4.1.7 S-10192 Polar Continental Shelf (PCS) Facilities

4.1.7.1 Location and Site Description

The PCS Facilities are made up of a series of trailers and other temporary structures that are used as offices, laboratories and accommodations. This area is located east of Eureka's main camp. The facilities also have their own generator which is kept in a shed and several barrels and a day tank are located outside the shed. Stains on the soil have been noted in this particular area. The site slopes gently towards the south and Slidre Fjord and the soils contains clay and silt.

4.1.7.2 Potential Receptors and Valued Ecological Components

Sparse vegetation, such as grasses exist on the site. Feces was the only sign of wildlife noted by BRI staff during the 2006 investigation. Drainage channels are also present, which drain into Slidre Fjord.

4.1.7.3 Summary of Previous Investigations

In total, 9 soil samples, including 1 field duplicate and 1 depth sample, were collected in 1998. Sample collection was concentrated on drainage pathways and visibly stained areas, particularly the area around the generator shed. The total estimated area affected by visible staining was approximately 400 m^2. The samples were analyzed for metals, PCBs, PAHs and TPH (Table XCI). The only contaminant of concern in this area was TPH, which exceeded the 2,500 mg/kg criterion in 2 of the 4 samples for which it was tested. These samples were obtained from a dark stain found on the west side of the generator shed. A surface sample (98-11522) contained 61,000 mg/kg TPH (79% lubricating oil) and sample 98-11523, collected from 20-30 cm below surface at the same location, was found to contain 15,000 mg/kg as 63% fuel oil and 37% lubricating oil. No PCBs were detected and PAH concentrations remained low. The metals content in the samples remained comparable to average background concentrations.

In 2001, 11 soil samples were collected around the area including 6 depth samples and

2 duplicate pairs. None of the 4 samples contained TPH concentrations above the guidelines; 1 sample contained 130 mg/kg TPH. No inorganic elements were found in the 2 samples analyzed.

Table XCI. (S-10192) Previous contaminated soil samples.

Samples	Depth (cm)	Contaminant	Criterion (mg/kg)	Concentration (mg/kg)
98-11522	0	TPH	2,500	61,000
98-11523	20	TPH	2,500	15,000

4.1.7.4 Nature and Extent of Contamination

In 2006, 2 soil samples were collected and analyzed for TPH (Table XCII). Two (2) test pits were dug in the vicinity of the generator hut and the samples were retrieved from within (Photograph 68, Appendix A). Sample 06PC0103, retrieved from 10-15 cm depth, was found to exceed the criteria for fraction 1 (770 mg/kg), BTEX (770 mg/kg) and fraction 2 (4,600 mg/kg) hydrocarbons. Fraction 3 hydrocarbons were also detected, but at a low concentration. Sample 06PC0104 also contained some hydrocarbons, but at concentrations that did not approach the criteria.

4.1.7.5 Recommendations

Delineation should be performed on this site during the next field visit. The collection of approximately 8 more soil samples is recommended for the evaluation of petroleum hydrocarbon and PAH contamination on the west side of the PCS Generator building.

Table XCII. (S-10192) Polar Continental Shelf Facilities results.

	PARAMETERS	SOIL			Polar Continental Shelf Facilities (S-10192) SOIL	
		UNITS	INDUSTRIAL GUIDELINES (Coarse)	DETECTION LIMIT	06PC0103 10-15 cm 06/30/06	06PC0104 25 cm 06/30/06
PETROLEUM HYDROCARBONS	Benzene	mg/kg	0.03	0.02	ND	ND
	Toluene	mg/kg	0.37	0.02	ND	ND
	Ethylbenzene	mg/kg	0.08	0.02	ND	ND
	o-Xylene	mg/kg	---	0.02	ND	0.04
	p+m-Xylene	mg/kg	---	0.04	ND	ND
	Total Xylene	mg/kg	11	0.04	ND	0.04
	F1 (C6-C10 Hydrocarbons)	mg/kg	310	10	770	41
	F1 (C6-C10) -BTEX	mg/kg	310	10	770	41
	F2 (C10-C16 Hydrocarbons)	mg/kg	760	10	4,600	140
	F3 (C16-C34 Hydrocarbons)	mg/kg	1,700	10	100	14
	F4(C34-C50 Hydrocarbons)	mg/kg	3,300	10	ND	ND

ND Not detected
NA Non available
Higher than the criteria

Figure 55. (S-10192) Eureka Polar Continental Shelf Facilities map.

4.1.8 S-10525 Barrel Dump

4.1.8.1 Location and Site Description

The Barrel Dump area is located east of the accommodations building (Figure 56). Here, the remaining contents of barrels are burned and crushed and then buried under a small amount of fill (Photograph 69, Appendix A).

The barrels are primarily aviation fuel drums, generated by DND, the Polar Continental Shelf (PCS), Bradley Air and Kenn Borek Air. The east side of the site features the barrel crusher, 2 incineration reservoirs (cut-open day tanks) in which any excess fuel is burnt, and a fuel delivery system that comprises of a trough and piping between the crusher and the reservoirs.

The configuration of the site has been altered somewhat since 1999 and equipment tends to be relocated each year. In 2006, 2 tarps were present on the site; 1, where sample 06BL0106 was collected, was being used for emptying the old barrels before they would get crushed and the other contained some old soil of unknown origin and history, (Photograph 70, Appendix A). BRI staff observed on-site at least 2 old flat areas where old barrels were buried, which suggests that other such areas exist. A lot of old barrels had still not been buried during the time of the investigation.

This area is not contained and ESG and BRI have noted many hydrocarbon stains throughout the area. The site remains active although the practice of burning fuels and crushing and burying barrels has been significantly reduced since 1999.

The land is fairly flat, but slopes gently toward the south and the bay. The soil is comprised mainly of clays and small rocks.

4.1.8.2 Potential Receptors and Valued Ecological Components

No vegetation has been noted in this area, but wildlife such as muskoxen, wolves and hares have been spotted in the vicinity. There are some drainage channels in this area, and the site's proximity to the bay is of concern. No human activities occur on the site.

4.1.8.3 Summary of Previous Investigations

A total of 11 soil samples, including 1 duplicate pair, were collected in 1998. Sampling was concentrated around stained areas and particularly around the incineration reservoirs and drainage pathways. Some soil samples were analyzed for metals, PCBs, PAHs and TPH (Table XCIII). TPH was the only contaminant of concern. The highest concentrations of TPH were found in samples 98-11534 and 98-11535, which contained 24,000 mg/kg and 11,000 mg/kg, respectively, as 100% fuel oil. Additionally, both of these samples contained metals concentrations comparable to the average background levels. No PCBs were detected and any detected PAHs remained well below the applicable criteria. Public Works and Government Services Canada (PWGSC 1998a) performed an audit in 1998 but they did not find any contamination on the site.

In 1999, 45 delineation soil samples, including 2 depth samples and 5 duplicate pairs, were collected around the barrel dump along a 12 m x 6 m grid that covered approximately 2,300 m^2. Every sample was analyzed for TPH and 2 were tested for glycol. Three (3) samples contained TPH at detectable levels but none exceeded the 2,500 mg/kg criterion. No glycol was detected. The total area affected by hydrocarbon contamination surpassing the 2,500 mg/kg criterion was estimated at 220 m^2 with a total volume affected of 56 m^3.

Another 32 soil samples, including 4 depth samples and 2 duplicate pairs, were collected in 2001 and tested for TPH and metals. None of these were found to exceed the applicable criteria.

Table XCIII. (S-10525) Previous contaminated soil samples.

Samples	Depth (cm)	Contaminant	Criterion (mg/kg)	Concentration (mg/kg)
98-11534	0	TPH	2,500	24,000
98-11535	0	TPH	2,500	11,000

4.1.8.4 Nature and Extent of Contamination

Two (2) soil samples were collected in the summer of 2006. One (1) was collected in a test pit 20 cm away from the green crusher (Photograph 71, Appendix A). Both were analyzed for TPH and 1 was analyzed for metals (Table XCIV). None of the metals exceeded the applicable criteria. TPH was found in sample 06BL0107, collected from the new location of the barrel crusher. Contaminants included 0.44 mg/kg toluene, 1,400 mg/kg fraction 2 hydrocarbons, 43,000 mg/kg fraction 3 hydrocarbons and 3,700 mg/kg fraction 4 hydrocarbons.

4.1.8.5 Recommendations

A delineation should be performed on this site during the next field visit. The collection of 5 more soil samples including one depth sample is recommended where sample 06BL0107 was collected (where the crusher was in 2006). Five more soil samples should be also collected south of 06BL0107, also where contamination was found. If possible, special attention should be paid to the previous crusher locations and the samples should be analyzed for PAHs, TPH and BTEX.

Additionnaly, the evaluation of the old barrel burial area is important to establish the possibility of contaminant migration via the drainage pathway toward the bay. This should include occasional monitoring.

Table XCIV. (S-10525) Barrel Dump results.

	PARAMETERS	SOIL			Barrel Dump (S-10525) SOIL	
		UNITS	INDUSTRIAL GUIDELINES (Coarse)	DETECTION LIMIT	06BL0106 20 cm 06/30/06	06BL0107 0-10 cm 06/30/06
METALS	Arsenic (As)	mg/kg	12	0.27	NA	8.6
	Barium (Ba)	mg/kg	2,000	5	NA	84
	Cadmium (Cd)	mg/kg	22	0.22	NA	2
	Chromium (Cr)	mg/kg	87	3	NA	48
	Cobalt (Co)	mg/kg	300	1.9	NA	10
	Copper (Cu)	mg/kg	91	2.1	NA	25
	Lead (Pb)	mg/kg	600	1.2	NA	120
	Manganese (Mn)	mg/kg	---	1.1	NA	335
	Molybdenum (Mo)	mg/kg	40	1.4	NA	5
	Nickel (Ni)	mg/kg	50	0.6	NA	19
	Selenium (Se)	mg/kg	3.9	0.5	NA	0.5
	Silver (Ag)	mg/kg	40	0.4	NA	<2
	Tin (Sn)	mg/kg	300	0.8	NA	<5
	Zinc (Zn)	mg/kg	360	2.5	NA	132
PETROLEUM HYDROCARBONS	Benzene	mg/kg	0.03	0.02	ND	ND
	Toluene	mg/kg	0.37	0.02	ND	0.44
	Ethylbenzene	mg/kg	0.08	0.02	ND	ND
	o-Xylene	mg/kg	---	0.02	ND	0.06
	p+m-Xylene	mg/kg	---	0.04	ND	0.08
	Total Xylene	mg/kg	11	0.04	ND	0.14
	F1 (C6-C10 Hydrocarbons)	mg/kg	310	10	ND	11
	F1 (C6-C10) -BTEX	mg/kg	310	10	ND	11
	F2 (C10-C16 Hydrocarbons)	mg/kg	760	10	ND	1,400
	F3 (C16-C34 Hydrocarbons)	mg/kg	1,700	10	24	43,000
	F4(C34-C50 Hydrocarbons)	mg/kg	3,300	10	ND	3,700

ND Not detected
NA Not available
Higher than the criteria

Figure 56. (S-10525) Eureka Barrel Dump map.

4.1.9 S-10526 New Grey Water Outfall

4.1.9.1 Location and Site Description

The New Grey Water Outfall pipe extends approximately 75 m south, starting from the new accomodations building where it is connected to the bioreactor, and discharging into an unlined lagoon that collects the grey water (ESG 1999) (Photographs 72-73, Appendix A). The temporary outfall was dismantled in 1998. A small shed with an antenna was located southeast of the lagoon.

The land in the area is flat at the top where the accommodations building is located. After that, there is 1 moderate slope drop near the area around the lagoon and finally, a light slope which heads toward the fjord, approximately 0.5 to 1 km downgradient. Several pools of standing water were observed during the 2006 field work around the lagoon.

4.1.9.2 Potential Receptors and Valued Ecological Components

BRI staff observed signs of wildlife during the summer, 2006 field visit, such as feces from Arctic hares. Grass and small plants were present all around the area. Several pools of standing water were present on site and the lagoon contained algae. This could potentially attract birds or small animals, although none were observed during the investigation. Human activities are rare in this area, except during the sampling of the lagoon.

4.1.9.3 Summary of Previous Investigations

A temporary outfall was being used in 1998 while the new sewage lagoon was being constructed. Water samples collected from the outfall were found to contain copper (880 µg/L), nickel (400 µg/L), cobalt (170 µg/L), lead (270 µg/L), zinc (3,700 µg/L), chromium (480 µg/L) and total phosphorus (7,500 µg/L). (Table XCV) All of these concentrations exceeded the Guidelines for Effluent Quality and Wastewater Treatment

at Federal Establishments (EC 1976). The question remained as to whether these elevated concentrations were simply a result of the newness of the bioreactor and if these levels would correct themselves over time.

Subsequent testing was performed in 1999 after the completion of the new lagoon and the new outfall pipe. Two (2) samples were collected in June of 1999 (midseason) and 1 more in July of 1999 (potential maximum efficiency) in order to indetify any changes in contaminant levels. (Table XCV) These were analyzed for metals, phenol, glycol, total phosphorus, nitrate, nitrite, pH and total suspended solids (TSS). The effluent sample collected in June revealed levels of phenol and total phosphorus that exceeded the applicable criteria[6] and TSS and total phosphorus exceeded the criteria in the July effluent sample. In all samples, copper and zinc remained below the criteria by at least an order of magnitude.

Table XCV (S-10526) Previous contaminated WATER samples.

Samples	Depth (cm)	Contaminant	Criterion (ug/L)	Concentration (ug/L)
Composite 1998	0	COPPER (CU)	200	880
		NICKEL (NI)	200	400
		COBALT (CO)	50	170
		LEAD (PB)	50	270
		ZINC (ZN)	1,000	3,700
		CHROMIUM (CR)	10	480
		PHOSPHORUS	7,500	7,500
99-07248W	0	PHENOL	20	118,000
	0	PHOSPHORUS	7,500	12,700
EUR-99-04W	0	PHOSPHORUS	7,500	16,800
	0	TSS	52,000	630,000
EUR-99-05W	0	TSS	52,000	190,000

[6] Coming from the guideline for Effluent Quality and Wastewater Treatment at Federal Extablishments (EC 1976)

4.1.9.4 Nature and Extent of Contamination

A total of 6 samples were obtained in 2006. This included 3 surface water samples, 2 freshwater sediment samples and 1 surface soil sample. The freshwater samples were analyzed for metals, phenol and glycol (Table XCVI), with none of them surpassing any of the applicable criteria. The sediment samples were analyzed for metals and 3 were found to exceed several criteria: samples 06SO0130 and 06SO0131 exceeded the 5.9 mg/kg ISQG criterion for arsenic, with concentrations of 9.6 mg/kg and 9.0 mg/kg, respectively. Sample 06SO0131 also exceeded the criteria for cadmium (1 mg/kg) and copper (51 mg/kg). It is not known whether sample 06SO0130 exceeded the criterion for cadmium, as the result was less specific than the criterion.

4.1.9.5 Recommendations

No more work is required for this site. However, a regular evaluation including sampling of the water is necessary. Next year, the arsenic and cadmium found in the sediment should be compared to the background sample results to determine whether it was contaminated or not.

	SOIL		FRESH SEDIMENT				New Grey Water Outfall (S-10526)					
							Freshwater			Fresh sediment		Soil
NITS	INDUSTRIAL GUIDELINES (Coarse)	DETECTION LIMIT	UNITS	GUIDELINES AQUATIC LIFE (1) ISQG	(2) PEL	DETECTION LIMIT	06WO0133 Surf. Water 07/01/06	06WO0134 Surf. Water 07/01/06	06WO0135 Surf. Water 07/01/06	06SO0130 Surf. Sed 06/30/06	06SO0131 Surf. Sed. 06/30/06	06SO0132 0-10 cm 06/30/06
g/kg	12	0.27	mg/kg	5.9	17	0.27	0.001	≤0.001	≤0.001	9.6	9	9.6
g/kg	2,000	5	mg/kg	---	---	5	0.01	0.02	0.05	78	132	54
g/kg	22	0.22	mg/kg	0.6	3.5	0.22	≤0.001	≤0.001	≤0.001	≤1	1	≤1
g/kg	87	3	mg/kg	37.3	90	3	0.004	0.005	0.002	26	29	24
g/kg	300	1.9	mg/kg	---	---	1.9	0.001	0.002	≤0.001	14	13	12
g/kg	91	2.1	mg/kg	35.7	197	2.1	0.035	0.039	0.003	27	51	26
g/kg	600	1.2	mg/kg	35	91.3	1.2	0.001	0.001	0.001	11	15	11
g/kg	---	1.1	mg/kg	---	---	1.1	0.264	0.273	0.132	350	256	289
g/kg	40	1.4	mg/kg	---	---	1.4	0.001	≤0.001	0.001	≤2	≤2	≤2
g/kg	50	0.6	mg/kg	---	---	0.6	0.008	0.013	0.007	29	28	24
g/kg	3.9	0.5	mg/kg	---	---	0.5	≤0.001	≤0.001	≤0.001	1.6	1.9	1.6
g/kg	40	0.4	mg/kg	---	---	0.4	≤0.001	≤0.001	≤0.001	≤2	≤2	≤2
g/kg	300	0.8	mg/kg	---	---	0.8	0.001	0.002	≤0.001	≤5	11	≤5
g/kg	360	2.5	mg/kg	123	315	2.5	0.06	0.11	≤0.01	81	113	79
g/kg	---	2	mg/kg	---	---	2	≤0.07	≤0.07	≤0.02	NA	NA	NA
g/kg	---	---	mg/kg	---	---	---	0.65	≤0.04	≤0.01	NA	NA	NA
g/kg	5	0.03	mg/kg	---	---	0.03	≤0.4	≤0.3	NA	NA	NA	NA
g/kg	5	0.02	mg/kg	---	---	0.02	≤0.4	≤0.3	NA	NA	NA	NA
g/kg	5	0.02	mg/kg	---	---	0.02	≤0.4	≤0.3	NA	NA	NA	NA
g/kg	5	0.02	mg/kg	---	---	0.02	≤0.4	≤0.3	NA	NA	NA	NA
g/kg	5	0.02	mg/kg	---	---	0.02	≤0.4	≤0.3	NA	NA	NA	NA
g/kg	5	0.01	mg/kg	---	---	0.01	≤0.4	≤0.3	NA	NA	NA	NA
g/kg	5	0.02	mg/kg	---	---	0.02	≤0.4	≤0.3	NA	NA	NA	NA
g/kg	5	0.02	mg/kg	---	---	0.02	≤0.4	≤0.3	NA	NA	NA	NA
g/kg	5	0.02	mg/kg	---	---	0.02	≤0.4	≤0.3	NA	NA	NA	NA
g/kg	5	0.04	mg/kg	---	---	0.04	≤0.4	≤0.3	NA	NA	NA	NA
g/kg	5	0.02	mg/kg	---	---	0.02	≤0.4	≤0.3	NA	NA	NA	NA
g/kg	5	0.03	mg/kg	---	---	0.03	≤0.4	≤0.3	NA	NA	NA	NA
g/kg	5	0.01	mg/kg	---	---	0.01	≤0.4	≤0.3	NA	NA	NA	NA
g/kg	5	0.04	mg/kg	---	---	0.04	≤0.4	≤0.3	NA	NA	NA	NA
g/kg	5	0.01	mg/kg	---	---	0.01	≤0.4	≤0.3	NA	NA	NA	NA
g/kg	5	0.02	mg/kg	---	---	0.02	≤0.4	≤0.3	NA	NA	NA	NA
g/kg	5	0.02	mg/kg	---	---	0.02	≤0.4	≤0.3	NA	NA	NA	NA
g/kg	7.6	0.02	mg/kg	---	---	0.02	≤0.4	≤0.3	NA	NA	NA	NA
g/kg	3.8	0.06	mg/kg	---	---	0.06	≤0.4	0.4	NA	NA	NA	NA
g/kg	10	0.03	mg/kg	---	---	0.03	≤0.4	≤0.3	NA	NA	NA	NA
g/kg	10	0.04	mg/kg	---	---	0.04	≤0.4	≤0.3	NA	NA	NA	NA
g/kg	10	0.03	mg/kg	---	---	0.03	≤0.4	≤0.3	NA	NA	NA	NA
g/kg	10	0.05	mg/kg	---	---	0.05	≤0.4	≤0.3	NA	NA	NA	NA
g/kg	10	0.03	mg/kg	---	---	0.03	≤0.4	≤0.3	NA	NA	NA	NA
g/kg	10	0.04	mg/kg	---	---	0.04	≤14	≤10	NA	NA	NA	NA
g/kg	10	0.04	mg/kg	---	---	0.04	≤0.4	≤0.3	NA	NA	NA	NA
g/kg	10	0.04	mg/kg	---	---	0.04	≤14	≤10	NA	NA	NA	NA
g/kg	---	---	mg/kg	---	---	---	ND	0.4	NA	NA	NA	NA
g/kg	960	≤8	mg/kg	---	---	≤8	≤1,000	NA	≤1,000	NA	NA	NA
g/kg	---	≤4	mg/kg	---	---	≤4	≤1,000	NA	≤1,000	NA	NA	NA
g/kg	---	≤16	mg/kg	---	---	≤16	≤2,000	NA	≤2,000	NA	NA	NA
g/kg	---	≤60	mg/kg	---	---	≤60	≤10,000	NA	≤10,000	NA	NA	NA
g/kg	---	≤8	mg/kg	---	---	≤8	≤1,000	NA	≤1,000	NA	NA	NA

Figure 57. (S-10526) Eureka New Grey Water Outfall map.

4.1.10 S-10527 North Airstrip Apron

4.1.10.1 Location and Site Description

The North Airstrip Apron is located across from the DND accommodations building, on the northwest side of the airstrip, just in front off the runway (Figure 58). This area contains 4 aboveground diesel fuel storage tanks installed in 1999 but which are not protected by berms. Although they should have been removed in 1999, the 2 fuel bladders of 90,000 L capacity both were still on-site with their own liners, just north of the new fuel tanks (Photograph 74, Appendix A). They appeared to be in active use, as suggested by the attached hoses, during the 2006 investigation. Also present were a fuel pump and hoses, a windsock, 2 seacan containers and several barrels temporarily stored on the site. It appears as though some soils have been excavated since the last site study, performed in 2001. The land in this area is fairly flat and the substrate consists of soils containing clay and silt.

4.1.10.2 Potential Receptors and Valued Ecological Components

Human activities likely occur during the refueling of the tank. A pool of standing water was present on-site but no drainage channel originated from it. No signs of wildlife were noted during the 2006 investigation or during any previous studies.

4.1.10.3 Summary of Previous Investigations

A total of 11 soil samples, including 3 depth samples and 1 duplicate pair, were collected in 1998. These were analyzed for metals, PCBs and TPH (Table XCVII). PCBs were not detected in the 2 samples analyzed and the mean concentrations of metals were comparable to average background concentrations. The only contaminant of concern was petroleum hydrocarbons: 3 of 7 samples exceeded the 2,500 mg/kg criterion, with an average concentration of 11,000 mg/kg. These samples ranged in concentration from below detection limits to 27,000 mg/kg, found in a surface sample obtained from next to

the refueling equipment. The hydrocarbons consisted of 100% fuel oil. The 3 depth samples did not possess any TPH contamination above the detection limit. The patterns of contamination in the area suggested that the contaminated areas were isolated to areas around the fuel pump and to surface soils that were in the immediate area of the fuel bladders.

In 2001, 68 soil samples were collected, including 7 field duplicates and 19 depth samples. Eleven (11) samples were tested for TPH and 3 of these were found to contain TPH, but not exceeding the criteria. However, a strong hydrocarbon odour was noted in the test pit. No PCBs were detected and the metals concentrations were comparable to average background levels, with the exception of zinc. Although the concentration of zinc did not exceed the criterion, they remained higher than background levels, ranging from 15 mg/kg to 100 mg/kg, with an average of 11.2 mg/kg.

Table XCVII. (S-10527) Previous contaminated soil samples.

Samples	Depth (cm)	Contaminant	Criterion (mg/kg)	Concentration (mg/kg)
98-11580/81	0	TPH	2,500	4,600
98-11583	0	TPH	2,500	27,000
98-11584	0	TPH	2,500	24,000

4.1.10.4 Nature and Extent of Contamination

Ten (10) soil samples of varying depths, including 1 duplicate field sample, were collected in the summer of 2006 and analyzed for TPH (Table XCVIII). Various TPH contaminants were found in each sample, with between 1 to 7 hydrocarbon criteria being surpassed in each sample. Benzene was detected in only 1 sample, but exceeded the criteria with a concentration of 59 mg/kg (sample 06NA0117), taken at a depth of 50 cm. Toluene was detected in 7 samples and exceeded the criterion in 4, with an average concentration of 52.5 mg/kg. Concentrations ranged from 0.03 mg/kg to 350 mg/kg. Ethylbenzene was detected in 6 samples and surpassed the criterion in each one. With concentrations ranging from 0.5 mg/kg to 91 mg/kg, the average concentration was

21.3 mg/kg. Total xylenes were detected in 9 samples and exceeded the criterion in 6. The average concentration was 111.4 mg/kg, with the lowest concentration at 0.13 mg/kg and the highest at 730 mg/kg. Fraction 1 hydrocarbons and BTEX were detected in all 10 samples, and exceeded the criterion in 9 samples. The average concentration was 2,590 mg/kg, ranging from 190 mg/kg to 9,000 mg/kg. Fraction 2 hydrocarbons exceeded the criterion in all 10 samples, ranging from 2,100 mg/kg to 16,000 mg/kg, with an average of 6,750 mg/kg. Fraction 3 hydrocarbons were detected in small amounts in all 10 samples and fraction 4 was detected in 2 samples (the duplicate pair), although neither fraction exceeded the guideline criteria. The most notable sample was 06NA0117 (located in front of the container nearest to the 4 fuel tanks), which was taken from the greatest depth and also exhibited the highest concentrations for each hydrocarbon contaminant, except for the fraction 2 hydrocarbons.

4.1.10.5 Recommendations

Delineation should be performed on this site during the next field visit to determine the extent of contamination between the on site facilities and the airstrip. This should include the collection of approximately 20 more soil samples analyzed for TPH, BTEX and PAHs.

ip Apron results.

			North Airstrip Apron (S-10527)									
SOIL			SOIL									
NITS	INDUSTRIAL GUIDELINES (Coarse)	DETECTION LIMIT	06NA0115 15-20 cm 06/30/06	06NA0116 Dup. of 0115 15-20 cm 06/30/06	06NA0117 50 cm 06/30/06	06NA0118 15 cm 06/30/06	06NA0119 0-10 cm 06/30/06	06NA0120 0-10 cn 06/30/06	06NA0121 60 cm 06/30/06	06NA0122 30 cm 06/30/06	06NA0123 5-10 cm 06/30/06	06NA0124 40 cm 06/30/06
ng/kg	0.03	0.02	ND	ND	59	ND	ND	ND	ND	ND	ND	ND
ng/kg	0.37	0.02	0.40	0.30	350	ND	0.30	0.03	15	ND	ND	1.5
ng/kg	0.08	0.02	0.5	1.2	91	ND	1.2	ND	19	ND	ND	8.7
ng/kg	---	0.02	7.3	9.1	170	1.5	7.4	0.04	55	1	ND	24
ng/kg	---	0.04	11	11	570	0.5	13	0.08	98	0.5	ND	37
ng/kg	11	0.04	18	20	730	2	20	0.13	150	1.5	ND	61
ng/kg	310	10	1,400	2,200	9,000	1,800	680	190	7,300	450	480	2,400
ng/kg	310	10	1,400	2,200	7,800	1,800	680	190	7,100	450	480	2,300
ng/kg	760	10	6,100	8,900	9,200	10,000	2,100	2,300	16,000	4,000	2,400	6,500
ng/kg	1,700	10	220	330	200	230	41	190	270	330	82	140
ng/kg	3,300	10	49	67	ND	ND	ND	ND	ND	ND	ND	ND

Figure 58. (S-10527) Eureka North Airstrip Apron map.

4.1.11 S-10528 South Airstrip Dump

4.1.11.1 Location and Site Description

The South Airstrip Dump is located on the south side of the airstrip, just west of the East Airstrip Landfill (Figure 59) and part of the area that has been proposed for a new series of landfill cells that would receive the barrels of ash that are produced by the AES incinerator (Photograph 75, Appendix A). This dump contains mostly demolition debris along with domestic garbage and ash from burning garbage.
The land slopes toward the south and the bay and is inactive.

4.1.11.2 Potential Receptors and Valued Ecological Components

The area surrounding the dump features grasses and several animal species have been noted in the area, including muskoxen, wolves and hares. A drainage channel also heads south toward the bay. No human activities occur on the site.

4.1.11.3 Summary of Previous Investigations

In 1998, 7 surface soil samples were collected, in addition to 1 plant sample. These were analyzed for metals and only 1 sample exceeded any applicable criteria (Table XCIX): sample 98-11578 contained 1,500 mg/kg copper, 29 mg/kg cadmium, 500 mg/kg lead and 4,000 mg/kg zinc, each of which was in excess of the Tier II criteria. Sample 98-11578 was collected from a pile of ash where garbage was burnt.

Table XCIX. (S-10528) Previous contaminated soil samples.

Samples	Depth (cm)	Contaminant	Criterion (mg/kg)	Concentration (mg/kg)
98-11578	0	COPPER (CU)	100	1,500
	0	LEAD (PB)	500	500
	0	ZINC (ZN)	500	4,300

4.1.11.4 Nature and Extent of Contamination

Three (3) surface soil samples were taken in the summer of 2006 and analyzed for metals (Table XCX). None of the samples exceeded any criteria, although all of the metals that were tested were seen in small quantities in all 3 samples. Arsenic reached 10.5 mg/kg in sample 06SL0112, which is just below the 12 mg/kg criterion. Polarized light microscopy did not show the presence of asbestos within the site.

4.1.11.5 Recommendations

Only one contaminated sample was detected during the previous sampling campaign and no migration of contaminants was been detected. Due to these results, no further characterization work is required for this site.

Table XCX. (S-10528) South Airstrip Dump results.

	PARAMETERS	SOIL			South Airstrip Dump (S-10528) SOIL		
		UNITS	INDUSTRIAL GUIDELINES (Coarse)	DETECTION LIMIT	06SL0112 15 cm 06/30/06	06SL0113 0-10 cm 06/30/06	06SL0114 10-15 cm 06/30/06
METALS	Arsenic (As)	mg/kg	12	0.27	10.5	7.9	8
	Barium (Ba)	mg/kg	2,000	5	75	50	60
	Cadmium (Cd)	mg/kg	22	0.22	<1	<1	<1
	Chromium (Cr)	mg/kg	87	3	24	16	22
	Cobalt (Co)	mg/kg	300	1.9	13	9	11
	Copper (Cu)	mg/kg	91	2.1	27	18	21
	Lead (Pb)	mg/kg	600	1.2	11	<10	<10
	Manganese (Mn)	mg/kg	---	1.1	303	254	301
	Molybdenum (Mo)	mg/kg	40	1.4	<2	<2	<2
	Nickel (Ni)	mg/kg	50	0.6	26	17	24
	Selenium (Se)	mg/kg	3.9	0.5	1.3	1.3	1.5
	Silver (Ag)	mg/kg	40	0.4	<2	<2	<2
	Tin (Sn)	mg/kg	300	0.8	<5	<5	<5
	Zinc (Zn)	mg/kg	360	2.5	78	50	67

ND Not detected
NA Not available
Higher than the criteria

Table XCXI. (S-10528) Mineralogical characterisation of the South Airstrip Dump.

MINERALOGICAL CHARACTERISATION BY POLARISED LIGHT MICROSCOPY	
06SL0114	
BROWN SOIL	
ASBESTOS FIBRES	**NON-DETECTED**
NAURALLY OCCURRING ORGANIC FIBRES (CELLULOSE)	**1-5%**
ANGULAR PARTICLES, FRAGMENTS AND OTHER	**>95%**

Figure 59. (S-10528) Eureka South Airstrip Dump map.

4.2 CFS-Eureka conclusion

4.2.1 Priority with FCSAP

The high priority sites at CFS-Eureka were classified using the FCSAP Contaminated Site Classification provided by CFB-Trenton (Appendix B). The list of high priority areas is as follows:

Class 1 Sites / Action required

- Sewage Lagoon

4.2.2 Special Consideration for Sites in Proximity to Fish Bearing Bodies of Water

Some sites may require special attention due to their proximity to fish-bearing bodies of water. These sites include:

- Sewage Lagoon

BRI also recommends the installation of a permanent sewage treatment facility at CFS-Eureka to properly treat sewage before it is released into the environment. This would result in the protection of this fragile environment from the introduction of potentially detrimental bacterial contaminants such as coliforms and fecal coliforms.

4.2.3 The Sites with the Highest Contamination

Provided is a list of sites with the highest contamination levels and/or sites which had 100% of their respective samples test above guideline criteria. These sites should receive special attention because of the more concentrated nature of the contamination:

- North Airstrip Apron
- Sewage Lagoon
- Barrel Dump

4.2.4 Sites Not Assessed in 2006

All of the sites at CFS-Eureka were assessed in 2006, with the exception of the Environment Canada sites, Incinerator Building (S-10189) and Power Plant (S-10188).

4.2.5 Projected Works for the Next Campaign

During the next sampling campaign, 5 delineations and 3 assessments will be necessary to determine the extent of contamination (see Appendix C for the sites). This will include approximately 170 soil analyses and 15 water analyses. Please refer to Appendix C for a compilation of the analyses planned for the next investigation.

4.2.6 Conclusion

In conclusion, due to the nature of contamination at Eureka, 3 sites do not require further investigation (West Airstrip Landfill, New Grey Water Outfall and South Airstrip Dump), as no contamination was discovered. Six (8) remaining sites require additional analyses. Eventually, the remediation of the remaining contaminated areas will have to be performed. This may include the excavation of soil for ex situ biopile treatment or employing an in situ treatment system. The team at BRI can provide more details for possible remediation during a subsequent evaluation. This includes microbiological testing during the next campaign for the evaluation of treatment possibilities.

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