

**DETAILED SITE INVESTIGATION
BRITISH COLUMBIA BUILDINGS CORPORATION
CASSIDY HIGHWAYS YARD
1329 KIPP ROAD
CASSIDY, B.C.**

SEACOR PROJECT NO.: 202.01221.500 (N0003-063)

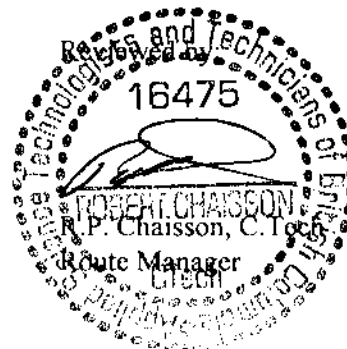
Submitted by
SEACOR Environmental Engineering Inc.

for
British Columbia Buildings Corporation
441A Columbia Street
Kamloops, B.C.
V2C 2T3

November 12, 1999

Prepared by:

G.M. Jesse, P.Geo.
Project Geologist



PRIVILEGED AND CONFIDENTIAL

Distribution: 5 copies – British Columbia Buildings Corporation
1 copy – SEACOR Environmental Engineering Inc.

EXECUTIVE SUMMARY

On behalf of British Columbia Buildings Corporation (BCBC), SEACOR Environmental Engineering Inc. (SEACOR) conducted a Detailed Site Investigation (DSI) of BCBC's Works Yard located at 1329 Kipp Road in Cassidy, B.C. The field work was carried on August 24, 25 and on September 10, 1999. The site was an active highways works yard with portions leased to various businesses, and located in a rural undeveloped area.

A Stage 1 and 2 Preliminary Site Investigation (PSI) was conducted at the subject site by Conor Pacific Environmental Technologies Inc. (Conor Pacific). Analytical soil chemistry results indicated that concentrations of dissolved chloride in soil samples collected from BH 1 and BH 4, advanced in the areas of the two salt sheds, were in excess of the typical dissolved chloride concentrations for Vancouver Island. The specific conductance of soil samples collected from BH 1 exceeded the Canadian Council of Ministers of the Environment (CCME) Interim Criteria. The concentration of light extractable petroleum hydrocarbons in a soil sample collected from BH 5, also advanced in the vicinity of the salt shed, was in excess of the BC Environment *Residential (RL)* standard. All other hydrocarbon and metal constituent concentrations in select soil samples collected and submitted for laboratory analysis during the investigation were below the applicable regulatory standards. It should be noted that several areas of environmental concern, including off-site discharge areas, the sand blasting area and exterior storage areas were not investigated during the Stage 2 PSI.

The DSI investigation comprised the advancement of thirteen boreholes, with nine boreholes completed as groundwater monitoring wells. Additionally, surface soil samples were obtained from Storage Area F, located on the eastern most portion of the property, from the area north of the Salt Shed #1 and from the sandblasting area. The soil profile generally comprised sand and gravel fill or asphalt road surfacing to a maximum depth of 1.2 m below ground surface, followed by native sandy silt till to a maximum depth of approximately 2.1 m below ground surface. Bedrock was encountered in all boreholes advanced (except BH 99-2) at depths ranging from 0.2 m to 2.1 m below ground surface. Groundwater was encountered in one (BH 99-7) of the nine monitoring wells at a depth of 1.28 m below grade; it is anticipated that surficial groundwater is present seasonally and will be encountered in the remaining wells during the winter months when groundwater levels are at their maximum. No free-phase product was encountered in BH 99-7 at the time of monitoring.

Analytical soil chemistry results indicated that concentrations of arsenic, copper and zinc in two surficial soil samples collected from the sandblasting area (assume 30 m³) were in excess of the BC Environment *Commercial (CL)* standards. Arsenic exceeded the *Special Waste* standard as defined in the Contaminated Sites Regulation (under the assumption that the groundwater used for drinking water standard applies) for one sample. The concentrations of barium and lead in one of the two samples were in excess of the *RL* standards. Although no samples were submitted for analyses, based on field observations, surficial soils in the waste oil tank area (AST #1 and UST #7) were assumed to be in excess of the *CL* standards. It should be noted that the staining appeared to be limited to the upper 150 mm of surficial soil (assume 5 m³).

Concentrations of dissolved chloride in one surficial soil sample and soil samples collected from five boreholes advanced in the vicinity of the two salt sheds (Sheds #1 and #2) were in excess of the regional background dissolved chloride concentrations. The sodium adsorption ratio for a soil sample collected from one of the boreholes advanced in the vicinity of the Salt Shed #2 was in excess of the CCME criterion.

The following table presents a summary of the target areas investigated during the DSI, sampling location and contaminant of concern exceeding the applicable environmental standards and follow-up recommendations:

DSI SUMMARY				
Target Area	Item of Concern	Sampling Location	Soil and Groundwater Analytical Chemistry Results	Recommendations
1	Salt Shed #1 (northern portion of property)	BH's 99-7, 99-8, 99-9, 99-10, SA5	Soils: Chloride - > RBCC, SAR - < CCME Conor Pacific Results - Soils: Chloride (BH 1) - > RBCC	<ul style="list-style-type: none"> Evaluate the requirement of groundwater quality to meet the DW standards. Conduct a groundwater monitoring/sampling event during the winter months to assess groundwater quality and to establish groundwater flow direction. Collect groundwater samples from the boreholes for analysis of dissolved metals and chloride.
2	Salt Shed #2 (southern portion of property)	BH's 99-3, 99-4, 99-5, 99-6	Soils: BETX/VPH, LEPH/HEPH, PAHs - < CL Sodium - > RBSC, Chloride - > RBCC, SAR - > CCME Conor Pacific Results - Soils: Chloride (BH 4) - > RBCC	<ul style="list-style-type: none"> Conduct a groundwater monitoring/sampling event during the winter months to assess groundwater quality and to establish groundwater flow direction. Collect groundwater samples from the boreholes for analysis of dissolved metals and chloride.
3	Oil Water Separator, Recycling Tank	BH 99-11	No samples submitted for analysis.	<ul style="list-style-type: none"> No further assessment work recommended for this area.
4	UST #7, AST #1	SA6, SA7, SA8 BH 99-12	Soils: LEPH/HEPH - > CL (assumed)	<ul style="list-style-type: none"> Based on field observations, the waste oil tank area exceeds the CL standards. Should BCBC wish to verify SEACOR's assumption, confirmatory soil samples could be collected during the recommended groundwater monitoring program. Staining appeared limited to the upper 150 mm of surficial soil (assume 5 m'). Conduct a groundwater monitoring/sampling event during the winter months to assess groundwater quality and to establish groundwater flow direction. Collect groundwater samples from the borehole for analysis of BETX/VPH, LEPH/HEPH and dissolved metals.
5	Oil Shed, Grease Ramp, Former Waste Oil UST, Three Former Gas/Diesel USTs	BH 99-1, BH 99-2,	Soils: BETX/VPH, LEPH/HEPH, PAHs - < CL	<ul style="list-style-type: none"> Conduct a groundwater monitoring/sampling event during the winter months to assess groundwater quality and to establish groundwater flow direction. Collect groundwater samples from the borehole for analysis of BETX/VPH, LEPH/HEPH and dissolved metals.
6	Storage Area D	BH 99-13	Soils: LEPH/HEPH - < CL	<ul style="list-style-type: none"> No further assessment work recommended for this area.
7	Lube Bay	Based on field observations, no further work deemed necessary.		<ul style="list-style-type: none"> No further assessment work recommended for this area.
8	Wash Pad	Based on field observations, no further work deemed necessary.		<ul style="list-style-type: none"> No further assessment work recommended for this area.

DSI Summary table is continued on the following page...

DSI SUMMARY				
Target Area	Item of Concern	Sampling Location	Soil and Groundwater Analytical Chemistry Results	Recommendations
9	Sandblasting Area	SA9, SA10, SA11, SA12	Soils: Metals - > CL, Arsenic - > SW (CSR)	<ul style="list-style-type: none"> Excavate impacted soils and determine appropriate method of soil treatment/disposal (assume 30 m³). Confirm soil quality at excavation limits (vertically and horizontally). Perform leachate quality tests for soil samples that exceed Special Waste standards for the CSR and TDG act.
10	Asphalt Millings	Based on field observations, no further work deemed necessary.		<ul style="list-style-type: none"> No further assessment work recommended for this area.
11	Paint Booth	Based on field observations, no further work deemed necessary.		<ul style="list-style-type: none"> No further assessment work recommended for this area.
12	Storage Area F	SA1, SA2, SA3, SA4	Soils: Metals - < CL, Sodium - > RBSC	<ul style="list-style-type: none"> Determine remedial target for salt impacted area in consultation with BC Environment.

- Notes:
- BETX – Benzene, Ethylbenzene, Toluene, Xylenes
 - VPH – Volatile Petroleum Hydrocarbons
 - LEPH/HEPH – Light/Heavy Extractable Petroleum Hydrocarbons
 - PAH – Polycyclic Aromatic Hydrocarbons
 - VOC – Volatile Organic Compounds
 - SAR – Sodium Adsorption Ratio
 - CL – BC Environment *Commercial* standards, Contaminated Sites Regulation (CSR), April 1, 1997
 - SW (CSR) – CSR, *Special Waste* standards, as detailed in Section 13
 - TDG act – Transportation of Dangerous Goods act
 - RBCC – Regional Background Chloride Concentrations
 - RBSC – Regional Background Sodium Concentrations
 - CCME – Canadian Council for Ministers of the Environment Interim Criteria

Summary of Report Participants

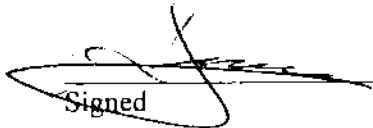
BCE SITE ID#: _____

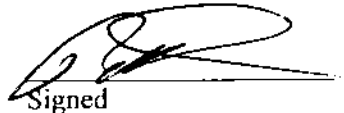
1. This report was commissioned by: company: British Columbia Buildings Corporation
contact name/position: George Wycherley, Environment Manager
address: 441A Columbia Street, Kamloops, B.C., V2C 2T3
telephone: (250) 314-5395
2. Report author(s): name(s): G.M. Jesse, P.Geo., Project Geologist
Robert Chaisson, C.Tech., Manager, Vancouver Island
address: #9 - 6421 Applecross Road, Nanaimo, B.C.
telephone: (250) 390-5050
3. Contributors to report: name/position: K.L. Winnicky, B.A., M.Sc., Environmental Scientist
name/position: Tara L. Siemens, B.Sc., Environmental Scientist
name/position: Brad Halsey, B.Sc., Environmental Scientist
4. Ministry policy considers that a regional pollution prevention manager has no duty to consider an application for an Approval in Principle, a Certificate of Compliance, a Conditional Certificate of Compliance or an approval of a preliminary or detailed site investigation until an applicant or the applicant's agent provides a written signed statement that the documentation prepared in support of any application has been carried out in accordance with all requirements in the Waste Management Act and the regulations thereto, and certifies that the person signing the statement has demonstrable experience in remediation of the type of contamination at the site for which the statement applies and is familiar with the remediation carried out on the site.

In consideration of the above policy, please detail below the relevant qualifications and experience of the main author(s) of the subject report.

G.M. Jesse, P.Geo., Project Geologist - over nine years experience, has completed over 150 site assessments including Stage 1 and 2 work.

Robert Chaisson, C.Tech., Manager, Vancouver Island - over nine years experience, has completed more than 150 Stage 1, 2 and 3 environmental site assessments and remediation projects.


Signed


Signed

Appendix C - Report Summary

CSR - PROTOCOL 5
October 1, 1998

Site Information Summary

Common name of site (if applicable)		Cassidy Works Yard		BCE SITE ID#	
Civic address of site		1329 Kipp Road			
city/postal code:		Cassidy, B.C.			
Owner of site		British Columbia Buildings Corporation (BCBC)			
Owner's address		441 A Columbia Street			
City, prov/state, postal code, country:		Kamloops, B.C., V2C 2T3, Canada			
Site occupant(s) (if different than owner)		JJM Maintenance			
Latitude (NAD 83 \pm 0.5 seconds)		Degrees:	49	Minutes:	6
Longitude (NAD 83 \pm 0.5 seconds)		Degrees:	123	Minutes:	54
PIDs/PINs of site					
(attach separate page if necessary)					
Legal description or meets and bounds:		Lot 1, Section 14, Range 6, Cranberry District			
(attach separate page if necessary)		Plan 40297			
Company official & address re sending:		George Wycherley, BCBC (see above)			
Air/Certificates by Registered Mail:					

Report(s) Submitted		Report Date(s)	
("x" as appropriate)		Past Submissions (yy-mm-dd)	Present (yy-mm-dd)
<input checked="" type="checkbox"/>	Preliminary Site Investigation - First Stage		
<input type="checkbox"/>	Preliminary Site Investigation - Second Stage		
<input checked="" type="checkbox"/>	Detailed Site Investigation*		
<input type="checkbox"/>	Remediation Plan with Risk Assessment		
<input type="checkbox"/>	Remediation Plan without Risk Assessment		
<input type="checkbox"/>	Confirmatory Sampling		
<input type="checkbox"/>	Monitoring		

Report Name	Detailed Site Investigation - Cassidy Works Yard
Consultant's Name	SEACOR Environmental Engineering Inc.
Consultant's file number	N0003-063 202.01221.500

Summary of Actions Taken (Current Status)

Detailed Site Investigation completed.

Actions Proposed (if applicable)

Site Data		Area Information		SITE ID#
Total area of site (m ²)	36000m2	Nearest groundwater water supply (m)	7 wells located within a 6 km ²	
Total area of building(s) (m ²)	3600m2	Nearest surface water (m)	Beck creek 0.25 km west, Beck lake 1.5 km southeast	
Total paved surface area (m ²)	29700m2	Nearest sensitive area (m)	Beck creek and Beck lake	
Current land use	CL	Uses of adjacent water resources	Aquatic life	
Proposed land use	NA	Annual rainfall (mm) + snowfall (cm)	Rainfall: 1045.0 Snowfall: 92.9	
Suspect land uses	NA	100/200 year flood potential of site	outside floodplain	
Contaminant source(s)	USTs/ASTs, salt shed, maintenance	100/200 yr flood potential of area	outside floodplain	
Presence of free product	LNAPL (Y/N) DNAPL (Y/N)	Adjacent land uses		
Number of soil contaminant zones				
No. of groundwater contaminant plumes				
Contaminant Migration potential	? unknown Low: High:			

Soil Sample Information		Groundwater Sample Information	
Number of testpits	0	Approx. depth to groundwater (m)	7 wells located within a 6 km ²
Number of boreholes	13	No. of affected aquifers & depths (m)	none
Number of surface samples collected	12	No. of monitoring wells developed	9 wells installed
Number of soil samples collected	46 (including surficial samples)	No. of groundwater samples collected	0
Number of soil samples analyzed (n)	17	No. groundwater samples analyzed (n)	0
Soil Contaminant(s) PCOCs	Soil Quality (AL, PL, RL, CL, IL, W, SW)	Groundwater Contaminant(s) PCOCs	Water Quality (AW, IW, LW, DW)
Shallow (depth, m): (0.0 - 1.0 m)	2 samples > CL copper and zinc	Shallow (depth, m):	
35 samples collected	1 sample > SW for arsenic	no samples collected	
	1 sample > CL for arsenic		
Intermediate (depth, m): (1.1 to 2.0 m)	no samples submitted at this depth	Intermediate (depth, m):	
8 samples collected			
Deep (depth, m): (2.1 to 3.0 m)	< RL for all tested parameters	Deep (depth, m):	
3 samples collected			

Notes: Migration potential refers to contaminant plume(s) and "?" = "unknown"		AL - Agricultural	AW - Aquatic Life
"surface samples" = soil samples obtained using hand trowels, shovels		PL - Urban Park	LW - Livestock
and hand augers at depths less than 0.5 metres		RL - Residential	IW - Irrigation
PCOC = Potential contaminants of concern		CL - Commercial W = Waste	DW = Drinking Water
		IL - Industrial SW = Special Waste	

SOIL -- Zones of Soil Contamination (referenced to attached Site Plan)

SOIL -- Zones of Soil Contamination (referenced to attached Site Plan)													
Map Area	Zone Area (m ²)	Depth Range (m)	Volume (m ³)	Quality (CL, IL, etc.)	Soil Contaminants (concentrations in µg/g)								
					PCOC	Number of Analyses	Sample Mean	Standard Deviation	Minimum Value	Maximum Value	Median	75th Percentile	90th Percentile
9 - Sandblasting area	375	0.03 m	11.3	> CL	Arsenic	1	n/a	n/a	110	110	n/a	n/a	n/a
				Copper	2	3590	1513.2	2520	4660	n/a	4125	4446	
				Zinc	2	7670	2573.9	5850	9490	n/a	8580	9126	
				> SW	Arsenic	1	n/a	n/a	160	160	n/a	n/a	n/a
Plume Location	Plume Area (m ²)	Depth Range (m)	Velocity Linear (m/yr)	Quality (AW, DW, etc.)	Groundwater Contaminants (concentrations in µg/L)								
					PCOCs & pH, Hardness	Number of Analyses	Sample Mean	Standard Deviation	Minimum Value	Maximum Value	Median	75th Percentile	90th Percentile

Linear velocity of plume = Darcy velocity (V_{Darcy}) divided by the effective porosity (n_e)

PCOC = potential contaminant of concern

The above information is a summary only and persons who may be relying on the report are encouraged to review the entire document so as to avoid the use of information out of context.

Date:

Appendix C: Page 3 of 5

TABLE OF CONTENTS

TAB A

EXECUTIVE SUMMARY
 PROTOCOL 5

TAB B

1.0 INTRODUCTION	1
2.0 BACKGROUND	3
2.1 SITE DETAILS	3
2.2 PREVIOUS ENVIRONMENTAL INVESTIGATIONS	4
3.0 METHODOLOGY	7
3.1 DRILLING INVESTIGATION	7
3.2 MONITORING WELL COMPLETIONS	7
3.3 SOIL SAMPLING	7
3.3.1 Borehole Samples	7
3.3.2 Surface Soil Samples	8
3.4 GROUNDWATER MONITORING	8
3.5 SURVEYING	8
3.6 ANALYTICAL TESTS AND REGULATORY STANDARDS	8

TAB C

4.0 SAMPLING LOCATIONS AND FIELD OBSERVATIONS	11
4.1 SAMPLING LOCATIONS	11
4.2 SOIL PROFILE	12
4.3 SOIL FIELD OBSERVATIONS	12
4.4 GROUNDWATER FIELD OBSERVATIONS	13

TAB D

5.0 ANALYTICAL RESULTS AND RECOMMENDATIONS	14
5.1 SOIL CHEMISTRY RESULTS	14
5.1.1 BETX, VPH, EPH, LEPH, HEPH Analyses	14
5.1.2 PAH Analyses	15
5.1.3 Total Metals Analyses	16
5.1.4 Dissolved Chloride and SAR Analyses	18
5.2 GROUNDWATER CHEMISTRY RESULTS	18
5.3 SUMMARY OF RESULTS	19
5.4 RECOMMENDATIONS	20
6.0 CLOSURE	22

TAB E**FIGURES**

Figure 1:	Site Location Map
Figure 2:	Surrounding Land Use Plan
Figure 3:	Site Plan – Sampling Locations
Figure 4:	Cross-Section
Figure 5:	Soil Contaminant Plan (ppm)

PHOTOGRAPHS**BOREHOLE LOGS****ANALYTICAL CHEMISTRY REPORTS**

TAB F**PROFESSIONAL STATEMENT****TABLES**

TABLE 1: SITE DETAILS	3
TABLE 2: SAMPLING LOCATIONS	11
TABLE 3: SOIL PROFILE	12
TABLE 4: SOIL FIELD OBSERVATIONS	12
TABLE 5: GROUNDWATER FIELD OBSERVATIONS	13
TABLE 6: SOIL CHEMISTRY - GENERAL HYDROCARBONS (ppm) – August 24 and 25, 1999.....	14
TABLE 7: SOIL CHEMISTRY – POLYCYCLIC AROMATIC HYDROCARBONS (ppm) – August 24 and 25, 1999.....	15
TABLE 8: SOIL CHEMISTRY – TOTAL METALS (ppm) – August 24 and 25, 1999.....	16
TABLE 9: SOIL CHEMISTRY - DISSOLVED CHLORIDE AND SAR RESULTS – August 24 and 25, 1999.....	18
TABLE 10: RECOMMENDATIONS	20

1.0 INTRODUCTION

On behalf of British Columbia Buildings Corporation (BCBC), SEACOR Environmental Engineering Inc. (SEACOR) conducted a Detailed Site Investigation (DSI) of BCBC's Work Yard Site located at 1329 Kipp Road, Cassidy, B.C. The field work was carried out on August 24, 25 and on September 10, 1999 in order to assess potential environmental liabilities at the site. This report presents the results of the Stage 1 and 2 Preliminary Site Investigation (PSI) conducted at the subject site by Conor Pacific Environmental Technologies Inc. (Conor Pacific), the DSI investigation, field observations and soil and groundwater analyses.

The work was carried out in accordance with BCBC's Request for Proposal (RFP No. 139TV) and SEACOR's standard field investigative procedures. The following work was conducted:

- Preparation of a site specific Health and Safety Plan.
- Review of Conor Pacific's January 1999 report titled Combined Stage 1/Stage 2 Preliminary Site Investigations – Cassidy Works Yard.
- Advancement of thirteen boreholes to a maximum depth of 3.0 m below grade, with nine boreholes completed as groundwater monitoring wells. Thirty-five soil samples were obtained during the drilling investigation for field observations and measurement of combustible hydrocarbon headspace vapour levels.
- Twelve surface soil samples were collected from areas of observed staining or other areas of suspected contamination.
- Submission of seventeen soil samples to Philip Analytical Services Corporation (PSC) of Burnaby, B.C. for confirmatory laboratory analysis.
- Completion of a groundwater monitoring event comprising the measurement of depth to groundwater, specific conductivity, pH, apparent free-phase product thickness (if any) and monitoring well vapour levels.
- Completion of a basic level survey of the monitoring wells to provide a reference for groundwater elevations.
- Site photographs.
- Site plans with sampling locations, inferred cross-sections and areas of contamination.
- Preparation of this report.

The results of the DSI are outlined in subsequent sections of this report. The remainder of this TAB includes a site background, summary of previous PSI Stage 1 and 2 work and field methodologies. TAB C comprises information regarding test locations, monitoring well locations, soil profile, groundwater elevations and inferred gradient (written and schematic) and the presence/absence of free-phase product. TAB D includes all DSI field observations, results of analytical testing compared to the applicable environmental standards and any further investigative/remedial recommendations. The site plans, sampling locations, and plans indicating areas of contamination, as well as the borehole logs and analytical chemistry reports are included in TAB E. As per the requirements of Section 63 of the BC Contaminated Sites Regulation, a professional statement is presented in TAB F.

2.0 BACKGROUND

2.1 SITE DETAILS

The subject site is located in a residential/undeveloped area at 1329 Kipp Road, Cassidy, B.C. The site location map and surrounding land use plan are presented as Figures 1 and 2, respectively. The following table summarizes the site details as reported in the Conor Pacific Stage 1/Stage 2 PSI report and as determined during SEACOR's site investigation.

TABLE 1: SITE DETAILS	
Site Address	Cassidy Highways Yard, 1329 Kipp Road, Cassidy, B.C.
Property Size	Approximately 300 m x 100 m
Legal Description	Lot 1, Section 14, Range 6, Cranberry District, Plan 40297
Latitude/Longitude of Site Centroid	49°6'11" N 123°54'49" W
Building Information	<p>Structures/facilities present at the site include:</p> <ul style="list-style-type: none"> Maintenance Building (Building #1) Office/Storage Building (Building #2) Oil Storage Building (Building #3) Two Salt Sheds (Shed #1 and #2) Cylinder Storage Shed (Shed #3) Metal Shed (Shed #4) Trailer #1 Grease Ramp Oil Water Separator
Tank Information	<p>AST #1 - 1500 litre, above ground, steel, waste oil AST #2 - 13500 litre, above ground, steel, diesel UST #1 - 13500 litre, underground, steel, diesel (removed March 1997) UST #2 - 13500 litre, underground, steel, diesel (removed March 1997) UST #3 - 13500 litre, underground, steel, gasoline (removed March 1997) UST #4 - 4500 litre, underground, steel, waste oil (removed March 1997) UST #5 - 9000 litre, underground, steel, heating oil UST #6 - unknown size, underground, steel, waste oil (decommissioned in March 1997) UST #7 - unknown size, underground, steel, waste oil (located under AST #1)</p>
Surrounding Land Use (refer to Figure 2)	<p>N Undeveloped/Forested NE Undeveloped/Forested E Undeveloped/Forested SE Undeveloped/Forested, ABC Pre-Cast Concrete Company S Undeveloped/Forested SW Undeveloped/Forested W Undeveloped/Forested NW Undeveloped/Forested</p>
Geography	<p>Topography: Apex of local topography. Surface Water: Beck Creek, approximately 0.25 km west; Beck Lake, approximately 1.5 km southeast Surface Drainage: Generally in all directions as site is situated on a topographic high point.</p>
Hydrogeology	<p>Soil Type: Sand and gravel fill and/or asphalt road surfacing followed by native sandy silt till overlying consolidated sandstone bedrock. Groundwater: The groundwater table was not encountered during the investigation Wells: Seven registered groundwater wells are located within a 6 km² area surrounding the site.</p>
Notes	<ul style="list-style-type: none"> Oil was identified in one of the sumps for the wash bay in 1995 USTs #1, 2, 3 and 4 were removed in March 1997, the excavations were reportedly 'clean'. Attempts to remove UST #6 were unsuccessful due to the close proximity to a building foundation; product was removed from the UST and the tank was filled with sand. A brine tank was connected to a catchbasin in the vicinity of Shed #1 (salt shed) in 1997. It was intended that the brine tank would be emptied as required.

Notes:

- AST - aboveground storage tank
- UST - underground storage tank

2.2 PREVIOUS ENVIRONMENTAL INVESTIGATIONS

The Stage 1 and Stage 2 PSI was conducted by Conor Pacific in November 1998. The results were presented in their report titled Combined Stage 1/Stage 2 Preliminary Site Investigations - Cassidy Works Yard, January 1999. The results of the Stage 1/Stage 2 Investigation conducted by Conor Pacific are summarized below.

The Stage 1 PSI comprised a search of historical aerial photographs, title search, archaeological search, and information from the Insurers' Advisory Organization, local fire department, BCBC files, BC On-line and water well records. A site reconnaissance was also conducted which included documentation of the site physiography, adjacent land use, various buildings and operations at the site and other items of potential concern. A summary of the results is as follows:

- The site was partially cleared between 1968 and 1975, at which time no structures or facilities were present. Three structures were constructed at the site between 1975 and 1984. The site was transferred from Her Majesty the Queen to BCBC in 1984.
- Three underground storage tanks (USTs) and two aboveground storage tanks (ASTs) were present at the site at the time of inspection; four former USTs were also identified (removed in 1997). Other structures/facilities at the site include a maintenance building, an office/storage building, two salt sheds, a cylinder storage shed, an oil storage building, a metal shed, a grease ramp and an oil water separator.
- Materials stored at the yard included, but were not limited to, asphalt millings, drums containing various products including oil, antifreeze and paint, drums and of sandblasting grit, two propane tanks, scrap metal and other miscellaneous equipment.

During the Stage 1 PSI, Conor Pacific reviewed several other previous environmental reports regarding the subject site. A summary of the results of these reports is provided below:

- A report titled Highways Yardsite Inspection dated November 1988 was reviewed. The site was described as being fully paved, with grass present behind the buildings. The report mentioned an on-site groundwater well (location unknown) and a septic field. An oil-fired boiler was identified in the garage/storage building.
- A Phase I Environmental Audit report dated March 27, 1991 was reviewed. The report stated that BCBC had occupied the site for approximately twenty years. The surrounding properties were reported to be covered with brush and privately owned. Wastes generated on-site included antifreeze (stored on-site) and waste oil (recycled). Both ASTs and USTs were identified at the site.
- A letter from Mr. Bruce Campbell to BCBC, dated April 1995, stated that one of two sumps located at the west washbay was full of oil, however, the oil had not reached the outflow.
- Correspondence between Mr. Daryl Amos and Mr. Dan Rettmer, both of BCBC, indicated that mercury vapour lamps were located at the subject site.

- A letter dated March 21, 1997 indicated that four USTs (USTs #1, 2, 3 and 4) had been removed and that the excavations appeared to be clean. Attempts to remove a fifth UST (UST #6) were unsuccessful due to the close proximity of a building foundation. The product was reportedly removed from the tank and the UST was subsequently filled with sand and abandoned in place.
- An environmental site assessment of the salt storage facility at the subject site was conducted by Enkon Environmental of Surrey, B.C. in August 1997. The report stated that the salt shed (Shed #1) was located on a paved surface and drainage within the facility was directed towards a catchbasin. The report stated that the catchbasin was being connected to a brine tank and that the brine tank would be emptied as required. The report recommended that the brine tank be treated to prevent corrosion, that the area in front of the salt shed be paved to direct surface water to a stormwater drain located to the southeast and that the catchbasin be inspected to ensure that the brine tank did not overflow. The assessment also noted that there were no fish-bearing streams in the area.
- A letter dated August 12, 1997, from Mainroad Mid-Island, stated that the area in front of the salt shed would be paved, the brine tank would be treated and that salt spillage would be cleaned up immediately. The letter also indicated that the storm system outfall drained to a wooded area to the south of the site and that there were no known fish-bearing streams in the area.

Conor Pacific identified nine potential items of concern and recommended that a Stage 2 PSI be completed to address these concerns.

The Stage 2 PSI comprised the advancement of nine boreholes (BH's 1 to 9) across the site; no boreholes were completed as groundwater monitoring wells as groundwater was not encountered in the soil matrix during the intrusive investigation. A summary of the field observations and analytical testing conducted on select samples is as follows:

- Dissolved chloride concentrations in soil samples collected from BH 1 (0.1-0.3 m and 1.2-1.5 m) and BH 4 (0-0.3 m and 0.6-0.9 m), advanced in the vicinity of Salt Shed's #1 and #2, exceeded typical dissolved chloride concentrations for Vancouver Island. The specific conductance of the soil samples collected from BH 1 exceeded the Canadian Council of Ministers of the Environment (CCME) Interim Criterion.
- The concentration of light extractable petroleum hydrocarbons (LEPH) in a soil sample collected from BH 5 (0.6-1.0 m) was in excess of the BC Environment *Residential (RL)* standard.
- Several areas of environmental concern, including off-site discharge areas, exterior storage areas and the sandblasting area, were not assessed during the Stage 2 PSI.
- The concentrations of all other hydrocarbon and metal constituents in the soil samples submitted for analysis were below the applicable regulatory standards.

Conor Pacific recommended that a DSI be completed. Based on Conor Pacific's recommendations, the following areas were approved for assessment:

- Salt Shed #1;
- Salt Shed #2;
- the oil water separator and recycling tank; and,
- the area of the oil shed, grease ramp, the former waste oil UST and the former gas and diesel USTs.

North West Environmental Group Ltd. (North West), on behalf of BCBC, provided "Exception Tracking Reports" that outlined the Scope of Work for the DSI program. Following SEACOR's review of the Conor Pacific Stage 1/Stage 2 PSI report, SEACOR forwarded supplemental assessment recommendations to BCBC and North West, of which the following were approved for implementation:

- UST #7 and AST #1;
- Storage area D;
- the lube bay;
- the wash pad;
- the sandblasting area;
- the area of asphalt millings storage;
- the paint booth; and,
- storage area F.

3.0 METHODOLOGY

3.1 DRILLING INVESTIGATION

The drilling program was completed utilizing a B-61 auger drill rig, provided and operated by Beck Drilling and Environmental Services Ltd. (Beck) of Richmond, B.C. Soil cuttings were stored on the eastern portion of the site on a polyethylene sheet and covered for future disposal. Aboveground and below ground utilities were located by Local Utility Locators of Chilliwack, B.C. Mr. Pete Waycott of Mainroad Contracting Limited accompanied SEACOR on a general reconnaissance of the site.

3.2 MONITORING WELL COMPLETIONS

Fifty-millimetre diameter, #010 slot PVC, standpipe monitoring wells were installed in 9 of the 13 boreholes (BH's 99-1, 99-3, 99-4, 99-6, 99-7, 99-8, 99-9, 99-10 and 99-12). Although no groundwater was encountered in the soil matrix during the advancement of the boreholes, it is expected that the surficially perched water bearing zone would manifest during months of maximum precipitation. The wells were installed in order to permit characterization of groundwater quality and determine the presence or absence of any free-phase product. The annulus around each monitoring well was backfilled with sand and a bentonite seal was installed close to ground surface; all wells were capped with a lockable well cap. Steel road boxes set in concrete were installed 0.15 m to 0.30 m below ground surface, as per BCBC's requirements. The remaining boreholes were backfilled to grade with soil cuttings and sealed with bentonite and concrete at the surface. Reference should be made to TAB E for specific monitoring well construction/borehole abandonment details.

3.3 SOIL SAMPLING

3.3.1 Borehole Samples

Boreholes were drilled to depths ranging from 0.2 m (auger refusal) to 3.1 m below ground surface. Soil samples were obtained directly from auger flights at approximate 0.6 m intervals throughout the boreholes. Each sample was classified according to soil type, structure and colour. All samples were field-screened for the presence of combustible organic vapours using a fixed-volume headspace technique with a Gastech (Model 1238) hydrocarbon vapour analyzer with the methane elimination feature activated. The Gastech was calibrated to two points prior to field use: 40% LEL (lower explosive limit) and 440 ppmv (parts per million volumetric) of hexane.

A 250 ml jar was half-filled with soil and allowed to sit for approximately ten minutes, prior to analyzing the headspace. The detector recorded the concentration of combustible organic vapours in ppmv or % LEL. It should be noted that for consistency within this report, the field recorded values of % LEL were converted to ppmv by multiplying by a factor of 100. Duplicate samples were retained for laboratory analyses; the soil samples were placed in laboratory-prepared glass jars, which were labelled and stored in an ice-filled cooler. The samples and a completed Chain-of-Custody form were subsequently transported to PSC for chemical analyses.

3.3.2 Surface Soil Samples

Surface soil samples were collected by hand utilizing a shovel. All samples were field-screened for the presence of combustible organic vapours as per Section 3.3.1. Duplicate samples were retained for laboratory analyses; the soil samples were placed in laboratory-prepared glass jars, which were labelled and stored in an ice-filled cooler. The samples and a completed Chain-of-Custody form were subsequently transported to PSC for chemical analyses.

3.4 GROUNDWATER MONITORING

On September 8, 1999, all monitoring wells were monitored for depth to groundwater and free-phase product utilizing a Solinst Interface Probe; monitoring well vapour levels were recorded using Gastech (Model 1238) hydrocarbon vapour analyzer with the methane elimination feature activated. The monitoring wells installed during the DSI program were noted to be dry. SEACOR conducted a subsequent monitoring event on September 10, 1999; at this time, groundwater was encountered in one of the nine monitoring wells.

3.5 SURVEYING

A basic level survey was completed on September 10, 1999 to provide an elevation reference for free-surface groundwater levels. An arbitrary elevation of 100.00 m was assumed for southeast corner of the office/storage building (Building #2).

3.6 ANALYTICAL TESTS AND REGULATORY STANDARDS

The Contaminated Sites Regulation (CSR) of the Waste Management Act came into effect on April 1, 1997 and is the principal document addressing contaminated sites in British Columbia. The CSR provides for both numerical and risk-based approaches to managing site contamination and outlines the procedural requirements for site assessment, remediation and application for environmental closure of a property.

The numerical standards for soils are presented in various schedules. The generic standards include a variety of inorganic and organic substances and are compared to five classes of land use: *Agricultural, Urban Park, Residential, Commercial* and *Industrial*. The matrix standards address 16 specific contaminants from both a land use and risk-based receptor perspective. On the basis of present land use at this site, the most conservative of the following site-specific factors for *Commercial Land* apply for determining applicable Matrix Numerical Soil Standards: *human intake of contaminated soil, toxicity to soil invertebrates and plants, groundwater flow to surface water used by aquatic life and groundwater used for drinking water*. *Commercial* Generic Numerical Soil Standards also apply at this site. The presence/absence of *Special Waste* soil at the site is determined as per Section 13 of the CSR.

The CSR was amended on July 19, 1999 to include the Regulation of Petroleum Hydrocarbons in Water under the Contaminated Sites and Special Waste Regulations document (Protocol 7). This document addresses dissolved petroleum hydrocarbon contamination and presents regulated standards for specific hydrocarbon compounds based on water uses. Groundwater quality in the CSR is referenced to four classes of water use (*Aquatic Life, Irrigation, Livestock and Drinking Water*). Based on the presence of seven registered water wells within a 6 km² area surrounding the site, the *Drinking Water* standards were applied. As groundwater travel time from the site to the closest surface water, it is likely that the groundwater at the site has the potential to impact the nearest aquatic receiving environment; thus *Aquatic Life* standards, as referenced in the CSR, would also apply at the site. The new Schedule 6 water quality standards for volatile petroleum hydrocarbons and light extractable petroleum hydrocarbons (VH_{w6-10} and EH_{w10-19}, respectively), as listed in Protocol 7, apply at all sites in B.C. irrespective of water use. Additionally, BCBC, may elect to determine risk-based remediation standards for the site.

Direction from BC Environment has been lacking with respect to levels of sodium or chloride in soils that would constitute contamination. In the absence of soil standards for sodium and chloride, regional background concentration data were referenced. BC Environment soil data summaries indicate that background chloride levels are < 35 parts per million (ppm), while sodium concentrations in natural surficial soils range from 140 ppm to 780 ppm. For the purpose of this report, chloride and sodium analytical results were compared to the 95% confidence interval for Vancouver Island regional background concentrations for each parameter (33 ppm and 750 ppm, respectively). The CCME sodium adsorption ratio (SAR) criterion presented in the *Interim Canadian Environmental Quality Criteria for Contaminated Sites* (1991) is also referenced. The SAR evaluates the potential base exchange relationships through which calcium and magnesium in a soil are replaced by sodium present in water. The *Canadian Water Quality Guidelines* state that the SAR is utilized to evaluate the suitability of waters used for agricultural irrigation, and that it is an estimate of the degree to which sodium will be adsorbed by the soil. As drinking water standards exist for both sodium and chloride, potential use of groundwater as a potable source at or near the site was also evaluated.

Soil and/or groundwater samples retained for analysis were submitted to PSC for selective quantification of one or many of the following parameters:

- BETX^{a,b} - benzene, ethylbenzene, toluene, xylenes
- VPH^a - volatile petroleum hydrocarbons (C₅₋₁₁), exclusive of BETX constituents
- LEPA^{a,b}/HEPA^a - light and heavy extractable hydrocarbons ((C₁₀₋₁₉) and (C₁₉₋₃₂))
- PAH^{a,b} - polycyclic aromatic hydrocarbons
- EPH^a - extractable petroleum hydrocarbons (C₁₀₋₁₉) and (C₁₉₋₃₂)
- Metals^{a,b} - total heavy metals (soil), dissolved metals (groundwater)/pH
- Chloride^b - dissolved chloride
- SAR^a - Sodium Adsorption Ratio

^a - indicates a regulated parameter in soil, ^b - indicates a regulated parameter in groundwater

It should be noted that soil samples may have been submitted for extractable petroleum hydrocarbon (EPH) analysis in place of light/heavy extractable hydrocarbon analysis (LEPH/HEPH); EPH results are, by definition, more conservative than LEPH/HEPH results for the purpose of gross parameter testing.

4.0 SAMPLING LOCATIONS AND FIELD OBSERVATIONS

4.1 SAMPLING LOCATIONS

During the period of August 24 and 25, 1999, thirteen boreholes (BH's 1 to 13) were advanced across the site; nine boreholes (BH's 99-1, 99-3, 99-4, 99-6, 99-7, 99-8, 99-9, 99-10 and 99-12) were completed as groundwater monitoring wells. As well, surface soil samples were obtained in several target areas. The sampling locations are illustrated on Figure 3 (refer to TAB E) and a summary of the completed sampling locations and depths is presented in Table 2 below.

TABLE 2: SAMPLING LOCATIONS				
Target Area	Description	Location ID	Maximum Depth (m)	Monitoring Well(s)
1	Salt Shed #1 (northern portion of property)	BH's 99-7, 99-8, 99-9, 99-10, SA5	2.7 (BH 99-9)	BH's 99-7, 99-8, 99-9 and 99-10
2	Salt Shed #2 (southern portion of property)	BH's 99-3, 99-4, 99-5, 99-6	1.5 (BH 99-3)	BH's 99-3, 99-4 and 99-6
3	Oil Water Separator, Recycling Tank	BH 99-11	0.2	None
4	UST #7, AST #1	BH 99-12, SA6, SA7, SA8	2.3	BH 99-12
5	Oil Shed, Grease Ramp, Former Waste Oil UST, Three Former Gas/Diesel USTs	BH 99-1, BH 99-2	3.0 (BH 99-1)	BH's 99-1
6	Storage Area D	BH 99-13	0.3	None
7	Lube Bay	Based on field observations, no further work deemed necessary.		
8	Wash Pad	Based on field observations, no further work deemed necessary.		
9	Sandblasting Area	SA9, SA10, SA11, SA12	0.1	None
10	Asphalt Millings	Based on field observations, no further work deemed necessary.		
11	Paint Booth	Based on field observations, no further work deemed necessary.		
12	Storage Area F	SA1, SA2, SA3, SA4	0.1	None

Note: • m - metres

The DSI program proceeded as outlined in North West's "Exception Tracking Report", with the following exceptions or revisions:

- Field observations indicated that no further work was required in Target Areas 7, 8, 10 and 11. The wash pad was not in use and no significant staining was observed in the areas of the lube bays and the paint booth. Concrete and asphalt surfacing generally appeared intact and no significant migration conduits were identified.

4.2 SOIL PROFILE

The generalized site soil profile is summarized in Table 3.

TABLE 3: SOIL PROFILE	
Nominal Depth	Soil Description
0 m – 0.05 m	ASPHALT ROAD SURFACING
0.05 m – 1.2 m	SAND AND GRAVEL (Fill) – subangular to subrounded gravel, fine to coarse sand, trace silt, oxidized, dense, well-graded, greyish brown, dry
1.2 m – 2.1 m	SANDY SILT TILL (Native) – fine to medium sand, trace to some gravel to 70 mm diameter, stiff, well graded, oxidized, brown, damp
> 2.1 m	BEDROCK (Sandstone)

Note: • m – metres below grade

The material and depths varied locally and reference should be made to the borehole logs in TAB E for specific information. A geological cross section detailing soil stratigraphy is provided in Figure 4, with the cross section line shown on Figure 3.

4.3 SOIL FIELD OBSERVATIONS

As part of the investigation, soil samples were field-screened for headspace vapour levels; a summary of these results is presented in Table 4 below:

TABLE 4: SOIL FIELD OBSERVATIONS				
Target Area	Test Location	Test Location ID	Maximum Headspace Vapour Level	
			Vapour Level (ppmv)	Depth(s) (m)
1	Salt Shed #1 (northern portion of property)	BH's 99-7, 99-8, 99-9, 99-10, SA5	110 (BH99-10)	0.8
2	Salt Shed #2 (southern portion of property)	BH's 99-3, 99-4 99-5, 99-6	35 (BH's 99-3, 99-4)	0.8
3	Oil Water Separator, Recycling Tank	BH 99-11	15	0.2
4	UST #7, AST #1	BH 99-12, SA6, SA7, SA8	45 (SA6)	0.1
5	Oil Shed, Grease Ramp, Former Waste Oil UST, Three Former Gas/Diesel USTs	BH 99-1, BH 99-2	165 (BH99-2)	0.8
6	Storage Area D	BH 99-13	15	0.2
7	Lube Bay	Based on field observations, no further work deemed necessary.		
8	Wash Pad	Based on field observations, no further work deemed necessary.		
9	Sandblasting Area	SA9, SA10, SA11, SA12	15 (SA11)	0.02
10	Asphalt Millings	Based on field observations, no further work deemed necessary.		
11	Paint Booth	Based on field observations, no further work deemed necessary.		
12	Storage Area F	SA1, SA2, SA3, SA4	15 (all samples)	0.1

Notes: • ppmv - parts per million volumetric
• m - metres

Maximum soil headspace vapour levels ranged from 15 ppmv in several of the test locations to a maximum of 165 ppmv in BH 99-2.

4.4 GROUNDWATER FIELD OBSERVATIONS

A groundwater monitoring event was conducted on September 10, 1999. Groundwater was encountered in one of the nine monitoring wells; it is anticipated that the surficially perched water bearing zone would manifest during months of maximum precipitation. The groundwater monitoring event comprised the measurement of depth to groundwater, depth to free-phase product (if any) and monitoring well vapour levels. A summary of the groundwater observations is provided in Table 5 below.

TABLE 5: GROUNDWATER FIELD OBSERVATIONS – September 10, 1999								
Monitoring Well ID	Screened Interval From Grade (m)	Elevation (m)		Depth to Groundwater Surface (m)		Groundwater Elevation (m)	Apparent Free-Phase Product Thickness	Monitoring Well Vapour Level (ppmv)
		T.O.P.	Grade	T.O.P.	Grade			
BH99-1	0.6-2.8	99.44	99.55	Dry	Dry	-	-	80
BH99-2	-	-	99.23	-	-	-	-	-
BH99-3	0.5-1.5	100.78	100.84	Dry	Dry	-	-	20
BH99-4	0.3-1.2	100.64	100.73	Dry	Dry	-	-	50
BH99-5	-	-	100.26	-	-	-	-	-
BH99-6	0.5-1.4	100.59	100.63	Dry	Dry	-	-	70
BH99-7	0.5-1.4	99.97	100.08	1.17	1.28	98.80	nil	55
BH99-8	0.5-2.3	99.73	99.86	Dry	Dry	-	-	65
BH99-9	0.6-2.7	99.86	99.73	Dry	Dry	-	-	80
BH99-10	0.6-2.1	99.82	99.91	Dry	Dry	-	-	65
BH99-11	-	-	99.91	-	-	-	-	-
BH99-12	0.4 – 2.3	100.06	100.20	Dry	Dry	-	-	55
BH99-13	-	-	100.07	-	-	-	-	-

Notes:

- m - metres
- T.O.P. - top of piezometer
- pmv - parts per million volumetric

Groundwater was encountered in BH 99-7 at 1.28 m below grade; groundwater was not encountered in the remaining monitoring wells. The monitoring well vapour levels were ranged from 20 ppmv in BH 99-3 to 80 ppmv in BH's 99-1 and 99-9. Free-phase product was not encountered BH 99-6 at the time of monitoring.

5.0 ANALYTICAL RESULTS AND RECOMMENDATIONS

5.1 SOIL CHEMISTRY RESULTS

The following sections present the results of the various chemical analyses conducted on select soil samples. Sample selection was based on elevated soil headspace vapour levels, field observations, soil stratigraphy, the properties of the potential contaminant of concern in each target area and/or the results of the Stage 1 and 2 PSI.

5.1.1 BETX, VPH, EPH, LEPH, HEPH Analyses

Four soil samples were submitted to PSC for analysis of various hydrocarbon constituents. The results of the analyses and applicable environmental standards are presented in Table 6, with the detailed analytical chemistry report provided in TAB E.

TABLE 6: SOIL CHEMISTRY - GENERAL HYDROCARBONS (ppm) – August 24 and 25, 1999									
Sample ID	Depth (m)	HSVL (ppmv)	Benzene	Ethyl-benzene	Toluene	Xylenes	VPH	LEPH	HEPH
BH99-1-SA4	2.1	30	-	-	-	-	-	< 10	< 10
BH99-2-SA2	0.8	165	< 0.04	< 0.04	< 0.04	< 0.03	< 10	-	-
BH99-4-SA1	0.2	10	-	-	-	-	-	< 10	< 10
BH99-13-SA1	0.2	15	-	-	-	-	-	< 10 ¹	< 10 ²
RL			0.04 ^a	5 ^b	2.5 ^a	5 ^b	200 ^c	1000 ^c	1000 ^c
CL			0.04 ^a	7 ^a	2.5 ^a	20 ^a	200 ^c	2000 ^c	5000 ^c

- Notes:
- ppm – parts per million (milligrams/dry kilogram)
 - HSVL (ppmv) – headspace vapour level (parts per million by volume)
 - - – sample not analyzed for parameter specified
 - < – less than analytical detection limit indicated
 - VPH – volatile petroleum hydrocarbons (C₃₋₁₁), LEPH – light extractable petroleum hydrocarbons (C₁₀₋₁₉), HEPH – heavy extractable petroleum hydrocarbons (C₁₉₋₃₂)
 - ¹ – indicates sample was submitted for analysis of extractable petroleum hydrocarbons (EPH C₁₀₋₁₉). The result was compared directly to the LEPH standard; EPH is not a regulated parameter.
 - ² – indicates sample was submitted for analysis of extractable petroleum hydrocarbons (EPH C₁₉₋₃₂). The result was compared directly to the HEPH standard; EPH is not a regulated parameter.
 - RL – Residential standards, BC Environment Contaminated Sites Regulation (CSR), April 1, 1997
 - CL – Commercial standards, BC Environment CSR
 - ^a – CSR, Matrix Numerical Soil Standards - groundwater used for drinking water
 - ^b – CSR, Matrix Numerical Soil Standards - toxicity to soil invertebrates and plants
 - ^c – CSR, Generic Numerical Soil Standards

The results indicated that the concentrations of hydrocarbon constituents in the samples analysed were below the RL standards. Although no samples were submitted for analyses, based on field observations, surficial soils in the waste oil tank area (AST #1 and UST #7) were assumed to be in excess of the BC Environment Commercial (CL) standards. It should be noted that the staining appeared to be limited to the upper 150 mm of surficial soil (assume 5 m³).

5.1.2 PAH Analyses

Two soil samples were submitted to PSC for analysis of polycyclic aromatic hydrocarbons (PAHs). The results of the analyses and applicable environmental standards are presented in Table 7, with the detailed analytical chemistry report provided in TAB E.

Sample ID	BH99-1-SA4	BH99-4-SA1	RL	CL
Acenaphthene	< 0.01	< 0.01	n.s.	n.s.
Acenaphthylene	< 0.01	< 0.01	n.s.	n.s.
Anthracene	< 0.01	< 0.01	n.s.	n.s.
Benzo (a) anthracene	< 0.01	< 0.01	1 ^a	10 ^a
Benzo (b) fluoranthene	0.01	< 0.01	1 ^a	10 ^a
Benzo (k) fluoranthene	< 0.01	< 0.01	1 ^a	10 ^a
Benzo (g,h,i) perylene	< 0.02	< 0.02	n.s.	n.s.
Benzo (a) pyrene	< 0.01	< 0.01	1 ^b	10 ^b
Chrysene	0.01	< 0.01	n.s.	n.s.
Dibenz (a,h) anthracene	< 0.02	< 0.02	1 ^a	10 ^a
Fluoranthene	< 0.01	< 0.01	n.s.	n.s.
Fluorene	< 0.01	< 0.01	n.s.	n.s.
Indeno (1,2,3-c,d) pyrene	< 0.02	< 0.02	1 ^a	10 ^a
Naphthalene	< 0.01	< 0.01	5 ^a	50 ^a
Phenanthrene	0.02	< 0.01	5 ^a	50 ^a
Pyrene	< 0.01	< 0.01	10 ^a	100 ^a

- Notes:
- ppm – parts per million (milligrams/dry kilogram)
 - < – less than the analytical detection limit indicated
 - RL – Residential standards, BC Environment Contaminated Sites Regulation, (CSR) April 1, 1997
 - CL – Commercial standards, BC Environment CSR
 - ^a – CSR, Generic Numerical Soil Standards
 - ^b – CSR, Matrix Numerical Soil Standards - toxicity to soil invertebrates and plants
 - n.s. – no standard listed

The result indicated that the concentrations of the PAHs in the samples analyzed were below the RL standards. It should be noted that detectable concentrations of chrysene and phenanthrene were noted in BH 99-1-S4 (Target Area #5).

5.1.3 Total Metals Analyses

Five soil samples were submitted to PSC for analysis of total metals concentrations. Sample selection was based on field observations and the potential contaminant type of the target area. The results of the analyses and the most stringent of the applicable environmental standards are presented in the following table, with the detailed analytical chemistry report provided in TAB E.

TABLE 8: SOIL CHEMISTRY – TOTAL METALS (ppm) – August 24 and 25, 1999								
Sample ID	BH99-5 SA1	BH99-8 SA1	SA3	SA9	SA10	RL	CL	SW (CSR)
Depth (m)	0.2	0.2	0.1	0.03	0.03			
pH	6.2	7.6	6.8	8.1	6.6	n.s.	n.s.	n.s.
Aluminum	23200	12200	12600	12800	15100	n.s.	n.s.	n.s.
Antimony	< 2	< 2	< 2	13	< 2	20 ^a	40 ^a	n.s.
Arsenic	3.9	2.0	2.3	110	160	15 ^b	15 ^b	150
Barium	106	50.7	29.0	447	765	500 ^a	2000 ^a	n.s.
Beryllium	0.3	0.2	0.2	0.6	1.0	4 ^a	8 ^a	n.s.
Bismuth	< 2	< 2	< 2	< 2	< 2	n.s.	n.s.	n.s.
Cadmium	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	1.5 ^b @pH<6.5 3 ^b @pH=6.5-<7.0 35 ^d	1.5 ^b @pH<6.5 3 ^b @pH=6.5-<7.0 100 ^d	15 – 1000
Calcium	2370	4700	3050	41800	73500	n.s.	n.s.	n.s.
Chromium	45.8	15.0	18.1	36.6	16.9	60 ^b	60 ^b	n.s.
Cobalt	11.9	7.8	7.3	15.9	20.9	50 ^a	300 ^a	n.s.
Copper	43.2	59.1	32.5	2520	4660	150 ^a	250 ^a	n.s.
Iron	30300	15200	17700	138000	219000	n.s.	n.s.	n.s.
Lead	6	< 2	7	388	592	250 ^a @pH=6.0-<6.5 500 ^d	250 ^a @pH=6.0-<6.5 1000 ^d	2500- 10000
Magnesium	5060	4660	4140	6230	6210	n.s.	n.s.	n.s.
Manganese	275	271	279	408	455	n.s.	n.s.	n.s.
Mercury	0.05	< 0.05	< 0.05	< 0.05	< 0.05	2 ^a	10 ^a	1000
Molybdenum	< 0.4	< 0.4	< 0.4	5.9	4.5	10 ^a	40 ^a	n.s.
Nickel	31.0	12.6	14.7	16.9	5.4	100 ^a	500 ^a	n.s.
Phosphorus	313	572	338	362	344	n.s.	n.s.	n.s.
Potassium	277	370	204	2080	3590	n.s.	n.s.	n.s.
Selenium	0.4	0.4	< 0.2	< 0.2	0.5	3 ^a	10 ^a	n.s.
Silver	< 1	< 1	< 1	3	7	20 ^a	40 ^a	n.s.
Sodium	4000	485	1090	531	514	n.s.	750 ^a	n.s.
Strontium	10.4	23.6	10.7	117	200	n.s.	n.s.	n.s.
Sulphur	183	16	73	1560	2630	n.s.	n.s.	n.s.
Tellurium	< 5	< 5	< 5	< 5	< 5	n.s.	n.s.	n.s.

Table 8 is continued on the following page...

TABLE 8 (continued): SOIL CHEMISTRY – TOTAL METALS (ppm) – August 24 and 25, 1999

Sample ID	BH99-5 SA1	BH99-8 SA1	SA3	SA9	SA10	RL	CL	SW (CSR)
Depth (m)	0.2	0.2	0.1	0.03	0.03			
pH	6.2	7.6	6.8	8.1	6.6	n.s.	n.s.	n.s.
Thallium	< 5	< 5	< 5	< 5	< 5	n.s.	n.s.	n.s.
Tin	< 2	< 2	< 2	< 2	< 2	50 ^a	300 ^a	n.s.
Titanium	1230	383	901	600	534	n.s.	n.s.	n.s.
Vanadium	88.1	35.2	50.0	56.0	65.2	200 ^a	n.s.	n.s.
Zinc	41.2	25.8	76.6	<u>5850</u>	<u>9490</u>	200 ^c @ pH=6.0-<6.5 450 ^c	200 ^c @ pH=6.0-<6.5 550 ^c @ pH=6.5-<7.0 600 ^c	n.s.
Zirconium	4.6	0.9	2.1	14.9	16.5	n.s.	n.s.	n.s.

Notes:

- ppm – parts per million (milligrams/dry kilogram)
- RL – Residential standard, BC Environment Contaminated Sites Regulation (CSR), April 1997
- CL – Commercial standard, BC Environment CSR
- SW (CSR) – CSR, Special Waste standards, as detailed in Section 13
- n.s. – no standard presently listed
- < – less than analytical detection limit indicated
- ^a – CSR, Generic Numerical Soil Standards
- ^b – CSR, Matrix Numerical Soil Standards – groundwater used for drinking water
- ^c – CSR, Matrix Numerical Soil Standards – toxicity to soil invertebrates and plants
- ^d – CSR, Matrix Numerical Standards – intake of contaminated soil
- ^e – CSR, Matrix Numerical Standards – groundwater flow to surface water used by aquatic life
- * – indicates regional background concentration; no standard exists for parameter
- **bold** – indicates concentrations in excess of the RL standards and/or the regional background concentration
- **bold and underlined** – indicates concentrations in excess of the CL standards
- **bold and double underlined** – indicates concentrations in excess of the SW (CSR) standards

The results of the total metals analyses indicated that concentrations of arsenic, copper and zinc in surficial soil samples SA9 and SA10, collected from the sandblasting area, in excess of the CL standards. Arsenic in SA10 also exceeded the *Special Waste (SW)* standard, as defined in Section 13 of the CSR. Concentrations of barium and lead in sample SA10 were in excess of the RL standards and concentrations of sodium in soil samples BH 99-5-SA1 and SA3 were in excess of the regional background sodium concentration.

5.1.4 Dissolved Chloride and SAR Analyses

Select soil samples were submitted to PSC for analysis of dissolved chloride and for the analysis of sodium, magnesium and calcium in saturated soil to yield the calculation of the SAR. The results, along with the regional background dissolved chloride concentration and the CCME SAR criterion are presented in Table 9, with the detailed analytical chemistry report provided in TAB E.

TABLE 9: SOIL CHEMISTRY - DISSOLVED CHLORIDE AND SAR RESULTS – August 24 and 25, 1999			
Sample ID	Depth (m)	Dissolved Chloride (ppm)	SAR
BH99-3-SA1	0.2	< 25	-
BH99-4-SA2	0.8	58	-
BH99-5-SA1	0.2	3800	281
BH99-7-SA1	0.2	62	-
BH99-8-SA3	1.5	69	3.39
BH99-9-SA4	2.1	29	-
BH99-10-SA4	1.8	49	-
SA5	0.1	1500	-
Regional Background Chloride Concentration		33	n.s.
CCME Criterion		n.s.	12

- Notes:
- ppm - parts per million (micrograms/gram)
 - SAR - Sodium Adsorption Ratio
 - *Regional Background Chloride Concentration* - the 95th % Confidence Interval for the BCMELP data set of background concentrations of dissolved chloride for various regions on Vancouver Island
 - CCME criterion - Interim Canadian Environmental Quality Criteria for Contaminated Sites
 - **bold** - exceeds the applicable criteria
 - n.s. - no standard

The results of the dissolved chloride analyses indicated that the concentrations in soil samples BH99-4-SA2, BH99-5-SA1 (Salt Shed #2), BH99-7-SA1, BH99-8-SA3, BH99-10-SA4 and SA5 (Salt Shed #1) were in excess of the regional background dissolved chloride concentration. The SAR for soil sample BH 99-5-SA1 was in excess of the CCME criterion.

5.2 GROUNDWATER CHEMISTRY RESULTS

Shallow groundwater conditions were encountered in one monitoring well (BH 99-7) only. SEACOR elected to withhold collection and submission of groundwater from the well. As the shallow groundwater regime is likely present seasonally, implementation of a comprehensive groundwater sampling program would be prudent during the months of elevated precipitation (December to February).

5.3 SUMMARY OF RESULTS

SEACOR conducted a DSI of the BCBC Work Yards Site located at 1329 Kipp Road in Cassidy, B.C. The field work was carried out during the period of August 17 to 19, 1999.

A Stage 1 and 2 PSI was conducted at the subject site by Conor Pacific Environmental Technologies Inc. Analytical soil chemistry results indicated that concentrations of dissolved chloride in soil samples collected from BH 1 and BH 4, advanced in the vicinity of Salt Sheds #1 and #2, respectively, exceeded the typical dissolved chloride concentrations for Vancouver Island. The specific conductance of soil samples collected from BH 1 exceeded the CCME criterion. The concentration of light extractable petroleum hydrocarbons in a soil sample collected from BH 5, also advanced in the vicinity of the salt shed, was in excess of the *RL* standard. All other hydrocarbon and metal constituent concentrations in select soil samples collected and submitted for laboratory analysis during the investigation were below the applicable regulatory standards. It should be noted that several areas of environmental concern, including off-site discharge areas, the sand blasting area and exterior storage areas were not investigated during the Stage 2 PSI.

The DSI investigation comprised the advancement of thirteen boreholes, with nine boreholes completed as groundwater monitoring wells. Additionally, surface soil samples were obtained from the Storage Area F, located on the eastern most portion of the property, from the area north of the Salt Shed #1 and from the sandblasting area. The soil profile generally comprised sand and gravel fill or asphalt road surfacing to a maximum depth of 1.2 m below ground surface, followed by native sandy silt till to a maximum depth of approximately 2.1 m below ground surface. Bedrock was encountered in all boreholes advanced (with the exception of BH 99-2) at depths ranging from 0.2 m to 2.1 m below ground surface. Groundwater was encountered in one (BH 99-7) of the nine monitoring wells at a depth of 1.28 m below grade; it is anticipated that groundwater will be encountered in the remaining wells during the winter months when groundwater levels are at their maximum. No free-phase product was encountered in BH 99-7 at the time of monitoring.

Analytical soil chemistry results indicated that concentrations of arsenic, copper and zinc in two surficial soil samples collected from the sandblasting area (assume 30 m³) in excess of the *CL* standards. Arsenic exceeded the *SW* standard as defined in the CSR (under the assumption that the groundwater used for drinking water standard applies) for one sample. The concentrations of barium and lead in one of the two samples were in excess of the *RL* standards. Although no samples were submitted for analyses, based on field observations, surficial soils in the waste oil tank area (AST #1 and UST #7) were assumed to be in excess of the *CL* standards. It should be noted that the staining appeared to be limited to the upper 150 mm of surficial soil (assume 5 m³). Concentrations of dissolved chloride in one surficial soil sample and soil samples collected from five boreholes advanced in the vicinity of the two salt sheds (Sheds #1 and #2) were in excess of the regional background dissolved chloride concentrations. The SAR for a soil sample collected from one of the boreholes advanced in the vicinity of the salt shed was in excess of the CCME criterion.

5.4 RECOMMENDATIONS

The following table presents a summary of the target areas investigated during the DSI, sampling location and contaminants of concern exceeding the applicable environmental standards, along with follow-up recommendations:

TABLE 10: RECOMMENDATIONS				
Target Area	Item of Concern	Sampling Location	Soil and Groundwater Analytical Chemistry Results	Recommendations
1	Salt Shed #1 (northern portion of property)	BH's 99-7, 99-8, 99-9, 99-10	Soils: Chloride - > RBCC, SAR - < CCME Conor Pacific Results - Soils: Chloride (BH 1) - > RBCC	<ul style="list-style-type: none"> Evaluate the requirement of groundwater quality to meet the <i>DW</i> standards. Conduct a groundwater monitoring/sampling event during the winter months to assess groundwater quality and to establish groundwater flow direction. Collect groundwater samples from the boreholes for analysis of dissolved metals and chloride.
2	Salt Shed #2 (southern portion of property)	BH's 99-3, 99-4, 99-5, 99-6, SA5	Soils: BETX/VPH, LEPH/HEPH, PAHs - < <i>CL</i> Sodium - > RBSC, Chloride - > RBCC, SAR - > CCME Conor Pacific Results - Soils: Chloride (BH 4) - > RBCC	<ul style="list-style-type: none"> Conduct a groundwater monitoring/sampling event during the winter months to assess groundwater quality and to establish groundwater flow direction. Collect groundwater samples from the boreholes for analysis of dissolved metals and chloride.
3	Oil Water Separator, Recycling Tank	BH 99-11	No samples submitted for analysis.	<ul style="list-style-type: none"> No further assessment work recommended for this area.
4	UST #7, AST #1	SA6, SA7, SA8 BH 99-12	Soils: LEPH/HEPH > <i>CL</i> (assumed)	<ul style="list-style-type: none"> Based on field observations, the waste oil tank area exceeds the <i>CL</i> standards. Should BCBC wish to verify SEACOR's assumption, confirmatory soil samples could be collected during the recommended groundwater monitoring program. Staining appeared limited to the upper 150 mm of surficial soil (assume 5 m³). Conduct a groundwater monitoring/sampling event during the winter months to assess groundwater quality and to establish groundwater flow direction. Collect groundwater samples from the borehole for analysis of BETX/VPH, LEPH/HEPH and dissolved metals.
5	Oil Shed, Grease Ramp, Former Waste Oil UST, Three Former Gas/Diesel USTs	BH 99-1, BH 99-2,	Soils: BETX/VPH, LEPH/HEPH, PAHs - < <i>CL</i>	<ul style="list-style-type: none"> Conduct a groundwater monitoring/sampling event during the winter months to assess groundwater quality and to establish groundwater flow direction. Collect groundwater samples from the borehole for analysis of BETX/VPH, LEPH/HEPH and dissolved metals.
6	Storage Area D	BH 99-13	Soils: LEPH/HEPH - < <i>CL</i>	<ul style="list-style-type: none"> No further assessment work recommended for this area.
7	Lube Bay	No further work deemed necessary by field observations		<ul style="list-style-type: none"> No further assessment work recommended for this area.
8	Wash Pad	No further work deemed necessary by field observations		<ul style="list-style-type: none"> No further assessment work recommended for this area.

Table 10 is continued on the following page...

TABLE 10: RECOMMENDATIONS				
Target Area	Item of Concern	Sampling Location	Soil and Groundwater Analytical Chemistry Results	Recommendations
9	Sandblasting Area	SA9, SA10, SA11, SA12	Soils: Metals - > CL	<ul style="list-style-type: none"> Excavate impacted soils and determine appropriate method of soil treatment/disposal (assume 30 m³). Confirm soil quality at the excavation limits (vertically and horizontally). Perform leachate quality tests for soil samples that exceed Special Waste standards for the CSR and TDG act.
10	Asphalt Millings	No further work deemed necessary by field observations		<ul style="list-style-type: none"> No further assessment work recommended for this area.
11	Paint Booth	No further work deemed necessary by field observations		<ul style="list-style-type: none"> No further assessment work recommended for this area.
12	Storage Area 1	SA1, SA2, SA3, SA4	Soils: Metals - < CL, Sodium - > RBSC	<ul style="list-style-type: none"> Determine remedial target for salt impacted area in consultation with BC Environment.

- Notes:
- BTEX – Benzene, Ethylbenzene, Toluene, Xylenes
 - VPH – Volatile Petroleum Hydrocarbons
 - LEPH/HEPH – Light/Heavy Extractable Petroleum Hydrocarbons
 - PAH – Polycyclic Aromatic Hydrocarbons
 - VOC – Volatile Organic Compounds
 - SAR – Sodium Adsorption Ratio
 - CL – BC Environment *Commercial* standards, *Contaminated Sites Regulation*, April 1, 1997
 - RBCC – Regional Background Chloride Concentrations
 - RBSC – Regional Background Sodium Concentrations
 - CCME – Canadian Council for Ministers of the Environment Interim Criteria

6.0 CLOSURE

The scope of work for the Detailed Site Investigation was based in part on the Stage 1 and 2 Preliminary Site Investigation work completed by Conor Pacific. This report is based on data and information collected during the previous investigations which was based solely on the conditions of the subject property at the time of the site investigations. In evaluating the subject property, SEACOR has relied in good faith on information provided by Conor Pacific. We accept no responsibility for any deficiency, misstatements or inaccuracy contained in this report as a result of omissions, misstatements or fraudulent acts of persons or corporations which have provided information noted herein.

If new information is discovered in the future during site excavations, or other activities, or if additional subsurface investigations or testing are conducted by others, SEACOR should be requested to re-evaluate the conclusions of this report and to provide amendments as required prior to any reliance upon the information presented herein.

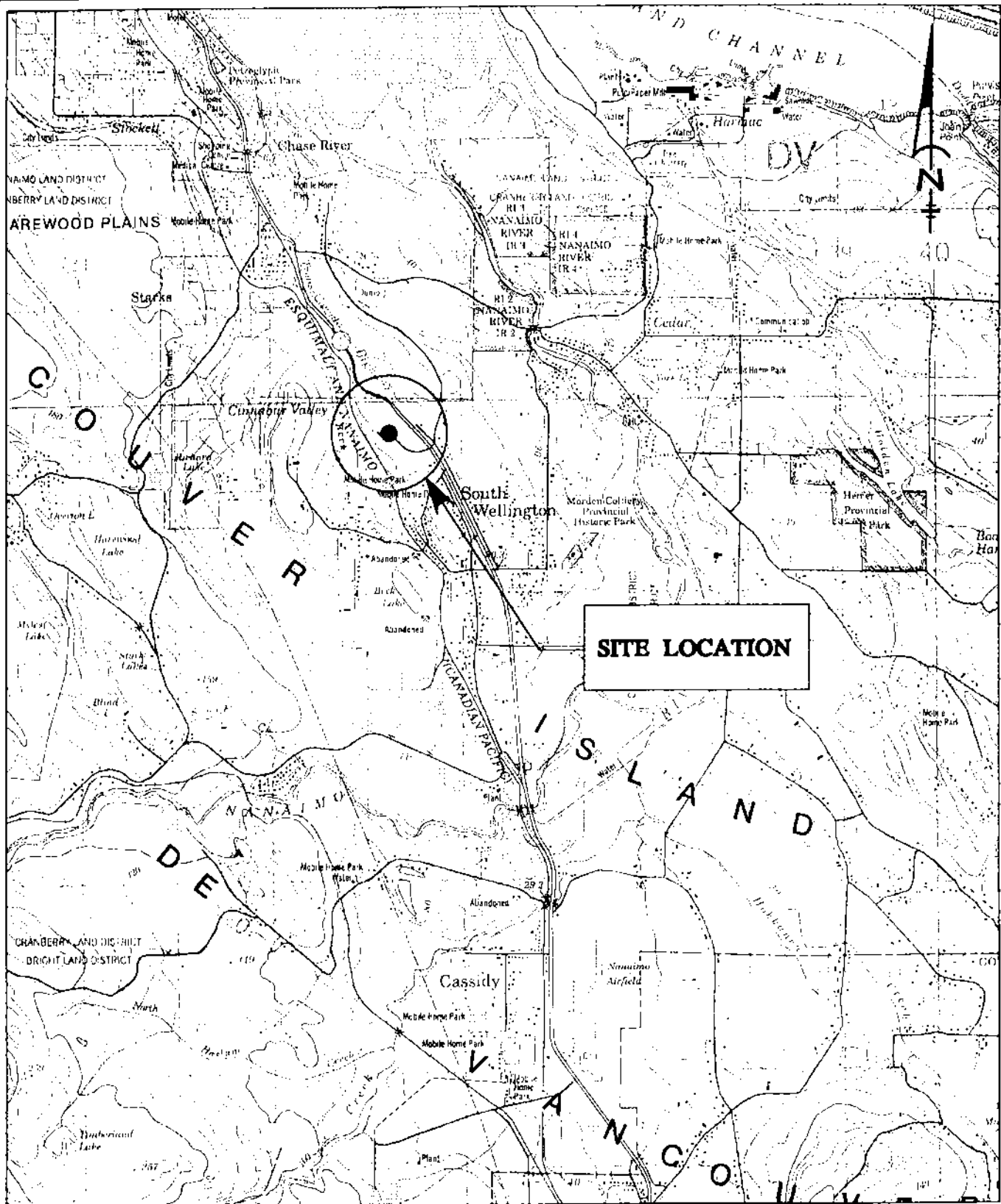
The assessment and conclusions in this report are based on the interpretation of data collected from the field investigation and the results of the laboratory analyses, which were limited to the quantification the potential contaminants of concern identified in this report. SEACOR expresses no warranty with respect to the accuracy of the laboratory analyses, methodologies used, or presentation of analytical results by the laboratory. Actual chemical concentrations in the samples submitted may vary according to the extraction and testing procedures used. The evaluation and conclusions reported herein do not preclude the existence of other chemical compounds for which no historical evidence exists and that variations of conditions within the site may be possible. Revisions to the regulatory standards may be expected over time and thus SEACOR should be provided with the opportunity to review the conclusions of this document accordingly.

This report is for the exclusive use of BCBC and their authorized agents. BCBC may submit this report to the British Columbia Ministry of Environment, Lands and Parks and/or related British Columbia environmental regulatory authorities or persons for review and comment purposes providing that SEACOR receives a copy of all correspondence between the British Columbia Ministry of Environment, Lands and Parks and/or related British Columbia environmental regulatory authorities or persons and BCBC pertaining to the report or project in question. Third party use of this report or any reliance or decisions made on the information herein by those not in the direct employ of BCBC, their authorized agents or the British Columbia Ministry of Environment, Land and Parks and/or related British Columbia environmental regulatory authorities or persons is at the risk of the third party. SEACOR has no obligation, contractual or otherwise, to any third persons using or relying upon this report for any reason and therefore accepts no responsibility for damage suffered by any third party as a result of decisions made on the basis of information or conclusions in this report.

G003-063.RP1.doc

TAB E

SITE PLANS
PHOTOGRAPHS
BOREHOLE LOGS
ANALYTICAL CHEMISTRY REPORTS



REFERENCED
FROM
DEPT OF ENERGY
MINES & RESOURCES
MAPPING BRANCH
NANAIMO
92 G/4

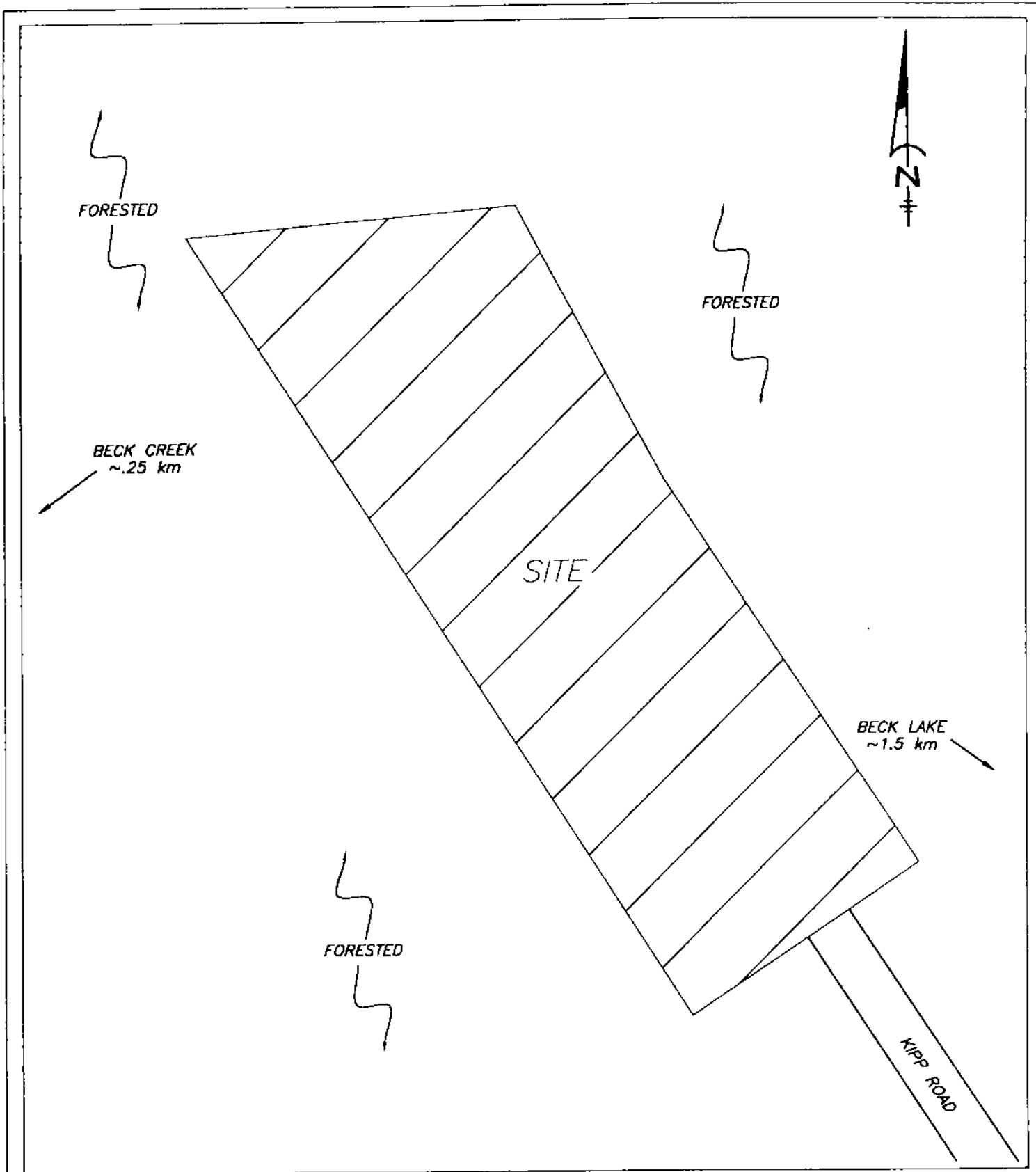
SEACOR
ENVIRONMENTAL
ENGINEERING INC.



BCBC HIGHWAYS YARD - ROUTE 9
1329 KIPP ROAD
CASSIDY, B.C.

SITE LOCATION MAP

SCALE NTS	DATE 10/04/99	FILE NAME 202-01221-A1.DWG	MADE TMS	CHKD KT	JOB NO. N0003-063 202-01221	FIG 1
--------------	------------------	-------------------------------	-------------	------------	--------------------------------	----------



THIS DRAWING IS
FOR CONCEPTUAL
PURPOSES ONLY.
ACTUAL LOCATIONS
MAY VARY AND NOT
ALL STRUCTURES
ARE SHOWN.

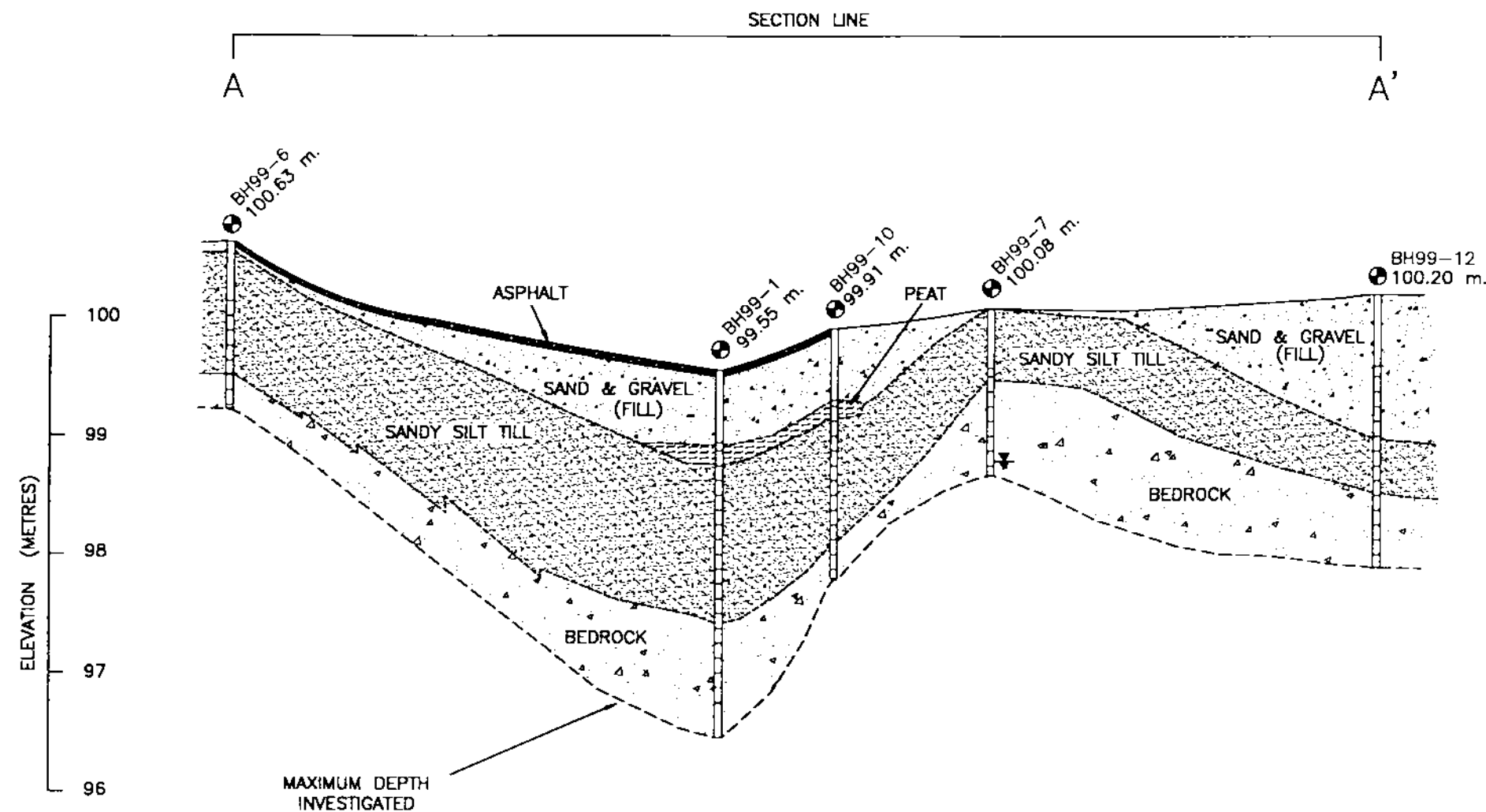
SEACOR
ENVIRONMENTAL
ENGINEERING INC.



BCBC HIGHWAYS YARD – ROUTE 9
1329 KIPP ROAD
CASSIDY, B.C.

SURROUNDING LAND USE PLAN

SCALE	DATE	FILE NAME	MADE	CHKD	JOB NO.	FIG
NTS	09/07/99	202-01221-A2.DWG	TMS	KT	202.01221	2



LEGEND

- BOREHOLE COMPLETED AS A MONITORING WELL
- BOREHOLE
- WATER LEVEL
- 99.55 m. BOREHOLE COLLAR ELEVATION
- SCREENED INTERVAL OF BOREHOLE

HORIZONTAL SCALE 1:1500 (APPROX.)

0 50 100 m

2				
1				
REV.	DESCRIPTION	DATE	MADE	CHKD

SEACOR
ENVIRONMENTAL ENGINEERING INC.

BC Buildings Corporation

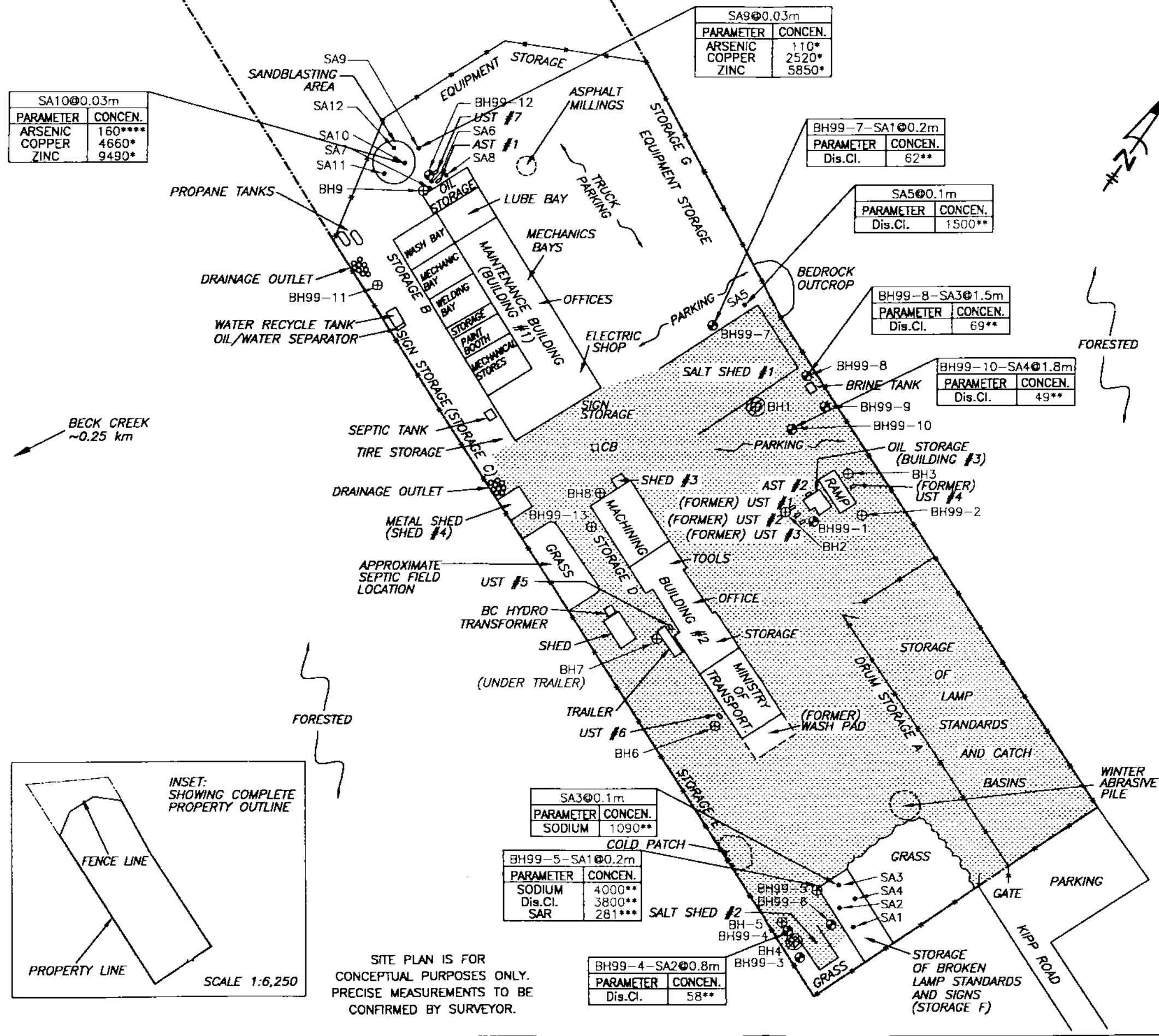
BCBC HIGHWAYS YARD – ROUTE 9
1329 KIPP ROAD
CASSIDY, B.C.

CROSS SECTION A – A'

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY.
ACTUAL LOCATIONS MAY VARY AND NOT ALL
STRUCTURES ARE SHOWN.

SCALE H 1:1500	DATE 11/15/99	FILE NAME 202-01221-A4.DWG
MADE MAT	CHKD BH	JOB NO. 202.01221.500
		FIG 4

HORIZONTAL SCALE APPROX. 1:1500
VERTICAL SCALE APPROX. 1:50



LEGEND

- APPROXIMATE SITE BOUNDARY
- x-x-x- FENCE
- STORAGE TANK
- FORMER STORAGE TANK
- FORMER STRUCTURE
- ⊕ BOREHOLE COMPLETED AS A MONITORING WELL
- ⊙ BOREHOLE
- SURFACE SOIL SAMPLE (SEACOR)
- STOCKPILE OR STORAGE BOUNDARY
- ▨ PAVED AREA
- AST ABOVE GROUND STORAGE TANK
- UST UNDERGROUND STORAGE TANK
- ▨ AREA OF CONTAMINATION NOTED BY CONOR PACIFIC

PARAMETER	CL (ppm)	RBC (ppm)	CCME	SW (ppm)
Dis.Cl.	n.s.	33	n.s.	n.s.
SODIUM	n.s.	750	n.s.	n.s.
ARSENIC	15	n.d.	n.s.	150
COPPER	250	n.d.	n.s.	n.s.
SAR	n.s.	n.d.	12	n.s.
ZINC	550 or 600	n.d.	n.s.	n.s.

SW BC ENVIRONMENT CSR, SECTION 13
CL BC ENVIRONMENT CSR 97
RBC REGIONAL BACKGROUND CONCENTRATIONS
CCME CANADIAN COUNCIL FOR MINISTERS OF THE ENVIRONMENT INTERIM CRITERIA
ppm PARTS PER MILLION
n.s. NO LISTED STANDARD
n.d. NOT APPLICABLE
Dis.Cl. DISSOLVED CHLORIDE
SAR SODIUM ADSORPTION RATIO
CONCEN. CONCENTRATION
* INDICATES CONCENTRATION EXCEEDS CL STANDARDS
** EXCEEDS REGIONAL BACKGROUND CONCENTRATIONS
*** INDICATES CONCENTRATION EXCEEDS CCME STANDARDS
**** INDICATES CONCENTRATION EXCEEDS SW STANDARDS

NOTES:
BH1 TO BH9 ADVANCED BY CONOR PACIFIC (1998)
BH99-1 TO BH99-13 ADVANCED BY SEACOR (AUGUST, 1999)
SA1 TO SA12 COLLECTED BY SEACOR (SEPTEMBER, 1999)

SCALE 1:1250 (APPROX.)

0 25 50 75 m

SEACOR
ENVIRONMENTAL ENGINEERING INC.

BC Buildings Corporation

BCBC HIGHWAYS YARD – ROUTE 9
1329 KIPP ROAD
CASSIDY, B.C.

SOIL CONTAMINANT PLAN(ppm)

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY.
ACTUAL LOCATIONS MAY VARY AND NOT ALL
STRUCTURES ARE SHOWN.

SCALE	DATE	FILE NAME
1:1250	11/05/99	202-01221-A6.DWG
MADE	CHKD	JOB NO.
TMS	BH	N0003-06J
		202.01221
		FIG
		5



PHOTO 1: Photograph showing location of former underground storage tank basin and BH99-1.



PHOTO 2: Location of BH99-2 adjacent to grease ramp. Note surficially stained area.

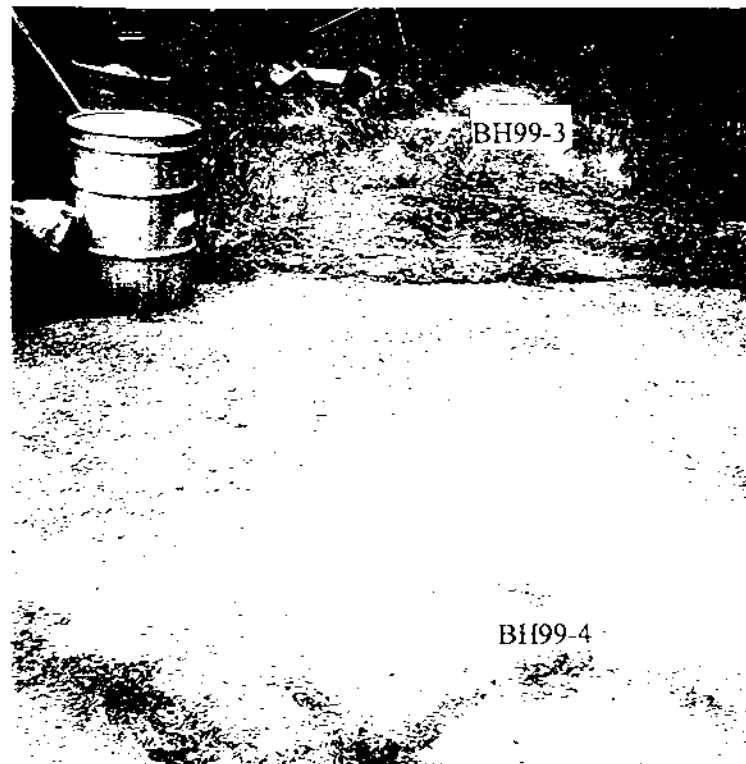


PHOTO 3: Location of BH's 99-3 and 99-4 adjacent to Salt Shed #2.



PHOTO 4: Location of BH99-5 adjacent to broken lamp standard storage area. Note surficial salt precipitation.

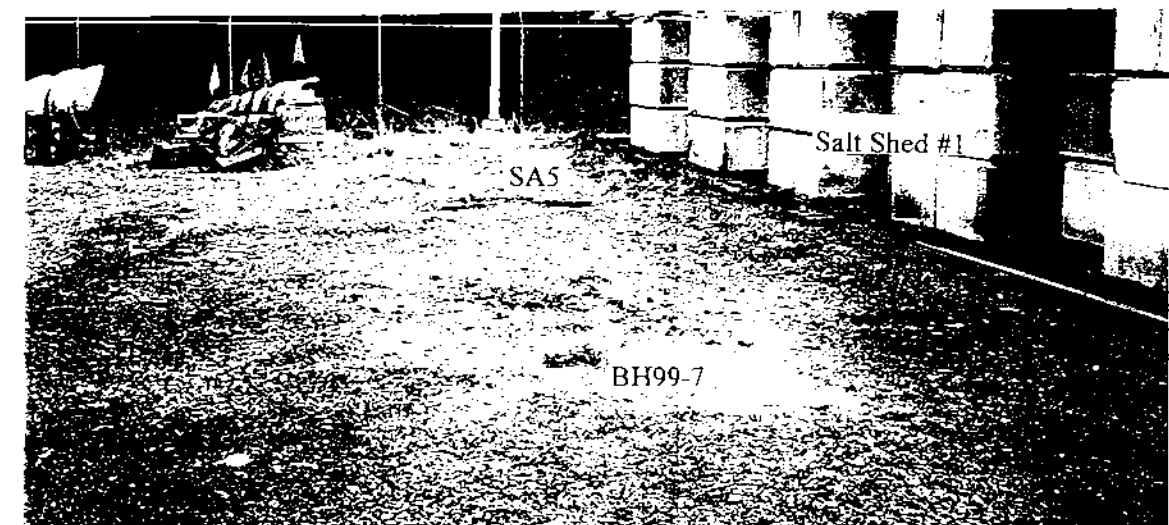


PHOTO 5: Location of BH99-7 and surficial soil sample location. SA5 adjacent to Salt Shed #1.

SEACOR ENVIRONMENTAL ENGINEERING INC.			BCBC HIGHWAYS YARD 1329 KIPP ROAD CASSIDY, B.C.		
			SITE PHOTOGRAPHS		
SCALE: NTS	DATE: NOV./99	MADE: BH	CHKD: GMJ	PROJECT NO: N0003-063	FRAME: 1 OF 2

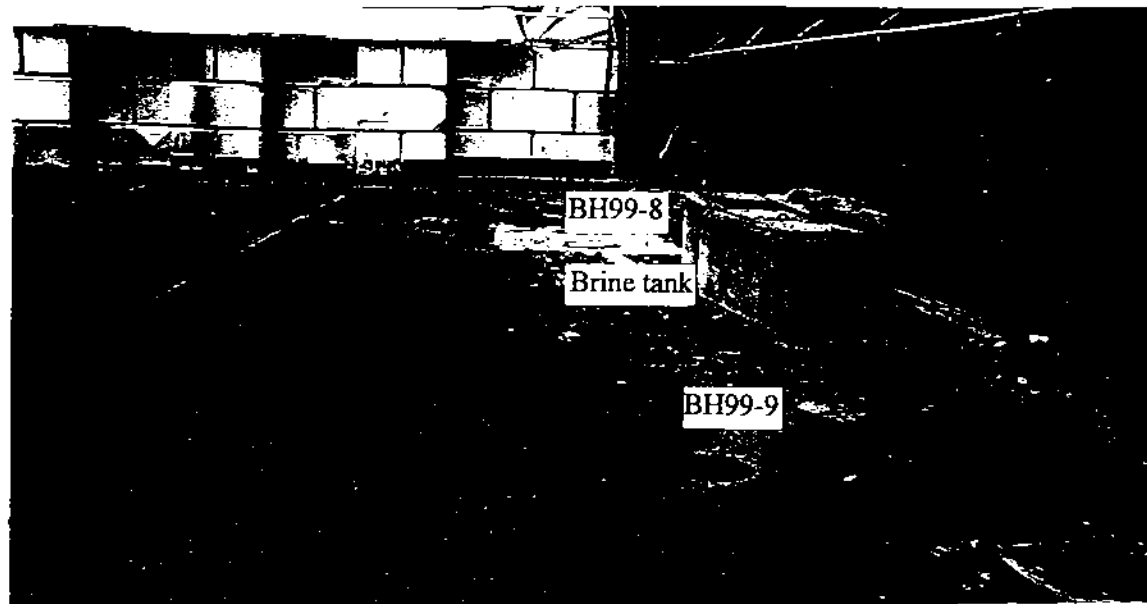


PHOTO 6: Photograph of the brine tank area showing BH's 99-8 and 99-9.



PHOTO 7: Photograph showing location of BH99-10 and Conor Pacific BH1 adjacent to Salt Shed #1.

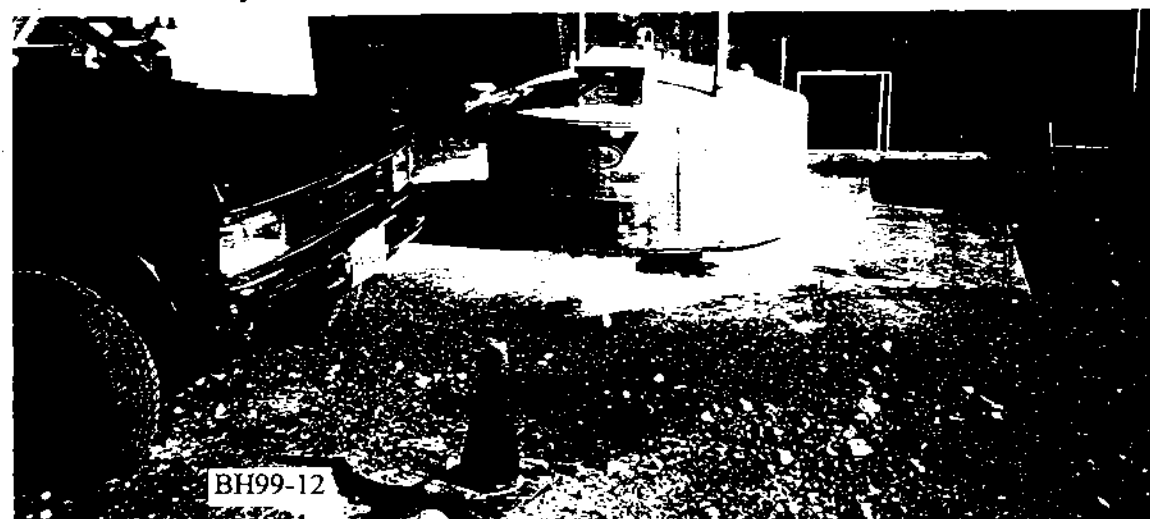


PHOTO 8: Location of BH99-12 adjacent to above-ground waste oil storage tank.

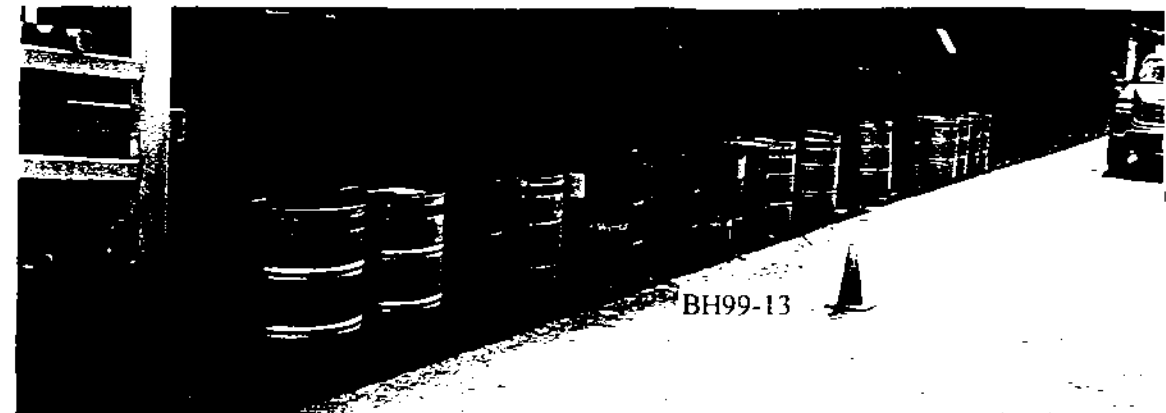


PHOTO 9: Location of BH99-13 adjacent to surficially stained asphalt and barrel storage area.



PHOTO 10: Photograph showing area of sandblasting and stained soils.

SEACOR ENVIRONMENTAL ENGINEERING INC.			BCBC HIGHWAYS YARD 1329 KIPP ROAD CASSIDY, B.C.		
			SITE PHOTOGRAPHS		
SCALE: NTS	DATE: NOV./99	MADE BH	CHKD: GMJ	PROJECT NO: N0003-063	FRAME: 2 OF 2

SEACOR JOB NO: N0003-063

CLIENT: BCBC
PROJECT: Cassidy Highways Yard
1329 Kipp Road
Cassidy, BC

BOREHOLE LOG

BOREHOLE NO: BH99-01
ELEVATION: 99.55

[illegible]

DRILLING METHOD. Solid stem auger

DATE DRILLED: 24/08/99

Notes: AUGER SAMPLE

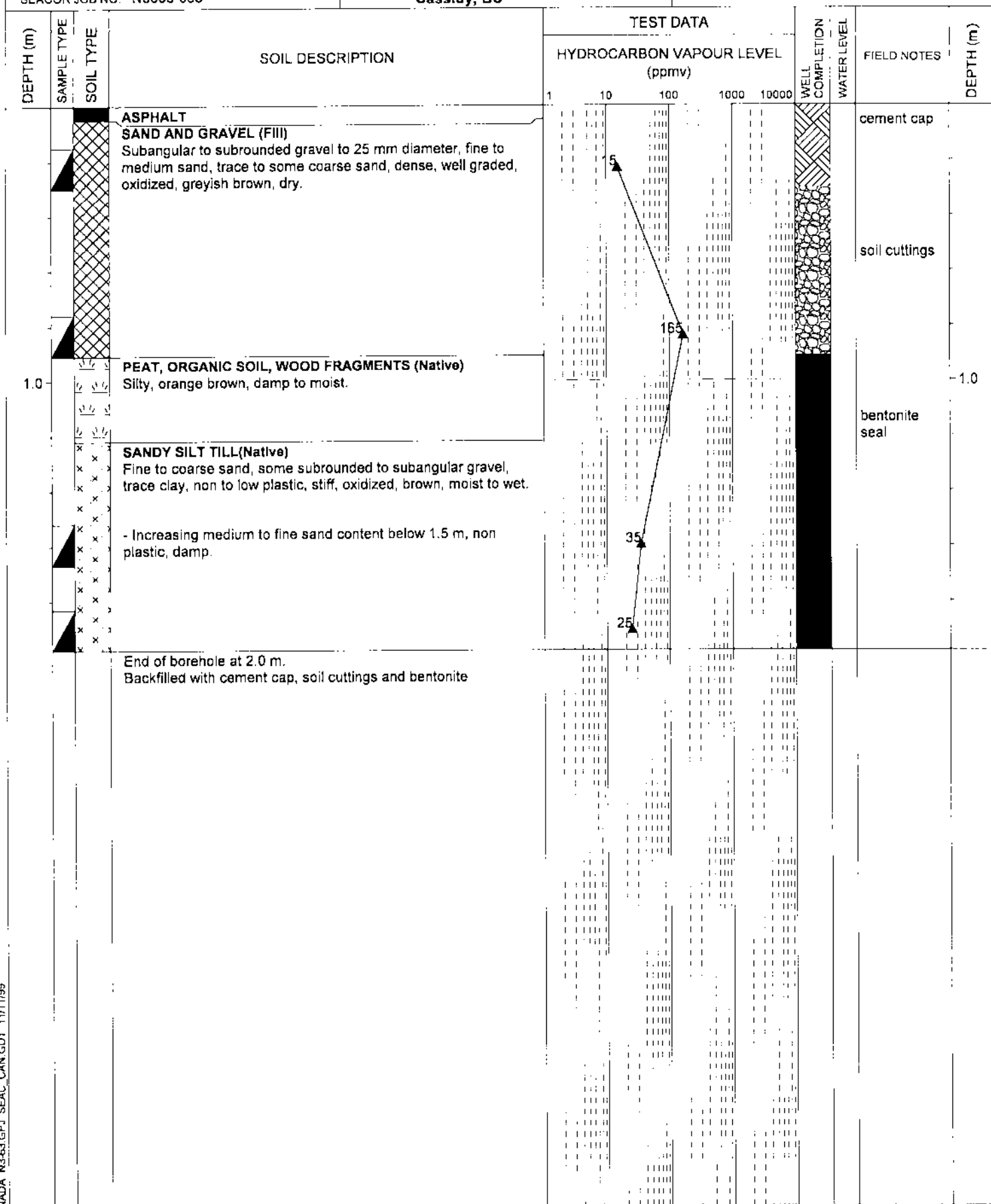
SEACOR ENVIRONMENTAL ENGINEERING INC.

SEACOR JOB NO: N0003-063

CLIENT: **BCBC**
PROJECT: **Cassidy Highways Yard**
1329 Klipp Road
Cassidy, BC

BOREHOLE LOG

BOREHOLE NO: **BH99-02**
ELEVATION: **99.23**



DRILLING METHOD: Solid stem auger

DATE DRILLED: 24/08/99

Notes:

▲ AUGER SAMPLE

Sheet 1 of 1

page 42 of 474

SEACOR JOB NO: N0003-063

CLIENT: **BCBC**
PROJECT: **Cassidy Highways Yard**
1329 Klpp Road
Cassidy, BC

BOREHOLE NO: BH99-03
ELEVATION: 100.84

DATE DRILLED: 24/08/99

Notes:

SEACOR ENVIRONMENTAL ENGINEERING INC.

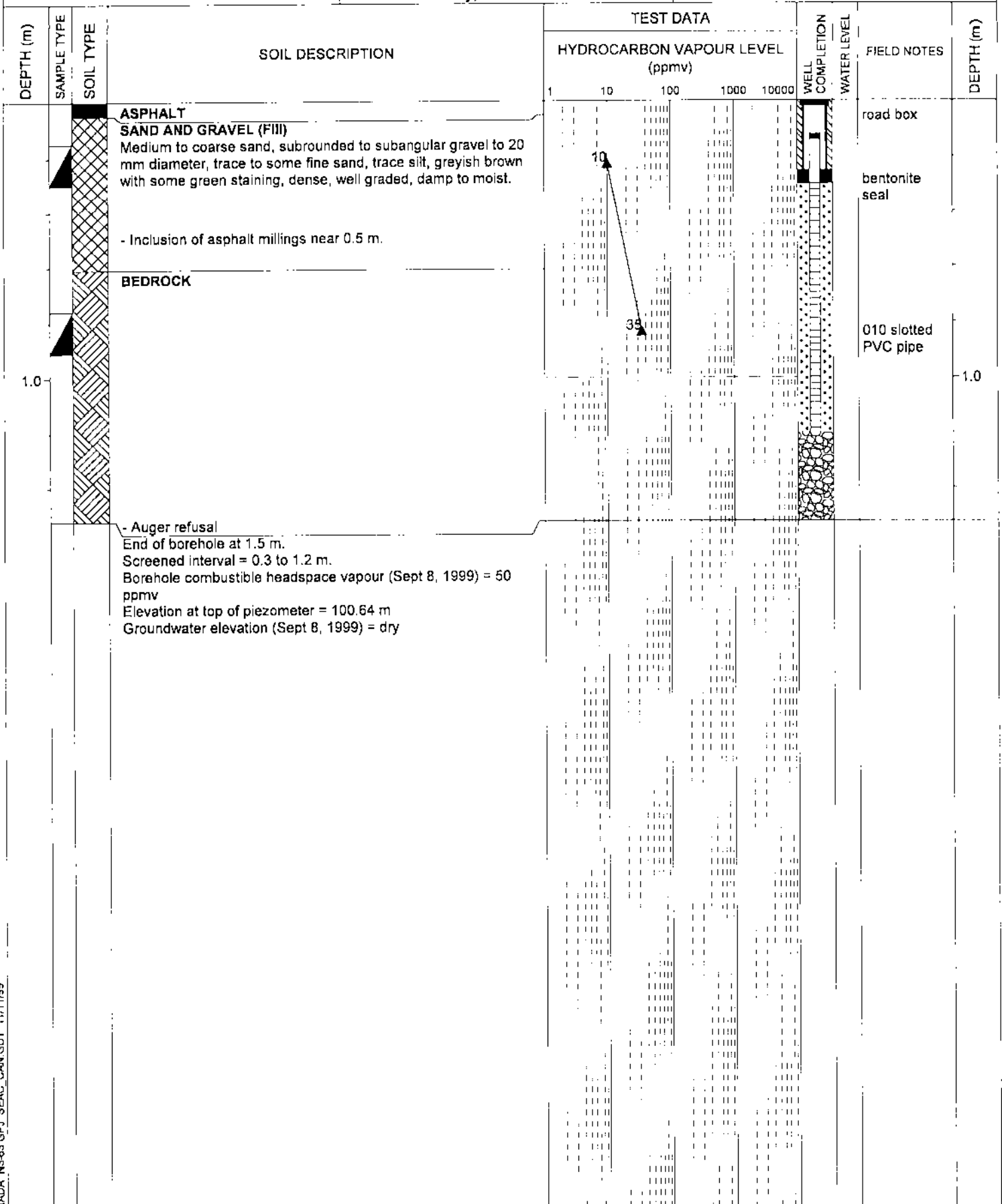
SEACOR JOB NO: N0003-063

CLIENT: BCBC
PROJECT: Cassidy Highways Yard
1329 Klipp Road
Cassidy, BC

BOREHOLE LOG

BOREHOLE NO: BH99-04

ELEVATION: 100.73



DRILLING METHOD: Solid stem auger

Notes: AUGER SAMPLE

DATE DRILLED: 24/08/99

Sheet 1 of 1





SEACOR ENVIRONMENTAL ENGINEERING INC.


CLIENT: BCBC
PROJECT: Cassidy Highways Yard
1329 Klpp Road
Cassidy, BC

BOREHOLE LOG

BOREHOLE NO: BH99-05
ELEVATION: 100.26

SEACOR JOB NO: N0003-063

DEPTH (m)	SAMPLE TYPE	SOIL TYPE	SOIL DESCRIPTION	TEST DATA					WELL COMPLETION	WATER LEVEL	FIELD NOTES	DEPTH (m)
				HYDROCARBON VAPOUR LEVEL (ppmv)								
				1	10	100	1000	10000				
			SAND AND GRAVEL (Fill) Fine to coarse sand, subangular to subrounded gravel to 25 mm diameter, trace silt, dense, well graded, oxidized, salt crystals in surficial soil, oxidized brown, dry.									
			SANDY SILT TILL (Native) Fine to coarse sand, subangular to subrounded gravel to 40 mm diameter, trace clay, non plastic, firm to stiff, oxidized brown, moist.									
			BEDROCK Auger refusal End of borehole at 0.3 m. Backfilled with soil cuttings									

Notes:  AUGER SAMPLE

DRILLING METHOD: Solid stem auger

DATE DRILLED: 24/08/99

Sheet 1 of 1

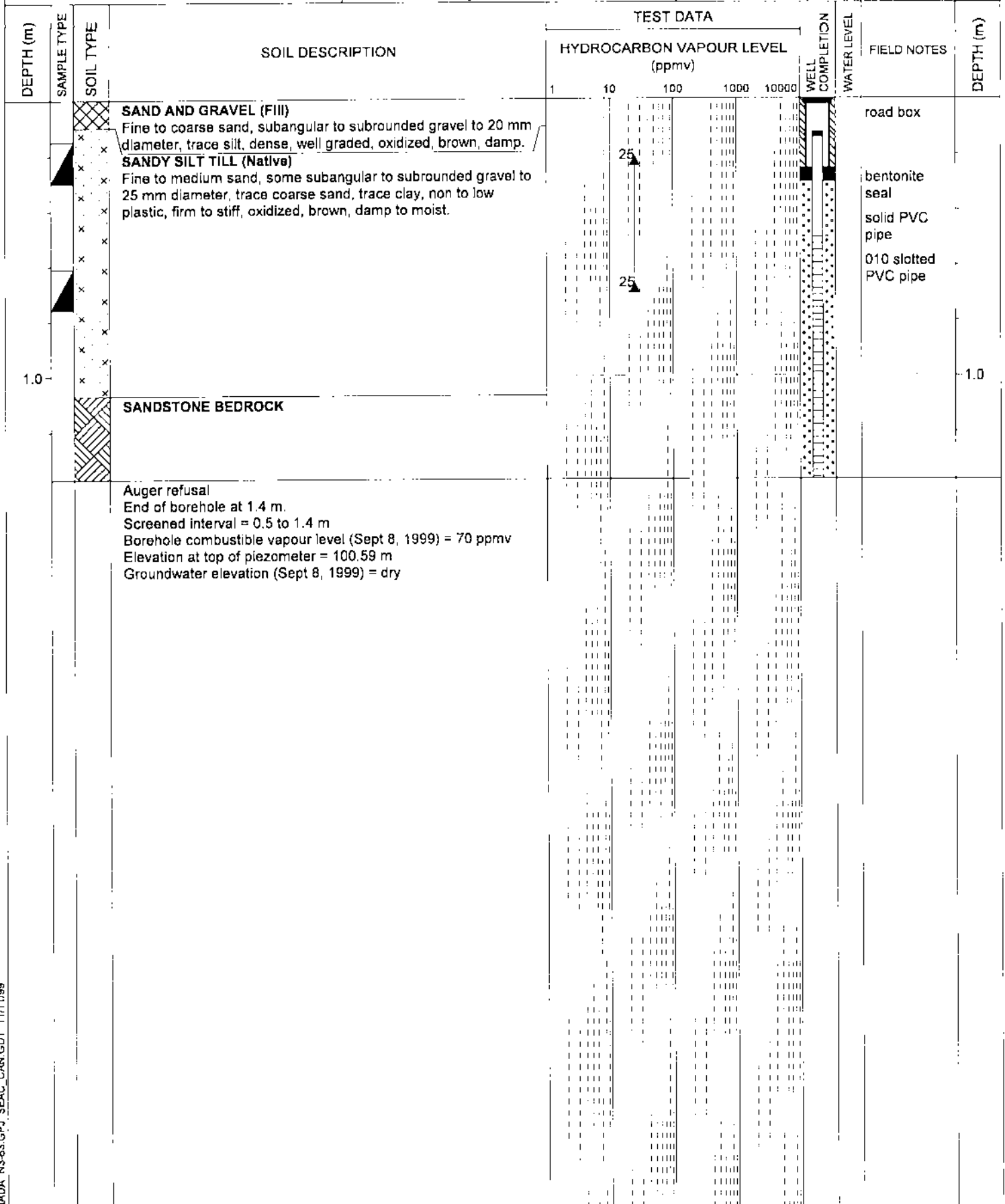
SEACOR ENVIRONMENTAL ENGINEERING INC.

CLIENT: **BCBC**
PROJECT: **Cassidy Highways Yard**
1329 Kipp Road
Cassidy, BC


BOREHOLE LOG

BOREHOLE NO: **BH99-06**
ELEVATION: **100.63**

SEACOR JOB NO: **N0003-063**



DRILLING METHOD: Solid stem auger

Notes:  AUGER SAMPLE

DATE DRILLED: 24/08/99

Sheet 1 of 1

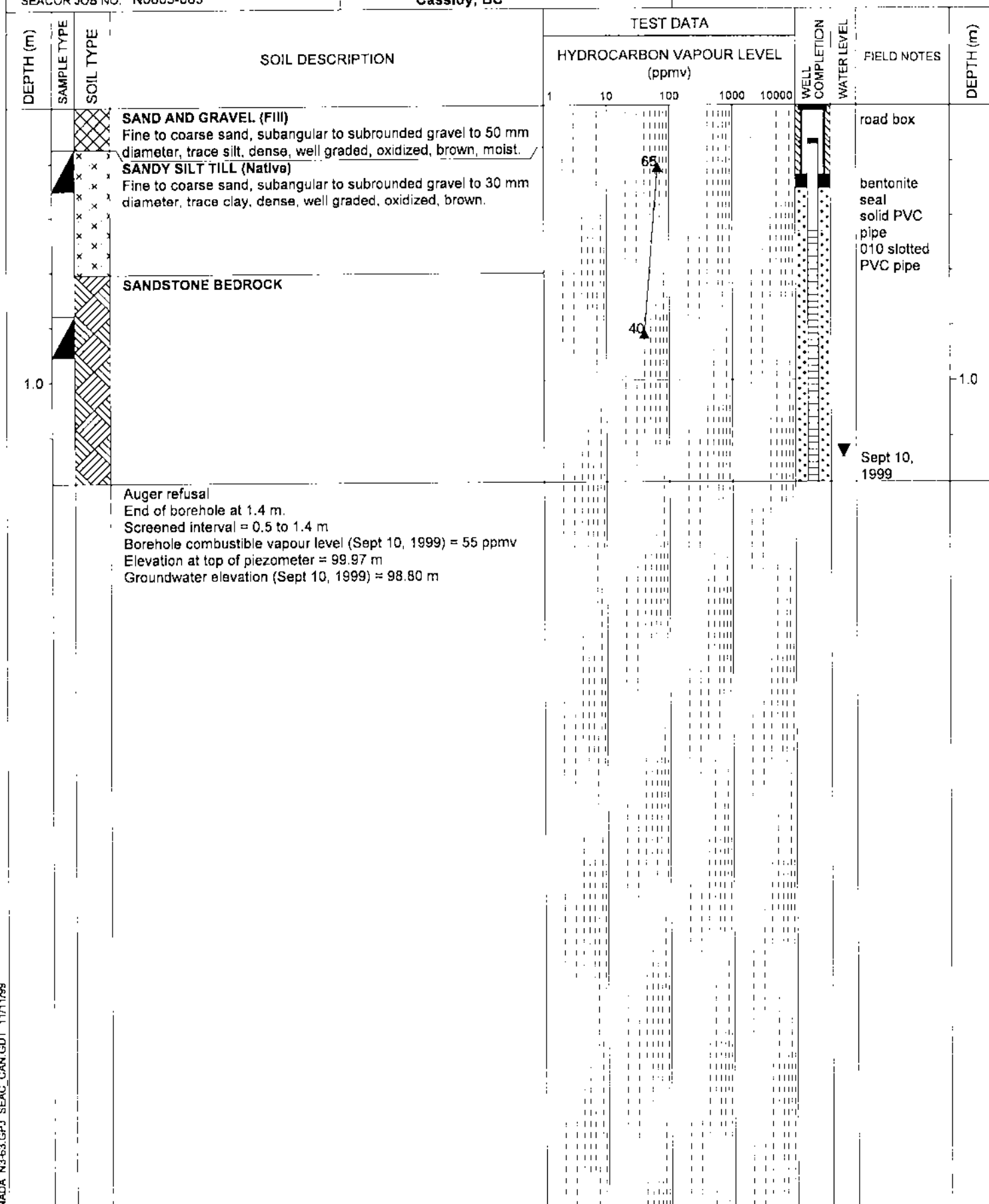
SEACOR ENVIRONMENTAL ENGINEERING INC.

SEACOR JOB NO: N0003-063

CLIENT: **BCBC**
PROJECT: **Cassidy Highways Yard**
1329 Klpp Road
Cassidy, BC

BOREHOLE LOG

BOREHOLE NO: **BH99-07**
ELEVATION: **100.08**



DRILLING METHOD: Solid stem auger

DATE DRILLED: 24/08/99

Notes: AUGER SAMPLE

Sheet 1 of 1

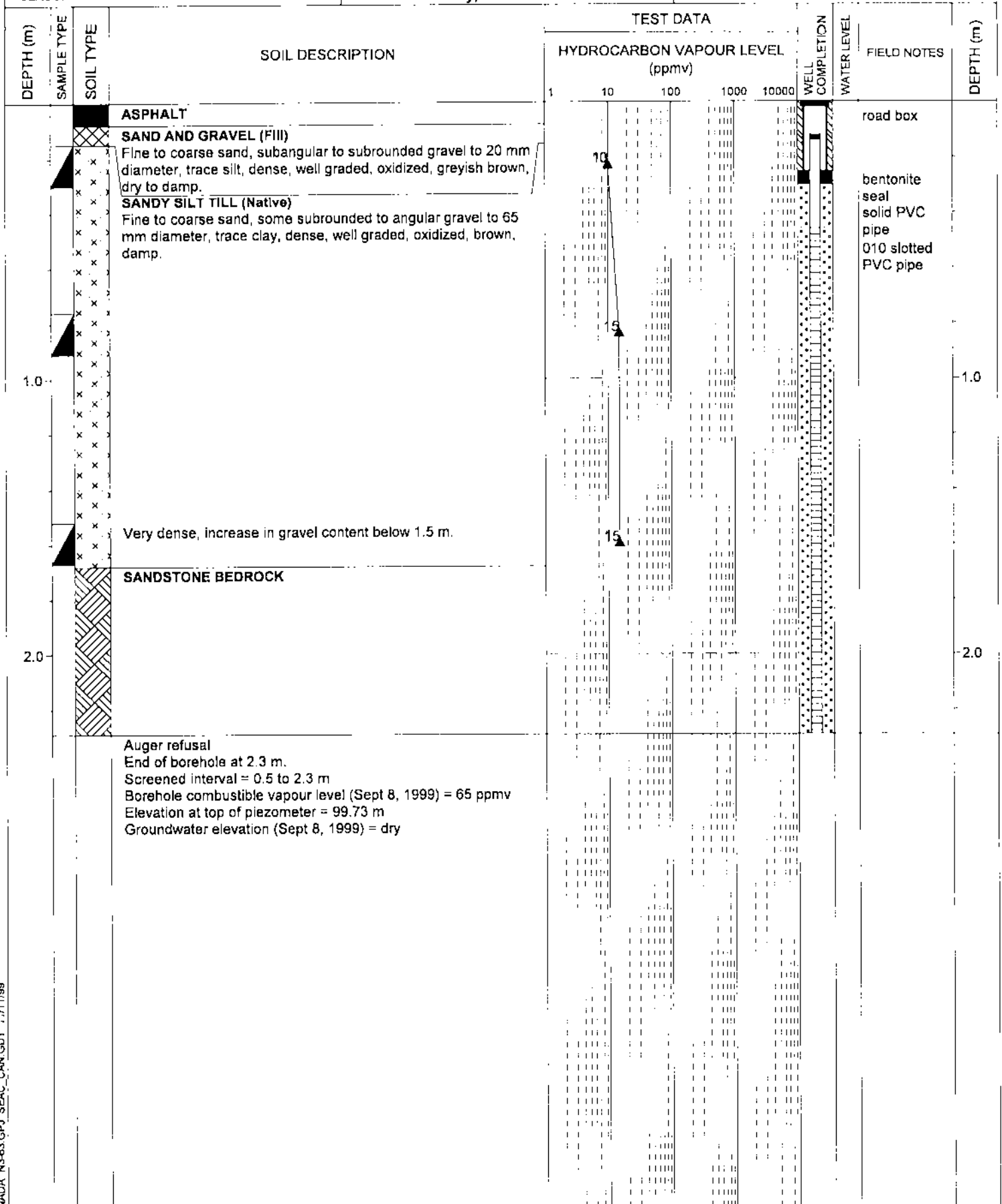
SEACOR ENVIRONMENTAL ENGINEERING INC.

CLIENT: **BCBC**
PROJECT: **Cassidy Highways Yard**
1329 Kipp Road
Cassidy, BC


BOREHOLE LOG

BOREHOLE NO: **BH99-08**
ELEVATION: **99.86**

SEACOR JOB NO: **N0003-063**



DRILLING METHOD: Solid stem auger

Notes:  **AUGER SAMPLE**

DATE DRILLED: **24/08/99**

Sheet **1** of **1**

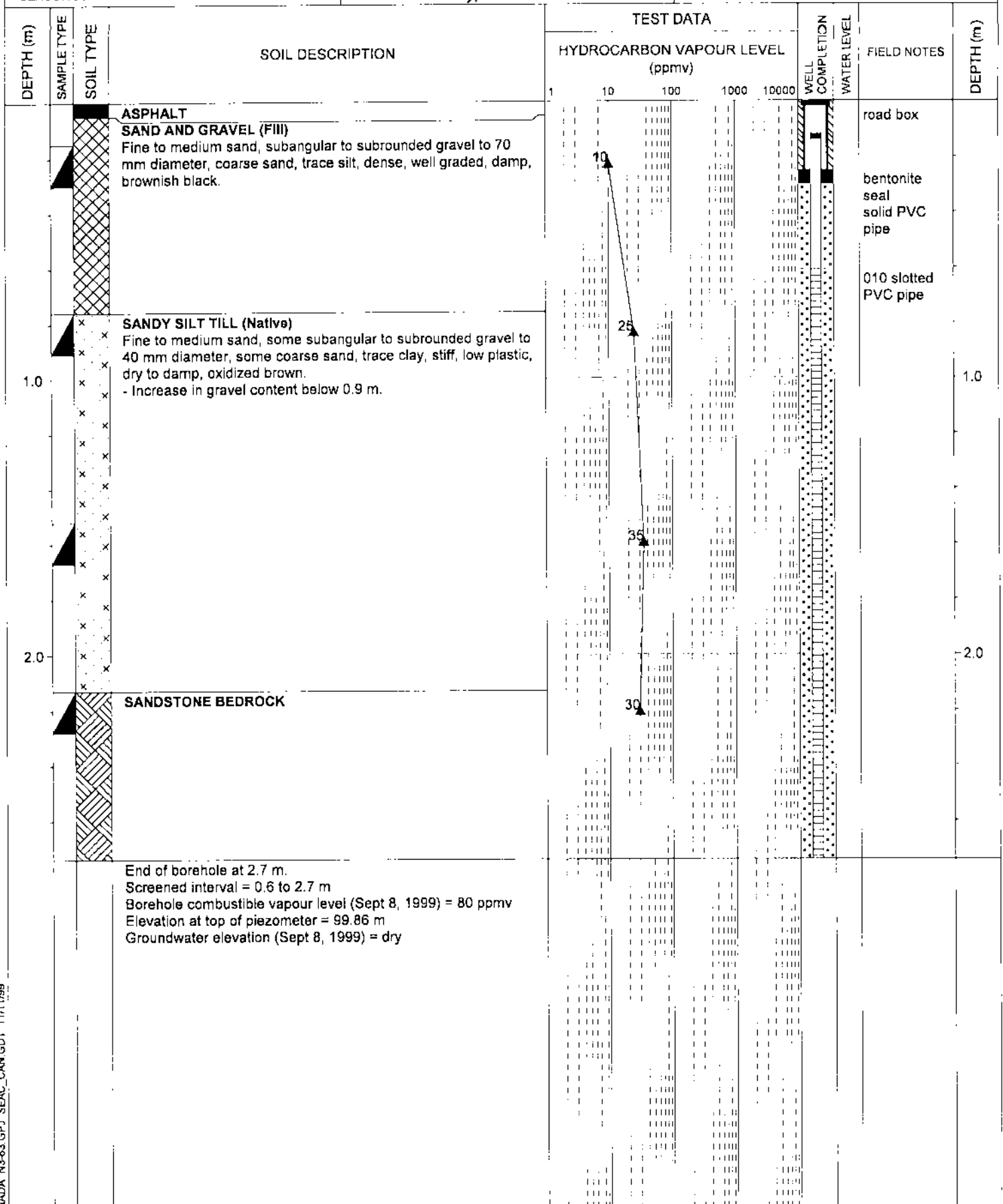
SEACOR ENVIRONMENTAL ENGINEERING INC.

SEACOR JOB NO: N0003-063


CLIENT: **BCBC**
PROJECT: **Cassidy Highways Yard**
1329 Kipp Road
Cassidy, BC

BOREHOLE LOG

BOREHOLE NO: **BH99-09**
ELEVATION: **99.73**



DRILLING METHOD: Solid stem auger

Notes:  AUGER SAMPLE

DATE DRILLED: 24/08/99

Sheet 1 of 1








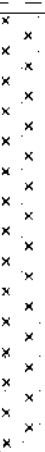


SEACOR ENVIRONMENTAL ENGINEERING INC.

SEACOR JOB NO: N0003-063

CLIENT: **BCBC**
PROJECT: **Cassidy Highways Yard**
1329 Kipp Road
Cassidy, BC


BOREHOLE LOG

BOREHOLE NO: **BH99-10**
ELEVATION: **99.91**

DEPTH (m)	SAMPLE TYPE	SOIL TYPE	SOIL DESCRIPTION	TEST DATA					WELL COMPLETION	WATER LEVEL	FIELD NOTES	DEPTH (m)
				HYDROCARBON VAPOUR LEVEL (ppmv)								
				1	10	100	1000	10000				
			ASPHALT								road box	
			SAND AND GRAVEL (Fill) Fine to medium sand, subangular to subrounded gravel to 75 mm diameter, some coarse sand, trace silt, dense, well graded, oxidized, brownish grey, damp. Moist to wet near 0.6 m.		10						bentonite seal solid PVC pipe	
			ORGANIC SOIL AND WOOD FRAGMENTS (Native) Silty, moist to wet, black, musty odour.								010 slotted PVC pipe	
1.0			SANDY SILT (Native) Fine to coarse sand, subangular to subrounded gravel to 25 mm diameter, trace clay, stiff, non to low plastic, stained green with white precipitate in fissures, brownish green, damp to moist.									
			SANDSTONE BEDROCK		20							
2.0			End of borehole at 2.1 m. Screened interval = 0.6 to 2.1 m Borehole combustible vapour level (Sept 8, 1999) = 65 ppmv Elevation at top of piezometer = 99.82 m Groundwater elevation (Sept 8, 1999) = dry									

DRILLING METHOD: Solid stem auger

DATE DRILLED: 25/08/99

Notes:  AUGER SAMPLE

Sheet 1 of 1




SEACOR ENVIRONMENTAL ENGINEERING INC.

SEACOR JOB NO: N0003-063

CLIENT: **BCBC**
PROJECT: **Cassidy Highways Yard**
1329 Klpp Road
Cassidy, BC


BOREHOLE LOG

BOREHOLE NO: **BH99-11**
ELEVATION: **99.91**

DEPTH (m)	SAMPLE TYPE	SOIL TYPE	SOIL DESCRIPTION	TEST DATA					WELL COMPLETION	WATER LEVEL	FIELD NOTES	DEPTH (m)
				HYDROCARBON VAPOUR LEVEL (ppmv)								
				1	10	100	1000	10000				
			SAND AND GRAVEL (Fill) Fine to medium sand, angular to subrounded gravel to 20 mm diameter, trace coarse sand, trace silt, dense, well graded, oxidized, brown, damp. Auger refusal End of borehole at 0.2 m. Backfilled with soil cuttings								soil cuttings	

DRILLING METHOD: Solid stem auger

DATE DRILLED: 25/08/99

Notes:  AUGER SAMPLE

Sheet 1 of 1

SEACOR ENVIRONMENTAL ENGINEERING INC.

SEACOR JOB NO: N0003-063


CLIENT: BCBC
PROJECT: Cassidy Highways Yard
1329 Kipp Road
Cassidy, BC

BOREHOLE LOG

BOREHOLE NO: BH99-12
ELEVATION: 100.20

DEPTH (m)	SAMPLE TYPE	SOIL TYPE	SOIL DESCRIPTION	TEST DATA					WELL COMPLETION	WATER LEVEL	FIELD NOTES	DEPTH (m)
				HYDROCARBON VAPOUR LEVEL (ppmv)								
				1	10	100	1000	10000				
			SAND AND GRAVEL (Fill) Fine to coarse sand, angular to subangular gravel to 45 mm diameter, trace silt, trace cobbles to 250 mm diameter, dense to very dense, oxidized, grey, damp.		10						road box	
1.0					10						bentonite	1.0
			SANDY SILT TILL (Native) Fine to medium sand, trace coarse sand, some subrounded to subangular gravel to 25 mm diameter, dense, well graded, oxidized, moist, brown.								solid PVC pipe	
											010 slotted PVC pipe	
2.0			SANDSTONE BEDROCK		5							2.0
			Auger refusal End of borehole at 2.3 m. Screened interval = 0.6 to 2.3 m Borehole combustible vapour level (Sept 8, 1999) = 55 ppmv Elevation at top of piezometer = 100.06 m Groundwater elevation (Sept 8, 1999) = dry									

DRILLING METHOD: Solid stem auger

Notes:  AUGER SAMPLE

DATE DRILLED: 25/08/99

Sheet 1 of 1

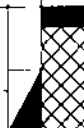
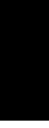
SEACOR ENVIRONMENTAL ENGINEERING INC.

SEACOR JOB NO: N0003-063

CLIENT: **BCBC**
PROJECT: **Cassidy Highways Yard**
1329 Kipp Road
Cassidy, BC

BOREHOLE LOG


BOREHOLE NO: **BH99-13**
ELEVATION: **100.07**

				TEST DATA								
DEPTH (m)	SAMPLE TYPE	SOIL TYPE	SOIL DESCRIPTION	HYDROCARBON VAPOUR LEVEL (ppmv)					WELL COMPLETION	WATER LEVEL	FIELD NOTES	DEPTH (m)
				1	10	100	1000	10000				
			ASPHALT SAND AND GRAVEL (Fill) Fine to coarse sand, subrounded to angular gravel to 75 mm diameter, trace silt, trace cobbles to 250 mm diameter, dense, well graded, oxidized, brown, damp. Auger refusal End of borehole at 0.3 m. Backfilled with bentonite								bentonite seal	

DRILLING METHOD: Solid stem auger

DATE DRILLED: 25/08/99

Notes:

 AUGER SAMPLE

Sheet 1 of 1



PHILIP ANALYTICAL

02-Sep-99
Page 1 of 9

Certificate of Analysis

8577 Commerce Court
Burnaby, B.C.
Canada V5A 4N5
Tel 604 444 4808
Fax 604 444 4511

Reported To : _____

SEACOR ENVIRONMENTAL ENGINEERING INC. Client Code S0

#9-6421 APPLECROSS ROAD
NANAIMO, B.C.
V9V 1N1

Attention : ROBERT CHAISSON
Phone : (250) 390-5050
FAX : (250) 390-5042

Project Information :

Project ID : N0003-063 CASSIDY
Submitted By : GORDON JESSE

Requisition Forms :

Form 08023999 shipped on 25-Aug-99 received on 26-Aug-99 logged on 26-Aug-99 completed on 2-Sep-99
Form 08024000 shipped on 25-Aug-99 received on 26-Aug-99 logged on 26-Aug-99 completed on 2-Sep-99
Form 08024001 shipped on 25-Aug-99 received on 26-Aug-99 logged on 26-Aug-99 completed on 2-Sep-99

Remarks : _____

- ☞ All organic data is blank corrected except for PCDD/F, Hi-res MS and CLP volatile analyses
- ☞ 'MDL' = Method Detection Limit, '<' = Less than MDL, '---' = Not analyzed
- ☞ Solids results are based on dry weight except Biota Analyses & Special Waste Oil & Grease
- ☞ Organic analyses are not corrected for extraction recovery standards except for Isotope Dilution methods, (i.e. CARB 429 PAH, all PCDD/F and DBD/DBF analyses)
- ☞ All Groundwater samples are decanted and/or filtered prior to analysis
- ☞ This report shall not be reproduced except in full, without the written approval of the laboratory

Methods used by Philip are based upon those found in 'Standard Methods for the Examination of Water and Wastewater', 19th Edition, published by the American Public Health Association, or on US EPA protocols found in the 'Test Methods For Evaluating Solid Waste, Physical/Chemical Method, SW846', 3rd Edition. Other procedures are based on methodologies accepted by the appropriate regulatory agency. Methodology briefs are available by written request.

All work recorded herein has been done in accordance with normal professional standards using accepted testing methodologies, quality assurance and quality control procedures except where otherwise agreed to by the client and testing company in writing. Liability for any and all use of these test results shall be limited to the actual cost of the pertinent analysis done. There is no other warranty expressed or implied. Your samples will be retained at Philip for a period of 30 days from receipt of data or as per contract.

PHILIP Project Manager: Jack Wilson

PHILIP ANALYTICAL

02-Sep-99
Page 2 of 9

ANALYTICAL REPORT

Client : SEACOR ENVIRONMENTAL ENGINEERING INC.
Project : N0003-063 CASSIDY

Philip ID : 99042810 99042813 99042816 99042818 99042861 99042862
Client ID : BH99-1 SA4 BH99-2 SA2 BH99-3 SA1 BH99-4 SA1 BH99-4 SA2 BH99-5 SA1

Sparcode	Parameter	Unit	MDL						
PHYSICAL									
0004DI02	pH (DI 1:2)	pH units	0.1	---	---	---	---	---	6.2
00250760	Moisture	%(W/W)	0.1	9.0	4.0	---	3.8	---	---
ANIONS									
1104155W	Chloride Dissolved	ug/g	50	---	---	< 50	---	58	3800
METALS TOTAL									
Al-T200S	Aluminum	ug/g	10	---	---	---	---	---	23200
Sb-T200S	Antimony	ug/g	2	---	---	---	---	---	< 2
As-T200E	Arsenic	ug/g	0.2	---	---	---	---	---	3.9
Ba-T200S	Barium	ug/g	0.1	---	---	---	---	---	106
Be-T200S	Beryllium	ug/g	0.1	---	---	---	---	---	0.3
Bi-T200S	Bismuth	ug/g	2	---	---	---	---	---	< 2
Cd-T200S	Cadmium	ug/g	0.2	---	---	---	---	---	< 0.2
Ca-T200S	Calcium	ug/g	40	---	---	---	---	---	2370
Cr-T200S	Chromium	ug/g	0.2	---	---	---	---	---	45.8
Co-T200S	Cobalt	ug/g	0.3	---	---	---	---	---	11.9
Cu-T200S	Copper	ug/g	0.5	---	---	---	---	---	43.2
Fe-T200S	Iron	ug/g	10.0	---	---	---	---	---	30300
Pb-T200S	Lead	ug/g	2	---	---	---	---	---	6
Mg-T200S	Magnesium	ug/g	10	---	---	---	---	---	5060
Mn-T200S	Manganese	ug/g	0.2	---	---	---	---	---	275
Hg-T200M	Mercury	ug/g	0.05	---	---	---	---	---	0.05
Mo-T200S	Molybdenum	ug/g	0.4	---	---	---	---	---	< 0.4
Ni-T200S	Nickel	ug/g	0.8	---	---	---	---	---	31.0
P-T200S	Phosphorus	ug/g	4	---	---	---	---	---	313
K-T200S	Potassium	ug/g	100	---	---	---	---	---	277
Se-T200E	Selenium	ug/g	0.2	---	---	---	---	---	0.4
Ag-T200S	Silver	ug/g	1	---	---	---	---	---	< 1
Na-T200S	Sodium	ug/g	10	---	---	---	---	---	4000
Sr-T200S	Strontium	ug/g	0.1	---	---	---	---	---	10.4
S-T200S	Sulphur	ug/g	10	---	---	---	---	---	183
Te-T200S	Tellurium	ug/g	5	---	---	---	---	---	< 5
Tl-T200S	Thallium	ug/g	5	---	---	---	---	---	< 5
Sn-T200S	Tin	ug/g	2	---	---	---	---	---	< 2
Ti-T200S	Titanium	ug/g	0.3	---	---	---	---	---	1230
V-T200S	Vanadium	ug/g	0.3	---	---	---	---	---	88.1

Matrix : Soil Soil Soil Soil Soil Soil
Sampled on: 99/08/24 99/08/24 99/08/24 99/08/24 99/08/24 99/08/24

CONTINUED on page 3

PHILIP ANALYTICAL

02-Sep-99
Page 3 of 9

ANALYTICAL REPORT

Client : SEACOR ENVIRONMENTAL ENGINEERING INC.
Project : N0003-063 CASSIDY

Philip ID : 99042810 99042813 99042816 99042818 99042861 99042862
Client ID : BH99-1 SA4 BH99-2 SA2 BH99-3 SA1 BH99-4 SA1 BH99-4 SA2 BH99-5 SA1

Sparcode	Parameter	Unit	MDL						
Zn-T200S	Zinc	ug/g	0.5	---	---	---	---	---	41.2
Zr-T200S	Zirconium	ug/g	0.3	---	---	---	---	---	4.6
HYDROCARBONS									
H105PT12	Hydrocarbons C5-C11	ug/g	10	---	< 10	---	---	---	---
EX995143	TEH Prep - soils	date		990827	---	---	990827	---	---
H113P108	EPH (C10 - < C19)	ug/g	10	< 10	---	---	< 10	---	---
LEPSCALC	LEPH (BC Guidelines)	ug/g		< 10	---	---	< 10	---	---
H114P108	EPH (C19 - C32)	ug/g	10	< 10	---	---	< 10	---	---
HEPSCALC	HEPH (BC Guidelines)	ug/g		< 10	---	---	< 10	---	---
H107CALC	VPH C5-C11	ug/g		---	< 10	---	---	---	---
SURROGATE RECOVERY									
T140P108	o-Terphenyl	%	0	99	---	---	100	---	---
POLYCYCLIC AROMATIC HYDROCARBONS									
EX9946Z2	Soil prep for PAH	date		990827	---	---	990827	---	---
PA01OS12	Acenaphthene	ug/g	0.01	< 0.01	---	---	< 0.01	---	---
PA02OS12	Acenaphthylene	ug/g	0.01	< 0.01	---	---	< 0.01	---	---
PA03OS12	Anthracene	ug/g	0.01	< 0.01	---	---	< 0.01	---	---
PA04OS12	Benzo(a)anthracene	ug/g	0.01	< 0.01	---	---	< 0.01	---	---
PA06OS12	Benzo(h)fluoranthene	ug/g	0.01	0.01	---	---	< 0.01	---	---
PA08OS12	Benzo(k)fluoranthene	ug/g	0.01	< 0.01	---	---	< 0.01	---	---
PA07OS12	Benzo(g,h,i)perylene	ug/g	0.02	< 0.02	---	---	< 0.02	---	---
PA05OS12	Benzo(a)pyrene	ug/g	0.01	< 0.01	---	---	< 0.01	---	---
PA09OS12	Chrysene	ug/g	0.01	0.01	---	---	< 0.01	---	---
PA10OS12	Dibenz(a,h)anthracene	ug/g	0.02	< 0.02	---	---	< 0.02	---	---
PA11OS12	Fluoranthene	ug/g	0.01	< 0.01	---	---	< 0.01	---	---
PA12OS12	Fluorene	ug/g	0.01	< 0.01	---	---	< 0.01	---	---
PA13OS12	Indeno(1,2,3-c,d)pyrene	ug/g	0.02	< 0.02	---	---	< 0.02	---	---
PA14OS12	Naphthalene	ug/g	0.01	< 0.01	---	---	< 0.01	---	---
PA15OS12	Phenanthrene	ug/g	0.01	0.02	---	---	< 0.01	---	---
PA16OS12	Pyrene	ug/g	0.01	< 0.01	---	---	< 0.01	---	---
PAHrCAL2	Total PAH's	ug/g		0.04	---	---	< 0.01	---	---
PAH CAL2	Total Low MW PAH's	ug/g		0.02	---	---	< 0.01	---	---
PAHhCAL2	Total High MW PAH's	ug/g		0.02	---	---	< 0.01	---	---

Matrix : Soil Soil Soil Soil Soil Soil
Sampled on: 99/08/24 99/08/24 99/08/24 99/08/24 99/08/24 99/08/24

CONTINUED on page 4



PHILIP ANALYTICAL

02-Sep-99
Page 4 of 9

ANALYTICAL REPORT

Client : SEACOR ENVIRONMENTAL ENGINEERING INC.
Project : N0003-063 CASSIDY

Philip ID : 99042810 99042813 99042816 99042818 99042861 99042862
Client ID : BH99-1 SA4 BH99-2 SA2 BH99-3 SA1 BH99-4 SA1 BH99-4 SA2 BH99-5 SA1

Sparcode	Parameter	Unit	MDL						
SURROGATE RECOVERY									
AcenOS12	d10-Acenaphthene	%	0	81	---	---	84	---	---
PhenOS12	d10-Phenanthrene	%	0	74	---	---	74	---	---
ChryOS12	d12-Chrysene	%	0	73	---	---	72	---	---
PeryOS12	d12-Perylene	%	0	71	---	---	72	---	---
VOLATILE ORGANICS-MAH									
EX995170	Volat. Soil Extract.	date		---	990827	---	---	---	---
B020PT12	Benzene	ug/g	0.04	---	< 0.04	---	---	---	---
B021PT12	Ethyl Benzene	ug/g	0.04	---	< 0.04	---	---	---	---
T001PT12	Toluene	ug/g	0.04	---	< 0.04	---	---	---	---
X_882_03	Xylenes	ug/g	0.03	---	< 0.03	---	---	---	---
VOC SURROGATE RECOVERY									
VS01PT12	Bromofluorobenzene	%	0	---	93	---	---	---	---
VS03PT12	d8-Toluene	%	0	---	99	---	---	---	---
<div>Matrix : Soil</div> <div>Sampled on: 99/08/24</div>									
				Soil	Soil	Soil	Soil	Soil	Soil
				99/08/24	99/08/24	99/08/24	99/08/24	99/08/24	99/08/24

PHILIP ANALYTICAL

02-Sep-99

Page 5 of 9

ANALYTICAL REPORT

Client : SEACOR ENVIRONMENTAL ENGINEERING INC.

Project : N0003-063 CASSIDY

Philip ID : 99042866 99042868 99042870 99042874 99042878 99042883
Client ID : BH99-7 SA1 BH99-8 SA1 BH99-8 SA3 BH99-9 SA4 BH99-10 SA4 BH99-13 SA1

Sparcode	Parameter	Unit	MDL						
PHYSICAL									
0004D102	pH (DI 1:2)	pH units	0.1	---	7.6	---	---	---	---
00250760	Moisture	%(W/W)	0.1	---	---	---	---	---	7.9
ANIONS									
110415SW	Chloride Dissolved	ug/g	50	62	---	69	< 50	< 50	---
METALS TOTAL									
Al-T200S	Aluminum	ug/g	10	---	12200	---	---	---	---
Sb-T200S	Antimony	ug/g	2	---	< 2	---	---	---	---
As-T200E	Arsenic	ug/g	0.2	---	2.0	---	---	---	---
Ba-T200S	Barium	ug/g	0.1	---	50.7	---	---	---	---
Be-T200S	Beryllium	ug/g	0.1	---	0.2	---	---	---	---
Bi-T200S	Bismuth	ug/g	2	---	< 2	---	---	---	---
Cd-T200S	Cadmium	ug/g	0.2	---	< 0.2	---	---	---	---
Ca-T200S	Calcium	ug/g	40	---	4700	---	---	---	---
Cr-T200S	Chromium	ug/g	0.2	---	15.0	---	---	---	---
Co-T200S	Cobalt	ug/g	0.3	---	7.8	---	---	---	---
Cu-T200S	Copper	ug/g	0.5	---	59.1	---	---	---	---
Fe-T200S	Iron	ug/g	10.0	---	15200	---	---	---	---
Pb-T200S	Lead	ug/g	2	---	< 2	---	---	---	---
Mg-T200S	Magnesium	ug/g	10	---	4660	---	---	---	---
Mn-T200S	Manganese	ug/g	0.2	---	271	---	---	---	---
Hg-T200M	Mercury	ug/g	0.05	---	< 0.05	---	---	---	---
Mo-T200S	Molybdenum	ug/g	0.4	---	< 0.4	---	---	---	---
Ni-T200S	Nickel	ug/g	0.8	---	12.6	---	---	---	---
P T200S	Phosphorus	ug/g	4	---	572	---	---	---	---
K T200S	Potassium	ug/g	100	---	370	---	---	---	---
Se-T200E	Selenium	ug/g	0.2	---	0.4	---	---	---	---
Ag-T200S	Silver	ug/g	1	---	< 1	---	---	---	---
Na T200S	Sodium	ug/g	10	---	485	---	---	---	---
Sr-T200S	Strontium	ug/g	0.1	---	23.6	---	---	---	---
S T200S	Sulphur	ug/g	10	---	16	---	---	---	---
Te-T200S	Tellurium	ug/g	5	---	< 5	---	---	---	---
Tl-T200S	Thallium	ug/g	5	---	< 5	---	---	---	---
Sn-T200S	Tin	ug/g	2	---	< 2	---	---	---	---
Ti-T200S	Titanium	ug/g	0.3	---	383	---	---	---	---
V-T200S	Vanadium	ug/g	0.3	---	35.2	---	---	---	---

Matrix : Soil Soil Soil Soil Soil Soil
Sampled on: 99/08/24 99/08/24 99/08/24 99/08/25 99/08/25 99/08/25

(CONTINUED) on page 6



PHILIP ANALYTICAL

02-Sep-99
Page 6 of 9

ANALYTICAL REPORT

Client : SEACOR ENVIRONMENTAL ENGINEERING INC.
Project : N0003-063 CASSIDY

Philip ID : 99042866 99042868 99042870 99042874 99042878 99042883
Client ID : BH99-7 SA1 BH99-8 SA1 BH99-8 SA3 BH99-9 SA4 BH99-10 SA4 BH99-13 SA1

Sparcode	Parameter	Unit	MDL						
Zn-T200S	Zinc	ug/g	0.5	---	25.8	---	---	---	---
Zr-T200S	Zirconium	ug/g	0.3	---	0.9	---	---	---	---
HYDROCARBONS									
EX99S143	TEH Prep - soils	date		---	---	---	---	---	990827
H113P108	EPH (C10 - < C19)	ug/g	10	---	---	---	---	---	< 10
H114P108	EPH (C19 - C32)	ug/g	10	---	---	---	---	---	< 10
SURROGATE RECOVERY									
T140P108	o-Terphenyl	%	0	---	---	---	---	---	103
Matrix : Soil Soil Soil Soil Soil Soil									
Sampled on: 99/08/24 99/08/24 99/08/24 99/08/25 99/08/25 99/08/25									



PHILIP ANALYTICAL

02-Sep-99
Page 7 of 9

DUPLICATE SUMMARY

Parameter	Client ID	Philip ID	Sample Conc.	Duplicate Conc.	MDL	Unit	Relative % Diff.
EPH (C10 - < C19)	BH99-1 SA4	99042810	< 10	< 10	10	ug/g	0.00
EPH (C19 - C32)	BH99-1 SA4	99042810	< 10	< 10	10	ug/g	0.00
o-Terphenyl	BH99-1 SA4	99042810	99	97	0	%	2.04
Benzene	BH99-2 SA2	99042813	< 0.04	< 0.04	0.04	ug/g	0.00
Toluene	BH99-2 SA2	99042813	< 0.04	< 0.04	0.04	ug/g	0.00
Ethyl Benzene	BH99-2 SA2	99042813	< 0.04	< 0.04	0.04	ug/g	0.00
Hydrocarbons C5-C11	BH99-2 SA2	99042813	< 10	< 10	10	ug/g	0.00

PHILIP ANALYTICAL

02-Sep-99
Page 8 of 9

SPIKE SUMMARY

Parameter	Client ID	Philip ID	Sample Conc.	Sample & Spike Conc.	Spike Amount	Unit	Percent Recovery
Naphthalene	Blank Spike. Batch :	94500905	< 0.01	0.10	.1	ug/g	100
Acenaphthylene	Blank Spike. Batch :	94500905	< 0.01	0.08	.1	ug/g	80
Acenaphthene	Blank Spike. Batch :	94500905	< 0.01	0.11	.1	ug/g	110
Fluorene	Blank Spike. Batch :	94500905	< 0.01	0.09	.1	ug/g	90
Phenanthrene	Blank Spike. Batch :	94500905	< 0.01	0.10	.1	ug/g	100
Anthracene	Blank Spike. Batch :	94500905	< 0.01	0.09	.1	ug/g	90
Fluoranthene	Blank Spike. Batch :	94500905	< 0.01	0.09	.1	ug/g	90
Pyrene	Blank Spike. Batch :	94500905	< 0.01	0.09	.1	ug/g	90
Benzo(a)anthracene	Blank Spike. Batch :	94500905	< 0.01	0.08	.1	ug/g	80
Chrysene	Blank Spike. Batch :	94500905	< 0.01	0.10	.1	ug/g	100
Benzo(h)fluoranthene	Blank Spike. Batch :	94500905	< 0.01	0.08	.1	ug/g	80
Benzo(k)fluoranthene	Blank Spike. Batch :	94500905	< 0.01	0.09	.1	ug/g	90
Benzo(a)pyrene	Blank Spike. Batch :	94500905	< 0.01	0.08	.1	ug/g	80
Indeno(1,2,3-c,d)pyrene	Blank Spike. Batch :	94500905	< 0.02	0.07	.1	ug/g	70
Dihenz(a,h)anthracene	Blank Spike. Batch :	94500905	< 0.02	0.06	.1	ug/g	60
Benzo(g,h,i)perylene	Blank Spike. Batch :	94500905	< 0.02	0.07	.1	ug/g	70
EPH (C10 - < C19)	Blank Spike. Batch :	95203572	< 10	380	450	ug/g	85
EPH (C19 - C32)	Blank Spike. Batch :	95203572	< 10	430	550	ug/g	79
Benzene	Blank Spike. Batch :	95203496	< 0.04	2.2	2.15	ug/g	103
Toluene	Blank Spike. Batch :	95203496	< 0.04	2.2	2.15	ug/g	104
Ethyl Benzene	Blank Spike. Batch :	95203496	< 0.04	2.3	2.15	ug/g	106
EPH (C10 - < C19)	Blank Spike. Batch :	95203579	< 10	400	450	ug/g	89
EPH (C19 - C32)	Blank Spike. Batch :	95203579	< 10	490	550	ug/g	90
Aluminum	Blank Spike. Batch :	94202804	< 10	7530	9518	ug/g	79
Barium	Blank Spike. Batch :	94202804	< 0.1	100	102	ug/g	98
Calcium	Blank Spike. Batch :	94202804	< 40	141000	137000	ug/g	103
Cadmium	Blank Spike. Batch :	94202804	< 0.2	33.0	34	ug/g	97
Cobalt	Blank Spike. Batch :	94202804	< 0.3	30.0	28	ug/g	107
Chromium	Blank Spike. Batch :	94202804	< 0.2	43.0	44.35	ug/g	97
Copper	Blank Spike. Batch :	94202804	< 0.5	691	690	ug/g	100
Iron	Blank Spike. Batch :	94202804	< 10.0	19500	20406	ug/g	95
Magnesium	Blank Spike. Batch :	94202804	< 10	5820	6086	ug/g	96
Manganese	Blank Spike. Batch :	94202804	< 0.2	425	425	ug/g	100
Nickel	Blank Spike. Batch :	94202804	< 0.8	227	231	ug/g	98
Lead	Blank Spike. Batch :	94202804	< 2	227	233	ug/g	97
Strontium	Blank Spike. Batch :	94202804	< 0.1	184	202	ug/g	91
Vanadium	Blank Spike. Batch :	94202804	< 0.3	15.7	19	ug/g	83
Zinc	Blank Spike. Batch :	94202804	1.0	6830	6775	ug/g	101



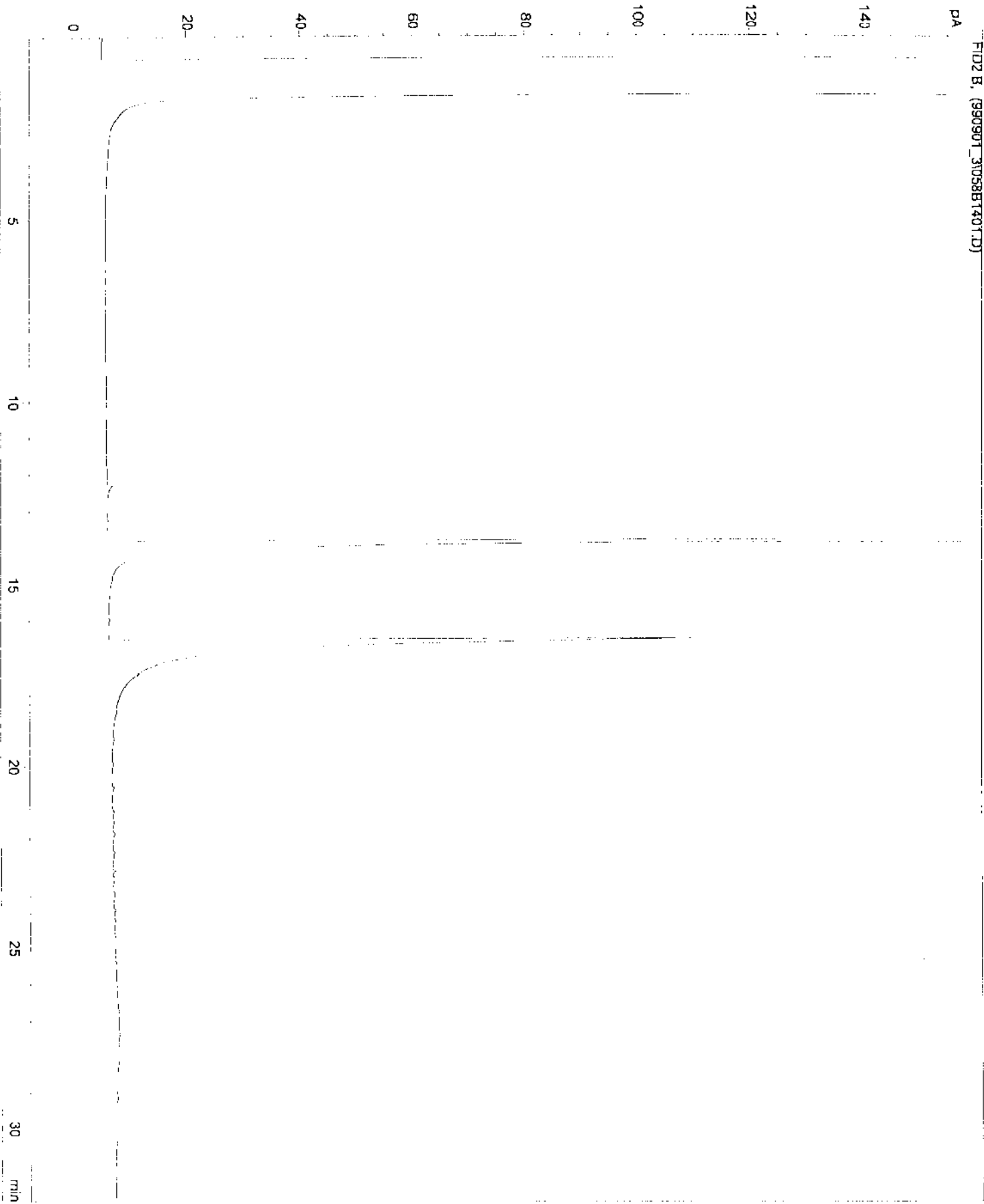
PHILIP ANALYTICAL

02-Sep-99
Page 9 of 9

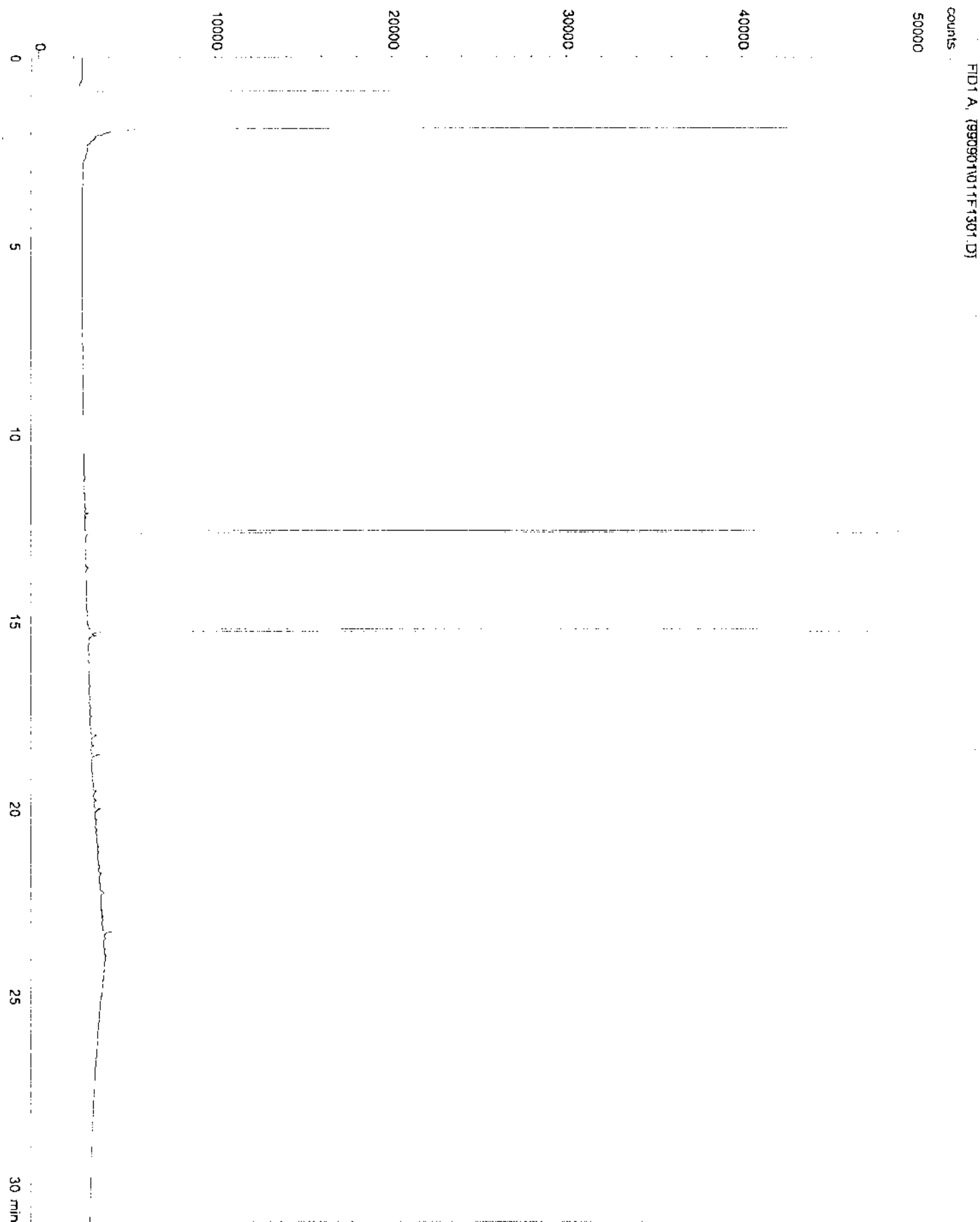
SPIKE SUMMARY

Parameter	Client ID	Philip ID	Sample Conc.	Sample & Spike Conc.	Spike Amount	Unit	Percent Recovery
Selenium	Blank Spike. Batch :	94202803	< 0.2	2.0	2	ug/g	101
Arsenic	Blank Spike. Batch :	94202803	< 0.2	18	18	ug/g	100
Mercury	Blank Spike. Batch :	94202813	< 0.05	6.36	6.25	ug/g	102

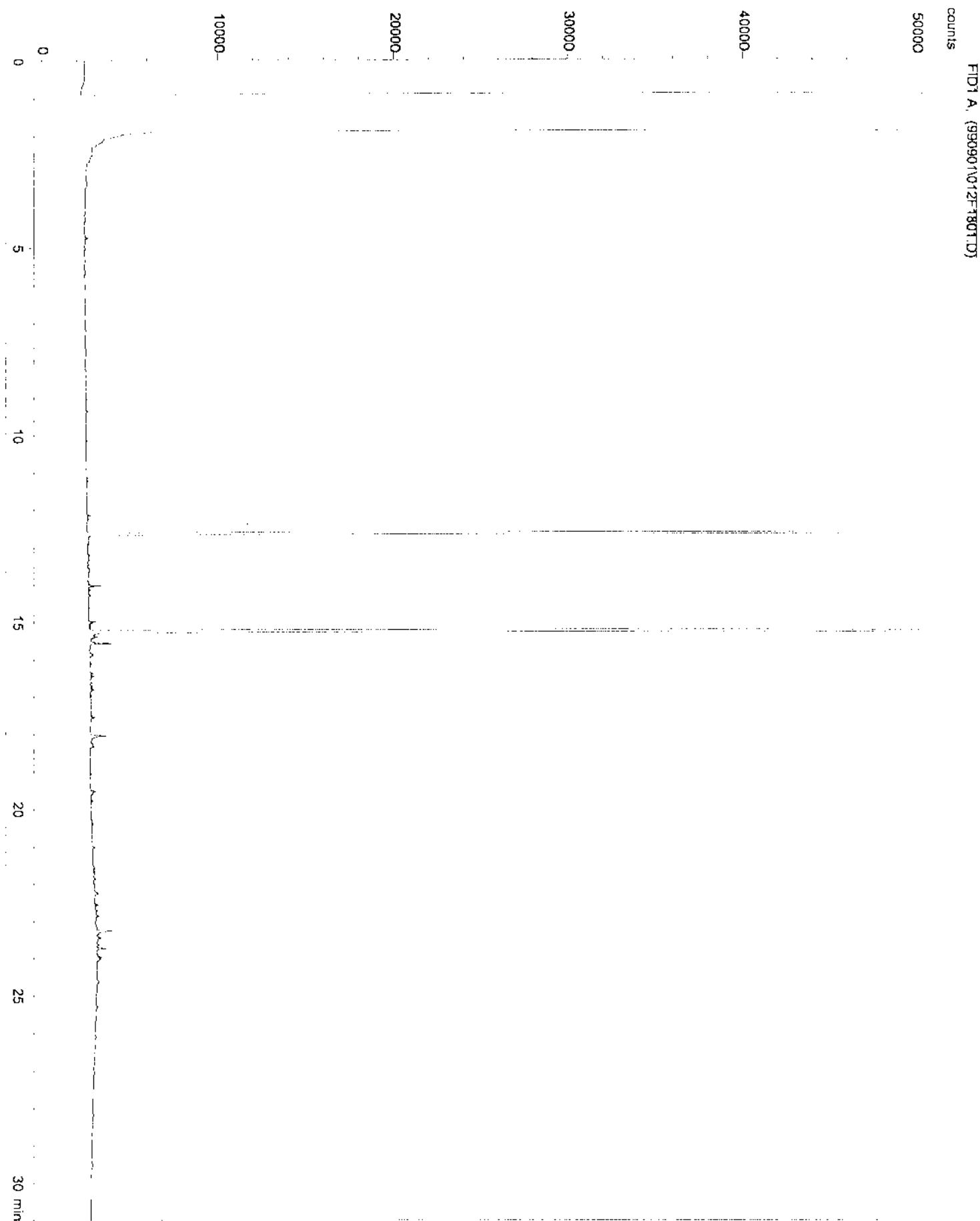
88-97-1 500



BH99-04-50



8877-13 SAT





PHILIP ANALYTICAL

22-Sep-99
Page 1 of 5

Certificate of Analysis

8577 Commerce Court
Burnaby, B.C.
Canada V5A 4N5
Tel 604 444 4808
Fax 604 444 4511

Reported To :

SEACOR ENVIRONMENTAL ENGINEERING INC. Client Code S0

#9-6421 APPLCROSS ROAD
NANAIMO, B.C.
V9V 1N1

Attention : ROB CHAISSON
Phone : (250) 390-5050
FAX : (250) 390-5042

Project Information :

Project ID : N0003-063 CASSIDY
Submitted By : BRAD HALSEY

Requisition Forms :

Form 08023895 received on 14-Sep-99 logged on 14-Sep-99 completed on 22-Sep-99

Remarks :

- ☞ All organic data is blank corrected except for PCDD/F, Hi-res MS and CLP volatile analyses
- ☞ 'MDL' = Method Detection Limit, '<' = Less than MDL, '—' = Not analyzed
- ☞ Solids results are based on dry weight except Biota Analyses & Special Waste Oil & Grease
- ☞ Organic analyses are not corrected for extraction recovery standards except for Isotope Dilution methods, (i.e. CARB 429 PAH, all PCDD/F and DBD/DBF analyses)
- ☞ All Groundwater samples are decanted and/or filtered prior to analysis
- ☞ This report shall not be reproduced except in full, without the written approval of the laboratory

Methods used by Philip are based upon those found in 'Standard Methods for the Examination of Water and Wastewater', 19th Edition, published by the American Public Health Association, or on US EPA protocols found in the 'Test Methods For Evaluating Solid Waste, Physical/Chemical Method, SW846', 3rd Edition. Other procedures are based on methodologies accepted by the appropriate regulatory agency. Methodology briefs are available by written request.

All work recorded herein has been done in accordance with normal professional standards using accepted testing methodologies, quality assurance and quality control procedures except where otherwise agreed to by the client and testing company in writing. Liability for any and all use of these test results shall be limited to the actual cost of the pertinent analysis done. There is no other warranty expressed or implied. Your samples will be retained at Philip for a period of 30 days from receipt of data or as per contract.

PHILIP Project Manager: Jack Wilson



PHILIP ANALYTICAL

22-Sep-99
Page 2 of 5

ANALYTICAL REPORT

Client : SEACOR ENVIRONMENTAL ENGINEERING INC.
Project : N0003-063 CASSIDY

Philip ID : 99049493 99049495 99049499 99049500
Client ID : SA 3 SA 5 SA 9 SA 10

Sparcode	Parameter	Unit	MDL				
PHYSICAL							
0004DI02	pH (DI 1:2)	pH units	0.1	6.8	---	8.1	6.6
ANIONS							
110415SW	Chloride Dissolved	ug/g	50	---	1500	---	---
METALS TOTAL							
Al-T200S	Aluminum	ug/g	10	12600	---	12800	15100
Sb-T200S	Antimony	ug/g	2	< 2	---	13	< 2
As-T200E	Arsenic	ug/g	0.2	2.3	---	110	160
Ba-T200S	Barium	ug/g	0.1	29.0	---	447	765
Be-T200S	Beryllium	ug/g	0.1	0.2	---	0.6	1.0
Bi-T200S	Bismuth	ug/g	2	< 2	---	< 2	< 2
Cd-T200S	Cadmium	ug/g	0.2	< 0.2	---	< 0.2	< 0.2
Ca-T200S	Calcium	ug/g	40	3050	---	41800	73500
Cr-T200S	Chromium	ug/g	0.2	18.1	---	36.6	16.9
Co-T200S	Cobalt	ug/g	0.3	7.3	---	15.9	20.9
Cu-T200S	Copper	ug/g	0.5	32.5	---	2520	4660
Fe-T200S	Iron	ug/g	10.0	17700	---	138000	219000
Pb-T200S	Lead	ug/g	2	7	---	388	592
Mg-T200S	Magnesium	ug/g	10	4140	---	6230	6210
Mn-T200S	Manganese	ug/g	0.2	279	---	408	455
Hg-T200M	Mercury	ug/g	0.05	< 0.05	---	< 0.05	< 0.05
Mo-T200S	Molybdenum	ug/g	0.4	< 0.4	---	5.9	4.5
Ni-T200S	Nickel	ug/g	0.8	14.7	---	16.9	5.4
P_T200S	Phosphorus	ug/g	4	338	---	362	344
K_T200S	Potassium	ug/g	100	204	---	2080	3590
Se-T200E	Selenium	ug/g	0.2	< 0.2	---	< 0.2	0.5
Ag-T200S	Silver	ug/g	1	< 1	---	3	7
Na_T200S	Sodium	ug/g	10	1090	---	531	514
Sr-T200S	Strontium	ug/g	0.1	10.7	---	117	200
S_T200S	Sulphur	ug/g	10	73	---	1560	2630
Te-T200S	Tellurium	ug/g	5	< 5	---	< 5	< 5
Tl-T200S	Thallium	ug/g	5	< 5	---	< 5	< 5
Sn-T200S	Tin	ug/g	2	< 2	---	< 2	< 2
Ti-T200S	Titanium	ug/g	0.3	901	---	600	534
V_T200S	Vanadium	ug/g	0.3	50.0	---	56.0	65.2
Zn-T200S	Zinc	ug/g	0.5	76.6	---	5850	9490

Matrix : Soil Soil Soil Soil
Sampled on: 99/09/10 99/09/10 99/09/10 99/09/10

CONTINUED on page 3



PHILIP ANALYTICAL

22-Sep-99
Page 3 of 5

ANALYTICAL REPORT

Client : SEACOR ENVIRONMENTAL ENGINEERING INC.
Project : N0003-063 CASSIDY

Philip ID : 99049493 99049495 99049499 99049500
Client ID : SA 3 SA 5 SA 9 SA 10

Sparcode	Parameter	Unit	MDL			
Zr-T200S	Zirconium	ug/g	0.3	2.1	---	14.9
						16.5
			Matrix : Soil	Soil	Soil	Soil
			Sampled on: 99/09/10	99/09/10	99/09/10	99/09/10

PHILIP ANALYTICAL

22-Sep-99
Page 4 of 5

DUPLICATE SUMMARY

Parameter	Client ID	Philip ID	Sample Conc.	Duplicate Conc.	MDL	Unit	Relative % Diff.
Silver	SA 3	99049493	< 1	< 1	1	ug/g	0.00
Aluminum	SA 3	99049493	12600	12400	10	ug/g	1.60
Barium	SA 3	99049493	29.0	27.0	0.1	ug/g	7.14
Beryllium	SA 3	99049493	0.2	0.2	0.1	ug/g	0.00
Bismuth	SA 3	99049493	< 2	< 2	2	ug/g	0.00
Calcium	SA 3	99049493	3050	3060	40	ug/g	-0.33
Cadmium	SA 3	99049493	< 0.2	< 0.2	0.2	ug/g	0.00
Cobalt	SA 3	99049493	7.3	7.4	0.3	ug/g	-1.36
Chromium	SA 3	99049493	18.1	18.2	0.2	ug/g	-0.55
Copper	SA 3	99049493	32.5	31.8	0.5	ug/g	2.18
Iron	SA 3	99049493	17700	17600	10.0	ug/g	0.57
Potassium	SA 3	99049493	204	214	100	ug/g	-4.78
Magnesium	SA 3	99049493	4140	4090	10	ug/g	1.22
Manganese	SA 3	99049493	279	283	0.2	ug/g	-1.42
Molybdenum	SA 3	99049493	< 0.4	< 0.4	0.4	ug/g	0.00
Sodium	SA 3	99049493	1090	1040	10	ug/g	4.69
Nickel	SA 3	99049493	14.7	14.1	0.8	ug/g	4.17
Phosphorus	SA 3	99049493	338	321	4	ug/g	5.16
Lead	SA 3	99049493	7	7	2	ug/g	0.00
Sulphur	SA 3	99049493	73	74	10	ug/g	-1.36
Antimony	SA 3	99049493	< 2	< 2	2	ug/g	0.00
Tin	SA 3	99049493	< 2	< 2	2	ug/g	0.00
Strontium	SA 3	99049493	10.7	10.0	0.1	ug/g	6.76
Tellurium	SA 3	99049493	< 5	< 5	5	ug/g	0.00
Titanium	SA 3	99049493	901	885	0.3	ug/g	1.79
Thallium	SA 3	99049493	< 5	< 5	5	ug/g	0.00
Vanadium	SA 3	99049493	50.0	49.6	0.3	ug/g	0.80
Zinc	SA 3	99049493	76.6	74.5	0.5	ug/g	2.78
Zirconium	SA 3	99049493	2.1	2.3	0.3	ug/g	-9.09
Selenium	SA 3	99049493	< 0.2	< 0.2	0.2	ug/g	0.00
Arsenic	SA 3	99049493	2.3	2.3	0.2	ug/g	0.00
Mercury	SA 3	99049493	< 0.05	< 0.05	0.05	ug/g	0.00
pH (DI 1:2)	SA 10	99049500	6.6	6.7	0.1	pH units	-1.50

PHILIP ANALYTICAL

22-Sep-99
Page 5 of 5

SPIKE SUMMARY

Parameter	Client ID	Philip ID	Sample Conc.	Sample & Spike Conc.	Spike Amount	Unit	Percent Recovery
Aluminum	Blank Spike. Batch :	94203111	< 10	8480	9518	ug/g	89
Barium	Blank Spike. Batch :	94203111	< 0.1	109	102	ug/g	106
Calcium	Blank Spike. Batch :	94203111	< 40	142000	137000	ug/g	103
Cadmium	Blank Spike. Batch :	94203111	< 0.2	33.3	34	ug/g	98
Cobalt	Blank Spike. Batch :	94203111	< 0.3	29.4	28	ug/g	104
Chromium	Blank Spike. Batch :	94203111	< 0.2	47.4	44.35	ug/g	106
Iron	Blank Spike. Batch :	94203111	< 10.0	21900	20406	ug/g	107
Magnesium	Blank Spike. Batch :	94203111	< 10	6430	6086	ug/g	106
Manganese	Blank Spike. Batch :	94203111	< 0.2	445	425	ug/g	105
Nickel	Blank Spike. Batch :	94203111	< 0.8	231	231	ug/g	100
Lead	Blank Spike. Batch :	94203111	< 2	241	233	ug/g	103
Strontium	Blank Spike. Batch :	94203111	< 0.1	204	202	ug/g	101
Vanadium	Blank Spike. Batch :	94203111	< 0.3	17.8	19	ug/g	93
Zinc	Blank Spike. Batch :	94203111	< 0.5	7210	6775	ug/g	106
Selenium	Blank Spike. Batch :	94203126	< 0.2	1.9	2	ug/g	95
Arsenic	Blank Spike. Batch :	94203126	< 0.2	19	18	ug/g	103
Mercury	Blank Spike. Batch :	94203121	< 0.05	6.31	6.25	ug/g	101



PHILIP ANALYTICAL

PHILIP ANALYTICAL SERVICES
Certificate of Analysis

REVISED

N0003-063 Sample ID	Cassidy Philip ID	Chloride ug/g
BH99-3 SA1	99042816	< 25
BH99-9 SA4	99042874	29
BH99-10 SA4	99042878	49

A handwritten signature in black ink, appearing to be 'J. Philip' or similar, written in a cursive style.



PHILIP ANALYTICAL

08-Oct-99
Page 1 of 2

Certificate of Analysis

8577 Commerce Court
Burnaby, B.C.
Canada V5A 4N5
Tel 604 444 4808
Fax 604 444 4511

Reported To :

SEACOR ENVIRONMENTAL ENGINEERING INC. Client Code S0

#9-6421 APPLECROSS ROAD
NANAIMO, B.C.
V9V 1N1

Attention : ROB CHAISSON
Phone : (250) 390-5050
FAX : (250) 390-5042

Project Information :

Project ID : N0003-063 CASSIDY

Requisition Forms :

Form 08022963 logged on 4-Oct-99 completed on 8-Oct-99

Remarks :

- ☞ All organic data is blank corrected except for PCDD/F, Hi-res MS and CLP volatile analyses
- ☞ 'MDL' = Method Detection Limit, '<' = Less than MDL, '---' = Not analyzed
- ☞ Solids results are based on dry weight except Biota Analyses & Special Waste Oil & Grease
- ☞ Organic analyses are not corrected for extraction recovery standards except for Isotope Dilution methods, (i.e. CARB 429 PAH, all PCDD/F and DBD/DBF analyses)
- ☞ All Groundwater samples except BTEX/VOC's or Purgeable Hydrocarbons are decanted and/or filtered prior to analysis unless otherwise mandated by regulatory agency
- ☞ This report shall not be reproduced except in full, without the written approval of the laboratory

Methods used by Philip are based upon those found in 'Standard Methods for the Examination of Water and Wastewater', 19th Edition, published by the American Public Health Association, or on US EPA protocols found in the 'Test Methods For Evaluating Solid Waste, Physical/Chemical Method, SW846', 3rd Edition. Other procedures are based on methodologies accepted by the appropriate regulatory agency. Methodology briefs are available by written request.

All work recorded herein has been done in accordance with normal professional standards using accepted testing methodologies, quality assurance and quality control procedures except where otherwise agreed to by the client and testing company in writing. Liability for any and all use of these test results shall be limited to the actual cost of the pertinent analysis done. There is no other warranty expressed or implied. Your samples will be retained at Philip for a period of 30 days from receipt of data or as per contract.

PHILIP Project Manager: Jack Wilson



PHILIP ANALYTICAL

08-Oct-99

Page 2 of 2

**ANALYTICAL REPORT
Form 08022963**

Client : SEACOR ENVIRONMENTAL ENGINEERING INC.
Project : N0003-063 CASSIDY

Philip ID : 99055494 99055495
Client ID : BH 99-5-SA1 BH 99-8-SA3

Sparcode	Parameter	Unit	MDL			
SOIL SALINITY						
NaSPSP31	Soluble Sodium	mg/L	4.0	2630	120	
CaSPSP31	Soluble Calcium	mg/L	0.50	5.75	29.2	
K-SPSP31	Soluble Potassium	mg/L	4.0	< 4.0	24.1	
MgSPSP31	Soluble Magnesium	mg/L	0.20	0.54	39.8	
S-SPSP31	Soluble Sulphur	mg/L	0.5	79.9	2.0	
SAR-CALC	Na Adsorp. Ratio(SAR)	None		281	3.39	
TGR-CALC	Theo. Gypsum Req(TGR)	µac		26.7	< 0.1	

Matrix : Soil Soil
Sampled on: 99/08/24 99/08/24

TAB F

PROFESSIONAL STATEMENT

The "Detailed Site Investigation" report, dated November 12, 1999, prepared by SEACOR Environmental Engineering Inc. (SEACOR) for the above-referenced site, was prepared in accordance with all requirements in the Waste Management Act and the Contaminated Sites Regulation. The authors of the report, Mr. G.M. Jesse, P.Geo. and Mr. R.P. Chaisson, C.Tech. have 18 years of combined experience in the assessment and remediation of similar sites and are familiar with the works carried out on the subject site.

**COMBINED STAGE 1 / STAGE 2
PRELIMINARY SITE
INVESTIGATIONS
CASSIDY
WORKS YARD**

Conor Pacific

Environmental Technologies Inc.



**COMBINED STAGE 1 / STAGE 2
PRELIMINARY SITE
INVESTIGATIONS
CASSIDY
WORKS YARD**

Prepared for:

British Columbia Buildings Corporation
Technical Value Department
441A Columbia Street
Kamloops, BC
V2C 2T3

FINAL

January 1999

Distribution:

5 copies: British Columbia Buildings Corporation
2 copies: Conor Pacific Environmental Technologies Inc.

Project No. 8216754

Conor Pacific

Environmental Technologies Inc.

Conor Pacific Environmental Technologies Inc.
1727 West Broadway Avenue, Suite 300
Vancouver, British Columbia V6J 4W6
Phone (604) 738-1100 FAX (604) 738-1166

Conor Pacific

Environmental Technologies Inc.

January 22, 1999

Job No. 8216754

British Columbia Buildings Corporation
Technical Value Department
441A Columbia Street
Kamloops, BC V2C 2T3

Attention: Mr. George Wycherley, Environment Manager

**Subject: Combined Stage 1 and Stage 2 Preliminary Site Investigation
Cassidy Works Yard, Cassidy, BC**

Conor Pacific Environmental Technologies (Conor Pacific) is pleased to provide four copies of the "Final Report - Combined Stage 1 and Stage 2 Preliminary Site Investigations, Cassidy Works Yard". One copy has been sent directly to Roger Purdy at North West Environmental.

The Stage 1 Preliminary Site Investigation (PSI) identified potential issues of environmental concern, and provided recommendations to North West Environmental (North West), acting on behalf of BCBC, for the Stage 2 PSI. Approval of the Stage 2 PSI was obtained when all comments provided by North West were incorporated into the Stage 2 recommendations. A Stage 2 drilling program was carried out.

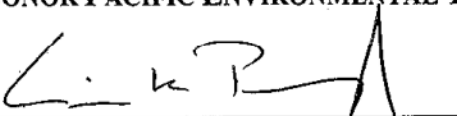
This report combines the findings of the Stage 1 and Stage 2 PSIs, and presents the analytical data with conclusions and recommendations for further work at the site.

Should you have any questions, please do not hesitate to contact Eric Pringle at (604) 738-1100, extension 114.

Yours truly,

CONOR PACIFIC ENVIRONMENTAL TECHNOLOGIES INC.

Per:



Eric K. Pringle, P. Eng.
Manager, Pacific Region
Senior Environmental Engineer

EKP:ljh

cc: *Roger Purdy, North West Environmental
attachment*

EXECUTIVE SUMMARY

Conor Pacific Environmental Technologies Inc. was retained by British Columbia Buildings Corporation (BCBC) to conduct a combined Stage 1 and Stage 2 Preliminary Site Investigation (PSI) of the Cassidy Works Yard, located in Cassidy, Vancouver Island, BC. The purpose of the Stage 1 and Stage 2 PSI was to determine if any contamination existed at the site, and if that contamination exceeded the CSR standards applicable for the subject property [i.e., commercial land use (CL)]. These objectives, as stated in the RFP, are as follows:

“site investigations will complete at minimum, Preliminary Investigations Stage 1 and Stage 2 to determine whether sites are:

- a) clear of regulated contaminants;
- b) have regulated contaminants present but within allowable landuse criteria; and
- c) have regulated contaminants present in excess of allowable landuse criteria (RFP Part B).”

The Stage 1 PSI was conducted first to determine historical land use at the site and identify historical activities that might have led to contamination. Upon completion of the Stage 1 PSI, Conor Pacific completed the Site Report – Exception Tracking spreadsheet provided by North West Environmental. This Exception Tracking report summarized areas of potential concern, and recommended a Stage 2 PSI be carried out at the site. The Exception Tracking report also presented North West with a proposed Stage 2 Work Plan. The Work Plan was reviewed by North West, and approval was given to carry out the Stage 2 when all North West’s comments were incorporated into the Work Plan.

The Stage 1 PSI identified areas of concern as listed in Table ES-1. The Stage 2 PSI was then completed by Conor Pacific, and included a drilling program to facilitate soil sampling. Soil samples analyzed were found to meet the CSR CL standards for all parameters analyzed in all samples. Soil samples from around the salt sheds exceeded the CCME Interim Soil Criteria for dissolved chloride at BH1 and BH4, and the CCME specific conductance criteria at BH1. BH5 analytical results indicated elevated EPH readings (1,500 ug/g compared to a standard of 2,000 ug/g) of which the vertical extent and degree of EPH levels is not yet known.

Table ES-1 summarizes the Conor Pacific recommendation that a Detailed Site Investigation (DSI) be completed to determine the extent of the salt and elevated hydrocarbon contamination and the potential contamination of other areas listed. This would involve drilling additional boreholes in these areas. Conor Pacific also recommends that a suitable drill rig be employed so that groundwater monitoring wells can be installed at the site to facilitate groundwater sampling.

Table ES-1 Items of Potential Concern, Stage 2 Results and Recommendations

ITEM #	ITEM OF CONCERN	BOREHOLE AND CONTAMINANTS	RECOMMENDATIONS AND DSI PROGRAM	RATIONALE
1	Shed #1	BH1 Salt & specific cond. > CCME & BCMELP criteria	Specific conditions follow environmental housekeeping and spill response procedures. Additional boreholes to delineate extent of elevated salt levels around BH1. Installation of shallow groundwater monitoring wells.	Exceeds standard/criteria for chloride (485X); within 10m. of the north property boundary; adjacent land zoned residential, currently vacant and forest covered; groundwater quality and flow direction not known.
2	Shed #2	BH4 Salt > CCME & BCMELP criteria BH5 EPH < CL	Follow environmental housekeeping and spill response procedures. Additional boreholes to delineate extent of elevated salt levels around BH4 and the extent of elevated LEPH levels around BH5. Installation of shallow groundwater monitoring wells.	Exceeds standard/criteria for chloride; within 10m of the south property boundary; no groundwater results to date; adjacent land zoned residential, currently vacant and forest covered.
3	Oil/water separator, recycling tank and UST #7	BH9 EPH & metals < CL	Follow environmental housekeeping and spill response procedures. Installation of shallow groundwater monitoring wells. Investigate off site discharge areas.	Groundwater quality and flow direction not known. Soil quality in offsite discharge areas in not known (see Item #6 also).
4	Oil shed, grease ramp, former waste oil UST, three former gas/diesel USTs	BH2, BH3 EPH < CL	Follow environmental housekeeping and spill response procedures. Install shallow monitoring well downgradient of area.	Groundwater quality and flow direction not known.
5	Drums and associated staining behind machining area of VMAC	BH8 EPH & metals < CL	Follow environmental housekeeping and spill response procedures for all material storage areas. No further sampling recommended at this time.	Samples did not exceed CSR CL standards.

Table ES-1 Items of Potential Concern, Stage 2 Results and Recommendations
(continued)

ITEM #	ITEM OF CONCERN	BOREHOLE AND CONTAMINANTS	RECOMMENDATIONS AND DSI PROGRAM	RATIONALE
6	Storage of scrap and waste oil at north end of maintenance Building #1	BH9 EPH & metals < CL	Follow environmental housekeeping and spill response procedures.	Groundwater quality and flow direction not known (investigate in conjunction with Item #3).
7	Heating Oil UST for VMAC building	BH7 EPH < CL	Follow environmental housekeeping and spill response procedures. No further sampling recommended at this time.	Samples tested did not exceed CSR CL standards.
8	Sandblasting Area	No Stage 2 PSI conducted	Follow environmental housekeeping and spill response procedures. Complete boreholes in this area to assess contamination.	No soil or groundwater sampling completed during the Stage 2. (investigate in conjunction with item #3 and #6).
9	Waste oil UST located at southwest corner of VMAC building.	BH6 EPH < CL	Follow environmental housekeeping and spill response procedures. No further sampling recommended at this time.	Samples tested did not exceed CSR CL standards.
10	Other exterior storage areas. i.e. Storage A	No stage 2 PSI conducted	Follow environmental housekeeping and spill response procedures. Investigate exterior storage areas.	Some exterior storage areas with contaminants of concern not investigated in Stage 2 PSI.

As well, potential mercury lamps should be properly handled and disposed.

A cost estimate to complete the North West "Site Reports for Exception Tracking" to include the Stage 2 PSI results, DSIK recommendations, and the costs to complete the contaminant delineation will be provided upon request.

Summary of Report Participants

BCE SITE ID#:

- 1 This report was
commissioned by: company: British Columbia Buildings Corporation
contact name/position: George Wycherley, Environment Manager
address: 441A Columbia St., Kamloops,
B.C. V2C 2T3
telephone: (250) 314-5395
- 2 Report author(s): names(s): Cindy Smith, Environmental Scientist
Paul Cahill, Environmental Planner
address: #300-1727 West Broadway
Vancouver, B.C.
telephone: (604) 738-1100

- Contributors to
3 report: name/position: Jackie Smith, Project Manager
(until Jan. 8/99)
name/position: Eric Pringle, Senior Environmental
Engineer, Manager, Pacific Region
(Senior Peer Review)
name/position: _____

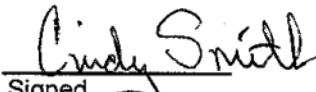
- 4 The ministry policy considers that a regional pollution prevention manager has no duty to consider an application for an Approval in Principle, a Certificate of Compliance, a Conditional Certificate of Compliance or an approval of a preliminary or detailed site investigation until an applicant or the applicants agent provides a written signed statement that the documentation prepared in support of any application has been carried out in accordance with all requirements in the Waste Management Act and the regulations thereto, and certifies that the person signing the statement has demonstratable experience in remediation of the type of contamination at the site for which the statement applies and is familiar with the remediation carried out on the site.

In consideration of the above policy, please detail below the relevant qualifications and experience of the main author(s) of the subject report.

Cindy Smith, D. Ecotox, H.BSc. - over 5 years consulting experience, has completed over 100 site assessments including Stage 1 and 2 PSI's.

Paul V. Cahill, BES (Hon.), MA - over 12 years of environmental engineering consulting experience, has completed over 200 Stage 1 and 2 PSI's, as well as DSI's, environmental site assessments and remedial projects.


Signed


Signed

Signed _____

Site Information Summary

Common name of site (if applicable)	Cassidy Works Yard	BCE SITE ID#:	
Civic address of site street:	1329 Kipp Road		
city/postal code:	Cassidy		
Owner of site name:	British Columbia Buildings Corporation (BCBC)		
Owner's address street:	441 A Columbia Street		
City, prov/state, postal code, country:	Kamloops, B.C., V2C 2T3, Canada		
Site occupant(s) (if different than owner)			
Latitude (NAD 27 \pm 0.5 seconds)	Degrees: 49	Minutes: 6	Seconds: 11
Longitude (NAD 27 \pm 0.5 seconds)	Degrees: 123	Minutes: 54	Seconds: 49
PIDs/PINs of site (attach separate page if necessary)			
Legal description or meets and bounds: (attach separate page if necessary)	Lot 1, Section 14, Range 6, Cranberry District Plan 40297		
Company official & address re sending AIP/Certificates by Registered Mail:	George Wycherley, BCBC (see above)		

Report(s) Submitted		Report Date(s)	
x	("x" as appropriate)	Past Submissions	Present
		(yy-mm-dd)	(yy-mm-dd)
<input type="checkbox"/>	Preliminary Site Investigation - First Stage		99-01-22
<input type="checkbox"/>	Preliminary Site Investigation - Second Stage		99-01-22
<input type="checkbox"/>	Detailed Site Investigation		
<input type="checkbox"/>	Remediation Plan with Risk Assessment		
<input type="checkbox"/>	Remediation Plan without Risk Assessment		
<input type="checkbox"/>	Confirmatory Sampling		
<input type="checkbox"/>	Monitoring		

Report Name	Combined Stage 1/Stage 2 Preliminary Site Investigation - Cassidy Works Yard
Consultant's Name	Conor Pacific Environmental Technologies Inc.
Consultant's file number	8216754-1001

Summary of Actions Taken (Current Status)

Actions Proposed (if applicable)

The above information is a summary only and persons who may be relying on the report are encouraged to review the entire document so as to avoid the use of information out of context.

Soil and Groundwater Sampling and Analysis Summary

Site Data	
Total area of site (m ²)	36000m2
Total area of building(s) (m ²)	3600m2
Total paved surface area (m ²)	29700m2
Current land use	CL
Proposed land use	N/A
Suspect land uses	N/A
Contaminant source(s)	USTs/ASTs, salt sheds, maintenance
Presence of free product	LNAPL (Y/N) DNAPL (Y/N)
Number of soil contaminant zones	Not yet known
No. of groundwater contaminant plumes	No groundwater tested
Contaminant Migration potential	? : ? Low: High:

Area Information	
Nearest groundwater water supply (m)	See page 12 of main report.
Nearest surface water (m)	See page 5 of main report.
Nearest sensitive area (m)	See page 5 of main report.
Uses of adjacent water resources	N/A
Annual rainfall (mm) + snowfall (cm)	N/A
100/200 year flood potential of site	N/A
100/200 yr flood potential of area	N/A
Adjacent land uses	See page 5 of main report.

Soil Sample Information	
Number of testpits	0
Number of boreholes	9
Number of surface samples collected	9
Number of soil samples collected	26
Number of soil samples analyzed (n)	17
Soil Contaminant(s) PCOCs	Soil Quality (AL, PL, RL, CL, IL, W, SW)
Shallow (depth, m)	
BH1 & BH4, Dissolved chloride (to 1.5mbg)	BCMELP typical criteria
BH1 Specific conductance (to 1.5 mbg)	CCME
Intermediate (depth, m)	
Deep (depth, m)	

Groundwater Sample Information	
Approx. depth to groundwater (m)	No groundwater was sampled
No. of affected aquifers & depths (m)	N/A
No. of monitoring wells developed	N/A
No. of groundwater samples collected	N/A
No. groundwater samples analyzed (n)	N/A
Groundwater Contaminant(s) PCOCs	Water Quality (AW, IW, LW, DW)
Shallow (depth, m)	
Intermediate (depth, m)	
Deep (depth, m)	

Notes: Migration potential refers to contaminant plume(s) and "?" = "unknown"
 "surface samples" = soil samples obtained using hand trowels, shovels
 and hand augers at depths less than 0.5 metres
 PCOC = Potential contaminants of concern

AL = Agricultural
 PL = Urban Park
 RL = Residential
 CL = Commercial
 W = Waste
 AW = Aquatic Life
 LW = Livestock
 IW = Irrigation
 DW = Drinking Water

The above information is a summary only and persons who may be relying on the report are encouraged to review the entire document so as to avoid the use of information out of context.

Report Date: _____

Appendix C: Page 2 of 5

Statistical Summary of Soil and Groundwater Analyses

Site ID#

[illegible]

GROUNDWATER -- Groundwater Contaminant Plumes (referenced to attached Site Plan)

[illegible]

Linear velocity of plume = Darcy velocity (V_{Darcy}) divided by the effective porosity (n_e)

PCOC = potential contaminant of concern

The above information is a summary only and persons who may be relying on the report are encouraged to review the entire document so as to avoid the use of information out of context.

Appendix C Continued

CSR - PROTOCOL 5

DRAFT

April 16, 1998

Contaminant Risk Summary 1

HUMAN HEALTH

SITE ID #: _____

CARCINOGENS

PCOC	Exposure Pathway	Incremental Lifetime Cancer Risk (90th percentile)	Risk-based Standard
N/A	N/A	N/A	

NON-CARCINOGENS

PCOC	Exposure Pathway	Hazard Index (90th percentile)	Risk-based Standard
N/A	N/A	N/A	

The above information is a summary only and persons who may be relying on the report are encouraged to review the entire document so as to avoid the use of information out of context.

Date: _____

Appendix C: Page 4 of 5

Appendix C Continued

CSR - PROTOCOL 5

DRAFT

April 16, 1998

Contaminant Risk Summary 2**ECOLOGICAL HEALTH**

SITE ID #: _____

Terrestrial

ERA Tier: _____

Substance	Critical Receptor	Exposure Pathway	Risk Estimate	Risk Characterization
N/A	N/A	N/A	N/A	

Aquatic

ERA Tier: _____

Substance	Critical Receptor	Exposure Pathway	Risk Estimate	Risk Characterization
N/A	N/A	N/A	N/A	

The above information is a summary only and persons who may be relying on the report are encouraged to review the entire document so as to avoid the use of information out of context.

Date: _____

Appendix C: Page 5 of 5

TABLE OF CONTENTS

LETTER OF TRANSMITTAL.....	i
EXECUTIVE SUMMARY	ii
1.0 INTRODUCTION.....	1
2.0 SCOPE OF WORK.....	2
3.0 SITE DESCRIPTION AND HISTORY	3
3.1 SITE DESCRIPTION	3
3.2 ZONING INFORMATION	3
3.3 SITE HISTORY	3
3.3.1 Historical Aerial Photographs.....	3
3.3.2 Title Search.....	8
3.3.3 Archaeological Search.....	8
3.3.4 Insurers Advisory Organization.....	8
3.3.5 Local Fire Department	8
3.3.6 BCBC Files	9
3.4 MINISTRY OF ENVIRONMENT FILES	11
3.4.1 BC On-Line.....	11
3.4.2 Water Well Records	12
3.5 SUMMARY OF HISTORICAL INFORMATION	12
4.0 SITE RECONNAISSANCE	13
4.1 SITE PHYSIOGRAPHY	13
4.2 ADJACENT LAND USE	13
4.3 BUILDINGS AND OPERATIONS.....	13
4.3.1 Permits (Federal, Provincial, and Municipal)	14
4.3.2 Wastewater and Stormwater Management.....	14
4.3.3 Waste Management.....	15
4.3.4 Trenches, Sumps, and Separators.....	15
4.3.5 Underground Storage Tanks.....	15
4.3.6 Aboveground Storage Tanks.....	16
4.3.7 Materials Storage	17
4.3.8 Spill Control and Emergency Response.....	20
4.3.9 Exterior Yard Conditions.....	20
4.3.10 Dumps and Fill Materials.....	20
4.3.11 Other Substances	21
5.0 ITEMS OF CONCERN AND RECOMMENDATIONS.....	22
6.0 STAGE 2 PSI SCOPE OF WORK	24

7.0	FIELD METHODOLOGIES	27
7.1	DRILLING PROGRAM	27
7.2	SOIL SAMPLING	27
7.3	PROJECT LABORATORY	28
8.0	REGULATORY CONTEXT	29
8.1	BC CONTAMINATED SITES REGULATION	29
8.2	SPECIAL WASTE REGULATION	30
8.3	CCME INTERIM CANADIAN ENVIRONMENTAL QUALITY CRITERA	31
9.0	FIELD PROGRAM	32
9.1	DRILLING PROGRAM	32
9.2	LABORATORY PROGRAM	32
10.0	FIELD PROGRAM RESULTS	34
10.1	SITE STRATIGRAPHY	34
10.2	FIELD OBSERVATIONS	34
10.3	ANALYTICAL RESULTS	34
	10.3.1 Soil	34
11.0	CONCLUSIONS	38
12.0	RECOMMENDATIONS	40
13.0	STATEMENT OF LIMITATIONS	42
14.0	REFERENCES	43

LIST OF TABLES

Table ES-1	Items of Potential Concern, Stage 2 Results and Recommendations	iii
Table 3-1	Title Search	8
Table 4-1	Adjoining Land Use and Environmental Concerns	13
Table 4-2	Underground Storage Tanks	16
Table 4-3	Aboveground Storage Tanks.....	17
Table 4-4	Materials of Concern.....	17
Table 5-1	Items of Potential Concern.....	22
Table 5-1	Items of Potential Concern (cont'd)	222
Table 6-1	Items of Potential Concern and Stage 2 PSI Scope of Work.....	24
Table 6-1	Items of Potential Concern and Stage 2 PSI Scope of Work (cont'd).....	25
Table 10-1	Concentration of Metals in Soil	36
Table 10-2	Concentration of Hydrocarbons in Soil	37
Table 12-1	Items of Potential Concern, Stage 2 Results and Recommendations	40

LIST OF FIGURES

Figure 1	Site Location Map - Cassidy, BC	4
Figure 2	Site Location and Adjacent Land Use	5
Figure 3	Site Plan	6
Figure 4	Sampling Locations	33
Figure 5	Areas of Contamination	39

1.0 INTRODUCTION

Conor Pacific Environmental Technologies Inc. (Conor Pacific) was retained by British Columbia Buildings Corporation (BCBC) to conduct a Combined Stage 1/Stage 2 Preliminary Site Investigation (PSI) of the highways works yard located at 1329 Kipp Road in Cassidy (subject site). The PSI was conducted as per the request for proposal (RFP, No. 139TV), dated June 22, 1998 and our "Proposal for Environmental Stage 1/Stage 2 and Detailed Site Investigations - Various Locations, BC" dated July 15, 1998. The format of this report is as per the RFP, with the exception that the field methodologies are included in Tab C, and is summarised below:

Tab	Contents
A	Executive summary and BC Site Registry information.
B	All work conducted as part of the Stage 1 PSI, including: <ul style="list-style-type: none">• an introduction and scope of work, background/site history;• summary of site history and site facilities; and• summary of site reconnaissance.
C	Field work conducted as part of the Stage 2 PSI, including: <ul style="list-style-type: none">• methodologies for field work;• details of test locations and monitoring well installations;• a description of the soil profile, including depth to groundwater (if encountered) and presence/absence of liquid hydrocarbons; and• a survey of borehole and monitoring well locations with a determination of groundwater elevations with inferred groundwater flow if groundwater is encountered.
D	Additional information obtained as a result of the Stage 2 PSI, including: <ul style="list-style-type: none">• field observations;• analytical results highlighting any exceedances compared to applicable standards; and• site plan showing locations of known or suspected contamination.
E	All borehole logs and analytical reports.
F	Colour photographs.
G	A copy of the aerial photographs.
H	Title search and zoning information.
I	Additional records obtained during the Stage 1 PSI (e.g., site plans, tank testing records etc.).
J	A professional statement consistent with Part 16, Section 63 of the BC Contaminated Site Regulation (CSR).

The overall objective as stated in the RFP is as follows:

"Site investigations will complete at minimum, Preliminary Investigations Stage 1 and Stage 2 to determine whether sites:

- are clear of regulated contaminants;
- have regulated contaminants present but within allowable land use criteria; and
- have regulated contaminants present in excess of allowable land use criteria".

2.0 SCOPE OF WORK (STAGE 1)

The Stage 1 PSI was conducted to identify areas of potential environmental contamination at the subject site. This assessment is based on both the past and present uses of the land. The scope of work completed is based on the protocols outlined by the BC Contaminated Sites Regulation (April 1997), the RFP and the Conor Pacific proposal. Accordingly, the Stage 1 scope of work included the following tasks:

- a) review of historical aerial photographs;
- b) review of title search and zoning information;
- c) review of BCBC property files including site plans, environmental reports, tank information, photographs, and letters;
- d) review of property information within a 0.5 km radius of the site from the BC Ministry of Environment, Lands and Parks (MOELP) Site Registry;
- e) review of BC Archaeology Branch files;
- f) review of Fire Insurance Maps;
- g) review of available information and reports for adjacent properties;
- h) a site visit including an inspection of the subject property and buildings, and observation of the adjoining properties;
- i) interviewing of persons with knowledge regarding the property history and usage; and,
- j) documentation and preparation of a Stage 1 PSI report.

As per the RFP, a review of hazardous building materials (asbestos and polychlorinated biphenyls) was not conducted as part of this assessment.

This report ("Report") was prepared by Conor Pacific Environmental Technologies (Conor Pacific), for the sole benefit and exclusive use of British Columbia Buildings Corporation (BCBC). The material in it reflects Conor Pacific's best judgement in light of the information available to it at the time of preparing the Report. Any use which a third party makes of this Report, or any reliance on or decisions made based on it, are the responsibility of such third parties. Conor Pacific accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on this Report.

3.0 SITE DESCRIPTION AND HISTORY

3.1 SITE DESCRIPTION

The site is located at 1329 Kipp Road in Cassidy, BC (see Figure 1). The site is legally described as Lot 1, Section 14, Range 6, Cranberry District, Plan 40297.

The site is somewhat rectangular in shape with a length of approximately 361 m and a width of 107 m. The site has an area of 3.62 Ha (8.95 acres) as taken from BCBC sources, (see Figure 2).

Located on the site is a maintenance building (Building #1), an office and storage building (Building #2), an oil storage building (Building #3), two salt sheds (Sheds #1 and #2), a utility shed (Shed #3) and a metal shed (Shed #4) (see Figure 3).

The site is leased by Mainroad Mid-Island Maintenance (Mainroad) for use as a highways maintenance yard. A portion of the site has been sub-leased by Mainroad to Vehicle Mounted Air Compressors (VMAC). VMAC occupies most of Building #2 in addition to the Ministry of Transportation and Highways (MOTH). Lease documents were not reviewed as part of this project.

3.2 ZONING INFORMATION

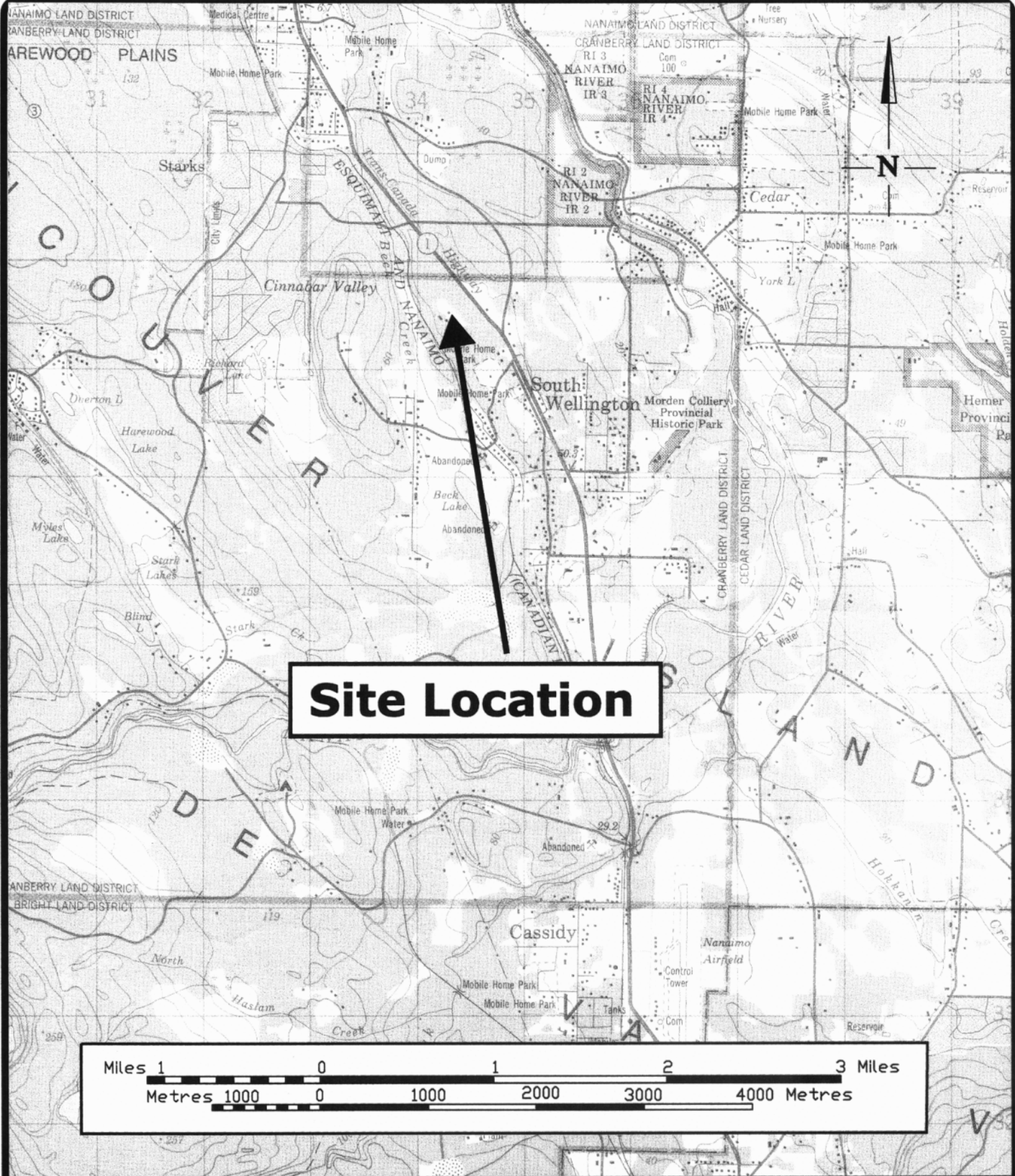
According to the Regional District of Nanaimo the site is zoned PU1 – Public Utility. A change of ownership to the private sector could require zoning changes.

The adjoining property to the north, south, east and west is zoned RS2F - Residential.

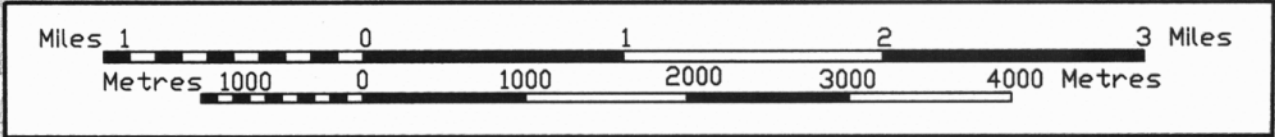
3.3 SITE HISTORY

3.3.1 Historical Aerial Photographs

Historical aerial photographs were obtained from the University of British Columbia Geographic Information Centre. Coverage of the subject site was available for 1950, 1957, 1962, 1968, 1975 and 1984. An enlarged copy of the aerial photographs from 1950, 1975 and 1984 with the subject site identified are attached in Tab G. The information obtained from a review of the aerial photographs is summarized below in tabular form listing the photo year, the archival photo reference number, the observations of the subject site, and the observations to the north, south, east and west of the property.



Site Location



Route 9 - Site Location Map Cassidy, BC (DEM 1994)

BC Buildings
Corporation

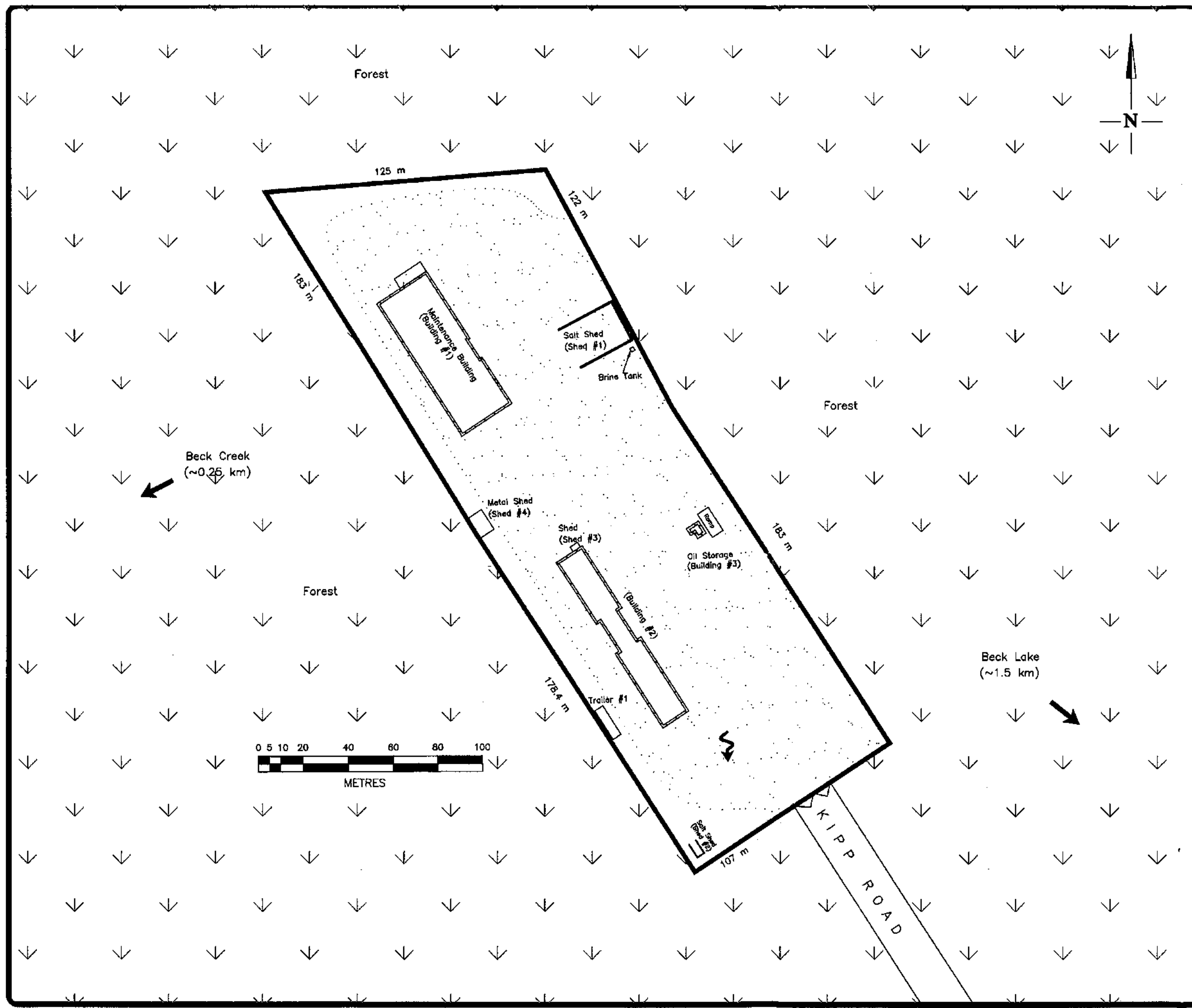
Conor Pacific
Environmental Technologies Inc.

Project # 8-2167-54

Task # 1001

FIGURE 1

216754T1001FIG1



LEGEND

- Vegetation
- Building
- Structure
- Salt Shed
- Property Line Of Site
- Paved Area
- Unpaved Area
- Interpreted Surface Drainage Direction

NOTE:

1. Base drawing provided by BC Buildings Corporation, Plan #x9006501
2. Dimensions and Site Features are approximate
3. Drawings not to be used for Engineering design or Construction purposes

TITLE

Site Location and Adjacent Land Use

PROJECT

BCBC Route 9, Cassidy Highways Yard
Stage 1 and 2 Preliminary Site Investigations

CLIENT

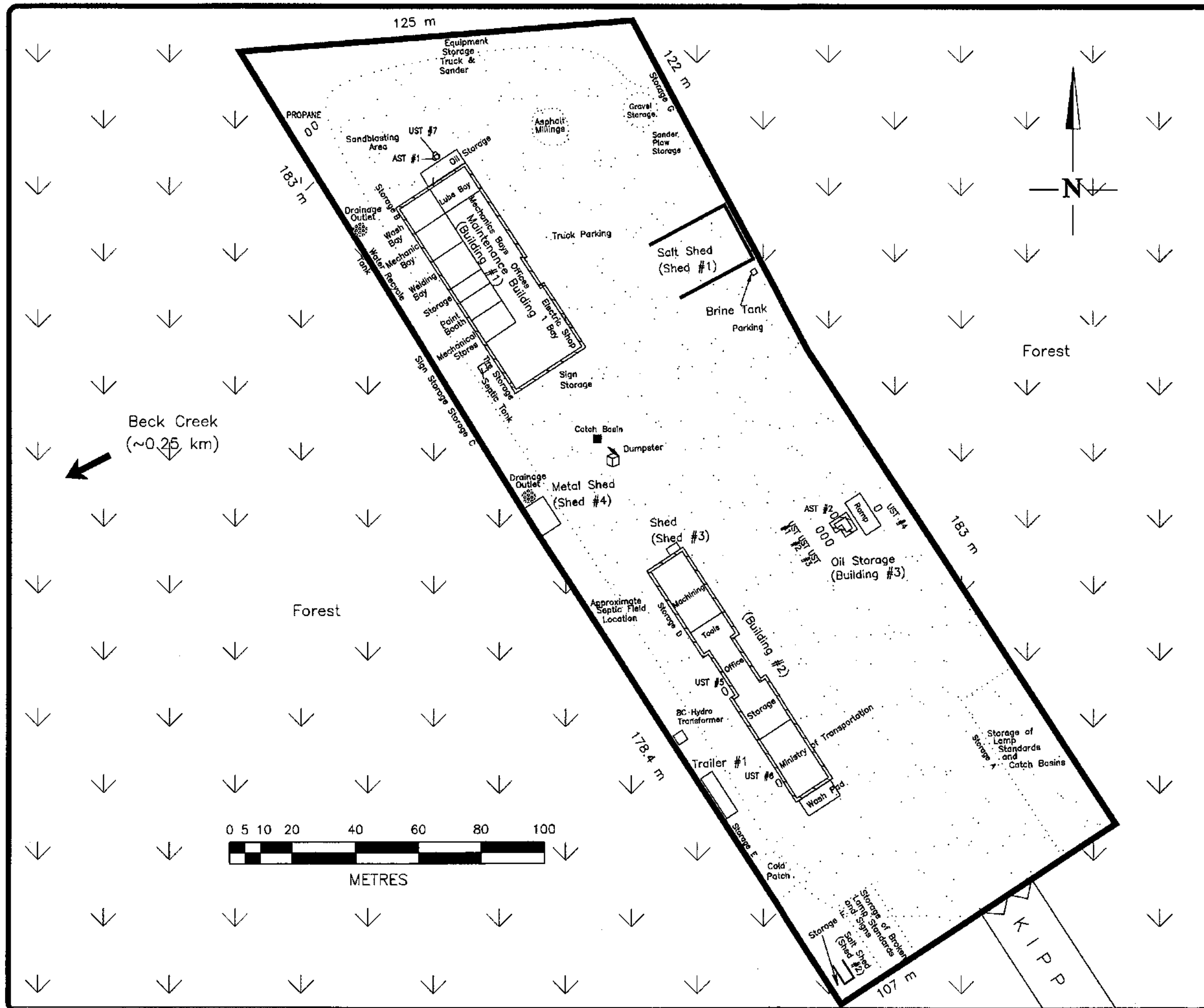
BC Buildings Corporation



Conor Pacific
Environmental Technologies Inc.

Drawing date: 08/01/99	Revised date: 19/01/99
Drawn by: SS	Checked by: PC
Project # 8-2167-54 Task # 1001	Date: 19/01/99

FIGURE 2



LEGEND

- UST Underground Storage Tank
- UST Former Underground Storage Tank
- AST Above Ground Storage Tank
- Vegetation
- Building
- Structure
- Salt Shed
- Property Line Of Site
- Paved Area
- Unpaved Area
- Stockpile or Storage Boundary

NOTE:

1. Base drawing provided by BC Buildings Corporation, Plan # x9006501
2. Dimensions and Site Features are approximate
3. Drawings not to be used for Engineering design or Construction purposes

TITLE

Site Plan

PROJECT

BCBC Route 9, Cassidy
Highways Yard
Stage 1 and 2 Preliminary Site
Investigations

CLIENT

BC Buildings
Corporation



Conor Pacific
Environmental Technologies Inc.

Drawing date: 08/01/99

Revised date: 19/01/99

Drawn by: SS

Checked by: PC

Project # 8-2167-54 Task # 1001

Date: 19/01/99

FIGURE 3

PHOTO DATE (photo reference #)	SUBJECT AREA	INTERPRETATIVE INFORMATION
1950 (BC 1052 76)	SITE	The site is forested.
1957 (BC 2086 26)	NORTH SOUTH EAST WEST	All adjoining properties are forested.
1962 (BC5047 110)		
1968 (BC 7075 212)		

PHOTO DATE (photo reference #)	SUBJECT AREA	INTERPRETATIVE INFORMATION
1975 (BC 5649 035)	SITE	The site is predominantly forested. There is one small clearing however no site features/structures are identifiable.
	NORTH SOUTH EAST WEST	All adjoining properties are forested.

PHOTO DATE (photo reference #)	SUBJECT AREA	INTERPRETATIVE INFORMATION
1984 (BC 84029 162)	SITE	There are three buildings on the site. Given their size and location they appear to be Building #2, Building #3 and Shed #1. There are some small items stored along the northern and western boundaries of the site. There is a clearing to the north which connects to the site.
	NORTH	The property is forested. There is a driveway which leads to Hwy 1.
	SOUTH	The property is forested.
	EAST	The property is forested with the exception of Kipps Rd. which leads to Hwy 1.
	WEST	The property is forested.

The site and adjoining properties were forested until at least 1968. The site was partially cleared in the 1975 aerial photograph and Building #2, Building #3 and Shed #1 are present in the 1984 aerial photograph.

The adjoining properties were predominantly forested from 1950 to 1984.

3.3.2 Title Search

A title search was conducted by West Coast Title Search, Victoria, BC. A copy of the information is included in Tab "H". The subject site is legally described as Lot 1, Section 14, Range 6, Cranberry District, Plan 40297. Previous owners of the subject site are summarized in Table 3-1.

Table 3-1 Title Search

Year From	Year To	Registered Owner
	1888	Crown
1888	1929	s.22
1929	1931	s.22 s.22 s.22
1931	1983	s.22
1983	1984	Her Majesty the Queen
1984	Present	BCBC

The information provided does not indicate that any of the previous property owners had industrial or commercial operations that could pose an environmental concern to the site.

3.3.3 Archaeological Search

The Archaeology Branch of the Ministry of Small Business, Tourism and Culture were contacted to obtain archaeological information pertaining to the subject site. No archaeological information was available.

3.3.4 Insurers' Advisory Organization

The Insurers' Advisory Organization (IAO), Vancouver, conducted a Heirs I search for the subject site. No site plans, fire insurance maps or reports were found for the site.

3.3.5 Local Fire Department

Attempts were made to contact ^{s.22}, Fire Chief at the East Wellington volunteer fire department. No response has been received at the time this report was prepared. Should any relevant information be obtained, BCBC will be forwarded that information at that time.

3.3.6 BCBC Files

BCBC files at the Glendale and Nanaimo offices were reviewed. A copy of pertinent information is included in Tab "I" and discussed below.

3.3.6.1 Site Plans

A site plan dated January 1976 was obtained for the site. Pertinent items identified on the map are as follows:

- a) an oil storage building (Building #3) with an associated pump island and three USTs;
- b) a building (Building #2);
- c) a furnace oil UST located on the west side of Building #2; and
- d) a waste oil UST located on the west side of Building #2;

A site plan dated January 1980 shows the following on the site:

- a) a building (Building #2);
- b) an oil storage building (Building #3);
- c) a grease ramp located on the east side of the oil storage building;
- d) gas pumps on the west side of the oil storage building;
- e) a septic field at the northwest corner;
- f) a BC Hydro Transformer; and
- g) a washpad at the south end of Building #2.

A site plan dated 1988 was obtained. The plan shows a proposed building (Building #1) indicating that Building #1 was built approximately 10 years after the others. Connected to the building is a concrete water reservoir (water recycle tank) that provides water to a wash bay.

3.3.6.2 Tank Testing Certificates

A Certificate of Tightness, dated March 21, 1992 from Tanknology Corporation International was obtained. The certificate was for a 13,600 L gasoline UST (former UST #1) and a 13,600 L diesel UST (former UST #2). Both tanks passed the tightness testing. The line for the gasoline UST also passed testing. The line for the diesel UST was not tested. An abandoned UST (former UST #3) is identified adjacent to the above noted USTs.

A Certificate of Tightness, dated August 6, 1996 from Tanknology Corporation International was obtained. The certificate was for the following:

- a) 9092 L diesel (former UST #2), tank passed, lines passed;
- b) 9092 L gasoline (former UST #1), tank passed, lines failed;
- c) 9092 L diesel (former UST #3), tank passed, lines abandoned; and
- d) 9000 L fuel oil (UST #5), tank passed.

The report also identified a waste oil tank on-site (UST #6). It could not be tested as it was full of water.

Although the two tanks (UST #1 and UST #2) identified in the 1992 report are a different size than those identified in 1996, they are assumed to be the same tanks based on the maps attached to these reports.

3.3.6.3 Previous Environmental Reports

A report titled Highways Yardsite Inspection was completed by Dan Rettmer of BCBC in November 1988. The site was identified as being fully paved, with some grass lawns at back of buildings. There was mention of a groundwater well on site (location not known) and a septic field. An oil fired boiler is identified as being present for the main (Building #2).

A Phase 1 Environmental Audit dated March 27, 1991 was completed by Dan Rettmer of BCBC. The report identified that BCBC had occupied the site for approximately 20 years. The surrounding properties are privately owned and are brush covered. Wastes generated on site included waste oil which was recycled and antifreeze which was stored. Aboveground and underground storage tanks are identified on site but no additional information is provided.

A letter from Bruce Campbell of Master Rooter to Kevin Sutcliffe at BCBC, dated April 1995 was obtained. The letter identified two sumps at the wash rack, one with holes and one with a solid plate. The sump was reportedly full of oil. Someone had dumped oil into the sump, however no oil had reached the outflow.

An e-mail from Daryl Amos of BCBC to Dan Rettmer also of BCBC dated March 1997 identified that mercury vapour lamps are located at the Cassidy Yard in the high bays and outside.

A letter to file dated March 21, 1997 by Dan Rettmer of BCBC identified that one 3,000 gal gas UST and two 3,000 gal diesel USTs (former USTs #1, #2 and #3) were removed and that the excavation appeared clean. Attempts were made to remove a 3000 gal waste oil tank (UST #6). However, the tank could not be removed as it was located seven feet deep and was close to the building foundation. The oil was removed from the tank and it was filled with sand. There was no evidence of contamination. A waste oil UST adjacent to the grease ramp was removed (UST #4). The excavation had no signs of contamination.

An environmental site assessment of the salt storage facility was conducted by Enkon Environmental of Surrey in August 1997. The report identified that the salt storage facility (Shed #1) was located on a paved surface. Drainage from within the facility was directed towards a catchbasin. At the time of the report, the catchbasin was being connected to a brine tank. It was intended that the brine tank would be emptied as required. The following conclusions and recommendations were made with respect to the salt storage:

- a) The interior of the brine tank should be treated to prevent corrosion.
- b) The area in front of the salt shed should be paved to direct surface water towards a stormwater drain located to the southeast. The outflow of the drain should be determined. The assessment also noted that information from the DFO and MOELP indicates there are no fish-bearing streams in the area.
- c) Visual inspection of the catchbasin is required to ensure the tank does not overfill.

A letter from Jerry Moreau, Mainroad Mid-Island, dated August 12, 1997 was attached to the environmental site assessment of the salt storage facility. It stated that they would pave the area in front of the salt dome (Shed #1), they would treat the inside of the brine tank and that salt spillage would be cleaned up immediately. It also stated that the storm system outfall drained to a wooded area south of site and that there were no fish-bearing streams known in the area.

3.4 MINISTRY OF ENVIRONMENT FILES

3.4.1 BC On-Line

The BC Environment Site Registry was searched for records pertaining to properties within a 0.5 kilometer radius of the subject site. No records were found.

3.4.2 Water Well Records

The Ministry of Environment, Lands and Parks Groundwater Database System was searched for water well information in the area of the subject site. The site is located in the area identified as BCGS# 092G011122 in the database system, which has an area of 3 km². There are seven groundwater wells registered within the 3 km² area of the site.

3.5 SUMMARY OF HISTORICAL INFORMATION

The site was forested until at least 1968. By 1975 the site was cleared and by 1976 an office and storage building (Building #2), an oil storage building (Building #3) and a salt shed (Shed #1) were present on the site. The maintenance building (Building #1) was constructed around 1988 and an additional salt shed (Shed #2) with a brine tank was constructed in 1997.

The following underground storage tanks have been identified on the site:

- a) One gas (former UST #3) and two diesel USTs (former UST #1 and #2). These were removed in 1997 with no evidence of contamination.
- b) A furnace oil UST at the west side of Building #2 (UST #5).
- c) A waste oil UST at the west side of Building #2 (UST #6). This tank was emptied and filled with sand in 1997.
- d) A waste oil UST by the grease ramp (former UST #4). This was removed in 1997 with no evidence of contamination.

In addition, the following items of potential concern are present on the site:

- a) A washpad at south end of Building #2 with two sumps, dumping of oil in the sump was identified although it did not reach the outflow;
- b) grease ramp next to Building #3;
- c) BC Hydro Transformer;
- d) mercury lamps on-site;
- e) storage of waste oil and antifreeze; and
- f) brine tank discharge.

The site is fully paved with some grass at the back of the buildings. The site has its own groundwater well and septic field. There are additional groundwater wells registered within the area of the site, (Section 3.4.2, above).

4.0 SITE RECONNAISSANCE

The site visit was conducted by Cindy Smith, Environmental Scientist, of Conor Pacific, Duane Lukyn, Operations Supervisor of BCBC, and s.22, Mechanic of Mainroad, on September 15, 1998. Selected photographs taken during the site visit are included in Tab F. Conditions observed at the subject site are depicted in Figure 3. The site visit included:

- a) a site walkover to identify areas of concern, adjoining landuses and site physiography;
- b) interior inspection of all buildings; and
- c) interviewing of BCBC and Mainroad personnel conducting the site visit.

Additional information was obtained by telephone from Mr. Pete Waycott, Road Manager for Mainroad.

4.1 SITE PHYSIOGRAPHY

The site is predominantly paved with the exception of some areas along the edges of the site. There was no surface water observed on the site. It appeared basically flat and sloped gently to the south. The site is within the Beck Creek sub-watershed.

4.2 ADJACENT LAND USE

Adjacent land use and potential environmental concerns associated with that land use are identified in Table 4-1.

Table 4-1 Adjoining Land Use and Environmental Concerns

Direction	Land Use	Environmental Concern
North	Forest	None observed
South	Highway, forest and concrete company	None observed
East	Forest	None observed
West	Forest, E&N Railway	None observed

4.3 BUILDINGS AND OPERATIONS

Located on the site is a maintenance building (Building #1), an office and storage building (Building #2), an oil storage building (Building #3), two salt sheds (Shed #1 and #2), a cylinder shed (Shed #3), a metal shed (Shed #4), and a trailer (Trailer #1).

The maintenance building (Building #1) was used by Mainroad for repairs and maintenance of equipment, storage of electrical equipment and as an office area. The building included an oil storage room, a lube bay, a wash bay, a mechanic bay, a welding bay, a paint booth, mechanical stores room, mechanic bays and an electric shop. The building was constructed with concrete blocks and had a concrete floor.

Building #2 was predominantly occupied by VMAC for the machining and storage of air compressors. The south end of the build was used by the MOTH for dry storage of electrical fixtures. The building was constructed of wood and had a concrete floor.

The oil storage building (Building #3) was constructed of wood and had a concrete floor. It was over 30 years old and was used for the storage of oils and lubes (see photograph 1, Tab F).

Shed #1 was located along the eastern edge of the site. There is a brine tank associated with the shed.

Shed #2 was located at the southwest corner of the site. ^{s.22} and ^{s.22} were unsure if the basin observed was a brine tank.

There was also a grease ramp located east of the oil storage building (Building #3) (see photograph 2, Tab F).

There was a groundwater well located on the site which was used for the washrooms (location not known). Bottled water was used as a drinking water source.

4.3.1 Permits (Federal, Provincial, and Municipal)

According to Mr. Lukyn of BCBC and Mr. Waycott of Mainroad, they were not aware of any permits issued to this site.

4.3.2 Wastewater and Stormwater Management

Wastewater from Building #2 emptied into a septic tank and then into a septic field located east of the building.

Wastewater from Building #1 emptied into a septic tank located on the west side of the building and then into the same septic field as Building #2.

There was a water tank located near the northwest end of the site which recycled water for the washbay. Excess water drained onto the adjoining property to the west.

There was no engineered stormwater drainage on the site. There were perimeter drains outside of Building #2, however they did not appear to drain anywhere. It was reported that water collected in the drains and then evaporated.

4.3.3 Waste Management

According to Mr. Waycott of Mainroad, the following waste management activities are conducted:

- a) waste oil is removed by Ballard Petroleum on an as required basis;
- b) garbage collected during highway maintenance activities are stored in metal bins on-site and is removed by Waste Management Co.;
- c) oil filters are removed by Laidlaw Environmental; and
- d) grit from the perimeter drains for Building #1 and the oil/water separator in the wash bay is removed by A-1 Septic.

4.3.4 Trenches, Sumps, and Separators

Mr. Lukyn informed Conor Pacific that there was an oil/water separator associated with the wash pad at the south end of Building #2 and an oil/water separator near the wash bay in Building #1. Both of the separators discharged onto the adjoining property to the west.

There were perimeter drains located inside Building #1 which also entered into the oil/water separator associated with the wash bay.

4.3.5 Underground Storage Tanks

Former and current USTs located on the site have been identified in Table 4-2. The tank volumes reported in the tank removal reports were different from those listed in the tank testing reports (Section 3.3.6.5).

Table 4-2 Underground Storage Tanks

Description	Former UST#1	Former UST#2	Former UST#3	Former UST#4
Size	13,500 L (3000 gal)	13,500 L (3000 gal)	13,500 L (3000 gal)	4,500 L (1000 gal)
Contents	Diesel	Diesel	Gasoline	Waste Oil
Tank location	West side of Building #3	West side of Building #3	West side of Building #3	By grease ramp
Age of tank	Removed March 21, 1997	Removed March 21, 1997	Removed March 21, 1997	Removed March 21, 1997
Leak detection/ Corrosion protection	Not known	Not known	Not known	Not known
Staining/leaks	Excavation reported as clean	Excavation reported as clean	Excavation reported as clean	Excavation reported as clean
Containment	Not known	Not known	Not known	Not known

DESCRIPTION	UST#5	UST#6	UST#7
Size	9000L	Unknown	Unknown
Contents	Heating oil	Waste oil	Waste oil
Tank location	West side of Building #2	West side of Building #2	Under waste oil AST at north end of Building #1
Age of tank	Unknown	Emptied and filled in with sand in 1997	Unknown – not used for 2 years
Leak detection/ corrosion protection	Not known	Not known	Not known
Staining/leaks	Passed tank testing	Excavation reported as clean	Unknown
Containment	Not known	Not known	Not known

4.3.6 Aboveground Storage Tanks

Aboveground storage tanks observed during the site inspection have been identified in Table 4-3.

Staining was observed by AST #1 which appeared to be the result of spills while transferring oil into the tank (see photograph 3, Tab F).

There were two propane tanks located at the northwest corner of the site.

Table 4-3 Aboveground Storage Tanks

Description	AST#1	AST#2
Size	1,500 L (330 gal)	13,500 L (3,000 gal)
Contents	Waste oil	Diesel
Tank location	North end of Building #1	North side of Building #3
Age of tank	3 years	2 years
Leak detection/ Corrosion protection	No	Vacuum monitor
Staining/leaks	Yes	Small amount near pump
Containment	Secondary	Secondary

4.3.7 Materials Storage

There are a number of other substances stored within the buildings and yard which represent a potential concern if not handled and stored in an appropriate manner. These have been identified in Table 4-4.

Table 4-4 Materials of Concern

Location	Materials of Concern
Interior – Building #1	<p>Electric Shop:</p> <ul style="list-style-type: none"> • 2 gal gas • 20 L pail of oil <p>Mechanical Stores:</p> <ul style="list-style-type: none"> • 13 - 20 L containers of windshield concentrate • 240 - 4 L antifreeze • 20 L brake fluid • seven 4 L pails of paint • 20 l lubricant • six 4 L thinner • 20 cans of spray paint • 25 - 80 lb bags of blasting grit • 10 new batteries • 15 - 1 L oil • 60 - 400 g grease • 12 - 16 oz diesel coolant <p>Wash bay:</p> <ul style="list-style-type: none"> • drum of unknown material <p>Lube Bay:</p> <ul style="list-style-type: none"> • drum waste antifreeze • two drums waste oil filters • 100 L gear oil • drum window washer fluid

Location	Materials of Concern
Interior – Building #1	<p>Oil Storage:</p> <ul style="list-style-type: none"> • drums of oils and fluids used in lube bay • 25 pails of oil <p>Storage Bay:</p> <ul style="list-style-type: none"> • 10 containers of fuel • Four 50 kg bags of cement • 4 L paint • 4 L solvent <p>Welding Bay:</p> <ul style="list-style-type: none"> • cylinders of carbon dioxide, oxygen, argon and propane. <p>Mechanics' Bays:</p> <ul style="list-style-type: none"> • batteries • 20 spray cans of lubes • drum with solvent washing system <p>Paint Booth- Flammable Cabinets:</p> <ul style="list-style-type: none"> • 20 - 4 L paint • 14 - 4 L thinners • 12 cans of spray paint • 20 L methanol • four 20 L thinner <p>Paint Booth Area:</p> <ul style="list-style-type: none"> • six 20 L paint • six 4 L thinner • four 4 L paint • waste drum of paint and thinner
Interior – Building #2	<ul style="list-style-type: none"> • small quantities of paints, thinner, cleaners and oils • two 20 L pails of sealer • two 70 lb tanks of polyair foam (no CFCs) • 50 - 4 L compressor oil • nine 20 L pails of metal working fluid • Oxygen and acetylene cylinders
Interior – Building #3	<ul style="list-style-type: none"> • 205 L drum of transmission fluid • five drums of oil • drum of windshield antifreeze • 20 L pail of oil
Exterior – by Building #3	<ul style="list-style-type: none"> • one drum coating • one drum oil • one drum unknown contents • 100 gal drum of antifreeze • propane tank

Location	Materials of Concern
Interior Shed #3	<ul style="list-style-type: none"> • four cylinders of oxygen • six cylinders of argon and carbon dioxide • five cylinders of argon • two cylinders of acetylene • one propane cylinder
Exterior Storage A (see photograph 4, Tab F)	<ul style="list-style-type: none"> • six 205L drums of paint thinner on flats (staining and odour noted) • 120 - 205 L drums highway paint • one 205 L drum of paint scum • one 205 L drum unknown • approximately 800 50 lb bags of highway spheres • 50 - empty paint drums
Exterior Storage B (north end of building #1)	<ul style="list-style-type: none"> • batteries on a wooden flat • open drum with oil filters and oil • ten pails of paint (owned by MOTH) • hydraulic cylinders • items stored on a concrete pad, staining observed
Exterior Storage C	<ul style="list-style-type: none"> • 12 - 100 lb bags of crack sealer • five drums of used paint in thinner (not secure) • five pails of used paint in thinner (not secure)
Exterior Storage D (see photograph 5, Tab F)	<ul style="list-style-type: none"> • one drum of grindings • seven drums of oil (a lot of staining) • ten empty drums • three pails of waste oil (one open)
Exterior Storage E	<ul style="list-style-type: none"> • drum of unknown material
Exterior Storage F	<ul style="list-style-type: none"> • drum of unknown material • seven old empty drums • drum of blasting grit
North end of site	<ul style="list-style-type: none"> • millings • sandblasting grit

The interior storage of compatible materials represents a minimal concern as any spills or leaks that may occur would likely be contained within the building. There were perimeter drains in Building #1. These emptied to an oil/water separator and then were discharged off-site. The perimeter drains in Building #2 did not appear to drain anywhere and contamination of the site due to a spill is possible. No drains were present in Building #3.

The exterior storage of drums and pails represents a potential concern as they were not stored within contained areas and spills or leaks may result in contamination of the site. At some locations (for example Storage A) the drums were not protected from vehicular impact, and at other locations (for example Storage B), the drums were not securely sealed.

4.3.8 Spill Control and Emergency Response

A spill clean-up kit, a book of WHMIS information, and fire extinguishers were observed on the site. There was no spill response plan that was specific for the site. Spill cleanup instructions were included with the clean-up kit.

4.3.9 Exterior Yard Conditions

Exterior yard conditions were observed to be moderate to poor. Items stored in the yard include:

- a) nuts and bolts in pails, a sander and metal culverts at storage Area E; eight old motors, one propane tank next to the BC Hydro transformer;
- b) broken light standard and signs at south end of site; and
- c) scrap metal, old bay lifts and old exhaust fans (identified as Storage G in Figure 3, see Photograph 6, Tab F).

Staining was observed on the asphalt by the grease ramp, by the waste oil AST (AST #1), on the concrete pad by the diesel AST (AST #2), by the dumpster and at the exterior storage areas A, B, D and G. Dried paint on the ground was observed at storage area F.

4.3.10 Dumps and Fill Materials

According to Mr. Lukyn of BCBC there were previous dumpings of road sweepings at the south side of the parking lot (at the south end). The sweepings have since been removed and taken to the local landfill. There was no additional dumping reported at the site. Sandblasting grit was present on the paved area northwest of AST #1.

During the construction of the site, the ground surface was levelled with gravel brought on site from an unknown source.

4.3.11 Other Substances

Polychlorinated biphenyls and asbestos were exempted from this study as per the RFP.

Mercury vapour lamps were identified during the historical review. ^{s.22} stated that the lamps may have been changed to high pressure sodium.

5.0 ITEMS OF CONCERN AND RECOMMENDATIONS

Items of potential concern identified in the Stage 1 PSI are identified in Table 5-1.

Table 5-1 Items of Potential Concern

	ITEM #	ITEM OF CONCERN	DESCRIPTION	POTENTIAL CONTAMINANT	RECOMMENDATION
OPERATIONS	1	Shed #1	A salt shed is located on the east side of the property. The shed has an associated brine tank. If the brine tank is ineffective a potential exists for salt to impact groundwater wells.	Salt	Drill borehole in area. MW installed if ground water encountered within 40ft. Follow environmental housekeeping and spill response procedures.
	2	Shed #2	A salt shed is located at the southwest corner of the site. There is a tank in this area which may be a brine tank. Potential exists for salt to impact groundwater wells.	Salt	Drill borehole in area. MW installed if groundwater encountered within 40ft. Follow environmental housekeeping and spill response procedures.
	3	Oil/water separator, Recycling Tank and UST # 7	There is an oil water separator in the wash bay which connects to a water recycle tank. Excess water is drained off site. Perimeter drains present in the maintenance bays drain into oil/water separator.	Hydrocarbons, metals	Borehole to be hand augered in this area. Follow environmental housekeeping and spill response procedures. Investigate off site drainage areas.
	4	Oil Shed, grease ramp, former USTs #1, 2, 3 and 4.	The location of former waste oil, diesel and gas USTs as well as a current grease ramp and oil shed in this area represents a potential concern.	Hydrocarbons	Drill boreholes in the area of the former gasoline/diesel USTs, the area of the former waste oil UST, and the grease ramp. Follow environmental housekeeping and spill response procedures.
	5	Drums and associated staining behind machining area of VMAC Storage D	Staining was observed in the area of oil drums and pails behind the VMAC.	Hydrocarbons	Collect surface sample or shallow borehole to be drilled in the area of the staining. Follow environmental housekeeping and spill response procedures for all material storage areas.

Table 5-1 Items of Potential Concern (Cont'd)

	ITEM #	ITEM OF CONCERN	DESCRIPTION	POTENTIAL CONTAMINANT	RECOMMENDATION
	6	Storage of scrap and waste oil at north end of maintenance building. Storage B	Storage of drums with oil filters, batteries and various scrap metal items has resulted in some staining in this area. Although the area has a concrete pad, years of such spills may result in soil contamination along the edge of the pad.	Hydrocarbons	Collect surface sample or shallow borehole to be drilled adjacent to concrete pad. Follow environmental housekeeping and spill response procedures.
	7	Heating Oil UST for VMAC building	A heating oil UST is located on the west side of the VMAC building just outside of the boiler room. It is adjacent to a septic tank.	Hydrocarbons	Borehole to be drilled in the area of the heating oil UST to confirm the presence/absence of contamination – subject to utility locates. Follow environmental housekeeping and spill response procedures.
	8	Sandblasting Area	Sandblasting is conducted at the north end of the site on a paved area.	Metals	No sampling was conducted for the Stage 2 PSI. Follow environmental housekeeping and spill response procedures.
	9	Waste oil UST located at southwest corner of VMAC building (UST #5)	This waste oil tank has been emptied and filled with sand. It could not be removed due to the close proximity to the building.	Hydrocarbons	Borehole to be drilled in the area of the waste oil UST to confirm the presence/absence of contamination. Follow environmental housekeeping and spill response procedures.

Other exterior storage of drums (item #10) and other material storage was conducted across the site. Operations in these areas should follow environmental housekeeping and spill response procedures. These areas should be investigated to assess contaminant levels in the soil and groundwater.

As well, potential mercury lamps should be properly handled and disposed.

6.0 SCOPE OF WORK (STAGE 2)

Based on the findings of the Stage 1 PSI, Conor Pacific prepared a scope of work to carry out a Stage 2 PSI at the subject property. A drilling and surface soil sampling program was proposed to BCBC and North West Environmental Group Ltd. (North West) to address the items of concern identified in the Stage 1. The approved scope of work included comments provided by North West. The approved scope of work has been summarized below.

Table 6-1 Items of Potential Concern and Stage 2 PSI Scope of Work

	ITEM #	ITEM OF CONCERN	DESCRIPTION	CONTAMINANT OF CONCERN	STAGE 2 SCOPE OF WORK (AS APPROVED BY NORTH WEST)
OPERATIONS	1	Shed #1	A salt shed is located on the east side of the property. The shed has an associated brine tank.	Salt	Drill borehole in the area. MW installed if groundwater encountered within 40 ft.
	2	Shed #2	A salt shed is located at the southwest corner of the site. There is a tank in this area which may be a brine tank.	Salt	Drill borehole in the area. MW installed if groundwater encountered within 40ft.
	3	Oil/water Separator, Recycling Tank and UST #7	There is an oil water separator in the wash bay which connects to a water recycle tank. Excess water is drained off site. Perimeter drains present in the maintenance bays drain into oil/water separator.	Hydrocarbons, metals	Borehole to be hand-augered in this area
	4	Oil shed, grease ramp, former waste oil UST, three former gas/diesel USTs	The location of former waste oil, diesel and gas USTs as well as a current grease ramp and oil shed in this area represents a potential concern.	Hydrocarbons	Boreholes in the area of the former gasoline/diesel USTs, the area of the former waste oil UST, and the grease ramp area

Table 6-1 Items of Potential Concern and Stage 2 PSI Scope of Work (cont'd)

ITEM #	ITEM OF CONCERN	DESCRIPTION	CONTAMINANT OF CONCERN	STAGE 2 SCOPE OF WORK (AS APPROVED BY NORTH WEST)
5	Drums and associated staining behind machining area of VMAC	Staining was observed in the area of oil drums and pails behind the VMAC.	Hydrocarbons, metals	Collect surface sample or shallow borehole to be drilled in the area of the staining
6	Storage of scrap and waste oil at north end of maintenance building	Storage of drums with oil filters, batteries and various scrap metal items has resulted in some staining in this area. Although the area has a concrete pad, years of such spills may result in soil contamination along the edge of the pad.	Hydrocarbons, metals	Collect surface sample or shallow borehole to be drilled adjacent to concrete pad
7	Heating Oil UST for VMAC building	A heating oil UST is used to heat the VMAC building. It is located on the west side of the VMAC building just outside of the boiler room. Note that it is adjacent to a septic tank.	Hydrocarbons	Borehole to be drilled in the area of the heating oil UST to confirm the presence/absence of contamination – subject to utility locates
8	Sandblasting Area	Sandblasting is conducted at the north end of the site. Given that this area is paved no additional investigations are required at this time.	Metals	No sampling was conducted for the Stage 2 PSI
9	Waste oil UST located at southwest corner of VMAC building	This waste oil tank has been emptied and filled with sand. It could not be removed due to the close proximity to the building.	Hydrocarbons	Borehole to be drilled in the area of the waste oil UST to confirm the presence/absence of contamination

This report ("Report") was prepared by Conor Pacific Environmental Technologies (Conor Pacific), for the sole benefit and exclusive use of British Columbia Buildings Corporation (BCBC). The material in it reflects Conor Pacific's best judgement in light of the information available to it at the time of preparing the Report. Any use which a third party makes of this Report, or any reliance on or decisions made based on it, are the responsibility of such third parties. Conor Pacific accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on this Report.

7.0 FIELD METHODOLOGIES

7.1 DRILLING PROGRAM

The drilling program was completed using a track-mounted auger rig. The auger rig was supplied by Beck Drilling of Nanaimo, BC. Beck supplied a drill crew, a support truck and steam cleaner. Boreholes were drilled using a solid stem auger flight. The drill flights were steam cleaned between boreholes. Cleaning was carried out on the asphalt area on the site, within a drum which was removed from the site by the driller and disposed by them.

During drilling operations, soil layers were classified and selected samples were collected from the extracted core. The boreholes were logged with respect to geologic properties including: colour, moisture, density, grain size, soil type, and visual and olfactory evidence of contamination.

Drill cuttings were replaced in the boreholes as backfill upon completion of drilling.

Groundwater was not encountered during the drilling program, and thus no groundwater monitoring wells were installed. Borehole logs have been provided in Tab E.

7.2 SOIL SAMPLING

Soil samples were collected directly from the auger flight during the drilling program. Descriptions of the soil horizon were accomplished by noting the depth at which the auger flight was drilled. Samples were collected using a stainless steel trowel. Soil was transferred directly into amber glass jars provided by the project laboratory. Soil samples were not collected which were in direct contact with the auger flights.

Trowels and soil sampling equipment were washed between collection of samples with distilled water and Alconox soap. The auger flights were steam cleaned in between boreholes. Steam cleaning of augers occurred on the asphalt area within driller supplied drums.

Combustible soil vapour (CSV) concentrations were measured using an organic vapour analyzer (OVA) calibrated to a hexane standard. Soil samples collected for soil vapour screening were placed, with a minimum of handling and atmospheric exposure, in a 125 mL clean amber laboratory glass jar with an aluminum foil cover. These glass jars were half to two-thirds filled

then sealed tightly with a nominal headspace. Soil samples in the jars were then gently agitated to facilitate the break-up of any lumps and then allowed to sit at approximately 15°C for approximately 10 minutes prior to analysis.

CSV concentrations were measured by inserting the probe of an OVA through the aluminum foil cover into the headspace of the glass jar. The stabilized CSV concentrations are reported on the borehole logs contained in Tab E.

Sample jars were identified using labels supplied by Philip Analytical Services (Philip), of Burnaby, BC, noting the date and sample number. The sample jars were then stored in coolers at approximately 4°C until delivery to the laboratory.

7.3 PROJECT LABORATORY

Laboratory analyses of soil and groundwater samples were carried out by Philip, who are accredited by the Standards Council of Canada (SCC) and certified by the Canadian Association for Environmental Analytical Laboratories (CAEAL) for performance standards. Philip is also accredited by CAEAL for all parameters of concern for this project, and is also registered with the BCMELP.

The Philip QA/QC Officer completed monitoring of internal/surrogate standards, replicates and duplicates, method blanks and method spikes, as part of standard operating procedures. All Philip laboratory reports were signed by Project Manager Jack Wilson confirming that all internal QA/QC protocols had been met.

8.0 REGULATORY CONTEXT

8.1 BC CONTAMINATED SITES REGULATION

The BCMELP has established standards for evaluating soil and groundwater contamination and subsequent remediation requirements in the BC Contaminated Sites Regulation 375/96 (CSR). The CSR was promulgated on April 1, 1997, and provides legislated steps to investigate, assess, and remediate contaminated sites in British Columbia.

Soil standards are divided into five categories based on the applicable land use at a site. Land use types are:

- | | |
|----------------------|--------------------|
| a) Agricultural (AL) | d) Commercial (CL) |
| b) Urban Park (PL) | e) Industrial (IL) |
| c) Residential (RL) | |

Sites are considered contaminated if soil parameters are found to be equal to or greater than the standard for the specific land use.

The CSR consists of both Generic and Matrix Numerical Standards. The Generic Standards consist of a numeric concentration of a given contaminant in soil or groundwater for a specific land use. The Matrix Numerical Standards take into account proximity to surface waters, human health and toxicity to invertebrates and plants. Site Specific Numerical Standards may be generated on a site-by-site basis, based on BCMELP protocols.

For the Cassidy works yards, standards for commercial land use (CL) have been applied to the soil data. Generic and Matrix soil standards were applied to the Cassidy site. Groundwater flow to surface water used by aquatic life and toxicity to soil invertebrates and plants are applicable at this site. The lowest applicable standard has been used to compare analytical data.

The CSR also contains Generic Numerical Standards for water. Water standards are divided into four categories based on the applicable water use at a site. Water use types are:

- a) Aquatic Life (AW)
- b) Irrigation Watering (IW)
- c) Livestock Watering (LW)
- d) Drinking Water (DW)

Beck Creek is located approximately 250 metres to the southwest of the site, Beck Lake is located about 1.5km to the south, and Nanaimo Harbour is located approximately 3.5 km to the north (see Figure 1). There is a water well on site which is not currently used as a potable water source. There were no groundwater samples taken since there were no monitoring wells installed at the subject site.

8.2 SPECIAL WASTE REGULATION

The BC Special Waste Regulation 63/88 (SWR), of the BC Waste Management Act, is the province's regulation describing the legal procedures for the identification, handling, storage, transportation, and disposal of Special Wastes. In association with the SWR, the "Special Waste Regulation Guide" is available, which explains how to follow the BC Special Waste management laws and regulations, and describes BC's Special Waste Management Programs.

The BC Special Waste Regulation classifies substances as Special Waste in conjunction with the Transportation of Dangerous Goods Act (TDG). In general, a soil is considered to be a Special Waste if any of the petroleum hydrocarbons and/or organic compounds contained within it have a Class 9.2 classification, according to the TDG Regulations, and is present in levels greater than 100 ppm by weight. Leachability of metals and some hydrocarbons above the Special Waste Extraction Standards set for specific metals may classify a soil as Special Waste. The Special Waste Extraction Procedure (SWEP) test outlined in the Regulation assesses contaminant leachability. Section 13 of the BC Contaminated Sites Regulation (CSR), described below, clarifies the conflict between the Special Waste Regulation and the CSR. If a site contains a Special Waste as per classification in the TDG Act, but is not a Special Waste for any other reason (e.g. not leachable), and it has a numerical/matrix standard in the CSR, it is not considered a Special Waste if the concentration is less than ten times the numeric commercial soil standard (Schedule 4, CSR) or the lowest applicable matrix concentration (Schedule 5, CSR).

The Regulation also establishes storage facility siting and operational requirements, lists prohibited management practices and stipulates the registration, handling and transportation requirements for Special Waste.

8.3 CCME INTERIM CANADIAN ENVIRONMENTAL QUALITY CRITERIA

The Interim Canadian Environmental Quality Criteria for Contaminated Sites (1991) were prepared by the Canadian Council of Ministers of the Environment (CCME) to provide interim quality criteria to promote consistency in the assessment and remediation of contaminated sites in Canada. The soil quality guidelines in this document were partially superceded in 1997 by the CCME Recommended Canadian Soil Quality Guidelines.

The CCME released a set of Canadian soil quality guidelines in March 1997, the Recommended Canadian Soil Quality Guidelines, which replaced parts of the Interim CCME guidelines (discussed above in Section 4.4). The new guidelines were derived specifically for the protection of ecological receptors in the environment or for the protection of human health associated with four land uses (agricultural, residential/park land, commercial, and industrial). Standards in the 1991 Interim document which were not updated or revised in the 1997 document remain in effect for the purposes of this report. The unrevised standards include: antimony, barium, beryllium, cobalt, molybdenum, nickel, silver, selenium and tin.

The BC CSR does not have a chloride standard for soil. For the purpose of this report, the Interim Canadian Environmental Quality Criteria for Contaminated Sites (1991) has been used to address the impact of salt on the soil in the vicinity of the works yard. The CCME has soil conductivity and sodium adsorption ratio (SAR) criteria. The SAR and conductivity criteria are interim assessment criteria, largely based on ambient or background concentrations in Canada. In addition, Conor Pacific has obtained some background or "typical" sodium and chloride concentration, and specific conductivity levels for British Columbia. This was obtained from BCMELP for comparison of BCBC sites to the "typical" concentrations in the province. Most of the data collected was for Vancouver Island (BCMELP, 1998). Some sodium data was also available for the Skeena region in Northern BC.

9.0 FIELD PROGRAM

The drilling program consisted of drilling nine shallow boreholes in the overburden. None of boreholes were installed with groundwater monitoring wells since no significant water was encountered in the soil matrix during the drilling program. The scope of work followed the "Stage 2 Recommendations" section of the "Site Report Exception Tracking", submitted to North West and approved upon inclusion of North West's recommendations (October 20, 1998). The Stage 2 Scope of Work was previously outlined in Section 6.0.

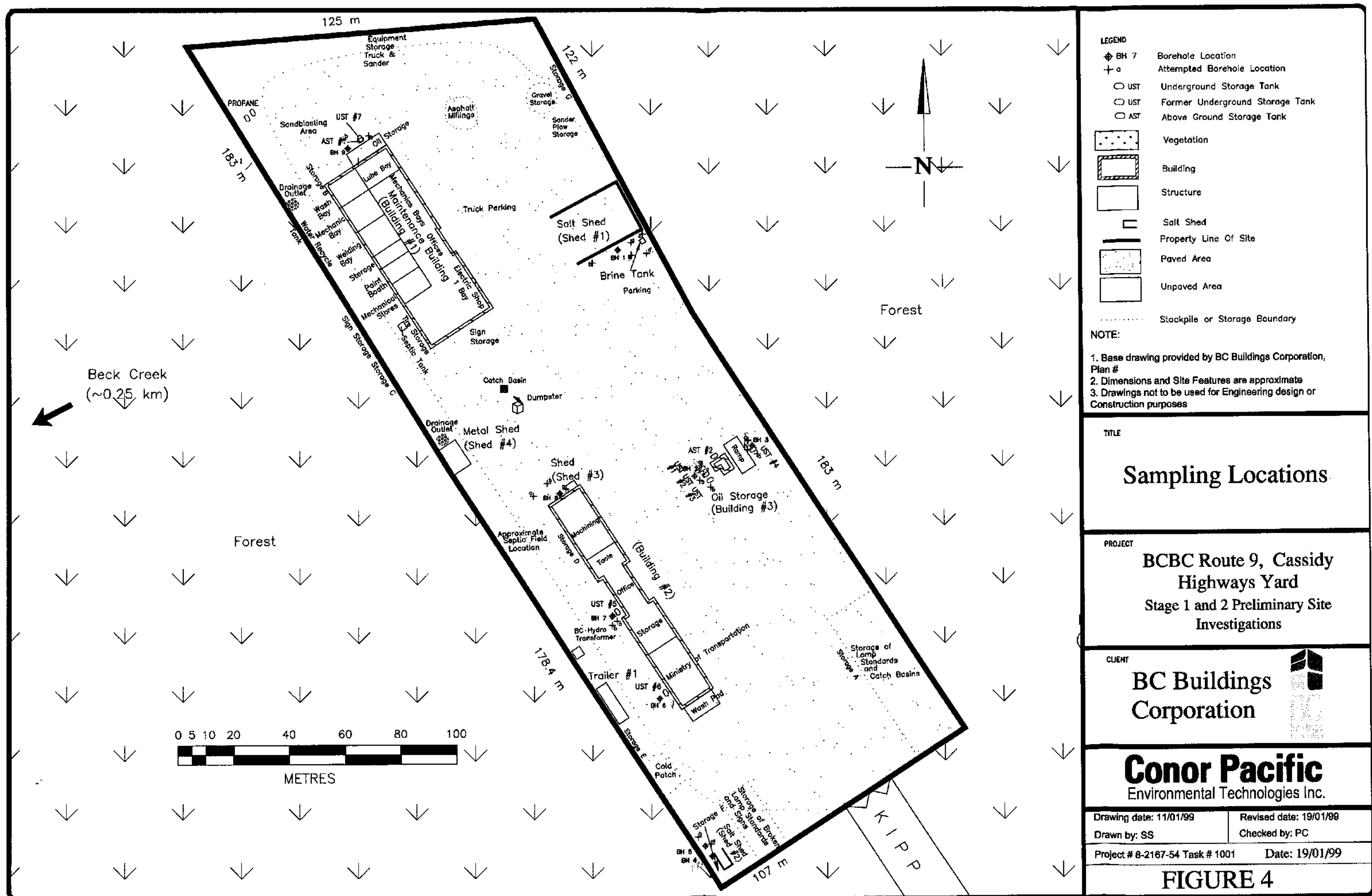
Mr. Greg Quandt, of Conor Pacific, conducted the field program on November 10, 1998.

9.1 DRILLING PROGRAM

The location of all Conor Pacific Stage 2 boreholes (BH) are shown on the attached Figure 4. BH1 was located in the vicinity of the Shed #1 (Item #1). BH2 and BH3 were located in the area where an historical site plan showed an oil shed and former gas/diesel USTs (Item #3). BH4 and BH5 were located adjacent to Shed #2 (Item #2). BH6 was located around the waste oil UST located at the southwest corner of the VMAC building (Item #9). BH7 was drilled close to the heating oil UST for the VMAC building (Item # 7). BH8 was located in the drum storage area (Item #5) and BH9 was located in the area of the oil/water separator and the scrap storage/waste oil at the north end of the maintenance building (Item #'s 3 and 6 respectively).

9.2 LABORATORY PROGRAM

The number of soil samples submitted and the parameters analyzed were based on the Site Reports reviewed and approved by Northwest (see Table 6-1). All soil samples were submitted to Philip. Selected samples were analyzed for extractable petroleum hydrocarbons (EPH) and benzene/toluene/ethylbenzene/xylene (BTEX). Light extractable petroleum hydrocarbons (LEPH) and heavy extractable petroleum hydrocarbons (HEPH) are EPH which are corrected for PAH. Samples not analyzed were stored at 4°C at the laboratory, pending any further analyses that may be required. The laboratory stored for a period of 30 days, after which time they were disposed of, unless otherwise instructed.



10.0 FIELD PROGRAM RESULTS

10.1 SITE STRATIGRAPHY

The site consisted of gravel to sand fill in the upper 0.5 metres, which was typically associated with the base of the asphalt covered areas. Based on conversations with site personnel and the borehole program findings, much of the subsurface materials at the site below the asphalt base appear to be a heterogeneous mixture of fill consisting of gravel, sand, silt and reddish brown clay at some locations.

10.2 FIELD OBSERVATIONS

Combustible Soil Vapour (CSV) readings were highest in the surface soil samples (0.1-0.5 mbg) that were tested. BH5 was the highest recorded location at 60ppm (0.1 – 0.4 mbg). BH5 field observations noted the presence of solvent odours in this interval.

Soil samples were collected from each borehole. Sample intervals have been indicated in the Borehole Logs (Tab E) and are summarized in Tab E, Table 1. Auger refusal occurred during drilling from 0.9 to 4.7 mbg (see borehole logs, Tab E). Based on the auger refusal and the lack of observations of significant water in the soil matrix, shallow ground water monitoring wells were not installed in any of the boreholes.

10.3 ANALYTICAL RESULTS

10.3.1 Soil

A total of five soil samples were submitted for analyses of total metals, (Table 10-1). All samples met the Contaminated Sites Regulation (CSR), Commercial Land (CL) use standards.

Four other samples, two from the salt shed area (BH1), and two from the possible brine tank area (BH4), were analysed for conductance and dissolved chloride only. The highest dissolved chloride results were 17,000 ug/g (0.1m-0.3m) and 4,500 ug/g (1.2m-1.5m) from BH1. There is no CSR CL standard for chloride in soil.

The dissolved chloride concentrations are significantly higher than the typical concentration of dissolved chloride for Vancouver Island, 2 – 35 ug/g (BCMELP, 1998). Based on the chloride

concentration, and the linear relationship between dissolved chloride and Sodium Absorption Ratio (SAR), this sample would likely exceed the CCME SAR criteria of 5 (Tab E, Figure 1). As well, the specific conductance results for BH1 and BH4 exceeded the CCME criteria.

A total of 13 soil samples were analyzed for extractable petroleum hydrocarbons (EPH), and five of these were also analysed for benzene/toluene/ethylbenzene/xylene (BTEX) parameters (Table 10-2). All samples analyzed met the CSR CL standards. The highest light extractable petroleum hydrocarbons (LEPH) concentration was found in BH5, Shed #2 (0.6-1.0 m) at 1,500 ug/g, and the highest heavy extractable petroleum hydrocarbons (HEPH) concentration was found in BH3, oil shed (1.0-1.3 metres below grade) with a concentration of 120 ug/g.

Table 10-1
Concentration of Metals in Soil
Cassidy Works Yard
British Columbia Buildings Corporation
January 1999
8216754

	Units	MDL	Sample Name and Depth (m)									
			CSR CL	CDBH1 0.1-0.3	CDBH1 1.2-1.5	CDBH4 0.0-0.3	CDBH4 0.6-0.9	CDBH6 0.2-0.5	CDBH6 2.0-2.2	CDBH7 0.7-1.0	CDBH8 0.1-0.5	CDBH9 0.1-0.3
Physical												
pH (DI 1:2)	pH units	0.1	NS	---	---	---	---	7.1	7	6.5	5.7	7.7
Specific Conductance	uS/cm	1	2000****	8920	2330	130	119	---	---	---	---	---
Moisture	%(W/W)	0.1	NS	---	---	---	---	16.3	11.9	13.6	15.3	4.4
Anions												
Chloride Dissolved	ug/g	25	2-35***	17000	4500	130	110	---	---	---	---	---
Total Metals												
Aluminum	ug/g	10	NS	---	---	---	---	30400	15700	19400	24600	17500
Antimony	ug/g	2	40	---	---	---	---	<2	<2	<2	<2	<2
Arsenic	ug/g	0.2	60*	---	---	---	---	3.3	4	3.4	4.5	3.3
Barium	ug/g	0.1	2000	---	---	---	---	98.9	66.6	68.9	96.1	65.4
Beryllium	ug/g	0.1	8	---	---	---	---	0.6	0.4	0.5	0.6	0.4
Bismuth	ug/g	2	NS	---	---	---	---	<2	<2	<2	<2	<2
Cadmium	ug/g	0.2	1.5-100**	---	---	---	---	<0.2	<0.2	<0.2	<0.2	<0.2
Calcium	ug/g	40	NS	---	---	---	---	2320	5530	3260	2470	4960
Chromium	ug/g	0.2	60*	---	---	---	---	41.3	33.5	39.5	42.9	20.9
Cobalt	ug/g	0.3	300	---	---	---	---	12.3	13.7	11.6	11.9	8.7
Copper	ug/g	0.1	90-250**	---	---	---	---	44	52.2	45.3	52.1	75.7
Iron	ug/g	10	NS	---	---	---	---	37500	34000	32900	36800	23600
Lead	ug/g	2	150-1000	---	---	---	---	<2	<2	<2	<2	7
Magnesium	ug/g	10	NS	---	---	---	---	5490	5900	5050	5810	5440
Manganese	ug/g	0.2	NS	---	---	---	---	477	538	477	365	367
Mercury	ug/g	0.05	10	---	---	---	---	0.1	0.06	0.07	0.08	<0.05
Molybdenum	ug/g	0.4	40	---	---	---	---	<0.4	<0.4	<0.4	<0.4	0.5
Nickel	ug/g	0.3	500	---	---	---	---	30.2	26.5	28.9	30.6	17.2
Phosphorus	ug/g	4	NS	---	---	---	---	559	548	505	415	635
Potassium	ug/g	40	NS	---	---	---	---	346	378	292	430	492
Selenium	ug/g	0.2	500	---	---	---	---	<0.2	<0.2	<0.2	<0.2	<0.2
Silver	ug/g	1	40	---	---	---	---	<1	<1	<1	<1	<1
Sodium	ug/g	10	NS	---	---	---	---	695	577	506	174	292
Strontium	ug/g	0.1	NS	---	---	---	---	17.2	25	24	18.1	24.5
Sulphur	ug/g	3	NS	---	---	---	---	119	21	65	54	49
Tellurium	ug/g	2	NS	---	---	---	---	<2	<2	<2	<2	4
Thallium	ug/g	2	NS	---	---	---	---	<2	<2	<2	<2	<2
Tin	ug/g	2	300	---	---	---	---	<2	<2	<2	<2	<2
Titanium	ug/g	0.3	NS	---	---	---	---	1620	500	898	1360	699
Vanadium	ug/g	0.3	NS	---	---	---	---	101	72.1	82.8	94.1	50.2
Zinc	ug/g	0.2	150-600*	---	---	---	---	46.7	45.2	38.4	41	80.3
Zirconium	ug/g	0.3	NS	---	---	---	---	4	3	2.8	5.3	2.2

* Indicates lowest applicable Standard

** Indicates Standard depends on soil pH

*** Indicates BCMELP "typical" dissolved chloride in soil for Vancouver Island (Dec. 1998)

**** CCME Interim Criteria

Note: If concentration is within indicated CSR range, but not highlighted, it does not exceed the CSR Standard, based on soil pH

Note: Data has been compared to the standard applicable for the current land use (CL)

Standards for AL and RL land use have been included for reference Data has NOT been compared to the RL and AL standards, and exceedances may exist.

a) CSR - BC Contaminated Sites Regulation, April 1997

b) CL - Standards for Commercial Land Use

c) RL - Standard for Residential Land Use, for reference only (data has not been compared to RL)

d) AL - Standards for Agricultural Land Use, for reference only (data has not been compared to AL)

Exceeds CSR CL standard or other applicable criteria

Table 10-2
Concentration of Hydrocarbons in Soil
Cassidy Works Yard
British Columbia Buildings Corporation
November 10, 1998
8216754

Parameter	Units	MDL	CSR CL	CDBH2 0.1-0.3	CDBH2 0.8-1.0	CDBH2 1.3-1.5	CDBH2 2.3-2.6	CDBH2 3.0-3.2	CDBH3 1.0-1.3	CDBH5 0.1-0.4	CDBH5 0.6-1.0	CDBH6 0.3-0.6	CDBH6 2.0-2.2	CDBH7 0.7-1.0	CDBH8 0.1-0.5	CDBH9 0.1-0.3
Hydrocarbons																
Hydrocarbons C5-C11	ug/g	10	NS	---	< 10	---	< 10	< 10	---	150	130	---	---	---	---	---
TEH (C10 - C30)	ug/g	10	NS	< 10	< 10	65	< 10	< 10	110	1200	1500	34	< 10	< 10	< 10	44
LEPH (C10 - C19)	ug/g	10	2000	< 10	< 10	35	< 10	< 10	12	1200	1500	< 10	< 10	< 10	< 10	< 10
HEPH (C19 - C32)	ug/g	10	5000	< 10	< 10	28	< 10	< 10	120	88	110	32	< 10	< 10	< 10	64
VPH (BC Guidelines)	ug/g	---	200	---	< 10	---	< 10	< 10	---	150	120	---	---	---	---	---
Volatile Organics																
Benzene	ug/g	0.04	8	---	< 0.04	---	< 0.04	< 0.04	---	< 0.04	< 0.04	---	---	---	---	---
Toluene	ug/g	0.04	30	---	< 0.04	---	< 0.04	< 0.04	---	< 0.04	< 0.04	---	---	---	---	---
Ethylbenzene	ug/g	0.04	50	---	< 0.04	---	< 0.04	< 0.04	---	< 0.04	< 0.04	---	---	---	---	---
Xylene (total)	ug/g	0.03	50	---	< 0.03	---	< 0.03	< 0.03	---	0.33	0.34	---	---	---	---	---

* Indicates lowest applicable Standard

- a) CSR - BC Contaminated Sites Regulation, April, 1997
b) CL - Standards for Commercial Land Use

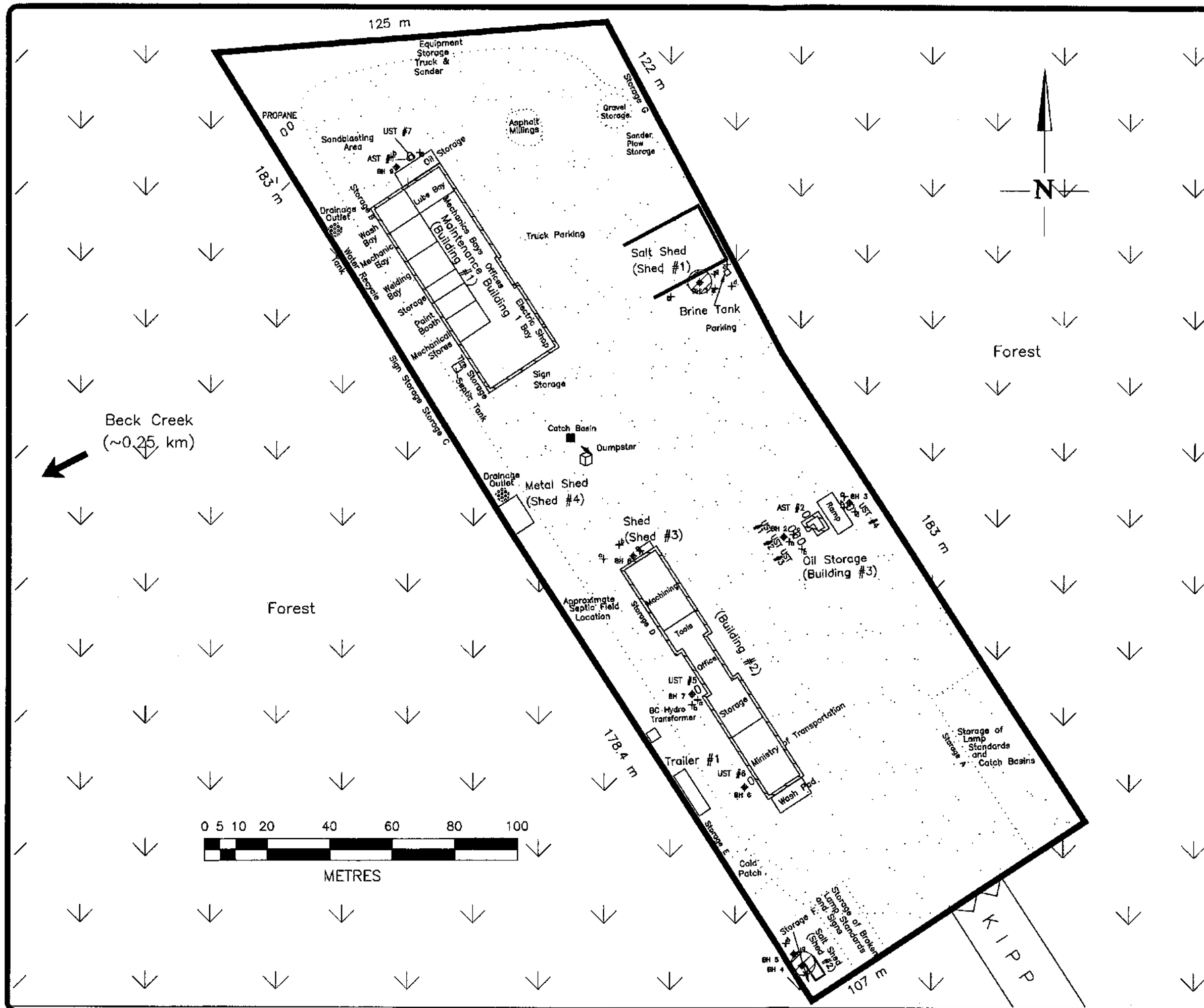
Exceeds CSR CL Standards

11.0 CONCLUSIONS

The following conclusions are made based on the Stage 1 and Stage 2 PSI work:

- a) There were elevated salt (dissolved chloride) and specific conductance soil sample analytical results that exceeded the BCMELP and the CCME criteria as detected at BH1 at 0.1-0.3 mbg and 1.2-1.5 mbg located close to Salt Shed #1 (Item #1).
- b) There were elevated salt (dissolved chloride) soil sample analytical results that exceeded the BCMELP criteria as detected at BH 4 at 0.0-0.3 mbg and 0.6-0.9 mbg located close to Salt Shed #2 (Item #2). BH5 had elevated LEPH results (1,500 ug/g compared to a standard of 2,000 ug/g) for a sample from 0.6-1.0 mbg.
- c) BH9 soil samples (0.1-0.3 mbg) taken from around the oil/water separator and recycling tank (Item #3), the scrap area/waste oil area (item #6) and the waste oil UST north of Building #1 (Item #10) and analysed for metals and EPH did not exceed the CSR CL standards. Off-site discharge areas were not investigated during the Stage 2 PSI.
- d) BH2 and BH3 soil samples taken from around the oil shed, former waste oil UST, and three former gas/diesel USTs (Item #4) ranging from 0.1 to 3.2 mbg were analysed for EPH and BTEX and did not exceed the CSR CL standards.
- e) BH8 soil samples taken from around the drums stored the machining area of the VMAC (Item #5) and analysed for EPH and metals did not exceed the CSR CL standards.
- f) One BH7 soil sample (0.7-0.9 mbg) taken from around the heating oil UST (Item #7) was analysed for EPH and did not exceed the CSR CL standards.
- g) There was no Stage 2 sampling conducted around the sand blasting area (Item #8).
- h) BH6 soil samples taken from around the waste oil UST (Item #9) and analysed for EPH and metals did not exceed the CSR CL standards.
- i) Other exterior storage areas, i.e. Storage A, were not investigated during the Stage 2 PSI.
- j) There was no formal environmental housekeeping procedure manual present relating to operations at the subject site.

Areas of contamination based on borehole soil sample exceedances of applicable standards/criteria are shown in Figure 5. The extent of contamination is not yet known and is to be delineated during the DSI.



- LEGEND**
- Confirmed Contamination (See note 4) (Exceeds Standards or Criteria)
 - Borehole Location
 - Attempted Borehole Location
 - UST
 - Former Underground Storage Tank
 - Above Ground Storage Tank
 - Vegetation
 - Building
 - Structure
 - Salt Shed
 - Property Line Of Site
 - Paved Area
 - Unpaved Area
 - Stockpile or Storage Boundary

- NOTE:**
1. Base drawing provided by BC Buildings Corporation, Plan #x9006501
 2. Dimensions and Site Features are approximate
 3. Drawings not to be used for Engineering design or Construction purposes
 4. Extent of contamination to be assessed in DSI

TITLE

Areas of Contamination

PROJECT

BCBC Route 9, Cassidy Highways Yard
Stage 1 and 2 Preliminary Site Investigations

CLIENT

BC Buildings Corporation

Conor Pacific
Environmental Technologies Inc.

Drawing date: 03/01/99	Revised date: 19/01/99
Drawn by: SS	Checked by: PC
Project # 8-2167-54 Task # 1001	
Date: 19/01/99	

FIGURE 5

12.0 RECOMMENDATIONS

The following summary of findings with recommendations is presented in Table 12-1.

Table 12-1 Items of Potential Concern, Stage 2 Results and Recommendations

ITEM #	ITEM OF CONCERN	BOREHOLE AND CONTAMINANTS	RECOMMENDATIONS AND DSI PROGRAM	RATIONALE
1	Shed #1	BH1 Salt & CCME & BCMELP criteria	Specific conditions follow environmental housekeeping and spill response procedures. Additional boreholes to delineate extent of elevated salt levels around BH1. Installation of shallow groundwater monitoring wells.	Exceeds standard/criteria for chloride (485X); within 10 m of the north property boundary; adjacent land zoned residential, currently vacant and forest covered; groundwater quality and flow direction not known.
2	Shed #2	BH4 Salt > CCME & BCMELP criteria BH5 EPH < CL	Follow environmental housekeeping and spill response procedures. Additional boreholes to delineate extent of elevated salt levels around BH4 and the extent of elevated LEPH levels around BH5. Installation of shallow groundwater monitoring wells.	Exceeds standard/criteria for chloride; within 10 m of the south property boundary; no groundwater results to date; adjacent land zoned residential, currently vacant and forest covered.
3	Oil/water separator, recycling tank and UST #7	BH9 EPH & metals < CL	Follow environmental housekeeping and spill response procedures. Installation of shallow groundwater monitoring wells. Investigate off-site discharge areas.	Groundwater quality and flow direction not known. Soil quality in offsite discharge areas in not known (see Item #6 also).
4	Oil shed, grease ramp, former waste oil UST, three former gas/diesel USTs	BH2, BH3 EPH < CL	Follow environmental housekeeping and spill response procedures. Install shallow monitoring well downgradient of area.	Groundwater quality and flow direction not known.
5	Drums and associated staining behind machining area of VMAC	BH8 EPH & metals < CL	Follow environmental housekeeping and spill response procedures for all material storage areas. No further sampling recommended at this time.	Samples did not exceed CSR CL standards.

Table 12-1 Items of Potential Concern, Stage 2 Results and Recommendations (cont'd)

ITEM #	ITEM OF CONCERN	BOREHOLE AND CONTAMINANTS	RECOMMENDATIONS AND DSI PROGRAM	RATIONALE
6	Storage of scrap and waste oil at north end of maintenance Building #1	BH9 EPH & metals < CL	Follow environmental housekeeping and spill response procedures.	Groundwater quality and flow direction not known (investigate in conjunction with Item #3).
7	Heating oil UST for VMAC building	BH7 EPH < CL	Follow environmental housekeeping and spill response procedures. No further sampling recommended at this time.	Samples tested did not exceed CSR CL standards.
8	Sandblasting area	No Stage 2 PSI conducted	Follow environmental housekeeping and spill response procedures. Complete boreholes in this area to assess contamination.	No soil or groundwater sampling completed during the Stage 2. (investigate in conjunction with Item #3 and #6).
9	Waste oil UST located at southwest corner of VMAC building.	BH6 EPH < CL	Follow environmental housekeeping and spill response procedures. No further sampling recommended at this time.	Samples tested did not exceed CSR CL standards.
10	Other exterior storage areas. i.e. Storage A	No stage 2 PSI conducted	Follow environmental housekeeping and spill response procedures. Investigate exterior storage areas.	Some exterior storage areas with contaminants of concern not investigated in Stage 2 PSI.

As well, potential mercury lamps should be properly handled and disposed.

A cost estimate to complete the North West "Site Reports for Exception Tracking" to include the Stage 2 PSI results, DSI recommendations, and the costs to complete the contaminant delineation will be provided upon request.

13.0 STATEMENT OF LIMITATIONS

This report ("Report") was prepared by Conor Pacific Environmental Technologies (Conor Pacific), for the sole benefit and exclusive use of British Columbia Buildings Corporation (BCBC). The material in it reflects Conor Pacific's best judgement in light of the information available to it at the time of preparing the Report. Any use which a third party makes of this Report, or any reliance on or decisions made based on it, are the responsibility of such third parties. Conor Pacific accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on this Report.

Conor Pacific has performed the work as described in the Scope of Work and, made the findings and conclusions set out in this Report in a manner consistent with the level of care and skill normally exercised by members of the environmental science profession practising under similar conditions at the time the work was performed.

This Report was prepared by Conor Pacific for BCBC and represents a reasonable review of the information available to Conor Pacific within the established Scope of Work, work schedule and budgetary constraints. It is therefore possible that currently unrecognised contamination or potentially hazardous materials may exist at the site(s) and that the levels of contamination or hazardous materials may vary across the site(s). No warranty, expressed or implied, is given concerning the presence or level of contamination on the site. The conclusions and recommendations contained in this Report are based upon applicable legislation existing at the time the Report was drafted and changes in the legislation may alter the conclusions and/or recommendations. Further, any discussion of regulatory implications is based on the applicable legislation existing at time of drafting the Report.

In preparing this Report, Conor Pacific has relied in good faith on information provided by others as noted in this Report and has assumed the information provided by those individuals is both factual and accurate. Conor Pacific accepts no responsibility for any deficiency, misstatement or inaccuracy in this Report resulting from the information provided by those individuals.

The liability of Conor Pacific to BCBC shall be limited to injury or loss caused by the negligent acts of Conor Pacific. The total aggregate liability of Conor Pacific related to this agreement shall not exceed the lesser of the actual damages incurred, or the total fee of Conor Pacific for services rendered on this project.

14.0 REFERENCES

BC Buildings Corporation, Chemical Spills Procedures Manual

BC Buildings Corporation, Environmental Housekeeping Guidelines

BC Ministry of Environment Lands and Parks, 1997, "BC Contaminated Sites Regulation, April 1997".

BC Ministry of Environment Lands and Parks, 1998 – phone conversation and facsimile from Mr. John Jungen, PAg., Contaminated Sites Remediation Unit, December 17, 1998.

Canadian Councils of Ministries of the Environment, 1991, "Interim Canadian Environmental Quality Criteria for Contaminated Sites". Report CCME, EPC-CS34, September 1991.

Department of Energy and Mines Canada (DEM). 1994. Nanaimo, 92 G/4 ed. 4, Topographic Map. Ottawa.

Table 1 Soil Sample Summary

Borehole	Sample ID (Borehole Log)	CSV (ppm)	Sample ID (Laboratory)
BH1	SA1	25	CDBH1 0.1-0.3
BH1	SA2	10	CDBH1 0.7-1.0
BH1	SA3	0	CDBH1 1.2-1.5
BH1	SA4	0	CDBH1 2.4-2.7
BH2	SA1	0	CDBH2 0.1-0.3
BH2	SA2	0	CDBH2 0.8-1.0
BH2	SA3	0	CDBH2 1.3-1.5
BH2	SA4	10	CDBH2 2.3-2.6
BH2	SA5	0	CDBH2 3.0-3.2
BH3	SA1	10	CDBH3 0.1-0.3
BH3	SA2	25	CDBH3 1.0-1.3
BH3	SA3	0	CDBH3 1.6-1.9
BH4	SA1	25	CDBH4 0.0-0.3
BH4	SA2	25	CDBH4 0.6-0.9
BH5	SA1	60	CDBH5 0.1-0.4
BH5	SA2	35	CDBH5 0.6-1.0
BH6	SA1	50	CDBH6 0.2-0.5
BH6	SA2	25	CDBH6 0.8-1.2
BH6	SA3	25	CDBH6 2.0-2.2
BH6	SA4	10	CDBH6 3.5-3.8
BH7	SA1	0	CDBH7 0.1-0.5
BH7	SA2	0	CDBH7 0.7-1.0
BH8	SA1	0	CDBH8 0.1-0.5
BH9	SA1	10	CDBH9 0.1-0.3
BH9	SA2	10	CDBH9 0.6-0.9
BH9	SA3	10	CDBH9 1.2-1.4

a) CSV - Combustible Soil Vapour (using GasTech)

Page 1 OF 1

LOGGED: GMQ

page 135 of 474

Page:1 OF 1

BORING DATE: Nov 10, 1998

DATUM: GROUND SURFACE

DIP: 0

LOGGED: GMD

page 136 of 474

PROJECT: 0216754

BH3

Page 1 OF 1

LOCATION: BCBC - Cassidy

BORING DATE: Nov 10, 1998

DATUM: GROUND SURFACE

DIP: 0

LOGGED: GMD

DEPTH SCALE		BORING METHOD	SOIL PROFILE		Samples				Concentration					
METRES	FEET		DESCRIPTION	STRATA PLOT	DEPTH B.G.S. (m)	ID	Type	Recovery (%)	W ₁ Value	LEL	Moisture Content	Gas Concentration		
										0 20 40 60 80 100	◆	●	■	
0	0		GROUND SURFACE		0									
						SA1	AO							
2														
1			Sand FILL with trace silt. Medium grained sand. Backfill material in former UST nest. Medium brown. Loose. Dry. Well sorted. No odour. Refusal at 1.9 metres.			SA2	AO							
4														
6						SA3	AO							
2			END OF EXPLORATION @ 1.90m		1.9									
8														
3														
10														
12														
4														
14														
16														
5														

NO INSTALLATION

END OF EXPLORATION

Solid Stem Auger

DRAWN: GMD

Connor Pacific

CHECKED: PC

PROJECT: B216754

BH4

Page 1 OF 1

LOCATION: BCBC - Cassidy

BORING DATE: Nov 10, 1996

DATUM: GROUND SURFACE

DIP: 0

LOGGED: GMQ

DEPTH SCALE		BORING METHOD	SOIL PROFILE		Samples				Concentration			
METRES	FEET		DESCRIPTION	STRATA PLOT	DEPTH B.G.S. (m)	ID	Type	Recovery (%)	Wt. Value	LEL	Moisture Content	Gas Concentration
0 20 40 60 80 100												
0	0	Solid Stem Auger	GROUND SURFACE		0							
			Gravelly sand FILL. Medium grained sand. Dark gray. Loose. Moist. Oily odour.		0.1	SA1	AG					
2			Gravelly sand FILL with trace silt. Brown. Loose. Dry. No odour. Refusal at 0.3 metres.		0.3							
					0.3	SA2	AG					
1			END OF EXPLORATION @ 0.30m		0.3							
4												
6												
2												
8												
3	10											
12												
4	14											
16												
5	16											

NO INSTALLATION

END OF EXPLORATION

DRAWN: GMQ

Conor Pacific

CHECKED: PC

PROJECT: 8216754

BH5

Page 1 OF 1

LOCATION: BCBC - Camidy

BORING DATE: Nov 10, 1998

DATUM: GROUND SURFACE

DIP: 0

LOGGED: GMQ

DEPTH SCALE		BORING METHOD	SOIL PROFILE		Samples			Concentration																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
METRES	FEET		DESCRIPTION	STRATA PLOT	DEPTH D.G.S. (m)	ID	Type	Recovery (%)	N Value	LEL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
										Moisture Content							Gas Concentration																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
									0 20 40 60 80 100																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
0	0	Solid Stem Auger	GROUND SURFACE		0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													

NO INSTALLATION

END OF EXPLORATION

DRAWN: GMQ

Cann Pacific

CHECKED: PC

PROJECT: 8216754

BH6

Page 1 OF 1

LOCATION: BCBC - Cassidy

BORING DATE: Nov 10, 1998

DATUM: GROUND SURFACE

DIP: 0

LOGGED: GMD

DEPTH SCALE		BORING METHOD	SOIL PROFILE		Samples				Concentration					
METRES	FEET		DESCRIPTION	STRATA PLAT	DEPTH B.G.S. (m)	ID	Type	Recovery (%)	W Value	LEL	Moisture Content	Gas Concentration		
0	0	Solid Stem Auger	GROUND SURFACE		0									
			Sandy gravel FILL. Medium grained sand. Gravel to 3cm. Grey. Loose. Dry. No odour.			SA1	AO							
2					0.4									
						SA2	AO							
1														
4														
6						SA3	AO							
2														
8		Solid Stem Auger	Sandy clay TILL with trace gravel. Medium grained sand. Gravel to 2cm. Reddish Brown. Compact. Moist. No odour.											
3														
10														
12						SA4	AO							
4														
14		Solid Stem Auger												
16		Solid Stem Auger	END OF EXPLORATION @ 4.70m		4.7									
5														

NO INSTALLATION

END OF EXPLORATION

PROJECT: 8216754

BH7

Page 1 OF 1

LOCATION: BCBC - Cassidy

BORING DATE: Nov 10, 1998

DATUM: GROUND SURFACE

DIP: 0

LOGGED: GMD

DEPTH SCALE		BORING METHOD	SOIL PROFILE		Samples				Concentration						
METRES	FEET		DESCRIPTION	STRATA PLOT	DEPTH B.G.S. (m)	ID	Type	Recovery (%)	"N" Value	LEL	Moisture Content	Gas Concentration			
0	0	Solid Stem Auger	GROUND SURFACE		0									NO INSTALLATION	
			Sand FILL. Medium grained sand. Brown. Loose. Dry. No odour.			SA1	AG								
2					0.8										
			Sandy clay TILL with gravel. Medium grained sand. Gravel to 2cm. Reddish brown. Compact. Moist. No odour. Refusal at 1.4 metres.			SA2	AG								
1														END OF EXPLORATION	
4			END OF EXPLORATION @ 1.40m		1.4										
6															
2															
8															
10															
12															
4															
14															
16															
5															

page 141 of 4

DRAWN: GMD

Conor Pacific

CHECKED: PC

PROJECT: 8216754

BH8

Page 1 OF 1

LOCATION: BCBC - Cassidy

BORING DATE: Nov 10, 1998

DATUM: GROUND SURFACE

DIP: 0

LOGGED: GMQ

DEPTH SCALE		BORING METHOD	SOIL PROFILE		Samples				Concentration							
METRES	FEET		DESCRIPTION	STRATA PLOT	DEPTH B.G.S. (m)	ID	Type	Recovery (%)	T _w Value	LEL	Moisture Content	Gas Concentration				
										0	20	40	60	80	100	
0	0	Solid Stem Auger	GROUND SURFACE		0											
			Gravelly sand FILL with trace silt. Medium grained sand. Gravel to 3 cm. Brown. Loose. Dry. No odour. Refusal at 0.6 metres.			SA1	AG									
			END OF EXPLORATION @ 0.50m		0.6											
2	2															
1	4															
	6															
2	8															
	10															
3	12															
	14															
4	16															
5																

NO INSTALLATION

END OF EXPLORATION

BDRING DATE: Nov 10, 1998

Page 1 OF 1

DATUM: GROUND SURFACE

BIP: . . 0

LOGGED: GMA

page 143 of 474



PHILIP ANALYTICAL

24-Nov-98
Page 1 of 18

Certificate of Analysis

8577 Commerce Court
Burnaby, B.C.
Canada V5A 4N5
Tel 604 444 4808
Fax 604 444 4511

Reported To :

CONOR PACIFIC

Client Code JS

SUITE 300
1727 WEST BROADWAY
VANCOUVER, B.C.
V6J 4W6

Attention : JACKIE SMITH
Phone : (604) 738-1100
FAX : (604) 738-1166

Project Information :

Project ID : 8-2167-54 CASSIDY (CD)
Submitted By : GREG QUANDT

Requisition Forms :

Form 08031789 received on 12-Nov-98 logged on 13-Nov-98 completed on 20-Nov-98
Form 08031790 received on 12-Nov-98 logged on 13-Nov-98 completed on 21-Nov-98
Form 08031791 received on 12-Nov-98 logged on 13-Nov-98 completed on 15-Nov-98

Remarks :

- ☞ All organic data is blank corrected except for PCDD/F, Hi-res MS and CLP volatile analyses
- ☞ 'MDL' = Method Detection Limit, '<' = Less than MDL, '---' = Not analyzed
- ☞ Solids results are based on dry weight except Biota Analyses & Special Waste Oil & Grease
- ☞ Organic analyses are not corrected for extraction recovery standards except for Isotope Dilution methods, (i.e. CARB 429 PAH, all PCDD/F and DBD/DBF analyses)
- ☞ All Groundwater samples are decanted and/or filtered prior to analysis
- ☞ This report shall not be reproduced except in full, without the written approval of the laboratory

Methods used by Philip are based upon those found in 'Standard Methods for the Examination of Water and Wastewater', 19th Edition, published by the American Public Health Association, or on US EPA protocols found in the 'Test Methods For Evaluating Solid Waste, Physical/Chemical Method, SW846', 3rd Edition. Other procedures are based on methodologies accepted by the appropriate regulatory agency. Methodology briefs are available by written request.

All work recorded herein has been done in accordance with normal professional standards using accepted testing methodologies, quality assurance and quality control procedures except where otherwise agreed to by the client and testing company in writing. Liability for any and all use of these test results shall be limited to the actual cost of the pertinent analysis done. There is no other warranty expressed or implied. Your samples will be retained at Philip for a period of 30 days from receipt of data or as per contract.

PHILIP Project Manager: Jack Wilson



PHILIP ANALYTICAL

24-Nov-98

Page 2 of 18

ANALYTICAL REPORT

Client : CONOR PACIFIC
Project : 8-2167-54 CASSIDY (CD)

Philip ID :	98064568	98064570	98064572	98064573	98064574	98064575
Client ID :	CDBH1X0	CDBH1X1	CDBH2X0	CDBH2X0	CDBH2X1	CDBH2X2
	.1-0.3	.2-1.5	.1-0.3	.8-1.0	.3-1.5	.3-2.6

Sparcode	Parameter	Unit	MDL						
PHYSICAL									
0011SDIL	Specific Conductance	uS/cm	1	8920	2330	---	---	---	---
00250760	Moisture	%(W/W)	0.1	---	---	3.5	3.7	3.8	4.1
ANIONS									
110415SW	Chloride Dissolved	ug/g	25	17000	4500	---	---	---	---
HYDROCARBONS									
H105PT12	Hydrocarbons C5-C11	ug/g	10	---	---	---	< 10	---	< 10
H109P108	TEH (C10 - C30)	ug/g	10	---	---	< 10	< 10	65	< 10
H113P108	EPH (C10 - < C19)	ug/g	10	---	---	< 10	< 10	35	< 10
H114P108	EPH (C19 - C32)	ug/g	10	---	---	< 10	< 10	28	< 10
H107CALC	VPH (BC Guidelines)	ug/g		---	---	---	< 10	---	< 10
SURROGATE RECOVERY									
T140P108	o-Terphenyl	%	0	---	---	109	109	109	109
VOLATILE ORGANICS-MAH									
B020PT12	Benzene	ug/g	0.04	---	---	---	< 0.04	---	< 0.04
B021PT12	Ethylbenzene	ug/g	0.04	---	---	---	< 0.04	---	< 0.04
T001PT12	Toluene	ug/g	0.04	---	---	---	< 0.04	---	< 0.04
X003PT12	m,p - Xylene	ug/g	0.03	---	---	---	< 0.03	---	< 0.03
X002PT12	o - Xylene	ug/g	0.03	---	---	---	< 0.03	---	< 0.03
SURROGATE RECOVERY									
VS01PT12	Bromofluorobenzene	%	0	---	---	---	100	---	97
VS03PT12	d8-Toluene	%	0	---	---	---	97	---	96

Matrix :	Soil	Soil	Soil	Soil	Soil	Soil
Sampled on:	98/11/10	98/11/10	98/11/10	98/11/10	98/11/10	98/11/10



PHILIP ANALYTICAL

24-Nov-98

Page 3 of 18

ANALYTICAL REPORT

Client : CONOR PACIFIC
Project : 8-2167-54 CASSIDY (CD)

Philip ID :	98064576	98064578	98064580	98064581	98064582	98064583
Client ID :	CDBH2X3	CDBH3X1	CDBH4X0	CDBH4X0	CDBH5X0	CDBH5X0
	.0-3.2	.0-1.3	.0-0.3	.6-0.9	.1-0.4	.6-1.0

Sparcode	Parameter	Unit	MDL						
PHYSICAL									
0011SDIL	Specific Conductance	uS/cm	1	---	---	130	119	---	---
00250760	Moisture	%(W/W)	0.1	5.0	7.8	---	---	14.3	12.8
ANIONS									
110415SW	Chloride Dissolved	ug/g	25	---	---	130	110	---	---
HYDROCARBONS									
H105PT12	Hydrocarbons C5-C11	ug/g	10	< 10	---	---	---	150	130
H109P108	TEH (C10 - C30)	ug/g	10	< 10	110	---	---	1200	1500
H113P108	EPH (C10 - < C19)	ug/g	10	< 10	12	---	---	1200	1500
H114P108	EPH (C19 - C32)	ug/g	10	< 10	120	---	---	88	110
H107CALC	VPH (BC Guidelines)	ug/g		< 10	---	---	---	150	120
SURROGATE RECOVERY									
T140P108	o-Terphenyl	%	0	105	111	---	---	109	110
VOLATILE ORGANICS-MAH									
B020PT12	Benzene	ug/g	0.04	< 0.04	---	---	---	< 0.04	< 0.04
B021PT12	Ethylbenzene	ug/g	0.04	< 0.04	---	---	---	< 0.04	< 0.04
T001PT12	Toluene	ug/g	0.04	< 0.04	---	---	---	< 0.04	< 0.04
X003PT12	m,p - Xylene	ug/g	0.03	< 0.03	---	---	---	0.22	0.13
X002PT12	o - Xylene	ug/g	0.03	< 0.03	---	---	---	0.31	0.21
SURROGATE RECOVERY									
VS01PT12	Bromofluorobenzene	%	0	96	---	---	---	107	109
VS03PT12	d8-Toluene	%	0	97	---	---	---	96	98

Matrix :	Soil	Soil	Soil	Soil	Soil	Soil
Sampled on:	98/11/10	98/11/10	98/11/10	98/11/10	98/11/10	98/11/10



PHILIP ANALYTICAL

24-Nov-98
Page 4 of 18

ANALYTICAL REPORT

Client : CONOR PACIFIC
Project : 8-2167-54 CASSIDY (CD)

Philip ID :	98064584	98064586	98064589	98064590	98064591	98064601
Client ID :	CDBH6X0	CDBH6X2	CDBH7X0	CDBH8X0	CDBH9X0	CDBH9X1
	.2-0.5	.0-2.2	.7-1.0	.1-0.5	.1-0.3	.2-1.4

Sparcode	Parameter	Unit	MDL						
PHYSICAL									
0004DI02	pH (DI 1:2)	pH units	0.1	7.1	7.0	6.5	5.7	7.7	---
00250760	Moisture	%(W/W)	0.1	16.3	11.9	13.6	15.3	4.4	---
METALS TOTAL									
Al-T200S	Aluminum	ug/g	10	30400	15700	19400	24600	17500	---
Sb-T200S	Antimony	ug/g	2	< 2	< 2	< 2	< 2	< 2	---
As-T200H	Arsenic	ug/g	0.2	3.3	4.0	3.4	4.5	3.3	---
Ba-T200S	Barium	ug/g	0.1	98.9	66.6	68.9	96.1	65.4	---
Be-T200S	Beryllium	ug/g	0.1	0.6	0.4	0.5	0.6	0.4	---
Bi-T200S	Bismuth	ug/g	2	< 2	< 2	< 2	< 2	< 2	---
Cd-T200S	Cadmium	ug/g	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	---
Ca-T200S	Calcium	ug/g	40	2320	5530	3260	2470	4960	---
Cr-T200S	Chromium	ug/g	0.2	41.3	33.5	39.5	42.9	20.9	---
Co-T200S	Cobalt	ug/g	0.3	12.3	13.7	11.6	11.9	8.7	---
Cu-T200S	Copper	ug/g	0.1	44.0	52.2	45.3	52.1	75.7	---
Fe-T200S	Iron	ug/g	10.0	37500	34000	32900	36800	23600	---
Pb-T200S	Lead	ug/g	2	< 2	< 2	< 2	< 2	7	---
Mg-T200S	Magnesium	ug/g	10	5490	5900	5050	5810	5440	---
Mn-T200S	Manganese	ug/g	0.2	477	538	477	365	367	---
Hg-T200M	Mercury	ug/g	0.05	0.10	0.06	0.07	0.08	< 0.05	---
Mo-T200S	Molybdenum	ug/g	0.4	< 0.4	< 0.4	< 0.4	< 0.4	0.5	---
Ni-T200S	Nickel	ug/g	0.8	30.2	26.5	28.9	30.6	17.2	---
P-T200S	Phosphorus	ug/g	4	559	548	505	415	635	---
K-T200S	Potassium	ug/g	40	346	378	292	430	492	---
Se-T200H	Selenium	ug/g	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	---
Ag-T200S	Silver	ug/g	1	< 1	< 1	< 1	< 1	< 1	---
Na-T200S	Sodium	ug/g	10	695	577	506	174	292	---
Sr-T200S	Strontium	ug/g	0.1	17.2	25.0	24.0	18.1	24.5	---
S-T200S	Sulphur	ug/g	3	119	21	65	54	49	---
Te-T200S	Tellurium	ug/g	2	< 2	< 2	< 2	< 2	4	---
Tl-T200S	Thallium	ug/g	2	< 2	< 2	< 2	< 2	< 2	---
Sn-T200S	Tin	ug/g	2	< 2	< 2	< 2	< 2	< 2	---
Ti-T200S	Titanium	ug/g	0.3	1620	500	898	1360	699	---
V-T200S	Vanadium	ug/g	0.3	101	72.1	82.8	94.1	50.2	---
Zn-T200S	Zinc	ug/g	0.2	46.7	45.2	38.4	41.0	80.3	---
Zr-T200S	Zirconium	ug/g	0.3	4.0	3.0	2.8	5.3	2.2	---

Matrix :	Soil	Soil	Soil	Soil	Soil	Soil
Sampled on:	98/11/10	98/11/10	98/11/10	98/11/10	98/11/10	98/11/10

CONTINUED on page 5



PHILIP ANALYTICAL

24-Nov-98
Page 5 of 18

ANALYTICAL REPORT

Client : CONOR PACIFIC
Project : 8-2167-54 CASSIDY (CD)

Philip ID :	98064584	98064586	98064589	98064590	98064591	98064601
Client ID :	CDBH6X0	CDBH6X2	CDBH7X0	CDBH8X0	CDBH9X0	CDBH9X1
	.2-0.5	.0-2.2	.7-1.0	.1-0.5	.1-0.3	.2-1.4

Sparcode	Parameter	Unit	MDL						
HYDROCARBONS									
H109P108	TEH (C10 - C30)	ug/g	10	34	< 10	< 10	< 10	44	---
H113P108	EPH (C10 - <C19)	ug/g	10	< 10	< 10	< 10	< 10	< 10	---
H114P108	EPH (C19 - C32)	ug/g	10	32	< 10	< 10	< 10	64	---
SURROGATE RECOVERY									
T140P108	o-Terphenyl	%	0	110	111	112	110	99	---
Matrix : Soil									
Sampled on: 98/11/10									
98/11/10									
98/11/10									
98/11/10									
98/11/10									
98/11/10									



PHILIP ANALYTICAL

24-Nov-98
Page 6 of 18

DUPLICATE SUMMARY

Parameter	Client ID	Philip ID	Sample Conc.	Duplicate Conc.	MDL	Unit	Relative % Diff.
TEH (C10 - C30)	CDBH2X0.1-0.3	98064572	< 10	< 10	10	ug/g	0.00
EPH (C10 - < C19)	CDBH2X0.1-0.3	98064572	< 10	< 10	10	ug/g	0.00
EPH (C19 - C32)	CDBH2X0.1-0.3	98064572	< 10	< 10	10	ug/g	0.00
o-Terphenyl	CDBH2X0.1-0.3	98064572	109	112	0	%	-2.71
Moisture	CDBH2X3.0-3.2	98064576	5.0	5.2	0.1	%(W/W)	-3.92
Specific Conductance	CDBH4X0.6-0.9	98064581	119	120	1	uS/cm	-0.84
Chloride Dissolved	CDBH4X0.6-0.9	98064581	110	110	25	ug/g	0.00



PHILIP ANALYTICAL

24-Nov-98
Page 7 of 18

SPIKE SUMMARY

Parameter	Client ID	Philip ID	Sample Conc.	Sample & Spike Conc.	Spike Amount	Unit	Percent Recovery
Chloride Dissolved	Blank Spike. Batch :	84101682	< 25	100	100	ug/g	104
TEH (C10 - C30)	CDBH2X0.1-0.3	98064572	< 10	470	500	ug/g	95
TEH (C10 - C30)	Blank Spike. Batch :	85206090	< 10	110	100	ug/g	106
Benzene	Blank Spike. Batch :	85206038	< 0.04	2.1	2.15	ug/g	97
Toluene	Blank Spike. Batch :	85206038	< 0.04	2.0	2.15	ug/g	94
Ethylbenzene	Blank Spike. Batch :	85206038	< 0.04	2.1	2.15	ug/g	98
m,p - Xylene	Blank Spike. Batch :	85206038	0.03	4.4	4.3	ug/g	102
o - Xylene	Blank Spike. Batch :	85206038	< 0.03	2.1	2.15	ug/g	97
Benzene	Blank Spike. Batch :	85206039	< 0.04	2.1	2.15	ug/g	94
Toluene	Blank Spike. Batch :	85206039	< 0.04	2.0	2.15	ug/g	90
Ethylbenzene	Blank Spike. Batch :	85206039	< 0.04	1.9	2.15	ug/g	90
m,p - Xylene	Blank Spike. Batch :	85206039	0.04	4.0	4.3	ug/g	92
o - Xylene	Blank Spike. Batch :	85206039	< 0.03	1.9	2.15	ug/g	89
Aluminum	Blank Spike. Batch :	84204122	< 10	6960	9518	ug/g	73
Barium	Blank Spike. Batch :	84204122	< 0.1	99.2	102	ug/g	97
Calcium	Blank Spike. Batch :	84204122	< 40	133000	137000	ug/g	97
Cadmium	Blank Spike. Batch :	84204122	< 0.2	31.3	34	ug/g	92
Cobalt	Blank Spike. Batch :	84204122	< 0.3	28.6	28	ug/g	102
Chromium	Blank Spike. Batch :	84204122	< 0.2	42.6	44.35	ug/g	96
Copper	Blank Spike. Batch :	84204122	< 0.1	691	690	ug/g	100
Iron	Blank Spike. Batch :	84204122	< 10.0	21100	20406	ug/g	103
Magnesium	Blank Spike. Batch :	84204122	< 10	5720	6086	ug/g	94
Manganese	Blank Spike. Batch :	84204122	< 0.2	412	425	ug/g	97
Nickel	Blank Spike. Batch :	84204122	< 0.8	214	231	ug/g	92
Lead	Blank Spike. Batch :	84204122	< 2	223	233	ug/g	96
Strontium	Blank Spike. Batch :	84204122	< 0.1	186	202	ug/g	92
Vanadium	Blank Spike. Batch :	84204122	< 0.3	14.7	19	ug/g	77
Zinc	Blank Spike. Batch :	84204122	0.3	6770	6775	ug/g	100
Arsenic	Blank Spike. Batch :	84204125	< 0.2	17.9	17	ug/g	105
Mercury	Blank Spike. Batch :	84204132	< 0.05	6.69	6.25	ug/g	107
TEH (C10 - C30)	Blank Spike. Batch :	85206091	< 10	87	100	ug/g	87



PHILIP ANALYTICAL

24-Nov-98
Page 8 of 18

ANALYSIS DATES

Philip ID:		98064568	98064570	98064572	98064573
Client ID:		CDBH1X0	CDBH1X1	CDBH2X0	CDBH2X0
		.1-0.3	.2-1.5	.1-0.3	.8-1.0
<hr/>					
0011SDIL	Specific Conductance	17-NOV-1998	17-NOV-1998	---	---
00250760	Moisture	---	---	18-NOV-1998	18-NOV-1998
110415SW	Chloride Dissolved	17-NOV-1998	17-NOV-1998	---	---
TEHSN	EPH 10-19,19-32 Soils	---	---	18-NOV-1998	18-NOV-1998
PKG-BT24	BTEX by P&T	---	---	---	14-NOV-1998
<hr/>					
Matrix:		Soil	Soil	Soil	Soil
Sampled on:		10-NOV-1998	10-NOV-1998	10-NOV-1998	10-NOV-1998
<hr/>					



PHILIP ANALYTICAL

24-Nov-98
Page 9 of 18

ANALYSIS DATES

	Philip ID:	98064574	98064575	98064576	98064578
	Client ID:	CDBH2X1	CDBH2X2	CDBH2X3	CDBH3X1
		.3-1.5	.3-2.6	.0-3.2	.0-1.3
00250760	Moisture	18-NOV-1998	18-NOV-1998	18-NOV-1998	18-NOV-1998
TEHSN	EPH 10-19,19-32 Soils	18-NOV-1998	18-NOV-1998	18-NOV-1998	18-NOV-1998
PKG-BT24	BTEX by P&T	---	14-NOV-1998	14-NOV-1998	---
	Matrix:	Soil	Soil	Soil	Soil
	Sampled on:	10-NOV-1998	10-NOV-1998	10-NOV-1998	10-NOV-1998



PHILIP ANALYTICAL

24-Nov-98
Page 10 of 18

ANALYSIS DATES

	Philip ID:	98064580	98064581	98064582	98064583
	Client ID:	CDBH4X0	CDBH4X0	CDBH5X0	CDBH5X0
		.0-0.3	.6-0.9	.1-0.4	.6-1.0
<hr/>					
0011SDIL	Specific Conductance	17-NOV-1998	17-NOV-1998	---	---
00250760	Moisture	---	---	18-NOV-1998	18-NOV-1998
110415SW	Chloride Dissolved	17-NOV-1998	17-NOV-1998	---	---
TEHSN	EPH 10-19,19-32 Soils	---	---	19-NOV-1998	19-NOV-1998
PKG-BT24	BTEX by P&T	---	---	14-NOV-1998	14-NOV-1998
<hr/>					
	Matrix:	Soil	Soil	Soil	Soil
	Sampled on:	10-NOV-1998	10-NOV-1998	10-NOV-1998	10-NOV-1998



PHILIP ANALYTICAL

24-Nov-98
Page 11 of 18

ANALYSIS DATES

Philip ID:		98064584	98064586	98064589	98064590
Client ID:		CDBH6X0	CDBH6X2	CDBH7X0	CDBH8X0
		.2-0.5	.0-2.2	.7-1.0	.1-0.5
<hr/>					
0004DI02	pH (DI 1:2)	18-NOV-1998	18-NOV-1998	18-NOV-1998	18-NOV-1998
00250760	Moisture	18-NOV-1998	18-NOV-1998	18-NOV-1998	18-NOV-1998
As-T200H	Arsenic	16-NOV-1998	16-NOV-1998	16-NOV-1998	16-NOV-1998
Hg-T200M	Mercury	17-NOV-1998	17-NOV-1998	17-NOV-1998	17-NOV-1998
ICP-200S	Metals Pkg:ICP Soil	17-NOV-1998	17-NOV-1998	17-NOV-1998	17-NOV-1998
Se-T200H	Selenium	16-NOV-1998	16-NOV-1998	16-NOV-1998	16-NOV-1998
TEHSN	EPH 10-19,19-32 Soils	19-NOV-1998	18-NOV-1998	18-NOV-1998	18-NOV-1998
<hr/>					
Matrix:		Soil	Soil	Soil	Soil
Sampled on:		10-NOV-1998	10-NOV-1998	10-NOV-1998	10-NOV-1998
<hr/>					



PHILIP ANALYTICAL

24-Nov-98
Page 12 of 18

ANALYSIS DATES

Philip ID:	98064591	98064601
Client ID:	CDBH9X0	CDBH9X1
	.1-0.3	.2-1.4

0004DI02	pH (DI 1:2)	18-NOV-1998	---
00250760	Moisture	18-NOV-1998	---
As-T200H	Arsenic	16-NOV-1998	---
Hg-T200M	Mercury	17-NOV-1998	---
ICP-200S	Metals Pkg:ICP Soil	17-NOV-1998	---
Se-T200H	Selenium	16-NOV-1998	---
TEHSN	EPH 10-19,19-32 Soils	17-NOV-1998	---

Matrix:	Soil	Soil
Sampled on:	10-NOV-1998	10-NOV-1998



PHILIP ANALYTICAL

24-Nov-98
Page 13 of 18

BATCH NUMBERS

Philip ID:		98064568	98064570	98064572	98064573
Client ID:		CDBH1X0	CDBH1X1	CDBH2X0	CDBH2X0
		.1-0.3	.2-1.5	.1-0.3	.8-1.0
<hr/>					
0011SDIL	Specific Conductance	84405013	84405013	---	---
00250760	Moisture	---	---	84405020	84405020
110415SW	Chloride Dissolved	84101682	84101682	---	---
TEHSN	EPH 10-19,19-32 Soils	---	---	85206090	85206090
PKG-BT24	BTEX by P&T	---	---	---	85206038
<hr/>					
Matrix:		Soil	Soil	Soil	Soil
Sampled on:		10-NOV-1998	10-NOV-1998	10-NOV-1998	10-NOV-1998
<hr/>					



PHILIP ANALYTICAL

24-Nov-98
Page 14 of 18

BATCH NUMBERS

Philip ID:		98064574	98064575	98064576	98064578
Client ID:		CDBH2X1	CDBH2X2	CDBH2X3	CDBH3X1
		.3-1.5	.3-2.6	.0-3.2	.0-1.3
<hr/>					
00250760	Moisture	84405020	84405020	84405020	84405020
TEHSN	EPH 10-19,19-32 Soils	85206090	85206090	85206090	85206090
PKG-BT24	BTEX by P&T	---	85206039	85206039	---
<hr/>					
Matrix:		Soil	Soil	Soil	Soil
Sampled on:		10-NOV-1998	10-NOV-1998	10-NOV-1998	10-NOV-1998
<hr/>					



PHILIP ANALYTICAL

24-Nov-98
Page 15 of 18

BATCH NUMBERS

Philip ID:		98064580	98064581	98064582	98064583
Client ID:		CDBH4X0	CDBH4X0	CDBH5X0	CDBH5X0
		.0-0.3	.6-0.9	.1-0.4	.6-1.0
<hr/>					
0011SDIL	Specific Conductance	84405013	84405013	---	---
00250760	Moisture	---	---	84405020	84405020
110415SW	Chloride Dissolved	84101682	84101682	---	---
TEHSN	EPH 10-19,19-32 Soils	---	---	85206090	85206090
PKG-BT24	BTEX by P&T	---	---	85206039	85206039
<hr/>					
Matrix:		Soil	Soil	Soil	Soil
Sampled on:		10-NOV-1998	10-NOV-1998	10-NOV-1998	10-NOV-1998
<hr/>					



PHILIP ANALYTICAL

24-Nov-98
Page 16 of 18

BATCH NUMBERS

Philip ID:	98064584	98064586	98064589	98064590
Client ID:	CDBH6X0	CDBH6X2	CDBH7X0	CDBH8X0
	.2-0.5	.0-2.2	.7-1.0	.1-0.5

0004DI02	pH (DI 1:2)	84405022	84405022	84405022	84405022
00250760	Moisture	84405020	84405020	84405020	84405020
As-T200H	Arsenic	84204125	84204125	84204125	84204125
Hg-T200M	Mercury	84204132	84204132	84204132	84204132
ICP-200S	Metals Pkg:ICP Soil	84204122	84204122	84204122	84204122
Se-T200H	Selenium	84204125	84204125	84204125	84204125
TEHSN	EPH 10-19,19-32 Soils	85206090	85206090	85206090	85206090

Matrix:	Soil	Soil	Soil	Soil
Sampled on:	10-NOV-1998	10-NOV-1998	10-NOV-1998	10-NOV-1998



PHILIP ANALYTICAL

24-Nov-98
Page 17 of 18

BATCH NUMBERS

Philip ID:	98064591	98064601
Client ID:	CDBH9X0	CDBH9X1
	.1-0.3	.2-1.4

0004DI02	pH (DI 1:2)	84405022	---
00250760	Moisture	84405020	---
As-T200H	Arsenic	84204125	---
Hg-T200M	Mercury	84204132	---
ICP-200S	Metals Pkg:ICP Soil	84204122	---
Se-T200H	Selenium	84204125	---
TEHSN	EPH 10-19,19-32 Soils	85206091	---

Matrix:	Soil	Soil
Sampled on:	10-NOV-1998	10-NOV-1998



PHILIP ANALYTICAL

24-Nov-98
Page 18 of 18

BLANK SUMMARY

All method blanks were less than MDL, except the following:

Parameter	Batch	Sparcode	Blank Conc.	MDL	Unit
m,p - Xylene	85206038	X003PT12	0.03	0.03	ug/g
m,p - Xylene	85206039	X003PT12	0.04	0.03	ug/g
Zinc	84204122	Zn-T200S	0.3	0.2	ug/g

SAMPLE INTEGRITY RECORD

Client: Conor Pacific
 Date: Nov. 13/98 Initials: MG COC Form #: 8031789

The following bottles were received for the above project:

Sample #	100mL AG	180mL AG	1L AG	1L CG	1L PL	500mL AG	500mL CG	250mL PL HNO3	250mL PL H2SO4	250mL PL	MICRO	100mL AG	40mL vials	Trip/Field Blk	Plastic Bag	Other
1																
2																
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																

Client: CPET
 Date: Nov. 13/98 Initials: MG COC Form #: 8031790

The following bottles were received for the above project:

Sample #	100mL AG	180mL AG	1L AG	1L CG	1L PL	500mL AG	500mL CG	250mL PL HNO3	250mL PL H2SO4	250mL PL	MICRO	100mL AG	40mL vials	Trip/Field Blk	Plastic Bag	Other
1																
2																
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																

SAMPLE INTEGRITY RECORD

Client: CPE7
 Date: Nov. 13/98 Initials: MG COC Form #: 8031791

The following bottles were received for the above project:

Sample #	100mL AG	180mL AG	1L AG	1L CG	1L PL	500mL AG	500mL CG	250mL PL HNO3	250mL PL H2SO4	250mL PL	MICRO	100mL AG	40mL vials	Trip/Field Blk	Plastic Bag	Other
1																
2																
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																

Client: _____
 Date: _____ Initials: _____ COC Form #: _____

The following bottles were received for the above project:

Sample #	100mL AG	180mL AG	1L AG	1L CG	1L PL	500mL AG	500mL CG	250mL PL HNO3	250mL PL H2SO4	250mL PL	MICRO	100mL AG	40mL vials	Trip/Field Blk	Plastic Bag	Other
1																
2																
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																

PHILIP ANALYTICAL SERVICES

8577 Commerce Court
Burnaby, B.C. V5A 4N5

Phone: (604) 444-4808
Fax: (604) 444-4511
Toll Free: 1-800-440-4808

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

PAGE 1 OF 5

ANALYSIS REQUEST

✓ 8031789

COMPANY NAME: CONOR PACIFIC (CPEI)						PH. #: (604) 738-1100 FAX #: (604) 738-1166									
COMPANY ADDRESS: 300-1727 Broadway Ave Vancouver BC V6T 4W6						CLIENT PROJECT ID: (#) BCBC Route 9 8-2167-54 Cassidy (CD)									
SAMPLER NAME (PRINT): Greg Quandt						PROJECT MANAGER:									
FIELD SAMPLE ID	PHILIP LAB # (Lab Use Only)	MATRIX				# CONTAINERS	SAMPLING			EPH	BTEX/VPH	PAHs	Metals	Chloride	Conductivity
		GROUND WATER	SURFACE WATER	SOIL	OTHER		DATE	TIME	HEADSPACE VAPOUR						
CDBH1X0.1-0.3	64568			✓		1	11/10		25					✓	✓
CDBH1X0.7-1.0	64569			✓		1	11/10		10						
CDBH1X1.2-1.5	64570			✓		1	11/10		0					✓	✓
CDBH1X2.4-2.7	64571			✓		1	11/10		0						
CDBH2X0.1-0.3	64572			✓		2	11/10		0	✓					
CDBH2X0.8-1.0	64573			✓		2	11/10		0	✓	✓				
CDBH2X1.3-1.5	64574			✓		2	11/10		0	✓					
CDBH2X2.3-2.6	64575			✓		2	11/10		10	✓	✓				
CDBH2X3.0-3.2	64576			✓		2	11/10		0	✓	✓				
CDBH3X0.1-0.3	64577			✓		1	11/10		10						
CDBH3X1.0-1.3	64578			✓		1	11/10		25	✓					
CDBH3X1.6-1.9	64579			✓		1	11/10		0						
TAT <input type="checkbox"/> Two Week <input type="checkbox"/> One Week <input type="checkbox"/> 48 Hours <input type="checkbox"/> 24 Hours Other: _____		P.O. NUMBER:		SPECIAL DETECTION LIMITS / CONTAMINANT TYPE						ARRIVAL TEMPERATURE °C		LAB USE ONLY LAB INFORMATION			
		ACCOUNTING CONTACT:		SPECIAL REPORTING OR BILLING INSTRUCTIONS EDT <input type="checkbox"/>								9 Nov 19 PM			
RELINQUISHED BY SAMPLER:				DATE		TIME		RECEIVED BY:							
RELINQUISHED BY:				DATE		TIME		RECEIVED BY:							
RELINQUISHED BY:				DATE NOV. 13/98		TIME 9:50		RECEIVED BY LABORATORY: [Signature]							

page 164 of



PHILIP ANALYTICAL SERVICES

8577 Commerce Court
Burnaby, B.C. V5A 4N5Phone: (604) 444-4808
Fax: (604) 444-4511
Toll Free: 1-800-440-4808

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

PAGE 2 OF 3

ANALYSIS REQUEST

80317904

COMPANY NAME: C PET	PH. #:
COMPANY ADDRESS:	FAX #:
SAMPLER NAME (PRINT): G. Quandt	CLIENT PROJECT ID: (#) 8216754 Cassidy (CD)
	PROJECT MANAGER: J. Smith

FIELD SAMPLE ID	PHILIP LAB # (Lab Use Only)	MATRIX				# CONTAINERS	SAMPLING		
		GROUND WATER	SURFACE WATER	SOIL	OTHER		DATE	TIME	HEADSPACE VAPOUR
CDBH4X0.0-0.3 64580				✓		1	11/10		25
CDBH4X0.6-0.9 64581				✓		1	11/10		25
CDBH5X0.1-0.4 64582				✓		2	11/10		60
CDBH5X0.6-1.0 64583				✓		2	11/10		35
CDBH6X0.2-0.5 64584				✓		1	11/10		50
CDBH6X0.8-1.2 64585				✓		1	11/10		25
CDBH6X2.0-2.2 64586				✓		1	11/10		25
CDBH6X3.5-3.8 64587				✓		1	11/10		10
CDBH7X0.1-0.5 64588				✓		1	11/10		0
CDBH7X0.7-1.0 64589				✓		1	11/10		0
CDBH8X0.1-0.5 64590				✓		1	11/10		0
CDBH9X0.1-0.3 64591				✓		1	11/10		10

EPH
BTX / UPH
PAHs
Metals
Chloride
Conductivity

TAT <input type="checkbox"/> Two Week <input type="checkbox"/> One Week <input type="checkbox"/> 48 Hours <input type="checkbox"/> 24 Hours Other: _____	P.O. NUMBER:	SPECIAL DETECTION LIMITS / CONTAMINANT TYPE	LAB USE ONLY	
	ACCOUNTING CONTACT:	SPECIAL REPORTING OR BILLING INSTRUCTIONS EDT <input type="checkbox"/>	ARRIVAL TEMPERATURE °C	LAB INFORMATION 9 Nov 19 PM
RELINQUISHED BY SAMPLER:		DATE	TIME	RECEIVED BY:
RELINQUISHED BY:		DATE	TIME	RECEIVED BY:
RELINQUISHED BY:		DATE Nov 12/09	TIME 850	RECEIVED BY LABORATORY: M

CUSTODY
RECORD

**PHILIP ANALYTICAL SERVICES**8577 Commerce Court
Burnaby, B.C. V5A 4N5Phone: (604) 444-4808
Fax: (604) 444-4511
Toll Free: 1-800-440-4808**CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST**PAGE 2 OF 2**ANALYSIS REQUEST****8031791**

COMPANY NAME: CPEX	PH. #: FAX #:
COMPANY ADDRESS:	CLIENT PROJECT ID: (#) 8216754 Cassidy (CD)
SAMPLER NAME (PRINT):	PROJECT MANAGER:

FIELD SAMPLE ID	PHILIP LAB # (Lab Use Only)	MATRIX				# CONTAINERS	SAMPLING		
		GROUND WATER	SURFACE WATER	SOIL	OTHER		DATE	TIME	HEADSPACE VAPOUR
CDBH9X0.6-0.9	64600			✓		1	11/10		10
CDBH9X1.2-1.4	64600			✓		1	11/10		10
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									

EPH
BTEX / VPH
PAH
Metals
ChlorideTAT
Two Week ☐
One Week ☐
48 Hours ☐
24 Hours ☐
Other: _____

PO. NUMBER:	SPECIAL DETECTION LIMITS / CONTAMINANT TYPE
ACCOUNTING CONTACT:	SPECIAL REPORTING OR BILLING INSTRUCTIONS EDT <input type="checkbox"/>

LAB USE ONLY ARRIVAL TEMPERATURE °C	LAB INFORMATION NOV 19 pm 9:06
--	--

RELINQUISHED BY SAMPLER:	DATE	TIME	RECEIVED BY:
RELINQUISHED BY:	DATE	TIME	RECEIVED BY:
RELINQUISHED BY:	DATE NOV. 12/09	TIME 850	RECEIVED BY LABORATORY: M.

**CUSTODY
RECORD**

TAB E - FIGURE 1
Relationship between Sodium Adsorption Ratio and Chloride Concentration

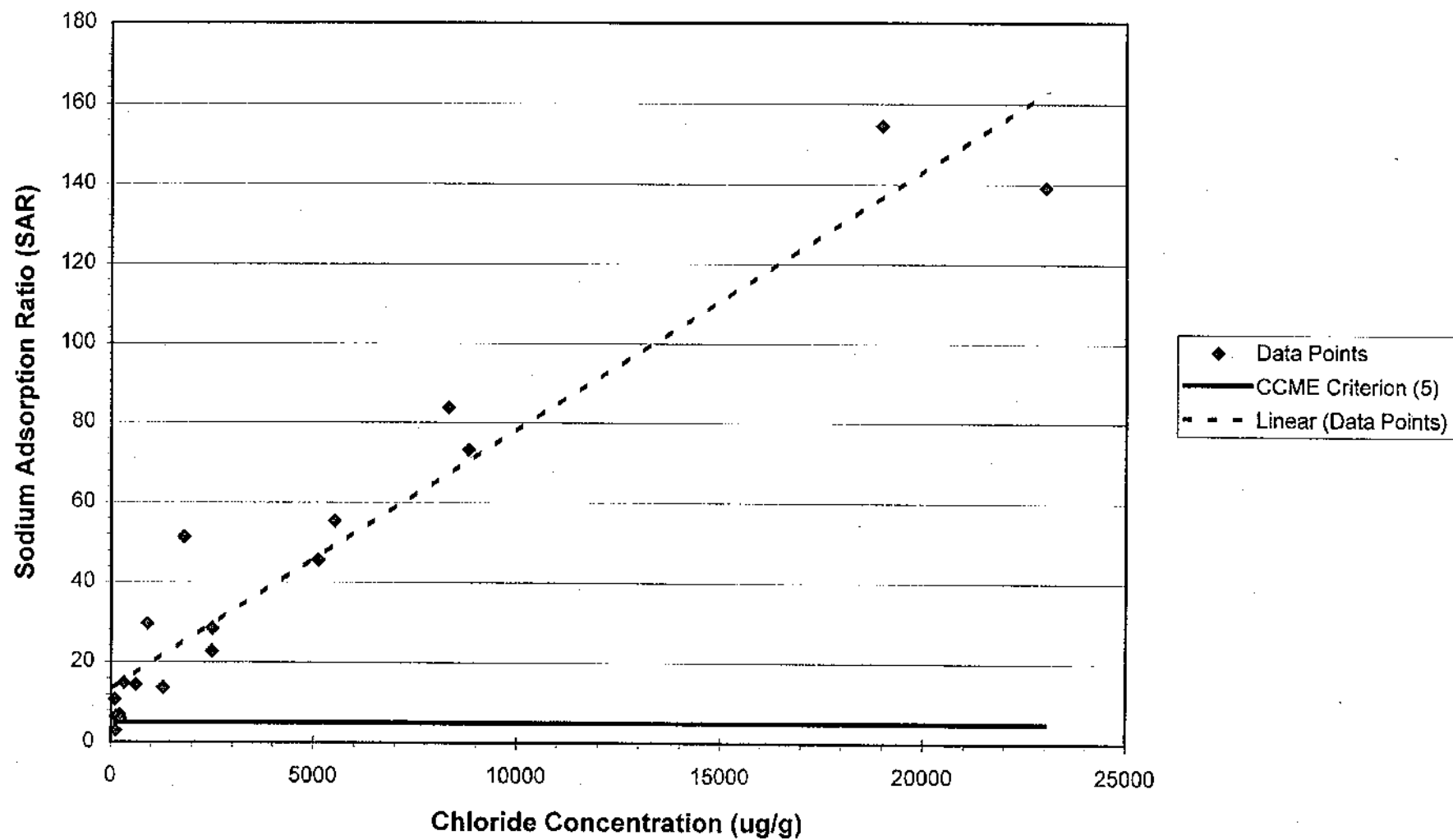




Photo 1 View east towards oil storage building, grease ramp and AST #2.



Photo 2 View north towards grease ramp, salt shed #2 and former location of UST #4.



Photo 3 View southwest towards waste oil AST #1.



Photo 4 View south towards exterior storage area A.



Photo 5 View south towards exterior storage area D and salt shed #1.

2



Photo 6 View northwest toward storage area G.



1950 Aerial Photograph - Cassidy



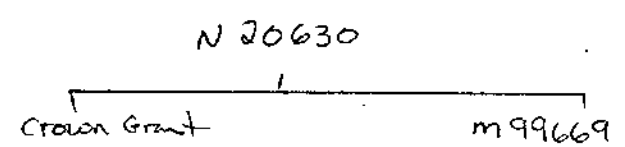
1975 Aerial Photograph - Cassidy



1984 Aerial Photograph - Cassidy

000-181-455

Lot 1, Sec 14, Rge 6
Cranberry Dist, Plan 40297



15052 N
12639 N

AFB
25-158-16785^c

AFB
10-170-8010^a

From Crown Grant

CONOR PACIFIC
365154
CASSIDY



ENVIRONMENTAL SEARCH FORM

Page 1 of _____

Client: CONOR PACIFIC

Invoice #: 365154

File Ref.: Cassidy

PID: 000-181-455

CURRENT LEGAL: Lot 1, Sec 14, Rge 6, Cranberry Dist, Plan 40297

Title No.	Registered Owner	Title Registered	Title Cancelled	Prior Legal(s)	Charge Information (Lease, RP, etc.)
N80630	British Columbia Buildings Corporation	March 13, 1984	current	as above	NONE
	From Crown Grant of m99669				
m99669	Her Majesty the Queen ---	Dec 14, 1983	march 13, 1984	as above	NONE
15052 N	s.22	May 26 1931	NA	Sec 14+15 Rge 6, of the E37 chains of Sec 15 Rge 5 Cranberry Dist as shown on Plan DD 7863, EXCEPT those parts of said Sec 14+15 Rge 6 lying E of the Nanaimo-Ladysmith Rd, containing 19.92 acres more or less as shown on plan DD 12921 N.	NONE
12639 N	s.22	Feb 28, 1929	June 17 1931	Sec 14+15 Rge 6 & the E 37 chains of Sec 15 Rge 5 Cranberry Dist, the whole containing 160 acres more or less as shown on Plan DD 7863	NONE
AFB 25-156-16765 C	s.22	March 16, 1908	NA	Cranberry Dist. E 37 chains of Sec 15 Rge 5 & Sec 14+15 Rge 6 containing in all 160 acres	

IMPORTANT: As all computer titles may not have been checked, charges appearing on them that could affect the property, such as leases, are not noted. Information must be checked against LTO records to verify. **Please request document copies or titles if required.** If you have any questions concerning how to read this form, please contact **West Coast Title Search Ltd.** in New Westminster at 525-9255 or 1-800-553-1936 and in Victoria at 383-3323 or 1-800-667-7767.

As Of: 98/08/25 13:24:08 BC Online: LAND TITLES - PARCEL SELECTION 98/08/25
Item: XTSA3440 For: PX45881 LAND 13:24:09
Folio: Printer: XIWC8594

Note: Additional Owners May Be Included On Title Displayed

000-181-455 S/40297/////1
PENDING APPLICATIONS: NONE

N20630 REGISTERED BRITISH COLUMBIA BUILDINGS CORPORATION
M99669 CANCELLED HER MAJESTY THE QUEEN IN RIGHT OF THE PROVINCE OF BRIT

LTO: I VICTORIA
TRX: QP M: A *** REQUEST INITIATED
KEY: 181455

PF1-Help PF3-Return PF7-Top PF8-Page Forward

Date: 98/08/25 TITLE SEARCH PRINT - VICTORIA
Requestor: (PX45881) WEST COAST TITLE SEARCH LTD.
TITLE - N20630

Time: 13:24:09
Page: 001

VICTORIA LAND TITLE OFFICE TITLE NO: N20630
FROM TITLE NO: M99669
CROWN GRANT

APPLICATION FOR REGISTRATION RECEIVED ON: 12 MARCH, 1984
ENTERED: 13 MARCH, 1984

REGISTERED OWNER IN FEE SIMPLE:
BRITISH COLUMBIA BUILDINGS CORPORATION
BOX 1112
VICTORIA, B.C.
V8W 2T4

TAXATION AUTHORITY:
NANAIMO/COWICHAN ASSESSMENT AREA

DESCRIPTION OF LAND:
PARCEL IDENTIFIER: 000-181-455
LOT 1, SECTION 14, RANGE 6, CRANBERRY DISTRICT, PLAN 40297

LEGAL NOTATIONS:

FOR PROVISOS, SEE CROWN GRANT N20630

CHARGES, LIENS AND INTERESTS:

NATURE OF CHARGE

CHARGE NUMBER	DATE	TIME
---------------	------	------

U & OTHER EX & RES RE GRANT N20630

N20879	1984-03-12	10:58
--------	------------	-------

REGISTERED OWNER OF CHARGE:

HER MAJESTY THE QUEEN IN RIGHT OF THE PROVINCE
OF BRITISH COLUMBIA

N20879

REMARKS: DD N20630 SECTION 47 LAND ACT

"CAUTION - CHARGES MAY NOT APPEAR IN ORDER OF PRIORITY. SEE SECTION 28, L.T.A."

DUPLICATE INDEFEASIBLE TITLE: NONE OUTSTANDING

TRANSFERS: NONE

PENDING APPLICATIONS: NONE

CORRECTIONS: NONE

Date: 98/08/25 TITLE SEARCH PRINT - VICTORIA
Requestor: (PX45881) WEST COAST TITLE SEARCH LTD.
TITLE - M99669

Time: 13:24:10
Page: 001

SECTION 98 LAND TITLE ACT

VICTORIA LAND TITLE OFFICE TITLE NO: M99669
FROM TITLE NO: 15052N

APPLICATION FOR REGISTRATION RECEIVED ON: 12 OCTOBER, 1983
ENTERED: 14 DECEMBER, 1983

TITLE CANCELLED: 13 MARCH, 1984

REGISTERED OWNER IN FEE SIMPLE:

HER MAJESTY THE QUEEN IN RIGHT OF THE PROVINCE OF BRITISH COLUMBIA
C/O MINISTRY OF LANDS, PARKS AND HOUSING,
3400 DAVIDSON AVENUE,
VICTORIA, B.C.,
V8W 2Y9
FILE: 1400772 (2 TUBE 1208)

TAXATION AUTHORITY:

NANAIMO ASSESSMENT DISTRICT

DESCRIPTION OF LAND:

PARCEL IDENTIFIER: 000-181-455
LOT 1, SECTION 14, RANGE 6, CRANBERRY DISTRICT, PLAN 40297

LEGAL NOTATIONS: NONE

CHARGES, LIENS AND INTERESTS: NONE

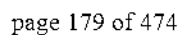
DUPLICATE INDEFEASIBLE TITLE: NONE OUTSTANDING

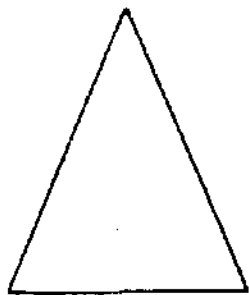
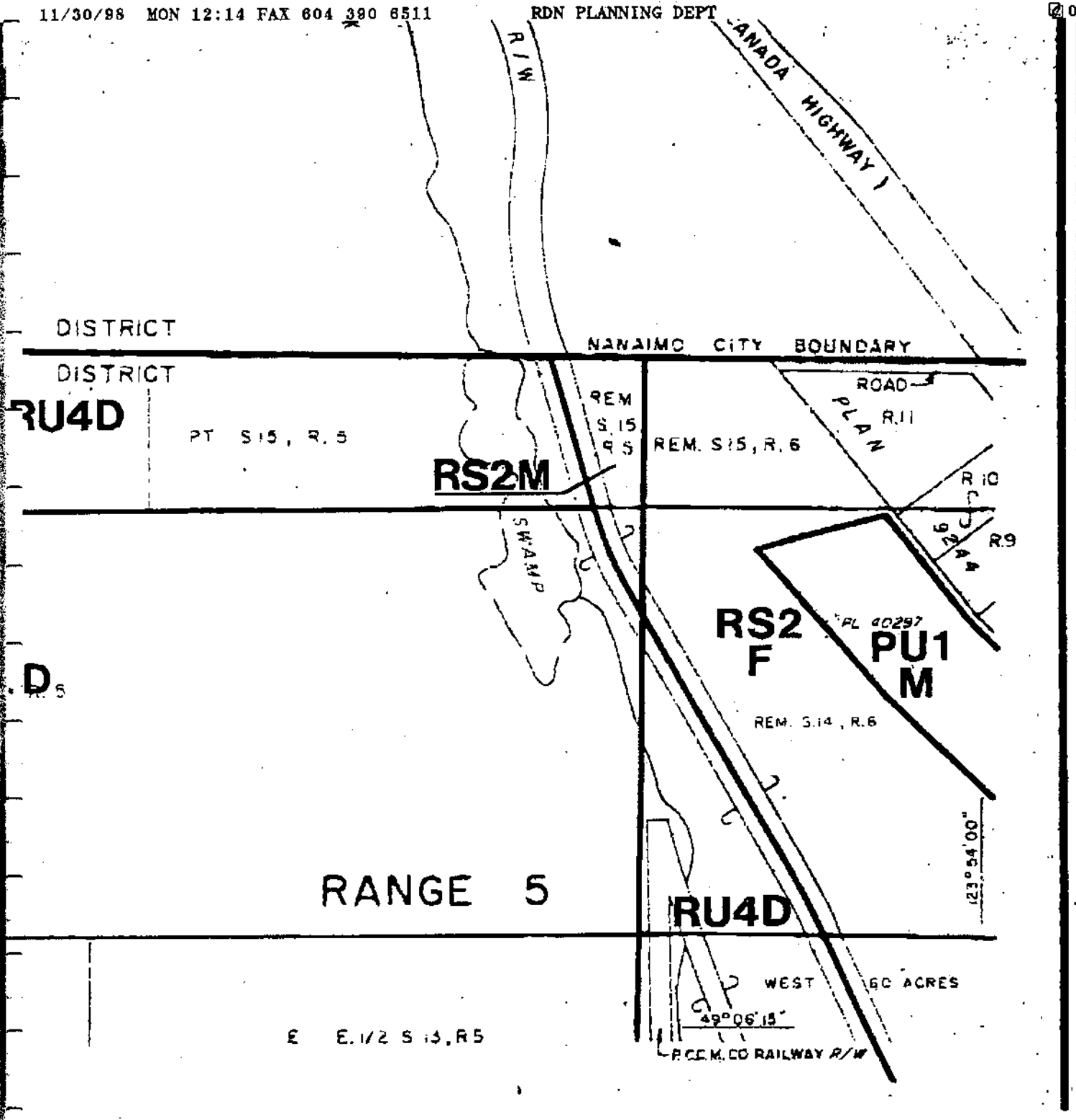
TRANSFERS:

1984-03-13

ALLN20630

CORRECTIONS: NONE





NORTH

National Topographic System

92G/4W27

RDN Reference

28 28

Victoria Land Registration District
Cranberry, Nanaimo Land Districts
Scale: 1:5000



RDN Bylaw No. 500

This is an excerpt only from "Regional District of Nanaimo Land Use and Subdivision Bylaw No. 500, 1987" and should not be used for interpretive or legal purposes without reference to the entire Bylaw.

Section 6.4.41**PUBLIC 1****PU1****Permitted uses and Minimum Site Area**

Permitted Uses	Required Site Area with:		
	Community Water & Sewer System	Community Water System	No Community Services
a) Personal Care	4000 m ²	5000 m ²	8000 m ²
b) Personal Care Unit	400 m ²	1600 m ²	1.0 ha
c) Public Assembly Use	4000 m ²	5000 m ²	8000 m ²
d) Public Utility Use	500 m ²	1000 m ²	1500 m ²
e) Residential Use ¹	n/a	n/a	n/a
f) School	4000 m ²	5000 m ²	8000 m ²

Maximum Number and Size of Buildings and Structures

Dwelling units/parcel ²	- 1
Height	- 8.0 m
Parcel coverage	- 50% ³

Minimum Setback Requirements

Front lot line	- 8.0 m
Other lot lines	- 5.0 m

except where any part of a parcel is adjacent to or contains a watercourse then the regulations in Section 3 of this Part shall apply.

¹ Bylaw No. 500.13, adopted October 13, 1987

² Bylaw No. 500.13, adopted October 13, 1987

³ Bylaw No. 500.198, adopted May 14, 1996



**REGIONAL
DISTRICT
OF NANAIMO**

EXCERPT FROM BYLAW NO. 500

SCHEDULE '7B'

SUBDIVISION DISTRICTS

1. The minimum size of any lot created by subdivision shall be determined by the standard of services provided and shall meet the applicable minimal parcel size set out below.

Copyright

RDN Bylaw No. 500

This is an excerpt only from "Regional District of Nanaimo Land Use and Subdivision Bylaw No. 500, 1987" and should not be used for interpretive or legal purposes without reference to the entire Bylaw.

HIGHWAYS YARDSITE INSPECTION

LOCATION Cassidy Highways Yard

DATE INSPECTED 1988 11 03

INSPECTOR Dan Rettmer

APPROXIMATE TOTAL BUILDING AREA

GENERAL COMMENTS (Condition, serious deficiencies, etc.)

Yard is fully paved and is in good condition.

Total Immediate Corrective Estimate \$

Total Long Term Corrective Estimate \$

Condition - V - Very Good
S - Satisfactory
A - Needs Attention - not serious
* - Needs Attention - serious

CHECK LIST FOR HIGHWAYS YARDSITES

LOCATION DESCRIPTION	COND.	NEEDS SERIOUS/NOT SERIOUS	GENERAL COMMENTS
A.SITE			
1.GROUNDS			
Fully paved yard in good condition.			
Some grass lawns at back of building.			
2.FENCING			
Yard is fully fenced but has no dividing fence between the contractors building			
and the Department of Highways Buildings - all in good condition.			

Immediate Corrective

Estimate \$ _____

Long Term Corrective

Estimate \$ _____

CHECK LIST FOR HIGHWAYS YARDSITES

LOCATION DESCRIPTION	COND.	NEEDS SERIOUS/NOT SERIOUS	GENERAL COMMENTS
B. BUILDING ENVELOPE			
1.a) Roofs/Canopies			
Main Shop - 3 roofs - tar and gravel - all in good condition			
Fuel Shed - tar and gravel - good condition;			
Salt Shed - tin roof - new condition.			
b) Support Structure			
Main Shop is wood framed - good condition;			
Salt Shed - concrete walls and gluelam beams - new condition;			
Fuel Shed - wood frame - good condition.			
c) Flashings			
All flashings are prefinished - metal - good condition.			

Immediate Corrective

Estimate \$ _____

Long Term Corrective

Estimate \$ _____

CHECK LIST FOR HIGHWAYS YARDSITES

LOCATION DESCRIPTION	COND.	NEEDS SERIOUS/NOT SERIOUS	GENERAL COMMENTS
d) Penetrations			
Good condition.			
e) Rainwater Goods			
All aluminum gutter and downs in good condition.			

Immediate Corrective

Estimate \$ _____

Long Term Corrective

Estimate \$ _____

CHECK LIST FOR HIGHWAYS YARDSITES

LOCATION DESCRIPTION	COND.	NEEDS SERIOUS/NOT SERIOUS	GENERAL COMMENTS
2.WALLS			
a) Exterior			
Main Shop - 1 x 6 lap siding - good condition.			
Salt Shed - conc. walls in new condition.			
Fuel Shed - 1 x 6 lap siding - good condition.			
b) Interior			
Fuel Shed - plywood walls - good condition.			
Main Shop Bays - plywood walls - good condition.			
Main Shop Office - drywall - good condition.			

Immediate Corrective
Estimate \$ _____

Long Term Corrective
Estimate \$ _____

PAGE 5		CHECK LIST FOR HIGHWAYS YARDSITES		
LOCATION DESCRIPTION	COND.	NEEDS SERIOUS/NOT SERIOUS	GENERAL COMMENTS	
3.WINDOWS				
a) Frames/Glazing				
Fuel Shed - wood framed, single glazing - good condition.				
Main Shop - wood framed - single glazing - good condition.				
b) Curtains/Rods etc.				
4.DOORS				
a) Interior				
Wood doors - good condition - Main Shop.				
b) Exterior				
Fuel Shed - steel man door - sliding wood - good condition.				
Main Shop - wood doors - good condition.				
Main Shop-10 overhead doors - good condition.				

Immediate Corrective
Estimate \$ _____

Long Term Corrective
Estimate \$ _____

CHECK LIST FOR HIGHWAYS YARDSITES

LOCATION DESCRIPTION	COND.	NEEDS SERIOUS/NOT SERIOUS	GENERAL COMMENTS
5. CEILINGS			
a) Ceiling			
Fuel Shed - open framework - good condition;			
Main Shop - 9 bays drywall - good condition and/Bay open frame - good condition.			
Main Shop Office - T-Bar ceiling - good condition.			
b) Light Fixtures			
Fuel Shed - fluorescent - good condition.			
Main Shop Office - all fluorescent - good condition.			
Main Shop Bays - HPS lighting in good condition; Bridge Crew Bay - 6 fluor. lights complete with full wraps-good			
c) Diffusers			
Fuel Shed - none			
Main Shop Office - all lights have diff. - good condition except 4 lights.			
d) Emerg. Lighting			
e) Smoke Detectors			
Fuel Shed - heat detectors - good condition.			
Main Shop - office - heat det. - good condition.			

Immediate Corrective

Estimate \$ _____

Long Term Corrective

Estimate \$ _____

PAGE 8

CHECK LIST FOR HIGHWAYS YARDSITES

LOCATION DESCRIPTION	COND.	NEEDS SERIOUS/NOT SERIOUS	GENERAL COMMENTS
C. SEWER SYSTEMS			
Complex is on septic system shared by both - in good condition.			
Immediate Corrective			

Immediate Corrective
Estimate \$ _____

Long Term Corrective
Estimate \$ _____

D. WATER SYSTEMS

Both halves of complex on same deep well complete with filter system - good condition.				

Immediate Corrective
Estimate \$ _____

Long Term Corrective
Estimate \$ _____

PAGE 9

CHECK LIST FOR HIGHWAYS YARDSITES

LOCATION DESCRIPTION	COND.	NEEDS SERIOUS/NOT SERIOUS	GENERAL COMMENTS
E.H.V.A.C. SYSTEMS			
Fuel Shed - electric unit heater - good condition.			
Oil Fired Boiler (hot water) - good condition - main shop.			

Immediate Corrective

Estimate \$ _____

Long Term Corrective

Estimate \$ _____

F.ELECTRICAL

Fuel Shed - good condition			
Main Building - good condition			

Immediate Corrective

Estimate \$ _____

Long Term Corrective

Estimate \$ _____

PHASE ONE OF ENVIRONMENTAL AUDIT

INDEX RATING 15.65%
0%

AN EVALUATION OF RISK SURROUNDING ENVIRONMENTAL CONCERNS:
the higher the point value, the higher the assessed risk of environmental problems)

BUILDING NAME & NUMBER:	CASSIDY HWYS YARD SITE
ADDRESS:	KIPP RD. NANAIMO
DATE OF INSPECTION:	91.06.27
INSPECTED BY:	D. RETTNER / s.22

CATEGORY TOTALS

I - GENERAL INFORMATION	0 /4	2
II - PHYSICAL & HISTORICAL	0 /75	11
III - BUILDING WASTES	0 /43	7
IV - RECYCLING	0 /0	0
V - PESTICIDES/HERBICIDES	0 /6	0
VI - CFC & HALON	0 /16	0
VII - AIR CONTAMINATION	0 /6	2
VIII - ENERGY CONSERVATION	0 /10	4
IX - PCB'S	0 /10	2
X - ASBESTOS	0 /15	0
XI - STORAGE TANKS	0 /30	9
XII - CHEMICALS	0 /37	0
XIII - WATER CONTAMINATION	0 /10	4

ENVIRONMENTAL INDEX RATING ... 0 /262 POINTS 41

UPDATE COMMENTS:

I. GENERAL INFORMATION

a) Which of the following best describes this property?

Bldg ☐ Bare land site ☐ Complex ☒

b) Is it presently occupied?

1/2 OCCUPIED

c) Is it owned or leased?

OWNED

If leased, what is the lease expiry date?

d) What percentage of the building do we occupy? HWYS - 50%
ISH. HWY SERV. - 50%

e) How long have we occupied this site?

20 YRS

f) What type(s) of operations or businesses are conducted at this property

HWY MAINTENANCE

g) What were the past uses of this site?

SAME

h) What is the age of the building?

if built in the 1990's - no points
if built in the 1980's give 1 point
if built in the 1970's give 2 points
if built prior to 1970 give 4 points

2

II. PHYSICAL & HISTORICAL INFORMATION

a) Was this site ever used as a landfill?

No (0) ☐ Don't know (1) ☐ yes (2) ☐

b) Has there been any fill material deposited on the site?

No (0) ☐ Don't know (1) ☐ yes (2) ☐

II. PHYSICAL & HISTORICAL INFORMATION

b) If known, what is the source(s) and the type of material(s)?

c) Identify the neighbouring properties

s.22

North	<u> </u>
South	<u> </u> <i>11</i>
East	<u> </u> <i>11</i>
West	<u> </u> <i>11</i>

- PRIVATE OWNED

d) Is there any record or history of chemicals dumped on the site?

If so, list the chemical(s) and the source if known

No (0) ☒ Don't know (1) ☐ yes (10) ☐

e) Have there been any accidental spills?

If so, list the substance(s) and the source if known

What was the quantity of the spill?

No (0) ☐ Don't know (1) ☐ yes (5) ☐

II. PHYSICAL & HISTORICAL INFORMATION

- f) Is there salt stored on the site? No (0) ☐ Don't Know (1) ☐ yes (2) ☒
- g) Is the salt exposed to wind or rain? No (0) ☒ Don't know (1) ☐ yes (2) ☐
- h) If applicable, describe the building/shed CONCRETE METAL ROOF
- i) Is the salt stored on a permeable floor? No (0) ☒ Don't know (1) ☐ yes (2) ☐
- j) Are there any water wells on site? No (0) ☐ Don't know (1) ☐ yes (2) ☒
- k) What is the ground water level? (in feet) >50 (0) ☐ 10-50 (2) ☒ <10 (5) ☐
Don't know (2) ☐
- l) Are there any neighbours who use the ground water for drinking? No (0) ☒ Don't know (1) ☐ yes (2) ☐
- m) Have there been any complaints about the well water quality? No (0) ☒ Don't know (1) ☐ yes (2) ☐
- n) Has the ground water been analysed? NO
- If yes, the ground water results were good (0) ☐ Don't know (5) ☐ Neg (10) ☐
- o) Has the soil been analysed? NO
- If yes, the soil results were good (0) ☐ Don't know (5) ☐ Neg (10) ☐
- p) Are there physical signs of contamination? No (0) ☒ Don't Know (1) ☐ yes (2) ☐
- q) Is there a sewage lagoon in the area? No (0) ☒ Don't know (1) ☐ yes (2) ☐

II. PHYSICAL & HISTORICAL INFORMATION

r) Is the site near a sensitive ecological area? No (0) ☒ Don't know (1) ☐ yes (2) ☐

If so, describe which type

s) Is there any site drainage? No (0) ☐ Don't know (1) ☐ yes (2) ☒

If so, does it appear to be contaminated? No (0) ☐ Don't know (1) ☐ yes (2) ☒

t) Are there surface waters nearby? No (0) ☒ Don't know (1) ☐ yes (2) ☐

If so, identify

u) If the property is in a flood plain,
In years, what is the return period
of the flood? 00+ (0) ☐ 200 (1) ☐ 100 (2) ☐
This property is not in a flood plain ☒

v) Is the property in a geographical area of BC
where Radon or other natural substances may
pose a hazard? No (0) ☒ Don't know (1) ☐ yes (5) ☐

If so, describe

III. BUILDING WASTES

a) Are any special wastes generated on the
property/building(s) No (0) ☐ yes (5) ☒

III. WASTES FROM BUILDING

If so, list the special wastes and method of disposal.

OIL PUMPED BY TRUCK
ANTIFREEZE STORED

Also include other wastes generated or stored on this site and the disposal method

SALT TRUCKED

- b) Is client disposing of oil, petroleum products or chemicals to either of the following?

dumping to on-site landfill (10)
dumping to storm drain or sewer (10)

☒ Other (5) ☐
☒ Don't know (5) ☐

Specify other location if known

- c) Are batteries stored directly on the ground No (0) ☒ Don't know (1) ☐ Yes (2) ☐

- d) Does the client possess special waste manifests for oil, batteries and other special waste?

all (0) ☐ Don't know (2) ☐ some (1) ☐
none (2) ☒

- e) Is there an incinerator on site?

No (0) ☒ yes (2) ☐

- f) Are there any bio-medical wastes being generated by the client?

No (0) ☒ Don't know (1) ☐ yes (2) ☐

If so, how are they disposed of?

IV. RECYCLING

- a) Are there recyclables in the waste stream?

YES - OIL / ANTIFREEZE

IV. RECYCLING

- b) Are any currently being recycled? YES - OIL
- c) If no recycling is currently underway are there sufficient quantities to recycle? _____
- d) If not recycling, how are they disposed of? ANTIFREEZE - STORED
- e) How are the recyclables stored? 45 GAL DRUMS.

V. PESTICIDES/HERBICIDES

- a) Are there any pesticides or herbicides being used on the site? No (0) ☒ Don't know (1) ☐ yes (2) ☐
- b) Is an organic alternative used? _____
- c) Are there any pesticides or herbicides being stored on site? No (0) ☒ Don't know (1) ☐ yes (2) ☐
- d) Are they stored in a paved, bermed and enclosed area? No (2) ☐ Don't know (1) ☐ yes (0) ☐

VI. CFC & HALON

- a) Is there a freon using air conditioning system in the building? No (0) ☒ Don't know (1) ☐ yes (2) ☐
If so, describe type of unit _____
- b) Is freon being released during servicing? No (0) ☒ Don't know (1) ☐ yes (5) ☐

VI. CFC & HALON

- c) Is there a Halon fire extinguishing system? No (0) ☒ Don't know (1) ☐ yes (2) ☐
- d) Are there portable Halon extinguishers? No (0) ☒ Don't know (1) ☐ yes (2) ☐
- e) Is Halon being released during servicing? No (0) ☒ Don't know (1) ☐ yes (5) ☐

VII. AIR CONTAMINATION

- a) Is there an air handling system present? No (2) ☒ Don't know (1) ☐ yes (0) ☐
- b) Are there any air quality complaints? No (0) ☒ Don't know (1) ☐ yes (2) ☐
- c) Have tests shown air to be contaminated? No (0) ☒ Don't know (1) ☐ yes (2) ☐

VIII. ENERGY CONSERVATION

- a) What is the Building Energy Performance Index (BEPI)?

DON'T KNOW

- b) Has the mechanical system been checked for peak efficiency?

No (2) ☐ Don't know (1) ☒ yes (0) ☐

Currently, is there a problem?

No (0) ☐ Don't know (1) ☒ yes (4) ☐

If so, describe the nature of the problem

- c) Has the electrical system been checked for peak efficiency?

No (2) ☒ Don't know (1) ☐ yes (0) ☐

Currently, is there a problem?

No (0) ☒ Don't know (1) ☐ yes (4) ☐

If so, describe the nature of the problem

IX. PCB'S

- a) Are there any suspect transformers, ballasts or capacitors in the building? No (0) ☐ Don't know (1) ☐ yes (2) ☒
- b) Are there any PCB's being stored on site? No (0) ☒ Don't know (1) ☐ yes (2) ☐
- If so, is the site registered with the Ministry of Environment? No (2) ☐ Don't know (1) ☐ yes (0) ☐
- c) Is there any record of a PCB spill in the past? No (0) ☒ Don't know (1) ☐ yes (4) ☐

X. ASBESTOS

- a) Does the building have asbestos? No (0) ☒ Don't know (1) ☐ yes (5) ☐
- b) If so, has there been an inspection in the previous 12 months? No (10) ☐ Don't know (1) ☐ yes (0) ☐

XI. ABOVEGROUND & UNDERGROUND TANKS

- a) Any known underground tanks on site? No (0) ☐ Don't know (1) ☐ yes (2) ☒
- b) Is a management program in place? No (10) ☐ yes (0) ☒
- If so, please attach management program documentation to this audit form.
- c) Does a visual inspection indicate any spillage or contamination? No (0) ☐ Don't know (1) ☐ yes (2) ☒

XI. ABOVEGROUND & UNDERGROUND TANKS

d) Are materials stored in aboveground tanks? No (0) ☐ yes (5) ☒

e) Condition of the aboveground tanks? good (0) ☐ deteriorated (5) ☐

Describe the area where the tanks are kept
area is paved, bermed and secure (0)
area is paved but not bermed (2)
area is unpaved (6)

☐
☐
☐

f) For the aboveground tanks, if they store other products besides petroleum and water please list what the product is

NO

XII. CHEMICALS

a) Is there a laboratory on site? No (0) ☐ Don't know (1) ☐ yes (2) ☐

b) Are there any chemicals used on site? No (0) ☒ Don't know (2) ☐ yes (5) ☐

c) Are raw material or waste chemicals stored in on-site drums? No (0) ☐ yes (5) ☐

d) Condition of the drums? good (0) ☐ deteriorated (10) ☐

e) Describe the area where these drums are stored
area is paved, bermed and secure (0)
area is paved but not bermed (2)
area is unpaved (6)

☐
☐
☐

XII. CHEMICALS

- f) Are the drums kept closed? No (2) ☐ Don't know (1) ☐ yes (0) ☐
- g) Are the drums labeled? No (2) ☐ Don't know (1) ☐ yes (0) ☐
- h) Describe housekeeping of indoor and outdoor chemical storage areas good (0) ☐ Poor (5) ☐

XIII. CONTAMINATION OF WATER IN THE BUILDING

- a) Have there been studies done to check for lead in the water? No (2) ☒ Don't know (1) ☐ yes (0) ☐

If so, do the results present a hazard to the tenants?

No (0) ☐ Don't know (1) ☐ yes (2) ☐

- b) Have any studies been done by the local Ministry of Health or other authorities to see if there are any problems with the local water supply or with water in other buildings in the area?

NO

If so, What was the water tested for?

Were there unfavorable results?

No (0) ☐ Don't know (1) ☐ yes (2) ☐

- c) Have there been complaints relating to the water in the building?

No (0) ☐ Don't know (1) ☐ yes (2) ☒

SOURCES OF INFORMATION:

HISTORICAL DATA FROM EMPLOYEES.

ON SITE INSPECTIONS

DISCUSSIONS WITH USERS

UNDERGROUND TANK TESTING CONSULTANTS

PCR TESTING BY CONSULTANT

ASBESTOS TESTING — 11 —

SEE NEXT PAGE FOR SITE PLAN

yes ☐

No ☒

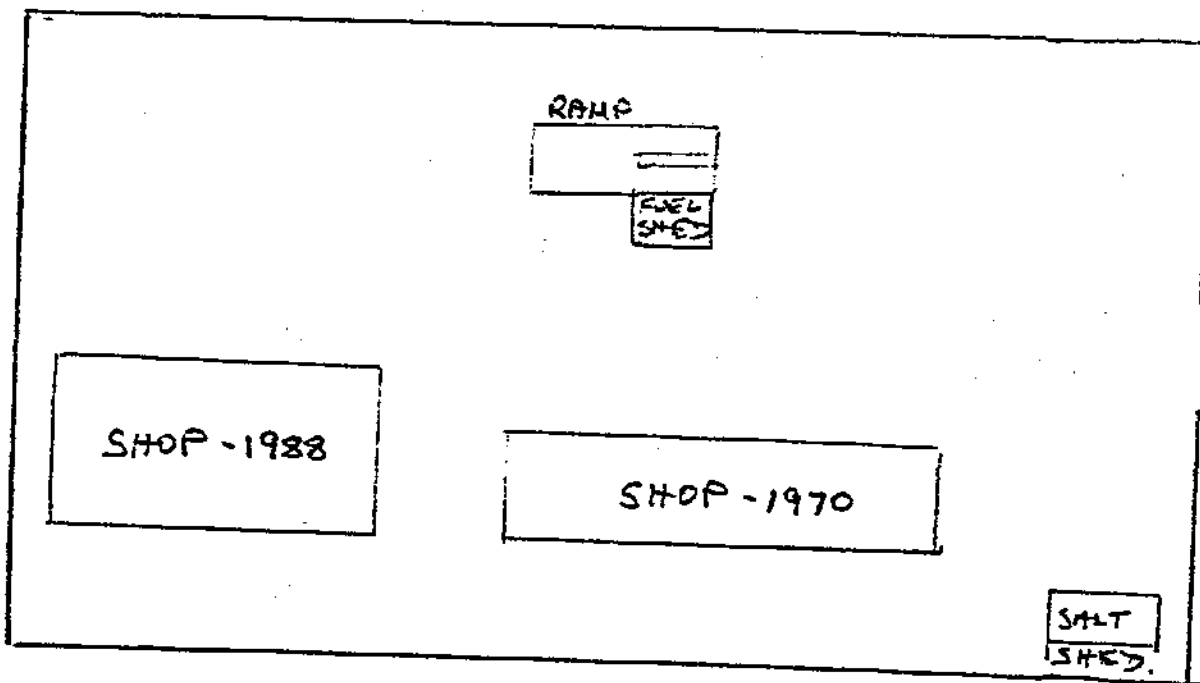
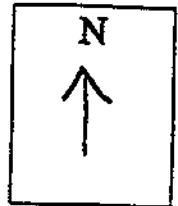
sch @ PMU 809 (03-14-91)

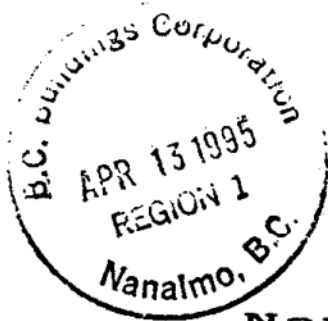
file > C:\LOTUS\E-AUDIT.WK1

PROPERTY SITE PLAN

DRAWN BY: D. RETTNER

DATE: 9/05/87





K-✓
DR
D.A.

1. EL Pte. 2000
Lateral Highway 2000

MASTER ROOTER
3124 Mexicana Road
Nanaimo, BC (604) 754-3393

April 6, 1995

BCBC
Attn: Kevin

RE: Highways Yard - Cassidy

Dear Kevin

There are two sumps at the wash rack, one with holes, one with a solid plate. While cleaning the wash rack sumps I lifted the solid plate, the sump was full of oil. Someone had lifted the plate and dumped oil into it on purpose. The oil didn't make it to the outflow. If it had it would have been a major pollution problem. The supervisor has been notified.

Sincerely

Bruce Campbell
MASTER ROOTER

Printed By: D-AMOS @RO
SENT: 97-03-10 09:39
FROM: D-AMOS

TO: D-RETTMER @RO
CC. K-SUTCLIFFE @RO
SUBJECT: HWYS MAINTENANCE

In Reply to: 97-03-10 08:29 FROM D-RETTMER : HWYS MAINTENANCE

File: Cassidy MOTH

Dan,

When you were acting Property Manager, I took over the responsibility for Cassidy and Gabriola Yardsites, at which time you interpreted the licences to include lamp changes for office areas, but not for high bay mercury lighting as in Cassidy. Did you really mean in your attached note to include the high bay lighting with the contractors' responsibilities? Kevin has replaced mercury on demand at Cassidy on the same understanding long before I became involved. To change it now is going to take some major heat from the Mainroad guys. Similarly, the exterior mercury vapour lamps at Cassidy have been changed by us. Is this contradictory to your interpretation of the Licences?

Daryl

----- ORIGINAL ATTACHMENT -----

SENT: 97-03-10 08:29

FROM: D-RETTMER

TO: D-RETTMER.STAFF @RO

CC. D-AMOS @RO, K-SUTCLIFFE @RO

SUBJECT: HWYS MAINTENANCE

I'd like to clarify our responsibilities regarding lighting maintenance in highway yardsites so we are consistently applying the license of occupation.

In the license, we are responsible for "the maintenance and repair of basic electrical service and its distribution systems including electrical generators where supplied." This is part of the "asset maintenance responsibilities we carry under schedule A of the license. Under schedule B, the contractor is responsible for lamp and tube replacement. This will include those rather expensive mercury vapour, high pressure sodium, gold eye etc. lamp tubes that we have in some of our sites.

Dan

JARYL → BUILDING FILE

Cassidy MOTH
X90065

Letter to file

1997 03 21

Re: Cassidy Hwys Tank Removal

A project was carried out today to remove UST's at the Cassidy Hwys yardsite. The 3-3000 gal tanks (one gas and two diesel) tested tight on Aug.6 1996. The excavation was clean with no evidence of fuel odours or signs of contamination. A 3000 gal.waste oil tank was excavated behind the old shop as well.As this tank is seven feet deep to the top of the tank,and the proximity to the foundation of the nearby building, removal is impossible. There was no evidence of any past contamination. The tank was opened up and all old oil and sludge was removed and the tank filled with sand . The hole was then backfilled. Another waste oil tank was removed beside the grease ramp. This 1000 gal tank showed no evidence of leakage and the excavation showed no signs of any contamination.



Dan Rettmer
Operations Superintendent



*Mainroad Mid-Island
Contracting
Ltd.*

371 Alberni Highway, Parksville, B.C. V9P 1J9
Telephone: (250) 248-6212 Fax: (250) 248-5574

August 12, 1997

B.C. Building Corporation
3151 Barons Road
Nanaimo, B.C.
V9P 5W5

Attention: Mr. Jim Harrison
District Director

Re: Salt Storage - Cassidy Yard

Dear Mr. Harrison:

Further to our discussions concerning our salt storage facility in the Cassidy Yard. I am enclosing our environment site assessment.

We will pave the area in front of the storage dome as suggested in the report. We will also treat the inside of the concrete storage tank to reduce the effect the brine will have on the concrete. Loading and unloading of trucks will take place within the dome. Any inadvertent salt spillage in front of the dome will be cleaned up immediately. These housekeeping procedures will allow only a very minimal amount of salty water to enter the storm system.

The outfall of the storm system is into a wooded area south of the yard. There is no fish bearing stream in the area. The outlet of the storm drain will allow water to run overland prior to entering any water course.

I trust this assessment and our subsequent actions to abide by the findings of the assessment are satisfactory to you.

Yours truly,

Jerry Moreau
General Manager
JM70812a

cc: Dan Rettmer - B.C.B.C. Operations Superintendent
Peter Wightman - M.O.T.H. District Manager

August 12, 1997

COPY



ENKON
ENVIRONMENTAL

18875 63rd Avenue,
Surrey, B.C. Canada
V3S 7V8
Phone/fax (604) 576 1661

Mainroad Mid-Island Contracting
371 Alberni Highway
Parksville, BC
V9P 1J9

Attention: Mr. Jerry Moreau
Manager

RE: Environmental Site Assessment
Salt Storage Facility
Cassidy, BC

Dear Jerry;

In accordance with your request of July 31st, 1997, ENKON Environmental Limited (ENKON) has completed an environmental site assessment of the salt storage facility located at the Cassidy Yard of Mainroad Mid-Island Contracting (Mainroad).

1.0 BACKGROUND

Mainroad has recently completed construction of a salt storage facility located at the Cassidy Yard on Kipp Road, south of Nanaimo, and north of the Nanaimo Airport. The property is leased from the British Columbia Building Corporation (BCBC), and is known legally as:

Lot 1
Section 14
Range 5
Cranberry District
Plan 40287

BCBC is concerned about the use of the site as a salt storage facility, and has requested that Mainroad retain an independent consultant to complete an environmental site assessment of the facility.

Page 2
Mainroad Mid-Island Contracting
Cassidy Salt Storage Facility

ENKON
ENVIRONMENTAL

The purpose of this assessment was therefore to determine whether any potential environmental impacts could result from the use of the property as a salt storage facility.

2.0 OVERVIEW OF SITE OPERATIONS

2.1 Site Location and Surrounding Land Use

The site is located at the west end of Kipp Road. The site is rectangular in shape, extending in a westerly direction from Kipp Road. Mainroad leases the entire site from BCBC. In turn, Mainroad subleases an equipment shed and offices located on the southeast side of the property to Vmac. Mainroad also subleases a portion of the northwest side of the site to the Ministry of Highways who store equipment at the site.

Mainroad uses the larger maintenance building located on the southwest corner of the site, as well as a newly constructed salt storage dome located on the north central area of the site.

The salt storage dome, and the area immediately surrounding it are the focus of this assessment. The assessment did not include any other portion of the site used by Mainroad, or any of their subleasees.

2.2 Regulatory Reference Materials

The following reference materials were used to determine compliance issues and recommended practices for site operations:

- *Special Waste Regulation* (BC Reg. 63/88) of the Waste Management Act of British Columbia, with amendments by BC Reg 10/89 and BC Reg. 132/92;
- *Spill Reporting Regulation* of the Waste Management Amendment Act of British Columbia;
- the provincial *Transportation of Dangerous Goods Regulations*, with amendments to August, 1992;
- the *National Fire Code*, 1995;

Page 3
Mainroad Mid-Island Contracting
Cassidy Salt Storage Facility

ENKON
ENVIRONMENTAL

- the *BC Fire Code*, 1992;
- the *Contaminated Sites Regulation* (1996), under the Waste Management Amendment Act, 1993; and
- prevailing and customary industrial practices.

3.0 SITE INSPECTION

On Tuesday, August 5th, 1997 a representative from ENKON visited the subject site to assess the current site conditions. Photographic documentation is attached for your records.

The salt storage facility is an elongated domed structure oriented in a north-south direction. It is located on a paved surface on the north central side of the site. The dome is constructed of metal bracing with a waterproof vinyl canopy on top of the bracing (refer to attached photographs).

The base of the dome consists of three rows of concrete blocks stacked one on top of the other to an approximate height of 2.5 m. The blocks are sealed with a foam sealant in between the rows. The base of the blocks are sealed on the inside, and on the outside with a 10 to 12 cm high asphalt berm. The front end of the salt storage facility is open to the outside.

The interior of the dome is located on a paved surface. Drainage from within the dome is directed toward the northeast corner of the storage facility where the paved berm is left open on one block to permit water to flow beneath the block to the outside and into a catchbasin. From the catchbasin, the water will travel via a polyvinylchloride (PVC) pipe to the underground storage tank. At the time of our inspection, this pipe was open to the outside, but was not yet connected to a catchbasin that will drain to a salt water storage tank.

A salt water storage tank was constructed underground on the northeast side of the salt storage facility. The tank is concrete, and is capable of holding 4100 L (1100 gallons) of salty water. This tank will be emptied as required. During the first year or so of operation, daily measurements of the tank volume may be required to monitor the water levels, especially during the wet season to ensure that the tank does not reach an overflow capacity. The

Page 4

Mainroad Mid-Island Contracting
Cassidy Salt Storage Facility**ENKON**
ENVIRONMENTAL

underground storage tank (UST) does not currently have any overfill detection devices, or leak detection devices.

Drainage from the area surrounding the storage facility flows in an easterly direction across the pavement toward the fuelling area from the south east corner of the facility. From the southwest corner of the facility, site drainage flows west. Immediately in front of the salt storage facility, site drainage appears to be pooling in the partially paved, partially gravel area on the south side of the storage facility. The gravel area begins approximately 15 m in front of the storage facility. This area eventually drains to a storm sewer drain located on the northwest corner of the Vmac facility. According to Mainroad, this storm sewer drains into the forested area to the south of the property.

A groundwater well is located to the northeast of the subject property in the forested area that surrounds the site. This well provides drinking water to the site. During the site inspection, the exact location of the well could not be determined.

4.0 FINDINGS AND RECOMMENDATIONS

4.1 Findings

The salt storage facility appears to be capable of minimizing the amount of precipitation that enters the area and could potentially generate runoff from the dome.

Drainage from inside the salt storage facility appears to be directed towards the underground saltwater concrete storage tank located at the northeast corner of the storage facility. This tank will be emptied periodically.

Drainage from the front exterior area of the storage facility, which is the area where trucks will enter and exit the facility from appears to drain towards the stormwater drain to the southeast. Although the first approximately 15 m is paved, the remainder of the yard in front of the facility is gravel.

The underground saltwater storage tank is concrete and is capable of holding approximately 4100 L of saltwater. The tank does not have an overflow detection, or a leak detection device on it.

Page 5
Mainroad Mid-Island Contracting
Cassidy Salt Storage Facility

ENKON
ENVIRONMENTAL

4.2 Recommendations

Based on the findings of our site inspection, the following recommendations are made:

- 1) The concrete storage tank could be lined to increase its longevity by coating the interior with a bituminous paint, boiled linseed oil or other suitable liner that will prevent the saltwater from eating away at the concrete over time. This should minimize the risk of the tank leaking. Periodic visual inspections of the tank interior should be undertaken to ensure that the integrity of the tank is maintained. If it is determined that the integrity of the tank is being breached by the saltwater, a leak detection device should be considered.
- 2) Overflow from the storage tank will leak back towards the catchbasin that will be located between the salt storage facility and the underground tank. Visual inspection of the catchbasin will enable site personnel to ensure that the tank has not overfilled. If the tank appears to overfill on a regular basis, an overflow alarm should be considered.
- 3) The area in front of the salt storage facility should be paved. At present, the dirt and gravel area allows saltwater to penetrate into the ground prior to reaching the catchbasin located to the southeast of the storage facility. Paving this area, and sloping the pavement to direct the runoff toward the storm sewer will reduce the potential for the water to enter the local groundwater table.
- 4) The outfall of the stormwater drain located to the southeast of the storage facility should be located. The volume of salt water runoff directed to this storm drain is not expected to be large. However, the outlet of the storm drain should allow water to run overland prior to entering any fish bearing streams. If this stormwater sewer is draining directly to a freshwater fish bearing stream, the concentration of salt in the runoff water could potentially be deleterious to the fish. If this is the case, this area should also be directed to drain towards the saltwater storage tank.

Page 6
Mainroad Mid-Island Contracting
Cassidy Salt Storage Facility

ENKON
ENVIRONMENTAL

5.0 CONCLUSIONS

It is possible that over time, the concrete storage tank could decay from contact with salt water. In addition, the tank could overflow if it is not emptied on time. The interior of the tank should be lined to reduce the potential for the concrete to deteriorate over time. To monitor the potential for the tank to decay, the interior should be inspected on a regular basis.

There is a potential for salty water to infiltrate the gravel area in front of the salt storage facility. If this area were paved and surface water directed towards the stormwater drain to the southeast, the potential to impact the local groundwater table would be greatly reduced.

The outfall for the storm sewer drain is likely directed to a freshwater stream or creek in the forest. However, a search of the Fish Information Summary System (FISS) provided by the Department of Fisheries and Oceans and the provincial Ministry of Environment, Lands and Parks does not indicate the presence of fish bearing streams in the area.

Locating the outfall of the stormwater sewer and ensuring that the water flows overland first prior to entering a stream should minimize the potential for any impacts to the stream. However, it should be noted that concentrated saltwater flow from this stormwater sewer is not expected to be large, and therefore any potential impact to freshwater fish is not expected to be large.

6.0 STANDARD LIMITATIONS

This environmental site assessment report has been prepared for the exclusive use of Mainroad Mid-Island Contracting and is intended to provide Mainroad Mid-Island Contracting with an understanding of the potential for environmental contamination by hazardous materials at the salt storage facility. The scope of services performed in execution of this assessment may not be appropriate to satisfy the needs of other users, and any use or re-use of this document or the findings, conclusions, or recommendations presented herein is at the sole risk of said user. The findings and recommendations in this report are based upon data and information obtained during a site visit by ENKON Environmental Limited personnel to the area of the property identified herein and the condition of the property on the date

Page 7

Mainroad Mid-Island Contracting
Cassidy Salt Storage Facility

ENKON
ENVIRONMENTAL

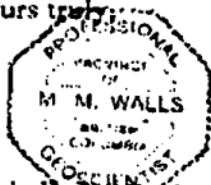
of such visit, supplemented by information and data obtained by ENKON Environmental Limited and described herein.

The findings and recommendations contained in this report are based on the expertise and experience of ENKON Environmental Limited in conducting similar site assessments. In assessing the subject site, ENKON Environmental Limited has also relied upon representations and information furnished by individuals noted in the report with respect to existing operations and property conditions to the extent that the information obtained has not been contradicted by data obtained from other sources. Accordingly, ENKON Environmental Limited accepts no responsibility for any deficiency, misstatements or inaccuracy contained in this report as a result of misstatements, omissions, misrepresentations or fraudulent information provided by the persons interviewed.

The findings and conclusions documented in this report have been prepared for specific application to this project and have been developed in a manner consistent with that level of care and skill normally exercised by members of the environmental science profession currently practicing under similar conditions in the area, and in accordance with the terms and conditions set forth in our agreement of July 31st, 1997. No other warranty, expressed or implied, is made. This report is for the exclusive use of Mainroad Mid-Island Contracting and their representatives.

We trust that this letter report provides the necessary information needed to satisfy the request of BCBC. Should you require any additional information, please do not hesitate to contact me at (250)380-2666.

Yours truly,



M. Walls

Michelle Walls, M.Eng., P.Geo.
Project Manager

attachments

PHOTOGRAPHIC DOCUMENTATION

TANKNOLOGY CORPORATION INTERNATIONAL

5225 Hollister, Houston, Texas 77040-6294 Phone (800) 888-8563 FAX (713) 690-2255

Certificate of Tightness

Service Order # 168210

Test Date 08/06/96

Underground storage tank system(s) tested and found tight for::

TANK OWNER: B.C. BUILDING CORP.

TEST SITE ADDRESS: B.C. BUILDING CORP. MAINROAD CONTRACTING
1329 KIPP RD. CASSIDY, BC

[4] TANK(S) ONLY, [2] LINE(S) ONLY, [] LEAK DETECTOR(S) ONLY.

TANK SIZES &
PRODUCTS TESTED

1 9092 RUN
3 9092 DIE

2 9092 DIE
4 9000 FUEL OIL

LINES TESTED 2A, 4A

LEAK DETECTORS TESTED

Unit Mgr. Certificate Number & Name 159 DAVID FROST 05/97

Valid only with
Corporate Seal.

U.S. Patent #4462249, Canadian Patent #1185693, European Patent Appl. #169283
TANKNOLOGY & VacuTest are trademarks of TANKNOLOGY CORPORATION INTERNATIONAL

Note: See VacuTest Test Report for tank identification and site location drawing.

VacuTest™ TEST REPORT

S.O. # 168210
Date 08/06/96
Phone <604> 751-7211
Attn: GORD PETLEY-JONES

mer B.C. BUILDING CORP.

Site # _____

Office Name / Address B.C. BUILDING CORP. PROPERTY MGMT. UNIT #4 3151 BARONS RD NANAIMO, BC V9T 5W5

3 Name / Address B.C. BUILDING CORP. MAINROAD CONTRACTING 1329 KIPP RD. CASSIDY, BC V0R 1H0

TANKS										LINES					Leak Det.		TANKS and LINES Tested to CFR-40 Parts 280-281 & NFPA 329 Spec's. Other:		
Tank Product	Tank Capacity Litres	Tank Dia. & Material ST / FRP / Lined	Dipped Water Level START END	Dipped Product Level START END	Probe Water Level START END	Water Ingress Detected Yes / No	Bubble Ingress Detected Yes / No	Ullage Air Ingress Detected Yes / No	TANK Tight or Fail	Line #	Line Material ST / FRP	Delivery Syst. Type PS/SS/GS	LINE TEST START TIME	LINE TEST END TIME	Final Leak Rate LPH	LINE Tight or Fail		Exit LD(s) Pass / Fail / or NONE	NEW LD(s) Tested & PASS
1 RUN	9092	Diameter 182 cm Material ST	3.00 055.00 10:15 12:28	055.00 10:15 12:28	0.000 10:15 12:28	N	N	N	T	1A	ST	SS	10:40	11:30	0.207				Exch LD SN / MDL / MFG: New LD SN / MDL / MFG: LINE TEST KPA: Dispenser Shear Valves Operate (yes/no)
2 DIE	9092	Diameter 182 cm Material ST	3.00 092.00 10:15 12:28	092.00 10:15 12:28	0.000 10:15 12:28	N	N	N	T	2A	ST	SS	12:00	12:30	0.600				Exch LD SN / MDL / MFG: New LD SN / MDL / MFG: LINE TEST KPA: Dispenser Shear Valves Operate (yes/no)
3 DIE	9092	Diameter 182 cm Material ST	3.00 046.00 14:55 12:45	046.00 14:55 12:45	0.000 14:55 12:45	N	N	N	T										Exch LD SN / MDL / MFG: New LD SN / MDL / MFG: LINE TEST KPA: Dispenser Shear Valves Operate (yes/no)
4 FUEL	9000	Diameter 177 cm Material ST	3.00 120.00 15:33 17:41	120.00 15:33 17:41	0.000 15:33 17:41	N	N	N	T	LINE ABANDONED									Exch LD SN / MDL / MFG: New LD SN / MDL / MFG: LINE TEST KPA: Dispenser Shear Valves Operate (yes/no)
5 OIL		Diameter 177 cm Material ST	3.00 120.00 15:33 17:41	120.00 15:33 17:41	0.000 15:33 17:41	N	N	N	T	LINE TESTED UNDER VACUUM									Exch LD SN / MDL / MFG: New LD SN / MDL / MFG: LINE TEST KPA: Dispenser Shear Valves Operate (yes/no)
		Diameter 177 cm Material ST	3.00 120.00 15:33 17:41	120.00 15:33 17:41	0.000 15:33 17:41	N	N	N	T										Exch LD SN / MDL / MFG: New LD SN / MDL / MFG: LINE TEST KPA: Dispenser Shear Valves Operate (yes/no)
		Diameter 177 cm Material ST	3.00 120.00 15:33 17:41	120.00 15:33 17:41	0.000 15:33 17:41	N	N	N	T										Exch LD SN / MDL / MFG: New LD SN / MDL / MFG: LINE TEST KPA: Dispenser Shear Valves Operate (yes/no)
		Diameter 177 cm Material ST	3.00 120.00 15:33 17:41	120.00 15:33 17:41	0.000 15:33 17:41	N	N	N	T										Exch LD SN / MDL / MFG: New LD SN / MDL / MFG: LINE TEST KPA: Dispenser Shear Valves Operate (yes/no)

END: T = Tight, F = Fail, U = Ullage, B = Bubble, R = Replaced, I = Installed, 077 None

TANKNOLOGY REGION: _____ Unit # _____ Prov. Lic. # _____ Province: _____

Original VacuTest Data recordings are reviewed by Tanknology's Audit Control Department and maintained on file.

BC

TANKNOLOGY CANADA (1988) INC.

2650 Meadowvale Boulevard, Mississauga, Ontario L5N 6M5

Phone: (905) 819-8811 • 1 (800) 465-1577 • Fax: (905) 819-8810

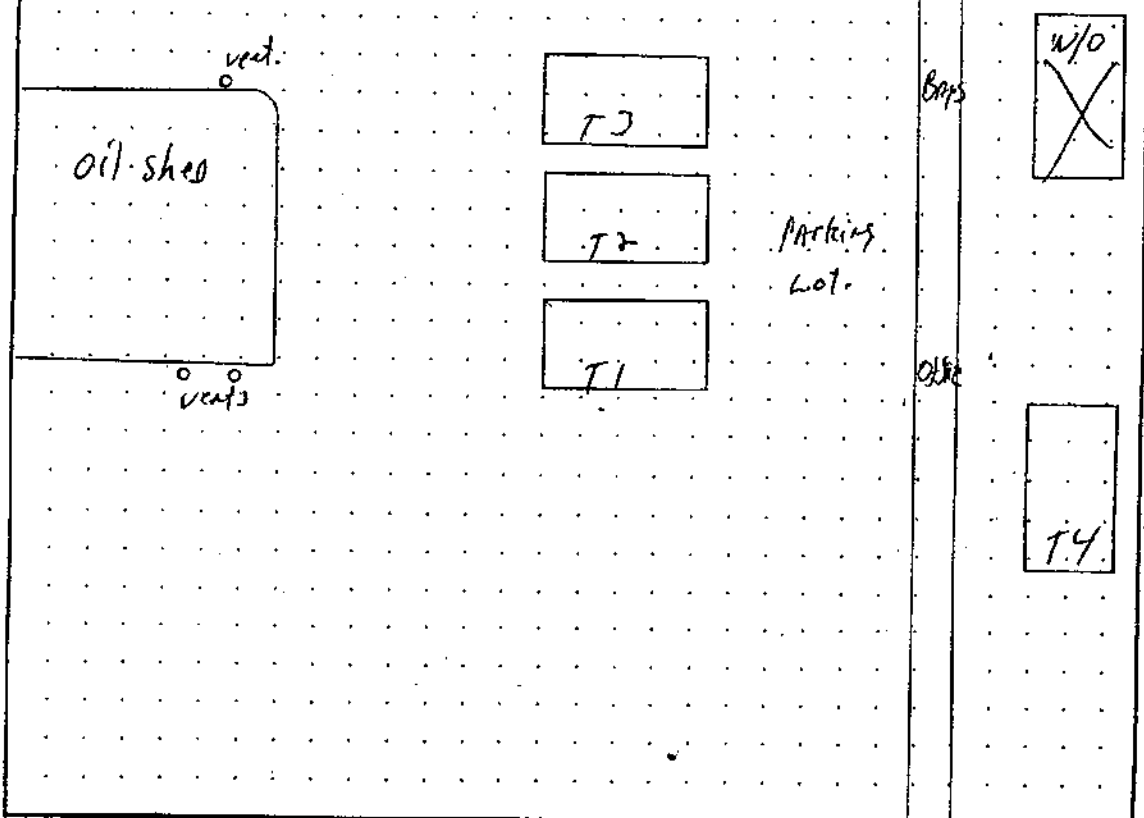
S.O. # 167710

Owner: B.C. B.C.

Site #

MONITOR WELLS

Well Number	1	2	3	4	5	6	7	8	9	10	11	12
Well Depth												
Depth of Water												
Product Detected AMOUNT in cm												

LOCATION DIAGRAM:**PARTS AND LABOUR USED:****GENERAL COMMENTS:**

- Line 1A - Leak - Fails. Line would not hold Product or Pressure. Recommended Repair of Foot Valve and Re-test.
- Line 2A tested tight.
- All Tanks tested tight.
- waste oil - not tested - Full of water.

When OWNER or local regulations require immediate reporting of a system failure —
Complete the following :

REPORTED TO:

NAME:

DATE:

TIME:

Phone #:

OWNER or Regulatory Agency:

FILE NUMBER:

PRINT: Certified Tester's Name:

DAVID FROST

VacuTect™ Certification Number:

159

Certified Tester's Signature:

[Signature]

Date Testing Completed:

Aug. 6

TANKNOLOGY CORPORATION INTERNATIONAL

5225 Hollister, Houston, Texas 77040-6294

Phone (800) 888-8563

FAX (713) 690-2255

Certificate of Tightness

Service Order # 052912

Test Date 05/21/92

Underground storage tank system(s) tested and found tight for:

TANK OWNER: ISLAND HIGHWAY SERVICES

TEST SITE ADDRESS: ISLAND HIGHWAY SERVICES 1329 KIPP ROAD
CASSIDY, BC

[2] TANK(S) ONLY, [1] LINE(S) ONLY, [] LEAK DETECTOR(S) ONLY.

TANK SIZES &
PRODUCTS TESTED

1 13600 REG UNL

2 13600 DIE

LINES TESTED 1A

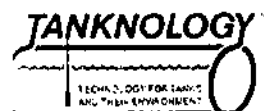
LEAK DETECTORS TESTED

Unit Mgr. Certificate Number & Name 117 BILL WEST 09/92

Valid only with
Corporate Seal

U.S. Patent #4462249, Canadian Patent #1185693, European Patent Appl. #169263
TANKNOLOGY & VacuTest are trademarks of TANKNOLOGY CORPORATION INTERNATIONAL

Note: See VacuTest Test Report for tank identification and site location drawing.



VacuTest™ TEST REPORT

S.O. # 052912
Date 05/21/92
Invoice Name/Address B.C. BUILDING CORP. PROPERTY MGMT. UNIT #4 3151 BARONS RD NANAIMO, BC V9T 5W5 Phone (604) 755-2245
Site Name/Address ISLAND HIGHWAY SERVICES 1329 KIPP ROAD CASSIDY, BC Attn: DAN RETTMER

TANKS											LINES						Leak Det		TANKS and LINES Tested to CFR-40 Parts 280-281 & NFPA 329 Spec's. Other:	
See Diag. For Loc.	Tank #	Tank Product	Tank Capacity	Tank Dia. & Material ST/ FRP/ Lined	Dipped Water Level START END	Dipped Product Level START END	Probe Water Level START END	Water Ingress Detected Yes/No	Bubble Ingress Detected Yes/No	Ullage Air Ingress Detected Yes/No	TANK Tight or Fall	Line #	Line Material ST/ FRP	Line Delivery Syst. Type PS/SS/GS	LINE TEST START TIME	LINE TEST END TIME	Final Leak Rate GPH	LINE Tight or Fall		Exist LD(s) Pass/ Fail/ or NONE
1	REG UNL	13600		Diameter: 20.000 109.00 23.300 Material: 1820.000 109.00 23.300 Start Time: 14:02 End Time: 17:00 Percent of Fill at Time of Test: 50.0 Tank Test PSI: -1.20 Pump Mfg: GILBARCO Probe Entry Point: FILL	N	N	N	T	1A	ST	SS	15:35	16:05	0.00	T	-	N	EXIST LD SH/MOL/MFG: NEW LD SH/MOL/MFG: LINE TEST PSI: Dispenser/Sheet Valves Operate (yes/no):		
2	DIE	13600		Diameter: 05.000 110.50 07.600 Material: 1820.000 110.50 07.600 Start Time: 14:02 End Time: 17:00 Percent of Fill at Time of Test: 51.0 Tank Test PSI: -1.20 Pump Mfg: TUTHILL Probe Entry Point: FILL	N	N	N	T										-	N	EXIST LD SH/MOL/MFG: NEW LD SH/MOL/MFG: LINE TEST PSI: Dispenser/Sheet Valves Operate (yes/no):
				Diameter:																EXIST LD SH/MOL/MFG: NEW LD SH/MOL/MFG: LINE TEST PSI: Dispenser/Sheet Valves Operate (yes/no):
				Material:																EXIST LD SH/MOL/MFG: NEW LD SH/MOL/MFG: LINE TEST PSI: Dispenser/Sheet Valves Operate (yes/no):
				Diameter:																EXIST LD SH/MOL/MFG: NEW LD SH/MOL/MFG: LINE TEST PSI: Dispenser/Sheet Valves Operate (yes/no):
				Material:																EXIST LD SH/MOL/MFG: NEW LD SH/MOL/MFG: LINE TEST PSI: Dispenser/Sheet Valves Operate (yes/no):
				Diameter:																EXIST LD SH/MOL/MFG: NEW LD SH/MOL/MFG: LINE TEST PSI: Dispenser/Sheet Valves Operate (yes/no):
				Material:																EXIST LD SH/MOL/MFG: NEW LD SH/MOL/MFG: LINE TEST PSI: Dispenser/Sheet Valves Operate (yes/no):
				Diameter:																EXIST LD SH/MOL/MFG: NEW LD SH/MOL/MFG: LINE TEST PSI: Dispenser/Sheet Valves Operate (yes/no):
				Material:																EXIST LD SH/MOL/MFG: NEW LD SH/MOL/MFG: LINE TEST PSI: Dispenser/Sheet Valves Operate (yes/no):

TANKNOLOGY Region: TANKNOLOGY CANADA Unit # 077 State Lic. # State: BC

NOTE: Original VacuTest Data recordings are reviewed by Tanknology's Audit Control Department and maintained on file.

TAK-01

Tanknology Corporation International
5225 Hollister St., Houston, TX 77040
(800) 888-8563 • FAX (713) 690-2255

SO# 52912

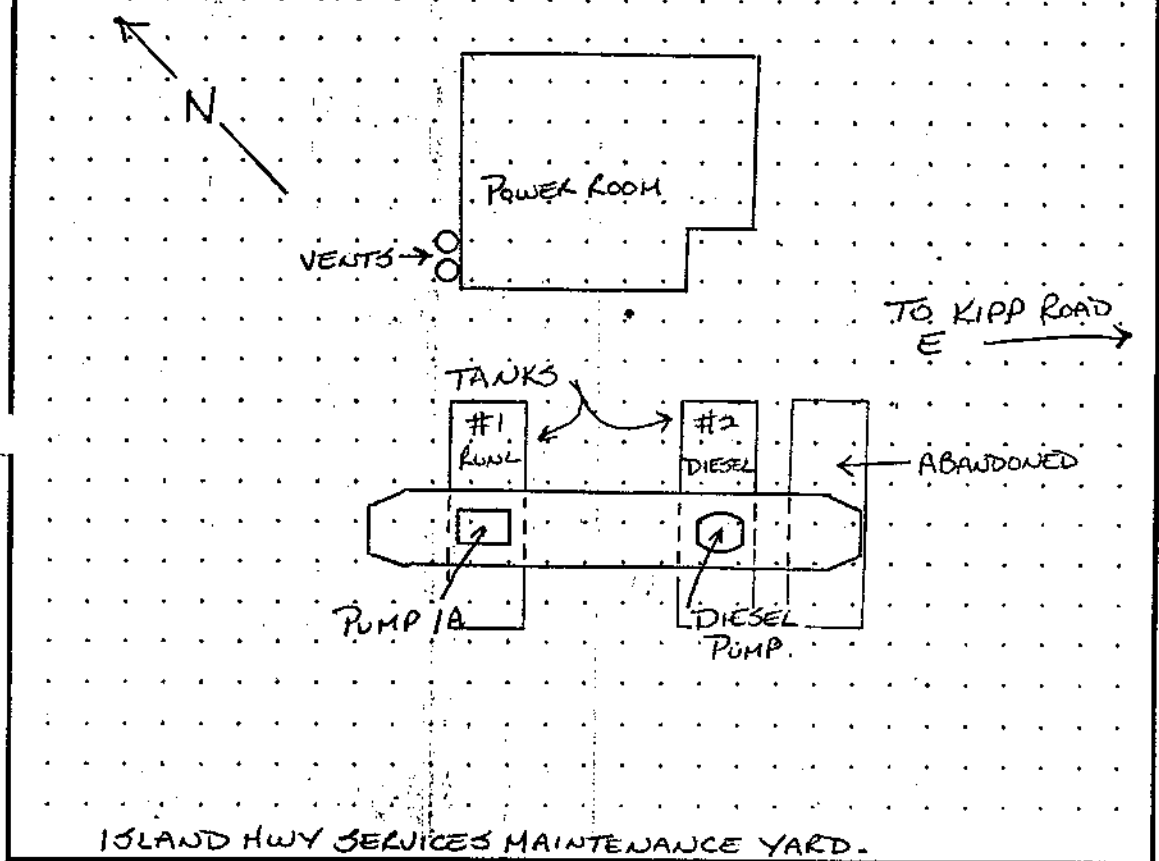
Owner: BCBC (CASSIDY)

Site#

MONITOR WELLS: NONE

Well Number	1	2	3	4	5	6	7	8	9	10	11	12
Well Depth												
Depth to Water												
Product Detected												
AMOUNT in inches												

Location Diagram



Parts and Labor used

General Comments

ABANDONED TANK ON GROUNDS. UNABLE TO
 TEST DIESEL LINE WITHOUT BREAKING ELECTRICAL. LINES ARE
 TANK TOP TO PUMP DIRECT.

When OWNER or local regulations require immediate reporting of a system failure-
 Complete the following:

REPORTED TO:	NAME	DATE	TIME
Phone#	OWNER or Regulatory Agency		FILE NUMBER
Print Certified Testers Name BILL WEST			Vacutec™ Certification Number 0117
Certified Testers Signature <i>[Signature]</i>			Date Testing Completed MAY 21 '92

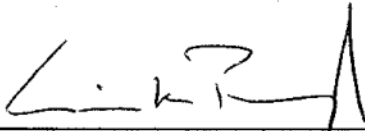
15.0 PROFESSIONAL STATEMENT

This Report has been prepared in accordance with the requirements of the Waste Management Act and regulations pursuant to the Act.

The person(s) signing the statement has demonstrable experience in investigation of the type of contamination encountered at the site and is familiar with the investigation carried out at the site.

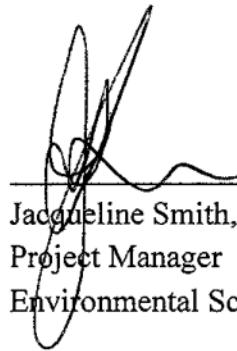
CONOR PACIFIC ENVIRONMENTAL TECHNOLOGIES INC.

Per:

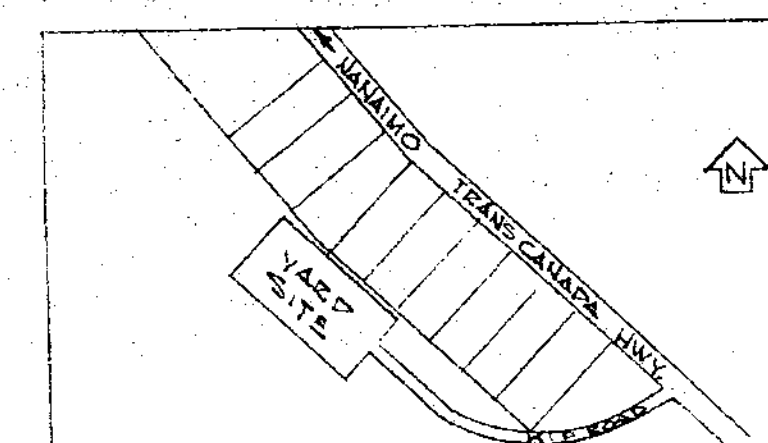
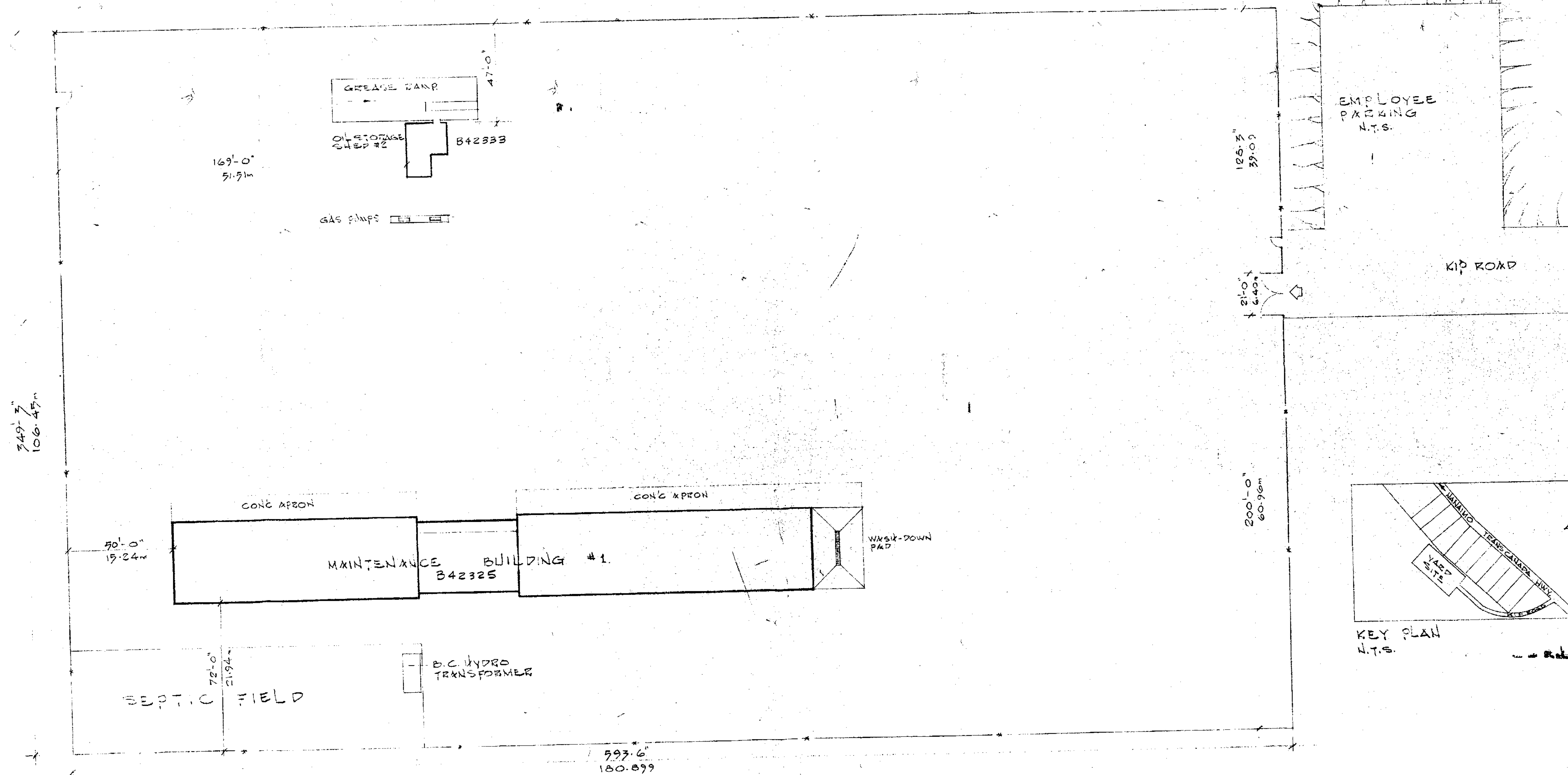
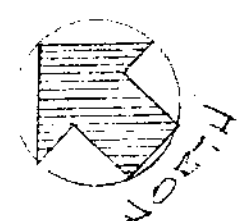


Eric K. Pringle, P.Eng.
Manager, Pacific Region
Senior Environmental Engineer

Per:



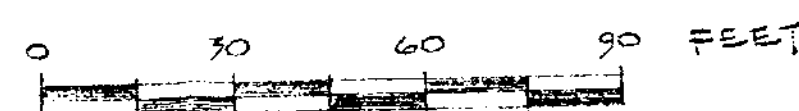
Jacqueline Smith, M.A.Sc., R.P.Bio.
Project Manager
Environmental Scientist



KEY PLAN
N.T.S.

SITE PLAN

SCALE 1" = 30'



NOTE:
METRIC SOFT CONVERSION



GOVERNMENT OF BRITISH COLUMBIA
MINISTRY OF TRANSPORTATION,
COMMUNICATIONS AND HIGHWAYS

NANAIMO HIGHWAY DISTRICT
MAINTENANCE ESTABLISHMENT AT
CASSIDY
SITE PLAN

REVISIONS	
A	REDRAWN FROM B.J. OCT-1970
B	CHANGED DIMENSION
C	
D	
E	

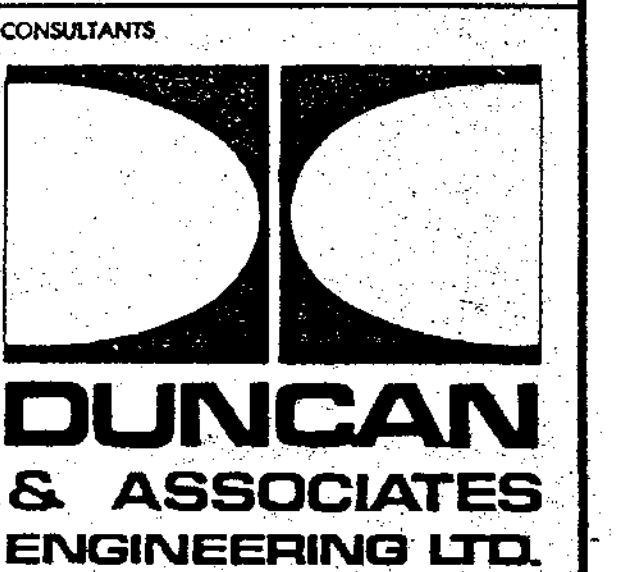
SUBJECT TO SURVEY BY B.C.L.S.

SURVEY BY: B.J.	DATE: JAN-1980
DRAWN BY: ALF. DAUGHTY	PROJECT No.:
CHECKED BY:	SHEET 1 OF 2
APPROVED BY:	APPROVED BY:
SCALE: HORIZ. 1: AS NOTED	DIST. PLAN No. 1-4-C/50
VERT. 1:	6-4-53

CANCEL PRINTS BEARING EARLIER LETTER



British Columbia
Buildings Corporation

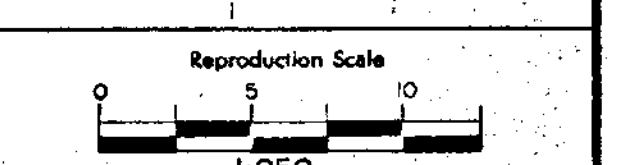


324 Terminal Avenue
Nanaimo, B.C. V9R 5C8
(604) 753-9106
D.A.E.L. No. B 442-13

REVISIONS	DATE	BY
1 AS CONSTRUCTED	08-05-05	

DRAWN BY	W.M.H.
CHECKED	
DESIGN	M.L.W.
ARCHITECTURAL	
STRUCTURAL	
MECHANICAL	
ELECTRICAL	

APPROVED



JOB TITLE
**HIGHWAYS
MAINTENANCE
ESTABLISHMENT**

CASSIDY B.C.

SHEET TITLE

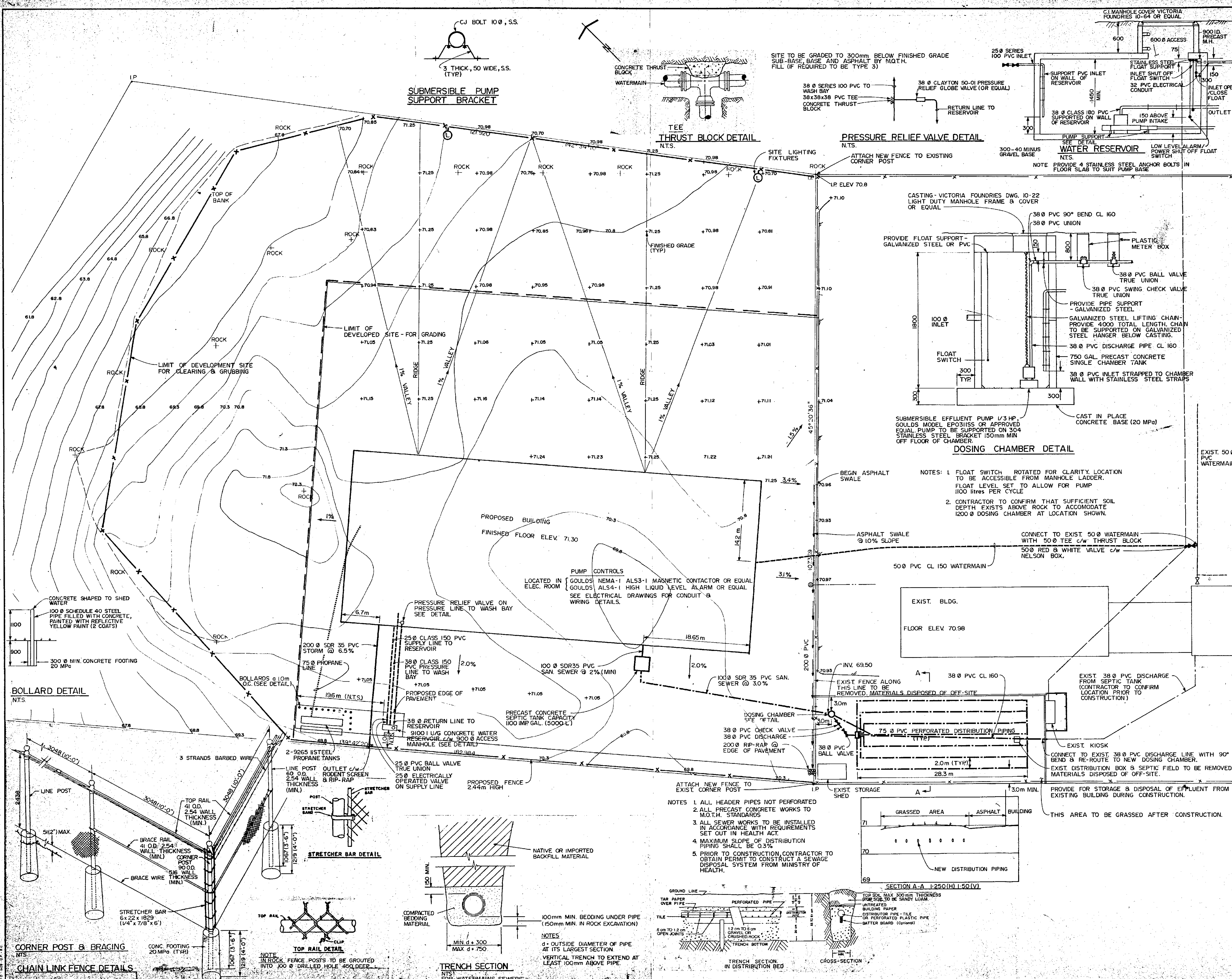
SITE PLAN

SHEET 1 OF 13

JOB NUMBER 708665

DRAWING NUMBER

AI REV. 1



SUBMERSIBLE PUMP
SUPPORT BRACKET

TEE
THRUST BLOCK DETAIL

PRESSURE RELIEF VALVE DETAIL

WATER RESERVOIR

DOSING CHAMBER DETAIL

BOLLARD DETAIL

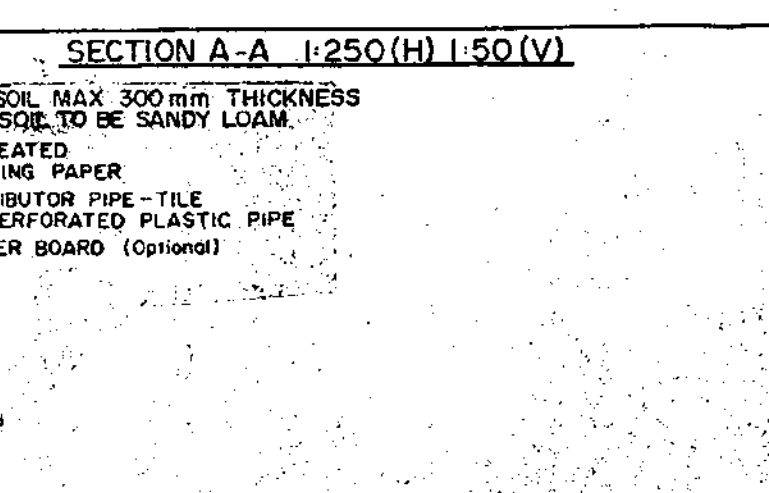
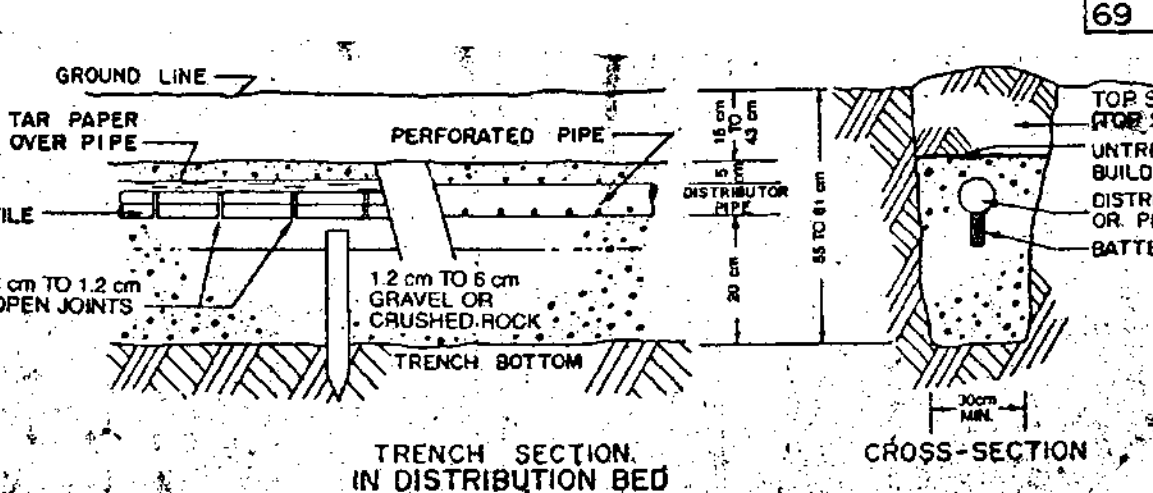
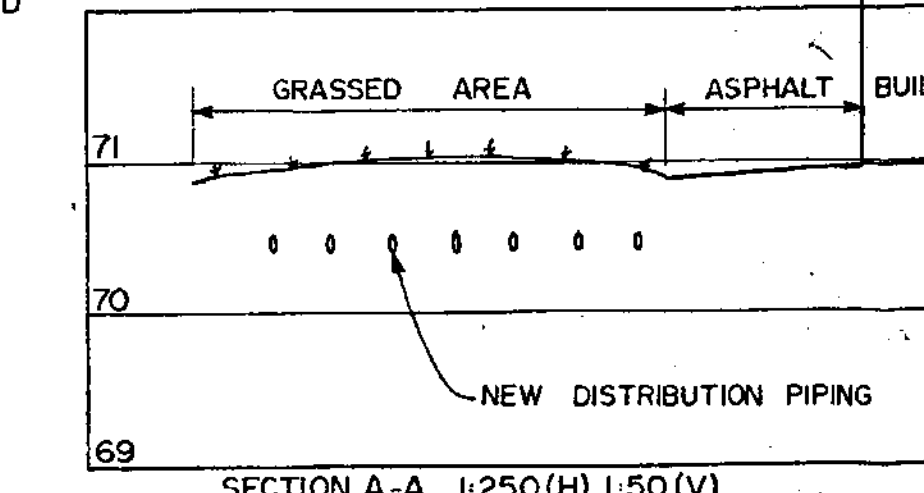
STRETCHER BAR DETAIL

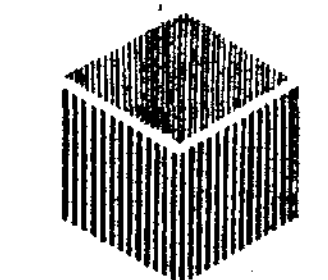
TRENCH SECTION

CORNER POST & BRACING

CHAIN FENCE DETAILS

- NOTES
1. ALL HEADER PIPES NOT PERFORMED TO M.O.T.H. STANDARDS
 2. ALL PRECAST CONCRETE WORKS TO M.O.T.H. STANDARDS
 3. ALL SEWER WORKS TO BE INSTALLED IN ACCORDANCE WITH REQUIREMENTS SET OUT IN HEALTH ACT.
 4. MAXIMUM SLOPE OF DISTRIBUTION PIPING SHALL BE 0.3%
 5. PRIOR TO CONSTRUCTION CONTRACTOR TO OBTAIN PERMIT TO CONSTRUCT A SEWAGE DISPOSAL SYSTEM FROM MINISTRY OF HEALTH.





CONSULTANTS

REVISIONS DATE BY

DRAWN BY A.G. SMILLIE
DATE JANUARY, 1976
CHECKED
DESIGN
ARCHITECTURAL
STRUCTURAL
MECHANICAL
ELECTRICAL
DIRECTOR

REPRODUCTION SCALE
1" = 40'

JOB TITLE
DEPT. OF HIGHWAYS
EQUIPMENT STORAGE
BUILDING

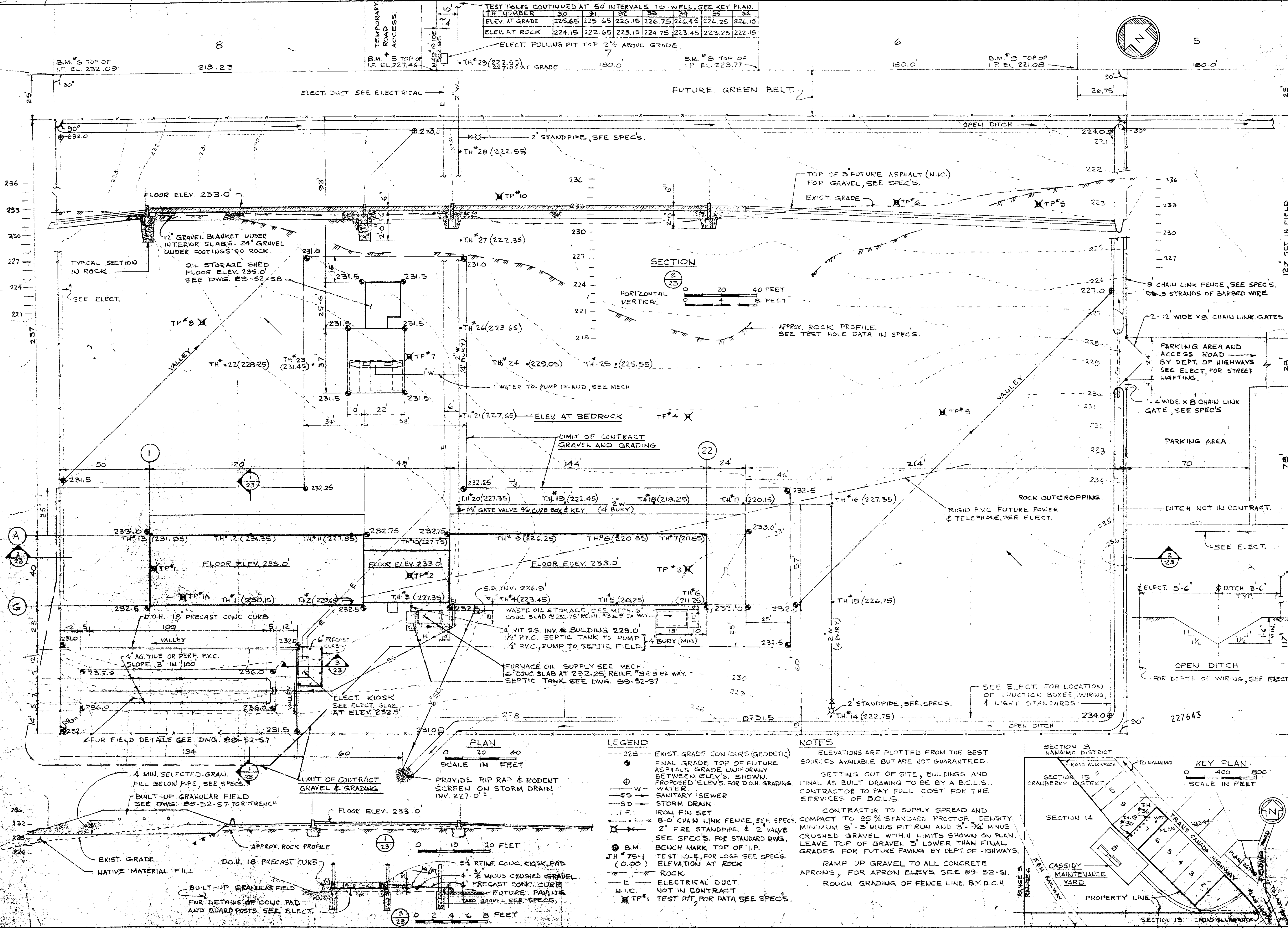
CASSIDY, B.C.

SHEET TITLE
SITE PLAN

89-52
89-5-23

TEST HOLE	CONTINUED AT 50' INTERVALS TO WELL, SEE KEY PLAN.
TH NUMBER	30 31 32 33 34 35 36
ELEV. AT GRADE	225.65 225.65 226.15 226.75 226.45 226.25 226.15
ELEV. AT ROCK	224.15 222.65 223.15 224.75 223.45 223.25 222.15

ELECT. PULLING PIT TOP 2" ABOVE GRADE.



- LEGEND
- 228 --- EXIST. GRADE CONTOURS (GEODETIC)
 - 228 --- FINAL GRADE TOP OF FUTURE ASPHALT GRADE UNIFORMITY BETWEEN ELEV'S. SHOWN.
 - 228 --- PROPOSED ELEV'S. FOR D.O.H. GRADING.
 - 228 --- WATER.
 - 228 --- SANITARY SEWER
 - 228 --- STORM DRAIN
 - 228 --- IRON PIN SET
 - 228 --- 8" CHAIN LINK FENCE, SEE SPEC'S.
 - 228 --- 2" FIRE STANDPIPE, 2 VALVE SEE SPEC'S. FOR STANDARD DWG.
 - 228 --- BENCH MARK TOP OF I.P.
 - 228 --- TEST HOLE, FOR LOGS SEE SPEC'S.
 - 228 --- ELEVATION AT ROCK
 - 228 --- ROCK
 - 228 --- ELECTRICAL DUCT, NOT IN CONTRACT
 - 228 --- N.I.C.
 - 228 --- TP#1 TEST PIT, FOR DATA SEE SPEC'S.

NOTES

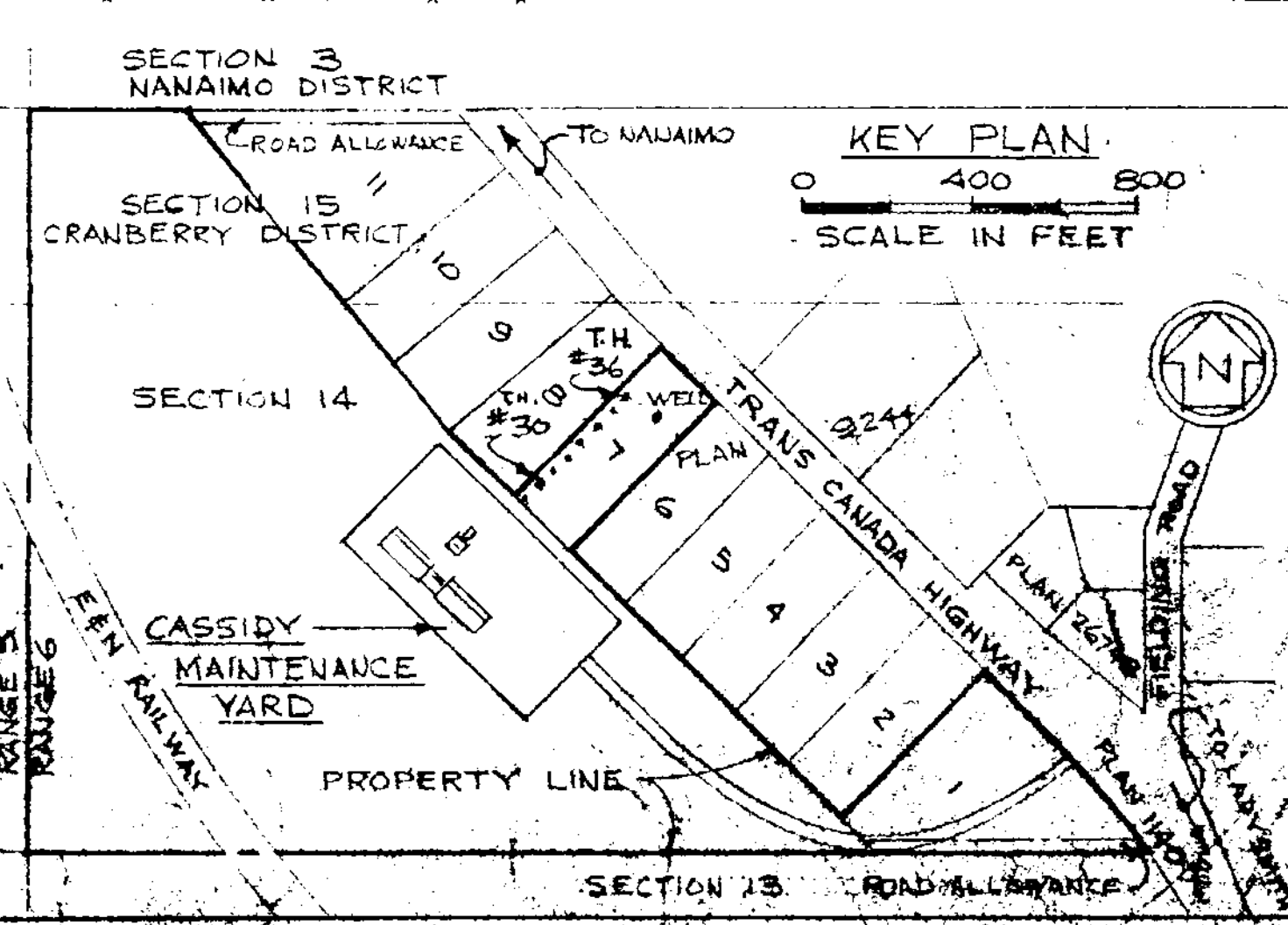
ELEVATIONS ARE PLOTTED FROM THE BEST SOURCES AVAILABLE BUT ARE NOT GUARANTEED.

SETTING OUT OF SITE, BUILDINGS AND FINAL AS BUILT DRAWING TO BE BY A B.C.L.S. CONTRACTOR TO PAY FULL COST FOR THE SERVICES OF B.C.L.S.

CONTRACTOR TO SUPPLY SPREAD AND COMPACT TO 95% STANDARD PROCTOR DENSITY MINIMUM 9" 3 MINUS PIT RUN AND 3" 3/4 MINUS CRUSHED GRAVEL WITHIN LIMITS SHOWN ON PLAN. LEAVE TOP OF GRAVEL 3" LOWER THAN FINAL GRADES FOR FUTURE PAVING BY DEPT. OF HIGHWAYS.

RAMP UP GRAVEL TO ALL CONCRETE APRONS, FOR APRON ELEV'S SEE 89-52-SI.

ROUGH GRADING OF FENCE LINE BY D.O.H.





REPORT

SALT INVESTIGATION PROGRAM
CASSIDY HIGHWAYS YARD
1329 KIPP ROAD
CASSIDY, BC

SEACOR PROJECT NO: 202.01221.003

SEACORTM
ENVIRONMENTAL INC.



**SALT INVESTIGATION PROGRAM
CASSIDY HIGHWAYS YARD
1329 KIPP ROAD
CASSIDY, BC**

SEACOR PROJECT: 202.01221.003

Submitted by
SEACOR Environmental Inc.

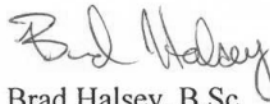
for
British Columbia Buildings Corporation
3151 Barons Road
Nanaimo, BC V9T 5W5

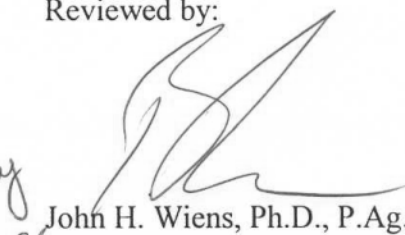
January 9, 2004

Prepared by:

Tara Siemens, M.E.T.
Environmental Toxicologist

Reviewed by:


Brad Halsey, B.Sc.
Project Manager


John H. Wiens, Ph.D., P.Ag.
Technical Director, Site Assessment

CONFIDENTIAL

Distribution: 5 copies – British Columbia Buildings Corporation
1 copy – SEACOR Environmental Inc.

EXECUTIVE SUMMARY

SEACOR Environmental Inc. (SEACOR) was retained by the British Columbia Buildings Corporation (BCBC) to conduct a salt investigation program at the Cassidy Highways Yard located at 1329 Kipp Road in Cassidy, BC. The purpose of the salt investigation program was to delineate chloride and sodium-impacted soil and groundwater on the highways yard property. The site works were conducted between June 12 and 16, 2003.

SEACOR, along with Drillwell Enterprises Ltd. (Drillwell) of Duncan, BC conducted a drilling investigation at the site on June 12, 2003. Twelve boreholes (BH's 03-4 to 03-15) were advanced to a maximum depth of 2.7 metres below ground surface, with nine of the boreholes (BH's 03-4, 03-5 and 03-9 to 03-15) completed as groundwater monitoring wells. Twenty-six soil samples were submitted to ALS Canada Ltd. (ALS) for analysis of chloride, sodium and/or total metals. The results of the analyses indicated that six of the soil samples exceeded the BC draft Commercial (CL) standard of 50 mg/kg for chloride and that one of the samples exceeded the BC draft CL standard for sodium of 1200 mg/kg. The concentration of chromium in one soil sample was in slight excess of the BC CL standard, however, the concentration was below the regional background chromium concentration (BC WLAP, 1999) and as per BC Ministry of Water, Land and Air Protection definition, is not considered to constitute contamination.

Groundwater was not encountered during the June 2003 investigation; SEACOR returned to the site four days following the installation of the monitoring wells (June 16, 2003) and each of the newly-installed monitoring wells was observed to be dry. Groundwater samples were collected from four pre-existing monitoring wells (BH 99-1, BH 99-3, BH 99-4 and BH 99-10) on June 16, 2003 and submitted for dissolved chloride and/or metals analyses. The groundwater chemistry results indicated that concentrations of aluminum, iron, lead and manganese in BH99-3; barium, manganese, sodium and chloride in BH99-4; and chloride in BH99-1 were in excess of the BC Drinking Water (DW) standards. The concentration of zinc in BH99-3 was in excess of the BC Aquatic Life (AW) standard. In addition, the laboratory detection limits reported for aluminum, antimony, arsenic, cadmium, chromium, cobalt, selenium and thallium for the groundwater sample collected from BH99-3 were in excess of the BC DW and/or AW standards; the detection limits were increased due to matrix interferences encountered during analysis.

TABLE OF CONTENTS

1.0	INTRODUCTION	1
2.0	BACKGROUND	2
2.1	Site Details	2
2.2	Previous Works Conducted	3
3.0	FIELD METHODOLOGY AND ENVIRONMENTAL STANDARDS.....	4
3.1	Introduction	4
3.2	Soil Sampling And Field-Screening	4
3.3	Drilling Activities	5
3.4	Environmental Standards.....	5
3.5	Potential Contaminants Of Concern	6
4.0	DRILLING INVESTIGATION	6
4.1	Soil	7
4.1.1	Soil Profile	7
4.1.2	Soil Chemistry	7
4.2	Groundwater	8
4.2.1	Groundwater Field Observations	8
4.2.2	Groundwater Chemistry	8
5.0	DATA SYNTHESIS	8
6.0	PROFESSIONAL STATEMENT	9
7.0	STATEMENT OF LIMITATIONS	9
8.0	REFERENCES.....	11

LIST OF TABLES

TABLE A: SITE DETAILS	2
TABLE B: SOIL PROFILE – DRILLING INVESTIGATION	7

LIST OF FIGURES

Figure 1:	Site Location Map
Figure 2:	Topographical Map
Figure 3:	Surrounding Land Use Plan
Figure 4:	Site Plan – Borehole Locations
Figure 5:	Soil Chemistry Plan

PHOTOGRAPHS

LIST OF APPENDICES

Appendix A	Data Tables
Appendix B	Borehole Logs
Appendix C	Analytical Chemistry Reports

1.0 INTRODUCTION

British Columbia Buildings Corporation (BCBC) retained SEACOR Environmental Inc. (SEACOR) to conduct a salt investigation of the Cassidy Highways Yard located at 1329 Kipp Road in Cassidy, BC. The investigation was conducted to delineate salt-impacts identified in soil and groundwater at the site during an investigation conducted in 1999.

SEACOR conducted a drilling investigation at the site on June 12, 2003 and returned to the site on June 16, 2003 to conduct a groundwater monitoring and sampling event. The scope of work for the investigation included:

- Completion of a site-specific health and safety plan;
- advancement of twelve boreholes (BH's 03-4 to 03-15) to a maximum depth of 2.7 metres below ground surface;
- collection of thirty soil samples from the boreholes,
- completion of nine of the boreholes (BH's 03-4, 03-5 and 03-9 to 03-15) as groundwater monitoring wells;
- completion of a groundwater monitoring and sampling program for the pre-existing and newly-installed monitoring wells, including combustible vapour levels, depth-to-water and end of monitoring well measurements;
- collection of representative groundwater samples from four pre-existing monitoring wells (groundwater was not encountered in the newly installed wells);
- submission of twenty-six soil samples and four groundwater samples to ALS Canada Ltd. (ALS) of Vancouver, BC for chloride, sodium and/or metals analyses; and,
- submission of this report, including data synthesis, photographs and site plans.

The results of the salt investigation program are outlined in the subsequent sections of the report, with site plans and photographs following the text for reference. Data tables are located in Appendix A, borehole logs are included in Appendix B and the analytical chemistry reports are included in Appendix C for reference.

2.0 BACKGROUND

2.1 Site Details

The site location map, topographical map and surrounding land use plans are illustrated on Figures 1 to 3, respectively. Table A below presents the site details.

TABLE A: SITE DETAILS		
REGISTERED OWNER	British Columbia Buildings Corporation	
SITE ADDRESS	1329 Kipp Road, Cassidy, BC	
LEGAL DESCRIPTION	Lot 1, Section 14, Range 6, Cranberry District, Plan 40297	
PARCEL IDENTIFICATION NO.	000-181-455	
LATITUDE/LONGITUDE	N 49° 6' 26.4"	W 123° 54' 6.6"
ZONING	PU1 – Public Utility (located within the Regional District of Nanaimo)	
PROPERTY SIZE	Approximately 3.62 hectares	
PERCENT ASPHALT COVER	Approximately 50%	
BUILDING INFORMATION	Structures present at the site include: <ul style="list-style-type: none"> Maintenance Building (Building #1) Office/storage Building (Building #2) 	<ul style="list-style-type: none"> Oil Storage Building (Building #3) Salt Shed (Shed #1) Cylinder Storage Shed (Shed #3)
TANK INFORMATION	Present: AST#1 – 1500 L, above ground, steel, waste oil AST#2 – 13500 L, above ground, steel, diesel AST#3 – 1100 L, above ground, steel, heating oil (installed October 2001) AST#4 – 1100 L, above ground, steel, heating oil (installed October 2001) Former: UST#1 – 13500 L, underground, steel, diesel (removed March 1997) UST#2 – 13500 L, underground, steel, diesel (removed March 1997) UST#3 – 13500 L, underground, steel, gasoline (removed March 1997) UST#4 – 4500 L, underground, steel, waste oil (removed March 1997) UST#5 – 9100 L, underground, steel, heating oil (removed October 2001) UST#6 – 22730 L, underground, steel, waste oil (removed October 2001) UST#7 – 5000 L, underground, steel, waste oil (removed October 2001)	
PROTECTION SYSTEMS	Cathodic Protection: None Monitoring Wells: Twenty (eight installed in 1999, three installed in 2001, nine installed in 2003) Catch Basins: Yes Oil/Water Separator: Yes	
SURROUNDING LAND USE (REFER TO FIGURE 3)	North Northeast East Southeast South Southwest West Northwest	Undeveloped/forested Undeveloped/forested Undeveloped/forested Undeveloped/forested, ABC Pre-Cast Concrete Company Undeveloped/forested Undeveloped/forested Undeveloped/forested Undeveloped/forested
PRECIPITATION*	Annual Rainfall: 1045.0 mm Annual Snowfall: 92.9 cm Annual Precipitation: 1144.4 mm	
STRATIGRAPHY	Sand and gravel fill and/or asphalt road surfacing followed by native sandy silt till overlying consolidated sandstone bedrock	

TABLE A: SITE DETAILS (cont)		
TOPOGRAPHY AND HYDROGEOLOGY	Topography:	Apex of local topography
	Flood potential:	None
	Groundwater:	0.82 m to 2.32 m below ground surface (June 16, 2003)
	Groundwater Gradient:	Apex of local topography
	Surface Water:	Beck Creek, approximately 250 m west; Beck Lake, approximately 1.5 km south
	Surface Drainage:	Site is flat, general surface drainage to the north
	Water Wells:	Approximately 247 registered groundwater wells are located within a 1.5 km radius of the site, including a groundwater well to the northeast, providing water to the site
	Water Supply:	Water well located approximately 100 m northeast of the site

Notes:

- *- Precipitation data from Nanaimo Airport, page 82, "Canadian Climate Normals, 1961 - 1990, volume 1", Minister of Supply and Services Canada, 1993

2.2

2.3 Previous Works Conducted

Conor Pacific Environmental Technologies Inc. (Conor Pacific) completed a Stage 1 and 2 Preliminary Site Investigation (PSI) of the Cassidy Highways Yard in November 1998 which included the advancement of nine boreholes across the site, with none completed as groundwater monitoring wells. The results of the analyses indicated the soil sample from BH1 (0.1 - 0.3 m and 1.2 - 1.5 m) exceeded the Canadian Council for the Ministers of the Environment interim criterion of 2000 uS/cm for specific conductance. All soil samples submitted for hydrocarbon and metals analyses were below the Contaminated Sites Regulation (CSR) Commercial standards. Groundwater was not assessed during the Stage 2 PSI, however, Conor Pacific noted that there were seven drinking water wells within a 3 km² area of the site.

SEACOR completed a DSI of the subject site in August 1999. Thirteen boreholes were advanced across the site, with nine boreholes completed as groundwater monitoring wells. Twelve surficial soil samples were also collected to assess surficial soil quality across the site. The soil analytical results during the DSI indicated soil samples SA9 and SA10 (0.03 m), collected in the sandblasting area west of the maintenance building, exceeded the CSR Commercial standard for arsenic, copper and zinc concentrations. The Canadian Council for Ministers of the Environment (CCME) sodium adsorption ratio (SAR) was exceeded in BH99-5 (0.2 m). Based on field observations, surficial soils in the vicinity of UST#7/AST#1 were assumed to exceed the CSR Commercial standard for light and heavy extractable petroleum hydrocarbons (LEPH/HEPH), however, no soil samples were submitted for laboratory analyses. Groundwater was not assessed during the DSI, as a negligible amount of water was present in BH99-7 only; SEACOR elected not to submit a groundwater sample from this monitoring well.

SEACOR was retained by BCBC to conduct a supplemental investigative and subsequent environmental site remediation program at the Cassidy Highways Yard. The field activities were completed between April 23 and December 11, 2001.

The supplemental investigative program was conducted between April 23 and July 6, 2001. Seven areas on the site required additional investigation following review of the preliminary and detailed site investigation (DSI): salt sheds #1 and #2, storage area F, oil shed and grease ramp area, sandblasting area, floor drain effluent sediment sampling, potable water well, removal of burn pile and brine tank water sampling. Soil and/or groundwater samples were collected from each of the seven areas, and submitted to ALS of Vancouver, BC for chemical analyses. The results of the analyses indicated soils in the vicinity of the burn pile and near the outlet of a 200 mm PVC drain pipe exceeded the CSR Commercial standard for several metals parameters; the soil sample collected from the 200 mm PVC drain pipe area also exceeded the CSR Commercial standard for light and heavy extractable petroleum hydrocarbons (LEPH/HEPH). Groundwater samples collected from monitoring wells installed during the DSI indicated metals and chloride concentrations in excess of the CSR Drinking Water standards. A sample collected from a brine tank associated with salt shed #2 indicated sodium and chloride concentrations in excess of the CSR Drinking Water standards.

SEACOR, along with Quantum Remediation Services (Quantum) conducted a remedial program at the Cassidy Highways Yard between October 10 and 23, 2001. Three steel underground storage tanks (USTs), one 5,000 L waste oil, one 9,100 L heating oil and one 22,730 L waste oil, were removed from the site. Approximately 60 m³ of hydrocarbon-impacted soils in excess of the CSR Commercial standards and 45 m³ of metals-impacted soils in excess of the CSR Commercial standards were excavated and transported off-site for disposal/treatment at licensed treatment facilities. Drums and pails located within salt shed #2, consisting of highway paint and paint-related products, and approximately 1000 L of water from a brine tank formerly associated with salt shed #2, were also removed off-site for disposal. Confirmatory soil samples indicated hydrocarbon and metals concentrations below the CSR Commercial standards.

3.0 FIELD METHODOLOGY AND ENVIRONMENTAL STANDARDS

3.1 Introduction

Field project activities conducted during the salt investigation program were performed in accordance with SEACOR's Standard Field Procedures and general environmental standards of practice. The results of the subsurface soil investigation are presented in Section 4.0, with analytical results summarized in Appendix A for reference.

3.2 Soil Sampling And Field-Screening

Soil samples collected during the investigation program were classified according to soil type, structure and colour. Duplicate samples were retained for laboratory analysis with the soil samples placed in 125 ml laboratory-prepared glass jars. The samples were labelled and stored in a cooler with ice or ice-packs. The soil samples were subsequently transported to ALS along with completed chain-of-custody forms.

3.3 Drilling Activities

Boreholes were completed utilizing a truck-mounted, rotary head drill rig with solid stem auger. Representative soil samples were collected during the drilling program directly from the auger flights. Augers flights were steam cleaned between boreholes. All soil samples were field-screened in accordance with the above-described procedures. Prior to implementing the drilling investigation, a site-specific health and safety review was conducted.

3.4 Environmental Standards

The Contaminated Sites Regulation (CSR) of the Waste Management Act came into effect on April 1, 1997 and is the principle document addressing contaminated sites in British Columbia. The CSR provides for both numerical and risk-based approaches to managing site conditions and outlines the procedural requirements for site assessment, remediation and application for environmental closure of a property.

The numerical standards for soil are presented in various schedules. The Schedule 4 generic standards include a variety of inorganic and organic substances and are compared to five classes of land use: Agricultural, Urban Park, Residential, Commercial and Industrial. The Schedule 5 matrix standards address sixteen specific contaminants from both a land use and risk-based receptor perspective. Schedule 7 of the CSR includes soil standards, which determine whether a soil relocation agreement is required to transport soil from a site. The most conservative of the following site-specific factors for Commercial land would apply for determining applicable Matrix Numerical Soil Standards applicable at the site: human intake of contaminated soil, toxicity to soil invertebrates and plants and groundwater flow to surface water used by aquatic life (freshwater). Residential land standards are also provided for reference. In addition, the Commercial land use Generic Numerical Soil Standards are also applicable at the Site. The presence/absence of Special Waste soil at the Site is determined as per the Special Waste Regulation (SWR) and Section 13 of the CSR.

Groundwater quality in the CSR is referenced to four classes of water use (Aquatic Life, Irrigation, Livestock and Drinking Water). Based on the presence of Beck Creek, located approximately 250 m from the site, the Aquatic Life (freshwater) standards are applicable to groundwater at the site. Based on the identification of drinking water wells within 1.5 km of the site, the BC Drinking Water standards are also applicable.

The Second Stage Amendments to the CSR were implemented on February 4, 2002. The amendments included new Schedule 4, Schedule 6, and Schedule 7 standards, and modifications to the Schedule 5 standards including the addition of three new matrix numerical soil standards. Select parameters contained in the Schedule 5 site specific factor of groundwater flow to surface water used by aquatic life and the Schedule 6 Aquatic Life standards were partitioned to address both marine

environments and freshwater environments independently. The second stage amendments also included a new Section 60.1, which requires a person to notify the manager and the owner of a neighbouring site if substances are migrating or likely migrating onto the neighbour's site and causing, or likely causing contamination.

In June 2002, the Applied Research Division of Royal Roads University submitted a report titled *Derivation of Matrix Soil Standards for Salt under the British Columbia Contaminated Sites Regulation* (Bright et al., 2002) to the BC Ministry of Water, Land and Air Protection (BC WLAP), the Ministry of Transportation and Highways, the British Columbia Buildings Corporation and the Canadian Association of Petroleum Producers. The report outlined draft matrix numerical soil standards for sodium and chloride. BC WLAP has posted the above document on their website for comment and review. The draft standards presented in this document have been applied to soil at the site.

3.5 Potential Contaminants Of Concern

Potential contaminants of concern associated with salt storage include chloride, sodium and metals. Soil and groundwater samples retained for analysis were submitted to ALS for selective quantification of one or more of the following parameters:

- Chloride^b - leachable or saturated paste extractable chloride (soil), dissolved chloride (water)
- Sodium^b - saturated paste extractable sodium (soil), dissolved sodium (groundwater)
- Metals^{a,b} - total metals (soil), dissolved metals (water)

^a – indicates a regulated parameter in soil; ^b – indicates a regulated parameter in groundwater

4.0 DRILLING INVESTIGATION

Twelve boreholes (BH's 03-4 to 03-15) were advanced across the site to a maximum depth of 2.7 metres below ground surface, with nine of the boreholes (BH03-4, BH03-5 and BH's 03-9 to 03-15) completed as groundwater monitoring wells. Boreholes BH's 03-4 to 03-9 were advanced in the vicinity of salt shed #2, with boreholes BH's 03-10 to 03-15 advanced in the area of salt shed #1. The field observations and chemistry results for soil and groundwater are presented on the following page. Figure 4 illustrates the borehole locations.

4.1 Soil

4.1.1 Soil Profile

The generalized soil profile encountered during the drilling investigation is summarized in Table B below.

TABLE B: SOIL PROFILE – DRILLING INVESTIGATION	
Approximate Depth (metres)	Soil Description
0.0 – 0.05	ASPHALT
0.05 – 0.3	SAND and GRAVEL
0.3 – 1.3	SAND – fine to medium, silty, trace to some gravel, brown, moist
1.3 – 1.5	BEDROCK

The material and depths varied locally and reference should be made to the borehole logs in Appendix B for specific information. The average encountered depths are presented in Table B.

4.1.2 Soil Chemistry

A total of thirty soil samples were collected during the advancement of the boreholes. Twenty-six of the thirty soil samples were submitted to ALS for analysis of chloride, sodium and/or total metals. The soil chemistry results are presented in Tables 1 and 2 in Appendix A of this report, with the detailed chemistry reports provided in Appendix C. Figure 5 illustrates the soil chemistry.

The soil chemistry results indicated that concentrations of chloride in six of the samples and sodium in one of the samples were in excess of the BC draft CL soil standards. A list of the samples that exceeded the draft standards is as follows:

- BH03-7 SA1 (0.3-0.6 m) – exceeded the draft CL standards for chloride and sodium;
- BH03-8 SA1 (0.15-0.6 m) – exceeded the draft CL standard for chloride;
- BH03-9 SA1 (0.3-0.75 m) – exceeded the draft CL standard for chloride;
- BH03-9 SA2 (0.9-1.35 m) – exceeded the draft CL standard for chloride;
- BH03-9 SA3 (1.7-2.2 m) – exceeded the draft CL standard for chloride; and,
- BH03-15 SA3 (1.1-1.55 m) – exceeded the draft CL standard for chloride.

In addition, the concentration of chromium in BH03-15 SA1 (0.15-0.3 m) was in slight excess of the BC CSR CL standard. It is noted, however, that the chromium concentration in the sample (61 mg/kg) was below the regional background chromium concentration for the Vancouver Island region of 90 mg/kg and as per BC WLAP definition, is not considered to constitute contamination.

4.2 Groundwater

Nine (BH03-4, BH03-5 and BH03-9 to BH03-15) of the twelve boreholes advanced across the site were completed as groundwater monitoring wells. A groundwater monitoring and sampling program was conducted on June 16, 2003, four days following the installation of the monitoring wells. The field observations and chemistry results are summarized below and in Tables 3 and 4, respectively, in Appendix A of this report. The detailed chemistry reports are included in Appendix C for reference.

4.2.1 Groundwater Field Observations

On June 16, 2003, SEACOR monitored combustible vapour levels and depth to groundwater in each of the nine newly installed monitoring wells, as well as for ten pre-existing monitoring wells. Headspace vapour levels ranged from 15 parts per million volumetric (ppmv) in BH01-1 to 770 ppmv in BH03-15. Groundwater was not encountered in any of the newly installed monitoring wells but was present in four (BH99-1, BH99-3, BH99-4 and BH99-10) of the ten pre-existing wells. Depth to groundwater in these wells ranged from 0.82 m below grade in BH99-10 to 2.32 m below grade in BH99-1. Based on the limited available groundwater data, groundwater flow direction at the site has not been inferred.

4.2.2 Groundwater Chemistry

Groundwater samples were collected from BH99-1, BH99-3, BH99-4 and BH99-10 on June 16, 2003 and were submitted to ALS for dissolved chloride and dissolved metals (including sodium) analyses. The groundwater chemistry results indicated that concentrations of aluminum, iron, lead and manganese in BH99-3; barium, manganese, sodium and chloride in BH99-4; and, chloride in BH99-1 were in excess of the BC Drinking Water (DW) standards. The concentration of zinc in BH99-3 was in excess of the BC Aquatic Life (AW) standard. In addition, the laboratory detection limits reported for aluminum, antimony, arsenic, cadmium, chromium, cobalt, selenium and thallium for the groundwater sample collected from BH99-3 were in excess of the BC DW and/or AW standards; ALS reported that the detection limits were increased due to matrix interferences encountered during analysis. It is noted that the hardness of the sample was 1840 mg/L CaCO₃.

5.0 DATA SYNTHESIS

SEACOR was retained by BCBC to conduct a salt investigation program at the Cassidy Highways Yard located at 1329 Kipp Road in Cassidy, BC. The purpose of the salt investigation program was to delineate chloride and sodium-impacted soil and groundwater on the highways yard property. The site works were conducted between June 12 and 16, 2003.

SEACOR, along with Drillwell, conducted a drilling investigation at the site on June 12, 2003. Twelve boreholes (BH's 03-4 to 03-15) were advanced to a maximum depth of 2.7 metres below ground surface, with nine of the boreholes (BH's 03-4, 03-5 and 03-9 to 03-15) completed as

groundwater monitoring wells. Twenty-six soil samples were submitted to ALS for analysis of chloride, sodium and/or total metals analyses. The results of the analyses indicated that six of the soil samples exceeded the BC draft CL standard of 50 mg/kg for chloride and that one of the samples exceeded the BC draft CL standard for sodium of 1200 mg/kg. The concentration of chromium in one soil sample was in slight excess of the BC CL standard, however, the concentration was below the regional background chromium concentration (BC WLAP, 1999) and as per BC WLAP definition, is not considered to constitute contamination.

Groundwater was not encountered during the June 2003 investigation; SEACOR returned to the site four days following the installation of the monitoring wells (June 16, 2003) and each of the newly-installed monitoring wells was observed to be dry. Groundwater samples were collected from four pre-existing monitoring wells (BH 99-1, BH 99-3, BH 99-4 and BH 99-10) on June 16, 2003 and submitted for analysis of dissolved metals. The groundwater chemistry results indicated that concentrations of aluminum, iron, lead and manganese in BH 99-3, barium, manganese, sodium and chloride in BH 99-4 and chloride in BH99-1 were in excess of the BC DW standards. The concentration of zinc in BH 99-3 was in excess of the BC AW standard. In addition, the laboratory detection limits reported for aluminum, antimony, arsenic, cadmium, chromium, cobalt, selenium and thallium for the groundwater sample collected from BH 99-3 were in excess of the BC DW and/or AW standards; the detection limits were increased due to matrix interferences encountered during analysis.

6.0 PROFESSIONAL STATEMENT

The “Salt Investigation Program” report, dated January 9, 2004, prepared by SEACOR Environmental Inc. for the subject property, was prepared in accordance with all requirements in the Waste Management Act and the Contaminated Sites Regulation. The authors of the report, Ms. Tara Siemens, M.E.T., Mr. Brad Halsey, B.Sc., and Mr. John H. Wiens, Ph.D., P.Ag. have over 32 years of combined experience in the assessment and remediation of similar sites and are familiar with the works carried out on the subject property.

7.0 STATEMENT OF LIMITATIONS

This report has been prepared and the work referred to in this report has been undertaken by SEACOR for the British Columbia Buildings Corporation. It is intended for the sole and exclusive use of the British Columbia Buildings Corporation and its authorized agents for the purpose(s) set out in this report. Any use of, reliance on or decision made based on this report by any person other than the British Columbia Buildings Corporation for any purpose, or by the British Columbia Buildings Corporation for a purpose other than the purpose(s) set out in this report, is the sole responsibility of such other person or the British Columbia Buildings Corporation. The British Columbia Buildings Corporation and SEACOR make no representation or warranty to any other person with regard to this report and the work referred to in this report and they accept no duty of

care to any other person or any liability or responsibility whatsoever for any losses, expenses, damages, fines, penalties or other harm that may be suffered or incurred by any other person as a result of the use of, reliance on, any decision made or any action taken based on this report or the work referred to in this report.

The investigation undertaken by SEACOR on which this report was based and any conclusions or recommendations made in this report reflect SEACOR's judgment based on the site conditions observed at the time of the site inspection on the date(s) set out in this report, on information available at the time of preparation of this report, on the interpretation of data collected from the field investigation, and on the results of laboratory analyses, which were limited to the quantification in select samples of those substances specifically identified in this report. This report has been prepared for specific application to this site and it is based, in part upon visual observation of the site, subsurface investigation at discrete locations and depths, and specific analysis of specific chemical parameters and materials during a specific time interval, all as described in this report.

Unless otherwise stated, the findings cannot be extended to previous or future site conditions, portions of the site which were unavailable for direct investigation, subsurface locations which were not investigated directly, or chemical parameters, materials or analysis which were not addressed. Substances other than those addressed by the investigation described in this report may exist within the Site; substances addressed by the investigation may exist in areas of the site not investigated and concentrations of substances addressed which are different than those reported may exist in areas other than the locations from which samples were taken. SEACOR expresses no warranty with respect to the accuracy of the laboratory analyses, methodologies used, or presentation of analytical results by the laboratory. Actual concentrations of the substances identified in the samples submitted may vary according to the extraction and testing procedures used.

As the evaluation and conclusions reported herein do not preclude the existence of other chemical compounds or that variations of conditions within the site may be possible, this report should be used for informational purposes only and should absolutely not be construed as a comprehensive hydrogeological or chemical characterization of the site. If site conditions change or if any additional information becomes available at a future date, modifications to the findings, conclusions and recommendations in this report may be necessary.

Nothing in this report is intended to constitute or provide a legal opinion. SEACOR makes no representation as to the requirements of or compliance with environmental laws, rules, regulations or policies established by federal, provincial or local government bodies. Revisions to the regulatory standards referred to in this report may be expected over time. As a result, modifications to the findings, conclusions and recommendations in this report may be necessary.

Regulatory authorities are authorized to rely on the information contained in this report for the purpose of determining whether the British Columbia Buildings Corporation is fulfilling or has fulfilled its obligations with respect to the applicable environmental statutory or regulatory requirements. Any use or reliance upon this report by any other third party is not authorized and is the sole risk of such third party.

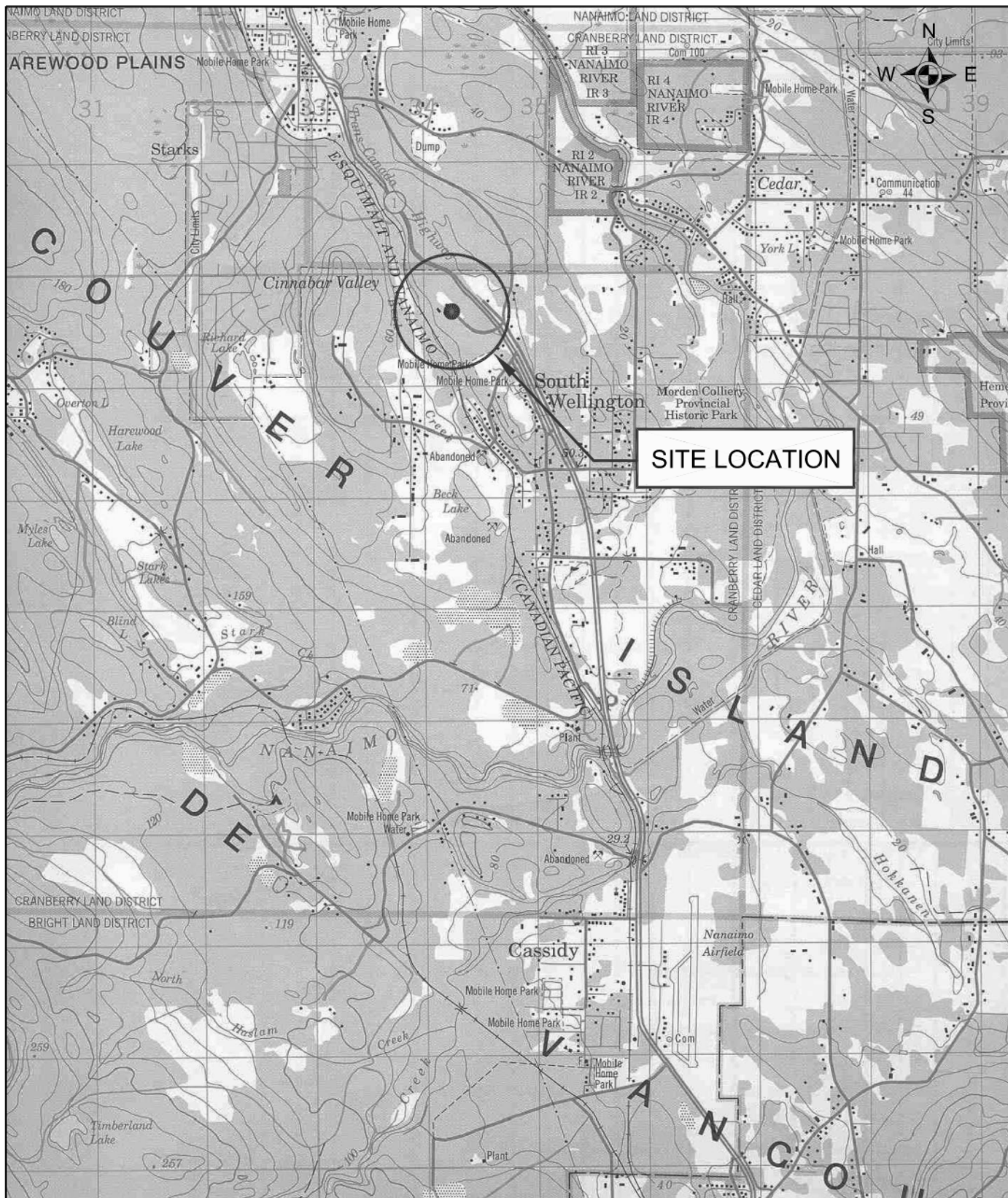
Other than by the British Columbia Buildings Corporation and as set out herein, copying or distribution of this report or use of or reliance on the information contained herein, in whole or in part, is not permitted without the express written permission of SEACOR.

8.0 REFERENCES

BC WLAP, 1999. BC Ministry of Water, Land and Air Protection. *Contaminated Sites Regulation Protocol 4 – Determining Background Soil Quality*. October 15, 1999.

Bright et al., 2002. Doug A. Bright Ph.D. and Jan Addison, Ph.D., June 2002. *Derivation of Matrix Soil Standards for Salt under the British Columbia Contaminated Sites Regulation.*, Applied Research Division, Royal Roads University, Victoria, B.C.

W:\PROJECTS\BCBC\202.01221 CASSIDY\202.01221chloride-rpt.doc



REFERENCED FROM:
DEPT OF ENERGY MINES & RESOURCES MAPPING BRANCH
NANAIMO 92 G/4

SCALE 1:50 000 (APPROX.)

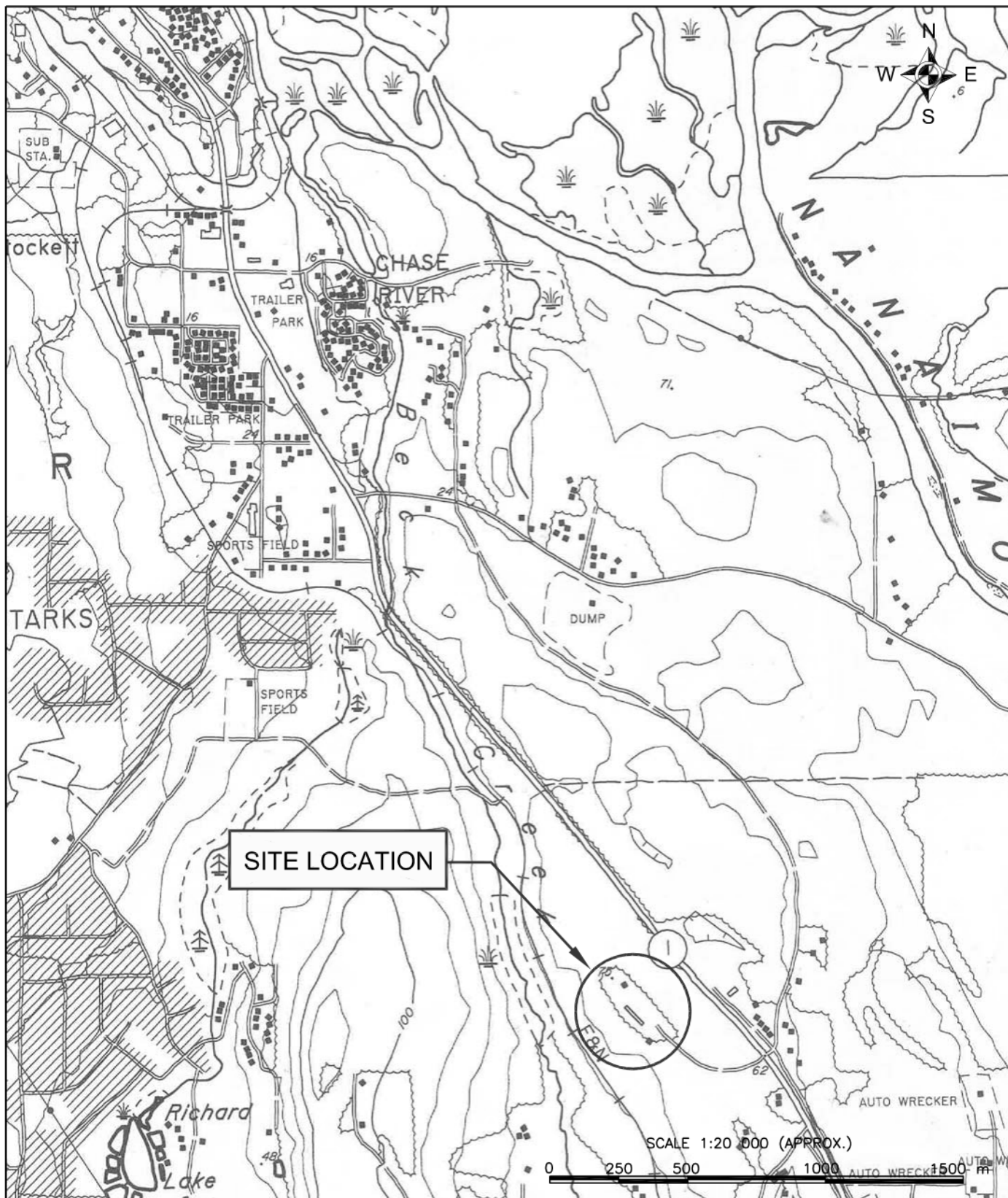
0 0.5 1 2 3 km

SEACOR
ENVIRONMENTAL INC.

**BRITISH COLUMBIA BUILDINGS CORPORATION
CASSIDY HIGHWAYS YARD
1329 KIPP ROAD
CASSIDY, B.C.**

SITE LOCATION MAP

SCALE	DATE	MADE	CHKD	FILE NAME	JOB NO.	FIG
1:50000	11/27/03	DK	BEH	202-01221-A22.DWG	202.01221	1



REFERENCED FROM:
BC MINISTRY OF ENVIRONMENT, LANDS & PARKS, SURVEYS &
RESOURCE MAPPING BRANCH, T.R.I.M. MAP
NANAIMO 92G.011

SEACOR
ENVIRONMENTAL INC.

**BRITISH COLUMBIA BUILDINGS CORPORATION
CASSIDY HIGHWAYS YARD
1329 KIPP ROAD
CASSIDY, B.C.**

TOPOGRAPHICAL MAP

SCALE	DATE	MADE	CHKD	FILE NAME	JOB NO.	FIG
1:20000	11/28/03	DK	BEH	202-01221-A23.DWG	202.01221	2



FORESTED

FORESTED

BECK CREEK
250m

TRANS-CANADA
HIGHWAY
~200 m

ESQUIMALT AND
NANAIMO RAILWAY
~150m

FORESTED

BECK LAKE
~1.5Km

KIPP ROAD

SITE



BRITISH COLUMBIA BUILDINGS CORPORATION
CASSIDY HIGHWAYS YARD
1329 KIPP ROAD
CASSIDY, B.C.

SURROUNDING LAND USE PLAN

SCALE	DATE	MADE	CHKD	FILE NAME	JOB NO.	FIG
NTS	11/28/03	DK	BEH	202-01221-A24.DWG	202.01221	3



- LEGEND
- APPROXIMATE SITE BOUNDARY

FENCE

STORAGE TANK

FORMER STORAGE TANK

FORMER STRUCTURE

BOREHOLE COMPLETED AS A MONITORING WELL

BOREHOLE

STOCKPILE OR STORAGE BOUNDARY

PAVED AREA

ABOVE GROUND STORAGE TANK

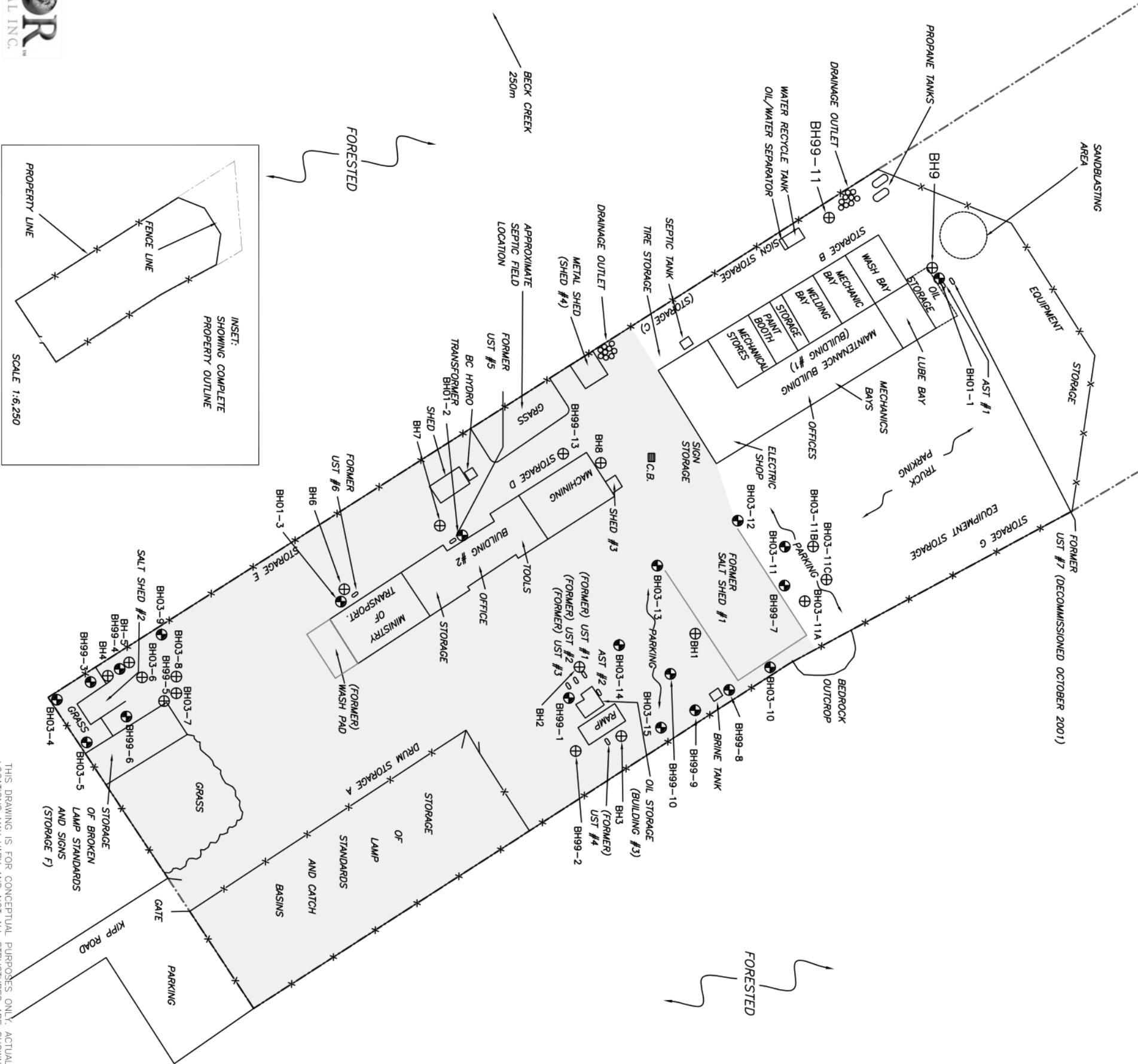
UNDERGROUND STORAGE TANK

CATCH BASIN

AST

UST

C.B.



THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.



LEGEND

- x --- APPROXIMATE SITE BOUNDARY
- x - FENCE
- STORAGE TANK
- FORMER STORAGE TANK
- FORMER STRUCTURE
- BOREHOLE COMPLETED AS A MONITORING WELL
- ⊕ BOREHOLE
- STOCKPILE OR STORAGE BOUNDARY
- ▭ PAVED AREA
- ▭ ABOVE GROUND STORAGE TANK
- ▭ UNDERGROUND STORAGE TANK
- ▭ CATCH BASIN
- AST
- UST
- C.B.

INDICATES SOIL SAMPLE IN EXCESS OF THE MOST STRINGENT DRAFT CSR COMMERCIAL STANDARD OF 50ppm FOR CHLORIDE

CSR
CONTAMINATED SITES REGULATION
PARTS PER MILLION

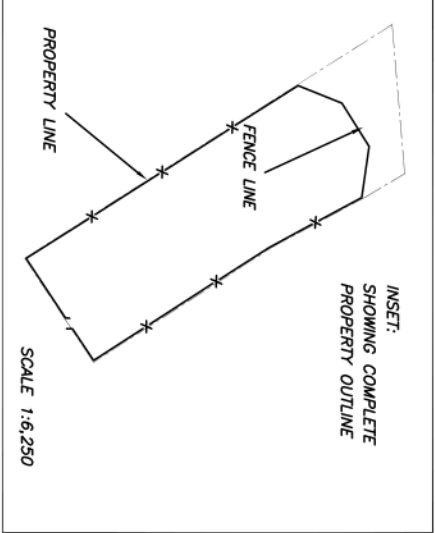
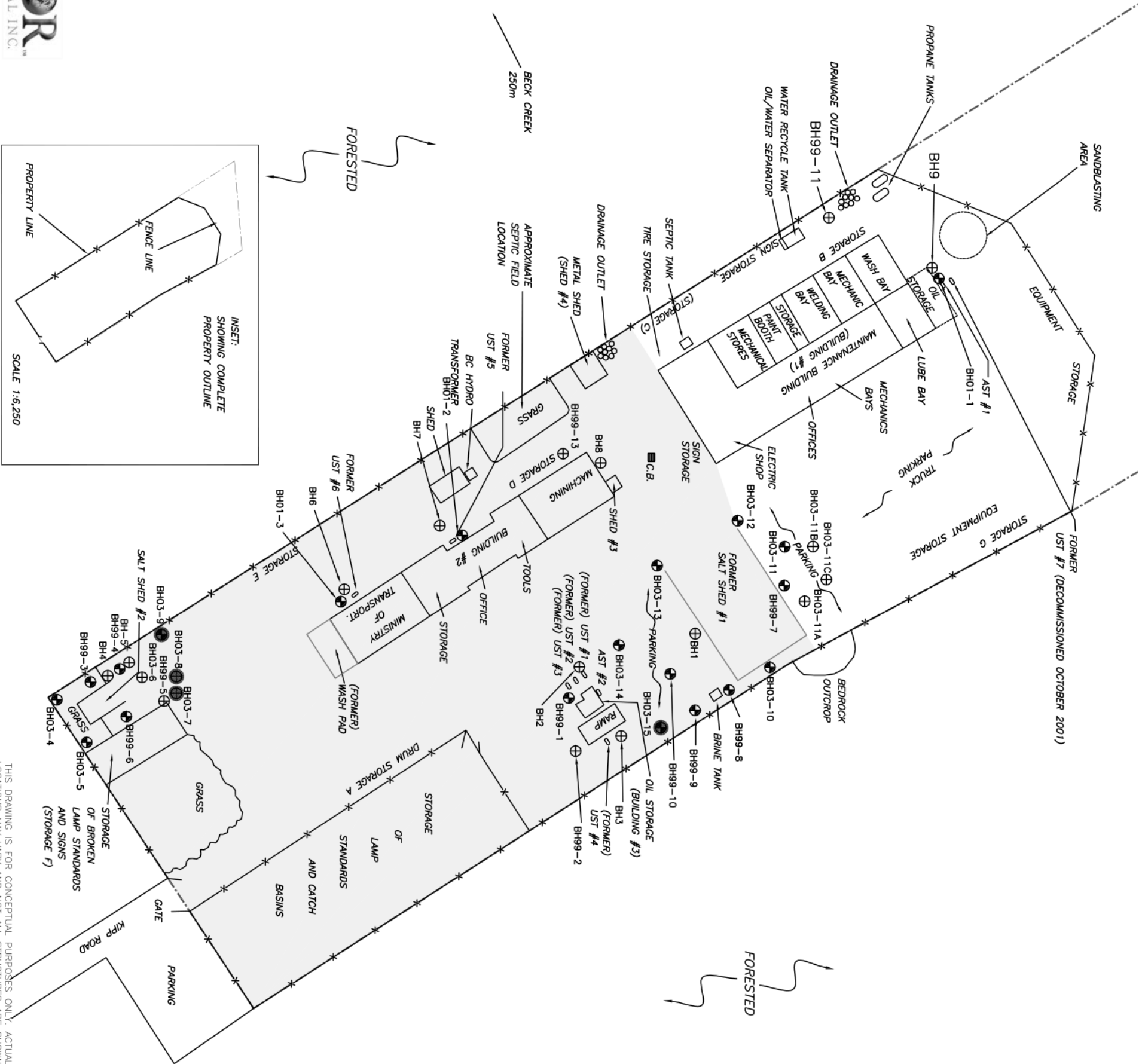
NOTES:
BH1 TO BH9 ADVANCED BY CONOR PACIFIC (1998)
BH99-1 TO BH99-13 ADVANCED BY SEACOR (AUGUST, 1999)



BRITISH COLUMBIA BUILDINGS CORPORATION
CASSIDY HIGHWAYS YARD
1329 KIPP ROAD
CASSIDY, B.C.

SOIL CHEMISTRY PLAN

SCALE	DATE	MADE	CHKD	FILE NAME	JOB NO.	FIG
1:1250	11/28/03	DK	BEH	202-01221-A25.DWG	202.01221	5



THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.



PHOTO 1: Location of BH's 03-11, 03-12, 03-13 and 03-14, facing west-northwest.



PHOTO 2: Location of BH's 99-9, 99-10 and 03-15, facing northeast.

APPENDIX A DATA TABLES

British Columbia Buildings Corporation
Cassidy Highways Yard
1329 Kipp Road, Cassidy, BC
SEACOR Project: 202.01221.003

TABLE 1: CHLORIDE AND SODIUM CHEMISTRY - DRILLING INVESTIGATION - June 12, 2003

Sample ID	Depth (metres)	Conventional Analysis	Saturated Paste Extractables (mg/kg)	
		Chloride (mg/kg)	Chloride	Sodium
BH03-4 SA1	0.15 - 0.30	9	0.8	14
BH03-5 SA1	0.15 - 0.75	-	1.5	14
BH03-6 SA1	0.30 - 0.60	28	22.8	37
BH03-7 SA1	0.30 - 0.60	4110	3990	2290
BH03-8 SA1	0.15 - 0.60	1770	1800	636
BH03-9 SA1	0.30 - 0.75	1080	1100	607
BH03-9 SA2	0.90 - 1.35	-	1360	743
BH03-9 SA3	1.70 - 2.20	-	382	234
BH03-10 SA1	0.15 - 0.60	7	6.8	4
BH03-10 SA2	0.75 - 1.20	-	5	<4
BH03-11 SA1	0.15 - 0.30	10	-	-
BH03-11 SA2	0.45 - 0.75	9	0.8	13
BH03-11A SA1	0.15 - 0.30	11	-	-
BH03-11B SA1	0.15 - 0.30	11	-	-
BH03-11C SA1	0.15 - 0.30	25	-	-
BH03-12 SA1	0.15 - 0.30	10	-	-
BH03-12 SA2	0.45 - 0.90	10	1.7	<20
BH03-12 SA3	1.05 - 1.55	-	17.2	17
BH03-13 SA1	0.15 - 0.30	10	-	-
BH03-13 SA2	0.45 - 0.90	9	7.6	10
BH03-14-SA1	0.15 - 0.30	10	-	-
BH03-14 SA2	0.30 - 0.75	-	17.6	<10
BH03-14 SA3	0.90 - 1.35	-	12	7
BH03-15 SA1	0.15 - 0.30	56	-	-
BH03-15 SA2	0.25 - 0.55	48	38.4	26
BH03-15 SA3	1.10 - 1.55	-	78	19
CSR Commercial		n.s.	50 ^a	1200 ^b

Notes:

- all concentrations expressed as milligrams per litre (ppm - parts per million)
- m - metres below grade
- < - less than the laboratory detection limit indicated
- n.s. - no standard currently listed
- CSR Commercial - BC Contaminated Sites Regulation (CSR) - Commercial standards
- ^a - Proposed Matrix Numerical Soil standards - groundwater used for drinking water. Note: the most conservative standards is presented. Standards is dependent on the coefficient of adsorption and ranges from 50 ppm to 210 ppm for Matrix Numerical Soil standards - groundwater used for drinking water.
- ^b - Proposed Matrix Numerical Soil standards - toxicity to soil invertebrates and plants
- **bold** - indicates concentration in excess of the CSR Commercial draft standard of 50 ppm for chloride or 1200 for sodium

TABLE 2: SOIL METALS CHEMISTRY - DRILLING INVESTIGATION - June 12, 2003

Sample ID Depth (m) Date	BH03-4 SA1 0.15 - 0.30 12-Jun-03	BH03-9 SA1 0.30 - 0.75 12-Jun-03	BH03-11ASA1 0.15-0.30 12-Jun-03	BH03-13 SA1 0.15 - 0.30 12-Jun-03	BH03-15 SA1 0.15 - 0.30 12-Jun-03	CSR Commercial
pH	7.97	4.95	6.49	6.63	6.73	n.s.
Antimony	<10	<10	<10	<10	<10	40 ^a
Arsenic	7	8	5	<5	8	15 ^e
Barium	60	72	102	57	54	2000 ^a
Beryllium	<0.5	<0.5	<0.5	<0.5	<0.5	8 ^a
Cadmium	<0.5	<0.5	<0.5	<0.5	<0.5	1.5 ^e @ pH<6.5 2 ^b @ pH=6.5-<7.0 25 ^b @ pH=7.5-<8.0
Chromium (total)	48	40	37	20	61	60 ^{b,e}
Cobalt	16	14	11	9	14	300 ^a
Copper	55	47	55	62	54	90b @ pH<5.0 250 ^c
Lead	<50	<50	<50	<50	<50	100 ^e @ pH<6.0 250 ^e @ pH=6.0-<6.5 1000 ^d
Mercury	0.05	0.05	<0.05	<0.05	0.06	40 ^d
Molybdenum	<4	<4	<4	<4	<4	40 ^a
Nickel	47	32	30	16	37	500 ^a
Selenium	<3	<2	<2	<2	<2	10 ^a
Silver	<2	<2	<2	<2	<2	40 ^a
Tin	<5	<5	<5	<5	<5	300 ^a
Vanadium	88	92	82	57	96	n.s.
Zinc	49	39	60	30	42	150 ^e @ pH<5.0 600 ^c

Notes:

m - metres: milligrams per dry kilogram

< - less than analytical detection limit indicated;

" - " - sample not analyzed for parameter indicated

CSR - Contaminated Sites Regulation, 1997 (with amendments to 2003)

CSR Commercial - BC CSR - Commercial standards

^a - CSR, Schedule 4 Generic Numerical Soil Standards

^b - CSR, Schedule 5 Matrix Numerical Soil Standards - groundwater flow to surface water used by aquatic life (freshwater)

^c - CSR, Schedule 5 Matrix Numerical Soil Standards - toxicity to soil invertebrates and plants

^d - CSR, Schedule 5 Matrix Numerical Soil Standards - intake of contaminated soil

^e - CSR, Schedule 5 Matrix Numerical Soil Standards - groundwater used for drinking water

^f - Standard varies with receiving water hardness (H). H=100-<200 mg/L as CaCO₃ is assumed.

bold indicates concentration in excess of the CSR Commercial standard

n.s. - no standard listed

TABLE 3: GROUNDWATER FIELD OBSERVATIONS - DRILLING INVESTIGATION - June 16, 2003						
Borehole ID	Elevation (m)		Depth to Water (m)		Groundwater Elevation (m)	HSVL (ppmv)
	TOP	Grade	TOP	Grade		
BH99-1	99.44	99.55	2.21	2.32	97.23	145
BH99-3	101.03	100.84	1.08	0.89	99.96	n/r
BH99-4	100.70	100.73	0.80	0.83	99.90	185
BH99-6	100.59	100.63	Dry	Dry	Dry	165
BH99-7	99.97	100.08	Not located			
BH99-8	99.73	99.86	Dry	Dry	Dry	125
BH99-9	99.65	99.73	Dry	Dry	Dry	145
BH99-10	99.82	99.91	0.73	0.82	99.09	25
BH01-1	99.99	100.06	Dry	Dry	Dry	15
BH01-2	99.60	99.66	Dry	Dry	Dry	75
BH01-3	99.68	99.76	Dry	Dry	Dry	140
BH03-4	100.87	100.76	Dry	Dry	Dry	255
BH03-5	100.52	100.34	Dry	Dry	Dry	90
BH03-9	99.90	100.00	Dry	Dry	Dry	320
BH03-10	100.13	100.19	Dry	Dry	Dry	145
BH03-11	99.94	100.10	Dry	Dry	Dry	175
BH03-12	100.03	100.15	Dry	Dry	Dry	235
BH03-13	100.09	100.17	Dry	Dry	Dry	155
BH03-14	99.66	99.79	Dry	Dry	Dry	190
BH03-15	99.61	99.65	Dry	Dry	Dry	770

Notes:

- HSVL - headspace vapour limit
- ppmv - volumetric parts per million
- n.r. - not recorded
- m - metres below grade

**TABLE 4: GROUNDWATER CHEMISTRY - DISSOLVED METALS, SODIUM AND CHLORIDE -
June 16, 2003**

Sample ID	BH99-3	BH99-4	BH99-1	BH99-10	CSR DW	CSR AW
Hardness (mg/L) ^H	67.3	1840.0	570	41.4	n.s.	n.s.
Aluminum	900	<500	<50	30	200	n.s.
Antimony	1	<30	<3	<1	6	200
Arsenic	3	<50	<5	<2	25	50
Barium	80	1280	110	20	1000	5000
Beryllium	<5	<20	<5	<5	n.s.	53
Boron	<100	<300	<100	<100	5000	50000
Cadmium	0.2	<3	<0.3	<0.1	5	0.3 @ H=30-<90 0.5 @ H=90-<150 0.6 @ H=150-<210
Calcium (mg/L)	21.8	504	150	10.2	n.s.	n.s.
Chromium	3	<30	<3	<1	50	10
Cobalt	3	<30	<3	<1	n.s.	9
Copper	4	<50	<5	<2	1000	20 @ H<50 30 @ H=50-<75 90 @ H≥200
Iron	2520	170	<30	<30	300	n.s.
Lead	15	<50	<5	<2	10	40 @ H<50 50 @ H=50-<100 160 @ H≥300
Lithium	<50	<200	<50	<50	n.s.	n.s.
Magnesium (mg/L)	3.1	142	47.7	3.9	100 mg/L	n.s.
Manganese	550	9040	<10	<10	50	n.s.
Mercury	<0.2	<0.2	<0.2	<0.2	1	1
Molybdenum	3	<50	20	<2	250	10000
Nickel	1	<300	<30	<10	n.s.	250 @ H<60 650 @ H=60-<120 1500 @ H≥180
Selenium	<2	<50	<5	<2	10	10
Silver	0.2	<3	<0.3	<0.1	n.s.	0.5 @ H<100 15 @ H>100
Thallium	<0.4	<10	<1	<0.4	n.s.	3
Titanium	<50	<200	<50	<50	n.s.	1000
Uranium	3.7	<10	3	<0.4	100	1000
Vanadium	<30	<90	<30	<30	n.s.	n.s.
Zinc	<u>172</u>	300	41	16	5000	75 @ H≤90
DISSOLVED SODIUM AND CHLORIDE						
Sodium	152	2390	180	132	200 mg/L	n.s.
Chloride	5.2	4840	363	191	250 mg/L	n.s.

Notes:

all concentrations expressed as micrograms per litre except where noted

H - hardness in milligrams per litre CaCO₃

mg/L - milligrams per litre;

< - less than analytical detection limit indicated

CSR - BC Contaminated Sites Regulation, 1997 (with amendments to 2003)

CSR AW - BC CSR - Aquatic Life standards (freshwater and/or marine)

CSR DW - BC CSR - Drinking Water standards






Bold - indicates concentration in excess of the BC DW standard

Underline - indicates concentration in excess of the BC AW standard

Italics - indicates laboratory detection limit exceeds the BC AW or DW standard

APPENDIX B BOREHOLE LOGS

British Columbia Buildings Corporation
Cassidy Highways Yard
1329 Kipp Road, Cassidy, BC
SEACOR Project: 202.01221.003




DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA				WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)	
						ORGANIC VAPOUR LEVEL (ppmv)								
						1	10	100	1000					
		SA1			silty SAND Medium grained sand, poorly graded, trace to some gravel, brown, moist trace clay near 0.3 m							roadbox, plug, cement		
1		SA2											bentonite seal	
													50 mm solid PVC pipe	100
													50 mm Ø10 slot PVC pipe	
													silica sand	
					BEDROCK									
					End of borehole at 1.7 m Well Completion Details: Screened interval from 0.9 m to 1.7 m below surface Elevation at top of pipe (TOP) = 100.870 m Combustible Vapour Level = 255 ppmv Groundwater Elevation = Dry									
DRILLING METHOD: Solid Stem Auger Drilling						Notes:  AUGER SAMPLE						Sheet 1 of 1		
BOREHOLE DIAMETER: 0.15 m (OD)														
DRILL DATE: June 12, 2003						LOGGED BY: BH								


 DRILLING METHOD: Solid Stem Auger Drilling
 BOREHOLE DIAMETER: 0.15 m (OD)

 Notes: ☒ AUGER SAMPLE

DRILL DATE: June 12, 2003 LOGGED BY: BH

Sheet 1 of 1

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA				WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
						ORGANIC VAPOUR LEVEL (ppmv)							
						1	10	100	1000				
		SA1			silty SAND Fine to medium grained, trace to some gravel, light brown, damp							roadbox, plug, cement bentonite seal 50 mm solid PVC pipe silica sand 50 mm Ø10 slot PVC pipe	100
1		SA2			BEDROCK								
					End of borehole at 1.2 m Well Completion Details: Screened interval from 0.6 m to 1.2 m below surface Elevation at top of pipe (TOP) = 100.520 m Combustible Vapour Level = 90 ppmv Groundwater Elevation = Dry								



DRILLING METHOD: Solid Stem Auger Drilling	Notes:  AUGER SAMPLE
BOREHOLE DIAMETER: 0.15 m (OD)	
DRILL DATE: June 12, 2003	LOGGED BY: BH

Sheet 1 of 1

BOREHOLE LOG

BOREHOLE NO: BH03-6

SURFACE ELEVATION: n.r.

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA				BOREHOLE COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
						ORGANIC VAPOUR LEVEL (ppmv)							
						1	10	100	1000				
		SA1			ASPHALT SAND AND GRAVEL Medium grained sand and gravel, some silt, dark brown, moist sandy SILT Fine to medium grained sand, trace gravel, light brown, damp							backfilled with drill cuttings	
					Auger refusal (bedrock) End of borehole at 0.6 m								

 DRILLING METHOD: Solid Stem Auger Drilling
 BOREHOLE DIAMETER: 0.15 m (OO)

 Notes: ☒ AUGER SAMPLE

DRILL DATE: June 12, 2003 LOGGED BY: BH

Sheet 1 of 1

BOREHOLE LOG

BOREHOLE NO: BH03-7

SURFACE ELEVATION: n.t.


DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA				BOREHOLE COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
						ORGANIC VAPOUR LEVEL (ppmv)							
						1	10	100	1000				
		SA1		0	ASPHALT SAND AND GRAVEL Medium grained sand and gravel, some silt, dark brown, moist sandy SILT Fine to medium grained sand, trace gravel, light brown, damp							backfilled with drill cuttings	
					Auger refusal (bedrock) End of borehole at 0.6 m								

 DRILLING METHOD: Solid Stem Auger Drilling
 BOREHOLE DIAMETER: 0.15 m (OD)

 Notes: ☒ AUGER SAMPLE

DRILL DATE: June 12, 2003 LOGGED BY: BH

Sheet 1 of 1


DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA				BOREHOLE COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
						ORGANIC VAPOUR LEVEL (ppmv)							
						1	10	100	1000				
		SA1		0	ASPHALT SAND AND GRAVEL Medium grained sand and gravel, some silt, dark brown, moist SAND Fine to medium grained, some silt, trace gravel, brown, damp							backfilled with dris cuttings	
					Auger refusal (bedrock) End of borehole at 0.6 m								

 DRILLING METHOD: Solid Stem Auger Drilling
 BOREHOLE DIAMETER: 0.15 m (OD)

 Notes: ☒ AUGER SAMPLE

DRILL DATE: June 12, 2003 LOGGED BY: BH

Sheet 1 of 1

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA				WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
						ORGANIC VAPOUR LEVEL (ppmv)							
						1	10	100	1000				
1		SA1			ASPHALT							roadbox, plug, cement	
					SAND AND GRAVEL								
					Fine to medium sand and gravel, some silt, dark brown, moist								
2		SA2			silty SAND							bentonite seal	
					Fine to medium grained sand, trace fine gravel, light brown, moist								
					Increase in silt content between 1.5 and 2.1 m								
		SA3										50 mm solid PVC pipe	
					Auger refusal (bedrock) End of borehole at 2.1 m								
					Well Completion Details: Screened interval from 0.9 m to 2.1 m below surface Elevation at top of pipe (TOP) = 99.900 m								
					Combustible Vapour Level = 320 ppmv Groundwater Elevation = Dry								
Notes:  AUGER SAMPLE													
Sheet 1 of 1													


 DRILLING METHOD: Solid Stem Auger Drilling
 BOREHOLE DIAMETER: 0.15 m (OD)

 Notes: ☒ AUGER SAMPLE

DRILL DATE: June 12, 2003

LOGGED BY: BH

Sheet 1 of 1

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA				WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
						ORGANIC VAPOUR LEVEL (ppmv)							
						1	10	100	1000				
				0	ASPHALT							roadbox, plug, cement	100
				0	SAND AND GRAVEL Medium sand and gravel, some silt, dark brown, moist								
		SA1		2	SAND Some silt, trace gravel, occasional rootlets, light brown, damp							bentonite seal	
												50 mm solid PVC pipe	
1		SA2										silica sand	99
												50 mm Ø10 slot PVC pipe	
					BEDROCK								
					End of borehole at 1.5 m								
					Well Completion Details: Screened interval from 0.7 m to 1.5 m below surface Elevation at top of pipe (TOP) = 100.130 m								
					Combustible Vapour Level = 145 ppmv Groundwater Elevation = Dry								
DRILLING METHOD: Solid Stem Auger Drilling BOREHOLE DIAMETER: 0.15 m (OD)					Notes:  AUGER SAMPLE								
DRILL DATE: June 12, 2003 LOGGED BY: BH										Sheet 1 of 1			

 DRILLING METHOD: Solid Stem Auger Drilling
 BOREHOLE DIAMETER: 0.15 m (OD)

 Notes: ☒ AUGER SAMPLE

DRILL DATE: June 12, 2003 LOGGED BY: BH

Sheet 1 of 1

BOREHOLE LOG

BOREHOLE NO: BH03-11

SURFACE ELEVATION: 100.10 m


DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA				WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
						ORGANIC VAPOUR LEVEL (ppmv)							
						1	10	100	1000				
		SA1			SAND AND GRAVEL Medium sand and gravel, some silt, dark brown, moist							roadbox, plug, cement	100
		SA2			sandy SILT Medium grained sand, trace to some gravel, trace clay, brown, moist							bentonite seal	
					SILT Some medium grained sand, low plasticity,, trace to some gravel, trace clay, brown, moist							50 mm solid PVC pipe	
		SA3										silica sand	
												50 mm Ø10 slot PVC pipe	99
					BEDROCK End of borehole at 1.6 m								
					Well Completion Details: Screened interval from 0.8 m to 1.6 m below surface Elevation at top of pipe (TOP) = 99.940 m								
					Combustible Vapour Level = 175 ppmv Groundwater Elevation = Dry								

 DRILLING METHOD: Solid Stem Auger Drilling
 BOREHOLE DIAMETER: 0.15 m (ØD)

 Notes: ☒ AUGER SAMPLE

DRILL DATE: June 12, 2003 LOGGED BY: BH

Sheet 1 of 1

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA				WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
						ORGANIC VAPOUR LEVEL (ppmv)							
						1	10	100	1000				
		SA1		0	ASPHALT SAND AND GRAVEL Medium sand and gravel, some silt, dark brown, moist							roadbox, plug, cement	100
		SA2		0	SAND Fine to medium grained sand, some gravel, trace to some silt, brown, moist							bentonite seal	
1					Increase to some silt between 1.1 and 1.5 m							50 mm solid PVC pipe	
		SA3										50 mm Ø10 slot PVC pipe	99
2		SA4			sandy SILT Fine to medium grained, low plasticity, trace to some gravel, dark brown, moist							silica sand	
												backfilled with drill cuttings	98
					End of borehole at 2.7 m								
					Well Completion Details: Screened interval from 0.9 m to 2.4 m below surface Elevation at top of pipe (TOP) = 100.030 m								
					Combustible Vapour Level = 235 ppmv Groundwater Elevation = Dry								
DRILLING METHOD: Solid Stem Auger Drilling BOREHOLE DIAMETER: 0.15 m (OD)					Notes:  AUGER SAMPLE								
DRILL DATE: June 12, 2003 LOGGED BY: BH					Sheet 1 of 1								

 DRILLING METHOD: Solid Stem Auger Drilling
 BOREHOLE DIAMETER: 0.15 m (OD)

DRILL DATE: June 12, 2003

LOGGED BY: BH

 Notes:  AUGER SAMPLE

Sheet 1 of 1



DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA				WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
						ORGANIC VAPOUR LEVEL (ppmv)							
						1	10	100	1000				
		SA1		0	ASPHALT SAND AND GRAVEL Medium sand and gravel, some silt, dark brown, moist							roadbox, plug, cement	100
		SA2		2	silty SAND Fine to medium grained sand, trace to some gravel, light brown, moist							bentonite seal 50 mm solid PVC pipe	
1		SA3										50 mm Ø10 slot PVC pipe silica sand	99
					Auger refusal (bedrock) End of borehole at 1.5 m Well Completion Details: Screened interval from 0.7 m to 1.5 m below surface Elevation at top of pipe (TOP) = 100.090 m Combustible Vapour Level = 155 ppmv Groundwater Elevation = Dry								

 DRILLING METHOD: Solid Stem Auger Drilling
 BOREHOLE DIAMETER: 0.15 m (ØD)



 Notes: ☒ AUGER SAMPLE

DRILL DATE: June 12, 2003 LOGGED BY: BH

Sheet 1 of 1

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA				WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
						ORGANIC VAPOUR LEVEL (ppmv)							
						1	10	100	1000				
		SA1		o	ASPHALT SAND AND GRAVEL Fine to medium sand and gravel, some silt, dark brown, moist							roadbox, plug, cement	
		SA2			silty SAND Fine to medium grained sand, trace to some gravel, wood fragments, black/brown, moist							bentonite seal	
1					Increase in silt content below 0.9 m							50 mm solid PVC pipe	99
		SA3			clayey SILT Medium plasticity, trace fine sand, rootlets, oxidation, moist								
					silty SAND Fine grained sand, trace gravel, rootlets, till-like, light brown, moist							50 mm Ø10 slot PVC pipe	98
2		SA4			Occassional gravel near 2.3 m							silica sand	
					Auger refusal (bedrock) End of borehole at 2.7 m								
					Well Completion Details: Screened interval from 0.9 m to 2.7 m below surface Elevation at top of pipe (TOP) = 99.660 m								
					Combustible Vapour Level = 190 ppmv Groundwater Elevation = Dry								
DRILLING METHOD: Solid Stem Auger Drilling BOREHOLE DIAMETER: 0.15 m (OD)					Notes:  GRAB SAMPLE  AUGER SAMPLE								
DRILL DATE: June 12, 2003 LOGGED BY: BH					Sheet 1 of 1								

 DRILLING METHOD: Solid Stem Auger Drilling
 BOREHOLE DIAMETER: 0.15 m (ØD)

 Notes:  GRAB SAMPLE
 AUGER SAMPLE

DRILL DATE: June 12, 2003 LOGGED BY: BH

Sheet 1 of 1

BOREHOLE LOG

BOREHOLE NO: BH03-15

SURFACE ELEVATION: 99.65 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA				WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
						ORGANIC VAPOUR LEVEL (ppmv)							
						1	10	100	1000				
		SA1		ASPHALT								roadbox, plug, cement	
		SA2		SAND AND GRAVEL	Medium grained sand and gravel, some silt, dark brown, moist							bentonite seal	99
		SA3		SILT	Some medium sand, trace gravel, dark brown, moist							50 mm solid PVC pipe	
		SA4		sandy SILT	Fine to medium grained, trace gravel, light brown, moist							silica sand	98
												50 mm Ø10 slot PVC pipe	
												backfilled with drill cuttings	
					Auger refusal (bedrock) End of borehole at 2.6 m								
					Well Completion Details: Screened interval from 0.9 m to 2.4 m below surface Elevation at top of pipe (TOP) = 99.610 m								
					Combustible Vapour Level = 770 ppmv Groundwater Elevation = Dry								

Notes:

GRAB SAMPLE

AUGER SAMPLE

DRILLING METHOD: Solid Stem Auger Drilling



BOREHOLE DIAMETER: 0.15 m (Ø)

DRILL DATE: June 12, 2003

LOGGED BY: BH

Sheet 1 of 1

 DRILLING METHOD: Solid Stem Auger Drilling
 BOREHOLE DIAMETER: 0.15 m (ØD)

 Notes:  GRAB SAMPLE
 AUGER SAMPLE

DRILL DATE: June 12, 2003 LOGGED BY: BH

Sheet 1 of 1

APPENDIX C

ANALYTICAL CHEMISTRY REPORTS

British Columbia Buildings Corporation
Cassidy Highways Yard
1329 Kipp Road, Cassidy, BC
SEACOR Project: 202.01221.003



CHEMICAL ANALYSIS REPORT

Date: July 15, 2003

ALS File No. S9345r

Report On: 202.01221.003 Soil Analysis
BCBC

Report To: **SEACOR Environmental Inc.**
#9 - 6421 Applecross Rd.
Nanaimo, BC
V9V 1N1

Attention: **Mr. Brad Halsey**

Received: June 14, 2003

ALS ENVIRONMENTAL

per:

Joanne Patrick, B.Sc. - Project Chemist
Leanne Harris, B.Sc. - Project Chemist

File No. S9345r

REMARKS



Please note that the detection limits for Selenium and Extractable Sodium were increased for some samples due to matrix interferences encountered during analysis.

RESULTS OF ANALYSIS - Sediment/Soil

Sample ID	BH03-4 SA1	BH03-5 SA1	BH03-6 SA1	BH03-7 SA1	BH03-8 SA1
Sample Date	03 06 12	03 06 12	03 06 12	03 06 12	03 06 12
ALS ID	1	2	3	4	5

Physical Tests

pH	7.97	-	-	-	-
----	------	---	---	---	---

Dissolved Anions

Chloride	Cl	0.8	1.5	22.8	3990	1800
----------	----	-----	-----	------	------	------

Extractable Metals

Sodium	Na	14	14	37	2290	636
--------	----	----	----	----	------	-----

Total Metals

Antimony	T-Sb	<10	-	-	-	-
Arsenic	T-As	7	-	-	-	-
Barium	T-Ba	60	-	-	-	-
Beryllium	T-Be	<0.5	-	-	-	-
Cadmium	T-Cd	<0.5	-	-	-	-
Chromium	T-Cr	48	-	-	-	-
Cobalt	T-Co	16	-	-	-	-
Copper	T-Cu	55	-	-	-	-
Lead	T-Pb	<50	-	-	-	-
Mercury	T-Hg	0.05	-	-	-	-
Molybdenum	T-Mo	<4	-	-	-	-
Nickel	T-Ni	47	-	-	-	-
Selenium	T-Se	<3	-	-	-	-
Silver	T-Ag	<2	-	-	-	-
Sodium	T-Na	2280	-	-	-	-
Tin	T-Sn	<5	-	-	-	-
Vanadium	T-V	88	-	-	-	-
Zinc	T-Zn	49	-	-	-	-

Remarks regarding the analyses appear at the beginning of this report.
 Results are expressed as milligrams per dry kilogram except where noted.
 < = Less than the detection limit indicated.

RESULTS OF ANALYSIS - Sediment/Soil

Sample ID	BH03-9 SA1	BH03-9 SA2	BH03-10 SA1	BH03-10 SA2	BH03-11 SA2
Sample Date <i>ALS ID</i>	03 06 12 6	03 06 12 7	03 06 12 8	03 06 12 9	03 06 12 10

Physical Tests

pH	4.95	-	-	-	-
----	------	---	---	---	---

Dissolved Anions

Chloride Cl	1100	1360	6.8	5.0	0.8
-------------	------	------	-----	-----	-----

Extractable Metals

Sodium Na	607	743	4	<4	13
-----------	-----	-----	---	----	----

Total Metals

Antimony T-Sb	<10	-	-	-	-
Arsenic T-As	8	-	-	-	-
Barium T-Ba	72	-	-	-	-
Beryllium T-Be	<0.5	-	-	-	-
Cadmium T-Cd	<0.5	-	-	-	-
Chromium T-Cr	40	-	-	-	-
Cobalt T-Co	14	-	-	-	-
Copper T-Cu	47	-	-	-	-
Lead T-Pb	<50	-	-	-	-
Mercury T-Hg	0.05	-	-	-	-
Molybdenum T-Mo	<4	-	-	-	-
Nickel T-Ni	32	-	-	-	-
Selenium T-Se	<2	-	-	-	-
Silver T-Ag	<2	-	-	-	-
Sodium T-Na	1500	-	-	-	-
Tin T-Sn	<5	-	-	-	-
Vanadium T-V	92	-	-	-	-
Zinc T-Zn	39	-	-	-	-

Remarks regarding the analyses appear at the beginning of this report.
 Results are expressed as milligrams per dry kilogram except where noted.
 < = Less than the detection limit indicated.

**RESULTS OF ANALYSIS - Sediment/Soil**

Sample ID	BH03-12 SA2	BH03-12 SA3	BH03-13 SA2	BH03-14 SA2	BH03-14 SA3
Sample Date <i>ALS ID</i>	03 06 12 11	03 06 12 12	03 06 12 13	03 06 12 14	03 06 12 15

Dissolved Anions

Chloride	Cl	1.7	17.2	7.6	17.6	12.0
----------	----	-----	------	-----	------	------

Extractable Metals

Sodium	Na	<20	17	10	<10	7
--------	----	-----	----	----	-----	---

Remarks regarding the analyses appear at the beginning of this report.
 Results are expressed as milligrams per dry kilogram except where noted.
 < = Less than the detection limit indicated.

RESULTS OF ANALYSIS - Sediment/Soil

Sample ID	BH03-15 SA2	BH03-11A SA1	BH03-13 SA1	BH03-15 SA1
Sample Date ALS ID	03 06 12 16	03 06 12 17	03 06 12 18	03 06 12 19

Physical Tests

pH	-	6.49	6.63	6.73
----	---	------	------	------

Dissolved Anions

Chloride	Cl	38.4	-	-	-
----------	----	------	---	---	---

Extractable Metals

Sodium	Na	26	-	-	-
--------	----	----	---	---	---

Total Metals

Antimony	T-Sb	-	<10	<10	<10
Arsenic	T-As	-	5	<5	8
Barium	T-Ba	-	102	57	54
Beryllium	T-Be	-	<0.5	<0.5	<0.5
Cadmium	T-Cd	-	<0.5	<0.5	<0.5
Chromium	T-Cr	-	37	20	61
Cobalt	T-Co	-	11	9	14
Copper	T-Cu	-	55	62	54
Lead	T-Pb	-	<50	<50	<50
Mercury	T-Hg	-	<0.05	<0.05	0.06
Molybdenum	T-Mo	-	<4	<4	<4
Nickel	T-Ni	-	30	16	37
Selenium	T-Se	-	<2	<2	<2
Silver	T-Ag	-	<2	<2	<2
Sodium	T-Na	-	496	345	394
Tin	T-Sn	-	<5	<5	<5
Vanadium	T-V	-	82	57	96
Zinc	T-Zn	-	60	30	42

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per dry kilogram except where noted.
< = Less than the detection limit indicated.

RESULTS OF ANALYSIS - Sediment/Soil

Sample ID	BH03-4 SA2	BH03-9 SA3	BH03-15 SA3
Sample Date ALS ID	03 06 12 20	03 06 12 21	03 06 12 22

Dissolved Anions

Chloride	Cl	-	382	78.0
----------	----	---	-----	------

Extractable Metals

Sodium	Na	-	234	19
--------	----	---	-----	----

Total Metals

Antimony	T-Sb	-	-	-
Arsenic	T-As	-	-	-
Barium	T-Ba	-	-	-
Beryllium	T-Be	-	-	-
Cadmium	T-Cd	-	-	-
Chromium	T-Cr	-	-	-
Cobalt	T-Co	-	-	-
Copper	T-Cu	-	-	-
Lead	T-Pb	-	-	-
Mercury	T-Hg	-	-	-
Molybdenum	T-Mo	-	-	-
Nickel	T-Ni	-	-	-
Selenium	T-Se	-	-	-
Silver	T-Ag	-	-	-
Sodium	T-Na	1350	-	-
Tin	T-Sn	-	-	-
Vanadium	T-V	-	-	-
Zinc	T-Zn	-	-	-

Remarks regarding the analyses appear at the beginning of this report.
 Results are expressed as milligrams per dry kilogram except where noted.
 < = Less than the detection limit indicated.

Appendix 1 - QUALITY CONTROL - Replicates

Sediment/Soil	BH03-8 SA1	BH03-8 SA1	BH03-14 SA2	BH03-14 SA2
	03 06 12	QC # 340343	03 06 12	QC # 340344
<hr/>				
<u>Dissolved Anions</u>				
Chloride Cl	1800	1820	17.6	17.1
<u>Extractable Metals</u>				
Sodium Na	636	682	<10	<10

Remarks regarding the analyses appear at the beginning of this report.
 Results are expressed as milligrams per dry kilogram except where noted.
 < = Less than the detection limit indicated.



Appendix 2 - METHODOLOGY

Outlines of the methodologies utilized for the analysis of the samples submitted are as follows

pH in Soil

This analysis is carried out in accordance with procedures described in "Soil Sampling and Methods of Analysis" (CSSS). The procedure involves mixing the air-dried sample with deionized/distilled water. The pH of the solution is then measured using a standard pH probe. A one to two ratio of sediment to water is used for mineral soils and a one to ten ratio is used for highly organic soils.

Paste Salinity in Sediment/Soil

This analysis is adapted from the methods outlined in "Soil Sampling and Methods of Analysis" (Canadian Society of Soil Science). In summary, 200 -500 dry grams of sample is extracted for a minimum of 4 hours with an amount of deionized water required to create a saturated paste. The resulting extract is then filtered or decanted and analysed for the requested parameters by methods adapted from "Methods for Chemical Analysis of Water and Wastes" (USEPA), "Manual for the Chemical Analysis of Water, Wastewaters, Sediments and Biological Tissues" (BCMOE), and/or "Standard Methods for the Examination of Water and Wastewater" (APHA). The Sodium Adsorption Ratio (SAR) is calculated from the Na, Ca and Mg results. Further details are available upon request.

Recommended Holding Time:

Sample/Extract: not applicable

Metals in Sediment/Soil

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B or Method 3051, United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celsius for 2 hours by either hotplate or block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic absorption/fluorescence spectrophotometry (EPA Method 7000 series), inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B), and/or inductively coupled plasma - mass spectrometry (EPA Method 6020).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.



Appendix 2 - METHODOLOGY - Continued

Recommended Holding Time:

Sample:	6 months (Hg = 28 days)
Extract:	6 months (Hg = 28 days, Sb & Sn = 7 days)
Reference:	BCMELP
For more detail see ALS Environmental "Collection & Sampling Guide"	

This Chemical Analysis Report shall only be reproduced in full, except with the written approval of ALS Environmental.

End of Report



CHEMICAL ANALYSIS REPORT

Date: July 17, 2003

ALS File No. S9346r

Report On: 202.01221.003 Soil Analysis
BCBC

Report To: **SEACOR Environmental Inc.**
#9 - 6421 Applecross Rd.
Nanaimo, BC
V9V 1N1

Attention: **Mr. Brad Halsey**

Received: June 14, 2003

ALS ENVIRONMENTAL

per:

Joanne Patrick, B.Sc. - Project Chemist
Leanne Harris, B.Sc. - Project Chemist

RESULTS OF ANALYSIS - Sediment/Soil

Sample ID	BH03-4 SA1	BH03-6 SA1	BH03-9 SA1	BH03-10 SA1	BH03-11 SA1
Sample Date	03 06 12	03 06 12	03 06 12	03 06 12	03 06 12
ALS ID	1	2	3	4	5

Physical Tests

Moisture	%	9.4	13.9	15.4	10.5	9.7
----------	---	-----	------	------	------	-----

Dissolved Anions

Chloride	Cl	9	28	1080	7	10
----------	----	---	----	------	---	----

Results are expressed as milligrams per dry kilogram except where noted.
 < = Less than the detection limit indicated.

**RESULTS OF ANALYSIS - Sediment/Soil**

Sample ID	BH03-11A SA1	BH03-11B SA1	BH03-11C SA1	BH03-12 SA1	BH03-12 SA2
Sample Date <i>ALS ID</i>	03 06 12 6	03 06 12 7	03 06 12 8	03 06 12 9	03 06 12 10
<hr/>					
<u>Physical Tests</u>					
Moisture %	15.5	17.8	5.9	12.8	6.9
<u>Dissolved Anions</u>					
Chloride Cl	11	11	25	10	10

Results are expressed as milligrams per dry kilogram except where noted.
 < = Less than the detection limit indicated.

**RESULTS OF ANALYSIS - Sediment/Soil**

Sample ID	BH03-13 SA1	BH03-13 SA2	BH03-14 SA1	BH03-15 SA1	BH03-15 SA2
Sample Date <i>ALS ID</i>	03 06 12 11	03 06 12 12	03 06 12 13	03 06 12 14	03 06 12 15

Physical Tests

Moisture	%	2.7	15.8	4.9	10.4	17.5
----------	---	-----	------	-----	------	------

Dissolved Anions

Chloride	Cl	10	9	10	56	48
----------	----	----	---	----	----	----

Total Metals

Sodium	T-Na	-	-	-	-	354
--------	------	---	---	---	---	-----

Results are expressed as milligrams per dry kilogram except where noted.
 < = Less than the detection limit indicated.

File No. S9346r

RESULTS OF ANALYSIS - Sediment/Soil



Sample ID	BH03-7 SA1	BH03-8 SA1
Sample Date ALS ID	03 06 12 16	03 06 12 17

Physical Tests

Moisture	%	13.4	10.4
----------	---	------	------

Dissolved Anions

Chloride	Cl	4110	1770
----------	----	------	------

Results are expressed as milligrams per dry kilogram except where noted.
< = Less than the detection limit indicated.

Appendix 1 - QUALITY CONTROL - Replicates

Sediment/Soil	BH03-11 SA1	BH03-11 SA1	BH03-15 SA2	BH03-15 SA2
	03 06 12	QC # 340351	03 06 12	QC # 340352
<hr/>				
<u>Physical Tests</u>				
Moisture %	9.7	7.9	17.5	15.6
<u>Dissolved Anions</u>				
Chloride Cl	10	10	48	49

Results are expressed as milligrams per dry kilogram except where noted.
 < = Less than the detection limit indicated.

Appendix 2 - METHODOLOGY



Outlines of the methodologies utilized for the analysis of the samples submitted are as follows

Moisture in Sediment/Soil

This analysis is carried out gravimetrically by drying the sample at 103 C for a minimum of six hours.

Recommended Holding Time:

Sample: 14 days

Reference: Puget

For more detail see ALS Environmental "Collection & Sampling Guide"

Conventional Parameters in Sediment/Soil

These analyses are carried out on a leachable basis. The procedure involves mixing the sample with reagent grade water in a one to ten ratio and leaching for several hours. The leachate is filtered and analyzed in accordance with procedures described in "Methods for Chemical Analysis of Water and Wastes" (USEPA), "Manual for the Chemical Analysis of Water, Wastewaters, Sediments and Biological Tissues" (BCMOE), and/or "Standard Methods for the Examination of Water and Wastewater" (APHA). Further details are available on request.

Metals in Sediment/Soil

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B or Method 3051, United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celsius for 2 hours by either hotplate or block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic absorption/fluorescence spectrophotometry (EPA Method 7000 series), inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B), and/or inductively coupled plasma - mass spectrometry (EPA Method 6020).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

Recommended Holding Time:

Sample: 6 months (Hg = 28 days)

Extract: 6 months (Hg = 28 days, Sb & Sn = 7 days)

Reference: BCMELP

For more detail see ALS Environmental "Collection & Sampling Guide"



This Chemical Analysis Report shall only be reproduced in full, except with the written approval of ALS Environmental.

End of Report



CHEMICAL ANALYSIS REPORT

Date: June 26, 2003

ALS File No. S9410

Report On: 202.01221.003 Water Analysis
BCBC

Report To: **SEACOR Environmental Inc.**
#9 - 6421 Applecross Rd.
Nanaimo, BC
V9V 1N1

Attention: **Mr. Brad Halsey**

Received: June 17, 2003

ALS ENVIRONMENTAL

per:

Leanne Harris, B.Sc. - Project Chemist
Joanne Patrick, B.Sc. - Project Chemist

File No. S9410

REMARKS



Please note that the detection limits for certain Dissolved Metals were increased due to matrix interferences encountered during analysis.

RESULTS OF ANALYSIS - Water

Sample ID	BH 99-3	BH 99-4	BH 99-1	BH 99-10
Sample Date	03 06 16	03 06 16	03 06 16	03 06 16
ALS ID	1	2	3	4

Physical Tests

Hardness	CaCO ₃	67.3	1840	570	41.4
----------	-------------------	------	------	-----	------

Dissolved Anions

Chloride	Cl	5.2	4840	363	191
----------	----	-----	------	-----	-----

Dissolved Metals

Aluminum	D-Al	0.90	<0.5	<0.05	0.03
Antimony	D-Sb	0.001	<0.03	<0.003	<0.001
Arsenic	D-As	0.003	<0.05	<0.005	<0.002
Barium	D-Ba	0.08	1.28	0.11	0.02
Beryllium	D-Be	<0.005	<0.02	<0.005	<0.005
Boron	D-B	<0.1	<0.3	<0.1	<0.1
Cadmium	D-Cd	0.0002	<0.003	<0.0003	<0.0001
Calcium	D-Ca	21.8	504	150	10.2
Chromium	D-Cr	0.003	<0.03	<0.003	<0.001
Cobalt	D-Co	0.003	<0.03	<0.003	<0.001
Copper	D-Cu	0.004	<0.05	<0.005	<0.002
Iron	D-Fe	2.52	0.17	<0.03	<0.03
Lead	D-Pb	0.015	<0.05	<0.005	<0.002
Lithium	D-Li	<0.05	<0.2	<0.05	<0.05
Magnesium	D-Mg	3.1	142	47.7	3.9
Manganese	D-Mn	0.55	9.04	<0.01	<0.01
Mercury	D-Hg	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	D-Mo	0.003	<0.05	0.020	<0.002
Nickel	D-Ni	<0.01	<0.3	<0.03	<0.01
Selenium	D-Se	<0.002	<0.05	<0.005	<0.002
Silver	D-Ag	0.0002	<0.003	<0.0003	<0.0001
Sodium	D-Na	152	2390	180	132
Thallium	D-Tl	<0.0004	<0.01	<0.001	<0.0004
Titanium	D-Ti	<0.05	<0.2	<0.05	<0.05
Uranium	D-U	0.0037	<0.01	0.003	<0.0004
Vanadium	D-V	<0.03	<0.09	<0.03	<0.03
Zinc	D-Zn	0.172	0.30	0.041	0.016

Remarks regarding the analyses appear at the beginning of this report.
 Results are expressed as milligrams per litre except where noted.
 < = Less than the detection limit indicated.

Appendix 1 - METHODOLOGY



Outlines of the methodologies utilized for the analysis of the samples submitted are as follows

Conventional Parameters in Water

These analyses are carried out in accordance with procedures described in "Methods for Chemical Analysis of Water and Wastes" (USEPA), "Manual for the Chemical Analysis of Water, Wastewaters, Sediments and Biological Tissues" (BCMOE), and/or "Standard Methods for the Examination of Water and Wastewater" (APHA). Further details are available on request.

Chloride in Water

This analysis is carried out using procedures adapted from APHA Method 4500 "Chloride". Chloride is determined using the ferricyanide colourimetric method.

Recommended Holding Time:

Sample: 28 days

Reference: APHA

For more detail see ALS Environmental "Collection & Sampling Guide"

Metals in Water

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" 20th Edition 1998 published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotplate or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by atomic absorption/emission spectrophotometry (EPA Method 7000 series), inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B), and/or inductively coupled plasma - mass spectrometry (EPA Method 6020).

Recommended Holding Time:

Sample: 6 months

Reference: EPA

For more detail see: ALS "Collection & Sampling Guide"

Mercury in Water

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" 20th Edition 1998 published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic absorption and/or fluorescence spectrophotometry (EPA Method 7470A/7471A/245.7).

File No. S9410

Appendix 1 - METHODOLOGY - Continued



Recommended Holding Time:

Sample: 28 days

Reference: EPA

For more detail see ALS Environmental "Collection & Sampling Guide"

This Chemical Analysis Report shall only be reproduced in full, except with the written approval of ALS Environmental.

End of Report

April 22, 2002

British Columbia Buildings Corporation
527 Michigan Street
Victoria, BC V8V 1S1

Attention: Mr. Jim Cuthbert
Project Superintendent - Environment

**RE: SITE REMEDIAL PROGRAM
CASSIDY HIGHWAYS YARD
1329 KIPP ROAD, CASSIDY, BC
SEACOR PROJECT NO.: 202.01221.003**

Dear Sir:

Please find enclosed five (5) copies of above-mentioned report, as well as a CD-ROM version of the report, for your review.

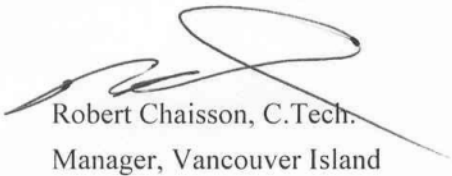
All works described in this site remediation report have been completed in compliance with the Waste Management Act and the Contaminated Sites Regulation (CSR). Based on the site works completed, the site has been remediated to meet the CSR *Commercial* soil standards for LEPH/HEPH and total metals. Dissolved BETX/VPHw and LEPHw complied with the CSR *Drinking Water* standards, however, dissolved benzo(a)pyrene concentrations equaled the CSR *Drinking Water* standard and several dissolved metals parameters and dissolved chloride concentrations exceeded the CSR *Drinking Water* and/or the CSR *Aquatic Life* standard. Additionally, elevated chloride concentrations in soil remain on-site and may require remediation.

Based on the results of the remedial program, and that chloride soil standards have not been implemented by the BC Ministry of Water, Land and Air Protection at this time, and considering that there is no economically viable remediation technology for dissolved metal constituents, SEACOR recommends that a hydrogeologic assessment be conducted to determine the migration time of impacted groundwater to the nearest drinking water wells and/or aquatic receptors. A risk assessment would subsequently be conducted to assess the long-term impacts of the chloride, sodium and metals-impacted groundwater on the drinking water wells and/or aquatic receptors. Should the results of the hydrogeologic evaluation indicate migration times of less than 100 years to the nearest drinking water well, or the risk assessment indicate unfavorable long-term impacts to nearby drinking water wells, SEACOR would provide recommendations to BCBC for additional on-site remedial works.

We trust the information presented meets your current requirements at this time. If you have any questions or concerns, please do not hesitate to contact the undersigned at your convenience.

Sincerely,

SEACOR Environmental Inc.



Robert Chaisson, C.Tech.
Manager, Vancouver Island

RC/dw

C:\PROJECTS\BCBC\202.01221.003\202.01221.003recommendations-ltr.doc

***SITE REMEDIAL PROGRAM
CASSIDY HIGHWAYS YARD
1329 KIPP ROAD
CASSIDY, BC***

FOR

***BRITISH COLUMBIA BUILDINGS CORPORATION
527 MICHIGAN STREET
VICTORIA, BC
V8V 1S1***

SEACOR PROJECT NUMBER: 202.01221.003

APRIL 22, 2002

CONFIDENTIAL

**SITE REMEDIAL PROGRAM
CASSIDY HIGHWAYS YARD
1329 KIPP ROAD
CASSIDY, BC**

SEACOR PROJECT NO: 202.01221.003

Submitted by
SEACOR Environmental Inc.

For
British Columbia Buildings Corporation
527 Michigan Street
Victoria, BC
V8V 1S1

April 22, 2002

Prepared by:

Brad Halsey

Brad Halsey, B.Sc.
Environmental Scientist

Reviewed by:

16475
ROBERT CHAISSON
Robert Chaisson, C.Tech.
Manager, Vancouver Island

CONFIDENTIAL

Distribution:

5 copies - British Columbia Buildings Corporation
1 copy - SEACOR

**SITE REMEDIAL PROGRAM
CASSIDY HIGHWAYS YARD
1329 KIPP ROAD
CASSIDY, BC**

SEACOR PROJECT NO: 202.01221.003

Submitted by
SEACOR Environmental Inc.

For
British Columbia Buildings Corporation
527 Michigan Street
Victoria, BC
V8V 1S1

April 22, 2002

Prepared by:

Reviewed by:

Brad Halsey, B.Sc.
Environmental Scientist

Robert Chaisson, C.Tech.
Manager, Vancouver Island

CONFIDENTIAL

Distribution:

5 copies - British Columbia Buildings Corporation
1 copy - SEACOR

EXECUTIVE SUMMARY

SEACOR Environmental Inc. (SEACOR) was retained by the British Columbia Buildings Corporation (BCBC) to conduct a supplemental investigative and subsequent environmental site remediation program at the Cassidy Highways Yard, located at 1329 Kipp Road in Cassidy, BC. The field activities were completed between April 23 and December 11, 2001.

The supplemental investigative program was conducted between April 23 and July 6, 2001. Seven areas on the site required additional investigation following review of the preliminary and detailed site investigation (DSI): salt sheds #1 and #2, storage area F, oil shed and grease ramp area, sandblasting area, floor drain effluent sediment sampling, potable water well, removal of burn pile and brine tank water sampling. Soil and/or groundwater samples were collected from each of the six areas, and submitted to ALS Environmental (ALS) of Vancouver, BC for chemical analyses. The results of the analyses indicated soils in the vicinity of the burn pile and near the outlet of a 200 mm PVC drain pipe exceeded the Contaminated Sites Regulation (CSR) *Commercial* standard for several metals parameters; the soil sample collected from the 200 mm PVC drain pipe area also exceeded the CSR *Commercial* standard for light and heavy extractable petroleum hydrocarbons (LEPH/HEPH). Groundwater samples collected from monitoring wells installed during the DSI indicated metals and chloride concentrations in excess of the CSR *Drinking Water* standards. A sample collected from a brine tank associated with salt shed #2 indicated sodium and chloride concentrations in excess of the CSR *Drinking Water* standards.

SEACOR, along with Quantum Remediation Services (Quantum) conducted a remedial program at the Cassidy Highways Yard between October 10 and 23, 2001. Three steel underground storage tanks (USTs), one 5,000 L waste oil, one 9,100 L heating oil and one 22,730 L waste oil, were removed from the site. Approximately 60 m³ of hydrocarbon-impacted soils in excess of the CSR *Commercial* standards and 45 m³ of metals-impacted soils in excess of the Transportation of Dangerous Goods (TDG) standards were excavated and transported off-site for disposal/treatment at licensed treatment facilities. Drums and pails located within salt shed #2, consisting of highway paint and paint-related products, and approximately 1000 L of water from a brine tank formerly associated with salt shed #2, were also removed off-site for disposal. Confirmatory soil samples collected from the UST excavation limits and sandblast materials excavation limits indicated hydrocarbon and metals concentrations below the CSR *Commercial* standards.

SEACOR, along with Drillwell Enterprises Ltd. (Drillwell) of Duncan, BC conducted a post-remediation groundwater assessment at the site on December 7, 2001. Three boreholes were advanced, one within each former UST location, and completed as groundwater monitoring wells. A groundwater monitoring and sampling event was conducted on December 11, 2001; one groundwater sample was collected from the well advanced within the former 22,730 L waste oil UST excavation. The results of the analyses indicated the groundwater sample exceeded the CSR *Drinking Water* standard for manganese.

TABLE OF CONTENTS

1.0	INTRODUCTION	1
2.0	BACKGROUND	2
2.1	SITE DETAILS	2
2.2	PREVIOUS WORKS CONDUCTED	3
2.3	POTENTIAL CONTAMINANTS OF CONCERN.....	4
2.4	REMEDIAL ACTION PLAN	4
	2.4.1 Request for Proposal	4
	2.4.2 Supplemental Investigative/Remedial Works	5
3.0	SOIL SAMPLING METHODOLOGY AND REGULATORY STANDARDS	7
3.1	SOIL SAMPLING AND FIELD SCREENING METHODOLOGY	7
3.2	DRILLING METHODOLOGY AND GROUNDWATER SAMPLING	7
3.3	ANALYTICAL TESTING AND REGULATORY STANDARDS.....	8
4.0	SUPPLEMENTAL INVESTIGATIVE PROGRAM.....	10
4.1	SOIL FIELD OBSERVATIONS	10
4.2	SOIL CHEMISTRY RESULTS	11
	4.2.1 Target Area #4 - Sandblasting Area - SWEP Chemistry Results.....	11
	4.2.2 Target Areas #5 and #9 - Floor Drain Effluent Sampling and Burn Pile -	12
	Hydrocarbon Chemistry Results.....	12
	4.2.3 Target Areas #5 and #9 - Floor Drain Effluent Sampling and Burn Pile -	13
	Metals Chemistry Results.....	13
4.3	GROUNDWATER MONITORING AND SAMPLING PROGRAM.....	14
4.3.1	Groundwater Field Observations - April 23, 2001	14
	4.3.2 Target Areas #1 and #3 - Salt Sheds #1 and #2, AST#1/UST#7 Area -	15
	Groundwater Chemistry - April 24, 2001	15
4.4	TARGET AREA #6 - POTABLE WATER WELL CHEMISTRY	17
4.5	TARGET AREA #11 - BRINE TANKS WATER CHEMISTRY	19
4.6	SUPPLEMENTAL INVESTIGATIVE PROGRAM SUMMARY	20
5.0	SITE REMEDIAL PROGRAM	22
5.1	SOIL FIELD OBSERVATIONS	22
5.2	SOIL CHEMISTRY RESULTS	24
	5.2.1 Target Area #4 - Sandblasting Area - TCLP Analyses	24
	5.2.2 Target Areas #2 and #8 - AST#1/UST#7 and Decommissioning of USTs - Excavated Soil Samples	25
	5.2.3 Target Areas #4, #5 and #8 - Sandblasting Area, Floor Drain Effluent Sampling and Decommissioning of USTs, and Grease Ramp Area - Confirmatory Soil Samples	26
	5.2.4 Imported Backfill	29
	5.2.5 Washdown Slab	31
	5.2.6 Accumulated Groundwater.....	33
5.3	REMEDIAL PROGRAM SUMMARY.....	33
6.0	POST-REMEDIATION GROUNDWATER ASSESSMENT.....	36
6.1	SOIL INVESTIGATION RESULTS.....	36
	6.1.1 Soil Field Observations	36
	6.1.2 Soil Chemistry Results	37
6.2	GROUNDWATER MONITORING PROGRAM.....	37
	6.2.1 Groundwater Field Observations.....	38
	6.2.2 Groundwater Chemistry Results.....	39
7.0	SUPPLEMENTAL INFORMATION	41
7.1	SITE REGISTRY SEARCH.....	41
7.2	GROUNDWATER WELL DATABASE SEARCH	41

7.3	LAND TITLES	41
7.4	LEGAL LOT PLAN	41
7.5	NOTIFICATION OF INDEPENDENT REMEDIATION	41
8.0	PROTOCOL 5 DOCUMENTATION	42
9.0	DATA SYNTHESIS	43
10.0	CONCLUSIONS	44
11.0	CLOSURE	45
12.0	PROFESSIONAL STATEMENT	46

TABLES

TABLE 1: SITE DETAILS	2
TABLE 2: SOIL OBSERVATIONS - SUPPLEMENTAL INVESTIGATION PROGRAMS - April 27 and July 6, 2001	10
TABLE 3: TARGET AREA #4 - SPECIAL WASTE EXTRACTION PROCEDURE CHEMISTRY (ppm) - April 27, 2001	11
TABLE 4: TARGET AREAS #5 and #9 - SOIL HYDROCARBON CHEMISTRY (ppm) - July 6, 2001	12
TABLE 5: TARGET AREAS #5 and #9 - SOIL METALS CHEMISTRY (ppm) - July 6, 2001	13
TABLE 6: GROUNDWATER FIELD OBSERVATIONS - April 23, 2001	14
TABLE 7: TARGET AREA #3: GROUNDWATER HYDROCARBON CHEMISTRY (ppb) - April 24, 2001	15
TABLE 8: TARGET AREAS #1 and #3 - GROUNDWATER DISSOLVED METALS AND CHLORIDE CHEMISTRY (ppb) - April 24, 2001	16
TABLE 9: TARGET AREA #6 - TOTAL METALS AND DISSOLVED CHLORIDE CHEMISTRY (ppb) - POTABLE WATER WELL - April 24, 2001	17
TABLE 10: TARGET AREA #6: GROUNDWATER HYDROCARBON ANALYSES (ppb) - POTABLE WATER WELL - April 24, 2001	18
TABLE 11: TARGET AREA #11 - DISSOLVED METALS AND CHLORIDE CHEMISTRY (ppb) - BRINE TANKS #1 AND #2 - July 6, 2001	19
TABLE 12: SOIL FIELD OBSERVATIONS - October 9 - 18, 2001	22
TABLE 13: TARGET AREA #4 - TOXIC CHARACTERISTIC LEACHATE PROCEDURE CHEMISTRY (ppm) - October 9, 2001	24
TABLE 14: TARGET AREAS #2 and #8 - SOIL EPH CHEMISTRY (ppm) - EXCAVATED SOIL SAMPLES - October 10 and 15, 2001	25
TABLE 15: TARGET AREAS #5, #8 AND GREASE RAMP AREA - SOIL HYDROCARBON CHEMISTRY - CONFIRMATORY SOIL SAMPLES - October 10 - 16, 2001	26
TABLE 16: TARGET AREA #5 and #8 - SOIL PAH and PCB CHEMISTRY - CONFIRMATORY SOIL SAMPLES (ppm) - October 10 - 18, 2001	27
TABLE 17: TARGET AREAS #4, #5 and #8 - SOIL METALS CHEMISTRY (ppm) - CONFIRMATORY SOIL SAMPLES - October 10 - 18, 2001	28
TABLE 18: IMPORTED BACKFILL EPH CHEMISTRY - October 15, 2001	29
TABLE 19: IMPORTED BACKFILL METALS CHEMISTRY - October 15, 2001	30
TABLE 20: SOIL EPH CHEMISTRY (ppm) - WASHDOWN SLAB - October 16, 2001	31
TABLE 21: SOIL METALS CHEMISTRY (ppm) - WASHDOWN SLAB - October 16, 2001	32
TABLE 22: TANK EXCAVATION WATER CHEMISTRY - October 15, 2001	33
TABLE 23: GENERALIZED SOIL PROFILE - POST-REMEDIATION GROUNDWATER ASSESSMENT	36
TABLE 24: SOIL FIELD OBSERVATIONS - POST-REMEDIATION GROUNDWATER ASSESSMENT - December 7, 2001	36
TABLE 25: SOIL METALS CHEMISTRY - POST REMEDIATION GROUNDWATER ASSESSMENT (ppm) - December 7, 2001	37

TABLE 26: GROUNDWATER FIELD OBSERVATIONS - POST-REMEDIATION GROUNDWATER ASSESSMENT - December 11, 2001	38
TABLE 27: POST-REMEDIATION GROUNDWATER ASSESSMENT	39
GROUNDWATER HYDROCARBON CHEMISTRY (ppb) - December 11, 2001	39
TABLE 28: POST-REMEDIATION GROUNDWATER ASSESSMENT-.....	40
DISSOLVED METALS AND CHLORIDE CHEMISTRY (ppb) - December 11, 2001	40

FIGURES

Figure 1:	Site Location Map
Figure 2:	Topographical Map
Figure 3:	Surrounding Land Use Plan
Figure 4:	Potential Contaminants of Concern Plan
Figure 5:	Supplemental Investigation - Target Areas
Figure 6:	Target Areas 4, 5 and 9 Soil Sampling Locations
Figure 7:	Target Areas 1 and 3 Groundwater Chemistry - April 24, 2001
Figure 8:	Confirmatory Soil Sample Locations - Sandblast Materials Excavation
Figure 9:	Confirmatory Soil Sample Locations - 5,000 L Waste Oil UST Excavation
Figure 10:	Confirmatory Soil Sample Locations - 9,100 L Heating Oil UST Excavation
Figure 11:	Confirmatory Soil Sample Locations - 22,730 L Waste Oil UST Excavation
Figure 12:	Target Area 5, Grease Ramp and Burn Pile Soil Sampling Locations
Figure 13:	Test Pit Location Plan
Figure 14:	Post Remediation Investigation Soil and Groundwater Chemistry - December 7 and 11, 2001

PHOTOGRAPHS

APPENDICES

Appendix A	Borehole and Test Pit Logs
Appendix B	ASL/ALS Analytical Chemistry Reports
Appendix C	Supplemental Information
Appendix D	Notification of Independent Remediation Letters
Appendix E	Protocol 5 Documentation

1.0 INTRODUCTION

SEACOR Environmental Inc. (SEACOR) was retained by the British Columbia Buildings Corporation (BCBC) to provide engineering consulting services during a supplemental investigative and environmental remediation program at the Cassidy Highways Yard, located at 1329 Kipp Road in Cassidy, BC.

SEACOR initiated a supplemental investigative program at the Cassidy Highways Yard on April 23, 2001. Seven areas on the site, as determined following review of the Stage 1 and 2 Preliminary Site Investigation (PSI) and Detailed Site Investigation (DSI), were targeted for additional investigation:

- Target Area #1 - Salt Sheds #1 and #2, Storage Area F
- Target Area #3 - Oil Shed and Grease Ramp Area
- Target Area #4 - Sandblasting Area
- Target Area #5 - Floor Drain
- Target Area #6 - Potable Water Well
- Target Area #9 - Removal of burn pile
- Target Area #11 - Brine tank water sampling

SEACOR, along with Quantum Remediation Services (Quantum) conducted a site remedial program between October 10 and 23, 2001. Three steel underground storage tanks (USTs), one 5,000 L waste oil, one 9,100 L heating oil and one 22,730 L waste oil, were removed from the site. Approximately 60 m³ of hydrocarbon-impacted soils in excess of the Contaminated Sites Regulation (CSR) *Commercial* standards and 45 m³ of metals-impacted soils in excess of the Transportation of Dangerous Goods (TDG) standards were excavated and transported off-site for disposal/treatment at licensed treatment facilities. Approximately 0.1 m³ of soil was excavated off-site adjacent to a 200 mm PVC drain pipe, and test pits were also advanced adjacent to the washdown slab. Drums and pails located within salt shed #2, consisting of paint and paint-related products, and approximately 1000 L of water from a brine tank formerly associated with salt shed #2, were also removed off-site for disposal.

A post-remediation assessment program was conducted between December 7 and 11, 2001. Three boreholes were advanced, one within each former UST location, and all were completed as groundwater monitoring wells. Groundwater samples were submitted for dissolved hydrocarbon, metals and chloride analyses.

The results of the supplemental investigative and remedial activities are outlined in the subsequent sections of this report. Site plans and photographs are presented for reference following the text. Borehole and test pit logs are included in Appendix A, analytical chemistry reports are included in Appendix B, supplemental information is provided in Appendix C, the notification of independent remediation and BC Environment response letter are included in Appendix D and the Protocol 5 documentation is included in Appendix E for reference.

2.0 BACKGROUND

2.1 SITE DETAILS

The site location map, topographical map and surrounding land use plan are illustrated on Figures 1 to 3, respectively. The site details are summarized in Table 1 below.

TABLE 1: SITE DETAILS		
REGISTERED OWNER	British Columbia Buildings Corporation	
SITE ADDRESS	1329 Kipp Road, Cassidy, BC	
LEGAL DESCRIPTION	Lot 1, Section 14, Range 6, Cranberry District, Plan 40297	
PARCEL IDENTIFICATION NO	000-181-455	
LATITUDE/LONGITUDE	N 49°6'11"	W 123°54'49"
ZONING	PU1 - Public Utility (located within the Regional District of Nanaimo)	
PROPERTY SIZE	3.622 hectares	
PERCENTAGE ASPHALT COVER	Approximately 50% (1.8 hectares)	
BUILDING INFORMATION	Structures at the site include: <ul style="list-style-type: none"> Maintenance Building (Building #1) Office/Storage Building (Building #2) 	<ul style="list-style-type: none"> Oil Storage Building (Building #3) Salt Shed (Shed #1) Cylinder Storage Shed (Shed #3)
TANK INFORMATION	<p>Present:</p> <p>AST#1 - 1500 L, above ground, steel, waste oil</p> <p>AST#2 - 13500 L, above ground, steel, diesel</p> <p>AST#3 - 1100 L, above ground, steel, heating oil (installed October 2001)</p> <p>AST#4 - 1100 L, above ground, steel, heating oil (installed October 2001)</p> <p>Former:</p> <p>UST#1 - 13500 L, underground, steel, diesel (removed March 1997)</p> <p>UST#2 - 13500 L, underground, steel, diesel (removed March 1997)</p> <p>UST#3 - 13500 L, underground, steel, gasoline (removed March 1997)</p> <p>UST#4 - 4500 L, underground, steel, waste oil (removed March 1997)</p> <p>UST#5 - 9100 L, underground, steel, heating oil (removed October 2001)</p> <p>UST#6 - 22730 L, underground, steel, waste oil (removed October 2001)</p> <p>UST#7 - 5000 L, underground, steel, waste oil (removed October 2001)</p>	
PROTECTION SYSTEMS	Cathodic Protection: Monitoring Wells: Catch Basins: Oil/Water Separator:	None currently; unknown if present on former USTs Nine Yes Yes
SURROUNDING LAND USE (REFER TO FIGURE 3)	North Northeast East Southeast South Southwest West Northwest	Undeveloped/forested Undeveloped/forested Undeveloped/forested Undeveloped/forested, ABC Pre-Cast Concrete Company Undeveloped/forested Undeveloped/forested Undeveloped/forested Undeveloped/forested
PRECIPITATION	Annual Rainfall: Annual Snowfall: Annual Precipitation:	1045.0 mm 92.9 cm 1144.4 mm
STRATIGRAPHY	Sand and gravel fill and/or asphalt road surfacing followed by native sandy silt till overlying consolidated sandstone bedrock.	

TABLE 1: SITE DETAILS (cont.)		
TOPOGRAPHY AND HYDROGEOLOGY	Topography:	Apex of local topography
	Flood potential:	None
	Groundwater:	0.6 m to 2.5 m below ground surface (April 23, 2001)
	Groundwater Gradient:	Apex of local topography
	Surface Water:	Beck Creek, approximately 250 m west; Beck Lake, approximately 1.5 km south
	Surface Drainage:	Site is flat; general surface drainage to the north.
	Water Wells:	Approximately 247 registered groundwater wells are located within a 1.5 km radius of the site, including a groundwater well northeast, providing water to the site.
	Water Supply:	Water well located approximately 100 m northeast of the site

Notes:

- - Precipitation data from Nanaimo Airport, page 82, "Canadian Climate Normals, 1961 - 1990, volume 1", Minister of Supply and Services Canada, 1993

2.2 PREVIOUS WORKS CONDUCTED

Conor Pacific Environmental Technologies Inc. (Conor Pacific) completed a Stage 1 and 2 PSI of the Cassidy Highways Yard in November 1998 which included the advancement of nine boreholes across the site, with none completed as groundwater monitoring wells. The soil analytical results during the Stage 2 PSI indicated BH1 (0.1 - 0.3 m and 1.2 - 1.5 m), advanced east of salt shed #1 and BH4 (0 - 0.3 m and 0.6 - 0.9 m), advanced south of salt shed #2, exceeded the Vancouver Island Regional Background concentration (RBC) of 33 parts per million (ppm) for dissolved chloride concentrations. BH1 (0.1 - 0.3 m and 1.2 - 1.5 m) also exceeded the Canadian Council for the Ministers of the Environment interim criterion of 2000 uS/cm for specific conductance. All soil samples submitted for hydrocarbon and metals analyses were below the Contaminated Sites Regulation (CSR) *Commercial* standards. Groundwater was not assessed during the Stage 2 PSI, however, Conor Pacific noted that there were seven drinking water wells within a 3 km² area of the site.

SEACOR completed a DSI of the subject site in August 1999. Thirteen boreholes were advanced across the site, with nine boreholes completed as groundwater monitoring wells. Twelve surficial soil samples were also collected to assess surficial soil quality across the site. The soil analytical results during the DSI indicated soil samples SA9 and SA10 (0.03 m), collected in the sandblasting area west of the maintenance building, exceeded the CSR *Commercial* standard for arsenic, copper and zinc concentrations. Concentrations of dissolved chloride in soil from BH99-7 (0.2 m) advanced west of salt shed #1, sample SA5 (0.1 m) collected west of salt shed #1, BH99-8 (1.5 m) and BH99-10 (1.8 m) advanced east of salt shed #1 and BH99-4 (0.8 m) and BH99-5 (0.2 m) advanced west of salt shed #2 exceeded the Vancouver Island RBC. Sodium concentrations in excess of the Vancouver Island RBC of 750 ppm were exceeded in BH99-5 (0.2 m) and soil sample SA3 (0.1 m) collected in storage area F; the Canadian Council for Ministers of the Environment (CCME) sodium adsorption ratio (SAR) was also exceeded in BH99-5 (0.2 m). Based on field observations, surficial soils in the vicinity of UST#7/AST#1 were assumed to exceed the CSR *Commercial* standard for light and heavy extractable petroleum hydrocarbons (LEPH/HEPH), however, no soil samples were submitted for laboratory analyses. Groundwater was not assessed during the DSI, as a negligible amount of water was present in BH99-7 only; SEACOR elected not to submit a groundwater sample from this monitoring well.

The results of the PSI and DSI suggested that approximately 30 m³ of metals-impacted soil and 5 m³ of hydrocarbon-impacted soil would require remediation.

2.3 POTENTIAL CONTAMINANTS OF CONCERN

Based on the PSI and DSI programs, potential contaminants of concern (PCOC) identified at the site included benzene, ethylbenzene, toluene xylenes (BETX), volatile petroleum hydrocarbons (VPH), LEPH, polycyclic aromatic hydrocarbons (PAH) related to fuels, LEPH, HEPH and PAH related to, motor oils, lubricants and hydraulic fluids and heavy metals related to fill soils and sandblast grit. Figure 4 illustrates the locations and PCOC's identified on the Cassidy Highways Yard.

2.4 REMEDIAL ACTION PLAN

SEACOR submitted a remedial action plan entitled "*Environmental Remedial Action Plan, Cassidy Highways Yard*", dated July 9, 2001 (the RAP) to BCBC outlining the proposed methods for remediation of the specific target areas as outlined in the document entitled "*Request for Proposal - Remediation, Cassidy Highways Yard*", February 15, 2001 (the RFP). The RAP was a compilation of the recommendations for remediation within the RFP, and following review of the PSI and DSI reports, additional recommendations for further investigation/remediation. The remedial action plan is summarized below and on the following pages.

2.4.1 Request for Proposal

Four target areas were identified by BCBC in the RFP at the Cassidy Highways Yard requiring further investigation and/or remediation to less than CSR *Commercial* standards for soil and CSR *Drinking Water* standards for groundwater. The locations of the target areas are illustrated on Figure 5. These areas included:

Target Area #1 - Salt Sheds #1 and #2, Storage Area F - groundwater monitoring and sampling program. As the seasonal groundwater table was not encountered during the DSI works in August 1999, groundwater quality was not assessed in the area of the salt sheds #1 and #2. SEACOR recommended that a groundwater monitoring and sampling program be conducted for seven groundwater monitoring wells (BH99-3, BH99-4, BH99-6, BH99-7, BH99-8, BH99-9 and BH99-10) installed adjacent to the salt sheds and storage area F, during a period of seasonal groundwater accumulation at the bedrock interface.

Target Area #2 - AST #1 and UST #7 Area - Due to the limited volume of soils requiring remediation, SEACOR recommended excavation and off-site disposal of approximately 5 m³ of hydrocarbon-impacted soils and completion of a groundwater monitoring and sampling program.

Target Area #3 - Oil Shed and Grease Ramp Area - groundwater monitoring and sampling program. As the seasonal groundwater table was not intersected during the DSI works in August 1999, groundwater quality could not be assessed in the area of the oil shed and grease ramp. SEACOR recommended that a groundwater monitoring and sampling program be conducted for the groundwater monitoring well (BH99-1) installed adjacent to the oil shed/grease ramp area, during a period of seasonal groundwater accumulation at the bedrock interface.

Target Area #4 - Sandblasting Area - as no cost-effective methodologies were available for remediation of heavy metals-impacted soils (specifically, arsenic, copper and zinc), SEACOR recommended ex-situ excavation and off-site disposal of approximately 30 m³ of metals-impacted soils and disposal at a licensed/permitted facility.

It was SEACOR's understanding that BCBC required a Certificate of Compliance (COC) for the site. Due to the increased time and costs involved in the implementation of an in-situ remedial system, SEACOR recommended that on-site contamination be remediated by means of ex-situ remedial technologies. The areas to be excavated were limited in size and volume, and ex-situ remediation could be accomplished in a period of days to weeks versus months to years with an in-situ remedial system.

2.4.2 Supplemental Investigative/Remedial Works

As requested by BCBC during a site meeting on April 11, 2001, SEACOR provided recommendations for further investigative/remedial work necessary to complete remediation planning for the subject site. Accordingly, SEACOR recommended supplemental works for the following additional target areas as outlined below, with proposed investigative procedures and remedial options, if deemed necessary following the investigation.

Target Area #5 - Floor Drain Effluent Sampling - due to the possibility for discharge of impacted groundwater from the wash bay, paint booth and mechanic bays to the environment, SEACOR recommended all floor drains and associated subsurface piping be located, along with the effluent discharge points.

Target Area #6 - Potable Water Well - it was noted during the Stage 1 and 2 PSI and DSI works that the potable water well, supplying water to the site, had not been sampled. SEACOR recommended sampling of the potable water well through collection of samples from an outside tap, and submitted for dissolved hydrocarbon, chloride and metals analyses.

Target Area #7 - Site Reconnaissance - location of surficially hydrocarbon impacted areas - as heavy equipment was utilized on the site in the past, there was a possibility that surficially stained areas may be present on the site that were not identified during the Stage 1 and 2 PSI or DSI work programs.

Target Area #8 - Decommissioning of Underground Storage Tanks - BCBC indicated during the April 2001 site meeting two USTs no longer in use (one 4,550 L waste oil and one 13,700 L waste oil, decommissioned in 1997 and filled with sand) were present on-site. Additionally, one active 9,100 L heating oil UST was utilized for heating of Building #2. SEACOR recommended that all three USTs be decommissioned and soil samples collected from the base and walls of the UST nests to determine the presence/absence of hydrocarbon contamination.

Target Area #9 - Removal of Burn Pile - it was noted during the April 2001 on-site meeting that a burn pile, consisting of charred metal and wood debris, was present near the west end of the site adjacent to the sandblasting area. SEACOR recommended removal of the debris pile to the local landfill for disposal, and collection of representative soil sample from beneath the burn pile to determine the presence/absence of contamination resulting from waste incineration.

Target Area #10 - Removal of Drums and Pails - during the April 2001 site reconnaissance, it was noted that six 205 L drums and nine 20 L pails, of unknown origin or contents, were noted to be temporarily stored in salt shed #2. SEACOR recommended that the contents of the drums/pails be identified, in order to determine proper disposal methods, and that the drums then be removed off-site to a licensed/permitted treatment facility for recycling or disposal of the drums/pails contents.

Target Area #11 - Brine Tank Water Sampling - two brine tanks, one associated with each of the two salt shed, were present on the site and full of water. SEACOR recommended that water samples be collected from each of the two brine tanks and submitted for dissolved chloride and metals analysis.

In addition to the above-noted areas, three areas not included within the original remedial action plan were also targeted for supplemental investigation/remediation:

- **Washdown Slab** - at BCBC's request, two test pits were advanced southwest of the washdown slab area.
- **Burn Pile** - removal of a small burn pile near salt shed #2, and excavation of impacted soils.
- **Grease Ramp** - removal of ancillary and vent piping between the grease ramp and a former waste oil tank, and assessment of soils.

3.0 SOIL SAMPLING METHODOLOGY AND REGULATORY STANDARDS

3.1 SOIL SAMPLING AND FIELD SCREENING METHODOLOGY

Soil sampling and field screening procedures were performed in accordance with the SEACOR's Standard Field Procedures and general environmental standards of practice.

Soil samples collected during the site remedial program were classified according to soil type, structure and colour. All samples were field-screened for the presence of combustible organic vapours using a fixed-volume headspace technique with a Gastech Model 1238ME with the methane elimination feature activated. The Gastech was calibrated each day to two points prior to field use: 43% lower explosive limit (LEL) and 443 parts per million volumetric (ppmv) of hexane. A ziploc bag was partially filled with soil prior to puncturing the bag and analyzing the headspace. The detector recorded the concentration of combustible organic vapours in ppmv. Duplicate samples were retained for laboratory analyses; the soil samples were placed in laboratory-prepared glass jars (125 mL), which were labeled and stored in an ice-filled cooler. The samples and a completed chain-of-custody form were subsequently transported to ALS for chemical analyses.

3.2 DRILLING METHODOLOGY AND GROUNDWATER SAMPLING

The post remediation groundwater quality assessment activities included the advancement of one borehole within each of the UST excavation areas. Boreholes were completed utilizing a truck-mounted rotary head drill rig. Boreholes were advanced utilizing hollow stem auger, with select boreholes drilled to a maximum depth of 4.3 m below grade. Representative soil samples were collected during the drilling from split spoon sampling tubes. All soil samples were field-screened in accordance with the above-described procedures. Prior to implementing the drilling investigation, a site-specific health and safety review was conducted.

Fifty-millimetre diameter, #010 slot polyvinyl chloride (PVC) monitoring wells were installed in the three boreholes to allow characterization of groundwater quality and to determine the presence or absence of any free-phase product. The annulus surrounding the screened section of each monitoring well was backfilled with silica sand and a bentonite seal was installed above the screened section to prevent cross-contamination; all monitoring wells were capped with lockable well caps and steel roadboxes, installed flush with surface grade. Reference should be made to Appendix A for borehole logs and specific monitoring well construction details.

3.3 ANALYTICAL TESTING AND REGULATORY STANDARDS

The Contaminated Sites Regulation (CSR) of the Waste Management Act is the principal document addressing contaminated sites in British Columbia. The CSR came into effect on April 1, 1997 and was amended on July 19, 1999 and February 4, 2002. The CSR provides for both numerical and risk-based approaches to managing site contamination and outlines the procedural requirements for site assessment, remediation and application for environmental closure of a property.

The numerical standards for soils are presented in two schedules. The Schedule 4 Generic Numerical Soil Standards include a variety of inorganic and organic substances and are compared to five classes of land use: *Agricultural, Urban Park, Residential, Commercial* and *Industrial*. The Schedule 5 Matrix Numerical Soil Standards address a number of contaminants from both a land use and risk-based receptor perspective. On the basis of present land use defined for the Cassidy Highways Yard, *Commercial* Generic Numerical Soil Standards apply and the most conservative of the following site-specific factors for *Commercial* land use were assumed to apply for determining applicable Matrix Numerical Soil Standards: *human intake of contaminated soil, toxicity to soil invertebrates and plants, groundwater flow to surface water used by aquatic life* (freshwater), and *groundwater used for drinking water*. The presence/absence of Special Waste soil at the site is determined as per the Special Waste Regulation and Section 13 of the CSR.

Groundwater quality in the CSR is referenced to four classes of water use (*Aquatic Life, Irrigation, Livestock* and *Drinking Water*). Based on the potential for groundwater transport to the Beck Creek, located approximately 250 m southwest of the site and groundwater wells within the default radius of 1.5 km, SEACOR has assumed that the *Aquatic Life* standards to protect freshwater aquatic life, and *Drinking Water* standards, as referenced in the CSR, would apply at the site. On the basis of current land use, *Irrigation* and *Livestock* standards would not apply at this site.

The First Stage Amendments to the CSR came into effect on July 19, 1999. The amendments included the new Schedule 6 water quality standards which were discussed in a supplemental document titled Regulation of Petroleum Hydrocarbons in Water under the Contaminated Sites and Special Waste Regulations (Protocol 7). The Schedule 6 water quality standards for volatile hydrocarbons and extractable hydrocarbons (VH_w and EH_w, respectively) apply at all sites in BC irrespective of water use. Under the advisement of the BC Ministry of Water, Land and Air Protection (MWLAP) regarding similar sites, and for the purpose of this investigation and remedial program, SEACOR has not compared analytical data to the Special Waste Regulation Leachate Quality standards.

The Second Stage Amendments to the CSR were implemented on February 4, 2002. The amendments included new generic numerical soil (Schedule 4) and water (Schedule 6) standards, standards for triggering contaminated soil relocation agreements (Schedule 7), and modifications to the existing matrix numerical soil standards including the addition of three new matrix numerical soil standards (Schedule 5). Select parameters contained in the Schedule 5 site specific factor of *groundwater flow to surface water used by aquatic life* and

the Schedule 6 *Aquatic Life* standards were partitioned to address both marine environments and freshwater environments independently.

Soil and groundwater samples retained for analyses were submitted to ALS for selective quantification of one or more of the following parameters:

- BETX^{a,b} - benzene, ethylbenzene, toluene, xylenes
- VPH^a - volatile petroleum hydrocarbons, exclusive of BETX constituents
- VPHw^b - volatile petroleum hydrocarbons in water
- LEPH^a/HEPH^a - light and heavy extractable petroleum hydrocarbons
- LEPHw^b - light extractable petroleum hydrocarbons in water
- PAH^{a,b} - polycyclic aromatic hydrocarbons
- EPH - extractable petroleum hydrocarbons, C₁₀₋₁₉ and C₁₉₋₃₂
- PCB^a - polychlorinated biphenyls
- Metals^{a,b} - total heavy metals (soil), dissolved metals (water)
- Dis.Cl.^b - dissolved chloride (water)
- SWEP - Special Waste Extraction Procedure
- TCLP - Toxicity Characteristic Leachate Procedure

^a - indicates a regulated parameter in soil

^b - indicates a regulated parameter in groundwater

It should be noted that soil samples may have been submitted for EPH analysis in place of LEPH/HEPH analysis; EPH results are, by definition, more conservative than LEPH/HEPH results for the purpose of gross parameter testing.

4.0 SUPPLEMENTAL INVESTIGATIVE PROGRAM

SEACOR initiated the supplemental investigative program on April 23, 2001. A total of seven additional areas were targeted for additional investigation/remediation:

- Target Area #1 - Salt Sheds #1 and #2, Storage Area F
- Target Area #3 - Oil Shed and Grease Ramp Area
- Target Area #4 - Sandblasting Area
- Target Area #5 - Floor Drain Effluent Sampling
- Target Area #6 - Potable Water Well
- Target Area #9 - Removal of Burn Pile
- Target Area #11 - Brine Tank Water Sampling

Soil and/or water samples were collected from each of aforementioned target areas and submitted to ALS for analysis. Target areas with hydrocarbon and/or metals concentrations in excess of the CSR *Commercial* standards were subsequently remediated to < CSR *Commercial* standards. The works conducted during the supplemental investigative program are summarized below and in the following sections. Figure 5 illustrates the target area locations.

4.1 SOIL FIELD OBSERVATIONS

Seven soil samples were collected during the supplemental investigative programs conducted on April 27 and July 6, 2001. A summary of field observations recorded during sample collection are presented in Table 2 below. Figure 6 illustrates the soil sample locations and soil chemistry.

TABLE 2: SOIL OBSERVATIONS - SUPPLEMENTAL INVESTIGATIVE PROGRAMS - April 27 and July 6, 2001				
Sample ID	Depth Below Grade (metres)	Location	Combustible Vapour Level (ppmv)	Analytical Schedule
Target Area #4 - Sandblasting Area - April 27, 2001				
SA1	0.03	Sandblasting area	n/r	SWEP
SA2	0.03	Sandblasting area	n/r	SWEP
Target Area #5 - Floor Drain Configuration and effluent sampling - July 6, 2001				
SA1	0.05	Off-site at outlet of 200 mm PVC drain pipe	n/r	EPH, Metals
Target Area #9 - Burn Pile - July 6, 2001				
SA2	0.03	Burn pile	n/r	LEPH/HEPH, PAH, Metals
SA3	0.03	Burn pile	n/r	-
SA4	0.03	Burn pile	n/r	-
SA5	0.03	Burn pile	n/r	LEPH/HEPH, PAH, Metals

- Notes:
- ppmv - parts per million volumetric
 - n/r - not recorded
 - SWEP - *Special Waste* Extraction Procedure; EPH - extractable petroleum hydrocarbons; LEPH - light extractable petroleum hydrocarbons; HEPH - heavy extractable petroleum hydrocarbons; PAH - polycyclic aromatic hydrocarbons
 - "-" - not analyzed

Soil samples were collected in the sandblast area, in the vicinity of the burn pile at the west end of Building #1, and below the discharge point of a 200 mm PVC drain pipe off-site. Samples were submitted to ALS for SWEP, EPH, LEPH, HEPH, PAH and total metals analyses.

4.2 SOIL CHEMISTRY RESULTS

Soil samples collected on April 27 and July 6, 2001 were submitted to ALS for hydrocarbon and metals analyses. The results of the analyses are summarized in the sections below, with the analytical chemistry reports included in Appendix B for reference.

4.2.1 Target Area #4 - Sandblasting Area - SWEP Chemistry Results

Two samples were submitted to ALS for SWEP analyses, to determine whether the sandblast materials contained leachable metals in excess of the *Special Waste* Leachate Quality standards. The results of the analyses, along with the applicable environmental standards, are summarized in Table 3 below.

TABLE 3: TARGET AREA #4 - SPECIAL WASTE EXTRACTION PROCEDURE CHEMISTRY (ppm) - April 27, 2001			
Parameter	SA1	SA2	SWEP
Arsenic	<0.2	<0.2	5
Barium	<0.05	<0.05	100
Boron	<0.1	<0.1	500
Cadmium	<0.01	<0.01	0.5
Chromium	<0.01	<0.01	5
Copper	0.29	0.15	100
Lead	<0.05	<0.05	50
Mercury	<0.00005	<0.00005	0.1
Selenium	<0.2	<0.2	1
Silver	<0.01	<0.01	5
Zinc	0.32	0.23	500

- Notes:
- all results expressed as milligrams per litre (ppm – parts per million)
 - < - less than the laboratory detection limit
 - *SWEP* - Special Waste Regulation; Schedule 4, Table 1, Leachate Quality Standards

The results of the analyses indicated both samples were below the *Special Waste* Leachate Quality standards for extractable metals parameters.

4.2.2 Target Areas #5 and #9 - Floor Drain Effluent Sampling and Burn Pile - Hydrocarbon Chemistry Results

Three soil samples were submitted to ALS for EPH, LEPH, HEPH and/or PAH analyses and the results of the analyses, along with the applicable environmental standards, are summarized in Table 4 below.

TABLE 4: TARGET AREAS #5 AND #9 - SOIL HYDROCARBON CHEMISTRY (ppm) - July 6, 2001					
Parameter	Target Area #5	Target Area #9		BC Standards	
	SA1	SA2	SA5	CSR Residential	CSR Commercial
EPH (C ₁₀₋₁₉)	5340	<200	<200	*1000 ^a	*2000 ^a
EPH (C ₁₉₋₃₂)	70300	669	<200	*2000 ^a	*5000 ^a
LEPH	-	<200	<200	1000 ^a	2000 ^a
HEPH	-	669	<200	2000 ^a	5000 ^a
Polycyclic Aromatic Hydrocarbons					
Acenaphthene	-	<0.05	<0.05	n.s.	n.s.
Acenaphthylene	-	<0.05	<0.05	n.s.	n.s.
Anthracene	-	<0.05	<0.05	n.s.	n.s.
Benz(a)anthracene	-	<0.05	<0.05	1 ^a	10 ^a
Benzo(a)pyrene	-	<0.05	<0.05	1 ^b	10 ^b
Benzo(b)fluoranthene	-	0.06	<0.05	1 ^a	10 ^a
Benzo(g,h,i)perylene	-	0.06	<0.05	n.s.	n.s.
Benzo(k)fluoranthene	-	<0.05	<0.05	1 ^a	10 ^a
Chrysene	-	0.06	<0.05	n.s.	n.s.
Dibenz(a,h)anthracene	-	<0.05	<0.05	1 ^a	10 ^a
Fluoranthene	-	<0.05	<0.05	n.s.	n.s.
Fluorene	-	<0.05	<0.05	n.s.	n.s.
Indeno(1,2,3-c,d)pyrene	-	<0.05	<0.05	1 ^a	10 ^a
Naphthalene	-	<0.05	<0.05	5 ^a	50 ^a
Phenanthrene	-	<0.05	<0.05	5 ^a	50 ^a
Pyrene	-	0.11	<0.05	10 ^a	100 ^a

- Notes:
- all results expressed as milligrams per dry kilogram (ppm - parts per million)
 - EPH - extractable petroleum hydrocarbons; LEPH/HEPH - light/heavy extractable petroleum hydrocarbons
 - CSR Residential - BC Contaminated Sites Regulation (CSR) - Residential standards
 - CSR Commercial - BC CSR - Commercial standards
 - ^a - Generic Numerical Soil Standards
 - ^b - Matrix Numerical Soil Standards - toxicity to soil invertebrates and plants
 - * - soil samples were submitted for EPH analysis in place of LEPH/HEPH analysis; EPH results include PAH constituents and are, by definition, more conservative than LEPH/HEPH results for the purpose of gross parameter testing
 - **bold** - indicates concentration in excess of the CSR Residential standard
 - **bold and underlined** - indicates concentration in excess of the CSR Commercial standard

The results of the analyses indicated soil sample SA1, collected below the discharge point of the 200 mm PVC drain pipe, exceeded the comparable CSR Commercial standard for EPH (C₁₀₋₁₉) and EPH (C₁₉₋₃₂).

4.2.3 Target Areas #5 and #9 - Floor Drain Effluent Sampling and Burn Pile - Metals Chemistry Results

Three soil samples were submitted to ALS for total metals analyses and the results of the analyses, along with the applicable environmental standards, are summarized in Table 5 below.

TABLE 5: TARGET AREAS #5 AND #9 - SOIL METALS CHEMISTRY (ppm) - July 6, 2001					
Parameter	Target Area #5	Target Area #9		BC Standards	
		SA1	SA2	SA5	
pH	6.14	8.76	8.58	n.s.	n.s.
Antimony	<10	39	<10	20 ^a	40 ^a
Arsenic	8	40	6	15 ^b	15 ^b
Barium	104	268	67	500 ^a	2000 ^a
Beryllium	<0.5	<0.5	<0.5	4 ^a	8 ^a
Cadmium	2.1	0.6	<0.5	1.5 @ pH <6.5 ^b , 35 ^c	1.5 @ pH <6.5 ^b , 100 ^c
Chromium	112	39	32	60 ^b	60 ^b
Cobalt	14	12	9	50 ^a	300 ^a
Copper	279	1150	122	150 ^d	250 ^d
Lead	143	218	<50	250 @ pH 6.0-<6.5 ^b , 500 ^c	250 @ pH 6.0-<6.5 ^b , 1000 ^c
Mercury	<0.05	<0.05	<0.05	15 ^c	40 ^c
Molybdenum	14	6	<4	10 ^a	40 ^a
Nickel	66	19	18	100 ^a	500 ^a
Selenium	<3	<2	<2	3 ^a	10 ^a
Silver	<2	<2	<2	20 ^a	40 ^a
Tin	12	10	<5	50 ^a	300 ^a
Vanadium	72	59	57	200 ^a	n.s.
Zinc	620	3130	318	300 @ pH 6.0-<6.5 ^c , 450 ^d	300 @ pH 6.0-<6.5 ^c , 600 ^c

- Notes:
- all results expressed as milligrams per kilogram (ppm - parts per million)
 - < - less than the laboratory detection limit
 - n.s. – no standard currently exists
 - pH used to determine some standards
 - CSR *Residential* - BC Contaminated Sites Regulation (CSR) - *Residential* standards
 - CSR *Commercial* - BC CSR - *Commercial*
 - ^a - Generic Numerical Soil Standards
 - ^b - Matrix Numerical Soil Standards - groundwater used for drinking water
 - ^c - Matrix Numerical Soil Standards - intake of contaminated soil
 - ^d - Matrix Numerical Soil Standards - toxicity to soil invertebrates and plants
 - ^e - Matrix Numerical Soil Standards - groundwater flow to surface water used by aquatic life (freshwater)
 - **bold** - indicates concentration in excess of CSR *Residential* standard
 - **bold and underlined** - indicates concentration in excess of the CSR *Commercial* standard

The results of the analyses indicated SA1 exceeded the CSR *Commercial* standards for cadmium, chromium, copper and zinc, and the CSR *Residential* standard for molybdenum. SA2, collected from the area of the burn pile, exceeded the CSR *Commercial* standards for arsenic, copper and zinc, and the CSR *Residential* standard for antimony.

4.3 GROUNDWATER MONITORING AND SAMPLING PROGRAM

A groundwater monitoring and sampling program was conducted on April 23 and 24, 2001 for the groundwater monitoring wells installed during the DSI conducted in 1999. Figure 7 illustrates the monitoring well locations and groundwater chemistry results.

4.3.1 Groundwater Field Observations - April 23, 2001

Table 6 below summarizes the monitoring well vapour levels and depth to groundwater observed during the monitoring program.

TABLE 6: GROUNDWATER FIELD OBSERVATIONS - April 23, 2001								
Monitoring Well ID	Screened Interval From Grade (metres)	Elevation (metres)		Depth to Groundwater Surface (metres)		Groundwater Elevation (metres)	Apparent Free-Phase Product Thickness (millimetres)	Monitoring Well Vapour Level (ppmv)
		T.O.P	Grade	T.O.P.	Grade			
BH99-1	0.6 - 2.8	99.44	99.55	2.18	2.29	97.26	none	110
BH99-3	0.5 - 1.5	100.78	100.84	0.79	0.85	99.99	none	40
BH99-4	0.3 - 1.2	100.64	100.73	0.54	0.63	100.10	none	90
BH99-6	0.5 - 1.4	100.59	100.63	1.83	1.87	98.76	none	150
BH99-7	0.5 - 1.4	99.97	100.08	0.99	1.10	98.98	none	190
BH99-8	0.5 - 2.3	99.73	99.86	Dry	Dry	Dry	none	95
BH99-9	0.6 - 2.7	99.86	99.73	2.63	2.50	97.23	none	105
BH99-10	0.6 - 2.1	99.82	99.91	0.52	0.61	99.30	none	55
BH99-12	0.4 - 2.3	100.06	100.20	Dry	Dry	Dry	none	55

- Notes:
- ppmv - parts per million volumetric
 - LTDL - less than the detection limit of the field instrument
 - T.O.P. - top of piezometer

Depth to groundwater ranged from 0.61 m below ground surface in BH99-10 to 2.50 m below ground surface in BH99-9. Monitoring well combustible vapour levels ranged from 40 ppmv in BH99-3 to 190 ppmv in BH99-7.

4.3.2 Target Areas #1 and #3 - Salt Sheds #1 and #2, AST#1/UST#7 Area - Groundwater Chemistry - April 24, 2001

One groundwater sample was collected from BH99-1, advanced in the vicinity of the former USTs, and submitted to ALS for dissolved hydrocarbon analyses. The results of the analyses, along with the applicable environmental standards, are summarized in Table 7 below. The analytical chemistry reports are included in Appendix B for reference.

TABLE 7: TARGET AREA #3: GROUNDWATER HYDROCARBON CHEMISTRY (ppb) - April 24, 2001			
Parameters	BH99-1	BC Standards	
		CSR Drinking Water	CSR Aquatic Life
Benzene	<0.5	5	4000
Ethylbenzene	<0.5	2.4	2000
Toluene	<0.5	24	390
Xylenes	<1.0	3000	n.s.
VHw	<100	n.s.	15000
VPHw	<100	n.s.	1500
EPH (C ₁₀₋₁₉)	<300	n.s.	500*
EPH (C ₁₉₋₃₂)	<1000	n.s.	n.s.
LEPHw	<300	n.s.	500
HEPH	<1000	n.s.	n.s.
Polycyclic Aromatic Hydrocarbons			
Acenaphthene	<0.05	n.s.	60
Acenaphthylene	<0.05	n.s.	n.s.
Acridine	<0.05	n.s.	0.5
Anthracene	<0.05	n.s.	1
Benz(a)anthracene	<0.05	n.s.	1
Benzo(a)pyrene	0.01	0.01	0.1
Benzo(b)fluoranthene	<0.05	n.s.	n.s.
Benzo(g,h,i)perylene	<0.05	n.s.	n.s.
Benzo(k)fluoranthene	<0.05	n.s.	n.s.
Chrysene	<0.05	n.s.	1
Dibenz(a,h)anthracene	<0.05	n.s.	n.s.
Fluoranthene	<0.05	n.s.	2
Fluorene	<0.05	n.s.	120
Indeno(1,2,3-c,d)pyrene	<0.05	n.s.	n.s.
Naphthalene	<0.05	n.s.	10
Phenanthrene	<0.05	n.s.	3
Pyrene	<0.05	n.s.	0.2

- Notes:
- all results expressed as micrograms per litre (ppb - parts per billion)
 - < - less than the laboratory detection limit
 - n.s. - no standard listed
 - VHw - volatile hydrocarbons in water; VPHw - volatile petroleum hydrocarbons in water; EPH - extractable petroleum hydrocarbons; LEPHw - light extractable petroleum hydrocarbons in water; HEPH - heavy extractable petroleum hydrocarbons
 - CSR *Drinking Water* - BC Contaminated Sites Regulation (CSR) - *Drinking Water* standards
 - CSR *Aquatic Life* - BC CSR - *Aquatic Life* standards
 - * - groundwater samples were submitted for EPH analysis in place of LEPH/HEPH analysis; EPH results include PAH constituents and are, by definition, more conservative than LEPH/HEPH results for the purpose of gross parameter testing
 - **bold** - indicates concentration equal to the CSR *Drinking Water* standard

The results of the analyses indicated that BH99-1 equaled the CSR *Drinking Water* standard for benzo(a)pyrene. All remaining analyzed hydrocarbon parameters were below the CSR *Drinking Water* standards.

Five groundwater samples were submitted to ALS for dissolved metals and chloride analyses and the results of the analyses, along with the applicable environmental standards, are summarized in Table 8 below.

TABLE 8: TARGET AREAS #1 AND #3 - GROUNDWATER DISSOLVED METALS AND CHLORIDE CHEMISTRY (ppb) - April 24, 2001							
Parameter	Target Area #3	Target Area #1				BC Standards	
	BH99-1	BH99-3	BH99-4	BH99-7	BH99-10	CSR Drinking Water	CSR Aquatic Life
Hardness (mg/L)	1180	21	1720	609	7.4	n.s.	n.s.
Aluminum	80	4310	100	80	95	200	n.s.
Antimony	<200	<200	<1000	<200	<200	6	300
Arsenic	<1	3	<1	2	<1	25	500
Barium	240	20	1960	240	10	1000	10,000
Beryllium	<5	<5	<30	<5	<5	n.s.	53
Boron	<100	<100	<500	<100	<100	5000	n.s.
Cadmium	<2	<2	<2	<2	<2	5	0.1 @ H = < 30
Calcium	31600	6930	524000	162000	1940	n.s.	n.s.
Chromium	<10	<10	<50	<10	<10	50	10 or 90
Cobalt	<10	<10	<50	20	<10	n.s.	9
Copper	<10	10	<50	<10	<10	1000	20 @ H < 50; 90 @ H > 200
Iron	60	460	<200	50	410	300	n.s.
Lead	<10	<10	<10	20	<10	10	40 @ H < 50; 160 @ H > 300
Magnesium*	95.1	0.9	101	49.5	0.6	100*	n.s.
Manganese	586	158	1960	5790	12	50	n.s.
Mercury	<0.05	<0.05	<0.05	<0.05	<0.05	1	1
Molybdenum	<30	<30	<200	<30	<30	250	10,000
Nickel	<50	<50	<300	<50	<5	n.s.	250 @ H < 60; 1,500 @ H > 180
Selenium	<10	<10	<10	<10	<10	10	10
Silver	<1	<1	<1	<1	<1	n.s.	0.5 @ H = < 100; 15
Sodium*	452	90	4030	373	45	200*	n.s.
Thallium	1	<1	<1	2	1	n.s.	3
Uranium	3.4	6.2	2	1.2	<0.1	100	3000
Zinc	384	62	610	235	82	5000	75 @ H = < 90
Dissolved Anions							
Chloride*	-	9.7	10300	834	31.3	250*	n.s.

- Notes:
- all results expressed as micrograms per litre (ppb - parts per billion) unless otherwise noted
 - < - less than the laboratory detection limit
 - * - measured in milligrams per litre (mg/L)
 - n.s. - no standard listed
 - H - hardness used to determine some standards (measured in mg/L of CaCO₃)
 - CSR *Drinking Water* - BC Contaminated Sites Regulation (CSR) - *Drinking Water* standards
 - CSR *Aquatic Life* - CSR - *Aquatic Life* standards
 - **bold** - indicates concentration in excess of the CSR *Drinking Water* standard
 - **bold and underlined** - indicates concentration in excess of the CSR *Aquatic Life* standard

The results of the analyses indicated BH99-1 exceeded the CSR *Drinking Water* standard for manganese and sodium, BH99-3 exceeded the CSR *Drinking Water* standard for aluminum, iron and manganese, and BH99-4 exceeded the CSR *Drinking Water* standard for barium, magnesium, manganese, sodium and dissolved chloride. BH99-7 exceeded the CSR *Drinking Water* standard for lead, manganese, sodium and dissolved chloride and the CSR *Aquatic Life* for cobalt and BH99-10 exceeded the CSR *Drinking Water* standard for iron and the CSR *Aquatic Life* standard for zinc.

4.4 TARGET AREA #6 - POTABLE WATER WELL CHEMISTRY

One sample was collected from the on-site potable water well and submitted to ALS for total metals and dissolved chloride analyses. The results of the analyses, along with the applicable environmental standards, are summarized in Table 9 below. The analytical chemistry report is included in Appendix B for reference.

TABLE 9: TARGET AREA #6 - TOTAL METALS AND DISSOLVED CHLORIDE CHEMISTRY (ppb) POTABLE WATER WELL - April 24, 2001			
Parameter	Potable Water Well	BC Standards	
		CSR Drinking Water	CSR Aquatic Life
Hardness (mg/L)	133	n.s.	n.s.
Aluminum	<50	200	n.s.
Antimony	<200	6	300
Arsenic	<1	25	500
Barium	60	1000	10,000
Beryllium	<5	n.s.	53
Boron	200	5000	n.s.
Cadmium	<2	5	0.5
Calcium	44700	n.s.	n.s.
Chromium	<10	50	10 or 90
Cobalt	<10	n.s.	9
Copper	30	1000	60
Iron	<30	300	n.s.
Lead	<10	10	60
Magnesium*	5.3	100*	n.s.
Manganese	<5	50	n.s.
Mercury	<0.05	1	1
Molybdenum	<30	250	10,000
Nickel	<50	n.s.	1100
Selenium	<10	10	10
Silver	<1	n.s.	15
Sodium*	145	200*	n.s.
Thallium	<1	n.s.	3
Uranium	2	100	3000
Zinc	103	5000	900
Dissolved Anions			
Chloride*	21.3	250*	n.s.

- Notes:
- all results expressed as micrograms per litre (ppb - parts per billion) unless otherwise noted
 - < - less than the laboratory detection limit
 - * - measured in milligrams per litre (mg/L)
 - n.s. - no standard listed
 - H - hardness, used to determine some standards (measured in mg/L of CaCO₃)
 - CSR Drinking Water - BC Contaminated Sites Regulation (CSR) - Drinking Water standards
 - CSR Aquatic Life - BC CSR - Aquatic Life standards

The results of the analyses indicated dissolved metals and chloride concentrations below the CSR Drinking Water standards and/or CSR Aquatic Life standards.

One sample was collected from the potable water well and submitted to ALS for hydrocarbon analyses. The results of the analyses, along with the applicable environmental standards, are summarized in Table 10 below.

TABLE 10: TARGET AREA #6: GROUNDWATER HYDROCARBON ANALYSES (ppb) POTABLE WATER WELL - April 24, 2001			
Parameters	Potable Water Well	BC Standards	
		CSR Drinking Water	CSR Aquatic Life
Benzene	<0.5	5	4000
Ethylbenzene	<0.5	2.4	2000
Toluene	<0.5	24	390
Xylenes	<1.0	300	n.s.
VHw	<100	n.s.	15000
VPHw	<100	n.s.	1500
EPH (C ₁₀₋₁₉)	<300	n.s.	500*
EPH (C ₁₉₋₃₁)	<1000	n.s.	n.s.
LEPHw	<300	n.s.	500
HEPH	<1000	n.s.	n.s.
Polycyclic Aromatic Hydrocarbons			
Acenaphthene	<0.05	n.s.	60
Acenaphthylene	<0.05	n.s.	n.s.
Acridine	<0.05	n.s.	0.5
Anthracene	<0.05	n.s.	1
Benz(a)anthracene	<0.05	n.s.	1
Benzo(a)pyrene	<0.01	0.01	0.1
Benzo(b)fluoranthene	<0.05	n.s.	n.s.
Benzo(g,h,i)perylene	<0.05	n.s.	n.s.
Benzo(k)fluoranthene	<0.05	n.s.	n.s.
Chrysene	<0.05	n.s.	1
Dibenz(a,h)anthracene	<0.05	n.s.	n.s.
Fluoranthene	<0.05	n.s.	2
Fluorene	<0.05	n.s.	120
Indeno(1,2,3-c,d)pyrene	<0.05	n.s.	n.s.
Naphthalene	<0.05	n.s.	10
Phenanthrene	<0.05	n.s.	3
Pyrene	<0.05	n.s.	0.2

- Notes:
- all results expressed as micrograms per litre (ppb - parts per billion)
 - < - less than the laboratory detection limit
 - n.s. - no standard listed
 - VHw - volatile hydrocarbons; VPHw - volatile petroleum hydrocarbons in water; EPH - extractable petroleum hydrocarbons; LEPHw - light extractable petroleum hydrocarbons in water; HEPH - heavy extractable petroleum hydrocarbons
 - CSR Drinking Water - BC Contaminated Sites Regulation (CSR) - Drinking Water standards
 - CSR Aquatic Life - BC CSR - Aquatic Life standards
 - * - groundwater samples were submitted EPH analysis in place of LEPH/HEPH analysis; EPH results include PAH constituents and are, by definition, more conservative than LEPH/HEPH results for the purpose of gross parameter testing

The results of the analyses indicated dissolved hydrocarbon concentrations below the laboratory analytical detection limit and the CSR Drinking Water standards and/or CSR Aquatic Life standards.

4.5 TARGET AREA #11 - BRINE TANKS WATER CHEMISTRY

Water samples were collected from each of the two brine tanks associated with the former on-site salt storage sheds and submitted to ALS for dissolved metals and chloride analyses. The results of the analyses, along with the applicable environmental standards, are summarized in Table 11 below. The analytical chemistry report is included in Appendix B for reference.

TABLE 11: TARGET AREA #11 – DISSOLVED METALS AND CHLORIDE CHEMISTRY (ppb) BRINE TANKS #1 AND #2 - July 6, 2001				
Parameter	Brine Tank #1	Brine Tank #2	BC Standards	
			CSR Drinking Water	CSR Aquatic Life
Hardness	96	65.0	n.s.	n.s.
Aluminum	160	69	200	n.s.
Antimony	<400	<200	6	300
Arsenic	<400	<200	25	500
Barium	<20	30	1000	10,000
Beryllium	<10	<5	n.s.	53
Boron	<200	<100	5000	n.s.
Cadmium	<2	<2	5	0.3 @H=30-<90; 0.5 @H=90-<150
Calcium	16100	22200	n.s.	n.s.
Chromium	<20	<10	50	10 or 90
Cobalt	<20	<10	n.s.	9
Copper	<20	<10	1000	30 @H=50-<75; 40 @H=75-<100
Iron	240	30	300	n.s.
Lead	<10	<1	10	50
Magnesium*	13.5	2.3	100*	n.s.
Manganese	30	10	50	n.s.
Mercury	<0.05	<0.05	1	1
Molybdenum	<60	<30	250	10,000
Nickel	<100	<50	n.s.	1100
Selenium	<10	<1	10	10
Silver	<1	<0.1	n.s.	0.5
Sodium*	1740	73	200*	n.s.
Thallium	2	0.2	n.s.	3
Uranium	<0.1	0.02	100	3000
Zinc	<u>190</u>	45	5000	75 @H=<90; 150 @H=90-<100
Dissolved Anions				
Chloride*	3210	123	250*	n.s.

- Notes:
- all results expressed as micrograms per litre (ppb - parts per million) unless otherwise noted
 - < - less than the laboratory detection limit
 - * - measured in milligrams per litre (mg/L)
 - n.s. - no standard listed
 - H - hardness, used to determine some standards (measured in mg/L of CaCO₃)
 - CSR *Drinking Water* - BC Contaminated Sites Regulation (CSR) - *Drinking Water* standards
 - CSR *Aquatic Life* - BC CSR - *Aquatic Life* standards
 - **bold** - indicates concentration in excess of the CSR *Drinking Water* standard
 - **bold and underlined** - indicates concentration in excess of the CSR *Aquatic Life* standard

The results of the analyses indicated water contained within brine tank #1 (adjacent to salt shed #2) exceeded the CSR *Drinking Water* standards for dissolved sodium and chloride and the CSR *Aquatic Life* standard for zinc.

4.6 SUPPLEMENTAL INVESTIGATIVE PROGRAM SUMMARY

A summary of the results of the supplemental investigative program for the select target areas is provided below.

Target Area #1 - Salt Sheds #1 and #2, Storage Area F

Groundwater samples were collected from BH99-3, BH99-4, BH99-7 and BH99-10 and submitted for dissolved metals and chloride analyses. The results of the analyses indicated concentrations of select dissolved metals and/or chloride in excess of the *CSR Drinking Water* and/or the *CSR Aquatic Life* standards in all four groundwater monitoring wells.

Target Area #3 - Oil Shed and Grease Ramp Area

One groundwater sample was collected from BH99-1 and submitted for dissolved hydrocarbon and metals analyses. The results of the analyses indicated dissolved manganese and sodium concentrations in excess of the *CSR Drinking Water* standard, with concentrations of benzo(a)pyrene equal to the *CSR Drinking Water* standard.

Target Area #4 - Sandblasting Area

Two soil samples were collected from the sandblasting area and submitted for SWEP analyses. The results of the analyses indicated both samples were below the Special Waste *Leachate Quality* standards for extractable metals.

Target Area #5 - Floor Drain and Effluent Sampling

As effluent was not present during the site visit, one soil sample was collected at the discharge location and submitted for EPH and metals analyses. The results of the analyses indicated EPH concentrations in excess of the comparable LEPH/HEPH *CSR Commercial* standards, with select metals concentrations also in excess of the *CSR Commercial* standards.

Target Area #6 - Potable Water Well

One groundwater sample was collected from an outside tap and submitted for dissolved hydrocarbon, total metals and dissolved chloride analyses. The results of the analyses indicated concentrations below the *CSR Drinking Water* standards for all constituents.

Target Area #9 - Removal of Burn Pile

Four soil samples were collected from the perimeter of a burn pile at the western end of Building #1 and submitted for hydrocarbon and metals analyses. The results of the analyses indicated arsenic, copper and zinc concentrations in excess of the *CSR Commercial* standards.

Target Area #11 - Brine Tank Water Sampling

One groundwater sample was collected from each of two brine tanks located on the site and submitted for dissolved metals and chloride analyses. The results of the analyses indicated dissolved sodium and chloride concentrations in excess of the CSR *Drinking Water* standard and dissolved zinc concentrations in excess of the CSR *Aquatic Life* standard in Brine Tank #1, located at the southwestern corner of the site.

Based on the results of the supplemental investigative program, remedial works were required in Target Areas #5, #9 and #11.

5.0 SITE REMEDIAL PROGRAM

SEACOR, along with Quantum conducted a site remedial program at the Cassidy Highways Yard between October 10 and 23, 2001. The works conducted during the remedial program are summarized in the sections below and on the following pages.

5.1 SOIL FIELD OBSERVATIONS

Six excavated soil samples, twenty-nine confirmatory soil samples and two soil samples of the imported backfill materials were collected during the remedial activities. In addition, one soil sample was collected of the sandblast material to determine disposal options and four samples were collected from two test pits advanced east of the washdown slab. A summary of the field observations recorded during sample collection are presented in Table 12 below. Figures 8 through 13 illustrate the confirmatory soil sample locations and soil chemistry. Test pit logs are included in Appendix A for reference.

TABLE 12: SOIL FIELD OBSERVATIONS - October 9 - 18, 2001				
Sample ID	Depth Below Grade (metres)	Location	Combustible Vapour Level (ppmv)	Analytical Schedule
TCLP - October 9, 2001				
SA1	0.03	Sandblast area	n/r	TCLP
EXCAVATED - October 10 - 15, 2001				
Target Area #2 - AST#1 and UST#7 Area - October 10, 2001				
SA4	0.3	Adjacent to AST#1	LTDL	EPH
SA5	0.3	Adjacent to AST#1	5	-
Target Area #8 - 22,730 L Waste Oil UST - October 12 and 15, 2001				
SA24	1.9	West wall	n/r	EPH
SA32	n/a	Stockpile	n/r	EPH
SA33	n/a	Stockpile	n/r	EPH
SA34	n/a	Stockpile	n/r	EPH
CONFIRMATORY - October 10 - 18, 2001				
Target Area #4 - Sandblasting Area - October 10, 2001 (refer to Figure 8)				
SA1	0.1	Sandblast area adjacent to Building #1	n/r	-
SA2	0.1	Sandblast area adjacent to Building #1	n/r	Metals
SA3	0.2	Sandblast area adjacent to Building #1	n/r	-
Target Area #8 - 5,000 L Waste Oil UST - October 10, 2001 (refer to Figure 9)				
SA6	1.0	East wall	5	-
SA7	1.0	East wall	5	BETX/VPH, LEPH/HEPH, PAH, PCB
SA8	1.0	East wall	LTDL	-
SA9	1.0	South wall	5	EPH
SA10	1.0	Southwest corner wall	5	-
SA11	1.0	West wall	5	EPH
SA12	1.0	Northwest corner wall	10	-
SA13	1.0	North wall	5	EPH
Target Area #8 - 9,100 L Heating Oil UST - October 11 and 13, 2001 (refer to Figure 10)				
SA14	3.5	Base (tank nest sands on bedrock base)	15	EPH
SA16	1.0	Northeast corner wall	5	EPH
SA17	0.9	N. wall beneath former supply lines	5	EPH
SA18	0.8	North wall	10	-
SA19	0.8	West wall adjacent to septic tank	15	EPH
SA20	1.1	Southwest corner wall	15	-
SA21	1.1	South wall	20	EPH
SA22	1.1	Southeast corner wall	5	-
SA23	1.1	East wall	LTDL	-
SA25	0.3	Beneath supply lines near bldg. footing	LTDL	EPH

TABLE 12 (cont.): SOIL FIELD OBSERVATIONS - October 9 - 18, 2001				
Sample ID	Depth Below Grade (metres)	Location	Combustible Vapour Level (ppmv)	Analytical Schedule
Target Area #8 - 22,730 L Waste Oil UST - October 13, 2001 (refer to Figure 11)				
SA26	3.0	South wall	35	-
SA27	2.0	East wall	65	BETX/VPH, LEPH/HEPH, PAH
SA28	3.0	South wall	30	PCB, Metals
SA29	3.0	South wall	20	EPH
SA30	2.2	West wall	25	-
Target Area #5 - October 16, 2001 (refer to Figure 12)				
SA35	0.5	Off-site below 200mm PVC drain pipe	n/r	LEPH/HEPH, PAH, Metals
Grease Ramp - October 16, 2001 (refer to Figure 12)				
SA36	0.1	Below former fill pipe	n/r	EPH
Burn pile near Salt Shed #2 - October 18, 2001 (refer to Figure 12)				
SA37	0.2	Centre base	n/r	Metals
IMPORTED BACKFILL - October 11 and 15, 2001				
SA15	n/a	Imported backfill	n/r	-
SA31	n/a	Imported backfill	n/r	EPH, Metals
TEST PITS - October 16, 2001 (refer to Figure 13)				
TP1-SA1	0.8	East of washdown slab	35	-
TP1-SA2	1.5	East of washdown slab	10	EPH, Metals
TP2-SA1	0.8	East of washdown slab	15	-
TP2-SA2	1.5	East of washdown slab	40	-

Notes:

- ppmv - parts per million volumetric
- LTDL - less than detection limit of field instrument
- n/r - not recorded
- TCLP - Toxicity Characteristic Leachate Procedure
- EPH - extractable petroleum hydrocarbons; BETX/VPH - benzene, ethylbenzene, toluene, xylenes, volatile petroleum hydrocarbons
- LEPH - light extractable petroleum hydrocarbons; HEPH - heavy extractable petroleum hydrocarbons; PAH - polycyclic aromatic hydrocarbons
- PCB - polychlorinated biphenyls
- "-" - not analyzed

Combustible vapour levels ranged from less than the detection limit of the field instrument in SA4, SA8, SA23 and SA25 to 65 ppmv in SA27. Soil samples were collected at depths ranging from 0.1 m to 3.5 m below ground surface. Soil samples were not collected at the base of the UST excavations due to the presence of bedrock subcrops.

5.2 SOIL CHEMISTRY RESULTS

5.2.1 Target Area #4 - Sandblasting Area - TCLP Analyses

One sample was collected from the sandblast material and submitted to ALS for TCLP analyses, as the soils were to be transported to Alberta for disposal. The results of the analyses, along with the applicable environmental standards, are summarized in Table 13 below. The analytical chemistry report is included in Appendix B for reference.

TABLE 13: TARGET AREA #4 - TOXIC CHARACTERISTIC LEACHATE PROCEDURE CHEMISTRY (ppm) October 9, 2001		
Parameter	SA1	TCLP
Antimony	<1	5.0
Arsenic	<1	6.0
Barium	<3	4.0
Beryllium	<0.03	5.0
Boron	<0.5	500
Cadmium	<0.05	1.0
Chromium	<0.3	5.0
Cobalt	<0.05	100
Copper	<0.05	100
Iron	191	1000
Lead	<0.3	5.0
Mercury	<0.00005	0.2
Nickel	<0.3	5.0
Selenium	<1	1.0
Silver	<0.3	5.0
Thallium	<1	5.0
Vanadium	<0.2	100
Zinc	11.2	500

- Notes:
- all results expressed as milligrams per litre (ppm - parts per million)
 - < - less than the laboratory detection limit
 - TCLP - Alberta User Guide for Waste Managers, Part 4, Table 2, Regulatory Levels

The results of the analyses indicated the sample was below the TCLP standards, as regulated in the Province of Alberta. No CSR standards are applicable for this analysis.

5.2.2 Target Areas #2 and #8 - AST#1/UST#7 and Decommissioning of USTs - Excavated Soil Samples

Five samples collected of the excavated soils were submitted to ALS for EPH analyses and the results of the analyses, along with the applicable environmental standards, are summarized in Table 14 below. The analytical chemistry reports are included in Appendix B for reference.

TABLE 14: TARGET AREAS #2 and #8 - SOIL EPH CHEMISTRY (ppm) EXCAVATED SOIL SAMPLES - October 10 and 15, 2001		
Sample ID	EPH (C ₁₀₋₁₉)	EPH (C ₁₉₋₃₂)
Target Area #2		
SA4	<200	<200
Target Area #8		
SA24	<200	<200
SA32	<200	<200
SA33	4990	<u>12400</u>
SA34	<200	<200
CSR Residential	1000*	1000*
CSR Commercial	2000*	5000*

- Notes:
- all results expressed as milligrams per dry kilogram (ppm - parts per million)
 - < - less than the laboratory analytical detection limit specified
 - EPH - extractable petroleum hydrocarbons
 - CSR Residential - BC Contaminated Sites Regulation (CSR) - Residential standards
 - CSR Commercial - BC CSR - Commercial standards
 - * - soil samples were submitted for extractable petroleum hydrocarbon (EPH) analysis in place of LEPH/HEPH analysis; EPH results include PAH constituents and are, by definition, more conservative than LEPH/HEPH results for the purpose of gross parameter testing
 - **bold** - indicates concentration in excess of the CSR Residential standard
 - **bold and underlined** - indicates concentration in excess of the CSR Commercial standard

The results of the analyses indicated soil sample SA33 exceeded the CSR Commercial standard for LEPH and HEPH. All remaining soil samples were below the CSR Residential standards for analyzed hydrocarbon parameters.

5.2.3 Target Areas #4, #5 and #8 - Sandblasting Area, Floor Drain Effluent Sampling and Decommissioning of USTs, and Grease Ramp Area - Confirmatory Soil Samples

Fifteen confirmatory soil samples collected during the remedial activities were submitted to ALS for hydrocarbon and metals analyses and the results, along with the applicable environmental standards, are summarized in Table 15 below. The analytical chemistry reports are included in Appendix B for reference.

TABLE 15: TARGET AREAS #5, #8 AND GREASE RAMP AREA - SOIL HYDROCARBON CHEMISTRY CONFIRMATORY SOIL SAMPLES - October 10 - 16, 2001									
Sample ID	Benzene	Ethylbenzene	Toluene	Xylenes	VPH	EPH (C ₁₀₋₁₉)	EPH (C ₁₉₋₃₂)	LEPH	HEPH
Target Area #5 - Floor Drain Effluent Sampling									
SA35	-	-	-	-	-	1350	1380	1350	1380
Target Area #8 - 5,000 L Waste Oil UST									
SA7	<0.04	<0.05	<0.05	<0.10	<200	<200	<200	<200	<200
SA9	-	-	-	-	-	<200	<200	-	-
SA11	-	-	-	-	-	<200	<200	-	-
SA13	-	-	-	-	-	<200	<200	-	-
Target Area #8 - 9,100 L Heating Oil UST									
SA14	-	-	-	-	-	<200	<200	-	-
SA16	-	-	-	-	-	<200	<200	-	-
SA17	-	-	-	-	-	<200	<200	-	-
SA19	-	-	-	-	-	<200	<200	-	-
SA21	-	-	-	-	-	<200	<200	-	-
SA25	-	-	-	-	-	<200	<200	-	-
Target Area #8 - 22,730 L Waste Oil UST									
SA27	<0.04	<0.05	<0.05	<0.10	<200	<200	<200	<200	<200
SA28	-	-	-	-	-	<200	<200	-	-
SA30	-	-	-	-	-	<200	<200	-	-
Grease Ramp									
SA36	-	-	-	-	-	<200	<200	-	-
CSR Residential	0.04 ^a	1 ^b	1.5 ^b	5 ^b	200 ^c	*1000 ^c	*1000 ^c	1000 ^c	1000 ^c
CSR Commercial	0.04 ^a	7 ^a	2.5 ^a	20 ^a	200 ^c	*2000 ^c	*5000 ^c	2000 ^c	5000 ^c

- Notes:
- all results expressed as milligrams per dry kilogram (ppm - parts per million)
 - VPH - volatile petroleum hydrocarbons
 - EPH - extractable petroleum hydrocarbons
 - LEPH and HEPH - light and heavy extractable petroleum hydrocarbons
 - < - less than laboratory detection limit indicated
 - "-" indicates sample not analyzed for specified parameter
 - CSR Residential - BC Contaminated Sites Regulation (CSR) - Residential standards
 - CSR Commercial - BC CSR - Commercial standards
 - ^a - Matrix Numerical Soil Standards - groundwater used for drinking water
 - ^b - Matrix Numerical Soil Standards - toxicity to soil invertebrates and plants
 - ^c - Generic Numerical Soil Standards
 - * - indicates comparable standards for LEPH and HEPH which are defined as EPH (C₁₀₋₁₉) - specific PAHs and EPH (C₁₉₋₃₂) - specific PAHs, respectively; EPH is not a regulated parameter in soil
 - bold** - indicates concentration in excess of the CSR Residential standard

The results of the analyses indicated soil sample SA35 exceeded the CSR Residential standard for LEPH and HEPH, however, was below the site-specific CSR Commercial standards. All remaining soil samples were below the laboratory analytical detection limit and the CSR Residential standard for analyzed hydrocarbon parameters.

Three confirmatory soil samples were submitted to ALS for PAH and/or PCB analyses and the results of the analyses, along with the applicable environmental standards, are summarized in Table 16 below.

TABLE 16: TARGET AREA #5 & #8 - SOIL PAH & PCB CHEMISTRY - CONFIRMATORY SOIL SAMPLES (ppm) October 10 - 18, 2001					
Parameter	Target Area #8		Target Area #5	BC Standards	
	5,000 L Waste Oil UST	22,730 L Waste Oil UST		CSR	CSR
	SA7	SA27	SA35	<i>Residential</i>	<i>Commercial</i>
Acenaphthene	<0.01	<0.01	<0.01	n.s.	n.s.
Acenaphthylene	<0.01	<0.01	<0.02	n.s.	n.s.
Anthracene	<0.01	<0.01	<0.01	n.s.	n.s.
Benz(a)anthracene	<0.01	<0.01	<0.01	1 ^a	10 ^a
Benzo(a)pyrene	<0.01	<0.01	<0.01	1 ^b	10 ^b
Benzo(b)fluoranthene	<0.01	<0.01	<0.01	1 ^a	10 ^a
Benzo(g,h,i)perylene	<0.01	<0.01	0.02	n.s.	n.s.
Benzo(k)fluoranthene	<0.01	<0.01	<0.01	1 ^a	10 ^a
Chrysene	<0.01	<0.01	<0.02	n.s.	n.s.
Dibenz(a,h)anthracene	<0.01	<0.01	<0.01	1 ^a	10 ^a
Fluoranthene	<0.01	<0.01	<0.3	n.s.	n.s.
Fluorene	<0.01	<0.01	<0.02	n.s.	n.s.
Indeno(1,2,3-c,d)pyrene	<0.01	<0.01	<0.01	1 ^a	10 ^a
Naphthalene	<0.01	<0.01	0.02	5 ^a	10 ^a
Phenanthrene	<0.01	<0.01	<0.04	5 ^a	10 ^a
Pyrene	<0.01	<0.01	0.28	10 ^a	10 ^a
PCBs	<0.05	<0.05	-	5 ^c	15 ^c

- Notes:
- all results expressed as milligrams per dry kilogram (ppm - parts per million)
 - PAH - polycyclic aromatic hydrocarbons; PCB - polychlorinated biphenyls
 - < - less than the laboratory analytical detection limit specified
 - "-" - sample not analyzed for specified parameter
 - n.s. - no standard listed
 - CSR *Residential* - BC Contaminated Sites Regulation (CSR) - *Residential* standards
 - CSR *Commercial* - BC CSR - *Commercial* standards
 - ^a - Generic Numerical Soil Standards
 - ^b - Matrix Numerical Soil Standards - toxicity to soil invertebrates and plants
 - ^c - Matrix Numerical Soil Standards - intake of contaminated soil

The results of the analyses indicated all three soil samples were below the CSR *Residential* standards for all regulated PAH and/or PCBs.

Four soil samples were submitted to ALS for metals analyses and the results of the analyses, along with the applicable environmental standards, are summarized in Table 17 below.

TABLE 17: TARGET AREAS #4, #5 and #8 - SOIL METALS CHEMISTRY (ppm) CONFIRMATORY SOIL SAMPLES - October 10 - 18, 2001						
Parameter	Target Area #4	Target Area #5	Target Area #8 (22,730 L Waste Oil UST)	Burn pile near SS#2	BC Standards	
	SA2	SA35	SA27	SA37	CSR Residential	CSR Commercial
pH	7.36	6.26	6.06	6.06	n.s.	n.s.
Antimony	<10	<10	<10	<10	20 ^a	40 ^a
Arsenic	<5	6	6	7	15 ^b	15 ^b
Barium	47	67	89	45	500 ^a	2000 ^a
Beryllium	<0.5	<0.5	<0.5	<0.5	4 ^a	8 ^a
Cadmium	<0.5	<0.5	<0.5	<0.5	1.5 @ pH <6.5 ^b , 2.5 @ pH 7.0-<7.5 ^c	1.5 @ pH <6.5 ^b , 2.5 @ pH 7.0-<7.5 ^c
Chromium	18	39	37	61	60 ^b	60 ^b
Cobalt	9	13	13	19	50 ^a	300 ^a
Copper	53	53	48	66	150 ^d	250 ^d
Lead	<50	<50	<50	<50	250 @ pH 6.0-<6.5 ^b , 500 ^c	250 @ pH 6.0-<6.5 ^b , 1000 ^c
Mercury	<0.05	0.11	<0.05	0.11	15 ^c	40 ^c
Molybdenum	<4	<4	<4	<4	10 ^a	40 ^a
Nickel	15	36	31	62	100 ^a	500 ^a
Selenium	<4	<3	<2	<3	3 ^a	10 ^a
Silver	<2	<2	<2	<2	20 ^a	40 ^a
Tin	<5	<5	<5	<5	50 ^a	300 ^a
Vanadium	57	82	86	123	200 ^a	n.s.
Zinc	45	74	50	46	300 @ pH 6.0-<6.5 ^c , 450 ^d	300 @ pH 6.0-<6.5 ^c , 600 ^d

- Notes:
- all results expressed as milligrams per dry kilogram (ppm - parts per million)
 - < - less than the laboratory detection limit
 - n.s. - no standard listed
 - pH used to determine some standards
 - CSR Residential - BC Contaminated Sites Regulation (CSR) - Residential standards
 - CSR Commercial - BC CSR - Commercial standards
 - ^a - Generic Numerical Standards
 - ^b - Matrix Numerical Soil Standards - groundwater used for drinking water
 - ^c - Matrix Numerical Soil Standards - groundwater flow to surface water used by aquatic life (freshwater)
 - ^d - Matrix Numerical Soil Standards - toxicity to soil invertebrates and plants
 - ^e - Matrix Numerical Soil Standards - intake of contaminated soil
 - SS#2 - Salt Shed #2, located near southwestern corner of the site

The results of the analyses indicated soil sample SA37, collected from the base of a former small burn area near salt shed #2, exceeded the CSR Commercial standard for chromium; the sample was, however, below the Vancouver Island Regional Background concentration of 90 parts per million for chromium.

5.2.4 Imported Backfill

One sample collected from imported soils required to backfill the tank excavations was submitted to ALS for hydrocarbon analysis. The results of the analysis, along with the applicable environmental standards, are summarized in Table 18 below. The analytical chemistry report is included in Appendix B for reference.

TABLE 18: IMPORTED BACKFILL EPH CHEMISTRY - October 15, 2001		
Sample ID	EPH (C ₁₀₋₁₉)	EPH (C ₁₉₋₃₂)
SA31	<200	<200
CSR Residential	*1000	*1000
CSR Commercial	*2000	*5000

- Notes:
- all results expressed as milligrams per dry kilogram (ppm - parts per million)
 - < - less than the laboratory analytical detection limit specified
 - EPH - extractable petroleum hydrocarbons
 - CSR Residential - BC Contaminated Sites Regulation (CSR) - Residential standards
 - CSR Commercial - BC CSR - Commercial standards
 - * - soil samples were submitted for extractable petroleum hydrocarbon (EPH) analysis in place of LEPH/HEPH analysis; EPH results include PAH constituents and are, by definition, more conservative than LEPH/HEPH results for the purpose of gross parameter testing

The results of the analyses indicated soil sample SA31 was below the comparable CSR Residential standards for EPH (C₁₀₋₁₉) and EPH (C₁₉₋₃₂).

One soil sample was submitted to ALS for total metals analyses and the results of the analyses, along with the applicable environmental standards, are summarized in Table 19 below.

TABLE 19: IMPORTED BACKFILL METALS CHEMISTRY - October 15, 2001			
Parameter	SA31	BC Standards	
		CSR Residential	CSR Commercial
pH	7.08	n.s.	n.s.
Antimony	<10	20 ^a	40 ^a
Arsenic	<5	15 ^b	15 ^b
Barium	48	500 ^a	2000 ^a
Beryllium	<0.5	4 ^a	8 ^a
Cadmium	<0.5	2.5 ^c	2.5 ^c
Chromium	14	60 ^b	60 ^b
Cobalt	7	50 ^a	300 ^a
Copper	46	150 ^d	250 ^d
Lead	<50	500 ^e	1000 ^e
Mercury	<0.05	15 ^c	40 ^c
Molybdenum	<4	10 ^a	40 ^a
Nickel	11	100 ^a	500 ^a
Selenium	<2	3 ^a	10 ^a
Silver	<2	20 ^a	40 ^a
Tin	<5	50 ^a	300 ^a
Vanadium	56	200 ^a	n.s.
Zinc	26	450 ^d	600 ^d

- Notes:
- all results expressed as milligrams per dry kilogram (ppm - parts per million)
 - < - less than the laboratory detection limit
 - n.s. - no standard listed
 - pH used to determine some standards
 - CSR Residential - BC Contaminated Sites Regulation (CSR) - Residential standards
 - CSR Commercial - BC CSR - Commercial standards
 - ^a - Generic Numerical Standards
 - ^b - Matrix Numerical Soil Standards - groundwater used for drinking water
 - ^c - Matrix Numerical Soil Standards - groundwater flow to surface water used by aquatic life (freshwater)
 - ^d - Matrix Numerical Soil Standards - toxicity to soil invertebrates and plants
 - ^e - Matrix Numerical Soil Standards - intake of contaminated soil

The results of the analyses indicated soil sample SA31 was below the CSR Residential standards for all regulated total metals parameters.

5.2.5 Washdown Slab

One sample collected during from test pits advanced adjacent to the washdown slab was submitted to ALS for hydrocarbon analyses and the results of the analyses, along with the applicable environmental standards, are summarized in Table 20 below. Test pit logs are included in Appendix A, and the analytical chemistry report is included in Appendix B for reference.

TABLE 20: SOIL EPH CHEMISTRY (ppm) - Washdown Slab - October 16, 2001		
Sample ID	EPH (C ₁₀₋₁₉)	EPH (C ₁₉₋₃₂)
TP1-SA2	<200	<200
CSR Residential	1000*	1000*
CSR Commercial	2000*	5000*

- Notes:
- all results expressed as milligrams per dry kilogram (ppm - parts per million)
 - < - less than the laboratory analytical detection limit specified
 - EPH - extractable petroleum hydrocarbons
 - CSR Residential - BC Contaminated Sites Regulation (CSR) - Residential standards
 - CSR Commercial - BC CSR - Commercial standards
 - * - soil samples were submitted for extractable petroleum hydrocarbon (EPH) analysis in place of LEPH/HEPH analysis; EPH results include PAH constituents and are, by definition, more conservative than LEPH/HEPH results for the purpose of gross parameter testing

The results of the analyses indicated that sample TP1-SA2 was below the comparable CSR Residential standard for EPH (C₁₀₋₁₉) and EPH (C₁₉₋₃₂).

One soil sample was submitted to ALS for total metals analysis and the results of the analyses, along with the applicable environmental standards, are summarized in Table 21 below.

TABLE 21: SOIL METALS CHEMISTRY (ppm) - WASHDOWN SLAB - October 16, 2001			
Parameter	TP1-SA2	BC Standards	
		CSR Residential	CSR Commercial
pH	7.43	n.s.	n.s.
Antimony	<10	20 ^a	40 ^a
Arsenic	<5	15 ^b	15 ^b
Barium	63	500 ^a	2000 ^a
Beryllium	<0.5	4 ^a	8 ^a
Cadmium	<0.5	2.5 ^c	2.5 ^c
Chromium	20	60 ^b	60 ^b
Cobalt	8	50 ^a	300 ^a
Copper	59	150 ^d	250 ^d
Lead	<50	500 ^e	1000 ^e
Mercury	<0.05	15 ^e	40 ^e
Manganese	<4	10 ^a	40 ^a
Molybdenum	16	100 ^a	500 ^a
Nickel	<3	3 ^a	10 ^a
Selenium	<2	20 ^a	40 ^a
Silver	<5	50 ^a	300 ^a
Vanadium	52	200 ^a	n.s.
Zinc	57	450 ^d	600 ^d

- Notes:
- all results expressed as milligrams per dry kilogram (ppm - parts per million)
 - < - less than the laboratory detection limit
 - n.s. - no standard listed
 - pH used to determine some standards
 - CSR Residential - BC Contaminated Sites Regulation (CSR) - Residential standards
 - CSR Commercial - BC CSR - Commercial standards
 - ^a - Generic Numerical Standards
 - ^b - Matrix Numerical Soil Standards - groundwater used for drinking water
 - ^c - Matrix Numerical Soil Standards - groundwater flow to surface water used by aquatic life (freshwater)
 - ^d - Matrix Numerical Soil Standards - toxicity to soil invertebrates and plants
 - ^e - Matrix Numerical Soil Standards - intake of contaminated soil

The results of the analyses indicated the soil sample TP1-SA2 was below the CSR Residential standards for all regulated total metals parameters.

5.2.6 Accumulated Groundwater

Approximately 4,383 litres of groundwater was removed from the former 22,730 L waste oil UST excavation and temporarily stored within a 22,730 L above-ground storage tank (AST) prior to removal off-site to Peninsula Waste Water Services in Victoria, BC for treatment. One water sample was collected from the AST prior to disposal and submitted to ALS for hydrocarbon analyses. The results of the analyses, along with the applicable environmental standards, are summarized in Table 22 below. The analytical chemistry report is included in Appendix B for reference.

TABLE 22: TANK EXCAVATION WATER CHEMISTRY - October 15, 2001			
Sample ID	Tank Water	CSR <i>Drinking Water</i>	CSR <i>Aquatic Life</i>
EPH (C ₁₀₋₁₉)	<300	n.s.	500*
EPH (C ₁₉₋₃₂)	1000	n.s.	n.s.
MOG	<5000	n.s.	n.s.

- Notes:
- all results expressed as micrograms per litre (ppb - parts per billion)
 - < - less than the laboratory detection limit
 - n.s. - no standard listed
 - EPH - extractable petroleum hydrocarbons; MOG - mineral oil and grease
 - CSR *Drinking Water* - BC Contaminated Sites Regulation (CSR) - *Drinking Water* standards
 - CSR *Aquatic Life* - BC CSR - *Aquatic Life* standards
 - * - groundwater samples were submitted for EPH analysis in place of LEPH/HEPH analysis; EPH results include PAH constituents and are, by definition, more conservative than LEPH/HEPH results for the purpose of gross parameter testing

The results of the analyses indicated the water sample was below the comparable CSR *Aquatic Life* standard for EPH (C₁₀₋₁₉).

5.3 REMEDIAL PROGRAM SUMMARY

A summary of the remedial works completed within each target area is summarized in the sections below and on the following page.

Target Area #2 - AST#1 and UST#7 Area

Approximately 3 m³ of hydrocarbon-impacted soils in excess of the CSR *Commercial* standards was excavated and transported off-site for disposal at WSTC Highlands Disposal Facility (WSTC) in Langford, BC. A confirmatory soil sample collected from the excavation base of the surficial stained area and submitted for analysis indicated EPH concentrations below the comparable CSR *Commercial* standards.

Target Areas #4 and #9 - Sandblasting Area and Removal of Burn Pile

Approximately 43 m³ of metals-impacted soils in excess of the TDG Special Waste standard for arsenic was excavated from the sandblast area and adjacent burn pile and transported off-site to Canadian Waste in Edmonton, AB for disposal. Due to the presence of cold patch/asphalt directly beneath the sandblast area and burn pile, confirmatory soil samples could not be collected from the majority of the excavation, however, soil

samples collected from the base of a small excavated area of sandblast grit adjacent to Building #1 indicated metals concentrations below the CSR *Commercial* standards.

Target Area #5 - Floor Drain Effluent Sampling

A soil sample collected during the site investigation program indicated hydrocarbon and metals concentrations in excess of the CSR *Commercial* standards below a 200 mm PVC drain pipe adjacent to the southwestern fence of the site. Approximately 0.1 m³ of soil was excavated from this area and transported off-site for disposal at the Canadian Waste facility in Edmonton, AB. The confirmatory soil sample results indicated metals and LEPH/HEPH concentrations below the CSR *Commercial* soil standards.

Target Area #7 - Site Reconnaissance

A site reconnaissance was conducted to identify additional surficially hydrocarbon-stained areas requiring remediation. Approximately 0.1 m³ of surficially-stained soils were excavated and disposed off-site at WSTC.

Target Area #8 - Decommissioning of Underground Storage Tanks

Three USTs, one 5,000 L steel waste oil UST, one 9,100 L heating oil UST and one 22,730 waste oil UST were decommissioned during the site remedial works. Approximately 57 m³ of hydrocarbon-impacted soils in excess of the CSR *Commercial* standards was excavated from the 22,730 L waste oil UST excavation and transported off-site for disposal at WSTC. Confirmatory soil samples collected from the three excavation limits indicated hydrocarbon, metals and PCB concentrations below the CSR *Residential* soil standards.

Target Area #10 - Removal of Drums and Pails

Six 205 L drums and nine 20 L pails of paint and paint-related products stored within salt shed #2 were removed during the remedial works and transported off-site to the Canada West Environmental Services Inc. disposal facility in Surrey, BC.

Target Area #11 - Brine Tank Water Sampling

Approximately 1,000 L of water within a brine tank formerly associated with salt shed #2 at the southwestern corner of the property was removed and transported off-site to the Peninsula Waste Water Services Ltd. facility in Victoria, BC for treatment and disposal.

Additional Works

Three additional areas on the site not previously identified as requiring further investigation/remediation were also investigated during the remedial program and a summary of the works conducted in each area is summarized below.

- Two test pits were advanced adjacent to the washdown slab, and a soil sample submitted for analysis indicated hydrocarbon and metals concentrations below the CSR *Residential* standards.
- A small burn pile near salt shed #2 was removed, with approximately 2 m³ of metals-impacted soils transported off-site for disposal. A soil sample collected from the excavation base and submitted for analysis indicated chromium concentrations slightly exceeding the CSR *Commercial* standard but below the Vancouver Island RBC for chromium.
- Ancillary piping between the grease ramp and a former waste oil tank, as well as vent piping, was removed, and a soil sample collected beneath the former piping just prior to connection with the grease ramp indicated hydrocarbon concentrations below the CSR *Residential* soil standards.

6.0 POST-REMEDIATION GROUNDWATER ASSESSMENT

The post-remediation groundwater assessment was initiated on December 7, 2001 to confirm soil and groundwater conditions following the UST decommissioning activities. Three boreholes were advanced, one within each of the three former UST nest excavations, and completed as groundwater monitoring wells. The locations of the monitoring wells are illustrated on Figure 14.

Fifty-millimetre diameter, #010 slot polyvinyl chloride (PVC) monitoring wells were installed to allow characterization of groundwater quality and to determine the presence or absence of any phase-separated product. The annulus surrounding the screened section of each monitoring well was backfilled with silica sand and a bentonite seal was installed above the screened section to prevent cross-contamination; all well were completed with flush-mount roadboxes and lockable well caps. Reference should be made to Appendix A for specific borehole logs and monitoring well construction details.

6.1 SOIL INVESTIGATION RESULTS

Table 23 below summarizes the generalized soil profile encountered during the post-remediation drilling activities.

TABLE 23: GENERALIZED SOIL PROFILE - POST-REMEDIATION GROUNDWATER ASSESSMENT	
Approximate Depth (metres)	Soil Description
0.05 - 4.3	SAND AND GRAVEL (Fill) - fine to coarse grained sand, fine to coarse gravel, trace silt, brown, damp to moist

The material and depths varied locally and reference should be made to the borehole logs in Appendix A for specific information.

6.1.1 Soil Field Observations

A summary of the soil combustible vapour levels encountered during the drilling investigation and the analytical schedule is presented in Table 24 below.

TABLE 24: SOIL FIELD OBSERVATIONS - POST-REMEDIATION GROUNDWATER ASSESSMENT December 7, 2001				
Borehole ID	Completion Depth (metres)	Maximum Combustible Vapour Level and Depth		Analytical Schedule
		Level (ppmv)	Depth (metres)	
BH01-1	2.1	50	0.6 - 1.2	Metals
BH01-2	3.5	5	2.1 - 2.7	Metals
BH01-3	4.3	30	3.7 - 4.3	Metals

Note: • ppmv - parts per million volumetric

Maximum combustible vapour levels ranged from 5 ppmv in a soil sample collected from BH01-2 to 50 ppmv in a soil sample collected from BH01-1.

6.1.2 Soil Chemistry Results

One sample was submitted from each of the three boreholes to ALS for total metals analyses and the results of the analyses, along with the applicable environmental standards, are summarized in Table 25 below. The analytical chemistry reports are included in Appendix B for reference.

TABLE 25: SOIL METALS CHEMISTRY - POST REMEDIATION GROUNDWATER ASSESSMENT (ppm)					
December 7, 2001					
Parameter	BH01-1 SA2 1.5 m - 2.1 m	BH01-2 SA3 2.1 m - 2.7 m	BH01-3 SA3 2.1 m - 2.7 m	BC Standards	
				CSR Residential	CSR Commercial
pH	7.14	7.58	7.65	n.s.	n.s.
Antimony	<10	<10	<10	20 ^a	40 ^a
Arsenic	<5	<5	6	15 ^b	15 ^b
Barium	67	41	67	500 ^a	2000 ^a
Beryllium	<0.5	<0.5	<0.5	4 ^a	8 ^a
Cadmium	<0.5	<0.5	<0.5	2.5 @pH7.0-<7.5 ^b , 25 @pH7.5-<8.0 ^c	2.5 @pH7.0-<7.5 ^b , 25 @pH7.5-<8.0 ^c
Chromium	25	19	28	60 ^b	60 ^b
Cobalt	8	8	10	50 ^a	300 ^a
Copper	82	42	63	150 ^d	250 ^d
Lead	<50	<50	<50	500 ^e	1000 ^e
Mercury	<0.05	<0.05	<0.05	15 ^c	40 ^c
Molybdenum	<4	<4	<4	10 ^a	40 ^a
Nickel	19	16	21	100 ^a	500 ^a
Selenium	<4	<3	<5	3 ^a	10 ^a
Tin	<2	<2	<2	20 ^a	40 ^a
Silver	<5	<5	<5	50 ^a	300 ^a
Vanadium	60	64	72	200 ^a	n.s.
Zinc	72	31	44	450 ^d	600 ^d

- Notes:
- all results expressed as milligrams per dry kilogram (ppm - parts per million)
 - < - less than the laboratory detection limit
 - n.s. - no standard listed; pH used to determine some standards
 - CSR Residential - BC Contaminated Sites Regulation (CSR) - Residential standards
 - CSR Commercial - BC CSR - Commercial standards
 - ^a - Generic Numerical Standards
 - ^b - Matrix Numerical Soil Standards - groundwater used for drinking water
 - ^c - Matrix Numerical Soil Standards - groundwater flow to surface water used by aquatic life (freshwater)
 - ^d - Matrix Numerical Soil Standards - toxicity to soil invertebrates and plants
 - ^e - Matrix Numerical Soil Standards - intake of contaminated soil

The results of the analyses indicated all three soil samples were below the CSR Residential standards for all regulated total metals parameters.

6.2 GROUNDWATER MONITORING PROGRAM

All boreholes were completed as groundwater monitoring wells during the post-remediation assessment program. A basic level survey was completed to obtain relative well head elevations and to subsequently provide an elevation reference for free-surface groundwater levels. An assumed elevation of 100.00 m was assigned to the northeast corner of the staff room and all calculated groundwater levels/elevations were referenced to this benchmark.

6.2.1 Groundwater Field Observations

On December 11, 2001, all three newly installed groundwater monitoring wells were monitored for vapour levels, depth to groundwater, and the presence/absence of hydrocarbon product/sheen, if any. The results of the monitoring program are summarized in Table 26 below.

TABLE 26: GROUNDWATER FIELD OBSERVATIONS - POST-REMEDATION GROUNDWATER ASSESSMENT								
December 11, 2001								
Monitoring Well ID	Screen Interval From Grade (m)	Elevation (m)		Phase-separated Product Thickness (cm)	Depth to Groundwater (m)		Groundwater Elevation (m)	Monitoring Well Vapour Level (ppmv)
		Top of Well Casing	Grade		Top of Well Casing	Grade		
BH01-1	0.9 - 2.1	100.17	100.20	none	Dry	Dry	Dry	40
BH01-2	1.4 - 3.5	99.78	99.84	none	Dry	Dry	Dry	55
BH01-3	1.5 - 3.7	99.86	99.94	none	2.48	2.56	97.38	125

- Notes:
- m - metres
 - cm - centimetres
 - ppmv - parts per million volumetric

Combustible vapour levels ranged from 40 ppmv in BH01-1 to 125 ppmv in BH01-3. BH01-1 and BH01-2, both advanced to bedrock, were dry; the groundwater level in BH01-3 was 2.56 m below ground surface.

6.2.2 Groundwater Chemistry Results

A groundwater sample was collected from BH01-3 and submitted to ALS for hydrocarbon and dissolved metals and chloride analyses. The results of the analyses, along with the applicable environmental standards, are summarized in Table 27 below and Table 28 on the following page. The analytical chemistry reports are included in Appendix B for reference.

TABLE 27: POST-REMEDIATION GROUNDWATER ASSESSMENT GROUNDWATER HYDROCARBON CHEMISTRY (ppb) - December 11, 2001			
Parameters	BH01-3	BC Standards	
		CSR Drinking Water	CSR Aquatic Life
Benzene	<0.5	5	4000
Ethylbenzene	<0.5	2.4	2000
Toluene	<0.5	24	390
Xylenes	<1.0	3000	n.s.
VHw	<100	n.s.	15000
VPHw	<100	n.s.	1500
Extractables			
EPH (C ₁₀₋₁₉)	<300	n.s.	500*
EPH (C ₁₉₋₃₂)	<1000	n.s.	n.s.
LEPHw	<300	n.s.	500
HEPH	<1000	n.s.	n.s.
Polycyclic Aromatic Hydrocarbons			
Acenaphthene	<0.05	n.s.	60
Acenaphthylene	<0.05	n.s.	n.s.
Acridine	<0.05	n.s.	0.5
Anthracene	<0.05	n.s.	1
Benz(a)anthracene	<0.05	n.s.	1
Benzo(a)pyrene	<0.01	0.01	0.1
Benzo(b)fluoranthene	<0.05	n.s.	n.s.
Benzo(g,h,i)perylene	<0.05	n.s.	n.s.
Benzo(k)fluoranthene	<0.05	n.s.	n.s.
Chrysene	<0.05	n.s.	1
Dibenz(a,h)anthracene	<0.05	n.s.	n.s.
Fluoranthene	<0.05	n.s.	2
Fluorene	<0.05	n.s.	120
Indeno(1,2,3-c,d)pyrene	<0.05	n.s.	n.s.
Naphthalene	<0.05	n.s.	10
Phenanthrene	<0.05	n.s.	3
Pyrene	<0.05	n.s.	0.2

- Notes:**
- all results expressed as micrograms per litre (ppb - parts per billion)
 - < - less than the laboratory detection limit
 - n.s. - no standard listed
 - VHw - volatile hydrocarbons in water; VPHw - volatile petroleum hydrocarbons in water; EPH - extractable petroleum hydrocarbons; LEPHw - light extractable petroleum hydrocarbons in water; HEPH - heavy extractable petroleum hydrocarbons
 - CSR Drinking Water - BC Contaminated Sites Regulation (CSR) - Drinking Water standards
 - CSR Aquatic Life - BC CSR - Aquatic Life standards
 - * - groundwater samples were submitted for EPH analysis in place of LEPH/HEPH analysis; EPH results include PAH constituents and are, by definition, more conservative than LEPH/HEPH results for the purpose of gross parameter testing

The results of the analyses indicated the groundwater sample collected from BH01-3 was below the CSR Drinking Water standards for all analyzed hydrocarbon parameters.

One groundwater sample from BH01-3 was submitted to ALS for dissolved metals and chloride analyses and the results of the analyses, along with the applicable environmental standards, are summarized in Table 28 below.

TABLE 28: POST-REMEDIATION GROUNDWATER ASSESSMENT- DISSOLVED METALS AND CHLORIDE CHEMISTRY (ppb) - December 11, 2001			
Parameter	BH01-3	BC Standards	
		CSR <i>Drinking Water</i>	CSR <i>Aquatic Life</i>
Hardness (mg/L)	83.9	n.s.	n.s.
Aluminum	40	200	n.s.
Antimony	<10	6	300
Arsenic	<1	25	500
Barium	80	1000	10,000
Beryllium	<5	n.s.	53
Boron	<100	5000	n.s.
Cadmium	<0.2	5	0.3
Calcium	26400	n.s.	n.s.
Chromium	<10	50	10 or 90
Cobalt	<10	n.s.	9
Copper	5	1000	40
Iron	<30	300	n.s.
Lead	<1	10	50
Magnesium*	4400	100*	n.s.
Manganese	320	50	n.s.
Mercury	<0.2	1	1
Molybdenum	<1	250	10,000
Nickel	<50	n.s.	1100
Selenium	<1	10	10
Silver	<0.1	n.s.	0.5
Sodium*	48	200*	n.s.
Thallium	<0.2	n.s.	3
Uranium	<0.2	100	3000
Vanadium	<30	n.s.	n.s.
Zinc	<50	5000	75
Dissolved Anions			
Chloride*	34.6	250*	n.s.

- Notes:
- all results expressed as micrograms per litre (ppb - parts per billion) unless otherwise noted
 - < - less than the laboratory detection limit
 - * - measured in milligrams per litre (mg/L)
 - n.s. - no standard listed
 - H - hardness used to determine some standards (measured in mg/L of CaCO₃)
 - CSR *Drinking Water* - BC Contaminated Sites Regulation (CSR) - *Drinking Water* standards
 - CSR *Aquatic Life* - CSR - *Aquatic Life* standards
 - **bold** - indicates concentration in excess of the CSR *Drinking Water* standard

The results of the analyses indicated BH01-3 exceeded the CSR *Drinking Water* standard for dissolved manganese concentrations.

7.0 SUPPLEMENTAL INFORMATION

7.1 SITE REGISTRY SEARCH

Based on the assessment requirements, a supplemental review of historical records on file with the BC MWLAP Site Registry was undertaken. The site registry review included a search of contaminated properties within a 0.5 km radius of the Cassidy Highways Yard site which may adversely impact the subject site. A search using the coordinates N 49° 6' 11" and W 123° 54' 49" was conducted on January 17, 2002; no sites were located within a 0.5 km radius of the site, however, the site itself was included on the Site Registry, and a copy of the detail report is included in Appendix C for reference.

7.2 GROUNDWATER WELL DATABASE SEARCH

SEACOR conducted a search of the BC MWLAP Groundwater Well Database to determine the presence/absence of groundwater wells within a 1.5 km radius of the site. The results of the groundwater database search indicated a minimum of 247 groundwater wells within a 1.5 km radius of the Cassidy Highways Yard.

7.3 LAND TITLES

A copy of the most recent land title for the Cassidy Highways Yard is included in Appendix C for reference.

7.4 LEGAL LOT PLAN

A copy of the legal lot plan illustrating Lot 1, Section 14, Range 6, Cranberry District, Plan 40297 has been included in Appendix C for reference.

7.5 NOTIFICATION OF INDEPENDENT REMEDIATION

A copy of the notification of independent remediation submitted to BC MWLAP on October 5, 2001, as well the response letter dated October 16, 2001, has been included in Appendix D for reference.

8.0 PROTOCOL 5 DOCUMENTATION

SEACOR has summarized the site remediation results, as well as results from the previous works conducted, in the format outlined in Protocol 5 of the CSR. The Protocol 5 documentation has been provided in Appendix E.

9.0 DATA SYNTHESIS

SEACOR was retained by BCBC to conduct a supplemental investigative and subsequent environmental site remediation program at the Cassidy Highways Yard, located at 1329 Kipp Road in Cassidy, BC. The field activities were completed between April 23 and December 11, 2001.

The supplemental investigative program was conducted between April 23 and July 6, 2001. Seven areas on the site required additional investigation following review of the preliminary and detailed site investigation: salt sheds #1 and #2, storage area F, oil shed and grease ramp area, sandblasting area, floor drain effluent sediment sampling, potable water well, removal of burn pile and brine tank water sampling. Soil and/or groundwater samples were collected from each of the six areas, and submitted to ALS for chemical analyses. The results of the analyses indicated soils in the vicinity of the burn pile and near the outlet of a 200 mm PVC drain pipe exceeded the CSR *Commercial* standard for several metals parameters; the soil sample collected from the 200 mm PVC drain pipe area also exceeded the CSR *Commercial* standard for LEPH and HEPH. Groundwater samples collected from monitoring wells installed during the DSI indicated metals and chloride concentrations in excess of the CSR *Drinking Water* standards. A sample collected from a brine tank associated with salt shed #2 indicated sodium and chloride concentrations in excess of the CSR *Drinking Water* standards.

SEACOR, along with Quantum, conducted a remedial program at the Cassidy Highways Yard between October 10 and 23, 2001. Three USTs, one 5,000 L waste oil, one 9,100 L heating oil and one 22,730 L waste oil, were removed from the site. Approximately 60 m³ of hydrocarbon-impacted soils in excess of the CSR *Commercial* standards and 45 m³ of metals-impacted soils in excess of the TDG standards were excavated and transported off-site for disposal/treatment at licensed treatment facilities. Drums and pails located within salt shed #2, consisting of paint and paint-related products, and approximately 1000 L of water from a brine tank formerly associated with salt shed #2, were also removed off-site for disposal. Confirmatory soil samples collected from the UST excavation limits and sandblast materials excavation limits indicated hydrocarbon and metals concentrations below the CSR *Commercial* standards.

SEACOR, along with Drillwell, conducted a post-remediation groundwater assessment at the site on December 7, 2001. Three boreholes were advanced, one within each former UST location, and completed as groundwater monitoring wells. A groundwater monitoring and sampling event was conducted on December 11, 2001; one groundwater sample was collected from the well advanced within the former 22,730 L waste oil UST excavation. The results of the analyses indicated the groundwater sample exceeded the CSR *Drinking Water* standard for manganese.

10.0 CONCLUSIONS

All works described in this site remediation report have been completed in compliance with the Waste Management Act and the Contaminated Sites Regulation. Based on the site works completed, the site has been remediated to meet the CSR *Commercial* soil standards for LEPH/HEPH and total metals. Dissolved BETX/VPHw and LEPHw complied with the CSR *Drinking Water* standards, however, dissolved benzo(a)pyrene concentrations equaled the CSR *Drinking Water* standard and several dissolved metals parameters and dissolved chloride concentrations exceeded the CSR *Drinking Water* and/or the CSR *Aquatic Life* standard. Additionally, elevated chloride concentrations in the soil remain on-site and may require remediation.

11.0 CLOSURE

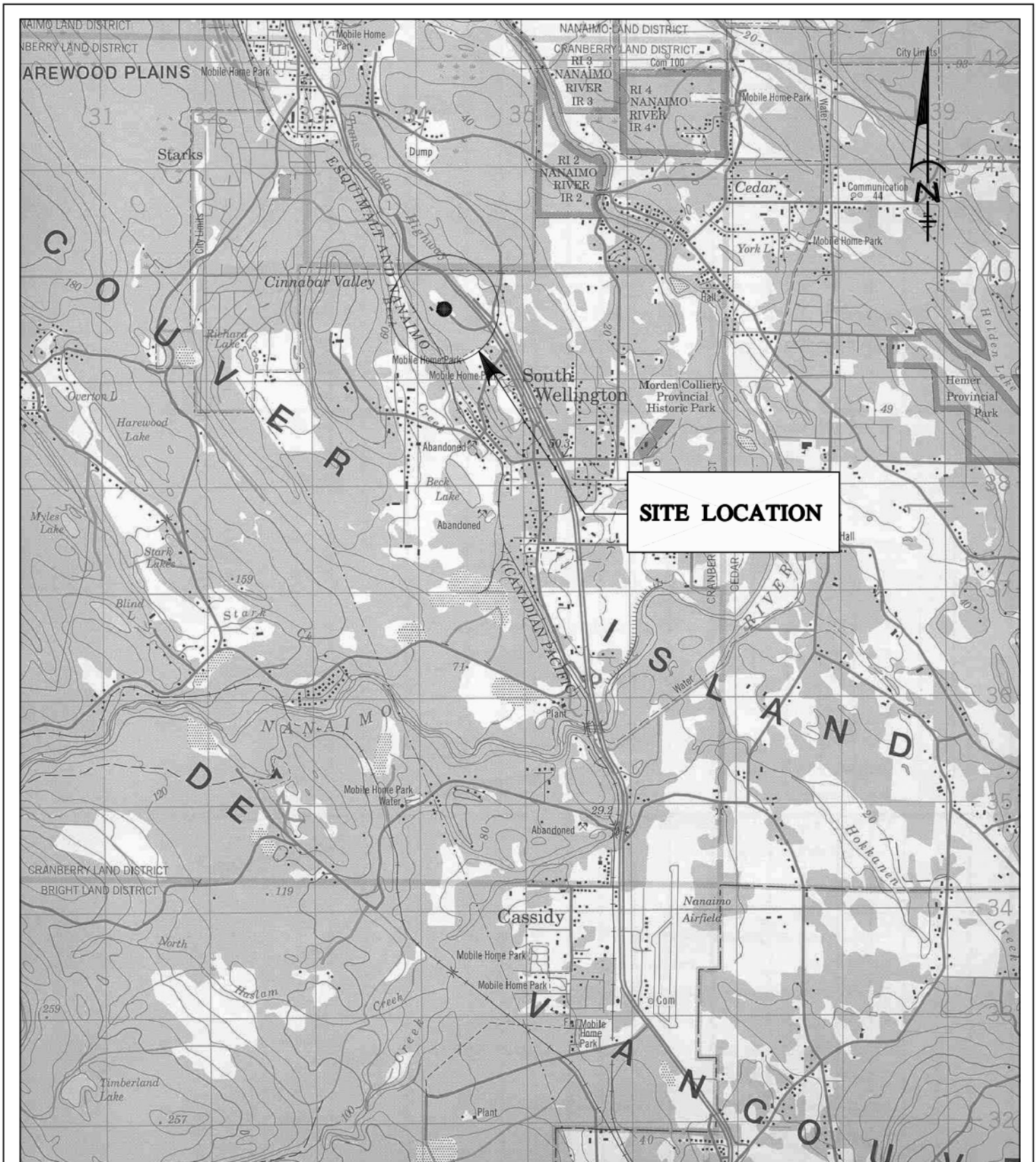
The assessment and conclusions in this document are based on the interpretation of data collected from the field investigation and the results of the laboratory analyses, which were limited to the quantification of common hydrocarbon indicators and metals in select samples. SEACOR expresses no warranty with respect to the accuracy of the laboratory analyses, methodologies used, or presentation of analytical results by the laboratory. Actual hydrocarbon and metal concentrations in the samples submitted may vary according to the extraction and testing procedures used. The evaluation and conclusions reported herein do not preclude the existence of other chemical compounds and/or that variations of conditions within the site may be possible. Hence, this document should be used for informational purposes only and should not be construed as a comprehensive hydrogeological or chemical characterization of the site. Revisions in the regulatory standards may be expected over time and thus SEACOR should be provided with the opportunity to review the conclusions of this document accordingly.

This document is for the exclusive use of the British Columbia Buildings Corporation and their authorized agents. The British Columbia Buildings Corporation may submit this document to the British Columbia Ministry of Water, Land and Air Protection and/or related British Columbia environmental regulatory authorities or persons for review and comment purposes providing that SEACOR receives a copy of all correspondence between the British Columbia Ministry of Water, Land and Air Protection and /or related British Columbia environmental regulatory authorities or persons and the British Columbia Buildings Corporation pertaining to the document or project in question. Third party use of this document or any reliance or decisions made on the information herein by those not in the direct employ of the British Columbia Buildings Corporation, their authorized agents or the British Columbia Water, Land and Air Protection and/or related British Columbia environmental regulatory authorities or persons is at the risk of the third party. SEACOR has no obligation, contractual or otherwise, to any third persons using or relying upon this document for any reason and therefore accepts no responsibility for damage suffered by any third party as a result of decisions made on the basis of information or conclusions in this document.

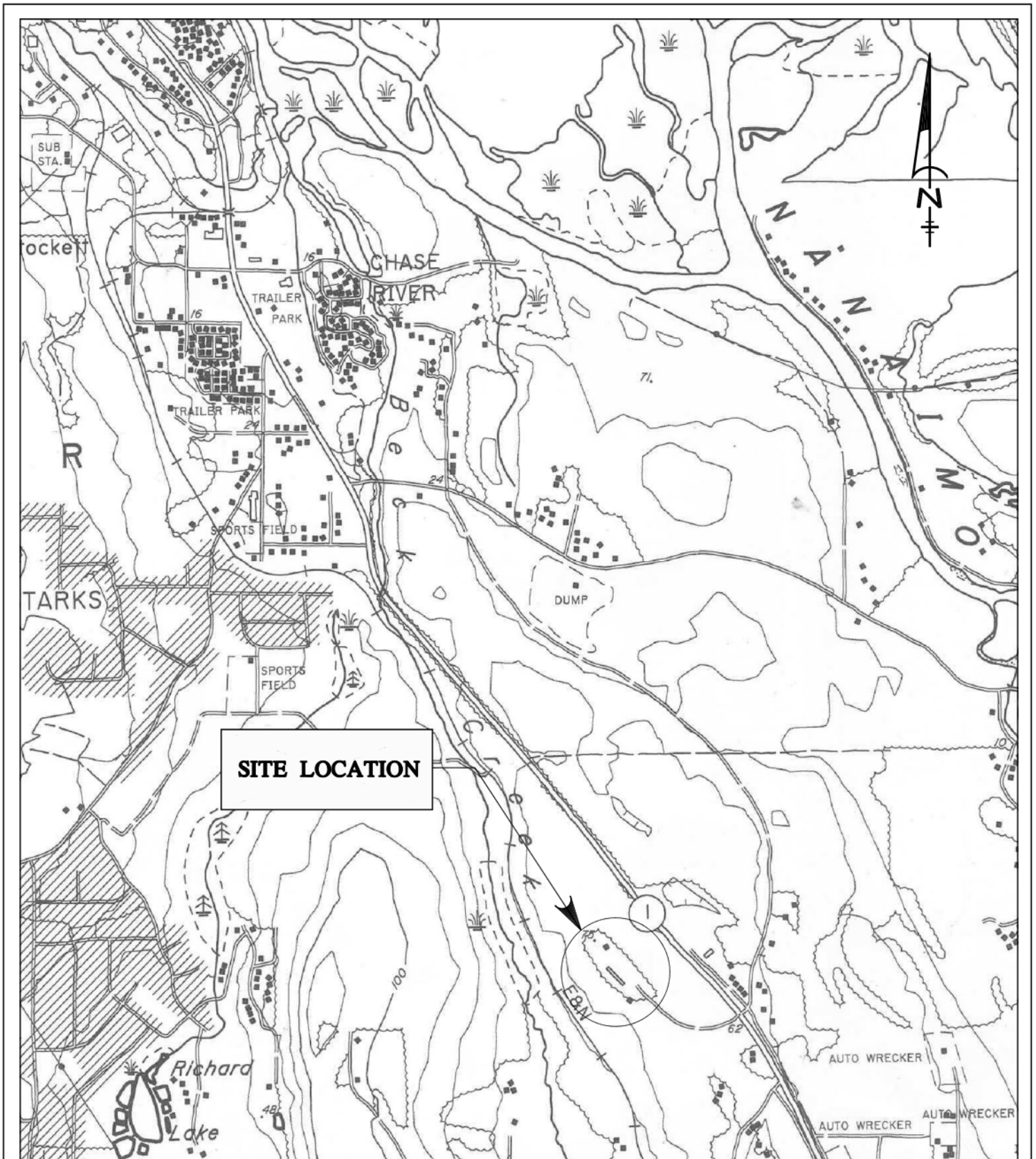
12.0 PROFESSIONAL STATEMENT

The "Site Remedial Program, Cassidy Highways Yard, 1329 Kipp Road, Cassidy, BC" report, dated April 22, 2002, prepared by SEACOR Environmental Inc. for the subject site, was prepared in accordance with all requirements in the Waste Management Act and the Contaminated Sites Regulation. The authors of the report, Mr. Brad Halsey, B.Sc. and Mr. Robert Chaisson, C.Tech., have over 15 years of combined experience in the assessment and remediation of similar sites and are familiar with the works carried out on the subject site.

C:\PROJECTS\BCBC\202.01221.003\202.01221.003 CASSIDYrem -rpt.doc



<p>REFERENCED FROM DEPT OF ENERGY MINES & RESOURCES MAPPING BRANCH NANAIMO 92 G/4</p>	<p>SEACOR ENVIRONMENTAL INC.</p>		<p>BRITISH COLUMBIA BUILDINGS CORPORATION CASSIDY HIGHWAYS YARD 1329 KIPP ROAD CASSIDY, B.C.</p>					
	<p>BC Buildings Corporation</p>		<p>SITE LOCATION MAP</p>					
SCALE 1:50,000	DATE 10/04/99	FILE NAME 202-01221-A1.DWG	MADE TMS	CHKD BEH	JOB NO. N0003-063 202-01221	FIG 1		



REF FROM:
BC MINISTRY OF
ENVIRONMENT, LANDS
& PARKS, SURVEYS
& RESOURCE
MAPPING BRANCH,
T.R.I.M. MAP

NANAIMO
92G.011

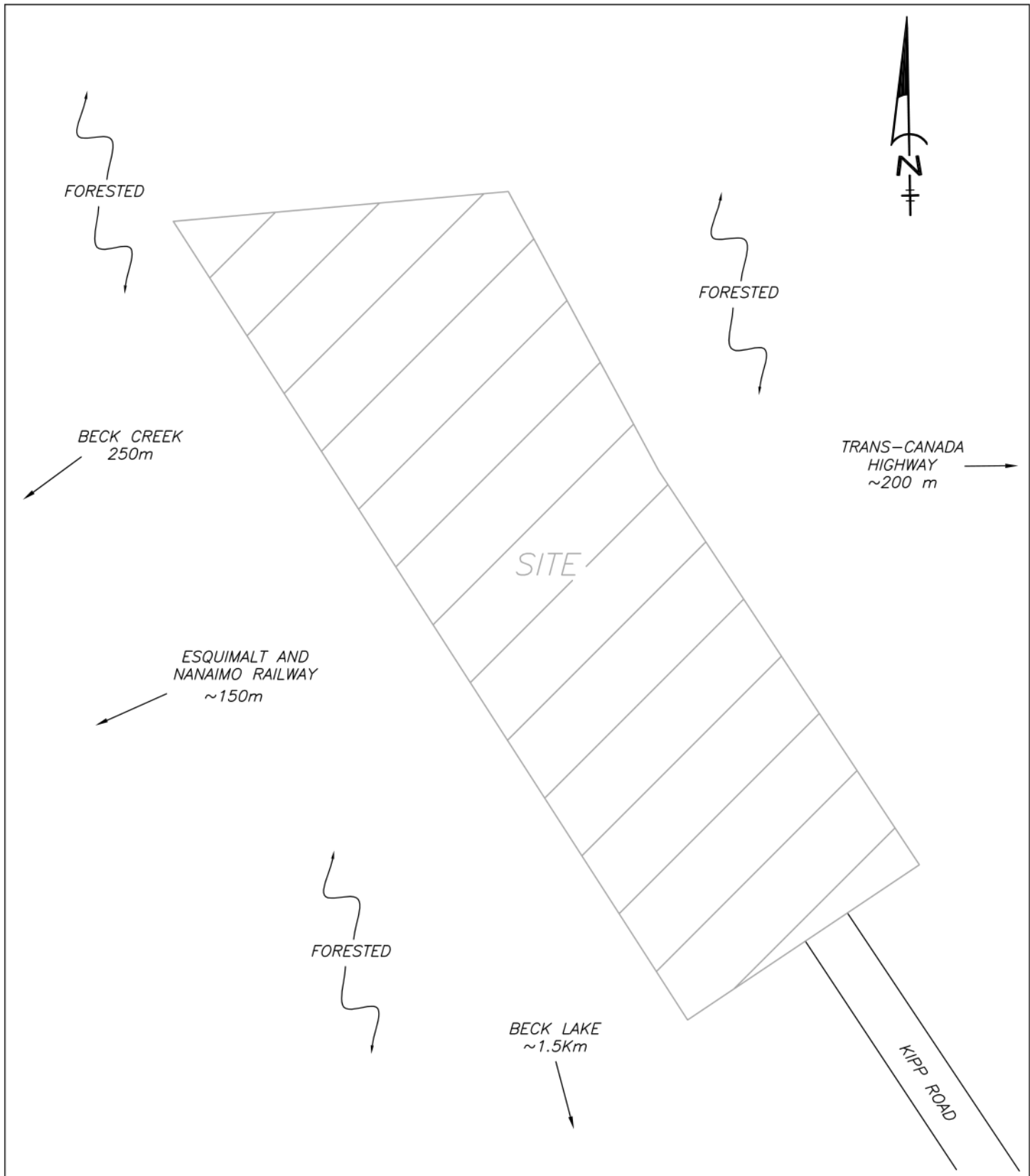
SEACOR
ENVIRONMENTAL INC.



BRITISH COLUMBIA BUILDINGS CORPORATION
CASSIDY HIGHWAYS YARD
1329 KIPP ROAD
CASSIDY, B.C.

TOPOGRAPHICAL MAP

SCALE 1:20,000	DATE 01/29/02	FILE NAME 202-01221-A8.DWG	MADE EK	CHKD BEH	JOB NO. N0003-063 202-01221	FIG 2
-------------------	------------------	-------------------------------	------------	-------------	--------------------------------	----------



THIS DRAWING IS
FOR CONCEPTUAL
PURPOSES ONLY.
ACTUAL LOCATIONS
MAY VARY AND NOT
ALL STRUCTURES
ARE SHOWN.

SEACOR
ENVIRONMENTAL INC.



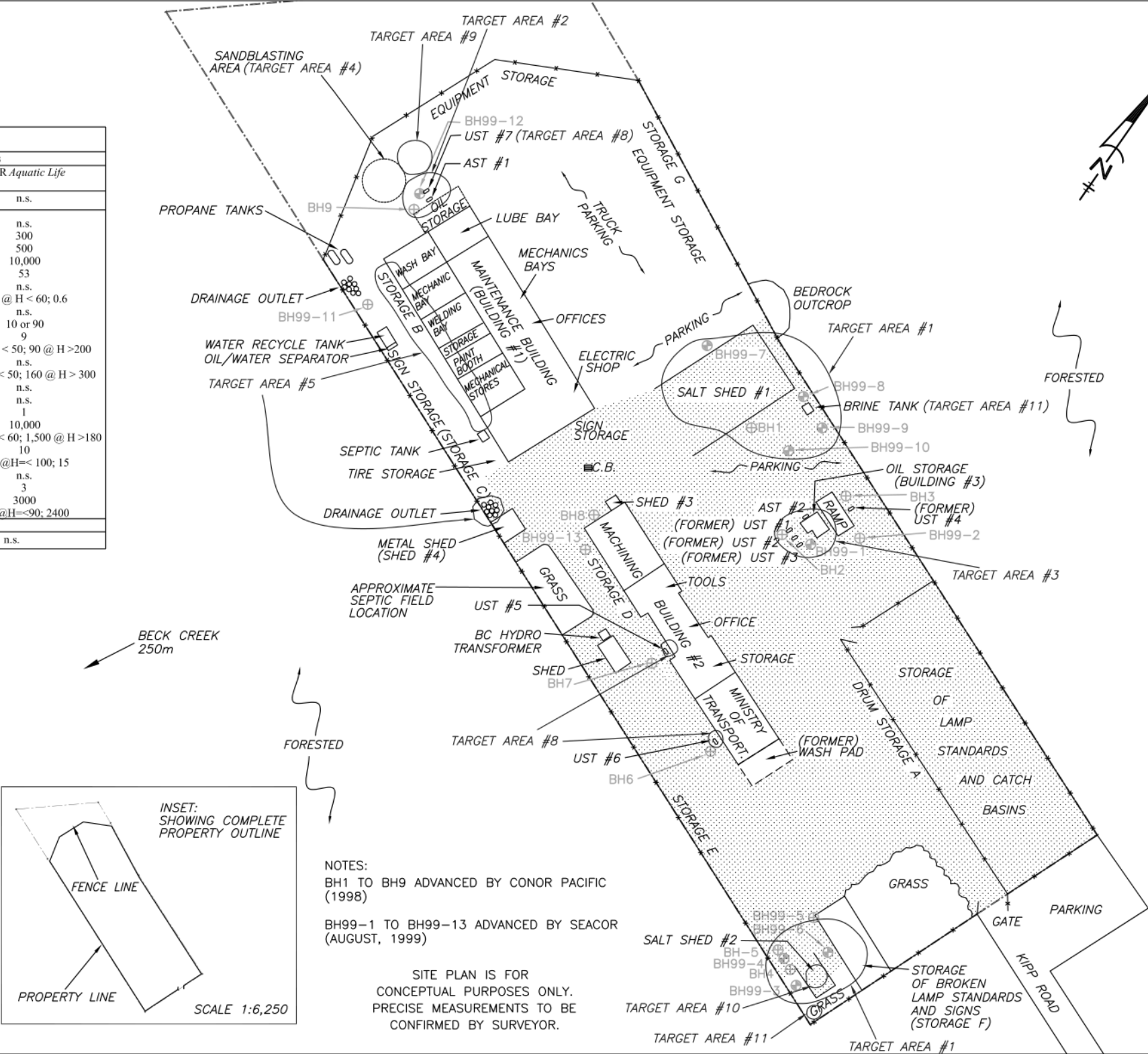
BRITISH COLUMBIA BUILDINGS CORPORATION
CASSIDY HIGHWAYS YARD
1329 KIPP ROAD
CASSIDY, B.C.

SURROUNDING LAND USE PLAN

SCALE NTS	DATE 09/07/99	FILE NAME 202-01221-A2.DWG	MADE TMS	CHKD BEH	JOB NO. 202.01221	FIG 3
--------------	------------------	-------------------------------	-------------	-------------	----------------------	----------

TARGET AREAS #1 and #3 - GROUNDWATER DISSOLVED METALS AND CHLORIDE CHEMISTRY (ppb) - April 24, 2001							
Parameter	Target Area #3	Target Area #1				BC Standards	
		BH99-1	BH99-3	BH99-4	BH99-7	CSR Drinking Water	CSR Aquatic Life
Hardness (mg/L)	1180	21	1720	609	7.4	n.s.	n.s.
Aluminum	80	4310*	100	80	95	200	n.s.
Antimony	<200	<200	<1000	<200	<200	6	300
Arsenic	<1	3	<1	2	<1	25	500
Barium	240	20	1960*	240	10	1000	10,000
Beryllium	<5	<5	<30	<5	<5	n.s.	53
Boron	<100	<100	<500	<100	<100	5000	n.s.
Cadmium	<2	<2	<2	<2	<2	5	0.1 @ H < 60; 0.6
Calcium	316,000	6,930	524,000	162,000	1,940	n.s.	n.s.
Chromium	<10	<10	<50	<10	<10	50	10 or 90
Cobalt	<10	<10	<50	20**	<10	n.s.	9
Copper	<10	10	<50	<10	<10	1000	20 @ H < 50; 90 @ H > 200
Iron	60	460*	<200	50	410*	300	n.s.
Lead	<10	<10	<10	20*	<10	10	40 @ H < 50; 160 @ H > 300
Magnesium	95.1	0.9	101*	49.5	0.6	100 ²	n.s.
Manganese	586*	158*	1960*	5790*	12	50	n.s.
Mercury	<0.05	<0.05	<0.05	<0.05	<0.05	1	1
Molybdenum	<30	<30	<200	<30	<30	250	10,000
Nickel	<50	<50	<300	<50	<5	n.s.	250 @ H < 60; 1,500 @ H > 180
Selenium	<10	<10	<10	<10	<10	10	10
Silver	<1	<1	<1	<1	<1	n.s.	0.5 @ H < 100; 15
Sodium	452*	90	4030*	373*	45	200 ²	n.s.
Thallium	1	<1	<1	2	1	n.s.	3
Uranium	3.4	6.2	2	1.2	<0.1	100	3000
Zinc	384	62	610	235	82**	5000	75 @ H < 90; 2400
Dissolved Anions							
Chloride	-	9.7	10300*	834*	31.3	250 ¹	n.s.

TARGET AREA #3: GROUNDWATER HYDROCARBON CHEMISTRY (ppb) - April 24, 2001			
Parameters	BH99-1	BC Standards	
		CSR Drinking Water	CSR Aquatic Life
Benzene	<0.5	5	4000
Ethylbenzene	<0.5	2.4	2000
Toluene	<0.5	24	390
Xylenes	<1.0	3000	n.s.
VHw	<100	n.s.	15000
VPHw	<100	n.s.	1500
EPH (C ₁₀₋₁₉)	<300	n.s.	500*
EPH (C ₁₀₋₃₂)	<1000	n.s.	n.s.
LEPHw	<300	n.s.	500
HEPH	<1000	n.s.	n.s.
Polycyclic Aromatic Hydrocarbons			
Acenaphthene	<0.05	n.s.	60
Acenaphthylene	<0.05	n.s.	n.s.
Acridine	<0.05	n.s.	0.5
Anthracene	<0.05	n.s.	1
Benz(a)anthracene	<0.05	n.s.	1
Benzo(a)pyrene	0.01*	0.01	0.1
Benzo(b)fluoranthene	<0.05	n.s.	n.s.
Benzo(g,h,i)perylene	<0.05	n.s.	n.s.
Benzo(k)fluoranthene	<0.05	n.s.	n.s.
Chrysene	<0.05	n.s.	1
Dibenz(a,h)anthracene	<0.05	n.s.	n.s.
Fluoranthene	<0.05	n.s.	2
Fluorene	<0.05	n.s.	120
Indeno(1,2,3-c,d)pyrene	<0.05	n.s.	n.s.
Naphthalene	<0.05	n.s.	10
Phenanthrene	<0.05	n.s.	3
Pyrene	<0.05	n.s.	0.2



LEGEND

- APPROXIMATE SITE BOUNDARY
- FENCE
- STORAGE TANK
- FORMER STORAGE TANK
- FORMER STRUCTURE
- ⊕ BOREHOLE COMPLETED AS A MONITORING WELL
- ⊕ BOREHOLE
- STOCKPILE OR STORAGE BOUNDARY
- ▨ PAVED AREA
- AST ABOVE GROUND STORAGE TANK
- UST UNDERGROUND STORAGE TANK
- C.B. CATCH BASIN

CSR - Contaminated Sites Regulation
CSR Drinking Water - CSR Drinking Water standards
CSR Aquatic Life - CSR Aquatic Life standards
n.s. - no standard listed
mg/L - milligrams per litre
ppb - parts per billion
< - less than analytical detection limit
1 - indicates concentration expressed as milligrams per litre
* - indicates concentration equal to or in excess of the CSR Drinking Water standards
** - indicates concentration in excess of the CSR Aquatic Life standards

SCALE 1:1250 (APPROX.)

0 25 50 75 m

2				
1				
REV.	DESCRIPTION	DATE	MADE	CHK

SEACOR
ENVIRONMENTAL INC.

BC Buildings Corporation

BRITISH COLUMBIA BUILDINGS CORPORATION
CASSIDY HIGHWAYS YARD
1329 KIPP ROAD
CASSIDY, B.C.

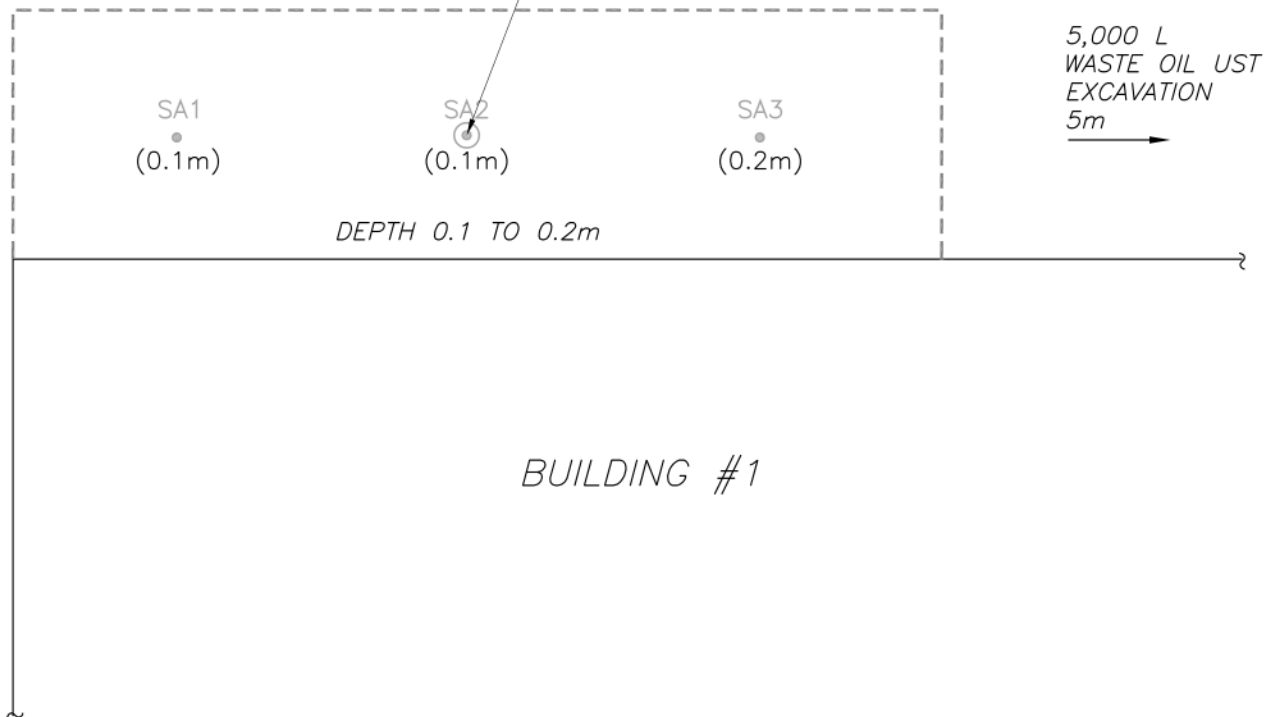
**TARGET AREAS 1 AND 3
GROUNDWATER CHEMISTRY –
APRIL 24, 2001**

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

SCALE 1:1250	DATE 04/19/02	FILE NAME 202-01221-A18.DWG
MADE MAT/DK/EK	CHKD BH	JOB NO. N0003-063
		FIG 202.01221
		7



SA2-OCTOBER 10, 2001	
PARAMETER	CONC.
METALS	<RL ¹



LEGEND

----- LIMITS OF EXCAVATION

• SOIL SAMPLE LOCATION

⊙ CONFIRMATORY SOIL SAMPLE
SUBMITTED FOR ANALYSIS

(0.1m) SAMPLE DEPTH IN METRES

CONC. CONCENTRATION
RL BC CSR RESIDENTIAL LAND STANDARDS
¹ REFER TO BC CSR FOR SPECIFIC METALS PARAMETER

THIS DRAWING IS
FOR CONCEPTUAL
PURPOSES ONLY.
ACTUAL LOCATIONS
MAY VARY AND NOT
ALL STRUCTURES
ARE SHOWN.

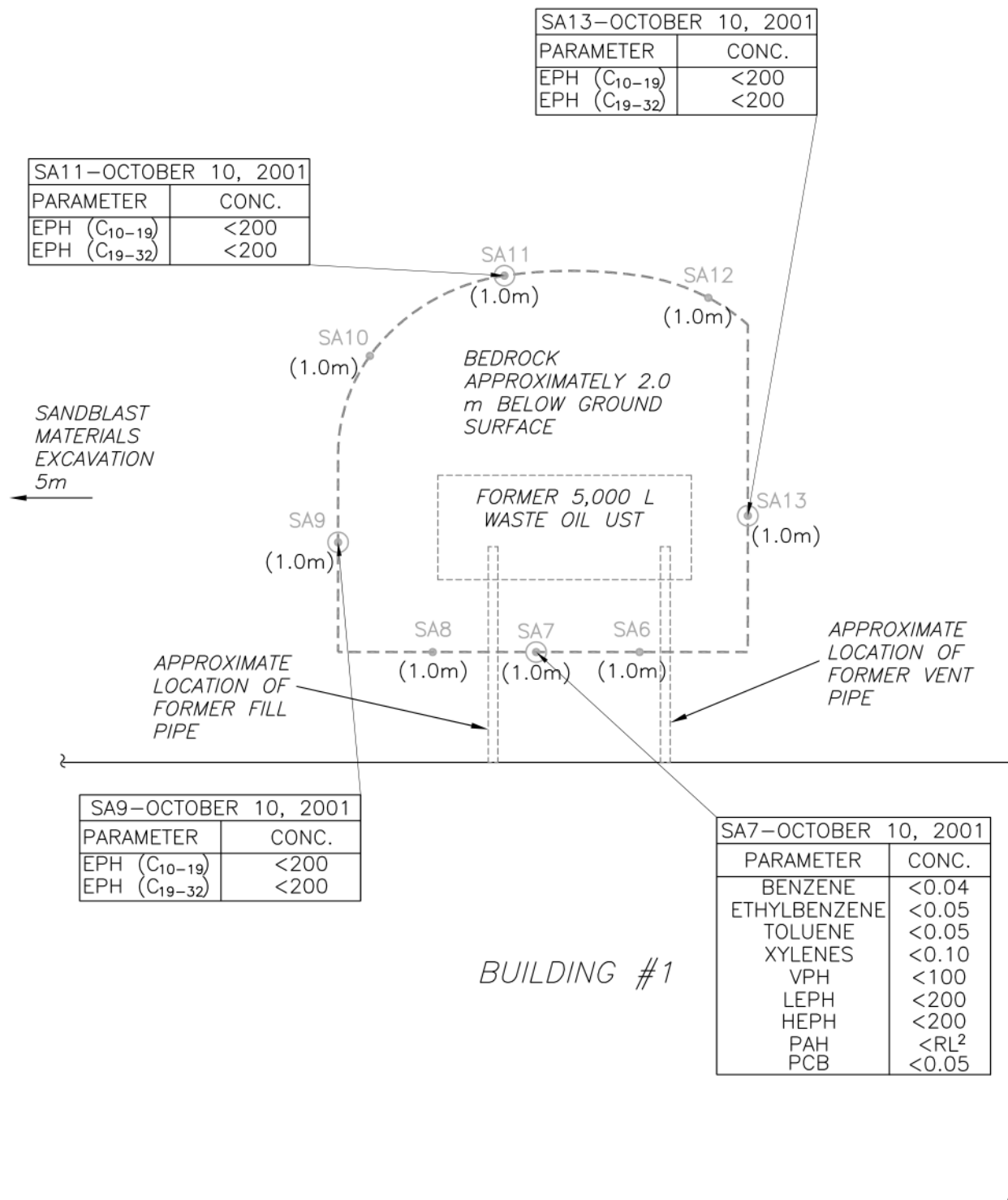
SEACOR
ENVIRONMENTAL INC.



BRITISH COLUMBIA BUILDINGS CORPORATION
CASSIDY HIGHWAYS YARD
1329 KIPP ROAD, CASSIDY, B.C.

CONFIRMATORY SOIL SAMPLE LOCATIONS
SANDBLAST MATERIALS EXCAVATION

SCALE 1:100	DATE 04/19/02	FILE NAME 202-01221-A10.DWG	MADE EK	CHKD BEH	JOB NO. 202.01221	FIG 8
----------------	------------------	--------------------------------	------------	-------------	----------------------	----------



LEGEND

- LIMITS OF EXCAVATION
- SOIL SAMPLE LOCATION
- ⊙ CONFIRMATORY SOIL SAMPLE SUBMITTED FOR ANALYSIS
- (1.0m) SAMPLE DEPTH IN METRES

STANDARDS (ppm)		
PARAMETER	CSR RL	CSR CL
BENZENE	0.04	0.04
ETHYLBENZENE	1	7
TOLUENE	1.5	2.5
XYLENES	5	20
VPH	200	200
EPH (C ₁₀₋₁₉)	1000 ¹	2000 ¹
EPH (C ₁₉₋₃₂)	1000 ¹	5000 ¹
LEPH	1000 ¹	2000
HEPH	1000 ¹	5000
PAH	2	2
PCB	5	15
CHROMIUM	60	60
REMAINING METALS	2	2

CSR CONTAMINATED SITES REGULATION
RL BC ENVIRONMENT CSR
CL RESIDENTIAL LAND STANDARDS
BC ENVIRONMENT CSR
COMMERCIAL LAND STANDARDS
CONC. CONCENTRATION
ppm PARTS PER MILLION
VPH VOLATILE PETROLEUM HYDROCARBONS
EPH EXTRACTABLE PETROLEUM HYDROCARBONS
LEPH LIGHT EXTRACTABLE PETROLEUM HYDROCARBONS
HEPH HEPH
PAH POLYCYCLIC AROMATIC HYDROCARBONS
PCB POLYCHLORINATED BIPHENYLS
¹ INDICATES COMPARABLE LEPH/HEPH STANDARDS;
EPH IS NOT A REGULATED PARAMETER
REFER TO BC CSR FOR SPECIFIC
² PAH/METALS STANDARD

1				
REV.	DESCRIPTION	DATE	MADE	CHKD
SEACOR ENVIRONMENTAL INC.				
BC Buildings Corporation				
BRITISH COLUMBIA BUILDINGS CORPORATION CASSIDY HIGHWAYS YARD 1329 KIPP ROAD CASSIDY, B.C.				
CONFIRMATORY SOIL SAMPLE LOCATIONS 5,000 L WASTE OIL UST EXCAVATION				
THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.				
SCALE 1:100	DATE 04/19/02	FILE NAME 202-01221-A11.DWG		
MADE MAT/DK	CHKD BH	JOB NO. 202.01221	N0003-063	FIG 9



SA19-OCTOBER 11, 2001	
PARAMETER	CONC.
EPH (C10-19)	<200
EPH (C19-32)	<200

SA14-OCTOBER 11, 2001	
PARAMETER	CONC.
EPH (C10-19)	<200
EPH (C19-32)	<200

SA17-OCTOBER 11, 2001	
PARAMETER	CONC.
EPH (C10-19)	<200
EPH (C19-32)	<200

SA25-OCTOBER 11, 2001	
PARAMETER	CONC.
EPH (C10-19)	<200
EPH (C19-32)	<200

SA21-OCTOBER 11, 2001	
PARAMETER	CONC.
EPH (C10-19)	<200
EPH (C19-32)	<200

SA16-OCTOBER 11, 2001	
PARAMETER	CONC.
EPH (C10-19)	<200
EPH (C19-32)	<200

SCALE 1:50 (APPROX.)



LEGEND

----- LIMITS OF EXCAVATION



SOIL SAMPLE LOCATION



CONFIRMATORY SOIL SAMPLE
SUBMITTED FOR ANALYSIS

(1.0m)

SAMPLE DEPTH IN METRES

CSR
RL
CL
CONC.
ppm
EPH
1

CONTAMINATED SITES REGULATION
BC CSR RESIDENTIAL LAND STANDARDS
BC CSR COMMERCIAL LAND STANDARDS
CONCENTRATION
PARTS PER MILLION
EXTRACTABLE PETROLEUM HYDROCARBONS
INDICATES COMPARABLE LEPH/HEPH STANDARDS;
EPH IS NOT A REGULATED PARAMETER

STANDARDS (ppm)		
PARAMETER	CSR RL	CSR CL
EPH (C10-19)	1000 ¹	2000 ¹
EPH (C19-32)	1000 ¹	5000 ¹

THIS DRAWING IS
FOR CONCEPTUAL
PURPOSES ONLY.
ACTUAL LOCATIONS
MAY VARY AND NOT
ALL STRUCTURES
ARE SHOWN.

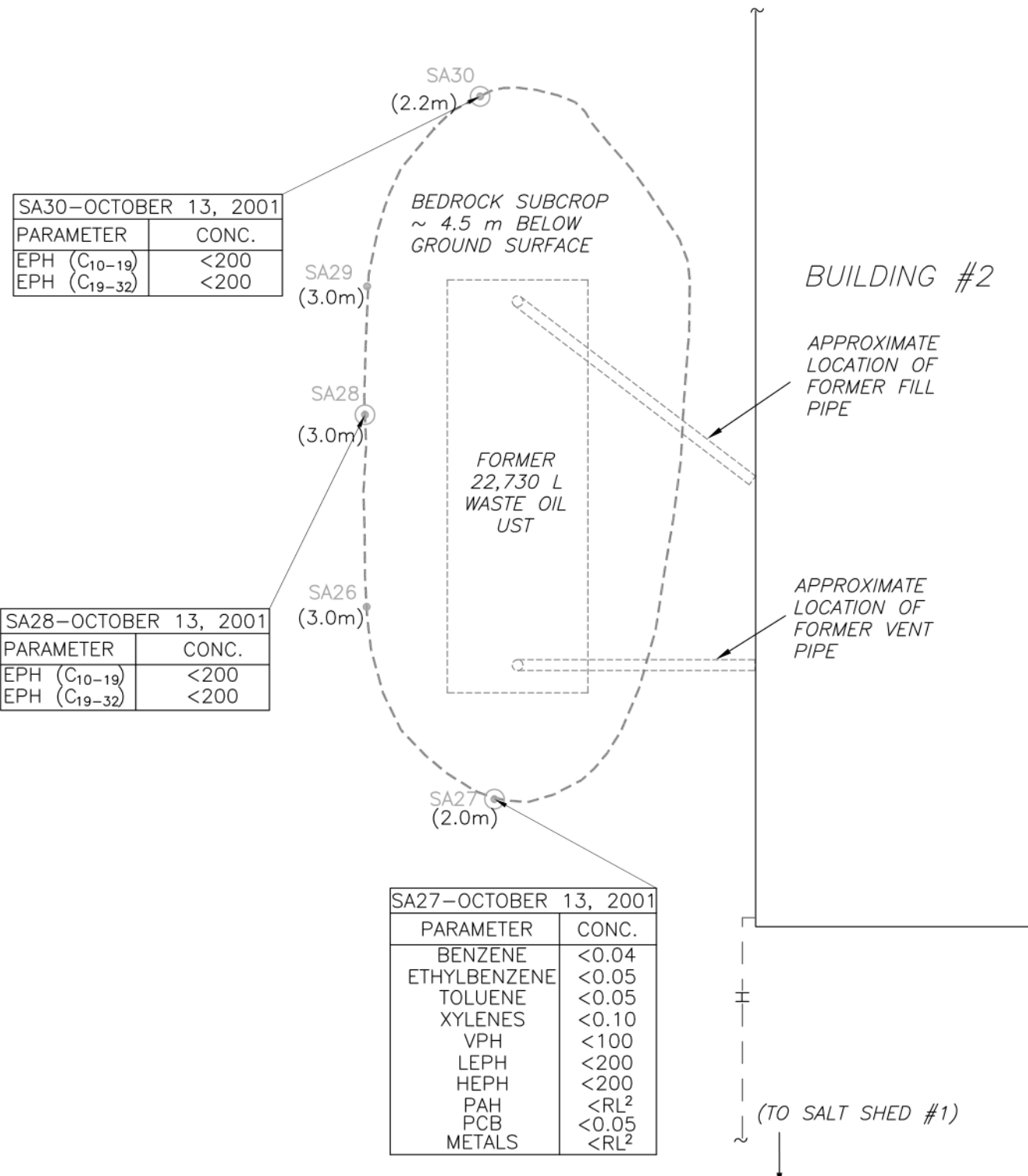
SEACOR
ENVIRONMENTAL INC.



BRITISH COLUMBIA BUILDINGS CORPORATION
CASSIDY HIGHWAYS YARD
1329 KIPP ROAD, CASSIDY, B.C.

CONFIRMATORY SOIL SAMPLE LOCATIONS
9,100 L HEATING OIL UST EXCAVATION

SCALE	DATE	FILE NAME	MADE	CHKD	JOB NO.	FIG
1:50	04/18/02	202-01221-A12.DWG	EK	BEH	202.01221	10



LEGEND

LIMITS OF EXCAVATION

•

SOIL SAMPLE LOCATION

⊙

CONFIRMATORY SOIL SAMPLE
SUBMITTED FOR ANALYSIS

(3.0m)

SAMPLE DEPTH IN METRES

- H -

HYDRO LINE (SUBSURFACE)

STANDARDS (ppm)

PARAMETER	CSR RL	CSR CL
BENZENE	0.04	0.04
ETHYLBENZENE	1	7
TOLUENE	1.5	2.5
XYLENES	5	20
VPH	200	200
EPH (C ₁₀₋₁₉)	1000 ¹	2000 ¹
EPH (C ₁₉₋₃₂)	1000 ¹	5000 ¹
LEPH	1000 ¹	2000
HEPH	1000 ¹	5000
PAH	2	2
PCB	5	15
CHROMIUM	60	60
REMAINING METALS	2	2

CSR

CONTAMINATED SITES REGULATION

RL

BC ENVIRONMENT CSR

CL

RESIDENTIAL LAND STANDARDS

BC ENVIRONMENT CSR

COMMERCIAL LAND STANDARDS

CONC.

CONCENTRATION

ppm

PARTS PER MILLION

VPH

VOLATILE PETROLEUM HYDROCARBONS

EPH

EXTRACTABLE PETROLEUM HYDROCARBONS

LEPH

LIGHT EXTRACTABLE PETROLEUM HYDROCARBONS

HEPH

HEAVY EXTRACTABLE PETROLEUM HYDROCARBONS

PAH

POLYCYCLIC AROMATIC HYDROCARBONS

PCB

POLYCHLORINATED BIPHENYLS

1

INDICATES COMPARABLE LEPH/HEPH STANDARDS;

EPH IS NOT A REGULATED PARAMETER

REFER TO BC CSR FOR SPECIFIC

2

PAH/METALS STANDARD

SEACOR

ENVIRONMENTAL INC.

BC Buildings Corporation

BRITISH COLUMBIA BUILDINGS CORPORATION

CASSIDY HIGHWAYS YARD

1329 KIPP ROAD

CASSIDY, B.C.

CONFIRMATORY

SOIL SAMPLE LOCATIONS

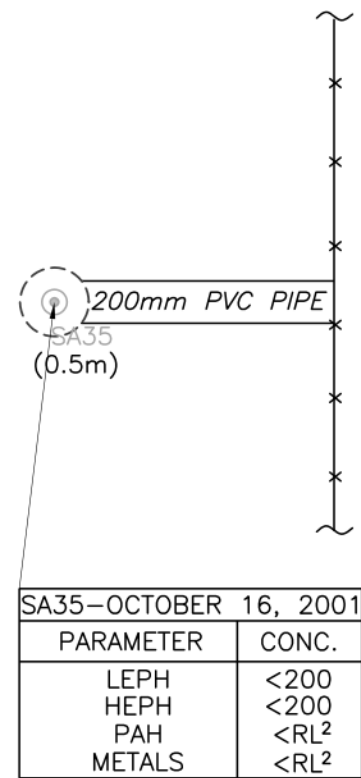
22,730 L WASTE OIL UST EXCAVATION

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY.

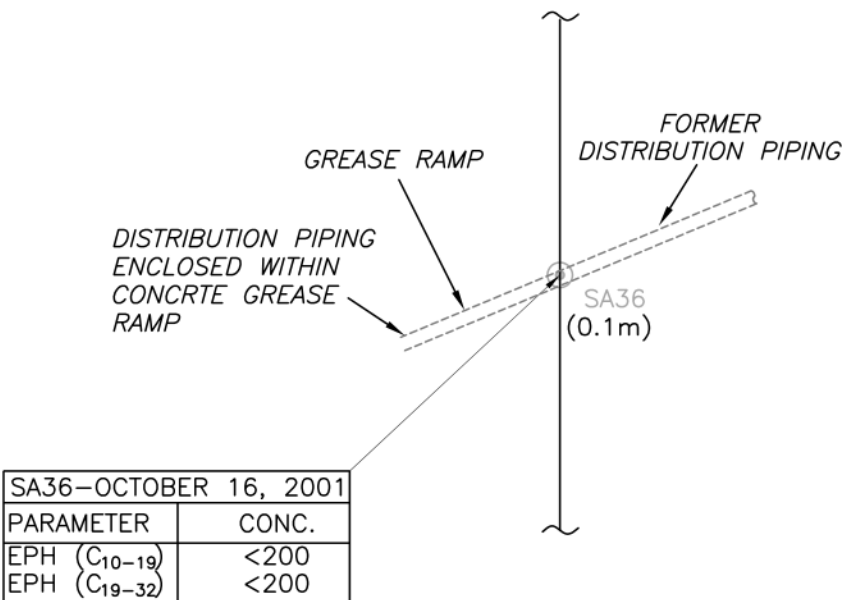
ACTUAL LOCATIONS MAY VARY AND NOT ALL

STRUCTURES ARE SHOWN.

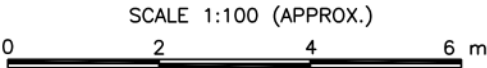
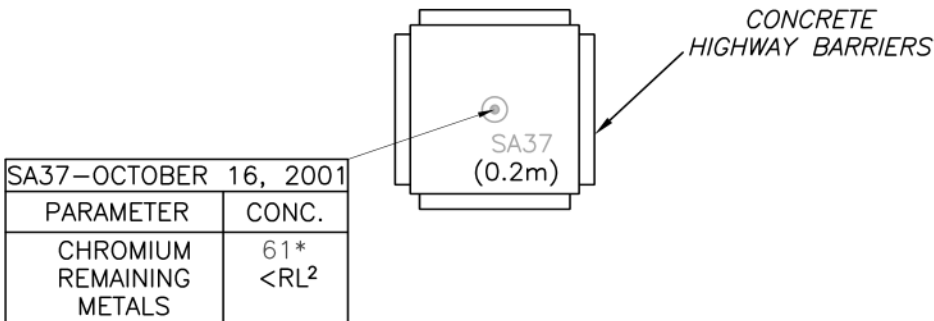
TARGET AREA #5 EXCAVATION – OCTOBER 16, 2001



GREASE RAMP – OCTOBER 16, 2001



BURN PILE NEAR SALT SHED #1 – OCTOBER 16, 2001



LEGEND

- LIMITS OF EXCAVATION
- SOIL SAMPLE LOCATION
- ⊙ CONFIRMATORY SOIL SAMPLE SUBMITTED FOR ANALYSIS
- (0.5m) SAMPLE DEPTH IN METRES
- X- X- X- FENCE

STANDARDS (ppm)		
PARAMETER	CSR RL	CSR CL
EPH (C ₁₀₋₁₉)	1000 ¹	2000 ¹
EPH (C ₁₉₋₃₂)	1000 ¹	5000 ¹
LEPH	1000 ¹	2000
HEPH	1000 ¹	5000
PAH	2	2
CHROMIUM	60	60
REMAINING METALS	2	2

CSR CONTAMINATED SITES REGULATION
RL BC CSR RESIDENTIAL LAND STANDARDS
CL BC CSR COMMERCIAL LAND STANDARDS
CONC. CONCENTRATION
ppm PARTS PER MILLION
EPH EXTRACTABLE PETROLEUM HYDROCARBONS
LEPH LIGHT EXTRACTABLE PETROLEUM HYDROCARBONS
HEPH POLYCYCLIC AROMATIC HYDROCARBONS
SWEP SPECIAL WASTE EXTRACTION PROCEDURE
INDICATES COMPARABLE LEPH/HEPH STANDARDS;
EPH IS NOT A REGULATED PARAMETER
REFER TO BC CSR FOR SPECIFIC
PAH/METALS STANDARD
* INDICATES CONCENTRATION EXCEEDS RL STANDARDS

1				
REV.	DESCRIPTION	DATE	MADE	CHKD

SEACORTM
ENVIRONMENTAL INC.



BRITISH COLUMBIA BUILDINGS CORPORATION
CASSIDY HIGHWAYS YARD
1329 KIPP ROAD
CASSIDY, B.C.

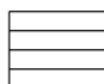
TARGET AREA 5, GREASE RAMP
AND BURN PILE
SOIL SAMPLING LOCATIONS

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY.
ACTUAL LOCATIONS MAY VARY AND NOT ALL
STRUCTURES ARE SHOWN.

SCALE 1:100	DATE 04/19/02	FILE NAME 202-01221-A20.DWG
MADE DK	CHKD BH	JOB NO. N0003-063 202.01221
		FIG 12

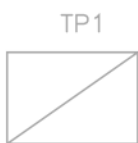
22,730 L
WASTE OIL
UST
EXCAVATION

BUILDING #2



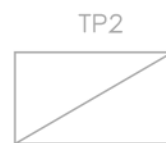
C.B.

WASHDOWN PAD



TP1

TP1-SA2 @ 1.5m OCTOBER 16, 2001	
PARAMETER	CONC.
EPH (C ₁₀₋₁₉)	<200
EPH (C ₁₉₋₃₂)	<200
METALS	<RL ²



TP2

(TO SALT SHED #1)

STANDARDS (ppm)		
PARAMETER	CSR RL	CSR CL
EPH (C ₁₀₋₁₉)	1000 ¹	2000 ¹
EPH (C ₁₉₋₃₂)	1000 ¹	5000 ¹
METALS	2	2

LEGEND



TEST PIT LOCATION



CATCH BASIN

(1.5m)

SAMPLE DEPTH IN METRES



HYDRO LINE (SUBSURFACE)

CSR CONTAMINATED SITES REGULATION
RL BC CSR RESIDENTIAL LAND STANDARDS
CL BC CSR COMMERCIAL LAND STANDARDS
CONC. CONCENTRATION
ppm PARTS PER MILLION
EPH EXTRACTABLE PETROLEUM HYDROCARBONS
¹ INDICATES COMPARABLE LEPH/HEPH STANDARDS;
² EPH IS NOT A REGULATED PARAMETER
REFER TO BC CSR FOR SPECIFIC
PAH/METALS STANDARD

SCALE 1:100 (APPROX.)

0 2 4 6 m

THIS DRAWING IS
FOR CONCEPTUAL
PURPOSES ONLY.
ACTUAL LOCATIONS
MAY VARY AND NOT
ALL STRUCTURES
ARE SHOWN.

SEACOR
ENVIRONMENTAL INC.



BRITISH COLUMBIA BUILDINGS CORPORATION
CASSIDY HIGHWAYS YARD
1329 KIPP ROAD, CASSIDY, B.C.

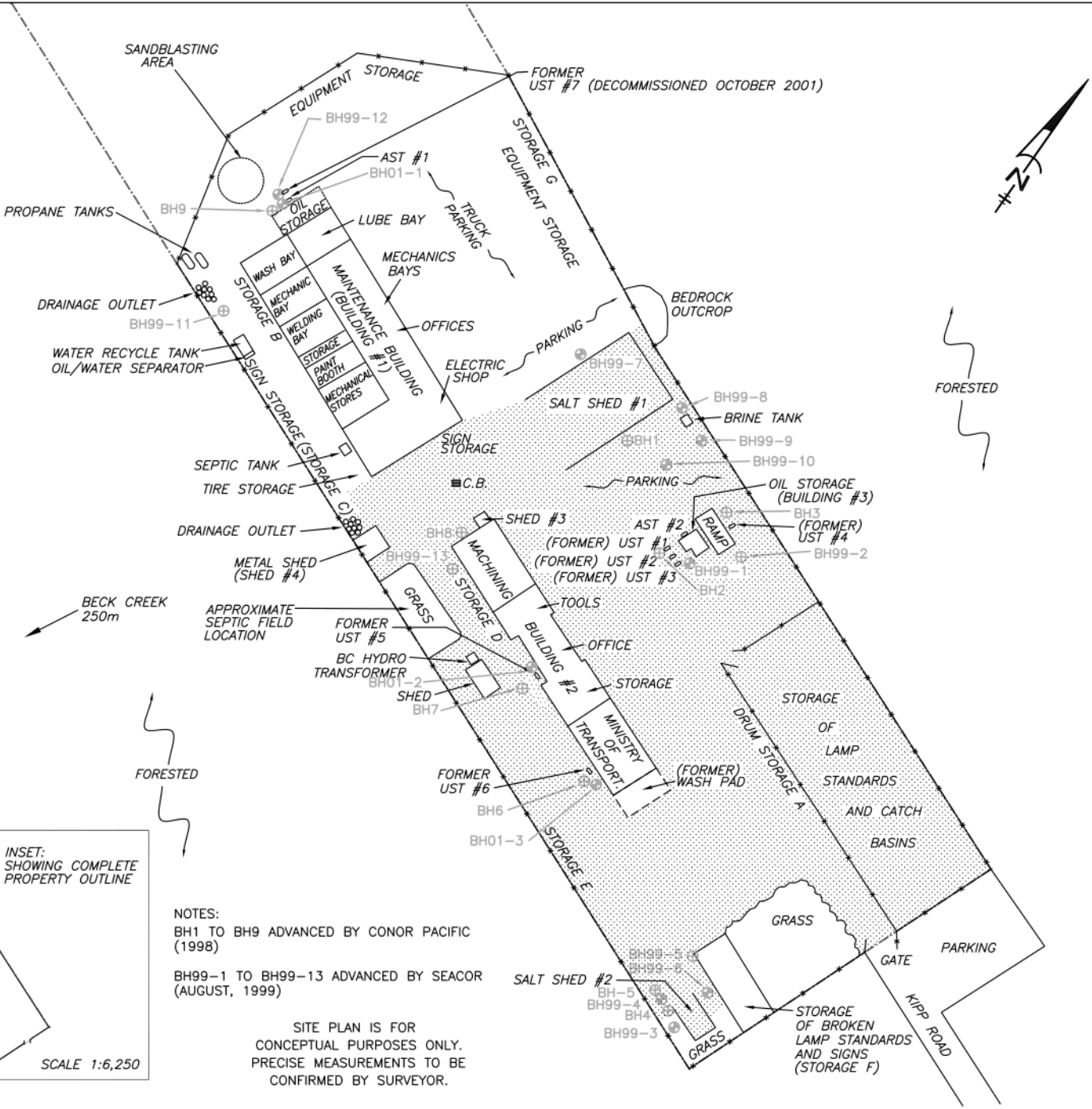
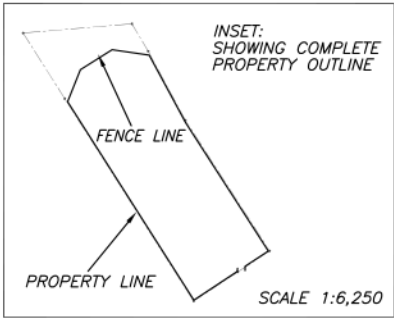
TEST PIT LOCATION PLAN

SCALE	DATE	FILE NAME	MADE	CHKD	JOB NO.	FIG
1:100	04/19/02	202-01221-A15.DWG	EK	BEH	202.01221	13

SOIL METALS CHEMISTRY - POST REMEDIATION INVESTIGATION (PPM) - DECEMBER 7, 2001					
Parameter	BH01-1 SA2	BH01-2 SA3	BH01-3 SA3	BC Standards	
				CSR Residential	CSR Commercial
pH	7.14	7.58	7.65	n.s.	n.s.
Antimony	<10	<10	<10	20	40
Arsenic	<5	<5	6	15	15
Barium	67	41	67	500	2000
Beryllium	<0.5	<0.5	<0.5	4	8
Cadmium	<0.5	<0.5	<0.5	2.5 @pH7.0-<7.5, 25 @pH7.5-<8.0	2.5 @pH7.0-<7.5, 25 @pH7.5-<8.0
Chromium	25	19	28	60	60
Cobalt	8	8	10	50	300
Copper	82	42	63	150	250
Lead	<50	<50	<50	300	1000
Mercury	<0.05	<0.05	<0.05	15	40
Molybdenum	<4	<4	<4	10	40
Nickel	19	16	21	100	500
Selenium	<4	<3	<5	3	10
Tin	<2	<2	<2	20	40
Silver	<5	<5	<5	50	300
Vanadium	60	64	72	200	n.s.
Zinc	72	31	44	450	600

POST-REMEDIATION INVESTIGATION - DISSOLVED METALS AND CHLORIDE CHEMISTRY (PPB) - DECEMBER 11, 2001			
Parameter	BH01-3	BC STANDARDS	
		CSR Drinking water	CSR Aquatic life
Hardness (mg/L)	83.9	n.s.	n.s.
Aluminum	40	200	n.s.
Antimony	<10	6	300
Arsenic	<1	25	500
Barium	80	1000	10,000
Beryllium	<5	n.s.	53
Boron	<100	5000	n.s.
Cadmium	<0.2	5	0.3
Calcium	26400	n.s.	9
Chromium	<10	50	10
Cobalt	<10	n.s.	40
Copper	5	1000	40
Iron	<30	300	n.s.
Lead	<1	10	50
Magnesium ²	4400	100 ²	n.s.
Manganese	320*	50	n.s.
Mercury	<0.2	1	1
Molybdenum	<1	250	10,000
Nickel	<50	n.s.	1100
Selenium	<1	10	10
Silver	<0.1	n.s.	0.5
Sodium ²	48	200 ²	n.s.
Thallium	<0.2	n.s.	3
Uranium	<0.2	100	3000
Vanadium	<30	n.s.	10
Zinc	<50	5000	75
Dissolved Anions			
Chloride ²	34.6	250 ²	n.s.

POST-REMEDIATION INVESTIGATION - GROUNDWATER HYDROCARBON CHEMISTRY (PPB) DECEMBER 11, 2001			
Parameters	BH01-3	BC STANDARDS	
		CSR Drinking water	CSR Aquatic life
Benzene	<0.5	5	4000
Ethylbenzene	<0.5	2.4	2000
Toluene	<0.5	24	390
Xylenes	<1.0	3000	n.s.
VHw	<100	n.s.	15000
VPHw	<100	n.s.	1500
Extractables			
EPH (C ₁₀₋₁₉)	<300	n.s.	500 ¹
EPH (C ₁₉₋₃₂)	<1000	n.s.	n.s.
LEPHw	<300	n.s.	500
HEPH	<1000	n.s.	n.s.
Polycyclic Aromatic Hydrocarbons			
Acenaphthene	<0.05	n.s.	60
Acenaphthylene	<0.05	n.s.	n.s.
Acridine	<0.05	n.s.	0.5
Anthracene	<0.05	n.s.	1
Benz(a)anthracene	<0.05	n.s.	1
Benzo(a)pyrene	<0.01	0.01	0.1
Benzo(b)fluoranthene	<0.05	n.s.	n.s.
Benzo(g,h,i)perylene	<0.05	n.s.	n.s.
Benzo(k)fluoranthene	<0.05	n.s.	n.s.
Chrysene	<0.05	n.s.	1
Dibenz(a,h)anthracene	<0.05	n.s.	n.s.
Fluoranthene	<0.05	n.s.	2
Fluorene	<0.05	n.s.	120
Indeno(1,2,3-c,d)pyrene	<0.05	n.s.	n.s.
Naphthalene	<0.05	n.s.	10
Phenanthrene	<0.05	n.s.	3
Pyrene	<0.05	n.s.	0.2



NOTES:
BH1 to BH9 ADVANCED BY CONOR PACIFIC (1998)

BH99-1 to BH99-13 ADVANCED BY SEACOR (AUGUST, 1999)

SITE PLAN IS FOR CONCEPTUAL PURPOSES ONLY. PRECISE MEASUREMENTS TO BE CONFIRMED BY SURVEYOR.

LEGEND	
---	APPROXIMATE SITE BOUNDARY
---	FENCE
○	STORAGE TANK
○	FORMER STORAGE TANK
○	FORMER STRUCTURE
+	BOREHOLE COMPLETED AS A MONITORING WELL
+	BOREHOLE
○	STOCKPILE OR STORAGE BOUNDARY
■	PAVED AREA
AST	ABOVE GROUND STORAGE TANK
UST	UNDERGROUND STORAGE TANK
C.B.	CATCH BASIN

CSR Residential - BC CSR Residential standards
CSR Commercial - BC CSR Commercial standards
CSR - Contaminated Sites Regulation
CSR Drinking Water - CSR Drinking Water standards
CSR Aquatic Life - CSR Aquatic Life standards
VPHw - volatile petroleum hydrocarbons in water
VHw - volatile hydrocarbons in water
EPH - extractable petroleum hydrocarbons
LEPHw - light extractable petroleum hydrocarbons
HEPH - heavy extractable petroleum hydrocarbons
n.s. - no standard listed
mg/L - milligrams per litre
ppb - parts per billion
< - less than analytical detection limit
H - hardness, expressed as mg/L
¹ - indicates comparable LEPHw standard; EPH is not a regulated parameter
² - indicates concentration expressed as milligrams per litre
* - indicates concentration in excess of the CSR Drinking Water standards

SCALE 1:1250 (APPROX.)

2				
1				
REV.	DESCRIPTION	DATE	MADE	CHK

SEACOR
ENVIRONMENTAL INC.

BC Buildings Corporation

BRITISH COLUMBIA BUILDINGS CORPORATION
CASSIDY HIGHWAYS YARD
1329 KIPP ROAD
CASSIDY, B.C.

POST REMEDIATION INVESTIGATION
SOIL AND GROUNDWATER CHEMISTRY
DECEMBER 7 AND 11, 2001

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

SCALE	DATE	FILE NAME
1:1250	04/19/02	202-01221-A19.DWG
MADE	CHKD	JOB NO.
MAT/DK	BH	202.01221



**PHOTO 1: Decommissioning of 5,000 L waste oil UST (October 10, 2001).
Note proximity of top of tank to ground surface (approximately 0.3 m).**



**PHOTO 2: Concrete slab below 5,000 L waste oil UST.
Note bedrock subcrop directly beneath concrete slab.**

SITE PHOTOGRAPHS



PHOTO 3: Sandblast materials and burn pile excavation areas, facing west.



PHOTO 4: Re-instatement of 5,000 L waste oil UST excavation area with new concrete slab, facing southeast.

SITE PHOTOGRAPHS



PHOTO 5: Removal of 9,100 heating oil UST (October 11, 2001).



PHOTO 6: Re-instatement of 9,100 heating oil UST excavation area, prior to asphaltting, facing northwest.

SEACOR
ENVIRONMENTAL INC.

BRITISH COLUMBIA BUILDINGS CORPORATION
CASSIDY HIGHWAYS YARD
1329 KIPP ROAD
CASSIDY, BC

SITE PHOTOGRAPHS

DATE	MADE	CHKD	JOB NO.	PAGE
April 2002	D.W.	R.C.	202.01221	3 OF 6



PHOTO 7: Debris, including concrete and asphalt, encountered directly beneath asphalt, during initiation of 22,730 L waste oil UST excavation (October 11, 2001).



PHOTO 8: Hole cut in top of 22,730 L waste oil UST, encountered 1.8 m below ground surface. Note extensive groundwater and hydrocarbon sheen within UST.

SITE PHOTOGRAPHS



PHOTO 9: Removal of 22,730 L UST (October 12, 2001). Note former vent pipe in foreground.



PHOTO 10: Remains of 22,730 L waste oil UST loaded onto flatbed for off-site disposal. Tank was extensively damaged during removal due to logistical difficulties.

SEACOR
ENVIRONMENTAL INC.

BRITISH COLUMBIA BUILDINGS CORPORATION
CASSIDY HIGHWAYS YARD
1329 KIPP ROAD
CASSIDY, BC

SITE PHOTOGRAPHS

DATE	MADE	CHKD	JOB NO.	PAGE
April 2002	D.W.	R.C.	202.01221	5 OF 6



PHOTO 11: Re-instatement of 22,730 waste oil UST excavation area, prior to asphaltting.



PHOTO 12: Excavation of impacted soils adjacent to 200 mm PVC drain pipe southwest of site (October 16, 2001).

SEACOR
ENVIRONMENTAL INC.

BRITISH COLUMBIA BUILDINGS CORPORATION
CASSIDY HIGHWAYS YARD
1329 KIPP ROAD
CASSIDY, BC

SITE PHOTOGRAPHS

DATE	MADE	CHKD	JOB NO.	PAGE
April 2002	D.W.	R.C.	202.01221	6 OF 6

APPENDIX A
BOREHOLE AND TEST PIT LOGS

SEACOR ENVIRONMENTAL INC.

SEACOR JOB NO: 202.01221.003

CLIENT: British Columbia Buildings Corporation
PROJECT: Cassidy Highways Yard
1329 Kipp Road
Cassidy, B.C.

BOREHOLE LOG

BOREHOLE NO: BH01-1
ELEVATION: 100.20 m

DEPTH (m)	SAMPLE TYPE	SOIL TYPE	SOIL DESCRIPTION	TEST DATA				WELL COMPLETION	WATER LEVEL	FIELD NOTES	DEPTH (m)
				HYDROCARBON VAPOUR LEVEL (ppmv)							
				1	10	100	1000				
			SAND AND GRAVEL (FIII) Fine to coarse grained sand, fine to coarse grained gravel, trace cobbles, trace silt, brown and grey, dry to damp								
1.0											1.0
2.0											2.0
			Auger refusal at 2.1 m (bedrock) End of borehole at 2.1 m; 50 mm diameter monitoring well installed Screened interval = 0.9 to 2.1 m below ground surface Borehole combustible vapour level (Dec. 11/01) = 40 ppmv Elevation at top of piezometer = 100.17 m Groundwater elevation (Dec. 11/01) = dry								



Notes: SPLIT SPOON

DRILLING METHOD: Hollow Stem Auger

DATE DRILLED: 07 December 2001

Sheet 1 of 1

SEACOR ENVIRONMENTAL INC.

SEACOR JOB NO: 202.01221.003

CLIENT: British Columbia Buildings Corporation
PROJECT: Cassidy Highways Yard
1329 Kipp Road
Cassidy, B.C.


BOREHOLE LOG

BOREHOLE NO: BH01-2
ELEVATION: 99.84 m

DEPTH (m)	SAMPLE TYPE	SOIL TYPE	SOIL DESCRIPTION	TEST DATA				WELL COMPLETION	WATER LEVEL	FIELD NOTES	DEPTH (m)
				HYDROCARBON VAPOUR LEVEL (ppmv)							
				1	10	100	1000				
		ASPHALT									
		SAND (Fill) Some fine gravel, trace cobbles, trace silt, brown, dry to damp								Roadbox with concrete seal	
										bentonite seal	
1.0										solid PVC pipe	1.0
			- Some silt, no gravel or cobbles below 1.5 m								
2.0										silica sand	2.0
										010 slotted PVC pipe	
3.0											3.0
			Auger refusal at 3.5 m (bedrock) End of borehole at 3.5 m; 50 mm diameter monitoring well installed Screened interval = 1.4 to 3.5 m below ground surface Borehole combustion vapour level (Dec. 11/01) = 55 ppmv Elevation at top of piezometer = 99.78 m Groundwater elevation (Dec. 11/01) = dry								

DRILLING METHOD: Hollow Stem Auger

DATE DRILLED: 07 December 2001

Notes:  SPLIT SPOON

SEACOR JOB NO: 202.01221.003

CLIENT: **British Columbia Buildings Corporation**
PROJECT: **Cassidy Highways Yard**
1329 Kipp Road
Cassidy, B.C.

TEST PIT NO: TP1
ELEVATION: n/a m

18/04/02
-AN GU

SEACOR_CA,

DRILLING METHOD: Excavator

DATE DRILLED: 16 October 2001

Notes: GRAB SAMPLE

Sheet 1 of 1
page 370 of 474

SEACOR ENVIRONMENTAL INC.

SEACOR JOB NO: 202.01221.003

CLIENT: British Columbia Buildings Corporation
PROJECT: Cassidy Highways Yard
1329 Kipp Road
Cassidy, B.C.

TEST PIT LOG

TEST PIT NO: TP2
ELEVATION: n/a m

DEPTH (m)	SAMPLE TYPE	SOIL TYPE	SOIL DESCRIPTION	TEST DATA				WELL COMPLETION	WATER LEVEL	FIELD NOTES	DEPTH (m)
				HYDROCARBON VAPOUR LEVEL (ppmv)							
				1	10	100	1000				
			SAND AND GRAVEL (Fill) Medium grained sand, rounded gravel, trace silt, brown, damp								
1.0			SILT (Native) Trace sand, trace gravel, brown, damp		15					Backfilled	1.0
					40						
			End of test pit at 1.8 m (bedrock)								

DRILLING METHOD: Excavator

Notes: ■ GRAB SAMPLE

DATE DRILLED: 16 October 2001

Sheet 1 of 1 page 571 of 474

APPENDIX B
ASL/ALS ANALYTICAL CHEMISTRY REPORTS



CHEMICAL ANALYSIS REPORT

Date: May 4, 2001

ALS File No. M9012

Report On: 202.01221.003 Water Analysis
BCBC

Report To: **SEACOR Environmental Inc.**
#9 - 6421 Applecross Rd.
Nanaimo, BC
V9V 1N1

Attention: **Mr. Brad Halsey**

Received: April 25, 2001

ALS ENVIRONMENTAL

per:

Can Dang, B.Sc. - Project Chemist
Joanne Patrick, B.Sc. - Project Chemist

File No. M9012

REMARKS



The detection limits were increased for some of the dissolved metals for the sample "BH99-4" due to the elevated sodium in this sample.

File No. M9012

RESULTS OF ANALYSIS - Water



Sample ID	BH99-1	BH99-3	BH99-4	BH99-7	BH99-10
Sample Date	01 04 24	01 04 24	01 04 24	01 04 24	01 04 24
Sample Time					
ALS ID	1	2	3	4	5

Physical Tests

Hardness	CaCO3	1180	21.0	1720	609	7.4
----------	-------	------	------	------	-----	-----

Dissolved Anions

Chloride	Cl		9.7	10300	834	31.3
----------	----	--	-----	-------	-----	------

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.
VPH = Volatile Petroleum Hydrocarbons.
EPH10-19 is equivalent to EHW10-19.
EPH = Extractable Petroleum Hydrocarbons.
LEPH & HEPH = Light and Heavy Extractable Petroleum Hydrocarbons.

RESULTS OF ANALYSIS - Water

Sample ID		BH99-1	BH99-3	BH99-4	BH99-7	BH99-10
Sample Date		01 04 24	01 04 24	01 04 24	01 04 24	01 04 24
Sample Time						
ALS ID		1	2	3	4	5
Dissolved Metals						
Aluminum	D-Al	0.08	4.31	0.10	0.08	0.95
Antimony	D-Sb	<0.2	<0.2	<1	<0.2	<0.2
Arsenic	D-As	<0.001	0.003	<0.001	0.002	<0.001
Barium	D-Ba	0.24	0.02	1.96	0.24	0.01
Beryllium	D-Be	<0.005	<0.005	<0.03	<0.005	<0.005
Boron	D-B	<0.1	<0.1	<0.5	<0.1	<0.1
Cadmium	D-Cd	<0.002	<0.002	<0.002	<0.002	<0.002
Calcium	D-Ca	316	6.93	524	162	1.94
Chromium	D-Cr	<0.01	<0.01	<0.05	<0.01	<0.01
Cobalt	D-Co	<0.01	<0.01	<0.05	0.02	<0.01
Copper	D-Cu	<0.01	0.01	<0.05	<0.01	<0.01
Iron	D-Fe	0.06	0.46	<0.2	0.05	0.41
Lead	D-Pb	<0.01	<0.01	<0.01	0.02	<0.01
Magnesium	D-Mg	95.1	0.9	101	49.5	0.6
Manganese	D-Mn	0.586	0.158	1.96	5.79	0.012
Mercury	D-Hg	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Molybdenum	D-Mo	<0.03	<0.03	<0.2	<0.03	<0.03
Nickel	D-Ni	<0.05	<0.05	<0.3	<0.05	<0.05
Selenium	D-Se	<0.01	<0.01	<0.01	<0.01	<0.01
Silver	D-Ag	<0.001	<0.001	<0.001	<0.001	<0.001
Sodium	D-Na	452	90	4030	373	45
Thallium	D-Tl	0.001	<0.001	<0.001	0.002	0.001
Uranium	D-U	0.0034	0.0062	0.0020	0.0012	<0.0001
Zinc	D-Zn	0.384	0.062	0.61	0.235	0.082
Non-halogenated Volatiles						
Benzene		<0.0005				
Ethylbenzene		<0.0005				
Toluene		<0.0005				
meta- & para-Xylene		<0.0005				
ortho-Xylene		<0.0005				
Volatile Hydrocarbons (VH6-10)		<0.1				
VPH		<0.1				

Remarks regarding the analyses appear at the beginning of this report.

Results are expressed as milligrams per litre except where noted.

< = Less than the detection limit indicated.

VPH = Volatile Petroleum Hydrocarbons.

EPH10-19 is equivalent to EHw10-19.

EPH = Extractable Petroleum Hydrocarbons.

LEPH & HEPH = Light and Heavy Extractable Petroleum Hydrocarbons.

RESULTS OF ANALYSIS - Water

Sample ID	BH99-1
Sample Date	01 04 24
Sample Time	
ALS ID	1

Polycyclic Aromatic Hydrocarbons

Acenaphthene	<0.00005
Acenaphthylene	<0.00005
Acridine	<0.00005
Anthracene	<0.00005
Benz(a)anthracene	<0.00005
Benzo(a)pyrene	0.00001
Benzo(b)fluoranthene	<0.00005
Benzo(g,h,i)perylene	<0.00005
Benzo(k)fluoranthene	<0.00005
Chrysene	<0.00005
Dibenz(a,h)anthracene	<0.00005
Fluoranthene	<0.00005
Fluorene	<0.00005
Indeno(1,2,3-c,d)pyrene	<0.00005
Naphthalene	<0.00005
Phenanthrene	<0.00005
Pyrene	<0.00005

Extractable Hydrocarbons

EPH10-19	<0.3
EPH19-32	<1
LEPH	<0.3
HEPH	<1

Remarks regarding the analyses appear at the beginning of this report.
 Results are expressed as milligrams per litre except where noted.
 < = Less than the detection limit indicated.
 VPH = Volatile Petroleum Hydrocarbons.
 EPH10-19 is equivalent to EHw10-19.
 EPH = Extractable Petroleum Hydrocarbons.
 LEPH & HEPH = Light and Heavy Extractable Petroleum Hydrocarbons.

RESULTS OF ANALYSIS - Water

Sample ID	Potable Water Well
Sample Date	01 04 24
Sample Time	
ALS ID	6

Physical Tests

Hardness	CaCO ₃	133
----------	-------------------	-----

Dissolved Anions

Chloride	Cl	21.3
----------	----	------

Total Metals

Aluminum	T-Al	<0.05
Antimony	T-Sb	<0.2
Arsenic	T-As	<0.001
Barium	T-Ba	0.06
Beryllium	T-Be	<0.005
Boron	T-B	0.2
Cadmium	T-Cd	<0.002
Calcium	T-Ca	44.7
Chromium	T-Cr	<0.01
Cobalt	T-Co	<0.01
Copper	T-Cu	0.03
Iron	T-Fe	<0.03
Lead	T-Pb	<0.01
Magnesium	T-Mg	5.3
Manganese	T-Mn	<0.005
Mercury	T-Hg	<0.00005
Molybdenum	T-Mo	<0.03
Nickel	T-Ni	<0.05
Selenium	T-Se	<0.01
Silver	T-Ag	<0.001
Sodium	T-Na	145
Thallium	T-Tl	<0.001
Uranium	T-U	0.0002
Zinc	T-Zn	0.103

Remarks regarding the analyses appear at the beginning of this report.

Results are expressed as milligrams per litre except where noted.

< = Less than the detection limit indicated.

VPH = Volatile Petroleum Hydrocarbons.

EPH10-19 is equivalent to EHW10-19.

EPH = Extractable Petroleum Hydrocarbons.

LEPH & HEPH = Light and Heavy Extractable Petroleum Hydrocarbons.

File No. M9012

RESULTS OF ANALYSIS - Water



Sample ID	Potable Water Well
Sample Date	01 04 24
Sample Time	
ALS ID	6

Non-halogenated Volatiles

Benzene	<0.0005
Ethylbenzene	<0.0005
Toluene	<0.0005
meta- & para-Xylene	<0.0005
ortho-Xylene	<0.0005
Volatile Hydrocarbons (VH6-10)	<0.1
VPH	<0.1

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.
VPH = Volatile Petroleum Hydrocarbons.
EPH10-19 is equivalent to EHW10-19.
EPH = Extractable Petroleum Hydrocarbons.
LEPH & HEPH = Light and Heavy Extractable Petroleum Hydrocarbons.

RESULTS OF ANALYSIS - Water

Sample ID	Potable Water Well
Sample Date	01 04 24
Sample Time	
ALS ID	6

Polycyclic Aromatic Hydrocarbons

Acenaphthene	<0.00005
Acenaphthylene	<0.00005
Acridine	<0.00005
Anthracene	<0.00005
Benz(a)anthracene	<0.00005
Benzo(a)pyrene	<0.00001
Benzo(b)fluoranthene	<0.00005
Benzo(g,h,i)perylene	<0.00005
Benzo(k)fluoranthene	<0.00005
Chrysene	<0.00005
Dibenz(a,h)anthracene	<0.00005
Fluoranthene	<0.00005
Fluorene	<0.00005
Indeno(1,2,3-c,d)pyrene	<0.00005
Naphthalene	<0.00005
Phenanthrene	<0.00005
Pyrene	<0.00005

Extractable Hydrocarbons

EPH10-19	<0.3
EPH19-32	<1
LEPH	<0.3
HEPH	<1

Remarks regarding the analyses appear at the beginning of this report.
 Results are expressed as milligrams per litre except where noted.
 < = Less than the detection limit indicated.
 VPH = Volatile Petroleum Hydrocarbons.
 EPH10-19 is equivalent to EHW10-19.
 EPH = Extractable Petroleum Hydrocarbons.
 LEPH & HEPH = Light and Heavy Extractable Petroleum Hydrocarbons.

Appendix 1 - QUALITY CONTROL - Replicates



Water	BH99-4	BH99-4
	01 04 24	QC # 237932

Physical Tests

Hardness	CaCO ₃	1720	1770
----------	-------------------	------	------

Dissolved Metals

Aluminum	D-Al	0.10	<0.05
Antimony	D-Sb	<1	<1
Arsenic	D-As	<0.001	<0.001
Barium	D-Ba	1.96	2.03
Beryllium	D-Be	<0.03	<0.03
Boron	D-B	<0.5	<0.5
Cadmium	D-Cd	<0.002	<0.002
Calcium	D-Ca	524	540
Chromium	D-Cr	<0.05	<0.05
Cobalt	D-Co	<0.05	<0.05
Copper	D-Cu	<0.05	<0.05
Iron	D-Fe	<0.2	<0.2
Lead	D-Pb	<0.01	<0.01
Magnesium	D-Mg	101	104
Manganese	D-Mn	1.96	2.02
Mercury	D-Hg	<0.00005	<0.00005
Molybdenum	D-Mo	<0.2	<0.2
Nickel	D-Ni	<0.3	<0.3
Selenium	D-Se	<0.01	<0.01
Silver	D-Ag	<0.001	<0.001
Sodium	D-Na	4030	4160
Thallium	D-Tl	<0.001	<0.001
Uranium	D-U	0.0020	0.0019
Zinc	D-Zn	0.61	0.61

Remarks regarding the analyses appear at the beginning of this report.
 Results are expressed as milligrams per litre except where noted.
 < = Less than the detection limit indicated.
 VPH = Volatile Petroleum Hydrocarbons.
 EPH10-19 is equivalent to EHw10-19.
 EPH = Extractable Petroleum Hydrocarbons.
 LEPH & HEPH = Light and Heavy Extractable Petroleum Hydrocarbons.

Appendix 2 - METHODOLOGY



Outlines of the methodologies utilized for the analysis of the samples submitted are as follows

Conventional Parameters in Water

These analyses are carried out in accordance with procedures described in "Methods for Chemical Analysis of Water and Wastes" (USEPA), "Manual for the Chemical Analysis of Water, Wastewaters, Sediments and Biological Tissues" (BCMOE), and/or "Standard Methods for the Examination of Water and Wastewater" (APHA). Further details are available on request.

Metals in Water

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" 20th Edition 1998 published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotplate or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by atomic absorption/emission spectrophotometry (EPA Method 7000 series), inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B), and/or inductively coupled plasma - mass spectrometry (EPA Method 6020).

Recommended Holding Time:

Sample: 6 months

Reference: EPA

For more detail see ALS Environmental "Collection & Sampling Guide"

Mercury in Water

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" 20th Edition 1998 published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic absorption spectrophotometry (EPA Method 7470A/7471A).

Recommended Holding Time:

Sample: 28 days

Reference: EPA

For more detail see ALS Environmental "Collection & Sampling Guide"

Volatile Organic Compounds and Volatile Hydrocarbons in Water

This procedure involves the purge and trap extraction of the sample prior to analysis for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID) and for specific Volatile Organic Compounds (VOC) by capillary column gas chromatography with mass spectrometric detection (GC/MS). The VH analysis is carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile



Appendix 2 - METHODOLOGY - Continued

Hydrocarbons in Water by GC/FID" (Version 2.1, July 1999). The VOC analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 8260, published by the United States Environmental Protection Agency (EPA).

Recommended Holding Time:

Sample: 7 days

Extract: NA

Reference: BCMELP

For more detail see ALS Environmental "Collection & Sampling Guide"

Volatile Petroleum Hydrocarbons (VPH) in Water

These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Volatile Petroleum Hydrocarbons in Solids or Water" (Version 2.1, July 20, 1999). According to this method, the concentrations of specific Monocyclic Aromatic Hydrocarbons (Benzene, Toluene, Xylenes) are subtracted from the collective concentration of Volatile Hydrocarbons (VH) that elute between n-hexane (nC6) and n-decane (nC10). Analysis of Volatile Hydrocarbons adheres to all prescribed elements of BCMELP method "Volatile Hydrocarbons in Water by GC/FID" (Version 2.1, July 20, 1999).

Recommended Holding Time: Not Applicable

Polycyclic Aromatic Hydrocarbons in Water

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3510, 3630 & 8270, published by the United States Environmental Protection Agency (EPA). The procedure involves extraction of the entire water sample with dichloromethane. The extract is then solvent exchanged to toluene prior to analysis by capillary column gas chromatography with mass spectrometric detection (GC/MS).

Recommended Holding Time:

Sample: 7 days

Extract: 40 days

Reference: EPA

For more detail see ALS Environmental "Collection & Sampling Guide"

Extractable Hydrocarbons in Water

This analysis is carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Extractable Petroleum Hydrocarbons in Water by GC/FID" (Version 2.1, July 1999). The procedure involves extraction of the entire water sample with dichloromethane. The extract is then solvent exchanged to toluene and analysed by capillary column gas chromatography with flame ionization detection (GC/FID). EPH results include Polycyclic Aromatic Hydrocarbons (PAH) and are therefore not equivalent to Light and Heavy Extractable Petroleum Hydrocarbons (LEPH/HEPH).

Recommended Holding Time:

Sample: 7 days

Extract: 40 days

Reference: BCMELP

For more detail see ALS Environmental "Collection & Sampling Guide"



Light and Heavy Extractable Petroleum Hydrocarbons in Water

These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated by subtracting selected Polynuclear Aromatic Hydrocarbon results from Extractable Petroleum Hydrocarbon results. To calculate LEPH, the individual results for Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene, and Phenanthrene are subtracted from EPH(C10-19). To calculate HEPH, the individual results for Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene are subtracted from EPH(C19-32). Analysis of Extractable Petroleum Hydrocarbons adheres to all prescribed elements of the BCMELP method "Extractable Petroleum Hydrocarbons in Water by GC/FID" (Version 2.1, July 20, 1999).

Recommended Holding Time: Not Applicable

Chloride in Water

This analysis is carried out using procedures adapted from APHA Method 4500 "Chloride". Chloride is determined using the ferricyanide colourimetric method.

Recommended Holding Time:

Sample: 28 days

Reference: APHA

For more detail see ALS Environmental "Collection & Sampling Guide"

End Of Report



CHEMICAL ANALYSIS REPORT

Date: May 4, 2001

ALS File No. M9100

Report On: 202.01221.003 Soil Analysis
BCBC

Report To: **SEACOR Environmental Inc.**
#9 - 6421 Applecross Rd.
Nanaimo, BC
V9V 1N1

Attention: **Mr. Brad Halsey**

Received: April 28, 2001

ALS ENVIRONMENTAL

per:

Joanne Patrick, B.Sc. - Project Chemist
Can Dang, B.Sc. - Project Chemist

File No. M9100

RESULTS OF ANALYSIS - Solid



Sample ID	SA1	
Sample Date	01 04 27	01 04 27
ALS ID	1	2

Physical Tests

Moisture %	0.1	0.2
Initial SWEP pH	5.34	5.86
Final SWEP pH	5.35	5.49

Extractable Metals

Arsenic	As	<0.2	<0.2
Barium	Ba	<0.05	<0.05
Boron	B	<0.1	<0.1
Cadmium	Cd	<0.01	<0.01
Chromium	Cr	<0.01	<0.01
Copper	Cu	0.29	0.15
Lead	Pb	<0.05	<0.05
Mercury	Hg	<0.00005	<0.00005
Selenium	Se	<0.2	<0.2
Silver	Ag	<0.01	<0.01
Zinc	Zn	0.32	

Results are expressed as milligrams per litre, as per the requirements of the Special Waste Regulations, B.C. Reg.63/88.
< = Less than the detection limit indicated.

Appendix 1 - METHODOLOGY



Outlines of the methodologies utilized for the analysis of the samples submitted are as follows

Moisture in Sediment/Soil

This analysis is carried out gravimetrically by drying the sample at 103 C for a minimum of six hours.

Recommended Holding Time:

Sample: 14 days

Reference: Puget

For more detail see ALS Environmental "Collection & Sampling Guide"

Special Waste/Leachate Extraction Procedure (SWEP/LEP) for Metals

This analysis is carried out in accordance with the extraction procedure outlined in the Waste Management Act, British Columbia Special Waste Regulation - Schedule Reg. 63/88, February 29, 1988. In summary the sample is extracted for a 24 hour period using 0.5 N acetic acid to maintain the pH of the extract at 5.0. The resulting extract is then filtered through a 0.45 micron membrane filter and analysed by atomic absorption spectrophotometry (EPA Method 7000 series), inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B & APHA 3120), and/or inductively coupled plasma - mass spectrometry (EPA Method 6020 & APHA Method 3125).

Recommended Holding Time:

Sample: 6 months (Mercury = 28 days)

Extract: 6 months (Mercury = 28 days)

Reference: EPA

For more detail see ALS Environmental "Collection & Sampling Guide"

End Of Report



CHEMICAL ANALYSIS REPORT

Date: July 18, 2001

ALS File No. N2908

Report On: 201.01221.003 Water Analysis
BCBC


Report To: **SEACOR Environmental Inc.**
#9 - 6421 Applecross Rd.
Nanaimo, BC
V9V 1N1

Attention: **Mr. Brad Halsey**

Received: July 9, 2001

ALS ENVIRONMENTAL

per:


Can Dang, B.Sc. - Project Chemist
Joanne Patrick, B.Sc. - Project Chemist

File No. N2908

REMARKS



The detection limits were increased for some of the metals due to sample matrix interferences (high sodium).

RESULTS OF ANALYSIS - Water

Sample ID	Brine Tank #1	Brine Tank #2
Sample Date	01 07 06	01 07 06
ALS ID	1	2

Physical Tests

Hardness	CaCO3	96	65.0
----------	-------	----	------

Dissolved Anions

Chloride	Cl	3210	123
----------	----	------	-----

Dissolved Metals

Aluminum	D-Al	0.16	0.069
Antimony	D-Sb	<0.4	<0.2
Arsenic	D-As	<0.4	<0.2
Barium	D-Ba	<0.02	0.03
Beryllium	D-Be	<0.01	<0.005
Boron	D-B	<0.2	<0.1
Cadmium	D-Cd	<0.002	<0.0002
Calcium	D-Ca	16.1	22.2
Chromium	D-Cr	<0.02	<0.01
Cobalt	D-Co	<0.02	<0.01
Copper	D-Cu	<0.02	<0.01
Iron	D-Fe	0.24	0.03
Lead	D-Pb	<0.01	<0.001
Magnesium	D-Mg	13.5	2.3
Manganese	D-Mn	0.03	0.010
Mercury	D-Hg	<0.00005	<0.00005
Molybdenum	D-Mo	<0.06	<0.03
Nickel	D-Ni	<0.1	<0.05
Selenium	D-Se	<0.01	<0.001
Silver	D-Ag	<0.001	<0.0001
Sodium	D-Na	1740	73
Thallium	D-Tl	0.002	0.0002
Uranium	D-U	<0.0001	0.00002
Zinc	D-Zn	0.19	0.045

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.

Appendix 1 - METHODOLOGY



Outlines of the methodologies utilized for the analysis of the samples submitted are as follows

Conventional Parameters in Water

These analyses are carried out in accordance with procedures described in "Methods for Chemical Analysis of Water and Wastes" (USEPA), "Manual for the Chemical Analysis of Water, Wastewaters, Sediments and Biological Tissues" (BCMOE), and/or "Standard Methods for the Examination of Water and Wastewater" (APHA). Further details are available on request.

Chloride in Water

This analysis is carried out using procedures adapted from APHA Method 4500 "Chloride". Chloride is determined using the ferricyanide colourimetric method.

Recommended Holding Time:

Sample: 28 days

Reference: APHA

For more detail see ALS Environmental "Collection & Sampling Guide"

Metals in Water

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" 20th Edition 1998 published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotplate or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by atomic absorption/emission spectrophotometry (EPA Method 7000 series), inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B), and/or inductively coupled plasma - mass spectrometry (EPA Method 6020).

Recommended Holding Time:

Sample: 6 months

Reference: EPA

For more detail see: ALS "Collection & Sampling Guide"

Mercury in Water

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" 20th Edition 1998 published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic absorption and/or fluorescence spectrophotometry (EPA Method 7470A/7471A/245.7).

Recommended Holding Time:

Sample: 28 days

File No. N2908

Appendix 1 - METHODOLOGY - Continued



Reference: EPA

For more detail see ALS Environmental "Collection & Sampling Guide"

End Of Report



CHEMICAL ANALYSIS REPORT

Date: July 18, 2001

ALS File No. N2907

Report On: 202.01221.003 Soil Analysis
BCBC


Report To: **SEACOR Environmental Inc.**
#9 - 6421 Applecross Rd.
Nanaimo, BC
V9V 1N1

Attention: **Mr. Brad Halsey**

Received: July 9, 2001

ALS ENVIRONMENTAL

per:


Can Dang, B.Sc. - Project Chemist
Joanne Patrick, B.Sc. - Project Chemist

RESULTS OF ANALYSIS - Sediment/Soil

Sample ID	SA1	SA2	SA5
Sample Date	01 07 06	01 07 06	01 07 06
ALS ID	1	2	5

Physical Tests

Moisture	%	14.9	1.4	0.8
pH		6.14	8.76	8.58

Total Metals

Antimony	T-Sb	<10	39	<10
Arsenic	T-As	8	40	6
Barium	T-Ba	104	268	67
Beryllium	T-Be	<0.5	<0.5	<0.5
Cadmium	T-Cd	2.1	0.6	<0.5
Chromium	T-Cr	112	39	32
Cobalt	T-Co	14	12	9
Copper	T-Cu	279	1150	122
Lead	T-Pb	143	218	<50
Mercury	T-Hg	<0.05	<0.05	<0.05
Molybdenum	T-Mo	14	6	<4
Nickel	T-Ni	66	19	18
Selenium	T-Se	<3	<2	<2
Silver	T-Ag	<2	<2	<2
Tin	T-Sn	12	10	<5
Vanadium	T-V	72	59	57
Zinc	T-Zn	620	3130	318

Results are expressed as milligrams per dry kilogram except where noted.

< = Less than the detection limit indicated.

EPH = Extractable Petroleum Hydrocarbons.

LEPH & HEPH = Light and Heavy Extractable Petroleum Hydrocarbons.

RESULTS OF ANALYSIS - Sediment/Soil

Sample ID	SA1	SA2	SA5
Sample Date	01 07 06	01 07 06	01 07 06
ALS ID	1	2	5

Polycyclic Aromatic Hydrocarbons

Acenaphthene		<0.05	<0.05
Acenaphthylene		<0.05	<0.05
Anthracene		<0.05	<0.05
Benz(a)anthracene		<0.05	<0.05
Benzo(a)pyrene		<0.05	<0.05
Benzo(b)fluoranthene		0.06	<0.05
Benzo(g,h,i)perylene		0.06	<0.05
Benzo(k)fluoranthene		<0.05	<0.05
Chrysene		0.06	<0.05
Dibenz(a,h)anthracene		<0.05	<0.05
Fluoranthene		<0.05	<0.05
Fluorene		<0.05	<0.05
Indeno(1,2,3-c,d)pyrene		<0.05	<0.05
Naphthalene		<0.05	<0.05
Phenanthrene		<0.05	<0.05
Pyrene		0.11	<0.05

Extractable Hydrocarbons

EPH10-19	5340	<200	<200
EPH19-32	70300	669	<200
LEPH	-	<200	<200
HEPH	-	669	<200

Results are expressed as milligrams per dry kilogram except where noted.

< = Less than the detection limit indicated.

EPH = Extractable Petroleum Hydrocarbons.

LEPH & HEPH = Light and Heavy Extractable Petroleum Hydrocarbons.

Appendix 1 - METHODOLOGY



Outlines of the methodologies utilized for the analysis of the samples submitted are as follows

Moisture in Sediment/Soil

This analysis is carried out gravimetrically by drying the sample at 103 C for a minimum of six hours.

Recommended Holding Time:

Sample: 14 days

Reference: Puget

For more detail see ALS Environmental "Collection & Sampling Guide"

pH in Soil

This analysis is carried out in accordance with procedures described in "Soil Sampling and Methods of Analysis" (CSSS). The procedure involves mixing the air-dried sample with deionized/distilled water. The pH of the solution is then measured using a standard pH probe. A one to two ratio of sediment to water is used for mineral soils and a one to ten ratio is used for highly organic soils.

Metals in Sediment/Soil

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B or Method 3051, United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celcius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celcius for 2 hours by either hotplate or block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic absorption spectrophotometry (EPA Method 7000 series) and/or inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

Recommended Holding Time:

Sample: 6 months (Hg = 28 days)

Extract: 6 months (Hg = 28 days, Sb & Sn = 7 days)

Reference: BCMELP

Extractable Hydrocarbons in Sediment/Soil

This analysis is carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Extractable Petroleum Hydrocarbons in Solids by GC/FID, Version 2.1 July 1999". The procedure uses an automated system (Accelerated Solvent Extractor - ASE) to extract a subsample of the sediment/soil with a 1:1 mixture of hexane and acetone at high temperature and pressure. The extract is then solvent exchanged to toluene and



Appendix 1 - METHODOLOGY - Continued

analysed by capillary column gas chromatography with flame ionization detection (GC/FID). EPH results include Polycyclic Aromatic Hydrocarbons (PAH) and are therefore not equivalent to Light and Heavy Extractable Petroleum Hydrocarbons (LEPH/HEPH).

Recommended Holding Time:

Sample: 14 days Extract: 40 days

Reference: BCMELP

For more detail see ALS Environmental "Collection & Sampling Guide"

Polycyclic Aromatic Hydrocarbons in Sediment/Soil

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3545, 3630 & 8270, published by the United States Environmental Protection Agency (EPA). The procedure uses an automated system (Accelerated Solvent Extractor - ASE) to extract a subsample of the sediment/soil with a 1:1 mixture of hexane and acetone. The extract is then solvent exchanged to toluene and undergoes a silica gel clean-up to remove sample components that could potentially interfere with the analysis. The final extract is analysed by capillary column gas chromatography with mass spectrometric detection (GC/MS).

Recommended Holding Time:

Sample: 14 days Extract: 40 days

Reference: EPA

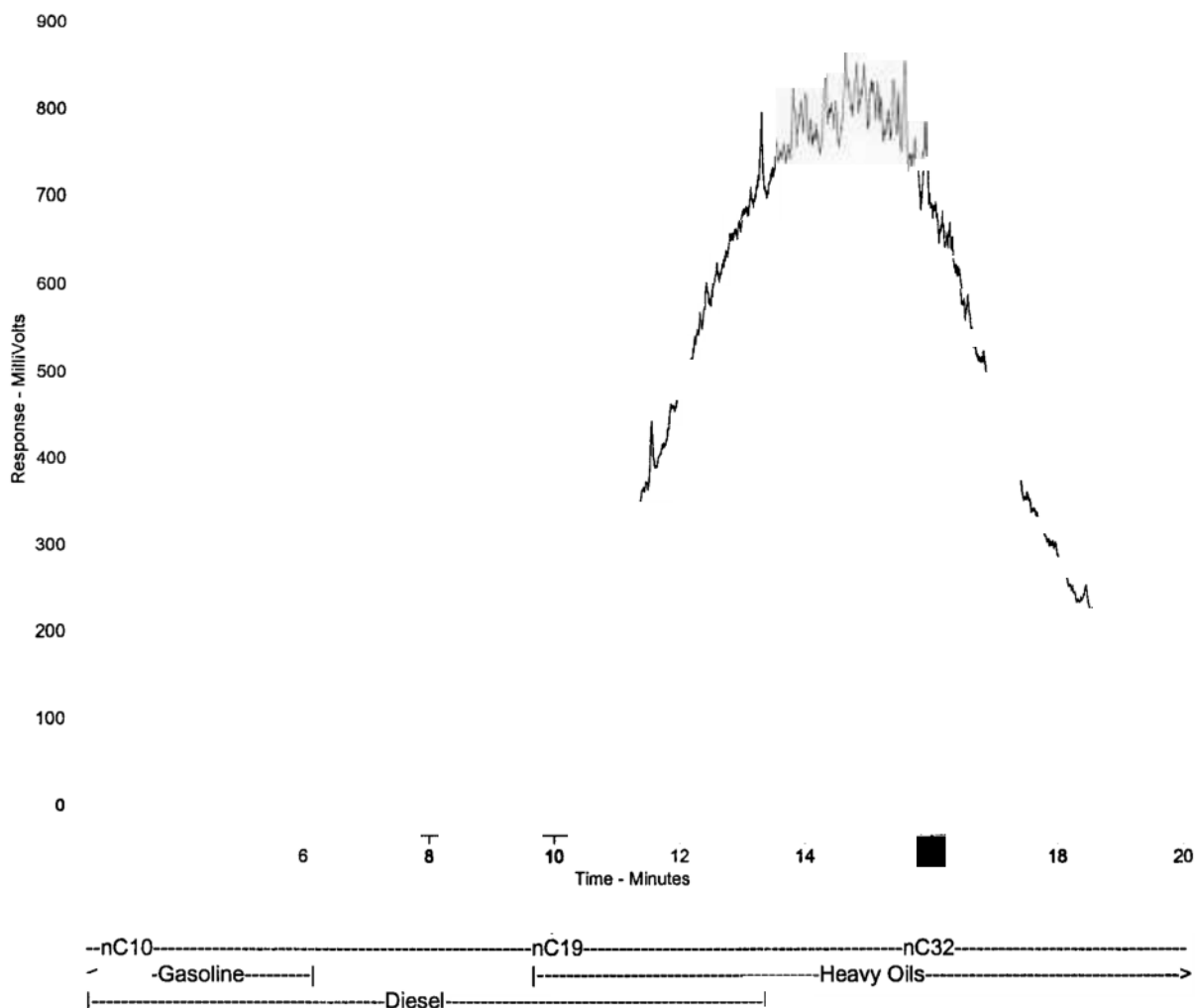
For more detail see ALS Environmental "Collection & Sampling Guide"

Light and Heavy Extractable Petroleum Hydrocarbons in Solids

These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated by subtracting selected Polycyclic Aromatic Hydrocarbon results from Extractable Petroleum Hydrocarbon results. To calculate LEPH, the individual results for Naphthalene and Phenanthrene are subtracted from EPH(C10-19). To calculate HEPH, the individual results for Benz(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Dibenz(a,h)anthracene, Indeno(1,2,3-c,d)pyrene, and Pyrene are subtracted from EPH(C19-32). Analysis of Extractable Petroleum Hydrocarbons adheres to all prescribed elements of the BCMELP method "Extractable Petroleum Hydrocarbons in Solids by GC/FID" (Version 2.1, July 20, 1999).

Recommended Holding Time: Not Applicable

End Of Report

ALS Environmental - Hydrocarbon Distribution Report**Client Sample ID:****ALS Sample ID:** N2907-T--1 10X**File Name:** m:\Chrom\gc12\data\gc12_14julB.0013.RAW**Run Information:** Acquired on GC12, 7/14/01 12:30:06 PM

Sample Amount = 10.0 (g or mL)

Dilution Factor = 100.0

The Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and of three n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample. A current library of reference products is available upon request.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

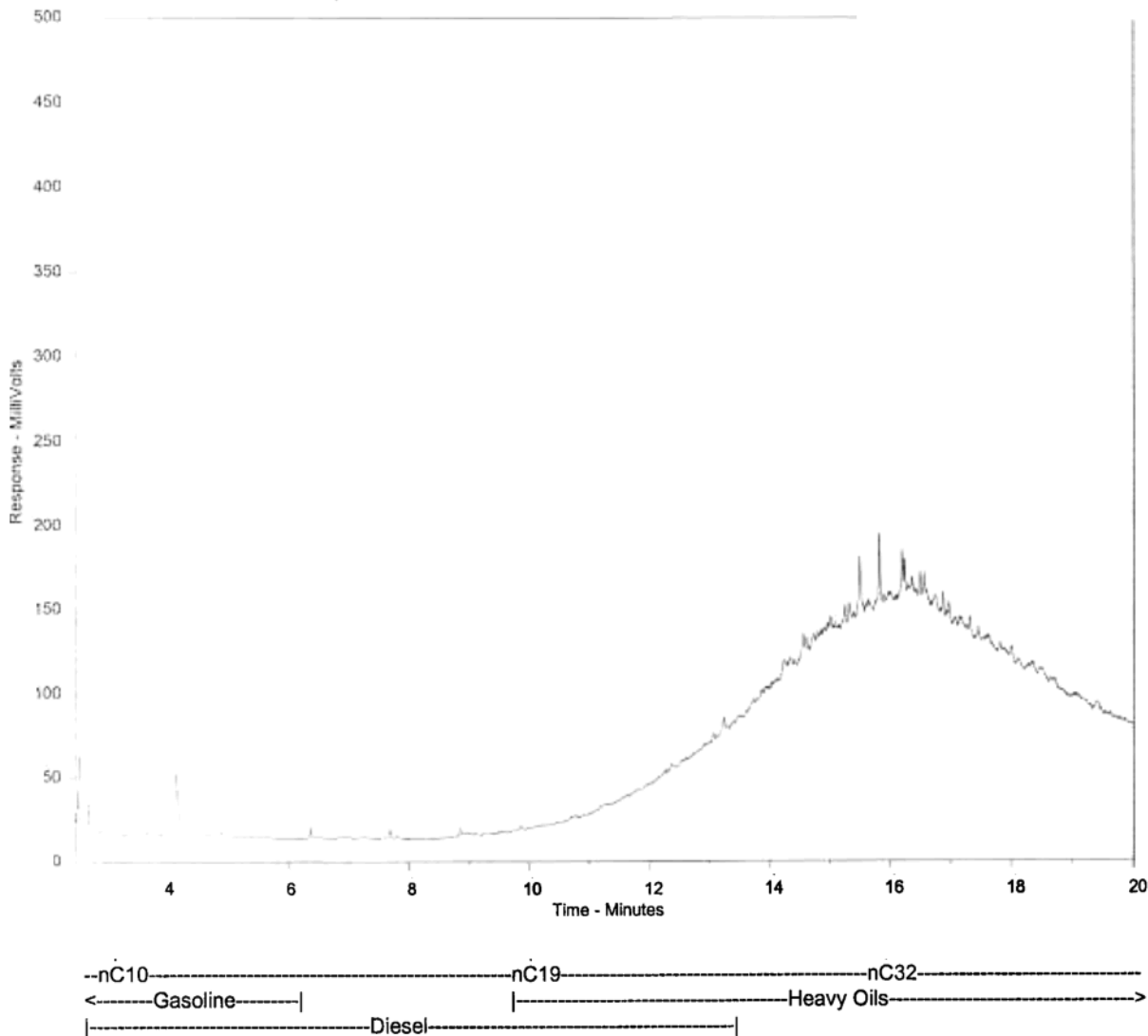
ALS Environmental - Hydrocarbon Distribution Report

Client Sample ID:

ALS Sample ID: N2907-1--2

File Name: m:\Chrom\gc12\data\gc12_11julB.0023.RAW

Run Information: Acquired on GC12, 7/12/01 4:33:12 AM



Sample Amount = 10.4 (g or mL)

Dilution Factor = 10.0

The Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and of three n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample. A current library of reference products is available upon request.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.



CHEMICAL ANALYSIS REPORT

Date: October 16, 2001

ALS File No. N6601

Report On: 202.01221.003 Soil Analysis
BCBC

Report To: **SEACOR Environmental Inc.**
#9 - 6421 Applecross Rd.
Nanaimo, BC
V9V 1N1

Attention: **Mr. Brad Halsey**

Received: October 10, 2001

ALS ENVIRONMENTAL

per:

Joanne Patrick, B.Sc. - Project Chemist
Can Dang, B.Sc. - Project Chemist

File No. N6601

REMARKS



The detection limits for some extractable metals were increased due to sample matrix interferences.

**RESULTS OF ANALYSIS - Sediment/Soil**

Sample ID	SA
Sample Date	01 10 09
ALS ID	1

Physical Tests

1st Preliminary TCLP pH	7.81
2nd Preliminary TCLP pH	1.09
TCLP Extraction Fluid pH	4.89
Final TCLP pH	5.14

Extractable Metals

Antimony	Sb	<1
Arsenic	As	<1
Barium	Ba	<3
Beryllium	Be	<0.03
Boron	B	<0.5
Cadmium	Cd	<0.05
Calcium	Ca	211
Chromium	Cr	<0.3
Cobalt	Co	<0.05
Copper	Cu	<0.05
Iron	Fe	191
Lead	Pb	<0.3
Magnesium	Mg	8.8
Mercury	Hg	<0.00005
Nickel	Ni	<0.3
Selenium	Se	<1
Silver	Ag	<0.3
Thallium	Tl	<1
Vanadium	V	<0.2
Zinc	Zn	11.2

Remarks regarding the analyses appear at the beginning of this report.
 Results are expressed as milligrams per litre, as per the requirements of
 the Toxicity Characteristic Leaching Procedure (TCLP).
 < = Less than the detection limit indicated.

Appendix 1 - METHODOLOGY



Outlines of the methodologies utilized for the analysis of the samples submitted are as follows

Toxicity Characteristic Leaching Procedure (TCLP) for Metals

This analysis is carried out in accordance with the extraction procedure outlined in "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods Volume 1C" SW-846 EPA Method 1311, published by the United States Environmental Protection Agency (EPA). In summary, the sample is extracted at a 20:1 liquid to solids ratio for 16 to 20 hours using either extraction fluid #1 (glacial acetic acid, water and sodium hydroxide) or extraction fluid #2 (glacial acetic acid), depending on the pH of the original sample. The extract is then filtered through a 0.6 to 0.8 micron glass fibre filter and analysed using atomic absorption spectrophotometry (EPA Method 7000 series) and/or inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Recommended Holding Time:

Sample:	6 months (Mercury = 28 days)
Extract:	6 months (Mercury = 28 days)
Reference:	EPA

For more detail see ALS Environmental "Collection & Sampling Guide"

End Of Report



CHEMICAL ANALYSIS REPORT

Date: October 20, 2001

ALS File No. N6795

Report On: 202.0122 .003 Soil Analysis
BCBC

Report To: **SEACOR Environmental Inc.**
#9 - 6421 Applecross Rd.
Nanaimo, BC
V9V 1N1

Attention: **Mr. Brad Halsey**

Received: October 16, 2001

ALS ENVIRONMENTAL

per:

Joanne Patrick, B.Sc. - Project Chemist
Can Dang, B.Sc. - Project Chemist

File No. N6795

RESULTS OF ANALYSIS - Sediment/Soil



Sample ID	SA32	SA33	SA34
Sample Date	01 10 15	01 10 15	01 10 15
ALS ID		2	3
<hr/>			
<u>Physical Tests</u>			
Moisture %	8.7	13.4	8.1
<u>Extractable Hydrocarbons</u>			
EPH10-19	<200	4990	<200
EPH19-32	<200	12400	<200

Results are expressed as milligrams per dry kilogram except where noted.

< = Less than the detection limit indicated.

EPH = Extractable Petroleum Hydrocarbons.

Appendix 1 - METHODOLOGY



Outlines of the methodologies utilized for the analysis of the samples submitted are as follows

Moisture in Sediment/Soil

This analysis is carried out gravimetrically by drying the sample at 103 C for a minimum of six hours.

Recommended Holding Time:

Sample: 14 days

Reference: Puget

For more detail see ALS Environmental "Collection & Sampling Guide"

Extractable Hydrocarbons in Sediment/Soil

This analysis is carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Extractable Petroleum Hydrocarbons in Solids by GC/FID, Version 2.1 July 1999". The procedure uses an automated system (Accelerated Solvent Extractor - ASE) to extract a subsample of the sediment/soil with a 1:1 mixture of hexane and acetone at high temperature and pressure. The extract is then solvent exchanged to toluene and analysed by capillary column gas chromatography with flame ionization detection (GC/FID). EPH results include Polycyclic Aromatic Hydrocarbons (PAH) and are therefore not equivalent to Light and Heavy Extractable Petroleum Hydrocarbons (LEPH/HEPH).

Recommended Holding Time:

Sample: 14 days Extract: 40 days

Reference: BCMELP

For more detail see ALS Environmental "Collection & Sampling Guide"

End Of Report

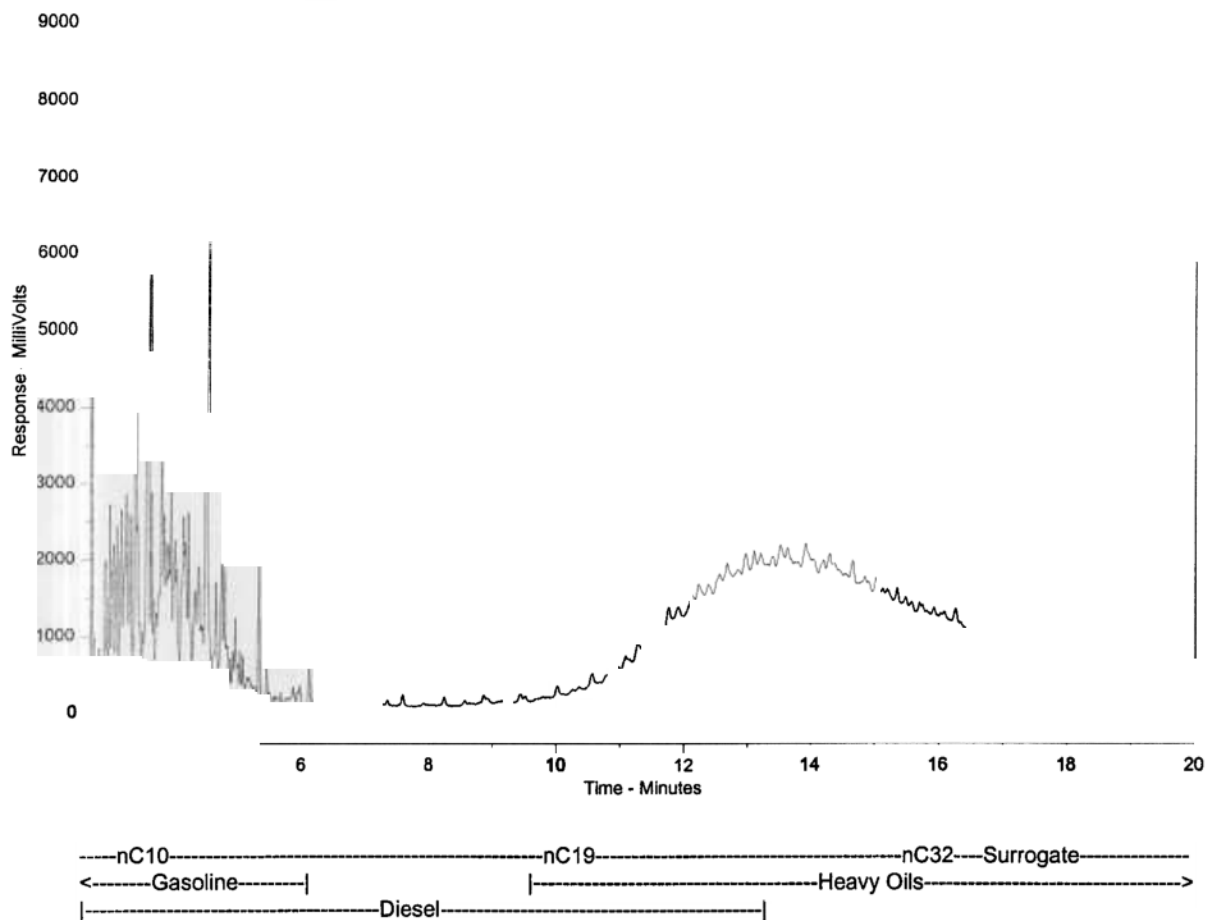
ALS Environmental - Hydrocarbon Distribution Report

Client Sample ID:

ALS Sample ID: **N6795-T--2**

File Name: i:\Chrom\gc18\data\gc18_18octB.0006.RAW

Run Information: Acquired on GC18, 10/18/01 8:46:06 PM



Sample Amount = 10.0 (g or mL)

Dilution Factor = 10.0

The Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and of three n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample. A current library of reference products is available upon request.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

A C35 surrogate compound is added to all samples by the laboratory as a component of quality control. Depending on the amount of heavy hydrocarbons present in the sample, this peak may or may not be visible near the end of the chromatogram where indicated.



CHEMICAL ANALYSIS REPORT

Date: October 26, 2001

ALS File No. N6896

Report On: 202.01221.003 Soil Analysis
BCBC

Report To: **SEACOR Environmental Inc.**
#9 - 6421 Applecross Rd.
Nanaimo, BC
V9V 1N1

Attention: **Mr. Brad Halsey**

Received: October 16, 2001

ALS ENVIRONMENTAL

per:

Leanne Harris, B.Sc. - Project Chemist
Joanne Patrick, B.Sc. - Project Chemist

File No. N6896

REMARKS



Detection limit for Selenium for the sample identified as "SA2" was increased due to matrix interferences encountered during analysis.

**RESULTS OF ANALYSIS - Sediment/Soil**

Sample ID	SA2 0.1	SA4 0.3	SA7 1.0	SA9 1.0	SA11 1.0
Sample Date ALS ID	01 10 10 1	01 10 10 2	01 10 10 3	01 10 10 4	01 10 10 5

Physical Tests

Moisture	%	-	4.3	2.7	3.8	4.5
pH		7.36	-	-	-	-

Total Metals

Antimony	T-Sb	<10
Arsenic	T-As	<5
Barium	T-Ba	47
Beryllium	T-Be	<0.5
Cadmium	T-Cd	<0.5
Chromium	T-Cr	18
Cobalt	T-Co	9
Copper	T-Cu	53
Lead	T-Pb	<50
Mercury	T-Hg	<0.05
Molybdenum	T-Mo	<4
Nickel	T-Ni	15
Selenium	T-Se	<4
Silver	T-Ag	<2
Tin	T-Sn	<5
Vanadium	T-V	57
Zinc	T-Zn	45

Non-Halogenated Volatiles

Benzene	<0.04
Ethylbenzene	<0.05
Styrene	<0.05
Toluene	<0.05
meta- & para-Xylene	<0.05
ortho-Xylene	<0.05
Volatile Hydrocarbons (VH6-10)	<100
VPH	<100

Remarks regarding the analyses appear at the beginning of this report.
 Results are expressed as milligrams per dry kilogram except where noted.
 < = Less than the detection limit indicated.
 EPH = Extractable Petroleum Hydrocarbons.
 VPH = Volatile Petroleum Hydrocarbons.
 LEPH & HEPH = Light and Heavy Extractable Petroleum Hydrocarbons.

**RESULTS OF ANALYSIS - Sediment/Soil**

Sample ID	SA4 0.3	SA7 1.0	SA9 1.0	SA11 1.0
Sample Date	01 10 10	01 10 10	01 10 10	01 10 10
ALS ID	2	3	4	5
<u>Polycyclic Aromatic Hydrocarbons</u>				
Acenaphthene		<0.01		
Acenaphthylene		<0.01		
Anthracene		<0.01		
Benz(a)anthracene		<0.01		
Benzo(a)pyrene		<0.01		
Benzo(b)fluoranthene		<0.01		
Benzo(g,h,i)perylene		<0.01		
Benzo(k)fluoranthene		<0.01		
Chrysene		<0.01		
Dibenz(a,h)anthracene		<0.01		
Fluoranthene		<0.01		
Fluorene		<0.01		
Indeno(1,2,3-c,d)pyrene		<0.01		
Naphthalene		<0.01		
Phenanthrene		<0.01		
Pyrene		<0.01		
<u>Extractable Hydrocarbons</u>				
EPH10-19	<200	<200	<200	<200
EPH19-32	<200	<200	<200	<200
LEPH	-	<200		
HEPH	-	<200		
<u>Polychlorinated Biphenyls</u>				
Total Polychlorinated Biphenyls		<0.05		

Remarks regarding the analyses appear at the beginning of this report.
 Results are expressed as milligrams per dry kilogram except where noted.
 < = Less than the detection limit indicated.
 EPH = Extractable Petroleum Hydrocarbons.
 VPH = Volatile Petroleum Hydrocarbons.
 LEPH & HEPH = Light and Heavy Extractable Petroleum Hydrocarbons.

File No. N6896

RESULTS OF ANALYSIS - Sediment/Soil



Sample ID	SA13 1.0	SA14 3.5	SA16 1.0	SA17 0.9	SA19 0.8
Sample Date ALS ID	01 10 10 6	01 10 1 7	01 10 11 8	01 10 1 9	01 10 11 10
<hr/>					
Physical Tests					
Moisture %	3.0	12.6	8.9	15.9	13.5
pH		-	-		

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per dry kilogram except where noted.
< = Less than the detection limit indicated.
EPH = Extractable Petroleum Hydrocarbons.
VPH = Volatile Petroleum Hydrocarbons.
LEPH & HEPH = Light and Heavy Extractable Petroleum Hydrocarbons.

**RESULTS OF ANALYSIS - Sediment/Soil**

Sample ID	SA13 1.0	SA14 3.5	SA16 1.0	SA17 0.9	SA19 0.8
Sample Date ALS ID	01 10 10 6	01 10 11 7	01 10 8	01 10 11 9	01 10 1 10
<hr/>					
<u>Extractable Hydrocarbons</u>					
EPH10-19	<200	<200	<200	<200	<200
EPH19-32	<200	<200	<200	<200	<200
LEPH	-	-	-	-	-
HEPH	-	-	-	-	-

Remarks regarding the analyses appear at the beginning of this report.
 Results are expressed as milligrams per dry kilogram except where noted.
 < = Less than the detection limit indicated.
 EPH = Extractable Petroleum Hydrocarbons.
 VPH = Volatile Petroleum Hydrocarbons.
 LEPH & HEPH = Light and Heavy Extractable Petroleum Hydrocarbons.

**RESULTS OF ANALYSIS - Sediment/Soil**

Sample ID	SA21 1.1	SA24 1.1	SA25 0.3	SA27 2.0	SA28 3.0
Sample Date	01 10 11	01 10 12	01 10 12	01 10 12	01 10 12
ALS ID	11	12	13	14	15

Physical Tests

Moisture %	18.2	14.8	4.3	15.4	12.1
pH	-	-	-	6.06	

Total Metals

Antimony	T-Sb			<10	
Arsenic	T-As			6	
Barium	T-Ba			89	
Beryllium	T-Be			<0.5	
Cadmium	T-Cd			<0.5	
Chromium	T-Cr			37	
Cobalt	T-Co			13	
Copper	T-Cu			48	
Lead	T-Pb			<50	
Mercury	T-Hg			<0.05	
Molybdenum	T-Mo			<4	
Nickel	T-Ni			31	
Selenium	T-Se			<2	
Silver	T-Ag			<2	
Tin	T-Sn			<5	
Vanadium	T-V			86	
Zinc	T-Zn			50	

Non-Halogenated Volatiles

Benzene	<0.04
Ethylbenzene	<0.05
Styrene	<0.05
Toluene	<0.05
meta- & para-Xylene	<0.05
ortho-Xylene	<0.05
Volatile Hydrocarbons (VH6-10)	<100
VPH	<100

Remarks regarding the analyses appear at the beginning of this report.
 Results are expressed as milligrams per dry kilogram except where noted.
 < = Less than the detection limit indicated.
 EPH = Extractable Petroleum Hydrocarbons.
 VPH = Volatile Petroleum Hydrocarbons.
 LEPH & HEPH = Light and Heavy Extractable Petroleum Hydrocarbons.

**RESULTS OF ANALYSIS - Sediment/Soil**

Sample ID	SA21 1.1	SA24 1.1	SA25 0.3	SA27 2.0	SA28 3.0
Sample Date ALS ID	01 10 11 11	01 10 12 12	01 10 12 13	01 10 12 14	01 10 12 15
<u>Polycyclic Aromatic Hydrocarbons</u>					
Acenaphthene				<0.01	
Acenaphthylene				<0.01	
Anthracene				<0.01	
Benz(a)anthracene				<0.01	
Benzo(a)pyrene				<0.01	
Benzo(b)fluoranthene				<0.01	
Benzo(g,h,i)perylene				<0.01	
Benzo(k)fluoranthene				<0.01	
Chrysene				<0.01	
Dibenz(a,h)anthracene				<0.01	
Fluoranthene				<0.01	
Fluorene				<0.01	
Indeno(1,2,3-c,d)pyrene				<0.01	
Naphthalene				<0.01	
Phenanthrene				<0.01	
Pyrene				<0.01	
<u>Extractable Hydrocarbons</u>					
EPH10-19	<200	<200	<200	<200	<200
EPH19-32	<200	<200	<200	<200	<200
LEPH		-		<200	-
HEPH				<200	-
<u>Polychlorinated Biphenyls</u>					
Total Polychlorinated Biphenyls				<0.05	

Remarks regarding the analyses appear at the beginning of this report.
 Results are expressed as milligrams per dry kilogram except where noted.
 < = Less than the detection limit indicated.
 EPH = Extractable Petroleum Hydrocarbons.
 VPH = Volatile Petroleum Hydrocarbons.
 LEPH & HEPH = Light and Heavy Extractable Petroleum Hydrocarbons.

**RESULTS OF ANALYSIS - Sediment/Soil**

Sample ID	SA30 2.2	SA31
Sample Date	01 10 12	01 10 15
ALS ID	16	17

Physical Tests

Moisture	%	12.0	7.1
pH			7.08

Total Metals

Antimony	T-Sb	<10
Arsenic	T-As	<5
Barium	T-Ba	48
Beryllium	T-Be	<0.5
Cadmium	T-Cd	<0.5
Chromium	T-Cr	14
Cobalt	T-Co	7
Copper	T-Cu	46
Lead	T-Pb	<50
Mercury	T-Hg	<0.05
Molybdenum	T-Mo	<4
Nickel	T-Ni	
Selenium	T-Se	<2
Silver	T-Ag	<2
Tin	T-Sn	<5
Vanadium	T-V	56
Zinc	T-Zn	26

Remarks regarding the analyses appear at the beginning of this report.
 Results are expressed as milligrams per dry kilogram except where noted.
 < = Less than the detection limit indicated.
 EPH = Extractable Petroleum Hydrocarbons.
 VPH = Volatile Petroleum Hydrocarbons.
 LEPH & HEPH = Light and Heavy Extractable Petroleum Hydrocarbons.

File No. N6896

RESULTS OF ANALYSIS - Sediment/Soil



Sample ID	SA30 2.2	SA31
Sample Date ALS ID	01 10 12 16	01 10 15 17
<hr/>		
<u>Extractable Hydrocarbons</u>		
EPH10-19	<200	<200
EPH19-32	<200	<200
LEPH	-	-
HEPH	-	-

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per dry kilogram except where noted.
< = Less than the detection limit indicated.
EPH = Extractable Petroleum Hydrocarbons.
VPH = Volatile Petroleum Hydrocarbons.
LEPH & HEPH = Light and Heavy Extractable Petroleum Hydrocarbons.

**Appendix 1 - QUALITY CONTROL - Replicates**

Sediment/Soil	SA14 3.5	SA14 3.5	SA24 1.1	SA24 1.1
	01 10 1	QC # 261917	01 10 12	QC # 261918
<hr/>				
<u>Physical Tests</u>				
Moisture %	12.6	12.4	14.8	14.
<u>Extractable Hydrocarbons</u>				
EPH10-19	<200	<200	<200	<200
EPH19-32	<200	<200	<200	<200

Remarks regarding the analyses appear at the beginning of this report.
 Results are expressed as milligrams per dry kilogram except where noted.
 < = Less than the detection limit indicated.
 EPH = Extractable Petroleum Hydrocarbons.
 VPH = Volatile Petroleum Hydrocarbons.
 LEPH & HEPH = Light and Heavy Extractable Petroleum Hydrocarbons.



Appendix 2 - METHODOLOGY

Outlines of the methodologies utilized for the analysis of the samples submitted are as follows

pH in Soil

This analysis is carried out in accordance with procedures described in "Soil Sampling and Methods of Analysis" (CSSS). The procedure involves mixing the air-dried sample with deionized/distilled water. The pH of the solution is then measured using a standard pH probe. A one to two ratio of sediment to water is used for mineral soils and a one to ten ratio is used for highly organic soils.

Metals in Sediment/Soil

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B or Method 3051, United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celcius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celcius for 2 hours by either hotplate or block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic absorption spectrophotometry (EPA Method 7000 series) and/or inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

Recommended Holding Time:

Sample:	6 months (Hg = 28 days)
Extract:	6 months (Hg = 28 days, Sb & Sn = 7 days)
Reference:	BCMELP

Moisture in Sediment/Soil

This analysis is carried out gravimetrically by drying the sample at 103 C for a minimum of six hours.

Recommended Holding Time:

Sample:	14 days
Reference:	Puget

For more detail see ALS Environmental "Collection & Sampling Guide"

Extractable Hydrocarbons in Sediment/Soil

This analysis is carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Extractable Petroleum Hydrocarbons in Solids by GC/FID, Version 2.1 July 1999". The procedure uses an automated system (Accelerated Solvent Extractor - ASE) to extract a subsample of the sediment/soil with a 1:1 mixture of hexane and acetone at high temperature and pressure. The extract is then solvent exchanged to toluene and



Appendix 2 - METHODOLOGY - Continued

analysed by capillary column gas chromatography with flame ionization detection (GC/FID). EPH results include Polycyclic Aromatic Hydrocarbons (PAH) and are therefore not equivalent to Light and Heavy Extractable Petroleum Hydrocarbons (LEPH/HEPH).

Recommended Holding Time:

Sample: 14 days

Extract: 40 days

Reference: BCMELP

For more detail see ALS Environmental "Collection & Sampling Guide"

Volatile Organic Compounds and Volatile Hydrocarbons in Sediment/Soil

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then analyzed for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID) and for specific Volatile Organic Compounds (VOC) by capillary column gas chromatography with mass spectrometric detection (GC/MS). The methanol extraction and VH analysis are carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999). The VOC analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 8260, published by the United States Environmental Protection Agency (EPA).

Recommended Holding Time:

Sample: 7 days

Extract: 40 days

Reference: BCMELP

For more detail see ALS Environmental "Collection & Sampling Guide"

Volatile Petroleum Hydrocarbons (VPH) in Solids

These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Volatile Petroleum Hydrocarbons in Solids or Water" (Version 2.1, July 20, 1999). According to this method, the concentrations of specific Monocyclic Aromatic Hydrocarbons (Benzene, Toluene, Xylenes and Styrene) are subtracted from the collective concentration of Volatile Hydrocarbons (VH) that elute between n-hexane (nC6) and n-decane (nC10). Analysis of Volatile Hydrocarbons adheres to all prescribed elements of BCMELP method "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1, July 20, 1999).

Recommended Holding Time: Not Applicable

Polycyclic Aromatic Hydrocarbons in Sediment/Soil

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3545, 3630 & 8270, published by the United States Environmental Protection Agency (EPA). The procedure uses an automated system (Accelerated Solvent Extractor - ASE) to extract a subsample of the sediment/soil with a 1:1 mixture of hexane and acetone. The extract is then solvent exchanged to toluene and undergoes a silica gel clean-up to remove sample components that could potentially interfere with the analysis. The final extract is analysed by capillary column gas chromatography with mass spectrometric detection (GC/MS).



Appendix 2 - METHODOLOGY - Continued

Recommended Holding Time:

Sample: 14 days

Extract: 40 days

Reference: EPA

For more detail see ALS Environmental "Collection & Sampling Guide"

Light and Heavy Extractable Petroleum Hydrocarbons in Solids

These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated by subtracting selected Polycyclic Aromatic Hydrocarbon results from Extractable Petroleum Hydrocarbon results. To calculate LEPH, the individual results for Naphthalene and Phenanthrene are subtracted from EPH(C10-19). To calculate HEPH, the individual results for Benz(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Dibenz(a,h)anthracene, Indeno(1,2,3-c,d)pyrene, and Pyrene are subtracted from EPH(C19-32). Analysis of Extractable Petroleum Hydrocarbons adheres to all prescribed elements of the BCMELP method "Extractable Petroleum Hydrocarbons in Solids by GC/FID" (Version 2.1, July 20, 1999).

Recommended Holding Time: Not Applicable

Polychlorinated Biphenyls in Sediment/Soil

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3500, 3620, 3630, 3660, 3665 & 8082, published by the United States Environmental Protection Agency (EPA). The procedure involves a solid-liquid extraction of a subsample of the sediment/soil using a mixture of hexane and acetone. Water is added to the extract and the resulting hexane extract undergoes one or more of the following clean-up procedures (if required): florisil clean-up, silica gel clean-up, sulphur clean-up and/or sulphuric acid clean-up. The final extract is analysed by capillary column gas chromatography with electron capture detection (GC/ECD).

Recommended Holding Time:

Sample: 14 days

Extract: 40 days

Reference: EPA

For more detail see ALS Environmental "Collection & Sampling Guide"

End Of Report



CHEMICAL ANALYSIS REPORT

Date: October 30, 2001

ALS File No. N7036

Report On: 202.01221.003 Soil Analysis
BCBC

Report To: **SEACOR Environmental Inc.**
#9 - 6421 Applecross Rd.
Nanaimo, BC
V9V 1N1

Attention: **Mr. Brad Halsey**

Received: October 20, 2001

ALS ENVIRONMENTAL

per:

Joanne Patrick, B.Sc. - Project Chemist
Can Dang, B.Sc. - Project Chemist

File No. N7036

REMARKS



The detection limit for Selenium was increased due to matrix interferences encountered during analysis.

RESULTS OF ANALYSIS - Sediment/Soil

Sample ID

Sample Date
ALS ID01 10 18
1**Physical Tests**

pH

Total Metals

Antimony	T-Sb	<10
Arsenic	T-As	7
Barium	T-Ba	45
Beryllium	T-Be	<0.5
Cadmium	T-Cd	<0.5
Chromium	T-Cr	61
Cobalt	T-Co	19
Copper	T-Cu	66
Lead	T-Pb	<50
Mercury	T-Hg	0.11
Molybdenum	T-Mo	<4
Nickel	T-Ni	62
Selenium	T-Se	<3
Silver	T-Ag	<2
Tin	T-Sn	<5
Vanadium	T-V	123
Zinc	T-Zn	46

Remarks regarding the analyses appear at the beginning of this report.
 Results are expressed as milligrams per dry kilogram except where noted.
 < = Less than the detection limit indicated.

Appendix 1 - METHODOLOGY



Outlines of the methodologies utilized for the analysis of the samples submitted are as follows

pH in Soil

This analysis is carried out in accordance with procedures described in "Soil Sampling and Methods of Analysis" (CSSS). The procedure involves mixing the air-dried sample with deionized/distilled water. The pH of the solution is then measured using a standard pH probe. A one to two ratio of sediment to water is used for mineral soils and a one to ten ratio is used for highly organic soils.

Metals in Sediment/Soil

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B or Method 3051, United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celcius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celcius for 2 hours by either hotplate or block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic absorption spectrophotometry (EPA Method 7000 series) and/or inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

Recommended Holding Time:

Sample:	6 months (Hg = 28 days)
Extract:	6 months (Hg = 28 days, Sb & Sn = 7 days)
Reference:	BCMELP

End Of Report



CHEMICAL ANALYSIS REPORT

Date: October 31, 2001

ALS File No. N6919

Report On: 202.01221.003 Water Analysis
BCBC

Report To: **SEACOR Environmental Inc.**
#9 - 6421 Applecross Rd.
Nanaimo, BC
V9V 1N1

Attention: **Mr. Brad Halsey**

Received: October 18, 2001

ALS ENVIRONMENTAL

per:

Joanne Patrick, B.Sc. - Project Chemist
Can Dang, B.Sc. - Project Chemist

File No. N6919

RESULTS OF ANALYSIS - Water



Sample ID	Tank Water
Sample Date	01 10 15
ALS ID	1

Extractable Hydrocarbons

EPH10-19	<0.3
EPH19-32	1

Extractables

Mineral Oil & Grease	<5
----------------------	----

Results are expressed as milligrams per litre except where noted.
EPH = Extractable Petroleum Hydrocarbons.
EPH10-19 is equivalent to EHw10-19.

Appendix 1 - METHODOLOGY



Outlines of the methodologies utilized for the analysis of the samples submitted are as follows

Extractable Hydrocarbons in Water

This analysis is carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Extractable Petroleum Hydrocarbons in Water by GC/FID" (Version 2.1, July 1999). The procedure involves extraction of the entire water sample with dichloromethane. The extract is then solvent exchanged to toluene and analysed by capillary column gas chromatography with flame ionization detection (GC/FID). EPH results include Polycyclic Aromatic Hydrocarbons (PAH) and are therefore not equivalent to Light and Heavy Extractable Petroleum Hydrocarbons (LEPH/HEPH).

Recommended Holding Time:

Sample: 7 days

Extract: 40 days

Reference: BCMELP

For more detail see ALS Environmental "Collection & Sampling Guide"

Mineral Oil and Grease in Water

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3510 & 9071, published by the United States Environmental Protection Agency (EPA), "Standard Methods for the Examination of Water and Wastewater", 20th ed., Method 5520, published by the American Public Health Association, and "BC Environmental Laboratory Manual for the Analysis of Water, Wastewater, Sediment and Biological Materials," 5th ed., published by the B.C. Ministry of Environment, Lands & Parks, 1994. The procedure involves an extraction of the entire water sample with hexane followed by a silica gel clean-up, to remove most naturally occurring non-petrogenic organic compounds. This extract is then evaporated to dryness, and the residue weighed to determine Mineral Oil and Grease.

Recommended Holding Time:

Sample: 28 days

Extract: 40 days

Reference: Puget Sound Protocols

For more detail see ALS Environmental "Collection & Sampling Guide"

End Of Report

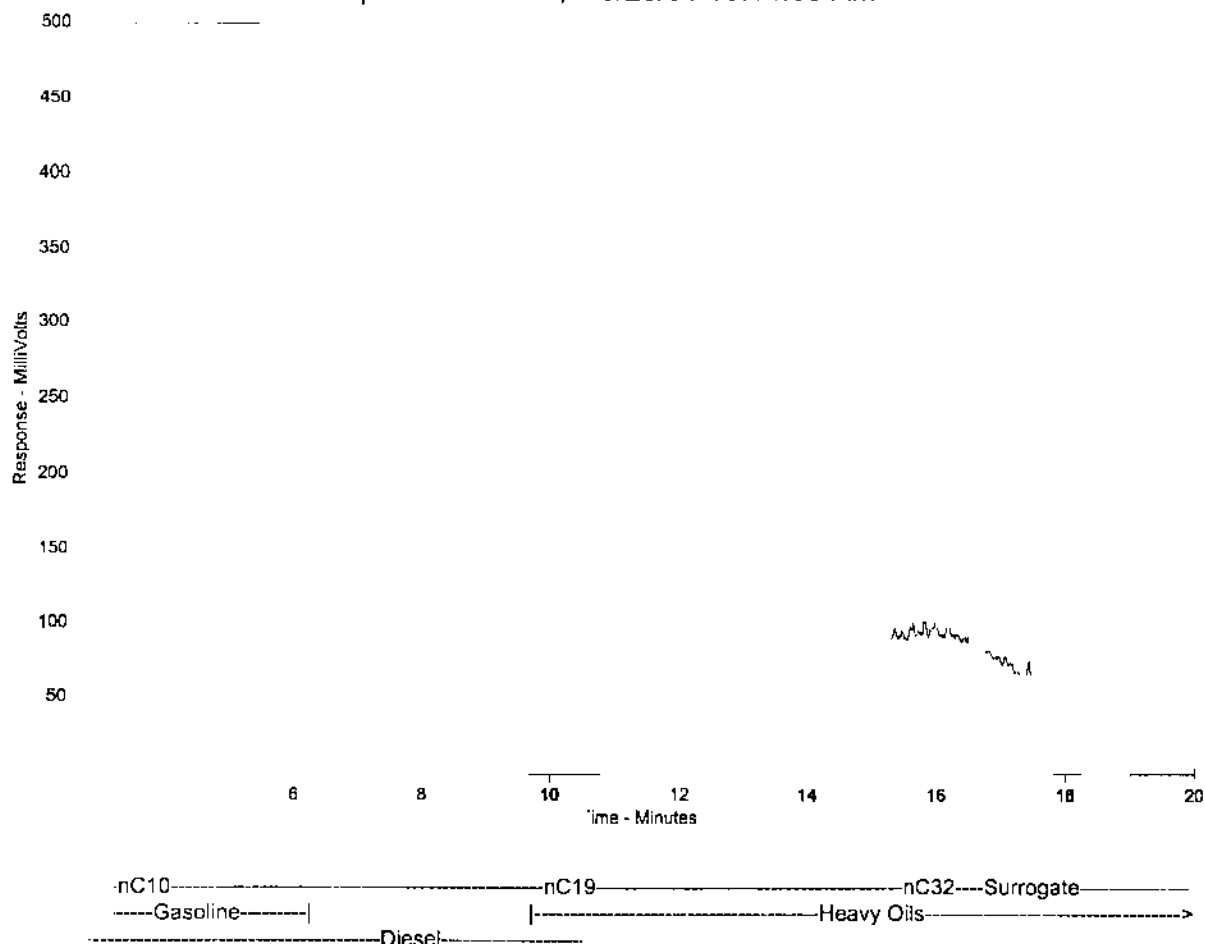
ALS Environmental - Hydrocarbon Distribution Report

Client Sample ID:

ALS Sample ID: N6919-T--1

File Name: i:\Chrom\gc12\data\gc12_25octB.0018.RAW

Run Information: Acquired on GC12, 10/26/01 10:14:33 AM



Dilution Factor = 1.0

The Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and of three n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample. A current library of reference products is available upon request.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

A C35 surrogate compound is added to all samples by the laboratory as a component of quality control. Depending on the amount of heavy hydrocarbons present in the sample, this peak may or may not be visible near the end of the chromatogram where indicated.



CHEMICAL ANALYSIS REPORT

Date: November 10, 2001

ALS File No. N7042r

Report On: 202.01221.003 Soil Analysis
BCBC

Report To: **SEACOR Environmental Inc.**
#9 - 6421 Applecross Rd.
Nanaimo, BC
V9V 1N1

Attention: **Mr. Brad Halsey**

Received: October 17, 2001

ALS ENVIRONMENTAL

per: *A* *n*

** anne Harris*
Can Dang, B.Sc. - Project Chemist
Leanne Harris, B.Sc. - Project Chemist

File No. N7042r

REMARKS



This report, N7042r, supercedes previously issued report N7042 and now contains results for analysis added to the sample identified as "TP1 SA2 1.5m".

The sample, "TP1 SA2 1.5m", was originally submitted to ALS Environmental on October 17, 2001. Extractable Hydrocarbons analysis was requested on this sample on November 5, 2001. The sample had exceeded the ALS recommended holding time of analysis within 14 days after collection. This point should be considered when reviewing the data.

RESULTS OF ANALYSIS - Sediment/Soil

Sample ID	SA35	SA36	TP1 SA2 1.5m
Sample Date	01 10 16	01 10 16	01 10 16
ALS ID	1	2	3
<hr/>			
Physical Tests			
Moisture %	13.4	4.3	15.4
pH	6.26	-	7.43
Total Metals			
Antimony T-Sb	<10		<10
Arsenic T-As	6		<5
Barium T-Ba	67		63
Beryllium T-Be	<0.5		<0.5
Cadmium T-Cd	<0.5		<0.5
Chromium T-Cr	39		20
Cobalt T-Co	13		8
Copper T-Cu	53		59
Lead T-Pb	<50		<50
Mercury T-Hg	0.11		<0.05
Molybdenum T-Mo	<4		<4
Nickel T-Ni	36		16
Selenium T-Se	<3		<3
Silver T-Ag	<2		<2
Tin T-Sn	<5		<5
Vanadium T-V	82		52
Zinc T-Zn	74		57

Remarks regarding the analyses appear at the beginning of this report.
 Results are expressed as milligrams per dry kilogram except where noted.
 LEPH & HEPH = Light and Heavy Extractable Petroleum Hydrocarbons.
 < = Less than the detection limit indicated.
 EPH = Extractable Petroleum Hydrocarbons.

RESULTS OF ANALYSIS - Sediment/Soil

Sample ID	SA35	SA36	TP1 SA2 1.5m
Sample Date	01 10 16	01 10 16	01 10 16
ALS ID	1	2	3

Polycyclic Aromatic Hydrocarbons

Acenaphthene	<0.01
Acenaphthylene	<0.02
Anthracene	<0.01
Benz(a)anthracene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(g,h,i)perylene	0.02
Benzo(k)fluoranthene	<0.01
Chrysene	<0.02
Dibenz(a,h)anthracene	<0.01
Fluoranthene	<0.3
Fluorene	<0.02
Indeno(1,2,3-c,d)pyrene	<0.01
Naphthalene	0.02
Phenanthrene	<0.04

Pyrene

Extractable Hydrocarbons

EPH10-19	1350	<200	<200
EPH19-32	1380	<200	<200
LEPH	1350	-	-
HEPH	1380	-	-

Remarks regarding the analyses appear at the beginning of this report.
 Results are expressed as milligrams per dry kilogram except where noted.
 LEPH & HEPH = Light and Heavy Extractable Petroleum Hydrocarbons.
 < = Less than the detection limit indicated.
 EPH = Extractable Petroleum Hydrocarbons.

Appendix 1 - METHODOLOGY



Outlines of the methodologies utilized for the analysis of the samples submitted are as follows

Moisture in Sediment/Soil

This analysis is carried out gravimetrically by drying the sample at 103 C for a minimum of six hours.

Recommended Holding Time:

Sample: 14 days

Reference: Puget

For more detail see ALS Environmental "Collection & Sampling Guide"

pH in Soil

This analysis is carried out in accordance with procedures described in "Soil Sampling and Methods of Analysis" (CSSS). The procedure involves mixing the air-dried sample with deionized/distilled water. The pH of the solution is then measured using a standard pH probe. A one to two ratio of sediment to water is used for mineral soils and a one to ten ratio is used for highly organic soils.

Metals in Sediment/Soil

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B or Method 3051, United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celcius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celcius for 2 hours by either hotplate or block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic absorption spectrophotometry (EPA Method 7000 series) and/or inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

Recommended Holding Time:

Sample: 6 months (Hg = 28 days)

Extract: 6 months (Hg = 28 days, Sb & Sn = 7 days)

Reference: BCMELP

Polycyclic Aromatic Hydrocarbons in Sediment/Soil

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3545, 3630 & 8270, published by the United States Environmental Protection Agency (EPA). The procedure uses an automated system (Accelerated Solvent Extractor - ASE) to extract a subsample of the sediment/soil with a 1:1 mixture of hexane and acetone. The extract is then solvent exchanged to toluene and undergoes a silica gel clean-up to remove sample components that could potentially interfere with



Appendix 1 - METHODOLOGY - Continued

the analysis. The final extract is analysed by capillary column gas chromatography with mass spectrometric detection (GC/MS).

Recommended Holding Time:

Sample: 14 days Extract: 40 days

Reference: EPA

For more detail see ALS Environmental "Collection & Sampling Guide"

Extractable Hydrocarbons in Sediment/Soil

This analysis is carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Extractable Petroleum Hydrocarbons in Solids by GC/FID, Version 2.1 July 1999". The procedure uses an automated system (Accelerated Solvent Extractor - ASE) to extract a subsample of the sediment/soil with a 1:1 mixture of hexane and acetone at high temperature and pressure. The extract is then solvent exchanged to toluene and analysed by capillary column gas chromatography with flame ionization detection (GC/FID). EPH results include Polycyclic Aromatic Hydrocarbons (PAH) and are therefore not equivalent to Light and Heavy Extractable Petroleum Hydrocarbons (LEPH/HEPH).

Recommended Holding Time:

Sample: 14 days Extract: 40 days

Reference: BCMELP

For more detail see ALS Environmental "Collection & Sampling Guide"

Light and Heavy Extractable Petroleum Hydrocarbons in Solids

These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated by subtracting selected Polycyclic Aromatic Hydrocarbon results from Extractable Petroleum Hydrocarbon results. To calculate LEPH, the individual results for Naphthalene and Phenanthrene are subtracted from EPH(C10-19). To calculate HEPH, the individual results for Benz(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Dibenz(a,h)anthracene, Indeno(1,2,3-c,d)pyrene, and Pyrene are subtracted from EPH(C19-32). Analysis of Extractable Petroleum Hydrocarbons adheres to all prescribed elements of the BCMELP method "Extractable Petroleum Hydrocarbons in Solids by GC/FID" (Version 2.1, July 20, 1999).

Recommended Holding Time: Not Applicable

End Of Report



CHEMICAL ANALYSIS REPORT

Date: February , 2002

ALS File No. N8851r

Report On: 202.0122 .003 Soil Analysis
BCBC

Report To: **SEACOR Environmental Inc.**
#9 - 6421 Applecross Rd.
Nanaimo, BC
V9V 1N1

Attention: **Ms. Suzanne Durnin**

Received: December 8, 2001

ALS ENVIRONMENTAL

per:

Leanne Harris, B.Sc. - Project Chemist
Can Dang, B.Sc. - Project Chemist

File No. N8851r

REMARKS



This report, N8851r replaces and supercedes previously issued report N8851 and contains changes to sample descriptions.

RESULTS OF ANALYSIS - Sediment/Soil

Sample ID		BH01-1 SA2	BH01-2 SA3	BH01-3 SA3
<i>ALS ID</i>		<i>1</i>	<i>2</i>	<i>3</i>
<hr/>				
<u>Physical Tests</u>				
pH		7.14	7.58	7.65
<u>Total Metals</u>				
Antimony	T-Sb	<10	<10	<10
Arsenic	T-As	<5	<5	6
Barium	T-Ba	67	41	67
Beryllium	T-Be	<0.5	<0.5	<0.5
Cadmium	T-Cd	<0.5	<0.5	<0.5
Chromium	T-Cr	25	19	28
Cobalt	T-Co	8	8	10
Copper	T-Cu	82	42	63
Lead	T-Pb	<50	<50	<50
Mercury	T-Hg	<0.05	<0.05	<0.05
Molybdenum	T-Mo	<4	<4	<4
Nickel	T-Ni	19	16	21
Selenium	T-Se	<4	<3	<5
Silver	T-Ag	<2	<2	<2
Tin	T-Sn	<5	<5	<5
Vanadium	T-V	60	64	72
Zinc	T-Zn	72	31	44

Remarks regarding the analyses appear at the beginning of this report.
 Results are expressed as milligrams per dry kilogram except where noted.
 < = Less than the detection limit indicated.

Appendix 1 - METHODOLOGY



Outlines of the methodologies utilized for the analysis of the samples submitted are as follows

pH in Soil

This analysis is carried out in accordance with procedures described in "Soil Sampling and Methods of Analysis" (CSSS). The procedure involves mixing the air-dried sample with deionized/distilled water. The pH of the solution is then measured using a standard pH probe. A one to two ratio of sediment to water is used for mineral soils and a one to ten ratio is used for highly organic soils.

Metals in Sediment/Soil

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B or Method 3051, United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celcius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celcius for 2 hours by either hotplate or block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic absorption spectrophotometry (EPA Method 7000 series) and/or inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

Recommended Holding Time:

Sample:	6 months (Hg = 28 days)
Extract:	6 months (Hg = 28 days, Sb & Sn = 7 days)
Reference:	BCMELP

End Of Report



CHEMICAL ANALYSIS REPORT

Date: February 1, 2002

ALS File No. N8963r

Report On: 202.01221.003 Water Analysis
BCBC

Report To: **SEACOR Environmental Inc.**
#9 - 6421 Applecross Rd.
Nanaimo, BC
V9V 1N1

Attention: **Ms. Suzanne Durnin**

Received: December 12, 2001

ALS ENVIRONMENTAL

per:

Leanne Harris, B.Sc. - Project Chemist
Can Dang, B.Sc. - Project Chemist

File No. N8963r

REMARKS



This report, N8963r replaces and supercedes previously issued report N8963 and contains changes to sample descriptions.

RESULTS OF ANALYSIS - Water

Sample ID BH01-3

Sample Date 01 12 1
ALS ID 1**Physical Tests**Hardness CaCO₃ 83.9**Dissolved Anions**

Chloride Cl 34.6

Dissolved Metals

Aluminum	D-Al	0.04
Antimony	D-Sb	<0.01
Arsenic	D-As	<0.001
Barium	D-Ba	0.08
Beryllium	D-Be	<0.005
Boron	D-B	<0.1
Cadmium	D-Cd	<0.0002
Calcium	D-Ca	26.4
Chromium	D-Cr	<0.01
Cobalt	D-Co	<0.01
Copper	D-Cu	0.005
Iron	D-Fe	<0.03
Lead	D-Pb	<0.001
Lithium	D-Li	<0.05
Magnesium	D-Mg	4.4
Manganese	D-Mn	0.32
Mercury	D-Hg	<0.0002
Molybdenum	D-Mo	<0.001
Nickel	D-Ni	<0.05
Selenium	D-Se	<0.001
Silver	D-Ag	<0.0001
Sodium	D-Na	48
Thallium	D-Tl	<0.0002
Uranium	D-U	<0.0002
Vanadium	D-V	<0.03
Zinc	D-Zn	<0.05

Remarks regarding the analyses appear at the beginning of this report.

Results are expressed as milligrams per litre except where noted.

< = Less than the detection limit indicated.

VPH = Volatile Petroleum Hydrocarbons.

EPH = Extractable Petroleum Hydrocarbons.

EPH10-19 is equivalent to EHW10-19.

LEPH & HEPH = Light and Heavy Extractable Petroleum Hydrocarbons.

RESULTS OF ANALYSIS - Water

Sample ID BH01-3

Sample Date 01 12 11
ALS ID 1**Non-Halogenated Volatiles**

Benzene	<0.0005
Ethylbenzene	<0.0005
Toluene	<0.0005
meta- & para-Xylene	<0.0005
ortho-Xylene	<0.0005

Volatile Hydrocarbons (VH6-10)	<0.1
VPH	<0.1

Polycyclic Aromatic Hydrocarbons

Acenaphthene	<0.00005
Acenaphthylene	<0.00005
Acridine	<0.00005
Anthracene	<0.00005
Benz(a)anthracene	<0.00005

Benzo(a)pyrene	<0.00001
Benzo(b)fluoranthene	<0.00005
Benzo(g,h,i)perylene	<0.00005
Benzo(k)fluoranthene	<0.00005
Chrysene	<0.00005

Dibenz(a,h)anthracene	<0.00005
Fluoranthene	<0.00005
Fluorene	<0.00005
Indeno(1,2,3-c,d)pyrene	<0.00005
Naphthalene	<0.00005

Phenanthrene	<0.00005
Pyrene	<0.00005

Extractable Hydrocarbons

EPH10-19	<0.3
EPH19-32	<1
LEPH	<0.3
HEPH	<1

Appendix 1 - METHODOLOGY



Outlines of the methodologies utilized for the analysis of the samples submitted are as follows

Conventional Parameters in Water

These analyses are carried out in accordance with procedures described in "Methods for Chemical Analysis of Water and Wastes" (USEPA), "Manual for the Chemical Analysis of Water, Wastewaters, Sediments and Biological Tissues" (BCMOE), and/or "Standard Methods for the Examination of Water and Wastewater" (APHA). Further details are available on request.

Chloride in Water

This analysis is carried out using procedures adapted from APHA Method 4500 "Chloride". Chloride is determined using the ferricyanide colourimetric method.

Recommended Holding Time:

Sample: 28 days

Reference: APHA

For more detail see ALS Environmental "Collection & Sampling Guide"

Metals in Water

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" 20th Edition 1998 published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotplate or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by atomic absorption/emission spectrophotometry (EPA Method 7000 series), inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B), and/or inductively coupled plasma - mass spectrometry (EPA Method 6020).

Recommended Holding Time:

Sample: 6 months

Reference: EPA

For more detail see: ALS "Collection & Sampling Guide"

Mercury in Water

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" 20th Edition 1998 published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic absorption and/or fluorescence spectrophotometry (EPA Method 7470A/7471A/245.7).

Recommended Holding Time:

Sample: 28 days

Appendix 1 - METHODOLOGY - Continued



Reference: EPA
For more detail see ALS Environmental "Collection & Sampling Guide"

Volatile Organic Compounds and Volatile Hydrocarbons in Water

This procedure involves the purge and trap extraction of the sample prior to analysis for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID) and for specific Volatile Organic Compounds (VOC) by capillary column gas chromatography with mass spectrometric detection (GC/MS). The VH analysis is carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Water by GC/FID" (Version 2.1, July 1999). The VOC analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 8260, published by the United States Environmental Protection Agency (EPA).

Recommended Holding Time:

Sample: 7 days Extract: NA

Reference: BCMELP

For more detail see ALS Environmental "Collection & Sampling Guide"

Volatile Petroleum Hydrocarbons (VPH) in Water

These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Volatile Petroleum Hydrocarbons in Solids or Water" (Version 2.1, July 20, 1999). According to this method, the concentrations of specific Monocyclic Aromatic Hydrocarbons (Benzene, Toluene, Ethylbenzene, and Xylenes) are subtracted from the collective concentration of Volatile Hydrocarbons (VH) that elute between n-hexane (nC6) and n-decane (nC10). Analysis of Volatile Hydrocarbons adheres to all prescribed elements of BCMELP method "Volatile Hydrocarbons in Water by GC/FID" (Version 2.1, July 20, 1999).

Recommended Holding Time: Not Applicable

Polycyclic Aromatic Hydrocarbons in Water

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3510, 3630 & 8270, published by the United States Environmental Protection Agency (EPA). The procedure involves extraction of the entire water sample with dichloromethane. The extract is then solvent exchanged to toluene prior to analysis by capillary column gas chromatography with mass spectrometric detection (GC/MS).

Recommended Holding Time:

Sample: 7 days Extract: 40 days

Reference: EPA

For more detail see ALS Environmental "Collection & Sampling Guide"

Appendix 1 - METHODOLOGY - Continued



Extractable Hydrocarbons in Water

This analysis is carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Extractable Petroleum Hydrocarbons in Water by GC/FID" (Version 2.1, July 1999). The procedure involves extraction of the entire water sample with dichloromethane. The extract is then solvent exchanged to toluene and analysed by capillary column gas chromatography with flame ionization detection (GC/FID). EPH results include Polycyclic Aromatic Hydrocarbons (PAH) and are therefore not equivalent to Light and Heavy Extractable Petroleum Hydrocarbons (LEPH/HEPH).

Recommended Holding Time:

Sample: 7 days

Extract: 40 days

Reference: BCMELP

For more detail see ALS Environmental "Collection & Sampling Guide"

Light and Heavy Extractable Petroleum Hydrocarbons in Water

These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated by subtracting selected Polynuclear Aromatic Hydrocarbon results from Extractable Petroleum Hydrocarbon results. To calculate LEPH, the individual results for Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene, and Phenanthrene are subtracted from EPH(C10-19). To calculate HEPH, the individual results for Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene are subtracted from EPH(C19-32). Analysis of Extractable Petroleum Hydrocarbons adheres to all prescribed elements of the BCMELP method "Extractable Petroleum Hydrocarbons in Water by GC/FID" (Version 2.1, July 20, 1999).

Recommended Holding Time: Not Applicable

End Of Report

APPENDIX C
SUPPLEMENTAL INFORMATION

As of: MAR 10, 2002 BC Online: Site Registry 02-03-12
 For: PC54841 SEACOR ENVIRONMENTAL ENGINEERING I 18:06:51
 Folio: Page 1

Detail Report

SITE LOCATION

Site ID: 7528 Latitude: 49d 06m 25.3s
 Victoria File: Longitude: 123d 54m 06.2s
 Regional File: 26250-20/7528
 Region: NANAIMO, VANCOUVER ISLAND

Site Address: 1329 KIPP ROAD

City: CASSIDY

Prov/State: BC

Postal Code:

Registered: OCT 26, 2001 Updated: NOV 16, 2001 Detail Removed: NOV 02, 2001

Notations: 1 Participants: 3 Associated Sites: 0
 Documents: 0 Susp. Land Use: 0 Parcel Descriptions: 2

Location Description: FORMER CASSIDY HIGHWAYS YARD

Record Status: ACTIVE - UNDER REMEDIATION

Fee category: UNRANKED

=====

NOTATIONS

Notation Type: NOTICE OF INDEPENDENT REMEDIATION INITIATION SUBMITTED (WMA
 28(2))

Notation Class: WASTE MANAGEMENT ACT: CONTAMINATED SITES NOTATIONS

Initiated: OCT 05, 2001

Approved:

Ministry Contact: COLLISON-BAKER, JOHN

Notation Participants

SEACOR ENVIRONMENTAL ENGINEERING INC. (NANAIMO,
 BC (APPLECROSS ROAD))

Notation Roles

SUBMITTED BY

=====

SITE PARTICIPANTS

Participant: BC BUILDINGS CORPORATION (VICTORIA, BC)

Role(s): PROPERTY OWNER

Start Date: OCT 05, 2001

End Date:

Participant: COLLISON-BAKER, JOHN

Role(s): MAIN BC ENVIRONMENT CONTACT

Start Date: OCT 05, 2001

End Date:

Participant: SEACOR ENVIRONMENTAL ENGINEERING INC. (NANAIMO, BC
 (APPLECROSS ROAD))

Role(s): ENVIRONMENTAL CONSULTANT/CONTRACTOR

Start Date: OCT 05, 2001

End Date:

=====

PARCEL DESCRIPTIONS

Date Added: OCT 16, 2001

Crown Land PIN#:

As of: MAR 10, 2002 BC Online: Site Registry 02-03-12
For: PC54841 SEACOR ENVIRONMENTAL ENGINEERING I 18:06:51
Folio: Page 2
PARCEL DESCRIPTIONS

LTO PID#: 000181455 Crown Land File#:
Land Desc: LOT 1, SECTION 14, RANGE 6, CRANBERRY DISTRICT, PLAN 40297

Date Added: NOV 01, 2001 Crown Land PIN#:
LTO PID#: 003932109 Crown Land File#:
Land Desc: LOT 3, SECTION 14, RANGE 6, QUAMICHAN DISTRICT, PLAN 17289
No activities were reported for this site

End of Detail Report

Date: 02/01/16 TITLE SEARCH PRINT - VICTORIA
Requestor: (PC54841) SEACOR ENVIRONMENTAL ENGINEERING INC.
 TITLE - N20630

Time: 08:35:21
Page: 001

VICTORIA LAND TITLE OFFICE TITLE NO: N20630
 FROM TITLE NO: M99669
 CROWN GRANT

APPLICATION FOR REGISTRATION RECEIVED ON: 12 MARCH, 1984
 ENTERED: 13 MARCH, 1984

REGISTERED OWNER IN FEE SIMPLE:
BRITISH COLUMBIA BUILDINGS CORPORATION
BOX 1112
VICTORIA, B.C.
V8W 2T4

TAXATION AUTHORITY:
NANAIMO/COWICHAN ASSESSMENT AREA

DESCRIPTION OF LAND:
PARCEL IDENTIFIER: 000-181-455
LOT 1, SECTION 14, RANGE 6, CRANBERRY DISTRICT, PLAN 40297

LEGAL NOTATIONS:

FOR PROVISOS, SEE CROWN GRANT N20630

CHARGES, LIENS AND INTERESTS:

NATURE OF CHARGE

CHARGE NUMBER	DATE	TIME
---------------	------	------

U & OTHER EX & RES RE GRANT N20630

N20879	1984-03-12	10:58
--------	------------	-------

REGISTERED OWNER OF CHARGE:

HER MAJESTY THE QUEEN IN RIGHT OF THE PROVINCE
OF BRITISH COLUMBIA
N20879

REMARKS: DD N20630 SECTION 47 LAND ACT

"CAUTION - CHARGES MAY NOT APPEAR IN ORDER OF PRIORITY. SEE SECTION 28, L.T.A."

DUPLICATE INDEFEASIBLE TITLE: NONE OUTSTANDING

TRANSFERS: NONE

PENDING APPLICATIONS: NONE

CORRECTIONS: NONE

Deposited in the Land Title Office at Victoria, B.C.
this 14th day of December, 1983.

[Signature]
REGISTRAR

Approved under the Land Title Act
this 31st day of AUG., 1983

[Signature]
Approving Officer
Ministry Of Transportation & Highways

I hereby certify that this is a true
copy of the Official Plan on deposit
with the Surveyor General, Ministry
of Lands, Parks and Housing and
numbered 2 tube 1208

[Signature]
Surveyor General, Victoria, B.C.
October 5, 1983

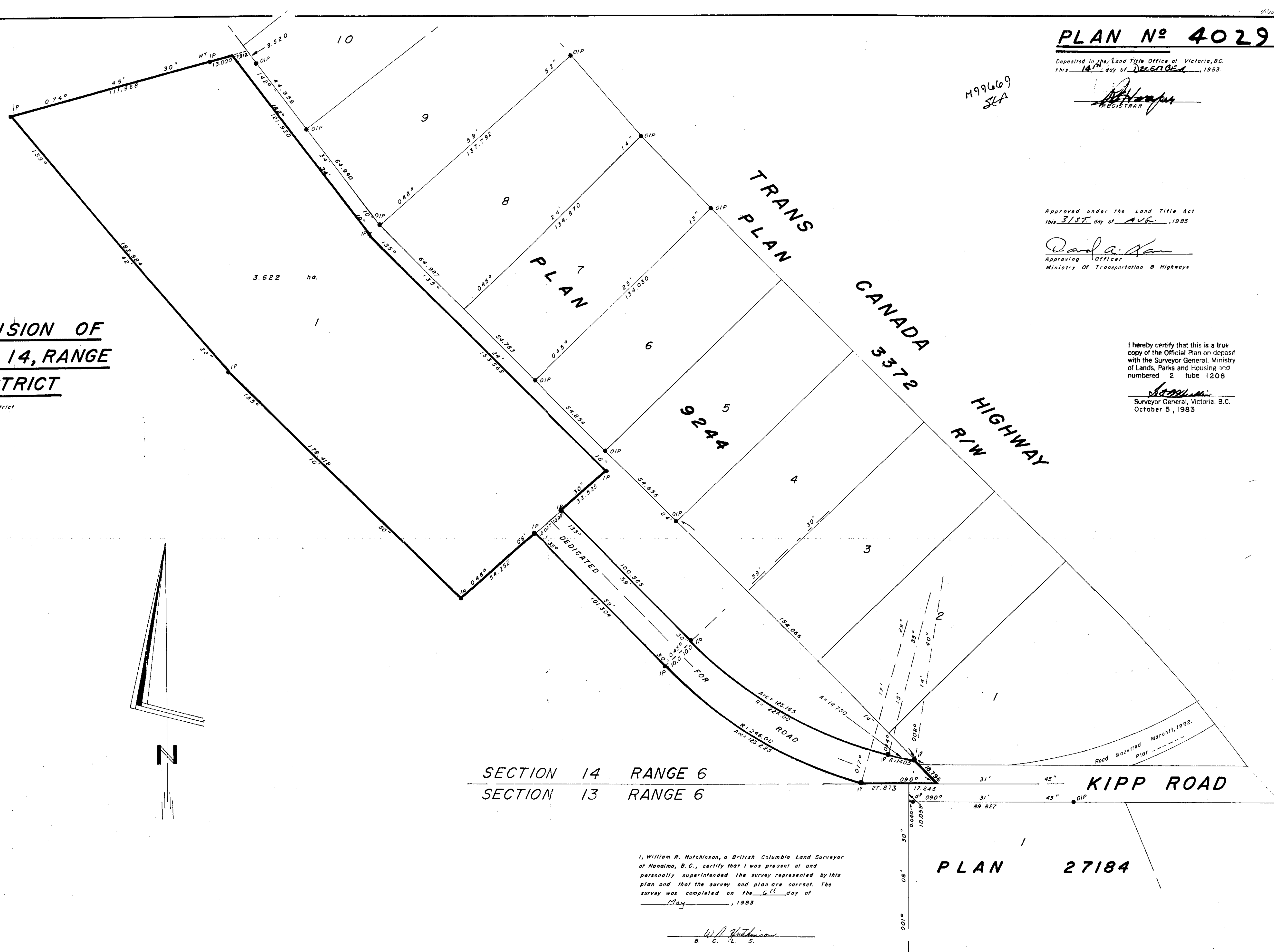
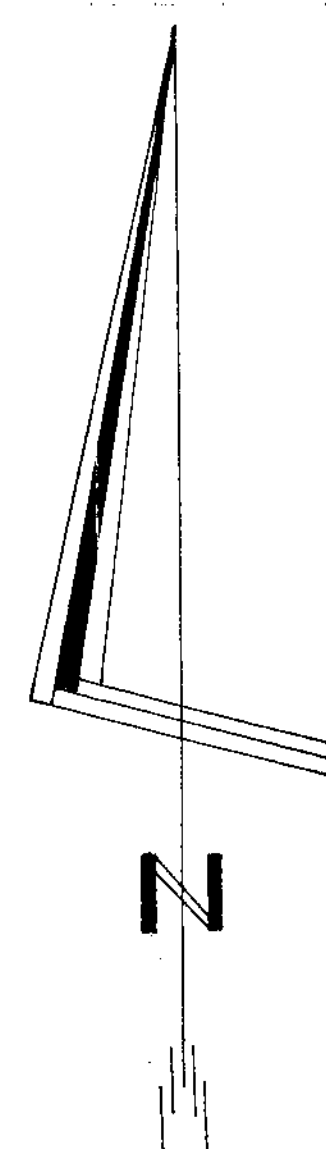
PLAN OF SUBDIVISION OF PART OF SECTION 14, RANGE 6, CRANBERRY DISTRICT

This plan lies within the Nanaimo Regional District

LEGEND
ha. denotes HECTARES
IP denotes IRON POST set
OIP denotes IRON POST found
WT denotes WITNESS POST set
R denotes RADIUS
A denotes ARC
Bearings are derived from Plan 27184

SCALE: 1:1000

20m 0 25 50m
All distances are in metres



SECTION 14 RANGE 6
SECTION 13 RANGE 6

I, William R. Hutchinson, a British Columbia Land Surveyor
of Nanaimo, B.C., certify that I was present at and
personally superintended the survey represented by this
plan and that the survey and plan are correct. The
survey was completed on the 6th day of
May, 1983.

[Signature]
B. C. L. S.

BCBC



FILE COPY

9 - 6421 Applecross Road
Nanaimo, BC Canada
V9V 1N1
Tel: (250) 390-5050
Fax: (250) 390-5042
www.seacorcandada.com

October 5, 2001

Ministry of Water, Land and Air Protection
2080-A Labieux Road
Nanaimo, B.C.
V9T 6J9

Attention: Mr. Ron Bollans, P.Eng.
Assistant Regional Waste Manager
Head, Industrial Section

**RE: NOTIFICATION OF INDEPENDENT REMEDIATION
CASSIDY HIGHWAYS YARD
1329 KIPP ROAD, CASSIDY, B.C.
SEACOR PROJECT NO.: 202.01221.003**

Dear Sir:

SEACOR Environmental Inc. (SEACOR), on behalf of the British Columbia Buildings Corporation (BCBC) is providing Notification of Independent Remediation to BC Environment for the above-referenced site as required under the Waste Management Act, Contaminated Sites Regulation (CSR), BC Reg. 375/96. In addition, SEACOR has completed a site-specific Notification of Independent Remediation form as provided by BC Environment.

Approximately 10m³ of *Commercial* and 30m³ of Transportation of Dangerous Goods (TDG) *Special Waste* metals-impacted soils were encountered in a burn pile and sandblasting area, respectively and would require remediation; additionally, approximately 18 m³ *Special Waste* Section 41.1 hydrocarbon-impacted soils located on-site would also require remediation. All soils would be excavated and transported off-site by Quantum Remediation Services Ltd. to licensed facilities for disposal and/or treatment. The site-specific Notification of Independent Remediation details are summarized in the table on the following page.

NOTIFICATION OF INDEPENDENT REMEDIATION	
CSR Section	Site Information
Section 57(1)(a) Verbal Notification	Verbal notification was provided to Mr. Mike Guther of the Ministry of Water, Land and Air Protection on October 5, 2001
Section 57(1)(b)(i) Site Identification	Civic address: 1329 Kipp Road, Cassidy, B.C. Parcel Identifier: 000-181-455 Latitude/Longitude N 49° 6' 11" W 123° 54' 49" Legal Description: Lot 1, Section 14, Range 6, Cranberry District, Plan 40297
Section 57(1)(b)(ii) Property Owner	British Columbia Buildings Corporation 527 Michigan Street Victoria, B.C. V8V 1S1
Section 57(1)(b)(iii) Site Contact	Mr. Jim Cuthbert, Project Superintendent - Environment (250) 888-1724
Section 57(1)(b)(iv) Site Details	The site is a former highways maintenance yard. SEACOR has conducted previous environmental works on this property, including soils and groundwater investigations.

Pursuant to Section 20.8(2)(b) of the Waste Management (Amendment) Act 1993, notification of completion will be submitted to BC Environment within 90 days of completion of the remedial works.

SEACOR trusts that the information contained herein meets your current needs, however, should you have any questions or require additional information, please do not hesitate to contact the undersigned at your convenience.

Sincerely,
SEACOR Environmental Inc.



Brad Halsey, B.Sc.
Environmental Scientist



Robert Chaisson, C.Tech.
Manager, Vancouver Island

Attachment: BC Environment Notification of Independent Remediation Form

c: Mr. Jim Cuthbert, British Columbia Buildings Corporation, Victoria, B.C.

C:\PROJECTS\BCBC\1001\202.01221.003\INDREM-LTR.DOC



202.01221
BCBC-2

SEACOR - Nanaimo
RECEIVED

OCT 18 2001

October 16, 2001

File: 26250-20/7528

Seacor Environmental Inc.
#9 - 6421 Applecross Road
Nanaimo British Columbia V9V 1N1

ATTENTION: Brad Halsey

Dear Brad Halsey:

Re: Independent Remediation at [PID: 000-181-455] 1329 Kipp Road, Cassidy

I have received your letter dated October 5, 2001, indicating that the land owner intends to pursue independent remediation at the above-noted site, under the authority of Section 57 of the Contaminated Sites Regulation and Section 28 of the *Waste Management Act*.

I understand that the site will be cleaned up in the near future. Pollution Prevention Program staff may monitor and inspect the remediation activities from time to time to ensure compliance with the Contaminated Sites Regulation and the *Waste Management Act*. In addition, the regional waste manager may impose requirements where necessary.

If there is evidence that contamination may have migrated past the property boundary, I will require an application for an approval in principle of a proposed plan to remediate any offsite contamination.

Please note that contaminated effluent must not be discharged from the remediation operation to the environment unless prior authorization is received from this office. Contaminated groundwater, if encountered, should be stored onsite, tested, and data submitted to this office for review prior to release of the effluent to the environment. Similarly, authorization will be required to discharge air contaminants from any air stripping system.

Please advise in writing within 90 days of completing remediation. Should the land owner request a certificate of compliance at the completion of remediation, the regional waste manager may request reports and require associated fees in order to verify compliance with applicable provincial standards.

Should you have any questions regarding the above, please contact John Collison-Baker at 250 751-7351.

.../2

Seacor Environmental Inc.

- 2 -

October 16, 2001

Yours truly,



R. A. Bollans, P.Eng.
Assistant Regional Waste Manager
Vancouver Island Region

SEACOR - Nanaimo
RECEIVED

OCT 18 2001

cc: Jim Cuthbert, BC Buildings Corporation, 527 Michigan Street, Victoria, BC, V8V 1S1

APPENDIX D

NOTIFICATION OF INDEPENDENT REMEDIATION LETTERS



Ministry of Environment, Lands and Parks
Pollution Prevention Program

Notification of Independent Remediation

Date: October 5, 2001

MELP SITE Number (if known): _____

Part 1: Required information [See Contaminated Sites Regulation, Section 57]

1. Date of verbal notification to manager [CSR Section 57 (1)(a)]		<u>Mr. Mike Guther, October 5, 2001</u>	
2. Legal Land description [CSR Section 57 (1)(b)(i)]:			
PID	<u>000-181-455</u>	PIN	_____
Legal Description	<u>Lot 1, Section 14, Range 6, Cranberry District, Plan 40297</u>		
Latitude and Longitude	<u>N 49° 6' 11" W 123° 54' 49"</u>		
Civic Address	<u>1329 Kipp Road, Cassidy, B.C.</u>		
3. Property owner [CSR Section 57 (1)(b)(ii)]:			
Name	<u>British Columbia Buildings Corporation</u>		
Address	<u>527 Michigan Street</u> <u>Victoria, B.C. V8V 1S1</u>		
Phone	<u>(250) 888-1724</u>	Fax	<u>(250) 952-8150</u>
4. Agent contact [CSR Section 57 (1)(b)(iii)]:			
Name	<u>Mr. Jim Cuthbert</u>		
Firm Name	<u>British Columbia Buildings Corporation</u>		
Address	<u>527 Michigan Street</u> <u>Victoria, B.C. V8V 1S1</u>		
Phone	<u>(250) 888-1724</u>	Fax	<u>(250) 952-8150</u>

5. Soil investigations [CSR Section 57 (1)(b)(iv)]:

The following contaminants ☒ were found ☐ are expected:

List contaminants (and maximum concentrations if known) Attach additional information if necessary.

Arsenic - 160 ppm Lead - 592 ppm Copper - 4660 ppm Zinc - 9490 ppm

Surficially hydrocarbon-stained soils were assumed to be > Special Waste for mineral oil and grease (30,000 ppm)

Contamination is greater than (CSR Schedules 4 & 5):

☐ >AL ☐ >PL ☐ >RL ☒ >CL ☐ >IL ☒ >Special Waste

Volume of contaminated soil: 10 m³ > Commercial metals; 30 m³ > Special Waste TDG metals; 18 m³ > Special Waste Section 41.1 hydrocarbon-impacted soils

Soil remediation strategy:

Excavation and disposal by Quantum Remediation Services Ltd. to licensed treatment facilities

6. Groundwater investigation [CSR Section 57 (1)(b)(iv)]:

Has a groundwater investigation been undertaken? ☒ Yes ☐ No ☐ To be investigated

Result: ☐ No GW encountered ☒ Contaminated ☐ Not contaminated

List contaminants (and maximum concentrations): Attach additional information if necessary.

Sodium - 4030 ppm Chloride - 10300 ppm Iron - 460 ppb Manganese - 5790 ppb Zinc - 610 ppb

Contamination is greater than (CSR Schedule 6):

☐ >AW ☐ >IW ☐ >LW ☒ >DW ☐ >Special Waste

Groundwater remediation strategy

To be determined

Part 2: Additional information

7. What is the current land use?

☐ Agricultural ☐ Park ☐ Residential ☒ Commercial ☐ IndustrialDescription of operation former highways yard

8. Is a change in zoning or land use expected?

☐ Change in zoning ☐ Change in land use ☒ No change in zoning or land use

From _____ To _____

9. Is a change of ownership expected following remediation? ☐ Yes ☒ No

10. Description of work to be completed: (construction/demolition/upgrade etc.)

Removal of > Commercial soils on-site and removal of three underground storage tanks11. Are there offsite impacts? Yes ☐ No ☒ To be investigatedIf to be investigated, the probability off-site impacts are ☐ Low ☐ High

Extent of offsite impacts:

Names/addresses of affected property owners: _____

Have affected property owners been notified? ☐ Yes ☐ No

12. Comments:

APPENDIX E
PROTOCOL 5 DOCUMENTATION

Summary of Report Participants

BCE SITE ID#: 7528

- | | | | |
|----|----------------------------------|------------------------|--|
| 1. | This report was commissioned by: | company: | British Columbia Buildings Corporation |
| | | contact name/position: | Mr. Jim Cuthbert, Project Superintendent - Environment |
| | | address: | 527 Michigan Street, Victoria BC V8V 1S1 |
| | | telephone: | (250) 888-1724 |
| 2. | Report author(s): | name(s): | Mr. Robert Chaisson, C.Tech. Manager, Vancouver Island |
| | | address: | 9 - 6421 Applecross Road, Nanaimo, B.C. V9V 1N1 |
| | | telephone: | (250) 390-5050 |
| | | name(s): | Mr. Brad Halsey, B.Sc. Environmental Scientist |
| | | address: | 9 - 6421 Applecross Road Nanaimo, B.C. V9V 1N1 |
| | | telephone: | (250) 390-5050 |
| 3. | Contributors to report: | name/position: | |

4. Ministry policy considers that a regional pollution prevention manager has no duty to consider an application for an Approval in Principle, a Certificate of Compliance, a Conditional Certificate of Compliance or an approval of a preliminary or detailed site investigation until an applicant or the applicant's agent provides a written signed statement that the documentation prepared in support of any application has been carried out in accordance with all requirements in the Waste Management Act and the regulations thereto, and certifies that the person signing the statement has demonstrable experience in remediation of the type of contamination at the site for which the statement applies and is familiar with the remediation carried out on the site.

In consideration of the above policy, please detail below the relevant qualifications and experience of the main author(s) of the subject report.

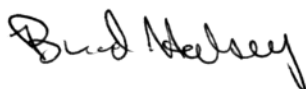
Robert Chaisson, C.Tech., Manager, Vancouver Island - over eleven years experience, has completed more than 175 Stage 1, 2 and 3 environmental site assessments and remediation projects.

Brad Halsey, B.Sc., Environmental Scientist - over four years experience, has completed numerous environmental site assessments and remediation projects.

Signed



Signed



Site Information Summary

Common name of site (if applicable)	Cassidy Highways Yard	BCE SITE ID#:	7528
Civic address of site	street: 1329 Kipp Road		
	city/postal code: Cassidy, BC		
Owner of site	name: British Columbia Buildings Corporation		
Owner's address	street: 3350 Douglas Street		
City, prov/state, postal code, country:	Victoria, BC V8Z 3R1		
Site occupant(s) (if different than owner)	VMAC		
Latitude (NAD 83 \pm 0.5 seconds)	Degrees:	49	Minutes: 6 Seconds: 11
Longitude (NAD 83 \pm 0.5 seconds)	Degrees:	123	Minutes: 54 Seconds: 49
PIDs/PINs of site	000-181-455		
(attach separate page if necessary)			
Legal description or meets and bounds:	Lot 1, Section 14, Range 6, Cranberry District, Plan 40297		
(attach separate page if necessary)			
Company official & address re sending	Mr. Jim Cuthbert, Superintendent - Environment		
AiP/Certificates by Registered Mail:	527 Michigan Street, Victoria, BC V8V 1S1		

Report Names	"Site Remedial Program"
Consultant's Name	SEACOR Environmental Inc.
Consultant's file number	202.01221.003

Summary of Actions Taken (Current Status)Actions Proposed (if applicable)

Soil and Groundwater Summary - Supplemental Investigation

Site Data	
Total area of site (m ²)	36220
Total area of building(s) (m ²)	Approximately 3500
Total paved surface area (m ²)	Approximately 18000
Current land use	Partially occupied by VMAC/MoT
Proposed land use	Unknown
Suspect land uses	As above
Contaminant source(s)	UST's, surficial staining, sandblast materials
Presence of free product	LNAPL (Y/N) N DNAPL (Y/N) N
Number of soil contaminant zones	3
No. of groundwater contaminant plumes	Unknown
Contaminant Migration potential	? : unknown Low: X High:

Soil Sample Information Supplemental Investigation	
Number of testpits	0
Number of boreholes	0
N	7
S	0
W	3
Soil Contaminant(s) PCOC's	Soil Quality (AL, PL, RL, CL, IL, W, SW)
Shallow (depth, m): 0 - 1.5 m	1 sample > CL for EPHC10-19 and EPHC19-32, cadmium, chromium, copper, zinc and > RL for molybdenum 1 sample > CL for arsenic, copper, zinc, and > RL for antimony
Intermediate (depth, m): 1.51 - 3.0 m	no samples collected or analyzed
Deep (depth, m): 3.01 m+	no samples collected or analyzed

Notes: Migration potential refers to contaminant plume(s) and "?" = "unknown"
 "surface samples" = soil samples obtained using hand trowels, shovels
 and hand augers at depths less than 0.5 metres
 PCOC = Potential contaminants of concern

Area Information		SITE ID#	7528
Nearest groundwater water supply (m)	< 100		
Nearest surface water (m)	250		
Nearest sensitive area (m)	250		
Uses of adjacent water resources	Aquatic Life		
	Rainfall: 1045	Snowfall: 92.9	
	n/a		
	n/a		
	Commercial/forested		

Groundwater Sample Information Supplemental Investigation	
Approx. depth to groundwater (m)	0.61 m to 2.5 m (Apr. 23/01)
No. of affected aquifers & depths (m)	unknown
No. of monitoring wells developed	6
No. of groundwater samples collected	6
No. groundwater samples analyzed (n)	6
Groundwater Contaminant(s) PCOC's	Water Quality (AW, IW, LW, DW)
Shallow (depth, m): 0 - 1.5 m	4 samples collected and analyzed 1 sample > DW for aluminum, iron, manganese 1 sample > DW for barium, magnesium, manganese sodium, chloride 1 sample > DW for lead, manganese, sodium, chloride; > AW for cobalt 1 sample > DW for iron and > AW for zinc
Intermediate (depth, m): 1.51 - 3.0 m	1 sample collected and analyzed > DW for manganese and sodium
Deep (depth, m): 3.01 m+	1 sample collected and analyzed < DW

AL = Agricultural
 PL = Urban Park
 RL = Residential
 CL = Commercial
 IL = Industrial
 W = Waste
 SW = Special Waste

AW = Aquatic Life
 LW = Livestock
 IW = Irrigation
 DW = Drinking Water

SOIL -- Zones of Soil Contamination (referenced to attached Site Plan) - Supplemental Investigation													
Map Area	Zone Area (m ²)	Depth Range (m)	Volume (m ³)	Quality (CL, IL, etc.)	Soil Contaminants (concentrations in µg/g)								
					PCOC	Number of Analyses	Sample Mean	Standard Deviation	Minimum Value	Maximum Value	Median	75th Percentile	90th Percentile
Target Area #5	2	0 - 0.1	0.2	> CL	EPHC10-19	1	5340	0	5340	5340	5340	n/a	n/a
				> CL	EPHC19-32	1	70300	0	70300	70300	70300	n/a	n/a
				< RL	Antimony	1	10	0	10	10	10	n/a	n/a
				< RL	Arsenic	1	8	0	8	8	8	n/a	n/a
				< RL	Barium	1	104	0	104	104	104	n/a	n/a
				< RL	Beryllium	1	0.5	0	0.5	0.5	0.5	n/a	n/a
				> CL	Cadmium	1	2.1	0	2.1	2.1	2.1	n/a	n/a
				> CL	Chromium	1	112	0	112	112	112	n/a	n/a
				< RL	Cobalt	1	14	0	14	14	14	n/a	n/a
				> CL	Copper	1	279	0	279	279	279	n/a	n/a
				< RL	Lead	1	143	0	143	143	143	n/a	n/a
				< RL	Mercury	1	0.05	0	0.05	0.05	0.05	n/a	n/a
				< CL	Molybdenum	1	14	0	14	14	14	n/a	n/a
				< RL	Nickel	1	66	0	66	66	66	n/a	n/a
				< RL	Selenium	1	3	0	3	3	3	n/a	n/a
				< RL	Silver	1	2	0	2	2	2	n/a	n/a
				< RL	Tin	1	12	0	12	12	12	n/a	n/a
				< RL	Vanadium	1	72	0	72	72	72	n/a	n/a
				> CL	Zinc	1	620	0	620	620	620	n/a	n/a
Target Area #9	200	0 - 0.05	10	< RL	EPHC10-19	2	200	0	200	200	200	n/a	n/a
				< RL	EPHC19-32	2	434.5	331.633	200	669	434.5	551.75	622.1
				< RL	LEPH	2	200	0	200	200	200	n/a	n/a
				< RL	HEPH	2	434.5	331.633	200	669	434.5	551.75	622.1
				< RL	Benz(a)anthracene	2	0.05	0	0.05	0.05	0.05	n/a	n/a
				< RL	Benzo(a)pyrene	2	0.05	0	0.05	0.05	0.05	n/a	n/a
				< RL	Benzo(b)fluoranthene	2	0.055	0.007	0.05	0.06	0.055	0.0575	0.059
				< RL	Benzo(k)fluoranthene	2	0.05	0	0.05	0.05	0.05	n/a	n/a
				< RL	Dibenz(a,h)anthracene	2	0.05	0	0.05	0.05	0.05	n/a	n/a
				< RL	Indeno(1,2,3-c,d)pyrene	2	0.05	0	0.05	0.05	0.05	n/a	n/a
				< RL	Naphthalene	2	0.05	0	0.05	0.05	0.05	n/a	n/a
				< RL	Phenanthrene	2	0.05	0	0.05	0.05	0.05	n/a	n/a
				< RL	Pyrene	2	0.08	0.042	0.05	0.11	0.08	0.095	0.104
				< CL	Antimony	2	24.5	20.506	10	39	24.5	31.75	36.1
				> CL	Arsenic	2	23	24.042	6	40	23	31.5	36.6
				< RL	Barium	2	167.5	142.129	67	268	167.5	217.75	247.9
				< RL	Beryllium	2	0.5	0	0.5	0.5	0.5	n/a	n/a
				> CL	Cadmium	2	0.55	0.071	0.5	0.6	0.55	0.575	0.59
				> CL	Chromium	2	35.5	4.95	32	39	35.5	37.25	38.3
				< RL	Cobalt	2	10.5	2.121	9	12	10.5	11.25	11.7
				> CL	Copper	2	636	726.906	122	1150	636	893	1047.2
				< RL	Lead	2	134	118.794	50	218	134	176	201.2
				< RL	Mercury	2	0.05	0	0.05	0.05	0.05	n/a	n/a
				< CL	Molybdenum	2	5	1.414	4	6	5	5.5	5.8
				< RL	Nickel	2	18.5	0.707	18	19	18.5	18.75	18.9
				< RL	Selenium	2	2	0	2	2	2	n/a	n/a
				< RL	Silver	2	2	0	2	2	2	n/a	n/a
				< RL	Tin	2	7.5	3.536	5	10	7.5	8.75	9.5
				< RL	Vanadium	2	58	1.414	57	59	58	58.5	58.8
				> CL	Zinc	2	1724	1988.384	318	3130	1724	2427	2848.8

GROUNDWATER -- Groundwater Contaminant Plumes (referenced to attached Site Plan)

Plume Location	Plume Area (m ²)	Depth Range (m)	Velocity Linear (m/yr)	Quality (AW, DW, etc.)	Groundwater Contaminants (concentrations in ug/L, except manganese, sodium and chloride)								
					PCOCs & pH, Hardness	Number of Analyses	Sample Mean	Standard Deviation	Minimum Value	Maximum Value	Median	75th Percentile	90th Percentile
				< DW	Benzene	2	0.5	0	0.5	0.5	0.5	n/a	n/a
				< DW	Ethylbenzene	2	0.5	0	0.5	0.5	0.5	n/a	n/a
				< DW	Toluene	2	0.5	0	0.5	0.5	0.5	n/a	n/a
				< DW	Xylenes	2	1	0	1	1	1	n/a	n/a
				< DW	VHw	2	100	0	100	100	100	n/a	n/a
				< DW	VPHw	2	100	0	100	100	100	n/a	n/a
				< DW	EPHC10-19	2	300	0	300	300	300	n/a	n/a
				< DW	LEPHw	2	300	0	300	300	300	n/a	n/a
				< DW	Acenaphthylene	2	0.05	0	0.05	0.05	0.05	n/a	n/a
				< DW	Acridine	2	0.05	0	0.05	0.05	0.05	n/a	n/a
				< DW	Anthracene	2	0.05	0	0.05	0.05	0.05	n/a	n/a
				< DW	Benz(a)anthracene	2	0.05	0	0.05	0.05	0.05	n/a	n/a
				< DW	Benzo(a)pyrene	2	0.01	0	0.01	0.01	0.01	n/a	n/a
				< DW	Chrysene	2	0.05	0	0.05	0.05	0.05	n/a	n/a
				< DW	Fluoranthene	2	0.05	0	0.05	0.05	0.05	n/a	n/a
				< DW	Fluorene	2	0.05	0	0.05	0.05	0.05	n/a	n/a
				< DW	Naphthalene	2	0.05	0	0.05	0.05	0.05	n/a	n/a
				< DW	Phenanthrene	2	0.05	0	0.05	0.05	0.05	n/a	n/a
				< DW	Pyrene	2	0.05	0	0.05	0.05	0.05	n/a	n/a
				> DW	Aluminum	6	785.833	1726.57	50	4310	87.5	98.75	2205
				< DW	Antimony	6	333.333	326.599	200	1000	200	200	600
				< DW	Arsenic	6	1.5	0.837	1	3	1	1.75	2.5
				> DW	Barium	6	421.667	760.8	10	1960	150	240	1100
				< DW	Beryllium	6	9.167	10.206	5	30	5	5	17.5
				< DW	Boron	6	183.333	160.208	100	500	100	175	350
				< DW	Cadmium	6	2	0	2	2	2	2	2
				< DW	Chromium	6	16.667	16.33	10	50	10	10	30
				> AW	Cobalt	6	18.333	16.021	10	50	10	17.5	35
				< DW	Copper	6	20	16.733	10	50	10	25	40
				> DW	Iron	6	201.667	191.146	30	460	130	357.5	435
				< DW	Lead	6	11.667	4.082	1	20	10	10	15
				> DW	Magnesium	6	42.05	47.149	0.5	101	27.4	83.7	98.05
				> DW	Manganese	6	1418.5	2265.45	5	5790	372	1616.5	3875
				< DW	Mercury	6	0.05	0	0.05	0.05	0.05	0.05	0.05
				< DW	Molybdenum	6	58.333	69.402	30	200	30	30	115
				< DW	Nickel	6	84.167	107.258	5	300	50	50	175
				< DW	Selenium	6	10	0	10	10	10	1	10
				< DW	Silver	6	1	0	1	1	1	1	1
				> DW	Sodium	6	955.833	1563.38	45	4030	259	432.25	2241
				< DW	Thallium	6	1.167	0.408	1	2	1	1	1.5
				< DW	Uranium	6	2.483	2.119	0.1	6.2	2	3.05	4.8
				> AW	Zinc	6	246	215.806	62	610	169	346.75	497
				> DW	Chloride	5	2239.26	4519.836	9.7	10300	31.3	834	6513.6

Date:

Apr 22/02

ed to review the entire document: s to avoid the use of information out of context.

Soil and Groundwater Summary - Confirmatory Soil Samples

Site Data	
Total area of site (m ²)	36220
Total area of building(s) (m ²)	Approximately 3500
Total paved surface area (m ²)	Approximately 18000
Current land use	Partially occupied by VMAC/MoT
Proposed land use	Unknown
Suspect land uses	As above
Contaminant source(s)	UST's, surficial staining, sandblast materials
Presence of free product	LNAPL (Y/N) N DNAPL (Y/N) N
Number of soil contaminant zones	3
No. of groundwater contaminant plumes	Unknown
Contaminant Migration potential	? : unknown Low: X High:

Soil Sample Information Confirmatory Soil Samples	
Number of test pits	0
No. of surface samples collected	0
Number of soil samples collected	33
Number of soil samples analyzed (n)	18
Soil Contaminant(s) PCOCs	Soil Quality (AL, PL, RL, CL, IL, W, SW)
Shallow (depth, m): 0 - 1.5 m	27 samples collected; 14 samples analyzed
	1 sample > RL for LEPH, HEPH
	1 sample > CL for chromium (less than regional background concentration)
Intermediate (depth, m): 1.51 - 3.0 m	2 samples collected; 2 samples analyzed
	Both samples below RL
Deep (depth, m): 3.01 m+	4 samples collected; 2 samples analyzed
	Both samples below RL

Notes: Migration potential refers to contaminant plume(s) and "?" = "unknown"
 "surface samples" = soil samples obtained using hand trowels, shovels and hand augers at depths less than 0.5 metres
 PCOC = Potential contaminants of concern

Area Information		SITE ID#	7528
Nearest groundwater water supply (m)	< 100		
Nearest surface water (m)	250		
Nearest sensitive area (m)	250		
Uses of adjacent water resources	Aquatic Life		
Annual rainfall (mm) + snowfall (cm)	Rainfall: 1045 Snowfall: 92.9		
100/200 year flood potential of site	n/a		
100/200 yr flood potential of area	n/a		
Adjacent land uses	Commercial/forested		

Groundwater Sample Information Confirmatory Soil Samples	
Approx. depth to groundwater (m)	2.56 m (Dec. 11/01)
No. of affected aquifers & depths (m)	unknown
No. of monitoring wells developed	1
No. of groundwater samples collected	1
No. groundwater samples analyzed (n)	1
Groundwater Contaminant(s) PCOCs	Water Quality (AW, IW, LW, DW)
Shallow (depth, m): 0 - 1.5 m	no samples collected or analyzed
Intermediate (depth, m): 1.51 - 3.0 m	1 sample collected and analyzed
	> DW for manganese
Deep (depth, m): 3.01 m+	no samples collected or analyzed

AL = Agricultural
 PL = Urban Park
 RL = Residential
 CL = Commercial
 IL = Industrial
 W = Waste
 SW = Special Waste
 AW = Aquatic Life
 LW = Livestock
 IW = Irrigation
 DW = Drinking Water

SOIL -- Zones of Soil Contamination (referenced to attached Site Plan) - Confirmatory Soil Samples													
Map Area	Zone Area (m ²)	Depth Range (m)	Volume (m ³)	Quality (CL, IL, etc.)	Soil Contaminants (concentrations in µg/g)								
					PCOC	Number of Analyses	Sample Mean	Standard Deviation	Minimum Value	Maximum Value	Median	75th Percentile	90th Percentile
Target Area #5	2	0 - 0.5	0.4	< CL	EPHC10-19	1	1350	0	1350	1350	1350	n/a	n/a
				< CL	EPHC19-32	1	1380	0	1380	1380	1380	n/a	n/a
				< CL	LEPH	1	1350	0	1350	1350	1350	n/a	n/a
				< CL	HEPH	1	1380	0	1380	1380	1380	n/a	n/a
				< RL	Benz(a)anthracene	1	0.01	0	0.01	0.01	0.01	n/a	n/a
				< RL	Benzo(a)pyrene	1	0.01	0	0.01	0.01	0.01	n/a	n/a
				< RL	Benzo(b)fluoranthene	1	0.01	0	0.01	0.01	0.01	n/a	n/a
				< RL	Benzo(k)fluoranthene	1	0.01	0	0.01	0.01	0.01	n/a	n/a
				< RL	Dibenz(a,h)anthracene	1	0.01	0	0.01	0.01	0.01	n/a	n/a
				< RL	Indeno(1,2,3-c,d)pyrene	1	0.01	0	0.01	0.01	0.01	n/a	n/a
				< RL	Naphthalene	1	0.02	0	0.02	0.02	0.02	n/a	n/a
				< RL	Phenanthrene	1	0.04	0	0.04	0.04	0.04	n/a	n/a
				< RL	Pyrene	1	0.28	0	0.28	0.28	0.28	n/a	n/a
				< RL	Antimony	1	10	0	10	10	10	n/a	n/a
				< RL	Arsenic	1	6	0	6	6	6	n/a	n/a
				< RL	Barium	1	67	0	67	67	67	n/a	n/a
				< RL	Beryllium	1	0.5	0	0.5	0.5	0.5	n/a	n/a
				< RL	Cadmium	1	0.5	0	0.5	0.5	0.5	n/a	n/a
				< RL	Chromium	1	39	0	39	39	39	n/a	n/a
				< RL	Cobalt	1	13	0	13	13	13	n/a	n/a
				< RL	Copper	1	53	0	53	53	53	n/a	n/a
				< RL	Lead	1	50	0	50	50	50	n/a	n/a
				< RL	Mercury	1	0.11	0	0.11	0.11	0.11	n/a	n/a
				< RL	Molybdenum	1	4	0	4	4	4	n/a	n/a
				< RL	Nickel	1	36	0	36	36	36	n/a	n/a
				< RL	Selenium	1	3	0	3	3	3	n/a	n/a
				< RL	Silver	1	2	0	2	2	2	n/a	n/a
				< RL	Tin	1	5	0	5	5	5	n/a	n/a
				< RL	Vanadium	1	82	0	82	82	82	n/a	n/a
				< RL	Zinc	1	74	0	74	74	74	n/a	n/a
Target Area #8	30	0 - 1.5	45	< RL	Benzene	1	0.04	0	0.04	0.04	0.04	n/a	n/a
5,000 L UST				< RL	Ethylbenzene	1	0.05	0	0.05	0.05	0.05	n/a	n/a
				< RL	Toluene	1	0.05	0	0.05	0.05	0.05	n/a	n/a
				< RL	Xylenes	1	0.1	0	0.1	0.1	0.1	n/a	n/a
				< RL	VPH	1	100	0	100	100	100	n/a	n/a
				< RL	EPHC10-19	4	200	0	200	200	200	n/a	n/a
				< RL	EPHC19-32	4	200	0	200	200	200	n/a	n/a
				< RL	LEPH	1	200	0	200	200	200	n/a	n/a
				< RL	HEPH	1	200	0	200	200	200	n/a	n/a
				< RL	Benz(a)anthracene	1	0.01	0	0.01	0.01	0.01	n/a	n/a
				< RL	Benzo(a)pyrene	1	0.01	0	0.01	0.01	0.01	n/a	n/a
				< RL	Benzo(b)fluoranthene	1	0.01	0	0.01	0.01	0.01	n/a	n/a
				< RL	Benzo(k)fluoranthene	1	0.01	0	0.01	0.01	0.01	n/a	n/a
				< RL	Dibenz(a,h)anthracene	1	0.01	0	0.01	0.01	0.01	n/a	n/a
				< RL	Indeno(1,2,3-c,d)pyrene	1	0.01	0	0.01	0.01	0.01	n/a	n/a
				< RL	Naphthalene	1	0.01	0	0.01	0.01	0.01	n/a	n/a
				< RL	Phenanthrene	1	0.01	0	0.01	0.01	0.01	n/a	n/a
				< RL	Pyrene	1	0.01	0	0.01	0.01	0.01	n/a	n/a
				< RL	PCB	1	0.05	0	0.05	0.05	0.05	n/a	n/a

SOIL -- Zones of Soil Contamination (referenced to attached Site Plan)													
Map Area	Zone Area (m ²)	Depth Range (m)	Volume (m ³)	Quality (CL, IL, etc.)	Soil Contaminants (concentrations in µg/g)								
					PCOC	Number of Analyses	Sample Mean	Standard Deviation	Minimum Value	Maximum Value	Median	75th Percentile	90th Percentile
Target Area #8	20	0 - 3.5	70	< RL	EPHC10-19	6	200	0	200	200	200	n/a	n/a
9,100 L UST				< RL	EPHC19-32	6	200	0	200	200	200	n/a	n/a
Target Area #8	60	0 - 4	240	< RL	Benzene	1	0.04	0	0.04	0.04	0.04	n/a	n/a
22,730 L UST				< RL	Ethylbenzene	1	0.05	0	0.05	0.05	0.05	n/a	n/a
				< RL	Toluene	1	0.05	0	0.05	0.05	0.05	n/a	n/a
				< RL	Xylenes	1	0.1	0	0.1	0.1	0.1	n/a	n/a
				< RL	VPH	1	100	0	100	100	100	n/a	n/a
				< RL	EPHC10-19	3	200	0	200	200	200	n/a	n/a
				< RL	EPHC19-32	3	200	0	200	200	200	n/a	n/a
				< RL	LEPH	1	200	0	200	200	200	n/a	n/a
				< RL	HEPH	1	200	0	200	200	200	n/a	n/a
				< RL	Benz(a)anthracene	1	0.01	0	0.01	0.01	0.01	n/a	n/a
				< RL	Benzo(a)pyrene	1	0.01	0	0.01	0.01	0.01	n/a	n/a
				< RL	Benzo(b)fluoranthene	1	0.01	0	0.01	0.01	0.01	n/a	n/a
				< RL	Benzo(k)fluoranthene	1	0.01	0	0.01	0.01	0.01	n/a	n/a
				< RL	Dibenz(a,h)anthracene	1	0.01	0	0.01	0.01	0.01	n/a	n/a
				< RL	Indeno(1,2,3-c,d)pyrene	1	0.01	0	0.01	0.01	0.01	n/a	n/a
				< RL	Naphthalene	1	0.01	0	0.01	0.01	0.01	n/a	n/a
				< RL	Phenanthrene	1	0.01	0	0.01	0.01	0.01	n/a	n/a
				< RL	Pyrene	1	0.01	0	0.01	0.01	0.01	n/a	n/a
				< RL	Antimony	1	10	0	10	10	10	n/a	n/a
				< RL	Arsenic	1	6	0	6	6	6	n/a	n/a
				< RL	Barium	1	89	0	89	89	89	n/a	n/a
				< RL	Beryllium	1	0.5	0	0.5	0.5	0.5	n/a	n/a
				< RL	Cadmium	1	0.5	0	0.5	0.5	0.5	n/a	n/a
				< RL	Chromium	1	37	0	37	37	37	n/a	n/a
				< RL	Cobalt	1	13	0	13	13	13	n/a	n/a
				< RL	Copper	1	48	0	48	48	48	n/a	n/a
				< RL	Lead	1	50	0	50	50	50	n/a	n/a
				< RL	Mercury	1	0.05	0	0.05	0.05	0.05	n/a	n/a
				< RL	Molybdenum	1	4	0	4	4	4	n/a	n/a
				< RL	Nickel	1	31	0	31	31	31	n/a	n/a
				< RL	Selenium	1	2	0	2	2	2	n/a	n/a
				< RL	Silver	1	2	0	2	2	2	n/a	n/a
				< RL	Tin	1	5	0	5	5	5	n/a	n/a
				< RL	Vanadium	1	86	0	86	86	86	n/a	n/a
				< RL	Zinc	1	50	0	50	50	50	n/a	n/a
				< RL	PCB	1	0.05	0	0.05	0.05	0.05	n/a	n/a
Grease ramp	1	0.1	0.1	< RL	EPHC10-19	1	200	0	200	200	200	n/a	n/a
				< RL	EPHC19-32	1	200	0	200	200	200	n/a	n/a

SOIL -- Zones of Soil Contamination (referenced to attached Site Plan)													
Map Area	Zone Area (m ²)	Depth Range (m)	Volume (m ³)	Quality (CL, IL, etc.)	Soil Contaminants (concentrations in µg/g)								
					PCOC	Number of Analyses	Sample Mean	Standard Deviation	Minimum Value	Maximum Value	Median	75th Percentile	90th Percentile
Target Area #4	35	0 - 0.1	3.5	< RL	Antimony	1	10	0	10	10	10	n/a	n/a
				< RL	Arsenic	1	5	0	5	5	5	n/a	n/a
				< RL	Barium	1	47	0	47	47	47	n/a	n/a
				< RL	Beryllium	1	0.5	0	0.5	0.5	0.5	n/a	n/a
				< RL	Cadmium	1	0.5	0	0.5	0.5	0.5	n/a	n/a
				< RL	Chromium	1	18	0	18	18	18	n/a	n/a
				< RL	Cobalt	1	9	0	9	9	9	n/a	n/a
				< RL	Copper	1	53	0	53	53	53	n/a	n/a
				< RL	Lead	1	50	0	50	50	50	n/a	n/a
				< RL	Mercury	1	0.05	0	0.05	0.05	0.05	n/a	n/a
				< RL	Molybdenum	1	4	0	4	4	4	n/a	n/a
				< RL	Nickel	1	15	0	15	15	15	n/a	n/a
				< RL	Selenium	1	4	0	4	4	4	n/a	n/a
				< RL	Silver	1	2	0	2	2	2	n/a	n/a
				< RL	Tin	1	5	0	5	5	5	n/a	n/a
				< RL	Vanadium	1	57	0	57	57	57	n/a	n/a
				< RL	Zinc	1	45	0	45	45	45	n/a	n/a
Burn pile near salt shed #2	4	0 - 0.2	0.8	< RL	Antimony	1	10	0	10	10	10	n/a	n/a
				< RL	Arsenic	1	7	0	7	7	7	n/a	n/a
				< RL	Barium	1	45	0	45	45	45	n/a	n/a
				< RL	Beryllium	1	0.5	0	0.5	0.5	0.5	n/a	n/a
				< RL	Cadmium	1	0.5	0	0.5	0.5	0.5	n/a	n/a
				> CL*	Chromium*	1	61	0	61	61	61	n/a	n/a
				< RL	Cobalt	1	19	0	19	19	19	n/a	n/a
				< RL	Copper	1	66	0	66	66	66	n/a	n/a
				< RL	Lead	1	50	0	50	50	50	n/a	n/a
				< RL	Mercury	1	0.11	0	0.11	0.11	0.11	n/a	n/a
				< RL	Molybdenum	1	4	0	4	4	4	n/a	n/a
				< RL	Nickel	1	62	0	62	62	62	n/a	n/a
				< RL	Selenium	1	3	0	3	3	3	n/a	n/a
				< RL	Silver	1	2	0	2	2	2	n/a	n/a
				< RL	Tin	1	5	0	5	5	5	n/a	n/a
				< RL	Vanadium	1	123	0	123	123	123	n/a	n/a
				< RL	Zinc	1	46	0	46	46	46	n/a	n/a
Washdown Slab	65	0 - 1.5	98	< RL	EPHC10-19	1	200	0	200	200	200	n/a	n/a
				< RL	EPHC19-32	1	200	0	200	200	200	n/a	n/a
				< RL	Antimony	1	10	0	10	10	10	n/a	n/a
				< RL	Arsenic	1	5	0	5	5	5	n/a	n/a
				< RL	Barium	1	63	0	63	63	63	n/a	n/a
				< RL	Beryllium	1	0.5	0	0.5	0.5	0.5	n/a	n/a
				< RL	Cadmium	1	0.5	0	0.5	0.5	0.5	n/a	n/a
				< RL	Chromium*	1	20	0	20	20	20	n/a	n/a
				< RL	Cobalt	1	8	0	8	8	8	n/a	n/a
				< RL	Copper	1	59	0	59	59	59	n/a	n/a
				< RL	Lead	1	50	0	50	50	50	n/a	n/a
				< RL	Mercury	1	0.05	0	0.05	0.05	0.05	n/a	n/a
				< RL	Molybdenum	1	4	0	4	4	4	n/a	n/a
				< RL	Nickel	1	16	0	16	16	16	n/a	n/a

SOIL -- Zones of Soil Contamination (referenced to attached Site Plan)													
Map Area	Zone Area (m ²)	Depth Range (m)	Volume (m ³)	Quality (CL, IL, etc.)	Soil Contaminants (concentrations in µg/g)								
					PCOC	Number of Analyses	Sample Mean	Standard Deviation	Minimum Value	Maximum Value	Median	75th Percentile	90th Percentile
Washdown Slab	65	0 - 1.5	98	< RL	Selenium	1	3	0	3	3	3	n/a	n/a
				< RL	Silver	1	2	0	2	2	2	n/a	n/a
				< RL	Tin	1	5	0	5	5	5	n/a	n/a
				< RL	Vanadium	1	52	0	52	52	52	n/a	n/a
				< RL	Zinc	1	57	0	57	57	57	n/a	n/a
GROUNDWATER -- Groundwater Contaminant Plumes (referenced to attached Site Plan)													
Plume Location	Plume Area (m ²)	Depth Range (m)	Velocity Linear (m/yr)	Quality (AW, DW, etc.)	Groundwater Contaminants (concentrations in µg/L, except manganese, sodium and chloride)								
					PCOCs & pH, Hardness	Number of Analyses	Sample Mean	Standard Deviation	Minimum Value	Maximum Value	Median	75th Percentile	90th Percentile
BH01-3				< DW	Benzene	1	0.5	0	0.5	0.5	0.5	n/a	n/a
				< DW	Ethylbenzene	1	0.5	0	0.5	0.5	0.5	n/a	n/a
				< DW	Toluene	1	0.5	0	0.5	0.5	0.5	n/a	n/a
				< DW	Xylenes	1	1	0	1	1	1	n/a	n/a
				< DW	VHw	1	100	0	100	100	100	n/a	n/a
				< DW	VPW	1	100	0	100	100	100	n/a	n/a
				< DW	EPHC10-19	1	300	0	300	300	300	n/a	n/a
				< DW	LEPHw	1	300	0	300	300	300	n/a	n/a
				< DW	Acenaphthylene	1	0.05	0	0.05	0.05	0.05	n/a	n/a
				< DW	Acridine	1	0.05	0	0.05	0.05	0.05	n/a	n/a
				< DW	Anthracene	1	0.05	0	0.05	0.05	0.05	n/a	n/a
				< DW	Benz(a)anthracene	1	0.05	0	0.05	0.05	0.05	n/a	n/a
				< DW	Benzo(a)pyrene	1	0.01	0	0.01	0.01	0.01	n/a	n/a
				< DW	Chrysene	1	0.05	0	0.05	0.05	0.05	n/a	n/a
				< DW	Fluoranthene	1	0.05	0	0.05	0.05	0.05	n/a	n/a
				< DW	Fluorene	1	0.05	0	0.05	0.05	0.05	n/a	n/a
				< DW	Naphthalene	1	0.05	0	0.05	0.05	0.05	n/a	n/a
				< DW	Phenanthrene	1	0.05	0	0.05	0.05	0.05	n/a	n/a
				< DW	Pyrene	1	0.05	0	0.05	0.05	0.05	n/a	n/a
				< DW	Aluminum	1	40	0	40	40	40	n/a	n/a
				< DW	Antimony	1	10	0	10	10	10	n/a	n/a
				< DW	Arsenic	1	1	0	1	1	1	n/a	n/a
				< DW	Barium	1	80	0	80	80	80	n/a	n/a
				< DW	Beryllium	1	5	0	5	5	5	n/a	n/a
				< DW	Boron	1	100	0	100	100	100	n/a	n/a
				< DW	Cadmium	1	0.2	0	0.2	0.2	0.2	n/a	n/a
				< DW	Chromium	1	10	0	10	10	10	n/a	n/a
				< DW	Cobalt	1	10	0	10	10	10	n/a	n/a
				< DW	Copper	1	5	0	5	5	5	n/a	n/a
				< DW	Iron	1	30	0	30	30	30	n/a	n/a
				< DW	Lead	1	1	0	1	1	1	n/a	n/a
				< DW	Magnesium	1	4.4	0	4.4	4.4	4.4	n/a	n/a
				> DW	Manganese	1	320	0	320	320	320	n/a	n/a
				< DW	Mercury	1	0.2	0	0.2	0.2	0.2	n/a	n/a
				< DW	Molybdenum	1	1	0	1	1	1	n/a	n/a
				< DW	Nickel	1	50	0	50	50	50	n/a	n/a
				< DW	Selenium	1	1	0	1	1	1	n/a	n/a
				< DW	Silver	1	0.1	0	0.1	0.1	0.1	n/a	n/a

GROUNDWATER -- Groundwater Contaminant Plumes (referenced to attached Site Plan)													
Plume Location	Plume Area (m ²)	Depth Range (m)	Velocity Linear (m/yr)	Quality (AW, DW, etc.)	Groundwater Contaminants (concentrations in ug/L, except manganese, sodium and chloride)								
					PCOCs & pH, Hardness	Number of Analyses	Sample Mean	Standard Deviation	Minimum Value	Maximum Value	Median	75th Percentile	90th Percentile
				< DW	Sodium	1	48	0	48	48	48	n/a	n/a
				< DW	Thallium	1	0.2	0	0.2	0.2	0.2	n/a	n/a
				< DW	Uranium	1	0.2	0	0.2	0.2	0.2	n/a	n/a
				< DW	Zinc	1	50	0	50	50	50	n/a	n/a
				< DW	Chloride	1	34.6	0	34.6	34.6	34.6	n/a	n/a

Linear velocity of plume = Darcy velocity (V_{Darcy}) divided by the effective porosity (n_e)

PCOC = potential contaminant of concern

The above information is a summary only and persons who may be relying on the report are encouraged to review the entire document so as to avoid the use of information out of context.

Date: Apr 22/02

Soil and Groundwater Summary - Excavated Soil Samples

Site Data	
Total area of site (m ²)	36220
Total area of building(s) (m ²)	Approximately 3500
Total paved surface area (m ²)	Approximately 18000
Current land use	Partially occupied by VMAC/MoT
Proposed land use	Unknown
Suspect land uses	As above
Contaminant source(s)	UST's, surficial staining, sandblast materials
Presence of free product	LNAPL (Y/N) N DNAPL (Y/N) N
Number of soil contaminant zones	3
No. of groundwater contaminant plumes	Unknown
Contaminant Migration potential	? : unknown Low: X High:

Soil Sample Information Excavated Soil Samples	
Number of testpits	0
Number of boreholes	0
Number of surface samples collected	0
Number of soil samples collected	6
Number of soil samples analyzed (n)	5
Soil Contaminant(s) PCOCs	Soil Quality (AL,PL, RL,CL,IL,W, SW)
Shallow (depth, m): 0 - 1.5 m	5 samples collected; 1 sample > CL for EPHC10-19 and EPHC19-32
Intermediate (depth, m): 1.51 - 3.0 m	1 sample collected; sample < RL
Deep (depth, m): 3.01 m+	no samples collected or analyzed

Notes: Migration potential refers to contaminant plume(s) and "?" = "unknown"
"surface samples" = soil samples obtained using hand trowels, shovels
and hand augers at depths less than 0.5 metres
PCOC = Potential contaminants of concern

Area Information		SITE ID#	7528
Nearest groundwater water supply (m)	< 100		
Nearest surface water (m)	250		
Nearest sensitive area (m)	250		
Uses of adjacent water resources	Aquatic Life		
Annual rainfall (mm) + snowfall (cm) (Nanaimo)	Rainfall: 1045 Snowfall: 92.9		
100/200 year flood potential of site	n/a		
100/200 yr flood potential of area	n/a		
Adjacent land uses	Commercial/forested		

Groundwater Sample Information Excavated Soil Samples	
Approx. depth to groundwater (m)	n/a
No. of affected aquifers & depths (m)	n/a
No. of monitoring wells developed	n/a
No. of groundwater samples collected	n/a
Groundwater samples analyzed (n)	n/a
Groundwater Contaminant(s) PCOCs	Water Quality (AW, IW, LW, DW)
Shallow (depth, m): 0 - 1.5 m	n/a
Intermediate (depth, m): 1.51 - 3.0 m	n/a
Deep (depth, m): 3.01 m+	n/a

AL = Agricultural
PL = Urban Park
RL = Residential
CL = Commercial
IL = Industrial
W = Waste
SW = Special Waste
AW = Aquatic Life
LW = Livestock
IW = Irrigation
DW = Drinking Water

Stats Summary - Excavated Soil Samples

SOIL -- Zones of Soil Contamination (referenced to attached Site Plan)													
Excavated Soil Samples													
Map Area	Zone Area (m ²)	Depth Range (m)	Volume (m ³)	Quality (CL, IL, etc.)	Soil Contaminants (concentrations in µg/g)								
					PCOC	Number of Analyses	Sample Mean	Standard Deviation	Minimum Value	Maximum Value	Median	75th Percentile	90th Percentile
Target Area #2	10	0 - 0.3	3	< RL	EPHC10-19	1	200	0	200	200	200	0	0
				< RL	EPHC19-32	1	200	0	200	200	200	0	0
Target Area #8	60	0 - 1.9	60	> CL	EPHC10-19	4	1397.5	2395	200	4990	200	1397.5	3553
				> CL	EPHC19-32	4	3250	6100	200	12400	200	3250	8740

The above information is a summary only and persons who may be relying on the report are encouraged to review the entire document so as to avoid the use of information out of context.

Date: Apr 22 2012

Summary of Report Participants

BCE SITE ID#: 7528

- | | | | |
|----|----------------------------------|------------------------|--|
| 1. | This report was commissioned by: | company: | British Columbia Buildings Corporation |
| | | contact name/position: | Mr. Jim Cuthbert, Project Superintendent - Environment |
| | | address: | 527 Michigan Street, Victoria BC V8V 1S1 |
| | | telephone: | (250) 888-1724 |
| 2. | Report author(s): | name(s): | Mr. Robert Chaisson, C.Tech. Manager, Vancouver Island |
| | | address: | 9 - 6421 Applecross Road, Nanaimo, B.C. V9V 1N1 |
| | | telephone: | (250) 390-5050 |
| | | name(s): | Mr. Brad Halsey, B.Sc. Environmental Scientist |
| | | address: | 9 - 6421 Applecross Road Nanaimo, B.C. V9V 1N1 |
| | | telephone: | (250) 390-5050 |
| 3. | Contributors to report: | name/position: | |

4. Ministry policy considers that a regional pollution prevention manager has no duty to consider an application for an Approval in Principle, a Certificate of Compliance, a Conditional Certificate of Compliance or an approval of a preliminary or detailed site investigation until an applicant or the applicant's agent provides a written signed statement that the documentation prepared in support of any application has been carried out in accordance with all requirements in the Waste Management Act and the regulations thereto, and certifies that the person signing the statement has demonstrable experience in remediation of the type of contamination at the site for which the statement applies and is familiar with the remediation carried out on the site.

In consideration of the above policy, please detail below the relevant qualifications and experience of the main author(s) of the subject report.

Robert Chaisson, C.Tech., Manager, Vancouver Island - over eleven years experience, has completed more than 175 Stage 1, 2 and 3 environmental site assessments and remediation projects.

Brad Halsey, B.Sc., Environmental Scientist - over four years experience, has completed numerous environmental site assessments and remediation projects.

Signed



Signed

