CITY OF VANCOUVER

CITY CLERK'S DEPARTMENT
Access to Information & Privacy

File No.: 04-1000-20-2019-615

November 6, 2019

s.22(1)

Dear s.22(1)

Re: **Request for Access to Records under the Freedom of Information and Protection of Privacy Act (the "Act")**

I am responding to your request of October 1, 2019 for:

The following reports related to 2182 West 39th Avenue:

1. **April 19, 2003 SNR Salvage and Recovery Project Completion Letter;**
2. **May 2003 ARO Environmental Underground Storage Tank Decommissioning and Remedial Excavation Report parts 1 and 2; and**
3. **February 10, 2004 Notice of Commencement/Completion of Independent Remediation.**

All responsive records are attached. Some information in the records has been severed, (blacked out), under s.22(1) of the Act. You can read or download this section here: http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/96165_00

Under section 52 of the Act, and within 30 business days of receipt of this letter, you may ask the Information & Privacy Commissioner to review any matter related to the City's response to your FOI request by writing to: Office of the Information & Privacy Commissioner, info@oipc.bc.ca or by phoning 250-387-5629.

If you request a review, please provide the Commissioner's office with: 1) the request number (#04-1000-20-2019-615); 2) a copy of this letter; 3) a copy of your original request; and 4) detailed reasons why you are seeking the review.

Yours truly,

Barbara J. Van Fraassen, BA
Director, Access to Information & Privacy
Barbara.vanfraassen@vancouver.ca
453 W. 12th Avenue Vancouver BC V5Y 1V4

*If you have any questions, please email us at foi@vancouver.ca and we will respond to you as soon as possible. Or you can call the FOI Case Manager at 604.871.6584.

Encl.

:ag

SALVAGE & RECOVERY
SNR
SINCE 1996
them is helpful
FURNACE FUEL AND TANK REMOVAL SPECIALISTS

SNR Salvage and Recovery
6179 Dawson Street
Burnaby, BC V5B 2W5

April 19, 2003.

John Poole
Lieutenant, Customer Service
Fire Prevention Division
201-456 W. Broadway
Vancouver, BC V5Y 1R3

Title: **PROJECT COMPLETION LETTER**

Dear Lt. John Poole,

This letter is to inform you of the completion of the **buried furnace fuel storage tank REMOVAL project** for;

PERMIT: **FI 401648**
CLIENT: s.22(1)
PROJECT LOCATION: **2182 W. 39th Avenue, Vancouver**
PROJECT COMPLETION DATE: **19 April 2003**

Please find enclosed **project photographs**;

1. View of site before tank removal
2. View of top of exposed tank; badly perforated. Contaminated soil suspected
3. View of tank void. Contaminated soil confirmed. Aro Environmental Inc. monitored removal of contaminated soil at site.
4. View of site at completion; awaiting re-pavement of parking lot.

Our request Rec'd

Attached, also please find a copy of the invoice from:

- **T.L.Roberge Trucking Ltd.** for material used to backfill the tank void.
- **Sumas Environmental Services Inc.** for processing of the contaminated tank contents for discharge
- **Scott Road Trading Ltd.** for recycling of the tank.
- M.S.D. Transport Ltd. for trucking of contaminated soil to remediation site.

Please do not hesitate to contact me for more information.

Yours truly,

Grandt Sathanielle
SNR Salvage and Recovery
Ph/FAX (604) 435-1722; Cel (604) 313-8998

CC s.22(1)
Environmental Protection Branch, City of Vancouver

TO DOMINO

① VIEW OF SITE BEFORE TANK REMOVAL.

② VIEW OF TOP OF EXPOSED TANK; BADLY PERFORATED. CONTAMINATED SOIL SUSPECTED.

③ VIEW OF TANK VOID. CONTAMINATED SOIL CONFIRMED. ARO ENVIRONMENTAL INC. MONITORED REMOVAL OF CONTAMINATED SOIL AT SITE.

④ VIEW OF SITE AT COMPLETION; AWAITING REPAVEMENT OF PARKING LOT.

MANIFEST - MANIFESTE

This Manifest conforms to all Federal and Provincial transport and environmental legislation requiring manifesting. Ce manifeste est conforme aux législations fédérale et provinciale sur l'environnement et le transport, requérant un manifeste.

Manifest Reference No. / Nº de référence du manifeste: **2236999-5**

A Consignor (Generator) / Expéditeur (Producteur)
Provincial ID No. / Nº d'id. provincial:
Company name / Nom de l'entreprise: SNB
Mailing address / Adresse postale, City / Ville, Province, Postal code / Code postal: 6179 Dawson St Burnaby BC
Shipping site address / Origine de l'expédition: 2682 W 39
City / Ville, Province, Postal code / Code postal: Vancouver BC

Intended consignee / Destinataire prévu: Sumas Environmental
Provincial ID No. / Nº d'id. provincial: PS 8096
Address / Adresse, City / Ville, Province, Postal code / Code postal: Same
Receiving site address / Destination de l'expédition: 4623 Byrne Rd
City / Ville, Province, Postal code / Code postal: Burnaby BC V5J 3H6

B Carrier / Transporteur
Provincial ID No. / Nº d'id. provincial: L71000.
Company name / Nom de l'entreprise: Sumas Environmental
Address / Adresse: 4623 Byrne Rd
City / Ville, Prov., Postal code / Code postal: Burnaby BC V5J 3H6
Vehicle / Véhicule — Registration No. / Nº d'immatriculation: 4784 GL — Prov.: BC
Trailer/Rail Car No. 1 / 1er remorque – wagon:
Trailer/Rail Car No. 2 / 2e remorque – wagon:
Point of entry / Point d'entrée: — Point of exit / Point de sortie:

Carrier Certification: I declare that I have received waste as offered by the consignor in Part A for delivery to the intended consignee and that the information contained in Part B is correct and complete. / Attestation du transporteur: J'atteste avoir reçu les déchets tels qu'offerts par l'expéditeur dans la partie A en vue de leur livraison au destinataire prévu et que les renseignements de la partie B sont exacts et complets.

Year / Année: 03 — Month / Mois: 04 — Day / Jour: 17 — Name of authorized person (print): Mike Kelman
Signature: [signature] — Tel. No. / Nº de tél.: 604 682-6627

C Consignee (Receiver) / Destinataire (Réceptionnaire)
Provincial ID No. / Nº d'id. provincial:
Consignee information same as Intended Consignee in Part A / L'information à fournir par le destinataire est la même qu'en A: Yes / Oui — No, complete the boxed area below / Non, compléter la boîte ci-dessous
Company name / Nom de l'entreprise:
Address / Adresse:
City / Ville, Province, Postal code / Code postal:
Receiving site address / Destination de l'expédition:
City / Ville, Province, Postal code / Code postal:
Date received / Date de réception: Year / Année, Month / Mois, Day / Jour — Time / Heure: A.M. / P.M.

Physical state / État physique	Shipping name of waste / Appellation réglementaire du déchet	Provincial No. / Nº (Québec-Ontario only)	TDGA/PIN / LTMD/NIP	Quantity shipped / Quantité expédiée	Units	Class / Packing group	Packages No.	Packages Codes	Quantity received / Quantité reçue	Units	Identify any shipment discrepancy	Handling code	Discrepancy
L	Waste Fuel Oil (BC Special Waste)		UN1202	3500	L	3 / III / NA NA	01	0					

Special handling / Emergency instructions / Manutention spéciale / Instructions d'urgence: Attached / Ci-jointe — Below / Ci-dessous: 4-1202 Placards

Circulation No. – Quebec only / Nº de circulation – Réservé au Québec:

Date shipped / Date d'expédition: Year / Année: 03 — Month / Mois: 04 — Day / Jour: 17 — Time / Heure: 2:30 P.M.
Scheduled arrival date / Date d'arrivée prévue: 03 04 17

Consignor Certification: I declare that the information contained in Part A is correct and complete. / Déclaration de l'expéditeur: Je déclare que tous les renseignements à la partie A sont véridiques et complets.

Name of authorized person (print): Grant Sakumoto[illegible]
Signature: [signature] — Tel. No. / Nº de tél.: 604 807 8948

If handling code "Other" (specify) / Si code de manutention "divers", spécifier:
If waste is to be transferred, specify intended company name / Si les déchets doivent être transférés, préciser le nom du destinataire — Provincial ID No. / Nº d'id. provincial:
Address / Adresse — City / Ville — Prov.
Consignee Certification / Attestation du destinataire:
Name of authorized person (print):
Signature — Tel. No. / Nº de tél.:

HOE 04-1917 (12/01)

SCOTT ROAD TRADING LTD.
12865 King George Hwy., Surrey, B.C. V3T 2T1
Phone: (604) 580-0771 or (604) 580-3137, Fax: (604) 580-2856

G.S.T. 131961088
Date: April 21 2003
M. S NR   RE: 2182 W. 39 AVE VANCOUVER

#	LBS.	DESCRIPTION	AMOUNT	
1		#1 Copper		
2		#2 Copper		
3		Light Copper		
4		Red Brass		
5		Yellow Brass 345283		
6		Dirty Brass		
7		Radiators		
8		Aluminum		
9		Dirty Aluminum		
10		Mixed Copper & Brass		
11		Stainless Steel		
12		Insulated Wire		
13		Batteries		38
14	990	Steel	12	87
15		Cast Iron GST		
16		Tin		25
17		Cardboard	13	
18		Car Bodies		
19		Die Cast		
20		Brass Shavings		
21		Lead		

T. L. Roberge Trucking Ltd.

100 - 1331 McKEEN AVE., NORTH VANCOUVER, B.C. V7P 3H9
PHONE: (604) 980-5413

INVOICE

NO: 29959

DATE: 04-17-03

PAGE: 1 of 1

ILD
D:

SNR Salvage & Recovery
G Sathanielle
4264 Sardis St
Burnaby , B.C.
VH1K4

SHIP
TO:

SNR Salvage & Recovery
G Sathanielle
2182 W 39th Ave
Vancouver , 604-313-8998

ST Number: R105299135

EM NO.	QUANTITY	UNIT	DESCRIPTION	F	F	UNIT PRICE	AMOUNT
1	8	Tonnes	Fill Sand Sechelt (D) Freight 3-GST @ 7 % PST @ 7.5 %				

OMER ASSUMES RESPONSIBILITY FOR DAMAGE TO PROPERTY CAUSED AS A RESULT OF USING ACCESS ROUTE RIED BY CUSTOMER.

ENTS:

urs Noonish / See For Inst

TOTAL

M.S.D. TRANS LTD
12320 57A Ave.
SRY B.C. V3X 3N3

Mike
787-7445

OUR NUMBER 088172
DATE April 12, 03
CUSTOMER'S ORDER

SOLD TO SNR
ADDRESS 2182 W 39.

SHIP TO Phone: 313-8228 Cell
ADDRESS Fax - 435-1722

DOC REG. NO.	DESCRIPTION	FOB	TERMS	VIA

QUANTITY	DESCRIPTION	PRICE	AMOUNT
	Rental of TA 400 M		
	Dump to haul said out		
	SAND on Mike Account		
	DIRT Dump next Day		
		GST	
		PST	
		TOTAL	

BRITISH COLUMBIA

Date: FEB 10 2004

Your File:
Our File: 26250-20/8361
SITE 8361

ENVIRONMENTAL PROTECTION BRANCH
CHECKED FEB. 11/04
APPROVED
RE: 2182 W 39TH AVE
FI 40164B

Dorwal Holdings Ltd.
2182 West 39th Avenue
Vancouver BC V5P 1H7

Dear Sir:

Re: Notice of Commencement/Completion of Independent Remediation
2182 West 39th

This letter is to acknowledge receipt of written notice of commencement and completion of independent remediation at the above-referenced site pursuant to section 28(2)(a) of the *Waste Management Act*. This letter is for information purposes only and should not be construed as acceptance or approval of independent remediation, discharges associated with remediation, or any remediation methods or practices.

This site has been assigned the provincial SITE identification number shown above and we request that you reference this number in future submissions regarding this site.

Please be advised that any reports or other documentation submitted with your notice of commencement or completion of independent remediation are not reviewed by the ministry. It remains your responsibility to meet the requirements of the *Waste Management Act* and regulations (e.g. Contaminated Sites Regulation, Special Waste Regulation, etc.) and to identify and address any human health or environmental impacts, safety issues or impacts on utilities associated with the contamination.

Please note that a soil relocation agreement may be required if contaminated soil from this site is relocated to a receiving site. We refer you to section 28.1 of the *Waste Management Act* and sections 40 through 46 of the Contaminated Sites Regulation which specify requirements with respect to relocation of contaminated soil.

In the event that you determine that one or more substances has migrated, or is likely to have migrated, to a neighbouring property(ies) and is, or likely is, causing contamination of the neighbouring property(ies), you are required to provide written notification to the person or persons who own the neighbouring property(ies) and send a copy to the manager as further

Ministry of Water, Land and Air Protection
Regional Operations
Lower Mainland Region
Mailing/Location Address:
10470 152 Street
SURREY BC V3R 0Y3
Telephone: (604) 582-5200
Facsimile: (604) 582-5334

explained in sections 57(1) and 60.1 of the Contaminated Sites Regulation. It is your responsibility to also advise any other affected persons (e.g. owners of rights-of-way, utility corridors, easements, etc.).

Should you anticipate a future requirement or desire for a *Waste Management Act* instrument (e.g. certificate of compliance, approval in principle, etc.) at this site, we recommend that you review all aspects of the government's contaminated sites legislation and supporting guideline documents and protocols to ensure that all required information is collected and documented during the remediation project. Information regarding ministry requirements may be accessed at: "**http://wlapwww.gov.bc.ca/epd/epdpa/contam_sites/index.html**".

If you have any questions about this letter, please contact Kerri Dundas at 604-582-5282.

Sincerely,

Kerri Dundas
Contaminated Sites Officer

/db
cc: Hank Uyeyama, City of Vancouver, fax: 604-873-7963
Kelly Fogarty, Aro Environmental Inc., fax: 604-278-0517

SNR SALVAGE & RECOVERY
SNR
SINCE 1996
there is hope!
FURNACE FUEL AND TANK REMOVAL SPECIALISTS

SNR Salvage and Recovery
6179 Dawson Street
Burnaby, BC V5B 2W5

April 19, 2003.

John Poole
Lieutenant, Customer Service
Fire Prevention Division
201-456 W. Broadway
Vancouver, BC V5Y 1R3

Title: **PROJECT COMPLETION LETTER**

Dear Lt. John Poole,

This letter is to inform you of the completion of the **buried furnace fuel storage tank REMOVAL project** for:

PERMIT: **F1 401648**
CLIENT: s.22(1)
PROJECT LOCATION: **2182 W. 39th Avenue, Vancouver**
PROJECT COMPLETION DATE: **19 April 2003**

Please find enclosed **project photographs;**

1. View of site before tank removal
2. View of top of exposed tank; badly perforated. Contaminated soil suspected
3. View of tank void. Contaminated soil confirmed. Aro Environmental Inc. monitored removal of contaminated soil at site.
4. View of site at completion; awaiting re-pavement of parking lot.

Attached, also please find a copy of the invoice from:

- **T.L.Roberge Trucking Ltd.** for material used to backfill the tank void.
- **Sumas Environmental Services Inc.** for processing of the contaminated tank contents for discharge
- **Scott Road Trading Ltd.** for recycling of the tank.
- M.S.D. Transport Ltd. for trucking of contaminated soil to remediation site.

Please do not hesitate to contact me for more information.

Yours truly,

Grandt Sathanielle
SNR Salvage and Recovery
Ph/FAX (604) 435-1722; Cel (604) 313-8998

CC s.22(1)
Environmental Protection Branch, City of Vancouver

Entered Prism
May 9/03
DB

[redacted]

① VIEW OF SITE BEFORE TANK REMOVAL.

② VIEW OF TOP OF EXPOSED TANK; BADLY PERFORATED CONTAMINATED SOIL SUSPECTED.

③ VIEW OF TANK VOID. CONTAMINATED SOIL CONFIRMED. ARO ENVIRONMENTAL INC. MONITORED REMOVAL OF CONTAMINATED SOIL AT SITE.

[redacted]

④ VIEW OF SITE AT COMPLETION; AWAITING NEW PAVEMENT OF PARKING LOT.

T. L. Roberge Trucking Ltd.

100 - 1331 McKEEN AVE., NORTH VANCOUVER, B.C. V7P 3H9
PHONE: (604) 980-5413

INVOICE

NO: 29959

DATE: 04-17-03

PAGE: 1 of 1

D

SNR Salvage & Recovery
G Sathanielle
4264 Sardis St
Burnaby , B.C.
VH1K4

SHIP TO:

SNR Salvage & Recovery
G Sathanielle
2182 W 39th Ave
Vancouver , 604-313-8998

I Number: R105299135

MNO	QUANTITY	UNIT	DESCRIPTION	UNIT PRICE	AMOUNT
	8	Tonnes	Fill Sand Sechelt (D) Freight 3-GST @ 7 % PST @ 7.5 %		

OMER ASSUMES RESPONSIBILITY FOR DAMAGE TO PROPERTY CAUSED AS A RESULT OF USING ACCESS ROUTE IFIED BY CUSTOMER.

TOTAL

ENTS:

urs Noonish / See For Inst

ke MSDTrk-Ph2404157 x5959954 PHO [redacted] NO. : Apr. [redacted] 2003 11:11AM P1

M.S.D. TRANS LTD
12320 57A Ave
SRY B.C. V3X 3H3

Mike
787-7445

OUR NUMBER 088172
DATE April 19.03
CUSTOMER'S ORDER

SOLD TO SNR
ADDRESS 2192 W 39.

SHIP TO Phone: 313-8998 Cell
ADDRESS Fax - 435 - 1720

SOLD BY	C.O.D. / CHARGE / ON ACCOUNT / MDSE RETURNED / PAID OUT	F.O.B.	TERMS	VIA

QUANTITY	DESCRIPTION	PRICE	AMOUNT
	Rental of TANDOM		
	Dump to HAUL Soil out		
	SAND on Mike Account		
	DIRT Dump Next Day		
			GST
			PST
			TOTAL

Katigbak, Veronica

From: Montgomery, Nicole
Sent: Monday, June 09, 2014 4:36 PM
To: DOMINO (CITYVAN)
Attachments: May 2003 UST Remediation (page 1 - 25).pdf; May 2003 UST Remediation (Page 26 - 54).pdf

Please file the attached report (in 2 parts) under 2182 W 39th Ave, in relation to FI401648.

Nicole Montgomery, B.Sc.
Environmental Protection Officer, Environmental Contamination Team
City of Vancouver
Mail: 453 West 12th Avenue, Vancouver, BC V5Y 1V4
Site Office: #300 – 515 W 10th Ave, Vancouver, BC
Phone: 604-873-7528
Email: nicole.montgomery@vancouver.ca

FI 401648 Part 2 of 2

Figure 3: Site & Surrounding Land Use

Not to Scale

aro ENVIRONMENTAL INC.

Figure 3: Site and Surrounding Land Use

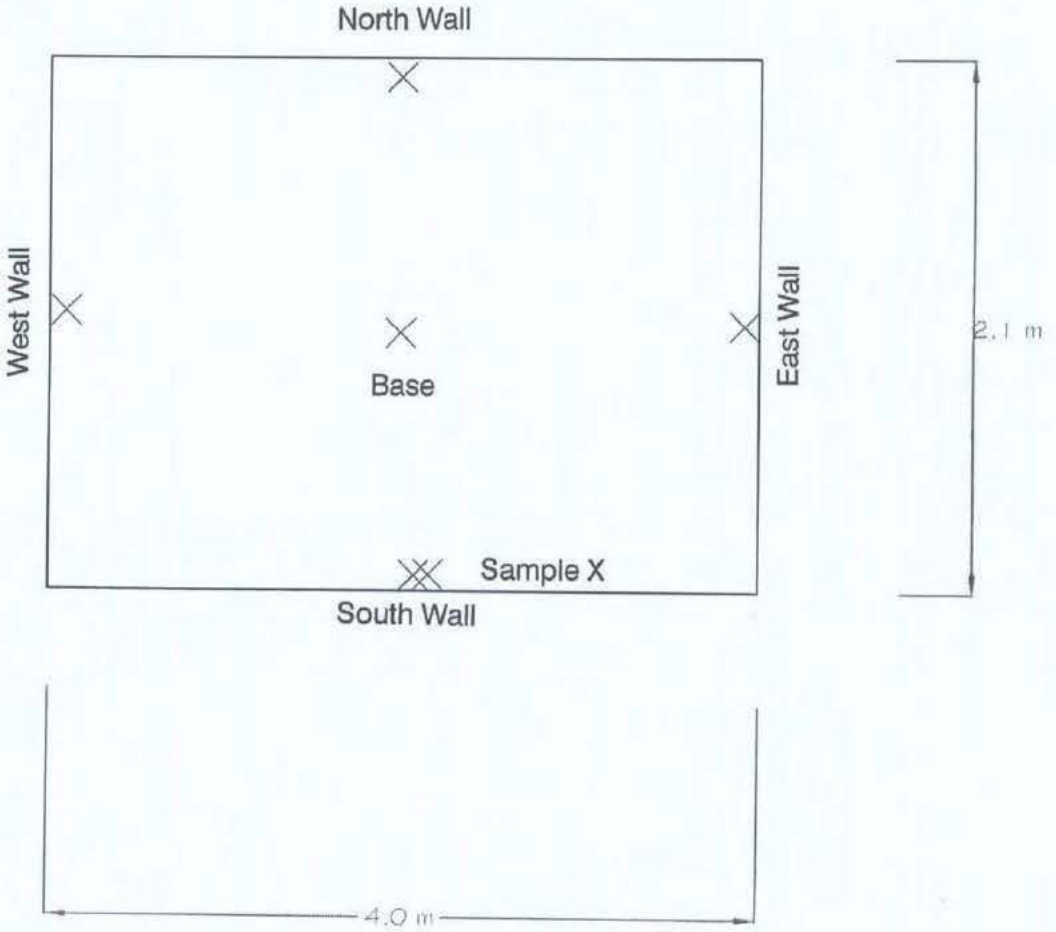
Location: 2182 West 39th Avenue Vancouver, BC

Drawn by:	Date:	Job No.
AWS	May 2003	S474-001

Figure 4: Excavation Limits and Soil Sample Locations

Excavation Limits and Soil Sample Locations

(4.0m X 2.1m X 2.1m deep)



Not to Scale

aro ENVIRONMENTAL INC.		
Figure 4: Excavation Limits and Soil Sample Locations		
Location: 2182 West 39th Avenue Vancouver, BC		
Drawn by:	Date:	Job No.
KF	May 2003	S474-001

Appendix A: Statement of Qualifications

Statement of Qualifications of
Kelly Fogarty, B.Sc., Diploma, Environmental Scientist

EDUCATION:

B.Sc. (Biological Sciences/Geography) 1999, University of Alberta.

Environmental Science Diploma, 1999, Langara College, Vancouver, BC.

Gas Chromatography and Mass Spectrometry, 2001, BCIT, Burnaby, BC.

EXPERIENCE:

Project Manager, Aro Environmental Inc., Richmond, BC.
Diverse responsibilities and skills relating to investigation, remediation, monitoring and management of contaminated soil and groundwater. October 2001 to present.

Environmental Lab Technician/GC *Operator*, *Soilcon* Laboratories Ltd., Richmond, BC.
Analysis of soil physical properties and analysis of petroleum concentrations in soil and water through the operation of gas chromatographs. October 2000 to October 2001.

Research Assistant, Langara College, Vancouver, BC.
Musquem Creek and Cutthroat Creek water quality monitoring project. January 1999 to May 1999.

SELECTED SKILLS:

- Managing, conducting and designing environmental impact investigations
- Data reduction and analysis of budgets and monitoring results for various contaminated Sites
- Preparing Preliminary Site Investigations
- Conducting remedial projects and associated reporting
- Compliance reporting and monitoring
- Updating and reporting to clients
- Group management, supervision and leadership experience
- Managing multiple projects simultaneously
- Analysing and interpreting raw data.

PROFESSIONAL COMPETENCIES

Stage 1 Preliminary Site Investigations: Site history research, aerial photograph interpretation, report writing

Stage 2 Preliminary Site Investigations & Detailed Site Investigations: Managing budgets and deadlines, determining intrusive investigation locations, performing site surveys, locating buried utilities, subsurface investigation experience (drilling, test pitting), soil sampling, groundwater sampling, soil classification, borehole logging, hydrogeology investigations (Bail tests, data analysis and gradient measurements), interpreting analytical data (respective to remediation guidelines, natural attenuation parameters, and risk assessment), monitoring laboratory QA/QC, as well as report writing.

Remedial Investigations: Budget management, coordinating job duties, designing and implementing soil and groundwater remediation systems and procedures; water treatment systems (rotating biological contactor), soil treatment systems (biocells), monitoring attenuation parameters, as well as report writing.

Compliance Reporting: Budget management, applications for permits relating to discharging from water treatment systems, analysing and sampling for permit compliance, designing and implementing treatment systems including trouble shooting procedures, as well as permit compliance reporting.

Government Regulation: Strong understanding and working knowledge of Contaminated Sites Regulations and the Special Waste Regulations for British Columbia and various federal and municipal policies and procedures for waste management.

Appendix B: Notification of Independent Remediation

aro
ENVIRONMENTAL INC.

Common Name	Apartment Building
Civic Address	2182 West 39th Avenue, Vancouver, BC
Legal Description	Lot 23 and 24 of Lot 7, Block 17, Plan 4907, District Lot 526
P.I.D.	011-280-131, 011-280-158
Latitude	N 49° 14' 17"
Longitude	W 123° 09' 46"

April 21, 2003

FAXED April 21/03

Ms. Kerri Dundas
Special Waste Section
BC Environment,
10470 – 152nd Street
Surrey, British Columbia

Fax: (604) 582-5334

Dear Ms. Dundas,

Re: NOTIFICATION OF INDEPENDENT REMEDIATION

As per Section 57 of the *Contaminated Sites Regulation* (CSR), the following information is provided:

CSR Section	Information
Section 57 (1)(a)	One heating oil UST was decommissioned from the Site on April 17, 2003. The tank basin fill sand appeared to be contaminated by petroleum hydrocarbons. Offsite contamination is not suspected at this point.
Section (1)(b)(i)	**Civic Address:** 2182 West 39th Avenue, Vancouver, BC **Parcel Identifier:**011-280-131, 011-280-158 **Longitude:** W 123° 09' 46" **Latitude:** N 49° 14' 17" **Legal Description:**
Section (1)(b)(ii)	**Owner:** Dorwall Holdings Ltd. s.22(1) [redacted]
Section (1)(b)(iii)	**Contact:** Kelly Fogarty, B.Sc., Dipl. **Company:** Aro Environmental Inc. (Formerly Soilcon Laboratories Ltd.) **Address:** Suite 275-11780 River Road, Richmond, B.C., V6X 1Z7 **Phone:** (604) 278-1161 **Fax:** (604) 278-0517

aro
ENVIRONMENTAL INC.

CSR Section	Information
Section (1)(b)(iv)	**General Description:** • One heating oil UST was decommissioned from the Site on April 17, 2003. The Site is an apartment complex in a residential area of Vancouver, BC. • Field observations have indicated that the backfill sand surrounding the UST was contaminated by petroleum hydrocarbons. • Planned work: The tank basin fill sand was removed from the Site and transport off Site on April 17, 2003 to a registered treatment facility. Conducted a soil sampling program of the native soil surrounding the tank basin. Will make appropriate recommendations following the completion of analyses.

It is also under stood that as per Section 20.8(2)(b) of the Waste Management (Amendment) Act 1993, notification of completion is to be submitted to BC Environment within 90 days of completion of remediation at this site.

Thank You,

Kelly Fogarty, B.Sc., Dipl.
Project Manager
Aro Environmental Inc.

Appendix C: Site Photographs

Plate 1:

Front view of the Mountainview Apartments at 2182 West 39th Avenue. Looking east from West 39th Avenue.

Plate 2:

Rear view of the Mountainview Apartments. Looking northeast from the lane.

Plate 3:

View of the tank before removal from the Site by the project coordinator.

Appendix C: Site Photographs	
Location: Mountainview Apartments 2182 West 39th Avenue Vancouver, BC	
Date	Job Number
May 2003	S474-001

aro ENVIRONMENTAL INC.

Plate 4:

Perforations in the tank.

Plate 5:

The final excavation limits. Looking east.

Plate 6:

The final excavation limits. Looking west.

Appendix C: Site Photographs	
Location: Mountainview Apartments 2182 West 39th Avenue Vancouver, BC	
Date	Job Number
May 2003	S474-001

aro ENVIRONMENTAL INC.

Appendix D: Laboratory Methods

Metals in Soil and Sediment
Strong Acid Leachable Metals (SALM) Analytical Method

Metals analysis was performed using the digestion procedures outlined in "Strong Acid Leachable Metals (SALM) in Soil", *CSR – Analytical Method 8., Version 1.0*, (February 2001), British Columbia Ministry of Environment, Lands and Parks.

Five milliliters of an *aqua regia* solution consisting of a 1:1 ratio of nitric acid to hydrochloric acid is added to a minimum of 1.00g (+/- 0.05g) of air dried soil that has passed through a 2mm stainless steel sieve. The mixture is allowed to digest at room temperature for 1 hour, and then placed on a 40-place block digestor at 90°C (+/-5°C) for 2 hours. Digestates are removed from block digestor, allowed to cool to room temperature, brought up to 75mL volume using distilled deionized (Type 1) water and centrifuged.

Spectral analysis of the digestates is performed using a Perkin Elmer Optima 2000DV, scanning CCD, ICP-OES, following the procedures outline in "Metals Analysis of Solids by ICP", Version 1.0, BC Environmental Laboratory Manual., Supplement #1 to the 1994 Edition (British Columbia Ministry of Environment, March 1997). Additional guidelines for spectral analysis are given in *Concepts, Instrumentation, and Techniques in Inductively Coupled Plasma Optical Emission Spectrometry, 2nd Edition*, (Boss, Charles B., Fredeen, Ken J, 1997) published by the Perkin-Elmer Corporation, Norwalk, CT.

Laboratory Methodology - Hydrocarbons

Soil and Water Sampling and Quality Assurance

All soil samples are collected in new 250 mL glass jars. Water samples for benzene, toluene, ethylbenzene, xylenes (BTEX) and naphthalene are collected in new 40 mL amber septa vials. Water samples for extractable petroleum hydrocarbons are collected in new 1L amber glass bottles. The jars and vials are completely filled and immediately cooled with ice packs prior to refrigeration. Chain-of-custody sheets accompany each consignment of samples. Method blanks, standards and duplicates are run with each sample set. Duplicates are maintained within 20% of the mean reading. External correlations are run on a regular basis by the Canadian Association for Environmental Analytical Laboratories (CAEAL).

BTEX and Naphthalene - Soil

Soil samples are analyzed for BTEX and naphthalene by Soilcon Laboratories Ltd. (Soilcon) in accordance with Environmental Protection Agency (EPA) methods 5030A/8020A (EPA 1992). An SRI chromatograph equipped with a 30m MXT 1 capillary column that conforms to EPA specifications is used. The chromatograph is calibrated with six concentrations of spiked water samples for each compound. BTEX and naphthalene are analyzed with a photo ionization detector (PID). Samples are extracted with a ratio of 15mL methanol to 5g wet soil and the methanol extract is then injected using a standard EPA purge and trap apparatus. A subsample is analyzed to determine gravimetric moisture content so that chromatograph readings can be adjusted to a dry-weight basis. This method meets the criteria in the *British Columbia Environmental Laboratory Manual*. Revision dates and adoption dates for the Manual are given below.

BTEX and Naphthalene - Water

Water samples are analyzed for BTEX and naphthalene by Soilcon in accordance with EPA methods 5030A/8020A (EPA 1992). Water samples are injected into a gas chromatograph using a standard EPA purge and trap apparatus. An SRI chromatograph equipped with a 30m MXT 1 capillary column that conforms to EPA specifications is used. BTEX and naphthalene are analyzed with a PID. The chromatograph is calibrated with six concentrations of water samples spiked with five compounds (B, T, E, and meta and para-xylene). This method meets the criteria in the *British Columbia Environmental Laboratory Manual*. Revision dates and adoption dates for the manual are given below.

VPH - Soil

All soil samples are analyzed for *volatile petroleum* hydrocarbons (VPH) by Soilcon in accordance with EPA methods 5030A/8015A (EPA 1992). An SRI chromatograph equipped with a 30m MXT 1 capillary column that conforms to EPA specifications is used. Samples are extracted with a 15mL methanol:5g wet soil ratio. A subsample of the soil is analyzed to determine gravimetric moisture content so that chromatograph readings can be adjusted to a dry-weight basis. The methanol extract is injected using a standard EPA purge and trap apparatus and VPH is analyzed with a flame ionization detector (FID). The VPH parameter is defined to include all GC/FID peaks eluting between hexane (nC6) and decane (nC10), thus VH_{S6-10} is the sum of the calculated concentrations for the two subranges: $VH_{S(6-oX)}$ and $VH_{S(oX-10)}$. $VH_{S(6-oX)}$ is calibrated against the meta-xylene calibration standard and $VH_{S(oX-10)}$ is calibrated against the 1,2,4-trimethylbenzene calibration standard. VPH_S is obtained by subtracting the concentration of BTEX compounds as determined in the previous section from VH_{S6-10}. This method meets the criteria in the *British Columbia Environmental Laboratory Manual.* Revision dates and adoption dates for the manual are given below.

VPH - Water

Water samples are analyzed for VPH by Soilcon in accordance with EPA methods 5030A/8015A (EPA 1992). Water samples are injected into a gas chromatograph using a standard EPA purge and trap apparatus. An SRI chromatograph equipped with a 30m MXT 1 capillary column that conforms to EPA specifications is used. VPH is analyzed with a FID. The VPH parameter is defined to include all GC/FID peaks eluting between hexane (nC_6) and decane (nC_{10}). Thus VH_{S6-10} is the sum of the calculated concentrations for the two subranges: $VH_{S(6-oX)}$ and $VH_{S(oX-10)}$. $VH_{S(6-oX)}$ is calibrated against a meta-xylene calibration standard and $VH_{S(oX-10)}$ is calibrated against a 1,2,4-trimethylbenzene calibration standard. VPH_W is obtained by subtracting the concentration of BTEX compounds as determined in the previous section. This method meets the criteria in the *British Columbia Environmental Laboratory Manual.* Revision dates and adoption dates for the manual are given below.

LEPH and HEPH - Soil

Soil samples are analyzed for light extractable hydrocarbons (LEPH) and heavy extractable hydrocarbons (HEPH) by Soilcon in accordance with EPA methods 5030A/8015A (EPA 1992). Soils are extracted with a 1:1 solution of hexane and acetone. Twenty mL of the hexane/acetone solution is added to 10g of soil and the mixture is shaken for one hour on an orbital shaker. Following solvent exchange to the hexane solution, the extract is then filtered through silica gel, which acts as an adsorbent for most functional groups with ionic characteristics. These include alkaloids, sugar esters, glycosides, dyes, alkali metal cations, lipids, glycerides, steroids, terpenoids, and plasticizers. The extract is automatically injected into a HP 5890 A series II gas chromatograph equipped with a 15m capillary column. LEPH and HEPH are analyzed with a FID. EPH_s is evaluated as two separate analytes: EPH_{S10-19} and EPH_{S19-32}. EPH_{S10-19} is evaluated as the total integrated peak area from the apex of C_{10} (decane) to the apex of C_{19} (nonadecane), calibrated against eicosane (C_{20}). $LEPH_S$ is obtained by subtracting the concentration of naphthalene from EPH_{S10-19}. EPH_{S19-32} (HEPH) is evaluated as the total integrated peak area from the apex of the C_{19} (nonadecane) to the apex of C_{32} (dotriacontane), calibrated against eicosane. This method meets the criteria in the *British Columbia Environmental Laboratory Manual*. Revision dates and adoption dates for the manual are given below.

LEPH and HEPH - Water

Water samples are analyzed for LEPH and HEPH by Soilcon in accordance with EPA methods 3510/8015A (EPA 1992). Water samples are extracted by pouring 1000mL of sample and 50mL of hexane into a 2000mL separatory funnel, which is placed in a rotary "TCLP" mixer for 10 minutes. After mixing, the water is drawn off and the hexane is retained. The extraction process is repeated two more times with the water that is drawn off. The retained hexane solutions are then concentrated in a Kuderna-Danish Apparatus. The concentrated extract is automatically injected into a HP 5890 A series II gas chromatograph equipped with a 15m capillary column.

LEPH and HEPH are analyzed with a FID. The FID is calibrated using six concentrations of C_{20} (eicosane), which is used to quantify both LEPH and HEPH. EPH_w is evaluated as two separate analytes. EPH_{w10-19} is evaluated as the total integrated peak area from the apex of C_{10} (decane) to the apex of C_{19} (nonadecane), calibrated against eicosane (C_{20}). $LEPH_w$ is obtained by subtracting the concentration of naphthalene from EPH_{w10-19}. EH_{w19-32} (HEPH) is evaluated as the total integrated peak area from the apex of the C_{19} (nonadecane) to the apex of C_{32} (dotriacontane), calibrated against eicosane (C_{20}). This method meets the criteria in the *British Columbia Environmental Laboratory Manual*. Revision dates and adoption dates for the manual are given below.

Revision dates and adoption dates for the Manual

In British Columbia there has been an evolution of laboratory methods for the determining of organic parameters in soil and water. The following timetable describes the series of proposed and accepted methods in the *British Columbia Environmental Laboratory Manual* together with the dates these changes were implemented by Soilcon.

- *British Columbia Environmental Laboratory Manual*, Section D Organic Constituent and Compounds (The British Columbia Quality Assurance Users Committee March 1994). Adopted by Soilcon in January 1995.

- *Draft Addendum to the 1994 British Columbia Environmental Laboratory Manual.* The British Columbia Quality Assurance Users Committee (July 1995). Adopted by Soilcon September 1995.

- *Draft Analytical Methods for VPH LEPH and HEPHs (Feb 1996). British Columbia Environmental Laboratory Manual.* As published in the BC Environmental Issues Searchable Reference Guide – Contaminated Sites Adopted by Soilcon April 1996.

- *British Columbia Environmental Laboratory Manual for the Analysis of Water, Wastewater, Sediment and Biological Materials, Supplement #1 to the 1994 Edition.* Laboratory Services and Data Management Section, Resources Inventory and Data Management Branch. Ministry of Environment, Lands and Parks (March 1997). Adopted by Soilcon May 1997.

- *Analytical Methods for VPHs, LEPHs and HEPHs. Version 2.1 Revision Date July 1999.* As published in the BC Environmental Issues Searchable Reference Guide – Contaminated Sites. Adopted by Soilcon September 1999.

Laboratory QA/QC Charts

Batch quality control charts are provided for each job. These charts provide the results of three sets of quality control procedures: laboratory blanks, laboratory surrogates, and duplicate samples. A batch is a group of samples that is run under automated control at a single time using a single set of instructions to the gas chromatograph software control system. Laboratory blanks are run with all sample batches. In some cases these are below the detection limits set in the *BC Methods Manual.* Surrogate recovery shows the recovered amount of a parameter found in a laboratory prepared spike sample that is run with the batch. In all cases the surrogate recoveries are well within the permissible ranges specified for each by the BC Methods Manual. The permissible ranges for each parameter are given on the batch quality control charts. The third set of data given on the charts is from duplicate samples. Laboratory duplicates are run on every tenth sample. Specifically sample numbers 2, 12, 22, etc. are run in duplicate in every batch. The results of duplicate analyses are reported as Relative Percent Difference (RPD), which is equal to the difference between sample values divided by the average value of the duplicate samples. The permissible range for RPDs is +/- 20%. RPDs cannot be calculated where both results are below the detection limit.

Additional quality control protocols include double-checking all data entries by a person other than the operator. External inter-laboratory correlations are run on a regular basis by the Canadian Association for Environmental Analytical Laboratories (CAEAL).

References:

United States Environmental Protection Agency (1986). *November Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.* (SW-846) 3rd Edition. 2 volumes (November 1986).

Ministry of Environment, Lands and Parks. 1994. *British Columbia Environmental Laboratory Manual for the Analysis of Water, Wastewater, Sediment and Biological Materials.* Revised July 1999. British Columbia Ministry of Environment, Victoria, BC.

Ministry of Environment. December 1996. *British Columbia Contaminated Sites Regulation.* B.C. Reg. 375/96am. 244/99, Victoria, B.C.

Appendix E: Laboratory Certificates and QA/QC Data

SOILCON LABORATORIES LTD.

GC Sample List

Job Name: DORWALL HOLDINGS LTD.

Sampled By: KELLY

Date Sampled: APRIL 17/03

No. of Samples Submitted:

9 (Soil) ____ Water

Consulting Job Number: SH74-001

#	Sample Identification	Sample Type	Depth	BTEX	LEPH HEPH	Metals	Other	Comments
1	North Wall	S			✓			
2	South Wall				✓			
3	East Wall				✓			
4	West Wall				✓			
5	Base			✓	✓			
6	Sample X				✓			
7	Stockpile				✓	✓		
8	New Fill					✓		
9	Load 1	↓		✓	✓			

Relinquished By:	Received By:	Date / Time:
Kelly Fogarty	[illegible]	Apr. 21/03 11:02 am

Lab Job Number: 03-176

WHITE - GC ROOM COPY

YELLOW - FILE COPY

soilcon LABORATORIES LTD.

275 - 11780 RIVER ROAD, RICHMOND, B.C. V6X 1Z7 • TEL: (604) 278-5535 • FAX: (604) 278-0517
E-MAIL: soilcon@soilconlabs.com • WEB SITE: www.soilconlabs.com

Petroleum Hydrocarbons in Soil Samples

Job	#	Sample ID	Dep.	Media	Moist	B	T	E	X	N	VPH	$EPHs_{19-32}$	$EPHs_{10-19}$
					% Dry	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
03-176	03-176 1	North Wall		soil	29%	NT	NT	NT	NT	NT	NT	<40	<40
Dorwall Holdings Ltd.	03-176 2	South Wall		soil	26%	NT	NT	NT	NT	NT	NT	<40	<40
Kelly	03-176 3	East Wall		soil	18%	NT	NT	NT	NT	NT	NT	<40	<40
S474-001	03-176 4	West Wall		soil	28%	NT	NT	NT	NT	NT	NT	<40	<40
	03-176 5	Base		soil	29%	<0.04	<0.05	<0.05	<0.10	<0.05	<10	<40	<40
	03-176 6	Sample X		soil	23%	NT	NT	NT	NT	NT	NT	<40	<40
	03-176 7	Stockpile		soil	23%	NT	NT	NT	NT	NT	NT	<40	<40
	03-176 9	Load 1		soil	31%	0.05	0.06	2.57	4.47	3.52	210	3492	14764

NT-Not tested
B-Benzene
T-Toluene
E-Ethylbenzene
X-Xylenes
N-Napthalene
VPH-Volatile Petroleum Hydrocarbons
LEPH-Light Extractable Petroleum Hydrocarbons
HEPH-Heavy Extractable Petroleum Hydrocarbons

5/26/2003

Initals: ____ QC: ____

Petroleum Hydrocarbons in Soil Samples

Job	#	Sample ID	Dep.	Media	Sample	BTEX	BTEX	BTEX	EPH	EPH	EPH
					Date	Extract Date	Analysis Date	QC Batch #	Extract date	nalysis Dat	QC Batch #
03-176	03-176 1	North Wall		soil	17-Apr-03	NT	NT	NT	21-Apr	23-Apr	E230403
Dorwall Holdings Ltd.	03-176 2	South Wall		soil	17-Apr-03	NT	NT	NT	21-Apr	23-Apr	E230403
Kelly	03-176 3	East Wall		soil	17-Apr-03	NT	NT	NT	21-Apr	23-Apr	E230403
S474-001	03-176 4	West Wall		soil	17-Apr-03	NT	NT	NT	21-Apr	23-Apr	E230403
	03-176 5	Base		soil	17-Apr-03	21-Apr	22-Apr	B220403	21-Apr	23-Apr	E230403
	03-176 6	Sample X		soil	17-Apr-03	NT	NT	NT	21-Apr	23-Apr	E230403
	03-176 7	Stockpile		soil	17-Apr-03	NT	NT	NT	21-Apr	23-Apr	E230403
	03-176 9	Load 1		soil	17-Apr-03	21-Apr	22-Apr	B220403	21-Apr	23-Apr	E230403

NT-Not tested
B-Benzene
T-Toluene
E-Ethylbenzene
X-Xylenes
Nap-Napthalene
VPH-Volatile Petroleum Hydrocarbons
LEPH-Light Extractable Petroleum Hydrocarbons
HEPH-Heavy Extractable Petroleum Hydrocarbons

4/29/03

Initals: aac QC: MB

Soilcon Laboratories Ltd.
Batch Quality Control
Soil BTEX Petroleum Hydrocarbons

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E-MAIL: soilcon@soilconlabs.com • WEB SITE: www.soilconlabs.com

SOILCON LABORATORIES LTD.

	QC	Run	Parameter	Blank	Detection	Surrogate	Recovery	Duplicate	Duplicate
	Batch#	Date			Limit	Recovery	Limits	R.P.D.	Limits
Job #				(mg/kg)	(mg/kg)	(%)	(%)	(%)	(%)
03-176	B220403	22-Apr	benzene	<.04	0.04	96	76-127	NC	20
Dorwall Holdings Ltd.	B220403	22-Apr	toluene	<.05	0.05	96	76-125	NC	20
Kelly	B220403	22-Apr	ethylbenzene	<.05	0.05	106	70-130	NC	20
S474-001	B220403	22-Apr	o-xylene	<.05	0.05	102	70-130	NC	20
	E230403	23-Apr	LEPH	<40	40	99	70-130	NC	20
	E230403	23-Apr	HEPH	<40	40	100	70-130	NC	20

R.P.D. = Relative Percent Difference
NC = Not Calculated Below Five Times The Standard Deviation

Initials: pac QC: MS

soilcon
LABORATORIES LTD.

Soilcon Job#		03-176		
Company:		Dorwall Holdings Ltd.		
Contact:		Kelly		
Project ID:		S474-001		
Media:		Soil		
Analysis:		ICP-Metals		
Batch #		SM250403		
Date Run:		25-Apr-03		
Sample ID		Stockpile	New fill	Detection
Lab#		03-176-7	03-176-8	Limit
Analyte	Units			
pH	--	7.03	7.45	0.01
Ag	mg/kg	<0.01	<0.01	0.01
Al	%	1.19	0.84	0.0001
As	mg/kg	9	7	1
B	mg/kg	2.24	1.22	0.05
Ba	mg/kg	53.3	50.6	0.02
Be	mg/kg	0.273	0.158	0.002
Ca	%	0.72	0.36	0.00002
Cd	mg/kg	<0.02	<0.02	0.02
Co	mg/kg	6.42	4.86	0.04
Cr	mg/kg	19.3	8.78	0.05
Cu	mg/kg	15.6	8.72	0.05
Fe	%	1.34	1.21	0.0001
K	%	0.05	0.11	0.0001
Mg	%	0.40	0.35	0.0001
Mn	mg/kg	227	219	0.4
Mo	mg/kg	1.9	1.8	0.1
Na	%	0.02	0.02	0.00002
Ni	mg/kg	14.6	5.0	0.1
P	%	0.05	0.04	0.004
Pb	mg/kg	15.5	5.9	0.3
S	mg/kg	2871	453	7
Sb	mg/kg	0.7	1.5	0.6
Se	mg/kg	5	5	1
Sn	mg/kg	2.0	2.9	0.3
Sr	mg/kg	55.5	40.5	0.001
V	mg/kg	37.6	24.7	0.03
Zn	mg/kg	48.7	34.1	0.1

03-176 soil met.xls 4/30/03
Liability limited to testing fee paid

Initials: DK

QC: mg

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E-MAIL: soilcon@soilconlabs.com • WEB SITE: www.soilconlabs.com

Soilcon Laboratories Ltd.
Batch Quality Control
Soil Metals

Job #	QC Batch #	Date	Analyte	Blank	Detection Limit	Surrogate Recovery	Recovery Limits	Duplicate R.P.D.	Duplicate Limits
	SM\dd\mm\yy	Run							
				(mg/kg)	(mg/kg)	(%)	(%)	(%)	(%)
03-176	SM250403	25-Apr-03	Ag	<0.01	0.01	88	80-120	NC	20
03-176	SM250403	25-Apr-03	Al	<1	1	99	80-120	1%	20
03-176	SM250403	25-Apr-03	As	<1	1	81	80-120	17%	20
03-176	SM250403	25-Apr-03	B	<0.05	0.05	90	80-120	9%	20
03-176	SM250403	25-Apr-03	Ba	<0.02	0.02	106	80-120	1%	20
03-176	SM250403	25-Apr-03	Be	<0.002	0.002	114	80-120	0%	20
03-176	SM250403	25-Apr-03	Ca	<0.2	0.2	109	80-120	2%	20
03-176	SM250403	25-Apr-03	Cd	<0.02	0.02	120	80-120	NC	20
03-176	SM250403	25-Apr-03	Co	<0.04	0.04	111	80-120	2%	20
03-176	SM250403	25-Apr-03	Cr	<0.05	0.05	113	80-120	1%	20
03-176	SM250403	25-Apr-03	Cu	<0.05	0.05	118	80-120	13%	20
03-176	SM250403	25-Apr-03	Fe	<0.5	0.5	106	80-120	2%	20
03-176	SM250403	25-Apr-03	K	<1	1	93	80-120	19%	20
03-176	SM250403	25-Apr-03	Mg	<1	1	110	80-120	0%	20
03-176	SM250403	25-Apr-03	Mn	<0.4	0.4	115	80-120	4%	20
03-176	SM250403	25-Apr-03	Mo	<0.1	0.1	94	80-120	13%	20
03-176	SM250403	25-Apr-03	Na	<0.2	0.2	97	80-120	5%	20
03-176	SM250403	25-Apr-03	Ni	<0.1	0.1	111	80-120	2%	20
03-176	SM250403	25-Apr-03	P	<40	40	109	80-120	5%	20
03-176	SM250403	25-Apr-03	Pb	<0.3	0.3	113	80-120	5%	20
03-176	SM250403	25-Apr-03	S	<7	7	106	80-120	3%	20
03-176	SM250403	25-Apr-03	Sb	<0.6	0.6	NC	80-120	NC	20
03-176	SM250403	25-Apr-03	Se	<1	1	NC	80-120	NC	20
03-176	SM250403	25-Apr-03	Sn	<0.3	0.3	N/A		11%	20
03-176	SM250403	25-Apr-03	Sr	<0.001	0.001	120	80-120	3%	20
03-176	SM250403	25-Apr-03	V	<0.03	0.03	105	80-120	2%	20
03-176	SM250403	25-Apr-03	Zn	<0.1	0.1	110	80-120	3%	20

R.P.D. Relative Percent Difference
N/A=Standard Reference Value Not Available
NC=Not Calculated (< 5xDL)

Initials: DK

QC: MS

Analysis Report

CANTEST LTD.
Professional Analytical Services
4606 Canada Way
Burnaby, B.C.
V5G 1K5
FAX: 604 731 2386
TEL: 604 734 7276
1 800 665 8566

REPORT ON: Analysis of Liquid Samples

REPORTED TO: Soilcon Laboratories Ltd.
Suite 275
11780 River Road
Richmond, B.C.
V6X 1Z7

Att'n: Ms. Natasha Smyth

PROJECT NUMBER: 03-149/03-176

NUMBER OF SAMPLES: 3

REPORT DATE: May 22, 2003

DATE SUBMITTED: May 5, 2003

GROUP NUMBER: 40505030

SAMPLE TYPE: Liquid

NOTE: Results contained in this report refer only to the testing of samples submitted.

TEST METHODS:

Mercury in Liquid - analysis was performed using procedures based on U. S. EPA Method 1631, oxydative digestion using a bromination procedure, and analysis using Cold Vapour Atomic Fluorescence Spectroscopy.

Metals in Liquid - analysis was performed using Inductively Coupled Plasma Optical Emission Spectroscopy (ICP), Inductively Coupled Plasma-Mass Spectroscopy (ICP/MS) or Graphite Furnace Atomic Absorption Spectrophotometry.

TEST RESULTS:

(See following page)

CANTEST LTD.

Richard S. Jornitz
Supervisor, Inorganic Testing

REPORTED TO: Soilcon Laboratories Ltd.

REPORT DATE: May 22, 2003

GROUP NUMBER: 40505030

CANTEST

Metals Analysis in Liquid

CLIENT SAMPLE IDENTIFICATION:	CANTEST ID	Total Mercury Hg	Total Selenium Se
03-149-1	305050135	1.1 x1.5	0.005
03-176-7	305050136	-	0.007
03-176-8	305050137	-	< 0.002
DETECTION LIMIT		0.5	0.002
UNITS		µg/L	mg/L

0.375
0.525
<0.1

µg/L = micrograms per liter
< = Less than detection limit

mg/L = milligrams per liter

165 µg/L
0.165 g/L

Katigbak, Veronica

From: Montgomery, Nicole
Sent: Monday, June 09, 2014 4:36 PM
To: DOMINO (CITYVAN)
Attachments: May 2003 UST Remediation (page 1 - 25).pdf; May 2003 UST Remediation (Page 26 - 54).pdf

Please file the attached report (in 2 parts) under 2182 W 39th Ave, in relation to FI401648.

Nicole Montgomery, B.Sc.
Environmental Protection Officer, Environmental Contamination Team
City of Vancouver
Mail: 453 West 12th Avenue, Vancouver, BC V5Y 1V4
Site Office: #300 – 515 W 10th Ave, Vancouver, BC
Phone: 604-873-7528
Email: nicole.montgomery@vancouver.ca

Underground Storage Tank Decommissioning and Remedial Excavation

2182 West 39th Avenue Vancouver, BC

FI 401648
Part 1 of 2

Prepared for:
Dorwall Holdings Ltd.

Project No.: S474-001

May 2003

BALANCING THE NEEDS OF ENTERPRISE AND THE ENVIRONMENT
275 - 11780 River Road, Richmond, British Columbia, Canada V6X 1Z7
> Tel: 604.278.1161 > Fax: 604.278.0517 > E-mail: info@aroenvironmental.com
www.aroenvironmental.com

aro ENVIRONMENTAL INC.

EXECUTIVE SUMMARY

In April 2003, s.22(1) of Dorwall Holdings Ltd. retained Aro Environmental Inc. (ARO) to supervise the environmental aspects of decommissioning a 800 gallon heating oil underground storage tank (UST) at The Mountainview apartment complex located at 2182 West 39th Avenue in Vancouver, BC (herein referred to as the Site). The objective of the environmental investigation was to assess whether the UST had contaminated the Site. The purpose of the project was for the refinancing of the Site. s.22(1) are the Site owners.

This report serves as a Notification of Completion of Independent Remediation as required under Section 57 of the British Columbia Contaminated Sites Regulation (CSR) and will be forwarded to the BC Ministry of Water, Land and Air Protection (MOWLAP) for review upon your approval.

On April 17th, 2003, ARO supervised the removal of the UST. Upon removal of the tank, petroleum contamination was evident in the tank basin. After consultation with the client, a total of 11 tonnes of contaminated soil was immediately removed from the tank basin and was shipped off-Site to a treatment facility in Delta, BC.

A total of nine soil samples were collected during the project and select samples were analysed for BTEX, naphthalene, VPH, EPH_{10-19}, EPH_{19-32}, metals, and pH. Laboratory results obtained from the final limit samples indicate that all petroleum hydrocarbon contamination has been removed from the Site. New backfill was shipped to the Site to fill the excavation and samples were recovered and analysed for metals as a precautionary measure. Samples were also recovered from the clean stockpiled soil and analysed for petroleum hydrocarbons and metals. The new backfill sample results and the stockpile sample results indicate that this fill material is suitable for use at the Site.

It is concluded that soil quality surrounding the removed UST at the Site meets the applicable Residential standards of the CSR. Groundwater contamination is not suspected due to the low permeability of soil surrounding the former tank location and the removal of the impacted soil. It is further concluded that removal of the UST and the surrounding impacted soil has improved the environmental quality of the Site.

All work was conducted in accordance with the *British Columbia Contaminated Sites Regulation* (CSR)(375/96 am. 17/2002).

No further environmental investigations are recommended at this time.

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DECOMMISSIONING OF AN UNDERGROUND STORAGE TANK AND REMEDIAL EXCAVATION

1 INTRODUCTION

In April 2003, s.22(1) of Dorwall Holdings Ltd. retained Aro Environmental Inc. (ARO) to supervise the environmental aspects of decommissioning one 800 gallon heating oil underground storage tank (UST) at the Mountainview apartment complex located at 2182 West 39th Avenue in Vancouver, BC (herein referred to as the Site). s.22(1) are the Site owners.

On April 17th, 2003, ARO supervised the removal of the UST. The objective of the environmental investigation was to assess whether the UST had negatively impacted the Site. Upon removal of the tank, petroleum contamination was evident in the soil tank basin surrounding the UST. ARO recommended a remedial excavation and the contaminated soil was removed from the tank basin and shipped off-Site to a treatment facility in Delta, BC. A Notification of Independent Remediation (NIR) was prepared for the Site on April 21st, 2003 and submitted to the Ministry of Water, Land and Air Protection (MOWLAP) as required under Section 57 of the *Contaminated Sites Regulation* (CSR)(375/96 am. 17/2002).

Soil samples were collected from the base and sidewalls of the final excavation limits, as well as from the clean stockpiled soil that had covered the tanks and the new imported fill material. Samples were also collected from the contaminated soil that was shipped off-Site. Selected samples were submitted for laboratory analysis of potential contaminants of concern (PCOC).

The purpose of this report is to describe the decommissioning of the UST and present the methods and results of the remedial excavation. This report also serves as a Notification of Completion of Independent Remediation as required under Section 57 of the CSR and will be forwarded to MOWLAP for review upon your approval.

Kelly Fogarty, B.Sc., Dipl. of ARO was the primary investigator for the tank decommissioning and remediation report. Senior review was conducted by E.L. Pottinger. Appendix A includes the statement of qualifications for the participant in this investigation. Appendix B includes the NIR document.

Figure 1 is a Site location map. The Site Schematic is shown in Figure 2. Site identification information is presented in Table 1.

Table 1: Site Identification Information

Land Use	Apartment Complex
Civic Address	2182 West 39th Avenue, Vancouver, BC
PID	011-280-131, 011-280-158
Legal Description	Lots 23 & 24 of Lot 7 Block 17 Plan 4907 DL 526
Latitude	49° 14 17" North
Longitude	123° 09' 46" West

This report is divided into the following sections:

1. Introduction
2. Conceptual Site Model and Applicable Standards
3. Methods
4. Results
5. Conclusions and Recommendations
6. Closure Statement
7. References

Supporting Documents are presented in Appendix A through Appendix E.

2 APPLICABLE STANDARDS AND CONCEPTUAL SITE MODEL

The Conceptual Site Model consists of an understanding of the potential sources of contamination that could occur on the Site, the potential receptors in the receiving environment, and pathways along which contaminants might flow from the source to the receptors. Such a model serves as a scientific basis for judging the significance of contamination at a site and serves as a basis for government regulation. This section develops a Conceptual Site Model for the Site based on the guidelines set under the CSR.

The CSR came into effect on April 1, 1997. Under the CSR there are several types of numerical standards for soil contaminants. Where there is sufficient data, matrix standards have been enacted. These are based on the presence of pathways along which a contaminant can travel from a source to a receptor. Matrix standards depend on the Conceptual Site Model. The derivation of matrix standards is described in the *Contaminated Sites Soil Taskgroup* (CSST) *Policy Decision Summary* (CSST January 1996) and the *Workshop on the Development and Implementation of Soil Quality Standards for Contaminated Sites* (MacDonald October 1995). Where matrix standards have not been developed, generic standards have been specified in the CSR based on conservative assumptions. Standards are provided in the CSR for both soil and water.

The water standards are presented first, as the applicability of some soil standards depends on the applicability of water standards. Table 2 provides a summary of all applicable criteria.

2.1 Water Standards

There are four categories for water use in the CSR. Each of these is described below.

2.2 Drinking Water Standards

The drinking water standards are applicable if water sources including wells and surface water supplies could be affected by a release at the Site.

If the travel time of the groundwater from the Site to the closest source of water used for domestic consumption is greater than 100 years, the CSR *Technical Guidance Document #6: Applying Water Quality Standards to the Groundwater and Surface Water (Draft)* (MOELP 1998) states it is unlikely that the Site has the potential to pollute the water source. Until Site-specific data is obtained, the drinking water standards are normally applied to sites within 1.5km from drinking water sources.

The Site and the surrounding areas receive their potable water from a Greater Vancouver Regional District (GVRD) system, which obtains water from reservoirs located in North Vancouver. Because the reservoirs could not be affected by a release from the Site, the Drinking Water standards are not applicable to the Site.

2.3 Aquatic Life Water Standards

If the travel time of the groundwater from a Site to the closest surface water containing aquatic life is greater than 50 years, the CSR *Technical Guidance Document #6* states that it is unlikely that the Site has the potential to pollute the aquatic receiving environment. Until Site-specific data is obtained, the Aquatic Life standards are normally applied if the Site is within 1km of surface water.

It is important to note that the second stage amendments (BC Reg. 17/2002) to the CSR altered the Aquatic Life standards to include freshwater and marine/estuarine areas. Surface waters in close proximity to the Site must therefore be identified as freshwater or marine/estuarine water bodies.

The Site is approximately 2.5km north of the North Arm of the Fraser River, which is the closest surface water containing aquatic life. This part of the Fraser River is classified as a marine/estuarine area. There are no freshwater aquatic environments located within 1km of the Site.

Because the Fraser River is located greater than 1km from the Site, the Aquatic Life Water standards for marine/estuarine are not applicable to the Site. The Aquatic Life Water standards for freshwater are *also not* applicable as there are no freshwater areas within 1km of the Site.

2.4 Irrigation And Livestock Watering

Water can also provide a pathway whereby contaminants can reach irrigation systems that are used to supply water to agricultural plants and/or water supplies for domestic livestock.

If the travel time of the groundwater from the Site to the closest source of water used for either irrigation or livestock watering is greater than 100 years, the *CSR Technical Guidance Document #6* states that it is unlikely that the Site has the potential to pollute the water source. The Irrigation standards and/or Livestock Watering standards are normally applied to sites within 1.5km from the water source.

The Site is located in a residential area of Vancouver. Because the Site is well away from agricultural enterprises, neither the Irrigation Water standards nor the Livestock Watering standards are applicable to the Site.

2.5 All Sites

Protocol 7, Regulation of Petroleum Hydrocarbons in Water under the CSR and *Special Waste Regulation* (SWR) (BC Reg. 63/88 am. 109/2002) introduced two new contaminant parameters that apply to all sites. These are volatile hydrocarbons (VH_{w6-10}) and extractable hydrocarbons (EH_{w10-19}). These are gross parameters aimed at determining if the concentration of gasoline weight hydrocarbons (VH) and/or diesel weight hydrocarbons (EH) are high enough that it is likely that free product may exist. These standards apply to all sites in British Columbia.

2.6 Special Waste Leachate

The SWR applies to all sites in BC. The BC MOWLAP applies the Special Waste leachable toxic waste criteria given in Table 1 of the SWR to all sites unless there has been an exemption given. *Protocol 7: Regulation of Petroleum Hydrocarbons in Water under the Special Waste and Contaminated Sites Regulation* (MOWLAP May 2002) provides the following mandatory conditions:

1. The water use assigned at the plume front applies to all properties that contribute to, or are impacted by, the petroleum hydrocarbon plume.

2. Where the petroleum hydrocarbon contaminant plume front is located the lesser of 1km or 50 years groundwater travel time from the nearest aquatic receiving environment, the applicable water use is aquatic life and the applicable standards are the CSR Aquatic Life numerical water standards.
3. Where the petroleum hydrocarbon contaminant plume front is located the lesser of 1.5km or 100 years groundwater travel time from the nearest existing or probable future drinking water supply, the applicable water use is drinking water and the applicable standards are the CSR Drinking Water numerical water standards.
4. At all sites, regardless of water use, the water quality standards for VHw6-10 and EHw10-19 apply.
5. In accordance with the requirements of the CSR, the owner of the petroleum hydrocarbon source site has notified the owners of neighbouring properties onto which the petroleum hydrocarbons have migrated or have likely migrated. This notification is required when any of the following CSR standards are exceeded or are likely exceeded:
    a. the numerical water standards for VHw6-10 or EHw10-19;
    b. the applicable numerical water standards for benzene (B), toluene (T), ethyl benzene (E), xylenes (X), volatile petroleum hydrocarbons (VPHw) or light extractable petroleum hydrocarbons (LEPHw).

The effect of these changes is to no longer apply the Special Waste Leachate standards for BTEX, however the CSR standards for BTEX and LEPH are still applicable.

2.7 Soil Standards

Land use is an important part of the Conceptual Site Model as it influences the way potential receptors interact with the Site. The CSR bases the applicability of soil criterion on land use. Standards are given in the CSR for five land use categories (Agricultural, Urban Park, Residential, Commercial, and Industrial).

The Site currently contains one building, which serves as an apartment complex. The apartment building is located in the center of the property and occupies approximately 65% of the Site area. The neighbouring properties on the north, south, east and west sides of the Site are also residential.

Figure 3 shows the Site and surrounding land use.

Because the Site is used for residential purposes, the Residential criteria are applicable to the Site. The results of the laboratory analyses are therefore compared to the Residential standards of the CSR.

Under the CSR, there are two types of numerical standards for soil contaminants. The first type of standards are generic numerical criteria. The second type of standards, used where there is sufficient data, are site-specific matrix numerical criteria. These are

based on the presence of pathways along which a contaminant can travel from soil to a receptor. The derivation of a matrix standard is described in the *CSST Policy Decision Summary* (CSST January 1996) and the *Workshop on the Development and Implementation of Soil Quality Standards for Contaminated Sites* (MacDonald October 1995).

There are eight basic pathways covered by the CSR.

Two pathways have a human receptor:
- Intake of Contaminated Soil
- Groundwater used for Drinking Water

Six pathways refer to non-human receptors:
- Toxicity to *Soil* Invertebrates and Plants
- Livestock Ingesting Soil and Fodder
- Major Microbial Functional Impairment
- Groundwater Flow to Surface Water used by Aquatic Life: Freshwater and/or Marine/Estuarine
- Groundwater used for Irrigation Watering
- Groundwater used for Livestock Watering

Under section 11 (2) of the CSR, a site is not a contaminated site if the soil, surface and groundwater do not exceed the applicable site-specific numerical criteria. The Intake of Contaminated Soil pathway and the Toxicity to Soil Invertebrates and Plants pathway apply to all sites. The following is a discussion of the other pathways that apply to the Site.

The four soil pathways that depend on groundwater flow are applied in the same manner as the related water pathways that are described in the previous section. As no Aquatic Life Water standards are applicable to the Site, neither are the soil pathways that depend on groundwater flow.

2.8 Special Waste Criteria for Soil

The SWR also applies to the Site. Section 13 of the CSR covers conflicts between soil standards in the two regulations by altering some of the criteria in the SWR. Provisions of the *Transport of Dangerous Goods Regulation* (TDG)(Canada) (SO/85-77) could be triggered by the relocation of soil from the Site if the soil was to exceed Special Waste standards. The tables displaying the laboratory results show both the Special Waste criteria as modified under Section 13 of the CSR and the original TDG criteria. The TDG criteria would apply to all excavated material intended for off-Site transport.

2.9 Conceptual Site Model

The Conceptual Site Model is a summary of the potential sources, pathways and receptors that are most important to the Site.

Due to the presence of the heating oil UST, the PCOCs are petroleum hydrocarbons associated with heating oil, namely LEPH and heavy extractable petroleum hydrocarbons (HEPH). LEPH includes diesel and heating oil weight petroleum hydrocarbons and HEPH includes heavier weight petroleum hydrocarbons found in motor oil and some heating oils. Secondary PCOCs include the gasoline weight petroleum hydrocarbons BTEX and volatile petroleum hydrocarbons (VPH), and the diesel fuel constituent naphthalene. Metals are also secondary PCOCs and are potentially associated with fill material that may have been used at the Site to cover the UST.

The two mandatory pathways: Intake of Contaminated Soil and Toxicity to Soil Invertebrates and Plants apply to the Site. The Intake of Contaminated Soil pathway is of special importance because of the residential aspect of the area. The Toxicity to Soil Invertebrates and Plants is also of special importance as approximately 25% of the Site is landscaped with grass and ornamental shrubs.

Table 2 summarises the applicable pathways for the Site.

Table 2: Applicable Pathways

	Pathway	Applicable
Water		
	Drinking Water	No
	Aquatic Life Water:	
	Freshwater	No
	Marine / Estuarine	No
	Irrigation Water	No
	Livestock Water	No
	All Sites	**Yes**
	Special Waste Leachate (except for BTEX)	**Yes**
Soil		
	Intake of Contaminated Soil	**Yes**
	Groundwater used for Drinking Water	No
	Toxicity to Soil Invertebrates and Plants	**Yes**
	Livestock Ingesting Soil and Fodder	No
	Major Microbial Functional Impairment	No
	Groundwater Flow to Surface Water used by Aquatic Life:	
	Freshwater	No
	Marine / Estuarine	No
	Groundwater used for Irrigation Watering	No
	Groundwater used for Livestock Watering	No
	Special Waste Soil Criterion (TDG)	**Yes**

3 METHODS

The following section describes the field methods employed during the tank decommissioning, remedial excavation and soil sampling program.

3.1 Tank Decommissioning

On April 17th, 2003, Kelly Fogarty of ARO, supervised the environmental aspects of decommissioning the UST at the Site. The tank, which was located on the southeast side of the Site, was exposed and removed using a backhoe supplied by the project contractor, SNR Salvage and Recovery. Soil excavated from above the UST was stockpiled on the Site and was inspected by ARO. Prior to the removal of the tank, approximately 600 gallons of oily water was pumped from the tank and removed from the Site for disposal by the Sumas Remediation Services Inc. (Sumas).

The tank was constructed of steel and measured approximately 2.4m X 1.2m with a capacity of approximately 800 gallons. Upon inspection, it was evident that the UST was perforated.

Visual and olfactory observations of the soil surrounding the UST indicated petroleum contamination. Upon consultation and approval from the client, ARO initiated a remedial excavation to remove the contaminated soil from the Site.

Pictures of the tank removal are included in Appendix C.

3.2 Remedial Excavation

On April 17th, 2003, a remedial excavation of contaminated soil was conducted at the Site. Approximately 10 tonnes of contaminated soil surrounding the removed tank was excavated and transferred to the Sumas soil treatment facility in Delta, BC.

The excavation was advanced until field observations indicated that a clean limit had been reached. Once all the contaminated soil was removed, confirmatory soil samples were recovered from the new excavation limits. The final excavation measured approximately 4.0m X 2.1m X 2.1m deep. Granular fill and clean stockpiled soil were used for backfill.

Because segregation and off-Site transfer of contaminated soil was conducted at the Site, a NIR was prepared for the Site and submitted to MOWLAP on April 21st, 2003, as required under Section 57 of the CSR.

3.3 Soil Sampling

A total of nine soil samples were collected from the tank decommissioning project after the completion of the remedial excavation. Six samples, including one field duplicate, were recovered from the base and side walls of the excavation, one sample was collected from the clean stockpiled soil that had been removed from the tank basin, and one sample was collected from the newly imported fill material. One sample was also collected from the contaminated soil that was shipped off-Site to the treatment facility. The sample locations are shown in Figure 4.

Soil samples were collected in new, clean, 250ml glass jars. All soil samples were discrete samples taken in accordance with *Guideline #1 Contaminated Sites, Site Characterization and Confirmation Testing* (MOELP June/96). The samples were kept cool during transportation and storage, and normal chain-of-custody procedures were followed.

Eight samples were submitted to Soilcon Laboratories Ltd. (Soilcon) for analysis of extractable petroleum hydrocarbons (EPH) EPH_{10-19} and EPH_{19-32}, which are conservative estimates of LEPH and HEPH respectively. Two samples, *Base* and *Load 2* were submitted to Soilcon for analysis of BTEX, naphthalene, and VPH. Two samples, *Stockpile* and *New Fill* were also submitted for analysis of soil metals.

All laboratory methods used were in accordance with the *British Columbia Environmental Laboratory Manual.*

Laboratory methods are provided in Appendix D.

3.4 Quality Assurance and Quality Control

Quality assurance (QA) is the management of data in order to ensure that quality objectives are met. QA ensures that adequate protocols are followed and that independent testing of data is carried out. Quality Control (QC) is the management of the collection and analysis of data in order to ensure that quality objectives are met. QC includes following sampling protocols and routinely checking the calibration of laboratory equipment. ARO and Soilcon implemented a system of QA/QC procedures throughout the investigation and reporting process to ensure that a high data quality objective was met.

QA/QC is achieved through experience, training and a consistent team approach. ARO's team of environmental expertise includes field staff, technical support, and office support. ARO's low staff turnover and team approach help to facilitate a commitment to QA/QC implementation and improvement.

A safety and QA/QC meeting was held prior to the start of this project that specified field sampling protocols and appropriate equipment usage. All sample containers were new and field equipment was decontaminated prior to sampling. Whenever possible, disposable sampling equipment was used to further avoid cross contamination. The appropriateness of sample containers, field handling, preservation techniques and transport protocols were reviewed by ARO staff prior to sampling. Triplicate signed chain-of-custody forms were filled out for all submitted samples and Soilcon personnel checked sample labels against the forms as part of the extensive QA/QC process.

Soilcon is a member of the Canadian Testing Association and the Canadian Centre for Occupational Health and Safety. Soilcon also partakes in external inter-laboratory correlations that are run on a regular basis by the Canadian Association for Environmental Analytical Laboratories (CAEAL) and the North American Proficiency Testing Program (NAPTP).

Field blanks, travel blanks and duplicates are taken during sampling as a part of ARO's QA/QC program. As part of the QA/QC program for this project, one field duplicate soil sample was taken and tested for LEPH and HEPH. *Sample X* (03-176-6) was the field duplicate of sample *South Wall* (03-176-2). The results for the duplicate samples suggest that the general field methods were adequate for the purposes of the study.

As part of Soilcon's QA/QC laboratory blanks and duplicates are routinely run on all sample batches. A batch is a group of samples that is run under automated control at a single time using a single set of instructions to the software control system of the analytical instrument. Batch quality control charts provide the results of three sets of quality control procedures - laboratory blanks, laboratory surrogates, and duplicate samples. Laboratory blanks are run with all sample batches and in all cases laboratory blanks are below the detection limits set in the *BC Methods Manual*. Surrogate recovery shows the recovered amount of a parameter found in a laboratory prepared spike. In all cases, the surrogate recoveries are well within the permissible ranges specified by the *BC Methods Manual*. The permissible ranges for each parameter are presented on the batch quality control charts. The third set of data presented on the charts is from duplicate samples. Laboratory duplicates are run on every tenth sample. Specifically, sample numbers 2, 12, 22, etc. are run in duplicate in every batch. The results of the duplicate analyses are reported as relative percent difference (RPD), which is equal to the difference between sample values divided by the average value of the duplicate samples. The permissible range for RPD is +/- 20%. The RPD cannot be calculated where both results are below the detection limit.

Based on the review of the data, the QA/QC procedures and the results presented in this report, it is concluded that the protocol and procedures used in this study were sufficient to achieve the objectives of the investigation.

4 RESULTS

This section presents the results of the subsurface observations as well as the results of the soil hydrocarbon analyses and soil metals analyses. Note that although petroleum hydrocarbons are the primary PCOCs, soil metals are also PCOCs in fill material.

Note that *Sample X* (03-176-6) was the field duplicate of sample *South Wall* (03-176-2) that was taken during this study.

Copies of laboratory certificates and original results from Soilcon are included in Appendix E.

4.1 Soil Descriptions

A soil description of the tank basin following the excavation of petroleum contaminated soil is presented in Table 3. Prior to the remedial excavation, petroleum staining and odours were observed within the tank basin. Petroleum staining or odours were not observed within the final excavation limits.

Table 3: Soil Description - Tank Basin Post Remediation

Depth (m)	Description	Petroleum Staining	Petroleum odour
0 – 0.08	Asphalt	No	No
0.08 – 0.4	Coarse Sand Fill	No	No
0.4 – 0.8	Light Brown Sand, Trace Silt, Some Clay	No	No
0.8 – 2.1	Grey Clay, Hard	No	No

4.2 Soil Petroleum Hydrocarbons

Table 4 presents the results of petroleum hydrocarbon analyses for the soil samples recovered from the Site on April 17th, 2003 after the completion of remediation. Seven samples were analysed for EPH_{10-19} and EPH_{19-32} and two samples were analysed for BTEX, naphthalene and VPH.

The corresponding applicable Residential standards of the CSR and the applicable SWR and TDG standards are presented at the bottom of the table. Results that exceed the Residential soil standards are shown in bold against a shaded background. Results that exceed the SWR standards are shown against a black background. Results that exceed the TDG standards are shown against a black background and are underlined.

Note that *Load 1* was a sample taken from the contaminated soil that was shipped off-Site.

Copies of laboratory certificates and the original results from Soilcon are provided in Appendix E.

Table 4: Soil Petroleum Hydrocarbons
(mg/kg)

Sample Location	Sample Number	Θg	Benzene	Toluene	Ethyl Benzene	Xylenes	Naphthalene	VPH	EPH 10-19	EPH 19-32
North Wall	03-176-1	29%	NT	NT	NT	NT	NT	NT	<40	<40
South Wall	03-176-2	26%	NT	NT	NT	NT	NT	NT	<40	<40
East Wall	03-176-3	18%	NT	NT	NT	NT	NT	NT	<40	<40
West Wall	03-176-4	28%	NT	NT	NT	NT	NT	NT	<40	<40
Base	03-176-5	29%	<0.04	<0.05	<0.05	<0.10	<0.05	<10	<40	<40
Sample X	03-176-6	23%	NT	NT	NT	NT	NT	NT	<40	<40
Stockpile	03-176-7	23%	NT	NT	NT	NT	NT	NT	<40	<40
Load 1	03-176-9	31%	0.05	0.06	2.57	4.47	3.52	210	14761	3492
Residential[1] (No Water Use)			70	1.5	1	5	5	200	1000	1000
Onsite Special Waste[2]			100	250	200	500	500	NS	NS	NS
TDG (Special Waste)[3]			100	100	100	100	100	NS	30,000	

[1] CSR. (375/96 am. 17/2002). [2] SWR B.C. Reg. (63/88 am. 109/2002).
[3] Transport of Dangerous Goods Regulation (Canada)(SOR/85-77)
NT- Not tested < less than specified detection limits. (NS) no applicable standard. Θg - Moisture content

All of the final limit samples and the soil used as backfill tested below the applicable Residential standards of the CSR for the Site.

The sample *Load 1*, which was collected from the contaminated soil that was shipped off-Site, tested above the applicable Residential standards of the CSR for ethyl benzene, naphthalene, EPH_{10-19} and EPH_{19-32}.

4.3 Soil Metals and pH

Soilcon analysed two soil samples for metals and pH. In addition, both samples were submitted to Cantest Ltd. (Cantest) for reanalysis of selenium. Selenium was reanalysed by Cantest by using Inductively Coupled Plasma-Mass Spectroscopy (ICP/MS) because the original results presented by Soilcon (using ICP) were suspect, having tested above the applicable standard and very close to the detection limit of the ICP. Note that the detection by ICP/MS is 10 times lower than by ICP.

Table 5 presents the results of the soil metals and pH analyses from the tank decommissioning project. The Residential standards of the CSR are presented to the left of the sample results. Results that exceed the Residential standards of the CSR are shown in bold against a shaded background.

Copies of laboratory certificates and the original results from Soilcon and Cantest are provided in Appendix E.

Table 5: Soil Metals and pH
(mg/kg)

Component	units	Residential[1]	Stockpile	New Fill
			03-176-7	03-176-8
			pH = 7.03	pH = 7.45
Ag Silver	mg/kg	20	<0.01	<0.01
Al Aluminum	%	NS	1.19	0.84
As Arsenic	mg/kg	50	9	7
B Boron (total)	mg/kg	NS	2.24	1.22
Ba Barium	mg/kg	500	53.3	50.6
Be Beryllium	mg/kg	4	0.273	0.158
Ca Calcium	%	NS	0.72	0.36
Cd Cadmium	mg/kg	3	<0.02	<0.02
Co Cobalt	mg/kg	50	6.42	4.86
Cr Chromium	mg/kg	100	19.3	8.78
Cu Copper	mg/kg	150	15.6	8.72
Fe Iron	%	NS	1.34	1.21
K Potassium	%	NS	0.05	0.11
Mg Magnesium	%	NS	0.40	0.35
Mn Manganese	mg/kg	NS	227	219
Mo Molybdenum	mg/kg	10	1.9	1.8
Na Sodium	%	NS	0.02	0.02
Ni Nickel	mg/kg	100	14.6	5.0
P Phosphorous	mg/kg	NS	0.05	0.04
Pb Lead	mg/kg	500	15.5	5.9
S Sulphur	%	NS	2871	453
Sb Antimony	mg/kg	20	0.7	1.5
Se Selenium	mg/kg	3	0.525	<0.1
Sn Tin	mg/kg	50	2.0	2.9
Sr Strontium	mg/kg	NS	55.5	40.5
V Vanadium	mg/kg	200	37.6	24.7
Zn Zinc	mg/kg	450	48.7	34.1

[1] CSR (BC Reg. 375/96 am. 17/02) NS no standard

The soil samples recovered from the contaminated soil and fill material tested below the applicable Residential standards of the CSR for all metal parameters.

5 CONCLUSIONS AND RECOMMENDATIONS

Results obtained from the final limit samples indicate that all petroleum hydrocarbon contamination has been removed from the Site. The new backfill sample results and the stockpile sample results indicate that this fill material is suitable for use at the Site.

It is concluded that soil quality surrounding the removed UST at the Site meets the *applicable Residential standards* of the CSR. Groundwater contamination is not suspected due to the low permeability of soil surrounding the former tank location and the removal of the impacted soil. It is further concluded that removal of the UST and the surrounding impacted soil has improved the environmental quality of the Site.

No further environmental investigations are recommended for the Site at this time.

6 CLOSURE STATEMENT

This report has been prepared in compliance with the *BC Waste Management Act* and by using general hydrogeological and environmental engineering practices. The information reported is solely for the purposes outlined for the Site location. The report is for the exclusive use of s.22(1) of Dorwall Holdings Ltd. and the British Columbia Ministry of Water, Land and Air Protection (MOWLAP). The undersigned have demonstrable experience in investigation and remediation of the types of contaminants encountered on the subject Site.

ARO's report represents a reasonable review of available information within an established scope of work and schedule, however, the data was collected at specific locations and times and therefore the subsurface conditions may vary at other locations and times. Information presented herein was obtained while conducting authorised investigations at 2182 West 39th Avenue, Vancouver, British Columbia. This report reflects ARO's best judgment based on available facts at the time of preparation. The environmental investigation was also limited to the contaminants specifically addressed in the report.

This report was prepared by ARO for the sole benefit of our client. ARO accepts no responsibility for general use of the reported information and damages, if any, suffered by any third party, other than the MOWLAP, as a consequence of decisions made or of actions based on this report. No warranty express or implied.

Sincerely,

Kelly Fogarty

Kelly Fogarty, B.Sc., Dipl.
Project Officer

p.p.c.

E.L. (Ned) Pottinger,
President

7 REFERENCES

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Figure 1: Site Location

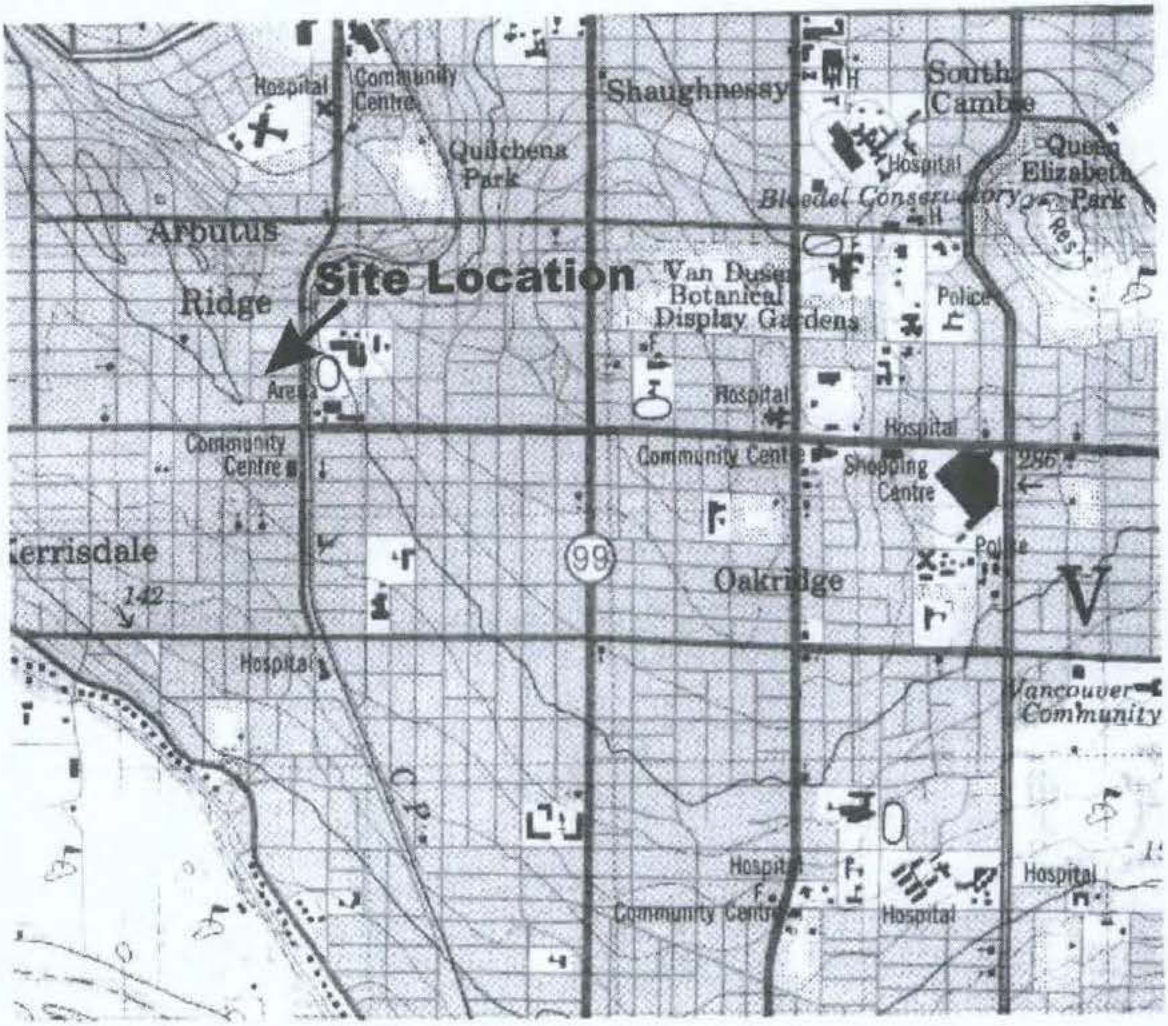

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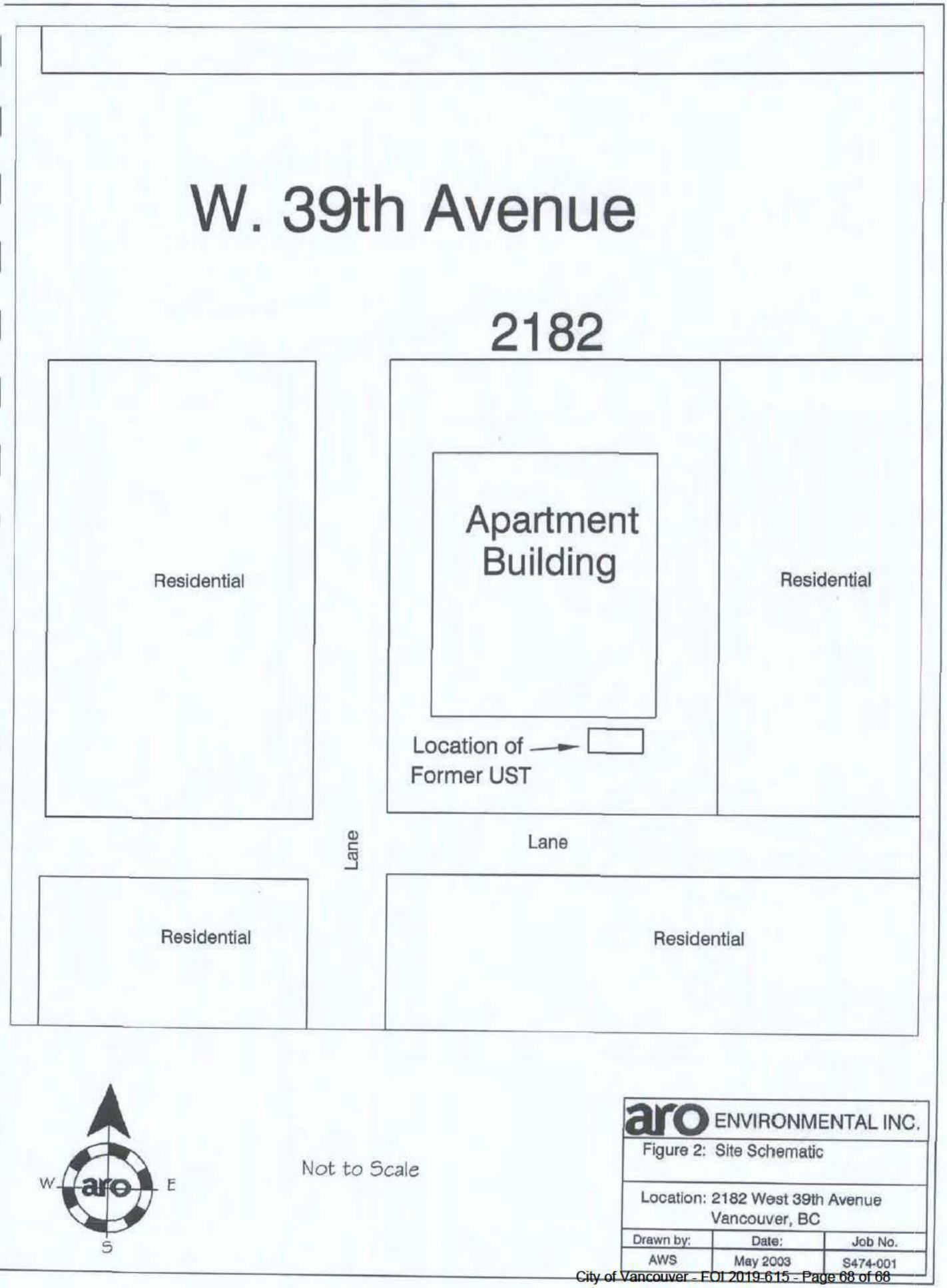
Figure 1:	Site Location
Location:	2182 West 39th Avenue Vancouver, BC

Date	Job Number
May 2003	S474-001

Figure 2: Site Schematic



aro ENVIRONMENTAL INC.

Figure 2: Site Schematic

Location: 2182 West 39th Avenue
Vancouver, BC

Drawn by:	Date:	Job No.
AWS	May 2003	S474-001