III. SITE INVESTIGATIONS

A. Airstrip Dump

A complete delineation of the surface of the airstrip dump was conducted during the 2000 season. Contamination with PCBs was found at the Tier I and Tier II levels with an average value of 6.4 ppm and a maximum of 33 ppm. PCB levels in drainage channels leading from the dump were found to be less than 0.5 ppm in all eight samples taken. However, on the final day of work at the site two trial pits were dug in the dump. One produced a hole, which filled with a black liquid and a small transformer was found in the other. These findings prompted the work conducted this year.

The activities this year comprised the excavation of 8 additional pits in the dump and sampling and analysis to determine the volume of PCB contaminated soils. Sampling locations and PCB concentrations are given on Map III-1. Initially, the excavated holes from the 2000 field season and the small transformer were investigated. Two soil samples (RI01-001 and RI01-002) were taken from the edge of the water filled hole. RI01-001, taken from the north side gave a PCB result of 72 ppm whereas RI01-002 (taken from the south side) showed contamination at the low Tier II level (5.3 ppm). A water sample taken from the hole did not indicate the presence of PCBs (<0.003ppm). A sample was also taken from the hole from which the transformer was removed. In this area, there was not a lot of soil but there was a large quantity of debris including many small particles of rusted metal. Soil removed from this area tested was also CEPA with a concentration of 109 ppm. Although the location of this contamination is a source of concern, samples taken from last year and from the initial 1994 site investigation at the edge of the dump below, did not indicate the presence of any PCBs. The CEPA contamination appears to be localized.

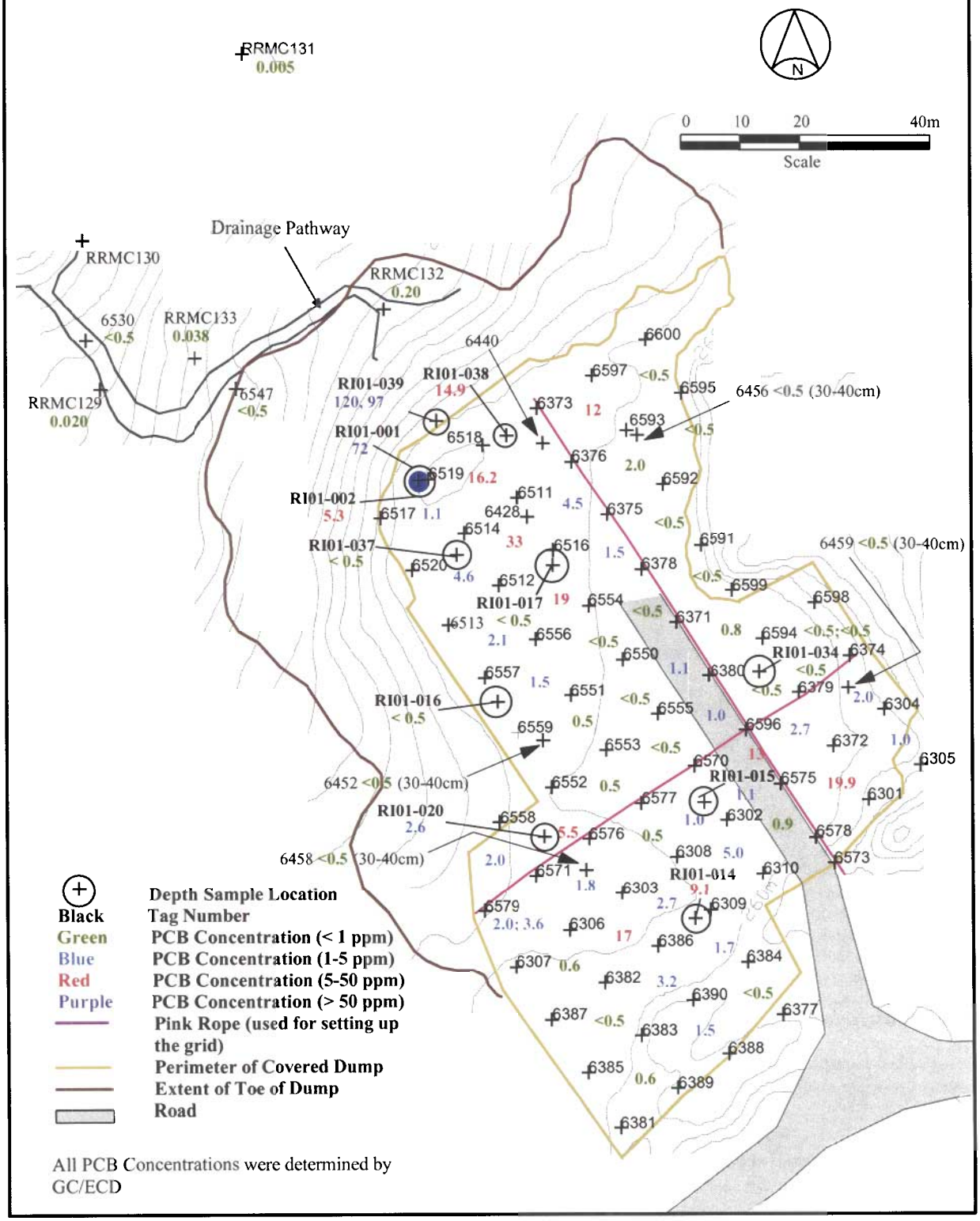
The transformer was investigated and found to contain no fluid. Oily residue from inside (RI01-E003) was analysed and indicated the presence of PCBs above CEPA levels. This transformer was, therefore, treated as if CEPA contaminated. It was transferred to the back of a trailer (lined with matasorb) and moved using an ATV vehicle to the Beach PCB Storage Facility.

In order to determine soil volumes with regard to contamination classification levels, test pits were required. Areas of interest were marked using orange stakes and an excavator was used to dig the holes. The depth of these holes ranged from 30 cm to 1.5 m

(Table III-1). The positions of these holes were mapped with GPS. Map III-2 illustrates the different PCB contamination levels at the Airstrip Dump. Sample results are in Table III-1 and the QA/QC data is compiled in Section K. While most of the PCBs were present as Aroclor 1260, a few samples contained a fraction of Aroclor 1254 or were pure Aroclor 1254. From the analytical results in Table III-1 and from other surface sample results obtained in 2000, the total amount of contaminated soil has been estimated at 50 m^3 of CEPA, 600 m^3 of Tier II and 750 m^3 of Tier I. A significant proportion of this "soil" may be in the form of metallic debris.

As a result of the work described here and the delineation work conducted last year, a new remediation plan for this dump needs to be formulated. More analytical data on PCB concentrations at various distances down slope of the toe of the dump are required. It is proposed that these samples should be taken as part of work for 2002 and analysed with low detection limits for PCBs. An accurate assessment of the impact of the landfill can then be undertaken and a final plan developed.

Map III-1: Sampling Locations and PCB Concentrations at the Airstrip Dump in 2001



All PCB Concentrations were determined by GC/ECD

Map III-2: Areas of Various Levels of PCB Contamination at the Airstrip Dump in 2001

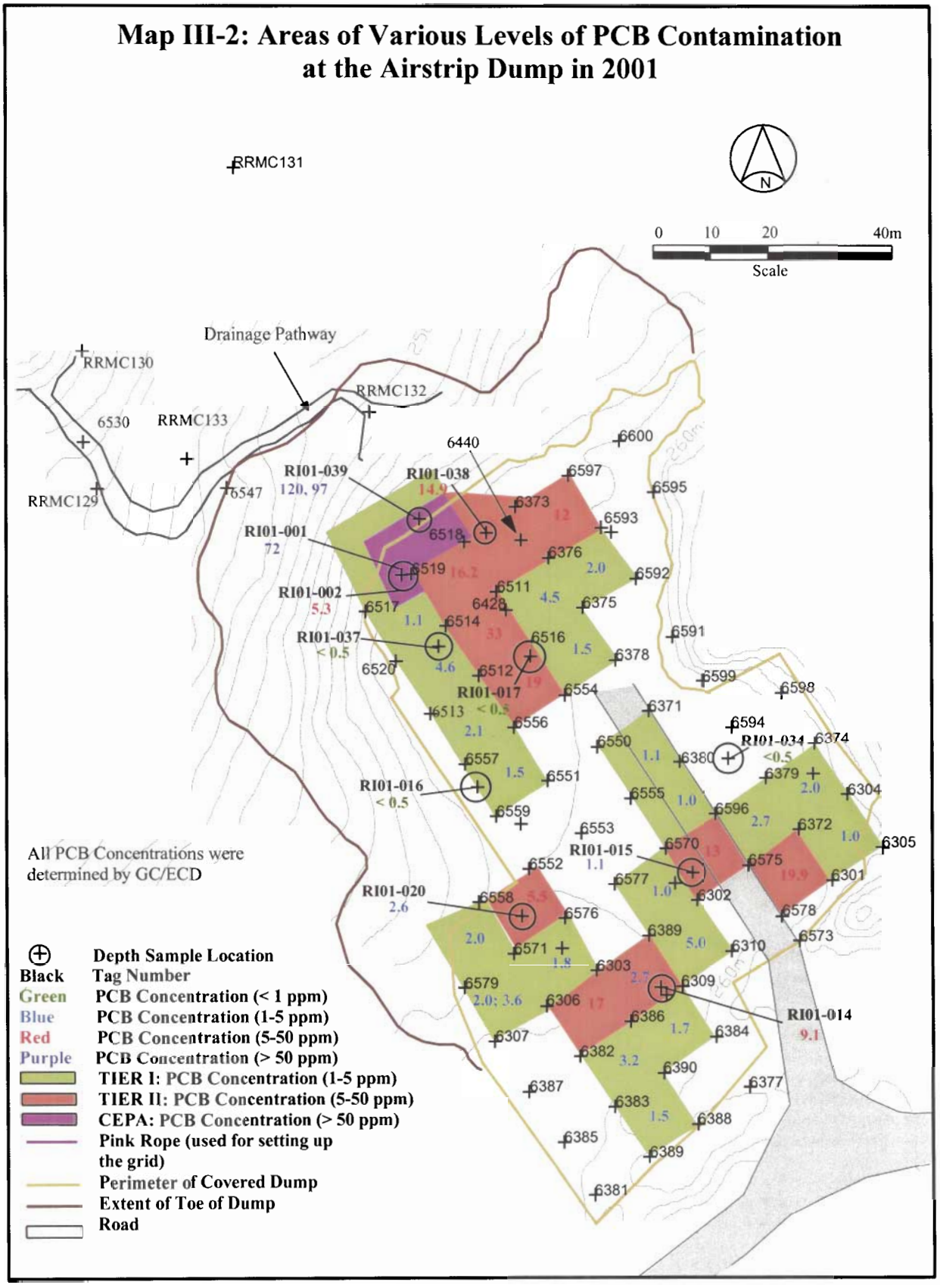


Table III-1: Sampling Locations and PCB Concentrations at the Airstrip Dump

Sample (prefix RI01-)	Location	Depth (m)	PCB Concentration by GC/ECD (ppm)
001	North end of test pit (30-40 cm) located between tags 6519 and 6428.	0.3 - 0.4	72
002	South end of test pit (20-30 cm) – same as above.	0.2 - 0.3	5.3
014	Test pit located between tags 6386 and 6390.	0.4 - 0.5	9.1
015	Test pit located between tags 6577 and 6389.	0.6 - 0.7	1.1
016	Test pit located between tags 6557 and 6559.	0.4 - 0.6	<0.5
017	Test pit located near tag 6516.	0.2 - 0.3	<0.5
020	Test pit located between tags 6558 and 6571.	0.8 - 1.0	2.6
034	Test pit located near tag 6380.	0.3 - 0.4	<0.5
037	Test pit located between tags 6520 and 6514.	0.5 - 0.6	<0.5
038	Test pit located between tags 6518 and 6373.	0.5 - 1.5	14.9
039	Test pit (1 m deep) located NW of 6518 on steep slope. Transformer was found in this area.	0.6 - 0.7	110

B. Airstrip Environmental Assessment

Investigations described in section A above show that, at least some of the airstrip dump, will require excavation. It was suggested that the area at the end of the runway might be a suitable location to construct a new landfill for non-hazardous waste generated by this excavation because of its proximity to the airstrip dump. The ASU were requested to conduct an environmental assessment of the area to ascertain if it was free from chemical contamination.

Eight soil samples were collected from the area beyond the runway. DND is responsible for the runway and all samples were taken beyond the boundary of their jurisdiction as shown on Map III-3. Samples were analysed for all chemicals listed in the Dew Line Cleanup Criteria. The results given in Table III-2 show that the area is not contaminated by any of the listed chemicals. QA/QC data is compiles in Section K.

Map III-3: Sampling Locations at the Area at the End of the Airstrip and DND boundary

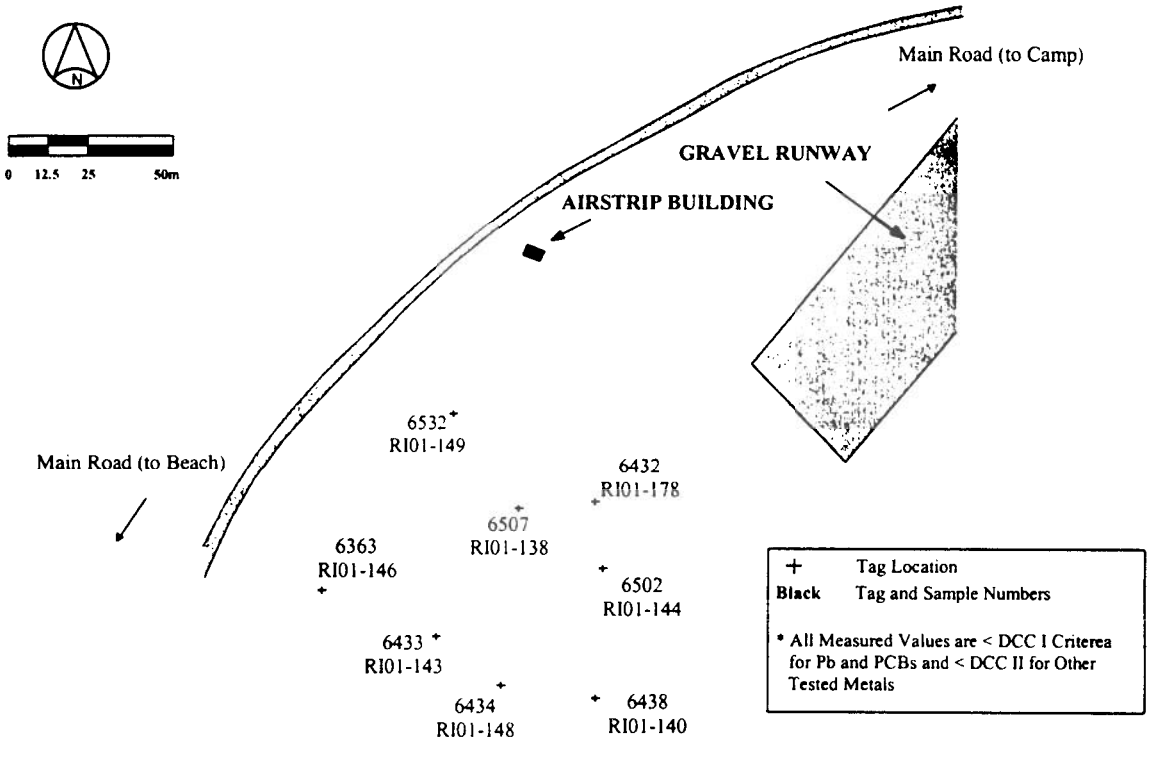


Table III-2 : PCB and Metal Concentrations in Soil at the Airstrip

Sample prefix: RI01-	PCB (ppm)	Arsenic (ppm)	Cadmium ppm)	Chromium (ppm)
138	<1.0	<1.0	<1.0	49
140	<1.0	<1.0	<1.0	42
143	<1.0	<1.0	<1.0	42
144	<1.0	<1.0	<1.0	36
146	<1.0	<1.0	<1.0	30
148	<1.0	<1.0	<1.0	43
149	<1.0	<1.0	<1.0	33
178	<1.0	<1.0	<1.0	38

Sample prefix: RI01-	Cobalt (ppm)	Copper (ppm)	Lead (ppm)	Nickel (ppm)	Zinc (ppm)
138	10.1	70	16	49	58
140	10.8	73	<10	59	51
143	15.1	61	<10	65	60
144	6.8	45	<10	29	42
146	6.8	41	<10	32	35
148	12.8	67	<10	61	59
149	12.8	55	29	45	63
178	<5.0	39	<10	13.2	33

C. S1/S4 Valley

In order to gain access to the CEPA soil in the S1/S4 valley, a new roadway was constructed to the area by way of the furniture dump (see Map II-2). This roadway traversed the valley just above the southerly barrier. Its crossing of the valley highlighted a well defined dark stained area, which was then sampled at five locations. Table III-3 shows that the oily soil in the area was contaminated above the CEPA level of 50 ppm with an average value of 120 ppm. The estimated volume of CEPA soil is 15 m^3.

Map III-4 shows the contaminated area and the sampling locations; also shown are previous sampling locations. The five samples were analysed both by GC/ECD and by test kit, since some of the previous results were obtained by the test kit method. Results given in Table III-3 show that there was good agreement between both methods so that comparison with previous results is valid. Most of the surface (0-10 cm) samples were collected and analysed in 1994[1].

Boreholes were made in 1997[2] and depth profiles obtained. This work was carried out because there was concern that the PCBs may have pooled at bedrock in the S1/S4 valley through migration along the bedrock surface. Most of the 12 holes followed the expected trend with PCB concentrations gradually diminishing with depth. Generally no significant evidence of high PCB concentrations at depth was found except in areas with surface PCB concentrations above or approaching 50 ppm. However, in two of the holes, PCB concentrations were higher at depth than on the surface. One of the boreholes with higher PCB levels at depth than at surface is shown on Map III-4 at location RRMC 80 next to the southern barrier.

In addition to the 12 boreholes mentioned above, the entire S1/S4 valley was tested for depth to bedrock by LDS in 1997 in order to determine soil volumes. These methods, however, may not give an accurate picture of the situation below the surface because even small rocks might have been interpreted as bedrock. The new results renew the debate concerning the possibility of elevated concentrations of PCBs having migrated at depth along bedrock surfaces, which will only be settled when excavation is carried

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[1] Analytical Services Unit (1995) Environmental Study of a Military Installation at Resolution Island, BAF-5: Volume Two. Prepared for Indian and Northern Affairs Canada.

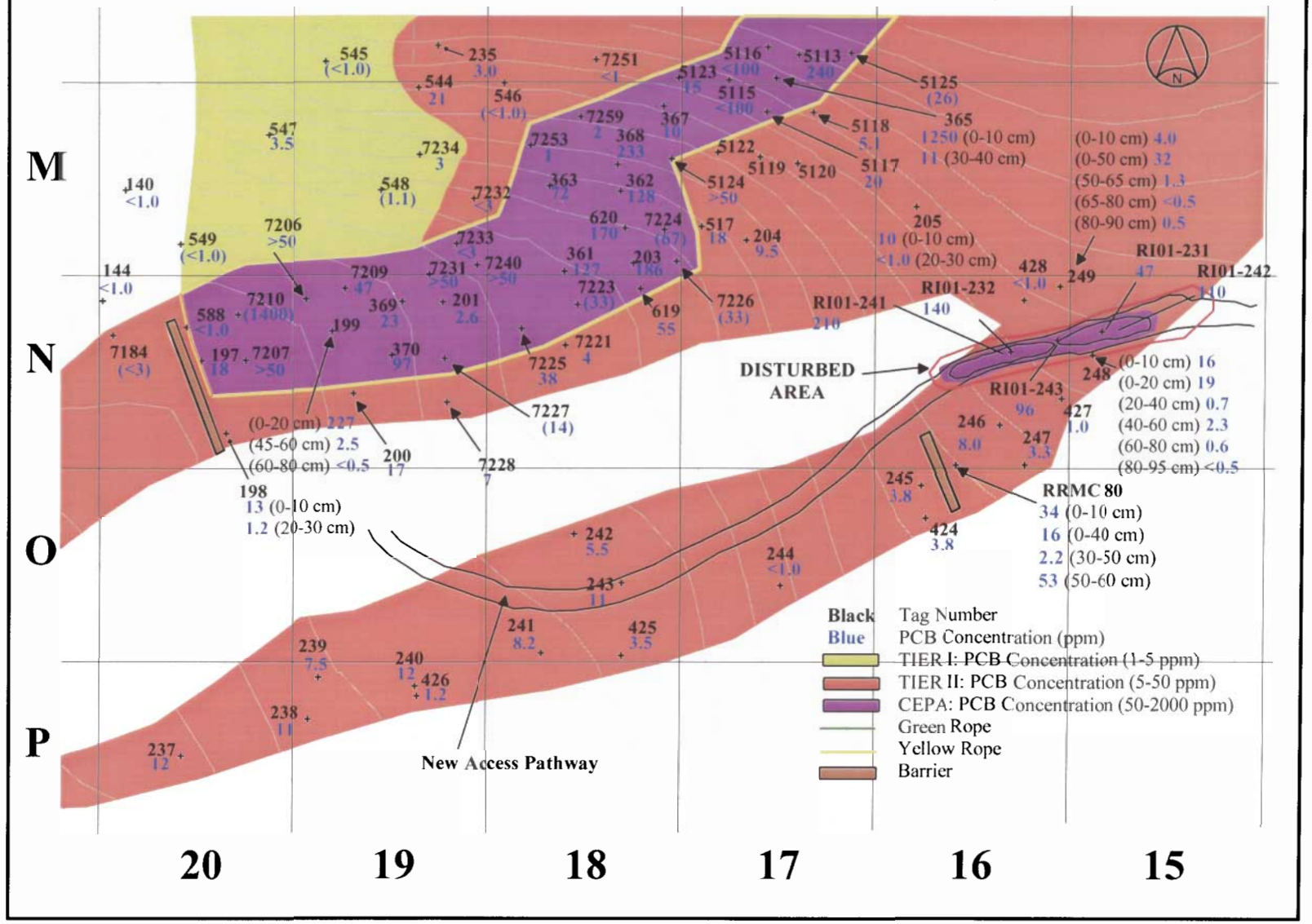
[2] Analytical Services Unit (1998). Resolution Island 1997: Scientific Investigations and Analytical Services Unit, Prepared for Indian and Northern Affairs Canada.

out. There is a CEPA contaminated area in the S1/S4 valley at quadrants I9 and I10 as shown on Map II-2, and excavation here, and at the new location, will determine whether further excavations and remediation in other sections of the S1/S4 valley are needed.

Table III-3: PCB Concentrations in Soil Samples Collected From Above the Southern Barrier in the S1/S4 Barrier in 2001.

Sample	Unit	PCB Concentration by Test Kit	PCB Concentration by GC/ECD
RI01-231	ppm	>50	47
RI01-232	ppm	160	140
RI01-241	ppm	200	210
RI01-242	ppm	96	110
RI01-243	ppm	66	96

Map III-4: Sampling Locations and PCB Concentrations in All Samples (1994-2001) Taken From Above the Southern Barrier in the S1/S4 Valley



D. Monitoring of Barrier Performance

In 1994, barriers were constructed in the drainage pathways where PCB-contaminated soils were found to be present. These pathways comprise the large contaminated area originating at the S1/S4 building complex and extending through the S1/S4 valley to the S1/S4 beach area and the smaller leachate pathway from the furniture dump. Both drainage pathways have been shown to contain PCBs at levels above 50 ppm.

A soil monitoring system was instituted at three of the six barriers in 1994 in order to assess their effectiveness. This consisted of a clean cell and a series of soil monitoring points on either side of the barrier. The clean cells were installed on the lower side of the barrier, using PCB-free sand and sphagsorb. As a result, any PCBs passing through the barriers could be detected. Soil monitoring points were positioned on either side of the barriers so that levels of PCBs could be monitored and compared to levels found in the previous years. The full details of barrier construction, clean cells and monitoring points are described elsewhere[3]. The barriers have been inspected and monitored each year since their installation.

The upper furniture dump barrier was removed in 2000 during the excavation of the furniture dump and its drainage pathway; the lower barrier was left and Sinanni were to construct a new system. The lower barrier was not inspected or tested by ASU in 2001. However, a sample (RI01-201) was taken from a silt fence placed up against the ASU barrier by Sinanni. This sample was analysed for PCBs and a result of 2.3 ppm was obtained.

During the 2001 site visit, a full inspection was made of the S1/S4 barriers and drainage pathways. This included an assessment of physical damage, sampling at the soil monitoring points, sampling of barrier material and sampling of water. The barriers at the S1/S4 valley and beach were found to be in good condition with the exception of the brown sphagsorb booms. As observed in previous years, these booms were starting to show signs of rotting but since they are contained between the other booms this is not of great concern. The soil monitoring points, established in 1994, were re-sampled and soil

[3] Analytical Services Unit (1995) Environmental Study of a Military Installation at Resolution Island, BAF-5: Volume Two. Prepared for Indian and Northern Affairs Canada.

samples submitted for analysis. Samples of barrier material from barriers were also collected and submitted for analyses as was water that was entering the ocean from the S1/S4 beach area and following the drainage pathway along the S1/S4 valley.

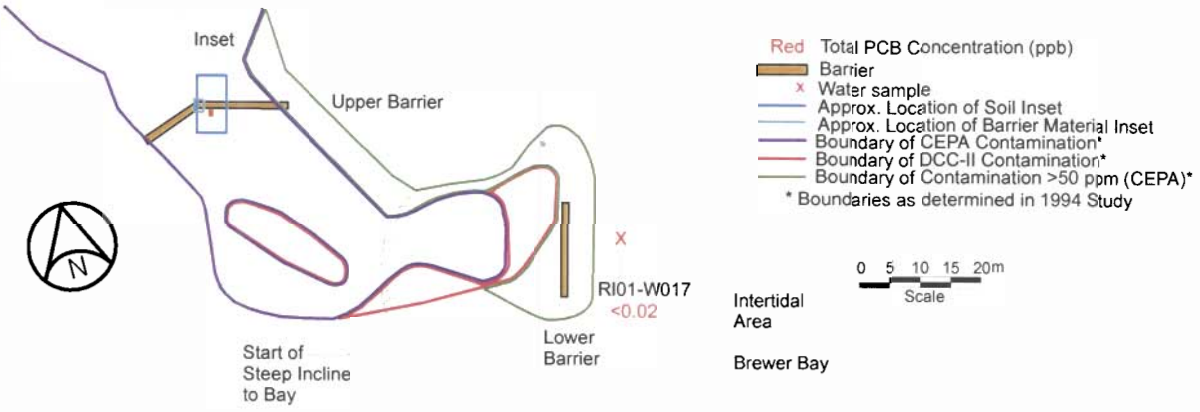
Maps III-5 and III-6 show the sampling locations and analytical results which are also given in Tables III-4, III-5 and III-6. QA/QC data is compiled in Section K.

The PCB levels in the booms ranged from <1.0 to 54 ppm. The PCB levels in the booms from the beach area were considerably less than those in the S1/S4 valley. Comparison of these results with those from previous years shows that this is a continuing trend indicating that there is more PCB migration in the S1/S4 valley. Results for the two barriers in the S1/S4 valley are given in Table III-5 and for the Northern barrier on Map III-6. The results of analyses of the clean cells show that the barriers are still functioning well; the clean cell PCB concentrations found were 1.8 ppm at the beach and <1.0 ppm at the Northern barrier in the S1/S4 valley. Soil samples collected at the same monitoring points as in the previous years continued to show significant variation.

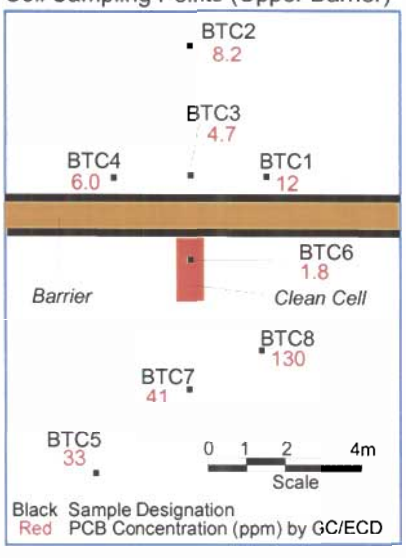
Three water samples were collected this year. Two of them contained less than the method detection limit (Table III-4). One of these samples was taken at the cliff below the lower barrier at the S1/S4 beach area where drainage enters the sea. A measurable level was found in a water sample collected below the southern barrier in the S1/S4 valley but the value of 0.14 ppb is still very low. No PCBs were found in water flowing over the top of the cliff.

Map III-5: Sampling Points and PCB Concentrations at the Upper Barrier in the S1/S4 Beach Area

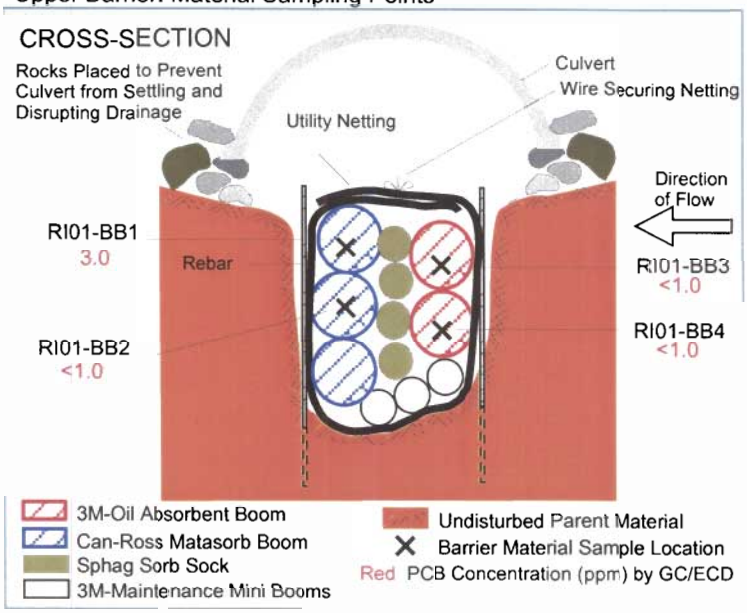
Barriers in the S1/S4 Beach Area



Soil Sampling Points (Upper Barrier)

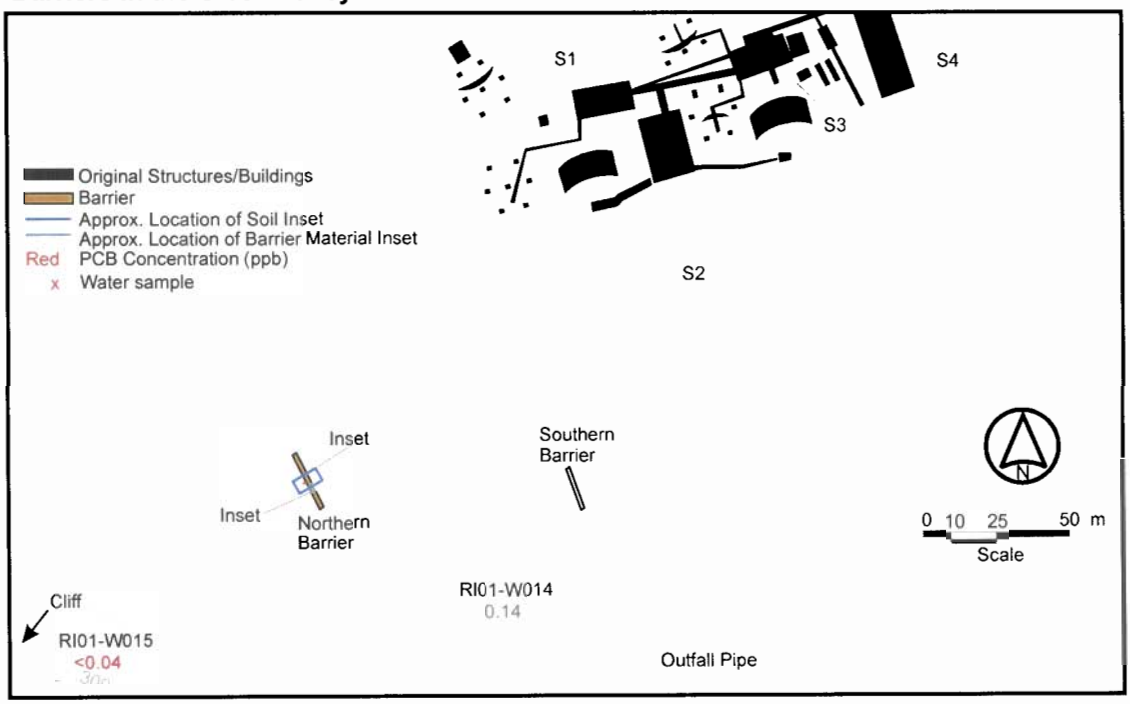


Upper Barrier: Material Sampling Points

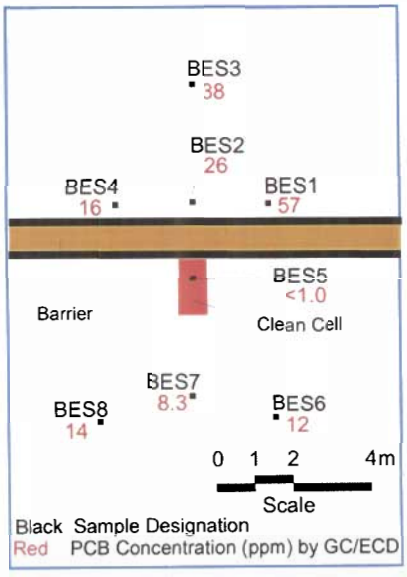


Map III-6: Sampling Points and PCB Concentrations at the Northern Barrier in the S1/S4 Valley

Barriers in the S1/S4 Valley



Soil Sampling Points



Barrier Material Sampling Points

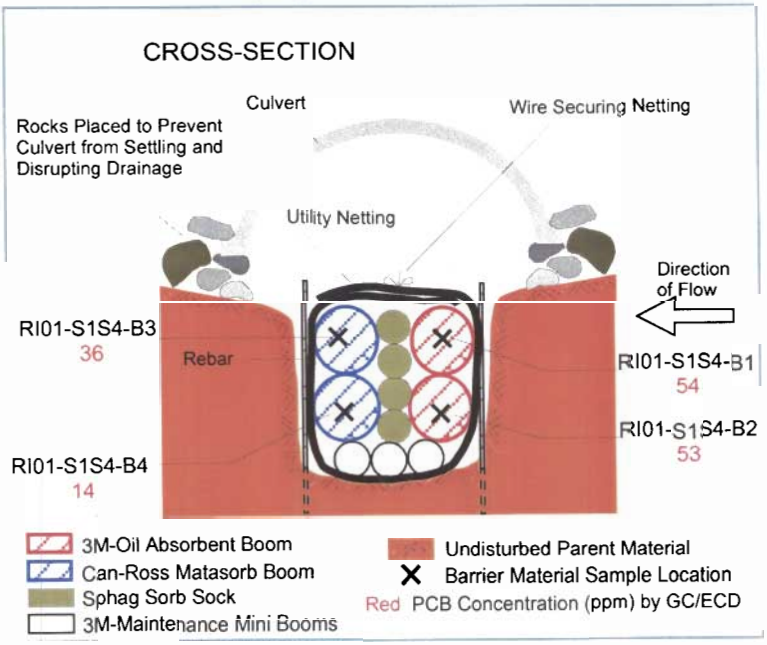


Table III-4: PCB Concentrations in Water Taken in the S1/S4 Drainage Pathway

Location	Sample	PCB Concentration (ppb)
S1/S4 Valley – above upper barrier	RI01-W014	0.14
S1/S4 Valley – near cliff	RI01-W015	<0.04
S1/S4 Beach	RI01-W017	<0.02

Table III-5: PCB Concentrations in Barrier Material Samples

Location of Sample	Material	Sample	PCB Concentration (ppm)
S1/S4 Valley – southern barrier	Matasorb	RI01-042	6.8
S1/S4 Valley – southern barrier	Matasorb	RI01-043	45
S1/S4 Valley – southern barrier	3M absorbent	RI01-044	18
S1/S4 Valley – northern barrier	3M absorbent	RI01-S1S4-B1	54
S1/S4 Valley – northern barrier	3M absorbent	RI01-S1S4-B2	53
S1/S4 Valley – northern barrier	Matasorb	RI01-S1S4-B3	36
S1/S4 Valley – northern barrier	Matasorb	RI01-S1S4-B4	14
S1/S4 Beach – upper barrier	Matasorb	RI01-BB1	3.0
S1/S4 Beach – upper barrier	Matasorb	RI01-BB2	<1.0
S1/S4 Beach – upper barrier	3M absorbent	RI01-BB3	<1.0
S1/S4 Beach – upper barrier	3M absorbent	RI01-BB4	<1.0

Table III-6 : PCB Concentrations in Soil at the Barrier Monitoring Points

Location	Sample	PCB Concentration (ppm)
S1/S4 Beach – above upper barrier	RI01-BTC1	12
S1/S4 Beach – above upper barrier	RI01-BTC2	8.2
S1/S4 Beach – below upper barrier	RI01-BTC3	4.7
S1/S4 Beach – below upper barrier	RI01-BTC4	6.0
S1/S4 Beach – above upper barrier	RI01-BTC5	33
S1/S4 Beach – below upper barrier	RI01-BTC6	1.8
S1/S4 Beach – below upper barrier	RI01-BTC7	41
S1/S4 Beach – bottom of the cliff	RI01-BTC8	130
S1/S4 Valley – above northern barrier	RI01-BES1	57
S1/S4 Valley – above northern barrier	RI01-BES2	26
S1/S4 Valley – below northern barrier	RI01-BES3	38
S1/S4 Valley – below northern barrier	RI01-BES4	16
S1/S4 Valley – above northern barrier	RI01-BES5	<1.0
S1/S4 Valley – below northern barrier	RI01-BES6	12
S1/S4 Valley – above northern barrier	RI01-BES7	8.3
S1/S4 Valley – below northern barrier	RI01-BES8	14

E. Beach POL Tank Remediation

In the summer of 2000 a water sample was collected from each of the large POL tanks at the beach. The water in both tanks was analyzed for the discharge criteria and all parameters except phenols met the criteria. The engineers were tasked with treating the water this year. It was determined before the field season that the water contained both TPH and phenols and that both should be removed before discharge.

The following phenols method was adapted for the field and tested on samples from the POL tanks prior to the field season. Standards (10, 20, 100 and 200 ppb) were prepared from a 1000 ppm stock solution of phenol. Buffer solution, 4-aminophenazone and potassium ferricyanide were added to 200 mL of standard and shaken for 15 minutes to allow for colour development. The standard was then extracted with 10 mL of chloroform. Phosphoric acid and copper sulphate were added to samples and then the samples were distilled. The distilled sample was then treated as described for the standards. A uv/visible spectrophotometer was used to determine concentrations in the samples.

The standard laboratory TPH method was used. A 75 mL portion of the water sample was accurately measured and transferred to a clean, 125 mL glass separatory funnel. Five mL of hexane was added and the mixture was shaken vigorously and then allowed to separate. Some of the hexane phase was then transferred to a GC vial. Samples were compared to fuel oil and lubricating oil standards prepared in hexane. Samples were run by gas chromatography on a SPB-1 fused silica capillary column (30 m, 0.25 mm i.d. x 0.25 μm film thickness). TPH was quantified by comparing the chromatogram peak area of the sample with that of the standard. Compound identity was determined by comparing the sample chromatogram with those of known hydrocarbons.

The water cleanup system designed and operated by the engineers worked very well. Each steel container full of cleaned water was tested before discharge. Table III-7 indicates that all samples were below the discharge criterion and below the detection limit.

Table III-7: Concentrations of Phenols and TPH in Samples from the POL Tank Remediation.

Sample Number (prefix: RI01-)	Concentration of Phenols – non-distilled (ppb)	Concentration of Phenols – distilled (ppb)	Concentration of TPH (ppm)
W006	<20	<20	<40
W010	<20	<20	<40
W011	<20	-	<40
W016	-	<20	<40
W018	-	<20	<40
W022	-	<20	<40

F. Air Sampling for PCBs and Chlorobenzenes

The selection of appropriate personal protective equipment for respiration when working with PCB contaminated materials at the site is important. In the Resolution Island Health and Safety Plan (HASP), Appendix 5, a dust level of 4.4 mg/m^3 is suggested as a trigger for when a dust mask should be worn. This value is calculated using a value of 10 mg/m^3 for an 8 hour day relating to particulates not otherwise classified. A direct reading dust meter is available for use at the site. In practice dust masks must be worn in dusty conditions or at any time workers may wish to do so. Half-face respirators equipped with filters and organic vapour cartridges are worn whenever the odour of PCBs is encountered. Regulations with respect to PCBs are given in the HASP and these are in the range 0.5 to 2.0 mg/m^3, that is less than the 4.4 mg/m^3 for dust suppression. However, it should also be noted that NIOSH has set a recommended exposure limit of 0.001 mg/m^3 or about one thousandth of the NWT occupational exposure limits. The situation with PCBs is also complicated by the fact that they were manufactured and sold as mixtures, often referred to as Askarels, which contained not only PCBs but also chlorobenzenes and solvents. These more volatile compounds are responsible for the characteristic PCB odour. Most of the chlorobenzenes that are found in Askarels are present as trichlorobenzenes with 1,2,4-trichlorobenzene being the predominant one. Regulations respecting Occupational Safety and Health made under Part II of the Canada Labour Code give a ceiling value of 5 ppm or 40 mg/m^3; NIOSH has the same standard for their time weighted average (TWA) concentration for a 10 hour working day.

In order to determine the levels of PCBs in the air, samples were collected using NIOSH method 5503 with an air pump and ORBO-60 adsorption tubes. The pump was run at a rate of about 170 mL/min for about 3-4 hours. Samples were collected outside during screening activities, in the Main PCB storage facility and at the shredder when Tier I/II wood was being processed. Results given in Table III-8 show that under all these conditions the PCB levels in air were extremely low and below the method detection limit. This confirms results obtained on 11 samples last year taken during excavation activities and in the storage area.

Table III-8: PCB Concentrations in Air Samples Collected at Resolution Island

Sample (Prefix RI01-)	Location	PCB per tube (μg)	PCB Concentration. in air (mg/m^3)
145	Inside main PCB storage facility – no activity	<0.05	<0.001
218	Screener at the S1/S4 valley	<0.05	<0.001
222	Screener at the S1/S4 valley	<0.05	<0.001
229	Screener at the S1/S4 valley	<0.05	<0.001
233	Shredder area near the camp	<0.05	<0.001
237	Shredder area near the camp	<0.05	<0.001

Photograph III-1: The Air Sampler Placed Near to Excavation Activities.

In order to determine the level of trichlorobenzenes in the air, samples were collected and analysed using NIOSH method 5517. Two samples were collected at the main PCB storage facility, two during screening operations and one while vacuuming in the S1/S4 valley. In 2000, two samples were collected in the main PCB storage facility. The XAD-2 and filter were extracted with hexane and the extracts run on a gas chromatograph with a mass spectrometric detector (GC/MS). Both 1,2,4-trichlorobenzene and 1,2,3-trichlorobenzene were detected and results are presented in Table III-9.

For the 1,2,4-trichlorobenzene, the concentrations found were very much below the federal regulated value of 37 mg/m^3; there are no published values for 1,2,3-trichlorobenzene. Despite the low values in Table III-9 (units were incorrectly reported in the 2000 ASU report), it is recommended that half-face respirators equipped with organic cartridges and filters be worn when the odour of PCBs is encountered because the actual concentrations may be higher on occasion and because the Inuit workers appear to be very susceptible to elevated levels of hydrocarbon vapours.

Table III-9: Chlorobenzene Concentrations in Air Samples Collected at Resolution Island Including Results for Two Samples Collected in 2000

Sample	Location	1,2,4 Trichlorobenzene		1,2,3- Trichlorobenzene	
		per tube (µg)	Concentration in air (mg/m^3)	per tube (µg)	Concentration in air (mg/m^3)
RI01-050	Main PCB storage facility – soil was being loaded onto CEPA pile	0.09	<0.005	<0.05	<0.005
RI01-051	Main PCB storage facility – soil was being loaded onto CEPA pile	0.21	<0.005	<0.05	<0.005
RI01-211	S1/S4 valley – taken while vacuuming soil	<0.05	<0.005	<0.05	<0.005
RI01-219	Screener at the S1/S4 Valley	<0.05	<0.005	<0.05	<0.005
RI01-299	Screener at the S1/S4 Valley	<0.05	<0.005	<0.05	<0.005
RI00-275	Main PCB storage facility	<0.05	<0.005	<0.05	<0.005
RI00-307	Main PCB storage facility	<0.05	<0.005	<0.05	<0.005

G. Drinking Water

1. Analysis

A thorough testing of the drinking water at Resolution Island was performed three times during the summer. In addition, the new drinking water lake was sampled and analyzed to comply with the water board requirements.

2. Methods

Water samples were collected in 1 litre polyethylene bottles for general water quality parameters and inorganic elements analysis and in 1 litre teflon bottles for PCB analysis. For the analysis of phenols, a bottle containing an aliquot of phosphoric acid was used, for mercury, a bottle with an aliquot of sodium dichromate solution was used and, for bacteriological measurements, a sterile bottle was employed. Upon receipt in the laboratory, all samples were stored at 4 ^{o}C. Tests were performed using standard laboratory procedures

3. Drinking Water

Analytical results are shown in Table III-10. None of the parameters measured, with the exception of the pH and *E.coli* were outside of the Ontario Ministry of the Environment Guidelines. The result of 3 counts for *E.coli* on 20 August sample prompted a re-sampling of the drinking water on 26 August. The 26 August sample gave a reading of zero and it is assumed that the sample was contaminated during sampling or analysis; *E.coli* has never been detected in the site drinking water before. The water at Resolution Island contains no buffering capacity and is quite acidic. Addition of sodium carbonate started about 26 July this year. pH values were measured daily. For the period up to 26 July, values obtained were all below 5.0 whereas after 26 July the pH ranged from 5.2 to 8.8 with a mean value of 6.6. Addition of sodium carbonate as expected raised the alkalinity and sodium levels on the second two sampling dates as seen in Table III-10.

Table III-10: Drinking Water Results and Guidelines

Parameter	Units	July 23	August 20	September 4	OME Guidelines
Alkalinity	mg/L	<1	41	15	30-500
Ammonia	mg/L	0.1	0.2	<0.1	-

Parameter	Units	July 23	August 20	September 4	OME Guidelines
Calcium	mg/L	3.9	4.8	5.6	-
COD	mg/L	<3	<3	<3	-
Conductivity	uS/cm	72	136	123	-
Copper	mg/L	0.34	0.008	<0.005	<1.0
Hardness	mg/L	16	19.4	23	80-100
Iron	mg/L	<0.05	<0.05	<0.05	<0.30
Lead	mg/L	<0.010	<0.010	<0.010	<0.010
Magnesium	mg/L	1.5	1.8	2.3	-
PCB	ug/L	<3.0	<3.0	<3.0	< 3.0
pH	-	4.3	8.3	6.9	6.5-8.5
Phenols	ug/L	<1.0	<1.0	<1.0	-
Potassium	mg/L	<0.2	0.34	0.32	-
Sodium	mg/L	2.3	18.3	14.4	<200
Sulphate	mg/L	22	27	34	<500
Nitrate	mg/L	<0.05	<0.05	<0.05	<10
Nitrite	mg/L	<0.05	<0.05	<0.05	<1.0
Chloride	mg/L	3.9	4.1	4.1	<250
TDS	mg/L	260	58	190	<500
TKN	mg/L	<0.2	<0.2	<0.2	-
TSS	mg/L	24	<1	3.4	<500
Zinc	mg/L	0.048	0.021	0.02	5
Total Coliforms	Cts/100 mL	<2	-	<2*	5
Faecal Coliforms	Cts/100 mL	0	0	0*	0
Faecal Streptococci	Cts/100 mL	<2	0	<2*	0
E coli	Cts/100 mL	0	3	0*	0
Standard Plate Ct (48hrs)	Cts/1 mL	2	-	2*	500
Background Count	Cts/100 mL	2	-	26*	250

* Sample was taken on August 26, 2001.

H. Lake Water

In order to comply with the water board licence, water samples were required to be collected from the water lake and runoff from the new non-hazardous landfills. However, there was no runoff from the two non-hazardous landfills so only results from the water lake are presented here. A sample of lake water was collected on 20 August, 2001 and analyzed to give the results presented in Table III-11. A new water lake, beside the road to the new gravel source, was used this year. Results are very similar to those obtained from the old water lake.

Table III-11: Lake Water Results

Parameter	Unit	Lake Water
Copper	mg/L	0.012
Iron	mg/L	<0.05
Lead	mg/L	<0.010
Manganese	mg/L	0.06
Mercury	mg/L	<0.0005
Cadmium	mg/L	<0.001
Nickel	mg/L	0.062
Chromium	mg/L	<0.005
Cobalt	mg/L	0.014
Zinc	mg/L	0.032
Phenols	ug/L	<1.0
pH	-	4.3
TSS	mg/L	<1
Nitrate	mg/L	0.06
Nitrite	mg/L	<0.05
Oil and Grease	mg/L	2.4
BOD	mg/L	3.0
Faecal Coliforms	Cts/100 mL	0