result, many of the site facilities will remain active. Some will be abandoned and decommissioned under the terms of the DND/DIAND 1989 MOU for the Restoration of Distant Early Warning System and North Warning Sites.

The MOU provides for a site-specific decommissioning plan, to be updated regularly as additional facilities are abandoned. Volume 2 discusses the general requirements and approach to facility decommissioning as the basis for the site-specific decommissioning plans. These generic approaches can be applied to the PIN-M site when the final disposition of the station facilites is known.

Table 7.1

Summary of Clean-up Options

LOCATION	RELEVANT INDICATOR CHEMICALS	QUEBEC GUIDELINES	CLEAN-UP OPTIONS	COMMENTS
POL 2	Lead	C	Encapsulate	Further Assesssment of Lead

7.2 CLEAN-UP OF CONTAMINANTED SOILS

The results of the baseline risk assessment indicate that contaminant levels are such that there is a low risk to human health for the two cases considered, the worker periodically visiting the site and the hunter utilizing country foods in the vicinity and on the site.

Based on this risk assessment, no clean-up of the site is required at this time. Site decommissioning procedures in Volume 2 for landfills, sewage outfalls, POL facilities, pallet lines and other site facilities outline procedures for restoring the site to ensure that contaminants are stabilized. During the decommissioning process, other zones of contamination may be found, especially when earthwork facilities, such as gravel pads and POL storage dykes are excavated and restored. A set of soil and water samples should be taken to confirm that contaminants have not been redistributed during the process. An environmental protection and continency plan for these potential releases should be developed as part of the site specific decommissioning plan.

It should be emphasized that this study was limited to a shallow subsurface investigation using hand tools at a specific time. As a result, there is no information about the contents of the waste disposal sites, particularly the landfill areas identified by visual observations. Leachate from the landfills does not appear at this time to be migrating and causing impacts. However, physical and chemical changes in the landfill could cause this to change in the future, and pollution from leachate migration could result.

It is recommended that a monitoring program be developed as part of the site specific decommissioning plan to address this potential. In particular, monitoring wells should be established at strategic locations on the site to take groundwater samples for analyses, to determine if contaminants are being mobilized and moving in the groundwater. As well, a comprehensive surface water quality program should be included in the monitoring program to determine if surface water processes are picking up site contamination and redistributing it in the environment.

PLATE 1

SEWAGE OUTFALL AREA

PLATE 2

ACTIVE LANDFILL AREA

PLATE 3

LEACHATE AT ACTIVE LANDFILL

BAR-2 SHINGLE POINT

PLATE 4

BUILDING SITE
POL TANK FACILITIES

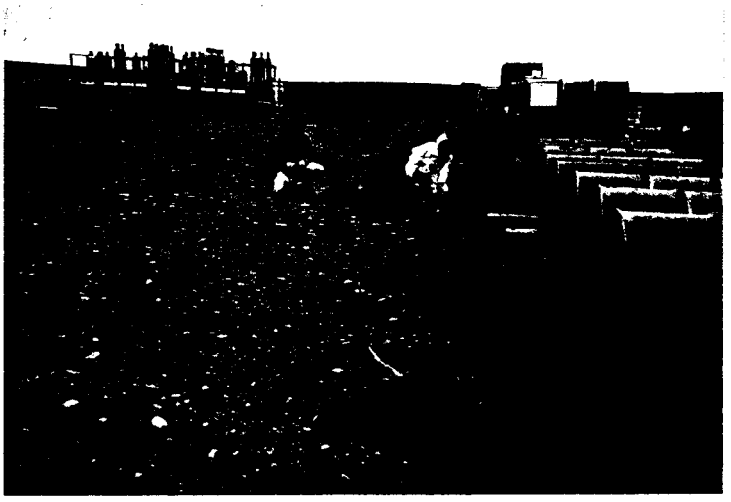


PLATE 5

SOIL SAMPLING WITH RRMC
AT POL DRUM STORAGE PALLET LINE

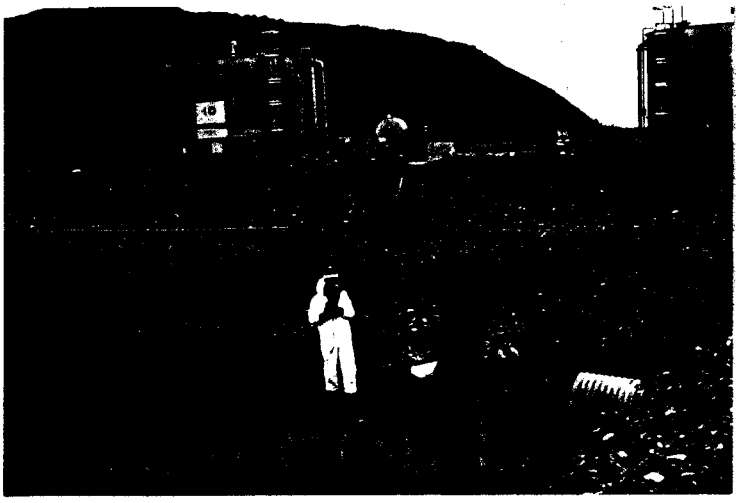


PLATE 6

WATER SAMPLING
NEAR BEACH POL TANK FACILITIES

APPENDIX A Base Civil Engineering Data

BAR-2 AUXILIARY RADAR STATION BCE DATA

LOCATION AND TOPOGRAPHY

Location:	Shingle Point, Canada, on Arctic Ocean shore immediately west of the Blow River located on the western limit of the MacKenzie River Delta.	
Terrain:	Gently sloping coastal plain (about 150' above SL).	
Topography:	100-foot sea bluffs, an exceptionally straight shoreline cut by steep-walled draws (penetrating no more than two miles inland), thick growths of willow trees at the mouth of the Blow, and foothills of the Richardson range (approximately 25 miles inland from the station) are the most prominent features.	

CLIMATE

Precipitation:	Annual (including 30" snowfall)	8"
Temperature:	Absolute Minimum and Maximum (degrees Fahrenheit)	-61 & +88

GROUNDS

Total acres		2682A

BUILDINGS

	Refer to following Table ot Particulars For Details	
	1. Total Number	9
	2. Semipermanent	4
	3. Temporary	5

AIRCRAFT FACILITIES

	Total Aircraft Facility Surface (gravel)	69,719 SY
Runway:	1. Distance from Main Building Site	5400'
	2. Elevation (approximate mean feet above SL)	123'
	3. Surface: Gravel on 24" wearing course on non-frost acting base	110' x 3805' 46,506 SY

EXTERNAL SANITARY SEWER (Continued)

System:	Only the module train is provided with running water, toilet, and drain facilities. Liquid sewage is accumulated in an internal stainless steel tank (installed September 1986) for temporary storage. The waste from the tank is periodically pumped via sewage pipeline to the outfall point.	
INTERNAL SEWAGE DISTRIBUTION	System is located in module train and consists of a stainless steel holding tank, a grease trap, sump tanks and pumps, a sewage ejector pump, plumbing and latrine fixtures, piping and valves.	
Stainless Steel Tank:	1. Holding, 8' x 5' x 8' (1) (U.S. Gal), located in Module 21.	2,100 GAL
STORM DRAIN SYSTEM	NOTE: There is no pipeline storm drain system.	
System:	Surface water is permitted to drain away by following natural run-off pattern of terrain, except where blocked by buildings gravel pads, roadways, etc. at which points culverts are provided.	
Culverts:	1. Approximate number 2. Approximate total length	12 428'
EXTERNAL WATER DISTRIBUTION	NOTE: There is no external, primary pipeline system.	
System:	External water distribution is accomplished by water-haul from fresh water lake to a raw water storage tank in Module Train. 1. Lake #1-Summer & Partial Winter Haul 2. Lake #2-Winter Haul	 5000' Approx. 10,000'
INTERNAL WATER DISTRIBUTION, TREATMENT	System is located in Module Train and consists of a stainless steel raw water receiving tank, filter plant, iodinator, primary and	

BAR-2 AUXILIARY RADAR STATION BCE DATA

ELECTRIC POWER (Continued)

Demand & Consumption:	1. Peak Demand	208 KW
	2. Average Power Consumption	
	a. Monthly	102,372 KWH
	b. Annual	1,228,462 KWH
	3. Fuel Oil Consumption, Power Production	
	a. Monthly Average (U.S. Gal)	9,060 GAL
POL STORAGE, DISTRIBUTION	Total Storage Capacity, external tanks (U.S. Gallons)	272,000 GAL
Storage:	1. Diesel Oil: Total Capacity	260,000 GAL
	a. Total number of tanks (steel)	4
	b. Beach Area:	
	(1) 2 tanks (65,000 each)	130,000 GAL
	c. Building Site Area:	
	(1) 2 tanks (65,000 each)	130,000 GAL
	2. Mogas: Total Capacity	12,000 GAL
	a. Total number of tanks (Steel)	2
	b. Beach Area:	
	(1) 1 tank	6,000 GAL
	c. Airstrip Area	
	(1) 1 tank	6,000 GAL
Pipelines:	Total length (including building feeder lines), 2" Pipe	7083'
Pumphouses:	Total Number	1
	a. Module Train Tank Area	1

System: Product is delivered by sealift to beach receiving tanks for redistribution via pipeline to Building Site tanks. Product is transferred via pumphouse to various fill stands and building day tanks. The day tanks of isolated buildings are serviced by a portable day tank. Drum stocks are transferred via portable pump units.

HEATING

Module Train:

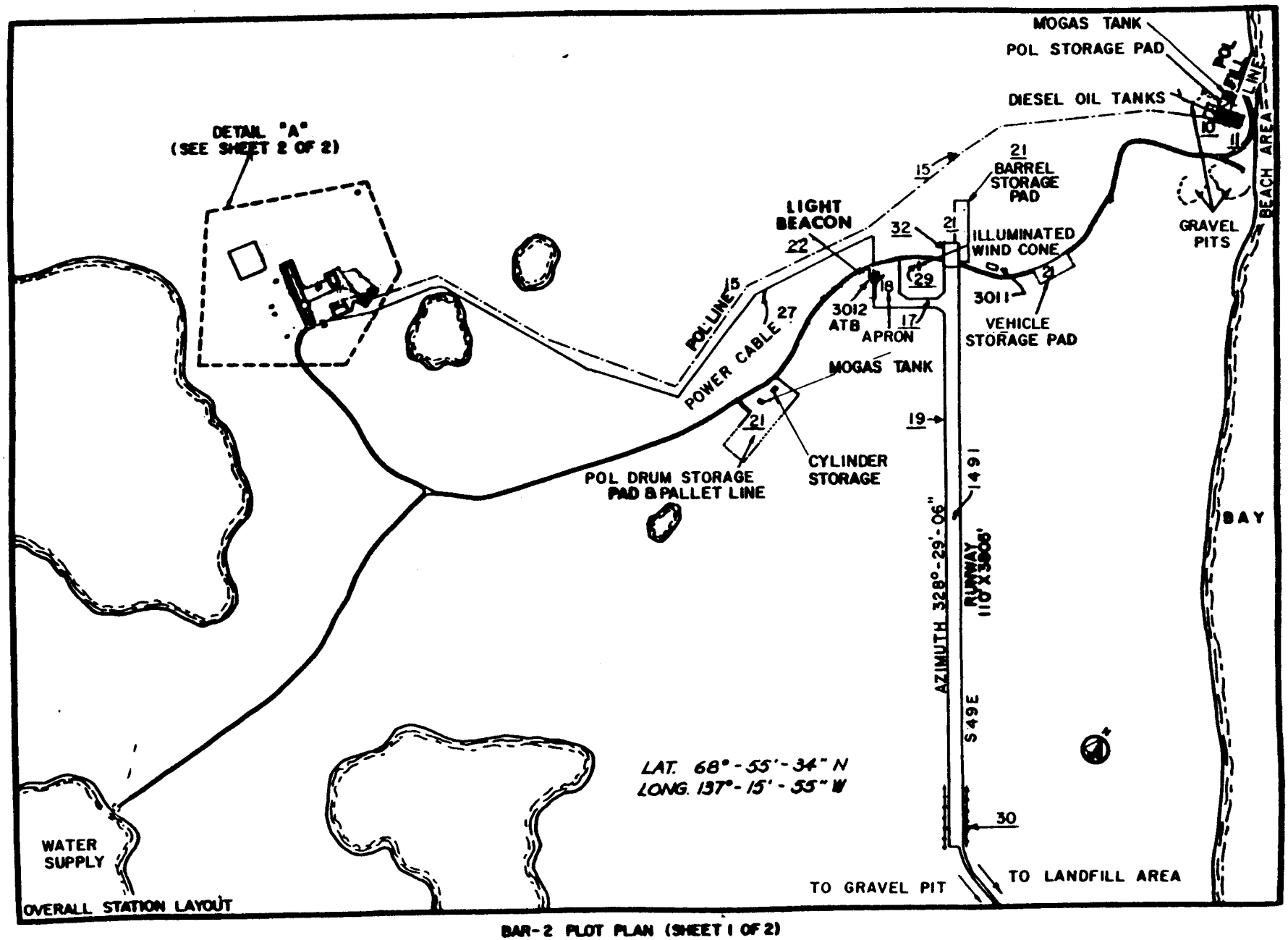
1. Primary System: Circulating hot water servicing single-tube, finned convectors and forced air unit heaters. Heat, recovered from powerplant engine coolant and exhaust gases, is transferred to heating system via heat exchangers.

FIRE PROTECTION (Continued)

Fire Fighting Systems:

Module Train:

1. Standpipe System consisting of three, 220 gallon water storage, pressurized by nitrogen gas (50 psi), and hose stands (12) located in corridor cabinets. (Modules #12-#25).
2. Deluge System consisting of fixed CO_2 tanks equipped for manual and automatic discharge.
   a. System automatically actuated in water treatment and storage module, (Module #1).
   b. System manually actuated in power-plant fuel day tank module, (Module #1A).
   NOTE: Actuation of CO_2 system automatically turns in fire alarm, deactivates associated heating and ventilating fans, and releases normally open fire doors to confine fire.
3. Fire Extinguishers: Halon, dry chemical and loaded-stream water hand extinguishers are placed at strategic locations throughout the Train.
4. Kitchen range exhaust hood Ansul Fire Protection system will provide automatic activation of pressurized liquid chemical fire suppression, or it can be activated manually through local or remote pull stations. The electrical supply to ranges and appliances will immediately shut off upon activation of the system, also automatically turns in fire alarm.
5. Halon flooding system, consisting of fixed storage tank (200 lbs. of Halon 1301) pressurized by nitrogen gas (360 PSIG), in powerhouse module. System is manually actuated, with a one minute time delay to allow evacuation of personnel from the powerhouse module.
   NOTE: Actuation of Halon System automatically turns in fire alarm and deactivates associated heating and ventilating fans.



BAR-2 PLOT PLAN (SHEET 1 OF 2)

FACILITIES INDEX BAR-2

1. Module Train
2. Garage
3. Warehouse
8. Diesel Fuel Tank (Steel)
9. Diesel Fuel Tank (Steel)
10. Diesel Fuel Tank (Steel)
11. Diesel Fuel Tank (Steel)
12. POL Pumphouse
15. POL Line
16. Road
17. Airstrip Taxiway
18. Airstrip Apron

*19. Runway Shoulder

21. Open Storage Areas
22. Beacon Light
27. Primary Power Cable (UG)
29. Wind Cone
30. Runway Lights
31. Antenna, Master TV
32. Runway Overrun
34. Communication "BILLBOARD"
35. Communication "BILLBOARD"
36. Communication "BILLBOARD"
37. Communication "BILLBOARD"
38. Sewer Line
39. Storage Shed (Robinson Bldg) (Transient Dorm)
40. Storage Shed (Robinson Bldg) (Carpenter Shop)

*41. Runway Strobecons

*42. Runway Threshold Lights

*43. Light taxiway

1491. Runway

3011. Storage Shed (Temp) (POL)

3012. Storage Shed (Temp) (ATB)

3013. Storage Shed (Temp) (QML)

NOTE: Ceiling Projector on Sheet 2 of Plot Plan is property of Canadian Dept of Atmosperic and Environmental Services (AES)

*Not shown on Plot Plan

TABLE OF PARTICULARS -- BAR-2 BUILDINGS -- REAL PROPERTY

BUILDING DESCRIPTION	CONSTRUCTION DATA FOUNDATION	CONSTRUCTION DATA BUILDING	FACILITIES AND/OR PURPOSE	UTILITY DATA ELECTRIC	UTILITY DATA HEAT	UTILITY DATA WATER	UTILITY DATA SEWAGE	VENTILATION	COMMENTS
Warehouse (40' x 100') FAC #00003	Concrete footings on piles	Steel frame with insulated metal panels	a. General storage b. Receiving dock c. Office d. Security crib e. Gym	Ext supply via station plant utility bus b. Emer lights (btry powered with auto lighting & charging controls)	Ducted forced air system from oil fired furnace	No System	No System	No Mechanical System	
Storage Shed (14' x 24') FAC #03011	Timber sills	Timber frame with wood exterior (insulated)	a. Hazard Storage (unheated)	No System	No System	No System	No System	No Mechanical System	Pol Shack
POL Pumphouse (8' x 8') FAC #00012	Concrete slab on fill	Stl frame with metal exterior (uninsulated)	POL Pumps	Ext supply via station plant utility bus	No System	No System	No System	No Mechanical System	
Storage Shed (2) (24' x 24') (Robertson Bldgs) FAC #00039 & 40	Timber skids	Stl frame with metal panels (insulated)	a. General Storage (unheated) b. Carp Shop c. Transient dormitory	Ext supply via station plant utility bus	Oil burning space heaters	No System	No System	No Mechanical System	39-Transit Dorm 40-Carp. Shop
Storage Shed FAC #03013 (21'9" x 24'5")	Timber sills	Metal panels (uninsulated)	OML material storage (unheated)	Ext supply from warehouse panel	No System	No System	No System	No System	OML materials secure storage

APPENDIX B Sample Location Description

BAR-2 SHINGLE POINT

Sample No.	Surface Run-Off	Soil Drainage Class	Soil Perviousness Class	Surface Stoniness	Soil Sample Depth	Topography	Slope Position	Slope Exposure	Soil Description	Soil Colour	Remarks (Location, Adjacent Areas, Comments)
B2-C	N/A	N/A	N/A	N/A	N/A	3% to the NE	N/A	N/A	N/A	N/A	-stream draining abandoned landfill, area adjacent to diesel storage tanks, 600m NE of runway -sample taken 5m upstream of POL tank access road -stream bottom covered with rusty sediments -vegetation cover 100% (upstream: grasses, sedges - downstream: sand, gravel associated with road shoulder)
B2-D	N/A	N/A	N/A	N/A	N/A	2% to the N	N/A	N/A	N/A	N/A	-stream draining abandoned landfill situated in shallow ravine 600m NE of runway -sample taken 400m upstream of beach POL tanks -several old barrels noted in stream -vegetation cover 80% (Salix spp., sedges)
B2-E	N/A	N/A	N/A	N/A	N/A	1% to the E	N/A	N/A	N/A	N/A	-small pond approx. 1km SW of S end of runway, in peatland -water was tea-coloured -vegetation cover 100%
B2-F	N/A	N/A	N/A	N/A	N/A	2% to the N	N/A	N/A	N/A	N/A	-small pond 5m E of NE corner of drum storage pad -hydrocarbon sheen noted on water -water was murky, tea-coloured -vegetation cover 100% (sedges, grasses)
B2-G	N/A	N/A	N/A	N/A	N/A	3% to the N & NE	N/A	N/A	N/A	N/A	-diesel fuel storage tanks 100m N of main module -tanks elevated on gravel pad above catch basin -volatile organic compound only -berm constructed of sand, gravel -vegetation cover (sedges around edge of pond)
B2-H	N/A	N/A	N/A	N/A	N/A	2% to the N	N/A	N/A	N/A	N/A	-small pond 5m E of NE corner of drum storage pad -volatile organic compound only -vegetation cover 100% (sedges, grasses)

BAR-2: Shingle Point
Water Sampling Field Information

Sample #	Royal Roads Location #	pH Meter Readings		Conductivity Meter Readings		Comments
		pH	Temp. (deg C)	Conductivity (umhos/cm)	Temp. (deg C)	
B2-A(D)/B2-B(D)	39	7.53	6.5	168	7.2	Sample taken from stream at toe of landfill A
B2-C	38	7.96	10.3	45	10.9	Sample takeh from stream adjacent to POL 2
B2-D	40	8.15	10.9	60	11.2	Sample taken from stream in ravine below landfill B
B2-E	41	8.06	12.3	15	12.8	Background sample 1 km southwest of south end of airstrip
B2-F		7.53	10.1	115	10.4	Sample taken from pond at east corner of pallet line 1
B2-G		N/A	N/A	N/A	N/A	Sample taken from catch basin for POL 1 (VOC sample only)
B2-H		N/A	N/A	N/A	N/A	Sample taken from pond at east corner of pallet line 1 (VOC sample only)

APPENDIX C Soil/Water Data

Soil Analysis Summary for Bar-2

Sample #	Location #	Location Description	1st Round Analysis							2nd Round Analysis						
			1	2	3	4	5	6	7	1	2	3	4	5	6	7
B2-1000	18	Landfill A														
B2-1001	336	Landfill A	*													
B2-1002	394	Landfill A	*	*	*	*		*	*							
B2-1003	391	Landfill A	*													
B2-1003(R)	391	Landfill A	*													
B2-1004	395	Landfill A	*	*	*	*		*	*							
B2-1005	392	Landfill A	*	*	*	*		*	*							
B2-1006	396	Landfill A	*	*	*	*		*	*							
B2-1007	397	Landfill A	*	*	*	*		*	*							
B2-1008	362	Landfill A	*	*	*	*		*	*							
B2-1009(D)	393	Landfill A								*		*				
B2-1010(D)	393	Landfill A								*		*				
B2-1011	367	Landfill A								*		*				
B2-1011(R)	367	Landfill A														
B2-1012	366	Landfill A	*	*	*	*		*	*							
B2-1013	342	POL 2	*	*	*	*		*	*							
B2-1014	325	POL 1	*	*	*	*	*	*	*							
B2-1015	321	POL 1	*	*	*		*									
B2-1016	368	POL 1	*	*	*	*	*	*	*							
B2-1016(R)	368	POL 1	*													
B2-1017	370	POL 1	*	*	*	*	*	*	*							
B2-1018	326	Stain Area 1	*	*	*	*	*	*	*							
B2-1019(D)	369	Stain Area 1	*	*	*	*	*	*	*							
B2-1020(D)	369	Stain Area 1	*	*	*	*	*	*	*							
B2-1021	317	Pallet Line 1	*	*	*	*	*	*	*							
B2-1022	340	Pallet Line 1	*	*	*	*	*	*	*							
B2-1022(R)	340	Pallet Line 1	*													
B2-1023	36	Pallet Line 1	*	*	*	*	*	*	*							
B2-1024	329	Pallet Line 1	*	*	*	*	*	*	*							
B2-1025	348	Pol 2	*	*	*	*	*	*	*							
B2-1026	57	Stain Area 1	*	*	*	*	*	*	*							
B2-1027	324	Sewage Outfall	*	*	*	*	*	*	*							
B2-1027(R)	324	Sewage Outfall	*													
B2-1028	327	Sewage Outfall	*	*	*	*	*	*	*							
B2-1029(D)	322	Sewage Outfall	*	*	*	*		*	*							
B2-1030(D)	322	Sewage Outfall	*	*	*	*		*	*							
B2-1101	4	Landfill B	*													
B2-1102	10	Landfill B										*				
B2-1103	12	Landfill B	*	*	*	*		*	*							
B2-1104	11	Background	*	*	*	*	*	*	*							
B2-1105	380	Background	*	*	*	*	*	*	*							
B2-1105(R)	380	Background	*													

1-metals
2-TPH
3-PCB
4-Pesticides
5-Volatile Organics (EPA 8240)
6-Acid Extractable Organics (EPA 8270)
7-Base/Neutral Extractable Organics (EPA 8270)

*-Requested and Reported

-Reported Results Were Higher Than Assessment Criteria Per Volume 2

Water Analysis Summary for Bar-2

Sample #	Location #	Location Description	1st Round Analysis							
			1	2	3	4	5	6	7	8
B2-A(D)	378	Landfill A	*	*	*	*	*	*	*	*
B2-B(D)	378	Landfill A	*	*	*	*	*	*	*	*
B2-C	371	POL 2	*	*	*	*	*	*	*	*
B2-D	372	Landfill B	*	*	*	*	*	*	*	*
B2-E	374	Background	*	*	*	*	*	*	*	*
B2-F	377	Pallet Line 1	*	*	*	*	*	*	*	*
B2-G	373	POL 1					*			
B2-H	330	Pallet Line 1					*			
F.Blank	-		*			*		*	*	*
T.Blank	-						*	*	*	

1-metals
2-TPH
3-PCB
4-Pesticides
5-Volatile Organics (EPA 8240)
6-Acid Extractable Organics (EPA 8270)
7-Base/Neutral Extractable Organics (EPA 8270)
8-Hg

*-Requested and Reported

-Reported Results Were Higher Than Assessment Criteria Per Volume 2

Dewline B2 Sites (Soils)

Parameter	MDL	B2-1000	B2-1001	B2-1002	B2-1003	B2-1003R	B2-1004	B2-1005	B2-1006	B2-1007	B2-1008	B2-1009D
METALS												
Arsenic	0.1	-	9.3	8.3	8.1	8.2	11	14	10	13	24	11
Selenium	0.5	-	<	<	<	<	0.8	<	<	<	0.6	0.8
Mercury	0.05	-	0.08	0.06	0.08	0.06	0.13	0.09	-	-	-	0.1
Barium	1	-	120	79	96	96	190	180	190	170	190	170
Beryllium	0.5	-	<1	<1	<1	<1	<	<	<1	<1	<1	0.7
Cadmium	1	-		<			<	<	<	<	<	-
Chromium	1	-	21	13	16	17	27	31	27	24	32	24
Lead	10	-		<			120	61	<	40	<	-
Nickel	5	-	42	24	28	29	45	42	62	33	42	35
Silver	5	-	<	<	<	<	<	<	<	<	3	<
TPH	1	-	-	<	-	-	<	<	<	<	6	-
PCB	0.01	-	-	<	-	-	0.05	0.05	0.03	0.03	0.06	<
PESTICIDES												
Aldrin	1.3			<			<	<	<	<	<	
a-BHC	1.3			<			<	<	<	<	<	
b-BHC	1.3			<			<	<	<	<	<	
g-BHC (Lindane)	1.3			<			<	<	<	<	<	
d-BHC	1.3			<			<	<	<	<	<	
Chlorodane	1.3											
p,p'-DDD	1.3			<			<	<	<	<	<	
p,p'-DDE	1.3			<			<	<	<	<	<	
p,p'-DDT	1.3			<			<	<	<	<	<	
Dieldrin	1.3			<			<	<	<	<	<	
a-Endosulfan	1.3			<			<	<	<	<	<	
b-Endosulfan	1.3			<			<	<	<	<	<	
Endosulfan Sulfate	1.3			<			<	<	<	<	<	
Endrin	1.3											
Endrin Aldehyde	1.3											
Heptachlor	1.3			<			<	<	<	<	<	
Heptachlor Epoxide	1.3			<			<	<	<	<	<	
Toxaphene	1.3											
VOLATILES												
Cl-Methane	0.011											
Vinyl Chloride	0.015											
Br-Methane	0.012											
Cl-Ethane	0.012											
Cl3F3-Methane	0.002											
1,1-Cl2-Ethylene	0.002											
Methylene Chloride	0.002											
trans 1,2-Cl2-Ethylene	0.002											
1,1 Cl2-Ethane	0.003											
Chloroform	0.002											
1,1,1-Cl3-Ethane	0.003											
1,2 Cl2-Ethane	0.002											
Carbon Tetrachloride	0.002											
Benzene	0.001											
1,2-Cl2-Propane	0.003											
Cl3-Ethylene	0.002											
BrCl2-Methane	0.002											
2-Cl-Ethylvinyl ether	0.014											
cis-1,2-Cl2-Propylene	0.003											
Toluene	0.002											
trans-1,2-Cl2-Propylene	0.006											
1,1,2-Cl3-Ethane	0.003											
ClBr2-Methane	0.002											
C14-Ethylene	0.001											
Cl-Benzene	0.003											
Ethyl Benzene	0.002											
Bromoform	0.002											
1,1,2,2-Cl4-ethane	0.002											
d4-1,2-Dichloroethane	%											
d8-Toluene	%											
Bromofluorobenzene	%											
ACID EXT												
*N-Nitrosodimethylamine				<			<	<	<	<	<	
phenol	0.11			<			<	<	<	<	<	
Bis(2-chloroethyl)ether	0.18			<			<	<	<	<	<	
2-Chlorophenol	0.27			<			<	<	<	<	<	
1,3-Dichlorobenzene	0.20			<			<	<	<	<	<	
1,4-Dichlorobenzene	0.20			<			<	<	<	<	<	
1,2-Dichlorobenzene	0.20			<			<	<	<	<	<	
Bis(2-chloroisopropyl)ether	0.15			<			<	<	<	<	<	
Hexachloroethane	0.20			<			<	<	<	<	<	
N-Nitroso-N-Propylamine	0.21			<			<	<	<	<	<	
Nitrobenzene	0.20			<			<	<	<	<	<	

Dewline B2 Sites (Soils)

Parameter	MDL	B2-1000	B2-1001	B2-1002	B2-1003	B2-1003R	B2-1004	B2-1005	B2-1006	B2-1007	B2-1008	B2-1009D
Isophrone	0.40			<			<	<	<	<	<	
2-Nitrophenol	0.14			<			<	<	<	<	<	
2,4-Dimethylphenol	0.17			<			<	<	<	<	<	
Bis(2-chloroethoxy)methane	0.13			<			<	<	<	<	<	
2,4-Dichlorophenol	0.12			<			<	<	<	<	<	
1,2,4-Trichlorobenzene	0.20			<			<	<	<	<	<	
Naphthalene	0.03			<			<	<	<	<	<	
Hexachlorobutadiene	0.20			<			<	<	<	<	<	
4-Chloro-3-Methylphenol	0.14			<			<	<	<	<	<	
Hexachlorocyclopentadiene	0.20			<			<	<	<	<	<	
2,4,6-Trichlorophenol	0.12			<			<	<	<	<	<	
BASE/NEUTRAL												
2-Chloronaphthalene	0.09			<			<	<	<	<	<	
Acenaphthylene	0.04			<			<	<	<	<	<	
Dimethyl phthalate	0.11			<			<	<	<	<	<	
2,6-Dinitrotoluene	0.06			<			<	<	<	<	<	
Acenaphthene	0.07			<			<	<	<	<	<	
2,4-Dinitrophenol	0.48			<			<	<	<	<	<	
2,4-Dinitrotolulene	0.05			<			<	<	<	<	<	
4-Nitrophenol	0.14			<			<	<	<	<	<	
Fluorene	0.03			<			<	<	<	<	<	
4-Chlorophenylphenylether	0.09			<			<	<	<	<	<	
Diethyl phthalate	0.11			<			<	<	<	<	<	
4,6-Dinitro-2-methylphenol	0.15			<			<	<	<	<	<	
N-Nitrosodiphenylamine	0.19			<			<	<	<	<	<	
4-Bromophenylphenylether	0.03			<			<	<	<	<	<	
Hexachlorobenzene	0.20			<			<	<	<	<	<	
Pentachlorophenol	0.11			<			<	<	<	<	<	
Phenanthrene	0.03			<			<	<	<	<	<	
Anthracene	0.02			<			<	<	<	<	<	
Di-n-butyl phthalate	0.11			<			<	<	<	<	<	
*Benzidine	0.40			<			<	<	<	<	<	
Fluoranthene	0.02			<			<	<	<	<	<	
Pyrene	0.03			<			<	<	<	<	<	
Benzyl butyl phthalate	0.06			<			<	<	<	<	<	
*3,3'-Dichlorobenzidine	0.20			<			<	<	<	<	<	
Benzo(a)Anthracene	0.02			<			<	<	<	<	<	
Chrysene	0.03			<			<	<	<	<	<	
Bis(2-ethylhexyl)phthalate	0.14			<			<	<	<	<	<	
Di-n-octyl phthalate	0.11			<			<	<	<	<	<	
Benzo(b)fluoranthene	0.04			<			<	<	<	<	<	
Benzo(k)fluoranthene	0.04			<			<	<	<	<	<	
Benzo(a)pyrene	0.05			<			<	<	<	<	<	
Ideno(1,2,3-cd)pyrene	0.06			<			<	<	<	<	<	
Dibenzo(a,h)anthracene	0.04			<			<	<	<	<	<	
Benzo(ghi)perylene	0.04			<			<	<	<	<	<	
d5-Phenol	%			81			74	78	83	94	89	
d5-Nitrobenzene	%			79			56	69	85	81	74	
2-Fluorobiphenyl	%			93			78	86	100	96	97	
2,4,6-Tribromophenol	%			77			82	77	82	71	100	
d-14-p-Terphenyl	%			110			110	88	93	100	83	

Dewline B2 Sites (Soils)

Parameter	MDL	B2-1010D	B2-1011	B2-1011R	B2-1012	B2-1013	B2-1013L	B2-1014	B2-1015	B2-1016	B2-1016R	B2-1017
METALS												
Arsenic	0.1	11	11	-	20	15		14	11	11	13	2.1
Selenium	0.5	0.7	0.8	-	<	<		0.9	0.9	<	<	<
Mercury	0.05	0.1	0.61	-	-	0.12		0.14	0.12	0.08	0.06	0.08
Barium	1	170	180	-	200	230		210	220	220	210	140
Beryllium	0.5	0.7	0.7	-	<1	<		<	<	<	<	<1
Cadmium	1	-	-	-	<	<			<	<		<
Chromium	1	21	30	-	31	25		27	25	28	27	10
Lead	10	-	-	-	<	96			15	11		19
Nickel	5	34	44	-	29	39		43	39	28	28	15
Silver	5	<	<	-	<	<		<	<	<	<	<
TPH	1	-	-	-	3	3		270	16	3	-	110
PCB	0.01	<	<	-	<	0.04		0.07	<	<	-	0.03
PESTICIDES												
Aldrin	1.3				<	<	<	<		<		<
a-BHC	1.3				<	<	<	<		<		<
b-BHC	1.3				<	<	<	<		<		<
g-BHC (Lindane)	1.3				<	<	<	<		<		<
d-BHC	1.3				<	<	<	<		<		<
Chlorodane	1.3					<	<	<		<		<
p,p'-DDD	1.3				<	<	<	<		<		<
p,p'-DDE	1.3				<	<	<	<		<		<
p,p'-DDT	1.3				<	<	<	<		<		<
Dieldrin	1.3				<	<	<	<		<		<
a-Endosulfan	1.3				<	<	<	<		<		<
b-Endosulfan	1.3				<	<	<	<		<		<
Endosulfan Sulfate	1.3				<	<	<	<		<		<
Endrin	1.3					<	<	<		<		<
Endrin Aldehyde	1.3					<	<	<		<		<
Heptachlor	1.3				<	<	<	<		<		<
Heptachlor Epoxide	1.3				<	<	<	<		<		<
Toxaphene	1.3											
VOLATILES												
Cl-Methane	0.011							<	<	<		<
Vinyl Chloride	0.015							<	<	<		<
Br-Methane	0.012							<	<	<		<
Cl-Ethane	0.012							<	<	<		<
Cl3F3-Methane	0.002							<	<	<		<
1,1-Cl2-Ethylene	0.002							<	<	<		<
Methylene Chloride	0.002							0.009	0.019	0.021		<
trans 1,2-Cl2-Ethylene	0.002							<	<	<		<
1,1 Cl2-Ethane	0.003							<	<	<		<
Chloroform	0.002							0.001	0.001	0.001		<
1,1,1-Cl3-Ethane	0.003							<	<	<		<
1,2 Cl2-Ethane	0.002							0.007	0.007	0.007		<
Carbon Tetrachloride	0.002							<	<	<		<
Benzene	0.001							0.01	0.008	0.008		<
1,2-Cl2-Propane	0.003							<	<	<		<
Cl3-Ethylene	0.002							<	<	<		<
BrCl2-Methane	0.002							<	<	<		<
2-Cl-Ethylvinyl ether	0.014							<	<	<		<
cis-1,2-Cl2-Propylene	0.003							<	<	<		<
Toluene	0.002							0.014	0.006	0.006		0.159
trans-1,2-Cl2-Propylene	0.006							<	<	<		<
1,1,2-Cl3-Ethane	0.003							<	<	<		<
ClBr2-Methane	0.002							<	<	<		<
Cl4-Ethylene	0.001							<	0.001	<		<
Cl-Benzene	0.003							<	<	<		<
Ethyl Benzene	0.002							<	<	<		0.002
Bromoform	0.002							<	<	<		<
1,1,2,2-Cl4-ethane	0.002							0.005	0.007	<		<
d4-1,2-Dichloroethane	%							97	110	110		110
d8-Toluene	%							110	110	110		113
Bromofluorobenzene	%							110	100	100		91
ACID EXT												
*N-Nitrosodimethylamine					<	<	<	<		<		<
phenol	0.11				<	<	<	<		<		<
Bis(2-chloroethyl)ether	0.18				<	<	<	<		<		<
2-Chlorophenol	0.27				<	<	<	<		<		<
1,3-Dichlorobenzene	0.20				<	<	<	<		<		<
1,4-Dichlorobenzene	0.20				<	<	<	<		<		<
1,2-Dichlorobenzene	0.20				<	<	<	<		<		<
Bis(2-chloroisopropyl)ether	0.15				<	<	<	<		<		<
Hexachloroethane	0.20				<	<	<	<		<		<
N-Nitroso-N-Propylamine	0.21				<	<	<	<		<		<
Nitrobenzene	0.20				<	<	<	<		<		<

Dewline B2 Sites (Soils)

Parameter	MDL	B2-1010D	B2-1011	B2-1011R	B2-1012	B2-1013	B2-1013L	B2-1014	B2-1015	B2-1016	B2-1016R	B2-1017
Isophrone	0.40				<	<	<	<		<		<
2-Nitrophenol	0.14				<	<	<	<		<		<
2,4-Dimethylphenol	0.17				<	<	<	<		<		<
Bis(2-chloroethoxy)methane	0.13				<	<	<	<		<		<
2,4-Dichlorophenol	0.12				<	<	<	<		<		<
1,2,4-Trichlorobenzene	0.20				<	<	<	<		<		<
Naphthalene	0.03				<	<	<	<		<		<
Hexachlorobutadiene	0.20				<	<	<	<		<		<
4-Chloro-3-Methylphenol	0.14				<	<	<	<		<		<
Hexachlorocyclopentadiene	0.20				<	<	<	<		<		<
2,4,6-Trichlorophenol	0.12				<	<	<	<		<		<
BASE/NEUTRAL												
2-Chloronaphthalene	0.09				<	<	<	<		<		<
Acenaphthylene	0.04				<	<	<	<		<		<
Dimethyl phthalate	0.11				<	<	<	<		<		<
2,6-Dinitrotoluene	0.06				<	<	<	<		<		<
Acenaphthene	0.07				<	<	<	<		<		<
2,4-Dinitrophenol	0.48				<	<	<	<		<		<
2,4-Dinitrotolulene	0.05				<	<	<	<		<		<
4-Nitrophenol	0.14				<	<	<	<		<		<
Fluorene	0.03				<	<	<	<		<		<
4-Chlorophenylphenylether	0.09				<	<	<	<		<		<
Diethyl phthalate	0.11				<	<	<	<		<		<
4,6-Dinitro-2-methylphenol	0.15				<	<	<	<		<		<
N-Nitrosodiphenylamine	0.19				<	<	<	<		<		<
4-Bromophenylphenylether	0.03				<	<	<	<		<		<
Hexachlorobenzene	0.20				<	<	<	<		<		<
Pentachlorophenol	0.11				<	<	<	<		<		<
Phenanthrene	0.03				<	0.05	<	0.52		<		0.08
Anthracene	0.02				<	<	<	0.11		<		<
Di-n-butyl phthalate	0.11				<	<	<	<		<		<
*Benzidine	0.40				<	<	<	<		<		<
Fluoranthene	0.02				<	<	<	0.75		<		<
Pyrene	0.03				<	<	<	1.1		<		0.05
Benzyl butyl phthalate	0.06				<	0.23	0.22	0.28		0.76		0.32
*3,3'-Dichlorobenzidine	0.20				<	<	<	<		<		<
Benzo(a)Anthracene	0.02				<	<	<	0.44		<		<
Chryesne	0.03				<	<	<	0.51		<		<
Bis(2-ethythexyl)phthalate	0.14				<	0.34	0.6	0.63		1.7		1.1
Di-n-octyl phthalate	0.11				<	<	<	0.53		<		0.25
Benzo(b)fluoranthene	0.04				<	<	<	0.56		<		<
Benzo(k)fluroanthene	0.04				<	<	<	0.3		<		<
Benzo(a)pyrene	0.05				<	<	<	0.3		<		<
Ideno(1,2,3-cd)pyrene	0.06				<	<	<	0.24		<		<
Dibenzo(a,h)anthracene	0.04				<	<	<	<		<		<
Benzo(ghi)perylene	0.04				<	<	<	0.26		<		<
d5-Phenol	%				110	34	33	82		88		34
d5-Nitrobenzene	%				90	25	25	62		52		23
2-Fluorobiphenyl	%				110	35	35	81		77		36
2,4,6-Tribromophenol	%				110	39	34	110		94		41
d-14-p-Terphenyl	%				96	59	55	130		97		83

Dewline B2 Sites (Soils)

Parameter	MDL	B2-1017L	B2-1018	B2-1018L	B2-1019D	B2-1019L	B2-1020D	B2-1021	B2-1022	B2-1022R	B2-1023	B2-1023S
METALS												
Arsenic	0.1		11		12		10	9.6	7.9	7.2	9.8	
Selenium	0.5		<		<		0.3	0.3	0.3	<	<	
Mercury	0.05		0.07		0.13		0.16	<	0.17	0.1	0.08	
Barium	1		160		120		120	120	150	130	150	
Beryllium	0.5		<		<		<	<	<	<	<	
Cadmium	1		<		<		<	<	<		<	
Chromium	1		28		25		26	40	28	27	24	
Lead	10		14		34		46	160	11		<	
Nickel	5		38		35		35	45	41	39	35	
Silver	5		<		<		<	<	<	<	<	
TPH	1		41		<		3	<	<	-	86	
PCB	0.01		0.27		0.28		0.23	<	<	-	<	
PESTICIDES												
Aldrin	1.3		<	<	<	<	<	<	<		<	17
a-BHC	1.3		<	<	<	<	<	<	<		<	18
b-BHC	1.3		<	<	<	<	<	<	<		<	16
g-BHC (Lindane)	1.3		<	<	<	<	<	<	<		<	16
d-BHC	1.3		<	<	<	<	<	<	<		<	17
Chlorodane	1.3		<	<	<	<	<	<	<		<	23
p,p'-DDD	1.3		<	<	<	<	<	<	<		<	21
p,p'-DDE	1.3		<	<	<	<	<	<	<		<	12
p,p'-DDT	1.3		<	<	<	<	<	<	<		<	22
Dieldrin	1.3		<	<	<	<	<	<	<		<	22
a-Endosulfan	1.3		<	<	<	<	<	<	<		<	<
b-Endosulfan	1.3		<	<	<	<	<	<	<		<	15
Endosulfan Sulfate	1.3		<	<	<	<	<	<	<		<	16
Endrin	1.3		<	<	<	<	<	<	<		<	17
Endrin Aldehyde	1.3		<	<	<	<	<	<	<		<	
Heptachlor	1.3		<	<	<	<	<	<	<		<	
Heptachlor Epoxide	1.3		<	<	<	<	<	<	<		<	
Toxaphene	1.3			<	<	<	<	<	<		<	
VOLATILES												
Cl-Methane	0.011	<	<		<		<	<	<		<	
Vinyl Chloride	0.015	<	<		<		<	<	<		<	
Br-Methane	0.012	<	<		<		<	<	<		<	
Cl-Ethane	0.012	<	<		<		<	<	<		<	
Cl3F3-Methane	0.002	<	<		<		<	<	<		<	
1,1-Cl2-Ethylene	0.002	<	<		<		<	<	<		<	
Methylene Chloride	0.002	<	<		0.134		<	<	0.062		<	
trans 1,2-Cl2-Ethylene	0.002	<	<		<		<	<	<		<	
1,1 Cl2-Ethane	0.003	<	<		<		<	<	<		<	
Chloroform	0.002	<	<		<		<	<	<		<	
1,1,1-Cl3-Ethane	0.003	<	<		<		<	<	<		<	
1,2 Cl2-Ethane	0.002	<	<		<		<	<	<		<	
Carbon Tetrachloride	0.002	<	<		<		<	<	<		<	
Benzene	0.001	<	<		<		<	<	<		<	
1,2-Cl2-Propane	0.003	<	<		<		<	<	<		<	
Cl3-Ethylene	0.002	<	<		<		<	<	<		<	
BrCl2-Methane	0.002	<	<		<		<	<	<		<	
2-Cl-Ethylvinyl ether	0.014	<	<		<		<	<	<		<	
cis-1,2-Cl2-Propylene	0.003	<	<		<		<	<	<		<	
Toluene	0.002	0.007	<		0.168		0.24	<	0.218		<	
trans-1,2-Cl2-Propylene	0.006	<	<		<		<	<	<		<	
1,1,2-Cl3-Ethane	0.003	<	<		<		<	<	<		<	
ClBr2-Methane	0.002	<	<		<		<	<	<		<	
C14-Ethylene	0.001	<	0.23		<		<	<	<		<	
Cl-Benzene	0.003	<	<		<		<	<	<		<	
Ethyl Benzene	0.002	0.003	<		<		<	<	<		<	
Bromoform	0.002	<	<		<		<	<	<		<	
1,1,2,2-Cl4-ethane	0.002	<	<		<		<	<	<		<	
d4-1,2-Dichloroethane	%	112	83		69		100	100	98		85	
d8-Toluene	%	110	97		86		98	93	94		99	
Bromofluorobenzene	%	101	90		120		130	110	120		110	
ACID EXT												
*N-Nitrosodimethylamine			<	<	<	<	<	<	<		<	17
phenol	0.11		<	<	<	<	<	<	<		<	15
Bis(2-chloroethyl)ether	0.18		<	<	<	<	<	<	<		<	14
2-Chlorophenol	0.27		<	<	<	<	<	<	<		<	15
1,3-Dichlorobenzene	0.20		<	<	<	<	<	<	<		<	14
1,4-Dichlorobenzene	0.20		<	<	<	<	<	<	<		<	14
1,2-Dichlorobenzene	0.20		<	<	<	<	<	<	<		<	14
Bis(2-chloroisopropyl)ether	0.15		<	<	<	<	<	<	<		<	17
Hexachloroethane	0.20		<	<	<	<	<	<	<		<	15
N-Nitroso-N-Propylamine	0.21		<	<	<	<	<	<	<		<	15
Nitrobenzene	0.20		<	<	<	<	<	<	<		<	17

Dewline B2 Sites (Soils)

Parameter	MDL	B2-1017L	B2-1018	B2-1018L	B2-1019D	B2-1019L	B2-1020D	B2-1021	B2-1022	B2-1022R	B2-1023	B2-1023S
Isophrone	0.40		<	<	<	<	<	<	<		<	18
2-Nitrophenol	0.14		<	<	<	<	<	<	<		<	17
2,4-Dimethylphenol	0.17		<	<	<	<	<	<	<		<	2.9
Bis(2-chloroethoxy)methane	0.13		<	<	<	<	<	<	<		<	17
2,4-Dichlorophenol	0.12		<	<	<	<	<	<	<		<	17
1,2,4-Trichlorobenzene	0.20		<	<	<	<	<	<	<		<	17
Naphthalene	0.03		<	<	<	<	<	<	<		<	17
Hexachlorobutadiene	0.20		<	<	<	<	<	<	<		<	17
4-Chloro-3-Methylphenol	0.14		<	<	<	<	<	<	<		<	<
Hexachlorocyclopentadiene	0.20		<	<	<	<	<	<	<		<	1.6
2,4,6-Trichlorophenol	0.12		<	<	<	<	<	<	<		<	17
BASE/NEUTRAL												
2-Chloronaphthalene	0.09		<	<	<	<	<	<	<		<	18
Acenaphthylene	0.04		<	<	<	<	<	<	<		<	18
Dimethyl phthalate	0.11		0.6	<	<	<	<	<	<		<	17
2,6-Dinitrotoluene	0.06		<	<	<	<	<	<	<		<	18
Acenaphthene	0.07		<	<	<	<	<	<	<		<	19
2,4-Dinitrophenol	0.48		<	<	<	<	<	<	<		<	25
2,4-Dinitrotoluene	0.05		<	<	<	<	<	<	<		<	18
4-Nitrophenol	0.14		<	<	<	<	<	<	<		<	19
Fluorene	0.03		<	<	<	<	<	<	<		<	18
4-Chlorophenylphenylether	0.09		<	<	<	<	<	<	<		<	19
Diethyl phthalate	0.11		<	<	<	<	<	<	<		<	18
4,6-Dinitro-2-methylphenol	0.15		<	<	<	<	<	<	<		<	<
N-Nitrosodiphenylamine	0.19		<	<	<	<	<	<	<		<	18
4-Bromophenylphenylether	0.03		<	<	<	<	<	<	<		<	19
Hexachlorobenzene	0.20		<	<	<	<	<	<	<		<	19
Pentachlorophenol	0.11		<	<	<	<	<	<	<		<	23
Phenanthrene	0.03		<	<	<	0.28	<	<	<		<	20
Anthracene	0.02		<	<	<	<	<	<	<		<	20
Di-n-butyl phthalate	0.11		<	<	<	<	<	<	<		<	19
*Benzidine	0.40		<	<	<	<	<	<	<		<	<
Fluoranthene	0.02		<	<	<	<	0.05	<	<		<	19
Pyrene	0.03		<	<	<	0.18	0.08	0.28	<		<	21
Benzyl butyl phthalate	0.06		0.23	0.8	<	0.36	0.21	2.6	0.24		0.21	21
*3,3'-Dichlorobenzidine	0.20		<	<	<	<	<	<	<		<	1.3
Benzo(a)Anthracene	0.02		<	<	<	<	0.06	<	<		<	19
Chrysene	0.03		<	<	<	<	<	<	<		<	19
Bis(2-ethylhexyl)phthalate	0.14		0.67	1.5	1.7	2.7	2.4	1	<		0.22	22
Di-n-octyl phthalate	0.11		0.2	0.53	0.18	0.18	0.21	<	0.16		<	21
Benzo(b)fluoranthene	0.04		<	<	<	<	<	<	<		<	22
Benzo(k)fluroanthene	0.04		<	<	<	<	<	<	<		<	22
Benzo(a)pyrene	0.05		<	<	<	<	<	<	<		<	18
Ideno(1,2,3-cd)pyrene	0.06		<	<	<	<	<	<	<		<	18
Dibenzo(a,h)anthracene	0.04		<	<	<	<	<	<	<		<	17
Benzo(ghi)perylene	0.04		<	<	<	<	<	<	<		<	19
d5-Phenol	%		60	58	59	64	63	16	79		72	72
d5-Nitrobenzene	%		58	63	54	57	56	23	62		62	62
2-Fluorobiphenyl	%		76	78	78	76	76	36	87		83	78
2,4,6-Tribromophenol	%		72	62	81	87	94	46	97		93	93
d-14-p-Terphenyl	%		94	96	100	140	140	56	100		100	110

Dewline B2 Sites (Soils)

Parameter	MDL	B2-1024	B2-1025	B2-1026	B2-1027	B2-1027R	B2-1028	B2-1029D	B2-1030D	Blank	B2-1101	B2-1102
METALS												
Arsenic	0.1	9.7	9.8	14	1.9	1.7	3	9.8	9.3	<	8.9	-
Selenium	0.5	<	<	0.7	0.9	1	0.7	<	<	<	<	-
Mercury	0.05	0.12	0.08	0.08	0.1	0.1	0.14	-	-	<	-	-
Barium	1	120	220	170	110	130	150	240	220	<	150	-
Beryllium	0.5	<	<	<	<1	<1	<1	<1	<1	<	<1	-
Cadmium	1	<	<	<	<		<	<	<	<	<	-
Chromium	1	23	25	34	10	11	14	31	31	<	24	-
Lead	10	<	1900	17	<		<	19	25	<	26	-
Nickel	5	37	37	43	11	13	13	31	31	<	21	-
Silver	5	<	<	<	<	<	<	<	<	<	<	-
TPH	1	<	250	<	<	-	8	<	<	<	<	-
PCB	0.01	<	0.06	0.04	0.18	-	0.51	0.05	0.05		<	0.2
PESTICIDES												
Aldrin	1.3	<	<	<	<		<	<	<			
a-BHC	1.3	<	<	<	<		<	<	<			
b-BHC	1.3	<	<	<	<		<	<	<			
g-BHC (Lindane)	1.3	<	<	<	<		<	<	<			
d-BHC	1.3	<	<	<	<		<	<	<			
Chlorodane	1.3	<	<	<	<		<					
p,p'-DDD	1.3	<	<	<	<		<	<	<			
p,p'-DDE	1.3	<	<	<	<		<	<	<			
p,p'-DDT	1.3	<	<	<	<		<	<	<			
Dieldrin	1.3	<	<	<	<		<	<	<			
a-Endosulfan	1.3	<	<	<	<		<	<	<			
b-Endosulfan	1.3	<	<	<	<		<	<	<			
Endosulfan Sulfate	1.3	<	<	<	<		<	<	<			
Endrin	1.3	<	<	<	<		<					
Endrin Aldehyde	1.3	<	<	<	<		<					
Heptachlor	1.3	<	<	<	<		<	<	<			
Heptachlor Epoxide	1.3	<	<	<	<		<	<	<			
Toxaphene	1.3	<	<	<	<		<					
VOLATILES												
Cl-Methane	0.011	<	<	<	<		<					
Vinyl Chloride	0.015	<	<	<	<		<					
Br-Methane	0.012	<	<	<	<		<					
Cl-Ethane	0.012	<	<	<	<		<					
Cl3F3-Methane	0.002	<	<	<	<		<					
1,1-Cl2-Ethylene	0.002	<	<	<	<		<					
Methylene Chloride	0.002	<	<	<	0.053		0.19					
trans 1,2-Cl2-Ethylene	0.002	0.013	<	<	<		<					
1,1 Cl2-Ethane	0.003	<	<	<	<		<					
Chloroform	0.002	<	<	<	<		<					
1,1,1-Cl3-Ethane	0.003	<	<	<	<		<					
1,2 Cl2-Ethane	0.002	<	<	<	<		<					
Carbon Tetrachloride	0.002	<	<	<	<		<					
Benzene	0.001	0.006	<	<	<		0.006					
1,2-Cl2-Propane	0.003	<	<	<	<		<					
Cl3-Ethylene	0.002	0.024	<	<	<		<					
BrCl2-Methane	0.002	<	<	<	<		<					
2-Cl-Ethylvinyl ether	0.014	<	<	<	<		<					
cis-1,2-Cl2-Propylene	0.003	<	<	<	<		<					
Toluene	0.002	<	<	0.007	0.29		0.11					
trans-1,2-Cl2-Propylene	0.006	<	<	<	<		<					
1,1,2-Cl3-Ethane	0.003	<	<	<	<		<					
ClBr2-Methane	0.002	<	<	<	<		<					
C14-Ethylene	0.001	<	<	<	<		<					
Cl-Benzene	0.003	<	<	<	<		<					
Ethyl Benzene	0.002	<	<	0.003	<		<					
Bromoform	0.002	<	<	<	<		<					
1,1,2,2-Cl4-ethane	0.002	<	<	<	<		<					
d4-1,2-Dichloroethane	%	88	84	110	62		89					
d8-Toluene	%	93	96	110	120		100					
Bromofluorobenzene	%	110	110	100	110		100					
ACID EXT												
*N-Nitrosodimethylamine		<	<	<	<		<	<	<			
phenol	0.11	<	<	<	<		<	<	<			
Bis(2-chloroethyl)ether	0.18	<	<	<	<		<	<	<			
2-Chlorophenol	0.27	<	<	<	<		<	<	<			
1,3-Dichlorobenzene	0.20	<	<	<	<		<	<	<			
1,4-Dichlorobenzene	0.20	<	<	<	<		<	<	<			
1,2-Dichlorobenzene	0.20	<	<	<	<		<	<	<			
Bis(2-chloroisopropyl)ether	0.15	<	<	<	<		<	<	<			
Hexachloroethane	0.20	<	<	<	<		<	<	<			
N-Nitroso-N-Propylamine	0.21	<	<	<	<		<	<	<			
Nitrobenzene	0.20	<	<	<	<		<	<	<			

Dewline B2 Sites (Soils)

Parameter	MDL	B2-1024	B2-1025	B2-1026	B2-1027	B2-1027R	B2-1028	B2-1029D	B2-1030D	Blank	B2-1101	B2-1102
Isophrone	0.40	<	<	<	<		<	<	<			
2-Nitrophenol	0.14	<	<	<	<		<	<	<			
2,4-Dimethylphenol	0.17	<	<	<	<		<	<	<			
Bis(2-chloroethoxy)methane	0.13	<	<	<	<		<	<	<			
2,4-Dichlorophenol	0.12	<	<	<	<		<	<	<			
1,2,4-Trichlorobenzene	0.20	<	<	<	<		<	<	<			
Naphthalene	0.03	<	<	<	<		<	<	<			
Hexachlorobutadiene	0.20	<	<	<	<		<	<	<			
4-Chloro-3-Methylphenol	0.14	<	<	<	<		<	<	<			
Hexachlorocyclopentadiene	0.20	<	<	<	<		<	<	<			
2,4,6-Trichlorophenol	0.12	<	<	<	<		<	<	<			
BASE/NEUTRAL												
2-Chloronaphthalene	0.09	<	<	<	<		<	<	<			
Acenaphthylene	0.04	<	<	<	<		<	<	<			
Dimethyl phthalate	0.11	<	<	<	<		<	<	<			
2,6-Dinitrotoluene	0.06	<	<	<	<		<	<	<			
Acenaphthene	0.07	<	<	<	<		<	<	<			
2,4-Dinitrophenol	0.48	<	<	<	<		<	<	<			
2,4-Dinitrotolulene	0.05	<	<	<	<		<	<	<			
4-Nitrophenol	0.14	<	<	<	<		<	<	<			
Fluorene	0.03	<	<	<	<		<	<	<			
4-Chlorophenylphenylether	0.09	<	<	<	<		<	<	<			
Diethyl phthalate	0.11	<	<	<	<		<	<	<			
4,6-Dinitro-2-methylphenol	0.15	<	<	<	<		<	<	<			
N-Nitrosodiphenylamine	0.19	<	<	<	<		<	<	<			
4-Bromophenylphenylether	0.03	<	<	<	<		<	<	<			
Hexachlorobenzene	0.20	<	<	<	<		<	<	<			
Pentachlorophenol	0.11	0.32	<	<	<		<	<	<			
Phenanthrene	0.03	<	<	<	<		<	<	<			
Anthracene	0.02	<	<	<	<		<	<	<			
Di-n-butyl phthalate	0.11	<	<	<	<		<	<	<			
*Benzidine	0.40	<	<	<	<		<	<	<			
Fluoranthene	0.02	<	<	<	<		<	<	<			
Pyrene	0.03	<	<	<	<		<	<	<			
Benzyl butyl phthalate	0.06	0.21	<	<	<		<	<	<			
*3,3'-Dichlorobenzidine	0.20	<	<	<	<		<	<	<			
Benzo(a)Anthracene	0.02	<	<	<	<		<	<	<			
Chrysene	0.03	<	<	<	<		<	<	<			
Bis(2-ethylhexyl)phthalate	0.14	<	<	1	0.16		0.4	<	<			
Di-n-octyl phthalate	0.11	0.16	<	<	<		0.67	<	<			
Benzo(b)fluoranthene	0.04	<	<	<	<		<	<	<			
Benzo(k)fluroanthene	0.04	<	<	<	<		<	<	<			
Benzo(a)pyrene	0.05	<	<	<	<		<	<	<			
Ideno(1,2,3-cd)pyrene	0.06	<	<	<	<		<	<	<			
Dibenzo(a,h)anthracene	0.04	<	<	<	<		<	<	<			
Benzo(ghi)perylene	0.04	<	<	<	<		<	<	<			
d5-Phenol	%	60	71	71	34		29	95	92			
d5-Nitrobenzene	%	58	77	71	27		21	77	80			
2-Fluorobiphenyl	%	79	90	83	37		33	100	99			
2,4,6-Tribromophenol	%	69	96	88	41		37	100	98			
d-14-p-Terphenyl	%	95	100	110	51		54	95	99			

Dewline B2 Sites (Soils)

Parameter	MDL	B2-1103	B2-1104	B2-1105	B2-1105R	B2-1105D	B2-1105RD
METALS							
Arsenic	0.1	8	14	5	5	5	4.5
Selenium	0.5	<	0.7	0.8	0.6	0.7	0.6
Mercury	0.05	-	0.08	0.18	0.15	0.16	0
Barium	1	120	200	210	140	160	140
Beryllium	0.5	<1	<	<	<	<	<
Cadmium	1	<	<	<			
Chromium	1	23	23	11	9	11	9
Lead	10	17	<	<			
Nickel	5	33	34	20	14	16	14
Silver	5	<	<	<	<	<	<
TPH	1	<	20	<			
PCB	0.01	0.02	<	<			
PESTICIDES							
Aldrin	1.3	<	<	<			
a-BHC	1.3	<	<	<			
b-BHC	1.3	<	<	<			
g-BHC (Lindane)	1.3	<	<	<			
d-BHC	1.3	<	<	<			
Chlorodane	1.3		<	<			
p,p'-DDD	1.3	<	<	<			
p,p'-DDE	1.3	<	<	<			
p,p'-DDT	1.3	<	<	<			
Dieldrin	1.3	<	<	<			
a-Endosulfan	1.3	<	<	<			
b-Endosulfan	1.3	<	<	<			
Endosulfan Sulfate	1.3	<	<	<			
Endrin	1.3		<	<			
Endrin Aldehyde	1.3		<	<			
Heptachlor	1.3	<	<	<			
Heptachlor Epoxide	1.3	<	<	<			
Toxaphene	1.3		<	<			
VOLATILES							
Cl-Methane	0.011		<	<			
Vinyl Chloride	0.015		<	<			
Br-Methane	0.012		<	<			
Cl-Ethane	0.012		<	<			
Cl3F3-Methane	0.002		0.009	<			
1,1-Cl2-Ethylene	0.002		<	<			
Methylene Chloride	0.002		0.025	0.015			
trans 1,2-Cl2-Ethylene	0.002		<	<			
1,1 Cl2-Ethane	0.003		<	<			
Chloroform	0.002		0.003	0.021			
1,1,1-Cl3-Ethane	0.003		<	<			
1,2 Cl2-Ethane	0.002		<	<			
Carbon Tetrachloride	0.002		<	<			
Benzene	0.001		0.01	0.009			
1,2-Cl2-Propane	0.003		<	<			
Cl3-Ethylene	0.002		<	<			
BrCl2-Methane	0.002		<	<			
2-Cl-Ethylvinyl ether	0.014		<	<			
cis-1,2-Cl2-Propylene	0.003		<	<			
Toluene	0.002		0.01	0.006			
trans-1,2-Cl2-Propylene	0.006		<	<			
1,1,2-Cl3-Ethane	0.003		<	<			
ClBr2-Methane	0.002		<	<			
Cl4-Ethylene	0.001		<	0.002			
Cl-Benzene	0.003		<	<			
Ethyl Benzene	0.002		<	<			
Bromoform	0.002		<	<			
1,1,2,2-Cl4-ethane	0.002		<	0.014			
d4-1,2-Dichloroethane	%		100	99			
d8-Toluene	%		100	100			
Bromofluorobenzene	%		91	110			
ACID EXT							
*N-Nitrosodimethylamine		<	<	<			
phenol	0.11	<	<	<			
Bis(2-chloroethyl)ether	0.18	<	<	<			
2-Chlorophenol	0.27	<	<	<			
1,3-Dichlorobenzene	0.20	<	<	<			
1,4-Dichlorobenzene	0.20	<	<	<			
1,2-Dichlorobenzene	0.20	<	<	<			
Bis(2-chloroisopropyl)ether	0.15	<	<	<			
Hexachloroethane	0.20	<	<	<			
N-Nitroso-N-Propylamine	0.21	<	<	<			
Nitrobenzene	0.20	<	<	<			

Dewline B2 Sites (Soils)

Parameter	MDL	B2-1103	B2-1104	B2-1105	B2-1105R	B2-1105D	B2-1105RD
Isophrone	0.40	<	<	<			
2-Nitrophenol	0.14	<	<	<			
2,4-Dimethylphenol	0.17	<	<	<			
Bis(2-chloroethoxy)methane	0.13	<	<	<			
2,4-Dichlorophenol	0.12	<	<	<			
1,2,4-Trichlorobenzene	0.20	<	<	<			
Naphthalene	0.03	<	<	<			
Hexachlorobutadiene	0.20	<	<	<			
4-Chloro-3-Methylphenol	0.14	<	<	<			
Hexachlorocyclopentadiene	0.20	<	<	<			
2,4,6-Trichlorophenol	0.12	<	<	<			
BASE/NEUTRAL							
2-Chloronaphthalene	0.09	<	<	<			
Acenaphthylene	0.04	<	<	<			
Dimethyl phthalate	0.11	<	<	<			
2,6-Dinitrotoluene	0.06	<	<	<			
Acenaphthene	0.07	<	<	<			
2,4-Dinitrophenol	0.48	<	<	<			
2,4-Dinitrotolulene	0.05	<	<	<			
4-Nitrophenol	0.14	<	<	0.48			
Fluorene	0.03	<	<	<			
4-Chlorophenylphenylether	0.09	<	<	<			
Diethyl phthalate	0.11	<	<	<			
4,6-Dinitro-2-methylphenol	0.15	<	<	<			
N-Nitrosodiphenylamine	0.19	<	<	<			
4-Bromophenylphenylether	0.08	<	<	<			
Hexachlorobenzene	0.20	<	<	<			
Pentachlorophenol	0.11	<	<	<			
Phenanthrene	0.03	<	0.19	<			
Anthracene	0.02	<	<	<			
Di-n-butyl phthalate	0.11	<	<	<			
*Benzidine	0.40	<	<	<			
Fluoranthene	0.02	<	<	<			
Pyrene	0.03	<	<	<			
Benzyl butyl phthalate	0.06	<	0.21	0.25			
*3,3'-Dichlorobenzidine	0.20	<	<	<			
Benzo(a)Anthracene	0.02	<	<	<			
Chrysene	0.03	<	<	<			
Bis(2-ethylhexyl)phthalate	0.14	<	<	<			
Di-n-octyl phthalate	0.11	<	<	<			
Benzo(b)fluoranthene	0.04	<	<	<			
Benzo(k)fluroanthene	0.04	<	<	<			
Benzo(a)pyrene	0.05	<	<	<			
Ideno(1,2,3-cd)pyrene	0.06	<	<	<			
Dibenzo(a,h)anthracene	0.04	<	<	<			
Benzo(ghi)perylene	0.04	<	<	<			
d5-Phenol	%	67	85	33			
d5-Nitrobenzene	%	78	91	28			
2-Fluorobiphenyl	%	94	88	36			
2,4,6-Tribromophenol	%	66	100	35			
d-14-p-Terphenyl	%	120	130	49			

Dewline B2 Sites (Water)

Parameter	MDL	Units	B2-A(D)	B2-B(D)	B2-C	B2-D	B2-E	B2-E(L)
METALS								
Arsenic	0.001	mg/L	<	<	0.002	<	<	<
Selenium	0.005	mg/L	<	<	<	<	<	<
Mercury	0.05	ug/L	<	<	<	<	<	<
Barium	0.01	mg/L	0.04	0.04	0.03	0.02	0.02	0.01
Beryllium	0.005	mg/L	<	<	<	<	<	<
Cadmium	0.01	mg/L	<	<	<	<	<	<
Chromium	0.01	mg/L	<	<	<	<	<	0.01
Lead	0.1	mg/L	<	<	<	<	<	<
Nickel	0.05	mg/L	<	<	<	<	<	<
Silver	0.05	mg/L	<	<	<	<	<	<
TPH	5	ug/L	<	<	<	<	<	<
PCB	0.05	ug/L	<	<	<	<	<	<
PESTICIDES								
Aldrin	10	ug/L	<	<	<	<	<	-
a-BHC	10	ug/L	<	<	<	<	<	-
b-BHC	10	ug/L	<	<	<	<	<	-
g-BHC (Lindane)	10	ug/L	<	<	<	<	<	-
d-BHC	10	ug/L	<	<	<	<	<	-
Chlorodane	100	ug/L	<	<	<	<	<	-
p,p'-DDD	10	ug/L	<	<	<	<	<	-
p,p'-DDE	10	ug/L	<	<	<	<	<	-
p,p'-DDT	10	ug/L	<	<	<	<	<	-
Dieldrin	10	ug/L	<	<	<	<	<	-
a-Endosulfan	10	ug/L	<	<	<	<	<	-
b-Endosulfan	10	ug/L	<	<	<	<	<	-
Endosulfan Sulfate	10	ug/L	<	<	<	<	<	-
Endrin	10	ug/L	<	<	<	<	<	-
Endrin Aldehyde	10	ug/L	<	<	<	<	<	-
Heptachlor	10	ug/L	<	<	<	<	<	-
Heptachlor Epoxide	10	ug/L	<	<	<	<	<	-
Toxaphene	300	ug/L	<	<	<	<	<	-
VOLATILES								
Cl-Methane	2.2	ug/L	<	<	<	<	<	
Vinyl Chloride	2.9	ug/L	<	<	<	<	<	
Br-Methane	2.4	ug/L	<	<	<	<	<	
Cl-Ethane	2.5	ug/L	<	<	<	<	<	
Cl3F3-Methane	0.3	ug/L	<	<	<	<	<	
1,1-Cl2-Ethylene	0.36	ug/L	<	<	<	<	<	
Methylene Chloride	0.33	ug/L	29	<	<	<	<	
trans 1,2-Cl2-Ethylene	0.42	ug/L	14	28	<	<	30	
1,1 Cl2-Ethane	0.51	ug/L	<	<	<	<	<	
Chloroform	0.36	ug/L	0.4	0.42	<	<	<	
1,1,1-Cl3-Ethane	0.75	ug/L	<	<	<	<	<	
1,2 Cl2-Ethane	0.39	ug/L	<	<	<	<	<	
Carbon Tetrachloride	0.3	ug/L	<	<	<	<	<	
Benzene	0.2	ug/L	1.7	<	<	<	6.8	
1,2-Cl2-Propane	0.54	ug/L	<	<	<	<	<	
Cl3-Ethylene	0.3	ug/L	17	45	1.1	0.47	<	
BrCl2-Methane	0.4	ug/L	<	<	<	<	<	
2-Cl-Ethylvinyl ether	2.0	ug/L	<	<	<	<	<	
cis-1,2-Cl2-Propylene	0.69	ug/L	<	<	<	<	<	
Toluene	0.4	ug/L	<	<	<	<	<	
trans-1,2-Cl2-Propylene	1.1	ug/L	<	<	<	<	<	

Dewline B2 Sites (Water)

Parameter	MDL	Units	B2-A(D)	B2-B(D)	B2-C	B2-D	B2-E	B2-E(L)
1,1,2-Cl3-Ethane	0.57	ug/L	<	<	<	<	<	
ClBr2-Methane	0.42	ug/L	<	<	<	<	<	
Cl4-Ethylene	0.15	ug/L	<	<	<	<	<	
Cl-Benzene	0.6	ug/L	<	<	<	<	<	
Ethyl Benzene	0.4	ug/L	<	<	<	<	<	
Bromoform	0.33	ug/L	<	<	<	<	<	
1,1,2,2-Cl4-ethane	0.36	ug/L	<	<	<	<	<	
d4-1,2-Dichloroethane		%	100	100	98	110	100	
d8-Toluene		%	110	110	100	110	110	
Bromofluorobenzene		%	100	100	90	100	99	
ACID EXT								
*N-Nitrosodimethylamine								
phenol	0.1	ug/L	<	<	<	<	<	-
Bis(2-chloroethyl)ether	0.8	ug/L	<	<	<	<	<	-
2-Chlorophenol	0.7	ug/L	<	<	<	<	<	-
1,3-Dichlorobenzene	2	ug/L	<	<	<	<	<	-
1,4-Dichlorobenzene	2	ug/L	<	<	<	<	<	-
1,2-Dichlorobenzene	2	ug/L	<	<	<	<	<	-
Bis(2-chloroisopropyl)ether	0.5	ug/L	<	<	<	<	<	-
Hexachloroethane	2	ug/L	<	<	<	<	<	-
N-Nitroso-N-Propylamine	0.1	ug/L	<	<	<	<	<	-
Nitrobenzene	2	ug/L	<	<	<	<	<	-
Isophrone	4	ug/L	<	<	<	<	<	-
2-Nitrophenol	0.4	ug/L	<	<	<	<	<	-
2,4-Dimethylphenol	0.7	ug/L	<	<	<	<	<	-
Bis(2-chloroethoxy)methane	0.3	ug/L	<	<	<	<	<	-
2,4-Dichlorophenol	0.2	ug/L	<	<	<	<	<	-
1,2,4-Trichlorobenzene	2	ug/L	<	<	<	<	<	-
Naphthalene	0.3	ug/L	<	<	<	<	<	-
Hexachlorobutadiene	2	ug/L	<	<	<	<	<	-
4-Chloro-3-Methylphenol	0.4	ug/L	<	<	<	<	<	-
Hexachlorocyclopentadiene	2	ug/L	<	<	<	<	<	-
2,4,6-Trichlorophenol	0.2	ug/L	<	<	<	<	<	-
BASE/NEUTRAL								
2-Chloronaphthalene	0.9	ug/L	<	<	<	<	<	-
Acenaphthylene	0.4	ug/L	<	<	<	<	<	-
Dimethyl phthalate	0.1	ug/L	<	<	<	<	<	-
2,6-Dinitrotolulene	0.6	ug/L	<	<	<	<	<	-
Acenaphthene	0.7	ug/L	<	<	<	<	<	-
2,4-Dinitrophenol	0.8	ug/L	<	<	<	<	<	-
2,4-Dinitrotolulene	0.5	ug/L	<	<	<	<	<	-
4-Nitrophenol	0.4	ug/L	<	<	<	<	<	-
Fluorene	0.3	ug/L	<	<	<	<	<	-
4-Chlorophenylphenylether	0.9	ug/L	<	<	<	<	<	-
Diethyl phthalate	0.1	ug/L	<	<	<	<	<	-
4,6-Dinitro-2-methylphenol	0.5	ug/L	<	<	<	<	<	-
N-Nitrosodiphenylamine	0.9	ug/L	<	<	<	<	<	-
4-Bromophenylphenylether	0.3	ug/L	<	<	<	<	<	-
Hexachlorobenzene	0	ug/L	<	<	<	<	<	-
Pentachlorophenol	0.1	ug/L	<	<	<	<	<	-
Phenanthrene	0.3	ug/L	<	<	<	<	<	-
Anthracene	0.2	ug/L	<	<	<	<	<	-
Di-n-butyl phthalate	0.1	ug/L	<	<	<	<	<	-
*Benzidine								

Dewline B2 Sites (Water)

Parameter	MDL	Units	B2-A(D)	B2-B(D)	B2-C	B2-D	B2-E	B2-E(L)
Fluoranthene	0.2	ug/L	<	<	<	<	<	-
Pyrene	0.3	ug/L	<	<	<	<	<	-
Benzyl butyl phthalate	0.6	ug/L	<	<	<	<	<	-
*3,3'-Dichlorobenzidine								
Benzo(a)Anthracene	0.2	ug/L	<	<	<	<	<	-
Chrysene	0.3	ug/L	<	<	<	<	<	-
Bis(2-ethylhexyl)phthalate	0.4	ug/L	7.7	6.8	2.8	170	2.4	-
Di-n-octyl phthalate	0.1	ug/L	15	13	5.3	1.7	5.2	-
Benzo(b)fluoranthene	0.4	ug/L	<	<	<	<	<	-
Benzo(k)fluroanthene	0.4	ug/L	<	<	<	<	<	-
Benzo(a)pyrene	0.5	ug/L	<	<	<	<	<	-
Ideno(1,2,3-cd)pyrene	0.6	ug/L	<	<	<	<	<	-
Dibenzo(a,h)anthracene	0.4	ug/L	<	<	<	<	<	-
Benzo(ghi)perylene	0.4	ug/L	<	<	<	<	<	-
d5-Phenol		%	20	31	35	11	36	
d5-Nitrobenzene		%	37	72	85	18	83	
2-Fluorobiphenyl		%	53	72	70	48	71	
2,4,6-Tribromophenol		%	90	93	89	89	95	
d-14-p-Terphenyl		%	98	110	98	99	100	

Dewline B2 Sites (Water)

Parameter	MDL	Units	B2-F	B2-G	B2-H	F-BLANK	T-BLANK
METALS							
Arsenic	0.001	mg/L	<			<	
Selenium	0.005	mg/L	<			<	
Mercury	0.05	ug/L	<			<	
Barium	0.01	mg/L	0.06			<	
Beryllium	0.005	mg/L	<			<	
Cadmium	0.01	mg/L	<			<	
Chromium	0.01	mg/L	<			<	
Lead	0.1	mg/L	<			0.02	
Nickel	0.05	mg/L	<			<	
Silver	0.05	mg/L	<			<	
TPH	5	ug/L	<			<	
PCB	0.05	ug/L	<				
PESTICIDES							
Aldrin	10	ug/L	<			<	<
a-BHC	10	ug/L	<			<	<
b-BHC	10	ug/L	<			<	<
g-BHC (Lindane)	10	ug/L	<			<	<
d-BHC	10	ug/L	<			<	<
Chlorodane	100	ug/L	<			<	<
p,p'-DDD	10	ug/L	<			<	<
p,p'-DDE	10	ug/L	<			<	<
p,p'-DDT	10	ug/L	<			<	<
Dieldrin	10	ug/L	<			<	<
a-Endosulfan	10	ug/L	<			<	<
b-Endosulfan	10	ug/L	<			<	<
Endosulfan Sulfate	10	ug/L	<			<	<
Endrin	10	ug/L	<			<	<
Endrin Aldehyde	10	ug/L	<			<	<
Heptachlor	10	ug/L	<			<	<
Heptachlor Epoxide	10	ug/L	<			<	<
Toxaphene	300	ug/L	<			<	<
VOLATILES							
Cl-Methane	2.2	ug/L	<	<	<		<
Vinyl Chloride	2.9	ug/L	<	<	<		<
Br-Methane	2.4	ug/L	<	<	<		<
Cl-Ethane	2.5	ug/L	<	<	<		<
Cl3F3-Methane	0.3	ug/L	<	<	<		<
1,1-Cl2-Ethylene	0.36	ug/L	<	<	<		<
Methylene Chloride	0.33	ug/L	<	<	<		<
trans 1,2-Cl2-Ethylene	0.42	ug/L	<	<	<		<
1,1 Cl2-Ethane	0.51	ug/L	<	<	<		<
Chloroform	0.36	ug/L	<	<	<		<
1,1,1-Cl3-Ethane	0.75	ug/L	<	<	<		<
1,2 Cl2-Ethane	0.39	ug/L	<	<	<		<
Carbon Tetrachloride	0.3	ug/L	<	<	<		<
Benzene	0.2	ug/L	<	<	<		<
1,2-Cl2-Propane	0.54	ug/L	<	<	<		<
Cl3-Ethylene	0.3	ug/L		0.35	<		<
BrCl2-Methane	0.4	ug/L	<	<	<		<
2-Cl-Ethylvinyl ether	2.0	ug/L	<	<	<		<
cis-1,2-Cl2-Propylene	0.69	ug/L	<	<	<		<
Toluene	0.4	ug/L	<	<	<		<
trans-1,2-Cl2-Propylene	1.1	ug/L	<	<	<		<

Dewline B2 Sites (Water)

Parameter	MDL	Units	B2-F	B2-G	B2-H	F-BLANK	T-BLANK
1,1,2-Cl3-Ethane	0.57	ug/L	<	<	<		<
ClBr2-Methane	0.42	ug/L	<	<	<		<
Cl4-Ethylene	0.15	ug/L	<	<	<		<
Cl-Benzene	0.6	ug/L	<	<	<		<
Ethyl Benzene	0.4	ug/L	<	<	<		<
Bromoform	0.33	ug/L	<	<	<		<
1,1,2,2-Cl4-ethane	0.36	ug/L	<	<	<		<
d4-1,2-Dichloroethane		%	97	100	100		97
d8-Toluene		%	110	110	99		110
Bromofluorobenzene		%	93	94	110		100
ACID EXT							
*N-Nitrosodimethylamine							
phenol	0.1	ug/L	5.7			<	<
Bis(2-chloroethyl)ether	0.8	ug/L	<			<	<
2-Chlorophenol	0.7	ug/L	<			<	<
1,3-Dichlorobenzene	2	ug/L	<			<	<
1,4-Dichlorobenzene	2	ug/L	<			<	<
1,2-Dichlorobenzene	2	ug/L	<			<	<
Bis(2-chloroisopropyl)ether	0.5	ug/L	<			<	<
Hexachloroethane	2	ug/L	<			<	<
N-Nitroso-N-Propylamine	0.1	ug/L	<			<	<
Nitrobenzene	2	ug/L	<			<	<
Isophrone	4	ug/L	<			<	<
2-Nitrophenol	0.4	ug/L	<			<	<
2,4-Dimethylphenol	0.7	ug/L	<			<	<
Bis(2-chloroethoxy)methane	0.3	ug/L	<			<	<
2,4-Dichlorophenol	0.2	ug/L	<			<	<
1,2,4-Trichlorobenzene	2	ug/L	<			<	<
Naphthalene	0.3	ug/L	<			<	<
Hexachlorobutadiene	2	ug/L	<			<	<
4-Chloro-3-Methylphenol	0.4	ug/L	<			<	<
Hexachlorocyclopentadiene	2	ug/L	<			<	<
2,4,6-Trichlorophenol	0.2	ug/L	<			<	<
BASE/NEUTRAL							
2-Chloronaphthalene	0.9	ug/L	<			<	<
Acenaphthylene	0.4	ug/L	<			<	<
Dimethyl phthalate	0.1	ug/L	<			<	<
2,6-Dinitrotolulene	0.6	ug/L	<			<	<
Acenaphthene	0.7	ug/L	<			<	<
2,4-Dinitrophenol	0.8	ug/L	<			<	<
2,4-Dinitrotolulene	0.5	ug/L	<			<	<
4-Nitrophenol	0.4	ug/L	<			<	<
Fluorene	0.3	ug/L	<			<	<
4-Chlorophenylphenylether	0.9	ug/L	<			<	<
Diethyl phthalate	0.1	ug/L	<			<	<
4,6-Dinitro-2-methylphenol	0.5	ug/L	<			<	<
N-Nitrosodiphenylamine	0.9	ug/L	<			<	<
4-Bromophenylphenylether	0.3	ug/L	<			<	<
Hexachlorobenzene	0	ug/L	<			<	<
Pentachlorophenol	0.1	ug/L	<			<	<
Phenanthrene	0.3	ug/L	<			<	<
Anthracene	0.2	ug/L	<			<	<
Di-n-butyl phthalate	0.1	ug/L	<			<	<
*Benzidine							

Dewline B2 Sites (Water)

Parameter	MDL	Units	B2-F	B2-G	B2-H	F-BLANK	T-BLANK
Fluoranthene	0.2	ug/L	<			<	<
Pyrene	0.3	ug/L	<			<	<
Benzyl butyl phthalate	0.6	ug/L	<			<	<
*3,3'-Dichlorobenzidine							
Benzo(a)Anthracene	0.2	ug/L	<			<	<
Chrysene	0.3	ug/L	<			<	<
Bis(2-ethylhexyl)phthalate	0.4	ug/L	2.3			2.8	<
Di-n-octyl phthalate	0.1	ug/L	7.2			4.3	3.4
Benzo(b)fluoranthene	0.4	ug/L	<			<	<
Benzo(k)fluroanthene	0.4	ug/L	<			<	<
Benzo(a)pyrene	0.5	ug/L	<			<	<
Ideno(1,2,3-cd)pyrene	0.6	ug/L	<			<	<
Dibenzo(a,h)anthracene	0.4	ug/L	<			<	<
Benzo(ghi)perylene	0.4	ug/L	<			<	<
d5-Phenol		%	37			13	46
d5-Nitrobenzene		%	78			31	34
2-Fluorobiphenyl		%	71			58	77
2,4,6-Tribromophenol		%	99			83	73
d-14-p-Terphenyl		%	120			96	90

APPENDIX D QUALITY ASSURANCE/QUALITY CONTROL RESULTS

D-1 QA/QC WATER

Water samples were collected at seven locations (Figure 6.1) throughout the site and all were submitted for full or partial analysis.

For BAR-2 the QA/QC program for water consisted of:

(1) 1 trip blank analyzed.
(2) 1 field blank analyzed.
(3) 1 field replicate sample analyzed.
(4) 1 laboratory duplicate sample analyzed.
(5) surrogate recoveries for all samples analyzed for organics.

The single field replicate sample fulfils the QA/QC requirements for field replication of water samples as defined for this project.

Results for the field replicate water sample (B2-B(D) show close correlation with the original sample (B2-A) except in the case of volatile organics. For these parameters a considerable amount of variation is indicated between samples which indicates that the methods of sampling introduces a degree of variability to the data.

The laboratory duplicate of B2-E (B2-E(L) was only analyzed for metals. Metals present were found at near detection limits so comparison is not valid.

Results of field blank analysis indicate the trace presence of chromium and two phthalates. The phthalates are attributed to trace contamination introduced from plastic material, such as gloves, during sampling and have been taken into consideration in interpretation of data for other samples.

The trip blank results indicate that contamination was not introduced during shipping and handling of samples.

Surrogate recoveries are acceptable according to guidelines set out in the relevant analytical procedures (EPA Procedure 6240 and EPA Procedure 6270).

D-2 QA/QC SOIL

Soil samples were collected at thirty-three locations throughout the site (Figure 6.1). Samples from thirty-two of these locations were submitted for full and partial analysis. A summary of soil QA/QC parameters is as follows:

(1) 3 field duplicates collected
(2) 3 field duplicates analyzed
(3) 5 field replicates collected
(4) 4 field replicates analyzed
(5) 6 laboratory replicates analyzed
(6) 1 method blank analyzed
(7) 1 matrix spike analyzed
(8) surrogate recoveries for all samples analyzed for organics

The quantity of field replicates and duplicates analyzed satisfies the QA/QC requirement for field replication and duplication of one in ten soil samples.

Data for duplicate and replicate samples indicates that the soils that have been sampled are relatively homogeneous and that sampling methods have not introduced much variability. However, a relatively high degree of variability was encountered for volatile organic compounds in B2-1018 and the replicate (B2-1018L). A significant

difference also was detected for PAH compounds between B2-1019 and the replicate (B2-1019L).

The method blank for soils was only analyzed for metals and TPH. Results are acceptable since none of these parameters were detected. This indicates that contamination by these constituents was not introduced during analysis.

Surrogate recoveries are acceptable according to guidelines set out in the relevant analytical procedures (EPA Procedure 6240 and EPA Procedure 6270).

APPENDIX E RISK ASSESSMENT

E-1 OVERVIEW

E-1.1 ASSESSMENT METHODS

The methodology used to assess the potential risks of contaminants found at the BAR-2 site was described in Volume 2, Section 3.3.1 entitled, Risk Assessment Study Approach. This methodology was categorized according to data evaluation, exposure assessment, toxicity assessment, and risk characterization and results from the BAR-2 risk assessment are similarly organized in the following subsections.

E-1.2 GENERAL ASSESSMENT DATA

Risk assessment data which were common to all 21 DEW Station Sites were not repeated in each site report but rather they were documented in Volume 2, Section 6.0 entitled, General Risk Assessment Data. General pathway equation variables used in the BAR-2 exposure assessment were described in Volume 2, subsection 6.1 and detailed in Volume 2, Appendix B. References to toxicity information used in the BAR-2 toxicity assessment were also described in Volume 2 but in a separate subsection, 6.2. This general data documented in Volume 2 has been repeated in the present volume only where necessary to clarify results.

E-2 DATA EVALUATION

E-2.1 CONTAMINANT MAP

The areal extent of each contaminant was estimated qualitatively based on the field observations and the geological and hydrological data presented in Section 3.0. Only at the Landfill A location were contaminants identified in a sufficient number of samples to permit contouring of concentration maps as described in Volume 2. Areas covered by contaminant sites such as landfills, outfalls, POLs, pallet lines and stain areas are shown in Figure E-1. For each of these sites, the areal extent of all significant contaminants was estimated along with the associated average concentration to provide the required inputs for the exposure assessment.

E-2.2 SUMMARY OF SIGNIFICANT CONTAMINANTS

Laboratory results and implications of these results for all contaminants found at BAR-2 were described in subsection 6.0. The examined sites were assessed and contaminant concentrations in both soil and water were compared with Canadian Federal and Provincial clean-up criteria. Laboratory data were reviewed in terms of concentrations calculated, error estimates, and minimum equipment detection limits and then compared with background values and government regulations and guidelines. The assessment criteria and rationale were previously described in Section 3.0.

A summary of the significant soil contaminants found at BAR-2 is given in Table E-1. Each location shown in Figure E-1 is listed in this table if a significant soil contaminant concentration was found from the lab analysis. As may be seen, twelve contaminants were found in one or more locations and the number of contaminant concentrations found to be greater than the method detection limit (MDL) in any one location varied from 1 to 13. Four contaminants, barium, nickel, arsenic, and mercury were found generally throughout the site. PAHs included eleven different polynuclear aromatic hydrocarbons which were evaluated as a group. Silver was found in only one sample at a concentration less than MDL and was therefore not included in Table E.1.

Seven water samples from the POLs, landfills and site ponds were analyzed and contaminants were found above MDL concentrations in all samples. A low

LEGEND

	CONTAMINANT BOUNDARY
SA 1	SPILL AREA
PL 1	PALLET AREA

BAR-2 SHINGLE POINT

CONTAMINANT MAP

FIGURE E-1

TABLE E-1 - SUMMARY OF SOIL CONTAMINANT LOCATIONS: BAR-2

LOCATION	SIGNIFICANT SOIL CONTAMINANT (No. of sample results > MDL)										
	Arsenic	Seleniu m	Mercury	Barium	Lead	Nickel	PCB	TPH	PAH	Toluene	Pentachlorop henol
Landfill A	13	5	9	13	3	13	-	-	-	-	-
Landfill B	2	2	-	-	-	2	2	-	-	-	-
POL 1	5	2	4	4	-	5	2	4	-	-	-
POL 2	2	-	2	2	2	2	-	2	2	-	-
Pallet Line 1	5	-	4	5	2	5	-	-	4	1	1
Sewage Outfall	5	3	3	5	-	5	4	2	2	2	-
Stain Area 1	4	2	4	4	4	4	4	-	6	3	-

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concentration of barium near MDL was found in all samples. Volatiles trans 1, 2-C12-Ethylene, or C13-Ethylene were found in six samples, while benzene was found in two samples. The sample without volatiles contained N-Nitrosodimethylaminephenol.

E-2.3 EVALUATION FOR EXPOSURE ASSESSMENT

Contaminant data identified in Subsections E-2.1 and E-2.2 were evaluated in order to determine the requirements for each pathway analysis. A summary of soil data required for the exposure assessment is presented in Table E-2. For each contaminant, the concentration ranges from lab data and comparative data are listed. Comparative data includes the minimum lab equipment detection limit (MDL), background concentrations and cleanup guidelines, all previously described in Subsection 6.0.

The parameters used in the pathway analysis include contaminant concentration and its areal extent, and an estimated exposure for each receptor being analyzed. The total contaminated area shown in Table E-2 is the sum of individual areas from the different locations previously identified. These areas define the contaminant concentration above background levels though for the purposes of risk assessment all contaminated areas were included and the results were then interpreted for background impacts. Four contaminants were identified over large areas, however, only nickel was found at concentrations greater than background over a large area.

The exposure fraction given in Table E-2 is the fraction of time a receptor may be exposed to the contaminated area based on criteria defined in Volume 2. For example, 75 percent of the workers' time is spent in the main camp area. The native exposure fractions may vary from those of workers because they are based on different criteria. For the BAR-2 contaminant locations, the native was assumed to spend more time in the beach area near POL 2 although his camp was placed in the same location as the worker. Exposure fractions are not additive, because some contaminant areas overlap. Caribou are assumed to graze on site for 10 days a year and in the contaminated area for a percentage of time equal to the ratio of contaminated to complete site area. The final receptor pathway analyzed was for vegetation, specifically grasses, and the percent of contaminated area covered with vegetation was estimated from field notes.

Low water concentrations of barium, ethylene volatiles, benzene and a phenol were identified in surface ponds on site. Contaminated streams below the landfills were assessed for exposure to caribou and natives camping on site. Though contaminants were present at low concentrations they were still assessed for the potential bioaccumulation in caribou which could then be eaten by people.

E-2.4 UNCERTAINTY ASSESSMENT

Uncertainties associated with the data evaluation were described in Volume 2 including strategies to identify all contaminant locations, the laboratory errors, and the limited background sampling. Such uncertainties specifically associated with the BAR-2 data were described in Section 3.0. For those contaminants identified at concentrations above background, the areal extent of contamination was conservatively estimated to ensure an over-prediction of risk, rather than an under-prediction. Two background samples were analyzed (with one replicate) and six significant metal contaminants were found at concentrations above those noted in the background samples. Barium and selenium concentrations were not, however, above the typical range of background concentrations in the region as identified in Section 3.0.

Finally, although the water sampling was limited, some contamination was found in surface ponds. Water quality may change depending on environmental changes and therefore there may be large uncertainties in assuming the samples analyzed were representative. Sediments which may affect aquatic life were not analyzed and the potential for mercury to migrate into such sediments was evaluated qualitatively as

TABLE E-2 - SOIL DATA EVALUATION FOR EXPOSURE ASSESSMENT: BAR-2

Contaminant	Contaminant Conc. Ranges (mg/kg)				Pathway Analysis					Remarks
	Lab Data	Comparitive Data			Total Contaminated Area (m^2)	Worker Exposure Fraction	Native Exposure Fraction	Caribou Exposure Fraction	% Area with Vegetation	
		MDL	Back-ground	Guidelines						
Barium	95-240	1	200-210	200-2000	20,000	0.09	0.15	-	-	Over 100,000m^2 < background
Lead	11-1900	10	<10	50-600	53,000	0.07	0.15	0.01	60	Hot spot in POL 2
Nickel	11-45	5	20-34	50-500	110,000	0.09	0.15	0.02	65	Widespread throughout site
Arsenic	1.7-24	0.1	5-14	10-50	69,000	0.09	0.15	0.02	65	Over 60,000 m^2 < background
Mercury	0.06-.61	0.05	0.08-0.18	0.2-10	1,500	0.07	0.10	0.02	-	Over 100,000 m^2 < background
Selenium	0.3-1	0.5	0.7-0.8	1-10	5,500	0.03	0.03	-	-	Low concentrations
TPH	3-270	1	-	100-5000	20,000	0.05	0.08	0.009	-	Low concentrations
PCB	0.02-0.51	0.01	-	0.1-10	27,000	0.06	0.12	0.01	70	-
PAH	0.05-0.75	0.02	-	1-200	28,000	0.03	0.05	0.003	-	Eleven individual PAHs
Toluene	0.007-0.24	0.00?	-	0.1-30	15,000	0.05	0.05	0.004	-	-
Pentachlorophenol	0.32	0.11	-	0.1-5	3,000	-	-	-	-	One sample in Pallet Line 1

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mercury is known to biotransform in sediments. Although only low concentrations of mercury were found, samples located in Landfill A and POL 2 are near the beach.

E-3 EXPOSURE ASSESSMENT

E-3.1 EXPOSURE PATHWAYS

Exposure pathways were analyzed for each of the significant contaminants described in Subsection E-2.3. All potential pathways by which contaminants are transported from the source to the receptor were described in Volume 2 for humans, fauna, and flora. Those relevant pathways through which BAR-2 contaminants can affect natives included soil, air, water, and caribou mediums leading to dermal, ingestion, and inhalation forms of intake. Worker pathways did not include water and caribou mediums. The contaminant concentrations used for the air inhalation pathway were derived from soil contaminant concentrations assuming uptake of soil dust through such mechanisms as wind action. Water pathways were based on water contaminant concentrations analyzed in field samples. Fauna pathways also included flora ingestion. Caribou from the Porcupine Caribou herd, as described in subsection 3.2.4, were used as surrogates for estimating fauna risks. Finally, contaminant uptakes through soil were evaluated in order to estimate flora risks. The vegetation cover in the BAR-2 site was previously described in Subsection 3.2.3 and grasses were used as surrogates for estimating flora risks.

Locations without vegetation were generally noted during the field survey and documented in the sample site descriptions given in Appendix A. It was noted for example that the area was characterized by a nearly continuous cover of vegetation except in disturbed areas. Where vegetation cover was evident the potential flora risks from contaminant uptakes through soil were estimated.

E-3.2 EXPOSURE INTAKES

Results from the pathway analysis of BAR-2 site contaminants for native exposure are presented in Table E-3. For each relevant pathway, the contaminants are identified along with the chronic daily intakes calculated for both carcinogenic and non-carcinogenic effects. A range of values was calculated for the chronic daily intakes to correspond with a potential range of exposure input parameter values previously described in Volume 2.

Chronic daily intakes for natives were calculated for contaminants transported by five principal pathways as shown in Table E-3. Intakes were estimated for each significant contaminant found on site except for lead. Risk estimates for lead were based on cleanup rather than toxicity criteria as further described in Subsection E-4. Contaminant intakes for workers were calculated using only the first three pathways namely, ingestion in soil, dermal contact with soil, and inhalation. The total worker intakes were less than those for natives and therefore separate results were not presented.

One lead hot spot of 1,900 mg/kg in POL 2 was identified and the potential for both acute and chronic risks was evaluated.

The exposure intake results from the fauna pathway analysis are given in Table E-4 in a similar format to that used for human exposure intake results. An additional pathway, ingestion of grasses, was evaluated for caribou. As discussed in Volume 2, only non-carcinogenic intakes were evaluated due to lack of environmental toxicity data.

Toxicity criteria for plants were available for arsenic, nickel, lead and PCBs and the corresponding concentrations in grasses covering the contaminant areas were estimated at 0.4, 2.0, 11, and 0.005 mg/kg, respectively.

TABLE E-3 BAR-2 SITE: NATIVE EXPOSURE INTAKE RESULTS

Pathway	Contaminant	Chronic Daily Intake Range (10^{-6} mg/kg day)	
		Carcinogenic Effects	Non-carcinogenic Effects
Ingestion of Contaminant in Soil	Mercury	-	0.0001
	Barium	-	0.6
	Lead	toxic	toxic
	TPH	-	0.1
	PCB	0.0002	-
	Arsenic	0.03	0.03
	Toluene	-	0.00003
	Nickel	-	0.1
	PAH	0.00003	0.0003
	Selenium	-	0.00007
	Pentachlorophenol	-	-
Dermal Contact with Contaminant in Soil	Mercury	-	0.007
	Barium	-	31
	Lead	toxic	toxic
	TPH	-	5
	PCB	0.01	-
	Arsenic	2	2
	Toluene	-	0.002
	Nickel	-	5
	PAH	0.002	0.02
	Selenium	-	0.004
	Pentachlorophenol	-	-
Inhalation of Airborne Contaminant	Mercury	-	0.01
	Barium	-	18
	Lead	toxic	toxic
	TPH	-	3
	PCB	0.005	-
	Arsenic	1	1
	Toluene	-	0.0003
	Nickel	4	4
	PAH	0.002	0.02
	Selenium	-	0.0001
	Pentachlorophenol	-	-
Ingestion of Contaminant in Water	Barium	-	0.3
	Arsenic	0.2	0.2
	Ethylene	-	-
	Benzene	-	-
Ingestion of Contaminated Caribou	**Mercury**	-	**0.002**
	TPH	-	**10^{-12}**
	PCB	**0.00006**	-
	Arsenic	**0.0001**	0.0001
	Toluene	-	-
	Nickel	-	0.002
	PAH	**0.000004**	0.00004

TABLE E-4 BAR-2 SITE: CARIBOU EXPOSURE INTAKE RESULTS

Pathway	Contaminant	Chronic Daily Intake (10^{-6} mg/kg day)
		Non-carcinogenic Effects
Ingestion of Contaminant in Soil	Mercury	0.0007
	Nickel	0.2
	Lead	1
	TPH	0.2
	PCB	0.0003
	Arsenic	0.07
	Toluene	0.0002
	PAH	0.001
Inhalation of Airborne Contaminant	Mercury	0.0008
	Nickel	0.3
	Lead	1
	TPH	0.2
	PCB	0.0003
	Arsenic	0.08
	Toluene	0.0001
	PAH	0.001
Dermal Contact with Contaminant in Soil	Mercury	0.04
	Nickel	13
	Lead	58
	TPH	10
	PCB	0.02
	Arsenic	4
	Toluene	0.01
	PAH	0.06
Ingestion of Contaminated Grasses	Mercury	0.9
	Nickel	18
	Lead	57
	TPH	1700
	PCB	0.03
	Arsenic	4
	Toluene	0.1
	PAH	0.3
Ingestion of Contaminant in Water	Arsenic	0.04

E-3.3 UNCERTAINTY ASSESSMENT

Data evaluation uncertainties included the strategies for sampling, identification of contaminant location, laboratory errors, and the limited background sampling as described previously in subsection E-2.4 Further uncertainties in the exposure assessment were generally described in Volume 2. For example the range of values used to estimate exposure for each pathway were presented. These data ranges were used as input for a sensitivity analysis of the exposure assessment in order to determine the corresponding impacts on chronic daily intakes.

Exposure of workers and natives to the different contaminant areas was based on a conservative distribution of a worker's time at each area as described in Volume 2. Fauna and flora exposures on site were also evaluated. For each potential receptor the reasonable maximum exposure to a contaminant transported over all principal pathways was estimated. Results could therefore be used directly in the risk assessment where risks associated with a particular contaminant are summed over all pathways through which the contaminant may be exposed to the receptor.

The higher values for the sensitivity results given previously in Table E-3 were subsequently used for the risk assessment in order to represent a maximum exposure level. Such levels were then evaluated to determine the reasonable maximum exposure for one particular receptor given each of the potential pathways for a particular contaminant.

The extent of contaminant migration was based on analysis of limited data from the field survey. In some locations the data was used to find closure on the areal extend of a contaminant, however, closure was often qualitatively estimated through assessment of the geology and hydrology data. The resulting estimate of contaminant areal extent was conservative in order to over predict the contamination area and therefore over estimate the potential risk. Mercury, barium and arsenic were found throughout the site at concentrations less than that found in the background sample. For example, in addition to the 20,000m^2 area of significant barium concentrations greater than background, some 100,000m^2 were identified at less than background. Due to the uncertainty associated with one background sample, all exposures were included in the risk assessment. Results were then interpreted to account for the portion of the total risk which is associated with background concentrations. In general all contaminant concentrations were near the lower level guidelines except for one lead hot spot.

E-4 TOXICITY ASSESSMENT

E-4.1 SITE CONTAMINANT TOXICITIES

The ten site contaminants identified from the exposure assessment as potential risk concerns were evaluated for both carcinogenic and non-carcinogenic human toxicity. Reference toxicity data including the associated uncertainties were collated for all contaminants identified in all 21 DEW Station Sites and presented in Volume 2, Subsection 6.2. The carcinogen slope factors and non-carcinogen reference dose toxicity measures from this reference are presented in Table E-5 for each of the contaminants. A carcinogenic risk slope factor is unverified at present for lead. The U.S. EPA considers the contaminants for which no slope factors are given as less likely carcinogens. Chronic reference doses were available for all contaminants except PCB and lead. PCBs are considered carcinogens and due to the present lack of knowledge about lead, its reference dose was based on cleanup guidelines as recommended by the U.S. EPA.

Toxicity data were not presented in Table E-5 for the volatile ethylenes and benzene nor the pentachlorophenol because estimated exposures were not significant.

TABLE E-5 BAR-2 SITE: CONTAMINANT TOXICITIES

Site Contaminant	Slope Factor Risk Per Unit Dose $(mg/kg/day)^{-1}$	Chronic Reference Dose (mg/kg/day)	Caribou Safe Dose (mg/kg day)	Grass Safe Concentration (mg/kg)
Mercury	-	8×10^{-5}	1×10^{-3}	-
Lead	toxic	toxic	1×10^{-2}	7
TPH	-	1×10^{-1}	70	-
PCB	7.7	-	2×10^{-2}	3
Arsenic	15	4×10^{-4}	5×10^{-1}	7×10^{-1}
Nickel	1.05	2×10^{-3}	2×10^{-2}	3
Selenium	-	3×10^{-3}	-	-
Barium	-	7×10^{-2}	-	-
PAH	11.5-6.1*	3×10^{-2}**	3×10^{-2}*	-
Toluene	-	2×10^{-1}	3×10^{-3}	-

*Benzo(a)pyrene2

**Pyrene

A potential acute exposure to lead was identified. Acute toxicity data is not published in IRIS at this time and lead cleanup guidelines were used to evaluate the potential risk.

The environmental risk assessment was based on a review of the limited toxicity data to determine safe levels of contaminant intake or ambient concentrations for caribou, and grasses. Safe intake values were available for seven contaminants based on exposure to dairy cows, and plants and these values were assumed representative for caribou, and grasses as given in Table E-5.

E-4.2 UNCERTAINTY ASSESSMENT

Uncertainties associated with the carcinogenic and non-carcinogenic human toxicity data and the environmental toxicity data were generally described in Volume 2. Specific impacts for the BAR-2 contaminants are summarized in this subsection.

Arsenic is classified by the U.S. EPA as a known human carcinogen. PCBs, lead, nickel, and benzo (a) pyrene, a PAH, are classified as probable carcinogens based on animal data while cadmium is a probable carcinogen based on limited human data. The chronic reference doses were based on varying uncertainty factors depending on the contaminant as described in Volume 2. The largest uncertainty factor of 3000 was associated with Pyrene, a PAH. Pyrene was used as a surrogate for all non-carcinogenic PAHs found on site because it is associated with a conservative reference dose. The TPH chronic reference dose was based on an acceptable daily intake value for petroleum distillates. TPH is a mixture of many components whereas toxicity values are estimated for specific components and therefore an acceptable daily intake for a mixture of petroleum distillates was used as a generic reference.

E-5 RISK CHARACTERIZATION

Results from the BAR-2 site exposure assessment presented in Subsection E-3 and toxicity assessment presented in Subsection E-4 were integrated in order to characterize the site-specific risk. As described in Volume 2, Section 3.0, the methods for characterizing non-carcinogenic risk are different from those used for carcinogenic risk. The quantification of BAR-2 site risk has therefore been segregated according to these categories as presented in the following subsections.

E-5.1 CARCINOGENIC RISK

Native carcinogenic risks were estimated for contaminant intakes from each of the relevant pathways identified in the exposure assessment. Worker risks were less than native risks based on the conservative native exposure assumptions and therefore native risks provided the maximum potential individual risks. The chronic daily intake estimated from the exposure assessment was multiplied by the slope factor identified in the toxicity assessment in order to quantify the carcinogenic risk. This risk is defined as the incremental cancer risk over the lifetime of a native who is exposed at the BAR-2 site.

Lead is considered a potential carcinogen by the U.S. EPA however a slope factor has not yet been determined and therefore the Quebec Soil Contamination Guidelines for cleanup of lead were used as recommended to characterize the risk. Lead concentrations in soils varied from 11-160 mg/kg for all locations except POL 2 where lead concentrations varied from 96-1900 mg/kg. These values were compared to the guideline of 600 mg/kg for implementing corrective measures or restricting land use. Based on these guidelines, there may be potential for health risks from the approximately 18,000 m^2 of POL 2. Otherwise the risks from lead were considered small.

Results have been summarized in Table E-6. and as may be seen the total carcinogenic risk was estimated at $\leq 5 \times 10^{-6}$. Based on the U.S. EPA site remediation goal of

TABLE E-6 BAR-2 SITE: NATIVE CARCINOGENIC RISK ESTIMATES

Pathway	Contaminant	Chronic Daily Intake (10^{-6} mg/kg day)	Slope Factor Risk per Unit Dose (mg/kg day)$^{-1}$	Risk
Ingestion of Soil	PCB	0.0002	7.7	2×10^{-9}
	Arsenic	0.03	15	5×10^{-7}
	PAH	0.00003	11.5	3×10^{-10}
TOTAL				3×10^{-7}
Dermal Contact of Soil	PCB	0.01	7.7	8×10^{-8}
	Arsenic	2	15	3×10^{-5}
	PAH	0.002	11.5	2×10^{-8}
TOTAL				2×10^{-5}
Inhalation of Airborne Contaminants	PCB	0.005	7.7	4×10^{-8}
	Arsenic	1	15	2×10^{-5}
	Nickel	4	1.05	4×10^{-6}
	PAH	0.4	6.1	2×10^{-6}
TOTAL				3×10^{-5}
Ingestion of Water	Arsenic	0.2	15	3×10^{-6}
Ingestion of Caribou	PCB	0.00006	7.7	5×10^{-10}
	Arsenic	0.0001	15	2×10^{-9}
	PAH	0.00004	11.5	5×10^{-10}
TOTAL				3×10^{-9}
BAR-2 Site Total Carcinogen Risk				5×10^{-5}

reducing cancer risks below 10^{-4}, the BAR-2 carcinogenic risk is less than criteria. The principal contributor was arsenic intake from the dermal contact of soil and inhalation pathways as shown in the distribution of risk given in Figure E-2. As previously shown, arsenic concentrations were less than typical background values in the region and therefore the incremental arsenic risk above background would be less than that used in this assessment. Carcinogenic risks for the worker will be less than those estimated above for the native due to the fewer intake pathways. Sensitivity analyses were also carried out for native children and the final risk results were not significantly different due to the inherent uncertainties in the assessment.

E-5.2 NON-CARCINOGENIC RISK

The native non-carcinogenic risk of the BAR-2 site was quantified based on a hazard index previously described in Volume 2, Subsection 3.0. For each contaminant in each pathway identified from the exposure assessment, the chronic daily intake was divided by the comparative reference dose determined from the toxicity assessment. This hazard quotient calculated for each contaminant was summed in order to calculate a pathway total and each pathway total was summed in order to calculate the total exposure hazard index. Should the hazard index exceed unity (1.0) then the contaminant exposure level exceeds the reference and there may be concern for potential non-cancer effects.

The BAR-2 site worker non-carcinogenic hazard index results are summarized in Table E-7. As may be seen dermal contact of soil contributed the largest amount to the risk index. Arsenic was the most significant contaminant as shown in the distribution of hazard quotients given in Figure E-3. The hazard index totals 1×10^{-2} which is much less than the unity criteria and therefore non-carcinogenic risk is considered small.

Non-carcinogenic risks for the worker again will be less than those estimated above for the native due to the reduced exposure.

The estimated contaminant intakes for caribou and grasses were compared to estimated safe values to characterize risk in a method similar to that used for human non-carcinogenic risk assessment. The sum of all hazard quotients in caribou was significantly smaller than the unity criterion and therefore caribou risks are considered small. Likewise, the hazard quotients for PCBs, arsenic, and nickel in grasses were less than unity. The lead hazard quotient for grasses was near unity and therefore there may be potential risks to plant health in the locations identified in Subsection E-2.2. The estimated intakes for the remaining contaminants were small, however, toxicity information was not available and therefore risks could not be quantified.

E-5.3 UNCERTAINTY ASSESSMENT

The uncertainties inherent in the risk assessment were documented in each of the data evaluation, exposure assessment, and toxicity assessment sub-tasks. Conservative assumptions were used to deal with the combination of uncertainties in order to ensure the final results were represented an over estimation of the risks. Quantitative risk estimates have been presented for both carcinogenic and non-carcinogenic hazards however the qualitative assessments and evaluations of uncertainties form an integral part of the results.

The carcinogenic risks were quantified for four contaminants and qualitatively assessed for lead. Results were based on conservative assumptions and therefore actual risks are considered to be lower than those presented in this report. The carcinogenic risk is defined as a probability of developing cancer, not of dying from cancer and the U.S. EPA weight-of-evidence classification for each contaminant varied as previously described. The weight of carcinogenic evidence for lead is uncertain at this time.

TABLE E-7 BAR-2 SITE: NATIVE NON-CARCINOGENIC HAZARD INDEX

Pathway	Contaminant	Chronic Daily Intake (10^{-6} mg/kg day)	Chronic Reference Dose (10^{-6} mg/kg day)	Hazard Quotient
Ingestion of Soil	Mercury	0.0001	80	1×10^{-6}
	Barium	0.6	70,000	9×10^{-6}
	TPH	0.1	100,000	1×10^{-6}
	Arsenic	0.03	400	8×10^{-5}
	Toluene	0.00003	200,000	1.5×10^{-10}
	Nickel	0.1	20,000	5×10^{-6}
	PAH	0.0003	3,000	1×10^{-7}
TOTAL				9×10^{-5}
Dermal Contact of Soil	Mercury	0.007	80	9×10^{-5}
	Barium	31	70,000	4×10^{-4}
	TPH	5	100,000	5×10^{-5}
	Arsenic	2	400	5×10^{-3}
	Toluene	0.002	200,000	1×10^{-8}
	Nickel	5	20,000	3×10^{-4}
	PAH	0.02	3,000	7×10^{-6}
TOTAL				6×10^{-3}
Inhalation	Mercury	0.01	80	1×10^{-4}
	Barium	18	70,000	3×10^{-4}
	TPH	3	100,000	3×10^{-5}
	Arsenic	1	400	3×10^{-3}
	Toluene	0.0003	200,000	2×10^{-9}
	Nickel	4	20,000	2×10^{-4}
	PAH	0.02	3,000	7×10^{-6}
TOTAL				4×10^{-3}
Ingestion of Water	Barium	0.3	20,000	4×10^{-6}
	Arsenic	0.2	400	5×10^{-4}
TOTAL				5×10^{-4}
Ingestion of Caribou	Mercury	0.002	80	3×10^{-5}
	Arsenic	0.0001	400	3×10^{-7}
	Nickel	0.002	20,000	1×10^{-7}
	PAH	0.00004	3,000	1×10^{-8}
TOTAL				3×10^{-5}
BAR-2 Site Total Exposure Hazard Index				1×10^{-2}

Bar-2 Site Carcinogenic Risk
(Total=6 x10-5)

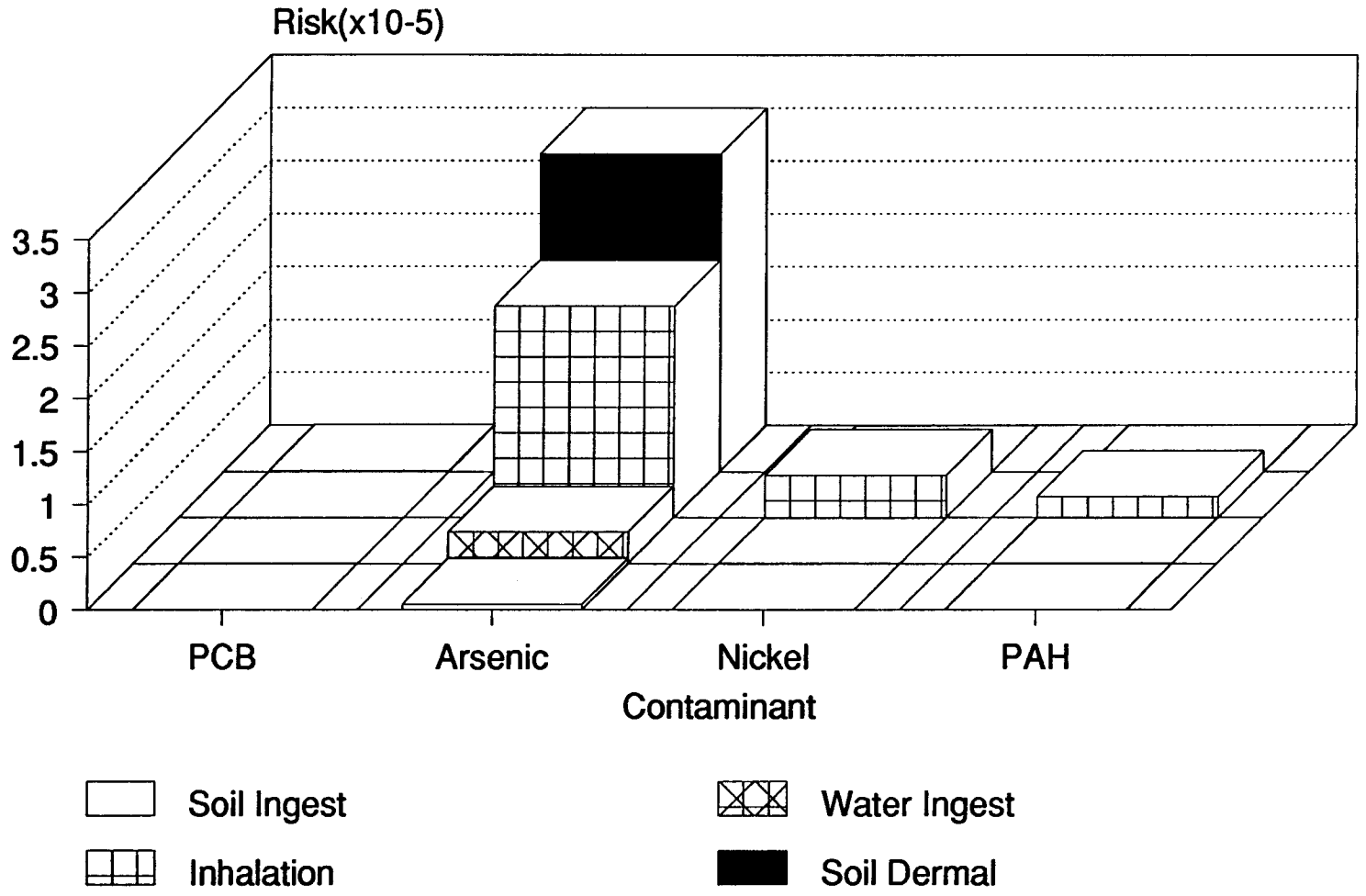

FIGURE 5-2

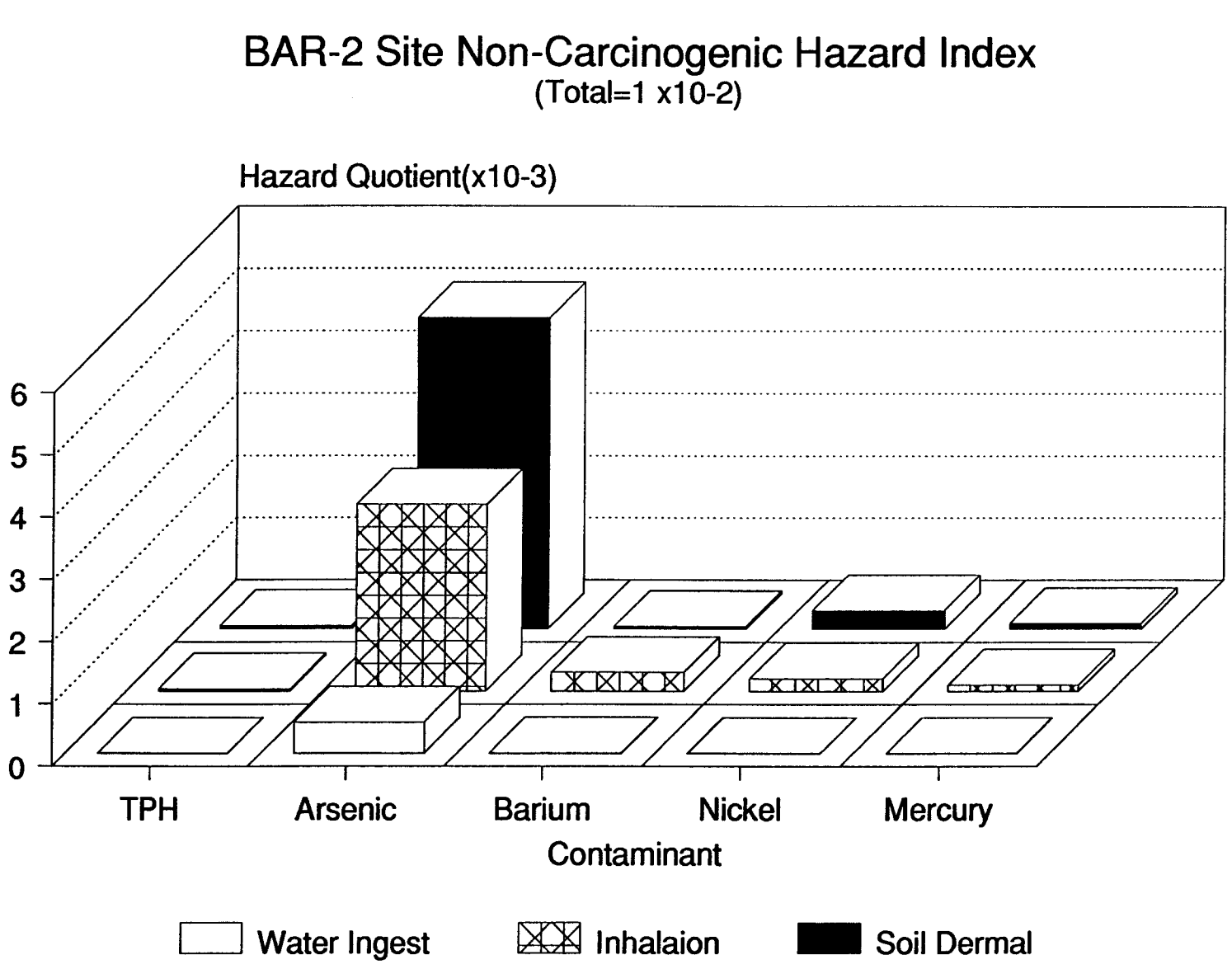
BAR-2 Site Non-Carcinogenic Hazard Index
(Total=1 x10-2)
Hazard Quotient(x10-3)
6
5
4
3
2
1
0
TPH
Arsenic
Barium
Nickel
Mercury
Contaminant
Water Ingest
Inhalaion
Soil Dermal

FIGURE E-3

The total site non-carcinogenic hazard index was developed by summing the hazard quotients from each contaminant in each pathway. As previously discussed the uncertainties associated with both the exposure assessment and toxicity assessment vary for each contaminant and the uncertainties associated with summing hazard quotients also depend on the contaminant mixture among other factors. As a first order approximation the hazard quotient was based on conservative assumptions and therefore presents an over estimation of the potential site risk. The BAR-2 hazard index of 1×10^{-2} is much less than the unity criterion and represents a risk for which even sensitive populations are unlikely to experience adverse health effects.

Although there were uncertainties due to the limited number of water analyses carried out, the results were used to estimate incremental risk to caribou through water pathways.

The uncertainty associated with the background sampling was discussed previously, and if only the incremental risk of arsenic above background was considered, the total estimated risk would be reduced. The background significance was a variable in developing cleanup recommendations for the BAR-2 site.