

5.0 ASBESTOS, PAINT, AND PCB RESULTS

5.1 ASBESTOS

5.1.1 RECORD REVIEW

A preliminary survey was conducted in March 1990 (DEW Surveys, 1990), at PIN-4 indicating the presence of pipe and sheet asbestos on-site. Table 5.1 summarizes the survey, listing locations, form and quantity of asbestos.

Table 5.1
PIN-4, BYRON BAY: ASBESTOS INVENTORY

Location	Form	Quantity
Module Train	Pipe	1492 m
	Sheet	145 m ²
Garage	Pipe	21 m
	Sheet	6 m ²
Warehouse	Sheet	69 m
Hangar	Pipe	18 m
	Sheet	13 m ²

Note: Pipe insulation measured in lineal metres.

5.1.2 FIELD SURVEY

In August, 1990 a follow-up site inspection of the warehouse, garage, module train and pallet storage area was conducted to determine the type(s) of asbestos present (Plate 2). Five samples of insulating material were obtained. All samples were taken from encapsulated materials. The sample locations are described in Table 5.2.

5.1.3 ANALYTICAL RESULTS

The results of the analysis of the asbestos samples are presented in Table 5.2. Asbestos content was determined by polarized light microscopy according to NIOSH Method 9002.

Seventy to ninety percent amosite asbestos was detected in the warehouse furnace flue pipe insulation, while in pipe insulation in the garage and Module Train A, 70 to 90 percent chrysotile asbestos was found. No asbestos was detected in the water heater insulation of the pallet storage area. According to Regulation 7/82, Alberta Occupational Health and Safety Guidelines, material with an asbestos content of greater than 1 percent is considered a hazardous good.

Table 5.2**PIN-4, BYRON BAY: ASBESTOS SAMPLE SITES
AND ANALYTICAL RESULTS**

Location	Area	Sample No.	Percent Asbestos Present	Type of Asbestos
Warehouse	Furnace Flue	P4-A1	70-90	Amosite
Garage	Generator Exhaust Flue	P4-A2	70-90	Chrysotile
Module Train A	Module 3 Heating Line Pipe	P4-A3	70-90	Chrysotile
Module Train A	Module 3 Heating Line Pipe	P4-A4	Not Detected	
Pallet Storage	Hot Water Heater Wallboard	P4-A5	Not Detected	

5.2 PAINT**5.2.1 FIELD SURVEY**

Five samples of paint were taken from the facilities of PIN-4. One exterior and three interior samples were obtained from the Module Train. The fifth sample was taken from the warehouse. The sample locations are described in Table 5.3.

5.2.2 ANALYTICAL RESULTS

The results of the analyses of the paint samples are presented in Table 5.3. All analyses determined the total concentration of specific metals. Test methods for the various chemicals are given in Appendix C.3.

The concentration of lead was elevated in four of the five samples with values ranging from 11000 to 34000 mg/kg. Two samples, P4-P2 and P4-P3, contained elevated concentrations of chromium with values of 3600 and 1300 mg/kg, respectively. The level of chromium in the remaining samples ranged from 320 to 590 mg/kg.

Generally, with the exception of the lead values, the concentrations of metals in these specific paint samples are considered to be typical of industrial oil-based paints.

Table 5.3

PIN-4, BYRON BAY: PAINT SAMPLE SITES AND ANALYTICAL RESULTS

Location	Module Train A	Warehouse	Module Train A	Module Train A	Module Train A
Sample Area	Exterior	South Door	Exterior Stairs	Loading Dock	Food Storage Room
Sample No.	P4-P1	P4-P2	P4-P3	P4-P4	P4-P5
Metals Present (mg/kg)					
Arsenic	3.3	24	82	1.4	88
Selenium	<0.5	3.9	3.8	0.3	5.8
Mercury	<0.05	0.25	0.99	<0.05	7.3
Barium	6500	820	1100	80	35
Beryllium	<1	<1	<1	<1	<1
Cadmium	6	6	6	2	4
Chromium	590	3600	1300	490	320
Lead	11000	34000	26000	3000	17000
Nickel	9	18	19	<5	32
Silver	<5	<5	<5	<5	<5

5.3 PCB**5.3.1 RECORD REVIEW**

A PCB inventory was conducted at PIN-4 on January 25, 1990 (DEW Surveys, 1990). A list of equipment suspected of containing PCBs and their status at that time is presented in Table 5.4.

5.3.2 FIELD SURVEY

Two oil samples were obtained for PCB testing during the August 1990 sampling program. Sample P4-PCB-1, was taken from the voltage regulator compensator located in the garage, and sample P4-PCB-2 was obtained from the runway light regulator, Serial No. 22547-70, located in the west mechanical room in the hangar. Other units in the site inventory could not be sampled as they were either sealed or in use at this time.

5.3.3 ANALYTICAL RESULTS

Sample P4-PCB-1, taken from the voltage regulation in the garage, contained PCBs at a level of 2.2 mg/L which is below the maximum acceptable concentrations (EPS, 1978) and poses no hazard with respect to potential PCB contamination. Sample P4-PCB-2 did not contain detectable levels of PCBs. The remaining equipment listed in the inventory should be assumed to contain PCBs until subsequent testing proves otherwise.

Table 5.4
PIN-4, BYRON BAY: PCB INVENTORY

Area	Transformer Units	Capacitor Units	Misc. Units	Suspected Total PCBs (kg)
Hangar	1	--	--	274.73
Module 5	1	--	--	407.13
Receiver Room	556	38	506	131.6
Radar Room	86	574	328	94.08
Lateral Communications Room	12	24	--	36.56
Surveillance Room	20	68	13	11.97
Emergency Radio Room	1	1	1	2.50

6.0 SITE ASSESSMENT

The study was designed to satisfy the requirements of the base line risk assessment and available environmental clean-up criteria (UMA, 1990a). A full suite of chemical analyses of soil and water samples consisted of the following: metals by ICP scan EPA Method 6010; arsenic EPA Method 7061; lead and cadmium EPA Method 7420 and 7130; mercury EPA Method 7471; PCB and TPH EPA Method 8080; volatiles EPA Method 8270; and semi-volatiles EPA Method 8260.

The full suite of analyses was conducted on water and leachate samples. Representative soil samples from each of the facilities/features investigated, as well as the background samples were analyzed for all requested parameters. Analysis of additional samples were targeted at specific compounds based on the results of the full suite of analysis. The results of all soil and water analyses are presented in Appendix C.

The evaluation of the 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 and identification of results with values greater than 50 percent of Quebec Level A Guidelines or detection of organic chemicals.
- (2) Comparison of laboratory data to Quebec Soil Guidelines and Guidelines for Canadian Drinking Water Quality.
- (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 an evaluation of the risk assessment. Quality assurance and quality control of the analytical data appears in Appendix D. Risk assessment for the site is presented in detail in Appendix E, and summarized in Table 6.1.

6.1 SITE EVALUATION RISK ASSESSMENT SUMMARY

Risk assessment at PIN-4 is described in terms of carcinogenic and non-carcinogenic 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 PIN-4 site risk has therefore been segregated according to these categories as presented in the following subsections.

Results of the risk analysis indicated that the total carcinogenic risk was estimated at $\leq 4 \times 10^{-5}$ (Table 6.1). Based on the U.S. EPA site remediation goal of reducing cancer risks below 10^{-4} , the PIN-4 carcinogenic risk is less than the criterion. The principal contributor of the risk was chromium intake from the inhalation pathway. Over 99 percent of the area where chromium was identified had concentrations below background and therefore incremental risks were a fraction of the total estimate. In addition, the hexavalent form of chromium was assumed for the risk assessment. This was a conservative assumption since the valence of chromium was not determined in the laboratory. Any portion of the chromium from PIN-4 site which is not in hexavalent form would reduce the estimated risk proportionately.

The worker non-carcinogenic risk of the PIN-4 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

Table 6.1

PIN-4, BYRON BAY: RISK ASSESSMENT SUMMARY

		Carcinogenic Risk	Non-Carcinogenic Risk
Site Worker		4×10^{-5}	5×10^{-2}
Northerner:	Adult	n/a	n/a
	Child	n/a	n/a
Standard		10^{-4}	1.0

n/a = Not Available

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. This risk is based on a hazard index. Should the hazard index exceed unity (1.0) then the contaminant exposure level exceeds the reference and there may be concern for health effects other than cancers. The hazard index totals 5×10^{-2} , which is much less than the unity criteria; therefore, non-carcinogenic risk is considered small.

The uncertainty of the risk assessment is addressed in Section E.5.3. 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 quotient for PCBs in grasses was also less than unity. The cadmium and lead hazard quotients for grasses were above unity and therefore there may be potential risks to plant health in the locations with relevant concentrations of cadmium and lead.

6.2 SITE BACKGROUND CONDITIONS

No background soil sample was obtained at this site as a result of a sampling omission. Instead, typical background concentrations based on published information, included in Table 6.2, are utilized for comparative purposes.

Background water conditions are represented by sample P4-A, taken from the station water supply lake, west of the base facilities. The water supply lake lies in a valley bottom west of the base facilities. Surface runoff from the east side of the base trends toward the water supply area. The water sample was found to be below the relevant detection limits for all the analyzed parameters (Appendix C-2 and C-5), with the exception of barium, which was detected at a concentration of 0.02 mg/kg. Phthalates were also detected in the sample; however, these are the result of laboratory contamination, since they also appear in blanks run for the analyses.

6.3 LANDFILLS

Five landfill areas (Landfills A - E) as shown in Figure 6.1 were inspected and sampled at the PIN-4 site.

6.3.1 LANDFILL A

6.3.1.1 Visual Observations and Sample Locations

Landfill A consists of an area of 150 m² inclined at about 3° located along the beach about 50 m from the sea and about 100 m northeast of POL 1. Debris observed in this area included partially buried metal drums. No soil discoloration was visible downslope of the landfill. The area is represented by sample P4-017 located in a small depression downslope of the main portion of the landfill. The soils are primarily sands and gravels with some intermixed organics. Vegetation cover was primarily comprised of sedges and willows.

6.3.1.2 Analytical Results

Sample P4-017 was analyzed for all parameters except volatile organics. The analyses indicated the presence of arsenic, barium chromium, lead and nickel. Concentrations of parameters detected in the analyses are presented in Table 6.3.

Table 6.2

PIN-4, BYRON BAY: BACKGROUND CONDITIONS OF SOIL

Parameter	Expected Background Levels			
	Bedrock		Soils	
	Range	Mean	Range	Mean
Arsenic (mg/kg)	0.5-1.0	0.1	0.7-15	3.6
Selenium (mg/kg)	0.01-0.05	-	0.41-2.09	0.94
Mercury (mg/kg)	-	-	0.01-0.14	0.06
Barium (mg/kg)	400-850	-	300-1500	785
Beryllium (mg/kg)	2-5	-	1-2	1.6
Cadmium (mg/kg)	0.09-0.20	-	0.01-1.80	0.43
Chromium (mg/kg)	4-25	-	2.6-34.0	-
Lead (mg/kg)	15-24	-	10-50	21
Nickel (mg/kg)	5-15	-	1.3-3.4	8
Silver (mg/kg)	0.04	-	0.01-5	-
TPH (mg/kg)	-	-	-	-
PCB (mg/kg)	-	-	-	-

Source: Kabata-Pendias and Pendias (1984).

Table 6.3

PIN-4, BYRON BAY: RESULTS - LANDFILL A

Indicator Chemical	Level A	Level B	Level C	Background	P4-017
Arsenic (mg/kg)	10	30	50	3.6	0.7
Barium (mg/kg)	200	500	2000	785	61
Chromium (mg/kg)	75	250	800	-	14
Lead (mg/kg)	50	200	600	21	12
Nickel (mg/kg)	50	100	500	8	14

- Not Analyzed

All measured parameters were below 50 percent of the Quebec Level A. The contents of the landfill have not been verified beyond the steel drums which were visible, and although present analyses do not indicate the presence of contamination, conditions may change over time depending on the landfill contents and the degree of degradation.

6.3.1.3 Evaluation of Risk Assessment and Analytical Results

The magnitude of the chemicals present in this landfill was found to have little impact upon the overall site risk assessment. The chemicals analyzed were present at concentrations which were below the Quebec Level B soil contamination guidelines. The physical hazard associated with this site is moderate.

6.3.2 LANDFILL B

6.3.2.1 Visual Observations and Sample Locations

Landfill B is located on the south side of a beach ridge east of the hangar. The terrain along the downslope perimeter of the landfill is low lying and saturated with water. The road from the DEW station to the beach is constructed on top of the ridge adjacent to the landfill which slopes at about 5° to the low, wet area to the south. Material in the landfill consisted of buried drums, tin cans, wood and paper. No stains or odours were detected downslope of the landfill.

Three soil samples (P4-031, P4-032, and P4-033) were obtained in depressions at the toe of the landfill (P4-031 at the southeast, P4-032 at the south and P4-033 at the southwest of the landfill) where surface and/or subsurface runoff would be expected to collect. Soils are generally comprised of moderate to poorly drained silts and organic silts vegetated primarily by grasses with some willows.

6.3.2.2 Analytical Results

Samples P4-032 and P4-033 were analyzed for all parameters with the exception of volatile organics in sample P4-032. Sample P4-033 contained arsenic, selenium, barium, chromium and nickel. Based on these results sample P4-032 was analyzed for metals, PCBs and TPH. The results indicated the presence of arsenic, barium, chromium, and PCBs. Concentrations of parameters detected in the analyses are presented in Table 6.4.

While the level of barium in sample P4-033 exceeded 50 percent of the Level A criterion, it is within typical ranges expected for the site. The concentration of PCBs detected in sample P4-032 exceeded Level A criterion (Appendix C-4). Based on this result it is possible that greater concentrations of PCBs may be present within the landfill.

6.3.2.3 Evaluation of Risk Assessment and Analytical Results

The magnitude of the contaminants present in this landfill was found to have little impact upon the overall site risk assessment. The chemicals were present at concentrations which were below the Quebec Level B soil contamination guidelines. PCBs were present at concentrations above Level A in an area which is frequently saturated and it is therefore possible that PCBs in this area have been in a mobile medium and may have leached from this site. However the present levels of PCBs are low and do not present a significant risk in soil. The physical hazards on this site are low.

Table 6.4

PIN-4, BYRON BAY: RESULTS - LANDFILL B

Indicator Chemical	Level A	Level B	Level C	Background	P4-032	P4-033
Arsenic (mg/kg)	10	30	50	3.6	<0.1	1
Barium (mg/kg)	200	500	2000	785	31	190
Chromium (mg/kg)	75	250	800	-	6	9
Nickel (mg/kg)	50	100	500	8	<5	7
PCB (mg/kg)	0.1	1	10	-	0.44	<0.01
- Not Analyzed						

6.3.3 LANDFILL C

6.3.3.1 Visual Observations and Sample Locations

Landfill C, currently in use, is located about 400 m west of the DEW station on a north-south trending beach ridge which slopes at about 5° west toward two ponds (water sample P4-D). The landfill slopes gently toward another pond to the northeast (water sample P4-C). Metal debris was observed protruding from this pond. Other debris identified in the landfill consisted of domestic waste, drums and some electrical equipment. An odour was noted in the landfill area.

The area is represented by four soil samples, P4-034 to P4-037, obtained near the toe of the landfill, and two water samples P4-D and P4-C, identified above. Soils are comprised of moderate to poorly drained silts and organic silts. Vegetation generally consisted of grasses with some willows at sample P4-035 and a thin layer of moss at sample P4-034. Minor rust staining was also observed at sample P4-034.

6.3.3.2 Analytical Results

Sample P4-036, located west of the pond and northeast of the landfill in a grass covered area, was analyzed for all parameters. Concentrations of parameters detected in the analysis are presented in Table 6.5. Arsenic, barium, chromium, and nickel were present in the sample at concentrations below 50 percent of Level A. Trace concentrations of ethyl benzene were also reported. PCBs were present at concentrations exceeding Level A.

Water samples P4-C and P4-D were analyzed for all parameters to represent areas where drainage from the landfill would collect. The results indicated all relevant parameters were below detection level with the exception of barium in P4-D.

The water samples were obtained from ponds adjacent to the landfill and found to contain no measurable concentrations of priority pollutants. If these are present at some location within the landfill, there is no indication of transport into the sampled water bodies. Only the levels of PCBs in sample P4-036 exceeded Level A criterion.

6.3.3.3 Evaluation of Risk Assessment and Analytical Results

The magnitude of the contaminants present in this landfill was found to have little impact upon the overall site risk assessment. The chemicals were present at concentrations which were below the Quebec Level B soil contamination guidelines. The migration potential of this area is moderate and due to scattered debris, the physical hazard is moderate.

6.3.4 LANDFILL D

6.3.4.1 Visual Observations and Sample Locations

Landfill D, an abandoned landfill, is located along the northwest trending beach ridge about 400 m north of the DEW station. The landfill extends for about 200 m along the south slope of the ridge that parallels the road leading northwest from the site. This road was known locally as the Chisholm Trail. The terrain slopes gently toward the southwest to a flat grassy area occupied by a pond at the northwest end (water sample P4-B). Debris observed included scattered metal, wood and some domestic waste. Eight spills of a thick, black substance covering a combined area of 12 m² were observed on the northwest end of the landfill.

Table 6.5

PIN-4, BYRON BAY: RESULTS - LANDFILL C

Indicator Chemical	Level A	Level B	Level C	Background	P4-036
Arsenic (mg/kg)	10	30	50	3.6	2.2
Barium (mg/kg)	200	500	2000	785	25
Chromium (mg/kg)	75	250	800	-	14
Nickel (mg/kg)	50	100	500	8	9
PCB (mg/kg)	0.1	1	10	-	0.13
Ethyl Benzene (mg/kg)	0.1	5	50	-	0.003
- Not Analyzed					

The area is represented by four soil samples (P4-010 to P4-013) taken in a depression located across the toe of the landfill (Figure 3.3). Soils are comprised generally of a thin organic veneer overlying coarse gravels. Vegetation generally included sedges and willows with some mosses observed at sample locations P4-012 and P4-013. Sample P4-013 was taken in the vicinity of the black stains smelling of hydrocarbon. No odours were detected or staining observed in the vicinity of the other three sample locations.

6.3.4.2 Analytical Results

Water sample P4-B was analyzed for all parameters and barium was the only relevant priority pollutant present above the detection limit. Soil samples P4-010 (southeast of the landfill) and P4-013 (south of the landfill) were analyzed for all parameters. Based on the results, sample P4-012 was analyzed for metals and TPH. Concentrations of parameters detected in the analyses are listed in Table 6.6. Sample P4-010 contained arsenic, barium, chromium and nickel. Sample P4-012 contained mercury, barium and chromium. Sample P4-013, taken in a black stained area, was found to contain TPH (as diesel), arsenic, barium and chromium.

Barium in sample P4-013 exceeded Level A, while TPH exceeded Level B, attributing the discontinuous staining observed in the field to a hydrocarbon spill. The areal extent of the hydrocarbon contamination is evident in the field; however, the thickness of the contamination could not be determined. All remaining parameters detected in the samples P4-010 and P4-012 were below 50 percent of the Quebec Level A criteria (Appendix C4).

6.3.4.3 Evaluation of Risk Assessment and Analytical Results

The magnitude of the contaminants present in this landfill was found to have little impact upon the overall site risk assessment. All chemicals except TPH were present at concentrations which were below the Quebec Level B soil contamination guidelines. TPH concentrations were found above Level B and field observations indicate that higher concentrations of TPH may be found at depth in the stain areas. Further sampling will be required to provide this information. Debris is found on the site which poses a moderate physical hazard.

6.3.5 LANDFILL E

6.3.5.1 Visual Observations and Sample Locations

Landfill E is located along the bend in the beach ridge 300 m east of the Module Train A, at the east end of the pallet storage area. The landfill is situated at the top of the ridge which slopes at about 10° toward a lower paralleling ridge to the east. A poorly drained, low lying area is located below the lower ridge. Debris observed consisted of buried metal, drums, plastic, wire, wood and two partially buried steel tower structures (Plates 3 and 4). No major stains or odours were noted downslope of this landfill.

Five soil samples (P4-005 through P4-009) representative of the landfill were taken primarily along the toe of the landfill. A localized stain approximately 1 m², apparently the result of burning electrical materials, was observed at sample P4-009, located between the landfill and a drum storage area. Soils across the landfill varied from organic silts to gravels in the more disturbed area. Vegetation, where present, consisted of sedges with some grasses and mosses.

Table 6.6

PIN-4, BYRON BAY: RESULTS - LANDFILL D

Indicator Chemical	Level A	Level B	Level C	Background	P4-010	P4-012	P4-013
Arsenic (mg/kg)	10	30	50	3.6	2.1	<0.1	0.2
Mercury (mg/kg)	0.2	2	10	0.08	<0.05	0.09	<0.05
Barium (mg/kg)	200	500	2000	785	67	49	250
Chromium (mg/kg)	75	250	800	-	20	6	5
Nickel (mg/kg)	50	100	500	8	15	<5	<5
TPH (mg/kg)	100	1000	5000	-	<5	<5	1100

- Not Analyzed

6.3.5.2 Analytical Results

Sample P4-006, located northeast of the landfill, was analyzed for all parameters. Based on these results, samples P4-007, P4-008 and P4-009 were analyzed for metals, TPH and PCBs. Sample P4-006 was found to contain arsenic, selenium, barium, chromium and nickel. Sample P4-007, located 90 m north of P4-006, contained detectable levels of arsenic, barium, chromium, and nickel. Sample P4-008 contained arsenic, mercury, barium, chromium, lead and nickel. Sample P4-009 contained detectable levels of arsenic, mercury, barium, chromium, lead, cadmium, PCBs and TPH. Table 6.7 presents the concentrations of parameters detected in the analyses.

The lead concentration in Sample P4-008 and selenium in P4-006 were greater than 50 percent of the Level A criteria while the remaining metals in samples P4-006, P4-007 and P4-008 were below 50 percent of the Level A criteria and generally within typical expected ranges for the area. Sample P4-009 contained TPH at concentrations in excess of Level A. Sample P4-009 contained mercury at 50 percent of Level A criteria, cadmium and PCBs in excess of Level B of the criteria, and lead in excess of Level C.

6.3.5.3 Evaluation of Risk Assessment and Analytical Results

The concentrations of lead, PCBs and cadmium associated with the localized stain all exceeded the Quebec Level B criterion, with cadmium contributing significantly to the overall site non-carcinogenic hazard index.

Lead was present at the toe of the landfill at concentrations above Level C. While lead is not included in the risk assessment, the concentrations measured would warrant remediation. The substances identified may all be associated with electrical equipment and therefore the aerial extent of contamination could be restricted to the stained/burned area (approximately 1 m²). A more important issue associated with the potential burning of electrical equipment which may have contained PCBs, is the release of polychlorinated dibenzofurans (PCDF). PCDF can be released into the atmosphere during uncontrolled burning and can potentially be deposited over a relatively large area around the site. Since PCDF can be of concern at levels in the parts per trillion range, further assessment to evaluate the presence of dioxins and dibenzofurans in the area should be completed. Until this area is further assessed, it is considered to be of moderate environmental risk and due to debris, of moderate physical risk.

6.4 POL AREAS

Four POL areas as shown in Figure 6.1 were inspected and sampled at the PIN-4 site.

6.4.1 POL 1

6.4.1.1 Visual Observations and Sample Locations

POL 1 is located 50 m from the sea about 500 m southwest of the mouth of Sinclair Creek in an area which slopes about 3° toward the sea. POL facilities consist of two 246 m³ diesel tanks, a 23 m³ gasoline tank and various pumps and pipelines. Dykes were not lined and had deteriorated on the northwest (upslope) side of the tanks. Some erosion was observed in the gravel pad and dykes of the mogas tank. A stain, 1 m² in area, was observed at the intake line to the diesel tanks (Plate 5). A strong odour and indications of leakage were observed in this area. A dark stain, 3 m² in area, was also observed between the two diesel tanks.

Table 6.7

PIN-4, BYRON BAY: RESULTS - LANDFILL E

Indicator Chemical	Level A	Level B	Level C	Background	P4-006	P4-007	P4-008	P4-009
Arsenic (mg/kg)	10	30	50	3.6	2.1	1.8	0.6	1.3
Selenium (mg/kg)	1	3	10	-	0.8	<0.5	<0.5	<0.5
Mercury (mg/kg)	0.2	2	10	0.08	<0.05	<0.05	0.08	0.1
Barium (mg/kg)	200	500	2000	785	85	30	28	39
Cadmium (mg/kg)	1.5	5	20	0.43	<1	<1	<1	6
Chromium (mg/kg)	75	250	800	-	11	11	11	21
Lead (mg/kg)	50	200	600	21	<10	<10	37	670
Nickel (mg/kg)	50	100	500	8	11	8	7	<5
TPH (mg/kg)	100	1000	5000	-	<5	<5	<5	250
PCB (mg/kg)	0.1	1	10	-	<0.01	<0.01	<0.01	1.6

- Not Analyzed
n No Guidelines

The area is represented by samples P4-014, P4-015 and P4-016. Sample P4-014 was taken at the intake pipe where previous leakage had occurred. The area influenced by the leakage covered approximately 1 m² and had a strong hydrocarbon odour. Sample P4-016 was taken in a larger stained area (3 m²) located between the tanks. No odours above ambient were detected in this area. Both areas had no vegetation cover. Sample P4-015 was taken outside the dyke downslope of the POL to represent offsite migration. The soils are generally well drained sands and gravels with vegetation consisting primarily of willows and sedges.

6.4.1.2 Analytical Results

Sample P4-016 was analyzed for all parameters in order to characterize general conditions and staining associated with the POL. Samples P4-014 and P4-015 were subsequently analyzed for TPH and PCBs. Sample P4-016 contained detectable levels of arsenic, barium, chromium, lead, nickel, TPH, PCBs, DDT, Dieldrin, and tetrachloroethylene. PCBs and TPH were detected in sample P4-014. The concentrations of parameters detected in the laboratory analyses are presented in Table 6.8.

TPH and PCB concentrations in sample P4-016 exceeded the Quebec Level A criterion, while lead, DDT and Dieldrin concentrations exceeded Level B. The staining observed between the tanks is likely a reflection of hydrocarbon spillage and is generally of limited areal extent. In sample P4-014, located at the intake pipe, PCB levels were at the Level A criterion, and the TPH concentration exceeded Quebec Level C criterion.

6.4.1.3 Evaluation of Risk Assessment and Analytical Results

High levels of lead and TPH above Quebec Levels B and C, were associated with stains caused by leaking pipes or spills. The DDT, identified in sample P4-016, was likely used for localized pest control on this site. Sample P4-015, taken downslope of the stained areas, indicated that these substances had not migrated from the POL site. The environmental risk is considered to be moderate as little migration has occurred. Although the TPH concentrations were high, they are thought to be localized. The physical hazard on the site is low.

6.4.2 POL 2

6.4.2.1 Visual Observations and Sample Locations

POL 2, the DEW station POL facility, consists of two 246 m³ diesel tanks located just south of the DEW station access road about 200 m west of the Module Train A on terrain that slopes toward a ditch to the west of the tanks. No stains or odours were noted in the facility. Sample P4-025, located in the ditch west of the tanks represents this area. No analyses were carried out on the sample from this area.

6.4.3 POL 3

6.4.3.1 Visual Observations and Sample Locations

The mogas tank is located west of the garage access road, 40 m southwest of the garage on a flat pad that slopes gently toward the west. Garbage was observed west of the tank.

The area is represented by sample P4-023, located in a drainage ditch to the south of the mogas tank. Soils consist of well drained sands and gravels with some scattered sedges covering the area. No stains or odours were noted in the vicinity of the sample location. No analysis was carried out on the sample from this area.