

**ENTERED**

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COURT FILE NUMBER 2101-00810  
COURT COURT OF QUEEN'S BENCH OF ALBERTA  
JUDICIAL CENTRE CALGARY  
PLAINTIFF 2314174 ALBERTA LTD.  
RESPONDENT 1652563 ALBERTA LTD.



IN THE MATTER OF  
THE RECEIVERSHIP OF  
1652563 ALBERTA LTD.

COM  
Aug. 11, 2021  
Justice Ho

DOCUMENT **SECOND REPORT OF THE  
RECEIVER,  
BDO CANADA LIMITED  
AUGUST 3, 2021**

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**SECOND REPORT OF THE RECEIVER  
BDO CANADA LIMITED  
AUGUST 3, 2021**

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## **INTRODUCTION**

1. On February 11, 2021, 2314174 Alberta Ltd. (“**231**”) made an application to the Court of Queen’s Bench of Alberta (the “**Court**”) for the appointment of a receiver and manager (the “**Receiver**”) of all of the current and future assets, undertakings and properties of every nature and kind whatsoever, and wherever situate, including all proceeds thereof (the “**Property**”), of 1652563 Alberta Ltd. (“the “**Company**”).
2. On February 11, 2021 (the “**Receivership Date**”), the Court granted an Order (the “**Receivership Order**”) appointing BDO Canada Limited (“**BDO**”) as the Receiver over the Company and its Property.
3. On April 6, 2021, the Receiver prepared a report (the “**First Report**”) in contemplation of the Receiver’s application seeking the Court’s approval of a proposed sales process (the “**Sales Process**”) with respect to the Company’s real estate holdings located in Carstairs, Alberta (the “**Lands**”) and various ancillary relief.
4. On April 13, 2021, the Court granted the following Orders:
  - a. an Order approving the Sales Process proposed by the Receiver, including the proposed listing agreement (the “**Listing Agreement**”) between the Receiver and Tyler Realty Ltd. (“**Tyler**”); and
  - b. an Order approving the activities of the Receiver as described in the First Report and the initial interim fees of the Receiver through to March 31, 2021 and its legal counsel through to April 5, 2021 (“**Order: Approving Activities & Fees**”).
5. The purpose of this report (the “**Second Report**”) is to provide information to the Court regarding:
  - a. the details of and the results of the Sales Process;
  - b. the details of an Agreement of Purchase and Sale entered into between the Receiver and 231 (the “**PSA**”);

- c. details regarding the Company's potential outstanding liability for unremitted GST;
- d. an update as to the Receiver's investigation into approximately 75 generally late model domestic pick-up trucks (the "**Trucks**") that were last known to be located in the United States;
- e. background information in respect of 231's forthcoming application seeking to amend the Receivership Order to provide authorization for the Receiver to assign the Company into bankruptcy;
- f. updated details of the Receiver's fees and disbursements and those of its legal counsel in contemplation of the passing of the respective professional accounts;
- g. an updated Statement of Receipts and Disbursements; and
- h. the Receiver's recommendation with respect to its discharge, including the disposition of the Company's remaining books and records that came into the Receiver's possession.

### **TERMS OF REFERENCE**

- 6. In preparing this Second Report, the Receiver has relied upon unaudited financial information, records of the Company and discussions with the Company's former management ("**Management**"). The Receiver has not performed an audit, review or other verification of such information; accordingly, the Receiver does not express an opinion thereon.
- 7. A copy of this Second Report, together with all other materials filed with the Court in the within Receivership proceeding have been and will continue to be made available to creditors and other interested parties in electronic format on the Receiver's website at: <https://www.bdo.ca/en-ca/extranets/1652563Alberta/> (the "**Receiver's Website**").



## SALES PROCESS

8. As set out in the First Report, the Lands are comprised of three contiguous parcels described as follows:

<u>No.</u>	<u>Municipal Address</u>	<u>Legal Description</u>	<u>Detail</u>
1	419, 10 Avenue South, Carstairs, AB, T0M 0N0	PLAN 3845C0 THAT PORTION OF THE ROADWAY SOUTH OF LOT 8 BLOCK 28 AND NORTH OF LOT 1 BLOCK 29 EXCEPTING THEREOUT ALL MINES AND MINERALS	Commercial building and parking space (the “ <b>Building Lot</b> ”)
2	417, 10 Avenue South, Carstairs, AB, T0M 0N0	LEGAL DESCRIPTION PLAN 3845CO BLOCK 28 LOTS 7 AND 8 EXCEPTING THEREOUT ALL MINES AND MINERALS AND THE RIGHT TO WORK THE SAME	Vacant commercial zoned land (“ <b>Lot 417</b> ”)
3	413, 10 Avenue South, Carstairs, AB, T0M 0N0	PLAN 3845CO BLOCK 28 LOTS 5 AND 6 EXCEPTING THEREOUT ALL MINES AND MINERALS AND THE RIGHT TO WORK THE SAME	Vacant commercial zoned land (“ <b>Lot 413</b> ”)

9. The salient details of the Sales Process are as follows:
- a. offers could be submitted for one of the following three packages;
    - i. Package 1: all of the Lands, being an *en bloc* offer;
    - ii. Package 2: the Building Lot; and
    - iii. Package 3: Lot 417 and Lot 413.
  - b. the Lands were offered for sale on an “*as is, where is*” basis and without surviving representations or warranties of any kind;
  - c. 231 was permitted to submit an offer whereby all or a portion of the consideration being offered included the compromise of all or a portion of the indebtedness owing to it; and
  - d. the deadline for receipt of offers was July 16, 2021 (the “**Offer Deadline**”).

10. Tyler launched the Sales Process on April 16, 2021. We are advised by Tyler that it undertook the following steps to execute the Sales Process:
  - a. “For Sale” signage was placed on the Lands;
  - b. a marketing brochure was prepared and placed on Tyler’s website;
  - c. the Lands were listed on MLS;
  - d. the Lands were listed on the following commercial listing platforms:
    - i. CoStar; and
    - ii. Spacelist;
  - e. an email marketing advertisement was sent on three separate occasions to Tyler’s internal database, which is comprised of commercial agents, owners, developers and former clients.
11. The Sales Process was also posted on the Receiver’s Website.
12. As a result of the above, 17 parties reached out to Tyler for further information and/or to discuss the opportunity resulting in various subsequent discussions and communications.
13. During the Sales Process, Tyler brought to the Receiver’s attention that it had become aware, through discussions with interested parties familiar with the Lands, of potential previous environmental contamination issues associated with the Lands that predated the Company’s ownership of the Lands.
14. As a result of these concerns, the Receiver’s legal counsel searched the public Alberta Environmental Site Assessment Repository (the “AESAR”) and obtained documents that appeared to indicate that the Lands had experienced previous contamination issues and that some remediation steps had been taken; however, the information obtained did not clarify whether remedial steps were completed.

15. The Receiver discussed the matter with 231, in its capacity as the principal secured creditor, at which time the Receiver advised that it did not have funds available to commission any form of independent environmental site assessment (“**ESA**”). The Receiver also advised 231 that the Receiver would be disclosing the information obtained from the AESAR to interested parties to enable them to consider the information in the context of carrying out their due diligence and assessment of the Lands.
16. To date, 231 has advanced \$113,000 by way of Receiver Certificates to fund the proceedings; however, 231 advised that it was not prepared to fund the costs of an ESA. In addition, 231 also agreed the information obtained from the AESAR should be disclosed to interested parties and that it was comfortable with the Sales Process continuing on that basis. As a result, the Receiver prepared a letter to prospective bidders dated May 26, 2021 (the “**Letter**”), which provided an overview of the potential issues flagged by the review of the AESAR and copies of the relevant documents obtained. A copy of the Letter, together with the documents obtained from the AESAR, is attached as **Appendix “A”**.
17. The Receiver directed Tyler to provide the Letter to parties that had already expressed an interest in the Lands and to those parties subsequently expressing an interest from that point on. The Receiver also posted the Letter on the Receiver’s Website.
18. Tyler advised that because of the environmental history of the Lands, the lack of any information confirming remedial steps were completed and the potential cost exposure to a buyer in comparison to the market value of the Lands, the interests of parties significantly waned leading to only the single offer advanced by 231 as of the Offer Deadline.

#### **AGREEMENT OF PURCHASE AND SALE**

19. The PSA was negotiated between the Receiver and 231, a copy of which is attached as **Appendix “B”**, the key terms of which can be summarized as follows:
  - a. an *en bloc* acquisition of the Lands;

- b. a purchase price of approximately \$402,500 to be satisfied by way of:
  - i. a non-cash credit reduction in the total amount of approximately \$362,500 (the “**Credit Bid Amount**”) payable by way of non-cash reduction in credit as follows:
    - 1. a reduction of the \$113,000 funded by 231 by way of Receivers Certificate, plus interest accruing thereunder up to the date of repayment, to \$0; and
    - 2. a reduction to the amount of the secured indebtedness of the Company to 231, totaling approximately \$655,000, equal to the amount of approximately \$249,500, plus interest accruing thereunder up to the date of repayment;
  - ii. payment of the Cash Amount pursuant to the PSA, being the amount of the “Additional Costs of Administration” estimated to fund the balance of the Receiver’s professional fees and expenses and the costs of administration of the anticipated bankruptcy proceedings, provided that such amount is capped at \$40,000.
- c. the Lands are being sold on an “*as is, where is*” basis with no representations or warranties attached;
- d. on closing, the Company shall have made an assignment or been assigned into bankruptcy or a bankruptcy order shall have been issued against the Company;
- e. at or prior to closing, the Receiver and 231 shall have entered into a mutually satisfactory side letter agreement whereby the principal of 231 shall have personally agreed to indemnify and hold the Receiver harmless with respect to any applicable goods and services taxes (“**GST**”) obligations arising on the Closing of the Property; and
- f. the PSA is subject to the approval of this Honourable Court.

20. In the First Report, the Receiver noted that it has obtained an independent legal opinion from its legal counsel, Borden Ladner Gervais LLP (“BLG”), confirming the validity and enforceability of 231’s security in respect of the Lands.
21. The Receiver recommends approval of the PSA for the following reasons:
- a. the Lands were exposed to the public market by a reputable commercial realtor pursuant to the Court-directed Sales Process;
  - b. there were no other offers generated from the Sales Process;
  - c. 231 is aware of the potential environmental issues associated with the Lands;
  - d. 231 as the fulcrum secured creditor would otherwise experience a significant shortfall were the Receiver to disclaim its interest in the Lands; and
  - e. there would otherwise be no recoveries available for any creditors ranking subordinate to 231’s security interest.

#### **POTENTIAL GST LIABILITY & ASSIGNMENT INTO BANKRUPTCY**

22. On or about June 9, 2021, the Receiver received correspondence from the Canada Revenue Agency (“CRA”) indicating that the Company’s GST return for the period of February 12, 2021 to February 28, 2021 had been selected for examination (the “CRA Letter”).
23. Through the CRA Letter, CRA also requested further information for the purpose of determining the Company’s pre-receivership liability for unremitted GST. While any liability has not been definitely ascertained by the CRA, if any liability does exist, the Receiver estimates it could be as high as approximately \$130,000 based on the CRA Letter. Management believes that CRA has made an error and Management and the Receiver have been following up with CRA to attempt to resolve the matter. The CRA Letter is attached hereto as **Appendix “C”**.

24. As noted above, one of 231's conditions precedent to closing as set out in the PSA is that the Company must be in bankruptcy. In order to facilitate the satisfaction of this condition, the Receiver understands that 231 will be making a concurrent application to this Honourable Court seeking an amendment to the Receivership Order authorizing the Receiver to assign the Company into bankruptcy and that BDO be authorized to act as the trustee of the bankrupt estate. The Receiver supports 231's forthcoming application to amend the Receivership Order to allow for the Company's assignment into bankruptcy.

### **TRUCKS**

25. As set out in the First Report, Management was unable to provide the Receiver with sufficient contact information to allow the Receiver to confirm the existence, status, and location of the Trucks such that the Receiver was pursuing assistance from alternative sources, to attempt to locate and confirm the status of the Trucks.
26. The Receiver engaged Greenberg Traurig LLP as legal counsel ("**Greenberg**") in the United States to assist with its investigation. Being cognizant of costs and in recognition of expenses being funded by 231, the Receiver provided Greenberg with an initial sample of 14 vehicles to attempt to trace their whereabouts.
27. Greenberg ultimately advised that it was able to trace seven of the vehicles as being registered to third parties, with five of them being subject to lien registrations
28. The Receiver reviewed these findings with 231 and it was agreed that based on Greenberg's findings, and in consideration of the lack of available funds, that it would likely not be cost efficient to attempt to undertake any further investigations or steps to attempt to realize recoveries from the Vehicles.

**PROFESSIONAL FEES**

29. Attached as **Appendix” D”**, is a summary of the professional invoices rendered by the Receiver and its legal counsel to date.
30. As noted earlier in this Second Report, the Order: Approving Activities & Fees approved the initial interim accounts of the Receiver and BLG respectively.
31. The Receiver is now seeking approval of its subsequent fees and disbursements incurred, as well as those of its legal counsel, BLG and Greenberg, specifically:
  - a. the Receiver has rendered one additional account in respect of the period April 1, 2021 through May 31, 2021, totalling \$14,419,86, plus GST (the **“Receiver’s Account”**); and
  - b. as summarized in Appendix “D”, BLG has rendered three subsequent accounts totalling \$21,934.57, plus GST, through to June 30, 2021 (the **“BLG Accounts”**).
32. In addition, the Receiver has paid Greenberg \$9,426.75 (US \$7,500) pursuant to an engagement agreement (the **“Retainer Agreement”**) entered into with Greenberg (the **“Greenberg Account”**).
33. Copies of the Receiver’s Account, the BLG Accounts and the Retainer Agreement will be made available to the Court prior to the hearing of the Application presently scheduled for August 11, 2021.
34. At this time, the Receiver anticipates issuing a final account in the approximate amount of \$20,000.00, including GST, (the **“Receiver’s Final Account”**) in connection with unbilled WIP, preparing this Second Report, preparing for and attending the upcoming Court application, closing the sale to 231 and attending to final banking issues and filing the final statutory report with the Office of the Superintendent of Bankruptcy.

35. BLG likewise anticipates issuing a final account in connection with unbilled WIP, preparing for the upcoming application, further steps necessary to conclude the sale to 231, and steps taken to conclude the proceedings in the approximate amount of \$15,000.00, including GST (the “**Final BLG Account**”).
36. The Receiver is of the view that its activities since the date of the First Report have been carried out fairly, efficiently and in a commercially reasonable manner. The Receiver is of the opinion that the Receiver’s Account, the BLG Accounts, the Greenberg Account and the Receiver’s Final Account and the Final BLG Account (collectively referred to as the “**Professional Accounts**”) are appropriate and reasonable in the circumstances, and commensurate with the work performed in these proceedings, including but not limited to:
- a. completing the Sales Process;
  - b. negotiating the PSA;
  - c. undertaking its investigation in respect of the Trucks;
  - d. preparing for the upcoming Court application; and
  - e. attending to final matters associated with the closing of the sale to 231.
37. In light of the foregoing, the Receiver is of the view that it is just and fair that this Honourable Court approve the Receiver’s activities, disbursements and fees, as well as the fees of the Receiver’s legal counsel, without the necessity of a formal passing of accounts.

#### **STATEMENT OF RECEIPTS AND DISBURSEMENTS**

38. Attached as **Appendix “E”** is a copy of the Receiver’s Statement of Receipts and Disbursements as at July 27, 2021 (the “**R&D**”) indicating the Receiver currently maintains approximately \$15,000 in its operational trust account.



39. As noted earlier in this Second Report, 231 has advanced \$113,000 to fund the proceedings by way of Receiver Certificates and 231 will be funding the balance of the costs of administration by way of the Cash Amount provided for in the PSA.

### **REQUEST FOR DISCHARGE**

40. Following the anticipated bankruptcy of the Company and upon the closing of the contemplated sale to 231, the Receiver will have substantially completed its mandate as Receiver, with no further realizations or recoveries possible, subject to completing final minor administrative tasks. Consequently, the Receiver recommends that the Court grant the Receiver's discharge subject to the Receiver filing a certificate (the "**Certificate**") confirming that the sale to 231 has closed and all administrative tasks have been completed.
41. In connection with its discharge, the Receiver recommends that any other corporate books and records remaining in the Receiver's possession (the "**Residual Records**") be transferred to the control of Mr. Jerry Roberts in his capacity as a former director of the Company.

### **RECOMMENDATIONS**

42. For the reasons set out in this Second Report, the Receiver recommends to this Honourable Court the following:
- a. approval of the PSA;
  - b. the amendment to the Receivership Order to authorize the Receiver to assign the Company into bankruptcy and that BDO be authorized to act as the trustee;
  - c. approval of the Professional Accounts;
  - d. the discharge of the Receiver subject to the filing of the Certificate;
  - e. authorization to turn over the Residual Records to Mr. Roberts; and
  - f. approval of the actions, conduct and activities of the Receiver from the Receivership Date through to the date of this Second Report, as are more particularly described herein.

All of which is respectfully submitted this 3<sup>rd</sup> day of August 2021.

BDO Canada Limited, in its capacity as  
Receiver and Manager of 1652563 Alberta Ltd.  
and not in its personal or corporate capacities



Per:

\_\_\_\_\_  
Marc Kelly  
Senior Vice President

# **APPENDIX “A”**



Tel: 403 777 9999  
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BDO Canada Limited  
110, 5800 - 2<sup>nd</sup> Street SW  
Calgary, AB T2H 0H2 Canada

May 26, 2021

Notice to Prospective Bidders

**Re: In the Matter of the Receivership Proceedings of 1652563 Alberta Ltd.  
Court of Queen's Bench Action No. 2101-00810**

Pursuant to a receivership order granted by the Alberta Court of Queen's Bench (the "**Court**") on February 11, 2021 (the "**Receivership Order**"), BDO Canada Limited was appointed as the court-appointed receiver and manager (the "**Receiver**") over all of the current and future assets, undertakings and properties of every nature and kind whatsoever and wherever situate of 1652563 Alberta Ltd. o/a Two Guys' Trailer (the "**Debtor**").

On April 13, 2021, the Receiver obtained a sales process approval order (the "**Sales Process Order**") authorizing the Receiver to conduct a sales process (the "**Sales Process**") respecting three contiguous parcels of land owned by the Debtor and located in the Town of Carstairs, Alberta, which are municipally and legally described as follows (collectively the "**Lands**"):

<u>No.</u>	<u>Municipal Address</u>	<u>Legal Description</u>	<u>Detail</u>
1	419, 10 Avenue South, Carstairs, AB, TOM 0N0	PLAN 3845C0 THAT PORTION OF THE ROADWAY SOUTH OF LOT 8 BLOCK 28 AND NORTH OF LOT 1 BLOCK 29 EXCEPTING THEREOUT ALL MINES AND MINERALS	Commercial building and parking space (the " <b>Building Lot</b> ")
2	417, 10 Avenue South, Carstairs, AB, TOM 0N0	LEGAL DESCRIPTION PLAN 3845C0 BLOCK 28 LOTS 7 AND 8 EXCEPTING THEREOUT ALL MINES AND MINERALS AND THE RIGHT TO WORK THE SAME	Vacant commercial zoned land (" <b>Lot 417</b> ")
3	413, 10 Avenue South, Carstairs, AB, TOM 0N0	PLAN 3845C0 BLOCK 28 LOTS 5 AND 6 EXCEPTING THEREOUT ALL MINES AND MINERALS AND THE RIGHT TO WORK THE SAME	Vacant commercial zoned land (" <b>Lot 413</b> ")

All capitalized terms used but not otherwise defined in this letter shall have the meanings given to them in the Sales Process.

Notwithstanding the terms of the Sales Process, and in particular paragraph 10 thereof, the Receiver wishes to advise prospective bidders of information related to some or all of the Lands, which the Receiver has since obtained. In particular, appended to this letter are documents the Receiver has retrieved, through its legal counsel, from the public Alberta Environmental Site Assessment Repository ("**ESAR**") which appear to pertain to some or all of the Lands.

These documents are being provided to you for informational purposes only. Neither the Receiver nor the Selling Agent, nor their respective advisors, make any representation or warranty as to the accuracy or completeness of the information contained in the attached documents. The sale of the Lands pursuant to the Sales Process remains on an “*as is, where is*” basis and interested parties are encouraged to conduct their own due diligence respecting the Opportunity.

Should you have any questions or concerns respecting this matter please contact either the Receiver (Marc Kelly: [makelly@bdo.ca](mailto:makelly@bdo.ca)) or the Selling Agent (Dan Shute: [dan@tylerrealty.com](mailto:dan@tylerrealty.com)).

Yours truly,

BDO Canada Limited,  
in its capacity as Receiver of 1652563 Alberta Ltd.  
and not in its personal or corporate capacities



Per: Marc Kelly  
Senior Vice President

10  
**RECEIVED**  
FEB 02 2010  
TANK PROGRAM



**2009 Insitu Bioremediation  
Program  
419 – 10<sup>th</sup> Avenue  
Carstairs, Alberta**

# 9302

Prepared For:  
Vaughn Wyant Investments Ltd.

Prepared By:  
Stantec Consulting Ltd.  
100 – 75 – 24<sup>th</sup> Street East  
Saskatoon, SK S7K 0K3  
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January 2010  
File: 1132-53576

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**Stantec**

**2009 Insitu Bioremediation Program  
419 – 10<sup>th</sup> Avenue  
Carstairs, Alberta**

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## **1.0 Introduction**

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Stantec Consulting Ltd. (Stantec) was retained by Vaughn Wyant Investments Ltd. to conduct an insitu bioremediation program on the property located at 419 – 10<sup>th</sup> Avenue, Carstairs, Alberta (Site). The location of the Site is presented in Figure 1.

The following report summarizes the 2009 groundwater monitoring and sampling, the 2009 soil vapour extraction (SVE) system monitoring and the 2009 nutrient injection.

A site plan showing the recovery well locations and the remedial equipment is provided in Figure 2 and site photographs are presented in Appendix A.

### **1.1 STUDY OBJECTIVES**

The objective of the program was to continue with the passive risk management approach using enhanced bioremediation, which was initiated in August of 2006. The insitu bioremediation of petroleum hydrocarbons (PHCs) was enhanced through the operation of a SVE system and the injection of select nutrients. The introduction of oxygen and a nitrate source to the impacted areas through the operation of the SVE system and the nutrient injection program, respectively, was conducted to increase the populations and diversity of indigenous micro organisms, thus, enhancing the bioremediation of PHCs.

### **1.2 SCOPE OF WORK**

The tasks required to accomplish the program objectives were as follows.

- Determine the appropriate level of nitrate source required for the 2009 nutrient injection event, based on the groundwater sampling results associated with the 2008 Insitu Bioremediation Program.
- Observe and document the operations of the SVE system at the Site.
- Coordinate the location of underground utility locates prior to the initiation of the nutrient injection event.
- Coordinate a subcontractor specializing in injection equipment to conduct the nutrient injection event.
- Coordinate a subcontractor to provide and supply potable water on site during the nutrient injection event.
- Inject nutrient enriched water into the subsurface to stimulate the enhancement of microbial populations.

## **Stantec**

**2009 Insitu Bioremediation Program  
419 – 10<sup>th</sup> Avenue  
Carstairs, Alberta**

- Conduct groundwater sampling and monitoring program following the nutrient injection event to evaluate potential changes with respect to the PHCs and the available nutrient concentrations at the Site.
- Prepare an environmental status report summarizing the results from the 2009 Bioremediation Program.

## 2.0 Background

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The Site is located in the central section of the Town of Carstairs and previously consisted of Carstairs Ford Sales and Service and a retail fueling facility. The Site has subsequently been used as Five Star Movies video store and Such a Deal grocery store. The Site is currently utilized by a utility trailer sales depot and an exterior construction company.

### 2.1 PREVIOUS ENVIRONMENTAL REPORTS

The following reports were reviewed in conducting the 2009 Insitu Bioremediation Program:

- Petroleum Enviro Services, May 2002. Phase II Hydrocarbon Environmental Site Assessment (ESA), 419 – 10th Avenue, Carstairs, Alberta.
- Petroleum Enviro Services, February 2003. Phase III Hydrocarbon Environmental Site Assessment (ESA) - Delineation, 419 – 10th Avenue, Carstairs, Alberta.
- Stantec Consulting Ltd., June 2005. Proposed Risk Management Plan – Revised, 419 – 10<sup>th</sup> Avenue, Carstairs, Alberta.
- Stantec Consulting Ltd., October 2005. Utility Corridor Assessment – Revised, 419 – 10<sup>th</sup> Avenue, Carstairs, Alberta.
- Stantec Consulting Ltd., August 2006. Monitoring Well Installation and Groundwater Sampling, 419 – 10<sup>th</sup> Avenue, Carstairs, Alberta.
- Stantec Consulting Ltd., April 2007. Soil Vapour Extraction System 2006 Commissioning, 419 – 10<sup>th</sup> Avenue, Carstairs, Alberta.
- Stantec Consulting Ltd., January 2009, 2007 and 2008 Insitu Bioremediation Monitoring 419 – 10<sup>th</sup> Avenue, Carstairs, Alberta.

Previous environmental reports estimated the volume of PHC impacted soils to be approximately 3,300 m<sup>3</sup>. The utility corridor assessment determined that hydrocarbon constituents are present within utility corridors. Excavating the offsite hydrocarbon impacted soil was considered to be difficult based on the lateral extent of the offsite hydrocarbon impacts and the presence of underground infrastructure; therefore, it was recommended that the hydrocarbon impacts be addressed by an insitu remediation technology. Several options exist to remediate and manage the hydrocarbon impacts both on and off the Site. A SVE system was selected as the most viable option at the Site in 2006.

Previous environmental reports summarized the commencement of the insitu bioremediation program conducted in 2008. The bioremediation program consisted of a nutrient injection event to enhance bioremediation processes naturally occurring in the subsurface. The groundwater



sampling event conducted after the 2008 nutrient injection indicated that PHC concentrations generally decreased, suggesting that bioremediation of PHCs was occurring at the Site.

## **2.2 SUMMARY OF SUBSURFACE CONDITIONS**

The upper subsurface geology at the Site consists of clay till and is relatively consistent across the Site. A sandy clay layer was identified at several locations throughout the Site.

Groundwater levels typically range from approximately 1.0 m below grade level (mBGL) to 2.0 mBGL and the groundwater flow is generally towards the south and southwest at the Site.

## **2.3 NATURE AND EXTENT OF HYDROCARBONS**

The nature and extent of the hydrocarbons present in the subsurface has been divided into liquid phase, dissolved phase, vapour phase and residual phase hydrocarbons. The characteristics of each phase are described in the following subsections.

### **Liquid Phase Hydrocarbons**

Liquid phase hydrocarbon (LPH) was detected in monitoring well MW1, observed as small droplets on the water surface, during the February 4, 2003 groundwater monitoring event. Liquid phase hydrocarbons were not detected in the monitoring wells during the 2006, 2007, 2008 and 2009 groundwater monitoring events.

### **Dissolved Phase Hydrocarbons**

Historic groundwater sampling results indicate that one or more of the benzene, toluene, ethylbenzene and xylene (BTEX) and PHC Fractions F1 and F2 parameter concentrations are greater than the commercial land use guidelines in monitoring wells MW1, MW4, MW7, MW8, MW9, MW10, MW11, MW12 and MW14.

Water samples collected from the kitchen tap of the Site building on September 29, 2005, displayed detectable benzene and xylene concentrations; however, concentrations were below the potable guidelines. Three additional samples were collected on October 7, 2005 to represent stagnant water present within the service connection overnight, water within the main line and water within the main line after further purging. The laboratory results indicated that each of the three samples displayed nondetectable hydrocarbon and methyl ter-butyl ether (MTBE) concentrations.

### **Residual Phase Hydrocarbons**

A Phase II and Phase III ESA have previously been conducted at the Site by Petroleum Enviro Services in 2002 and 2003 in which PHC impacted soil was detected. Petroleum Enviro Services estimated the volume of PHC impacted soils to be approximately 3,300 m<sup>3</sup>. The volume estimate was based on a limited number of boreholes drilled at the Site and an

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estimated value for the hydrocarbon impacted soil on the Co-op Food Store property without complete delineation. The lateral extents of hydrocarbon impacts at the Site suggest that hydrocarbon constituents may be present within utility corridors. Hydrocarbon impacts have been observed on the north and south sides of the service connections that supply the on Site building with water and sanitary sewer services.

A utility corridor assessment was conducted by Stantec in August 2005 to determine if PHC impacts, previously identified at the Site, have migrated into the utility corridor that services the Site. Soil analytical results indicated that soil samples exceeded applicable guidelines for benzene and PHC Fraction 1 concentrations.

A total of seven boreholes (BH12 and BH28 to BH33) were drilled at the Site on August 21 and August 22, 2006. The seven boreholes were completed as groundwater monitoring wells and labelled monitoring wells MW8 to MW14. The soil sample analytical data indicated that benzene concentrations in the soil samples obtained from boreholes BH12, BH30, BH33 were greater than commercial guidelines. The PHC Fraction F1 concentrations in the soil samples obtained from boreholes BH12, BH30 and BH33 were greater than the commercial guidelines.

### **Vapour Phase Hydrocarbons**

The standpipe combustible vapour concentrations (SCVC) measured in monitoring wells MW1, MW8, MW9, MW10, MW11, MW12, MW13 and MW14 ranged from 30% lower explosive limit (LEL) to greater than 100% LEL prior to commissioning the SVE system in August 2006.

The SCVC measurements in monitoring wells MW1, MW4, MW5, MW6, MW7, MW8, MW9, MW10, MW11, MW12 MW13 and MW14 have significantly decreased with ranges of 0 % LEL (0 ppm) to 70 % LEL (8,500 ppm) during the December 2009 monitoring event.



## **3.0 Methodology**

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### **3.1 ENHANCED BIOREMEDIATION**

The insitu bioremediation processes were enhanced by the operation of the SVE system and the injection of nutrients into the subsurface. The 2009 insitu bioremediation program consisted of operating the SVE system along with a single nutrient injection event. The operation of the SVE system provides the oxygen required to enhance the heterotrophic aerobic bacteria. Nitrate concentrations in the subsurface are used to increase the denitrifying bacterial populations.

#### **3.1.1 SVE System**

The SVE system was operated at the Site to provide oxygen rich atmospheric air to the subsurface to augment the heterotrophic aerobic bioremediation processes.

The SVE system and remedial equipment utilized at the Site was fabricated, supplied and installed by Ground Effects Environmental Services (Ground Effects) located in Regina, Saskatchewan. The 5.5 hp SVE system is capable of a maximum air flow rate of 475 cubic metres per minute and is contained within a 0.6 m by 1.5 m steel, sound attenuated, lockable skid enclosure. The SVE system is operated on a 230 volt, single phase power supply.

The SVE system was previously installed along the north side of the building at the Site and was connected to the existing monitoring wells, both on and off the Site. Seven 51 mm (2 in) monitoring wells (MW1, MW9, MW10, MW11, MW12, MW13 and MW14) were converted to SVE recovery wells and connected to the SVE system by a 51 mm Schedule 40 PVC header pipe.

#### **3.1.2 Nutrient Injection**

A nutrient injection program was conducted at the Site to stimulate and enhance the bioremediation of hydrocarbons within the subsurface.

Nutrient enriched water was pumped into the 2.5 cm diameter steel injection rods using a high pressure positive displacement pump. Select monitoring well locations were sampled for nutrients prior to and following the injection of nutrient enriched water.

The mobility of nitrate in groundwater is a diffusion dominated process, which is highly dependent upon chemical gradients. The nutrient injection program consisted of injecting a concentrated volume of calcium nitrate fertilizer (15.5-0-0) in select monitoring wells within the hydrocarbon impacted area. The amount of calcium nitrate injected into the subsurface was

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based upon a conservative approach to ensure that nitrate concentrations would not remain as a contaminant of concern.

Approximately 200 L of nutrient enriched water was injected at each of the 20 injection point locations; therefore, a total of approximately 4,000 L of nutrient enriched water was injected at the Site. Approximately 25 kg of calcium nitrate fertilizer (15.5-0-0) was mixed with 200 L of water at each injection location.

### **3.2 GROUNDWATER MONITORING AND SAMPLING**

Groundwater sampling events were conducted in November 2007, July 2008, September 2008, November 2008 and November 2009. Groundwater samples were obtained prior to and following the nutrient injection to assess the changes in bioremediation parameters, which are indicative of enhanced bioremediation activities. The performance monitoring activities consisted of characterization sampling program to identify changes resulting from the remedial efforts.

Groundwater monitoring consisted of measuring the standpipe combustible vapour concentrations, indicative of the presence of volatile organic compounds (VOCs), and measuring the water level and thickness of light non-aqueous phase liquid (LNAPL), if any.

Monitoring wells selected for groundwater sampling were purged using high density polyethylene (HDPE) bailers dedicated to each monitoring well. Groundwater was purged from the wells until at least three well volumes had been removed or until the monitoring well was bailed dry.

Groundwater samples were obtained with dedicated HDPE sampling bailers and collected in sample containers provided by ALS Laboratories (ALS) and preserved as per laboratory requirements. Groundwater samples were stored with ice to moderate the temperature during transport to the laboratory and were submitted to ALS for analysis of the following parameters:

- BTEX concentrations;
- PHC Fractions F1 and F2; and
- Nitrate and nitrite.

Twelve groundwater samples plus one duplicate sample were collected and submitted to the laboratory for BTEX and PHC Fractions F1 to F2 analysis and nitrate and nitrite analysis on December 18, 2009.

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**3.2.1 Groundwater Laboratory Analysis**

The following sample collection and associated laboratory analyses was performed during the 2009 groundwater sampling event. A QA/QC program was conducted during the groundwater sampling event.

**2009 Groundwater Analytical Program  
December 2009 Sampling Event**

Monitoring Well	Parameters	
	BTEX, F1, F2	N <sub>2</sub> /N <sub>3</sub>
<b>On Site</b>		
MW1	√	√
MW2	N/A	N/A
MW3	N/A	N/A
MW4	√	√
MW5	√	√
MW8	√	√
MW11	√	√
<b>Off Site</b>		
MW6	√	√
MW7	√	√
MW9	√	√
MW10	√	√
MW12	√	√
MW13	√	√
MW14	√	√
<b>Duplicates</b>	√	√
<b>Total</b>	<b>13</b>	<b>13</b>

BTEX/F1,F2 - benzene, toluene, ethylbenzene and xylenes and PHC Fractions F1 and F2.

N<sub>2</sub>/N<sub>3</sub> – nitrate and nitrite.

NA – not available

Groundwater samples were submitted under chain-of-custody protocol to ALS in Calgary, Alberta. Copies of the complete laboratory analytical reports are presented in Appendix B.



## **4.0 Applicable Guidelines**

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### **4.1 GROUNDWATER GUIDELINES**

The groundwater conditions at the Site were compared to the following guidelines:

- Alberta Environment (ANEV) Tier 1 Groundwater Remediation Guidelines (2009).

The specific guidelines selected for groundwater comparison are the generic hydrocarbon criteria for coarse grained soil in a commercial setting.

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# **5.0 Results**

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## **5.1 ENHANCED BIOREMEDIATION**

### **5.1.1 SVE System**

The SVE system was commissioned in August of 2006 and has been generally operating since the commissioning. The SVE system experienced some downtime due to disruptions in the power source, high water levels in the knockout tank and icing due to cold weather. Disruptions in the power source were caused by activities associated with the onsite facilities. The power disruptions caused the system to temporarily shut down. The power was restarted by Site tenants or by Stantec personnel.

The SVE system was operated through the utilization of seven groundwater monitoring wells that were converted to recovery wells. The SVE system operated at an average inlet vacuum rate of 19.9 kPa (80 inches H<sub>2</sub>O) on recovery wells MW1, MW9, MW10, MW11, MW12, MW13 and MW14 throughout the 2009 SVE operating season, based on two SVE performance monitoring events. The 2009 SCVC measurements ranged from 70% LEL to 0% LEL, indicating a decrease from the 2006 SCVC measurement range of 100% LEL to 30%.

### **5.1.2 Nutrient Injection**

The nutrient injection event was conducted on September 23, 2009 to enhance the bioremediation processes naturally occurring in the subsurface.

Previous groundwater monitoring and sampling data indicated that obtained prior to the nutrient injection event indicated that nitrates were not detected in the sampled wells that have historically displayed PHC concentrations greater than guidelines and nitrate concentrations within the PHC impacted area were typically near or below the laboratory detection limit. The apparent utilization of nitrate within the PHC impacted areas indicates that nitrate is being readily consumed by indigenous microbial populations and it may be the limiting factor to enhanced natural attenuation. The supplementation of nitrate is expected to be consumed by the existing bacteria, increasing the microbial populations, and ultimately decreasing the PHC concentrations.

G and R Remediation was contracted to supply the necessary equipment to inject nutrients at the Site on September 23, 2009. Twenty steel injection rods were inserted into the subsurface at depths ranging between 2 mBGL and 4 mBGL. The average spacing between the nutrient injection points supplemented with nutrient enriched water was approximately 4 m to 5 m. Conservative calculations were completed during the 2008 program to determine the amount of calcium nitrate that could be injected into each nutrient injection well to establish nitrate

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concentrations equal to approximately ten times the nitrate guidelines for potable water. A concentration of approximately 100 mg/L (as nitrogen) was selected for the 2008 nutrient injection, which was selected based on the above information. Nitrate concentrations for the 2009 nutrient injection were double the 2008 nitrate concentrations since nitrate concentrations were adequately utilized after the last injection. Nitrate guidelines are based on potable water as the receptor; however, groundwater in the vicinity of the Site is not being used for potable purposes. Therefore, it is a reasonable assumption that nitrate can exceed the applicable guidelines for a period of time with no immediate threat to any sensitive receptors in the vicinity of the Site.

### **5.2 GROUNDWATER MONITORING AND SAMPLING**

Twelve groundwater monitoring wells were monitored at the Site on December 18, 2009. The results of the groundwater monitoring event are presented in Table 1.

The standpipe combustible vapour concentrations ranged between 0 ppm and 8,500 ppm. Liquid phase hydrocarbons were not encountered during the December 2009 monitoring event and the depth to groundwater ranged between approximately 1.4 metres below top of casing (mBTOC) and 2.5 mBTOC.

#### **5.2.3 Groundwater Analytical Results**

A summary of laboratory analytical results from the 2007, 2008, and 2009 groundwater sampling events are presented in Table 2 and Table 3. Laboratory Analytical reports for the 2009 samples are presented in Appendix B.

The 2009 laboratory analytical results indicated that groundwater monitoring wells MW1, MW4, MW8, MW9, MW10, MW11, MW12, MW13 and MW14 had one or more PHC parameters that were greater than the applicable guidelines. The PHC concentrations in monitoring well MW5, MW6 and MW7 were less than the guidelines. The results are consistent with historical data from 2007 and 2008, other than monitoring well MW7, which historically has displayed PHC concentrations greater than applicable guidelines. Monitoring well MW1 and MW2 had PHC concentrations below applicable guidelines in November 2007; however, they were not located during the 2009 December sampling event and consequently were not sampled.

The baseline PHC concentrations obtained in 2007 prior to the nutrient injections have been compared to post the nutrient injections PHC concentrations from 2008 and 2009 nutrient injection events. This comparison is presented in Table 2.

Several monitoring wells had elevated PHC concentrations following the second nutrient injection in 2009, most significantly in monitoring well MW11. Injected nutrients in certain conditions can cause a desorption of PHCs within the soils colloids and can cause concentrations of PHCs to migrate into groundwater, consequently, causing elevated PHC concentrations in certain monitoring wells. However, the migration to the dissolved phase allows the PHCs to be more bioavailable for future biodegradation.

The nutrient injections have generally decreased or maintained the PHC concentrations in approximately 60% of the sampled parameters, indicating that bioremediation of hydrocarbons is occurring at the Site.

Groundwater nutrient concentrations were monitored to provide a baseline for nitrate and nitrite concentrations at the Site prior to and following nutrient injection. The changes in analytical parameters were used to evaluate the SVE and nutrient injection programs at stimulating and diversifying the bioremediation processes. A summary of groundwater results is presented in Table 3.

Results from the Nitrate concentrations from the 2007 and 2008 sampling events were generally less than the guidelines and less than the laboratory detection limit in the sampled monitoring wells, with the exception of monitoring well MW8, which displayed elevated nitrate concentrations of 3,640 mg/L, on the same day of the nutrient injection event and 2,800 mg/L approximately two months after the nutrient injection event.

The 2009 sampling results were consistent with the 2007 and 2008 data displaying similar results. Monitoring MW8 displayed nitrate concentrations (278 mg/L) less than previous post injections sampling events; however, was still above applicable guidelines. Several nutrient injection points were located near monitoring well MW8 and the heterogeneous nature of the subsurface appears to have resulted in elevated nitrate accumulating in this area. Short circuiting between the injection well and monitoring well during nutrient injection is likely to have caused the flawed data and these concentrations are not representative of actual groundwater conditions at the Site. The decrease in nitrate concentrations in MW8 from post 2008 and 2009 nutrient injection sampling events indicate that nutrients are being consumed through biological processes and diffusing in the groundwater due to concentration gradients.

Monitoring well MW11 is also located near a nutrient injection point and it has nitrate concentrations that are less than the guidelines. The elevated nitrate concentrations in monitoring well MW8 are expected to continue to decrease with time, as it is consumed in the bioremediation processes where PHC concentrations will be reduced.

The combination of nutrient injection and SVE operation are enhancing the bioremediation processes; however, it appears additional timelines and nutrient injections would be required to reduce the PHC concentrations to appropriate guidelines. Additional groundwater sampling would determine if the nitrate has been further consumed in monitoring well MW8, and if additional nutrient injection is warranted.



## 6.0 Quality Assurance/Quality Control

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The QA/QC data indicate that the analytical results are valid for the November 2009 groundwater sampling event. The relative percent difference (RPD) was calculated using the formula in Equation 1 for the analytical results. The RPD was calculated as follows:

$$RPD = \frac{S - R}{(S + R)/2} \times 100 \quad (1)$$

where:

S = sample result; and

R = replicate or duplicate result.

U.S. EPA Region I Criteria (Zeiner, 1994) was used to validate the field and laboratory duplicates. The Region I data validation guidelines indicate that if both the duplicate results are greater than or equal to five times the detection limit, the RPD must be less than 20% for aqueous and less than 30% for solid samples. Results that lie outside these ranges should be considered estimates. A maximum difference was reported for duplicate sample results that are within five times the laboratory detection limit. In addition, ALS incorporates their own QA/QC procedures during analytical testing of the samples.

One field duplicate groundwater sample was collected from monitoring well MW8 during the December 2009 groundwater sampling events. The duplicate sample from monitoring well MW 8 was labelled as MW A.

The RPDs ranged between 0 % and 26.6% for the December 2009 duplicate samples. The variance in the samples is possibly due to varying amounts of sediment present and the heterogeneous nature of the samples, however, slight discrepancies in the results do not effect the conclusions of this report. The average RPD was calculated to be 7.5, indicating that the analytical results for the December 2009 sampling events were within the acceptable range of 20. A summary of the QA/QC is presented in Table 4.

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## **7.0 Summary**

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The SVE system was commissioned in August of 2006 and has been operating on recovery wells MW1, MW9, MW10, MW11, MW12, MW13 and MW14 between 2006 and 2009. The SCVC measurements from the December 2009 monitoring program have decreased significantly from previous 2006 monitoring events, indicating that the SVE system is supplementing the bioremediation processes on Site.

The second nutrient injection event was conducted on September 23, 2009 to enhance the bioremediation processes naturally occurring in the subsurface stratum.

Twelve groundwater monitoring wells were monitored and sampled at the Site on December 18, 2009. Liquid phase hydrocarbons were not encountered during the November 2007 and November 2008 as well as the 2009 monitoring events. Analytical results indicated that groundwater monitoring wells MW1, MW4, MW8, MW9, MW10, MW11, MW12 and MW14 had one or more PHC parameter(s) that were greater than the guidelines. The PHC concentrations in monitoring well MW2, MW3, MW5 and MW6, and MW7 were less than the guidelines. Results were consistent with previous sampling 2007 and 2008 events, except for MW7 which typically had PHC concentrations greater than applicable guidelines. Monitoring well MW11 had a significant increase in PHC concentrations, indicating that the nutrient injection potentially caused the desorption of PHC from the soils and released into the groundwater, causing elevated PHC concentrations in the dissolved phase.

Approximately 60% of the PHC parameters have either decreased or maintained concentrations in the monitoring wells throughout the Site since 2007, suggesting that bioremediation of hydrocarbons is occurring at the Site.

The combination of nutrient injection and SVE operation are enhancing the bioremediation processes; however, it appears additional timelines and possible nutrient injections would be required to reduce the PHC concentrations to appropriate guidelines. Additional groundwater sampling would determine if the nitrate has been further consumed in monitoring well MW8, and if additional nutrient injection is warranted.

## 8.0 Closure

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In conducting this environmental site assessment, Stantec confirms that it had access to the experience and capability necessary to perform and did perform in accordance with generally accepted professional standards at the time and location in which the services were provided. No other representations, warranties or guarantees are made concerning the accuracy or completeness of the data or conclusions contained within this report, including no assurance that this assessment has uncovered all potential liabilities associated with the identified property.

This report provides an evaluation of environmental conditions associated with the identified property at the time the assessments were conducted and are based on information obtained by and/or provided to Stantec at that time. All information received from the client or third parties in the preparation of this report has been assumed by Stantec to be correct. Stantec assumes no responsibility for any deficiency or inaccuracy in information received from others.

The opinions in this report can only be relied upon as they relate to the condition of the identified property at the time the assessments and/or investigations were conducted. Activities at the property subsequent to Stantec's assessment may have significantly altered the property's condition. Conclusions made within this report are a professional opinion, not a certification of the property's environmental condition.

This report has been prepared for the exclusive use of the client identified herein. Stantec assumes no responsibility for losses, damages, liabilities or claims, howsoever arising, from third party use of this report.

The locations of any utilities illustrated in this report, if any, including pole lines, conduits, water mains, sewers and other surface or sub-surface utilities and structures are not necessarily as described in this report or its appendices, and where shown or described, the accuracy of the position of such utilities and structures is not guaranteed. Before starting work, any Contractor should confirm the exact location of all such utilities and structures and assume all liability for damage to them.

If Stantec's services include destructive testing, it should be noted that there are limitations that are inherent in any intrusive work of this nature. Conditions may vary between sample locations and the parameters tested for may be limited by factors such as the areas of greatest risk identified in any previous site assessment, the site conditions (e.g. utility placements) and cost factors. Accordingly, no representations can be made regarding parameters that were not tested for. A potential remains for the presence of unknown, unidentified, or unforeseen surface and sub-surface environmental conditions.



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## 9.0 Stantec Quality Management Program

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This report, entitled **2009 Insitu Bioremediation Program, 419 – 10th Avenue, Carstairs, Alberta, January 2010**, was produced by Stantec Consulting Ltd.

This report was written by the following individual(s):

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Signature



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**10.0 References**

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Stantec Consulting Ltd., April 2007, Soil Vapour Extraction System 2006 Commissioning, 419 – 10<sup>th</sup> Avenue, Carstairs, Alberta.

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**Stantec****Table 1. Summary of Groundwater Monitoring Data - December 2009****2009 Insitu Bioremediation Program**

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<b>Monitoring Well</b>	<b>Standpipe Combustible Vapour Concentration (ppm)</b>	<b>Depth to LPH (mBTOC)</b>	<b>Depth to Groundwater (mBTOC)</b>	<b>LPH Thickness (m)</b>
MW1	8,500	-	1.991	0
MW2	N/A	-	N/A	0
MW3	N/A	-	N/A	0
MW4	190	-	2.441	0
MW5	110	-	2.341	0
MW6	60	-	1.635	0
MW7	0	-	2.19	0
MW8	300	-	2.038	0
MW9	100	-	2.051	0
MW10	170	-	1.931	0
MW11	5	-	2.287	0
MW12	65	-	2.521	0
MW13	15	-	2.417	0
MW14	120	-	1.951	0

**Notes:**

ppm indicates parts per million

LPH indicates liquid phase hydrocarbon

mBTOC indicates metres below top of casing

N/A - Not Available



Table 2. Summary of Groundwater Analytical Results for Petroleum Hydrocarbons  
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Parameter	Unit	Detection Limit	Location	Water Samples																															
				W01		W02		W03		W04		W05		W06		W07		W08		W09		W10		W11		W12		W13		W14		W15			
				Pre-Biorem. Sample 1	Post-Biorem. Sample 1	Pre-Biorem. Sample 2	Post-Biorem. Sample 2	Pre-Biorem. Sample 3	Post-Biorem. Sample 3	Pre-Biorem. Sample 4	Post-Biorem. Sample 4	Pre-Biorem. Sample 5	Post-Biorem. Sample 5	Pre-Biorem. Sample 6	Post-Biorem. Sample 6	Pre-Biorem. Sample 7	Post-Biorem. Sample 7	Pre-Biorem. Sample 8	Post-Biorem. Sample 8	Pre-Biorem. Sample 9	Post-Biorem. Sample 9	Pre-Biorem. Sample 10	Post-Biorem. Sample 10	Pre-Biorem. Sample 11	Post-Biorem. Sample 11	Pre-Biorem. Sample 12	Post-Biorem. Sample 12	Pre-Biorem. Sample 13	Post-Biorem. Sample 13	Pre-Biorem. Sample 14	Post-Biorem. Sample 14	Pre-Biorem. Sample 15	Post-Biorem. Sample 15		
Gasoline	mg/l	0.002	0.001	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005
Gasoline	mg/l	0.002	0.001	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005
Gasoline	mg/l	0.002	0.001	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005

Notes: Alberta Environment Tier 1 (AET-1) Remediation Guidelines (RGLs) for water ground and surface water and soil.  
 ND - Indicates not detected.  
 NA - Indicates not available.  
 BOLD - Indicates guideline exceeded.  
 [Shaded Box] - Indicates a decrease in 2009 post-biorem. PHE concentrations when compared to pre-biorem. PHE concentrations from 2007.  
 [Shaded Box] - Indicates a decrease in 2009 post-biorem. PHE concentrations when compared to pre-biorem. PHE concentrations from 2007.

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Table 3. Summary of Groundwater Analytical Results for Nutrients

Station Name	Date Sampled	Lab Sample ID	General Injection	Injection 1	Injection 2	Injection 3	Injection 4	Injection 5	Injection 6	Injection 7	Injection 8	Injection 9	Injection 10	Injection 11	Injection 12	Injection 13	Injection 14	Injection 15	Injection 16	Injection 17	Injection 18	Injection 19	Injection 20	Nutrient		
																								mg/L	mg/L	
MVA1	16-Jul-08	16A0715-1	Post Injection 2	0.05	0.10	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	27-Jul-08	16A0715-2	Post Injection 2	0.05	0.10	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
MVA2	16-Jul-08	16A0715-3	Post Injection 2	0.05	0.10	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	27-Jul-08	16A0715-4	Post Injection 2	0.05	0.10	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
MVA3	16-Jul-08	16A0715-5	Post Injection 2	0.05	0.10	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	27-Jul-08	16A0715-6	Post Injection 2	0.05	0.10	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
MVA4	16-Jul-08	16A0715-7	Post Injection 2	0.05	0.10	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	27-Jul-08	16A0715-8	Post Injection 2	0.05	0.10	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
MVA5	16-Jul-08	16A0715-9	Post Injection 2	0.05	0.10	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	27-Jul-08	16A0715-10	Post Injection 2	0.05	0.10	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
MVA6	16-Jul-08	16A0715-11	Post Injection 2	0.05	0.10	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	27-Jul-08	16A0715-12	Post Injection 2	0.05	0.10	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
MVA7	16-Jul-08	16A0715-13	Post Injection 2	0.05	0.10	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	27-Jul-08	16A0715-14	Post Injection 2	0.05	0.10	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
MVA8	16-Jul-08	16A0715-15	Post Injection 2	0.05	0.10	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	27-Jul-08	16A0715-16	Post Injection 2	0.05	0.10	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
MVA9	16-Jul-08	16A0715-17	Post Injection 2	0.05	0.10	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	27-Jul-08	16A0715-18	Post Injection 2	0.05	0.10	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
MVA10	16-Jul-08	16A0715-19	Post Injection 2	0.05	0.10	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	27-Jul-08	16A0715-20	Post Injection 2	0.05	0.10	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
MVA11	16-Jul-08	16A0715-21	Post Injection 2	0.05	0.10	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	27-Jul-08	16A0715-22	Post Injection 2	0.05	0.10	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
MVA12	16-Jul-08	16A0715-23	Post Injection 2	0.05	0.10	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	27-Jul-08	16A0715-24	Post Injection 2	0.05	0.10	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
MVA13	16-Jul-08	16A0715-25	Post Injection 2	0.05	0.10	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	27-Jul-08	16A0715-26	Post Injection 2	0.05	0.10	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
MVA14	16-Jul-08	16A0715-27	Post Injection 2	0.05	0.10	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	27-Jul-08	16A0715-28	Post Injection 2	0.05	0.10	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05

Notes: Analytical Method for 1. Groundwater Remediation Guidelines (GRL) for water ground soil and commercial land use  
 NA - Includes no results  
 ND - Includes no results

**Stantec**

**Table 4. Summary of Quality Assurance and Quality Control  
2009 Insitu Bioremediation Program  
419-10th Avenue  
Carstairs, Alberta**

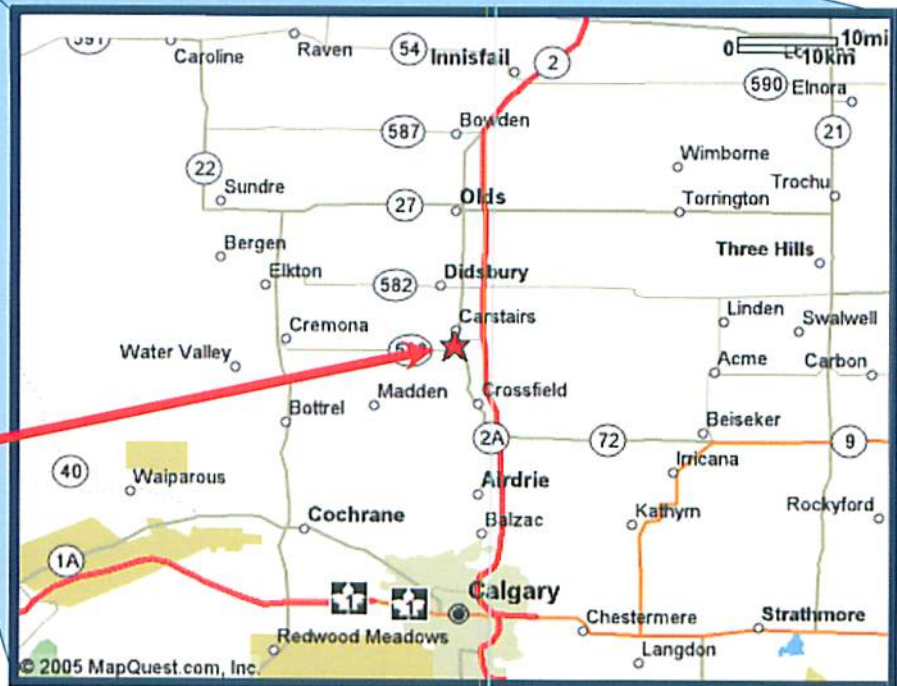
Parameter	Units	MDL	MW 8 Duplicate		Value	Value	Difference	RPD	QA/QC Analysis		Pass
									Type	Result	
Benzene	mg/L	0.001	17.3	19.1	17.3	19.1	1.8	9.89	RPD	9.9	Yes
Toluene	mg/L	0.001	0.092	0.0704	0.092	0.0704	0.0216	26.60	RPD	26.6	<u>No</u>
Ethylbenzene	mg/L	0.001	0.404	0.422	0.404	0.422	0.018	4.36	RPD	4.4	Yes
Xylenes	mg/L	0.002	0.695	0.666	0.695	0.666	0.029	4.26	RPD	4.3	Yes
C6 - C10 (F1)	mg/L	0.05	23.1	22	23.1	22	1.1	4.88	RPD	4.9	Yes
C10 - C16 (F1 - BTEX)	mg/L	0.05	4.67	1.87	4.67	1.87	2.8	85.63	RPD	85.6	N/A
>C10 - C16 (F2)	mg/L	0.03	0.564	0.513	0.564	0.513	0.051	9.47	RPD	9.5	Yes
Nitrate -N	mg/L	0.03	279	278	279	278	1	0.36	RPD	0.4	Yes
Nitrite - N	mg/L	0.03	<0.030	<0.10	0.03	0.03	0	0.00	RPD	0.0	Yes

Notes:

- DIF - denotes difference QA/QC method recommended by Zeiner when one or both values are within the laboratory method detection limit (MDL).
- RPD - denotes relative percent difference (RPD) QA/QC method recommended by Zeiner for values above 5x method detection limit (MDL).
- bold** - denotes values exceeding the guidelines provided by Zenier 1994.
- N/A - denotes not applicable



**SUBJECT  
PROPERTY**



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1.29.10



**Stantec**

Client/Project  
VAUGHN WYANT INVESTMENTS LTD.  
2009 INSITU BIOREMEDIATION PROGRAM  
419 – 10<sup>TH</sup> AVENUE, CARSTAIRS, AB

Figure No.

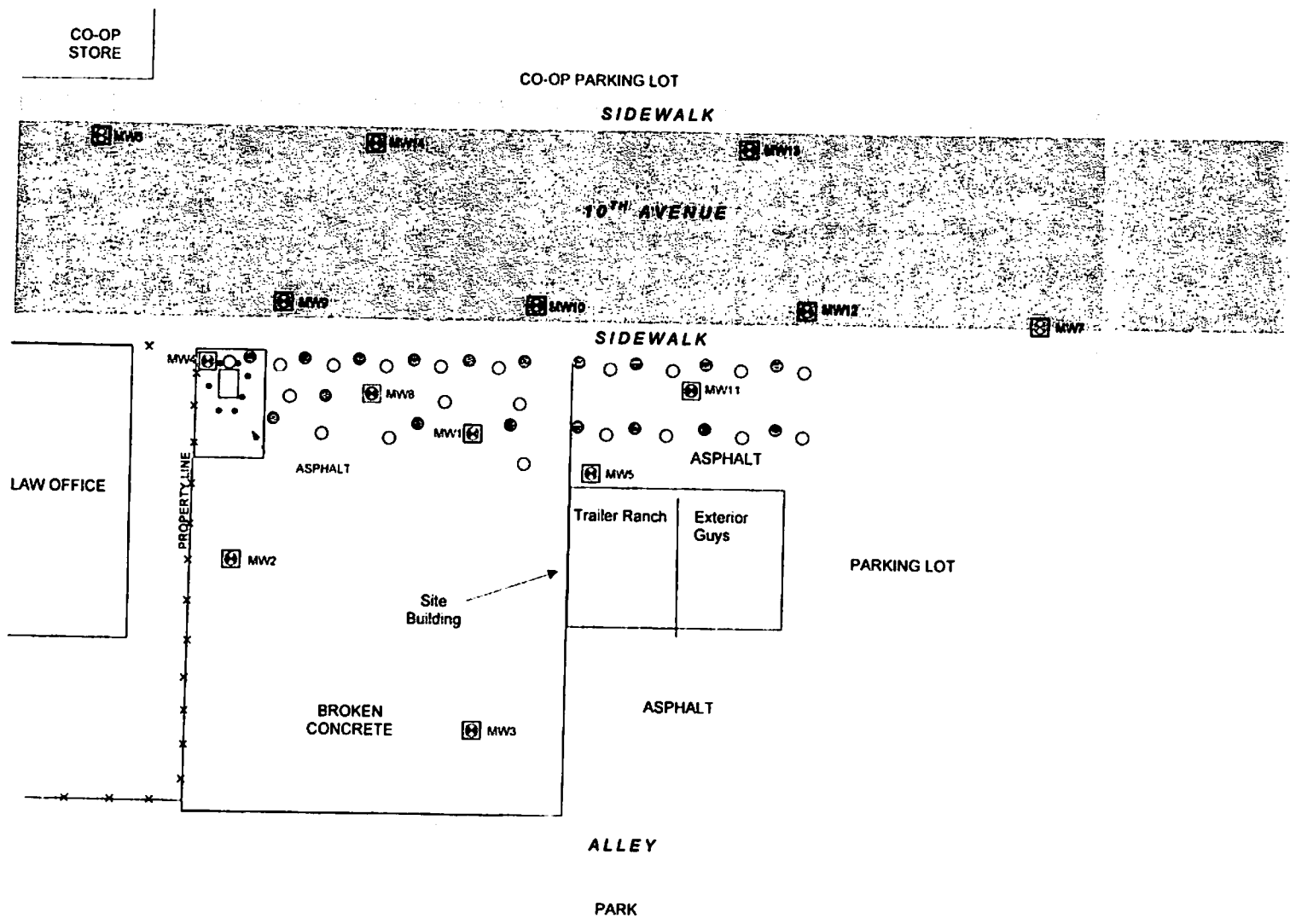
**1**

Title

**Site Location Map**



GROUNDWATER FLOW  
↓



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1 29 10



Legend



Legend

- Monitoring Well Location
- Monitoring Well/Recovery Well Location
- Nutrient Injection Point - September 26, 2008
- Nutrient Injection Point - September 23, 2009

Legend

Client/Project  
 VAUGHN WYANT INVESTMENTS LTD.  
 2009 INSITU BIOREMEDIATION PROGRAM  
 419 - 10<sup>TH</sup> AVENUE, CARSTAIRS, AB

Figure No.  
**2**

Title  
**Site Plan**

**Stantec**

2009 Insitu Bioremediation Program  
419 – 10<sup>th</sup> Avenue Carstairs, Alberta



## **APPENDIX A**

### **Site Photographs**





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PHOTO 1 View of Site facing southwest.



PHOTO 2 View of Soil Vapour Extraction System.



PHOTO 3 View of rig and nutrient injection points facing south.



PHOTO 4 View of nutrient mixing system.



PHOTO 5 View of G&R mixing batch of nutrient water.





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PHOTO 6 View of injection points facing north.



PHOTO 7 View of direct push rig installing injection well.



PHOTO 8 View of direct push rig at north end of Site.



PHOTO 9 View of Site facing north.





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PHOTO 10 View of frozen monitoring well.



PHOTO 11 View of well located on 10<sup>th</sup> Avenue.



PHOTO 12 View of MW 1 facing southeast.

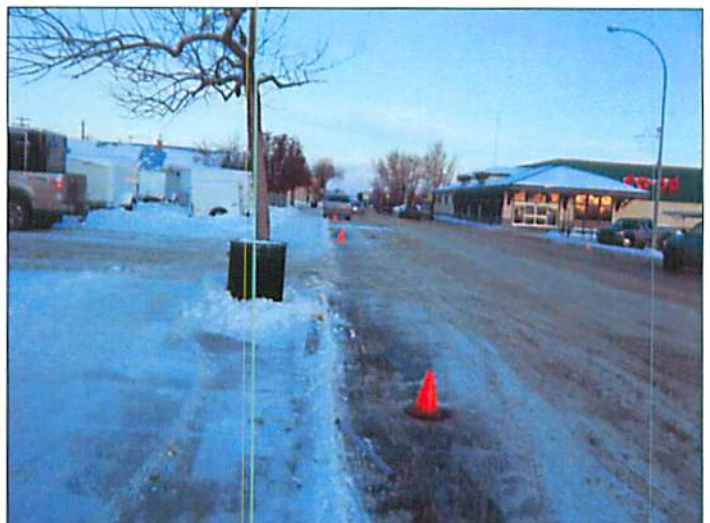


PHOTO 13 View of wells located on 10<sup>th</sup> Avenue.

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2009 Insitu Bioremediation Program  
419 – 10<sup>th</sup> Avenue Carstairs, Alberta



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**APPENDIX B**  
**Laboratory Analytical Reports**



Environmental Division

**Certificate of Analysis**

STANTEC CONSULTING LTD  
ATTN: JEREMY LANG  
100, 75 - 24TH STREET EAST  
SASKATOON SK S7K 0K3

Report Date: 24-DEC-09 13:54 (MT)  
Version: FINAL

Lab Work Order #: **L849715**

Date Received: **18-DEC-09**

Project P.O. #: NOT PROVIDED  
Job Reference: 113253576  
Legal Site Desc: CARSTAIRS, AB.  
CofC Numbers: 08-033081, 08-033082

Other Information:

Comments:

Lori Provencher  
Account Manager

THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN AUTHORITY OF THE LABORATORY.  
ALL SAMPLES WILL BE DISPOSED OF AFTER 30 DAYS FOLLOWING ANALYSIS. PLEASE CONTACT THE LAB IF YOU  
REQUIRE ADDITIONAL SAMPLE STORAGE TIME.

**ALS Canada Ltd.**  
Part of the **ALS Laboratory Group**  
Bay 2, 1313-44 Ave. N.E., Calgary, AB T2E 6L5  
Phone: +1 403 291 9897 Fax: +1 403 291 0298 [www.alsglobal.com](http://www.alsglobal.com)  
A Campbell Brothers Limited Company

## ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier	D.L.	Units	Extracted	Analyzed	Batch
<b>L849715-1 MW1</b> Sampled By: GM on 18-DEC-09 Matrix: WATER <b>BTEX, F1 (C6-C10),F2 (&gt;C10-C16)</b> <b>BTEX and F1 (C6-C10)</b> Benzene Toluene EthylBenzene Xylenes F1(C6-C10) F1-BTEX <b>F2</b> F2 (>C10-C16) <b>Miscellaneous Parameters</b> Nitrate-N Nitrite-N	19.0 0.158 2.27 4.50 34.9 9.04 6.06 429 0.10		0.00050 0.00050 0.00050 0.00050 0.10 0.10 0.050 0.050 0.10	mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L	20-DEC-09 20-DEC-09 20-DEC-09 20-DEC-09 20-DEC-09 20-DEC-09 21-DEC-09	21-DEC-09 21-DEC-09 21-DEC-09 21-DEC-09 21-DEC-09 21-DEC-09 21-DEC-09 21-DEC-09 21-DEC-09	R1115817 R1115817 R1115817 R1115817 R1115817 R1115817 R1114532 R1116352 R1116352
<b>L849715-2 MW4</b> Sampled By: GM on 18-DEC-09 Matrix: WATER <b>BTEX, F1 (C6-C10),F2 (&gt;C10-C16)</b> <b>BTEX and F1 (C6-C10)</b> Benzene Toluene EthylBenzene Xylenes F1(C6-C10) F1-BTEX <b>F2</b> F2 (>C10-C16) <b>Miscellaneous Parameters</b> Nitrate-N Nitrite-N	1.46 0.0075 0.0590 0.0245 1.90 0.35 0.093 0.114 <0.050	DLA DLA DLA DLA DLA	0.0025 0.0025 0.0025 0.0025 0.50 0.10 0.050 0.050 0.050	mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L	20-DEC-09 20-DEC-09 20-DEC-09 20-DEC-09 20-DEC-09 20-DEC-09 21-DEC-09	21-DEC-09 21-DEC-09 21-DEC-09 21-DEC-09 21-DEC-09 21-DEC-09 21-DEC-09 18-DEC-09 18-DEC-09	R1115817 R1115817 R1115817 R1115817 R1115817 R1115817 R1114532 R1114705 R1114705
<b>L849715-3 MW5</b> Sampled By: GM on 18-DEC-09 Matrix: WATER <b>BTEX, F1 (C6-C10),F2 (&gt;C10-C16)</b> <b>BTEX and F1 (C6-C10)</b> Benzene Toluene EthylBenzene Xylenes F1(C6-C10) F1-BTEX <b>F2</b> F2 (>C10-C16) <b>Miscellaneous Parameters</b> Nitrate-N Nitrite-N	<0.00050 <0.00050 <0.00050 <0.00050 <0.10 <0.10 <0.050 5.20 <0.050		0.00050 0.00050 0.00050 0.00050 0.10 0.10 0.050 0.050 0.050	mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L	20-DEC-09 20-DEC-09 20-DEC-09 20-DEC-09 20-DEC-09 20-DEC-09 21-DEC-09	20-DEC-09 20-DEC-09 20-DEC-09 20-DEC-09 20-DEC-09 20-DEC-09 21-DEC-09 18-DEC-09 18-DEC-09	R1115817 R1115817 R1115817 R1115817 R1115817 R1115817 R1114532 R1114705 R1114705
<b>L849715-4 MW6</b> Sampled By: GM on 18-DEC-09 Matrix: WATER <b>BTEX, F1 (C6-C10),F2 (&gt;C10-C16)</b> <b>BTEX and F1 (C6-C10)</b> Benzene	0.00056		0.00050	mg/L	20-DEC-09	20-DEC-09	R1115817

\* Refer to Referenced Information for Qualifiers (if any) and Methodology.

## ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier	D.L.	Units	Extracted	Analyzed	Batch
<b>L849715-4 MW6</b> Sampled By: GM on 18-DEC-09 Matrix: WATER <b>BTEX and F1 (C6-C10)</b>							
Toluene	0.0184		0.00050	mg/L	20-DEC-09	20-DEC-09	R1115817
EthylBenzene	0.00052		0.00050	mg/L	20-DEC-09	20-DEC-09	R1115817
Xylenes	<0.00050		0.00050	mg/L	20-DEC-09	20-DEC-09	R1115817
F1(C6-C10)	<0.10		0.10	mg/L	20-DEC-09	20-DEC-09	R1115817
F1-BTEX	<0.10		0.10	mg/L	20-DEC-09	20-DEC-09	R1115817
<b>F2</b>							
F2 (>C10-C16)	0.122		0.050	mg/L	21-DEC-09	21-DEC-09	R1114532
<b>Miscellaneous Parameters</b>							
Nitrate-N	<0.050		0.050	mg/L		18-DEC-09	R1114705
Nitrite-N	<0.050		0.050	mg/L		18-DEC-09	R1114705
<b>L849715-5 MW7</b> Sampled By: GM on 18-DEC-09 Matrix: WATER <b>BTEX, F1 (C6-C10),F2 (&gt;C10-C16)</b>							
<b>BTEX and F1 (C6-C10)</b>							
Benzene	0.00238		0.00050	mg/L	20-DEC-09	20-DEC-09	R1115817
Toluene	<0.00050		0.00050	mg/L	20-DEC-09	20-DEC-09	R1115817
EthylBenzene	<0.00050		0.00050	mg/L	20-DEC-09	20-DEC-09	R1115817
Xylenes	<0.00050		0.00050	mg/L	20-DEC-09	20-DEC-09	R1115817
F1(C6-C10)	<0.10		0.10	mg/L	20-DEC-09	20-DEC-09	R1115817
F1-BTEX	<0.10		0.10	mg/L	20-DEC-09	20-DEC-09	R1115817
<b>F2</b>							
F2 (>C10-C16)	<0.050		0.050	mg/L	21-DEC-09	21-DEC-09	R1114532
<b>Miscellaneous Parameters</b>							
Nitrate-N	<0.050		0.050	mg/L		18-DEC-09	R1114705
Nitrite-N	<0.050		0.050	mg/L		18-DEC-09	R1114705
<b>L849715-6 MW8</b> Sampled By: GM on 18-DEC-09 Matrix: WATER <b>BTEX, F1 (C6-C10),F2 (&gt;C10-C16)</b>							
<b>BTEX and F1 (C6-C10)</b>							
Benzene	17.3		0.00050	mg/L	20-DEC-09	21-DEC-09	R1115817
Toluene	0.0920		0.00050	mg/L	20-DEC-09	21-DEC-09	R1115817
EthylBenzene	0.404		0.00050	mg/L	20-DEC-09	21-DEC-09	R1115817
Xylenes	0.695		0.00050	mg/L	20-DEC-09	21-DEC-09	R1115817
F1(C6-C10)	23.1		0.10	mg/L	20-DEC-09	21-DEC-09	R1115817
F1-BTEX	4.67		0.10	mg/L	20-DEC-09	21-DEC-09	R1115817
<b>F2</b>							
F2 (>C10-C16)	0.564		0.050	mg/L	21-DEC-09	21-DEC-09	R1114532
<b>Miscellaneous Parameters</b>							
Nitrate-N	278		0.050	mg/L		21-DEC-09	R1116352
Nitrite-N	<0.10	DLA	0.10	mg/L		21-DEC-09	R1116352
<b>L849715-7 MW9</b> Sampled By: GM on 18-DEC-09 Matrix: WATER <b>BTEX, F1 (C6-C10),F2 (&gt;C10-C16)</b>							
<b>BTEX and F1 (C6-C10)</b>							
Benzene	18.9		0.00050	mg/L	20-DEC-09	21-DEC-09	R1115817
Toluene	1.80		0.00050	mg/L	20-DEC-09	21-DEC-09	R1115817
EthylBenzene	1.00		0.00050	mg/L	20-DEC-09	21-DEC-09	R1115817

\* Refer to Referenced Information for Qualifiers (if any) and Methodology.

## ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Data/Parameters	Result	Qualifier	DL	Units	Extracted	Analyzed	Batch
L849715-7 MW9 Sampled By: GM on 18-DEC-09 Matrix: WATER BTEX and F1 (C6-C10)							
Xylenes	2.57		0.00050	mg/L	20-DEC-09	21-DEC-09	R1115817
F1(C6-C10)	31.8		0.10	mg/L	20-DEC-09	21-DEC-09	R1115817
F1-BTEX	7.50		0.10	mg/L	20-DEC-09	21-DEC-09	R1115817
F2							
F2 (>C10-C16)	1.40		0.050	mg/L	21-DEC-09	21-DEC-09	R1114532
Miscellaneous Parameters							
Nitrate-N	0.484		0.050	mg/L		18-DEC-09	R1114705
Nitrite-N	<0.050		0.050	mg/L		18-DEC-09	R1114705
L849715-8 MW10 Sampled By: GM on 18-DEC-09 Matrix: WATER BTEX, F1 (C6-C10),F2 (>C10-C16)							
BTEX and F1 (C6-C10)							
Benzene	5.93	DLA	0.00050	mg/L	20-DEC-09	20-DEC-09	R1115817
Toluene	<0.022		0.022	mg/L	20-DEC-09	20-DEC-09	R1115817
EthylBenzene	0.177		0.00050	mg/L	20-DEC-09	20-DEC-09	R1115817
Xylenes	0.0431		0.00050	mg/L	20-DEC-09	20-DEC-09	R1115817
F1(C6-C10)	7.15		0.10	mg/L	20-DEC-09	20-DEC-09	R1115817
F1-BTEX	1.00		0.10	mg/L	20-DEC-09	20-DEC-09	R1115817
F2							
F2 (>C10-C16)	0.228		0.050	mg/L	21-DEC-09	21-DEC-09	R1114532
Miscellaneous Parameters							
Nitrate-N	<0.050		0.050	mg/L		18-DEC-09	R1114705
Nitrite-N	<0.050		0.050	mg/L		18-DEC-09	R1114705
L849715-9 MW11 Sampled By: GM on 18-DEC-09 Matrix: WATER BTEX, F1 (C6-C10),F2 (>C10-C16)							
BTEX and F1 (C6-C10)							
Benzene	23.3		0.00050	mg/L	20-DEC-09	20-DEC-09	R1115817
Toluene	0.0304		0.00050	mg/L	20-DEC-09	20-DEC-09	R1115817
EthylBenzene	1.47		0.00050	mg/L	20-DEC-09	20-DEC-09	R1115817
Xylenes	1.33		0.00050	mg/L	20-DEC-09	20-DEC-09	R1115817
F1(C6-C10)	31.0		0.10	mg/L	20-DEC-09	20-DEC-09	R1115817
F1-BTEX	4.89		0.10	mg/L	20-DEC-09	20-DEC-09	R1115817
F2							
F2 (>C10-C16)	1.60		0.050	mg/L	21-DEC-09	21-DEC-09	R1114532
Miscellaneous Parameters							
Nitrate-N	3.04		0.050	mg/L		18-DEC-09	R1114705
Nitrite-N	<0.050		0.050	mg/L		18-DEC-09	R1114705
L849715-10 MW12 Sampled By: GM on 18-DEC-09 Matrix: WATER BTEX, F1 (C6-C10),F2 (>C10-C16)							
BTEX and F1 (C6-C10)							
Benzene	3.11	DLA	0.022	mg/L	23-DEC-09	23-DEC-09	R1118325
Toluene	0.0089	DLA	0.0050	mg/L	23-DEC-09	23-DEC-09	R1118325
EthylBenzene	0.455	DLA	0.0050	mg/L	23-DEC-09	23-DEC-09	R1118325
Xylenes	0.0122	DLA	0.0050	mg/L	23-DEC-09	23-DEC-09	R1118325
F1(C6-C10)	4.7	DLA	4.4	mg/L	23-DEC-09	23-DEC-09	R1118325

\* Refer to Referenced Information for Qualifiers (if any) and Methodology.



## ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier	D.L.	Units	Extracted	Analyzed	Batch
L849715-10 MW12 Sampled By: GM on 18-DEC-09 Matrix: WATER BTEX and F1 (C6-C10)							
F1-BTEX	1.13		0.10	mg/L	23-DEC-09	23-DEC-09	R1118325
F2							
F2 (>C10-C16)	0.529		0.050	mg/L	21-DEC-09	21-DEC-09	R1114532
Miscellaneous Parameters							
Nitrate-N	<0.050		0.050	mg/L		18-DEC-09	R1114705
Nitrite-N	<0.050		0.050	mg/L		18-DEC-09	R1114705
L849715-11 MW13 Sampled By: GM on 18-DEC-09 Matrix: WATER BTEX, F1 (C6-C10),F2 (>C10-C16)							
BTEX and F1 (C6-C10)							
Benzene	9.02	DLA	0.11	mg/L	23-DEC-09	23-DEC-09	R1118325
Toluene	0.0231	DLA	0.0050	mg/L	23-DEC-09	23-DEC-09	R1118325
EthylBenzene	1.27	DLA	0.022	mg/L	23-DEC-09	23-DEC-09	R1118325
Xylenes	1.11	DLA	0.0050	mg/L	23-DEC-09	23-DEC-09	R1118325
F1(C6-C10)	14.0	DLA	4.4	mg/L	23-DEC-09	23-DEC-09	R1118325
F1-BTEX	2.62		0.10	mg/L	23-DEC-09	23-DEC-09	R1118325
F2							
F2 (>C10-C16)	1.10		0.050	mg/L	21-DEC-09	21-DEC-09	R1114532
Miscellaneous Parameters							
Nitrate-N	<0.050		0.050	mg/L		18-DEC-09	R1114705
Nitrite-N	<0.050		0.050	mg/L		18-DEC-09	R1114705
L849715-12 MW14 Sampled By: GM on 18-DEC-09 Matrix: WATER BTEX, F1 (C6-C10),F2 (>C10-C16)							
BTEX and F1 (C6-C10)							
Benzene	17.7	DLA	0.11	mg/L	23-DEC-09	24-DEC-09	R1118325
Toluene	0.585	DLA	0.0050	mg/L	23-DEC-09	24-DEC-09	R1118325
EthylBenzene	1.88	DLA	0.022	mg/L	23-DEC-09	24-DEC-09	R1118325
Xylenes	3.76	DLA	0.022	mg/L	23-DEC-09	24-DEC-09	R1118325
F1(C6-C10)	30	DLA	22	mg/L	23-DEC-09	24-DEC-09	R1118325
F1-BTEX	6.32		0.10	mg/L	23-DEC-09	24-DEC-09	R1118325
F2							
F2 (>C10-C16)	2.09		0.050	mg/L	21-DEC-09	21-DEC-09	R1114532
Miscellaneous Parameters							
Nitrate-N	<0.050		0.050	mg/L		18-DEC-09	R1114705
Nitrite-N	<0.050		0.050	mg/L		18-DEC-09	R1114705
L849715-13 MWA Sampled By: GM on 18-DEC-09 Matrix: WATER BTEX, F1 (C6-C10),F2 (>C10-C16)							
BTEX and F1 (C6-C10)							
Benzene	19.1	DLA	0.11	mg/L	23-DEC-09	24-DEC-09	R1118325
Toluene	0.0704	DLA	0.0050	mg/L	23-DEC-09	24-DEC-09	R1118325
EthylBenzene	0.422	DLA	0.0050	mg/L	23-DEC-09	24-DEC-09	R1118325
Xylenes	0.666	DLA	0.0050	mg/L	23-DEC-09	24-DEC-09	R1118325
F1(C6-C10)	22	DLA	22	mg/L	23-DEC-09	24-DEC-09	R1118325
F1-BTEX	1.87		0.10	mg/L	23-DEC-09	24-DEC-09	R1118325
F2							

\* Refer to Referenced Information for Qualifiers (if any) and Methodology.

# ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier	DL	Units	Extracted	Analyzed	Batch
L849715-13 MWA Sampled By: GM on 18-DEC-09 Matrix: WATER F2 F2 (>C10-C16) <b>Miscellaneous Parameters</b> Nitrate-N Nitrite-N	0.513   279 <0.10	   DLA	0.050   0.050 0.10	mg/L   mg/L mg/L	21-DEC-09   21-DEC-09 21-DEC-09	21-DEC-09   21-DEC-09 21-DEC-09	R1114532   R1116352 R1116352

\* Refer to Referenced Information for Qualifiers (if any) and Methodology.

## Reference Information

**Sample Parameter Qualifier Key:**

Qualifier	Description
DLA	Detection Limit Adjusted For required dilution

**Test Method References:**

ALS Test Code	Matrix	Test Description	Method Reference**
BTX,F1-CL	Water	BTEX and F1 (C6-C10)	EPA 5030/8015& 8260-P&T GC-MS/FID
F2-CL	Water	F2	EPA 3510/8000-GC-FID
NO2-CL	Water	Nitrite-N	APHA 4110 B-Ion Chromatography
NO3-IC-CL	Water	Nitrate-N	APHA 4110 B-Ion Chromatography

\*\* ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS LABORATORY GROUP - CALGARY, ALBERTA, CANADA

**Chain of Custody Numbers:**

08-033081                      08-033082

**GLOSSARY OF REPORT TERMS**

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mk/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Environmental Division

**ALS Laboratory Group Quality Control Report**

Workorder: L849715

Report Date: 24-DEC-09

Page 1 of 4

**Client:** STANTEC CONSULTING LTD  
100, 75 - 24TH STREET EAST  
SASKATOON SK S7K 0K3

**Contact:** JEREMY LANG

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>BTX,F1-CL</b>		<b>Water</b>						
<b>Batch</b>	<b>R1115817</b>							
<b>WG1050584-3</b>	<b>LCS</b>							
Benzene			95		%		81-120	20-DEC-09
Toluene			98		%		82-119	20-DEC-09
EthylBenzene			98		%		82-120	20-DEC-09
Xylenes			99		%		81-124	20-DEC-09
F1(C6-C10)			102		%		80-119	20-DEC-09
<b>WG1050584-1</b>	<b>MB</b>							
Benzene			<0.00050		mg/L		0.0005	20-DEC-09
Toluene			<0.00050		mg/L		0.0005	20-DEC-09
EthylBenzene			<0.00050		mg/L		0.0005	20-DEC-09
Xylenes			<0.00050		mg/L		0.0005	20-DEC-09
F1(C6-C10)			<0.10		mg/L		0.1	20-DEC-09
<b>Batch</b>	<b>R1118325</b>							
<b>WG1052000-3</b>	<b>LCS</b>							
Benzene			97		%		81-120	24-DEC-09
Toluene			100		%		82-119	24-DEC-09
EthylBenzene			98		%		82-120	24-DEC-09
Xylenes			100		%		81-124	24-DEC-09
F1(C6-C10)			100		%		80-119	24-DEC-09
<b>WG1052000-1</b>	<b>MB</b>							
Benzene			<0.00050		mg/L		0.0005	23-DEC-09
Toluene			<0.00050		mg/L		0.0005	23-DEC-09
EthylBenzene			<0.00050		mg/L		0.0005	23-DEC-09
Xylenes			<0.00050		mg/L		0.0005	23-DEC-09
F1(C6-C10)			<0.10		mg/L		0.1	23-DEC-09
<b>F2-CL</b>		<b>Water</b>						
<b>Batch</b>	<b>R1114532</b>							
<b>WG1049881-4</b>	<b>DUP</b>	<b>L848869-1</b>						
F2 (>C10-C16)		<0.050	<0.050	RPD-NA	mg/L	N/A	33	17-DEC-09
<b>WG1049881-7</b>	<b>DUP</b>	<b>L849715-1</b>						
F2 (>C10-C16)		6.06	6.07		mg/L	0.23	33	21-DEC-09
<b>WG1049881-9</b>	<b>DUP</b>	<b>L849784-4</b>						
F2 (>C10-C16)		<0.050	<0.050	RPD-NA	mg/L	N/A	33	21-DEC-09
<b>WG1049881-2</b>	<b>MB</b>							
F2 (>C10-C16)			<0.050		mg/L		0.05	17-DEC-09
<b>WG1049881-6</b>	<b>MB</b>							

# ALS Laboratory Group Quality Control Report

Workorder: L849715

Report Date: 24-DEC-09

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Client: STANTEC CONSULTING LTD  
 100, 75 - 24TH STREET EAST  
 SASKATOON SK S7K 0K3  
 Contact: JEREMY LANG

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>F2-CL Water</b>								
Batch R1114532								
WG1049881-6	MB		<0.050		mg/L		0.05	21-DEC-09
F2 (>C10-C16)								
WG1049881-10	MS	L849784-5	78		%		61-140	21-DEC-09
F2 (>C10-C16)								
WG1049881-5	MS	L848869-2	128		%		61-140	17-DEC-09
F2 (>C10-C16)								
WG1049881-8	MS	L849715-2	83		%		61-140	21-DEC-09
F2 (>C10-C16)								
<b>NO2-CL Water</b>								
Batch R1114705								
WG1049902-4	DUP	L849382-5	<0.050	RPD-NA	mg/L	N/A	16	18-DEC-09
Nitrite-N								
WG1049902-5	DUP	L849486-4	<0.050	RPD-NA	mg/L	N/A	16	18-DEC-09
Nitrite-N								
WG1049902-2	LCS		103		%		89-111	18-DEC-09
Nitrite-N								
WG1049902-1	MB		<0.050		mg/L		0.05	18-DEC-09
Nitrite-N								
Batch R1116352								
WG1050887-3	DUP	L849382-14	<0.050	RPD-NA	mg/L	N/A	16	21-DEC-09
Nitrite-N								
WG1050887-5	DUP	L849844-5	<0.050	RPD-NA	mg/L	N/A	16	21-DEC-09
Nitrite-N								
WG1050887-2	LCS		100		%		89-111	21-DEC-09
Nitrite-N								
WG1050887-1	MB		<0.050		mg/L		0.05	21-DEC-09
Nitrite-N								
<b>NO3-IC-CL Water</b>								
Batch R1114705								
WG1049902-4	DUP	L849382-5	1.04		mg/L	0.84	16	18-DEC-09
Nitrate-N								
WG1049902-5	DUP	L849486-4	1.42		mg/L	2.2	16	18-DEC-09
Nitrate-N								
WG1049902-2	LCS		106		%		89-109	18-DEC-09
Nitrate-N								
WG1049902-1	MB		<0.050		mg/L		0.05	18-DEC-09
Nitrate-N								

# ALS Laboratory Group Quality Control Report

Workorder: L849715

Report Date: 24-DEC-09

Page 3 of 4

**Client:** STANTEC CONSULTING LTD  
 100, 75 - 24TH STREET EAST  
 SASKATOON SK S7K 0K3

**Contact:** JEREMY LANG

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-CL	Water							
Batch	R1116352							
WG1050887-3	DUP	L849382-14						
Nitrate-N		7.50	7.55		mg/L	0.74	16	21-DEC-09
WG1050887-5	DUP	L849844-5						
Nitrate-N		<0.050	<0.050	RPD-NA	mg/L	N/A	16	21-DEC-09
WG1050887-2	LCS							
Nitrate-N			105		%		89-109	21-DEC-09
WG1050887-1	MB							
Nitrate-N			<0.050		mg/L		0.05	21-DEC-09

# ALS Laboratory Group Quality Control Report

Workorder: L849715

Report Date: 24-DEC-09

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## Legend:

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Limit	99% Confidence Interval (Laboratory Control Limits)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Description Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

## Sample Parameter Qualifier Definitions:

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Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

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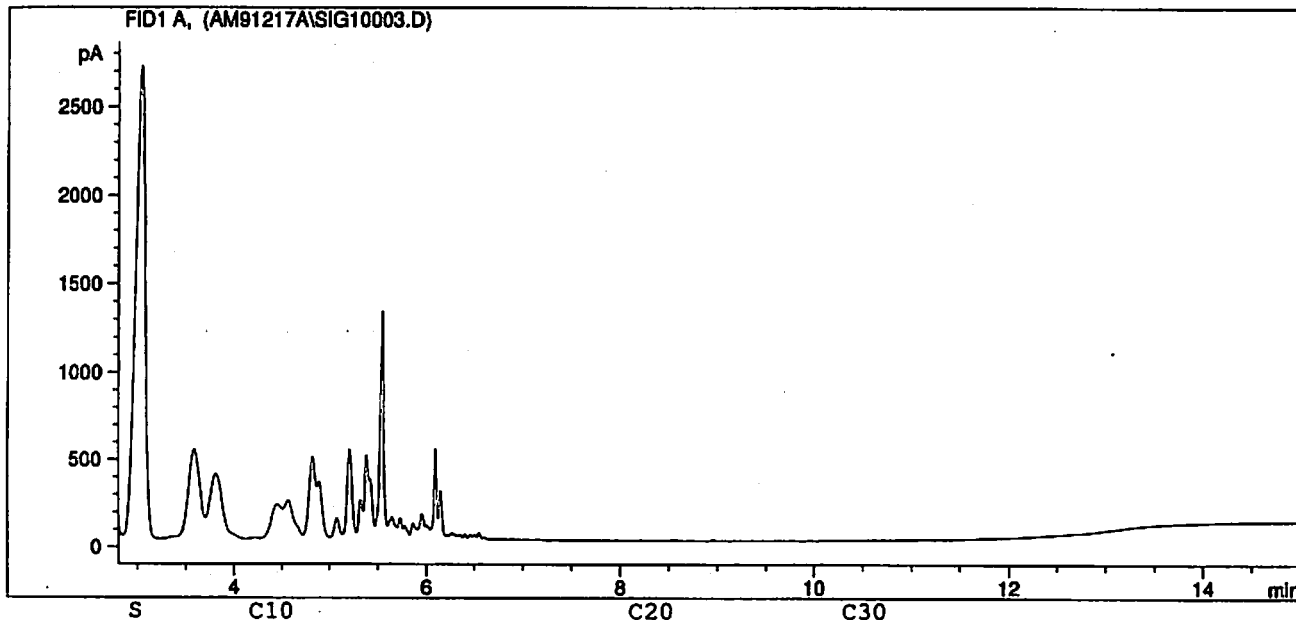
The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Client ID: MW1



Sample ID: L849715-1 V4F2  
 Injection Date: 12/21/2009 2:50:52 PM  
 Injection Time: 12/21/2009 2:50:52 PM  
 Instrument ID: 6890HP9  
 Operator: organics



S=Surrogate

Boiling Point Distribution Range for Petroleum Based Fuel Products

Carbon #	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
B.P. (°C)	-42	-0.5	36	69	98	126	151	174	196	216	235	253	270	287	302	316	329	343	356	369	380	391	402	412	422	431	449
B.P. (°F)	-44	31	97	156	209	258	303	345	384	421	456	488	519	548	575	601	625	649	674	695	716	736	756	774	792	808	840

VM&P Naphtha	←	→																										
Mineral Spirits	←	→																										
Gasoline	←	→																										
#1 Diesel																												
#2 Diesel																												
JP5, Jet A																												
Heavy Diesel																												
Gas Oil, Fuel Oil																												
Lubricating Oils																												

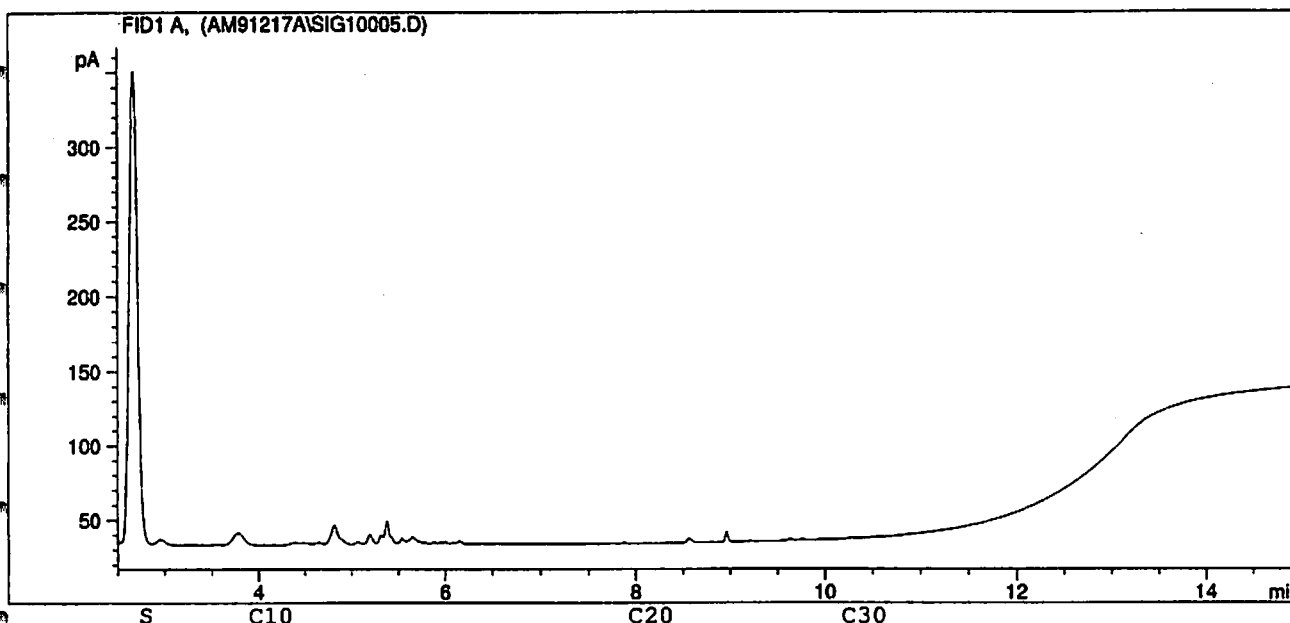
Adapted from: Drews, A.W., ED. Manual on Hydrocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadelphia, PA., 1989: p XVIII.



Client ID: MW4



Sample ID: L84915-2 V4F2  
 Injection Date: 12/21/2009 3:44:32 PM  
 Injection Time: 12/21/2009 3:44:32 PM  
 Instrument ID: 6890HP9  
 Operator: organics



S=Surrogate

Boiling Point Distribution Range for Petroleum Based Fuel Products

Carbon #	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
B.P. (°C)	-42	-0.5	36	69	98	126	151	174	196	216	235	253	270	287	302	316	329	343	356	369	380	391	402	412	422	431	449
B.P. (°F)	-44	31	97	156	209	258	303	345	394	421	456	488	519	548	575	601	625	649	674	695	716	736	756	774	792	808	840

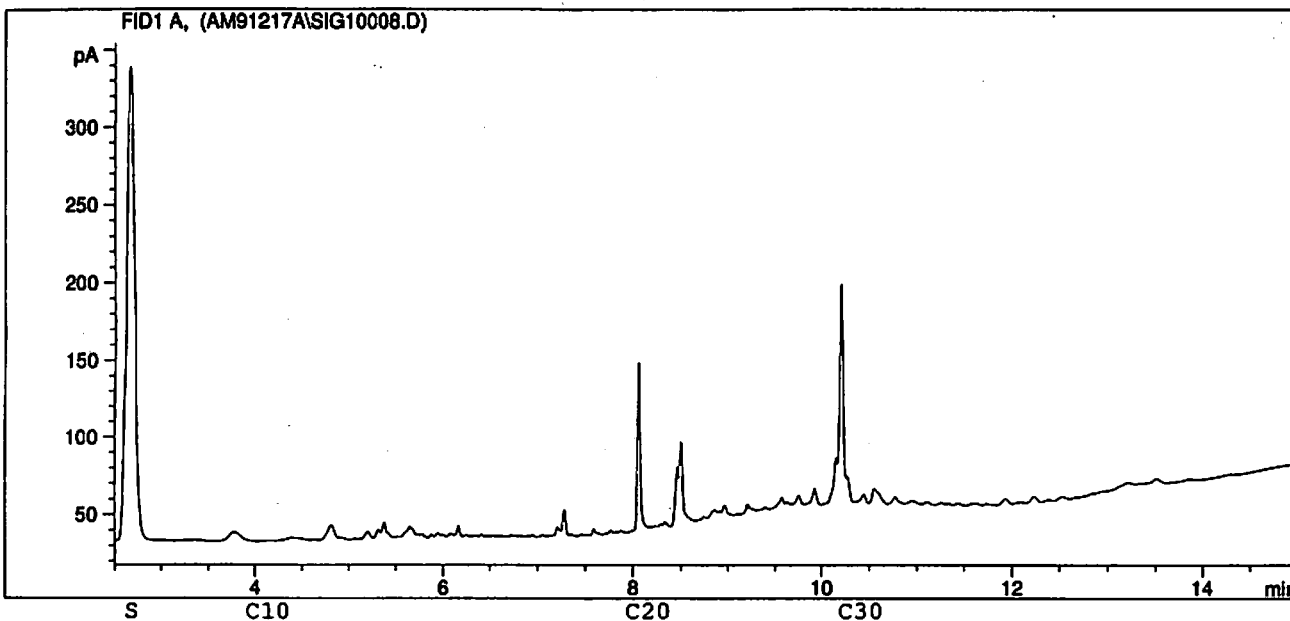
  

Adapted from: Drews, A.W., ED. Manual on Hydrocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadelphia, PA., 1989: p XVIII.

Client ID: MW6



Sample ID: L849715-4 V4F2  
Injection Date: 12/21/2009 5:05:26 PM  
Injection Time: 12/21/2009 5:05:26 PM  
Instrument ID: 6890HP9  
Operator: organics



S=Surrogate

Boiling Point Distribution Range for Petroleum Based Fuel Products

Carbon #	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
B.P. (°C)	-42	-0.5	36	69	98	126	151	174	196	216	235	253	270	287	302	316	329	343	356	369	380	391	402	412	422	431	449
B.P. (°F)	-44	31	97	156	209	258	303	345	384	421	456	488	519	548	575	601	625	649	674	695	716	736	756	774	792	808	840

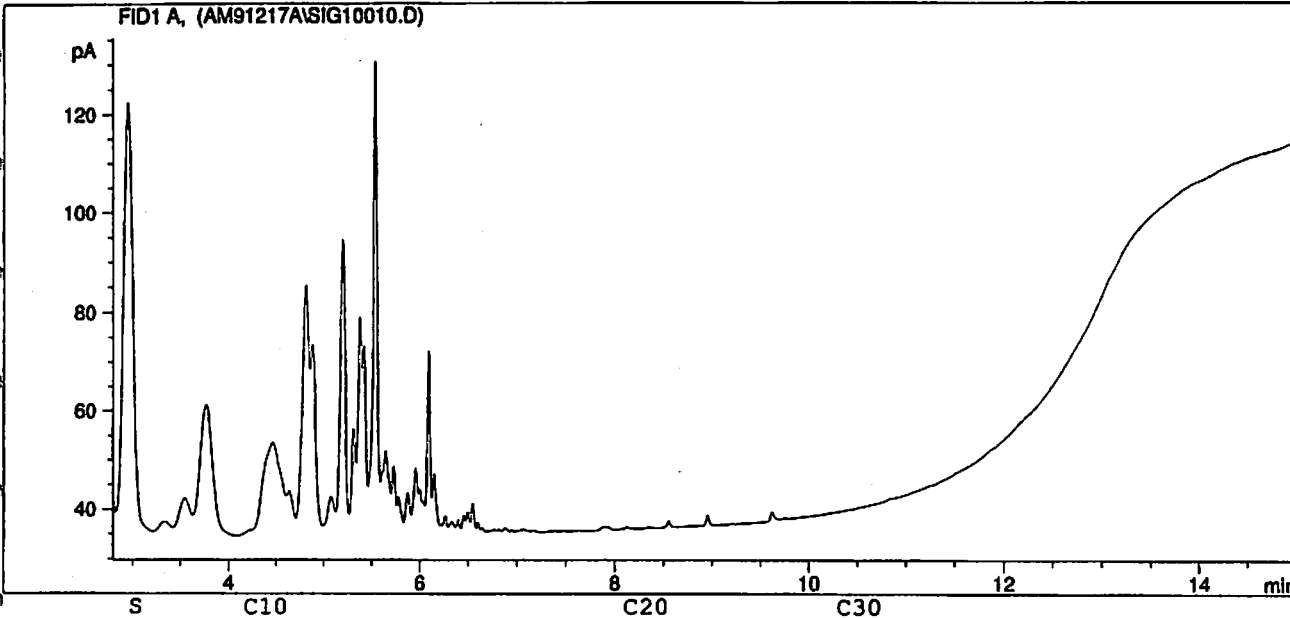
  

Adapted from: Drews, A.W., ED. Manual on Hydrocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadelphia, PA., 1989: p XVIII.

Client ID: MW8



Sample ID: L849715-6 V4F2  
Injection Date: 12/21/2009 5:59:23 PM  
Injection Time: 12/21/2009 5:59:23 PM  
Instrument ID: 6890HP9  
Operator: organics



S=Surrogate

Boiling Point Distribution Range for Petroleum Based Fuel Products

Carbon #	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
B.P. (°C)	-42	-0.5	36	69	98	134	151	174	196	216	235	253	270	287	303	316	329	343	356	369	380	391	402	412	422	431	449
B.P. (°F)	-44	31	97	156	209	258	303	343	384	421	456	488	519	548	575	601	625	649	674	695	716	736	756	774	792	808	840

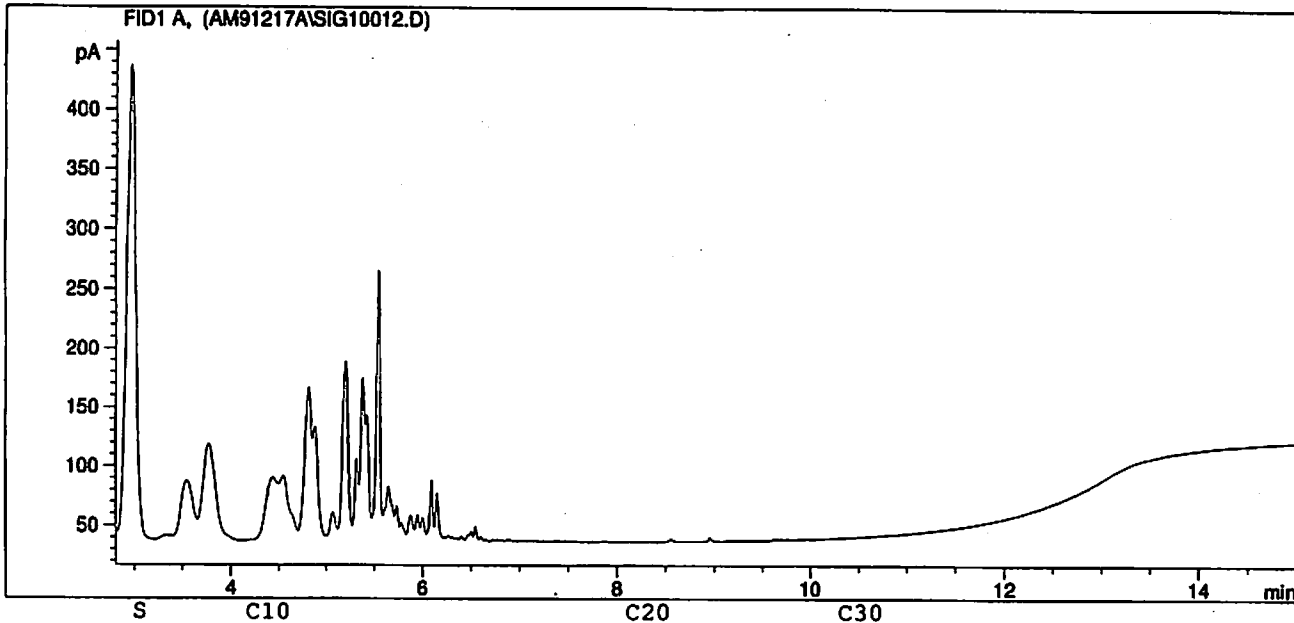
VM&P Naphtha	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
Mineral Spirits	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
Gasoline	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
#1 Diesel	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
#2 Diesel	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
JP5, Jet A	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
Heavy Diesel	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
Gas Oil, Fuel Oil	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
Lubricating Oils	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30

Adapted from: Drews, A.W., ED. Manual on Hydrocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadelphia, PA., 1989: p XVIII.

Client ID: MW9



Sample ID: L849715-7 V4F2  
Injection Date: 12/21/2009 6:53:14 PM  
Injection Time: 12/21/2009 6:53:14 PM  
Instrument ID: 6890HP9  
Operator: organics



S=Surrogate

Boiling Point Distribution Range for Petroleum Based Fuel Products

Carbon #	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
B.P. (°C)	-42	-0.5	36	69	98	126	151	174	196	216	235	253	270	287	302	316	329	343	356	369	380	391	402	412	422	431	449
B.P. (°F)	-44	31	97	156	209	258	303	345	384	421	456	488	519	548	575	601	625	649	674	695	716	736	756	774	792	808	840

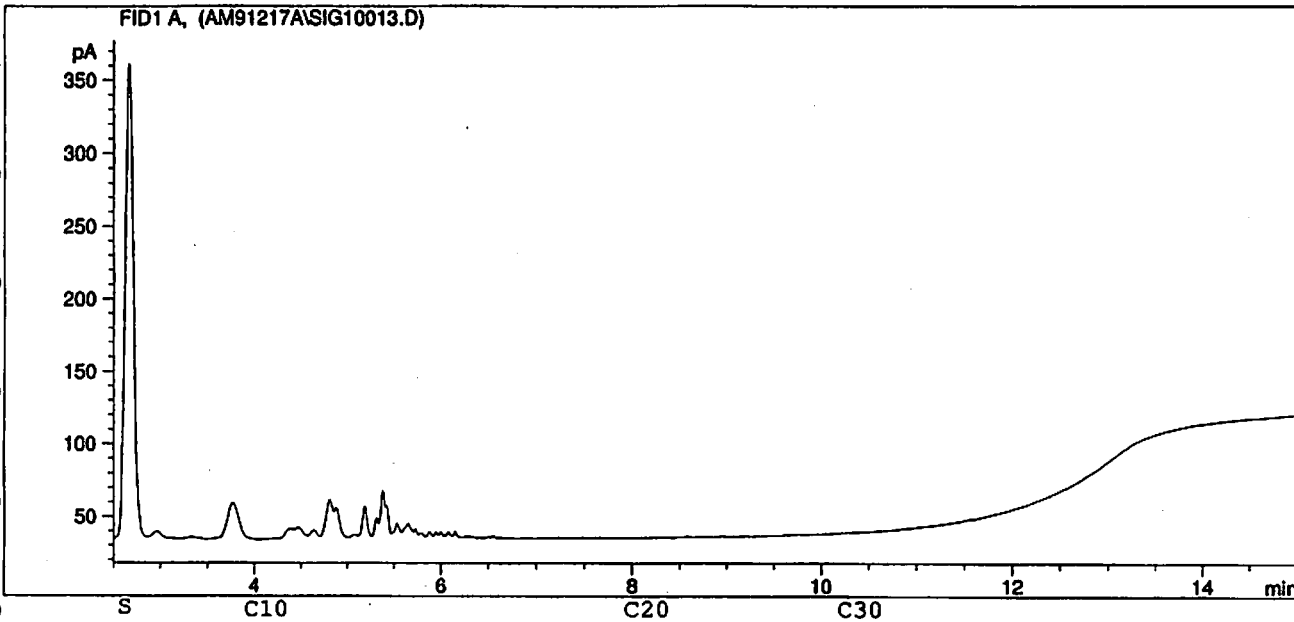
VH&P. Naphtha	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
Mineral Spirits	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
Gasoline	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
#1 Diesel	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
#2 Diesel	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
JP5, Jet A	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
Heavy Diesel	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
Gas Oil, Fuel Oil	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
Lubricating Oils	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30

Adapted from: Drews, A.W., ED. Manual on Hydrocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadelphia, PA., 1989: p XVIII.

Client ID: MW10



Sample ID: L849715-8 V4F2  
Injection Date: 12/21/2009 7:20:00 PM  
Injection Time: 12/21/2009 7:20:00 PM  
Instrument ID: 6890HP9  
Operator: organics



S=Surrogate

Boiling Point Distribution Range for Petroleum Based Fuel Products

Carbon#	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
B.P. (°C)	-42	-0.5	36	69	98	126	151	174	196	216	235	253	270	287	302	316	328	343	356	369	380	391	402	412	422	431	449
B.P. (°F)	-44	31	97	156	209	258	303	345	384	421	458	488	519	548	575	601	625	649	674	695	716	736	753	774	792	808	848

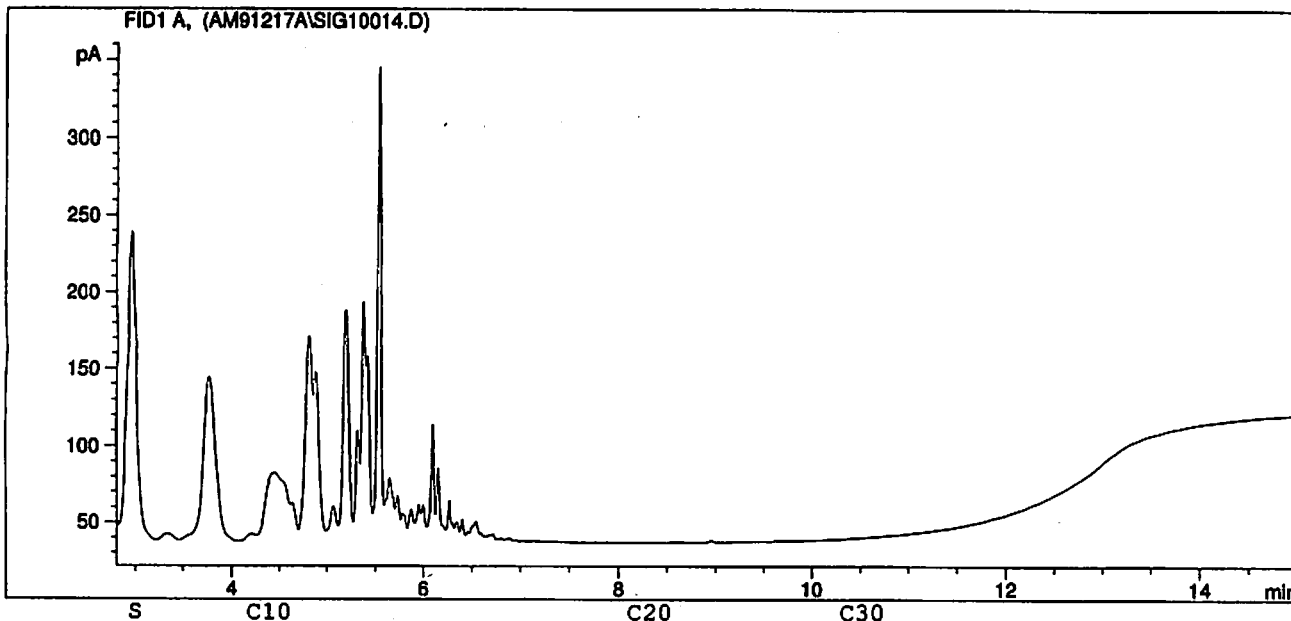
  

Adapted from: Drews, A.W., ED. Manual on Hydrocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadelphia, PA., 1989: p XVIII.

Client ID: MW11



Sample ID: L849715-9 V4F2  
 Injection Date: 12/21/2009 7:46:59 PM  
 Injection Time: 12/21/2009 7:46:59 PM  
 Instrument ID: 6890HP9  
 Operator: organics



S=Surrogate

Boiling Point Distribution Range for Petroleum Based Fuel Products

Carbon #	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
B.P. (°C)	-42	-0.5	36	69	98	126	151	174	196	216	235	253	270	287	302	316	329	343	356	369	380	391	402	412	422	431	449
B.P. (°F)	-44	31	97	156	209	258	303	345	384	421	456	488	519	548	575	601	625	649	674	695	716	736	756	774	792	808	840

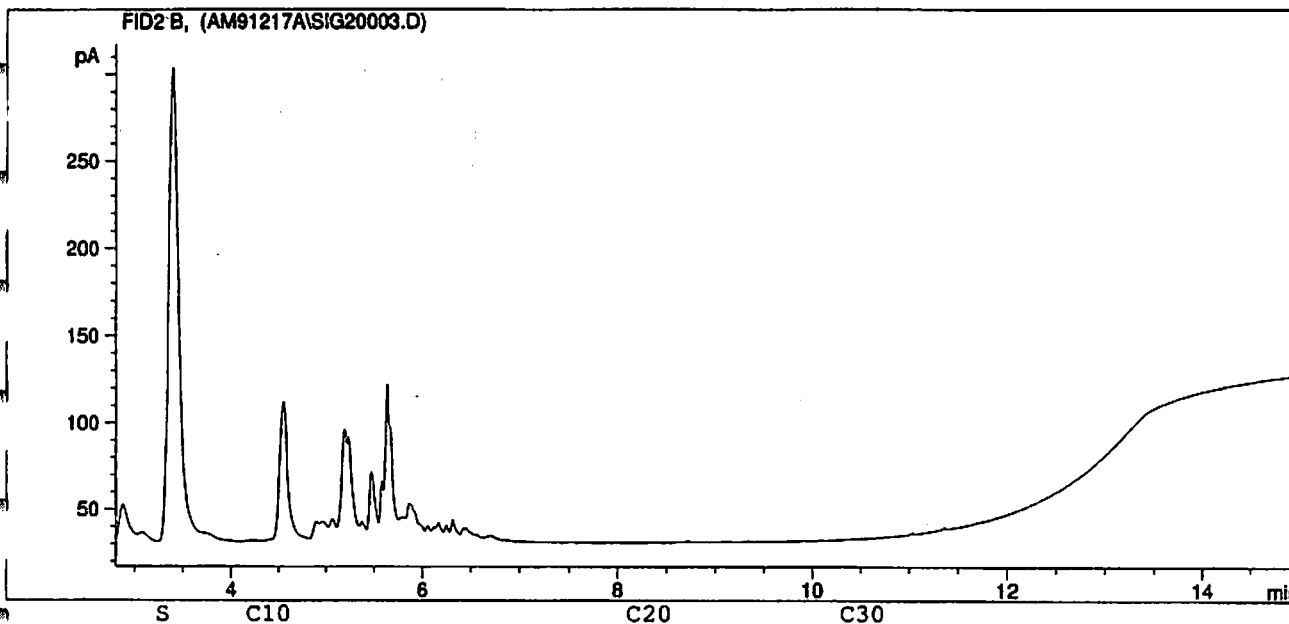
VM&P Naphtha	←	→																										
Mineral Spirits				←	→																							
Gasoline	←																											
#1 Diesel																												
#2 Diesel																												
JP5, Jet A																												
Heavy Diesel																												
Gas Oil, Fuel Oil																												
Lubricating Oils																												

Adapted from: Drews, A.W., ED. Manual on Hydrocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadelphia, PA., 1989: p XVIII.

Client ID: MW12



Sample ID: L849715-10 V4F2  
 Injection Date: 12/21/2009 2:50:52 PM  
 Injection Time: 12/21/2009 2:50:52 PM  
 Instrument ID: 6890HP9  
 Operator: organics



S=Surrogate

Boiling Point Distribution Range for Petroleum Based Fuel Products

Carbon #	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
B.P.(°C)	-42	-0.5	36	69	98	126	151	174	196	218	239	259	279	297	316	334	353	373	393	412	432	452	472	492	512	532	552
B.P.(°F)	-44	31	97	156	209	258	303	343	384	421	456	488	519	548	573	601	625	649	674	695	716	736	756	774	792	808	840

VM&P Naphtha	←	→																										
Mineral Spirits				←	→																							
Gasoline	←	→																										
#1 Diesel																												
#2 Diesel																												
JP5, Jet A																												
Heavy Diesel																												
Gas Oil, Fuel Oil																												
Lubricating Oils																												

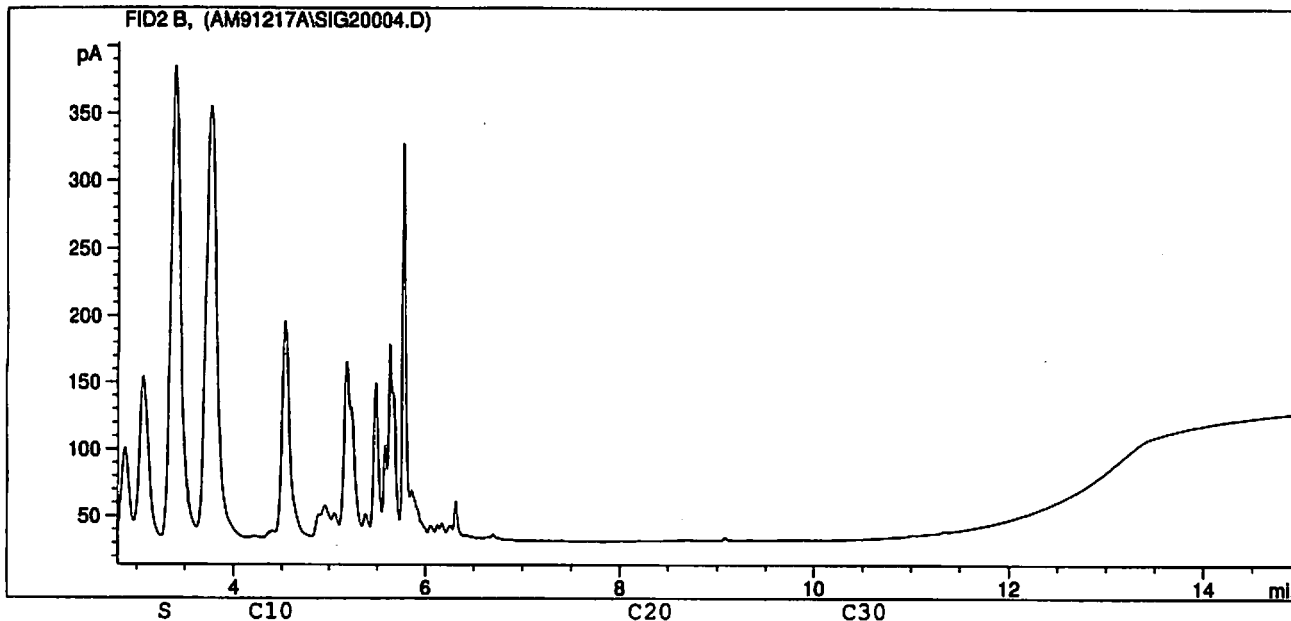
Adapted from: Drews, A.W., ED. Manual on Hydrocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadelphia, PA., 1989: p XVIII.



Client ID: MW13



Sample ID: L849715-11 V4F2  
 Injection Date: 12/21/2009 3:17:46 PM  
 Injection Time: 12/21/2009 3:17:46 PM  
 Instrument ID: 6890HP9  
 Operator: organics



S=Surrogate

Boiling Point Distribution Range for Petroleum Based Fuel Products

Carbon #	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
B.P. (°C)	-42	-0.5	36	69	98	126	151	174	196	216	235	253	270	287	302	316	329	343	356	369	380	391	402	412	422	431	449
B.P. (°F)	-44	31	97	156	209	258	303	345	384	421	456	488	519	548	575	601	625	649	674	695	716	736	756	774	792	808	840

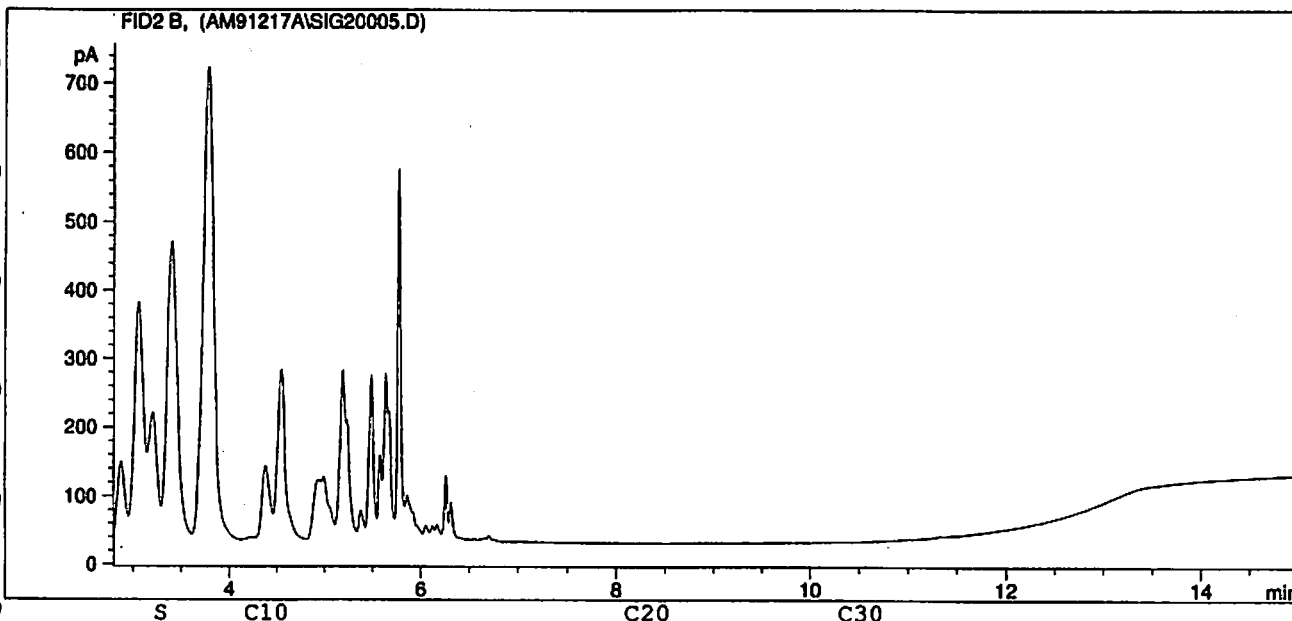
VM&P Naphtha	←	→																										
Mineral Spirits					←	→																						
Gasoline	←																											
#1 Diesel																												
#2 Diesel																												
JP5, Jet A																												
Heavy Diesel																												
Gas Oil, Fuel Oil																												
Lubricating Oils																												

Adapted from: Drews, A.W., ED. Manual on Hydrocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadelphia, PA., 1989: p XVIII.

Client ID: MW14



Sample ID: L849715-12 V4F2  
Injection Date: 12/21/2009 3:44:32 PM  
Injection Time: 12/21/2009 3:44:32 PM  
Instrument ID: 6890HP9  
Operator: organics



S=Surrogate

Boiling Point Distribution Range for Petroleum Based Fuel Products

Carbon #	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
B.P. (°C)	-42	-0.5	36	69	98	126	151	174	196	216	235	253	270	287	302	316	329	343	356	369	380	391	402	412	422	431	449
B.P. (°F)	-44	31	97	156	209	258	303	345	384	421	456	488	519	548	575	601	625	649	674	695	716	736	756	774	792	808	840

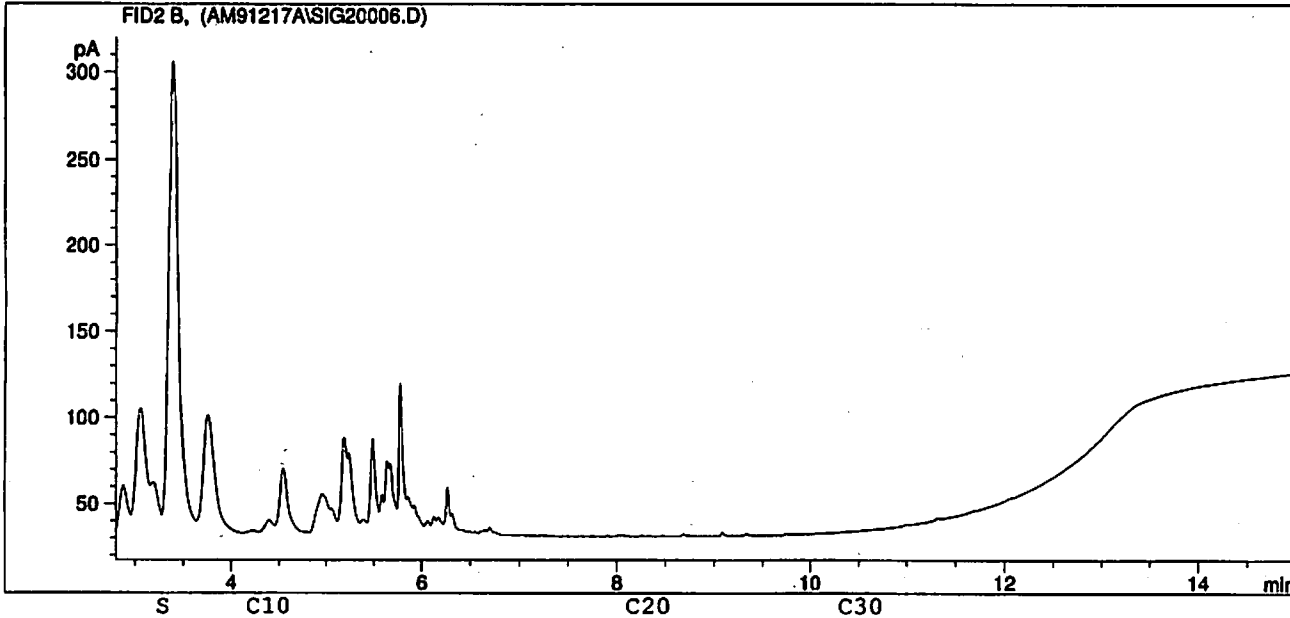
V.M.&P. Naphtha	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
Mineral Spirits	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
Gasoline	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
#1 Diesel	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
#2 Diesel	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
JP5, Jet A	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
Heavy Diesel	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
Gas Oil, Fuel Oil	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
Lubricating Oils	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30

Adapted from: Drews, A.W., ED. Manual on Hydrocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadelphia, PA., 1989: p XVIII.

Client ID: MWA



Sample ID: L849715-13 V4F2  
 Injection Date: 12/21/2009 4:11:21 PM  
 Injection Time: 12/21/2009 4:11:21 PM  
 Instrument ID: 6890HP9  
 Operator: organics



S=Surrogate

Boiling Point Distribution Range for Petroleum Based Fuel Products

Carbon #	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
BP (°C)	-42	-0.5	36	69	98	126	151	174	196	216	235	253	270	287	302	316	329	343	356	369	380	391	402	412	422	431	449
BP (°F)	-44	31	97	156	209	258	303	345	384	421	456	488	519	548	575	601	625	649	674	695	716	736	756	774	792	808	840

VM&P, Naphtha	3	10																										
Mineral Spirits	3	12																										
Gasoline	3	14																										
#1 Diesel	3	16																										
#2 Diesel	3	18																										
JP5, Jet A	3	20																										
Heavy Diesel	3	22																										
Gas Oil, Fuel Oil	3	24																										
Lubricating Oils	3	26																										

Adapted from: Drews, A.W., ED. Manual on Hydrocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadelphia, PA., 1989; p XVIII.

**Kim Kirillo**

---

**From:** Kim Kirillo  
**Sent:** Friday, February 17, 2006 9:52 AM  
**To:** Greg Saretzky (E-mail)  
**Cc:** Stephen Hoare; 'paul.vonschoenberg@calgaryhealthregion.ca'  
**Subject:** SCC Site 9302, 419 - 10 Avenue Carstairs

Hi Greg,

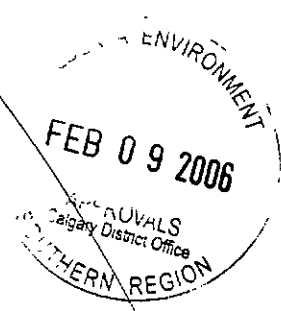
Thank you for the January 30, 2006 letter from Stantec Consulting Ltd. Alberta Environment accepts your rationale, and agrees that the revised remedial action and risk management plans should proceed with the additional sampling and monitoring.

Sincerely,

Kim Kirillo  
Contaminated Sites Coordinator  
Alberta Environment  
Regional Services, Southern Region  
2nd Floor, Deerfoot Square  
2938 - 11th Street NE  
Calgary, Alberta T2E 7L7  
Tel: (403) 297 - 8270 Fax: (403) 297 - 2749  
mailto:Kim.Kirillo@gov.ab.ca

Stantec Consulting Ltd.  
100 - 75 - 24th Street East  
Saskatoon SK S7K 0K3  
(306) 667-2400 Fax: (306) 667-2500  
stantec.com

190795



**Stantec**

January 30, 2006  
File: 1132-52998.200

Alberta Environment  
2938 - 11<sup>th</sup> Street NE  
Calgary, AB T2E 7L7

**Attention: Kim Kirillo**

Dear Ms. Kirillo:

**Reference: Assessment and Remediation Activities  
419 - 10<sup>th</sup> Avenue  
Carstairs, Alberta**

Stantec Consulting Ltd. (Stantec) is pleased to provide Alberta Environment (AENV) with the following response in regards to the AENV letter dated January 17, 2006. The letter was addressed to Vaughn Wyant Investments Ltd. and was in response to Stantec's Addendum to the Revised Remedial Action and Risk Management Plans for the property located at 419 - 10<sup>th</sup> Avenue in Carstairs, Alberta (Site).

Stantec has considered various remedial options for the Site during the completion of the remedial action plan. The review of remedial options determined that several options were available, however, the implementation of a soil vapour extraction (SVE) system provided the most cost effective method of remediating the Site. Additional options that were investigated included excavation and the implementation of a dual phase vacuum extraction (DPVE) system. The various options have been discussed with our client, Vaughn Wyant Investments Ltd. It was determined that the installation of a SVE system is the appropriate remedial technology for the Site. It is important to note that SVE systems are a common remediation technique for hydrocarbon impacted sites in municipal land settings with the presence of utility corridors.

The letter submitted by AENV also requested for additional assessment activities to be completed for the municipal water line located beneath 10<sup>th</sup> Avenue. It is Stantec's professional opinion that further assessment within the street would not provide additional information valuable to the direction of the program. A utility corridor assessment has been completed for the service connection supplying the Five Star Movies building. The impacts surrounding the service connection are considered to be a worst case scenario, since the service connection is located directly adjacent to the former underground storage tanks.

The Calgary Health Region collected water samples from building surrounding the hydrocarbon impacted area on January 3, 2006. The results indicated that benzene, toluene, ethylbenzene and xylene (BTEX) concentrations were nondetectable at each of the sampling locations. The

January 10, 2006

S. Kirillo

Page 2 of 2

**Reference: Remedial Action Plan  
419 - 10<sup>th</sup> Avenue  
Carstairs, Alberta**

results indicate that hydrocarbon impacts are not entering the municipal water line beneath 10<sup>th</sup> Avenue and the drinking water has not been adversely affected. The results are consistent with the four samples obtained by Stantec from the Five Star Movies building on October 7, 2005.

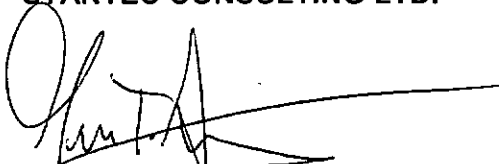
The data collected by Stantec and the Calgary Health Region to date indicate that hydrocarbon concentrations in the drinking water are nondetectable or significantly below drinking water standards. A total of thirteen drinking water samples have been collected by Stantec and the Calgary Health Region, one of which displayed a low concentration of benzene and xylene. The remaining samples were nondetectable. It is very possible that the low detectable concentrations were a result of a calibration error of laboratory equipment or cross contamination during the collection of the sample.

Stantec recommends that the activities defined in the Revised Remedial Action and Risk Management Plans be implemented at the Site, with the addition of a quarterly drinking water sampling program and indoor air quality monitoring. The indoor air quality monitoring would be conducted with field instrumentation that measured volatile hydrocarbon concentrations.

Should you have any comments or questions, please contact the undersigned at (306) 667-2400.

Sincerely,

**STANTEC CONSULTING LTD.**



Greg Saretzky, M.Sc., P.Eng.

Environmental Engineer

Tel: (306) 667-2456

Fax: (306) 667-2500

gsaretzky@stantec.com

c – Vaughn Wyant (Vaughn Wyant Investments Ltd.), Steve Hoare (Safety Codes Council), Paul von Schoenberg (Calgary Health Region) and Jeanette Austin (Town of Carstairs).

190795

**fax message**



**calgary health region**

total number of pages  
(including cover page): 11

date: February 6, 2006

**to**

**from**

Kim Kirillo

name: Contaminated Sites  
Coordinator  
Industrial Approvals Team

name: Paul von Schoenberg

company: Alberta Environment

department: Environmental Health

telephone number:

telephone number: 943-8054

facsimile number: 297-2749

facsimile number: 943-8090

Hi Kim,

Attached are water sample results (VOC's) for five Carstairs locations, in reference to concerns regarding contamination at 419 11 Ave S for your reference. The samples were collected by the CHR.

Paul von Schoenberg

10

**confidential:** This communication is intended only for the individual or institution to which it is addressed and should not be distributed, copied, or disclosed to anyone else. The documents in this communication may contain personal, confidential, or privileged information which may be subject to the Freedom of Information and Protection of Privacy Act, the Health Information Act and other legislation. If you have received this communication in error, please notify us immediately. Thank you for your cooperation and assistance.

paulfax.dot





**calgary health region**  
**Southeast Community Portfolio**

Environmental Health  
1509 Centre Street SW  
Calgary, Alberta Canada T2G 2E6  
Facsimile: (403) 943-8056

February 6<sup>th</sup>, 2006

**Ms. Tammy Howard**  
**Five Star Movies**  
P.O. Box 1435  
Castairs, Alberta T0M 0N0

Dear Ms. Howard,

**RE: Water Sampling Results**

---

As you may be aware, the Calgary Health Region (CHR) collected water samples from your establishment on January 3<sup>rd</sup>, 2006.

The CHR had been notified of hydrocarbon-contaminated soil at the nearby former service station (address: 419 10 Ave, Carstairs) by Alberta Environment. To assess whether there has been the possible impact of contaminated soil from the former service station on private water service lines in the area, the CHR recently collected water samples from your establishment. The water samples were analyzed for the presence of petroleum hydrocarbons, including those expected to be found in hydrocarbon-contaminated soil. A copy of the water analysis results for the samples collected from your establishment is attached for your reference.

The results of the analysis indicate that the water samples meet Health Canada's **Guidelines for Canadian Drinking Water Quality**. Specifically,

- **Water Sample Results for Benzene and Total Xylene** - The level of benzene in the water samples collected from your establishment was below the detection limit, and the average level of total xylene from two samples was 0.57µg/L (**micrograms per litre of water**). The Maximum Acceptable Concentration (MAC) in the Health Canada **Guidelines for Canadian Drinking Water Quality** is 5µg/L for benzene. The guideline level for total xylene is 300µg/L. This is an Aesthetic Objective (the level below which there are not expected to be any effects on taste or odour). Please also note that benzene and xylenes are customarily present in 'background' concentrations, and there is normally a small quantity of these chemicals in the water from most drinking water systems.
- **Benzene** - For benzene, the guideline of 5µg/L represents the maximum concentration of benzene in drinking water that is considered not to represent a health concern for lifelong consumption. The absence of a measurable amount of benzene in the sample from your establishment indicates that consumption of water does not represent a health risk.
- **Total Xylenes** - The measured concentration of total xylene does not represent a health concern and is representative of background levels

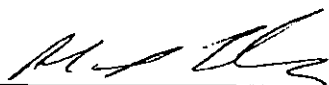
To re-iterate, the water samples collected met the criteria specified in the **Guidelines for Canadian Drinking Water Quality**. Please also be advised that the CHR is currently working in conjunction with Alberta Environment, Town of Carstairs, and the owner of the property on which contamination has been identified to ensure the safety of the local drinking water and to address any outstanding public health concerns and environmental concerns are addressed.

If the CHR becomes aware of an environmental or public health concern affecting your establishment, you will be notified.

FIVE STAR MOVIES  
FEBRUARY 6, 2006  
PAGE 2

If you have any questions, please feel free to contact me at 943-8054.

Sincerely,



---

Paul von Schoenberg  
Environmental Health Advisor  
Health Risk Assessment and Management  
Environmental Health

cc. Greg Saretzky, Environmental Engineer, Stantec Consulting Ltd. (fax only)  
Kim Kirillo – Alberta Environment (fax only)  
Chief Administrative Officer Carl McDonnell – Town of Carstairs



UNIVERSITY OF  
CALGARY

# Centre for Toxicology

HMRB, University of Calgary

B19, 3330 Hospital Drive NW

Calgary, Alberta T2N 4N1

## REPORT TO:

HEALTH REGION 3  
BOX 4016, STATION C  
1509 CENTRE STREET SW  
CALGARY AB  
T2T 5T1

Req. ID No: T071134  
Lab Code: 200601042

## PRIVATE DRINKING WATER FROM:

TOEN OF CARSTAIRS

W  
CARSTAIRS AB

( ) 943-8039

Land Description: SE-17-30-1-5  
Collected: 1/3/2006  
By: JASON FELTHAN  
Site: CO-OP JANITOR'S ROOM  
Source: River  
Depth:  
Comments:

## CERTIFICATE OF CHEMICAL ANALYSIS

## CDW GUIDELINES (2002)

Benzene	0.0 ug/L	5 ug/L MAC
Bromodichloromethane	4.0 ug/L	100 ug/L IMAC*
Bromoform	0.0 ug/L	100 ug/L IMAC*
Carbon Tetrachloride	0.0 ug/L	5 ug/L MAC
Chlorobenzene	0.0 ug/L	
Chloroethane	0.0 ug/L	
Chloroform	45.0 ug/L	100 ug/L IMAC*
Dibromochloromethane	0.0 ug/L	100 ug/L IMAC*
1,2-Dichlorobenzene	0.0 ug/L	200 ug/L MAC
1,4-Dichlorobenzene	0.0 ug/L	5 ug/L MAC
1,2-Dichloroethane	0.0 ug/L	5 ug/L IMAC
1,1-Dichloroethylene	0.0 ug/L	14 ug/L MAC
Dichloromethane	0.0 ug/L	50 ug/L MAC
Ethylbenzene	0.0 ug/L	≤ 2.4 ug/L AO
p-Isopropyltoluene	0.0 ug/L	
1,1,2,2-Tetrachloroethane	0.0 ug/L	
Tetrachloroethylene	0.0 ug/L	30 ug/L MAC
Toluene	0.0 ug/L	≤ 24 ug/L AO
1,1,1-Trichloroethane	0.0 ug/L	
Trichloroethylene	0.0 ug/L	50 ug/L MAC
1,2,4-Trimethylbenzene	0.0 ug/L	
1,3,5-Trimethylbenzene	0.0 ug/L	
m,p-Xylenes	0.0 ug/L	≤ 300 ug/L AO**
o-Xylene	0.0 ug/L	≤ 300 ug/L AO**

Received: 1/3/2006

Reported: 1/10/2006

Certified By:

*David W. Kinniburgh*  
For: David W. Kinniburgh, PhD, FCACB  
Co-Director  
Centre for Toxicology

CDW = Canadian Drinking Water

AO = Aesthetic Objectives

MAC = Maximum Acceptable Concentration

IMAC = Interim Maximum Acceptable Concentration

\* Sum of Trihalomethanes (THM)

\*\* Sum of Xylene



UNIVERSITY OF  
CALGARY

# Centre for Toxicology

HMRB, University of Calgary  
B19, 3330 Hospital Drive NW  
Calgary, Alberta T2N 4N1

## REPORT TO:

HEALTH REGION 3  
BOX 4016, STATION C  
1509 CENTRE STREET SW  
CALGARY AB  
T2T 5T1

## PRIVATE DRINKING WATER FROM:

TOWN OF CARSTAIRS

CARSTAIRS AB

( ) 943-8039

Land Description: SE-17-30-1-5  
Collected: 1/3/2006  
By: JASON FELTHAN  
Site: HUNTER'S COUNTRY KITCHEN  
Source: River  
Depth:  
Comments:

Req. ID No: T071135  
Lab Code: 200601043

### CERTIFICATE OF CHEMICAL ANALYSIS

### CDW GUIDELINES (2002)

Benzene	0.0 ug/L	5 ug/L MAC
Bromodichloromethane	4.0 ug/L	100 ug/L IMAC*
Bromoform	0.0 ug/L	100 ug/L IMAC*
Carbon Tetrachloride	0.0 ug/L	5 ug/L MAC
Chlorobenzene	0.0 ug/L	
Chloroethane	0.0 ug/L	
Chloroform	46.0 ug/L	100 ug/L IMAC*
Dibromochloromethane	0.0 ug/L	100 ug/L IMAC*
1,2-Dichlorobenzene	0.0 ug/L	200 ug/L MAC
1,4-Dichlorobenzene	0.0 ug/L	5 ug/L MAC
1,2-Dichloroethane	0.0 ug/L	5 ug/L IMAC
1,1-Dichloroethylene	0.0 ug/L	14 ug/L MAC
Dichloromethane	0.0 ug/L	50 ug/L MAC
Ethylbenzene	0.0 ug/L	≤ 2.4 ug/L AO
p-Isopropyltoluene	0.0 ug/L	
1,1,1,2-Tetrachloroethane	0.0 ug/L	
Tetrachloroethylene	0.0 ug/L	30 ug/L MAC
Toluene	0.0 ug/L	≤ 24 ug/L AO
1,1,1-Trichloroethane	0.0 ug/L	
Trichloroethylene	0.0 ug/L	50 ug/L MAC
1,2,4-Trimethylbenzene	0.0 ug/L	
1,3,5-Trimethylbenzene	0.0 ug/L	
m,p-Xylenes	0.0 ug/L	≤ 300 ug/L AO**
o-Xylene	0.0 ug/L	≤ 300 ug/L AO**

Received: 1/3/2006

Reported: 1/10/2006

Certified By:

*David W. Kinrburgh*  
For: David W. Kinrburgh, PhD, FCACB  
Co-Director  
Centre for Toxicology

CDW = Canadian Drinking Water

AO = Aesthetic Objectives

MAC = Maximum Acceptable Concentration

IMAC = Interim Maximum Acceptable Concentration

\* Sum of Trihalomethanes (THM)

\*\* Sum of Xylene



UNIVERSITY OF  
CALGARY

# Centre for Toxicology

HMRB, University of Calgary

B19, 3330 Hospital Drive NW  
Calgary, Alberta T2N 4N1

## REPORT TO:

HEALTH REGION 3  
BOX 4016, STATION C  
1509 CENTRE STREET SW  
CALGARY AB  
T2T 5T1

Req. ID No: T071139  
Lab Code: 200601047

## PRIVATE DRINKING WATER FROM: TOWN OF CARSTAIRS

CARSTAIRS AB

( ) 943-8039

Land Description: SE-17-30-1-5  
Collected: 1/3/2006  
By: JASON FELTHAN  
Site: 105 MEADOW PARK DR  
Source: River  
Depth:  
Comments:

### CERTIFICATE OF CHEMICAL ANALYSIS


### CDW GUIDELINES (2002)

Benzene	0.0	ug/L	5 ug/L MAC
Bromodichloromethane	4.0	ug/L	100 ug/L IMAC*
Bromoform	0.0	ug/L	100 ug/L IMAC*
Carbon Tetrachloride	0.0	ug/L	5 ug/L MAC
Chlorobenzene	0.0	ug/L	
Chloroethane	0.0	ug/L	
Chloroform	49.0	ug/L	100 ug/L IMAC*
Dibromochloromethane	0.0	ug/L	100 ug/L IMAC*
1,2-Dichlorobenzene	0.0	ug/L	200 ug/L MAC
1,4-Dichlorobenzene	0.0	ug/L	5 ug/L MAC
1,2-Dichloroethane	0.0	ug/L	5 ug/L IMAC
1,1-Dichloroethylene	0.0	ug/L	14 ug/L MAC
Dichloromethane	0.0	ug/L	50 ug/L MAC
Ethylbenzene	0.0	ug/L	≤ 2.4 ug/L AO
p-Isopropyltoluene	0.0	ug/L	
1,1,2,2-Tetrachloroethane	0.0	ug/L	
Tetrachloroethylene	0.0	ug/L	30 ug/L MAC
Toluene	0.0	ug/L	≤ 24 ug/L AO
1,1,1-Trichloroethane	0.0	ug/L	
Trichloroethylene	0.0	ug/L	50 ug/L MAC
1,2,4-Trimethylbenzene	0.0	ug/L	
1,3,5-Trimethylbenzene	0.0	ug/L	
m,p-Xylenes	0.0	ug/L	≤ 300 ug/L AO**
o-Xylene	0.0	ug/L	≤ 300 ug/L AO**

Received: 1/3/2006

Reported: 1/10/2006

Certified By:

  
For: David W. Kinniburgh, PhD, FCACB  
Co-Director  
Centre for Toxicology

CDW = Canadian Drinking Water

AO = Aesthetic Objectives

MAC = Maximum Acceptable Concentration

IMAC = Interim Maximum Acceptable Concentration

\* Sum of Trihalomethanes (THM)

\*\* Sum of Xylene



UNIVERSITY OF  
CALGARY

# Centre for Toxicology

HMRB, University of Calgary  
B19, 3330 Hospital Drive NW  
Calgary, Alberta T2N 4N1

## REPORT TO:

HEALTH REGION 3  
BOX 4016, STATION C  
1509 CENTRE STREET SW  
CALGARY AB  
T2T 5T1

## PRIVATE DRINKING WATER FROM:

TOWN OF CARSTAIRS

CARSTAIRS AB

( ) 943-8039

**Land Description:** SE-17-30-1-5  
**Collected:** 1/3/2006  
**By:** JASON FELTHAN  
**Site:** FIVE STAR VIDEO #1  
**Source:** River  
**Depth:**  
**Comments:**

**Req. ID No:** T071138  
**Lab Code:** 200601046

### CERTIFICATE OF CHEMICAL ANALYSIS

### CDW GUIDELINES (2002)

Benzene	0.0 ug/L	5 ug/L MAC
Bromodichloromethane	4.0 ug/L	100 ug/L IMAC*
Bromoform	0.0 ug/L	100 ug/L IMAC*
Carbon Tetrachloride	0.0 ug/L	5 ug/L MAC
Chlorobenzene	0.0 ug/L	
Chloroethane	0.0 ug/L	
Chloroform	46.0 ug/L	100 ug/L IMAC*
Dibromochloromethane	0.0 ug/L	100 ug/L IMAC*
1,2-Dichlorobenzene	0.0 ug/L	200 ug/L MAC
1,4-Dichlorobenzene	0.0 ug/L	5 ug/L MAC
1,2-Dichloroethane	0.0 ug/L	5 ug/L IMAC
1,1-Dichloroethylene	0.0 ug/L	14 ug/L MAC
Dichloromethane	0.0 ug/L	50 ug/L MAC
Ethylbenzene	0.0 ug/L	≤ 2.4 ug/L AO
p-Isopropyltoluene	0.0 ug/L	
1,1,1,2-Tetrachloroethane	0.0 ug/L	
Tetrachloroethylene	0.0 ug/L	30 ug/L MAC
Toluene	0.0 ug/L	≤ 24 ug/L AO
1,1,1-Trichloroethane	0.0 ug/L	
Trichloroethylene	0.0 ug/L	50 ug/L MAC
1,2,4-Trimethylbenzene	0.0 ug/L	
1,3,5-Trimethylbenzene	0.0 ug/L	
m,p-Xylenes	0.0 ug/L	≤ 300 ug/L AO**
o-Xylene	0.0 ug/L	≤ 300 ug/L AO**

**Received:** 1/3/2006

**Reported:** 1/10/2006

**Certified By:**

*David W. Knibb*  
For: David W. Knibb, PhD, FCACB  
Co-Director  
Centre for Toxicology

CDW = Canadian Drinking Water

AO = Aesthetic Objectives

MAC = Maximum Acceptable Concentration

IMAC = Interim Maximum Acceptable Concentration

\* Sum of Trihalomethanes (THM)

\*\* Sum of Xylene



UNIVERSITY OF  
CALGARY

# Centre for Toxicology

HMRB, University of Calgary  
B19, 3330 Hospital Drive NW  
Calgary, Alberta T2N 4N1

## REPORT TO:

HEALTH REGION 3  
BOX 4016, STATION C  
1509 CENTRE STREET SW  
CALGARY AB  
T2T 5T1

Req. ID No: T071137  
Lab Code: 200601045

## PRIVATE DRINKING WATER FROM:

TOWN OF CARSTAIRS

CARSTAIRS AB

( ) 943-8039

Land Description: SE-17-30-1-5  
Collected: 1/3/2006  
By: JASON FELTHAM  
Site: WILDE'S LAW OFFICE #2  
Source: River  
Depth:  
Comments:

## CERTIFICATE OF CHEMICAL ANALYSIS

## CDW GUIDELINES (2002)

Benzene	0.0 ug/L	5 ug/L MAC
Bromodichloromethane	4.0 ug/L	100 ug/L IMAC*
Bromoform	0.0 ug/L	100 ug/L IMAC*
Carbon Tetrachloride	0.0 ug/L	5 ug/L MAC
Chlorobenzene	0.0 ug/L	
Chloroethane	0.0 ug/L	
Chloroform	44.0 ug/L	100 ug/L IMAC*
Dibromochloromethane	0.0 ug/L	100 ug/L IMAC*
1,2-Dichlorobenzene	0.0 ug/L	200 ug/L MAC
1,4-Dichlorobenzene	0.0 ug/L	5 ug/L MAC
1,2-Dichloroethane	0.0 ug/L	5 ug/L IMAC
1,1-Dichloroethylene	0.0 ug/L	14 ug/L MAC
Dichloromethane	0.0 ug/L	50 ug/L MAC
Ethylbenzene	0.0 ug/L	≤ 2.4 ug/L AO
p-Isopropyltoluene	0.0 ug/L	
1,1,1,2-Tetrachloroethane	0.0 ug/L	
Tetrachloroethylene	0.0 ug/L	30 ug/L MAC
Toluene	0.0 ug/L	≤ 24 ug/L AO
1,1,1-Trichloroethane	0.0 ug/L	
Trichloroethylene	0.0 ug/L	50 ug/L MAC
1,2,4-Trimethylbenzene	0.0 ug/L	
1,3,5-Trimethylbenzene	0.0 ug/L	
m,p-Xylenes	0.0 ug/L	≤ 300 ug/L AO**
o-Xylene	0.0 ug/L	≤ 300 ug/L AO**

Received: 1/3/2006

Reported: 1/10/2006

Certified By:

*David W. Kinniburgh*  
For: David W. Kinniburgh, PhD, FCACB  
Co-Director  
Centre for Toxicology

CDW = Canadian Drinking Water

AO = Aesthetic Objectives

MAC = Maximum Acceptable Concentration

IMAC = Interim Maximum Acceptable Concentration

\* Sum of Trihalomethanes (THM)

\*\* Sum of Xylene



UNIVERSITY OF CALGARY

# Centre for Toxicology

HMRB, University of Calgary  
B19, 3330 Hospital Drive NW  
Calgary, Alberta T2N 4N1

**REPORT TO:**

HEALTH REGION 3  
BOX 4016, STATION C  
1509 CENTRE STREET SW  
CALGARY AB  
T2T 5T1

**PRIVATE DRINKING WATER FROM:**

TOWN OF CARSTAIRS

CARSTAIRS AB

( ) 943-8039

**Land Description:** SE-17-30-1-5  
**Collected:** 1/3/2006  
**By:** JASON FELTHAN  
**Site:** WILDE'S LAW OFFICE #1  
**Source:** River  
**Depth:**  
**Comments:**

**Req. ID No:** T071136  
**Lab Code:** 200601044

**CERTIFICATE OF CHEMICAL ANALYSIS**

**CDW GUIDELINES (2002)**

Benzene	0.0 ug/L	5 ug/L MAC
Bromodichloromethane	5.0 ug/L	100 ug/L IMAC*
Bromoform	0.0 ug/L	100 ug/L IMAC*
Carbon Tetrachloride	0.0 ug/L	5 ug/L MAC
Chlorobenzene	0.0 ug/L	
Chloroethane	0.0 ug/L	
Chloroform	67.0 ug/L	100 ug/L IMAC*
Dibromochloromethane	0.0 ug/L	100 ug/L IMAC*
1,2-Dichlorobenzene	0.0 ug/L	200 ug/L MAC
1,4-Dichlorobenzene	0.0 ug/L	5 ug/L MAC
1,2-Dichloroethane	0.0 ug/L	5 ug/L IMAC
1,1-Dichloroethylene	0.0 ug/L	14 ug/L MAC
Dichloromethane	0.0 ug/L	50 ug/L MAC
Ethylbenzene	0.0 ug/L	≤ 2.4 ug/L AO
p-Isopropyltoluene	0.0 ug/L	
1,1,2,2-Tetrachloroethane	0.0 ug/L	
Tetrachloroethylene	0.0 ug/L	30 ug/L MAC
Toluene	0.0 ug/L	≤ 24 ug/L AO
1,1,1-Trichloroethane	0.0 ug/L	
Trichloroethylene	0.0 ug/L	50 ug/L MAC
1,2,4-Trimethylbenzene	0.0 ug/L	
1,3,5-Trimethylbenzene	0.0 ug/L	
m,p-Xylenes	0.0 ug/L	≤ 300 ug/L AO**
o-Xylene	0.0 ug/L	≤ 300 ug/L AO**

**Received:** 1/3/2006

**Reported:** 1/10/2006

**Certified By:**

*David W. Kiniburgh*  
For: David W. Kiniburgh, PhD, ECACB  
Co-Director  
Centre for Toxicology

CDW = Canadian Drinking Water

AO = Aesthetic Objectives

MAC = Maximum Acceptable Concentration

IMAC = Interim Maximum Acceptable Concentration

\* Sum of Trihalomethanes (THM)

\*\* Sum of Xylene





UNIVERSITY OF  
CALGARY

# Centre for Toxicology

HMRB, University of Calgary

B19, 3330 Hospital Drive NW  
Calgary, Alberta T2N 4N1

## REPORT TO:

HEALTH REGION 3  
BOX 4016, STATION C  
1509 CENTRE STREET SW  
CALGARY AB  
T2T 5T1

Req. ID No: T071133  
Lab Code: 200601041

## PRIVATE DRINKING WATER FROM: TOWN OF CARSTAIRS

CARSTAIRS AB

( ) 943-8039

Land Description: SE-17-30-1-5  
Collected: 1/3/2006  
By: JASON FELTHAN  
Site: FIVE STAR VIDEO #2  
Source: River  
Depth:  
Comments:

### CERTIFICATE OF CHEMICAL ANALYSIS

### CDW GUIDELINES (2002)

Benzene	0.0 ug/L	5 ug/L MAC
Bromodichloromethane	4.0 ug/L	100 ug/L IMAC*
Bromoform	0.0 ug/L	100 ug/L IMAC*
Carbon Tetrachloride	0.0 ug/L	5 ug/L MAC
Chlorobenzene	0.0 ug/L	
Chloroethane	0.0 ug/L	
Chloroform	45.0 ug/L	100 ug/L IMAC*
Dibromochloromethane	0.0 ug/L	100 ug/L IMAC*
1,2-Dichlorobenzene	0.0 ug/L	200 ug/L MAC
1,4-Dichlorobenzene	0.0 ug/L	5 ug/L MAC
1,2-Dichloroethane	0.0 ug/L	5 ug/L IMAC
1,1-Dichloroethylene	0.0 ug/L	14 ug/L MAC
Dichloromethane	0.0 ug/L	50 ug/L MAC
Ethylbenzene	0.0 ug/L	≤ 2.4 ug/L AO
p-Isopropyltoluene	0.0 ug/L	
1,1,2,2-Tetrachloroethane	0.0 ug/L	
Tetrachloroethylene	0.0 ug/L	30 ug/L MAC
Toluene	0.0 ug/L	≤ 24 ug/L AO
1,1,1-Trichloroethane	0.0 ug/L	
Trichloroethylene	0.0 ug/L	50 ug/L MAC
1,2,4-Trimethylbenzene	0.0 ug/L	
1,3,5-Trimethylbenzene	0.0 ug/L	
m,p-Xylenes	0.0 ug/L	≤ 300 ug/L AO**
o-Xylene	0.0 ug/L	≤ 300 ug/L AO**

Received: 1/3/2006

Reported: 1/10/2006

Certified By:

*David W. Kinniburgh*  
David W. Kinniburgh, PhD, FCACB  
Co-Director  
Centre for Toxicology

CDW = Canadian Drinking Water

AO = Aesthetic Objectives

MAC = Maximum Acceptable Concentration

IMAC = Interim Maximum Acceptable Concentration

\* Sum of Trihalomethanes (THM)

\*\* Sum of Xylene



UNIVERSITY OF  
CALGARY

# Centre for Toxicology

HMRB, University of Calgary

B19, 3330 Hospital Drive NW  
Calgary, Alberta T2N 4N1

## REPORT TO:

HEALTH REGION 3  
BOX 4016, STATION C  
1509 CENTRE STREET SW  
CALGARY AB  
T2T 5T1

## PRIVATE DRINKING WATER FROM:

TOWN OF CARSTAIRS

CARSTAIRS AB

( ) 943-8039

**Land Description:** SE-17-30-1-5  
**Collected:** 1/3/2006  
**By:** JASON FELTHAM  
**Site:** FIVE STAR VIDEO #2  
**Source:** River  
**Depth:**  
**Comments:**

**Req. ID No:** T071133  
**Lab Code:** 200601041

### CERTIFICATE OF CHEMICAL ANALYSIS

### CDW GUIDELINES (2002)

Benzene	0.0	ug/L	5 ug/L MAC
Bromodichloromethane	4.0	ug/L	100 ug/L IMAC*
Bromoform	0.0	ug/L	100 ug/L IMAC*
Carbon Tetrachloride	0.0	ug/L	5 ug/L MAC
Chlorobenzene	0.0	ug/L	
Chloroethane	0.0	ug/L	
Chloroform	45.0	ug/L	100 ug/L IMAC*
Dibromochloromethane	0.0	ug/L	100 ug/L IMAC*
1,2-Dichlorobenzene	0.0	ug/L	200 ug/L MAC
1,4-Dichlorobenzene	0.0	ug/L	5 ug/L MAC
1,2-Dichloroethane	0.0	ug/L	5 ug/L IMAC
1,1-Dichloroethylene	0.0	ug/L	14 ug/L MAC
Dichloromethane	0.0	ug/L	50 ug/L MAC
Ethylbenzene	0.0	ug/L	≤ 2.4 ug/L AO
p-Isopropyltoluene	0.0	ug/L	
1,1,2,2-Tetrachloroethane	0.0	ug/L	
Tetrachloroethylene	0.0	ug/L	30 ug/L MAC
Toluene	0.0	ug/L	≤ 24 ug/L AO
1,1,1-Trichloroethane	0.0	ug/L	
Trichloroethylene	0.0	ug/L	50 ug/L MAC
1,2,4-Trimethylbenzene	0.0	ug/L	
1,3,5-Trimethylbenzene	0.0	ug/L	
m,p-Xylenes	0.0	ug/L	≤ 300 ug/L AO**
o-Xylene	0.0	ug/L	≤ 300 ug/L AO**

**Received:** 1/3/2006  
**Reported:** 1/10/2006  
**Certified By:**

*David W. Kinniburgh*  
For David W. Kinniburgh, PhD, FCACB  
Co-Director  
Centre for Toxicology

CDW = Canadian Drinking Water  
AO = Aesthetic Objectives  
MAC = Maximum Acceptable Concentration  
IMAC = Interim Maximum Acceptable Concentration

\* Sum of Trihalomethanes (THM)

\*\* Sum of Xylene



*SAFETY CODES COUNCIL*

Underground Tank Remediation Program  
16<sup>th</sup> Floor, Commerce Place  
10155 - 102 Street  
Edmonton, Alberta, Canada T5J 4L4

Tel: (780) 415-8659  
Fax: (780) 415-8664

**Ref: 00123-9302**

February 21, 2006

Vaughn Wyant Investments Ltd.  
419 Brand Place  
Saskatoon, SK S7J 5L6

Dear Vaughn Wyant:

**Re: Staged Remediation Plan  
Site 9302, Lots 5 to 8 Block 28 Plan 3845CO, Carstairs**

Thank you for the response letter to Alberta Environment dated January 30, 2006 that was submitted by your Consultant, Stantec Consulting. Alberta Environment has completed its review of the letter, and we received a copy of their email dated February 17, 2006.

Based on information in Alberta Environment's review, the revised Remedial Action Plan and Risk Management Plan dated June 29, 2005 are acceptable. **The next steps are:**

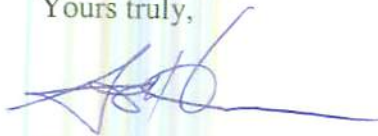
1. Obtain Landfarm Permit, if required.
2. **Provide a copy of the tender documents, for our review, by March 21, 2006.** Please note that it is extremely important that Program deadlines are met so that you are able to utilize the 2006 summer field season to complete remediation work using available grant funds. Please contact us if you require an extension to this date. Do **NOT** tender the project before our review of the tender documents. Also submit a list of proposed contractors to be invited to submit bids (confirm with the proposed contractors that they would submit bids).
3. Invite a minimum of three contractors to submit bids. As all invited contractors may not submit bids we strongly recommend that you invite more than three contractors so as to get the most competitive bids.
4. Submit copies of all bids together with your consultant's analysis of bids and recommendations for award of contract.

If the estimated cost of remediation exceeds the balance of the grant, you should consider advising the bidders that you may not award the contract if the tendered amount exceeds the balance of the grant.

**The proposed fee of \$2,000.00 (excluding GST) for tendering was approved on July 20, 2005.**

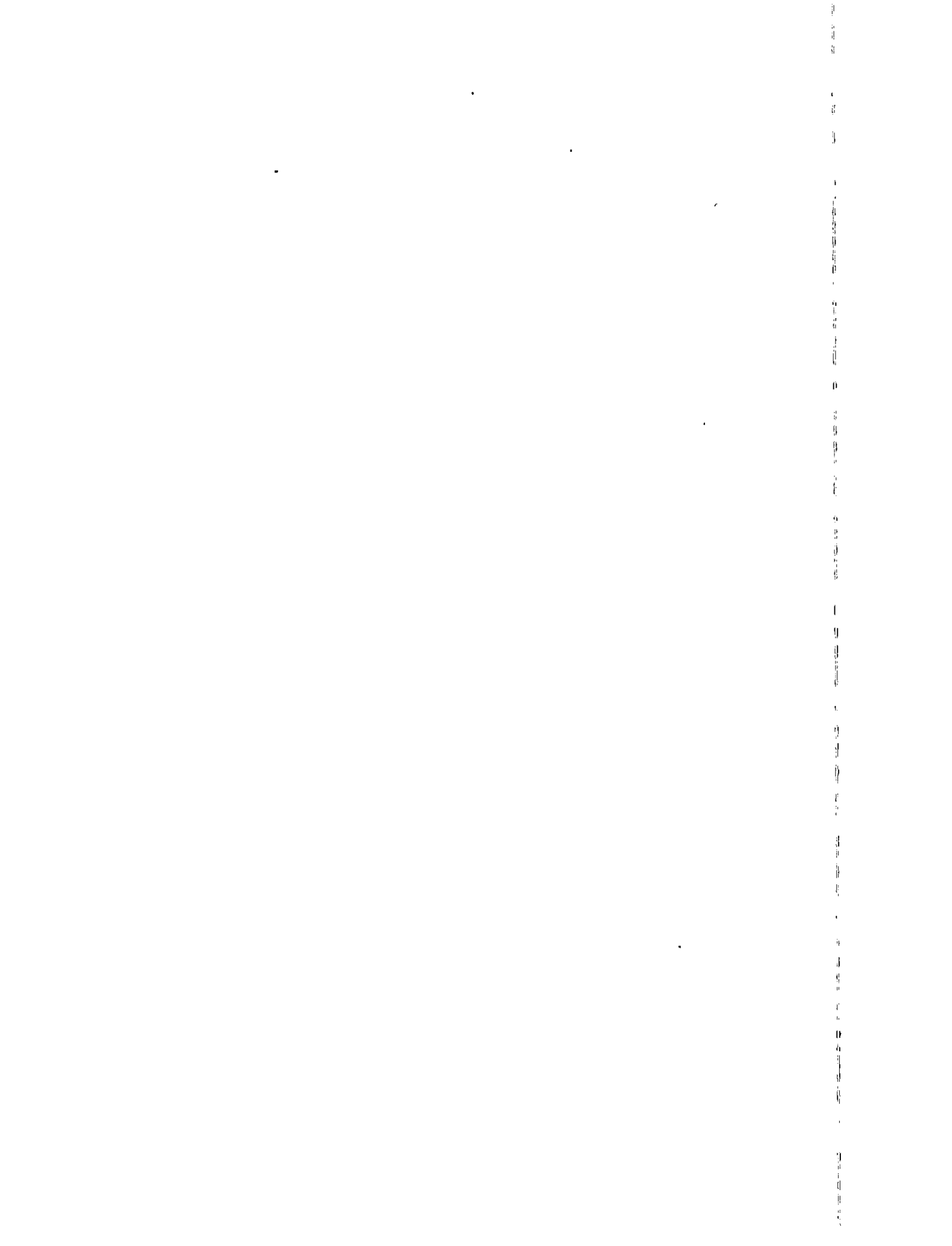
The reviews are based on technical information submitted to the program by your Consultant. Acceptance or non-acceptance of this proposal does not absolve you from the responsibility for remediating your site in accordance with the Risk Management Guidelines for Petroleum Storage Tank Sites – October 2001 or from future liability for remediating your site in situations where either the land use may change or additional concerns arise from the contaminants remaining on or off-site.

Yours truly,

A handwritten signature in blue ink, appearing to read 'S. Hoare', with a long horizontal line extending to the right.

Steve Hoare  
Technical Coordinator

Cc: Chris Mathies, Stantec Consulting, Saskatoon  
Kim Kirillo, Alberta Environment  
Paul von Schoenberg, Calgary Heath Region



December 30, 2005



## calgary health region

Kim Kirillo  
Alberta Environment  
2nd fl Deerfoot Square  
2938 - 11 Street NE  
Calgary, AB  
T2E 7L7

Dear Madame,

**Re: Water Sample to be collected from your establishment on Tuesday, January 3<sup>rd</sup>, 2006**

The Calgary Health Region has become aware of hydrocarbon-contaminated soil at the site of a former service station (address: 419 10 Ave, Carstairs). Analysis of a drinking water sample collected from a business neighboring the site indicated that soil contamination may have affected the business' private water service line (the pipe connecting the home or business to the municipal utility line)

The water sample collected from the business's service line contained benzene and xylene at very low concentrations deemed non-hazardous to human health by the *Guidelines for Canadian Drinking Water Quality*. Water samples drawn from the Town of Carstairs municipal utility line showed no detectable levels of benzene and xylene. Although benzene and xylene may normally be present in treated drinking water samples at detectable levels, these chemicals are also found in hydrocarbon-contaminated soil.

To detect and assess any further impact by contaminated soil on private water service lines in the area, the Calgary Health Region will be collecting water samples from several adjacent businesses on the morning of January 3, 2006. Water samples from the Town of Carstairs main utility line will also be collected on the same day.

The water samples collected from your building on Tuesday, January 3<sup>rd</sup>, 2006, will undergo an analysis to detect the presence of volatile organic compounds (VOC's), including those expected to be found in hydrocarbon-contaminated soil. The Calgary Health Region will contact you to discuss the results of these analyses, which are expected to be available near the end of January 2006.

If you are concerned about the safety of your water service line before these results are available, please consider taking the following precautionary measures:

- do not use the water for any consumptive purposes such as drinking, cooking or dental care,
- water that has been sitting in the service line overnight or over the weekend can be flushed to waste each morning by allowing all the taps in the building to run for several minutes

If you have any questions, please contact the Calgary Health Region at 943-8054. Thank-you for your co-operation

Sincerely,

Paul von Schoenberg  
Environmental Health Advisor  
Risk Assessment and Management Group  
Environmental Health

Jason Feltham  
Environmental Health Advisor-Water Consultant  
Service Delivery - North  
Environmental Health

Cc: Greg Saretzky - Stantech Consulting Ltd., Kim Kirillo - Alberta Environment,  
Chief Administrative Officer Karl MacDonald - Town of Carstairs

Southeast Community Portfolio  
Centre 15  
Environmental Health  
1509 Centre St SW  
Calgary, Alberta T2G 2E6

phone. (403) 943-8095  
fax (403) 943-8056  
www.calgaryhealthregion.ca







**Underground Tank Remediation Program**

*16<sup>th</sup> Floor, Commerce Place*

*10155 - 102 Street*

*Edmonton, AB T5J 4L4*

***Tel:(780)415-8666 1-866-833-3300 Fax:(780)415-8664 1-866-833-1100***

**F A X**

Best Copy Available

<b>To:</b>	Vaughn Wyant	<b>From:</b>	Steve Hoare
<b>Fax:</b>	306 373 6700	<b>Pages:</b>	2 (including cover sheet)
<b>Phone:</b>		<b>Date:</b>	September 19, 2005
<b>Re:</b>	Site #9302	<b>cc:</b>	Chris Mathies 306 667 2500 Kim Kirillo 403 297 5944

<input type="checkbox"/> Urgent	<input type="checkbox"/> For Review	<input type="checkbox"/> Please Comment
<input type="checkbox"/> Please Reply	<input type="checkbox"/> Original(s) to follow in mail	<input type="checkbox"/> Recycle

**MESSAGE:**

**If you do not receive all the pages, please call Jouhayna @ 415 8660**

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190795

**SAFETY CODES COUNCIL**

Underground Tank Remediation Program  
16<sup>th</sup> Floor, Commerce Place  
10155 - 102 Street  
Edmonton, Alberta T5J 4L4

**FILE # 9302**

Tel. 780/415-8666  
Fax: 780/415-8664

September 19, 2005

Vaughn Wyant Investments Ltd.  
419 Brand Place  
Saskatoon, SK S7J 5L6

**Best Copy Available**

Dear Vaughn Wyant:

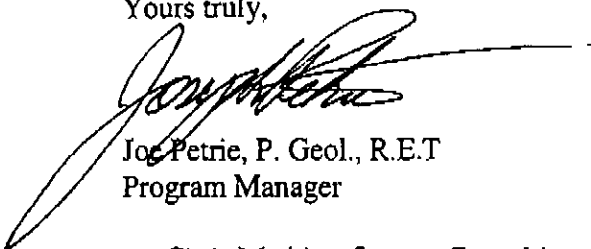
**Re: Request for Engineering Fees  
Site 9302, Lots 5 to 8 Block 28 Plan 3845CO, Carstairs**

Thank you for the request dated September 19, 2005 that was prepared by your Consultant, Stantec Consulting.

The request for engineering fees is acceptable. **If you are in agreement, you may authorize your Consultant to proceed with the completion of the utility corridor assessment at a lump sum cost of \$1,200.00 (excluding GST).**

**Please have your Consultant submit the updated report to Alberta Environment, with a copy to us. If you have any questions or concerns, please contact Steve Hoare at (780) 415-8665 or toll free at 1-866-833-3300.**

Yours truly,



Joe Petrie, P. Geol., R.E.T  
Program Manager

cc: Chris Mathies, Stantec Consulting  
Kim Kirillo, Alberta Environment



190795



**Underground Tank Remediation Program**  
*16<sup>th</sup> Floor, Commerce Place*  
*10155 - 102 Street*  
*Edmonton, AB T5J 4L4*

Tel:(780)415-8666 1-866-833-3300 Fax:(780)415-8664 1-866-833-1100

**F A X**

**To:** Vaughn Wyant **From:** Steve Hoare

---

**Fax:** 306 373 6700 **Pages:** 3 (including cover sheet)

---

**Phone:** **Date:** July 20, 2005

---

**Re:** Site #9302 **CC:** Chris Mathies 306 667 2500  
Kim Kirillo 403 297 5944

- Urgent
- For Review
- Please Comment
- Please Reply
- Original(s) to follow in mail
- Recycle

**MESSAGE:**

If you don't receive all the pages, please contact Jouhayna @415 8660.

This communication is intended for the use of the recipient to which it is addressed, and may contain confidential, personal and or privileged information. Please contact us immediately if you are not the intended recipient of this communication, and do not copy, distribute, or take action relying on it. Any communication received in error, or subsequent reply, should be deleted or destroyed.

**SAFETY CODES COUNCIL**

Underground Tank Remediation Program  
16<sup>th</sup> Floor, Commerce Place  
10155 - 102 Street  
Edmonton, Alberta, Canada T5J 4L4

Tel: (780) 415-8659  
Fax: (780) 415-8664

Ref: 00123-9302

July 20, 2005

Vaughn Wyant Investments Ltd.  
419 Brand Place  
Saskatoon, SK S7J 5L6

Best Copy Available

Dear Vaughn Wyant:

**Re: Staged Remediation Plan/Delineation  
Site 9302, Lots 5 to 8 Block 28 Plan 3845CO, Carstairs**

Thank you for the revised Remedial Action Plan and Risk Management Plan dated June 29, 2005. Alberta Environment has completed its review of the plan, and we received a copy of their review letter dated July 13, 2005.

Based on information in Alberta Environment's review, the Staged Remediation Plan is acceptable. **The next steps are:**

1. Obtain Landfarm Permit, if required.
2. **Provide a copy of the tender documents, for our review, by August 19, 2005.** Please contact us if you require an extension to this date. Do NOT tender the project before our review of the tender documents. Also submit a list of proposed contractors to be invited to submit bids (confirm with the proposed contractors that they would submit bids).
3. Invite a minimum of three contractors to submit bids. As all invited contractors may not submit bids we strongly recommend that you invite more than three contractors so as to get the most competitive bids.
4. Submit copies of all bids together with your consultant's analysis of bids and recommendations for award of contract.

If the estimated cost of remediation exceeds the balance of the grant, you should consider advising the bidders that you may not award the contract if the tendered amount exceeds the balance of the grant.

The proposed fees of \$2,000.00 (excluding GST) for tendering and \$5,500.00 (excluding GST) for the utility corridor assessment are reasonable, and if you are in agreement, you may authorize your Consultant to proceed with the tendering process and assessment.

The delineation work as per your Consultant's proposal of April 20, 2005 cannot be completed due to third party issues. We have, therefore, rescinded our approval dated April 25, 2005 for fees of \$7,850.00 (excluding GST) for the present time.

The reviews are based on technical information submitted to the program by your Consultant. Acceptance or non-acceptance of this proposal does not absolve you from the responsibility for remediating your site in accordance with the Risk Management Guidelines for Petroleum Storage Tank Sites – October 2001 or from future liability for remediating your site in situations where either the land use may change or additional concerns arise from the contaminants remaining on or off-site.

Yours truly,

Best Copy Available



Joe Petrie, P. Geol., R.E.T.  
Program Manager

Cc: Chris Mathies, Stantec Consulting, Saskatoon  
Kim Kirillo, Alberta Environment

190795

KK



June 29, 2005  
File: 1132-52998.200

Alberta Environment  
Southern Region  
2<sup>nd</sup> Floor, Deerfoot Square  
2938 - 11<sup>th</sup> Street NE  
Calgary, AB T2E 7L7

**Attention: Kim Kirillo**  
**Petroleum Storage Tank Sites Specialist**

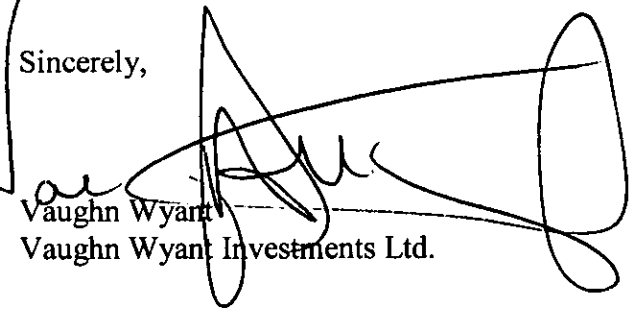
Dear Ms. Kirillo:

**Reference: 419 - 10<sup>th</sup> Avenue**  
**Carstairs, Alberta**

This letter has been provided to indicate my commitment to continuing with the remediation and risk management activities once funding has ended and until remediation guidelines have been met. I will also inform potential buyers and future owners of the site of the remediation and risk management plan that is in place and the associated responsibilities.

Should you have any comments or questions, please contact the undersigned.

Sincerely,

  
Vaughn Wyant  
Vaughn Wyant Investments Ltd.



C - Steve Hoare (Safety Codes Council), Greg Saretzky (Stantec Consulting Ltd.)







190795  
DUPLICATE



**SAFETY CODES COUNCIL**

Underground Tank Remediation Program  
16<sup>th</sup> Floor, Commerce Place  
10155 - 102 Street  
Edmonton, Alberta T5J 4L4

Tel: 780/415-8666  
Fax: 780/415-8664

FILE #9302

June 20, 2005

Vaughn Wyant Investments Ltd.  
419 Brand Place  
Saskatoon, SK, S7J 5L6



Dear Vaughn Wyant:

**Re: Remedial Action Plan (RAP) and Risk Management Plan (RMP)  
Site 9302, Carstairs**

Thank you for the RAP and RMP dated May 25, 2005 and May 18, 2005 respectively that were submitted to Alberta Environment (AENV) by your Consultant, Stantec Consulting.

Alberta Environment has completed its review of the submission and we have received a copy of the review letter dated June 14, 2005. Based on comments made by AENV, there are items to be addressed before the plans can be approved. **Please have your Consultant respond to the comments made by AENV by July 11, 2005. If, for some reason, this deadline cannot be met, please contact us immediately.**

Yours truly,

Steve Hoare  
Technical Coordinator

cc: Greg Saretzky, Stantec Consulting  
Kim Kirillo, Alberta Environment



**SAFETY CODES COUNCIL**

---

Underground Tank Remediation Program

16<sup>th</sup> Floor, Commerce Place  
10155 - 102 Street  
Edmonton, Alberta T5J 4L4

**FILE # 9302**

Tel: 780/415-8666  
Fax: 780/415-8664

April 25, 2005

Vaughn Wyant Investments Ltd.  
419 Brand Place  
Saskatoon, SK S7J 5L6

Best Copy Available

Dear Vaughn Wyant:

**Re: Delineation Proposal  
Site 9302, Lots 5 to 8 Block 28 Plan 3845CO, Carstairs**

Thank you for the Additional Delineation Plan dated April 20, 2005, received on April 22, 2005 that was submitted by your Consultant, Stantec Consulting. The Program has completed its review of the Delineation Plan.

**The proposed engineering fee for conducting the delineation is acceptable. If you are in agreement, you may authorize your Consultant to proceed with the delineation at a lump sum cost of \$7,850.00 (excluding G.S.T.).**

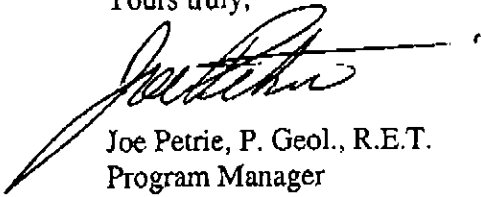
It is your responsibility to obtain any necessary agreements for access to sites other than your own if off-site drilling is required. Please note Grant funding is conditional on the site being remediated to meet a level compatible with the existing zoning and Land Use Assessment to comply with Alberta Environment's "Risk Management Guidelines for Petroleum Storage Tank Sites - October 2001" including both on and offsite impacts in both soil and groundwater. It is your Consultant's responsibility to ensure the proposed delineation work, supported by laboratory analysis, is sufficient to fully delineate both on and offsite contamination impacts in both soil and groundwater and provides sufficient information to support a remediation plan.

**Any changes to the scope of delineation work and associated costs require approval by the Program. To assist in completing the work in a timely manner the consultant may contact the Program for approval for increases to the scope of work while onsite. If based on results from the field work, one or more of the proposed boreholes or monitoring wells is not required to delineate the extent of contamination, please ensure that the scope of work and associated costs are reduced accordingly. Please submit the delineation report and finalized Remedial Action Plan (RAP) to Alberta Environment, with a copies to us, by May 24, 2005. A**

**completed Review Checklist for Risk Management Plans should be submitted with the RAP. If you are unable to comply with this deadline, please contact the Program office.**

The reviews are based on technical information submitted to the program by your Consultant. Acceptance or non-acceptance of a proposal does not absolve the Grant recipient from the responsibility for remediating his site in accordance with the aforementioned Guidelines or from future liability for remediating his site in situations where either the land use may change or additional concerns arise from the contaminants remaining on or offsite.

Yours truly,

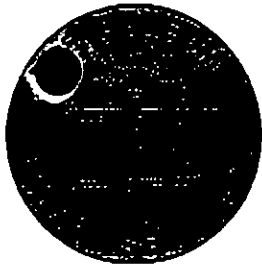


Joe Petrie, P. Geol., R.E.T.  
Program Manager

Best Copy Available

Cc: Greg Saretzky, Stantec Consulting, Saskatoon  
Kim Kirillo, Alberta Environment





#2, 10016 - 29A Avenue  
Edmonton, Alberta  
T6N 1A8

Tel.: (780) 461-4941  
Fax: (780) 461-6067



DIVISION OF **ASB** CORROSION CONTROL LTD.



RECEIVED MAY 2 9 2003

May 5, 2003

SCCMAY503

Safety Codes Council  
Underground Tank Remediation Program  
14<sup>th</sup> Floor, Commerce Place  
10155 - 102 Street  
Edmonton, Alberta  
T5J 4L4

Best Copy Available

Attn: Joe Petrie, P. Geol., R.E.T.  
Program Manager

Re: Environmental Services - Site No. 9302  
Phase III: Hydrocarbon Environmental Site Assessment - File Closure  
Lots 5 & 6, Block 28, Plan 3845 CO; 419 - 10<sup>th</sup> Avenue, Carstairs, Alberta

In response to the review letter dated April 29, 2003, from the Safety Codes Council, and further to telephone conversations of today's date, with Mr. Vaughn Wyant, owner of SCC Site No. 9302, it has been decided not to continue with the Underground Tank Remediation Program at this time.

The remediation costs, estimated at \$127,000.00, currently exceed the remaining funds in the Conditional Grant Agreement by approximately \$45,000.00. The remediation plan has not been accepted by the SCC as presented by our firm. Further work to enhance the natural attenuation rate to reduce the hydrocarbon concentrations off-site has been recommended by the review committee in addition to the remedial plan. Additional costs to enhance the natural attenuation rate will increase the amount required for remediation beyond the estimated \$ 127,000.00 by a significant amount.

According to the owner, the cost of the proposed remediation efforts exceeds the value of the above noted property and feels that it is not economical to complete the remediation at this time. The owner is interested in applying for appeal funding to complete the remediation in the future. Please advise Mr. Vaughn Wyatt on the appeal process. He has been informed that the appeal process has been suspended until the end of the program.

**SAFETY CODES COUNCIL**

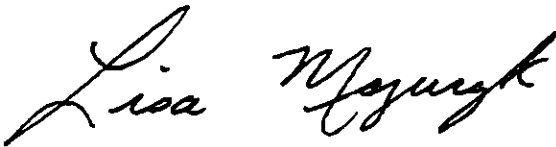
May 5, 2003

Page 2

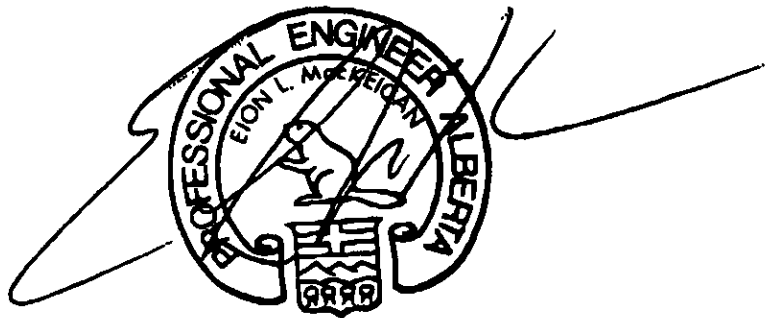
Best Copy Available

We would like to thank the Safety Codes Council for their assistance in completing the Environmental Site Assessments pertaining to the subject property, and trust this letter is sufficient notice of intent to close the file. Should further documentation or information be required, please contact Mr. Vaughn Wyant directly at (306) 373-4444.

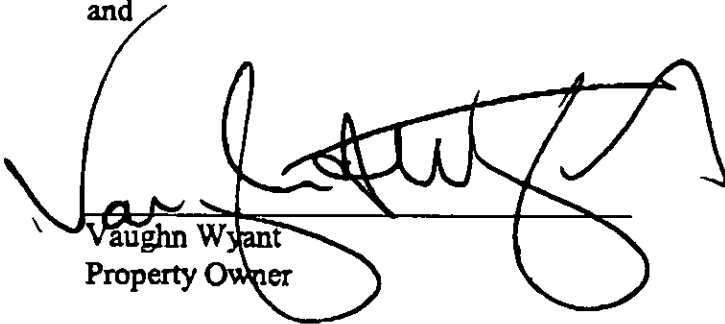
Yours truly,  
PETROLEUM ENVIRO SERVICES



Lisa Mazuryk  
Manager, Environmental Services



and



Vaughn Wyant  
Property Owner

cc. Karen Clarke - Safety Codes Council



**Underground Tank Remediation Program**  
*14<sup>th</sup> Floor, Commerce Place*  
*10155 - 102 Street*  
*Edmonton, AB T5J 4L4*

Best Copy Available

Tel:(780)415-8666 1-866-833-3300 Fax:(780)415-8664 1-866-833-1100

## F A X

<b>To:</b>	Kim Kiriillo	<b>From:</b>	Steve Hoare
<b>Fax:</b>	403 297 5944	<b>Pages:</b>	2 (including cover sheet)
<b>Phone:</b>		<b>Date:</b>	June 6, 2003
<b>Re:</b>		<b>CC:</b>	

Urgent    For Review    Please Comment    Please Reply    Recycle

### MESSAGE:

**If this fax is not complete, please call Jouhayna @ 780 415 8660.**

Thanks

This communication is intended for the use of the recipient to which it is addressed, and may contain confidential, personal and or privileged information. Please contact us immediately if you are not the intended recipient of this communication, and do not copy, distribute, or take action relying on it. Any communication received in error, or subsequent reply, should be deleted or destroyed.





190795



**SAFETY CODES COUNCIL**

Underground Tank Remediation Program  
14<sup>th</sup> Floor, Commerce Place  
10155 - 102 Street  
Edmonton, Alberta, Canada T5J 4L4

Tel: (780) 415-8656  
Fax: (780) 415-8664

**Ref: 00123-9302**

June 5, 2003

**DUPLICATE**

Vaughn Wyant Investments Ltd.  
419 Brand Place  
Saskatoon, SK S7J 5L6

Best Copy Available

Dear Vaughn Wyant:

**Re: Remediation Grant**

Thank you for the letter dated May 5, 2003 written by your Consultant, Petroleum Enviro Services, and signed by yourself, stating that you have decided to withdraw from the Program.

The Program funding is presently fully committed to providing grants, within the allowable maximum \$100,000, to about 500 eligible applicants. In view of the financial constraints, the Appeal Committee has advised us that requests for grants, in excess of the allowable \$100,000, are not available through the appeal process.

Your file is now closed. Enclosed is a Notice of Termination of the Conditional Grant Agreement for your records. The total grant provided to you under the Underground Tank Remediation Program was \$26,165.00. We hope that the funding provided by the Alberta Government was useful.

I wish to advise you that your decision regarding the grant does not absolve you from compliance with the *Alberta Environmental Protection and Enhancement Act*.

If you have any questions or concerns, please call Steve Hoare at (780) 415-8665 or call toll free at 1-866-833-3300.

Yours truly,

Habib Dhalla, M.Sc., P.Eng.  
Program Director

cc. Lisa Mazuryk, Petroleum Enviro Services  
Kim Kirillo, Alberta Environment Southern

Enc.





JAN - 4 1993  
DEPT. 29

Second Floor, Deerfoot Square, 2938 - 11 Street N E., Calgary, Alberta, Canada T2E 7L7 403/297-8271

December 29, 1993  
• File No. 93-118188

125071  
Mr. Daniel B. Konkin  
McKercher McKerchêr Laing & Whitmore  
374 - 3rd Avenue South  
Saskatoon, Saskatchewan  
S7K 1M5

Dear Sir:

Re: Underground Storage Tank Removal and Site Remediation  
Plan 3845CO, Block 28, Lot 5,6,7,8, Carstairs, Alberta

There has been a recent realignment of responsibilities within our organization. As a result, you are requested to communicate directly with Mr. Don Wyrostock of our Groundwater Protection Branch with regard to information about your remediation activities at the Carstairs site. I will be transferring all my information to Mr. Wyrostock. He may be contacted at (403) 382-4255.

All initial reporting of releases of substances should continue to be forwarded to this office by calling (403) 297-8271 or in the case of after hours or emergencies 1-800-222-6514. If you have any questions or require clarification please contact me directly.

Yours truly,

Kevin E. Pilger  
Investigations Branch  
Pollution Control Division

cc: Don Wyrostock - Lethbridge



Post-It brand

Fax Transmittal Memo 7672

No. of Pages **3** Today's Date **11/10/93**  
 From **Pollution Control Division**  
 Company **AB ENVIRONMENTAL PROTECTION**  
 Location **CALGARY** Dept. Charge  
 Fax # **297-8232** Telephone # **297-8271**  
 Destroy  Return  Call for pickup

To **[Redacted]**  
 Company **Groundwater Protection**  
 Location **Lethbridge**  
 Fax # \_\_\_\_\_ Telephone # \_\_\_\_\_  
 Con. \_\_\_\_\_



Second Floor, Deerfoot Square 2938 - 11 Street N.E., Calgary, Alberta Canada T2E 7L7 403/297-8271

November 10, 1993

Best Copy Available

File No. 93-118188

Mr. Vaughn Wyant  
 Vaughn Wyant Investments  
 1550 - 8 Street East  
 Saskatoon, Saskatchewan  
 S7H 0T3

Dear Sir:

Re: Underground Storage Tank Removal and Site Remediation  
 at Plan 384500, Block 26, Lot 5, 6, 7, 8, Town of Carstairs

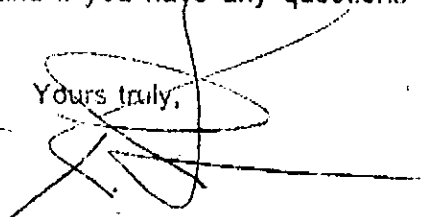
*JUBILEE FUELS LTD.*

This office was recently advised that you removed underground storage tanks at the above site. Under current legislation, Alberta Environmental Protection has shared responsibility to ensure that areas where soil and/or groundwater may be contaminated, the site is remediated according to the current Alberta Environmental Protection Guidelines and in particular the "Subsurface Remediation Guidelines for Underground Storage Tanks, 1991.

With this in mind, we ask that you undertake a site investigation as outlined in the Guidelines and report your findings and recommendations on remediation to this office. The Groundwater Protection Branch will review the report and forward comments directly to you or your consultant. Once the site clean-up is completed, a letter will be issued indicating that the clean-up is final and in accordance with current government guidelines.

Thank you for your co-operation in this matter and if you have any questions, please contact me at 297-8271 in Calgary

Yours truly,

  
 Kevin E. Pilger  
 Investigations Branch  
 Pollution Control Division

cc: Don Wyrstock - Lethbridge  
 Alberta Labour - Fire Prevention  
 Mount View Health Unit



*SAFETY CODES COUNCIL*

---

Underground Tank Remediation Program  
16<sup>th</sup> Floor, Commerce Place  
10155 – 102 Street  
Edmonton, Alberta T5J 4L4

**FILE # 9302**

Tel: 780/415-8666  
Fax: 780/415-8664

May 24, 2006

Vaughn Wyant Investments Ltd.  
419 Brand Place  
Saskatoon, SK S7J 5L6

Dear Vaughn Wyant:

**Re: Confirmation of Security  
Site 9302, Plan 3845CO Block 28 Lots 5 to 8, Carstairs**

Thank you for providing the Security in the amount of \$7,054.31 to cover the estimated costs of the remediation project that exceed the maximum grant of \$100,000.00. We received a copy of the bank draft on May 24, 2006.

**If you are in agreement with our letter of May 12, 2006, you may authorize your Consultant to proceed to award the contract.**

**Please have your Consultant submit a Remediation Program Report by August 31, 2006.** If you have any questions or concerns, please contact me at (780) 415-8665 or toll free at 1-866-833-3300.

Yours truly,

Steve Hoare  
Technical Coordinator

cc: Jeremy Lang, Stantec Consulting  
Kim Kirillo, Alberta Environment

August 20, 2009

Site #9302

Vaughn Wyant Investments Ltd.  
419 Brand Place  
Saskatoon, SK S7J 5L6

Dear Vaughn Wyant:

**Re: Insitu Bioremediation Proposal  
Site 9302, Plan 3845CO Block 28 Lots 5 to 8, Carstairs**

Thank you for the proposal dated August 13, 2009 and the additional information dated August 19, 2009, which were received on August 13, 2009 and August 19, 2009 respectively. The documents were submitted by your Consultant, Stantec Consulting. We have completed our review of the plan.

Based on your Consultant's recommendation, the proposed scope of work: the injection of chemical nutrients and subsequent monitoring program, is acceptable for funding under the grant.

We have received confirmation from your Consultant that all invoices for previous work have been submitted. A review of your file indicates that there is a balance of \$12,323.02 in your Program 2 grant, which the Program can fund towards the remedial project. Of that amount the Program will allocate \$10,273.02 toward costs related to the injection program and \$2,050.00 will be allocated to reporting. Your Consultant's estimate to complete the project is \$20,800.00, excluding GST. **As per Clause 3(e) of your Conditional Grant Agreement, you the Owner will be responsible for the \$8,476.98 shortfall as well the GST amount of \$1,040.00 (5% of \$20,800.00).** If you are in agreement, you may authorize your Consultant to proceed with the proposed scope of work.

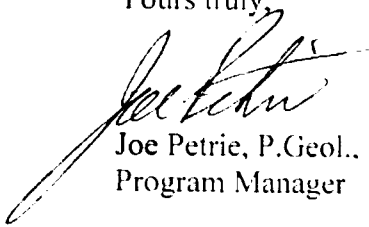
**Please have your Consultant submit the monitoring report by January 30, 2010.** The report should include, in tabular chart form, a comparison of monitoring results from the previous events to the most recent. In addition, your Consultant should analyze the compared results and determine whether or not the contamination is diminishing and provide, if possible, a timeframe for the site to meet the appropriate environmental guidelines. If required, recommendations for more aggressive action should be provided. If the monitoring report does not meet the requirements as specified we will return the report to your Consultant and will not process any related invoices until the requirements are met.



As per our letter of May 25, 2009, you are advised to work with your Consultant to ensure that the project, including reporting, is completed by your grant expiry date of March 31, 2010. There is no guarantee of funding beyond that date.

The reviews are based on technical information submitted to the Program by your Consultant. Acceptance or non-acceptance of this proposal does not absolve you from the responsibility for remediating your site in accordance appropriate Alberta Environment Guidelines or from future liability for remediating your site in situations where either the land use may change or additional concerns arise from the contaminants remaining on or off-site.

Yours truly,

A handwritten signature in black ink, appearing to read "Joe Petrie", written over a horizontal line.

Joe Petrie, P.Geol., R.E.T.  
Program Manager

Cc: Jeremy Lang, Stantec Consulting, Saskatoon  
Kim Kirillo, Alberta Environment

March 5, 2010

Site #9302

Vaughn Wyant Investments Ltd.  
419 Brand Place  
Saskatoon, SK S7J 5L6

Dear Vaughn Wyant:

**Re: Remediation Report  
Site 9302, Carstairs**

Thank you for the Insitu Bioremediation Program Report dated January 2010 and the Record of Site Condition that were received on February 23, 2010 and March 4, 2010 respectively. The documents were prepared by your consultant, Stantec Consulting. If you have any questions regarding the report, please contact your consultant.

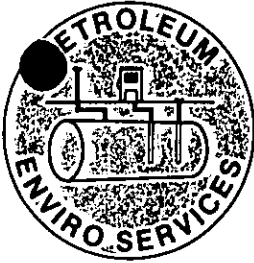
We note that your consultant recommends that remedial activities continue until such time as the site meets criteria, as per Alberta Environment's current Guidelines. As costs to date for remediation of your site exceed the maximum grant amount, the Program is not in a position to fund any more work. We will be closing the file and encourage you to work with Alberta Environment to complete the remediation project.

Yours truly,



Steve Hoare, C.E.T.  
Project Coordinator

Cc: Jeremy Lang, Stantec Consulting  
Kim Kirillo, Alberta Environment



#2, 10016 - 29A Avenue  
Edmonton, Alberta  
T6N 1A8

Tel.: (780) 461-4941  
Fax: (780) 461-6067



DIVISION OF ASM CORROSION CONTROL LTD



July 27, 2002

Best Copy Available

VWIJ2702.lam

Vaughn Wyant Investments Ltd.  
O/a Carstairs Ford Sales & Services Ltd.  
419 Brand Place  
Saskatoon, Saskatchewan  
S7J 5L6

Attention: Vaughn Wyant  
Owner

Re: Environmental Services - Site No. 9302  
Amendment to Phase II ESA Report No. E02/3607

*Send to AENVU  
central  
Report sent July 24  
also enclosed  
Addendum to  
report which was  
sent to you*

Further to a telephone conversation with the Safety Codes Council on July 24, 2002, a revision has been made to our report dated E-02/3607 dated May 27, 2002.

The revision addresses the reported values for Carbon Fraction F4. The values reported are F4 (C34 - C50). Both F4 (C34-C50) and F4G-SG(C50-C60) are provided in the laboratory results. After a telephone discussion with Enviro-Test Laboratories, the higher of the two (2) values should be used for comparison to the 2001, Risk Management Criteria. After reviewing the data, the corrections made altered the values slightly. However, Carbon Fraction F4 for all four (4) samples are still below criteria. A replacement page is attached for your files in Letter Attachment I.

We trust you will find our submission to be in order.

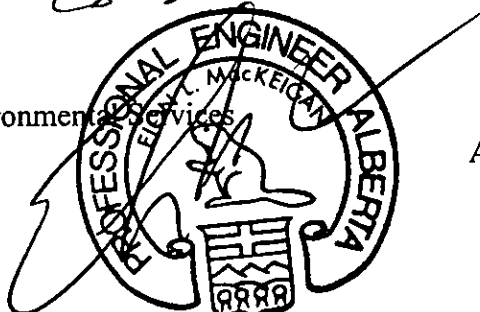
Yours truly,  
PETROLEUM ENVIRO SERVICES

Lisa Mazuryk  
Manager, Environmental Services

cc. Safety Codes Council  
Underground Tank Remediation Program  
14<sup>th</sup> Floor, Commerce Place  
10155 - 102 Street  
Edmonton, Alberta  
T5J 4L4

Attn: Karen Clarke  
Technical Coordinator

Encl.





LETTER ATTACHMENT I

Replacement Page for Report No. E-02/3706



Table S-1: SOIL SAMPLE LABORATORY RESULTS IN COMPARISON TO  
 GENERIC HYDROCARBON AND LEAD CRITERIA FOR FINE-GRAINED SOIL

(Risk Management Guidelines For Petroleum Storage Tank Sites; October 2001)

Borehole Location and Sample Depth (m)	Parameters										F4(>C34)	Field Vapour Reading	
	Commercial Land Use Criteria (mg/Kg)	Benzene	Toluene	Ethylbenzene	Xylene	Lead	F1(BTEX)	F2(>C10-C16)	F3(>C16-C34)	F4(>C34)			
BH 1 @ 2.25m	9	450	690	1500	260	660	1500	2500	6600				
BH 2 @ 1.5m	32	12	100	270	31	1200	1000	45	400				>100% L.E.L.
BH 5 @ 3.0m	11	39	45	320	41	310	1000	380	1400				>100% L.E.L.
BH 8 @ 3.0m	14	48	23	130	20	25	210	56	200				58% L.E.L.
	0.09	0.05	24	37	15	290	410	53	100				72% L.E.L.

Notes:

1. All numbers presented in mg/kg.
2. Levels which exceed allowable limits are noted in bold.
3. N/A - Denotes data not available.
4. NG - Denotes No Guideline required for this pathway.







OP ID 174779

## SAFETY CODES COUNCIL

Underground Tank Remediation Program  
14<sup>th</sup> Floor, Commerce Place  
10155 - 102 Street  
Edmonton Alberta T5J 4L4

Tel: 780/415-8671

Fax: 780/415-8664

July 24, 2002

*SOUTH REGION*  
Central Region  
Alberta Environment  
3<sup>rd</sup> Floor Provincial Building  
4920 - 51 Street  
Red Deer, AB T4N 6K8



Dear Karen Gervais:

### RE: Phase II Environmental Site Assessment Reports

Enclosed are the Phase II Environmental Site Assessment reports for the following sites, which were funded by the Underground Tank Remediation Program.

- Site #0715 - Clive Sales and Service Ltd.
- Site #5740 - Thorsby Mohawk
- Site #6993 - Rudes Esso and Car Wash
- Site #9342 - Former Service Station, Ponoka
- Site #9355 - Blair's Store & Coffee Shop
- Site #9025 - Bill's Service
- Site #9261 - Bauer Tire & Auto
- Site #9302 - Carstairs Ford Sales & Service Ltd.

We welcome any comments that you may wish to make.

Yours truly,

*Karen Clarke*

Karen Clarke  
Technical Coordinator

Enc.



#2, 10016 - 29A Avenue  
Edmonton, Alberta  
T6N 1A8

Tel.: (780) 461-4941  
Fax: (780) 461-6067



DIVISION OF ASM CORROSION CONTROL LTD



July 10, 2002

CFSSLJ1002 BJD

Vaughn Wyant Investments Ltd  
o/a Carstairs Ford Sales and Service Ltd.  
419 Brand Place  
Saskatoon, Saskatchewan  
S7J 5L6

Attention Vaughn Wyant  
Owner

Re Environmental Services - Site No 9302  
Phase II Environmental Site Assessment - Addendum to Report E-02/3607  
Lots 5 & 6, Block 28, Plan 3845 CO, 419 - 10th Avenue, Carstairs, Alberta

In response to the Safety Codes Council's letter of July 4, 2002, a revision has been made to our report E-02/3607 dated April 30, 2002. Please find the addendum of required revisions in Letter Attachment I.

Revisions include removal of the name of a Safety Codes Council Employee from the executive summary and modification to the reported laboratory data in the guideline charts found on pages 8 and 9 of the above mentioned report. Correction of the parameter F1(C6 - C10) to F1 (B T E X) has caused the groundwater sample from MW #1 to fall below the risk management criteria, and F1 criteria in BH #4 to fall below criteria. However, corrections made do not alter the overall conclusion that further delineation of the contaminant plume is required prior to submission of a remediation proposal.

We trust you will find our submission in order.

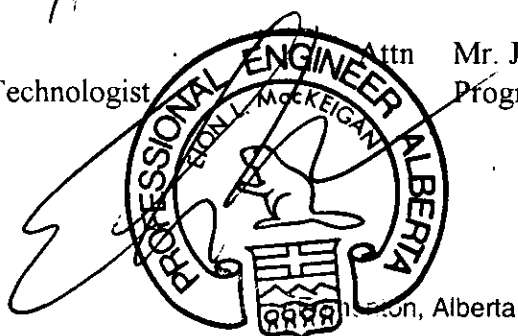
Yours Truly,  
PETROLEUM ENVIRO SERVICES

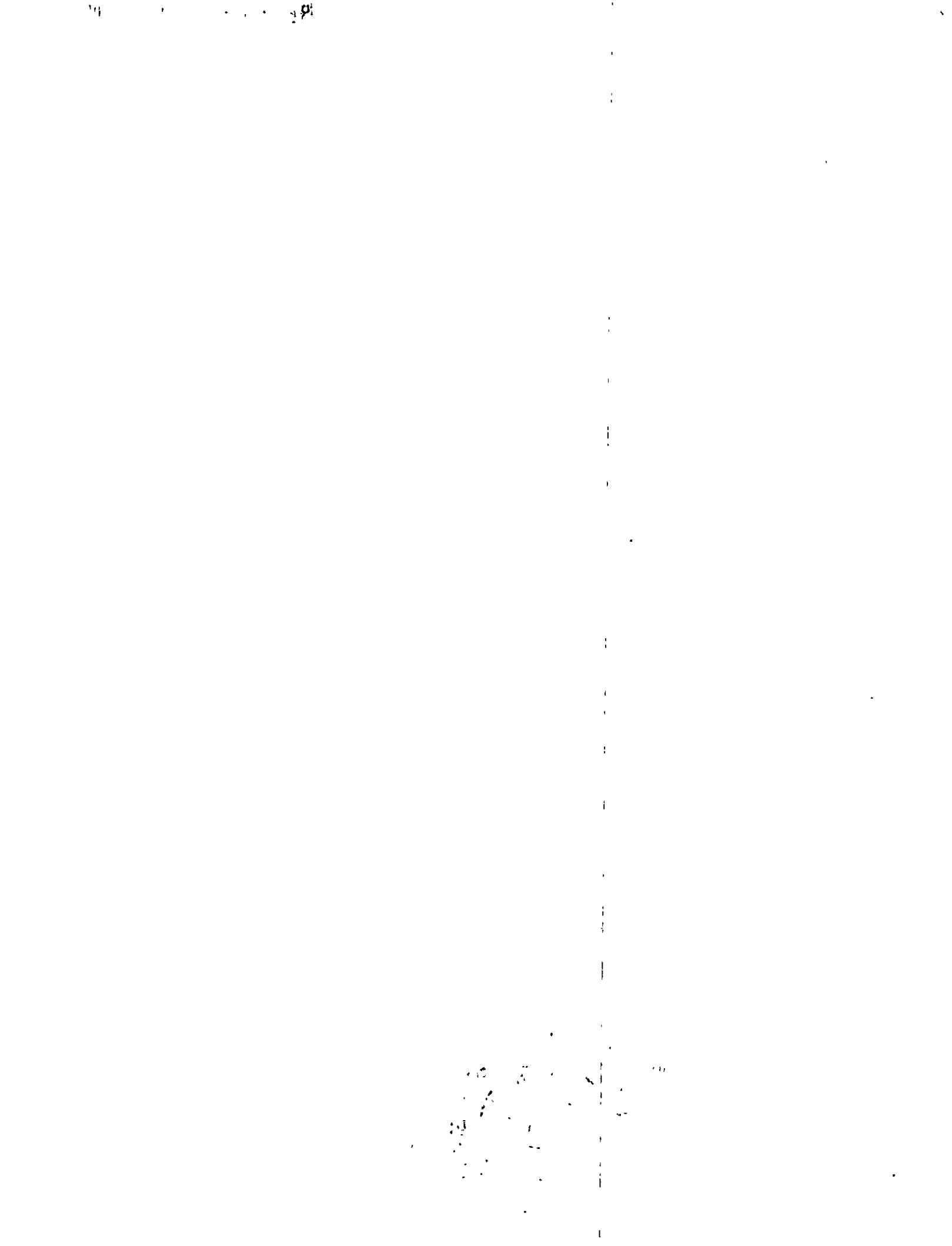
cc Safety Codes Council  
Underground Tank Remediation Program  
14th Floor, Commerce Place  
10155 - 102 Street  
Edmonton, Alberta, T5J 4L4

Brian Duff  
Environmental Technologist

Attn Mr. Joe Petrie, P. Geol., R.E.T.  
Program Manager

BJD/bjd  
Encl





LETTER ATTACHMENT I

Revised Report Pages



#2, 10016 - 29A Avenue  
Edmonton, Alberta  
T6N 1A8

Tel.: (780) 461-4941  
Fax: (780) 461-6067

DIVISION OF **ASM** CORROSION CONTROL LTD

May 27, 2002

E-02/3607

Vaughn Wyant Investments Ltd.  
419 Brand Place  
Saskatoon, Saskatchewan  
S7J 5L6

Attention Mr Vaughn Wyant  
Owner

Re. Environmental Services - Site No 9302  
Phase II Hydrocarbon Environmental Site Assessment (ESA)  
Lots 5 & 6, Block 28, Plan 3845 CO; 419 - 10<sup>th</sup> Avenue, Carstairs, Alberta

Enclosed is Petroleum Enviro Services' technical report E-02/3607 pertaining to the Phase II Hydrocarbon Environmental Site Assessment (ESA) conducted by our firm on the above noted property

Exploratory borehole drilling, soil vapour screening, soil sampling and the installation of three (3) groundwater monitoring wells were completed May 6, 2002, in response to the facsimile authorization received April 30, 2002 from the Safety Codes Council. The work was performed in accordance with our original quotation Q-3142 dated November 8, 2000 with addendum dated March 7, 2002 (Revised Fee Schedule).

Governing risk management criteria applied to the subject property have been identified as Generic Hydrocarbon and Lead Guidelines for Fine-Grained soil and Generic Hydrocarbon Criteria for Groundwater. Both residential and commercial land use criteria will be applied to the site as a residential property is located within 30 meters of the subject property

The information obtained during the Phase II Environmental Site Assessment showed there is petroleum product contamination beyond the governing risk management criteria for the subject location in three (3) of the four (4) soil samples submitted for the subject property

Water sample laboratory results from Monitoring Well (MW) #1 have revealed all parameters are below the governing risk management criteria for the well location. Commercial land use criteria has been compared to the laboratory results as the monitoring well is located in the commercial land use zone

Edmonton, Alberta

VAUGHN WYANT INVESTMENTS LTD.

May 27, 2002

Page 2

Prior to preparation of remediation recommendations for the subject site, further delineation of the contaminant plume for soil and groundwater is required

Invoice no.'s E-7051 and E-7052 for services rendered are also enclosed. We trust you will find our submission to be in order.

Yours truly,  
PETROLEUM ENVIRO SERVICES



Lisa Mazuryk  
Manager, Environmental Services

LAM/cb  
Encl.

cc. Safety Codes Council  
Underground Tank Remediation Program  
14<sup>th</sup> Floor, Commerce Place  
10155 - 102 Street  
Edmonton, Alberta  
T5J 4L4

Attn: Mr. Joe Petrie, P. Geol., R.E.T.  
Program Manager

OP

RECEIVED JUN 11 2002

ENVIRONMENTAL SERVICES  
PHASE II HYDROCARBON ENVIRONMENTAL SITE ASSESSMENT (ESA)

SITE NO. 9302

Lots 5 & 6, Block 28, Plan 3845 CO; 419 - 10<sup>th</sup> Avenue, Carstairs, Alberta

for

VAUGHN WYANT INVESTMENTS LTD.

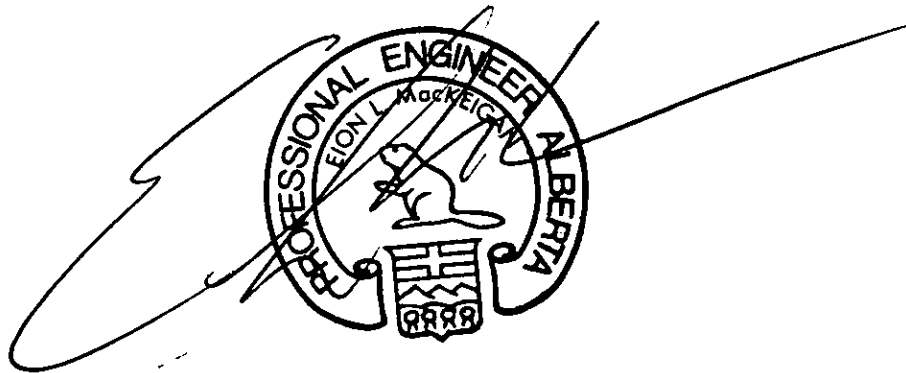
&

SAFETY CODES COUNCIL  
UNDERGROUND TANK REMEDIATION PROGRAM

Prepared for: Mr. Vaughn Wyant  
Owner  
Vaughn Wyant Investments Ltd.

Prepared by: Lisa Mazuryk  
Manager, Environmental Services  
Petroleum Enviro Services

Available for Public Distribution



Report No. E/02-3607

May 27, 2002

✦ PETROLEUM ENVIRO SERVICES ✦

A DIVISION OF ASM CORROSION CONTROL LTD.

1980





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- APPENDIX VIII Safety Codes Council Authorization Facsimile



## 1.0 EXECUTIVE SUMMARY

Petroleum Enviro Services was notified by the Safety Codes Council, via fax, to perform a Phase II Hydrocarbon Environmental Site Assessment (ESA) at the former Carstairs Ford Sales and Service Ltd site in Carstairs, Alberta

The subject site is located at 419 - 10<sup>th</sup> Avenue, in the central portion of the Town of Carstairs. The subject property is currently vacant. The buildings were demolished during the site decommission, however the concrete foundations remain. The remainder of the ground surface is covered by a mixture of asphalt and grass.

During the site decommission, approximately seven (7) years ago, the tanks, pump island and piping were removed and destroyed.

On-site drilling and soil sampling occurred May 7, 2002. Eight (8) exploratory boreholes were advanced on the property utilizing a truck-mounted solid stem auger rig. The boreholes were placed in the vicinity of the former underground storage tanks, pump island, on each concrete pad and near an old floor sump. Three (3) of the boreholes were completed as groundwater monitoring wells.

Soil samples were taken at regular intervals of 0.75 meters during drilling operations. On-site vapour screening was conducted on all samples for hydrocarbon vapour analysis using a portable RKI Eagle gas vapour probe c/w methane elimination.

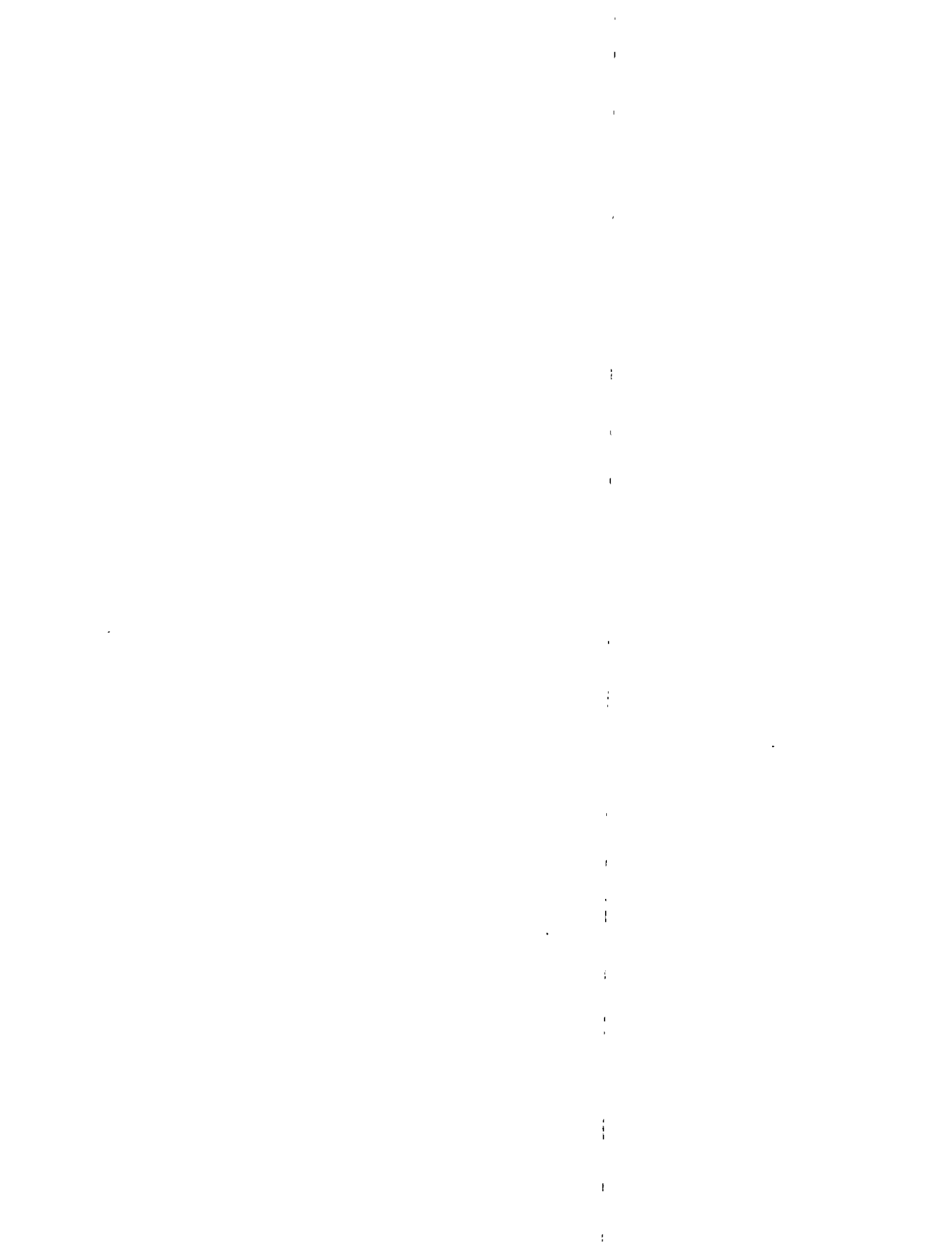
Four (4) soil samples with the highest vapour measurement from selected boreholes were submitted to the laboratory for analysis of B.T.E.X (Benzene, Toluene, Ethylbenzene, and Xylenes), Carbon Fractions F1 (B.T.E.X.), F1 (C6 - C10), F2 (C10 - C16), F3 (C16 - C34), F4 (C34 - C50), Lead, and particle size analysis.

A groundwater sample was taken from Monitoring Well (MW) #1, May 23, 2002 and analyzed for B.T.E.X compounds (Benzene, Toluene, Ethylbenzene, and Xylenes) and Carbon Fractions F1 (B.T.E.X.), F1 (C6 - C10) and F2 (C10 - C16).

After a careful comparison of the laboratory results to the new Alberta Environment Generic Hydrocarbon and Lead Criteria, the information obtained during the Phase II Environmental Site Assessment showed there is petroleum product contamination beyond the governing risk management criteria for the subject location in three (3) of the four (4) soil samples submitted for the subject property.

Water sample laboratory results from Monitoring Well (MW) #1 revealed all parameters for hydrocarbon contamination are below the governing risk management criteria. Commercial land use criteria has been compared to the laboratory results as the monitoring well is located in the commercial land use zone.

Prior to remediation of the subject site, further delineation of the contaminant plume in soil and groundwater is required.



## 2.0 INTRODUCTION

Petroleum Enviro Services, a division of ASM Corrosion Control Ltd, was notified by the Safety Codes Council, via fax, to perform a Phase II Hydrocarbon Environmental Site Assessment (ESA) at the former Carstairs Ford Sales and Service Ltd. site in Carstairs, Alberta. The subject property is located on Lots 5 and 6, Block 28, Plan 3845 CO; 419 - 10<sup>th</sup> Avenue, Carstairs, Alberta.

This ESA was performed under the Underground Tank Remediation Program, administered by the Safety Codes Council. The investigation was completed according to our proposal of November 8, 2000 and in conjunction with Alberta Environment's Risk Management Guidelines for Petroleum Storage Tank Sites - October 2001 (herein after referred to as the Guidelines.)

## 3.0 BACKGROUND

Carstairs Ford Sales & Service Ltd occupied Lots 5 and 6 between the years 1980 to 1995 when the buildings and fuel dispensing system were decommissioned. General activities on the property included typical vehicle sales, service and repair.

Prior to Carstairs Ford Sales and Service Ltd., the subject site previously operated as a privately owned service station for approximately 20 years.

## 4.0 SITE DESCRIPTION

### 4.1 General Site Description

The subject site is located at 419 - 10<sup>th</sup> Avenue, in the central portion of the Town of Carstairs. Adjacent to the subject site, South on Lots 7 and 8, is Five Star Movies, also owned and operated by Vaughn Wyant Investments Ltd.

Lots 5 and 6 are currently vacant. The buildings were demolished during the site decommission, however the concrete foundations remain. The remainder of the ground surface is covered by a mixture of asphalt and grass. Fronting onto 10<sup>th</sup> Avenue is an asphalt pad layer approximately 100mm thick. The rear portion of the property is surfaced by grass.





All utilities to the subject site have been disconnected and/or removed during the site decommission. Water and sewer entered the property from 10<sup>th</sup> Avenue between the former Ford Sales and Service and Five Star Movies. Power was overhead and telephone and natural gas entered underground from the alley.

Other relevant site conditions noted at the time of investigation included: no surface bodies of water within 300 meters and no apparent groundwater use within the Town of Carstairs. The Town of Carstairs receives water from the Regional Waterline from Innisfail.

#### **4.2 Petroleum Storage Tank Facilities**

Due to a lack of records, very little information was found in regards to the size, age and number of underground petroleum storage tanks that were present on the subject property. From the owners best recollection, two (2) or three (3) Petroleum Storage Tanks (PST) were on-site that contained gasoline and diesel. The tanks were approximately 2000 gallons each.

During the site decommission, the tanks, pump island and piping were removed and destroyed approximately seven (7) years ago. During our site visit a dirt patch, located at the East edge of the property, was visible indicating the former tank excavation (Refer to Appendix II - Site Layout Drawing).

### **5.0 SITE INVESTIGATIONS**

#### **5.1 Field Procedures**

Prior to drilling activities to investigate for subsurface soil/water contamination Alberta 1<sup>st</sup> Call was notified to locate the underground utilities.

On-site drilling and soil sampling occurred May 7, 2002. Eight (8) exploratory boreholes were advanced on the property utilizing a truck-mounted solid stem auger rig. The boreholes were placed in the vicinity of the former underground storage tanks, pump island, on each concrete pad and near an old floor sump. Three (3) of the boreholes were completed as groundwater monitoring wells. (See Appendix II - Site layout drawing for borehole placement). The remaining five (5) boreholes were backfilled and sealed with bentonite plugs.



Soil samples were taken at regular intervals of 0.75 meters during drilling operations. Samples were removed from the auger flytes, examined and lithologically logged (See Appendix III - Lithologic Borehole Logs). On-site vapour screening was conducted on all samples for hydrocarbon vapour analysis using a portable RKI Eagle gas vapour probe c/w methane elimination. Sample depths and results of vapour analysis are recorded in Appendix IV - Hydrocarbon Vapour Measurements.

Four (4) soil samples with the highest vapour measurement were submitted to the laboratory for analysis of B T E X (Benzene, Toluene, Ethylbenzene, and Xylenes), Carbon Fractions F1 (B T E X), F1 (C6 - C10), F2 (C10 - C16), F3 (C16 - C34), F4 (C34 - C50), and Lead. Three (3) soil samples were submitted for particle size analysis.

A groundwater sample was taken from Monitoring Well (MW) #1, May 24, 2002 and analyzed for B T E X compounds (Benzene, Toluene, Ethylbenzene, and Xylenes) and Carbon Fractions F1 (B.T.E.X.), F1 (C6 - C10) and F2 (C10 - C16). MW #1 was chosen for sampling based on the high soil vapour readings recorded and its' close proximity to the former tank location.

## 5.2 Data Evaluation

### 5.2.1 Soil Stratigraphy

Beneath the asphalt and/or concrete, the stratigraphic unit below the subject property consisted of a thin unit of gravel fill or topsoil (0.1m to 0.75m thick) overlying a silty clay till unit which extended below the maximum depth of investigation (6.0m). A fine-grained sand layer was encountered at varying depth in the central and Eastern portion of the subject site. The sand layer was at its' greatest thickness of 1.4 meters thick starting at 1.1 meters below surface in BH #3. Thinner, corresponding sand lenses, were found at similar depths ranging from 1.0 m to 2.5 meters depth in boreholes #4, #6, and #7. Detailed descriptions of the soil stratigraphy at each borehole location are presented in Appendix III - Lithologic Borehole Logs.

### 5.2.2 Groundwater Monitoring

Three (3) piezometers (groundwater monitoring wells) were installed on the subject site. This was performed to obtain information on the depth of the water table, the local groundwater gradient (flow direction) and to detect the presence of any free product floating on the groundwater surface. The piezometers were constructed out of 51 mm diameter PVC pipe with approximately 4.5 meters of machine-slotted screen. A uniform sand pack was installed to at least 300 mm above the slotted section and a bentonite chip seal was placed to surface. The surface was completed with a locking cap and a flush mount bolt-down road box.



The piezometers were installed to 6.0 meters depth in Borehole (BH) BH #2, BH #4, and BH #7 May 6, 2002. The top of the casing for each well was surveyed to establish their elevations relative to a temporary benchmark (assumed elevation 500.000 meters using the fire hydrant on the corner of 10<sup>th</sup> Ave. and Nanton St.) on May 7, 2002. The wells were monitored 16 days after drilling, on May 23, 2002 for depth to groundwater, to verify the presence/absence of phase-separated hydrocarbon on the water surface and to obtain a groundwater sample.

Groundwater levels were recorded May 22, 2002 and MW #1 was purged (Refer to Appendix V - for groundwater monitoring data). A groundwater sample from MW #1 was taken May 23, 2002 using a dedicated bailer. The sample was transferred to laboratory jars, stored on ice and shipped to the laboratory.

Groundwater levels taken May 22, 2002 were utilized to determine the local groundwater gradient. From initial readings the groundwater gradient is flowing in a Southwest direction. Continuous monitoring of groundwater levels during seasonal flux is recommended to obtain true groundwater flow direction as the water table is still unstable and well recovery may be delayed.

### **5.2.3 Hydrocarbon Vapour Analysis**

Field vapour readings indicated the presence of hydrocarbon vapours in the soil near the former underground tank location, on the East portion of the property. Boreholes #1, #2, #5 and #8 all recorded vapour levels in the Lower Explosive Limit (L.E.L.) range. Peak readings of greater than 100 % L.E.L. were recorded in BH #1 and BH #2. Test locations near the center and Western half of the property indicated trace vapour readings, with slightly higher reading of 70 ppm at BH #7's location. Borehole #7 was placed near an old floor sump in the former service bay. Drilling directly beside the sump was not possible due to the potential of running into dismantled utility lines and debris from the building demolition. Further investigation in this area is recommended to determine the presence or absence of hydrocarbon contamination.

High hydrocarbon vapour readings were recorded from surface to 4.0 meters depth at the tank excavation location and to 4.5 meters depth North of the tank excavation. Initial assessments indicate that the contaminant plume is moving in a Northeasterly direction away from the suspected source; the former petroleum storage tanks.



#### **5.2.4 Soil and Groundwater Laboratory Analysis**

Subsoil samples were selected for laboratory analysis from the highest area of suspected hydrocarbon contamination. Four (4) soil samples with the highest field vapour readings were submitted for laboratory analysis of B T E X (Benzene, Toluene, Ethylbenzene, and Xylenes), Carbon Fractions F1 (B.T.E.X.), F1 (C6 - C10), F2 (C10 - C16), F3 (C16 - C34), F4 (C34 - C50), and Lead and particle size analysis.

Various fine-grained sand lenses found in the center and West portion of the property were not present in the area of contamination. Trace hydrocarbon vapours were detected in these units. A soil sample from this sand unit was submitted for particle size analysis along with the clay till soil which is controlling the current path of the contaminant plume. Particle size analysis results for all soil samples confirmed fine-grained soil, BH #4 at 2.25 meters had the largest particle size analysis result at 38% sands.

A groundwater sample was taken from MW #1, May 24, 2002 and analyzed for B T E X compounds (Benzene, Toluene, Ethylbenzene, and Xylenes) and Carbon Fractions F1 (B T E X), F1 (C6 - C10) and F2 (C10 - C16).

Soil sample laboratory results revealed elevated levels of Benzene and Carbon Fraction F1 (B T E X). Water sample laboratory results revealed levels below criteria in all parameters.

### **6.0 SITE ASSESSMENT**

#### **6.1 Site Sensitivity Analysis**

##### **6.2.1 Land Use Assessment**

The subject site and the property North, East, and South are zoned for commercial land use, as confirmed by the Town of Carstairs. The current businesses bordering the property to the North is a law office and South is a movie rentals store. East, across 10<sup>th</sup> Avenue, is the parking lot for a grocery store. West of the subject site, across the alley, is a green zone and is currently an urban park. The guidelines classify urban parks under residential land use.

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As stated in the Guidelines, "where the PST site is adjacent to a property where more stringent remediation criteria apply, the remediation criteria for the adjacent property must be applied to a distance of 30 meters from the shared property line. Thirty (30) meters from the residential property line, assumed to be at the West edge of the alley, cuts across the subject site at approximately the East edge of the concrete foundation. Therefore two (2) sets of criteria will be applied at this site; one (1) set for commercial land use East of the "30 meter mark" and one (1) set for residential land use West of the "30 meter mark". Refer to Letter Attachment II - Site Layout Drawing to see where the two (2) sets of criteria are applied.

During our site visit of May 6, 2002, it was noted that a service station, with operating underground petroleum storage tanks, is located approximately 600 meters Southeast of the subject site.

The new 2001 Alberta Environment Guidelines have allowed for several exposure pathways, however, in this case, protection of potable groundwater and protection of groundwater for aquatic life are not relative pathways. The later pathway can be excluded as there are no surface water bodies within 300 m downgradient of the site.

Groundwater investigations for the subject site has confirmed no water wells are located on or near the subject site. The Town of Carstairs receives their drinking water from the Regional Waterline from Innisfail. The Town Administrative Office has confirmed one (1) groundwater well South of Town that is still in use. The well in question is located over 1.8 km from the subject site and is not a concern.

Through the risk management process it has been determined that laboratory results will be compared to Generic Hydrocarbon and Lead Criteria for Fine-Grained Soil. The most stringent criteria for the site is the inhalation slab-on-grade exposure pathway for residential land use West of the "30 meter mark" and commercial land use criteria for the area East of the "30 meter mark"

## **6.2 Hydrocarbon Contamination in Relation to Risk Management Guidelines**

Soil sample laboratory results were received May 17, 2002. After a careful comparison of the laboratory results to the new Alberta Environment Generic Hydrocarbon and Lead Criteria, soil samples from boreholes #1, #2, and #5 exceeded the generic criteria.

The following tables, S-1 and W-1, display a detailed comparison of laboratory results to their representative criteria.



Table S-1: SOIL SAMPLE LABORATORY RESULTS IN COMPARISON TO  
 GENERIC HYDROCARBON AND LEAD CRITERIA FOR FINE-GRAINED SOIL  
 (Risk Management Guidelines For Petroleum Storage Tank Sites, October 2001)

Borehole Location and Sample Depth (m)	Parameters										Field Vapour Reading	
	Commercial Land Use Criteria (mg/Kg)	Benzene	Toluene	Ethylbenzene	Xylene	Lead	F1(BTEX)	F2 (C10-C16)	F3 (C16-C34)	F4 (C34)		
BH 1 @ 2.25m	9	450	690	1500	260	660	1500	2500	6600			
BH 2 @ 1.5m	32	12	100	270	31	1200	1200	45	21	>100% L.E.L.		
BH 5 @ 3.0m	11	39	45	320	41	310	1000	380	190	>100% L.E.L.		
BH 8 @ 3.0m	14	48	23	130	20	25	210	56	46	58% L.E.L.		
	0.09	0.05	24	37	15	( 290 )	410	53	41	72% L.E.L.		

Notes:

- 1 All numbers presented in mg/kg.
2. Levels which exceed allowable limits are noted in **bold**.
- 3 N/A - Denotes data not available.
4. NG - Denotes No Guideline required for this pathway



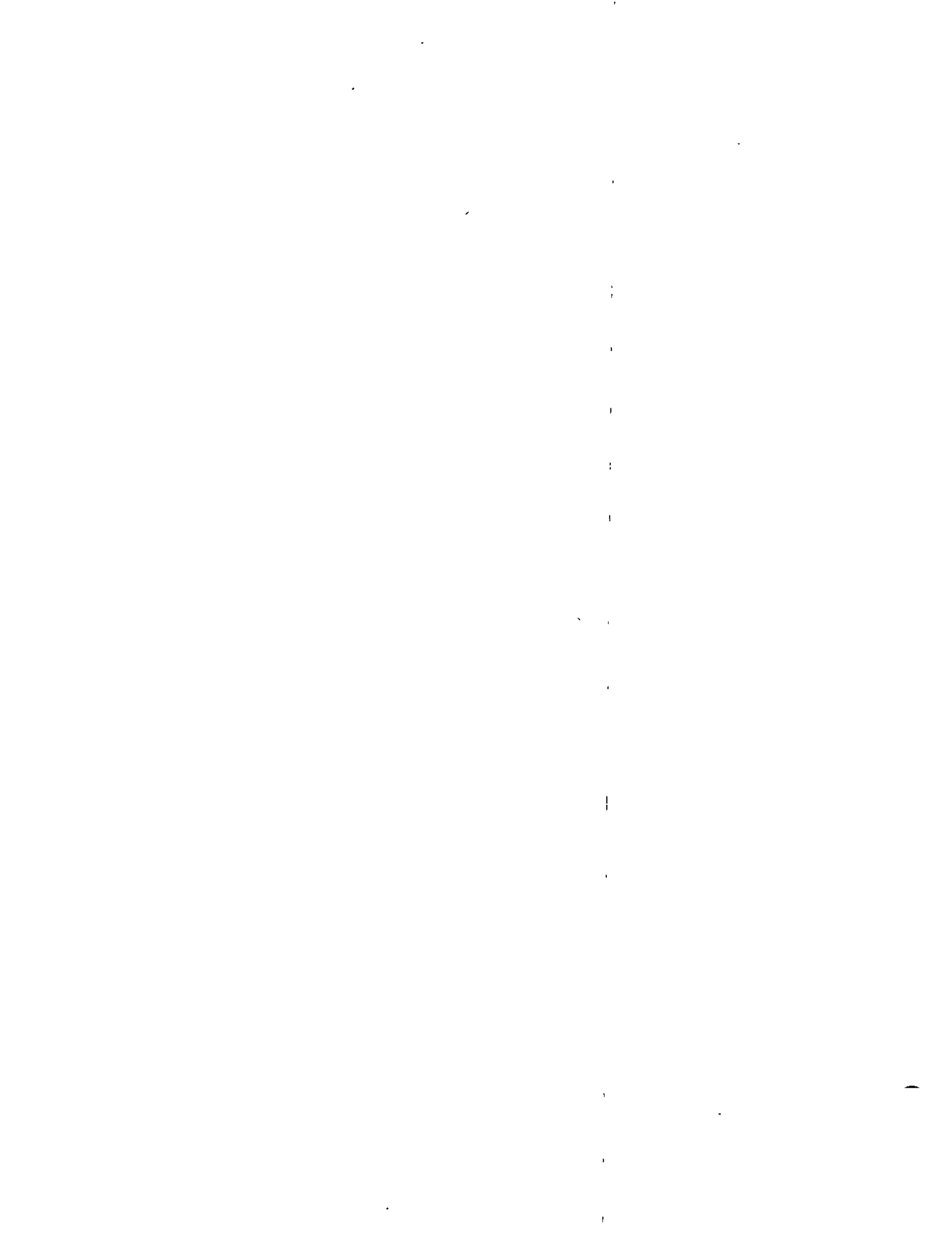
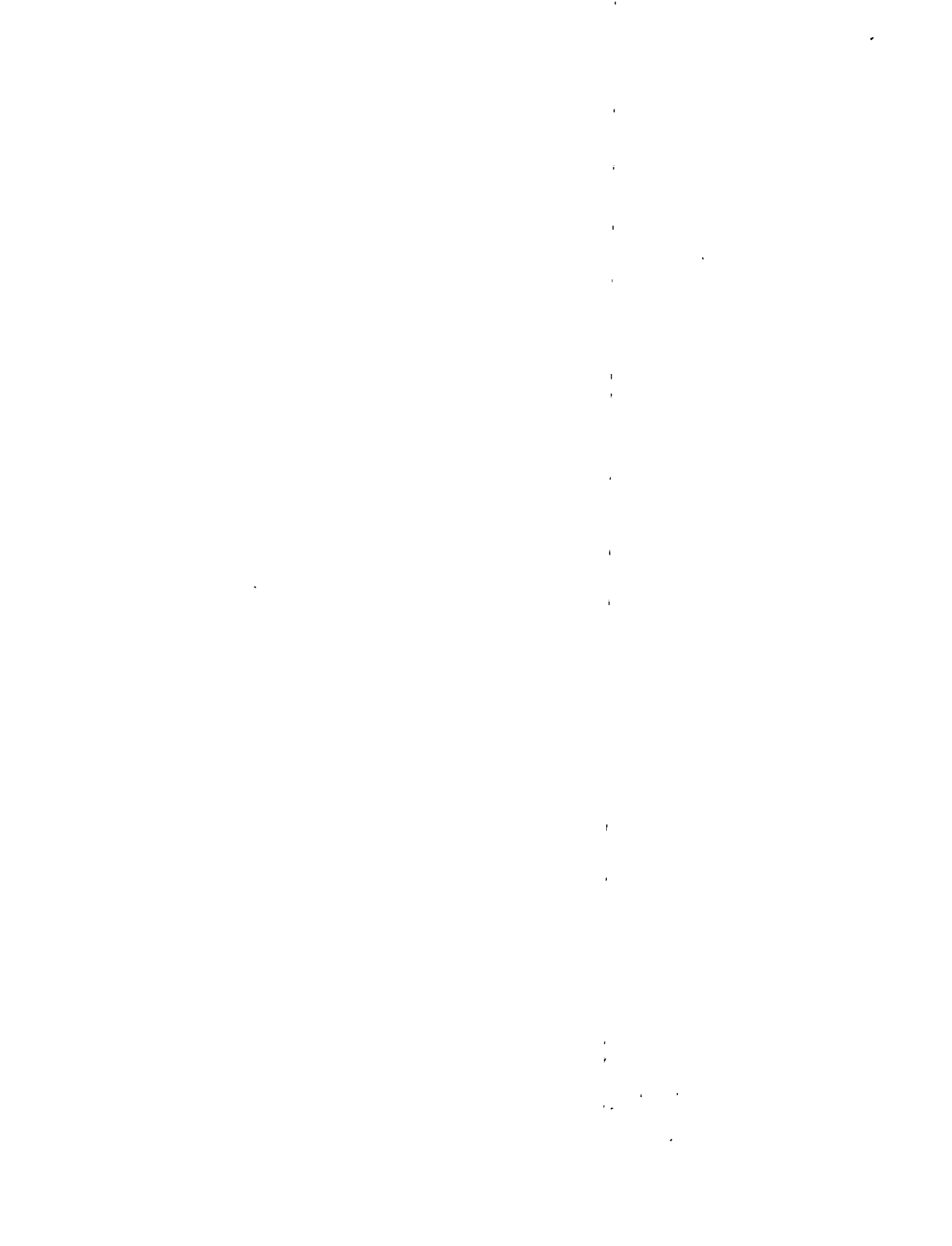


Table W-1: WATER SAMPLE LABORATORY RESULTS IN COMPARISON TO  
 GENERIC HYDROCARBON AND LEAD CRITERIA FOR FINE-GRAINED SOIL  
 (Risk Management Guidelines For Petroleum Storage Tank Sites, October 2001)

Monitoring Well Location	Parameters						
	Benzene	Toluene	Ethylbenzene	Xylene	F1(BTEX)	F2 (C10-C16)	
	Commercial Land Use Criteria (mg/Kg)	16	342	NG	NG	24	18
MW # 1	14	0.12	1.5	3.6	19	1.8	

- Notes:**
1. All numbers presented in mg/kg.
  2. Levels which exceed allowable limits are noted in **bold**.
  3. N/A - Denotes data not available
  4. NG - Denotes No Guideline required for this pathway.



## 7.0 CONCLUSION AND RECOMMENDATIONS

The information obtained during the Phase II Hydrocarbon Environmental Site Assessment showed there is petroleum product contamination beyond the governing risk management criteria for the subject location in three (3) of the four (4) soil samples submitted for the subject property

Water sample laboratory results revealed levels below the governing risk management criteria in all parameters. Commercial land use criteria has been compared to the laboratory results as the monitoring well is located in the commercial land use zone

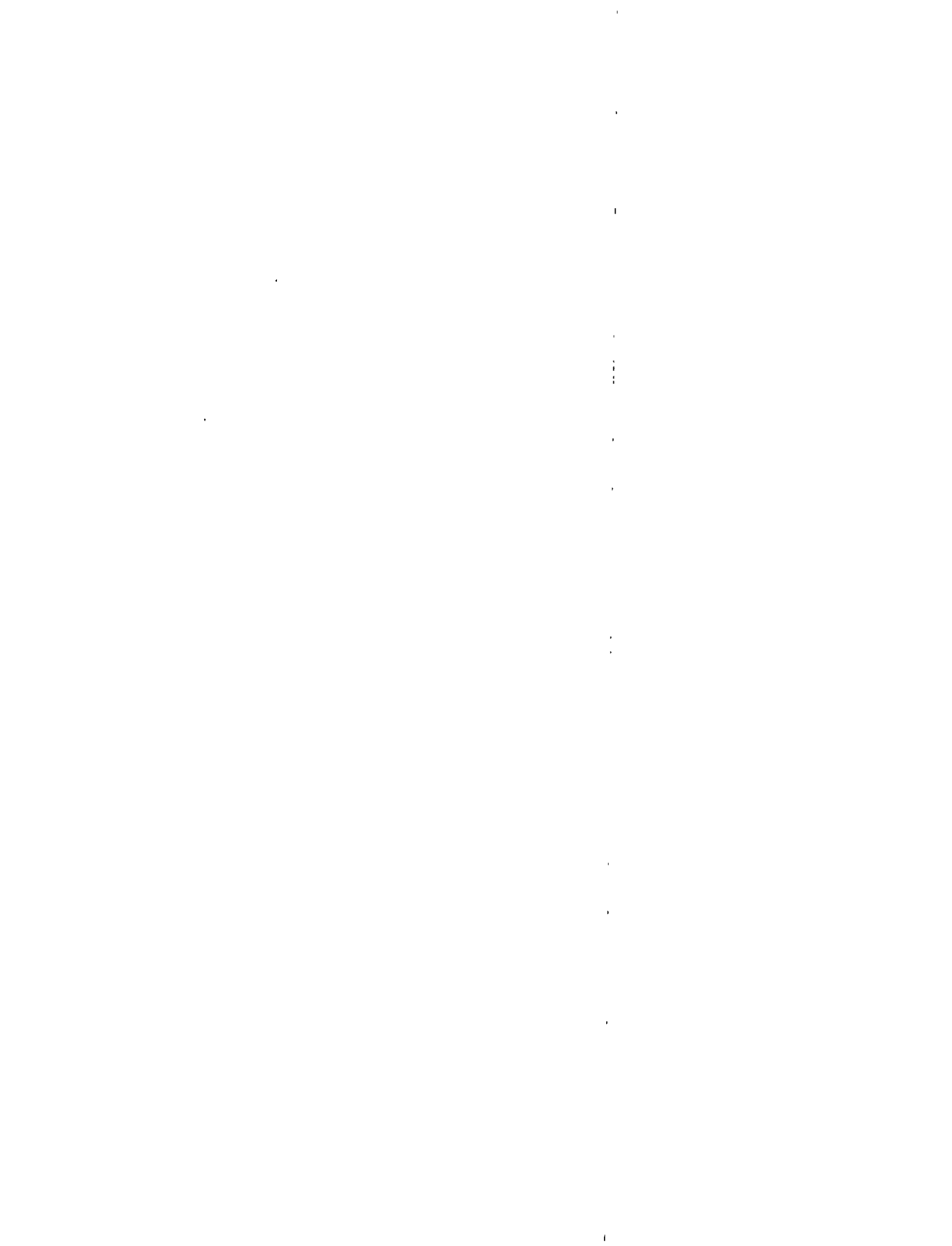
Prior to remediation of the subject site, further delineation of the contaminant plume for soil and groundwater is recommended

Costs associated with further delineation and estimates for remediation will be forwarded under a separate cover

## 8.0 CLOSURE/LIMITATIONS

This report was prepared for the exclusive use of Carstairs Ford Sales and Service and its authorized agents Petroleum Enviro Services ( div of A.S.M Corrosion Control Ltd ) or its employees will not be responsible for any use of the information in this report, or any reliance on or decisions made based on it, by authorized third parties.

There is no warranty, expressed or implied by Petroleum Enviro Services that this investigation has identified all potential contamination on or beneath the subject site. The assessment of environmental conditions at this site has been made using information supplied by the results of borehole investigations and chemical analysis of soil samples retrieved on the dates specified. No assurance is made regarding changes in conditions subsequent to the time of investigation.





VAUGHN WYANT INVESTMENTS LTD.

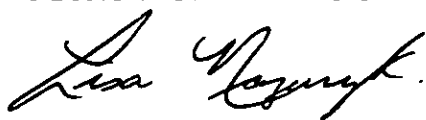
Environmental Services

May 27, 2002; E-02/3607

Page 11

Although the data collected were only at site-specific locations, the reported information is believed to provide a reasonable representation of the general environmental conditions at this site. The findings outlined herein do not preclude the existence of subsurface contamination in areas of the site which were not specifically investigated. In addition, the existence of contaminants other than those addressed in this report has not been evaluated.

Respectfully submitted,  
PETROLEUM ENVIRO SERVICES



Lisa Mazuryk  
Manger, Environmental Services



**APPENDIX I**  
**Selected Site Photographs**





Photo No. 1: May 6, 2002; Phase II Hydrocarbon Environmental Site Assessment  
Lots 5 & 6, Block 28, Plan 3845 CO; 419 - 10<sup>th</sup> Avenue, Carstairs, Alberta  
Looking Southwest from the Co-op Parking Lot. General Site View of Vacant Lot 5 & 6.



Photo No. 2: May 6, 2002; Phase II Hydrocarbon Environmental Site Assessment  
Lots 5 & 6, Block 28, Plan 3845 CO; 419 - 10<sup>th</sup> Avenue, Carstairs, Alberta  
Looking West. Close-up of Above Photo. General Site View.





Photo No. 3: May 6, 2002; Phase II Hydrocarbon Environmental Site Assessment  
Lots 5 & 6, Block 28, Plan 3845 CO; 419 - 10<sup>th</sup> Avenue, Carstairs, Alberta  
Looking North Along East Property Line.



Photo No. 4: May 6, 2002; Phase II Hydrocarbon Environmental Site Assessment  
Lots 5 & 6, Block 28, Plan 3845 CO; 419 - 10<sup>th</sup> Avenue, Carstairs, Alberta  
Looking North Along West Property Line.







Photo No. 5: May 6, 2002; Phase II Hydrocarbon Environmental Site Assessment  
Lots 5 & 6, Block 28, Plan 3845 CO; 419 - 10<sup>th</sup> Avenue, Carstairs, Alberta  
Looking East along South Property Line of Lot 6.  
Note: Five Star Movies in Blue and White Stripped Building.



Photo No. 6: May 6, 2002; Phase II Hydrocarbon Environmental Site Assessment  
Lots 5 & 6, Block 28, Plan 3845 CO; 419 - 10<sup>th</sup> Avenue, Carstairs, Alberta  
Looking East Along North Property Line of Lot 5.





Photo No. 7: May 6, 2002; Phase II Hydrocarbon Environmental Site Assessment  
Lots 5 & 6, Block 28, Plan 3845 CO; 419 - 10<sup>th</sup> Avenue, Carstairs, Alberta  
Looking West. Drilling Borehole #1.



Photo No. 8: May 6, 2002; Phase II Hydrocarbon Environmental Site Assessment  
Lots 5 & 6, Block 28, Plan 3845 CO; 419 - 10<sup>th</sup> Avenue, Carstairs, Alberta  
Looking North. Drilling Borehole #2/MW #1.  
View of First Auger Flyte. Note: Heavy Black Staining.







Photo No. 9: May 6, 2002; Phase II Hydrocarbon Environmental Site Assessment  
Lots 5 & 6, Block 28, Plan 3845 CO; 419 - 10<sup>th</sup> Avenue, Carstairs, Alberta  
Borehole # 2/MW #1. View of PES Staff Collecting Soil Samples.



Photo No. 10: May 6, 2002; Phase II Hydrocarbon Environmental Site Assessment  
Lots 5 & 6, Block 28, Plan 3845 CO; 419 - 10<sup>th</sup> Avenue, Carstairs, Alberta  
Looking West. Drilling Borehole #3.





Photo No. 11: May 6, 2002; Phase II Hydrocarbon Environmental Site Assessment  
Lots 5 & 6, Block 28, Plan 3845 CO; 419 - 10<sup>th</sup> Avenue, Carstairs, Alberta  
Looking East. Drilling Borehole # 5.



Photo No. 12: May 6, 2002; Phase II Hydrocarbon Environmental Site Assessment  
Lots 5 & 6, Block 28, Plan 3845 CO; 419 - 10<sup>th</sup> Avenue, Carstairs, Alberta  
Looking North along Alley. Drilling Borehole #7/MW # 3..







Photo No. 13: May 6, 2002; Phase II Hydrocarbon Environmental Site Assessment  
Lots 5 & 6, Block 28, Plan 3845 CO; 419 - 10<sup>th</sup> Avenue, Carstairs, Alberta  
Looking West. Drilling Borehole #7/MW #3.  
Note: View of Urban Park West of the Subject Property, Across the Alley.



Photo No. 14: May 6, 2002; Phase II Hydrocarbon Environmental Site Assessment  
Lots 5 & 6, Block 28, Plan 3845 CO; 419 - 10<sup>th</sup> Avenue, Carstairs, Alberta  
Looking West. Drilling Borehole #8.



## **APPENDIX II**

### **Drawings**

- Site Layout Drawing
- Town of Carstairs Plot Plan Map



CO-OP PARKING LOT

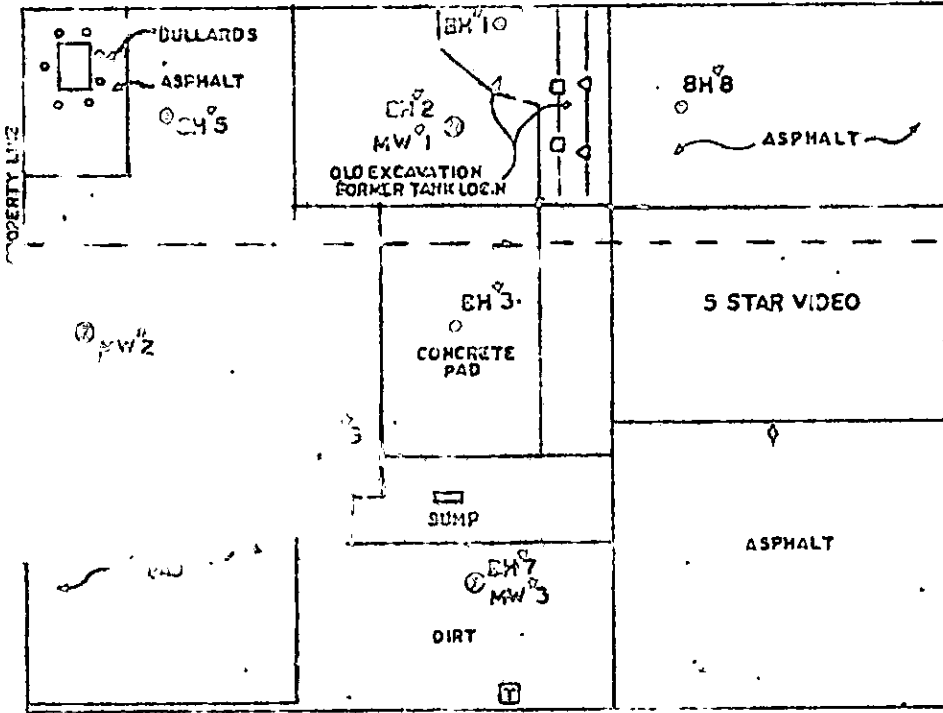


10<sup>th</sup> AVE

Best Copy Available

SIDE WALK

LAW OFFICE



RESTAURANT

Commercial Residential PARKING LOT

5 STAR VIDEO

ASPHALT

ALLEY

PARK

LEGEND

- ⊙ BORE HOLE
- ⊕ MONITORING WELL
- ⊗ POWER POLE
- ◇— GAS LINE
- SEWER LINE
- △— WATER LINE

No.	REVISION	DATE	BY	No.	REVISION	DATE	BY



FOR  
**VAUGHN VYANT INVESTMENTS LTD**  
 SITE No. 9302

**SITE LAYOUT DRAWING**  
**CARSTAIRS FORD SALES & SERVICE LTD**  
 419 - 10<sup>th</sup> AVE  
 CARSTAIRS, ALBERTA

DESIGNED BY: SCALE: 1:400  
 DRAWN BY: G.V.D DATE: 02-05-10

DRAWING No.  
**3449-A**



TOWN OF CARSTAIRS  
TENTATIVE FUTURE GROWTH

S.W.1/4 SEC.21-30-1-6



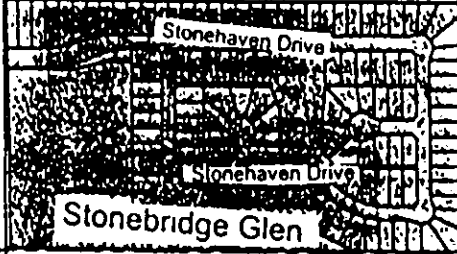
-  REGISTERED
-  APPROVED
-  CONCEPTUAL



CONDOMINIUMS  
(APPROX 200 UNITS)  
Conceptual Subdivision

Best Copy Available

Carstairs Golf Club



16  
30-1-5

SUBJECT SITE

Campground

School

SECONDARY HIGHWAY 961

Arena

Conceptual Subdivision

9  
30-1-5

Conceptual Subdivision

Carriage Lane

Conceptual Subdivision

30-1-5

Fire Hall

Scout Hall

Curling Rink

Carstairs Links

Conceptual Subdivision

Conceptual Subdivision

Beckner Crescent

Slicer Way

HOPFIELD DR

HOPFIELD DR

HOPFIELD DR

HOPFIELD DR

HOPFIELD DR

HOPFIELD DR

HOPFIELD DR

HOPFIELD DR

HOPFIELD DR

HOPFIELD DR

HOPFIELD DR

HOPFIELD DR

HOPFIELD DR

HOPFIELD DR

HOPFIELD DR

HOPFIELD DR

HOPFIELD DR

HOPFIELD DR

HOPFIELD DR

HOPFIELD DR

HOPFIELD DR

Community Hall

LOCKER WAY

LOCKER WAY

LOCKER WAY

LOCKER WAY

LOCKER WAY

LOCKER WAY

LOCKER WAY

LOCKER WAY

LOCKER WAY

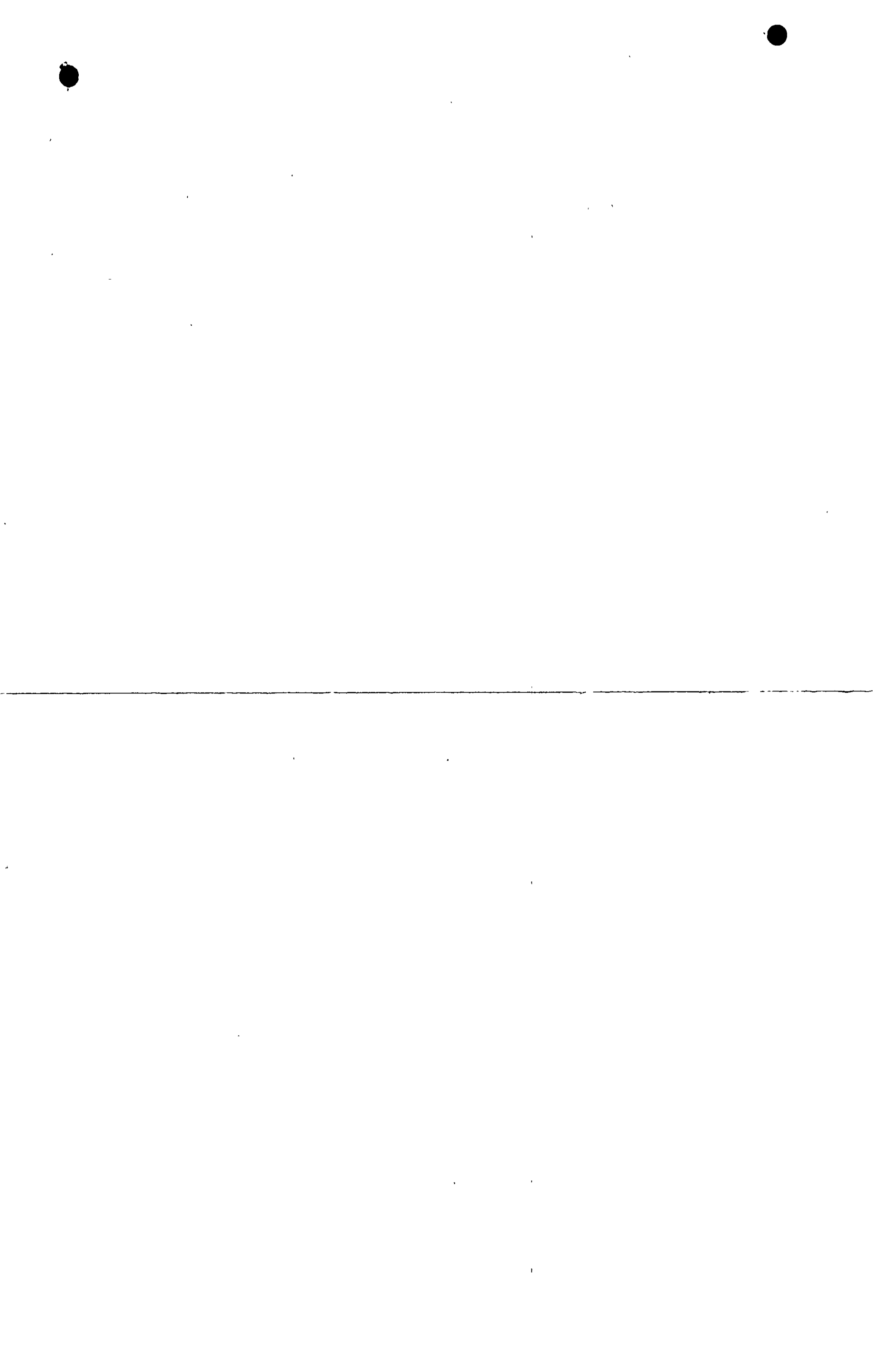
HIGHWAY 2A

SECONDARY HIGHWAY 961

HOPFIELD DR

HOPFIELD DR

HOPFIELD DR





**APPENDIX III**

**Lithologic Borehole Logs**



Reference No: 9302

# Log of Borehole: BH #1

Project: Phase II ESA

Client: Carstairs Ford Sales & Service

Location: Carstairs, Alberta

Technologist: Lisa Mazuryk

SUBSURFACE PROFILE			SOIL SAMPLE		VAPOUR ANALYSIS		Well Data	NOTES
Depth (ft)	Symbol	Description	Depth (m)	Sample No.	Type	LOWER EXPLOSIVE LIMIT % 10 30 50 70 90		
0		Ground Surface	0					Borehole sealed at surface with bentonite
0-1		Gravel						
1-2		Clay Fill						Soil sample taken at 2.25m - BTEX, Total Volatile and Extractable Hydrocarbons, Lead.
2-3		Soft, wet clay, black stained, strong hydrocarbon odour		1	●	920		
3-4				2	●	100		
4-5				3	●	100		Cuttings used as backfill
5-6		Clay Till						
6-7		Native medium/light brown clay, moist, sandy, iron oxidation		4	●	26		
7-8				5	●	260		
8-9		Clay Till						Bottom of borehole sealed with bentonite
9-10		Medium brown clay stiff		6	●	180		
10-11		Clay Till						
11-12		Medium/dark brown clay, stiff		7	●	410		
12-13				8	●	300		
13-14		Clay Till						
14-15		Medium brown clay stiff						
15-16		Clay Till						
16-17		Medium/dark brown clay, stiff						
17-18								
18-19								
19-20								
20-21		End of Borehole						
21-22								
22-23								

Drill Method: Solid-Stem Auger

Drill Date: May 6, 2002

Hole Size: 6"



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 Edmonton, Alberta  
 T6N 1A8

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Sheet: 1 of 1



Reference No: 9302

# Log of Borehole: BH #2/MW #1

Project: Phase II ESA

Client: Carstairs Ford Sales & Service

Location: Carstairs, Alberta

Technologist: Lisa Mazuryk

SUBSURFACE PROFILE		SOIL SAMPLE		VAPOUR ANALYSIS		Well Data	NOTES	
Depth (ft)	Symbol	Description	Depth (m)	Sample No.	Type			LOWER EXPLOSIVE LIMIT
								10 30 50 70 90 % PPM ppm 100 300 500 700 900
0		Ground Surface	0					
0-1		Concrete						
1-2		Gravel Fill Dark/black staining, hydrocarbon odour						
2-3		Clay Fill						
3-7		Black/dark staining, silty clay, sticky, frost, strong hydrocarbon odour	1	1	S	95	Borehole seal to 0.3m below surface. Flush mount road box installed	
7-12		Clay Till						
12-15		Native light brown clay and till, marbled staining-mostly black, small amount of organics	2	2	S	100	Soil sample taken at 1.5m - BTEX, Total Volatile and Extractable Hydrocarbons, Lead	
15-17		Clay Till						
17-18		Medium brown clay till, oxidation, stiff, trace sand	3	3	S	100	Particle Size taken @2.3	
18-20		End of Borehole	4	4	S	77	Sand pack from 1.3m to well bottom	
20-22			5	5	S	450	Well screened from 1.5m to 4.5m	
22-24			6	6	S	55		

Drill Method: Solid-Stem Auger

Drill Date: May 6, 2002

Hole Size: 6"



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Reference No: 9302

## Log of Borehole: BH #3

Project: Phase II ESA

Client: Carstairs Ford Sales & Service

Location: Carstairs, Alberta

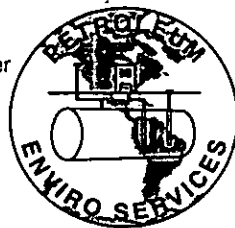
Technologist: Lisa Mazuryk

SUBSURFACE PROFILE			SOIL SAMPLE		VAPOUR ANALYSIS					Well Data	NOTES		
Depth (ft)	Symbol	Description	Depth (m)	Sample No.	Type	LOWER EXPLOSIVE LIMIT							
						10	30	50	70			90	
						PPM ppm							
						100	300	500	700	900			
0		Ground Surface	0									Borehole sealed at surface with bentonite	
		Concrete											
		Gravel Fill											
1													
2		Topsoil		1	S	5							
		Black, organics											
3													
4													
5		Sand		2	S	5							
		Mostly sand-some clay lenses and gravel											
6													
7													
8		Clay Till		3	S	5							
		Native light brown clay till											
9													
10		Clay Till		4	S	5							
		Medium brown clay till, moist											
11													
12													
13													
14													
15		End of Borehole		6	S	10							
16													
17				5									
												Cuttings used as backfill material	

Drill Method: Solid-Stem Auger

Drill Date: May 6, 2002

Hole Size: 6"



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Reference No: 9302

# Log of Borehole: BH #4/MW #2

Project: Phase II ESA

Client: Carstairs Ford Sales & Service

Location: Carstairs, Alberta

Technologist: Lisa Mazuryk

SUBSURFACE PROFILE		SOIL SAMPLE		VAPOUR ANALYSIS		Well Data	NOTES											
Depth (ft)	Symbol	Description	Depth (m)	Sample No.	Type			LOWER EXPLOSIVE LIMIT										
								%	PPM									
						10	30	50	70	90								
0		Ground Surface	0															
		Concrete																
		Gravel Fill																
1																		
2		Topsoil																
		Black, organics																
3																		
4		Clay Till																
		Light brown																
5																		
6		Sand Lense																
		Coarse sands and gravels																
7																		
8		Clay Till																
		Native light/medium brown clay till, moist																
9																		
10		Clay Till																
		Medium brown clay till, moist, stiff																
11																		
12																		
13																		
14																		
15		End of Borehole																
16																		
17																		

Borehole seal to 0.3m below surface  
Flush mount road box installed

Sand pack from 1.2m to 4.5m

Particle size sample taken @ 2.25m

Well screened from 1.5m to 4.5m

Drill Method: Solid-Stem Auger

Drill Date: May 6, 2002

Hole Size: 6"



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Reference No: 9302

## Log of Borehole: BH #5

Project: Phase II ESA

Client: Carstairs Ford Sales & Service

Location: Carstairs, Alberta

Technologist: Lisa Mazuryk

SUBSURFACE PROFILE			SOIL SAMPLE		VAPOUR ANALYSIS					Well Data	NOTES	
Depth (ft)	Symbol	Description	Depth (m)	Sample No.	Type	LOWER EXPLOSIVE LIMIT						
						10	30	50	70			90
						PPM						
						100	300	500	700	900		
0		Ground Surface	0									Borehole sealed at surface with bentonite
0		Concrete										
1		Topsoil										
2		Dark, fibrous, slight odor		1	Soil					28		
3		Clay Till	1									
4		Grey Clay with blue/green hue, trace oxidation, stiff, hydrocarbon odour		2	Soil					10		
5												
6			2									
7		Clay Till		3	Soil					14		
8		Medium brown clay, with greyish/green hue, stiff, oxidation present, strong hydrocarbon odour										
9												
10			3	4	Soil					58		
11												
12				5	Soil					25		
13		Clay Till	4									
14		Rusty Brown, very stiff, slight hydrocarbon odour, oxidation										
15				6	Soil					43		
16												
17			5	7	Soil					360		
18												
19												
20			6	8	Soil					350		
21		End of Borehole										
22												

Drill Method: Solid-Stem Auger

Drill Date: May 6, 2002

Hole Size: 6"



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Reference No: 9302

# Log of Borehole: BH #6

Project: Phase II ESA

Client: Carstairs Ford Sales & Service

Location: Carstairs, Alberta

Technologist: Lisa Mazuryk

SUBSURFACE PROFILE			SOIL SAMPLE		VAPOUR ANALYSIS					Well Data	NOTES	
Depth (ft)	Symbol	Description	Depth (m)	Sample No.	Type	LOWER EXPLOSIVE LIMIT						
						10	30	50	70			90
						PPM ppm						
						100	300	500	700	900		
Ground Surface			0									
		Concrete										
0		Clay Till										
1		Dark, moist, fill material										
2				1	S	30						
3		Sand										
4		Reddish-brown sand, coarse grained, inclusions of clay till										
5				2	S	45						
6		Clay Till										
7		Medium/light brown clay till, some oxidation										
8				3	S	10						
9												
10				4	S	10						
11		Clay Till										
12		Medium brown clay till, stiff										
13				5	S	10						
14												
15		End of Borehole		6	S	30						
16												
17												

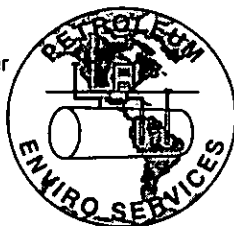
Borehole sealed at surface with bentonite

Cuttings used as backfill material

Drill Method: Solid-Stem Auger

Drill Date: May 6, 2002

Hole Size: 6"



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Reference No: 9302

# Log of Borehole: BH #7/MW #3

Project: Phase II ESA

Client: Carstairs Ford Sales & Service

Location: Carstairs, Alberta

Technologist: Lisa Mazuryk

SUBSURFACE PROFILE			SOIL SAMPLE		VAPOUR ANALYSIS		Well Data	NOTES			
Depth (ft)	Symbol	Description	Depth (m)	Sample No.	Type	LOWER EXPLOSIVE LIMIT					
						10			30	50	70
						PPM ppm					
						100	300	500	700	900	
0		Ground Surface	0								
0-1		Topsoil Black, organics									
1-2		Clay Till Light brown clay till, soft		1	S	10					
2-5		Sand Brown fine grained		2	S	10					
5-6		Clay Till Medium brown clay till		3	S	15					
6-7		Sand Brown, fine grained									
7-10		Clay Till Medium brown, soft, moist/wet		4	S	70					
10-12		Clay Till Dark brown, stiff		5	S	70					
12-15		Clay Till Dark brown, stiff		6	S	25					
15		End of Borehole									

Borehole seal to 0.1m below surface. Flush mount road box installed.

Sand pack from 1.3m to well bottom

Well Screened from 1.5m to 4.5m

Drill Method: Solid-Stem Auger

Drill Date: May 6, 2002

Hole Size: 6"



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Reference No: 9302

## Log of Borehole: BH #8

Project: Phase II ESA

Client: Carstairs Ford Sales & Service

Location: Carstairs, Alberta

Technologist: Lisa Mazuryk

SUBSURFACE PROFILE			SOIL SAMPLE		VAPOUR ANALYSIS		Well Data	NOTES	
Depth (ft)	Symbol	Description	Depth (m)	Sample No.	Type	LOWER EXPLOSIVE LIMIT			
						%			PPM
						10 30 50 70 90	100 300 500 700 900		
0		Ground Surface	0					Borehole sealed at surface with bentonite	
0.5		Ashphalt							
1		Clay Till						Soil sample taken @ 3m - BTEX, Lead, Total Volatile and Extractable Hydrocarbons	
1.5		Clay till with bluish/grey hue		1			400		
2									
2.5		Till							
3		Grey, sandy, frozen		2			450		
4									
4.5		Clay Till							
5		Clay till with bluish/green hue, hydrocarbon odour, moderate stiffness		3			9		
6									
6.5		Clay Till							
7		Medium brown clay, trace oxidation, coal seams		4			72		
8									
8.5		Clay Till							
9		Dark brown		5			280		
10									
10.5		Clay Till							
11		Dark brown		6			130		
12									
12.5		Clay Till							
13		Dark brown		7			75		
14									
14.5		Clay Till							
15		Dark brown		8			60		
16									
16.5		Clay Till							
17		Dark brown							
18									
18.5		Clay Till							
19		Dark brown							
20									
20.5		Clay Till							
21		Dark brown							
22									
22.5		Clay Till							
23		End of Borehole						Borehole sealed at bottom with bentonite	

Drill Method: Solid-Stem Auger

Drill Date: May 6, 2002

Hole Size: 6"



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**APPENDIX IV**

**Hydrocarbon Vapour Measurements**



**SOIL SAMPLE HYDROCARBON VAPOUR ANALYSIS**

ps. = particle size

LOCATION	SAMPLE NO.	DEPTH (m)	MEASUREMENT		SOIL TYPE	REMARKS
			% L.E.L.	p.p.m.		
BH #1	1	0.75	0	920	Clay Fill	
	2	1.50	100	>1000	Clay Fill	
	3	2.25	100	>1000	Sandy Clay	Soil sample submitted.
	4	3.00	26	>1000	Sandy Clay	
	5	3.75	0	260	Clay Till	
	6	4.50	0	180	Clay Till	
	7	5.25	0	410	Clay Till	
	8	6.00	0	300	Clay Till	

LOCATION	SAMPLE NO.	DEPTH (m)	MEASUREMENT		SOIL TYPE	REMARKS
			% L.E.L.	p.p.m.		
BH #2/MW #1	1	0.75	95	>1000	Gravel Fill	Installed monitoring well.
	2	1.50	100	>1000	Gravel Fill	Soil sample & ps. submitted.
	3	2.25	100	>1000	Clay Till	Water sample taken 5/23/02
	4	3.00	77	>1000	Clay Till	
	5	3.75	0	450	Clay Till	
	6	4.50	0	55	Clay Till	

LOCATION	SAMPLE NO.	DEPTH (m)	MEASUREMENT		SOIL TYPE	REMARKS
			% L.E.L.	p.p.m.		
BH #3	1	0.75	0	5	Topsoil	
	2	1.50	0	5	Sand	
	3	2.25	0	5	Sandy Clay	
	4	3.00	0	5	Clay Till	
	5	3.75	0	15	Clay Till	
	6	4.50	0	10	Clay Till	

LOCATION	SAMPLE NO.	DEPTH (m)	MEASUREMENT		SOIL TYPE	REMARKS
			% L.E.L.	p.p.m.		
BH #4/MW #2	1	0.75	0	15	Topsoil	Installed monitoring well.
	2	1.50	0	15	Clay Till	
	3	2.25	0	15	Sand	Particle size submitted.
	4	3.00	0	10	Clay Till	
	5	3.75	0	35	Clay Till	
	6	4.50	0	30	Clay Till	

LOCATION	SAMPLE NO.	DEPTH (m)	MEASUREMENT		SOIL TYPE	REMARKS
			% L.E.L.	p.p.m.		
BH #5	1	0.75	28	>1000	Topsoil	
	2	1.50	10	>1000	Clay Till	
	3	2.25	14	>1000	Clay Till	
	4	3.00	58	>1000	Clay Till	Soil sample & ps. submitted
	5	3.75	25	>1000	Clay Till	
	6	4.50	43	>1000	Clay Till	
	7	5.25	0	360	Clay Till	
	8	6.00	0	350	Clay Till	

LOCATION	SAMPLE NO.	DEPTH (m)	MEASUREMENT		SOIL TYPE	REMARKS
			% L.E.L.	p.p.m.		
BH #6	1	0.75	0	30	Topsoil	
	2	1.50	0	45	Sandy Till	
	3	2.25	0	10	Clay Till	
	4	3.00	0	10	Clay Till	
	5	3.75	0	10	Clay Till	
	6	4.50	0	30	Clay Till	



**SOIL SAMPLE HYDROCARBON VAPOUR ANALYSIS**

LOCATION	SAMPLE NO.	DEPTH (m)	MEASUREMENT		SOIL TYPE	REMARKS
			% L.E.L.	p.p.m.		
BH #7/MW #3	1	0.75	0	10	Clay Till	Installed monitoring well.
	2	1.50	0	10	Clay Till	
	3	2.25	0	15	Sand	
	4	3.00	0	70	Clay Till	
	5	3.75	0	70	Clay Till	
	6	4.50	0	25	Clay	

LOCATION	SAMPLE NO.	DEPTH (m)	MEASUREMENT		SOIL TYPE	REMARKS
			% L.E.L.	p.p.m.		
BH #8	1	0.75	0	400	Clay Till	
	2	1.50	0	450	Sandy Clay Till	
	3	2.25	9	>1000	Clay Till	
	4	3.00	72	>1000	Clay Till	Soil sample submitted.
	5	3.75	0	280	Clay Till	
	6	4.50	0	130	Clay Till	
	7	5.25	0	75	Clay Till	
	8	6.00	0	60	Clay Till	





**APPENDIX V**  
**Groundwater Monitoring Data**



**GROUNDWATER MONITORING DATA**

**May 22/2002**

<b>Well No.</b>	<b>Top of Well Casing Elevation (meters)</b>	<b>Depth to Water (meters)</b>	<b>Water Level Elevation (meters)</b>
MW #1	499.123	2.902	496.221
MW #2	499.245	2.660	496.585
MW #3	498.575	4.120	494.455



**APPENDIX VI**

**Soil/Water Sample Laboratory Analysis**



Edmonton (Main)  
9936 - 67 Avenue  
Edmonton, AB T6P 0P5  
Phone: (780) 413-5227  
Fax: (780) 437-2311

Edmonton (Downtown)  
Industrial Hygiene  
2nd Flr. 10158 - 103 Street  
Edmonton, AB T5J 0X6  
Phone: (780) 413-5265  
Fax: (780) 424-4602

Calgary  
Bay 2, 1313 - 44 Ave. N.E.  
Calgary, AB T2E 6L5  
Phone: (403) 291-9897  
Fax: (403) 291-0298

Grande Prairie  
9505 - 111 Street  
Grande Prairie, AB T8V 5W1  
Phone: (780) 539-5196  
Fax: (780) 513-2191

Saskatoon  
124 Veterinary Road  
Saskatoon, SK S7N 5E3  
Phone: (306) 668-8370  
Fax: (306) 668-8383  
1-800-667-7645

Winnipeg  
745 Logan Avenue  
Winnipeg, MB R3E 3L5  
Phone: (204) 945-3705  
Fax: (204) 945-0763

Thunder Bay  
1081 Barton Street  
Thunder Bay, ON P7B 5N3  
Phone: (807) 623-6463  
Fax: (807) 623-7598

Ottawa  
Xenos Laboratories Inc.  
210 Colonnade Road  
Unit #13  
Nepean, ON K2E 7L5  
Phone: (613) 731-1005  
Fax: (613) 736-1107

Waterloo  
50 Bathurst Drive  
Unit #1  
Waterloo, ON N2V 2C5  
Phone: (519) 886-6910  
Fax: (519) 886-9047

Wyoming  
420 West First Street  
Casper, Wyoming 82601  
Phone: (307) 235-5741  
Fax: (307) 266-1676  
1-800-666-0306

Canada Wide Phone:  
1-800-38-9878

Western Canada Fax:  
1-800-286-7319



# Enviro-Test

LABORATORY  
A DIVISION OF ETL CHEMSPEC ANALYTICAL LIMITED

## CHEMICAL ANALYSIS REPORT

PETROLEUM ENVIRO SERVICES

DATE: 29-MAY-02 Revision: 1

ATTN: LISA MAZURYK

2 10016 29A AVENUE

EDMONTON AB T6N 1A8

Lab Work Order #: L64230

Sampled By: LAM

Date Received: 08-MAY-02

Project P.O. #: CARSTAIRS

Project Reference: AB PII UPST 10542

Comments: ADDITIONAL 23-MAY-02 15:37

APPROVED BY: 

RACHEL PUTNAM

Project Manager

THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN AUTHORITY OF THE LABORATORY.  
ALL SAMPLES WILL BE DISPOSED OF AFTER 30 DAYS FOLLOWING ANALYSIS. PLEASE CONTACT THE LAB IF YOU  
REQUIRE ADDITIONAL SAMPLE STORAGE TIME.

### LABORATORY ACCREDITATIONS:

- STANDARDS COUNCIL OF CANADA IN COOPERATION WITH THE CANADIAN ASSOCIATION FOR ENVIRONMENTAL ANALYTICAL LABORATORIES (CAEAL) FOR SPECIFIC TESTS AS REGISTERED BY THE COUNCIL (EDMONTON, CALGARY, GRANDE PRAIRIE, SASKATOON, WINNIPEG, THUNDER BAY, WATERLOO)
- AMERICAN INDUSTRIAL HYGIENE ASSOCIATION (AIHA) IN THE INDUSTRIAL HYGIENE PROGRAM (EDMONTON, WINNIPEG)
- STANDARDS COUNCIL OF CANADA IN COOPERATION WITH THE CANADIAN FOOD INSPECTION AGENCY (CFIA) FOR FERTILIZER AND FEED TESTING (SASKATOON) AND FOR MICROBIOLOGICAL TESTING IN FOOD (WINNIPEG)

### LABORATORY RECOGNITIONS:

- STANDARDS COUNCIL OF CANADA - GLP COMPLIANT FACILITY (EDMONTON, OTTAWA)





# ENVIRO-TEST CHEMICAL ANALYSIS REPORT

Sample Details/Parameters	Height	Depth	DL	Units	Estimated	Analyzed	Ev.	Batch
L64230-1 BH 1 @ 2.25M								
Sample Date: 06-MAY-02								
Matrix: SOIL								
<b>CCME Petroleum Hydrocarbons (PHC)</b>								
Gravimetric Heavy Hydrocarbons (Silica)								
Prep/Analysis Dates					10-MAY-02	10-MAY-02	SCM	R77162
<b>CCME Total Hydrocarbons</b>								
F1 (C6-C10)	1600		5	mg/kg		16-MAY-02		
F1-BTEX	1200		5	mg/kg		16-MAY-02		
F2 (C10-C16)	560		5	mg/kg		16-MAY-02		
F3 (C16-C34)	45		5	mg/kg		16-MAY-02		
F4 (C34-C50)	21		5	mg/kg		16-MAY-02		
F4G-SG (GHH-Silica)	400		100	mg/kg		16-MAY-02		
Total Hydrocarbons (C6-C50)	2200		5	mg/kg		16-MAY-02		
Chrom. to baseline at nC50	YES					16-MAY-02		
<b>CCME Total Extractable Hydrocarbons</b>								
Prep/Analysis Dates					10-MAY-02	10-MAY-02	SCM	R77162
<b>BTEX</b>								
Benzene	32		0.01	mg/kg	10-MAY-02	10-MAY-02	TKP	R77573
Toluene	12		0.01	mg/kg	10-MAY-02	10-MAY-02	TKP	R77573
Ethylbenzene	100		0.01	mg/kg	10-MAY-02	10-MAY-02	TKP	R77573
Xylenes	270		0.01	mg/kg	10-MAY-02	10-MAY-02	TKP	R77573
% Moisture	17		0.1	%		09-MAY-02	KW	R77024
Lead (Pb)	31		5	mg/kg		14-MAY-02	HAS	R77436
L64230-2 BH 2 @ 1.5M								
Sample Date: 06-MAY-02								
Matrix: SOIL								
<b>CCME Petroleum Hydrocarbons (PHC)</b>								
Gravimetric Heavy Hydrocarbons (Silica)								
Prep/Analysis Dates					10-MAY-02	10-MAY-02	SCM	R77162
<b>CCME Total Hydrocarbons</b>								
F1 (C6-C10)	720		5	mg/kg		16-MAY-02		
F1-BTEX	310		5	mg/kg		16-MAY-02		
F2 (C10-C16)	1000		5	mg/kg		16-MAY-02		
F3 (C16-C34)	380		5	mg/kg		16-MAY-02		
F4 (C34-C50)	190		5	mg/kg		16-MAY-02		
F4G-SG (GHH-Silica)	1400		100	mg/kg		16-MAY-02		
Total Hydrocarbons (C6-C50)	2300		5	mg/kg		16-MAY-02		
Chrom. to baseline at nC50	YES					16-MAY-02		
<b>CCME Total Extractable Hydrocarbons</b>								
Prep/Analysis Dates					10-MAY-02	10-MAY-02	SCM	R77162
<b>BTEX</b>								
Benzene	11		0.01	mg/kg	10-MAY-02	10-MAY-02	TKP	R77573
Toluene	39		0.01	mg/kg	10-MAY-02	10-MAY-02	TKP	R77573
Ethylbenzene	45		0.01	mg/kg	10-MAY-02	10-MAY-02	TKP	R77573
Xylenes	320		0.01	mg/kg	10-MAY-02	10-MAY-02	TKP	R77573
% Moisture	16		0.1	%		09-MAY-02	KW	R77024
Lead (Pb)	41		5	mg/kg		14-MAY-02	HAS	R77436
L64230-3 BH 5 @ 3M								
Sample Date: 06-MAY-02								
Matrix: SOIL								
<b>CCME Petroleum Hydrocarbons (PHC)</b>								
Gravimetric Heavy Hydrocarbons (Silica)								
Prep/Analysis Dates					10-MAY-02	10-MAY-02	SCM	R77162



## ENVIRO-TEST CHEMICAL ANALYSIS REPORT

Sample Details/Parameter	Result	Quality	Unit	Units	Extracted	Analyzed	By	Batch
L64230-3 BH 5 @ 3M								
Sample Date: 06-MAY-02								
Matrix: SOIL								
<b>CCME Petroleum Hydrocarbons (PHC)</b>								
<b>CCME Total Hydrocarbons</b>								
F1 (C6-C10)	240		5	mg/kg		17-MAY-02		
F1-BTEX	25		5	mg/kg		17-MAY-02		
F2 (C10-C16)	210		5	mg/kg		17-MAY-02		
F3 (C16-C34)	56		5	mg/kg		17-MAY-02		
F4 (C34-C50)	46		5	mg/kg		17-MAY-02		
F4G-SG (GHH-Silica)	200		100	mg/kg		17-MAY-02		
Total Hydrocarbons (C6-C50)	550		5	mg/kg		17-MAY-02		
Chrom. to baseline at nC50	YES					17-MAY-02		
<b>CCME Total Extractable Hydrocarbons</b>								
Prep/Analysis Dates					10-MAY-02	10-MAY-02	SCM	R77162
<b>BTEX</b>								
Benzene	14		0.01	mg/kg	10-MAY-02	10-MAY-02	TKP	R77573
Toluene	48		0.01	mg/kg	10-MAY-02	10-MAY-02	TKP	R77573
Ethylbenzene	23		0.01	mg/kg	10-MAY-02	10-MAY-02	TKP	R77573
Xylenes	130		0.01	mg/kg	10-MAY-02	10-MAY-02	TKP	R77573
% Moisture	15		0.1	%		09-MAY-02	KW	R77024
Lead (Pb)	20		5	mg/kg		14-MAY-02	HAS	R77436
L64230-4 BH 8 @ 3M								
Sample Date: 06-MAY-02								
Matrix: SOIL								
<b>CCME Petroleum Hydrocarbons (PHC)</b>								
<b>Gravimetric Heavy Hydrocarbons (Silica)</b>								
Prep/Analysis Dates					10-MAY-02	10-MAY-02	SCM	R77162
<b>CCME Total Hydrocarbons</b>								
F1 (C6-C10)	350		5	mg/kg		16-MAY-02		
F1-BTEX	290		5	mg/kg		16-MAY-02		
F2 (C10-C16)	410		5	mg/kg		16-MAY-02		
F3 (C16-C34)	53		5	mg/kg		16-MAY-02		
F4 (C34-C50)	41		5	mg/kg		16-MAY-02		
F4G-SG (GHH-Silica)	100		100	mg/kg		16-MAY-02		
Total Hydrocarbons (C6-C50)	850		5	mg/kg		16-MAY-02		
Chrom. to baseline at nC50	YES					16-MAY-02		
<b>CCME Total Extractable Hydrocarbons</b>								
Prep/Analysis Dates					10-MAY-02	10-MAY-02	SCM	R77162
<b>BTEX</b>								
Benzene	0.09		0.01	mg/kg	10-MAY-02	10-MAY-02	TKP	R77573
Toluene	0.05		0.01	mg/kg	10-MAY-02	10-MAY-02	TKP	R77573
Ethylbenzene	24		0.01	mg/kg	10-MAY-02	10-MAY-02	TKP	R77573
Xylenes	37		0.01	mg/kg	10-MAY-02	10-MAY-02	TKP	R77573
% Moisture	16		0.1	%		10-MAY-02	KW	R77148
Lead (Pb)	15		5	mg/kg		14-MAY-02	HAS	R77436
L64230-5 BH 2 @ 2.25								
Sample Date: 06-MAY-02								
Matrix: SOIL								
MUST PSA D50 > 75um	37		1	%	09-MAY-02	10-MAY-02	SR	R77081



# ENVIRO-TEST CHEMICAL ANALYSIS REPORT

Sample ID/Location	Result	Qualifier	Dil	Units	Extracted	Analyzed	By	Batch
L64230-6      BH 4 @ 2.25M Sample Date: 06-MAY-02 Matrix:        SOIL  MUST PSA D50 > 75um	38		1	%	09-MAY-02	10-MAY-02	SR	R77081
L64230-7      BH 5 @ 3M Sample Date: 06-MAY-02 Matrix:        SOIL  MUST PSA D50 > 75um	32		1	%	09-MAY-02	10-MAY-02	SR	R77081
L64230-8      MW#1 Sample Date: 23-MAY-02 Matrix:        WATER BTEX, F1 (C6-C10) and F2 (>C10-C16) F2 (>C10-C16)	1.8		0.05	mg/L	27-MAY-02	27-MAY-02	MRH	R78810
BTEX and F1 (C6-C10) F1-BTEX	19		0.1	mg/L	27-MAY-02	29-MAY-02	MSK	R78833
Benzene	14		0.0005	mg/L	27-MAY-02	29-MAY-02	MSK	R78833
Toluene	0.12		0.0005	mg/L	27-MAY-02	29-MAY-02	MSK	R78833
EthylBenzene	1.5		0.0005	mg/L	27-MAY-02	29-MAY-02	MSK	R78833
Xylenes	3.6		0.0005	mg/L	27-MAY-02	29-MAY-02	MSK	R78833
F1(C6-C10)	38		0.1	mg/L	27-MAY-02	29-MAY-02	MSK	R78833
Refer to Referenced Information for Qualifiers (If any) and Methodology.								



## Reference Information

**Methods Listed (if applicable):**

ETL Test Code	Matrix	Test Description	Preparation Method Reference**	Analytical Method Reference**
BTX,F1-CL	Water	BTEX and F1 (C6-C10)	EPA 5030B	EPA 5030/8015&8021B-P&T GC-PID & FID
ETL-BTX,TVH-CCME-ED	Soil	BTEX	EPA 5030	CCME CWS-PHC Dec-2000 - Pub# 1310
ETL-OGG-CCME-ED	Soil	Gravimetric Heavy Hydrocarbons (Silica)		CCME CWS-PHC Dec-2000 - Pub# 1310
ETL-TEH-CCME-ED	Soil	CCME Total Extractable Hydrocarbons		CCME CWS-PHC Dec-2000 - Pub# 1310
F2-CL	Water	F2 (>C10-C16)	EPA 3550B	EPA 3510/8000-GC-FID
PB-MUST-ED	Soil	Lead (Pb)		SW846/3050/7420-AAS
PREP-MOISTURE-ED	Soil	% Moisture		Oven dry 105C-Gravimetric
PSA-MUST-ED	Soil	MUST PSA D50 > 75um		ASTM D422-63-Hydrometer/Sieve

\*\* Analytical Methods employed follow in-house standard operations procedures, which are generally based on US-EPA, ASTM, NIOSH and/or APHA methods.

*The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:*

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
CL	Enviro-Test Laboratories - Calgary, Alberta, Canada	ED	Enviro-Test Laboratories - Edmonton, Alberta, Canada

*"Please note that there has been detection limit changes on some of the parameters for the following products as of 1 December 2001."*

*The following soil metal packages:*

*METAL-ED, METAL-EXD-ED, METAL-CCME-ED, METAL-G50-ED, METAL-PITS-BC-ED, METAL-SK-GL99-ED, METAL-OILYWST-ED and METAL-REFINEDOIL-ED, METAL-LOW-ED and METAL-LOW-EXD-ED*

*The following water metal package:*

*MET-TOT-LOW-ED*

*Test results reported relate only to the samples as received by the laboratory.*

*Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.*

*Enviro-Test Laboratories has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, Enviro-Test Laboratories assumes no liability for the use or interpretation of the results.*





**ENVIRO-TEST QC REPORT**

Workorder: L64230

Client: PETROLEUM ENVIRO SERVICES  
 2 10016 29A AVENUE  
 EDMONTON AB T6N 1A8

Contact: LISA MAZURYK

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>BTX,F1-CL</b>		<u>Water</u>						
Batch	R78833							
<b>WG67430-4</b>	<b>DUP</b>	<b>L65850-2</b>						
Benzene		0.043	0.042		mg/L	1.2	21	29-MAY-02
EthylBenzene		0.066	0.063		mg/L	4.2	21	29-MAY-02
Toluene		0.041	0.040		mg/L	3.2	21	29-MAY-02
F1(C6-C10)		2.1	2.1		mg/L	1.4	25	29-MAY-02
Xylenes		0.24	0.23		mg/L	4.6	21	29-MAY-02
<b>WG67430-1</b>	<b>LCS</b>							
Benzene			99		%		88-117	28-MAY-02
Toluene			90		%		88-117	28-MAY-02
F1(C6-C10)			100		%		85-115	28-MAY-02
Xylenes			88		%		88-117	28-MAY-02
EthylBenzene			85		%		88-117	28-MAY-02
<b>WG67430-2</b>	<b>MB</b>							
Benzene			<0.0005		mg/L		0.0005	28-MAY-02
EthylBenzene			<0.0005		mg/L		0.0005	28-MAY-02
Toluene			<0.0005		mg/L		0.0005	28-MAY-02
F1(C6-C10)			<0.1		mg/L		0.1	28-MAY-02
Xylenes			<0.0005		mg/L		0.0005	28-MAY-02
<b>WG67430-5</b>	<b>MS</b>	<b>L65850-3</b>						
Benzene			97		%		79-120	29-MAY-02
EthylBenzene			93		%		79-120	29-MAY-02
Toluene			93		%		79-120	29-MAY-02
F1(C6-C10)			115		%		70-130	29-MAY-02
Xylenes			94		%		79-120	29-MAY-02
<b>F2-CL</b>		<u>Water</u>						
Batch	R78810							
<b>WG67418-8</b>	<b>DUP</b>	<b>L65815-6</b>						
F2 (>C10-C16)		1.3	1.5	G	mg/L	14	0	29-MAY-02
<b>WG67418-1</b>	<b>MB</b>							
F2 (>C10-C16)			<0.05		mg/L		0.05	28-MAY-02
<b>WG67418-3</b>	<b>MS</b>	<b>L65815-4</b>						
F2 (>C10-C16)			96	G	%		999-999	27-MAY-02

**ETL-BTX,TVH-CCME-ED** Soil



**ENVIRO-TEST QC REPORT**

Workorder: L64230

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>ETL-BTX,TVH-CCME-ED</b>		<b>Soil</b>						
Batch	R77573							
WG65503-3	LCS							
Ethylbenzene			96		%		65-118	10-MAY-02
Toluene			115		%		64-119	10-MAY-02
TVH: (C6-C10 / No BTEX Correction)			92		%		70-130	10-MAY-02
Xylenes			105		%		77-119	10-MAY-02
Benzene			100		%		71-118	10-MAY-02
WG66024-1	MB							
Benzene			<0.01		mg/kg		0.01	10-MAY-02
Ethylbenzene			<0.01		mg/kg		0.01	10-MAY-02
Toluene			<0.01		mg/kg		0.01	10-MAY-02
TVH: (C6-C10 / No BTEX Correction)			<5		mg/kg		5	10-MAY-02
Xylenes			<0.01		mg/kg		0.01	10-MAY-02
<b>ETL-OGG-CCME-ED</b>		<b>Soil</b>						
Batch	R77162							
WG65614-1	MB							
Gravimetric Heavy Hydrocarbons (Silica)			<100		mg/kg		100	10-MAY-02
<b>ETL-TEH-CCME-ED</b>		<b>Soil</b>						
Batch	R77162							
WG65614-3	DUP	L64202-1						
TEH: (C10-C16)		710	660		mg/kg	6.5	43	10-MAY-02
TEH: (C16-C34)		40	39		mg/kg	1.1	43	10-MAY-02
TEH: (C34-C50)		24	25	J	mg/kg	1	15	10-MAY-02
WG65614-4	DUP	L64230-4						
TEH: (C10-C16)		410	390		mg/kg	5.9	43	10-MAY-02
TEH: (C16-C34)		53	58		mg/kg	9.0	43	10-MAY-02
TEH: (C34-C50)		41	41		mg/kg	0.0	43	10-MAY-02
WG65614-2	LCS							
TEH: (C10-C16)			88		%		61-121	10-MAY-02
TEH: (C16-C34)			88		%		61-121	10-MAY-02
TEH: (C34-C50)			88		%		61-121	10-MAY-02
WG65614-5	LCS							
TEH: (C10-C16)			84		%		61-121	10-MAY-02
TEH: (C16-C34)			84		%		61-121	10-MAY-02
TEH: (C34-C50)			84		%		61-121	10-MAY-02
WG65614-6	LCS							
TEH: (C10-C16)			91		%		61-121	10-MAY-02
TEH: (C16-C34)			91		%		61-121	10-MAY-02
TEH: (C34-C50)			91		%		61-121	10-MAY-02
WG65614-7	LCS							



**ENVIRO-TEST QC REPORT**

Workorder: L64230

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>ETL-TEH-CCME-ED</b>		<b>Soil</b>						
Batch	R77162							
WG65614-7	LCS							
TEH: (C10-C16)			76		%		61-121	10-MAY-02
TEH: (C16-C34)			76		%		61-121	10-MAY-02
TEH: (C34-C50)			76		%		61-121	10-MAY-02
WG65614-1	MB							
TEH: (C10-C16)			<5		mg/kg		5	10-MAY-02
TEH: (C16-C34)			<5		mg/kg		5	10-MAY-02
TEH: (C34-C50)			<5		mg/kg		5	10-MAY-02
WG65614-8	MS							
		L64595-1						
TEH: (C10-C16)			108		%		61-121	10-MAY-02
TEH: (C16-C34)			108		%		61-121	10-MAY-02
TEH: (C34-C50)			108		%		61-121	10-MAY-02
<b>PB-MUST-ED</b>		<b>Soil</b>						
Batch	R77436							
WG65871-2	CRM							
Lead (Pb)			116		%		81-119	14-MAY-02
WG65871-3	DUP							
		L64230-1						
Lead (Pb)		31	28		mg/kg	9.3	20	14-MAY-02
WG65871-1	MB							
Lead (Pb)			<5		mg/kg		25	14-MAY-02
WG65871-4	MS							
		WG65871-3						
Lead (Pb)			115		%		89-121	14-MAY-02
<b>PSA-MUST-ED</b>		<b>Soil</b>						
Batch	R77081							
WG65523-1	DUP							
		L64230-5						
MUST PSA D50 > 75um		37	37		%	0.40	18	10-MAY-02

**Product - Batch and Sample Number Relations:**

BTX,F1-CL	1							
	R78833	L64230-8						
F2-CL	1							
	R78810	L64230-8						
ETL-BTX,TVH-CCME-ED	2							
	R77573	L64230-1	L64230-2	L64230-3	L64230-4			
ETL-OGG-CCME-ED	2							
	R77162	L64230-1	L64230-2	L64230-3	L64230-4			
ETL-TEH-CCME-ED	2							
	R77162	L64230-1	L64230-2	L64230-3	L64230-4			
PB-MUST-ED	2							
	R77436	L64230-1	L64230-2	L64230-3	L64230-4			



**ENVIRO-TEST QC REPORT**

Workorder: L64230

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
Product - Batch and Sample Number Relations:								
PREP-MOISTURE-ED	2							
	R77024	L64230-1	L64230-2	L64230-3				
PREP-MOISTURE-ED	2							
	R77148	L64230-4						
PSA-MUST-ED	2							
	R77081	L64230-5	L64230-6	L64230-7				





Workorder # L64230

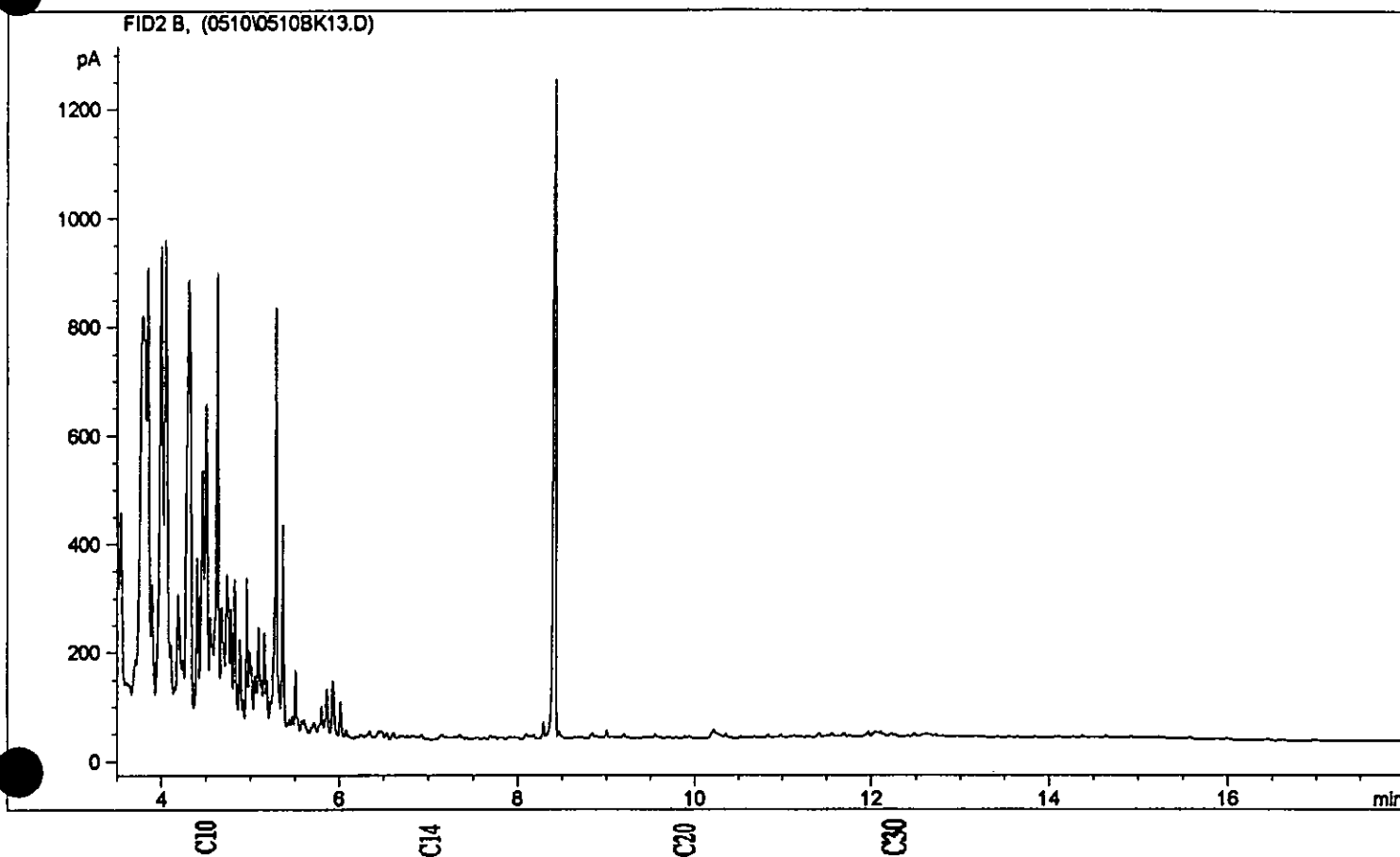
## Legend:

Limit	95% Confidence Interval (Laboratory Warning Limits)
DUP	Duplicate
RPD	Relative Percent Difference ((higher result-lower result)/Average, expressed as %)
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Materials
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material

## Qualifier:

RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.
A	Method blank exceeds acceptance limit. Blank correction applied, where appropriate.
B	Method blank result exceeds acceptance limit, however, it is less than 5% of sample concentration. Blank correction not applied.
D	Duplicate result may exceed limit due to increased variability for low level samples.
E	Matrix spike recovery falls outside the acceptance limits due to high sample background.
F	Silver recovery low, likely due to elevated chloride levels in sample.
G	Outlier - No assignable cause for nonconformity has been determined.
H	Result falls within the 99% Confidence Interval (Laboratory Control Limits)
J	Duplicate results and limit(s) are expressed in terms of absolute difference.





Carbon #	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
B.P. (°C)	-42	-0.5	36	69	98	126	151	174	196	216	235	253	270	287	302	316	329	343	356	369	380	391	402	412	422	431	449
B.P. (°F)	-44	31	97	156	209	258	303	345	384	421	456	488	519	548	575	601	625	649	674	695	716	736	756	774	792	808	840

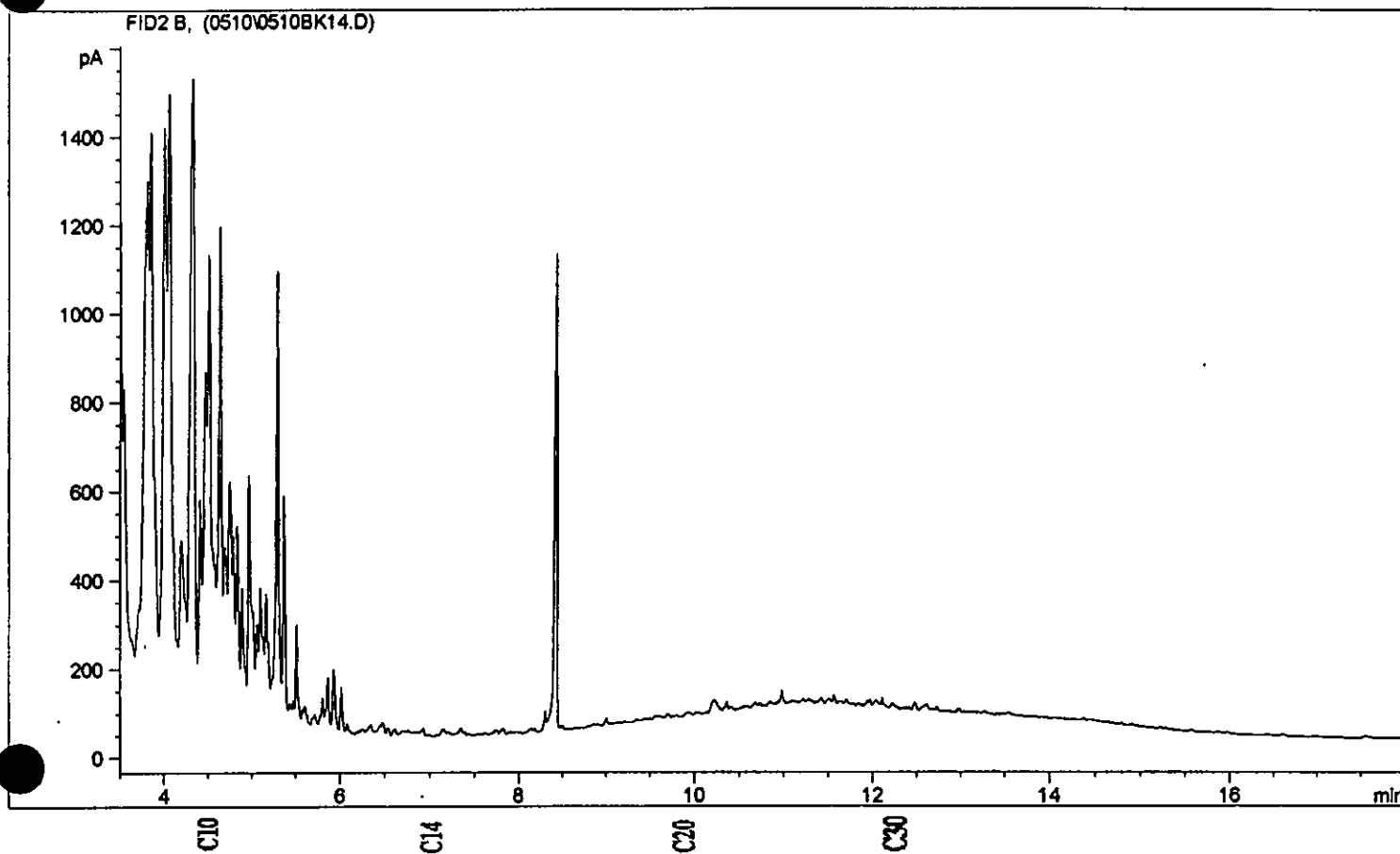
  

V.M.&P. Naphtha	←	→																											
Mineral Spirits	←	→																											
#2 Diesel																													
JP5, Jet A																													
Heavy Diesel																													
Gas Oil, Fuel Oil																													
Lubricating Oils																													

**Boiling Point Distribution Range for Petroleum Based Fuel Products**

Adapted from: Drews, A.W., ED; Manual on Hydrocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadelphia, PA, 1989: p XVIII





Carbon#	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
B.P. (°C)	-42	-0.5	36	69	98	126	151	174	196	216	235	253	270	287	302	316	329	343	356	369	380	391	402	412	422	431	449
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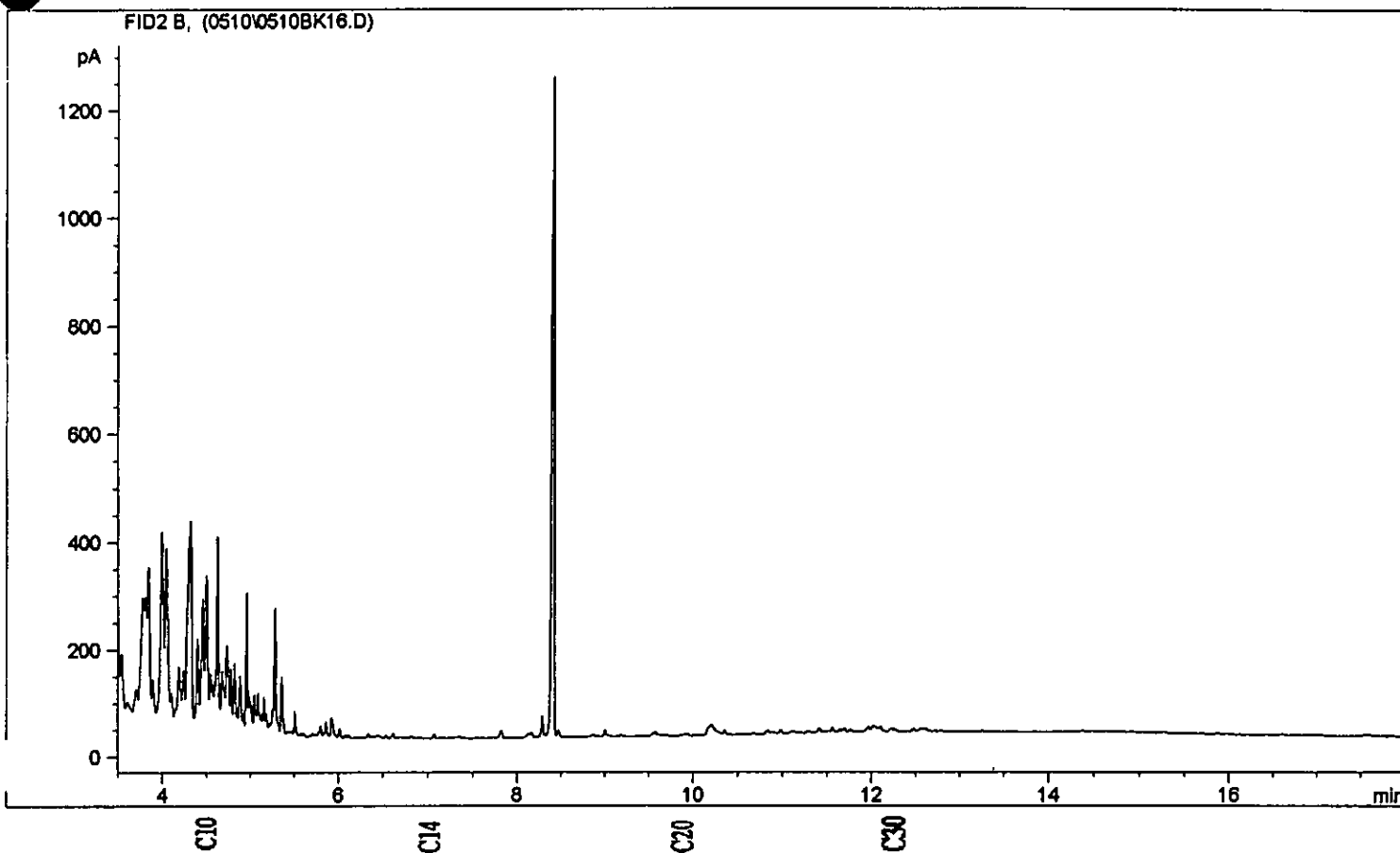
  

V.M.&P. Naphtha	←	→																											
Mineral Spirits		←	→																										
#2 Diesel			←	→																									
JP5, Jet A				←	→																								
Heavy Diesel					←	→																							
Gas Oil, Fuel Oil						←	→																						
Lubricating Oils								←	→																				

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Carbon #	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
B.P. (°C)	-42	-0.5	36	69	98	126	151	174	196	216	235	253	270	287	302	316	329	343	356	369	380	391	402	412	422	431	449
B.P. (°F)	-44	31	97	156	209	258	303	345	384	421	456	488	519	548	575	601	625	649	674	695	716	736	756	774	792	808	840

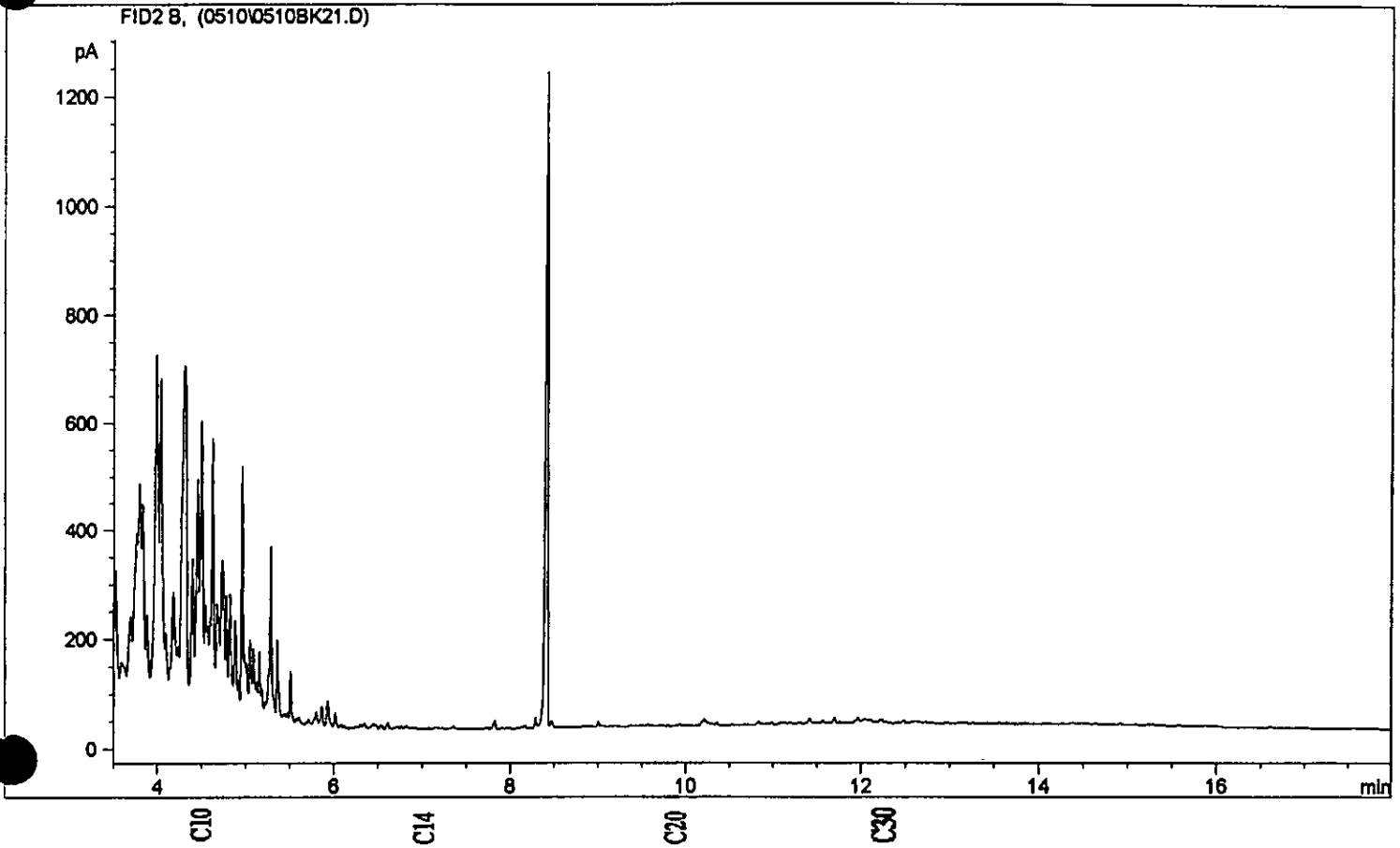
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B.P. (°C)	-42	-0.5	36	69	98	126	151	174	196	216	235	253	270	287	302	316	329	343	356	369	380	391	402	412	422	431	449
B.P. (°F)	-44	31	97	156	209	258	303	345	384	421	456	488	519	548	575	601	625	649	674	695	716	736	756	774	792	808	840

VM.&P. Naphtha	←	→																									
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**Boiling Point Distribution Range for Petroleum Based Fuel Products**

Adapted from: Drews, A.W., ED; Manual on Hydrocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadelphia, PA, 1989: p XVIII



9336 - 67<sup>th</sup> Avenue, Edmonton, Alberta T6E 0P5  
 Edmonton Toll Free Line  
 1313 - 44<sup>th</sup> Avenue N.E., Calgary, Alberta T2E 6L5  
 9505 - 111<sup>th</sup> Street, Grande Prairie, Alberta T8V 5W1  
 General Purpose Bldg., 124 Vetsimary Road, Saskatoon, Saskatchewan S7N 5E3  
 745 Logan Avenue, Winnipeg, Manitoba R3E 3L5  
 1081 Barton Street, Thunder Bay, Ontario P7B 5N3

Telephone: (780) 413-5220  
 Telephone: 1-800-669-9878  
 Telephone: (403) 291-9897  
 Telephone: (780) 539-5196  
 Telephone: (306) 668-8370  
 Telephone: (204) 945-3705  
 Telephone: (807) 623-6463

Fax: (780) 437-2311  
 Fax: 1-800-288-7319  
 Fax: (403) 291-0298  
 Fax: (780) 513-2191  
 Fax: (306) 668-8383  
 Fax: (204) 945-0763  
 Fax: (807) 623-7598

DATE: May 6/02 DATE REQUIRED: \_\_\_\_\_

SERVICE REQUESTED:

REGULAR  PRIORITY (50% SURCHARGE)  
 EMERGENCY (100% SURCHARGE)

SPECIAL REQUIREMENTS / REGS (CIRCLE ONE)

MISA  
 BC MELP  
 OTHER

TIER 1  
 AB MUST

CCME

ANALYSIS REQUESTED:

PREP MESSAGE - e  
 PB-MUST - (5)  
 PB-MUST - (5)  
 PB-MUST - (5)

LAB SAMPLE NO  
 L6A230

SAMPLE ID	SAMPLED BY / DATE / TIME	LOCATION OF SAMPLING	SAMPLING METHOD	SAMPLE TYPE	LAB SAMPLE NO
BH1 @ 2.25m	LAM May 6/02	Carstairs	<del>Soil</del>	Soil	1
BH2 @ 1.5m	"	"	"	"	2
BH5 @ 3m	"	"	"	"	3
BH8 @ 3m	"	"	"	"	4
BH2 @ 2.25	"	"	"	"	5
BH4 @ 2.25m	"	"	"	"	6
BH5 @ 3m	"	"	"	"	7

Best Copy Available

NOTES & CONDITIONS

1 Quote number must be provided to ensure proper pricing.

2 Turnaround times will vary dependant on complexity of analysis & Lab workload at time of submission. Please contact the Lab to confirm turnaround times.

3 All hazardous samples submitted must be labeled to comply with WHMIS and TDG regulations. This must include the nature of the hazard, as well as a contact name & phone number that the Lab can contact for further information.

NOTE: Shaded areas MUST be completed in full by client for sample processing to occur.

CLIENT: Petroleum Enviro Services

CONTACT: Lisa Mazuryk

REPORT ADDRESS: #2 1001b-29A Ave

Edmonton AB T6N 1A8

BILLING ADDRESS: as above

NO. BOTTLES SUBMITTED: 18

PHONE: 780-461-4941

FAX: 780-461-6067

QUOTE NO: AB PII VPST

P.O. NO: Carstairs

JOB NO: Carstairs

LANDSITE NO: Carstairs

RELINQUISHED BY	DATE	RECEIVED BY	DATE
	TIME	ETL LAB	TIME
RELINQUISHED BY	DATE	RECEIVED BY	DATE
	TIME	ETL LAB	TIME

SAMPLE CONDITION UPON RECEIPT

FROZEN  COLD  AMBIENT

OTHER (BREAKAGE, LEAKAGE, ETC.)







**APPENDIX VII**

**Alberta Environment's Risk Management Guidelines for  
Petroleum Storage Tanks Sites - October 2001**







## TABLES

- Table 1. Generic Hydrocarbon and Lead Guidelines for Fine-Grained Soil
- Table 2. Generic Hydrocarbon and Lead Guidelines for Coarse-Grained Soil
- Table 3. Generic Hydrocarbon Criteria for Groundwater
- Table 4. Generic Hydrocarbon Criteria for the Groundwater Ingestion Pathway



**Table 3. Generic Hydrocarbon Criteria for Groundwater**

<b>Criteria</b>	<b>Benzene (mg/L)</b>	<b>Toluene (mg/L)</b>	<b>Ethylbenzene (mg/L)</b>	<b>Xylenes (mg/L)</b>	<b>F1 (mg/L)</b>	<b>F2 (mg/L)</b>
<b>Fine-Grained Soils</b>						
Residential	3.5	228	NG	163	9	11
Commercial / Industrial	16	342	NG	NG	24	18
<b>Coarse-Grained Soils</b>						
Residential	0.09	19	19	5	1	2
Commercial / Industrial	1	55	71	43	10	9
<b>All Soils; Piezometers &lt;10 m from Surface Water Body</b>						
Freshwater Aquatic Life*	0.370	0.002	0.090	0.180	NG	NG
<b>Fine-Grained Soils; Piezometers &gt;10 m from Surface Water Body</b>						
Freshwater Aquatic Life*	NG	NG	NG	NG	NG	NG
<b>Coarse-Grained Soils; Piezometers &gt;10 m from Surface Water Body</b>						
Freshwater Aquatic Life*	0.53	0.021	4.8	3.3	NG	NG

NG = no guideline required for this pathway; limited by solubility

\* = may not apply at a particular site

**Table 4. Generic Hydrocarbon Criteria for the Groundwater Ingestion Pathway**

<b>Medium</b>	<b>Soil Texture</b>	<b>Benzene</b>	<b>Toluene</b>	<b>Ethylbenzene</b>	<b>Xylenes</b>	<b>F1</b>	<b>F2</b>	<b>F3</b>	<b>F4</b>
Soil (mg/kg)	Fine-Grained Soil	0.073	0.86	0.19	25	1900	2600	NA	NA
	Coarse-Grained Soil	0.13	1.6	0.36	49	3700	5100	NA	NA
Groundwater (mg/L)	All Soil Textures	0.005	0.024	0.0024	0.3	5	2	NA	NA

NA = not applicable



**Table 1. Generic Hydrocarbon and Lead Criteria for Fine-Grained Soil**

<b>Land Use</b>	<b>Benzene (mg/kg)</b>	<b>Toluene (mg/kg)</b>	<b>Ethyl- benzene (mg/kg)</b>	<b>Xylenes (mg/kg)</b>	<b>Lead (mg/kg)</b>	<b>F1 (mg/kg)</b>	<b>F2 (mg/kg)</b>	<b>F3 (mg/kg)</b>	<b>F4 (mg/kg)</b>
Residential	1.9	300	450	500	140	260	900	800	5,600
Commercial / Industrial	9	450	690	1,500	260 / 600	660	1,500	2,500	6,600
Freshwater Aquatic Life*	NA	NA	NA	NA	NA	NA	NA	NA	NA

NA = not applicable

\* = may not apply at a particular site

**Table 2. Generic Hydrocarbon and Lead Criteria for Coarse-Grained Soil**

<b>Land Use</b>	<b>Benzene (mg/kg)</b>	<b>Toluene (mg/kg)</b>	<b>Ethyl- benzene (mg/kg)</b>	<b>Xylenes (mg/kg)</b>	<b>Lead (mg/kg)</b>	<b>F1 (mg/kg)</b>	<b>F2 (mg/kg)</b>	<b>F3 (mg/kg)</b>	<b>F4 (mg/kg)</b>
Residential	0.048	24	54	14	140	30	150	400	2,800
Commercial / Industrial	0.55	71	200	130	260 / 600	310	760	1700	3,300
Freshwater Aquatic Life*	1.6	0.16	79	59	NA	360	230	NA	NA

NA = not applicable

\* = may not apply at a particular site



**APPENDIX VIII**

**Safety Codes Council Authorization Facsimile**







***SAFETY CODES COUNCIL***

Underground Tank Remediation Program  
14<sup>th</sup> Floor, Commerce Place  
10155 - 102 Street  
Edmonton, Alberta, Canada T5J 4L4

Tel: (780) 415-8671  
Fax: (780) 415-8663

When replying please quote:

**File No.: 00123-9302**

April 30, 2002

**FAXED**

Petroleum Enviro Services  
#2, 10016 - 29A Avenue SW  
Edmonton, AB T6N 1A8  
Telephone: (780) 461-4799

Dear Eion MacKeigan:

**Re: Assignment of Environmental Site Assessment**

We are pleased to advise that a new site has been assigned to Area 20 as follows:

Contact: Vaughn Wyant, Saskatoon, Saskatchewan  
Telephone: (306) 373-4444  
Owner Name: Vaughn Wyant Investments Ltd.  
Site Name: Carstairs Ford Sales & Service Ltd.  
Site Address: 419 - 10th Avenue →  
Carstairs, Alberta

Please be reminded that the cost of the ESA must not exceed the amount quoted in your RFP, which was \$8,075.00.

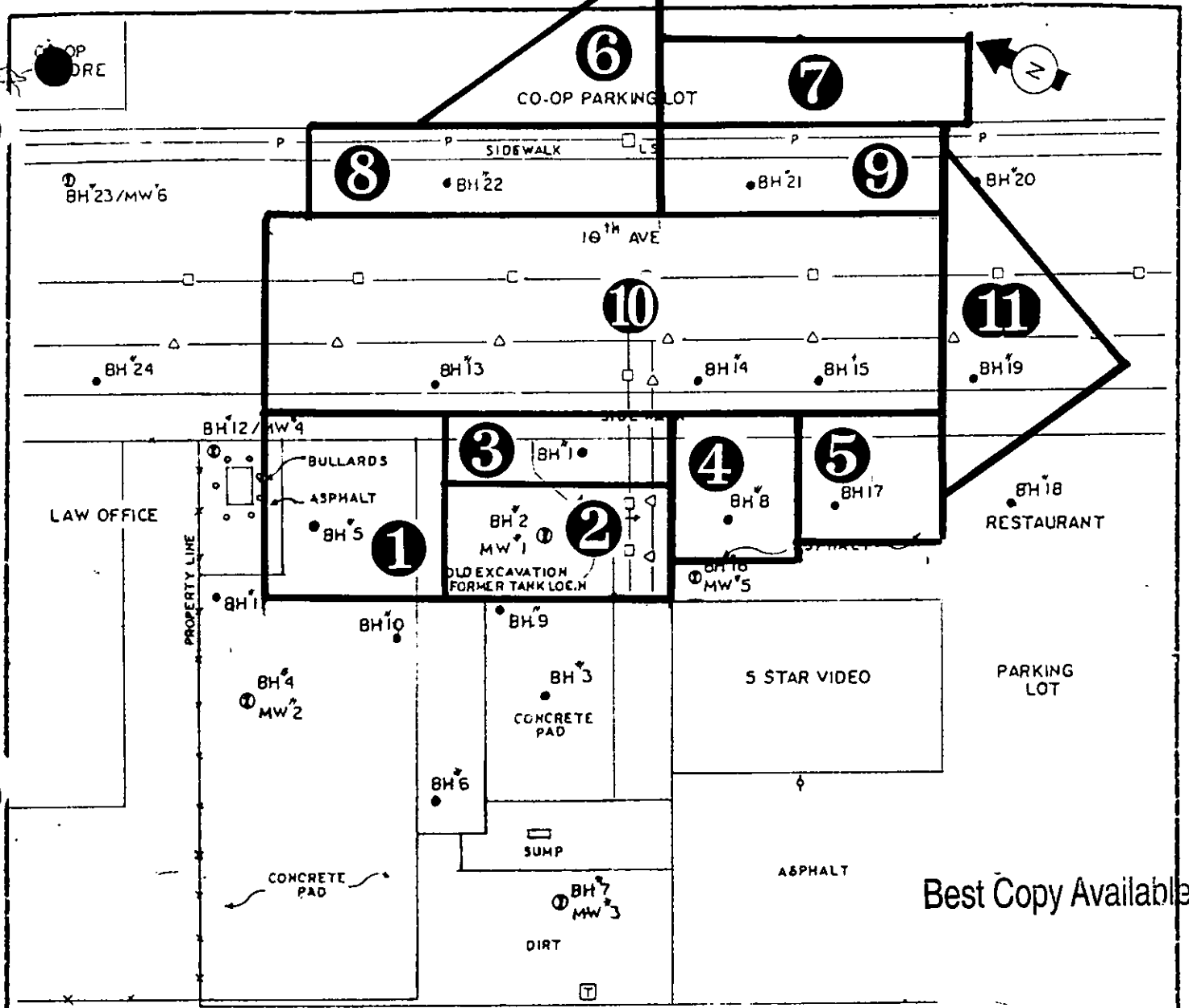
The assessment must be completed in time to allow for submission of the Phase II ESA Report no later than June 30, 2002.

Yours truly,

Karen Clarke  
Technical Coordinator

cc: Vaughn Wyant





Best Copy Available

**LEGEND**

- BORE HOLE
- ⊕ MONITORING WELL
- ⊗ POWER POLE
- GAS LINE —P— POWER
- SEWER LINE
- △— WATER LINE
- LS □ LIGHT STANDARD

No	REVISION	DATE	BY	No	REVISION	DATE	BY



DIVISION OF A.S.M. COMMISSION CONTROL

FOR  
**VAUGHN WYANT INVESTMENTS LTD**  
 SITE No. 9302

**Contaminant Plume Section Drawing**  
**CARSTAIRS FORD SALES & SERVICE LTD**  
 419 - 10<sup>th</sup> AVE  
 CARSTAIRS, ALBERTA

DESIGNED BY: SCALE: 1:400 DRAWING No. 3449-A  
 DRAWN BY: G.V.D. DATE: 02-05-16



Kim Kirillo

From: David Williams [drwilliams@meridian-strategies.com]  
Sent: Monday, April 28, 2003 8:36 AM  
To: Joe Petrie; Kim Kirillo  
Cc: Zsolt Margitar; Stephen Hoare; Karen Clarke; Harold  
Subject: Sites 9302, 9392

Joe and Kim:

Best Copy Available

-----  
10  
9302 - 419 40th Ave, Carstairs

Comment letter attached.

I have not prepared the RMP checklist since the consultant has not prepared a risk management plan at this point, and there are some fundamental issues to resolve before going forward with any kind of plan for the site

Based on the information presented in the reports, the offsite contamination is almost entirely upgradient of the onsite source (former tank nest). This begs the question of an upgradient source... Furthermore, the plume has not been delineated to the northeast (upgradient) and the Co-op refused access to their property for drilling.

check files for offsite source

If the site is to be remediated, the offsite contamination will have to be prevented from recontaminating the site (the consultant does in fact propose a liner). However, nothing can be done about the offsite contamination (MNA, RM or otherwise) if there is still an upgradient source that hasn't been dealt with.

I don't know how you wish to handle this between SCC and AENV, but I recommend that the consultant perform a historical search to see if there is/was an upgradient source. Then, depending on what's found, access to the Co-op property will have to be granted. Otherwise, I don't see how the offsite contamination can be tackled.

-----  
9392 - Reed Ranch Service, Olds

Comment letter attached.

I have not prepared an RMP checklist as I'm not certain the proposed strategy is the appropriate one. The consultant proposes to excavate and landfill the impacted soil (most of which is onsite) with the exception of a "cone" around a power pole which services the property. As a result, this cone will be "risk managed" by surrounding it with a barrier (which implies it will be left indefinitely). It's not absolutely clear but a portion of this soil may be offsite. The consultant has estimated the cost to temporarily remove the power pole as \$10k to \$50k. This seems high and the range is broad - the consultant could surely get a better estimate of this. In view of the long term obligations and liabilities associated with leaving it in place, I would recommend that removal be considered.

On a separate issue, the groundwater ingestion pathway has been excluded, based on 25+ m of shale bedrock (but with no hydraulic conductivity data). Given the possibility that the bedrock could be fractured, perhaps AENV could decide on this issue.

To summarize, I'm not sure whether we should treat this as a risk management proposal, or go back to the consultant and have them cost out removal of all the soil.

-----

Dave



Suite 1110, 640 - 8<sup>th</sup> Avenue SW  
Calgary, AB T2P 1G7, Canada  
Tel: (403) 265-6597 Fax: (403) 265-6584

April 28, 2003

1032

Safety Codes Council  
Underground Tank Remediation Program  
14<sup>th</sup> Floor, Commerce Place  
10155 – 102 Street  
Edmonton, AB T5J 4L4

Attention: Mr. Joe Petrie, P Geol  
Program Manager

**Re: Site 9302 – 419 40<sup>th</sup> Avenue, Carstairs**

On behalf of the Technical Review Committee of the Underground Tank Remediation Program, we have reviewed the following letter(s) and/or report(s) with respect to the above referenced site.

- ESA Delineation & Remediation Plan – prepared by Petroleum Enviro Services, February 21, 2003

The following comments are provided for your consideration. In addition, since the proposed remedial plan includes a risk management component, the consultant is referred to the Review Checklist for Risk Management Plans, prepared by the Program in consultation with Alberta Environment.

- Aeration of soils may not be an effective remedial method if liquid product is present onsite. It is noted that, in spite of the apparent presence of liquid product at MW1 (reported as droplets), the soil and groundwater concentrations at this location are only marginally in excess of the applicable guidelines. Consideration should be given to confirming the presence of liquid product in MW1.
- Elevated vapours exist offsite and contaminant concentrations may not be effectively reduced within a reasonable timeframe using passive methods. The consultant may wish to consider pursuing a more aggressive method (e.g. enhanced natural attenuation) to reduce the offsite hydrocarbon concentrations.
- Groundwater impacts have not been assessed within or downgradient of the offsite impacted area.
- The major portion of identified offsite contamination appears to be upgradient of the former onsite underground tank location. Consideration should be given to undertaking a historical search to identify other possible sources of contamination (e.g. on the site now occupied by the Co-op). If there is an upgradient source that has not been remediated, risk management or long term remediation of the identified offsite impacts will not be effective.

- The remedial plan involves leaving offsite contaminated soil and groundwater in place. Risk management of offsite contamination, on public or private land, requires the approval of Alberta Environment and the affected landowner(s). A detailed risk management plan should be prepared in accordance with the above referenced checklist. The plan should include costs and a commitment from the owner to maintain the plan until compliance with the governing remedial objectives is demonstrated.

This technical review has been conducted in the context of conditions outlined in the Conditional Grant Agreement between the Grant Recipient and Alberta Municipal Affairs or the Safety Codes Council, and with reference to Alberta Environment's Risk Management Guidelines for Petroleum Tank Sites - October 2001. The review has been conducted pursuant to an agreement between Meridian Environmental Inc. and the Safety Codes Council. The above comments are provided to the Safety Codes Council to assist the Grant Recipient in meeting the requirements of the Program, but are not exhaustive and are not to be interpreted as recommendations or directions to the Grant Recipient.

Nothing within this letter shall constitute any representation to the Grant Recipient or its environmental professionals upon which they may rely so as to impose any liability upon Meridian Environmental Inc. or its employees. Meridian Environmental Inc. and its employees shall not accept any liability to the Grant Recipient or its environmental professionals for the results or consequences of any actions taken or decisions made based on information contained in this letter. The Grant Recipient and its environmental professionals remain solely responsible for compliance with all applicable regulatory requirements and for any other liabilities or obligations related to the site.

Should you have any questions or concerns, please contact the undersigned.

Yours truly,

Meridian Environmental Inc.

David R. Williams, P.Eng.

APEGGA Permit to Practice No. P7470

drw/



PST file 190795

***SAFETY CODES COUNCIL***

Underground Tank Remediation Program  
14<sup>th</sup> Floor, Commerce Place  
10155 – 102 Street  
Edmonton Alberta T5J 4L4

Tel. (780) 415-8666  
Fax: (780) 415-8664

**File # 00123-9302**

March 4, 2003

Alberta Environment  
Southern Region  
3<sup>rd</sup> Floor, Deerfoot Square  
2938 – 11<sup>th</sup> Street NE  
Calgary , AB T2E 7L7



Dear Kim Kinllo:

**Re: Risk Management**

Enclosed for your review is a copy of the Delineation Report/Remediation Proposal prepared for:

Vaughn Wyant Investments Ltd.  
Carstairs, AB  
Site No. 9302

The consultant is proposing remediation involving risk management. We welcome any comments you have regarding this site.

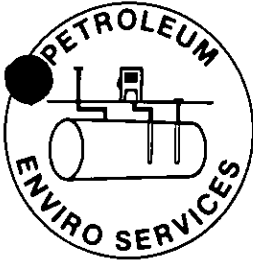
Yours truly,

Steve Hoare  
Technical Coordinator

Enc.



RECEIVED FEB 28 2003



#2, 10016 - 29A Avenue  
Edmonton, Alberta  
T6N 1A8

Tel.: (780) 461-4941  
Fax: (780) 461-6067

DIVISION OF **ASM** CORROSION CONTROL LTD

February 21, 2003

E-03/3907

Vaughn Wyant Investments Ltd.  
419 Brand Place  
Saskatoon, Saskatchewan  
S73 5L6

Attn: Mr. V. Wyant  
Property Owner

Re: Environmental Services - Site No. 9302  
Phase III: Hydrocarbon Environmental Site Assessment-Delineation  
Lots 5 & 6, Block 28, Plan 3845 CO; 419 - 10 Avenue, Carstairs, Alberta

Further to Petroleum Enviro Services' previously submitted Phase II technical report E-02/3607 dated May 27, 2002, please find the enclosed report E-03/3907, pertaining to a Phase III: Hydrocarbon Environmental Site Assessment (ESA)-Delineation, conducted by our firm on the above noted property. Verbal approval regarding an extension of the report and remediation plan deadline was received from the Safety Codes Council on February 20, 2003. The deadline was extended to February 28, 2003.

Exploratory borehole drilling, soil vapour screening, soil sampling and the installation of four (4) groundwater monitoring wells were completed January 14 and 15, and February 6, 2003, in response to the facsimile authorization dated December 16, 2002, and verbal authorization on February 4, 2003, from the Safety Codes Council. The work was performed in accordance with our quotation Q-3293 dated July 30, 2002.

The governing risk management criteria for the subject property have been identified as Generic Hydrocarbon and Lead Criteria for Fine-Grained Soil for Commercial and Residential Land Use. One (1) monitoring well (MW#7) installed February 6, 2003, has not recovered to date. Therefore, monitoring of this well will be performed at a later date. Pending the collection of a water sample from this well, laboratory results will be forwarded under a separate cover.

*for sample analysis pending*

Best Copy Available

LAUGHN WYANT INVESTMENTS LTD.

February 21, 2003

Page 2

The Phase III: Hydrocarbon Environmental Site Assessment-Delineation has determined approximately 3300 cubic metres of soil requires remediation. Groundwater on-site also requires remediation. The contaminant plume has not been fully delineated in an Eastern direction. Permission to drill on CO-OP property to the East was denied by the General Manager of the CO-OP food store. Soil contamination volumes for CO-OP property has been estimated. Sufficient information has been collected to prepare a remediation plan regarding the soil and groundwater environments. Refer to Appendix IX for the remediation plan.

Invoice no.'s E-7427 and E-7428, E-7472 and E-7473, for services rendered are enclosed. We trust you will find our submission to be in order.

Yours truly,  
PETROLEUM ENVIRO SERVICES



Jenifer Bachand, B.Sc.  
Environmental Technologist

RAP in APPX

Best Copy Available

JMB/lp  
Encl.

cc. Safety Codes Council  
Underground Tank Remediation Program  
14<sup>th</sup> Floor, Commerce Place  
10155 - 102 Street  
Edmonton, Alberta  
T5J 4L4

Attn: Mr. Joe Petrie, P. Geol., R.E.T.  
Program Manager



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**ENVIRONMENTAL SERVICES**

**PHASE III: HYDROCARBON ENVIRONMENTAL SITE ASSESSMENT (ESA)  
-DELINEATION-**

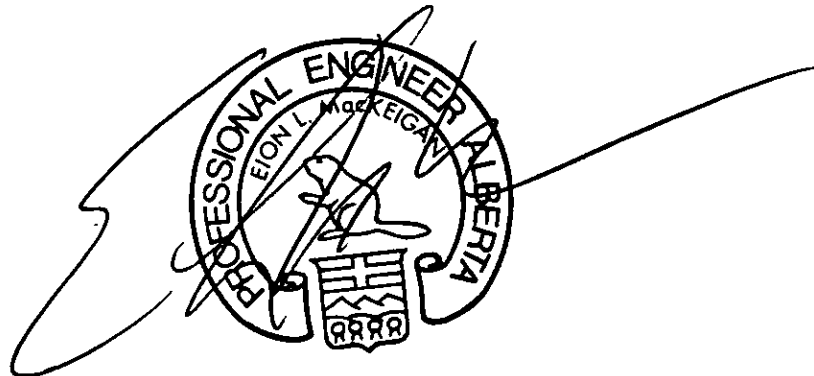
for

**SITE NO. 9302**

Lots 5 & 6, Block 28, Plan 3845 CO; 419 - 10<sup>th</sup> Avenue, Carstairs, Alberta

Prepared for: Mr. V. Wyant  
Vaughn Wyant Investments Ltd.  
Property Owner

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Petroleum Enviro Services



**Report No. E-03/3907**

February 21, 2003



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## EXECUTIVE SUMMARY

Property Owner:	Vaughn Wyant Investments Ltd.	Site Number:	9302
Site Address:	419 -10 <sup>th</sup> Avenue, Carstairs, Alberta	Legal Land Address:	Lots 5 & 6, Block 28, Plan 3845 CO

The scope of work outlined in Petroleum Enviro Services' quotation Q-3293 for site no. 9302 was granted approval by the Safety Codes Council, via facsimile dated December 16, 2002. In response, a Phase III: Hydrocarbon Environmental Site Assessment-Delineation was completed at the above noted location.

- Procedures:** Boreholes were placed in areas suspected to be impacted by migrating hydrocarbon contamination, then stepped out, based on field results, in order to delineate the contaminant plume. A total of nineteen (19) boreholes were advanced on and off property on January 14 and 15, and February 6, 2003. Four (4) boreholes were completed as groundwater monitoring wells. Soil samples taken at regular intervals of 0.75 metres were analysed for hydrocarbon vapours. Twenty (20) soil samples were submitted for laboratory analysis.
- Criteria:** Risk management criteria applied to the subject site have been identified through a site sensitivity analysis as Generic Hydrocarbon and Lead Criteria for Commercial and Residential Land Use in Fine-Grained Soil.
- Groundwater:** Groundwater flow is in a South-Southwestern direction. On-site groundwater contamination has been detected.
- Soil:** The total contaminant plume area has been estimated to be approximately 1731 square metres, with a total volume of 3200 cubic metres.  
**On-Site:** Hydrocarbon contaminated soil volumes have been estimated at 1333 cubic metres within the subject sites' property line.  
**Off-Site:** Hydrocarbon contaminated soil volumes have been estimated at 1353 cubic metres within Town of Carstairs property. CO-OP food store property to the East is suspected to be impacted by migrating contamination but could not be confirmed as permission to drill on this property was denied. Contamination on this property has been estimated at 242 cubic metres. To the West, Five Star Video property contamination has been estimated at 263 cubic metres.
- Proposed Remediation:** Risk management of the contamination within the roadway, installation of a geosynthetic liner and remediation through On-Site Treatment for on-site contamination has been recommended. Risk management aspects of this plan must be pre-approved by Alberta Environment, Safety Codes Council and the Town of Carstairs prior to the commencement of any remediation. In the event that an agreement on risk management can not be reached, on-site treatment or aeration through alluvium for all impacted soil is the next most cost effective method.





## 2.0 INTRODUCTION

Petroleum Enviro Services, a division of ASM Corrosion Control Ltd., was notified December 16, 2002, by the Safety Codes Council, via facsimile, to perform a Phase III: Hydrocarbon Environmental Site Assessment (ESA)-Delineation at the Former Carstairs Ford Sales and Service Ltd. in Carstairs, Alberta, site number 9302. The purpose of the investigation was to determine the vertical and lateral extent of hydrocarbon contamination by means of an on and off-site investigation including exploratory borehole drilling, vapour analysis, soil/groundwater sampling, and laboratory analysis.

The ESA was performed in accordance with the Underground Tank Remediation Program administered by the Safety Codes Council. The investigation was completed according to our quotation Q-3293 dated July 30, 2002, and with reference to Alberta Environments' Risk Management Guidelines for Petroleum Storage Tank Sites - October 2001 (herein referred to as the guidelines or criteria).

## 3.0 BACKGROUND

A Phase II Environmental Site Assessment was performed on the subject site on May 6, 2002, by Petroleum Enviro Services. This investigation identified hydrocarbon contamination within the areas of the former pump island and underground storage tank locations. Based on these findings, further investigation to determine the extent of hydrocarbon contamination was recommended.

The subject site, formerly Carstairs Ford Sales and Service, has been out of service since 1995. Prior to this date, the site operated as a retail fuelling facility from approximately the 1960's. The former building was demolished in 1995 during the sites' decommission. The subject site is currently vacant. During the site visit an operating Esso gas station was noted approximately 70 metres to the Southeast.

## 4.0 SITE DESCRIPTION

### 4.1 General Site Description

The subject site is located at 419-10 Avenue in the central section of the Town of Carstairs. It is bound by a gravel alley along the Western perimeter and 10 Avenue along the Eastern perimeter. West, beyond the alley, is an urban park. A CO-OP grocery store and associated parking lot is located to the East across 10 Avenue. To the North, on Lot 4, is an operating Law Office. To the West, on Lots 7 and 8, is Five Star Video. The Five Star Video property has the same owner as the subject site.



Although no buildings are currently present on the site concrete foundations remain. Significant elevation changes throughout the site are indicated by a patchwork of foundation sections. The remaining ground surface is covered by a mixture of asphalt and grass. The Western portion of the site is surfaced with grass. A number of steel bullards, arranged in a circular pattern, were noted in the Northeastern corner of the property. These indicate a former propane dispensing location.

All utilities servicing the property were located prior to drilling. All utilities to the subject site were disconnected and/or removed during site decommission in 1995. Water and sewer main lines are located within 10 Avenue. These lines enter the property, from 10 Avenue, and run between the former Carstairs Ford Sales and Service and the current Five Star Video. Power lines are located overhead, and telephone and natural gas are located underground in the Western alley.

Other relevant site conditions noted at the time of investigation included: no permanent surface bodies of water within 300 metres and no apparent groundwater use within the Town of Carstairs. The Town receives treated water from the Regional Waterline originating in Innisfail. Please refer to Appendix I - Selected Site Photographs and Appendix II - Site Layout Drawing.

#### **4.2 Petroleum Storage Tank Facilities**

Due to lack of records, very little information was found regarding the size, age, number or condition of underground petroleum storage tanks (UPST's) on the premises. Possibly two (2) or three (3) UPST's were once located on the property. From the owners best recollection the tanks were approximately 9080 litres (2000 gallons) in size. During decommission in 1995 all tanks, related piping and pump island were removed and destroyed. During the initial Phase II ESA investigation, a patch of disturbed ground on the Eastern edge of the property was visible, suggesting a former excavation.

### **5.0 SITE INVESTIGATIONS**

#### **5.1 Field Procedures**

Prior to investigation for subsurface soil/water contamination through drilling activities, Alberta 1<sup>st</sup> Call was notified to locate all utilities. On-site drilling and soil sampling occurred January 15 and 16, and February 6, 2003, when nineteen (19) exploratory boreholes were advanced on and off property using a solid stem truck-mounted auger. Boreholes were drilled surrounding the area of known contamination and stepped out when field vapour readings indicated the presence of contamination in order to fully delineate the contaminant plume.



Four (4) of the nineteen (19) boreholes were completed as groundwater monitoring wells. The remaining fifteen (15) boreholes were sealed with bentonite plugs and backfilled with cuttings. See Appendix II - Site Layout Drawing for borehole and monitoring well placement.

Soil samples were taken at regular intervals of 0.75 metres during drilling operations. Samples were removed from the auger flytes, examined and lithologically logged. See Appendix III - Lithologic Borehole Logs. On-site vapour screening was conducted on all samples for hydrocarbon vapour analysis using a portable RKI Eagle gas vapour probe c/w methane elimination. Sample depths and the results of vapour analysis are recorded in Appendix IV - Hydrocarbon Vapour Measurements.

## 5.2 Soil and Groundwater Laboratory Analysis

Subsurface soil samples were selected for laboratory analysis from areas suspected of the highest hydrocarbon contamination. Twenty (20) soil samples (from boreholes #9 through #27) with the highest vapour measurements were submitted to the laboratory for analysis of B.T.E.X. (Benzene, Toluene, Ethylbenzene, and Xylene), Carbon Fractions F1-B.T.E.X., F1(C6 - 610), F2(C10 - C16), F3(C16 - C34), F4(C34 - C50), F4G-SG, and Lead content. Two (2) samples were submitted for particle size analysis. A soil sample also underwent testing for landfill characterization: leachable B.T.E.X. and metals, flash point, and pH.

Groundwater samples were taken on February 6, 2003, from monitoring wells (MW) #1 through #6. Monitoring well #7 will be sampled at a later date, when the well has recovered. They were analysed for B.T.E.X. compounds (Benzene, Toluene, Ethylbenzene, and Xylene) and Carbon Fractions F1-B.T.E.X., F1(C6 - C10) and F2(C10 - C16). Refer to Appendix VI for soil/water sample laboratory analysis data.

## 5.3 Data Evaluation

### 5.3.1 Soil Stratigraphy

The dominant stratigraphic unit encountered during delineation was consistent with the clay till identified during Phase II investigations. A sandy clay layer, approximately 1.00 metre thick, and beginning around 2.70 metres depth, was identified in borehole #11. A fifteen (15) centimetre sandy clay lense was encountered in borehole #24 at 1.20 metres. This sandy clay was not encountered in any other boreholes, suggesting a discontinuous layer. All boreholes met stiff, pebbly clay till between approximately 2.70 metres and 3.80 metres depth. Detailed descriptions of the soil stratigraphy in each borehole are presented in Appendix III - Lithologic Borehole Logs.





### 5.3.2 Hydrocarbon Vapour Analysis

Field vapour readings indicated the presence of elevated hydrocarbon vapours in the soil in fifteen (15) of the nineteen (19) boreholes (BH) tested. The neighbouring Five Star Video lot to the South displayed a range of vapour readings from the high L.E.L. range to low/trace vapours throughout. Generally, significant hydrocarbon vapour readings were detected between 2.25 metre and 3.00 metre depths with the exception of the former pump island and UPST area. Here, significant vapour readings were recorded from surface to a maximum depth of 4.50 metres.

Investigations along 10<sup>th</sup> Avenue produced peak vapour levels of greater than 100% Lower Explosive Limit (L.E.L.). High readings were obtained directly East of the subject site, along the Eastern edge of 10<sup>th</sup> Avenue, between 2.25 metre and 3.00 metre depths. Refer to Appendix IV-Hydrocarbon Vapour Measurements and Appendix II - Site Layout Drawing for borehole locations.

### 5.3.3 Groundwater Monitoring

The four (4) groundwater monitoring wells (MW) installed on the subject site during this investigation were in addition to three (3) existing wells installed during the Phase II investigation. Monitoring wells were installed to obtain information on the depth of the water table, the local groundwater gradient (flow direction), to detect the presence of any free product floating on the groundwater surface, and to enable sampling of the groundwater.

The monitoring wells are constructed out of 51mm diameter PVC pipe with varied lengths of machine-slotted screen. A uniform sand pack was installed to at least 300 mm above the slotted section and a bentonite chip seal was placed to the surface. All monitoring wells were completed with flush mount bolt-down road boxes. All wells were purged after completion to promote inflow of adjacent groundwater.

The groundwater monitoring wells were installed on January 15 and 16, and February 6, 2003. On February 6, 2003, the top of the casing for each well (#1-#7) was surveyed to establish its elevation relative to a temporary benchmark (assumed elevation 500.000 metres above sea level using the fire hydrant on the corner of 10<sup>th</sup> Avenue and Nanton Street). Groundwater levels were recorded on this date as sufficient time had past for the water table to stabilize after purging and sampling.



Groundwater samples were obtained from monitoring wells #1 through #7 on February 6, 2003, using dedicated bailers. The samples were transferred to laboratory bottles, stored on ice and transported to the laboratory for analysis. Monitoring well #1 had also been sampled during the Phase II investigation.

Groundwater monitoring levels obtained January 15, and February 6, 2003, were used for calculation of the local groundwater gradient; groundwater appears to be flowing in a South Southwestern direction. Droplet evidence of phase-separated hydrocarbons on the water surface within monitoring well #1 was observed. Continued monitoring is advised to record changing groundwater levels during seasonal flux. Refer to Appendix V - Groundwater Monitoring Data.

## 6.0 SITE ASSESSMENT

### 6.1 Site Sensitivity Analysis

#### 6.1.1 Land Use Assessment

Land use assessment is based on past, present, and potential future uses of the property and surrounding area. The 2001 Alberta Environment Risk Management Guidelines have provided numerical criteria with respect to chemicals of concern for different land uses. The most conservative land use is selected to ensure adequate consideration of all stakeholders.

The subject site is zoned for Commercial land use, as confirmed by the Town of Carstairs. Northern and Southern neighbouring properties are also zoned for Commercial use. The CO-OP property to the East is zoned for Commercial land use. The urban park area to the West is designated as Residential land use under the Guidelines.

As Residential land use is the most stringent criteria, a thirty (30) metre line will be applied to the subject site from the adjacent parks' property line, assumed to be the fence on the West side of the gravel alley. This thirty (30) metre line extends approximately 24 metres into the subject site. Refer to Appendix II - Site Layout Drawing for the Commercial/Residential criteria areas.



### 6.1.2 Soil Type

Soil type is an important component in controlling how and where contaminants migrate underground. Generic guidelines are based on two (2) soil types; fine-grained and coarse-grained. As stated in Section 5.3.1, clay till soil was present from surface to depths investigated, at least 6.00 metres. A sandy layer was observed in few a boreholes. Using visual inspection in combination with field hydrocarbon vapour readings, selected samples were chosen and submitted for laboratory analysis. Findings of particle size analysis are summarized below.

Borehole Location	Sands and Gravel	Silts and Clays
BH 2 @ 2.25m	37%	63%
BH 11 @ 3.00m	48%	52%
BH 13 @ 2.25m	33%	67%

Although some sand was visually identified during site investigations, laboratory analysis of the sandy soil, represented by borehole #11, has warranted the use of fine-grained criteria. The soil that controls contaminant migration on the site has been identified as fine-grained.

### 6.1.3 Exposure Pathways & Receptors

The 2001 Alberta Environment Guidelines have provided numerical criteria for several exposure pathways whereby chemicals of concern may impact human and/or ecological entities. As mentioned in Section 3.0, no permanent surface bodies of water are present within 300 metres of the subject site, thus eliminating the protection of Groundwater for Aquatic Life Pathway. The Groundwater Ingestion Pathway can also be eliminated as potable water is received from Innisfails' Regional Waterline. The Town Administrative Office confirmed the use of water from a groundwater well South of the town. This well is located over 1.8 kilometres from the subject site and is not a concern at this time.

Inhalation of indoor air, soil ingestion, and soil dermal contact are possible pathways for those with extended exposure to the site. Generally, areas investigated which produced high vapour readings at surface were overlaid by cement or asphalt ground surfacing. This greatly reduces the likelihood of contaminated soil contact and/or ingestion. The presence of contaminated soil within 10<sup>th</sup> Avenue, above commercial risk management criteria, is a potential risk to workers during roadway excavation or underground utility repair.



#### 6.1.4 Criteria Selection

Through the risk management process, it has been determined that soil and water laboratory results will be compared to the Generic Hydrocarbon and Lead Criteria For Fine-Grained Soil, Commercial and Residential Land Use for remediation purposes. Refer to Appendix II - Site Layout Drawing for illustration of the land use change from Residential to Commercial.

### 6.2 Hydrocarbon Contamination in Relation to Risk Management Guidelines

Soil and groundwater sample laboratory results were compared to the 2001 Alberta Environment Generic Hydrocarbon and Lead Criteria for Fine-grained Soil, Commercial and Residential Land-Use. Of the twenty (20) delineation samples submitted, ten (10) exceeded the applicable generic criteria in one (1) or more parameters. One (1) groundwater sample was found to be above criteria. Refer to Table S-1 on Page 9 for soil laboratory results in comparison to Commercial Guidelines. Water laboratory results compared to Commercial criteria can be found in Table W-1 on Page 10. Table S-2 and W-2 on Page 11 outline groundwater samples with reference to Residential criteria. Vapour readings obtained during site investigations did not warrant the submission of numerous soil samples from the Residential criteria area.

Delineation activities within 10<sup>th</sup> Avenue were hindered by underground utilities, notably sewer, water, and underground power within the sidewalk on the East side of 10<sup>th</sup> Avenue. Utilities prevented placement of boreholes within the centre of the roadway. It is suspected that the water and sewer utility corridor within 10<sup>th</sup> Avenue has acted as a conduit for the contamination, further advancing the hydrocarbon contamination South along the West side of 10<sup>th</sup> Avenue. Contamination within the roadway has been consistently documented between 2.00 and 3.50 metres depth.

Permission to advance boreholes in the CO-OP parking lot to the East was denied by the General Manager of the property. Concentrations found in boreholes #21 and #22 indicate the contaminant plume has migrated onto the CO-OP parking lot. Dimensions of the contaminant plume on the CO-OP property can not be confirmed at this time. Using known concentrations and extrapolating them over a distance, a contaminant plume boundary has been estimated for the CO-OP property. The estimated plume dimensions in this area have been included in the remediation plan cost estimates.

Significant hydrocarbon vapours were present in most boreholes. Laboratory analysis has shown a number of boreholes displaying significant vapours to be below applicable criteria, in specific, boreholes #8, #9, #11, and #20. In the tank nest and former pump island area, contamination has been identified from surface to between approximately 3.25 and 5.50 metres depth.





**Table S-1: SOIL SAMPLE LABORATORY RESULTS IN COMPARISON TO COMMERCIAL  
GENERIC HYDROCARBON AND LEAD CRITERIA FOR FINE GRAINED SOIL**

(Risk Management Guidelines For Petroleum Storage Tank Sites; October 2001)

Parameters	Benzene	Toluene	Ethylbenzene	Xylene	Lead	F1-BTEX	F2 (C10-C16)	F3(C16-C34)	F4(>C34)	Field Vapour Reading	Sample Date (d/m/y)
	Commercial Criteria (mg/kg)										
Borehole Location and Sample Depth	9	450	690	1500	260	660	1500	2500	6600		
BH 1 @ 2.25m	<b>32</b>	12	100	270	31	<b>1200</b>	1200	45	400	>100%	7/5/02
BH 2 @ 1.50m	<b>11</b>	39	45	320	41	310	1000	380	1400	>100%	7/5/02
BH 5 @ 3.00m	<b>14</b>	48	23	130	20	25	210	56	200	58%	7/5/02
BH 8 @ 3.00m	0.09	0.05	24	37	15	290	410	53	100	72%	7/5/02
BH 9 @ 3.00m	5	0.06	8.2	0.65	7	96	60	53	100	23%	15/1/03
BH 11@ 3.00m	2.1	1.4	14	80	7	250	48	11	<5	67%	15/1/03
BH 12@ 3.00m	2.4	0.38	18	74	8	520	85	61	300	20%	15/1/03
BH 12@ 3.75m	4.2	0.16	3.3	4	9	12	6	120	400	570ppm	15/1/03
BH 13@ 2.25m	<b>27</b>	260	48	350	15	<b>1300</b>	550	80	300	>100%	15/1/03
BH 14@ 3.00m	<b>71</b>	1.3	45	70	7	23	84	63	200	>100%	15/1/03
BH 15@ 3.00m	<b>59</b>	0.25	26	40	9	530	66	48	200	>100%	15/1/03
BH 16@ 3.75m	<0.01	<0.01	<0.01	<0.01	8	<5	<5	100	300	35ppm	15/1/03
BH 17@ 3.00m	<b>25</b>	0.4	29	54	15	<b>770</b>	170	45	300	78%	16/1/03
BH 18@ 2.25m	1.6	0.05	5.6	5	8	150	140	31	200	510ppm	16/1/03
BH 19@ 3.00m	<b>26</b>	0.19	28	44	7	420	170	44	300	27%	16/1/03
BH 20@ 2.25m	7.9	0.43	12	23	8	540	220	42	300	54%	16/1/03
BH 21@ 2.25m	<b>24</b>	0.23	55	84	8	<b>1300</b>	280	61	300	65%	16/1/03
BH 22@ 3.00m	<b>11</b>	12	23	61	8	480	130	68	300	97%	16/1/03
BH 23@ 3.00m	<0.01	<0.01	1.2	0.68	7	150	65	57	300	10%	16/1/03
BH 24@ 3.00m	1.9	0.42	9.8	30	11	220	68	35	200	14%	16/1/03
BH 25@ 3.00m	0.31	0.05	9.6	0.14	48	170	180	53	300	800ppm	6/2/03
BH 26@ 2.25m	<0.01	<0.01	<0.01	<0.01	<5	<5	<5	36	200	55ppm	6/2/03
BH 27@ 3.75m	<0.01	<0.01	<0.01	<0.01	5	<5	<5	130	300	75ppm	6/2/03

**Notes:**

1. All numbers presented in mg/kg.

2. Levels which exceed allowable limits are noted in bold.

3. ppm - Denotes parts per million.

4. % - Denotes percent Lower Explosive Limit.

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**Table W-1: WATER SAMPLE LABORATORY RESULTS IN COMPARISON TO  
 COMMERCIAL GENERIC HYDROCARBON CRITERIA FOR FINE GRAINED SOIL**  
 (Risk Management Guidelines For Petroleum Storage Tank Sites; October 2001)

Parameters	Benzene	Toluene	Ethylbenzene	Xylene	F1-BTEX	F2 (>C10-C16)	
Monitoring Well Location	16	Commercial Criteria (mg/l)				18	Sample Date (d/m/y)
	<b>342</b>	<b>71</b> <sup>NG</sup>	<b>43</b> <sup>NG</sup>	<b>24</b>			
MW #1	14	0.12	1.5	3.6	19	1.8	23/5/02
MW #1	<b>25</b>	0.1	2.7	4.1	0.3	1.7	6/2/03
MW #4	3.8	0.066	0.11	0.67	0.2	0.07	6/2/03
MW #5	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05	6/2/03
MW #6	0.0057	0.0034	<0.0005	0.018	0.3	<0.05	6/2/03
MW #7	To be forwarded upon receipt.						

**Notes:**

1. All numbers presented in mg/l.
2. Levels which exceed allowable limits are noted in **bold**.



**Table S-2: SOIL SAMPLE LABORATORY RESULTS IN COMPARISON TO RESIDENTIAL GENERIC HYDROCARBON AND LEAD CRITERIA FOR FINE GRAINED SOIL**  
(Risk Management Guidelines For Petroleum Storage Tank Sites; October 2001)

Parameters	Benzene	Toluene	Ethylbenzene	Xylene	Lead	F1-BTEX	F2 (C10-C16)	F3(C16-C34)	F4(>C34)	Field Vapour Reading	Sample Date (d/m/y)
Borehole Location and Sample Depth (m)	1.9	300	Residential Criteria (mg/kg)				900	800	5600		
BH 10@ 3.00m	1.4	0.06	8.3	1.8	10	150	120	75	300	460ppm	15/01/03

**Notes:**

1. All numbers presented in mg/kg.
2. Levels which exceed allowable limits are noted in bold.
3. ppm - Denotes Parts Per Million.
4. % - Denotes percent Lower Explosive Limit.

**Table W-2: WATER SAMPLE LABORATORY RESULTS IN COMPARISON TO RESIDENTIAL GENERIC HYDROCARBON CRITERIA FOR FINE GRAINED SOIL**  
(Risk Management Guidelines For Petroleum Storage Tank Sites; October 2001)

Parameters	Benzene	Toluene	Ethylbenzene	Xylene	F1-BTEX	F2 (>C10-C16)	Sample Date (d/m/y)
Monitoring Well Location	3.5	Residential Criteria (mg/l)				11	
	228	19 NGL	163	9			
MW #2	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	<0.05	6/2/03
MW #3	0.0042	<0.0005	<0.0005	<0.0005	<0.1	<0.05	6/2/03

**Notes:**

1. All numbers presented in mg/l.
2. Levels which exceed allowable limits are noted in bold.



A Southern cut-off point, within 10<sup>th</sup> Avenue, was established with boreholes # 25, #26, and #27. Although borehole #8 tested below criteria, it has been included within the plume boundaries as borehole #17, directly South, was found to be above criteria. Refer to Appendix II for a Contaminant Plume Boundary Drawing.

The following table outlines the sections used to determine the dimensions of the contaminant plume. A combination of laboratory analysis and vapour readings were utilized while preparing the following table. Appendix II contains a Contaminant Plume Section Drawing for an illustration of the sections.

**Table 1 - Contaminant Plume Sections**

Section	Area (m <sup>2</sup> )	Depth (m) of Contamination	Volume (m <sup>3</sup> )
<b>On-Site</b>			
1	144	0 - 4.75	684
2	105	0 - 3.50	368
3	75	0 - 3.75	281
<b>Off-Site - Five Star Video Property</b>			
4	80	2.25 - 3.25	80
5	122	2.00 - 3.50	183
<b>Off-Site - CO-OP Food Store Property (Estimated)</b>			
6	77	2.00 - 3.50	116
7	126	2.00 - 3.00	126
<b>Off-Site - Town of Carstairs Property</b>			
8	161	2.00 - 3.50	242
9	126	2.00 - 3.00	126
10	540	2.00 - 3.50	810
11	175	2.50 - 3.50	175
<b>TOTALS</b>	<b>1731m<sup>2</sup></b>		<b>3190m<sup>3</sup></b>

Taking into consideration extended excavation edges, the volume of soil used in preparing cost estimates will be 3,300m<sup>3</sup>.





## 7.0 CONCLUSION AND RECOMMENDATIONS

The information obtained during the Phase III: Hydrocarbon Environmental Site Assessment-Delineation confirmed petroleum product contamination above 2001 Alberta Environment Generic Hydrocarbon and Lead Criteria for Fine-grained Soil, Commercial and Residential Land-Use. Off-site and on-site soil has been impacted by migrating hydrocarbon contamination; on-site groundwater is also impacted. Sufficient data has been obtained to prepare a contaminant plume boundary (see Appendix II - Drawings).

A remediation plan complete with estimated costs has been included within Appendix IX. Due to evidence of subsurface hydrocarbon contamination, Alberta Environment should be notified at the following address:

Alberta Environment Central Regional Office  
Compliance Division  
3<sup>rd</sup> Floor Provincial Building  
4920 - 51 Street  
Red Deer, Alberta  
T4N 6K8

It is the landowners responsibility to report to this agency as a requirement of the Environmental and Protection and Enhancement Act (Part 4, Division 1, Release of Substances). Please see Appendix X for the Alberta Regulation 117/93 - Release Reporting Regulation.

## 8.0 CLOSURE/LIMITATIONS

This report was prepared for the exclusive use of Vaughn Wyant Investments Ltd. and its' authorized agents. Petroleum Enviro Services ( Div. of A.S.M. Corrosion Control Ltd.) or its employees will not be responsible for any use of the information in this report, or any reliance on or decisions made based on it, by unauthorized third parties.

There is no warranty, expressed or implied by Petroleum Enviro Services that this investigation has identified all potential contamination on or beneath the subject site. The assessment of environmental conditions at this site has been made using information supplied by the results of borehole investigations and chemical analysis of soil samples retrieved on the dates specified. No assurance is made regarding changes in conditions subsequent to the time of investigation.



VAUGHN WYANT INVESTMENTS LTD.

Environmental Services

February 21, 2003; E-03/3907

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Although the data collected were only at site-specific locations, the reported information is believed to provide a reasonable representation of the general environmental conditions at this site. The findings outlined herein do not preclude the existence of subsurface contamination in areas of this site which were not specifically investigated. In addition, the existence of contaminants other than those addressed in this report has not been evaluated.

Respectfully submitted,

PETROLEUM ENVIRO SERVICES



Jenifer Bachand, B.Sc.

Environmental Technologist



**APPENDIX I**

**Selected Site Photographs**





Photo No. 1 January 15 & 16, 2003; Phase III: Hydrocarbon ESA-Delineation  
Lots 5 &6, Block 28, Plan 3845 CO; 419 - 10 Avenue, Carstairs, Alberta  
Looking North. Drilling Borehole #9.



Photo No. 2 January 15 & 16, 2003; Phase III: Hydrocarbon ESA-Delineation  
Lots 5 &6, Block 28, Plan 3845 CO; 419 - 10 Avenue, Carstairs, Alberta  
Looking Southeast. Sampling Borehole #10.







Photo No. 3 January 15 & 16, 2003; Phase III: Hydrocarbon ESA-Delineation  
Lots 5 & 6, Block 28, Plan 3845 CO; 419 - 10 Avenue, Carstairs, Alberta  
Looking West. Drilling Borehole #11.



Photo No. 4 January 15 & 16, 2003; Phase III: Hydrocarbon ESA-Delineation  
Lots 5 & 6, Block 28, Plan 3845 CO; 419 - 10 Avenue, Carstairs, Alberta  
Looking West. Drilling Borehole #12/Monitoring Well #4.





Photo No. 5 January 15 & 16, 2003; Phase III: Hydrocarbon ESA-Delineation  
Lots 5 & 6, Block 28, Plan 3845 CO; 419 - 10 Avenue, Carstairs, Alberta  
Looking North. Drilling Borehole #13.



Photo No. 6 January 15 & 16, 2003; Phase III: Hydrocarbon ESA-Delineation  
Lots 5 & 6, Block 28, Plan 3845 CO; 419 - 10 Avenue, Carstairs, Alberta  
Looking West. Drilling Borehole #14.







Photo No. 7 January 15 & 16, 2003; Phase III: Hydrocarbon ESA-Delineation  
Lots 5 &6, Block 28, Plan 3845 CO; 419 - 10 Avenue, Carstairs, Alberta  
Looking West. Drilling Borehole #15.



Photo No. 8 January 15 & 16, 2003; Phase III: Hydrocarbon ESA-Delineation  
Lots 5 &6, Block 28, Plan 3845 CO; 419 - 10 Avenue, Carstairs, Alberta  
Looking North. Drilling Borehole #16/Monitoring Well #5.





Photo No. 9 January 15 & 16, 2003; Phase III: Hydrocarbon ESA-Delineation  
Lots 5 & 6, Block 28, Plan 3845 CO; 419 - 10 Avenue, Carstairs, Alberta  
Looking West. Drilling Borehole #17.



Photo No. 10 January 15 & 16, 2003; Phase III: Hydrocarbon ESA-Delineation  
Lots 5 & 6, Block 28, Plan 3845 CO; 419 - 10 Avenue, Carstairs, Alberta  
Looking West. Drilling Borehole #18.







Photo No. 11 January 15 & 16, 2003; Phase III: Hydrocarbon ESA-Delineation  
Lots 5 & 6, Block 28, Plan 3845 CO; 419 - 10 Avenue, Carstairs, Alberta  
Looking West. Drilling Borehole #19.



Photo No. 12 January 15 & 16, 2003; Phase III: Hydrocarbon ESA-Delineation  
Lots 5 & 6, Block 28, Plan 3845 CO; 419 - 10 Avenue, Carstairs, Alberta  
Looking East. Drilling Borehole #22.





Photo No. 13 January 15 & 16, 2003; Phase III: Hydrocarbon ESA-Delineation  
Lots 5 & 6, Block 28, Plan 3845 CO; 419 - 10 Avenue, Carstairs, Alberta  
Looking East. Drilling Borehole #23/Monitoring Well #6.



Photo No. 14 January 15 & 16, 2003; Phase III: Hydrocarbon ESA-Delineation  
Lots 5 & 6, Block 28, Plan 3845 CO; 419 - 10 Avenue, Carstairs, Alberta  
Looking West. Borehole #24. Finishing The Borehole Surface.



## **APPENDIX II**

### **Drawings**

- Contaminant Plume Boundary Overlay
- Site Layout Drawing
- Contaminant Plume Section Drawing





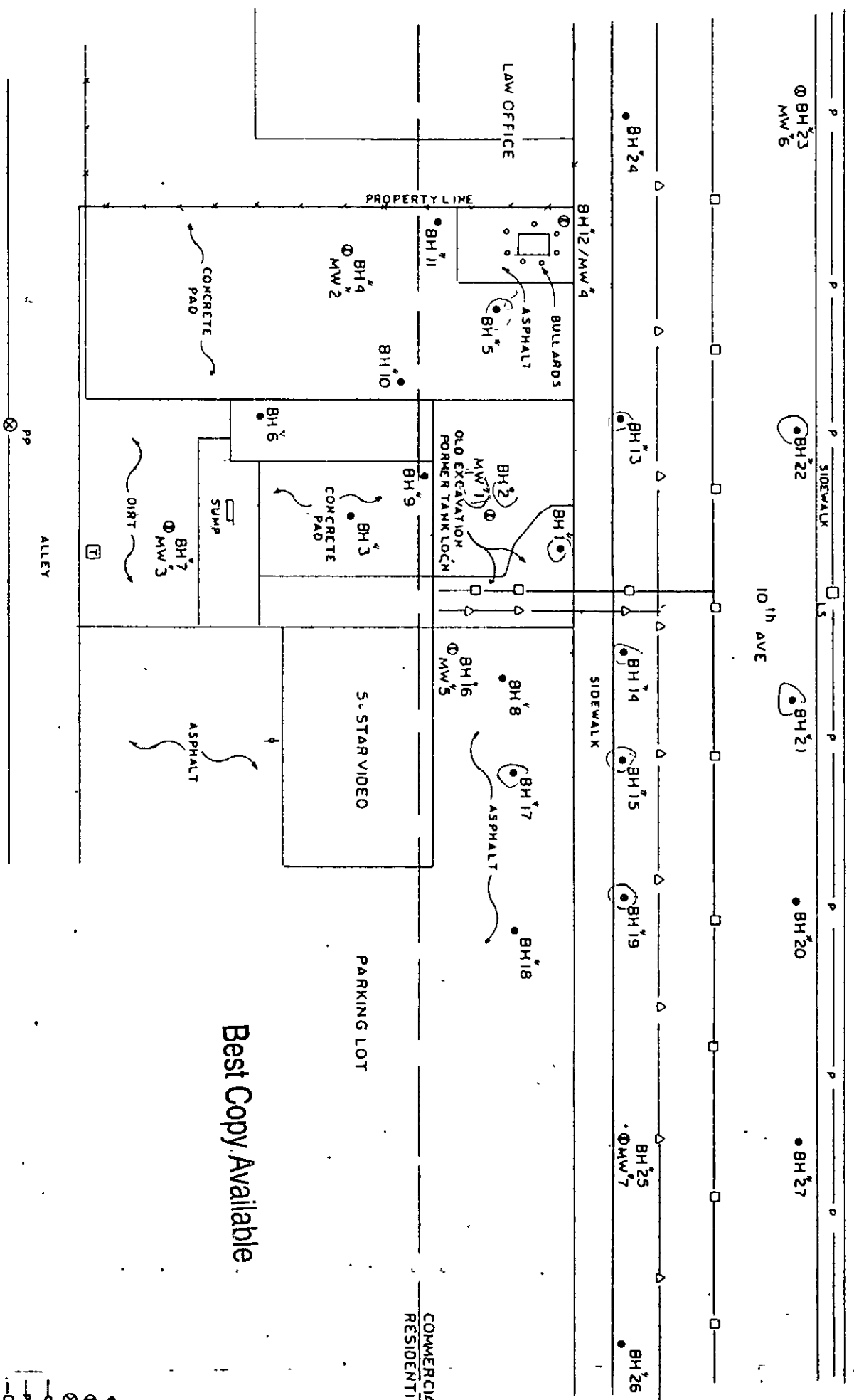
GROUNDWATER FLOW



CO-OP STORE

CO-OP PARKING LOT

10th AVE



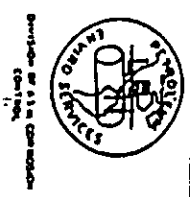
Slu/s

Best Copy Available

COMMERCIAL CRITERIA  
RESIDENTIAL CRITERIA

- LEGEND**
- BOREHOLE
  - ⊕ MONITORING WELL
  - ⊗ POWERPOLE
  - GASLINE
  - POWERLINE
  - SEWERLINE
  - WATERLINE
  - ⊕ LIGHT STANDARD
  - CRITERIA CHANGE LINE

No.	REVISION	DATE	BY
1	TO ADD BOREHOLES 23, 26, 27 & MONITORING WELL 7	03-02-20	G.W.D.



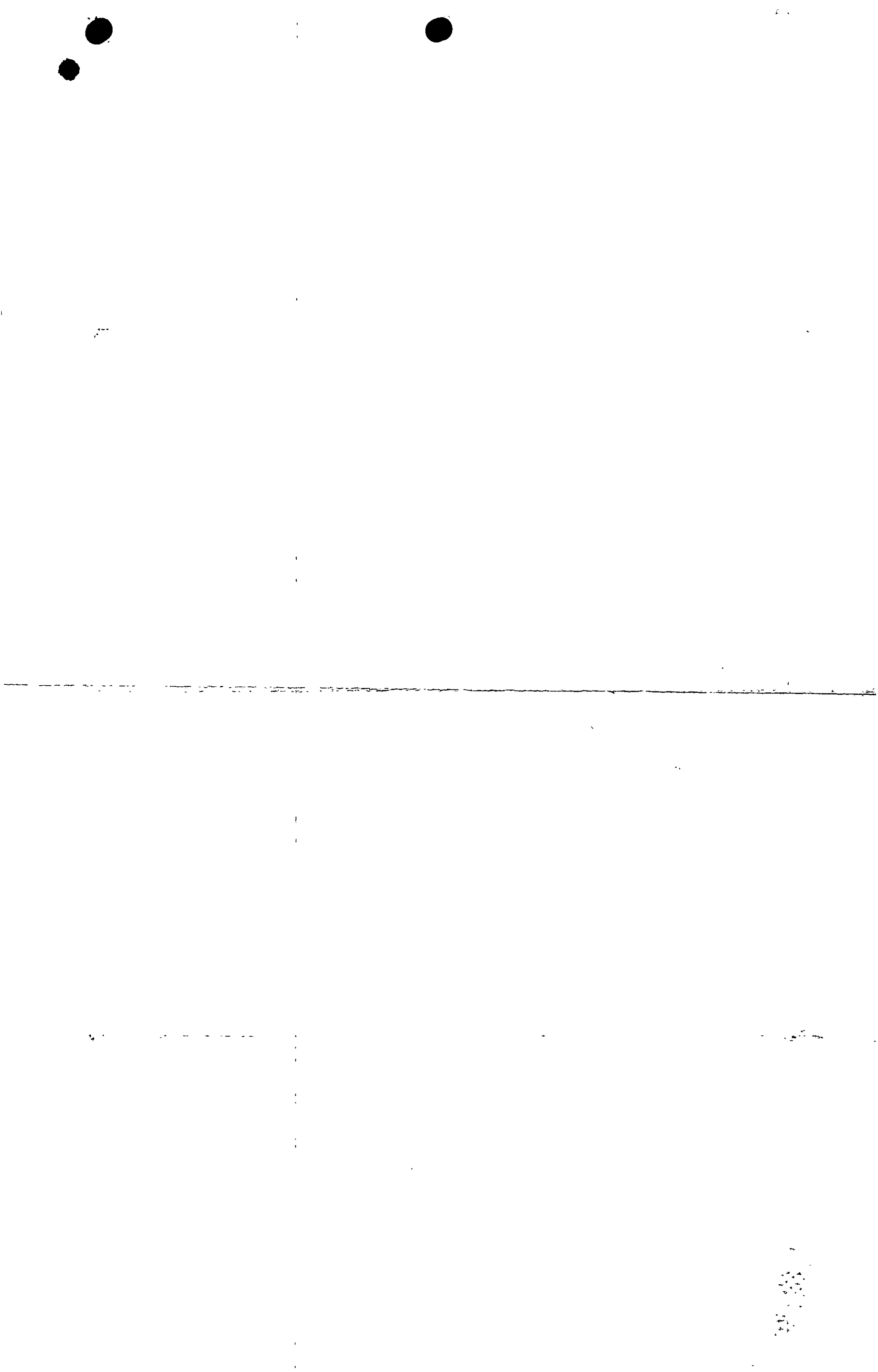
FOR  
VAUGHN WYANT INVESTMENTS LTD  
SITE NO. 9302

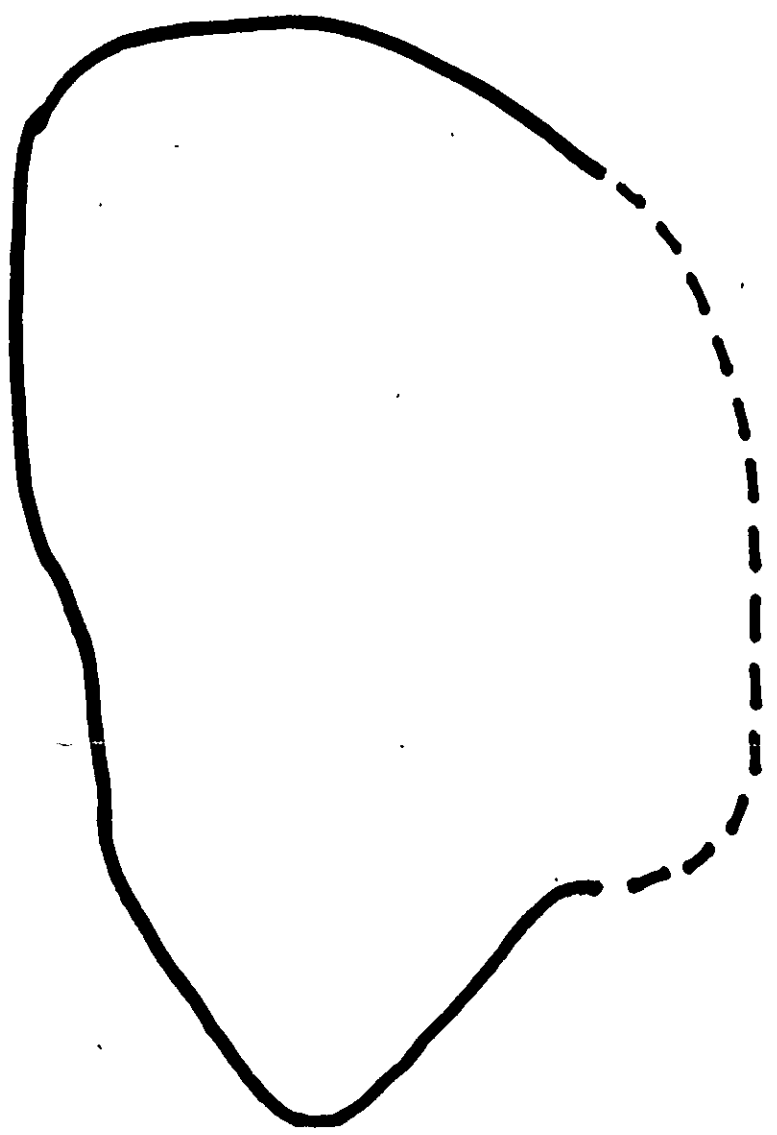
SITE LAYOUT DRAWING  
CARSTAIRS FORD SALES & SERVICE LTD.  
419-10th AVE.  
CARSTAIRS, ALBERTA.

DESIGNED BY: SCALE: 1:400  
DRAWN BY: C.V.D. DATE: 02-03-16

DRAWING No. 3449-B

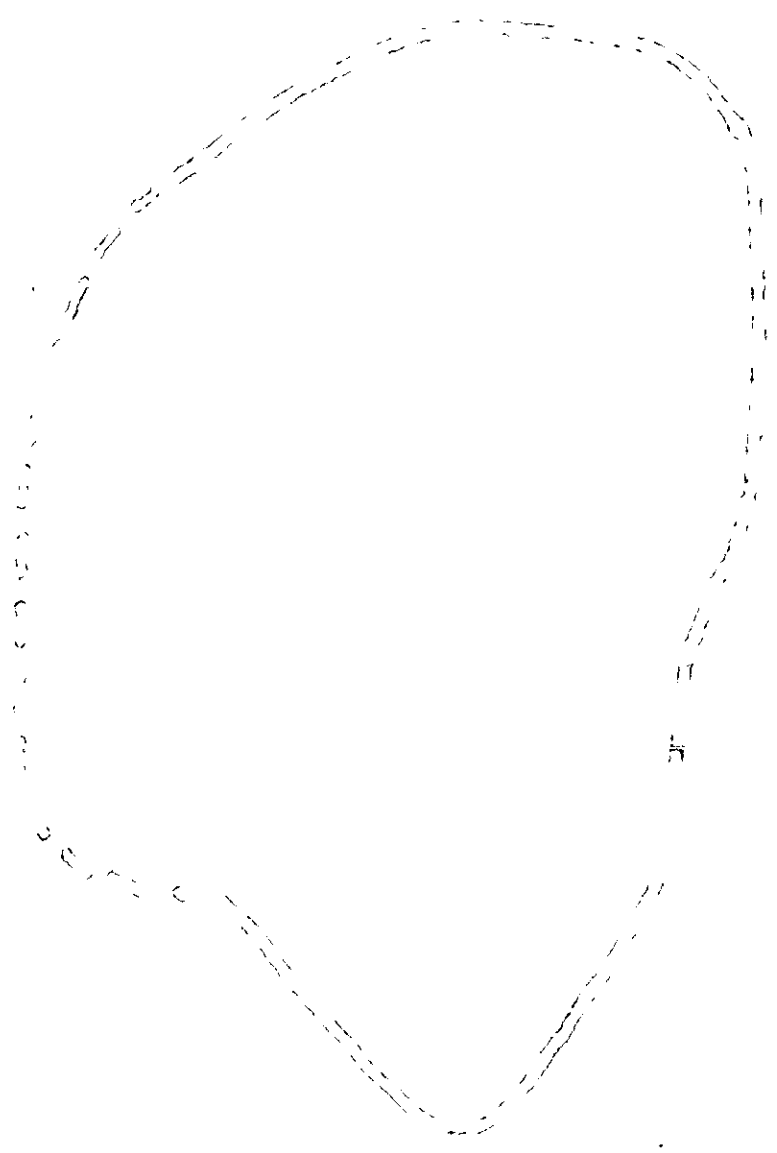
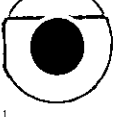
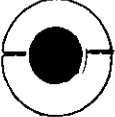


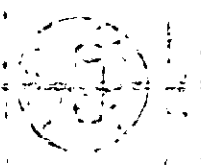




— CONTAMINANT PLUME BOUNDARY  
 - - - ESTIMATED BOUNDARY

		FOR <b>VAUGHN WYANT INVESTMENTS LTD</b> SITE NO. 9302		SITE LAYOUT DRAWING <b>CARSTAIRS FORD SALES &amp; SERVICE LTD.</b> 419-10th AVE CARSTAIRS, ALBERTA	
NO. 1 TO ADD BORE HOLES 23, 26, 27B MONITORING WELLS	REVISION	DATE 03-02-20	BY GMD	DESIGNED BY: G.V.O. DRAWN BY: G.V.O.	SCALE: 1:100 DATE: 02-03-18
			DRAWING NO. 3449-B		



UNITED STATES DEPARTMENT OF THE INTERIOR  
 BUREAU OF LAND MANAGEMENT  
 SUPPLEMENTAL SURVEY

SECTION 16 T. 12 N. R. 10 E. S. 34  
 COUNTY OF ... STATE OF ...

DATE OF SURVEY ...

**APPENDIX III**

Lithologic Borehole Logs



# Log of Borehole: BH #9

Reference No: 9302

Project: Delineation

Location: Carstairs, Alberta

Client: Vaughn Wyant

Technologist: JMB

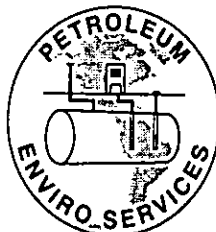
SUBSURFACE PROFILE			SOIL SAMPLE		VAPOUR ANALYSIS		Well Data	NOTES
Depth (ft)	Symbol	Description	Depth (m)	Sample No	Type	LOWER EXPLOSIVE LIMIT □ 10 30 50 70 90 □ PARTS PER MILLION ● 100 300 500 700 900 ●		
0		Ground Surface	0					
0-1		Gravel and Clay Fill Frozen						
1-2		Clay Till Brown, frozen						
2-3				1	S	20		
3-4								
4-5		Frost line Grey, soft, moist						
5-6		Black staining, hydrocarbon odour, plastic, grey, soft		2	S	270		
6-7								
7-8				3	S	21		
8-9								
9-10		Stiffer Brown, no odour or staining, stiffer, less moisture						
10-11				4	S	23		
11-12								
12-13		Poorly sorted pebbles						
13-14		Moist						
14-15				5	S	60		
15-16								
16-17				6	S	55		
17-18								
18-19				7	S	45		
19-20								
20-21		End of Borehole		8	S	40		

Soil sample submitted  
from 3 00 metres.

Drill Method Solid Stem Auger

Drill Date: January 15, 2003

Hole Size: 15cm/6"



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# Log of Borehole: BH #10

Reference No: 9302

Project: Delineation

Location: Carstairs, Alberta

Client: Vaughn Wyant

Technologist: JMB

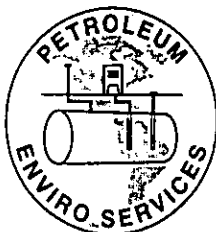
SUBSURFACE PROFILE			SOIL SAMPLE		VAPOUR ANALYSIS		Well Data	NOTES
Depth (ft)	Symbol	Description	Depth (m)	Sample No.	Type	LOWER EXPLOSIVE LIMIT □ % □ 10 30 50 70 90		
						PARTS PER MILLION ● ppm ● 100 300 500 700 900		
0		Ground Surface	0					
		Concrete 4"						
1		Gravel and Clay Fill						
		Frozen						
2		Clay Till						
		Brown, frozen						
3		Frost line						
4		Grey, moist, plastic						
5		Hydrocarbon odour		2	20			
6								
7				3		450		
8								
9		Black staining, hydrocarbon odour, stiffer, less moisture						
10				4		460		
11		Brown, no staining or odour, stiffer						
12				5	15			
13								
14								
15		End of Borehole		6	15			
16								

Soil sample submitted from 3.00 metres

Drill Method Solid Stem Auger

Drill Date January 15, 2003

Hole Size 15cm/6"



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# Log of Borehole: BH #11

Reference No: 9302

Project: Delineation

Location: Carstairs, Alberta

Client: Vaughn Wyant

Technologist: JMB

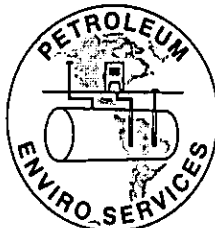
SUBSURFACE PROFILE			SOIL SAMPLE		VAPOUR ANALYSIS		Well Data	NOTES
Depth (ft)	Symbol	Description	Depth (m)	Sample No	Type	LOWER EXPLOSIVE LIMIT □ 10 30 50 70 90 □ PARTS PER MILLION ● 100 300 500 700 900 ●		
0		Ground Surface	0					
0		Asphalt 3"						
1		Topsoil Black, organics, frozen						
2		Frost line						
3		Moist, soft, black	1	1	S	15		
5		Clay Till Brown, no staining or odour, stiffer	2	2	S	25		
7			3	3	S	370		
9		Softer, hydrocarbon odour, fine-grained sand stringers throughout	3	4	S	67		
12		Brown, no staining or odour, stiffer	4	5	S	120		
15		End of Borehole	4	6	S	45		

Soil sample submitted  
from 3.00 metres Particle  
size submitted

Drill Method Solid Stem Auger

Drill Date January 15, 2003

Hole Size 15cm/6"



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# Log of Borehole: BH #12/MW #4

Reference No: 9302

Project: Delineation

Location: Carstairs, Alberta

Client: Vaughn Wyant

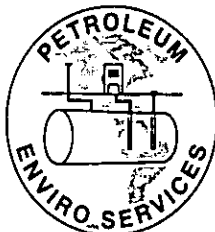
Technologist: JMB

SUBSURFACE PROFILE			SOIL SAMPLE		VAPOUR ANALYSIS		Well Data	NOTES
Depth (ft)	Symbol	Description	Depth (m)	Sample No	LOWER EXPLOSIVE LIMIT □ 10 30 50 70 90 □ PARTS PER MILLION ● 100 300 500 700 900 ●	Type		
0		Ground Surface	0					Borehole sealed to 0.1m below surface with bentonite. Flush mount road cap installed.  Sand pack from 1.2m to 6.0m.  Soil sample submitted from 3.00 metres.  Soil sample submitted from 3.75 metres.  Well screened from 1.5m to 6.0m.
0		Asphalt 2"						
1		Topsoil Black, organics, frozen						
2		Frost line		1	30			
3		Moist, soft, black	1					
4		Clay Till Brown, no staining or odour, soft, plastic		2	25			
5		Stiffer	2					
6		Scattered sand stringers		3	150			
7		Hydrocarbon odour, dark grey, moist, stiff, plastic	3					
8		Slight odour		4	20			
9		Brown, no staining or odour, stiffer	4					
10				5	570			
11			5					
12				6	150			
13			6					
14				7	45			
15			7					
16				8	70			
17			8					
18								
19								
20		End of Borehole	6					
21								

Drill Method: Solid Stem Auger

Drill Date: January 15, 2003

Hole Size: 15cm/6"



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# Log of Borehole: BH #13

Reference No: 9302

Project: Delineation

Location: Carstairs, Alberta

Client: Vaughn Wyant

Technologist: JMB

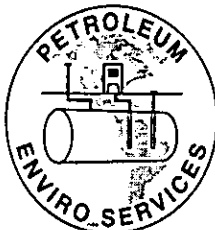
SUBSURFACE PROFILE			SOIL SAMPLE		VAPOUR ANALYSIS		Well Data	NOTES
Depth (ft)	Symbol	Description	Depth (m)	Sample No	Type	LOWER EXPLOSIVE LIMIT □ 10 30 50 70 90 □ PARTS PER MILLION ● 100 300 500 700 900 ●		
0		Ground Surface	0					
		Asphalt 5"						
		Gravel						
1		Clay Till						
2		Dark blue/grey, frozen, hydrocarbon odour						
		Frost line						
3			1	1		580		
4		Plastic, moist						
5				2		890		
6								
7			2	3		100		
8								
9		Black staining, hydrocarbon odour, plastic, light brown						
10			3	4		98		
11								
12		Brown, no odour or staining, stiffer, less moisture		5		430		
13								
14								
15		End of Borehole		6		140		
16								

Soil sample submitted from 2.25 metres

Drill Method: Solid Stem Auger

Drill Date: January 15, 2003

Hole Size: 15cm/6"



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# Log of Borehole: BH #14

Reference No: 9302

Project: Delineation

Location: Carstairs, Alberta

Client: Vaughn Wyant

Technologist: JMB

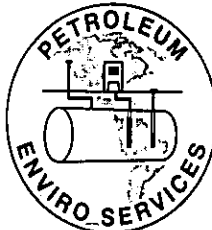
SUBSURFACE PROFILE			SOIL SAMPLE		VAPOUR ANALYSIS		Well Data	NOTES
Depth (ft)	Symbol	Description	Depth (m)	Sample No	LOWER EXPLOSIVE LIMIT □ 10 30 50 70 90 □ PARTS PER MILLION ● 100 300 500 700 900 ●			
0		Ground Surface	0					
		Asphalt 5"						
		Gravel						
1		Clay Till						
		Dark blue/grey, frozen						
2								
		Frost line						
3				1		150		
		Plastic, stiff, grey						
4				1				
5				2		320		
6								
7				2				
8				3			86	
		Black staining, hydrocarbon odour, plastic, increased moisture						
9								
10				3			100	
11								
12				5		65		
		Brown, no odour or staining, stiffer, less moisture						
13				4				
14								
15				6		45		
		End of Borehole						
16								

Soil sample submitted from 3 00 metres.

Drill Method: Solid Stem Auger

Drill Date: January 15, 2003

Hole Size: 15cm/6"



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# Log of Borehole: BH #15

Reference No: 9302

Project: Delineation

Location: Carstairs, Alberta

Client: Vaughn Wyant

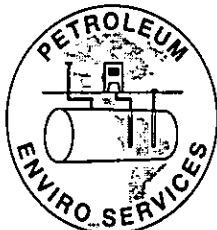
Technologist: JMB

SUBSURFACE PROFILE			SOIL SAMPLE		VAPOUR ANALYSIS		Well Data	NOTES
Depth (ft)	Symbol	Description	Depth (m)	Sample No	Type	LOWER EXPLOSIVE LIMIT □ 10 30 50 70 90 □ PARTS PER MILLION ● 100 300 500 700 900 ●		
0		Ground Surface	0					
		<b>Asphalt 5"</b>						
1		<b>Clay Till</b> Dark blue/grey, frozen						
2				1		210		
3		Frost line	1					
4				2		220		
5		Plastic, stiff						
6								
7		Black staining, hydrocarbon odour, plastic	2	3		74		
8								
9								
10				4		100		
11		Brown, no odour or staining, stiffer, less moisture	3					Soil sample submitted from 3.00 metres
12				5		55		
13								
14								
15				6		60		
16		End of Borehole						

Drill Method Solid Stem Auger

Drill Date January 15, 2003

Hole Size 15cm/6"



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# Log of Borehole: BH #16/MW #5

Reference No: 9302

Project: Delineation

Location: Carstairs, Alberta

Client: Vaughn Wyant

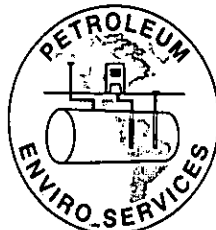
Technologist: JMB

SUBSURFACE PROFILE			SOIL SAMPLE		VAPOUR ANALYSIS		Well Data	NOTES
Depth (ft)	Symbol	Description	Depth (m)	Sample No	LOWER EXPLOSIVE LIMIT			
					%			
				PARTS PER MILLION				
				ppm				
				100 300 500 700 900				
0		Ground Surface	0					Borehole sealed to 0.1m below surface with bentonite. Flush mount road cap installed.  Sand pack from 1.2m to 6.0m.  Well screened from 1.5m to 6.0m.  Soil sample submitted from 3.75 metres.
		Concrete 4"						
1		Clay Till Brown, frozen						
2								
3		Frost line Grey, brown, moist, plastic	1	1	25			
4								
5		Brown, no staining or odour, stiff	2	2	20			
6								
7		Oxidation evidence	2	3	25			
8								
9			3	4	20			
10								
11			4	5	35			
12								
13			5	6	35			
14								
15			5	7	45			
16								
17			6	8	55			
18								
19								
20								
21		End of Borehole						

Drill Method Solid Stem Auger

Drill Date January 15, 2003

Hole Size 15cm/6"



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# Log of Borehole: BH #17

Reference No: 9302

Project: Delineation

Location: Carstairs, Alberta

Client: Vaughn Wyant

Technologist: JMB

SUBSURFACE PROFILE			SOIL SAMPLE		VAPOUR ANALYSIS		Well Data	NOTES
Depth (ft)	Symbol	Description	Depth (m)	Sample No	LOWER EXPLOSIVE LIMIT □ % □ 10 30 50 70 90	PARTS PER MILLION ● ppm ● 100 300 500 700 900		
0		Ground Surface	0					
0		Asphalt 2"						
0		Clay Fill						
1		Black, topsoil/organics, frozen						
2								
3		Brown, frozen	1	1		750		
4								
4		Frost line						
5		Light brown/grey hydrocarbon odour, moist, soft, plastic		2		680		
6								
7			2	3		50		
8								
9		Heavy black staining, stiff, odour, less moisture						
10		Light odour, no staining, light brown	3	4		78		
11								
12				5		250		
13			4					
14		No odour						
15				6		85		
16		End of Borehole						

Soil sample submitted from 3 00 metres

Drill Method Solid Stem Auger

Drill Date January 16, 2003

Hole Size 15cm/6"



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# Log of Borehole: BH #18

Reference No: 9302

Project: Delineation

Location: Carstairs, Alberta

Client: Vaughn Wyant

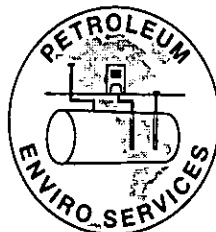
Technologist: JMB

SUBSURFACE PROFILE			SOIL SAMPLE		VAPOUR ANALYSIS		Well Data	NOTES
Depth (ft)	Symbol	Description	Depth (m)	Sample No.	Type	LOWER EXPLOSIVE LIMIT □ 10 30 50 70 90 □ PARTS PER MILLION ● 100 300 500 700 900 ●		
0		Ground Surface	0					
0		Asphalt 2"						
0		Sandy Fill						
1								
2								
3		Frost line	1	1	S	100		
4								
5		Clay Till	2	2	S	55		
6		Sand and clay combination						
7								
8		Grey/brown, black staining, hydrocarbon odour, soft, moist, plastic	2	3	S	510		Soil sample submitted from 2.25 metres
9								
10		Brown, stiff, decreased moisture, no odour or staining	3	4	S	250		
11								
12								
13								
14		No odour	4	5	S	45		
15								
16		End of Borehole		6	S	35		

Drill Method Solid Stem Auger

Drill Date January 16, 2003

Hole Size 15cm/6"



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# Log of Borehole: BH #19

Reference No: 9302

Project: Delineation

Location: Carstairs, Alberta

Client: Vaughn Wyant

Technologist: JMB

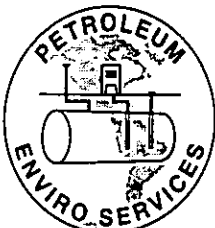
SUBSURFACE PROFILE			SOIL SAMPLE		VAPOUR ANALYSIS		Well Data	NOTES
Depth (ft)	Symbol	Description	Depth (m)	Sample No.	Type	LOWER EXPLOSIVE LIMIT □ % □ 10 30 50 70 90		
0		Ground Surface	0					
0		Asphalt 2"						
0		Sandy Clay Fill						
1								
2								
3		Frost line		1	S	55		
3		Clay Till	1					
4		Thin sand stringers, greenish, soft, moist, plastic						
5				2	S	0		
6								
7								
8		Some black staining, hydrocarbon odour		3	S	790		
9								
10		Heavy black staining, hydrocarbon odour, plastic moist		4	S	27		
11								
12		No odour or staining, very stiff, decreased moisture, brown		5	S	30		
13								
14								
15				6	S	30		
15		End of Borehole						
16								

Soil sample submitted from 3 00 metres.

Drill Method: Solid Stem Auger

Drill Date: January 16, 2003

Hole Size: 15cm/6"



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# Log of Borehole: BH #20

Reference No: 9302

Project: Delineation

Location: Carstairs, Alberta

Client: Vaughn Wyant

Technologist: JMB

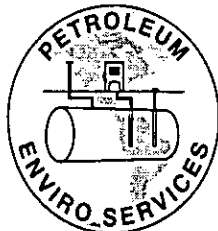
SUBSURFACE PROFILE			SOIL SAMPLE		VAPOUR ANALYSIS		Well Data	NOTES
Depth (ft)	Symbol	Description	Depth (m)	Sample No	Type	LOWER EXPLOSIVE LIMIT □ 10 30 50 70 90 □ PARTS PER MILLION ● 100 300 500 700 900 ●		
0		Ground Surface	0					
0		Asphalt 2"						
0		Sandy Clay Fill						
1								
2								
2		Frost line						
3		Clay Till	1	1	S	35		
3		Poorly sorted pebbles, stiff, brown, moist						
4								
5								
5			2	2	S	120		
6								
7		Hydrocarbon odour, plastic, soft						
7								
8		Black Staining						
8								
9								
10								
10			3	3	S	54		
11		No staining or odour, brown, stiff						
11								
12								
12								
13								
13								
14								
14								
15		Increased moisture						
15								
15		End of Borehole						
15								
16								
16								

Soil sample submitted from 2.25 metres.

Drill Method: Solid Stem Auger

Drill Date: January 16, 2003

Hole Size: 15cm/6"



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# Log of Borehole: BH #21

Reference No: 9302

Project: Delineation

Location: Carstairs, Alberta

Client: Vaughn Wyant

Technologist: JMB

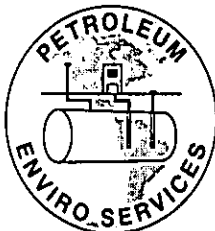
SUBSURFACE PROFILE			SOIL SAMPLE	VAPOUR ANALYSIS		Well Data	NOTES	
Depth (ft)	Symbol	Description	Depth (m)	Sample No	Type			LOWER EXPLOSIVE LIMIT
								<input type="checkbox"/> 10 <input type="checkbox"/> 30 <input type="checkbox"/> 50 <input type="checkbox"/> 70 <input type="checkbox"/> 90 PARTS PER MILLION ppm
0		Ground Surface	0					
0		Asphalt 2"						
0		Sandy Clay Fill						
1								
2								
3		Frost line						
3		Clay Till	1	1	S	120		
4		Poorly sorted pebbles, stiff, brown, moist						
5				2	S	220		
6								
7		Hydrocarbon odour, plastic, soft	2	3	S		65	
8		Black Staining						
9								
10		No staining or odour, brown, stiff	3	4	S		620	
11								
12				5	S		15	
13			4					
14								
15				6	S		5	
16		End of Borehole						

Soil sample submitted from 2.25 metres.

Drill Method Solid Stem Auger

Drill Date January 16, 2003

Hole Size 15cm/6"



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# Log of Borehole: BH #22

Reference No: 9302

Project: Delineation

Location: Carstairs, Alberta

Client: Vaughn Wyant

Technologist: JMB

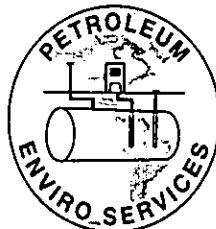
SUBSURFACE PROFILE			SOIL SAMPLE		VAPOUR ANALYSIS					Well Data	NOTES	
Depth (ft)	Symbol	Description	Depth (m)	Sample No	Type	LOWER EXPLOSIVE LIMIT						
						10	30	50	70			90
						PARTS PER MILLION						
						100	300	500	700	900		
0		Ground Surface	0									
0		Asphalt 2"										
0		Sandy Clay Fill										
1												
2												
2		Frost line		1	10							
3		Clay Till										
3		Poorly sorted pebbles, stiff, brown, moist		1								
4												
5				2	10							
6												
6		Hydrocarbon odour, plastic, soft										
7				3		19						
8		Black Staining										
9												
10				4					97			
10		No staining or odour, brown, stiff										
11												
12				5	30							
13												
14												
15				6	20							
15		End of Borehole										
16												

Soil sample submitted from 3.00 metres.

Drill Method Solid Stem Auger

Drill Date January 16, 2003

Hole Size 15cm/6"



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# Log of Borehole: BH #23/MW #6

Reference No: 9302

Project: Delineation

Location: Carstairs, Alberta

Client: Vaughn Wyant

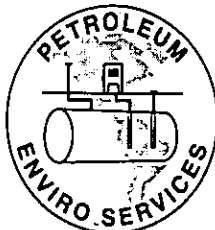
Technologist: JMB

SUBSURFACE PROFILE			SOIL SAMPLE		VAPOUR ANALYSIS		Well Data	NOTES
Depth (ft)	Symbol	Description	Depth (m)	Sample No	LOWER EXPLOSIVE LIMIT			
					%			
				PARTS PER MILLION				
				ppm				
				100 300 500 700 900				
0		Ground Surface	0					Borehole sealed to 0.1m below surface with bentonite. Flush mount road cap installed.  Sand pack from 1.2m to 4.6m.  Well screened from 1.5m to 4.6m.  Soil sample submitted from 3.00 metres.
		Asphalt 2"						
		Sandy Clay Fill						
1								
2		Frost line						
3		Clay Till	1	1	40			
		Poorly sorted pebbles, brown, moist, plastic						
4								
5				2	15			
6								
7			2	3	15			
8								
9		Hydrocarbon odour, plastic, soft						
10		Black Staining	3	4	10			
11								
12		No staining or odour, brown, very stiff		5	25			
13			4					
14		Water in hole						
15		End of Borehole		6	25			
16								

Drill Method: Solid Stem Auger

Drill Date: January 16, 2003

Hole Size: 15cm/6"



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# Log of Borehole: BH #24

Reference No: 9302

Project: Delineation

Location: Carstairs, Alberta

Client: Vaughn Wyant

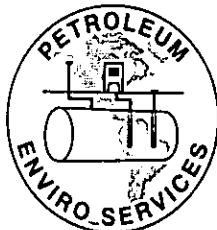
Technologist: JMB

SUBSURFACE PROFILE			SOIL SAMPLE		VAPOUR ANALYSIS		Well Data	NOTES
Depth (ft)	Symbol	Description	Depth (m)	Sample No	Type	LOWER EXPLOSIVE LIMIT □ % □ 10 30 50 70 90		
						PARTS PER MILLION ● ppm ● 100 300 500 700 900		
0		Ground Surface	0					
0		Asphalt 2"						
0		Sandy Clay Fill						
2		Frost line						
3		Clay Till		1	20			
3		Poorly sorted pebbles, soft, grey, moist	1					
4		Sandy Clay						
5		Clay Till		2	30			
5		Brown, moist, soft, plastic	2					
7				3	90			
8								
8		Hydrocarbon odour, plastic, stiff, black staining		4	14			
10			3					Soil sample submitted from 3.00 metres.
12		No staining or odour, brown, stiff		5	20			
13			4					
15				6	15			
15		End of Borehole						
16								

Drill Method Solid Stem Auger

Drill Date January 16, 2003

Hole Size 15cm/6"



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# Log of Borehole: BH #25/MW #7

Reference No: 9302

Project: Delineation

Location: Carstairs, Alberta

Client: Vaughn Wyant

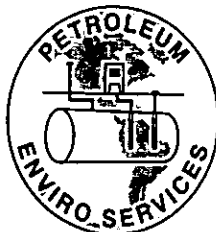
Technologist: JMB

SUBSURFACE PROFILE			SOIL SAMPLE		VAPOUR ANALYSIS		Well Data	NOTES	
Depth (ft)	Symbol	Description	Depth (m)	Sample No.	Type	LOWER EXPLOSIVE LIMIT			PARTS PER MILLION
						□ 10 30 50 70 90 □ %			
0		Ground Surface	0					Borehole sealed to 0.1m below surface with bentonite Flush mount road cap installed  Sand pack from 1.2m to 6.0m.  Soil sample submitted from 3.00 metres.  Well screened from 1.5m to 6.0m.	
0		Asphalt 6"							
1		Sandy Clay Fill							
2				1	S	310			
3									
4		Clay Till							
4		Poorly sorted pebbles, grey, frozen							
5		Frost line		2	S	60			
6									
7				3	S	90			
8									
9									
10		Hydrocarbon odour, plastic, stiff, black staining		4	S	800			
11									
12		No staining or odour, brown, stiff		5	S	240			
13									
14									
15				6	S	100			
16									
17				7	S	75			
18									
19									
20				8	S	60			
21		End of Borehole							

Drill Method Solid Stem Auger

Drill Date: February 6, 2003

Hole Size: 15cm/6"



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# Log of Borehole: BH #26

Reference No: 9302

Project: Delineation

Location: Carstairs, Alberta

Client: Vaughn Wyant

Technologist: JMB

SUBSURFACE PROFILE			SOIL SAMPLE		VAPOUR ANALYSIS				Well Data	NOTES		
Depth (ft)	Symbol	Description	Depth (m)	Sample No.	Type	LOWER EXPLOSIVE LIMIT						
						10	30	50			70	90
						PARTS PER MILLION						
						100	300	500	700	900		
0		Ground Surface	0									
		Asphalt 6"										
		Sandy Clay Fill										
1												
2												
3				1	S	10						
4		Clay Till										
		Brown, frozen, poorly sorted pebbles										
5				2	S	60						
		Frost line										
6												
7												
8				3	S	55						
9												
10		No staining or odour, brown, stiff		4	S	40						
11												
12				5	S	50						
13												
14												
15				6	S	25						
		End of Borehole										
16												

Soil sample submitted from 2.25 metres.

Drill Method Solid Stem Auger

Drill Date: February 6, 2003

Hole Size: 15cm/6"



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# Log of Borehole: BH #27

Reference No: 9302

Project: Delineation

Location: Carstairs, Alberta

Client: Vaughn Wyant

Technologist: JMB

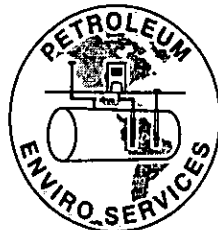
SUBSURFACE PROFILE			SOIL SAMPLE		VAPOUR ANALYSIS		Well Data	NOTES
Depth (ft)	Symbol	Description	Depth (m)	Sample No	Type	LOWER EXPLOSIVE LIMIT □ 10 30 50 70 90 □ PARTS PER MILLION ● 100 300 500 700 900 ●		
0		Ground Surface	0					
0		<i>Asphalt 6"</i>						
0		<i>Sandy Clay Fill</i>						
1								
2								
3				1	S	60		
4		<i>Clay Till</i> Brown, frozen, poorly sorted pebbles	1					
5		Frost line	2	2	S	65		
6								
7			2					
8				3	S	25		
9								
10		No staining or odour, brown, stiff	3	4	S	25		
11								
12				5	S	75		
13			4					
14								
15				6	S	75		
16		End of Borehole						

Soil sample submitted from 3.75 metres.

Drill Method: Solid Stem Auger

Drill Date: February 6, 2003

Hole Size: 15cm/6"



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## **APPENDIX IV**

### **Hydrocarbon Vapour Measurements**



## SOIL SAMPLE HYDROCARBON VAPOUR ANALYSIS

LOCATION	SAMPLE NO.	DEPTH (m)	MEASUREMENT		SOIL TYPE	REMARKS
			% L.E.L.	p.p.m.		
BH #9	1	0.75	0	20	Clay Till	
	2	1.50	0	270	Clay Till	
	3	2.25	21	>1000	Clay Till	
	4	3.00	23	>1000	Clay Till	Soil sample submitted.
	5	3.75	0	60	Clay Till	
	6	4.50	0	55	Clay Till	
	7	5.25	0	45	Clay Till	
	8	6.00	0	40	Clay Till	

LOCATION	SAMPLE NO.	DEPTH (m)	MEASUREMENT		SOIL TYPE	REMARKS
			% L.E.L.	p.p.m.		
BH #10	1	0.75	0	0	Clay Till	
	2	1.50	0	20	Clay Till	
	3	2.25	0	450	Clay Till	
	4	3.00	0	460	Clay Till	Soil sample submitted.
	5	3.75	0	15	Clay Till	
	6	4.50	0	15	Clay Till	

LOCATION	SAMPLE NO.	DEPTH (m)	MEASUREMENT		SOIL TYPE	REMARKS
			% L.E.L.	p.p.m.		
BH #11	1	0.75	0	15	Topsoil	
	2	1.50	0	25	Topsoil/Till	
	3	2.25	0	370	Clay Till	
	4	3.00	67	>1000	Clay Till	Soil and particle submitted.
	5	3.75	0	120	Clay Till	
	6	4.50	0	45	Clay Till	

LOCATION	SAMPLE NO.	DEPTH (m)	MEASUREMENT		SOIL TYPE	REMARKS
			% L.E.L.	p.p.m.		
BH #12/MW #4	1	0.75	0	30	Topsoil	Monitoring well installed.
	2	1.50	0	25	Clay Till	
	3	2.25	0	150	Clay Till	
	4	3.00	20	>1000	Clay Till	Soil sample submitted.
	5	3.75	0	570	Clay Till	Soil sample submitted.
	6	4.50	0	150	Clay Till	
	7	5.25	0	45	Clay Till	
	8	6.00	0	70	Clay Till	



**SOIL SAMPLE HYDROCARBON VAPOUR ANALYSIS**

LOCATION	SAMPLE NO.	DEPTH (m)	MEASUREMENT		SOIL TYPE	REMARKS
			% L.E.L.	p.p.m.		
BH #13	1	0.75	0	580	Clay Till	
	2	1.50	0	890	Clay Till	
	3	2.25	>100	>1000	Clay Till	Soil and particle submitted.
	4	3.00	98	>1000	Clay Till	
	5	3.75	0	430	Clay Till	
	6	4.50	0	140	Clay Till	

LOCATION	SAMPLE NO.	DEPTH (m)	MEASUREMENT		SOIL TYPE	REMARKS
			% L.E.L.	p.p.m.		
BH #14	1	0.75	0	150	Clay Till	
	2	1.50	0	320	Clay Till	
	3	2.25	86	>1000	Clay Till	
	4	3.00	>100	>1000	Clay Till	Soil sample submitted.
	5	3.75	0	65	Clay Till	
	6	4.50	0	45	Clay Till	

LOCATION	SAMPLE NO.	DEPTH (m)	MEASUREMENT		SOIL TYPE	REMARKS
			% L.E.L.	p.p.m.		
BH #15	1	0.75	0	210	Clay Till	
	2	1.50	0	220	Clay Till	
	3	2.25	74	>1000	Clay Till	
	4	3.00	>100	>1000	Clay Till	Soil sample submitted.
	5	3.75	0	55	Clay Till	
	6	4.50	0	60	Clay Till	

LOCATION	SAMPLE NO.	DEPTH (m)	MEASUREMENT		SOIL TYPE	REMARKS
			% L.E.L.	p.p.m.		
BH #16/MW #5	1	0.75	0	25	Clay Till	
	2	1.50	0	20	Clay Till	
	3	2.25	0	25	Clay Till	
	4	3.00	0	20	Clay Till	
	5	3.75	0	35	Clay Till	Soil sample submitted.
	6	4.50	0	35	Clay Till	
	7	5.25	0	45	Clay Till	
	8	6.00	0	55	Clay Till	





**SOIL SAMPLE HYDROCARBON VAPOUR ANALYSIS**

LOCATION	SAMPLE NO.	DEPTH (m)	MEASUREMENT		SOIL TYPE	REMARKS
			% L.E.L.	p.p.m.		
BH #17	1	0.75	0	750	Clay Fill	
	2	1.50	0	680	Clay Till	
	3	2.25	50	>1000	Clay Till	
	4	3.00	78	>1000	Clay Till	Soil sample submitted.
	5	3.75	0	250	Clay Till	
	6	4.50	0	85	Clay Till	

LOCATION	SAMPLE NO.	DEPTH (m)	MEASUREMENT		SOIL TYPE	REMARKS
			% L.E.L.	p.p.m.		
BH #18	1	0.75	0	100	Sandy Fill	
	2	1.50	0	55	Fill/Till	
	3	2.25	0	510	Clay Till	Soil sample submitted.
	4	3.00	0	250	Clay Till	
	5	3.75	0	45	Clay Till	
	6	4.50	0	35	Clay Till	

LOCATION	SAMPLE NO.	DEPTH (m)	MEASUREMENT		SOIL TYPE	REMARKS
			% L.E.L.	p.p.m.		
BH #19	1	0.75	0	55	Sandy Clay Fill	
	2	1.50	0	0	Clay Till	
	3	2.25	0	790	Clay Till	
	4	3.00	27	>1000	Clay Till	Soil sample submitted.
	5	3.75	0	30	Clay Till	
	6	4.50	0	30	Clay Till	

LOCATION	SAMPLE NO.	DEPTH (m)	MEASUREMENT		SOIL TYPE	REMARKS
			% L.E.L.	p.p.m.		
BH #20	1	0.75	0	35	Sandy Clay Fill	
	2	1.50	0	120	Clay Till	
	3	2.25	54	>1000	Clay Till	Soil sample submitted.
	4	3.00	0	580	Clay Till	
	5	3.75	0	60	Clay Till	
	6	4.50	0	55	Clay Till	



**SOIL SAMPLE HYDROCARBON VAPOUR ANALYSIS**

LOCATION	SAMPLE NO.	DEPTH (m)	MEASUREMENT		SOIL TYPE	REMARKS
			% L.E.L.	p.p.m.		
BH #21	1	0.75	0	120	Sandy Clay Fill	
	2	1.50	0	220	Clay Till	
	3	2.25	65	>1000	Clay Till	Soil sample submitted.
	4	3.00	0	620	Clay Till	
	5	3.75	0	15	Clay Till	
	6	4.50	0	5	Clay Till	

LOCATION	SAMPLE NO.	DEPTH (m)	MEASUREMENT		SOIL TYPE	REMARKS
			% L.E.L.	p.p.m.		
BH #22	1	0.75	0	10	Sandy Clay Fill	
	2	1.50	0	10	Clay Till	
	3	2.25	19	>1000	Clay Till	
	4	3.00	97	>1000	Clay Till	Soil sample submitted.
	5	3.75	0	30	Clay Till	
	6	4.50	0	20	Clay Till	

LOCATION	SAMPLE NO.	DEPTH (m)	MEASUREMENT		SOIL TYPE	REMARKS
			% L.E.L.	p.p.m.		
BH #23/MW #6	1	0.75	0	40	Sandy Clay Fill	Monitoring well installed.
	2	1.50	0	15	Clay Till	
	3	2.25	0	15	Clay Till	
	4	3.00	10	>1000	Clay Till	Soil sample submitted.
	5	3.75	0	25	Clay Till	
	6	4.50	0	25	Clay Till	

LOCATION	SAMPLE NO.	DEPTH (m)	MEASUREMENT		SOIL TYPE	REMARKS
			% L.E.L.	p.p.m.		
BH #24	1	0.75	0	20	Sandy Clay Fill	
	2	1.50	0	30	Clay Till	
	3	2.25	0	90	Clay Till	
	4	3.00	14	>1000	Clay Till	Soil sample submitted.
	5	3.75	0	20	Clay Till	
	6	4.50	0	15	Clay Till	



**SOIL SAMPLE HYDROCARBON VAPOUR ANALYSIS**

LOCATION	SAMPLE NO.	DEPTH (m)	MEASUREMENT		SOIL TYPE	REMARKS
			% L.E.L.	p.p.m.		
BH #25/MW #7	1	0.75	0	310	Fill	Monitoirng well installed.
	2	1.50	0	60	Clay Till	
	3	2.25	0	90	Clay Till	
	4	3.00	0	800	Clay Till	Soil sample submitted.
	5	3.75	0	240	Clay Till	
	6	4.50	0	100	Clay Till	
	7	5.25	0	75	Clay Till	
	8	6.00	0	60	Clay Till	

LOCATION	SAMPLE NO.	DEPTH (m)	MEASUREMENT		SOIL TYPE	REMARKS
			% L.E.L.	p.p.m.		
BH #26	1	0.75	0	10	Fill	
	2	1.50	0	60	Clay Till	
	3	2.25	0	55	Clay Till	Soil sample submitted.
	4	3.00	0	40	Clay Till	
	5	3.75	0	50	Clay Till	
	6	4.50	0	25	Clay Till	

LOCATION	SAMPLE NO.	DEPTH (m)	MEASUREMENT		SOIL TYPE	REMARKS
			% L.E.L.	p.p.m.		
BH #27	1	0.75	0	60	Fill	
	2	1.50	0	65	Clay Till	
	3	2.25	0	25	Clay Till	
	4	3.00	0	25	Clay Till	
	5	3.75	0	75	Clay Till	Soil sample submitted.
	6	4.50	0	75	Clay Till	



**APPENDIX V**

**Groundwater Monitoring Data**





## GROUNDWATER MONITORING DATA

May 22/02

Well No.	Top of Well Casing Elevation (meters)	Depth to Water (meters)	Water Level Elevation (meters)	Remarks
MW #1	499.123	2.902	496.221	
MW #2	499.245	2.660	496.585	
MW #3	498.575	4.120	494.455	

January 15/03

Well No.	Top of Well Casing Elevation (meters)	Depth to Water (meters)	Water Level Elevation (meters)	Remarks
MW #1	499.123	2.006	497.117	Hydrocarbon odour
MW #2	499.245	2.062	497.183	
MW #3	498.575	1.817	496.758	

February 4/03

Well No.	Top of Well Casing Elevation (meters)	Depth to Water (meters)	Water Level Elevation (meters)	Remarks
MW #1	499.146	2.198	496.948	Odour, droplets on surface
MW #2	499.281	2.198	497.083	
MW #3	498.611	1.977	496.634	
MW #4	499.088	3.805	495.283	
MW #5	499.178	2.147	497.031	
MW #6	498.654	1.601	497.053	
MW #7	498.729	NA.	NA	Well newly installed



## **APPENDIX VI**

### **Soil/Water Sample Laboratory Analysis**



**ANALYTICAL REPORT**

PETROLEUM ENVIRO SERVICES  
ATTN: JENNIFER BACHAND  
2 10016 29A AVENUE  
EDMONTON AB T6N 1A8

DATE: 30-JAN-03

Lab Work Order #: L96485

Sampled By: LAM

Date Received: 17-JAN-03

Project P.O. #: CARSTAIRS

Project Reference: CARSTAIRS

Comments:

APPROVED BY: \_\_\_\_\_

  
RICK ZOLKIEWSKI

Project Manager

THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN AUTHORITY OF THE LABORATORY  
ANY REMAINING SAMPLES WILL BE DISPOSED OF AFTER 30 DAYS FOLLOWING ANALYSIS. PLEASE CONTACT THE LAB IF YOU  
REQUIRE ADDITIONAL SAMPLE STORAGE TIME.

**LABORATORY ACCREDITATIONS:**

- STANDARDS COUNCIL OF CANADA IN COOPERATION WITH THE CANADIAN ASSOCIATION FOR ENVIRONMENTAL ANALYTICAL LABORATORIES (CAEAL) FOR SPECIFIC TESTS AS REGISTERED BY THE COUNCIL (EDMONTON, CALGARY, GRANDE PRAIRIE, SASKATOON, WINNIPEG, THUNDER BAY, WATERLOO)
  - AMERICAN INDUSTRIAL HYGIENE ASSOCIATION (AIHA) IN THE INDUSTRIAL HYGIENE PROGRAM (EDMONTON, WINNIPEG)
  - STANDARDS COUNCIL OF CANADA IN COOPERATION WITH THE CANADIAN FOOD INSPECTION AGENCY (CFIA) FOR FERTILIZER AND FEED TESTING (SASKATOON) AND FOR MICROBIOLOGICAL TESTING IN FOOD (WINNIPEG)
- LABORATORY RECOGNITIONS:**
- STANDARDS COUNCIL OF CANADA - GLP COMPLIANT FACILITY (EDMONTON, OTTAWA)

9936 - 67 Avenue, Edmonton, Alberta T6E 0P5, Tel. (780) 413-5227, Fax (780) 437-2311  
Canada Wide Tel. 1-800-668-9878 [www.envirotest.com](http://www.envirotest.com)

(Edmonton, Calgary, Grande Prairie, Saskatoon, Winnipeg, Thunder Bay, Ottawa, Waterloo, Montreal)



# ENVIRO-TEST ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier	DL	Units	Extracted	Analyzed	By	Batch
L96485-1 BH9@3.0M Sample Date: 15-JAN-03 Matrix: SOIL								
<b>CCME Petroleum Hydrocarbons (PHC)</b>								
<b>CCME Total Hydrocarbons</b>								
F1 (C6-C10)	110		5	mg/kg		23-JAN-03		
F1-BTEX	96		5	mg/kg		23-JAN-03		
F2 (C10-C16)	60		5	mg/kg		23-JAN-03		
F3 (C16-C34)	53		5	mg/kg		23-JAN-03		
F4 (C34-C50)	54		5	mg/kg		23-JAN-03		
F4G-SG (GHH-Silica)	100		100	mg/kg		23-JAN-03		
Total Hydrocarbons (C6-C50)	280		5	mg/kg		23-JAN-03		
Chromatogram to baseline at nC50	YES					23-JAN-03		
<b>CCME Total Extractable Hydrocarbons</b> Prep/Analysis Dates					20-JAN-03	21-JAN-03	SCM	R109772
<b>CCME Gravimetric Heavy Hydrocarbons (SII)</b> Prep/Analysis Dates					20-JAN-03	21-JAN-03	SCM	R109772
<b>CCME BTEX</b>								
Benzene	5.0		0.01	mg/kg		21-JAN-03	MAA	R109852
Toluene	0.06		0.01	mg/kg		21-JAN-03	MAA	R109852
Ethylbenzene	8.2		0.01	mg/kg		21-JAN-03	MAA	R109852
Xylenes	0.65		0.01	mg/kg		21-JAN-03	MAA	R109852
% Moisture	16		0.1	%		20-JAN-03	ED/EM	R109739
Lead (Pb)	7		5	mg/kg		21-JAN-03	CMM	R109849
L96485-2 BH10@3.0M Sample Date: 15-JAN-03 Matrix: SOIL								
<b>CCME Petroleum Hydrocarbons (PHC)</b>								
<b>CCME Total Hydrocarbons</b>								
F1 (C6-C10)	160		5	mg/kg		23-JAN-03		
F1-BTEX	150		5	mg/kg		23-JAN-03		
F2 (C10-C16)	120		5	mg/kg		23-JAN-03		
F3 (C16-C34)	75		5	mg/kg		23-JAN-03		
F4 (C34-C50)	84		5	mg/kg		23-JAN-03		
F4G-SG (GHH-Silica)	300		100	mg/kg		23-JAN-03		
Total Hydrocarbons (C6-C50)	440		5	mg/kg		23-JAN-03		
Chromatogram to baseline at nC50	YES					23-JAN-03		
<b>CCME Total Extractable Hydrocarbons</b> Prep/Analysis Dates					20-JAN-03	21-JAN-03	SCM	R109772
<b>CCME Gravimetric Heavy Hydrocarbons (SII)</b> Prep/Analysis Dates					20-JAN-03	21-JAN-03	SCM	R109772
<b>CCME BTEX</b>								
Benzene	1.4		0.01	mg/kg	20-JAN-03	21-JAN-03	MAA	R109852
Toluene	0.06		0.01	mg/kg	20-JAN-03	21-JAN-03	MAA	R109852
Ethylbenzene	8.3		0.01	mg/kg	20-JAN-03	21-JAN-03	MAA	R109852
Xylenes	1.8		0.01	mg/kg	20-JAN-03	21-JAN-03	MAA	R109852
% Moisture	15		0.1	%		20-JAN-03	ED/EM	R109739
Lead (Pb)	10		5	mg/kg		21-JAN-03	CMM	R109849
L96485-3 BH11@3.0M Sample Date: 15-JAN-03 Matrix: SOIL								
<b>CCME Petroleum Hydrocarbons (PHC)</b>								
<b>CCME Total Hydrocarbons</b>								
F1 (C6-C10)	350		5	mg/kg		23-JAN-03		





# ENVIRO-TEST ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier	DL	Units	Extracted	Analyzed	By	Batch
L96485-3      BH11@3.0M Sample Date: 15-JAN-03 Matrix: SOIL								
<b>CCME Petroleum Hydrocarbons (PHC)</b>								
<b>CCME Total Hydrocarbons</b>								
F1-BTEX	250			5	mg/kg	23-JAN-03		
F2 (C10-C16)	48			5	mg/kg	23-JAN-03		
F3 (C16-C34)	11			5	mg/kg	23-JAN-03		
F4 (C34-C50)	<5			5	mg/kg	23-JAN-03		
F4G-SG (GHH-Silica)	<100			100	mg/kg	23-JAN-03		
Total Hydrocarbons (C6-C50)	410			5	mg/kg	23-JAN-03		
Chromatogram to baseline at nC50	YES					23-JAN-03		
<b>CCME Total Extractable Hydrocarbons</b>								
Prep/Analysis Dates						21-JAN-03	21-JAN-03	SCM   R109898
<b>CCME Gravimetric Heavy Hydrocarbons (SII)</b>								
Prep/Analysis Dates						21-JAN-03	21-JAN-03	SCM   R109898
<b>CCME BTEX</b>								
Benzene	2.1			0.01	mg/kg	20-JAN-03	21-JAN-03	MAA   R109852
Toluene	1.4			0.01	mg/kg	20-JAN-03	21-JAN-03	MAA   R109852
Ethylbenzene	14			0.01	mg/kg	20-JAN-03	21-JAN-03	MAA   R109852
Xylenes	80			0.01	mg/kg	20-JAN-03	21-JAN-03	MAA   R109852
% Moisture	14			0.1	%	20-JAN-03		ED/EM R109739
Lead (Pb)	7			5	mg/kg	21-JAN-03		CMM   R109849
MUST PSA D50 > 75um	48			1	%	22-JAN-03		MP   R109911
L96485-4      BH12@3.0M Sample Date: 15-JAN-03 Matrix: SOIL								
<b>CCME Petroleum Hydrocarbons (PHC)</b>								
<b>CCME Total Hydrocarbons</b>								
F1 (C6-C10)	610			5	mg/kg	23-JAN-03		
F1-BTEX	520			5	mg/kg	23-JAN-03		
F2 (C10-C16)	85			5	mg/kg	23-JAN-03		
F3 (C16-C34)	61			5	mg/kg	23-JAN-03		
F4 (C34-C50)	58			5	mg/kg	23-JAN-03		
F4G-SG (GHH-Silica)	300			100	mg/kg	23-JAN-03		
Total Hydrocarbons (C6-C50)	810			5	mg/kg	23-JAN-03		
Chromatogram to baseline at nC50	YES					23-JAN-03		
<b>CCME Total Extractable Hydrocarbons</b>								
Prep/Analysis Dates						21-JAN-03	21-JAN-03	SCM   R109898
<b>CCME Gravimetric Heavy Hydrocarbons (SII)</b>								
Prep/Analysis Dates						21-JAN-03	21-JAN-03	SCM   R109898
<b>CCME BTEX</b>								
Benzene	2.4			0.01	mg/kg	20-JAN-03	21-JAN-03	MAA   R109852
Toluene	0.38			0.01	mg/kg	20-JAN-03	21-JAN-03	MAA   R109852
Ethylbenzene	18			0.01	mg/kg	20-JAN-03	21-JAN-03	MAA   R109852
Xylenes	74			0.01	mg/kg	20-JAN-03	21-JAN-03	MAA   R109852
% Moisture	16			0.1	%	20-JAN-03		ED/EM R109739
Lead (Pb)	8			5	mg/kg	21-JAN-03		CMM   R109849
L96485-5      BH12@3.75M Sample Date: 15-JAN-03 Matrix: SOIL								
<b>CCME Petroleum Hydrocarbons (PHC)</b>								
<b>CCME Total Hydrocarbons</b>								
F1 (C6-C10)	24			5	mg/kg	23-JAN-03		







# ENVIRO-TEST ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier	D.L.	Units	Extracted	Analyzed	By	Batch
L96485-6 BH13@2.25M								
Sample Date: 15-JAN-03								
Matrix: SOIL								
<b>TCLP Leachable Metals</b>								
<b>TCLP Leachable Metals</b>								
Chromium (Cr)	<0.01		0.01	mg/L		25-JAN-03	DDN	R110302
Copper (Cu)	<0.1		0.1	mg/L		25-JAN-03	DDN	R110302
Iron (Fe)	0.6		0.1	mg/L		25-JAN-03	DDN	R110302
Manganese (Mn)	3.36		0.01	mg/L		25-JAN-03	DDN	R110302
Molybdenum (Mo)	0.02		0.01	mg/L		25-JAN-03	DDN	R110302
Nickel (Ni)	0.04		0.02	mg/L		25-JAN-03	DDN	R110302
Lead (Pb)	<0.05		0.05	mg/L		25-JAN-03	DDN	R110302
Antimony (Sb)	<0.2		0.2	mg/L		25-JAN-03	DDN	R110302
Selenium (Se)	<0.2		0.2	mg/L		25-JAN-03	DDN	R110302
Thallium (Tl)	<0.05		0.05	mg/L		25-JAN-03	DDN	R110302
Uranium (U)	<0.2		0.2	mg/L		25-JAN-03	DDN	R110302
Vanadium (V)	0.01		0.01	mg/L		25-JAN-03	DDN	R110302
Zinc (Zn)	<0.2		0.2	mg/L		25-JAN-03	DDN	R110302
Zirconium (Zr)	<0.1		0.1	mg/L		25-JAN-03	DDN	R110302
% Moisture	16		0.1	%		20-JAN-03	ED/EM	R109739
Lead (Pb)	15		5	mg/kg		21-JAN-03	CMM	R109849
MUST PSA D50 > 75um	33		1	%		22-JAN-03	MP	R109911
pH	8.7		0.1	pH		28-JAN-03	SR	R110516
<b>TCLP Leachable BTEX</b>								
Benzene	3.1		0.005	mg/L	22-JAN-03	27-JAN-03	RLB	R110307
Toluene	11		0.005	mg/L	22-JAN-03	27-JAN-03	RLB	R110307
Ethylbenzene	1.2		0.005	mg/L	22-JAN-03	27-JAN-03	RLB	R110307
Xylenes	8.6		0.005	mg/L	22-JAN-03	27-JAN-03	RLB	R110307
L96485-7 BH14@3.0M								
Sample Date: 15-JAN-03								
Matrix: SOIL								
<b>CCME Petroleum Hydrocarbons (PHC)</b>								
<b>CCME Total Hydrocarbons</b>								
F1 (C6-C10)	210		5	mg/kg		23-JAN-03		
F1-BTEX	23		5	mg/kg		23-JAN-03		
F2 (C10-C16)	84		5	mg/kg		23-JAN-03		
F3 (C16-C34)	63		5	mg/kg		23-JAN-03		
F4 (C34-C50)	43		5	mg/kg		23-JAN-03		
F4G-SG (GHH-Silica)	200		100	mg/kg		23-JAN-03		
Total Hydrocarbons (C6-C50)	400		5	mg/kg		23-JAN-03		
Chromatogram to baseline at nC50	YES					23-JAN-03		
<b>CCME Total Extractable Hydrocarbons</b>								
Prep/Analysis Dates					21-JAN-03	21-JAN-03	SCM	R109898
<b>CCME Gravimetric Heavy Hydrocarbons (SII)</b>								
Prep/Analysis Dates					21-JAN-03	21-JAN-03	SCM	R109898
<b>CCME BTEX</b>								
Benzene	71		0.01	mg/kg	20-JAN-03	21-JAN-03	MAA	R109852
Toluene	1.3		0.01	mg/kg	20-JAN-03	21-JAN-03	MAA	R109852
Ethylbenzene	45		0.01	mg/kg	20-JAN-03	21-JAN-03	MAA	R109852
Xylenes	70		0.01	mg/kg	20-JAN-03	21-JAN-03	MAA	R109852
% Moisture	17		0.1	%		20-JAN-03	ED/EM	R109739
Lead (Pb)	7		5	mg/kg		21-JAN-03	CMM	R109849



# ENVIRO-TEST ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier	D.L.	Units	Extracted	Analyzed	By	Batch
L96485-8      BH15@3.0M								
Sample Date: 15-JAN-03								
Matrix:      SOIL								
<b>CCME Petroleum Hydrocarbons (PHC)</b>								
<b>CCME Total Hydrocarbons</b>								
F1 (C6-C10)	660		5	mg/kg		23-JAN-03		
F1-BTEX	530		5	mg/kg		23-JAN-03		
F2 (C10-C16)	66		5	mg/kg		23-JAN-03		
F3 (C16-C34)	48		5	mg/kg		23-JAN-03		
F4 (C34-C50)	35		5	mg/kg		23-JAN-03		
F4G-SG (GHH-Silica)	200		100	mg/kg		23-JAN-03		
Total Hydrocarbons (C6-C50)	810		5	mg/kg		23-JAN-03		
Chromatogram to baseline at nC50	YES					23-JAN-03		
<b>CCME Total Extractable Hydrocarbons</b>								
Prep/Analysis Dates								
					21-JAN-03	21-JAN-03	SCM	R109898
<b>CCME Gravimetric Heavy Hydrocarbons (SII)</b>								
Prep/Analysis Dates								
					21-JAN-03	21-JAN-03	SCM	R109898
<b>CCME BTEX</b>								
Benzene	59		0.01	mg/kg	20-JAN-03	21-JAN-03	MAA	R109852
Toluene	0.25		0.01	mg/kg	20-JAN-03	21-JAN-03	MAA	R109852
Ethylbenzene	26		0.01	mg/kg	20-JAN-03	21-JAN-03	MAA	R109852
Xylenes	40		0.01	mg/kg	20-JAN-03	21-JAN-03	MAA	R109852
% Moisture	16		0.1	%		20-JAN-03	ED/EM	R109739
Lead (Pb)	9		5	mg/kg		21-JAN-03	CMM	R109849
L96485-9      BH16@3.75M								
Sample Date: 15-JAN-03								
Matrix:      SOIL								
<b>CCME Petroleum Hydrocarbons (PHC)</b>								
<b>CCME Total Hydrocarbons</b>								
F1 (C6-C10)	<5		5	mg/kg		23-JAN-03		
F1-BTEX	<5		5	mg/kg		23-JAN-03		
F2 (C10-C16)	<5		5	mg/kg		23-JAN-03		
F3 (C16-C34)	100		5	mg/kg		23-JAN-03		
F4 (C34-C50)	80		5	mg/kg		23-JAN-03		
F4G-SG (GHH-Silica)	300		100	mg/kg		23-JAN-03		
Total Hydrocarbons (C6-C50)	180		5	mg/kg		23-JAN-03		
Chromatogram to baseline at nC50	NO					23-JAN-03		
<b>CCME Total Extractable Hydrocarbons</b>								
Prep/Analysis Dates								
					21-JAN-03	21-JAN-03	SCM	R109898
<b>CCME Gravimetric Heavy Hydrocarbons (SII)</b>								
Prep/Analysis Dates								
					21-JAN-03	21-JAN-03	SCM	R109898
<b>CCME BTEX</b>								
Benzene	<0.01		0.01	mg/kg	20-JAN-03	21-JAN-03	MAA	R109852
Toluene	<0.01		0.01	mg/kg	20-JAN-03	21-JAN-03	MAA	R109852
Ethylbenzene	<0.01		0.01	mg/kg	20-JAN-03	21-JAN-03	MAA	R109852
Xylenes	<0.01		0.01	mg/kg	20-JAN-03	21-JAN-03	MAA	R109852
% Moisture	14		0.1	%		20-JAN-03	ED/EM	R109739
Lead (Pb)	8		5	mg/kg		21-JAN-03	CMM	R109849
L96485-10      BH17@3.0M								
Sample Date: 16-JAN-03								
Matrix:      SOIL								
<b>CCME Petroleum Hydrocarbons (PHC)</b>								
<b>CCME Total Hydrocarbons</b>								
F1 (C6-C10)	880		5	mg/kg		23-JAN-03		





# ENVIRO-TEST ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier	D.L.	Units	Extracted	Analyzed	By	Batch
L96485-10 BH17@3.0M Sample Date: 16-JAN-03 Matrix: SOIL CCME Petroleum Hydrocarbons (PHC) CCME Total Hydrocarbons F1-BTEX F2 (C10-C16) F3 (C16-C34) F4 (C34-C50) F4G-SG (GHH-Silica) Total Hydrocarbons (C6-C50) Chromatogram to baseline at nC50 CCME Total Extractable Hydrocarbons Prep/Analysis Dates CCME Gravimetric Heavy Hydrocarbons (SII) Prep/Analysis Dates CCME BTEX Benzene Toluene Ethylbenzene Xylenes % Moisture Lead (Pb)	770 170 45 34 300 1100 YES			mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg		23-JAN-03 23-JAN-03 23-JAN-03 23-JAN-03 23-JAN-03 23-JAN-03 23-JAN-03		
						21-JAN-03	SCM	R109898
						21-JAN-03	SCM	R109898
	25	0.01		mg/kg	20-JAN-03	21-JAN-03	MAA	R109852
	0.40	0.01		mg/kg	20-JAN-03	21-JAN-03	MAA	R109852
	29	0.01		mg/kg	20-JAN-03	21-JAN-03	MAA	R109852
	54	0.01		mg/kg	20-JAN-03	21-JAN-03	MAA	R109852
	16	0.1		%		20-JAN-03	ED/EM	R109739
	15	5		mg/kg		21-JAN-03	CMM	R109849
L96485-11 BH18@2.25M Sample Date: 16-JAN-03 Matrix: SOIL CCME Petroleum Hydrocarbons (PHC) CCME Total Hydrocarbons F1 (C6-C10) F1-BTEX F2 (C10-C16) F3 (C16-C34) F4 (C34-C50) F4G-SG (GHH-Silica) Total Hydrocarbons (C6-C50) Chromatogram to baseline at nC50 CCME Total Extractable Hydrocarbons Prep/Analysis Dates CCME Gravimetric Heavy Hydrocarbons (SII) Prep/Analysis Dates CCME BTEX Benzene Toluene Ethylbenzene Xylenes % Moisture Lead (Pb)	160 150 140 31 30 200 360 YES			mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg		23-JAN-03 23-JAN-03 23-JAN-03 23-JAN-03 23-JAN-03 23-JAN-03 23-JAN-03		
						21-JAN-03	SCM	R109898
						21-JAN-03	SCM	R109898
	1.6	0.01		mg/kg	20-JAN-03	21-JAN-03	MAA	R109852
	0.05	0.01		mg/kg	20-JAN-03	21-JAN-03	MAA	R109852
	5.6	0.01		mg/kg	20-JAN-03	21-JAN-03	MAA	R109852
	5.0	0.01		mg/kg	20-JAN-03	21-JAN-03	MAA	R109852
	17	0.1		%		20-JAN-03	ED/EM	R109739
	8	5		mg/kg		21-JAN-03	CMM	R109849
L96485-12 BH19@3.0M Sample Date: 16-JAN-03 Matrix: SOIL CCME Petroleum Hydrocarbons (PHC) CCME Total Hydrocarbons F1 (C6-C10) F1-BTEX	520 420			mg/kg mg/kg		23-JAN-03 23-JAN-03		



# ENVIRO-TEST ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier	DL	Units	Extracted	Analyzed	By	Batch
<b>L96485-12 BH19@3.0M</b> Sample Date: 16-JAN-03 Matrix: SOIL <b>CCME Petroleum Hydrocarbons (PHC)</b> <b>CCME Total Hydrocarbons</b> F2 (C10-C16) 170 5 mg/kg 23-JAN-03 F3 (C16-C34) 44 5 mg/kg 23-JAN-03 F4 (C34-C50) 34 5 mg/kg 23-JAN-03 F4G-SG (GHH-Silica) 300 100 mg/kg 23-JAN-03 Total Hydrocarbons (C6-C50) 770 5 mg/kg 23-JAN-03 Chromatogram to baseline at nC50 YES 23-JAN-03 <b>CCME Total Extractable Hydrocarbons</b> Prep/Analysis Dates 21-JAN-03 21-JAN-03 SCM R109898 <b>CCME Gravimetric Heavy Hydrocarbons (SII)</b> Prep/Analysis Dates 21-JAN-03 21-JAN-03 SCM R109898 <b>CCME BTEX</b> Benzene 26 0.01 mg/kg 20-JAN-03 21-JAN-03 MAA R109852 Toluene 0.19 0.01 mg/kg 20-JAN-03 21-JAN-03 MAA R109852 Ethylbenzene 28 0.01 mg/kg 20-JAN-03 21-JAN-03 MAA R109852 Xylenes 44 0.01 mg/kg 20-JAN-03 21-JAN-03 MAA R109852 % Moisture 15 0.1 % 20-JAN-03 ED/EM R109739 Lead (Pb) 7 5 mg/kg 21-JAN-03 CMM R109849								
<b>L96485-13 BH20@2.25M</b> Sample Date: 16-JAN-03 Matrix: SOIL <b>CCME Petroleum Hydrocarbons (PHC)</b> <b>CCME Total Hydrocarbons</b> F1 (C6-C10) 580 5 mg/kg 23-JAN-03 F1-BTEX 540 5 mg/kg 23-JAN-03 F2 (C10-C16) 220 5 mg/kg 23-JAN-03 F3 (C16-C34) 42 5 mg/kg 23-JAN-03 F4 (C34-C50) 31 5 mg/kg 23-JAN-03 F4G-SG (GHH-Silica) 300 100 mg/kg 23-JAN-03 Total Hydrocarbons (C6-C50) 870 5 mg/kg 23-JAN-03 Chromatogram to baseline at nC50 YES 23-JAN-03 <b>CCME Total Extractable Hydrocarbons</b> Prep/Analysis Dates 21-JAN-03 21-JAN-03 SCM R109898 <b>CCME Gravimetric Heavy Hydrocarbons (SII)</b> Prep/Analysis Dates 21-JAN-03 21-JAN-03 SCM R109898 <b>CCME BTEX</b> Benzene 7.9 0.01 mg/kg 20-JAN-03 21-JAN-03 MAA R109852 Toluene 0.43 0.01 mg/kg 20-JAN-03 21-JAN-03 MAA R109852 Ethylbenzene 12 0.01 mg/kg 20-JAN-03 21-JAN-03 MAA R109852 Xylenes 23 0.01 mg/kg 20-JAN-03 21-JAN-03 MAA R109852 % Moisture 16 0.1 % 20-JAN-03 ED/EM R109739 Lead (Pb) 8 5 mg/kg 21-JAN-03 CMM R109849								
<b>L96485-14 BH21@2.25M</b> Sample Date: 16-JAN-03 Matrix: SOIL <b>CCME Petroleum Hydrocarbons (PHC)</b> <b>CCME Total Hydrocarbons</b> F1 (C6-C10) 1500 5 mg/kg 23-JAN-03 F1-BTEX 1300 5 mg/kg 23-JAN-03 F2 (C10-C16) 280 5 mg/kg 23-JAN-03								



# ENVIRO-TEST ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier	DL	Units	Extracted	Analyzed	By	Batch
L96485-14 BH21@2.25M								
Sample Date: 16-JAN-03								
Matrix: SOIL								
<b>CCME Petroleum Hydrocarbons (PHC)</b>								
<b>CCME Total Hydrocarbons</b>								
F3 (C16-C34)	61		5	mg/kg		23-JAN-03		
F4 (C34-C50)	45		5	mg/kg		23-JAN-03		
F4G-SG (GHH-Silica)	300		100	mg/kg		23-JAN-03		
Total Hydrocarbons (C6-C50)	1900		5	mg/kg		23-JAN-03		
Chromatogram to baseline at nC50	YES					23-JAN-03		
<b>CCME Total Extractable Hydrocarbons</b>								
Prep/Analysis Dates					21-JAN-03	22-JAN-03	SCM	R109898
<b>CCME Gravimetric Heavy Hydrocarbons (SII)</b>								
Prep/Analysis Dates					21-JAN-03	22-JAN-03	SCM	R109898
<b>CCME BTEX</b>								
Benzene	24		0.01	mg/kg	20-JAN-03	21-JAN-03	MAA	R109852
Toluene	0.23		0.01	mg/kg	20-JAN-03	21-JAN-03	MAA	R109852
Ethylbenzene	55		0.01	mg/kg	20-JAN-03	21-JAN-03	MAA	R109852
Xylenes	84		0.01	mg/kg	20-JAN-03	21-JAN-03	MAA	R109852
% Moisture	16		0.1	%		20-JAN-03	ED/EM	R109739
Lead (Pb)	8		5	mg/kg		21-JAN-03	CMM	R109849
L96485-15 BH22@3.0M								
Sample Date: 16-JAN-03								
Matrix: SOIL								
<b>CCME Petroleum Hydrocarbons (PHC)</b>								
<b>CCME Total Hydrocarbons</b>								
F1 (C6-C10)	590		5	mg/kg		23-JAN-03		
F1-BTEX	480		5	mg/kg		23-JAN-03		
F2 (C10-C16)	130		5	mg/kg		23-JAN-03		
F3 (C16-C34)	68		5	mg/kg		23-JAN-03		
F4 (C34-C50)	63		5	mg/kg		23-JAN-03		
F4G-SG (GHH-Silica)	300		100	mg/kg		23-JAN-03		
Total Hydrocarbons (C6-C50)	850		5	mg/kg		23-JAN-03		
Chromatogram to baseline at nC50	YES					23-JAN-03		
<b>CCME Total Extractable Hydrocarbons</b>								
Prep/Analysis Dates					21-JAN-03	22-JAN-03	SCM	R109898
<b>CCME Gravimetric Heavy Hydrocarbons (SII)</b>								
Prep/Analysis Dates					21-JAN-03	22-JAN-03	SCM	R109898
<b>CCME BTEX</b>								
Benzene	11		0.01	mg/kg	20-JAN-03	21-JAN-03	MAA	R109852
Toluene	12		0.01	mg/kg	20-JAN-03	21-JAN-03	MAA	R109852
Ethylbenzene	23		0.01	mg/kg	20-JAN-03	21-JAN-03	MAA	R109852
Xylenes	61		0.01	mg/kg	20-JAN-03	21-JAN-03	MAA	R109852
% Moisture	15		0.1	%		20-JAN-03	ED/EM	R109739
Lead (Pb)	8		5	mg/kg		21-JAN-03	CMM	R109849
L96485-16 BH23@3.0M								
Sample Date: 16-JAN-03								
Matrix: SOIL								
<b>CCME Petroleum Hydrocarbons (PHC)</b>								
<b>CCME Total Hydrocarbons</b>								
F1 (C6-C10)	150		5	mg/kg		23-JAN-03		
F1-BTEX	150		5	mg/kg		23-JAN-03		
F2 (C10-C16)	65		5	mg/kg		23-JAN-03		
F3 (C16-C34)	57		5	mg/kg		23-JAN-03		









## Reference Information

**Methods Listed (If applicable):**

ETL Test Code	Matrix	Test Description	Preparation Method Reference(Based On)	Analytical Method Reference(Based)
BTX-TCLP-CL	Waste	TCLP Leachable BTEX		EPA5030/8021B
ETL-BTX,TVH-CCME-ED	Soil	CCME BTEX	EPA 5030	CCME CWS-PHC Dec-2000 - Pub# 1310
ETL-METAL-TCLP-CL	Waste	TCLP Leachable Metals		EPA SW846 Methods 1311 and 6010
ETL-OGG-CCME-ED	Soil	CCME Gravimetric Heavy Hydrocarbons (Sil)		CCME CWS-PHC Dec-2000 - Pub# 1310
ETL-TEH-CCME-ED	Soil	CCME Total Extractable Hydrocarbons		CCME CWS-PHC Dec-2000 - Pub# 1310
FLASH-CL	Soil	Flash Point (Closed Cup)		ASTM D-93
HG-TCLP-CL	Waste	Mercury (Hg) - TCLP		APHA 3112 B-AAS Cold Vapor
PB-MUST-ED	Soil	Lead (Pb)	EPA 3050	APHA 3111C
PH-ED	Soil	pH		CSSS 16.3 - pH of 1:2 water extract
PREP-MOISTURE-ED	Soil	% Moisture		Oven dry 105C-Gravimetric
PSA-MUST-ED	Soil	MUST PSA D50 > 75um		ASTM D422-63-Hydrometer/Sieve

\*\* Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.

**Chain of Custody numbers:**

25163

*The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:*

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
CL	Enviro-Test Laboratories - Calgary, Alberta, Canada	ED	Enviro-Test Laboratories - Edmonton, Alberta, Canada

**GLOSSARY OF REPORT TERMS**

*Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in environmental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds. The reported surrogate recovery value provides a measure of method efficiency. The Laboratory warning units are determined under column heading D.L.*

*mg/kg (units) - unit of concentration based on mass, parts per million*  
*mg/L (units) - unit of concentration based on volume, parts per million*

*< - Less than*

*D.L. - Detection Limit*

*N/A - Result not available. Refer to qualifier code and definition for explanation*

*Test results reported relate only to the samples as received by the laboratory.*

*UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.*

*UNLESS OTHERWISE STATED, SAMPLES ARE NOT CORRECTED FOR CLIENT FIELD BLANKS.*

*Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.*

*Enviro-Test Laboratories has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, Enviro-Test Laboratories assumes no liability for the use or interpretation of the results.*



**ENVIRO-TEST QC REPORT**

Workorder: L96485

Client: PETROLEUM ENVIRO SERVICES  
 2 10016 29A AVENUE  
 EDMONTON AB T6N 1A8

Contact: JENNIFER BACHAND

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>ETL-BTX,TVH-CCME-ED</b>		<b>Soil</b>						
Batch	R109852							
WG101169-2	DUP	L96543-5						
Benzene		<0.01	<0.01	RPD-NA	mg/kg	N/A	42	21-JAN-03
Ethylbenzene		<0.01	<0.01	RPD-NA	mg/kg	N/A	48	21-JAN-03
Toluene		<0.01	<0.01	RPD-NA	mg/kg	N/A	39	21-JAN-03
TVH: (C6-C10 / No BTEX Correction)		<5	<5	RPD-NA	mg/kg	N/A	41	21-JAN-03
Xylenes		<0.01	<0.01	RPD-NA	mg/kg	N/A	52	21-JAN-03
WG101429-1	MB							
Benzene			<0.01		mg/kg		0.01	21-JAN-03
Ethylbenzene			<0.01		mg/kg		0.01	21-JAN-03
Toluene			<0.01		mg/kg		0.01	21-JAN-03
TVH: (C6-C10 / No BTEX Correction)			<5		mg/kg		5	21-JAN-03
Xylenes			<0.01		mg/kg		0.01	21-JAN-03
<b>ETL-OGG-CCME-ED</b>		<b>Soil</b>						
Batch	R109772							
WG101352-1	MB							
Gravimetric Heavy Hydrocarbons (Silica)			<100		mg/kg		100	20-JAN-03
Batch	R109898							
WG101529-3	DUP	L96485-3						
Gravimetric Heavy Hydrocarbons (Silica)		<100	<100	RPD-NA	mg/kg	N/A	30	21-JAN-03
WG101529-1	MB							
Gravimetric Heavy Hydrocarbons (Silica)			<100		mg/kg		100	21-JAN-03
Batch	R109899							
WG101530-1	MB							
Gravimetric Heavy Hydrocarbons (Silica)			<100		mg/kg		100	21-JAN-03
<b>ETL-TEH-CCME-ED</b>		<b>Soil</b>						
Batch	R109772							
WG101352-3	DUP	L96342-14						
TEH: (C10-C16)		29	26		mg/kg	10	40	20-JAN-03
TEH: (C16-C34)		140	130		mg/kg	8.1	37	20-JAN-03
TEH: (C34-C50)		230	230		mg/kg	0.59	42	20-JAN-03
WG101352-2	LCS							
TEH: (C10-C16)			86		%		51-107	20-JAN-03
TEH: (C16-C34)			86		%		51-107	20-JAN-03
TEH: (C34-C50)			86				51-107	



**ENVIRO-TEST QC REPORT**

Workorder: L96485

Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed	
<b>ETL-TEH-CCME-ED</b>		<b>Soil</b>						
Batch	R109772							
WG101352-2	LCS							
TEH: (C34-C50)		86		%		51-107	20-JAN-03	
WG101352-1	MB							
TEH: (C10-C16)		<5		mg/kg		5	20-JAN-03	
TEH: (C16-C34)		<5		mg/kg		5	20-JAN-03	
TEH: (C34-C50)		<5		mg/kg		5	20-JAN-03	
Batch	R109898							
WG101529-3	DUP	L96485-3						
TEH: (C10-C16)		48	31	H	mg/kg	44	40	21-JAN-03
TEH: (C16-C34)		11	20	J	mg/kg	9	15	21-JAN-03
TEH: (C34-C50)		<5	12	J	mg/kg	N/A	42	21-JAN-03
WG101529-2	LCS							
TEH: (C10-C16)		92		%		51-107	21-JAN-03	
TEH: (C16-C34)		92		%		51-107	21-JAN-03	
TEH: (C34-C50)		92		%		51-107	21-JAN-03	
WG101529-1	MB							
TEH: (C10-C16)		<5		mg/kg		5	21-JAN-03	
TEH: (C16-C34)		<5		mg/kg		5	21-JAN-03	
TEH: (C34-C50)		<5		mg/kg		5	21-JAN-03	
Batch	R109899							
WG101530-3	DUP	L96432-7						
TEH: (C10-C16)		<5	<5	RPD-NA	mg/kg	N/A	40	21-JAN-03
TEH: (C16-C34)		40	51		mg/kg	25	37	21-JAN-03
TEH: (C34-C50)		30	35		mg/kg	14	42	21-JAN-03
WG101530-2	LCS							
TEH: (C10-C16)		87		%		51-107	21-JAN-03	
TEH: (C16-C34)		87		%		51-107	21-JAN-03	
TEH: (C34-C50)		87		%		51-107	21-JAN-03	
WG101530-1	MB							
TEH: (C10-C16)		<5		mg/kg		5	21-JAN-03	
TEH: (C16-C34)		<5		mg/kg		5	21-JAN-03	
TEH: (C34-C50)		<5		mg/kg		5	21-JAN-03	
<b>PB-MUST-ED</b>		<b>Soil</b>						
Batch	R109849							
WG101309-2	CRM							
Lead (Pb)		98		%		81-119	21-JAN-03	
WG101309-3	DUP	L96342-19						
Lead (Pb)		22	19	J	mg/kg	3	15	21-JAN-03
WG101309-5	DUP	L96485-17						
Lead (Pb)		11	10	J	mg/kg	2	15	21-JAN-03



**ENVIRO-TEST QC REPORT**

Workorder: L96485

Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed	
<b><u>PB-MUST-ED</u></b>								
<b><u>Soil</u></b>								
Batch	R109849							
WG101309-1	MB							
Lead (Pb)		<5		mg/kg		25	21-JAN-03	
<b><u>PH-ED</u></b>								
<b><u>Soil</u></b>								
Batch	R110516							
WG102179-2	DUP	L96485-6						
pH		8.7	8.7	J	pH	0.0	0.2	28-JAN-03
WG102179-1	IRM							
pH			8.2		pH	7.9-8.4		28-JAN-03
WG102179-3	LCS							
pH			4.0		pH	3.9-4.1		28-JAN-03
WG102179-4	LCS							
pH			6.9		pH	6.9-7.1		28-JAN-03
WG102179-5	LCS							
pH			10.1		pH	9.9-10.1		28-JAN-03
<b><u>PSA-MUST-ED</u></b>								
<b><u>Soil</u></b>								
Batch	R109911							
WG101538-1	DUP	L96485-3						
MUST PSA D50 > 75um		48	47		%	1.7	7.8	22-JAN-03
<b><u>BTX-TCLP-CL</u></b>								
<b><u>Waste</u></b>								
Batch	R110307							
WG101938-1	MB							
Benzene			<0.005		mg/L	0.005		25-JAN-03
Ethylbenzene			<0.005		mg/L	0.005		25-JAN-03
Toluene			<0.005		mg/L	0.005		25-JAN-03
Xylenes			<0.005		mg/L	0.005		25-JAN-03
WG101938-3	MS	L97289-1						
Benzene			106		%	70-130		25-JAN-03
Ethylbenzene			103		%	70-130		25-JAN-03
Toluene			109		%	70-130		25-JAN-03
Xylenes			121		%	70-130		25-JAN-03
<b><u>ETL-METAL-TCLP-CL</u></b>								
<b><u>Waste</u></b>								
Batch	R110302							
WG101936-3	DUP	L97105-1						
Antimony (Sb)		<0.2	<0.2	RPD-NA	mg/L	N/A	39	25-JAN-03
Arsenic (As)		<0.2	<0.2	RPD-NA	mg/L	N/A	27	25-JAN-03
Barium (Ba)		0.8	0.8		mg/L	0.26	15	25-JAN-03
Beryllium (Be)		<0.01	<0.01	RPD-NA	mg/L	N/A	33	25-JAN-03
Boron (B)		<0.5	<0.5	RPD-NA	mg/L	N/A	19	25-JAN-03





**ENVIRO-TEST QC REPORT**

Workorder: L96485

Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>ETL-METAL-TCLP-CL</b>		<b>Waste</b>					
Batch	R110302						
WG101936-3	DUP	L97105-1					
Cadmium (Cd)	<0.005	<0.005	RPD-NA	mg/L	N/A	25	25-JAN-03
Chromium (Cr)	0.02	0.02	J	mg/L	0.00	0.031	25-JAN-03
Cobalt (Co)	0.02	0.02	J	mg/L	0.00	0.031	25-JAN-03
Copper (Cu)	0.1	0.1	J	mg/L	0.0	0.31	25-JAN-03
Iron (Fe)	34.0	34.0		mg/L	0.0	19	25-JAN-03
Lead (Pb)	<0.05	<0.05	RPD-NA	mg/L	N/A	45	25-JAN-03
Manganese (Mn)	1.29	1.29		mg/L	0.051	15	25-JAN-03
Molybdenum (Mo)	0.02	0.02	J	mg/L	0.00	0.031	25-JAN-03
Nickel (Ni)	0.06	0.06	J	mg/L	0.00	0.061	25-JAN-03
Selenium (Se)	<0.2	<0.2	RPD-NA	mg/L	N/A	42	25-JAN-03
Silver (Ag)	<0.01	<0.01	RPD-NA	mg/L	N/A	35	25-JAN-03
Thallium (Tl)	<0.05	<0.05	RPD-NA	mg/L	N/A	47	25-JAN-03
Uranium (U)	<0.2	<0.2	RPD-NA	mg/L	N/A	58	25-JAN-03
Vanadium (V)	<0.01	<0.01	RPD-NA	mg/L	N/A	30	25-JAN-03
Zinc (Zn)	4.8	4.8		mg/L	0.57	12	25-JAN-03
Zirconium (Zr)	<0.1	<0.1	RPD-NA	mg/L	N/A	53	25-JAN-03
WG101936-1	LCS						
Antimony (Sb)		101		%		95-105	25-JAN-03
Arsenic (As)		98		%		95-105	25-JAN-03
Barium (Ba)		100		%		95-105	25-JAN-03
Beryllium (Be)		98		%		95-105	25-JAN-03
Boron (B)		100		%		95-105	25-JAN-03
Cadmium (Cd)		100		%		95-105	25-JAN-03
Chromium (Cr)		98		%		95-105	25-JAN-03
Cobalt (Co)		99		%		95-105	25-JAN-03
Copper (Cu)		101		%		95-105	25-JAN-03
Iron (Fe)		97		%		95-105	25-JAN-03
Lead (Pb)		99		%		95-105	25-JAN-03
Manganese (Mn)		98		%		95-105	25-JAN-03
Molybdenum (Mo)		98		%		95-105	25-JAN-03
Nickel (Ni)		97		%		95-105	25-JAN-03
Selenium (Se)		99		%		95-105	25-JAN-03
Silver (Ag)		101		%		95-105	25-JAN-03
Thallium (Tl)		101		%		95-105	25-JAN-03
Uranium (U)		97		%		96-112	25-JAN-03
Vanadium (V)		101		%		95-105	25-JAN-03
Zinc (Zn)		103		%		95-105	25-JAN-03



**ENVIRO-TEST QC REPORT**

Workorder: L96485

	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>ETL-METAL-TCLP-CL</b>		<b>Waste</b>						
Batch	R110302							
<b>WG101936-1</b>	<b>LCS</b>							
Zirconium (Zr)			100		%		95-105	25-JAN-03
<b>WG101936-2</b>	<b>MB</b>							
Antimony (Sb)			<0.2		mg/L		0.2	25-JAN-03
Arsenic (As)			<0.2		mg/L		0.2	25-JAN-03
Barium (Ba)			<0.1		mg/L		0.1	25-JAN-03
Beryllium (Be)			<0.01		mg/L		0.01	25-JAN-03
Boron (B)			<0.5		mg/L		0.5	25-JAN-03
Cadmium (Cd)			<0.005		mg/L		0.005	25-JAN-03
Chromium (Cr)			<0.01		mg/L		0.01	25-JAN-03
Cobalt (Co)			<0.01		mg/L		0.01	25-JAN-03
Copper (Cu)			<0.1		mg/L		0.1	25-JAN-03
Iron (Fe)			<0.1		mg/L		0.1	25-JAN-03
Lead (Pb)			<0.05		mg/L		0.05	25-JAN-03
Manganese (Mn)			<0.01		mg/L		0.01	25-JAN-03
Molybdenum (Mo)			<0.01		mg/L		0.01	25-JAN-03
Nickel (Ni)			<0.02		mg/L		0.02	25-JAN-03
Selenium (Se)			<0.2		mg/L		0.2	25-JAN-03
Silver (Ag)			<0.01		mg/L		0.01	25-JAN-03
Thallium (Tl)			<0.05		mg/L		0.05	25-JAN-03
Uranium (U)			<0.2		mg/L		0.2	25-JAN-03
Vanadium (V)			<0.01		mg/L		0.01	25-JAN-03
Zinc (Zn)			<0.2		mg/L		0.2	25-JAN-03
Zirconium (Zr)			<0.1		mg/L		0.1	25-JAN-03
<b>WG101936-4</b>	<b>MS</b>	<b>L97105-1</b>						
Antimony (Sb)			92		%		86-103	25-JAN-03
Arsenic (As)			99		%		86-106	25-JAN-03
Barium (Ba)			97		%		86-107	25-JAN-03
Beryllium (Be)			89		%		85-101	25-JAN-03
Boron (B)			97		%		95-108	25-JAN-03
Cadmium (Cd)			90		%		87-101	25-JAN-03
Chromium (Cr)			91		%		85-103	25-JAN-03
Cobalt (Co)			88		%		85-100	25-JAN-03
Copper (Cu)			100		%		95-109	25-JAN-03
Iron (Fe)			96		%		83-99	25-JAN-03
Lead (Pb)			89		%		88-103	25-JAN-03
Manganese (Mn)			95		%		81-108	25-JAN-03
Molybdenum (Mo)			95		%		89-105	25-JAN-03



**ENVIRO-TEST QC REPORT**

Workorder: L96485

Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>ETL-METAL-TCLP-CL</b>							
<b>Waste</b>							
Batch	R110302						
WG101938-4	MS	L97105-1					
Nickel (Ni)		87		%		84-99	25-JAN-03
Selenium (Se)		92		%		87-109	25-JAN-03
Silver (Ag)		96		%		86-104	25-JAN-03
Thallium (Tl)		86		%		80-99	25-JAN-03
Uranium (U)		84	H	%		86-107	25-JAN-03
Vanadium (V)		96		%		91-104	25-JAN-03
Zinc (Zn)		105		%		80-118	25-JAN-03
Zirconium (Zr)		95		%		92-106	25-JAN-03
<b>HG-TCLP-CL</b>							
<b>Waste</b>							
Batch	R110310						
WG101943-1	LCS						
Mercury (Hg)-Leachate		100		%		95-117	26-JAN-03
WG101943-2	MB						
Mercury (Hg)-Leachate		<0.01		mg/L		0.01	26-JAN-03
WG101943-3	MS	L97105-1					
Mercury (Hg)-Leachate		100		%		91-117	26-JAN-03
WG101943-4	MSD	WG101943-3					
Mercury (Hg)-Leachate		92	H	%	8.3	7.5	24-JAN-03

## Product - Batch and Sample Number Relations:

ETL-BTX,TVH-CCME-ED	2						
R109852		L96485-1	L96485-2	L96485-3	L96485-4	L96485-5	
		L96485-6	L96485-7	L96485-8	L96485-9	L96485-10	
		L96485-11	L96485-12	L96485-13	L96485-14	L96485-15	
		L96485-16	L96485-17				
ETL-OGG-CCME-ED	2						
R109772		L96485-1	L96485-2				
ETL-OGG-CCME-ED	2						
R109898		L96485-3	L96485-4	L96485-5	L96485-6	L96485-7	
		L96485-8	L96485-9	L96485-10	L96485-11	L96485-12	
		L96485-13	L96485-14	L96485-15	L96485-16		
ETL-OGG-CCME-ED	2						
R109899		L96485-17					
ETL-TEH-CCME-ED	2						
R109772		L96485-1	L96485-2				
ETL-TEH-CCME-ED	2						
R109898		L96485-3	L96485-4	L96485-5	L96485-6	L96485-7	
		L96485-8	L96485-9	L96485-10	L96485-11	L96485-12	
		L96485-13	L96485-14	L96485-15	L96485-16		
ETL-TEH-CCME-ED	2						
R109899		L96485-17					



**ENVIRO-TEST QC REPORT**

Workorder: L96485

Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>Product - Batch and Sample Number Relations:</b>							
PB-MUST-ED	2						
R109849	L96485-1	L96485-2	L96485-3	L96485-4	L96485-5		
	L96485-6	L96485-7	L96485-8	L96485-9	L96485-10		
	L96485-11	L96485-12	L96485-13	L96485-14	L96485-15		
	L96485-16	L96485-17					
PH-ED	2						
R110516	L96485-6						
PREP-MOISTURE-ED	2						
R109739	L96485-1	L96485-2	L96485-3	L96485-4	L96485-5		
	L96485-6	L96485-7	L96485-8	L96485-9	L96485-10		
	L96485-11	L96485-12	L96485-13	L96485-14	L96485-15		
	L96485-16	L96485-17					
PSA-MUST-ED	2						
R109911	L96485-3	L96485-6					
BTX-TCLP-CL	24						
R110307	L96485-6						
ETL-METAL-TCLP-CL	24						
R110302	L96485-6						
HG-TCLP-CL	24						
R110310	L96485-6						





Workorder # L96485

**Legend:**

Limit 95% Confidence Interval (Laboratory Warning Limits)  
DUP Duplicate  
RPD Relative Percent Difference ((higher result-lower result)/Average, expressed as %)  
N/A Not Available  
LCS Laboratory Control Sample  
SRM Standard Reference Materials  
MS Matrix Spike  
MSD Matrix Spike Duplicate  
ADE Average Desorption Efficiency  
MB Method Blank  
IRM Internal Reference Material  
CRM Certified Reference Material

**Qualifier:**

RPD-NA Relative Percent Difference Not Available due to result(s) being less than detection limit.  
A Method blank exceeds acceptance limit. Blank correction not applied, unless the qualifier "RAMB"  
(result adjusted for method blank) appears in the Analytical Report.  
B Method blank result exceeds acceptance limit, however, it is less than 5% of sample concentration.  
Blank correction not applied.  
D Duplicate result may exceed limit due to increased variability for low level samples.  
E Matrix spike recovery may fall outside the acceptance limits due to high sample background.  
F Silver recovery low, likely due to elevated choride levels in sample.  
Outlier - No assignable cause for nonconformity has been determined.  
Result falls within the 99% Confidence Interval (Laboratory Control Limits)  
J Duplicate results and limit(s) are expressed in terms of absolute difference.

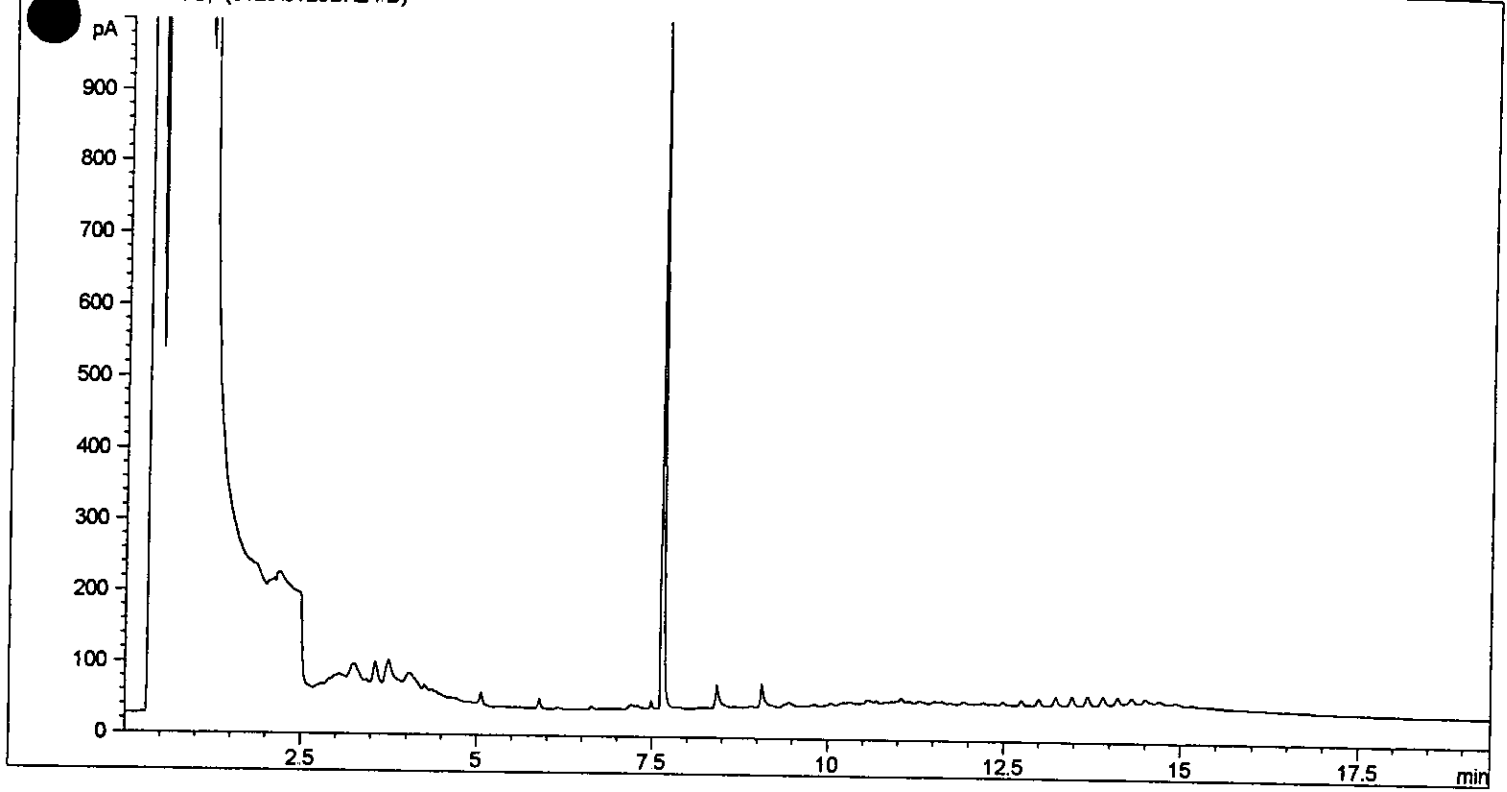


Client ID: BH9@3.0M  
 Sample ID: L96485-1 5  
 Injection Date: 1/21/03 12:54:57 AM  
 Instrument ID: Instrument A



Total Extractable Hydrocarbons

FID2 B, (0120\0120BK24.D)



C10

C20

C30

C50

Boiling Point Distribution Range of Petroleum Based Fuel Products

Carbon #	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
B.P. (°C)	-42	-0.5	36	69	98	126	151	174	196	216	235	253	270	287	302	316	329	343	356	369	380	391	402	412	422	431	449
B.P. (°F)	-44	31	97	156	209	258	303	345	384	421	456	488	519	548	575	601	625	649	674	695	716	736	756	774	792	808	840

V.M.&P. Naphtha	←	→																											
Mineral Spirits	←	→																											
#2 Diesel	←	→																											
JP5, Jet A	←	→																											
Heavy Diesel	←	→																											
Gas Oil, Fuel Oil	←	→																											
Lubricating Oils	←	→																											

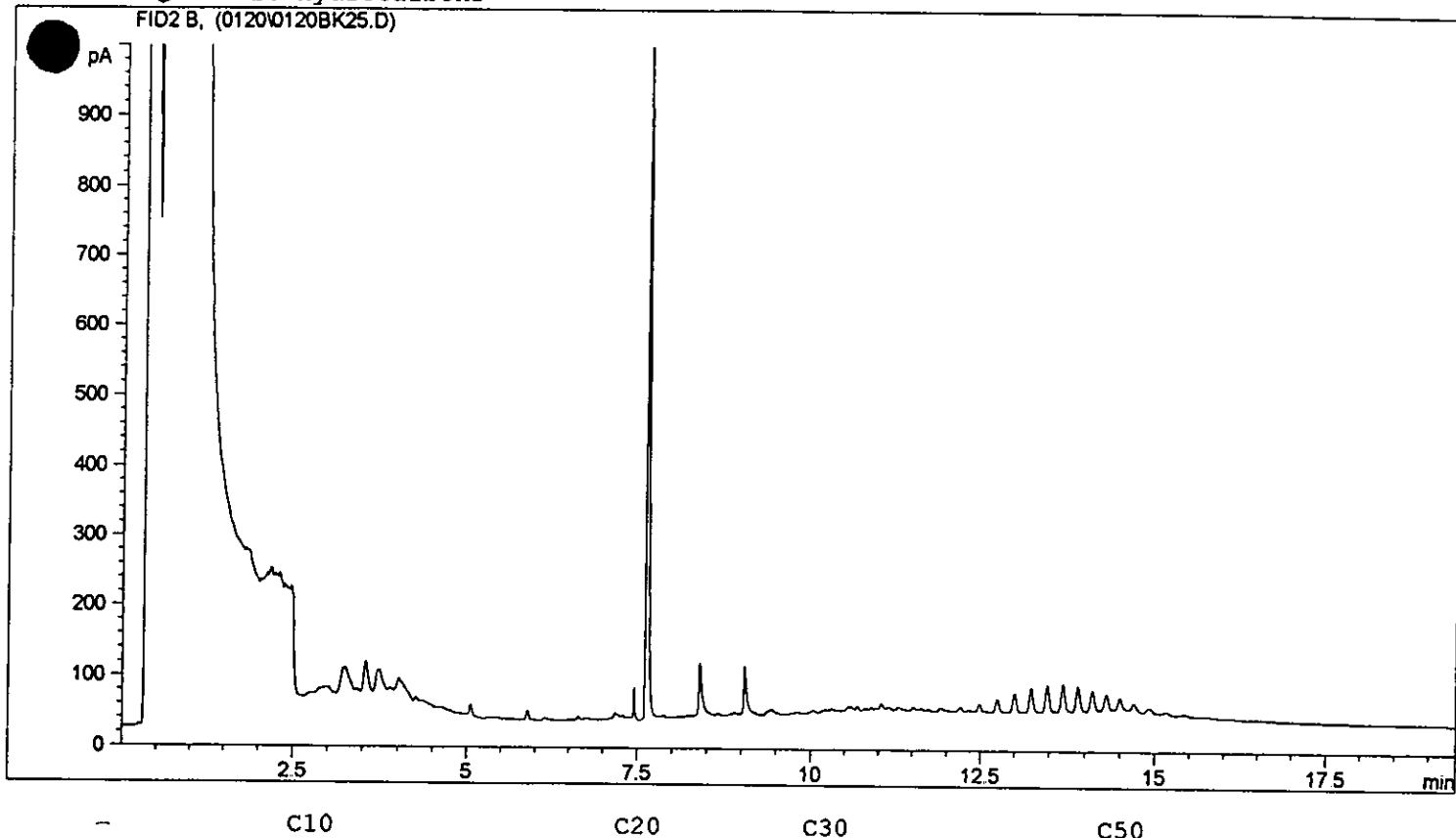
Adapted from: Drews, A.W., ED. Manual on Hydrocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadelphia, PA., 1989: p XVIII



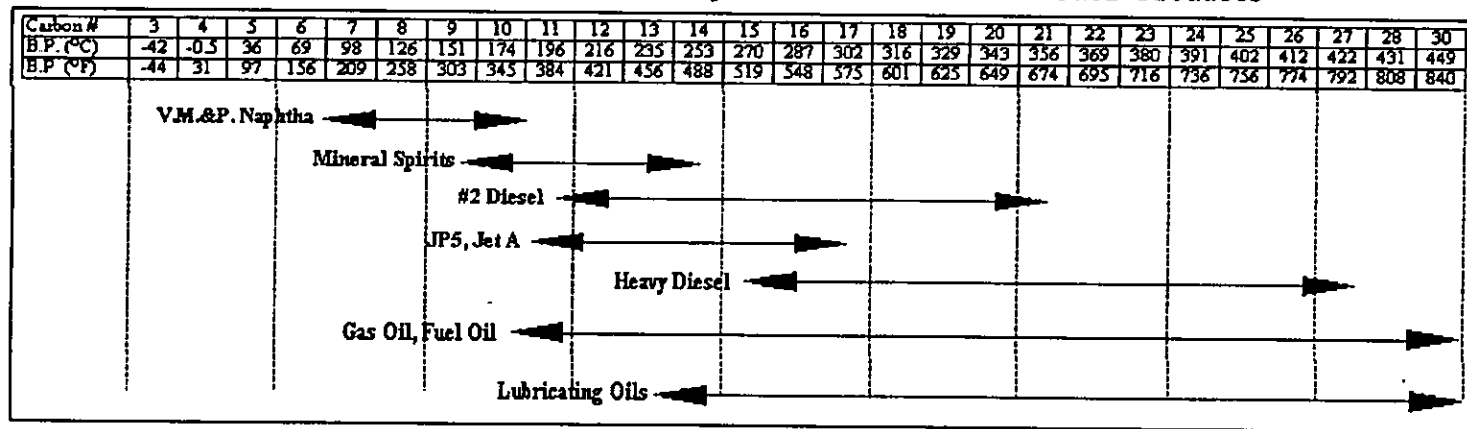
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 Sample ID: L96485-2 5  
 Injection Date: 1/21/03 1:23:26 AM  
 Instrument ID: Instrument A



Total Extractable Hydrocarbons



Boiling Point Distribution Range of Petroleum Based Fuel Products



Adapted from: Drews, A.W., ED. Manual on Hydrocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadelphia, PA., 1989: p XVIII

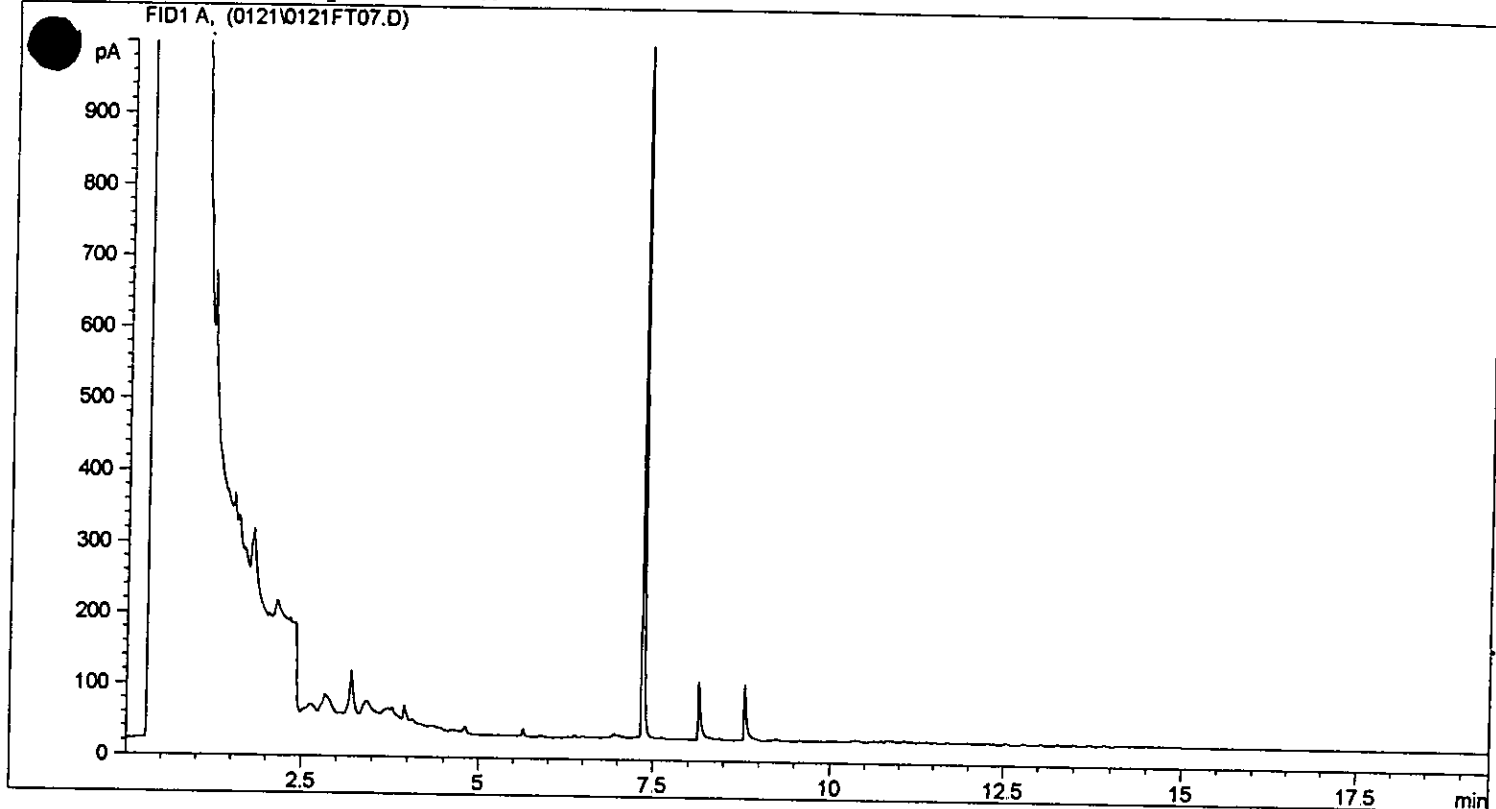


Client ID: BH1103.0M  
 Sample ID: L96485-3 5  
 Injection Date: 1/21/03 5:48:45 PM  
 Instrument ID: Instrument A



Total Extractable Hydrocarbons

FID1 A, (0121\0121FT07.D)



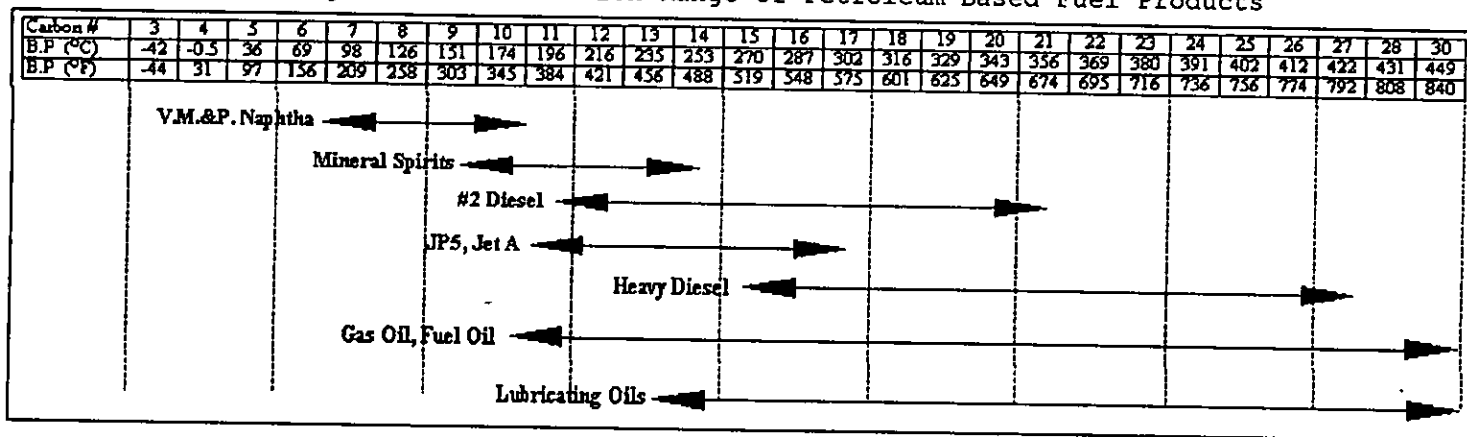
C10

C20

C30

C50

Boiling Point Distribution Range of Petroleum Based Fuel Products



Adapted from: Drews, A.W., ED. Manual on Hydrocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadelphia, PA., 1989: p XVIII



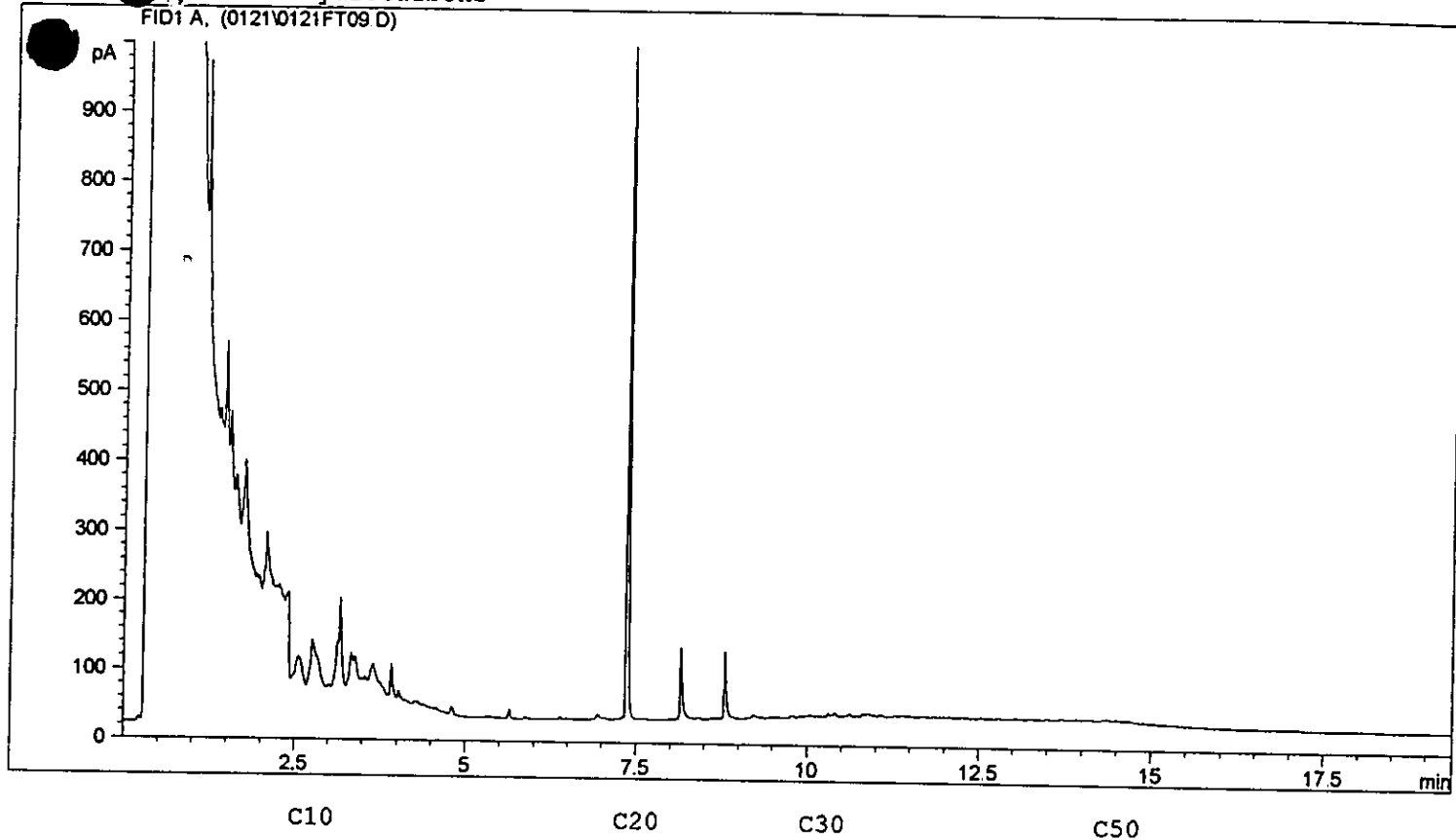


Client ID: BR1203.0M  
 Sample ID: L96485-4 5  
 Injection Date: 1/21/03 6:45:58 PM  
 Instrument ID: Instrument A



Total Detectable Hydrocarbons

FID: A, (0121\0121FT09.D)



Boiling Point Distribution Range of Petroleum Based Fuel Products

Carbon #	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30					
B.P. (°C)	-42	-0.5	36	69	98	126	151	174	196	216	235	253	270	287	302	316	329	343	356	369	380	391	402	412	422	431	449					
B.P. (°F)	-44	31	97	156	209	258	303	345	384	421	456	488	519	548	575	601	625	649	674	695	716	736	756	774	792	808	840					
V.M.&P. Naphtha	←		→																													
Mineral Spirits	←			→																												
#2 Diesel	←				→																											
JP5, Jet A	←					→																										
Heavy Diesel	←						→																									
Gas Oil, Fuel Oil	←							→																								
Lubricating Oils	←								→																							

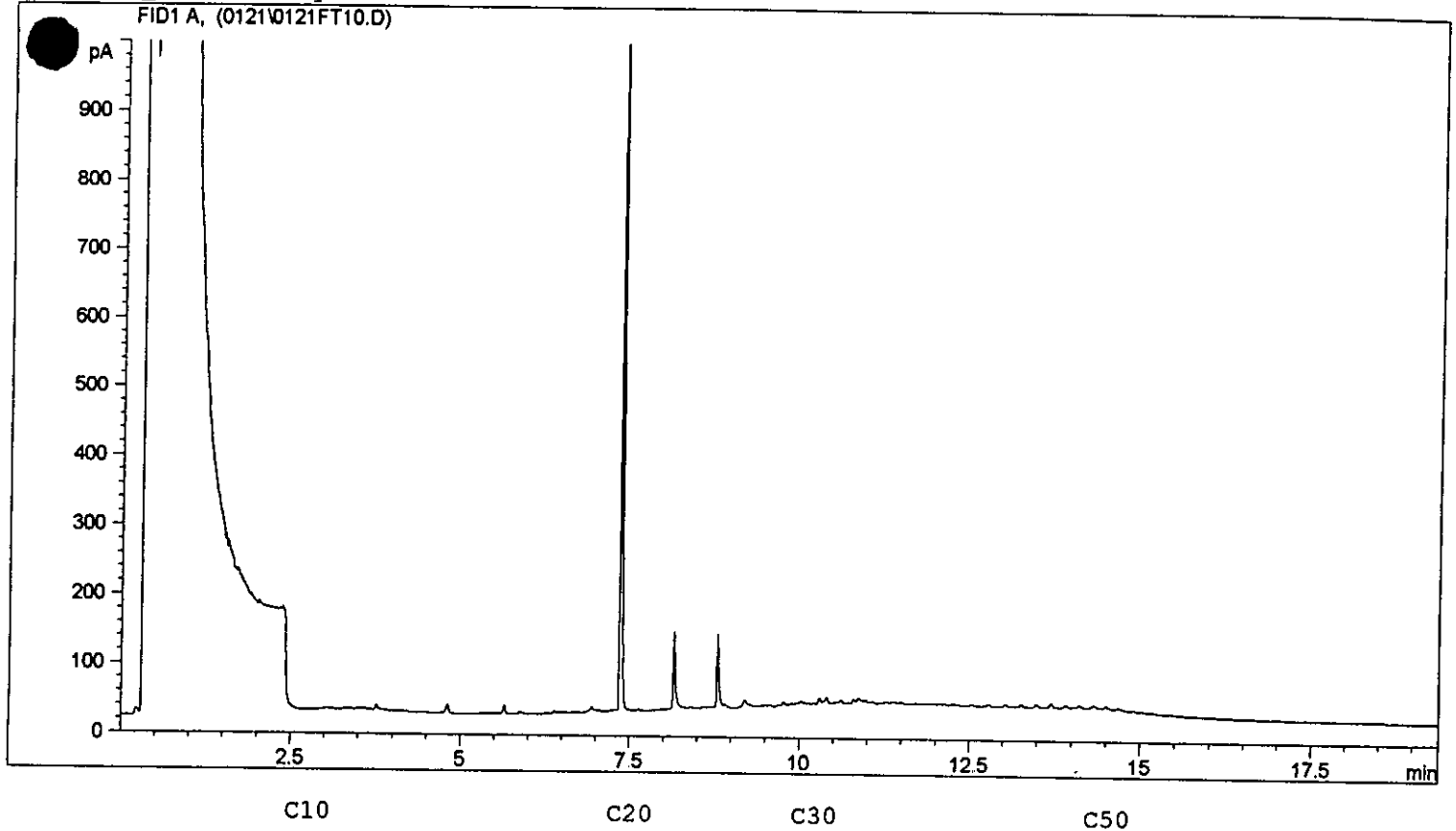
Adapted from: Drews, A.W., ED. Manual on Hydrocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadelphia, PA., 1989: p XVIII



Sample ID: L96485-5 5  
 Injection Date: 1/21/03 7:14:45 PM  
 Instrument ID: Instrument A



Total Extractable Hydrocarbons



Boiling Point Distribution Range of Petroleum Based Fuel Products

Carbon #	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
BP (°C)	-42	-0.5	36	69	98	126	151	174	196	216	235	253	270	287	302	316	329	343	356	369	380	391	402	412	422	431	449
BP (°F)	-44	31	97	156	209	258	303	345	384	421	456	488	519	548	575	601	625	649	674	695	716	736	756	774	792	808	840

VM.&P. Naphtha	←	→
Mineral Spirits	←	→
#2 Diesel	←	→
JP5, Jet A	←	→
Heavy Diesel	←	→
Gas Oil, Fuel Oil	←	→
Lubricating Oils	←	→

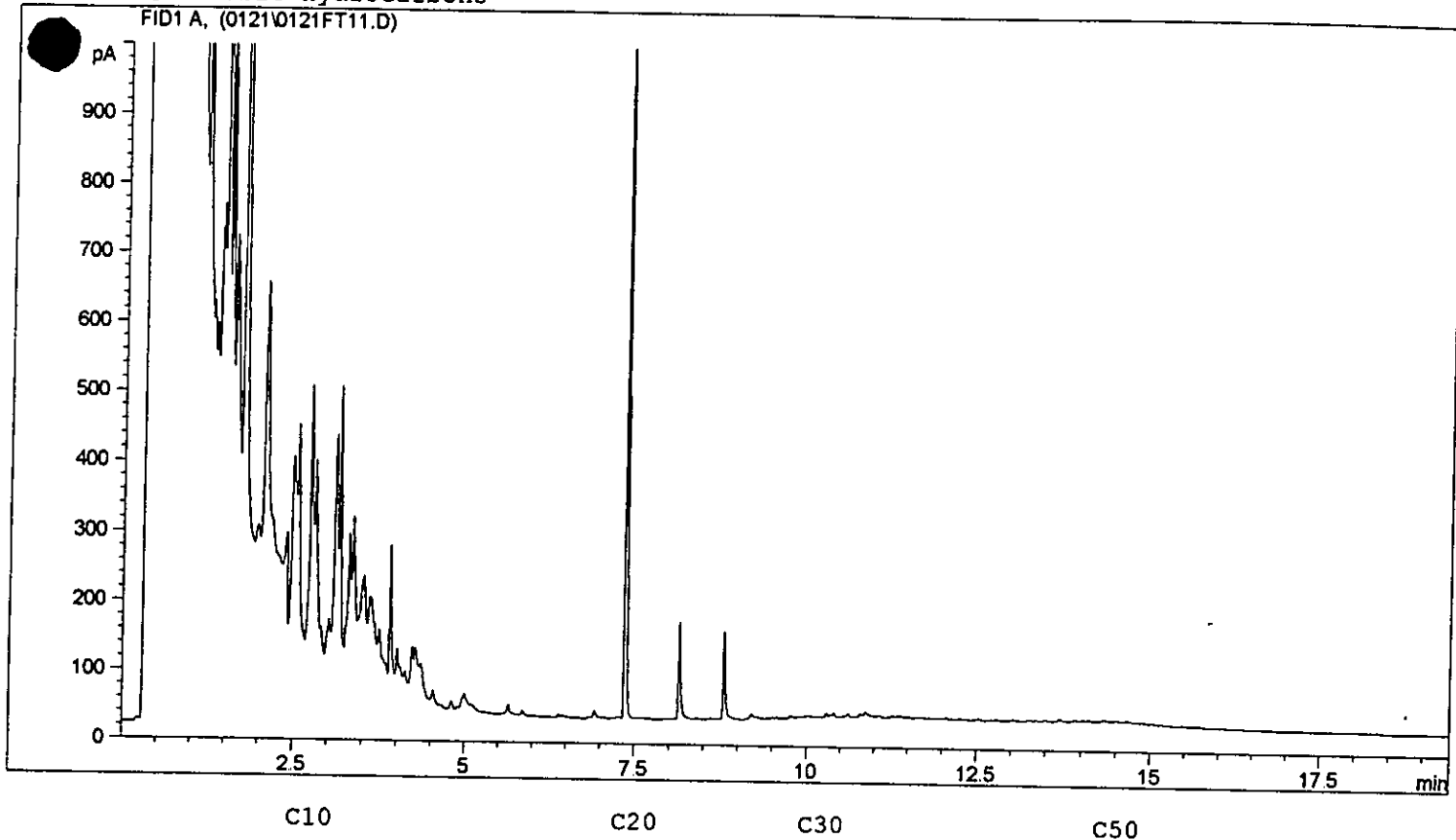
Adapted from: Drews, A.W., ED. Manual on Hydrocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadelphia, PA., 1989: p XVIII



Client ID: BH13@2.75M  
 Sample ID: L96485-6 5  
 Injection Date: 1/21/03 7:43:52 PM  
 Instrument ID: Instrument A



Total Extractable Hydrocarbons



Boiling Point Distribution Range of Petroleum Based Fuel Products

Carbon #	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
BP (°C)	-42	-0.5	36	69	98	126	151	174	196	216	235	253	270	287	302	316	329	343	356	369	380	391	402	412	422	431	449
BP (°F)	-44	31	97	156	209	258	303	345	384	421	456	488	519	548	575	601	625	649	674	695	716	736	756	774	792	808	840

V.M.&P. Naphtha	Carbon 3 to 10
Mineral Spirits	Carbon 4 to 12
#2 Diesel	Carbon 6 to 18
JP5, Jet A	Carbon 8 to 16
Heavy Diesel	Carbon 10 to 24
Gas Oil, Fuel Oil	Carbon 12 to 28
Lubricating Oils	Carbon 14 to 30

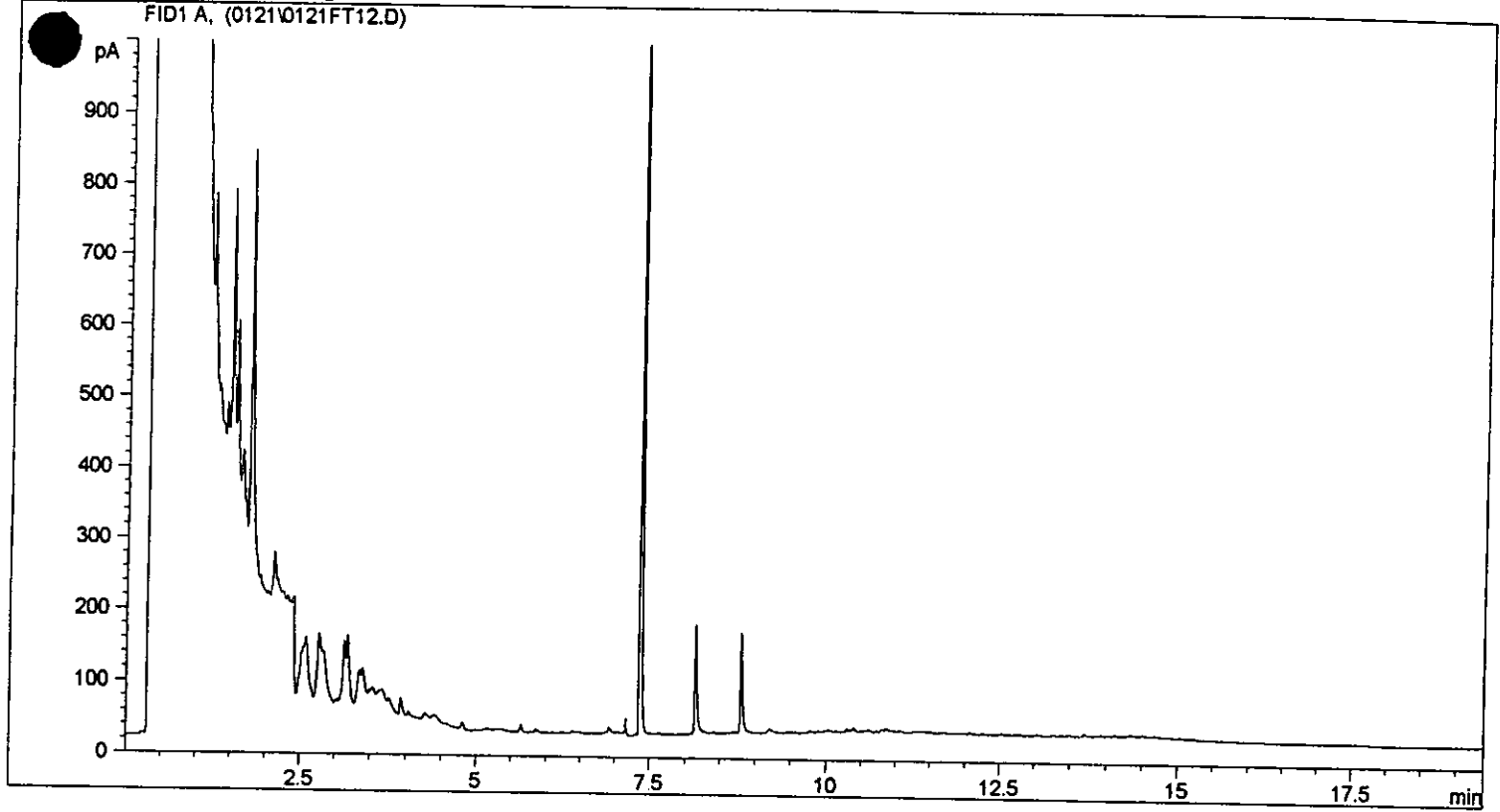
Adapted from: Drews, A.W., ED. Manual on Hyrdocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadelphia, PA., 1989: p XVIII



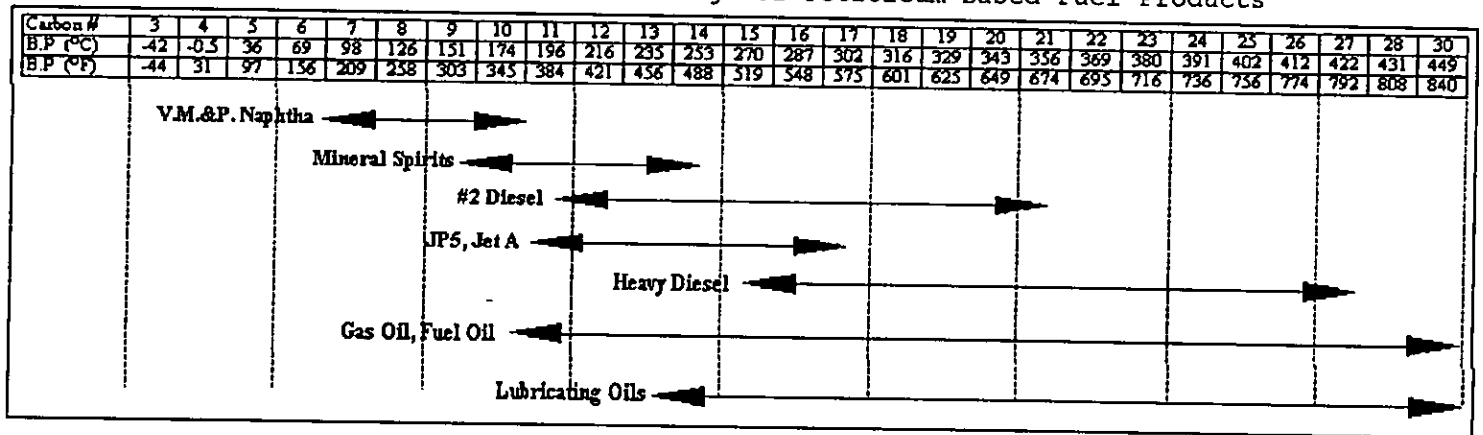
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Sample ID: L96485-7 5  
Injection Date: 1/21/03 8:12:04 PM  
Instrument ID: Instrument A



Total Extractable Hydrocarbons



Boiling Point Distribution Range of Petroleum Based Fuel Products



Adapted from: Drews, A.W., ED. Manual on Hyrdocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadelphia, PA., 1989: p XVIII

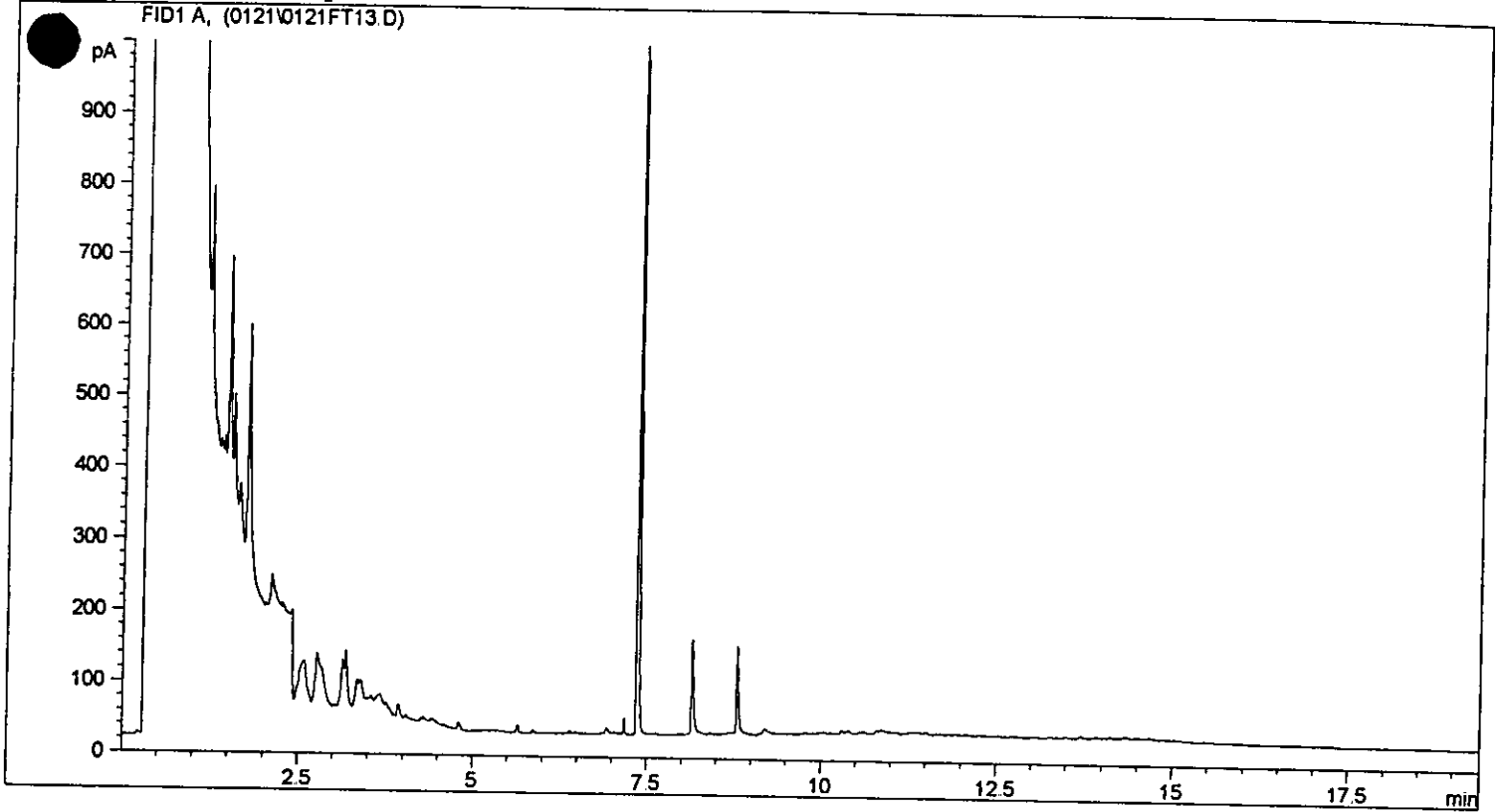




Client ID: BH1503.0M  
 Sample ID: L96485-8 5  
 Injection Date: 1/21/03 8:40:56 PM  
 Instrument ID: Instrument A



Total Extractable Hydrocarbons



C10    C20    C30    C50

Boiling Point Distribution Range of Petroleum Based Fuel Products

Carbon #	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30													
B.P. (°C)	-42	-0.5	36	69	98	128	151	174	196	216	235	253	270	287	302	316	329	343	356	369	380	391	402	412	422	431	449													
B.P. (°F)	-44	31	97	156	209	258	303	345	384	421	456	488	519	548	575	601	625	649	674	695	716	736	756	774	792	808	840													
V.M.&P. Naphtha	←			→																																				
Mineral Spirits	←				→																																			
#2 Diesel	←						→																																	
JP5, Jet A	←								→																															
Heavy Diesel	←										→																													
Gas Oil, Fuel Oil	←												→																											
Lubricating Oils	←														→																									

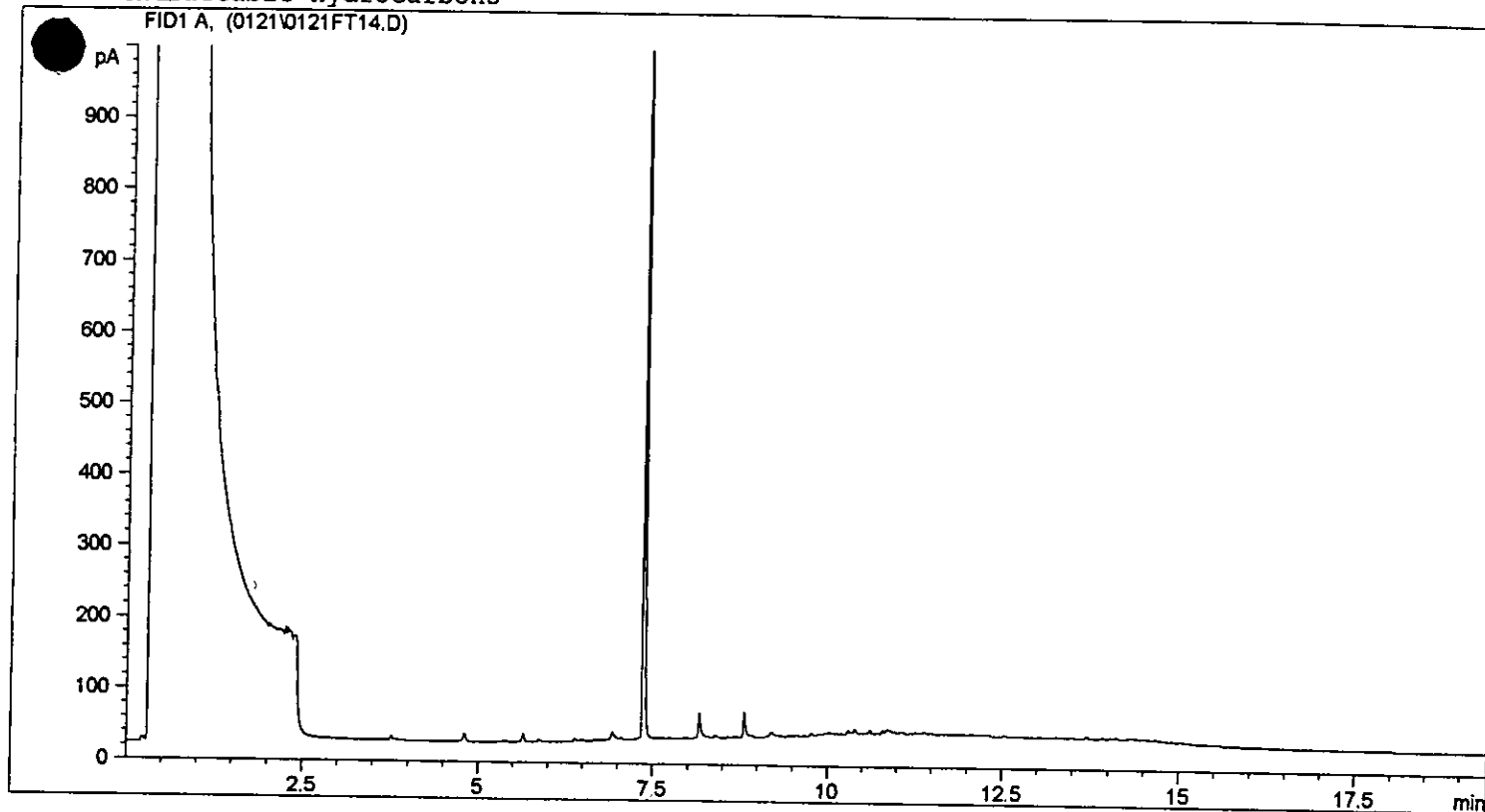
Adapted from: Drews, A.W., ED. Manual on Hydrocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadelphia, PA., 1989: p XVIII



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 Sample ID: L96485-9 5  
 Injection Date: 1/21/03 9:10:00 PM  
 Instrument ID: Instrument A



Total Extractable Hydrocarbons



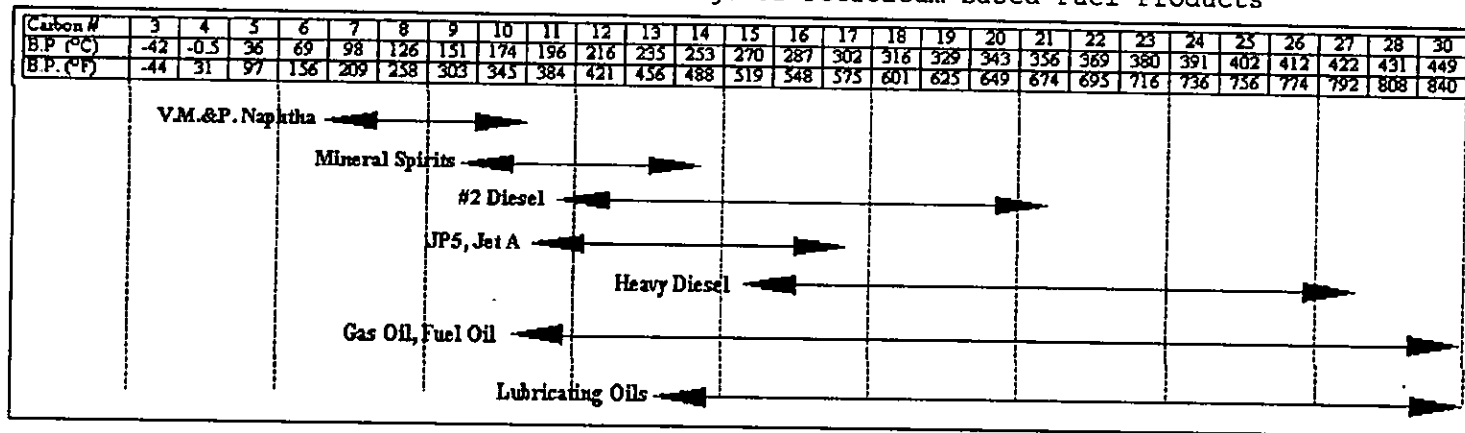
C10

C20

C30

C50

Boiling Point Distribution Range of Petroleum Based Fuel Products



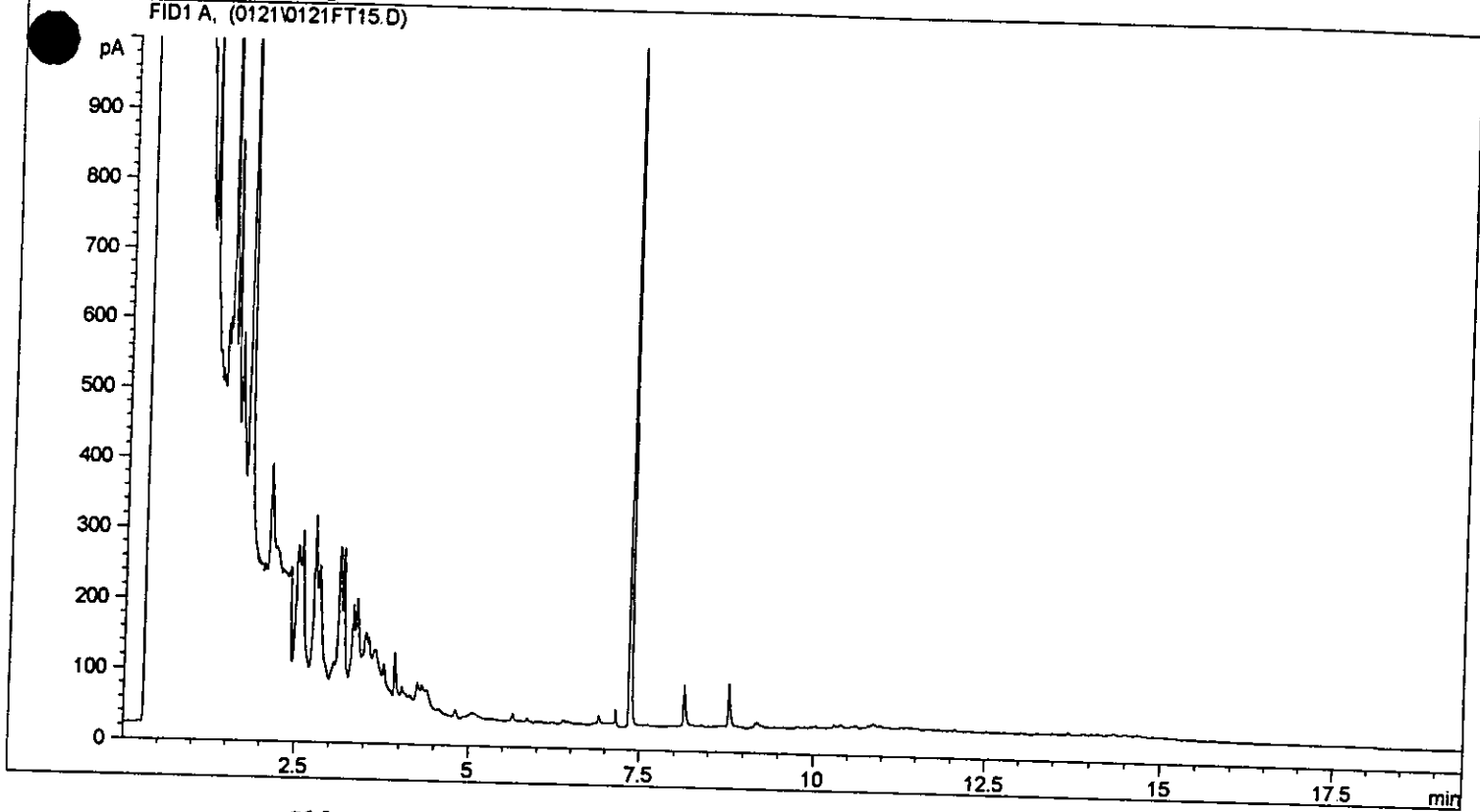
Adapted from: Drews, A.W., ED. Manual on Hydrocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadelphia, PA., 1989: p XVIII





Sample ID: L96485-10 5  
 Injection Date: 1/21/03 9:38:24 PM  
 Instrument ID: Instrument A

Total Extractable Hydrocarbons



Boiling Point Distribution Range of Petroleum Based Fuel Products

Carbon #	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
B.P (°C)	-42	-0.5	36	69	98	126	151	174	196	216	235	253	270	287	302	316	329	343	356	369	380	391	402	412	422	431	449
B.P (°F)	-44	31	97	156	209	258	303	345	384	421	456	488	519	548	575	601	625	649	674	695	716	736	756	774	792	808	840

V.M.&P. Naphtha	←	→
Mineral Spirits	←	→
#2 Diesel	←	→
JP5, Jet A	←	→
Heavy Diesel	←	→
Gas Oil, Fuel Oil	←	→
Lubricating Oils	←	→

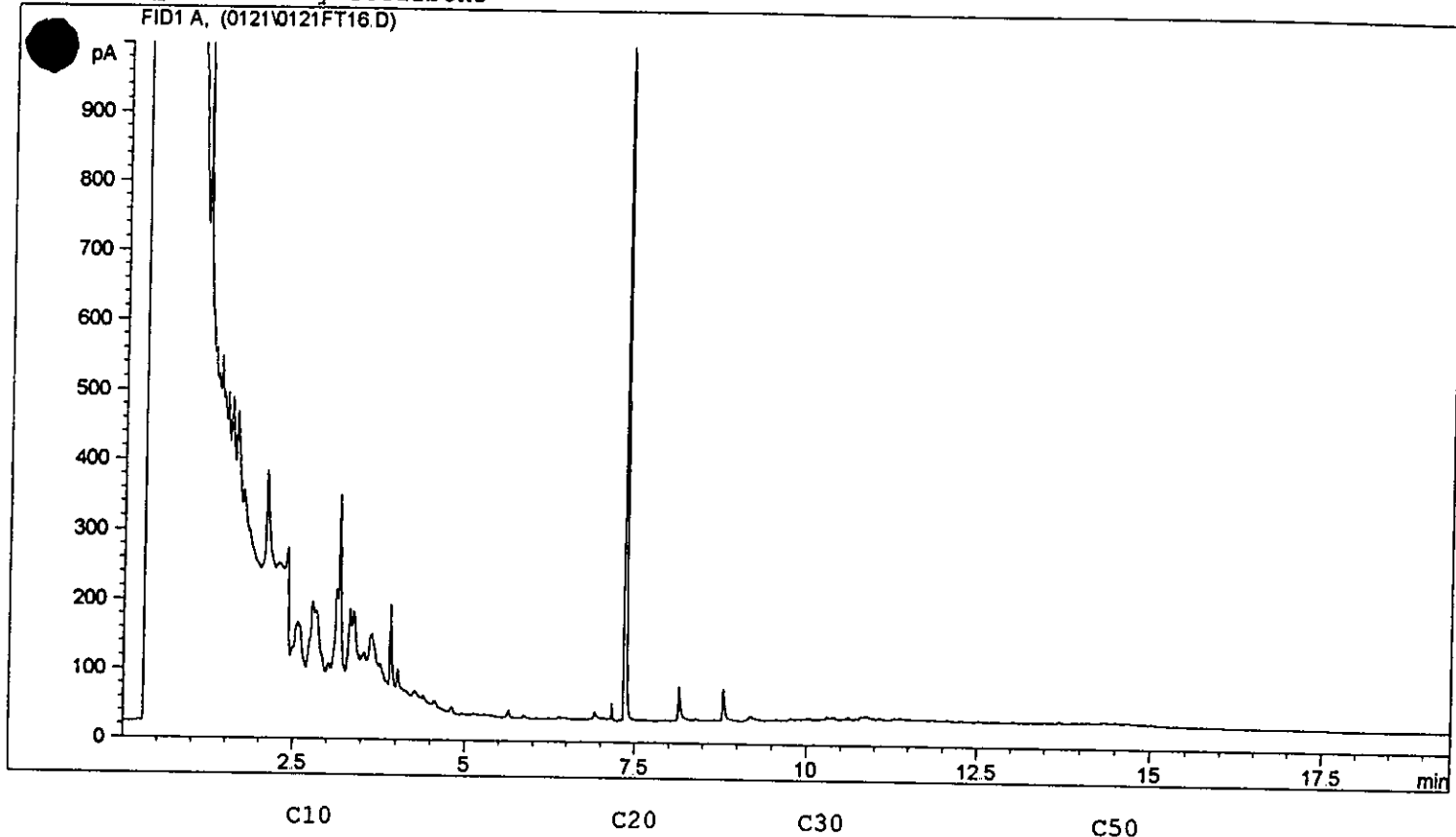
Adapted from: Drews, A.W., ED. Manual on Hydrocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadelphia, PA., 1989: p XVIII



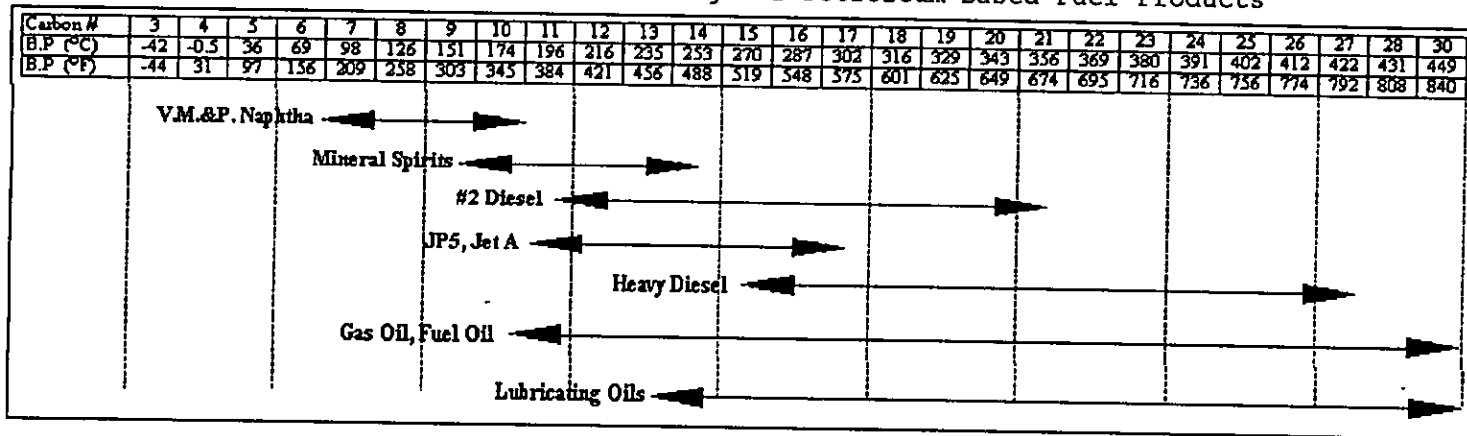
Sample ID: L96485-11 5  
 Injection Date: 1/21/03 10:07:32 PM  
 Instrument ID: Instrument A



Total Extractable Hydrocarbons



Boiling Point Distribution Range of Petroleum Based Fuel Products



Adapted from: Drews, A.W., ED. Manual on Hydrocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadelphia, PA., 1989: p XVIII



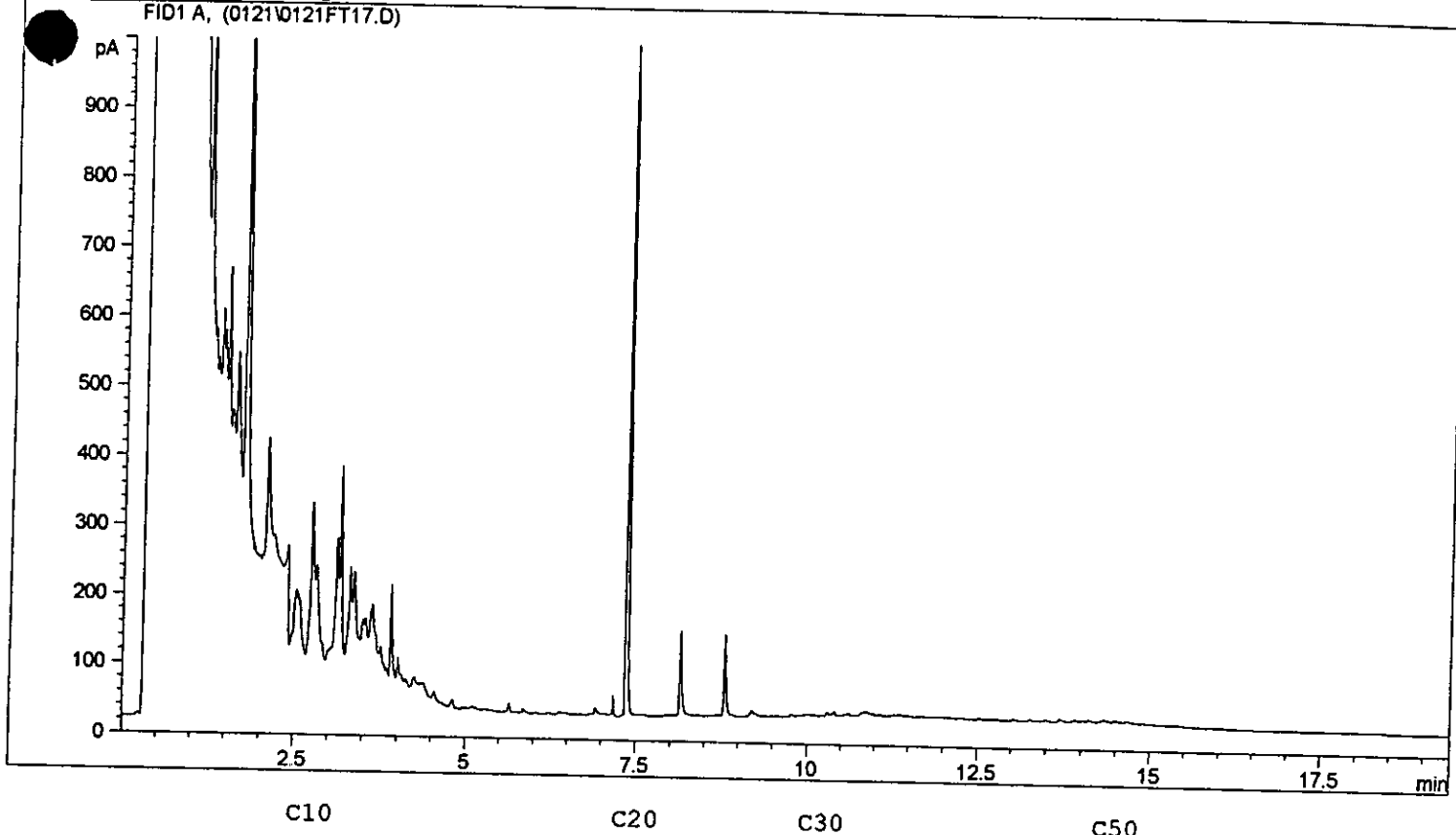


Client ID: BH1903.UM  
 Sample ID: L96485-12 5  
 Injection Date: 1/21/03 10:36:19 PM  
 Instrument ID: Instrument A



Total Extractable Hydrocarbons

FID1 A, (01210121FT17.D)



Boiling Point Distribution Range of Petroleum Based Fuel Products

Carbon #	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30													
BP (°C)	-42	-0.5	36	69	98	126	151	174	196	216	235	253	270	287	302	316	329	343	356	369	380	391	402	412	422	431	449													
BP (°F)	-44	31	97	156	209	258	303	345	384	421	456	488	519	548	575	601	625	649	674	695	716	736	756	774	792	808	840													
VM.&P. Naphtha	←		→																																					
Mineral Spirits	←			→																																				
#2 Diesel	←				→																																			
JP5, Jet A	←					→																																		
Heavy Diesel	←						→																																	
Gas Oil, Fuel Oil	←							→																																
Lubricating Oils	←								→																															

Adapted from: Drews, A.W., ED. Manual on Hydrocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadelphia, PA., 1989: p XVIII

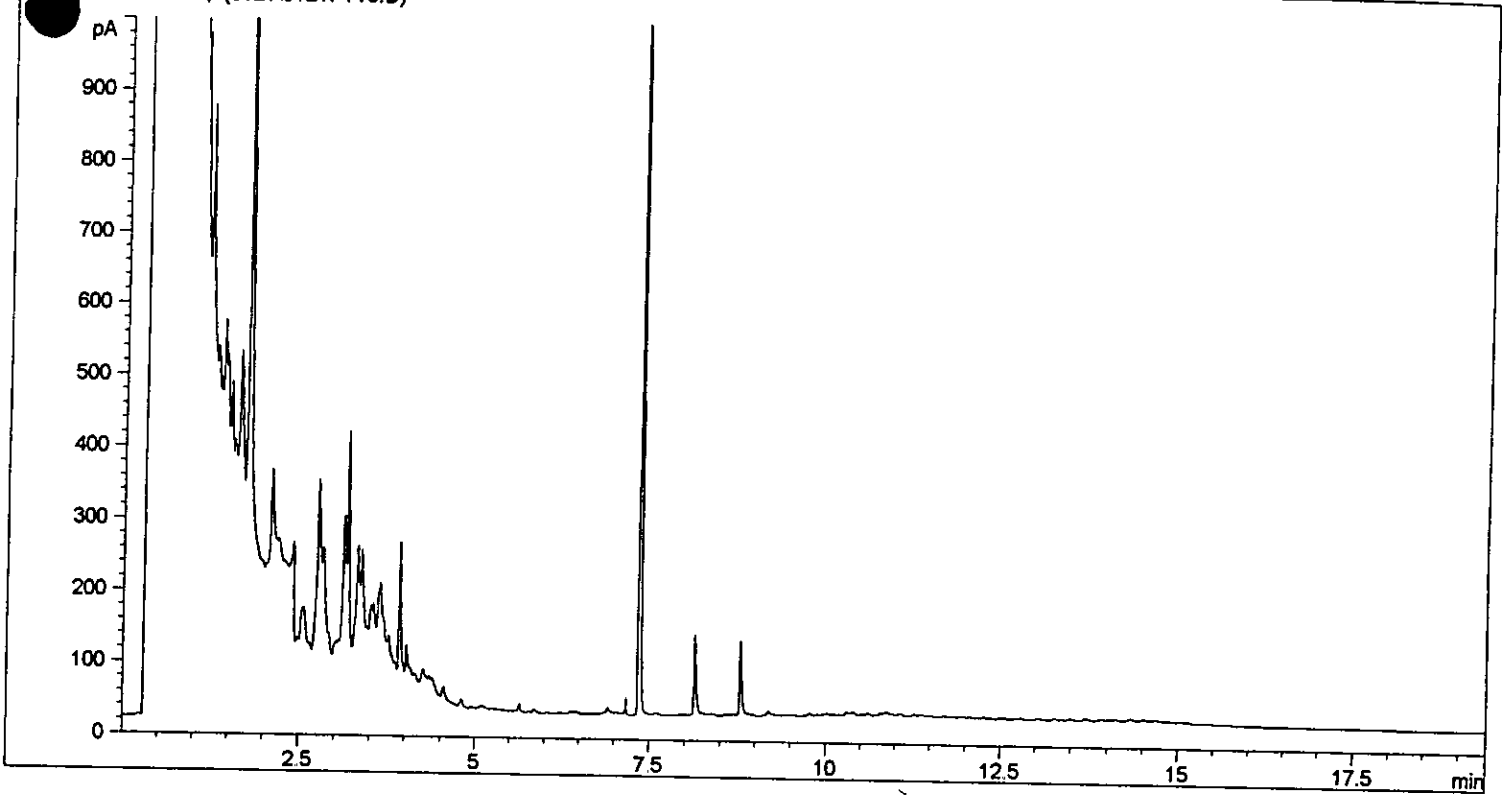


Client ID: BH20@2.25M  
 Sample ID: L96485-13 5  
 Injection Date: 1/21/03 11:04:35 PM  
 Instrument ID: Instrument A



Total Extractable Hydrocarbons

FID1 A, (0121\0121FT18.D)



Boiling Point Distribution Range of Petroleum Based Fuel Products

Carbon #	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30			
B.P. (°C)	-42	-0.5	36	69	98	126	151	174	196	216	235	253	270	287	302	316	329	343	356	369	380	391	402	412	422	431	449			
B.P. (°F)	-44	31	97	156	209	258	303	345	384	421	456	488	519	548	575	601	625	649	674	695	716	736	756	774	792	808	840			
	V.M.&P. Naphtha		Mineral Spirits			#2 Diesel				JP5, Jet A					Heavy Diesel						Gas Oil, Fuel Oil					Lubricating Oils				

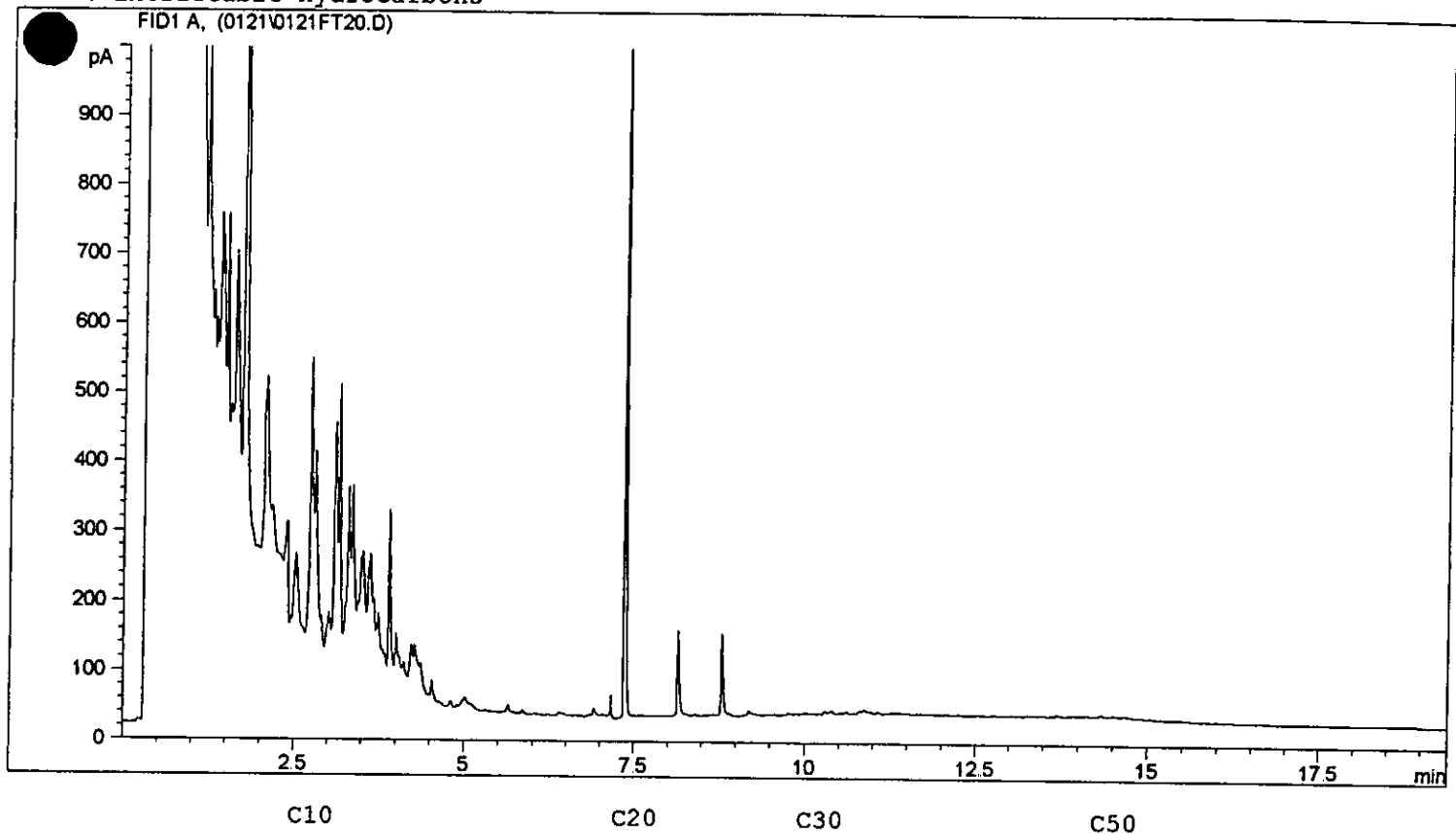
Adapted from: Drews, A.W., ED. Manual on Hydrocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadelphia, PA., 1989: p XVIII





Sample ID: L96485-14 5  
 Injection Date: 1/22/03 12:02:20 AM  
 Instrument ID: Instrument A

Total Extractable Hydrocarbons



Boiling Point Distribution Range of Petroleum Based Fuel Products

Carbon #	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
B.P. (°C)	-42	-0.5	36	69	98	126	151	174	196	216	235	253	270	287	302	316	329	343	356	369	380	391	402	412	422	431	449
B.P. (°F)	-44	31	97	156	209	258	303	345	384	421	456	488	519	548	575	601	625	649	674	695	716	736	756	774	792	808	840

V.M.&P. Naphtha	←	→																										
Mineral Spirits	←	→																										
#2 Diesel			←	→																								
JP5, Jet A				←	→																							
Heavy Diesel					←	→																						
Gas Oil, Fuel Oil						←	→																					
Lubricating Oils								←	→																			

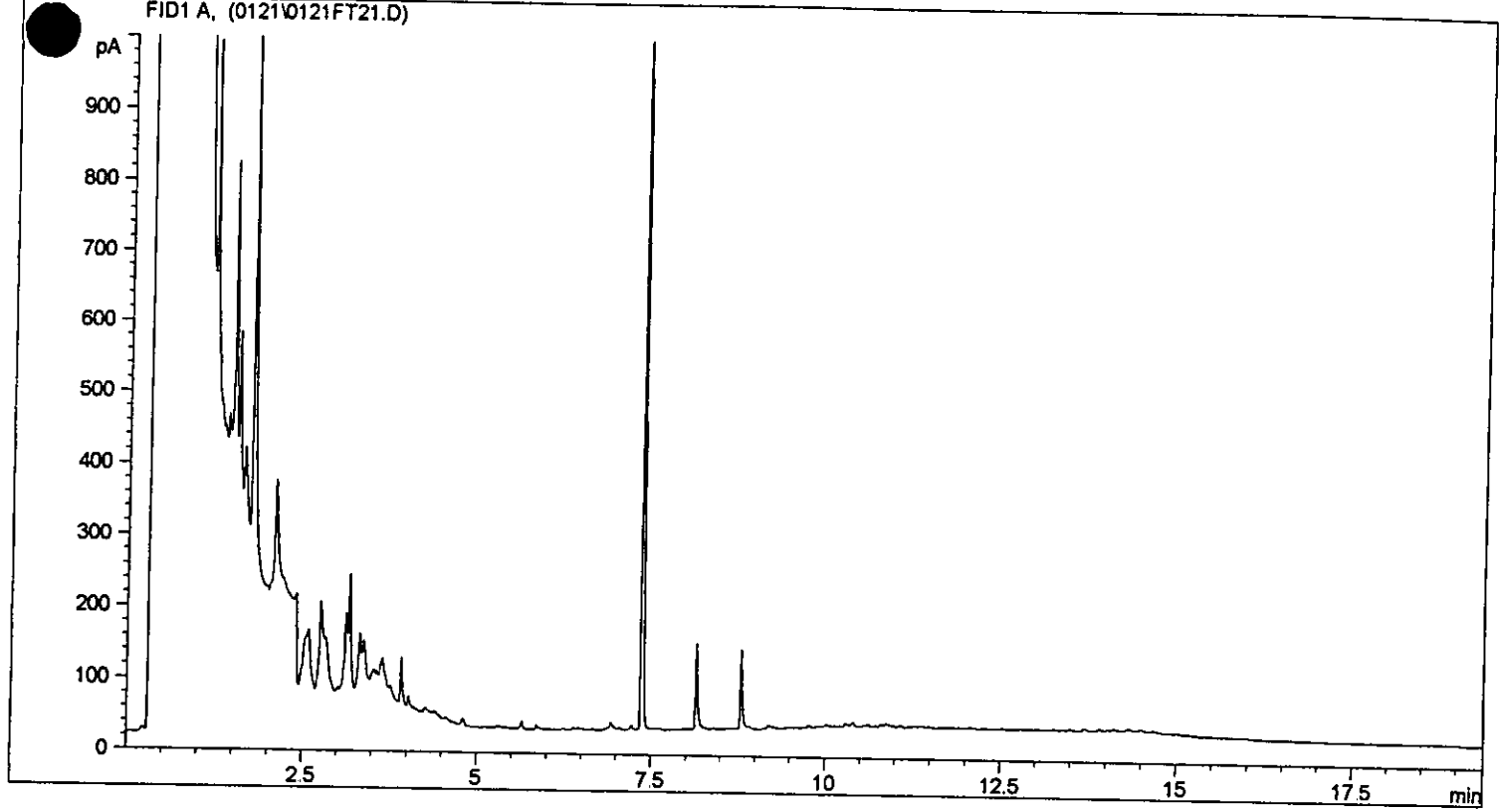
Adapted from: Drews, A.W., ED. Manual on Hydrocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadelphia, PA., 1989: p XVIII



Client ID: BH22@3.0M  
 Sample ID: L96485-15 5  
 Injection Date: 1/22/03 12:30:37 AM  
 Instrument ID: Instrument A



Total Extractable Hydrocarbons



Boiling Point Distribution Range of Petroleum Based Fuel Products

Carbon #	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30
B.P. (°C)	-42	-0.5	36	69	98	126	151	174	196	216	235	253	270	287	302	316	329	343	356	369	380	391	402	412	422	431	449
B.P. (°F)	-44	31	97	156	209	258	303	345	384	421	456	488	519	548	575	601	625	649	674	695	716	736	756	774	792	808	840

VM&P. Naptha	←	→																										
Mineral Spirits	←	→																										
#2 Diesel	←	→																										
JP5, Jet A	←	→																										
Heavy Diesel	←	→																										
Gas Oil, Fuel Oil	←	→																										
Lubricating Oils	←	→																										

Adapted from: Drews, A.W., ED. Manual on Hydrocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadelphia, PA., 1989: p XVIII













9936 - 67<sup>th</sup> Avenue Edmonton, Alberta T6E 0P5  
Edmonton Toll Free Line  
1313 - 44<sup>th</sup> Avenue N.E., Calgary, Alberta T2E 6L5  
9505 - 111<sup>th</sup> Street, Grande Prairie, Alberta T8V 5W1  
General Purpose Bldg., 124 Veterinary Road, Saskatoon, Saskatchewan S7N 5E3  
745 Logan Avenue, Winnipeg, Manitoba R3E 3L5  
1081 Barton Street, Thunder Bay, Ontario P7B 5N3

Telephone: (780) 413-5220  
Telephone: 1-800-668-9878  
Telephone: (403) 281-9897  
Telephone: (780) 539-5196  
Telephone: (306) 668-8370  
Telephone: (204) 845-3705  
Telephone: (807) 823-9463

Fax (780) 437-2311  
Fax: 1-800-286-7319  
Fax: (403) 281-0298  
Fax: (780) 513-2191  
Fax: (306) 668-8383  
Fax: (204) 945-0763  
Fax: (807) 823-7598

DATE Jan 17 03 DATE REQUIRED \_\_\_\_\_

SERVICE REQUESTED:

REGULAR  
 PRIORITY (50% SURCHARGE)  
 EMERGENCY (100% SURCHARGE)

SPECIAL REQUIREMENTS / REGS (CIRCLE ONE)

MISA  
BC MELP  
OTHER  
**CCME**  
TIER 1  
AB MUST

ANALYSIS REQUESTED: PSA MUST  
ETL/TA-G, CING  
PSA MUST

LAB SAMPLE NO L96485

SAMPLE ID	SAMPLED BY / DATE / TIME	LOCATION OF SAMPLING	SAMPLING METHOD	SAMPLE TYPE	LAB SAMPLE NO
BH 9 @ 3.0m	LAM / Jan 15 / 03	-	-	soil	1
BH 10 @ 3.0m	"	-	-	soil	2
BH 11 @ 3.0m	"	-	-	soil	3
BH 12 @ 3.0m	"	-	-	soil	4
BH 12 @ 3.75m	"	-	-	soil	5
BH 13 @ 2.25m	"	-	-	soil	6
BH 14 @ 3.0m	"	-	-	soil	7
BH 15 @ 3.0m	"	-	-	soil	8
BH 16 @ 3.75m	"	-	-	soil	9
BH 17 @ 3.0m	LAM / Jan 16 / 03	-	-	soil	10
BH 18 @ 2.25m	"	-	-	soil	11

Best Copy Available

NOTES & CONDITIONS

1 Quote number must be provided to ensure proper pricing.

2 Turnaround times will vary dependant on complexity of analysis & Lab workload at time of submission. Please contact the Lab to confirm turnaround times.

3 All hazardous samples submitted must be labeled to comply with WHMIS and TDG regulations. This must include the nature of the hazard, as well as a contact name & phone number that the Lab can contact for further information.

NOTE: Shaded areas MUST be completed in full by client for sample processing to occur.

CLIENT: Petroleum Enviro Services  
CONTACT: Jenifer Bachand

REPORT ADDRESS: #2-10066 29a Ave.  
Edmonton, AB T6N 1A8

BILLING ADDRESS:

as above

NO. BOTTLES SUBMITTED: 51  
PHONE: 780-461-4941  
FAX: 780-461-6067

QUOTE NO. AB P11 UPST  
P.O. NO. Carstairs  
JOB NO. Carstairs  
LANDSITE NO. Carstairs

RELINQUISHED BY: JB  
DATE: Jan 17 03  
TIME: 3:40pm  
RECEIVED BY: [Signature]  
DATE: 17-Jan-03  
TIME: 1435

SAMPLE CONDITION UPON RECEIPT  
FROZEN \_\_\_\_\_ COLD \_\_\_\_\_ AMBIENT \_\_\_\_\_  
OTHER: (BREAKAGE, LEAKAGE, ETC.) \_\_\_\_\_

NOTE: Failure to properly complete all portions of this form may delay analysis.

WHITE - Report Copy  
PINK - File Copy  
YELLOW - Customer Copy  
Revised Jan 2001



9936 - 67th Ave. Edmonton, Alberta T6E 0P5  
 Edmonton Toll Free Line  
 1313 - 44th Avenue N.E., Calgary, Alberta T2E 6L5  
 9405 - 11th Street, Grande Prairie, Alberta T6V 5W1  
 General Purpose Bldg., 124 Veterinary Road, Saskatoon, Saskatchewan S7N 5E3  
 745 Logan Avenue, Winnipeg, Manitoba R3E 3L5  
 1061 Barton Street, Thunder Bay, Ontario P7B 5N3

25163

Telephone: (780) 413-5220 Fax: (780) 437-2311  
 Telephone: 1-800-668-9878 Fax: 1-800-286-7319  
 Telephone: (403) 291-9897 Fax: (403) 291-0298  
 Telephone: (780) 539-5196 Fax: (780) 513-2191  
 Telephone: (306) 668-8370 Fax: (306) 668-8383  
 Telephone: (204) 945-0765 Fax: (204) 945-0763  
 Telephone: (807) 823-6463 Fax: (807) 823-7598

DATE: Jan 17/03 DATE REQUIRED: \_\_\_\_\_

SERVICE REQUESTED:  REGULAR  PRIORITY (50% SURCHARGE)  EMERGENCY (100% SURCHARGE)

SPECIAL REQUIREMENTS / REGS (CIRCLE ONE)  
 MISA  TIER 1  CCME   
 BC MELP  AB MUST  OTHER

SAMPLE ID	SAMPLED BY / DATE / TIME	LOCATION OF SAMPLING	SAMPLING METHOD	SAMPLE TYPE	LAB SAMPLE NO
BH19 @ 3.0m	AM / Jan 16 / 03	---	---	soil	12
BH20 @ 2.25m	↓	---	---	---	13
BH21 @ 2.25m	↓	---	---	---	14
BH22 @ 3.0m	↓	---	---	---	15
BH23 @ 3.0m	↓	---	---	---	16
BH24 @ 3.0m	↓	---	---	---	17
PRESERVED					
FILTERED					

Best Copy Available

ANALYSIS REQUESTED:  
 BTK TV / ETL LAB - GMS  
 PB MUST  
 PSA MUST  
 page 2 of 2  
 L96485

NOTES & CONDITIONS  
 1 Quote number must be provided to ensure proper pricing.  
 2 Turnaround times will vary dependant on complexity of analysis & Lab workload at time of submission. Please contact the Lab to confirm turnaround times.  
 3 All hazardous samples submitted must be labeled to comply with WHMIS and TDG regulations. This must include the nature of the hazard, as well as a contact name & phone number that the Lab can contact for further information.

NOTE: Shaded areas **MUST** be completed in full by client for sample processing to occur.

CLIENT: Petroleum Enviro Services

CONTACT: \_\_\_\_\_

REPORT ADDRESS: \_\_\_\_\_

BILLING ADDRESS: \_\_\_\_\_

NO. BOTTLES SUBMITTED: \_\_\_\_\_

PHONE: \_\_\_\_\_ FAX: \_\_\_\_\_

RELINQUISHED BY: Jfb DATE: Jan 17/03 RECEIVED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
 TIME: 3:40 pm ETL LAB RECEIVED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
 TIME: \_\_\_\_\_ ETL LAB: \_\_\_\_\_

SAMPLE CONDITION UPON RECEIPT:  
 FROZEN \_\_\_\_\_ COLD \_\_\_\_\_ AMBIENT \_\_\_\_\_

OTHER: (BREAKAGE, LEAKAGE, ETC.) \_\_\_\_\_

QUOTE NO: AB P11 VPST

PO. NO: Carstairs

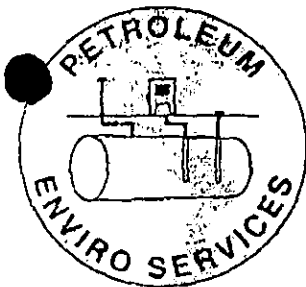
JOB NO: Carstairs

LANDSITE NO.: Carstairs

WHITE - Report Copy  
 PINK - File Copy  
 YELLOW - Customer Copy







#2, 10016 - 29A Avenue  
Edmonton, Alberta  
T6N 1A8

Tel (780) 461-4941  
Fax (780) 461-6067

division of ASM CORROSION CONTROL LTD

FACSIMILE TRANSMITTAL SHEET

TO: Enviro Test Laboratory *KH & LJ*

ATTENTION: Customer Service

**COPY**

RE: Lab Number L - 96485

FAX NO: 437-2311      DATE: January 22, 2003      TIME: 11:30 am

FROM: Jenifer Bachand

NUMBER OF PAGES INCLUDING COVER SHEET: 1

NOTE: IF YOU DO NOT RECEIVE ALL THE PAGES, PLEASE CALL US  
BACK AS SOON AS POSSIBLE      TELEPHONE NUMBER: (780) 461-4941

ASK FOR: Jenifer

Hello,

Soil samples from L-96485 were submitted on January 17, 2003, for analysis. It has come to my attention that a number of analysis were omitted on the C.O.C. (My fault!) and need to be done *also under*

Please add the following tests to this sample - BH #13 @ 2.25m: -6

**Best Copy Available**

- BTX - TCLP**
- Metal - TCLP**
- pH**
- Flash**

If you are lacking an ample amount of sample then you may perform Metal - TCLP and pH on sample BH #14 @ 3.00m.

If you have any questions at all about this request, or require additional information, do not hesitate to contact the undersigned. Thank-you, and I apologize for any inconvenience this may cause. Please provide a faxed confirmation, at your convenience, documenting the addition of these tests

Thank-you,

Jenifer Bachand

*Jan 22/03*



Toll Free 1-800-668-9878  
9936 -67 Avenue, Edmonton, Alberta, T6E 0P5  
Customer service - (780) 413-5220  
Main Number - (780) 413-5227

FAX'S: DIOXIN/ENVIRONMENTAL DEPT - (780) 437-2311  
AGR. CHEM. DIV./PESTICIDE - (780) 434-9178  
INORGANICS/QAQC - (780) 435-7044

**ENVIRO-TEST FAST FAXED ANALYSIS REPORT**

PROJECT INFORMATION.

COMPANY	PETROLEUM ENVIRO SERVICES
ATTENTION	JENIFER BACHAND
LAB WORK ORDER #	L98779
PROJECT REFERENCE.	CARSTAIRS
PROJECT P O #	CARSTAIRS
SAMPLED BY	LAM
DATE RECEIVED:	07-FEB-03
FAX NUMBER.	-461-6067
TECHNICAL QUESTIONS:	
# of PAGES	5

MESSAGE: Preliminary Results

If you require results couriered immediately, check \_\_\_\_ and return by fax.

All results will be mailed unless otherwise notified

All couriered results will be billed directly at cost

If you did not receive all pages, Please notify 1-800-668-9878 as soon as possible

IMPORTANT. The accompanying message is intended only for the use of the individual or entity to which it is addressed and may represent an attorney-client communication or otherwise contain information privileged, confidential and exempt from disclosure under applicable law. If the reader of this message is not the intended recipient, you are hereby notified that any dissemination, distribution or copying or other use of the communication is strictly prohibited. If you receive the communication in error, please notify us immediately by telephone, and return the message to us at the above address via Canadian Postal Service postage due. Thank you

13-FEB-03 10 17 AM



**ENVIRO-TEST ANALYTICAL REPORT**

Best Copy Available

Sample Details/Parameters	Result	Qualifier	D.L.	Units	Extracted	Analyzed	Bv	Batch
L98779-1 BH 25 @ 3.0M Sample Date 06-FEB-03 Matrix: SOIL CCME Petroleum Hydrocarbons (PHC)								
CCME Total Hydrocarbons								
F1 (C6-C10)	180		5	mg/kg		12-FEB-03		
F1-BTEX	170		5	mg/kg		12-FEB-03		
F2 (C10-C18)	180		5	mg/kg		12-FEB-03		
F3 (C16-C34)	53		5	mg/kg		12-FEB-03		
F4 (C34-C50)	57		5	mg/kg		12-FEB-03		
F4G-SG (GHH-Silica)	300		100	mg/kg		12-FEB-03		
Total Hydrocarbons (C6-C50)	470		5	mg/kg		12-FEB-03		
Chromatogram to baseline at nC50	NO					12-FEB-03		
CCME Total Extractable Hydrocarbons								
Prep/Analysis Dates					11-FEB-03	11-FEB-03	SCM	R112116
CCME Gravimetric Heavy Hydrocarbons (SII)								
Prep/Analysis Dates					11-FEB-03	11-FEB-03	SCM	R112116
CCME BTEX								
Benzene	0.31		0.01	mg/kg	10-FEB-03	12-FEB-03	TKP	R112018
Toluene	0.05		0.01	mg/kg	10-FEB-03	12-FEB-03	TKP	R112018
Ethylbenzene	9.6		0.01	mg/kg	10-FEB-03	12-FEB-03	TKP	R112018
Xylenes	0.14		0.01	mg/kg	10-FEB-03	12-FEB-03	TKP	R112018
% Moisture	16		0.1	%		10-FEB-03	RED	R111893
Lead (Pb)	48		5	mg/kg		11-FEB-03	CMM	R112034
L98779-2 BH 26 @ 2.25M Sample Date 06-FEB-03 Matrix: SOIL CCME Petroleum Hydrocarbons (PHC)								
CCME Total Hydrocarbons								
F1 (C6-C10)	<5		5	mg/kg		12-FEB-03		
F1-BTEX	<5		5	mg/kg		12-FEB-03		
F2 (C10-C18)	<5		5	mg/kg		12-FEB-03		
F3 (C16-C34)	36		5	mg/kg		12-FEB-03		
F4 (C34-C50)	28		5	mg/kg		12-FEB-03		
F4G-SG (GHH-Silica)	200		100	mg/kg		12-FEB-03		
Total Hydrocarbons (C6-C50)	64		5	mg/kg		12-FEB-03		
Chromatogram to baseline at nC50	NO					12-FEB-03		
CCME Total Extractable Hydrocarbons								
Prep/Analysis Dates					11-FEB-03	11-FEB-03	SCM	R112116
CCME Gravimetric Heavy Hydrocarbons (SII)								
Prep/Analysis Dates					11-FEB-03	11-FEB-03	SCM	R112116
CCME BTEX								
Benzene	<0.01		0.01	mg/kg	10-FEB-03	11-FEB-03	TKP	R112018
Toluene	<0.01		0.01	mg/kg	10-FEB-03	11-FEB-03	TKP	R112018
Ethylbenzene	<0.01		0.01	mg/kg	10-FEB-03	11-FEB-03	TKP	R112018
Xylenes	<0.01		0.01	mg/kg	10-FEB-03	11-FEB-03	TKP	R112018
% Moisture	15		0.1	%		10-FEB-03	RED	R111893
Lead (Pb)	<5		5	mg/kg		11-FEB-03	CMM	R112034
L98779-3 BH 27 @ 3.75M Sample Date 06-FEB-03 Matrix: SOIL CCME Petroleum Hydrocarbons (PHC)								









**ENVIRO-TEST ANALYTICAL REPORT**

Best Copy Available

Sample Details/Parameters	Result	Qualifier	D.L.	Units	Extracted	Analyzed	By	Batch
L98779-6 MW #3 Sample Date: 06-FEB-03 Matrix: WATER BTEX, F1 (C6-C10) and F2 (>C10-C16) F2 (>C10-C16)	<0.05		0.05	mg/L	11-FEB-03	11-FEB-03	AAT	R112096
BTEX and F1 (C6-C10) F1-BTEX	<0.1		0.1	mg/L	10-FEB-03	11-FEB-03	S.P	R111948
Benzene	0.0042		0.0005	mg/L	10-FEB-03	11-FEB-03	S.P	R111948
Toluene	<0.0005		0.0005	mg/L	10-FEB-03	11-FEB-03	S.P	R111948
EthylBenzene	<0.0005		0.0005	mg/L	10-FEB-03	11-FEB-03	S.P	R111948
Xylenes	<0.0005		0.0005	mg/L	10-FEB-03	11-FEB-03	S.P	R111948
F1(C6-C10)	<0.1		0.1	mg/L	10-FEB-03	11-FEB-03	S.P	R111948
L98779-7 MW #4 Sample Date: 06-FEB-03 Matrix: WATER BTEX, F1 (C6-C10) and F2 (>C10-C16) F2 (>C10-C16)	0.07		0.05	mg/L	10-FEB-03	10-FEB-03	AAT	R111930
BTEX and F1 (C6-C10) F1-BTEX	0.2		0.1	mg/L	11-FEB-03	11-FEB-03	SCM	R112103
Benzene	3.8		0.0005	mg/L	11-FEB-03	11-FEB-03	SCM	R112103
Toluene	0.066		0.0005	mg/L	11-FEB-03	11-FEB-03	SCM	R112103
EthylBenzene	0.11		0.0005	mg/L	11-FEB-03	11-FEB-03	SCM	R112103
Xylenes	0.67		0.0005	mg/L	11-FEB-03	11-FEB-03	SCM	R112103
F1(C6-C10)	4.8		0.1	mg/L	11-FEB-03	11-FEB-03	SCM	R112103
L98779-8 MW #5 Sample Date: 06-FEB-03 Matrix: WATER BTEX, F1 (C6-C10) and F2 (>C10-C16) F2 (>C10-C16)	<0.05		0.05	mg/L	10-FEB-03	10-FEB-03	AAT	R111930
BTEX and F1 (C6-C10) F1-BTEX	<0.1		0.1	mg/L	11-FEB-03	11-FEB-03	SCM	R112103
Benzene	<0.0005		0.0005	mg/L	11-FEB-03	11-FEB-03	SCM	R112103
Toluene	<0.0005		0.0005	mg/L	11-FEB-03	11-FEB-03	SCM	R112103
EthylBenzene	<0.0005		0.0005	mg/L	11-FEB-03	11-FEB-03	SCM	R112103
Xylenes	<0.0005		0.0005	mg/L	11-FEB-03	11-FEB-03	SCM	R112103
F1(C6-C10)	<0.1		0.1	mg/L	11-FEB-03	11-FEB-03	SCM	R112103
L98779-9 MW #6 Sample Date: 06-FEB-03 Matrix: WATER BTEX, F1 (C6-C10) and F2 (>C10-C16) F2 (>C10-C16)	<0.05		0.05	mg/L	10-FEB-03	10-FEB-03	AAT	R111930
BTEX and F1 (C6-C10) F1-BTEX	0.3		0.1	mg/L	10-FEB-03	11-FEB-03	S.P	R111948
Benzene	0.0057		0.0005	mg/L	10-FEB-03	11-FEB-03	S.P	R111948
Toluene	0.0034		0.0005	mg/L	10-FEB-03	11-FEB-03	S.P	R111948
EthylBenzene	<0.0005		0.0005	mg/L	10-FEB-03	11-FEB-03	S.P	R111948
Xylenes	0.018		0.0005	mg/L	10-FEB-03	11-FEB-03	S.P	R111948
F1(C6-C10)	0.3		0.1	mg/L	10-FEB-03	11-FEB-03	S.P	R111948
Refer to Referenced Information for Qualifiers (if any) and Methodology.								



**Reference Information**

Best Copy Available

**Methods Listed (if applicable):**

ETL Test Code	Matrix	Test Description	Preparation Method Reference**	Analytical Method Reference**
BTX,F1-ED	Water	BTEX and F1 (C6-C10)		EPA 5030/8015&8021B-P&T GC-PID & FID
ETL-BTX,TVH-CCME-ED	Soil	CCME BTEX	EPA 5030	CCME CWS-PHC Dec-2000 - Pub# 1310
ETL-OGG-CCME-ED	Soil	CCME Gravimetric Heavy Hydrocarbons (SII)		CCME CWS-PHC Dec-2000 - Pub# 1310
ETL-TEH-CCME-ED	Soil	CCME Total Extractable Hydrocarbons		CCME CWS-PHC Dec-2000 - Pub# 1310
F2-ED	Water	F2 (>C10-C16)		EPA 3510/8000-GC-FID
PB-MUST-ED	Soil	Lead (Pb)	EPA 3050	APHA 3111C
PREP-MOISTURE-ED	Soil	% Moisture		Oven dry 105C-Gravimetric

\*\* Analytical Methods employed follow in-house standard operations procedures, which are generally based on US-EPA, ASTM, NIOSH and/or APHA methods.

**Chain of Custody numbers:**

25156

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below.

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
ED	Enviro-Test Laboratories - Edmonton, Alberta, Canada		

Test results reported relate only to the samples as received by the laboratory

Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary

Enviro-Test Laboratories has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, Enviro-Test Laboratories assumes no liability for the use or interpretation of the results.



**APPENDIX VII**

**Alberta Environment's Risk Management Guidelines for  
Petroleum Storage Tanks Sites - October 2001**



## TABLES

- Table 1. Generic Hydrocarbon and Lead Guidelines for Fine-Grained Soil
- Table 2. Generic Hydrocarbon and Lead Guidelines for Coarse-Grained Soil
- Table 3. Generic Hydrocarbon Criteria for Groundwater
- Table 4. Generic Hydrocarbon Criteria for the Groundwater Ingestion Pathway





**Table 1. Generic Hydrocarbon and Lead Criteria for Fine-Grained Soil**

Land Use	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)	Lead (mg/kg)	F1 (mg/kg)	F2 (mg/kg)	F3 (mg/kg)	F4 (mg/kg)
Residential	1.9	300	450	500	140	260	900	800	5,600
Commercial/Industrial	9	450	690	1,500	260 / 600	660	1,500	2,500	6,600
Freshwater/Aquatic Life	NA	NA	NA	NA	NA	NA	NA	NA	NA

NA = not applicable

\* = may not apply at a particular site

**Table 2. Generic Hydrocarbon and Lead Criteria for Coarse-Grained Soil**

Land Use	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)	Lead (mg/kg)	F1 (mg/kg)	F2 (mg/kg)	F3 (mg/kg)	F4 (mg/kg)
Residential	0.048	24	54	14	140	30	150	400	2,800
Commercial/Industrial	0.55	71	200	130	260 / 600	310	760	1700	3,300
Freshwater/Aquatic Life	1.6	0.16	79	59	NA	360	230	NA	NA

NA = not applicable

\* = may not apply at a particular site



Table 3. Generic Hydrocarbon Criteria for Groundwater

Criteria	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (mg/L)	F1 (mg/L)	F2 (mg/L)
<b>Fine-Grained Soils</b>						
Residential	3.5	228	NG	163	9	11
Commercial/Industrial	16	342	NG	NG	24	18
<b>Coarse-Grained Soils</b>						
Residential	0.09	19	19	5	1	2
Commercial/Industrial	1	55	71	43	10	9
<b>All Soils; Piezometers &lt;10 m from Surface Water Body</b>						
Freshwater Aquatic Life	0.370	0.002	0.090	0.180	NG	NG
<b>Fine-Grained Soils; Piezometers &gt;10 m from Surface Water Body</b>						
Freshwater Aquatic Life	NG	NG	NG	NG	NG	NG
<b>Coarse-Grained Soils; Piezometers &gt;10 m from Surface Water Body</b>						
Freshwater Aquatic Life	0.53	0.021	4.8	3.3	NG	NG

NG = no guideline required for this pathway, limited by solubility

\* = may not apply at a particular site

Table 4. Generic Hydrocarbon Criteria for the Groundwater Ingestion Pathway

Medium	Soil Textures	Benzene	Toluene	Ethylbenzene	Xylenes	F1	F2	F3	F4
Soil (mg/kg)	Fine-Grained Soil	0.073	0.86	0.19	25	1900	2600	NA	NA
	Coarse-Grained Soil	0.13	1.6	0.36	49	3700	5100	NA	NA
Groundwater (mg/L)	All Soil Textures	0.005	0.024	0.0024	0.3	5	2	NA	NA

NA = not applicable



**APPENDIX VIII**

**Safety Codes Council Authorization Facsimile**



**SAFETY CODES COUNCIL**

Underground Tank Remediation Program  
14<sup>th</sup> Floor, Commerce Place  
10155 - 102 Street  
Edmonton, Alberta, Canada T5J 4L4

Tel: (780) 415-8668  
Fax: (780) 415-8664

Ref: 00123-9302

December 16, 2002

Vaughn Wyant Investments Ltd  
419 Brand Place  
Saskatoon, SK S7J 5L6

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Dear Vaughn Wyant:

**Re: Proposed Delineation Plan, Site 9302; Plan 3845CO Block 28 Lots 5 - 8, Carstairs**

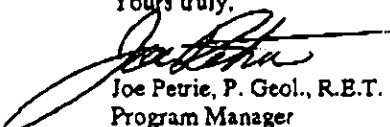
Thank you for the Delineation Plan submitted by your Consultant, Petroleum Enviro Services. The Technical Committee has completed its review of the proposed Delineation Plan. In keeping with the new format please find the technical review comments for you consultant's consideration in the attached letter from the Program's Technical Consultant.

**The proposed engineering fee for conducting additional delineation is acceptable conditional upon consideration of the technical review comments. You may, therefore, proceed with the additional work at a maximum upset cost (not on time & material basis) of \$14,500.00 excluding G.S.T. It is your responsibility to obtain any necessary agreements for access to sites other than your own if off-site drilling is required. Please note Grant funding is conditional on the site being remediated to meet a level compatible with the existing zoning and Land Use Assessment to comply with Alberta Environment's Risk Management Guidelines for Petroleum Storage Tank Sites -October 2001 including both on and offsite impacts in both soil and groundwater. It is your Consultant's responsibility to ensure the proposed delineation work, supported by laboratory analysis, is sufficient to fully delineate both on and offsite contamination impacts in both soil and groundwater and provides sufficient information to support a detailed remediation plan. If Risk management is being proposed the Risk Management Plan requires written acceptance by Alberta Environment prior to submission to the Program for funding review.**

**Any changes to the scope of delineation work and associated costs require approval by the Program. To assist in completing the work in a timely manner the consultant may contact the Program for approval for increases to the scope of work while onsite. If based on results from the field work, one or more of the proposed boreholes or monitoring wells is not required to delineate the extent of contamination please ensure that the scope of work and associated costs are reduced accordingly. Please submit Delineation Report and the finalized Remediation Plan by February 10, 2003. If you are unable to comply with this deadline please contact the Program immediately.**

The reviews are based on technical information submitted to the program by your Consultant. Acceptance of this proposal does not absolve the Grant recipient from the responsibility for remediating his site in accordance with the aforementioned Guidelines or from future liability for remediating his site in situations where either the land use may change or additional concerns arise from the contaminants remaining on or offsite.

Yours truly,

  
Joe Petrie, P. Geol., R.E.T.  
Program Manager

cc: Lisa Mazuryk, Petroleum Enviro Services





**APPENDIX IX**

**Remediation Plan**



**Remediation Plan**  
for

**Site No. 9302**

Lots 5 & 6, Block 28, Plan 3845 CO;  
419 - 10<sup>th</sup> Avenue, Carstairs, Alberta



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3.2 In-Situ Bioremediation .....	5
3.3 On-Site Soil Removal and Treatment (Aeration by Alluving) .....	6
3.4 Risk Management and On-Site Treatment (Aeration by Alluving) .....	7
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## Illustrations and Tables

### Illustrations

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## INTRODUCTION

As presented in the Phase III: Hydrocarbon Environmental Site Assessment-Delineation report, a remediation proposal is required by the Safety Codes Council in order to proceed with the next stage of the Underground Tank Remediation Program. Once approval is granted by the Safety Codes Council, the landowner accepts costs above the amount remaining in the grant, and affected third parties have been consulted, the scope of work is tendered to three (3) contractors. The landowner then chooses a contractor based on bids received.

Site sensitivity analyses conducted during Phase II and III investigations have indicated governing risk management criteria to be Generic Hydrocarbon and Lead Guidelines for Fine-Grained Soil for Residential and Commercial Land Use. The remediation process aims to remove/reduce soil and on-site groundwater hydrocarbon contaminant levels to below the applicable criteria.

The four (4) remedial methods being considered are: excavation and disposal, in-situ bioremediation, on-site aeration, and a combination of risk management and on-site aeration. Further discussion of each method can be found within Section 3.0 Methods Under Consideration.

## 2.0 SOIL VOLUME CALCULATIONS

The following tables contain numerical values used in soil/water volume calculations; they are used to determine the dimensions of the contaminant plume. The values have been obtained through a combination of soil hydrocarbon vapour readings and laboratory analysis data for soil samples submitted. The following assumptions apply: trace vapours indicate low/non-existent hydrocarbon contamination, contamination has not travelled under any building, and the estimate of contaminated soil present on CO-OP property is accurate. Figure 1 on the following page illustrates the estimated plume boundary sections to undergo remediation. The sections will be used for soil and overburden volume calculations.

As mentioned in report, E-03/3907 dated February 18, 2003, delineation activities were constricted by permission to drill on CO-OP property to the East being denied. This prevented a precise and quantified contaminant plume boundary from being constructed. In the following Figure 1, Eastern portions of the plume have been estimated through extrapolation from known concentrations.

Table 1 on page 3 references the volume of overburden where applicable. Overburden refers to unaffected soil material overlaying contaminated soils. Typically, overburden is excavated, separated and stock-piled on-site during remediation and replaced once remediation has been completed. The sections encompass both on and off site contamination.

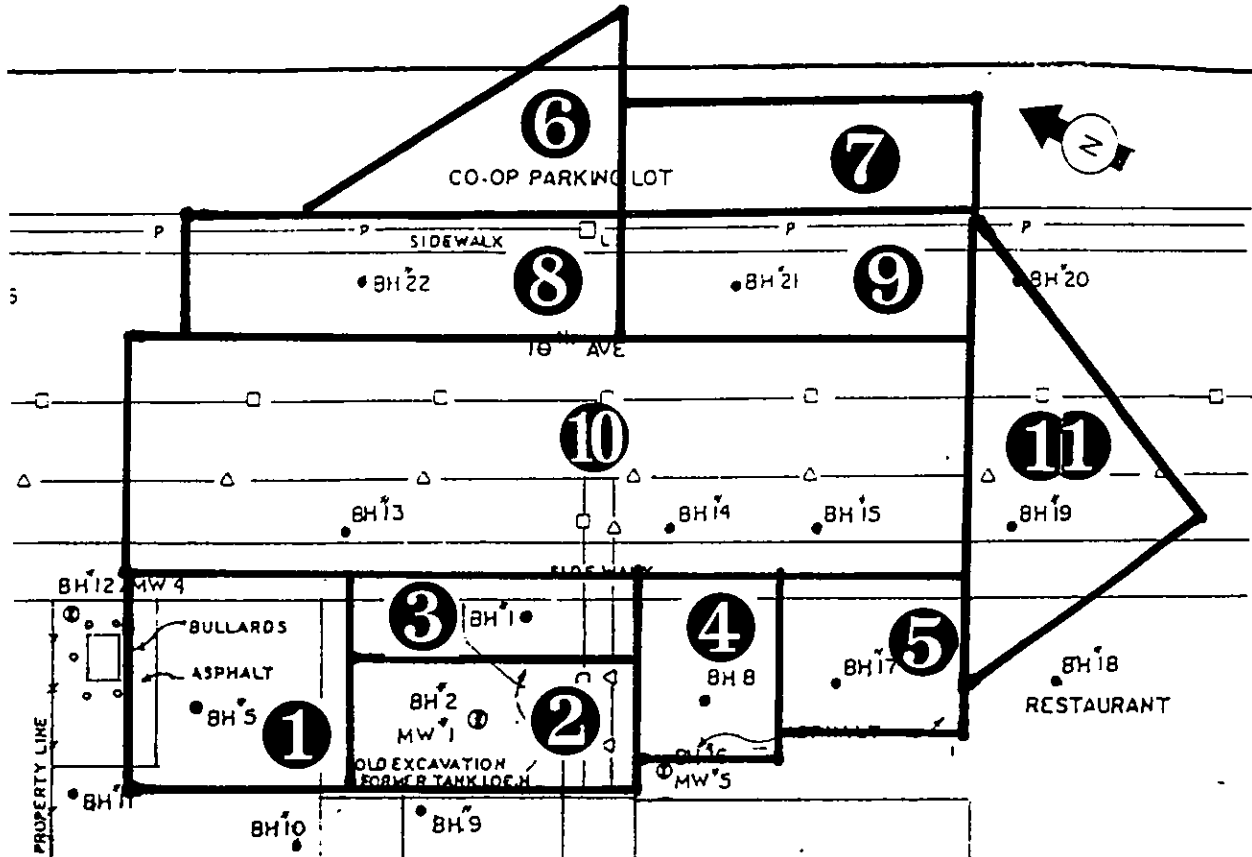


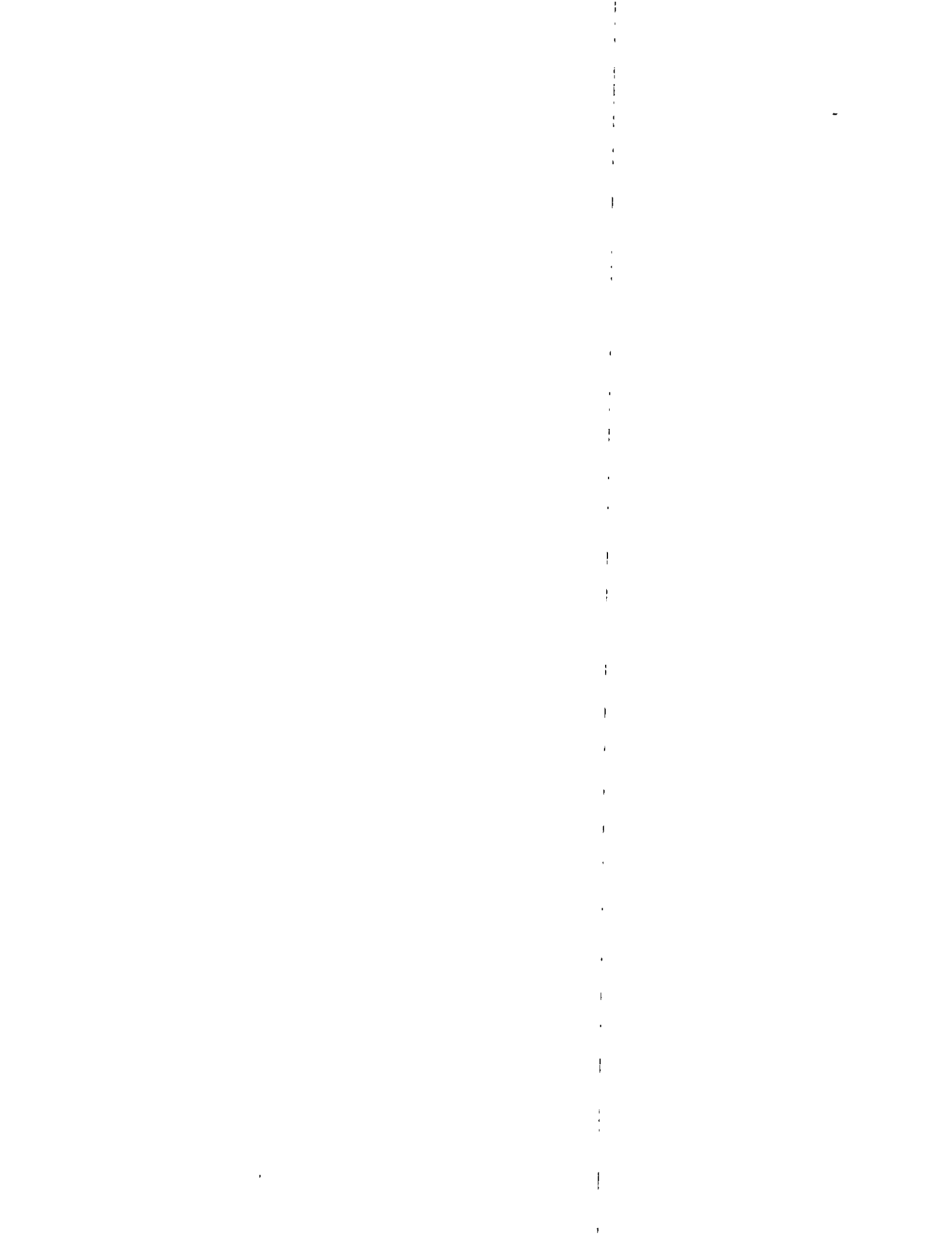


**Figure 1 - Contaminant Plume Boundary Sections**

Detail of drawing no. 3449-B. For full drawing refer to Appendix II - Site Drawings. Section boundaries based on hydrocarbon vapour readings and laboratory analysis. Scale: 1 400.

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**Table 1 - Volume of Overburden**

Section Number	Area (m <sup>2</sup> )	Depth of Overburden (m)	Volume (m <sup>3</sup> )
1	144	0	0
2	105	0	0
3	75	0	0
4	80	0 - 2.25	180
5	122	0 - 2.00	244
6	77	0 - 2.00	154
7	126	0 - 2.00	252
8	161	0 - 2.00	322
9	126	0 - 2.00	252
10	540	0 - 2.00	1080
11	175	0 - 2.50	438
<b>Total Overburden Volume</b>			<b>2,922m<sup>3</sup></b>

Overburden calculations indicate approximately 2,922m<sup>3</sup> of unaffected soils. In order to account for any discrepancies or extended excavation limits, 3,000m<sup>3</sup> will be used as the total volume of overburden for remediation cost estimate purposes. The data within Table 2 will be used to determine the volume of contaminated soils which require remediation.



**Table 2 - Contaminated Soil Volume**

Section Number	Area (m <sup>2</sup> )	Vertical Thickness of Contamination (m)	Volume (m <sup>3</sup> )
1	144	0 - 4.75	684
2	105	0 - 3.50	368
3	75	0 - 3.75	281
4	80	2.25 - 3.25	80
5	122	2.00 - 3.50	183
6	77	2.00 - 3.50	116
7	126	2.00 - 3.00	126
8	161	2.00 - 3.50	242
9	126	2.00 - 3.00	126
10	540	2.00 - 3.50	810
11	175	2.50 - 3.50	175
<b>Total Contaminated Soil Volume</b>			<b>3,190m<sup>3</sup></b>

Calculations for contaminated soil indicate approximately 3,190m<sup>3</sup> of affected soils. In order to account for any discrepancies or extended excavation limits, 3,300m<sup>3</sup> will be used as the total volume of contaminated soil for remediation cost estimate purposes.

### 3.0 REMEDIATION METHODS UNDER CONSIDERATION

All underground storage tanks and associated piping have been removed from the subject site. Further soil delineation into CO-OP property should occur prior to remediation activities. The full extent of the contaminant plume must be determined. Affected third parties, such as the Town of Carstairs, Five Star Video, and the CO-OP should be involved in the planning and execution of a remediation plan.

Paving is an additional cost not covered by the Grant Program. Estimates for re-paving 10<sup>th</sup> Avenue and the affected portion of the CO-OP parking lot have been included in the applicable remediation cost estimates.



### 3.1 Soil Removal and Disposal - "Dig and Dump"

By removing and disposing source contaminated soil, plume migration is effectively halted. This proposed remediation method removes soil using conventional earth moving equipment. Overburden is removed and stock-piled on site, thus exposing the contaminated soil. Soil vapour screening and sampling of the base and walls of the excavation are used to ensure the correct volume of soil is removed. The contaminated soil is then disposed of at an approved landfill. The excavation is back-filled with clean fill material and the overburden is replaced.

This method is a time efficient solution for removing the contaminated material from a site and eliminates liability associated with contaminated soil. However, proper access for the mobility of equipment can be problematic on a site to site basis. In this case, equipment access is not an issue as sufficient room on the property exists for navigation. Typically, business activities which require the use of the site are forced to shut-down for a two (2) to four (4) week period. Due to high costs of contaminated soil transportation, disposal, and clean fill replacement, the process is expensive.

The dimensions of an excavation is a strong limiting factor in this specific case. The excavation may require a staged approach to maintain roadway and business access. The large volume of soil requiring removal makes this method less attractive. A soil sample from borehole #13 at 2.25 metres was submitted for landfill characterization. The results of the test showed the soil exceeds the leachable limits for B.T.E.X. and will not be accepted at a landfill, effectively prohibiting the excavation and disposal option.

### 3.2 In-Situ Bioremediation

The principle behind bioremediation involves the use of oxygen and nutrients to encourage decomposition (biodegradation) of contamination until all levels fall below the remedial criteria. Naturally occurring bacterial microbes existing within the soil can metabolize (break-down) petroleum hydrocarbons. This ability is harnessed through the injection of nutrients and oxygen below the root zone, thereby encouraging bacterial growth. The ability to degrade contaminants is combined with the natural decomposition traits of oxygen to accelerate natural decomposition processes.

In-situ methods minimize surface disturbance and are advantageous to areas of restricted surface access, such as under buildings. Full remediation by this method may take between one (1) and ten (10) years, during which time high monitoring costs are incurred.





Although in-situ treatment remediates both light and heavy hydrocarbons, the process also requires sufficiently permeable soil for the oxygen and nutrients to penetrate to the entire contaminant plume. In this case, contamination has been consistently documented within clay till. Clay till would impede the dispersion of oxygen and nutrients within the soil, rendering In-Situ treatment ineffective. This method often requires numerous nutrient injection treatments over time for successful remediation results.

As a relatively new technology, in-situ bioremediation has been known to produce inconsistent results over varied periods of time. The length of time required to complete this remediation option is difficult to predict. This method is not recommended for this site due to the fine-grained soil conditions.

### **3.3 On-Site Soil Removal and Treatment (Aeration by Alluing)**

This process involves the removal of contaminated soil by excavation. However, rather than disposal of the soil in a landfill, the soil is moved to a lined treatment area, on-site, for volatilization of the hydrocarbons. A bucket attachment for a track hoe, called an allu bucket, grinds, aerates, and separates the soil. The process releases the hydrocarbons from the soil into the atmosphere. The soil sits exposed in the treatment area between allu treatments furthering hydrocarbon degradation. More than one (1) allu treatment is often necessary. Remediation is completed at such time when hydrocarbon levels in the soil have been reduced below the governing risk management criteria. After excavation edges have been confirmed through soil sample laboratory analysis as below criteria, the treated soil is returned to the excavation. Clean fill is added to the excavation to replace minor soil loss during aeration.

The aeration method is more cost effective than excavation and disposal or in-situ bioremediation. However, effectiveness of this method hinges on warm weather (above 15°C) and a large treatment area. It is also an unsightly, potentially lengthy procedure. Full remediation may take anywhere between two (2) weeks and three (3) months depending on soil volumes and type, weather conditions, and space constrictions. Destruction and disposal of the concrete foundations must occur.

As the excavation remains open during treatment, this method may inhibit business access for the neighbouring Five Star Video property. An open excavation, although fenced, may be an aesthetic and/or safety concern. Hydrocarbon vapours once released into the atmosphere will disperse with general air circulation. Windy conditions make for quicker treatment times and better dispersal of the airborne vapours. Visitors and employees in the area will incur minimal exposure to hydrocarbon vapours over the treatment time.



This method is may be impeded by space constrictions. The concrete foundations on site would need to be removed prior to the creation of a treatment area. Space would have to be procured from the neighbouring Five Star Video rear parking lot. Overburden storage would also be an issue. A significant amount of uncontaminated soils overlays the contaminant plume and space to store this soil as well as construct a treatment area may be difficult to coordinate on the subject site.

### 3.4 Risk Management and On-Site Treatment (Aeration By Alluing)

This option significantly reduces the volume of soil to be remediated by proposing to leave the contamination within 10<sup>th</sup> Avenue and the CO-OP parking in place. On-site aeration through alluing as described in Section 3.3 would be employed to remediate soil contamination on the subject property and neighbouring Five Star Video. Overburden would be stored on-site for the duration of the project and replaced upon completion. A geosynthetic liner, an impervious textile, would be installed along the Eastern property line of the subject site and Five Star Video to prevent contamination within the roadway from migrating into the remediated soil. Paving costs are not applicable in this method as the area to be excavated would not require resurfacing. Destruction and disposal of the concrete foundations must occur.

Contaminant plume sections used for calculations regarding this method, as described in section 2.0, are sections one (1) through five (5). Overburden volume will be rounded up to 450m<sup>3</sup> and the contaminated soil volume will be 1700m<sup>3</sup>.

This option requires the preparation and submission of a risk management plan to Alberta Environment, Safety Codes Council, CO-OP, and the Town of Carstairs. It is crucial that all parties agree to the plan. A risk management plan would outline and evaluate potential risks to an assortment of receptors. It would provide a management plan for contaminated soil in the eventuality of excavation or construction in the roadway or CO-OP property. Future excavations would have to stockpile contaminated soil on a plastic liner. It should be noted that roadway contamination concentrations do not meet Commercial criteria or landfill acceptance. An Environmental Consulting firm should be conferred with at such time as roadway or CO-OP contaminated soil requires disposal. Some long term monitoring of the soil environment may be required.

This method has the lowest estimated cost of all methods considered. Assuming the acceptance of a risk management plan by appropriate parties, this method still requires the input of funds beyond the remaining grant. An appeal process is in place for the application of additional funds. The appeal package has been included within Appendix XI OF Report E-03/3907. Appeals can be made based on financial hardship and/or threat to human and/or environmental health and/or public interest.

*Notification of RMP requirement*



#### 4.0 GROUNDWATER CONTAMINATION

Groundwater directly within the former tank location has been shown to be above the applicable Commercial criteria. Other groundwater samples have returned below criteria. Monitoring well #7 is scheduled for sampling at a later date. Soil vapour concentrations within this borehole were minimal at the time of drilling. Groundwater from this well is not expected to exceed criteria. Due to the isolated nature of contaminated groundwater, methods involving excavation of soil in the vicinity of monitoring well #1 should be sufficient to alleviate the groundwater contamination.

Treatment of source contaminated soil will aid in the reduction of groundwater contamination.

#### 5.0 ESTIMATED PRE-TENDER COSTS

Included within this section is a summary of the four (4) remediation methods being considered. A number of factors should be considered while evaluating these costs. Costs are based on current industry standards. Table 5 provides a brief summary of the costs incurred to date.

**Table 3 - Costs to Date**

<b>Investigation</b>	<b>Costs</b>	<b>Available Funds</b>	<b>Remaining Funds</b>
<b>Phase II</b>	\$ 8,075.00	\$ 8,075.00	\$ 0.00
<b>Phase III Delineation</b>	\$ 18,065.00	\$ 100,000.00	\$ 81,935.00
<b>Grant Funds Remaining for Remediation Purposes</b>			<b>\$ 81,935.00</b>

The following Table 4 summarizes the pros/cons and pre-tender estimated costs of each remediation method being considered. The costs used for calculations are an approximation and should be viewed solely as a basis for an economic comparison of the methods.



**Table 6 - Remediation Method Summary**

Remediation Method	Pros	Cons	General Description	Cost Estimate
<p><b>Method #1</b></p> <p><b>Excavation and Disposal</b></p>	<p>Removes problem</p> <p>Quick (3 weeks)</p> <p>Absolves owner of liability</p> <p>Addresses groundwater contamination</p>	<p>Expensive excavation and transport costs</p> <p>Expensive landfill disposal costs</p> <p>Eyesore during project</p> <p><b>Soil will not be accepted at a landfill due to high leachable concentrations of B.T.E.X.</b></p>	<p>\$20/m<sup>3</sup> for removal and replacement of overburden</p> <p>\$75/m<sup>3</sup> of contaminated soil for removal, disposal &amp; replacement</p> <p>Engineering (Incl. Laboratory analysis)</p> <p>Paving Costs \$17/m<sup>2</sup> of ground surface</p>	<p>Overburden \$20/m<sup>3</sup> x 3000m<sup>3</sup> = \$60,000.00</p> <p>Contaminated Soil \$75/m<sup>3</sup> x 3300m<sup>3</sup> = \$247,500.00</p> <p>Engineering Fees = \$30,000.00</p> <p>Paving \$17/m<sup>2</sup> x 1010m<sup>2</sup> = \$17,170.00</p> <p><b>Total=\$ 354,670.00</b></p>
<p><b>Method #2</b></p> <p><b>In-Situ Bioremediation</b></p>	<p>Removes problem</p> <p>Minimal disturbance to site</p> <p>Remediates light and heavy hydrocarbons</p> <p>May address groundwater contamination</p>	<p>Lengthy treatment time (1-10 years)</p> <p>High monitoring costs</p> <p>Requires considerable maintenance</p> <p>Soil type present not conducive to this method</p>	<p>\$150/m<sup>3</sup> of contaminated soil</p> <p>Engineering (Incl. Laboratory analysis)</p>	<p>Contaminated Soil \$150/m<sup>3</sup> x 3300m<sup>3</sup> = \$495,000.00</p> <p>Engineering = \$50,000.00</p> <p><b>Total=\$ 545,000.00</b></p>





Remediation Method	Pros	Cons	General Description	Cost Estimate
<p><b>Method #3</b></p> <p><b>On-Site Removal and Treatment (Aeration By Alluig)</b></p>	<p>Removes problem</p> <p>Minimal backfill required</p> <p>Most effective with light end hydrocarbons</p> <p>Addresses groundwater contamination</p>	<p>Requires large treatment area</p> <p>Moderate treatment time (2 wks-3 months)</p> <p>Eyesore during treatment</p> <p>Weather dependant</p> <p>Short term vapour exposure to surrounding properties</p>	<p>\$20/m<sup>3</sup> for removal and replacement of overburden</p> <p>\$50/m<sup>3</sup> of contaminated soil</p> <p>Engineering (Incl. Laboratory analysis)</p> <p>Paving costs \$17/m<sup>2</sup> of ground surface</p> <p>Site preparation</p>	<p>Overburden \$20/m<sup>3</sup> x 3000m<sup>3</sup> = \$60,000 00</p> <p>Contaminated Soil \$50/m<sup>3</sup> x 3300m<sup>3</sup> = \$165,000.00</p> <p>Engineering = \$22,500.00</p> <p>Paving \$17/m<sup>2</sup> x 1010m<sup>2</sup> = \$17,170.00</p> <p>Site Preparation = \$5,000.00</p> <p><b>Total=\$ 269,670.00</b></p>
<p><b>Method #4</b></p> <p><b>Risk Management and On-Site Treatment (Aeration By Alluig)</b></p>	<p>Reduces soil volumes to be remediated</p> <p>Effectively removes problem on-property</p> <p>Does not require re-paving costs to be considered</p> <p>Minimal backfill required</p> <p>Addresses groundwater contmination</p>	<p>Leaves some contamination in place, on off-site property</p> <p>Requires large treatment area</p> <p>Moderate treatment time (2 wks-3 mths)</p> <p>Eyesore during treatment</p> <p>Weather dependant</p> <p>Short term vapour exposure to surrounding properties</p> <p>May require monitoring</p>	<p>\$20/m<sup>3</sup> for removal and replacement of overburden</p> <p>\$50/m<sup>3</sup> of contaminated soil</p> <p>Engineering (Incl. Laboratory analysis)</p> <p>Geosynthetic Liner Supply and Install \$25/m<sup>2</sup> (56m x 3.75m)</p> <p>Risk Management Report Preparation and Affected Party Co-ordination</p> <p>Site Preparation</p>	<p>Overburden \$20/m<sup>3</sup> x 450m<sup>3</sup> = \$9,000.00</p> <p>Contaminated Soil \$50/m<sup>3</sup> x 1700m<sup>3</sup> = \$85,000.00</p> <p>Engineering = \$20,000.00</p> <p>Geosynthetic Liner \$25/m<sup>2</sup> x 210m<sup>2</sup> = \$5,250.00</p> <p>Risk Manage Report = \$3,500.00</p> <p>Site Preparation = \$5,000 00</p> <p><b>Total=\$ 127,750.00</b></p>



**6.0 RECOMMENDATIONS AND ASSOCIATED COSTS**

Based on economic considerations, **Risk Management and On-Site Soil Treatment (Aeration By Alluing)** appears to be the most economical choice at this time. Implementation of this method requires a risk management plan to be accepted by appropriate parties. Preparation of a risk management plan is still required. Sufficient space for the creation of a treatment area and overburden storage is available, provided the rear parking area of Five Star Video is available. For this method to be acceptable the landowner must recognize that possibly more than three (3) months, depending on weather, may be required for the method to be successful. An open excavation would exist for the duration of the project. It is suspected that remediation of source contaminated soil would aid in the reduction of groundwater contaminant concentrations to below applicable criteria. The following table shows that grant funds will not cover the entirety of projected costs.

**Table 5 - Cost Summary**

<b>Investigation</b>	<b>Estimated Costs</b>	<b>Available Funds</b>	<b>Remaining Funds</b>
<b>Phase III Remediation</b>	\$ 127,750.00	\$ 81,935.00	\$ -45,815.00
Estimated Additional Funds Required for Remediation (GST Additional)			\$ 45,815.00

**7.0 CONCLUSION**

This remediation plan aims to reduce hydrocarbon contamination to levels acceptable in the 2001 Alberta Environment Risk Management Guidelines for Petroleum Storage Tank Sites for Residential and Commercial Land Use for Fine-Grained Soils. **The Underground Tank Remediation Program, of which you are a participant, stipulates funding is conditional on the remediation of all contamination.** Remediation costs above and beyond the \$100,000.00 must be accepted by the land owner prior to the commencement of remediation activities. Consultation with the Town of Carstairs, CO-OP and Alberta Environment is required, prior to the preparation of a formal remediation plan.

That being said, it has been recommended to proceed with **Risk Management and On-Site Soil Treatment (Aeration By Alluing)** as the remediation method for the subject site. Additional funds beyond the remaining grant are required for this method. If affected parties do not agree with a risk management plan, Aeration By Alluing is the next most cost effective method, it also requires additional funds beyond the remaining grant. Contaminated soil volumes have been estimated using hydrocarbon vapour screening and laboratory analysis from previous assessments. If, during remedial investigations, volumes of soil vary from initial estimates, costs will be adjusted accordingly.



KAUGHN WYANT INVESTMENTS LTD.

Environmental Services

February 21, 2003; Remediation Plan

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This remediation plan must be approved by the Safety Codes Council and the landowner before a formal remediation proposal will be prepared. The proposal will consist of an itemized project break-down. Contractors will then bid on the scope of work presented within the proposal.

We trust you will find our submission in order.

Sincerely,

PETROLEUM ENVIRO SERVICES



Jenifer Bachand B.Sc.

Environmental Technologist



**APPENDIX X**

**Alberta Regulation 117/93 - Release Reporting Regulation**





**AR 117/93 Release Reporting**  
(Consolidated up to 217/96)

**ALBERTA REGULATION 117/93**

Environmental Protection and Enhancement Act

**RELEASE REPORTING REGULATION**



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### **Definition**

1 In this Regulation, "Act" means the Environmental Protection and Enhancement Act.

### **Exemption from reporting**

2 Sections 99 to 101 of the Act and this Regulation do not apply

(a) to releases of substances that are regulated by the Oil and Gas Conservation Act or any regulation made under that Act, the Transportation of Dangerous Goods Control Act or any regulation made under that Act, or an approval, licence or permit granted under any of those Acts or regulations, or

(b) to releases of substances classified as Class 1 dangerous goods (explosives) or Class 7 dangerous goods (radioactive materials) as set out in the Schedule to the Transportation of Dangerous Goods Act, 1992 (Canada). AR 117/93 s2;217/96

### **Substances regulated by federal Act**

3(1) Subject to section 2(a), where a release of a substance falling within the Class and Division set out in Column I of Table 1 in Part IX of the Transportation of Dangerous Goods Regulation (SOR 85/77) under the Transportation of Dangerous Goods Act, 1992 (Canada) occurs and the release has caused, is causing or may cause an adverse effect, sections 99 to 101 of the Act and this Regulation apply in respect of the release only if

(a) the release is at or in excess of the quantities or levels set out for the substance in Column II of that Table,

(b) the substance is released into a watercourse or into groundwater or surface water, or

(c) the substance is classified as Class 2 dangerous goods.

(2) Subsections (1)(b) and (c) apply regardless of whether the quantity or level of the release is at or in excess of the levels set out for the substance in Column II of the Table. AR 117/93 s3;247/93;217/96

### **Written report**

4(1) A person referred to in section 99(2) of the Act who makes an oral report under section 100(1) of the Act shall within 7 days ensure that the Director is in receipt of a written report made by the person in accordance with subsection (3).

(2) The Director may, on the request of the person reporting under section 100(1) of the Act, waive the requirement of subsection (1) of this section where, in the Director's opinion, the report provided under section 100(1)



of the Act is satisfactory and

(a) no adverse effects are likely to occur as a result of the release, or

(b) the adverse effects caused by the release have been adequately controlled.

(3) A written report must include the following information, where reasonably available:

(a) the date and time of the release;

(b) the location of the point of the release;

(c) the duration of the release and the release rate;

(d) the composition of the release showing with respect to each substance

(i) its concentration, and

(ii) the total weight, quantity or amount released;

(e) a detailed description of the circumstances leading up to the release;

(f) the steps or procedures which were taken to minimize, control or stop the release;

(g) the steps or procedures which will be taken to prevent similar releases;

(h) any other information required by the Director.

(4) Where the Director receives a written report the Director may require, by written notice given to the person who submitted the report, the submission of additional information specified in the notice by the time specified in the notice.

(5) A person who receives a notice under subsection (4) shall comply with it in accordance with its terms.

#### **Coming into force**

5 This Regulation comes into force on September 1, 1993.



## **Reporting and Remediation Requirements under the *Environmental Protection and Enhancement Act***

- Release of substances (including discovery of historical spills, or cumulative releases) are subject to EPEA, and must be reported, upon discovery, orally under Section 110 (formerly section 99). This section states that any substance released into the environment that has caused, is causing, or may cause an adverse effect shall be reported as soon as that person knows or ought to know about the release. Where an oral report is made, a seven day written report to AENV required as per Release Reporting Regulations (AR117/93).
- Under Section 112 (formerly 101) of the Environmental Protection and Enhancement Act, it is your responsibility to take remedial measures and mitigate any potential adverse impacts that could be associated with the contaminants released. To ensure that the contamination present is remediated to applicable Soil and Water Quality Criteria, AENV requests you provide a Remedial Action Plan or final clean-up report (typically within 90 days of the incident). The date for this information to be provided should be included in the 7 day written report. Should an alternate timeframe be required, please contact AENV to arrange as required.

The website for the *Environmental Protection and Enhancement Act* is:

<http://www.qp.gov.ab.ca/documents/acts/E12.cfm>

Section 110 refers to your duty to report, Section 111, manner of reporting, Section 112, duty to remediate. As follows:

### **Duty to report release**

110(1) A person who releases or causes or permits the release of a substance into the environment that may cause, is causing or has caused an adverse effect shall, as soon as that person knows or ought to know of the release, report it to

- (a) the Director,
- (b) the owner of the substance, where the person reporting knows or is readily able to ascertain the identity of the owner,
- (c) any person to whom the person reporting reports in an employment relationship,
- (d) the person having control of the substance, where the person reporting is not the person having control of the substance and knows or is readily able to ascertain the identity of the person having control, and
- (e) any other person who the person reporting knows or ought to know may be directly affected by the release.

(2) The person having control of a substance that is released into the environment that may cause, is causing or has caused an adverse effect shall, immediately on becoming aware of the release, report it to the persons referred to in subsection (1)(a), (b), (c) and (e) unless the person having control has reasonable grounds to believe that those persons already know of the release.

(3) A police officer or employee of a local authority or other public authority who is informed of or who investigates a release of a substance into the environment that may cause, is causing or has caused an adverse effect shall immediately notify the Director of the release unless the police officer or employee has reasonable grounds to believe that it has been reported by another person.

1992 cE-13 3 s99;1998 c15 s10





**Manner of reporting**

111(1) A person who is required to report to the Director pursuant to section 110 shall report in person or by telephone and shall include the following in the report, where the information is known or can be readily obtained by that person:

- (a) the location and time of the release;
- (b) a description of the circumstances leading up to the release;
- (c) the type and quantity of the substance released;
- (d) the details of any action taken and proposed to be taken at the release site;
- (e) a description of the location of the release and the immediately surrounding area.

(2) In addition to a report under subsection (1), the person shall report in writing where required by the regulations.

(3) A person who reports under subsections (1) and (2) shall give to the Director any additional information in respect of the release that the Director requires.

1992 cE-13.3 s100;1994 c15 s37

**Duty to take remedial measures**

112 Where a substance that may cause, is causing or has caused an adverse effect is released into the environment, the person responsible for the substance shall, as soon as that person becomes aware or ought to have become aware of the release,

- (a) take all reasonable measures to
  - (i) repair, remedy and confine the effects of the substance, and
  - (ii) remove or otherwise dispose of the substance in such a manner as to effect maximum protection to human life, health and the environment, and
- (b) restore the environment to a condition satisfactory to the Director.

**ENVIRONMENTAL RESPONSE CENTRE**

In Alberta Dial Toll Free

(Complaints/Emergencies/Release Reporting --24 hours)

**1-800-222-6514**



**APPENDIX XI**

**Appeal Package**



## APPEAL PROCESS

Best Copy Available

### INTRODUCTION

An appeal process for personal hardship or public interest claims is available for applicants for the Underground Storage Tank Site Remediation Program (the "Program"). Should your application for a grant be refused or given a lower priority, you may apply to the Director's Administrative Review. If the results of the Director's Administrative Review are unsatisfactory to you; you may subsequently make application to the Appeal Committee based on personal hardship or public interest reasons. It is recommended that these factors be clearly demonstrated in your application for appeal.

Municipal Affairs has created and produced this guide to assist your understanding of the process when submitting appeals to the Appeal Committee. It is important to Municipal Affairs that you experience a fair hearing and that the decision has been presented to you in a way that is understandable and is supported by reasons.

### GENERAL

The Director's Administrative Review will determine if the eligibility criteria, policies and priorities of the Program have been accurately applied to your application by the Program Office. Should you disagree with the results of this review, you may apply to the Appeal Committee for further consideration of your case.

All applications reviewed by the Appeal Committee take into account the eligibility criteria for the Program, the policies and priorities of the Program, the availability of funds, and any other factors relating to personal hardship and the public interest.

Each stage of the review process is governed by specific time periods, which are standard for these types of programs, to ensure that you and the department work toward resolving all issues in a timely manner.

### WHAT TO DO

#### **1. Director's Administrative Review**

The first step in the process is the Director's Administrative Review. This request for review must be in writing and must be sent by mail, fax or direct delivery to the following address within 30 days from the date you received notification of your refusal:

Habib Dhalla  
Program Director  
14<sup>th</sup> Floor, Commerce Place  
10155-102 Street  
Edmonton, Alberta T5J 4L4  
Fax: 1-866-833-1100 / (780) 415-8663

- In the written application, give your reasons as to why the refusal for a grant is unfair or unwarranted.
- Within 30 days after receiving your application, the Director will provide the results of the Administrative Review to you in writing.



- If the Director determines that you are eligible, a revised grant application will be made out to you for your approval and the appeal process is complete.

## 2. Review by the Appeal Committee

The second step in the process is a review of your application by the Appeal Committee (the "Committee"). You may make an application to the Committee if you object to the decision of the Director's Administrative Review. Your objection must be based on personal hardship or public interest reasons.

- The Committee must receive your application for appeal, in writing, within 60 days from the date you received the decision of the Director's Administrative Review.

Your application for appeal must be sent to:

John McIsaac  
Secretary of the Appeal Committee  
16<sup>th</sup> Floor, Commerce Place  
10155 - 102 Street  
Edmonton, Alberta T5J 4L4  
Fax: (780) 422 - 5946

Best Copy Available

- If you wish to appear before the Committee in person, please state this in your application.
- The Secretary of the Appeal Committee will contact you regarding arrangements of the timing, location and date of your appeal; and with respect to further information that will be required in order for the Appeal Committee to assess your appeal.
- Please keep in mind that the Committee will NOT accept your request for appeal beyond the 60 day time period.
- Within 30 days after receiving your application, the Committee will provide you with its decision in writing.

### THE APPEAL COMMITTEE:

The Appeal Committee ("Committee") is a five-member panel, representing government and industry expertise in the petroleum storage tank field.

The Committee is represented by members from Alberta Environment, Alberta Infrastructure, the Petroleum Tank Management Association of Alberta, the Canadian Petroleum Products Institute, and the Safety Codes Council.

The Committee will reconsider the record to determine whether the Director's Administrative Review of the grant application was fair and reasonable. The Committee will also take into account eligibility criteria, availability of funds, policies and priorities of the Program, and any other factors relating to personal hardship and the public interest.





The grant program ended on March 28, 2002.

### **Appeal process after March 28, 2002**

1. Only applicants approved into the Program before March 28, 2002 can appeal.
2. Appeals to be submitted directly to the Secretary of the Appeal Committee.
3. Appeals can only be made to increase the amount of the grant beyond \$100,000.00 on the grounds of financial hardship or public interest.

The appellant must provide all necessary information to the Secretary and be prepared to make any necessary presentations to the Appeal Committee at the time and place as requested by the Secretary. In the event the Appeal Committee has not received any information or presentations at the requested time, it will proceed with the merits of the Appeal based on information it does have.

For further information on the process to file an appeal with the Appeal Committee please contact John McIsaac, Secretary of the Appeal Committee at (780) 422-5946.

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**Appeal Committee  
Underground Petroleum Storage Tank Site Remediation Program**

**Instructions to File an Appeal Based on Personal Hardship**

Applicants to the Underground Petroleum Storage Tank Site Remediation Program can appeal to the Appeal Committee on the basis of personal hardship. In submitting an appeal on this basis, appellants will need to provide additional background information as evidence in support of their claim. The additional background information that is required to support a claim of personal hardship is as follows:

**1. All Applicants:**

The financial information requested is to be completed on behalf of each of the individuals (e.g. both spouses) connected to the operation or former operation of the site.

- a) Personal income tax returns for the last 2 years including the Notices of Assessment.
- b) A land appraisal estimating the value of the site after remediation, that is, after it is has been cleaned.
- c) Completion of the enclosed Statement of Expenditures, Statement of Cash Flow, and Statement of Financial Position for the owners personally.

**2. Incorporated Applicants**

The financial information requested is to be completed on behalf of each of the individuals (e.g. both spouses), in addition to the incorporated company connected to the operation or former operation of the site.

- a) Corporate and personal income tax returns for the last 2 years including the Notices of Assessment.
- b) Financial statements of the Business for the two most recent years.
- c) A land appraisal estimating the value of the site after remediation, that is, after it is has been cleaned.
- d) Completion of the enclosed Statement of Expenditures, Statement of Cash Flow, and Statement of Financial Position for the owners personally.



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## **Analysis of Your Information**

In order to assist the Appeal Committee in evaluating your appeal, financial and technical staff in Alberta Municipal Affairs will summarize the information that you supply in support of your application. This summary will be provided to the Appeal Committee and will be sent to you in advance of the scheduled date of your appeal. No decisions will be made in advance of your appeal hearing. If you choose to do so, you have the opportunity to speak directly to the results of this summary during your appeal hearing.

## **Collection of Information Statement**

Please be aware that the information collected in support of your appeal is done under the authority of the Alberta Fire Code Section 4.3.17, and is expressly for the purposes of determining the merits of your appeal and will be managed in accordance with the *Freedom of Information and Protection of Privacy Act*. If you have any questions on the collection of this information, please call John McIsaac, Secretary to the Appeal Committee, at (780) 422-5946.

## **Return of Information**

Please return all documentation to:

John McIsaac  
Secretary to the Appeal Committee  
16<sup>th</sup> Floor, Commerce Place  
10155 - 102 Street  
Edmonton, Alberta T5J 4L4

Phone: (780) 422-5946  
Fax: (780) 427-8586





**Statement of Financial Position**

Best Copy Available

For \_\_\_\_\_ Date \_\_\_\_\_  
 (Name of Individual)

	2001	2002
<b>ASSETS</b>		
<b>Liquid Assets</b>		
Cash	_____	_____
Short-term investments	_____	_____
Other liquid investments	_____	_____
	\$ -	\$ -
<b>Investment and Business Assets</b>		
RRSP's (P)	_____	_____
Registered Pension Plan (P)	_____	_____
Canada Savings Bonds	_____	_____
Common shares	_____	_____
Rental property	_____	_____
Mutual funds	_____	_____
Other Investments	_____	_____
	\$ -	\$ -
<b>Personal Assets</b>		
Residence	_____	_____
Furnishings	_____	_____
Vehicles - (# of vehicles)	_____	_____
Cottage	_____	_____
Other personal assets	_____	_____
	\$ -	\$ -
<b>Total Assets</b>	<b>\$ -</b>	<b>\$ -</b>
<b>LIABILITIES AND NET WORTH</b>		
<b>Short-term Obligations</b>		
Credit Cards	_____	_____
Personal Loans	_____	_____
	\$ -	\$ -
<b>Investment and business loans</b>		
Bank loans	_____	_____
Mortgage	_____	_____
	\$ -	\$ -
<b>Loans to purchase personal assets</b>		
Mortgage on residence	_____	_____
Car loans	_____	_____
Mortgage on cottage	_____	_____
	\$ -	\$ -
<b>Estimated Deferred Income Taxes</b>	_____	_____
<b>Net worth</b>	_____	_____
<b>Liabilities and Net Worth</b>	<b>\$ -</b>	<b>\$ -</b>

(P) - Pension Assets



Best Copy Available

**Statement of Expenditures**

For \_\_\_\_\_ Date \_\_\_\_\_  
 (Name of Individual)

	2001	2002
Mortgage (interest only) (a)	_____	_____
Property taxes	_____	_____
Insurance	_____	_____
Utilities	_____	_____
Maintenance	_____	_____
Garden Upkeep	_____	_____
<b>Housing Costs</b>	<b>\$ -</b>	<b>\$ -</b>
Food	_____	_____
Household expenses	_____	_____
Telephone	_____	_____
Personal Care	_____	_____
Clothing	_____	_____
Other	_____	_____
<b>Food, Household, etc.</b>	<b>\$ -</b>	<b>\$ -</b>
Car Payments (Interest only) (a)	_____	_____
Insurance	_____	_____
Gasoline	_____	_____
Maintenance	_____	_____
Public Transportation	_____	_____
<b>Transportation</b>	<b>\$ -</b>	<b>\$ -</b>
Entertainment	_____	_____
Eating out	_____	_____
Gifts	_____	_____
Fees, Accounting, etc.	_____	_____
Holidays	_____	_____
Other	_____	_____
<b>Discretionary</b>	<b>\$ -</b>	<b>\$ -</b>
Medical expenses	_____	_____
life and disability insurance	_____	_____
Payroll deductions (sundry)	_____	_____
Bank Charges (including overdraft & NSF charges) (a)	_____	_____
Credit Card interest (a)	_____	_____
Other Debt Servicing Costs (a)	_____	_____
<b>Miscellaneous</b>	<b>\$ -</b>	<b>\$ -</b>
<b>Basic Expenditures</b>	<b>\$ -</b>	<b>\$ -</b>

(a) - Debt Servicing Costs



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**Statement of Cash Flow**For \_\_\_\_\_  
(Name of Individual)

Date \_\_\_\_\_

	2001	2002
<b>Cash from Sources of Income</b>		
Employment and self-employed income	_____	_____
Pension income	_____	_____
Dividends, interest and rents	_____	_____
	\$ -	\$ -
<b>Cash Outlays for Expenses</b>		
Income taxes	_____	_____
Expenditures (as per Statement of Expenditures)	_____	_____
Interest expense for investments	_____	_____
Other cash outlays for expenses	_____	_____
Unaccounted for difference in cash	_____	_____
	\$ -	\$ -
<b>Cash flow from income and expenses</b>	\$ -	\$ -
<b>Cash Flow from Net Investment Assets</b>		
RRSP's	_____	_____
Registered Pension Plan	_____	_____
Canada Savings Bonds	_____	_____
Common shares	_____	_____
Rental property	_____	_____
Mutual Funds	_____	_____
Other investments	_____	_____
Investment Loans	\$ -	\$ -
<b>Cash Flow from Net Personal Assets</b>		
Residence	_____	_____
Furnishings	_____	_____
Vehicles (# of vehicles)	_____	_____
Cottage	_____	_____
Other personal assets	_____	_____
Loans to purchase personal assets	_____	_____
	\$ -	\$ -
<b>Total Cash from All Activities</b>	\$ -	\$ -



**Appeal Committee  
Underground Petroleum Storage Tank Site Remediation Program**

**Instructions to File an Appeal Based on Public Interest**

Applicants to the Underground Petroleum Storage Tank Site Remediation Program can appeal to the Appeal Committee on the basis of public interest. In submitting an appeal on this basis, appellants will need to provide additional background information as evidence in support of their claim.

**Evaluation Criteria**

The Underground Petroleum Tank Site Remediation Program Appeal Committee will use the following criteria to evaluate cases brought before them on the basis of public interest.

**Imminent Environmental Damage**

Contamination of an environmental receptor\* (See definition below).

**Risk to Health and Safety**

Hydrocarbon contamination of drinking water supply.

Hydrocarbon vapour in a building from leaked hydrocarbons.

Fire risk due to the presence of leaked hydrocarbons.

**Supporting Evidence**

To assist the Appeal Committee in assessing your claim based on public interest, please provide documentation to support any of the above criteria.

Please do not resubmit information that you have already sent in to the Program with your initial application, such as an environmental site assessment. Forward only new and relevant information that you may have obtained since you filed your initial application.





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## **Analysis of Your Information**

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## **Return of Information**

Please return all documentation to:

John McIsaac  
Secretary to the Appeal Committee  
16<sup>th</sup> Floor, Commerce Place  
10155 - 102 Street  
Edmonton, Alberta T5J 4L4

Phone: (780) 422-5946  
Fax: (780) 427-8886

## **Definition**

An "environmental receptor" is: a biological system (for example, humans, plants, or animals) exposed to a contaminating substance. (Source: *Policy for Management of Risks at Contaminated Sites in Alberta*, Alberta Environment)



Regional Services  
Southern Region

2<sup>nd</sup> floor, Deerfoot Square  
2938 – 11 Street NE  
Calgary, Alberta  
Canada T2E 7L7

Our File: 190795  
SCC Site # 9302

June 14, 2005

Vaughn Wyant  
Vaughn Wyant Investments Ltd  
419 Brand Place  
Saskatoon, Saskatchewan  
S7J 5L6

Dear Mr Wyant:

**Re: Assessment and Remediation Activities  
419 – 10 Avenue, Carstairs, Alberta**

Alberta Environment (AENV) has completed a file review for the above referenced site including the following documents:

Petroleum Enviro Services, *Phase II Hydrocarbon Environmental Site Assessment*, 27 May 2002  
Petroleum Enviro Services, *Phase III: Hydrocarbon Environmental Site Assessment-Delineation*, 21 February 2003  
Stantec, *Proposed Remedial Action Plan*, 08 April 2005  
Stantec, *Proposed Remedial Action Plan-Revised*, 25 May 2005  
Stantec, *Proposed Risk Management Plan*, 19 May 2005

Petroleum hydrocarbon (PHC) contamination was present in the soil on and off site, exceeding the generic hydrocarbon criteria for fine-grained soil, commercial land use. The groundwater has also been impacted with PHCs in the area of the former underground storage tank nest on site. AENV understands that additional assessment work is planned for the Co-op property to the east/northeast once access is gained.

Benzene concentrations in the soil were particularly high in borehole BH1 adjacent to the east property line, and off site to the east/northeast underneath 10 Avenue. It appears that the PHCs may have migrated along the underground utility corridor although this has not been confirmed through more detailed assessment of the utility corridor. In particular, AENV has a concern that the water line utility trench may be impacted.

AENV has the following comments regarding the proposed risk management plan:

✓  
provided

A letter will be needed from Vaughn Wyant Investments to demonstrate their commitment to continue with remediation and risk management activities once funding has ended and until remediation guidelines have been met.

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not addressed yet

plan to do. ✓

Potential buyers/future owners of the site must be informed of the remediation and risk management plan in place, and the responsibilities associated with it.

Since PHC contamination will remain underneath 10 Avenue, an administrative control will need to be filed with the Town of Carstairs. The control would be a notification of the PHCs present should future ground disturbance occur, and include a plan for proper handling and disposal of the PHC impacted soil material.

- ✓ • The monitoring and groundwater sampling plan needs to identify which wells will be used and the frequency of vapour measurements and groundwater sampling.
- ✓ • The reporting schedule needs to include affected third parties and AENV.

proposed updated plan ✓

AENV requests that assessment of the water line utility trench be completed in order to determine whether there are potential health risks, and that the risk management plan be revised to address the above comments.

The review presented in this letter is based on the remediation process and objectives presented in Alberta Environment's *Risk Management Guidelines for Petroleum Storage Tank Sites, October 2001*. This letter is not intended to absolve any party from the potential for future liability for remediating this site in situations where either the land use may change or additional concerns arise from the contaminants remaining on or off-site.

Should you have any questions or concerns please contact me at (403) 297 – 8270.

Sincerely,



Kim Kirillo  
Petroleum Storage Tank Sites Specialist

cc: Steve Hoare, Safety Codes Council  
Greg Saretzky, Stantec Consulting





190795

**SAFETY CODES COUNCIL**

Underground Tank Remediation Program  
16<sup>th</sup> Floor, Commerce Place  
10155 - 102 Street  
Edmonton Alberta T5J 4L4

Tel: (780) 415-8666  
Fax: (780) 415-8664

**File # 00123-9302**

May 31, 2005

Alberta Environment  
3<sup>rd</sup> Floor Deerfoot Square  
2938 - 11 Street NE  
Calgary, AB T2E 7L7



Dear Kim Kirillo:

**Re: Remedial/Risk Management Plans  
Site 9302, Carstairs**

Enclosed for your review are copies of the Remedial Action Plan and Risk Management Plan prepared by Stantec Consulting. The Phase II and III ESA Reports were previously forwarded to you

The Consultant's proposals involve risk management. We welcome any comments you have regarding the site.

Yours truly,

Steve Hoare  
Technical Coordinator

Enc.

\* Note:  
These were discarded  
and replaced with  
more current copies  
(June 29 '05)

Best Copy Available



190795



**SAFETY CODES COUNCIL**

Underground Tank Remediation Program  
16<sup>th</sup> Floor, Commerce Place  
10155 - 102 Street  
Edmonton Alberta T5J 4L4

Tel: (780) 415-8666  
Fax: (780) 415-8664

**File # 00123-9302**

April 12, 2005

Alberta Environment  
3<sup>rd</sup> Floor Deerfoot Square  
2938 - 11 Street NE  
Calgary, AB T2E 7L7

Dear Kim Kirillo:



**Re: Remedial Action Plan  
Site 9302, Carstairs**

Enclosed for your review are copies of the following documents:

- Remedial Action Plan (April 8, 2005) by Stantec Consulting
- Phase II ESA Report (May 27, 2002) by Petroleum Enviro Services.

According to our files, a copy of the Phase III ESA Report was forwarded to you.

The Consultant is proposing a remedial plan involving risk management. We welcome any comments you have regarding the site.

Yours truly,

Steve Hoare  
Technical Coordinator

Enc.

*have this report on file already; discard copy*



**Stantec**

April 8, 2005  
File: 1132-89056.103

Vaughn Wyant Investments Ltd.  
419 Brand Place  
Saskatoon, SK S7J 5L6

**Attention: Mr. Vaughn Wyant**

Dear Mr. Wyant:

**Reference: Proposed Remedial Action Plan  
419 – 10<sup>th</sup> Avenue, Carstairs, AB**



Stantec Consulting Ltd. (Stantec) is pleased to provide Vaughn Wyant Investments Ltd. (Vaughn Wyant) with this letter presenting our remedial action plan (RAP) and associated cost estimate for the property located at 419 – 10<sup>th</sup> Avenue in Carstairs, Alberta (Site). The RAP encompasses the Site, the adjacent Five Star Video property, a portion of 10<sup>th</sup> Avenue and the Co-op property located across 10<sup>th</sup> Avenue. A Site location map and Site plan are provided in Figure 1 and Figure 2, respectively.

## 1.0 WORK TO DATE

The following reports were reviewed prior to completing this RAP:

- Petroleum Enviro Services., May 2002. Phase II Hydrocarbon Environmental Site Assessment (ESA), 419 – 10<sup>th</sup> Avenue, Carstairs, Alberta.
- Petroleum Enviro Services., May 2002. Phase III Hydrocarbon Environmental Site Assessment (ESA) - Delineation, 419 – 10<sup>th</sup> Avenue, Carstairs, Alberta.

## 2.0 SITE CONDITIONS

The upper subsurface geology at the Site consists of clay till and is relatively consistent across the Site. A sandy clay layer was identified at several locations throughout the Site (Petroleum Enviro Services, 2003).

April 8, 2005

Mr. Vaughn Wyant

Page 2 of 12

**Reference: Proposed Remedial Action Plan  
419 – 10<sup>th</sup> Avenue, Carstairs, AB**

Groundwater levels ranged from approximately 1.6 m below grade level (mBGL) to 3.8 mBGL during groundwater monitoring activities completed on February 4, 2003. The groundwater flow is generally towards the south and southwest based on the measured groundwater elevations (Petroleum Enviro Services, 2003).

Petroleum Enviro Services estimated the volume of petroleum hydrocarbon (PHC) impacted soils to be approximately 3,300 m<sup>3</sup> (Petroleum Enviro Services, 2003). The volume estimate is based on a limited number of boreholes drilled at the Site and an estimated value for the hydrocarbon impacted soil on the Co-op Food Store property without complete delineation.

Liquid phase hydrocarbon (LPH) was detected in monitoring well MW#1, observed as small droplets on the water surface, during the February 4, 2003 groundwater monitoring event (Petroleum Enviro Services, 2003).

Groundwater samples were obtained from six monitoring wells on February 6, 2003 and analysed for benzene, toluene, ethylbenzene and xylene (BTEX) and petroleum hydrocarbon (PHC) Fractions F1 and F2. Monitoring well MW#1 displayed a benzene concentration that exceeded commercial criteria during the sampling event. The remaining five monitoring wells (MW#2, MW#3, MW#4, MW#5 and MW#6) displayed petroleum hydrocarbon concentrations below criteria.

Petroleum Enviro Services compared to soil and groundwater concentration to the Alberta Environment Risk Management Guidelines for Petroleum Storage Tanks, October 2001. Generic hydrocarbon guidelines for fine grained soils were used for comparison purposes.

### **3.0 REMEDIAL OPTIONS**

Excavate the offsite hydrocarbon impacted soil would be difficult based on the lateral extent of the offsite hydrocarbon impacts and the presence of underground infrastructure, therefore, it is recommended that the hydrocarbon impacts be addressed by an insitu remediation technology. Several options exist to remediate and manage the hydrocarbon impacts both on and off the Site. The most viable options are listed below and presented in more detail in the following sections, with Stantec's recommendations presented in Section 5.0.

1. Dual Phase Vacuum Extraction System
2. Soil Vapour Extraction System
3. Excavate PHC impacted soil onsite and use Soil Vapour Extraction offsite

**Reference: Proposed Remedial Action Plan  
419 – 10<sup>th</sup> Avenue, Carstairs, AB**

### **3.1 Dual Phase Vacuum Extraction**

Dual Phase Vacuum Extraction (DPVE) systems utilize vacuum technology to rapidly recover LPH, impacted groundwater and hydrocarbon vapours from both the saturated and unsaturated zones. In addition, the movement of air through the unsaturated zone stimulates indigenous microorganisms to aerobically degrade petroleum hydrocarbons in the soil. The recovered liquid from the DPVE system is diverted to an aboveground storage tank.

The DPVE system would extract contaminants from eight to ten extraction wells located within the hydrocarbon impacted region. The extraction wells would also be used to control the hydraulic and pneumatic gradients to reduce the possibility of further contaminant migration. An underground header pipe would need to be trenched to connect the DPVE system to the extraction wells. If it were desired to operate the DPVE system during the winter months the header pipe would require heat tracing and insulation at an extra cost.

Extracted groundwater would be contained within an aboveground storage tank until it is hauled off the Site and disposed of accordingly. Liquid phase hydrocarbon is separated from the groundwater and sent to a storage tank for disposal. The air stripper is designed to volatilize hydrocarbons from the dissolved and vapour phases. A genset for external power supply can also be utilized. Additional technologies, power supply and heat tracing for trench pipe would add extra costs.

Remediation timelines cannot be estimated without conducting a DPVE pilot study at the Site, however, it is estimated that hydrocarbon concentrations would be reduced below Alberta Environment criteria in approximately 2 to 5 years of operation. This estimate is based on Stantec's knowledge and experience in operating DPVE systems in various types of subsurface conditions and various contaminant types. Stantec would be able to provide Vaughn Wyant with a more definitive remedial timeline, based on hydrocarbon recovery rates in comparison to an estimated hydrocarbon volume present at the Site prior to remediation, following approximately six months of DPVE operations.

As with most other remedial options, a groundwater monitoring program would also be required to measure the effectiveness of the system and determine when the Site is considered to be remediated. A delineation drilling program would also be required in the final stages of remediation to assess soil conditions and determine if the hydrocarbon concentrations are below guidelines.

Dual Phase Vacuum Extraction technology is currently the most effective remedial technology to address each hydrocarbon phase. Remediation using DPVE technology would reduce remedial timelines since it addresses each of the hydrocarbon phases, which significantly increases the

**Reference: Proposed Remedial Action Plan  
 419 – 10<sup>th</sup> Avenue, Carstairs, AB**

hydrocarbon recovery rates. The estimated consulting and contractor costs for implementing a DPVE system at the Site are presented in Table 1.

**TABLE 1  
 DPVE Remediation – Estimated Annual Costs**

Task	Estimated Cost
<b>Consultant Costs</b>	
Estimated Annual Consultant Costs	\$ 20,000
<b>Estimated Contractor Costs</b>	
Estimated Contractor Costs <sup>a</sup>	\$ 95,000
<b>Estimated Total Annual Cost (exclusive of applicable taxes)</b>	<b>\$ 115,000<sup>a</sup></b>

a – Contractor costs consist of leasing a DPVE system and an aboveground storage tank. It is often more economical to lease DPVE systems as remediation timelines cannot be determined and the purchase costs are very high.

b - Costs are an estimated annual cost for lease of the remediation equipment, consultant costs, analytical costs. Costs would likely be slightly higher during the first year due to costs associated with the installation of the remediation system, which requires trenching the header pipe beneath 10<sup>th</sup> Avenue. The estimated cost does not include provisions for electrical costs.

Dual phase vacuum extraction remediation is one of the most effective remedial solutions, however, it also is the most expensive. It is estimated that remediation costs would range from approximately \$250,000 to \$550,000 depending on the remediation timelines. Stantec does not recommend DPVE remediation in this situation based on the high associated costs and the limited additional benefits to other viable options.

**3.2 Soil Vapour Extraction**

Soil vapour extraction (SVE) systems utilize vacuum technology to recover hydrocarbon vapours from the unsaturated zones. In addition, the movement of air through the unsaturated zone simulates indigenous microorganisms to aerobically degrade petroleum hydrocarbons in the soil. The use of a SVE system does not directly recover LPH or dissolved phase petroleum hydrocarbons from the subsurface.

The SVE system would extract contaminants from eight to ten extraction wells located within the identified hydrocarbon plume. The extraction wells would also be used to control the pneumatic gradient to reduce the possibility of contaminant migration off the Site. The SVE system cannot effectively control the hydraulic gradients as it does not recover groundwater.

Remediation timelines cannot be estimated without conducting a SVE pilot study at the Site, however, it is estimated that hydrocarbon concentrations would be reduced below Alberta Environment guidelines in approximately 3 to 7 years of operation. This estimate is based on Stantec's knowledge and experience in operating SVE systems in various types of subsurface conditions and various contaminant types. Stantec would be able to provide Vaughn Wyant

**Reference: Proposed Remedial Action Plan  
 419 – 10<sup>th</sup> Avenue, Carstairs, AB**

with a more definitive remedial timeline, based on hydrocarbon recovery rates in comparison to an estimated hydrocarbon volume present at the Site prior to remediation, following approximately six months of SVE operations.

The use of an SVE system is an effective option to effectively remove hydrocarbon vapours and stimulate the microbial activity in the subsurface, however, is limited in its ability to address LPH. The SVE system has the ability to volatilize the LPH by formation airflow, but cannot directly remove the LPH since fluids are not recovered. Liquid phase hydrocarbons are not considered to be a significant concern at the Site since LPH was identified as small droplets on the water table during past assessments. In addition, SVE operations cannot address the dissolved phase hydrocarbons, however, groundwater concentrations would be expected to decline as the SVE system decreases the hydrocarbon concentrations in the soils.

As with most other remedial options, a groundwater monitoring program would also be required to measure the effectiveness of the system and determine when the Site is considered to be successfully remediated. A delineation drilling program would also be required in the final stages of remediation to assess soil conditions and determine if the hydrocarbon concentrations are below guidelines.

Soil vapour extraction technology is an excellent, more economical remedial solution than DPVE remediation. The estimated consulting and contractor costs for implementing a SVE system at the Site are presented in Table 2.

**TABLE 2  
 SVE Remediation – Estimated Annual Costs**

Task	Estimated Cost
<b>Consultant Costs</b>	
Estimated Annual Consultant Costs <sup>a</sup>	\$ 18,000
<b>Estimated Contractor Costs</b>	
Estimated Contractor Costs <sup>b</sup>	\$ 35,000
<b>Estimated Total Cost for 1<sup>st</sup> Year of Operation (exclusive of applicable taxes)</b>	<b>\$ 53,000</b>
<b>Estimated Total Annual Cost for Each Additional Year of Operation (exclusive of applicable taxes)</b>	<b>\$ 10,000</b>

a – Consultant costs include installation and operation of the SVE system for the initial year of operation.

b – Contractor costs are for the purchase and installation of the SVE system. The estimated cost does not include provisions for electrical costs.

It is estimated that remediation costs using a SVE system would range from \$80,000 to \$120,000 depending on the remediation timelines. Remediation of the Site using a SVE system is one of the most viable strategies, given the extent of petroleum hydrocarbon impacts.

Reference: Proposed Remedial Action Plan  
419 – 10<sup>th</sup> Avenue, Carstairs, AB

### 3.3 Excavate Onsite and Soil Vapour Extraction System for Offsite Locations

The option of an onsite excavation would consist of excavating PHC impacted soil located on the Site and the Five Star Video property and installing a SVE system to operate on offsite locations. The excavated hydrocarbon impacted soil would be remediated on the Site by the use of an allu bucket, which is an attachment for a trackhoe. The allu bucket aerates the hydrocarbon impacted soil. The process would be continued until hydrocarbon concentrations in the soils are reduced below the applicable guidelines.

The excavation and treatment on the Site requires that the excavation remain open for an extended period of time, until hydrocarbon concentrations in the soils have been reduced below guidelines. An open excavation often poses a safety hazard and is unsightly to the general public.

The costs associated with excavating the impacted soil and treating on site are presented in Table 3.

**TABLE 3**  
**Excavation and Treatment Onsite**

Task	Estimated Cost
<b>Consultant Costs</b>	
Estimated Annual Consultant Costs	\$ 20,000
<b>Estimated Contractor Costs</b>	
Estimated Contractor Costs	\$ 110,000
<b>Estimated Total Annual Cost (exclusive of applicable taxes)</b>	<b>\$ 130,000</b>

The option of excavation onsite would also require implementing a SVE system in the offsite locations to effectively reduce the hydrocarbon concentrations beneath 10<sup>th</sup> Avenue and on the Co-op property. The costs associated with the installation and operation of the SVE system would be slightly lower than those presented in Section 4.2 for the option of SVE remediation.

The total cost for this option would range from \$200,000 to \$250,000 depending on the remediation timeline of the SVE system. This option is a feasible solution, however, does not provide significant advantages to the exclusive operation of a SVE system both on and off the Site. The SVE system has the potential to remediate hydrocarbon impacts both on and off the Site, thus, conducting additional excavation activities result in additional costs with minimal additional benefits.

**Reference: Proposed Remedial Action Plan  
419 – 10<sup>th</sup> Avenue, Carstairs, AB**

## **4.0 RECOMMENDATIONS**

The remediation methods presented each have associated pros and cons. A summary of the pros and cons for each method are presented below.

### **Dual Phase Vacuum Extraction System**

- Pros
  - Addresses each hydrocarbon phase and provides reduced remedial timelines.
  - Ability to recover hydrocarbons from on and off the Site.
  - No excavation activities required.
- Cons
  - High associated costs with leasing, operating and maintaining the DPVE system.
  - Remedial timelines are longer in comparison to excavation.

### **Soil Vapour Extraction System**

- Pros
  - Relatively cost effective remedial solution in comparison to other options.
  - Effectively addresses the vapour and biodegradation phases of hydrocarbon.
  - Indirectly addresses LPH through volatilization.
  - No excavation activities required.
- Cons
  - Does not address dissolved phase hydrocarbons.
  - Remedial timelines are longer in comparison to excavation.

### **Excavation Onsite and Soil Vapour Extraction System Offsite**

- Pros
  - Removes the source of the hydrocarbon impacts immediately.
  - May provide reduced timelines in comparison to only SVE operation.
  - The SVE system effectively addresses the vapour and biodegradation phases of hydrocarbon.
  - The SVE system indirectly addresses liquid phase hydrocarbon through volatilization.



**Reference: Proposed Remedial Action Plan  
419 – 10<sup>th</sup> Avenue, Carstairs, AB**

- Cons
  - Costs are significantly higher than option of only a SVE system.
  - Safety hazards associated with leaving the excavation open during extended treatment periods.
  - The treatment of soils onsite may result in strong hydrocarbon odours in the areas surrounding the Site.
  - The treatment of soils onsite may be an unsightly feature.

Stantec recommends that the second option, installation of a SVE system, be implemented at the Site based on overall effectiveness and economic issues. A detailed workplan of the recommended remedial solution is presented in the following section.

#### **4.1 Proposed Remedial Solution – Soil Vapour Extraction System**

A delineation drilling and monitoring well installation program would be required to assess the hydrocarbon impacts on the adjacent Co-op property and install monitoring wells to be used as recovery wells for the SVE system. The delineation drilling program would consist of drilling three boreholes on the Co-op property, which would require approval from the Co-op Food Store. Monitoring wells, which would be used as recovery wells, would be installed within the Site, 10<sup>th</sup> Avenue and the Five Star Video property and would consist of 51 mm Schedule 40 PVC slotted pipe. Approval would also be required from the Town of Carstairs prior to drilling within the street. The location of the proposed boreholes and monitoring wells are presented in Figure 2. Traffic control may also be required during activities performed on the street.

Stantec proposes to implement a 5.5 hp SVE system supplied by Ground Effects Environmental Services (Ground Effects) located in Regina, Saskatchewan. The SVE system is capable of a max air flow rate of 280 cubic feet per minute (cfm) and would be contained within a 2 ft by 5 ft steel, sound attenuated, lockable skid enclosure. The SVE system is operated on a 230 volt, single phase power supply.

The SVE system would be installed on the north corner of the Site. The SVE system would be connected to the existing and proposed monitoring wells, both on and off the Site. It is proposed that nine monitoring wells be connected to the SVE system, as outlined in Figure 2. The monitoring wells would be connected to the SVE system by a 51 mm Schedule 40 PVC header pipe. Each monitoring well would be connected to the header pipe with a valve to allow the monitoring wells to be pulsed for maximum hydrocarbon recovery.

Reference: Proposed Remedial Action Plan  
419 – 10<sup>th</sup> Avenue, Carstairs, AB

A contractor would be required to install the header pipe beneath 10<sup>th</sup> Avenue since the monitoring wells located on street are completed within the asphalt. The contractor would provide equipment and services to cut the asphalt, remove and dispose of the asphalt, excavate a trench to install the header pipe, backfill the trench with a granular material, compact the backfill and pour an asphalt cap over the backfilled area.

**4.2 Estimated Installation Costs**

Estimated costs for drilling ten boreholes, eight of which would be used as SVE recovery wells, are provided in Table 4.

**TABLE 4  
Delineation Drilling and Recovery Well Installation**

Task	Total Estimated Cost	
<b>Recovery Well Installation</b>		
Drill Rig and Monitoring Well Installation Materials	\$	4,000
Analytical	\$	1,500
Labour	\$	1,200
Analysis and Reporting	\$	900
<b>Estimated Total Cost (exclusive of applicable taxes)</b>	<b>\$</b>	<b>7,600<sup>a</sup></b>

a – based on drilling 10 boreholes, eight of which will be completed as monitoring wells.

Estimated contractor costs for purchasing and implementing the SVE system are presented in Table 5.

**TABLE 5  
Contractor and Capital Cost Estimate**

Task	Total Estimated Cost	
<b>SVE System (Capital and Installation Costs)</b>		
5.5 hp SVE System (Single Phase Power)	\$	10,105
Materials (Header pipe, fittings, valves, well boxes)	\$	3,480
Labour (Commissioning)	\$	4,230
Disbursements	\$	5,450
Electrician to Connect System	\$	1,500
Contractor to dig trench and backfill	\$	11,300
<b>Estimated Total Cost (exclusive of applicable taxes)</b>	<b>\$</b>	<b>36,065</b>

Reference: **Proposed Remedial Action Plan**  
 419 – 10<sup>th</sup> Avenue, Carstairs, AB

Estimated consultant costs for implementing the SVE system are presented in Table 6.

**TABLE 6**  
**Consultant Fees Cost Estimate**

Task	Total Estimated Cost	
<b>SVE System Installation</b>		
Labour (commissioning)	\$	4,000
Disbursements	\$	1,000
<b>Estimated Total Cost (exclusive of applicable taxes)</b>	<b>\$</b>	<b>5,000</b>

The total estimated cost to install the additional recovery wells, purchase the SVE system, install the SVE system and commence the remediation program is estimated to be approximately \$49,000.

**4.3 Estimated Annual Consultant Costs**

The costs associated with the annual operation of the SVE system is presented in Table 7. The consulting costs are based on move and demove costs from Calgary, Alberta.

**TABLE 7**  
**Consultant Fees Cost Estimate**

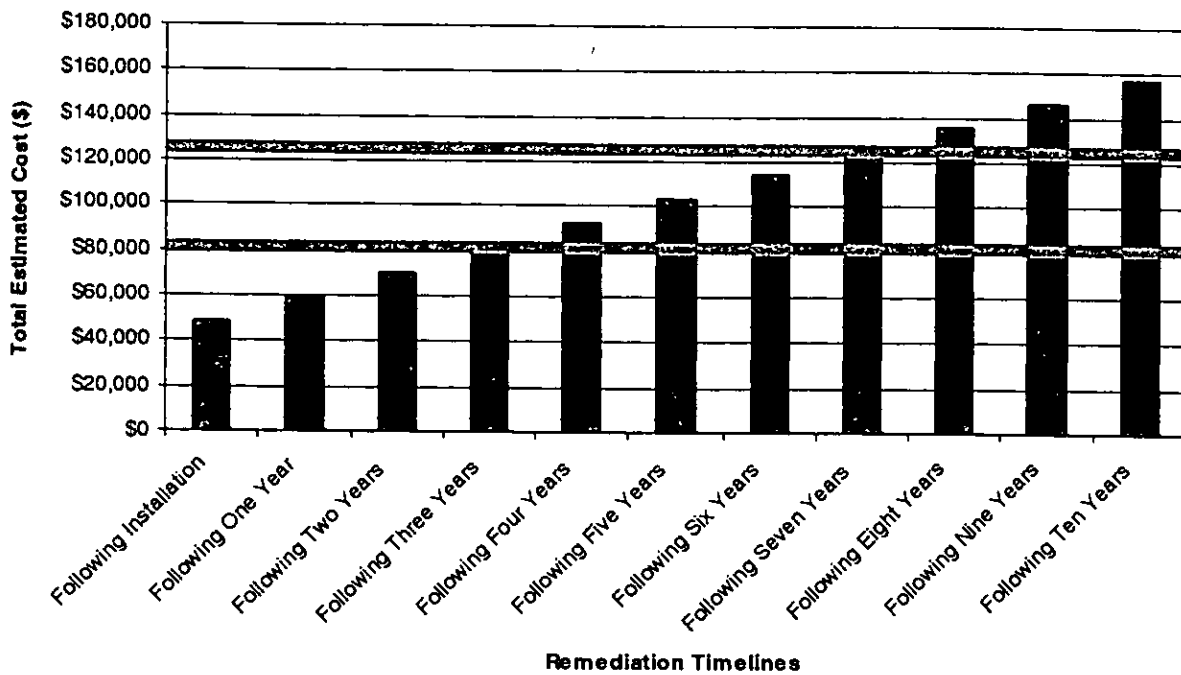
Task	Total Estimated Cost	
<b>SVE System</b>		
Labour (monthly monitoring)	\$	4,000
Analysis and Reporting	\$	2,500
Disbursements	\$	2,000
Laboratory Analysis	\$	800
Regulatory Reporting	\$	1,500
<b>Estimated Total Cost (exclusive of applicable taxes)</b>	<b>\$</b>	<b>10,800</b>

It is important to note that the Town of Carstairs may require that the monitoring wells and header pipe be removed from within the street once the remediation program has been completed. A delineation drilling program would also be required in the final stages of remediation to assess soil conditions and determine if the hydrocarbon concentrations are below guidelines.

Reference: Proposed Remedial Action Plan  
419 - 10<sup>th</sup> Avenue, Carstairs, AB

#### 4.4 Total Estimated Cost

It is difficult to provide a total estimated cost for an insitu system since the remediation timelines are unknown. It is anticipated that hydrocarbon concentrations would be reduced below the applicable guidelines following 3 to 7 years or operation. The following graphical interpretation presents the estimated total costs versus the remediation timeline, where the red lines indicate the estimated remedial timeline and associated cost range.



#### 5.0 REPORTING

Stantec would provide Vaughn Wyant with monthly update letters on the operation and performance of the SVE system. Annual reports would be completed for the operation and performance of the remedial systems and the groundwater monitoring and sampling program. Stantec would provide reporting to the Safety Codes Council as required.

#### 6.0 DISCUSSION

Discussions should be held between Vaughn Wyant and Stantec to discuss the proposed remedial approach. Once a course of action has been agreed upon, discussions with the Safety Codes Council should be conducted. Discussions should also be held with the Town of

**Stantec**

April 8, 2005

Mr. Vaughn Wyant

Page 12 of 12

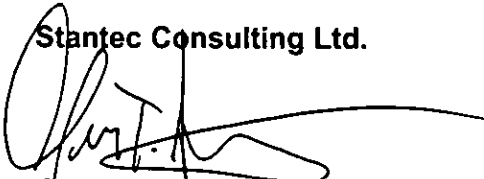
**Reference: Proposed Remedial Action Plan  
419 – 10<sup>th</sup> Avenue, Carstairs, AB**

Carstairs Infrastructure Department to get approval to complete the work required on 10<sup>th</sup> Avenue.

Should you have any comments or questions, please contact the undersigned at (306) 667-2400.

Sincerely,

**Stantec Consulting Ltd.**



Greg Saretzky, M.Sc., P.Eng.

Environmental Engineer

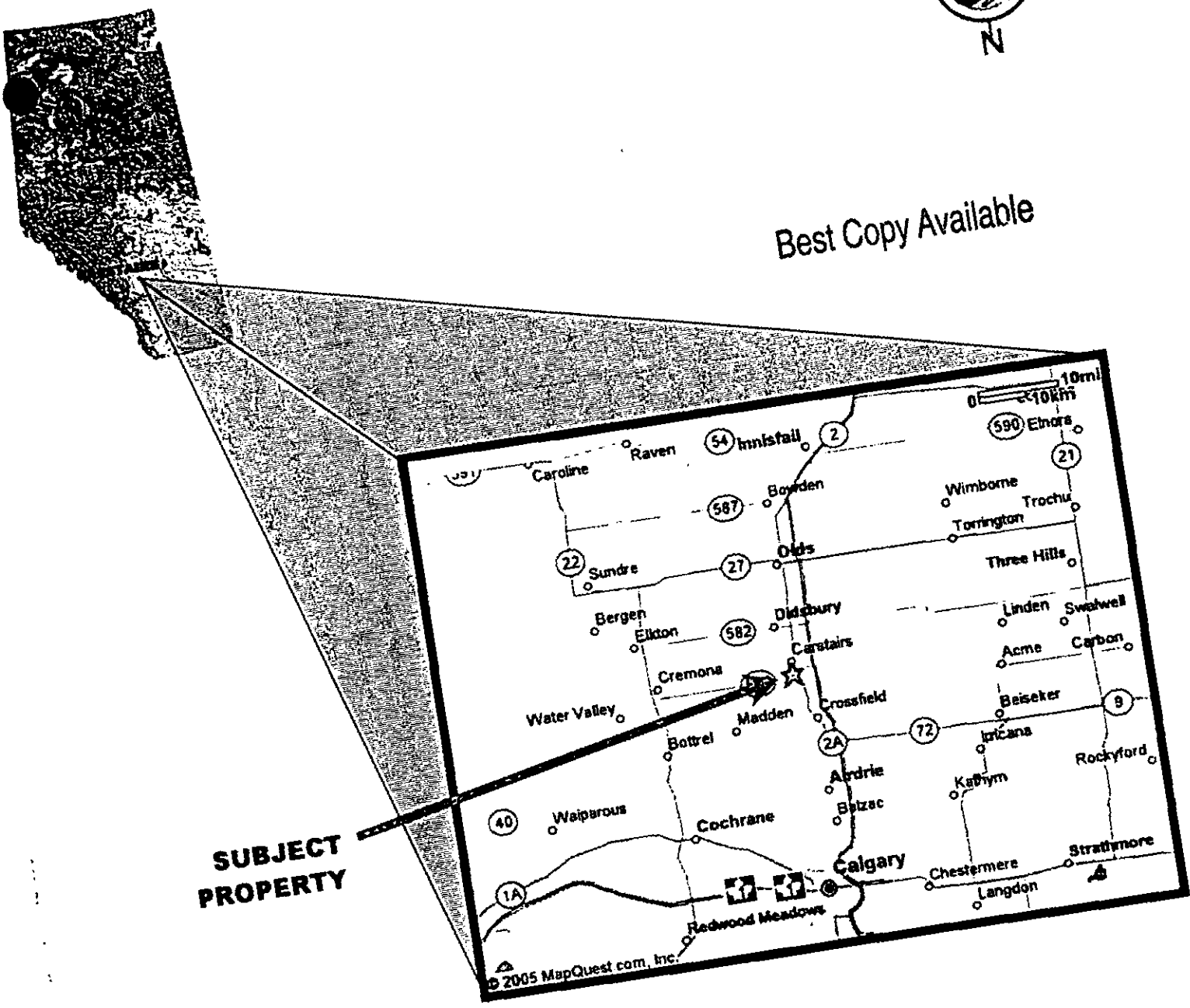
Tel: 306-667-2456

Fax: 306-667-2500

gsaretzky@stantec.com



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Client/Project  
VAUGHN WYANT INVESTMENTS LTD.  
REMEDIAL ACTION PLAN  
419 - 10<sup>TH</sup> AVENUE, CARSTAIRS, AB

Figure No.  
**1**

Title  
**Site Location Map**

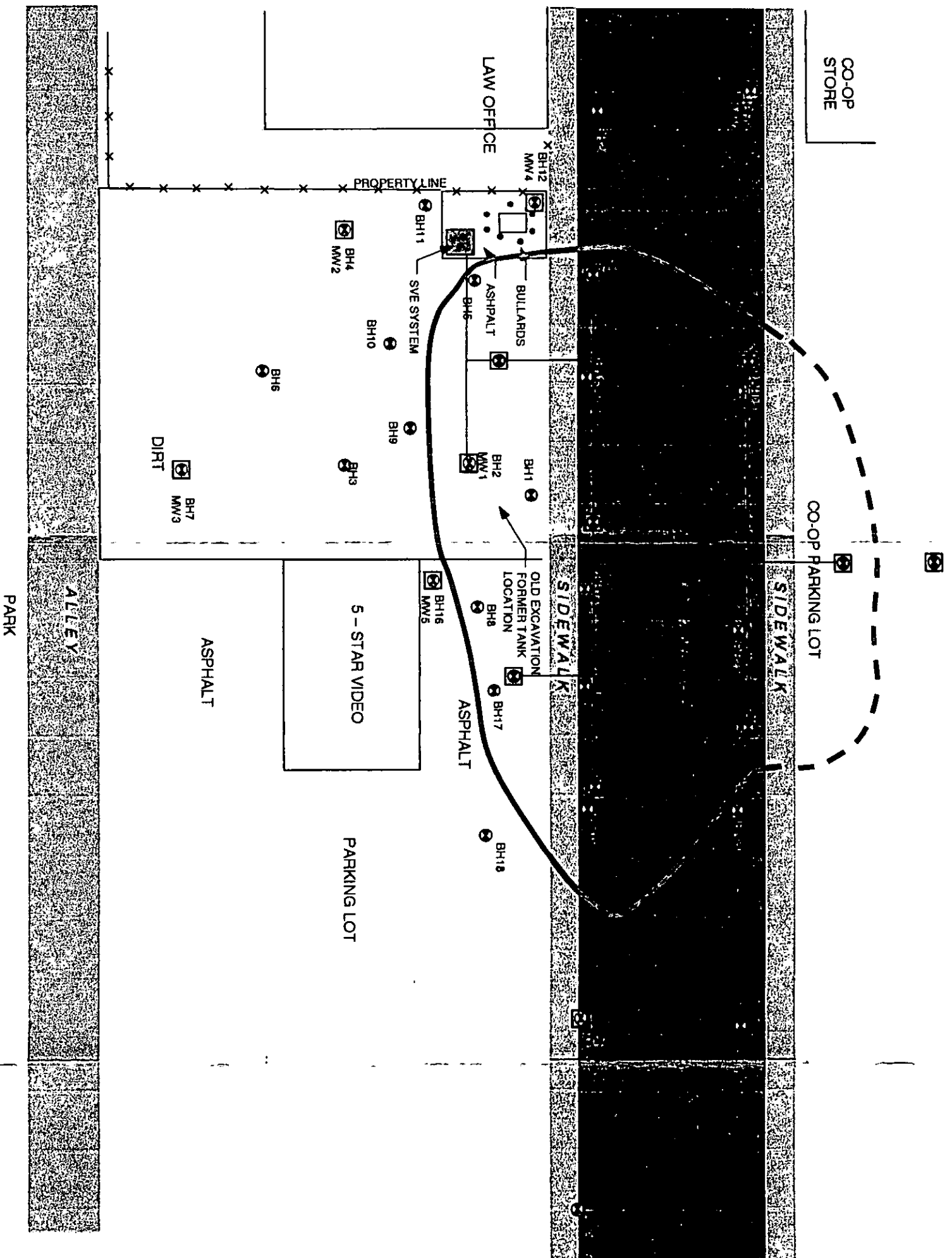


**Stantec**

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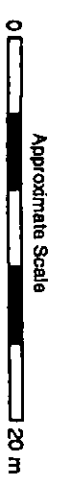
Taken from Petroleum Enviro Services, 2003

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Stantec



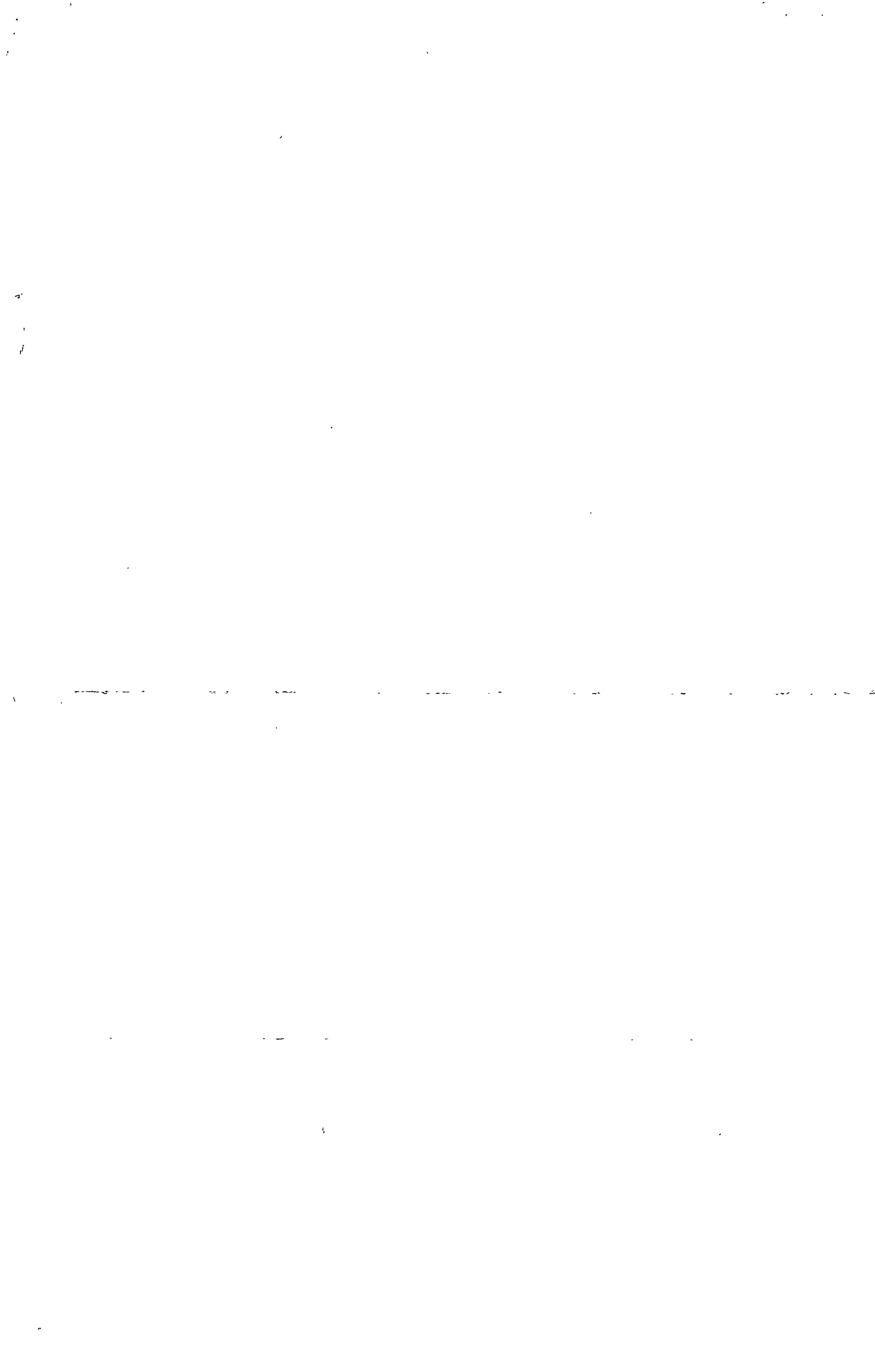
- Current Borehole Location
- Current Monitoring Well Location
- Proposed Header Pipe
- Proposed Borehole Location
- Proposed Monitoring Well Location

Client/Project  
VAUGHN WYANT INVESTMENTS LTD.  
REMEDIAL ACTION PLAN  
419 - 10<sup>TH</sup> AVENUE, CARSTAIRS, AB

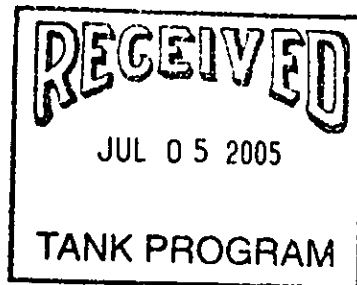
Figure No. **2**

Title  
**Site Plan and Proposed Remediation Layout**





Available for Public Distribution



**Stantec**

**Proposed Remedial Action Plan -  
Revised**

**419 – 10<sup>th</sup> Avenue**

**Carstairs, AB**

Prepared For:  
Vaughn Wyant Investments Ltd.

Prepared By:  
Stantec Consulting Ltd.  
100 – 75 24<sup>th</sup> Street East  
Saskatoon, SK S7K 0K3  
[www.stantec.com](http://www.stantec.com)

June, 2005  
File: 1132-52998

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stantec.com



**Stantec**

June 29, 2005  
File: 1132-52998.200

Vaughn Wyant Investments Ltd.  
419 Brand Place  
Saskatoon, SK S7J 5L6

**Attention: Mr. Vaughn Wyant**

Dear Mr. Wyant:

**Reference: Proposed Remedial Action Plan - Revised  
419 - 10<sup>th</sup> Avenue, Carstairs, AB**

Stantec Consulting Ltd. (Stantec) is pleased to provide Vaughn Wyant Investments Ltd. (Vaughn Wyant) with this letter presenting our revised remedial action plan (RAP) and associated cost estimate for the property located at 419 - 10<sup>th</sup> Avenue in Carstairs, Alberta (Site). The RAP has been revised based on recommendations from Alberta Environment. The RAP encompasses the Site, the adjacent Five Star Video property, a portion of 10<sup>th</sup> Avenue and the Co-op property located across 10<sup>th</sup> Avenue. A Site location map and Site plan are provided in Figure 1 and Figure 2, respectively.

## **1.0 WORK TO DATE**

The following reports were reviewed prior to completing this RAP:

- Petroleum Enviro Services., May 2002. Phase II Hydrocarbon Environmental Site Assessment (ESA), 419 - 10th Avenue, Carstairs, Alberta.
- Petroleum Enviro Services., May 2002. Phase III Hydrocarbon Environmental Site Assessment (ESA) - Delineation, 419 - 10th Avenue, Carstairs, Alberta.



**Reference: Proposed Remedial Action Plan - RAP  
419 – 10<sup>th</sup> Avenue, Carstairs, AB**

## **2.0 SITE CONDITIONS**

The upper subsurface geology at the Site consists of clay till and is relatively consistent across the Site. A sandy clay layer was identified at several locations throughout the Site (Petroleum Enviro Services, 2003).

Groundwater levels ranged from approximately 1.6 m below grade level (mBGL) to 3.8 mBGL during groundwater monitoring activities completed on February 4, 2003. The groundwater flow is generally towards the south and southwest based on the measured groundwater elevations (Petroleum Enviro Services, 2003).

Petroleum Enviro Services estimated the volume of petroleum hydrocarbon (PHC) impacted soils to be approximately 3,300 m<sup>3</sup> (Petroleum Enviro Services, 2003). The volume estimate is based on a limited number of boreholes drilled at the Site and an estimated value for the hydrocarbon impacted soil on the Co-op Food Store property without complete delineation.

Liquid phase hydrocarbon (LPH) was detected in monitoring well MW#1, observed as small droplets on the water surface, during the February 4, 2003 groundwater monitoring event (Petroleum Enviro Services, 2003).

Groundwater samples were obtained from six monitoring wells on February 6, 2003 and analysed for benzene, toluene, ethylbenzene and xylene (BTEX) and petroleum hydrocarbon (PHC) Fractions F1 and F2. Monitoring well MW#1 displayed a benzene concentration that exceeded commercial criteria during the sampling event. The remaining five monitoring wells (MW#2, MW#3, MW#4, MW#5 and MW#6) displayed petroleum hydrocarbon concentrations below criteria.

Petroleum Enviro Services compared to soil and groundwater concentration to the Alberta Environment Risk Management Guidelines for Petroleum Storage Tanks, October 2001. Generic hydrocarbon guidelines for fine grained soils were used for comparison purposes.

## **3.0 REMEDIAL OPTIONS**

Excavating the offsite hydrocarbon impacted soil would be difficult based on the lateral extent of the offsite hydrocarbon impacts and the presence of underground infrastructure, therefore, it is recommended that the hydrocarbon impacts be addressed by an insitu remediation technology. Several options exist to remediate and manage the hydrocarbon impacts both on and off the Site. The most viable options are listed below and presented in more detail in the following sections, with Stantec's recommendations presented in Section 5.0.

### **1. Dual Phase Vacuum Extraction System**

**Reference: Proposed Remedial Action Plan - RAP  
419 – 10<sup>th</sup> Avenue, Carstairs, AB**

2. Soil Vapour Extraction System
3. Excavate PHC impacted soil onsite and use Soil Vapour Extraction offsite

### **3.1 Dual Phase Vacuum Extraction**

Dual Phase Vacuum Extraction (DPVE) systems utilize vacuum technology to rapidly recover LPH, impacted groundwater and hydrocarbon vapours from both the saturated and unsaturated zones. In addition, the movement of air through the unsaturated zone stimulates indigenous microorganisms to aerobically degrade petroleum hydrocarbons in the soil. The recovered liquid from the DPVE system is diverted to an aboveground storage tank.

The DPVE system would extract contaminants from eight to ten extraction wells located within the hydrocarbon impacted region. The extraction wells would also be used to control the hydraulic and pneumatic gradients to reduce the possibility of further contaminant migration. An underground header pipe would need to be trenched to connect the DPVE system to the extraction wells. If it were desired to operate the DPVE system during the winter months the header pipe would require heat tracing and insulation at an extra cost.

Extracted groundwater would be contained within an aboveground storage tank until it is hauled off the Site and disposed of accordingly. Liquid phase hydrocarbon is separated from the groundwater and sent to a storage tank for disposal. The air stripper is designed to volatilize hydrocarbons from the dissolved and vapour phases. A genset for external power supply can also be utilized. Additional technologies, power supply and heat tracing for trench pipe would add extra costs.

Remediation timelines cannot be estimated without conducting a DPVE pilot study at the Site, however, it is estimated that hydrocarbon concentrations would be reduced below Alberta Environment criteria in approximately 2 to 5 years of operation. This estimate is based on Stantec's knowledge and experience in operating DPVE systems in various types of subsurface conditions and various contaminant types. Stantec would be able to provide Vaughn Wyant with a more definitive remedial timeline, based on hydrocarbon recovery rates in comparison to an estimated hydrocarbon volume present at the Site prior to remediation, following approximately six months of DPVE operations.

As with most other remedial options, a groundwater monitoring program would also be required to measure the effectiveness of the system and determine when the Site is considered to be remediated. A delineation drilling program would also be required in the final stages of remediation to assess soil conditions and determine if the hydrocarbon concentrations are below guidelines.

**Reference: Proposed Remedial Action Plan - RAP  
 419 – 10<sup>th</sup> Avenue, Carstairs, AB**

Dual Phase Vacuum Extraction technology is currently the most effective remedial technology to address each hydrocarbon phase. Remediation using DPVE technology would reduce remedial timelines since it addresses each of the hydrocarbon phases, which significantly increases the hydrocarbon recovery rates. The estimated consulting and contractor costs for implementing a DPVE system at the Site are presented in Table 1.

**TABLE 1  
 DPVE Remediation – Estimated Annual Costs**

Task	Estimated Cost
<b>Consultant Costs</b>	
Estimated Annual Consultant Costs	\$ 40,000
<b>Estimated Contractor Costs</b>	
Estimated Contractor Costs <sup>a</sup>	\$ 95,000
<b>Estimated Total Annual Cost (exclusive of applicable taxes)</b>	<b>\$ 135,000<sup>b</sup></b>

a – Contractor costs consist of leasing a DPVE system and an aboveground storage tank. It is often more economical to lease DPVE systems as remediation timelines cannot be determined and the purchase costs are very high.

b - Costs are an estimated annual cost for lease of the remediation equipment, consultant costs, analytical costs. Costs would likely be slightly higher during the first year due to costs associated with the installation of the remediation system, which requires trenching the header pipe beneath 10<sup>th</sup> Avenue. The estimated cost does not include provisions for electrical costs.

Dual phase vacuum extraction remediation is one of the most effective remedial solutions, however, it also is the most expensive. It is estimated that remediation costs would range from approximately \$250,000 to \$550,000 depending on the remediation timelines. Stantec does not recommend DPVE remediation in this situation based on the high associated costs and the limited additional benefits to other viable options.

**3.2 Soil Vapour Extraction**

Soil vapour extraction (SVE) systems utilize vacuum technology to recover hydrocarbon vapours from the unsaturated zones. In addition, the movement of air through the unsaturated zone simulates indigenous microorganisms to aerobically degrade petroleum hydrocarbons in the soil. The use of a SVE system does not directly recover LPH or dissolved phase petroleum hydrocarbons from the subsurface.

The SVE system would extract contaminants from eight to ten extraction wells located within the identified hydrocarbon plume. The extraction wells would also be used to control the pneumatic gradient to reduce the possibility of contaminant migration off the Site. The SVE system cannot effectively control the hydraulic gradients as it does not recover groundwater.

Remediation timelines cannot be estimated without conducting a SVE pilot study at the Site, however, it is estimated that hydrocarbon concentrations would be reduced below Alberta





**Reference: Proposed Remedial Action Plan - RAP  
 419 – 10<sup>th</sup> Avenue, Carstairs, AB**

Environment guidelines in approximately 3 to 7 years of operation. This estimate is based on Stantec's knowledge and experience in operating SVE systems in various types of subsurface conditions and various contaminant types. Stantec would be able to provide Vaughn Wyant with a more definitive remedial timeline, based on hydrocarbon recovery rates in comparison to an estimated hydrocarbon volume present at the Site prior to remediation, following approximately six months of SVE operations.

The use of an SVE system is an effective option to effectively remove hydrocarbon vapours and stimulate the microbial activity in the subsurface, however, is limited in its ability to address LPH. The SVE system has the ability to volatilize the LPH by formation airflow, but cannot directly remove the LPH since fluids are not recovered. Liquid phase hydrocarbons are not considered to be a significant concern at the Site since LPH was been identified as small droplets on the water table during past assessments. In addition, SVE operations cannot address the dissolved phase hydrocarbons, however, groundwater concentrations would be expected to decline as the SVE system decreases the hydrocarbon concentrations in the soils.

As with most other remedial options, a groundwater monitoring program would also be required to measure the effectiveness of the system and determine when the Site is considered to be successfully remediated. A delineation drilling program would also be required in the final stages of remediation to assess soil conditions and determine if the hydrocarbon concentrations are below guidelines.

Soil vapour extraction technology is an excellent, more economical remedial solution than DPVE remediation. The estimated consulting and contractor costs for implementing a SVE system at the Site are presented in Table 2.

**TABLE 2  
 SVE Remediation – Estimated Annual Costs**

Task	Estimated Cost
<b>Consultant Costs</b>	
Estimated Annual Consultant Costs <sup>a</sup>	\$ 40,000
<b>Estimated Contractor Costs</b>	
Estimated Contractor Costs <sup>b</sup>	\$ 36,000
<b>Estimated Total Cost for 1<sup>st</sup> Year of Operation (exclusive of applicable taxes)</b>	<b>\$ 76,000</b>
<b>Estimated Total Annual Cost for Each Additional Year of Operation (exclusive of applicable taxes)</b>	<b>\$ 18,000</b>

a – Consultant costs include installation and operation of the SVE system for the initial year of operation

b – Contractor costs are for the purchase and installation of the SVE system. The estimated cost does not include provisions for electrical costs.

**Reference: Proposed Remedial Action Plan - RAP  
 419 – 10<sup>th</sup> Avenue, Carstairs, AB**

It is estimated that remediation costs using a SVE system would range from \$120,000 to \$200,000 depending on the remediation timelines. Remediation of the Site using a SVE system is one of the most viable strategies, given the extent of petroleum hydrocarbon impacts.

**3.3 Excavate Onsite and Soil Vapour Extraction System for Offsite Locations**

The option of an onsite excavation would consist of excavating PHC impacted soil located on the Site and the Five Star Video property and installing a SVE system to operate on offsite locations. The excavated hydrocarbon impacted soil would be remediated on the Site by the use of an allu bucket, which is an attachment for a trackhoe that aerates the hydrocarbon impacted soil. The process would be continued until hydrocarbon concentrations in the soils are reduced below the applicable guidelines.

The excavation and treatment on the Site requires that the excavation remain open for an extended period of time, until hydrocarbon concentrations in the soils have been reduced below guidelines. An open excavation often poses a safety hazard and is unsightly to the general public.

The costs associated with excavating the impacted soil and treating on site are presented in Table 3.

**TABLE 3  
 Excavation and Treatment Onsite**

Task	Estimated Cost
<b>Consultant Costs</b>	
Estimated Annual Consultant Costs	\$ 20,000
<b>Estimated Contractor Costs</b>	
Estimated Contractor Costs	\$ 110,000
<b>Estimated Total Annual Cost (exclusive of applicable taxes)</b>	<b>\$ 130,000</b>

The option of excavation onsite would also require implementing a SVE system in the offsite locations to effectively reduce the hydrocarbon concentrations beneath 10<sup>th</sup> Avenue and on the Co-op property. The costs associated with the installation and operation of the SVE system would be slightly lower than those presented in Section 4.2 for the option of SVE remediation.

The total cost for this option would range from \$200,000 to \$250,000 depending on the remediation timeline of the SVE system. This option is a feasible solution, however, does not provide significant advantages to the exclusive operation of a SVE system both on and off the Site. The SVE system has the potential to remediate hydrocarbon impacts both on and off the

**Reference: Proposed Remedial Action Plan - RAP  
419 – 10<sup>th</sup> Avenue, Carstairs, AB**

Site, thus, conducting additional excavation activities result in additional costs with minimal additional benefits.

#### **4.0 RECOMMENDATIONS**

The remediation methods presented each have associated pros and cons. A summary of the pros and cons for each method are presented below.

##### **Dual Phase Vacuum Extraction System**

- Pros
  - Addresses each hydrocarbon phase and provides reduced remedial timelines.
  - Ability to recover hydrocarbons from on and off the Site.
  - No excavation activities required.
- Cons
  - High associated costs with leasing, operating and maintaining the DPVE system.
  - Remedial timelines are longer in comparison to excavation.

##### **Soil Vapour Extraction System**

- Pros
  - Relatively cost effective remedial solution in comparison to other options.
  - Effectively addresses the vapour and biodegradation phases of hydrocarbon.
  - Indirectly addresses LPH through volatilization.
  - No excavation activities required.
- Cons
  - Does not address dissolved phase hydrocarbons.
  - Remedial timelines are longer in comparison to excavation.

##### **Excavation Onsite and Soil Vapour Extraction System Offsite**

- Pros
  - Removes the source of the hydrocarbon impacts immediately.
  - May provide reduced timelines in comparison to only SVE operation.
  - The SVE system effectively addresses the vapour and biodegradation phases of hydrocarbon.

**Reference: Proposed Remedial Action Plan - RAP  
419 – 10<sup>th</sup> Avenue, Carstairs, AB**

- The SVE system indirectly addresses liquid phase hydrocarbon through volatilization.
- Cons
  - Costs are significantly higher than option of only a SVE system.
  - Safety hazards associated with leaving the excavation open during extended treatment periods.
  - The treatment of soils onsite may result in strong hydrocarbon odours in the areas surrounding the Site.
  - The treatment of soils onsite may be an unsightly feature.

Stantec recommends that the second option, installation of a SVE system, be implemented at the Site based on overall effectiveness and economic issues. A detailed workplan of the recommended remedial solution is presented in the following section.

#### **4.1 Proposed Remedial Solution – Soil Vapour Extraction System**

A utility corridor assessment is required to determine the hydrocarbon concentrations that are potentially present along the water service connection line. The water service connection is located near the original source of the hydrocarbon impacts and is anticipated to represent the worst case area. Hydrocarbons situated along water lines have the potential to degrade the construction materials, which could result in hydrocarbons entering the water distributions system.

The utility assessment would consist of excavating a test pit above the service connection within the Site boundary and exposing the granular fill surrounding the water line. A soil sample will be collected from the fill and analysed for BTEX and PHC Fractions F1 to F4. The analytical results, along with the construction materials of the service connections, will be analysed to determine the associated risk to human health and safety. The following is the proposed remedial action plan, however, the plan may need to be revised if a higher human health risk is associated with the utility corridor.

A monitoring well installation program would be required within 10<sup>th</sup> Avenue to install monitoring wells to be used as recovery wells for the SVE system. Monitoring wells, which would be used as recovery wells, would be installed within the Site, 10<sup>th</sup> Avenue and the Five Star Video property and would consist of 51 mm Schedule 40 PVC slotted pipe. Approval would also be required from the Town of Carstairs prior to drilling within the street. The location of the proposed boreholes and monitoring wells are presented in Figure 2. Traffic control may also be required during activities performed on the street.

**Reference: Proposed Remedial Action Plan - RAP  
419 – 10<sup>th</sup> Avenue, Carstairs, AB**

A delineation drilling program would also be required on the adjacent Co-op property, which would also include installing monitoring wells. Drilling on the Co-op property would be completed once access can be gained to the property. The Co-op is currently in a litigation process regarding the condition of the asphalt in their parking lot. Drilling activities can not be conducted until the litigation process has been completed, which is anticipated to occur later in the summer of 2005.

Stantec proposes to implement a 5.5 hp SVE system supplied by Ground Effects Environmental Services (Ground Effects) located in Regina, Saskatchewan. The SVE system is capable of a max air flow rate of 280 cubic feet per minute (cfm) and would be contained within a 2 ft by 5 ft steel, sound attenuated, lockable skid enclosure. The SVE system is operated on a 230 volt, single phase power supply.

The SVE system would be installed on the north corner of the Site and would be connected to the existing and proposed monitoring wells, both on and off the Site. It is proposed that nine monitoring wells be connected to the SVE system, as outlined in Figure 2. The monitoring wells would be connected to the SVE system by a 51 mm Schedule 40 PVC header pipe. Each monitoring well would be connected to the header pipe with a valve to allow the monitoring wells to be pulsed for maximum hydrocarbon recovery.

A contractor would be required to install the header pipe beneath 10<sup>th</sup> Avenue since the monitoring wells located on the street are completed within the asphalt. The contractor would provide equipment and services to cut the asphalt, remove and dispose of the asphalt, excavate a trench to install the header pipe, backfill the trench with a granular material, compact the backfill and pour an asphalt cap over the backfilled area.

Stantec recommends that a groundwater monitoring and sampling program be conducted on an annual basis. The groundwater monitoring program would consist of measuring the standpipe combustible vapour concentrations in each of the monitoring wells and the depth to groundwater and LPH, if detected. Standpipe combustible vapour concentrations would also be measured in each well during monthly SVE monitoring events. Stantec proposes to sample existing monitoring wells MW1, MW4, MW6 and MW7. Proposed monitoring wells MW13, MW14, MW15 and MW16 will also be sampled. Groundwater samples will be submitted for analysis of BTEX and PHC Fractions F1 and F2 concentrations. The monitoring wells that are sampled annually may change based on hydrocarbon concentrations observed during the sampling events.

Reference: Proposed Remedial Action Plan - RAP  
 419 – 10<sup>th</sup> Avenue, Carstairs, AB

**4.2 Estimated Installation Costs**

The estimated costs for completing the utility corridor assessment along the service connection for the water supply line are presented in Table 4.

**TABLE 4  
 Utility Corridor Assessment**

Task	Total Estimated Cost	
<b>Utility Corridor Assessment</b>		
Labour	\$	2,000
Analytical	\$	500
Disbursements and Contractor Costs	\$	1,500
Analysis and Reporting	\$	1,500
<b>Estimated Total Cost (exclusive of applicable taxes)</b>	<b>\$</b>	<b>5,500</b>

Estimated costs for drilling and installing the additional monitoring wells that will be used as SVE recovery wells are provided in Table 5.

**TABLE 5  
 Recovery Well Installation**

Task	Total Estimated Cost	
<b>Recovery Well Installation</b>		
Drill Rig and Monitoring Well Installation Materials	\$	4,000
Analytical	\$	1,300
Labour	\$	1,200
Disbursements	\$	300
Analysis and Reporting	\$	800
<b>Estimated Total Cost (exclusive of applicable taxes)</b>	<b>\$</b>	<b>7,600*</b>

\* Based on drilling and installing seven recovery wells.

Stantec provided Vaughn Wyant a cost proposal on April 20, 2005 for completing the additional drilling and groundwater sampling program on the adjacent Co-op property once access is gained. The costs for conducting that assessment are presented in Table 6, with costs associated with additional boreholes provided in Table 7.

Reference: Proposed Remedial Action Plan - RAP  
419 – 10<sup>th</sup> Avenue, Carstairs, AB

**TABLE 6**  
**Delineation Drilling and Groundwater Sampling Cost Estimate**

Task	Estimated Cost
Planning and Approvals	\$ 600
Labour	\$ 1,200
Disbursements	\$ 800
Subcontractors (drill truck and supplies for monitoring wells)	\$ 2,800
Laboratory Analysis (4 soil samples and 2 groundwater samples)	\$ 950
Analysis and Reporting	\$ 1,500
<b>Estimated Total Cost (exclusive of applicable taxes)</b>	<b>\$ 7,850*</b>

\* Cost includes drilling 4 boreholes and installing 2 groundwater monitoring wells. Private locators and daylighting activities have not been included in the cost estimate, as they are not anticipated to be required.

**TABLE 7**  
**Additional Borehole Cost Estimate**

Task	Estimated Cost
Labour	\$ 100
Subcontractors (drill truck)	\$ 180
Laboratory Analysis	\$ 150
Analysis and Reporting	\$ 100
<b>Estimated per Extra Borehole (exclusive of applicable taxes)</b>	<b>\$ 530*</b>

\* Extra borehole costs are for additional boreholes beyond the estimated four boreholes in the scope of the Phase II ESA.

Estimated contractor costs for purchasing and implementing the SVE system are presented in Table 8.

**TABLE 8**  
**Contractor and Capital Cost Estimate**

Task	Total Estimated Cost
<b>SVE System (Capital and Installation Costs)</b>	
5.5 hp SVE System (Single Phase Power)	\$ 10,105
Materials (Header pipe, fittings, valves, well boxes)	\$ 3,480
Labour (Commissioning)	\$ 4,230
Disbursements	\$ 5,450
Electrician to Connect System	\$ 1,500
Contractor to dig trench and backfill	\$ 11,300
<b>Estimated Total Cost (exclusive of applicable taxes)</b>	<b>\$ 36,065</b>

Estimated consultant costs for implementing the SVE system are presented in Table 9.

June 29, 2005

Mr. Vaughn Wyant

Page 12 of 14

Reference: Proposed Remedial Action Plan - RAP  
419 - 10<sup>th</sup> Avenue, Carstairs, AB

**TABLE 9**  
**Consultant Fees Cost Estimate**

Task	Total Estimated Cost	
<b>SVE System Installation</b>		
Labour (commissioning)	\$	4,000
Disbursements	\$	1,000
<b>Estimated Total Cost (exclusive of applicable taxes)</b>	<b>\$</b>	<b>5,000</b>

The total estimated cost to conduct the utility corridor assessment, install the additional recovery wells, purchase the SVE system, install the SVE system and commence the remediation program is estimated to be approximately \$62,000.

#### 4.3 Estimated Annual Consultant Costs

The costs associated with the annual operation of the SVE system and the groundwater monitoring and sampling program are presented in Table 10. The consulting costs are based on move and demove costs from Calgary, Alberta.

**TABLE 10**  
**Consultant Fees Cost Estimate**

Task	Total Estimated Cost	
<b>SVE System</b>		
Labour (monthly monitoring)	\$	4,000
Analysis and Reporting	\$	2,500
Disbursements	\$	2,000
Laboratory Analysis	\$	800
Regulatory Reporting	\$	1,500
Subtotal	\$	10,800
<b>Groundwater Monitoring and Sampling Program</b>		
Labour	\$	2,000
Analysis and Reporting	\$	2,200
Disbursements	\$	800
Laboratory Analysis	\$	1,800
Regulatory Reporting	\$	1,200
Subtotal	\$	8,000
<b>Estimated Total Cost (exclusive of applicable taxes)</b>	<b>\$</b>	<b>18,800</b>

It is important to note that the Town of Carstairs may require that the monitoring wells and header pipe be removed from within the street once the remediation program has been completed. A delineation assessment would also be required in the final stages of remediation to assess soil conditions and determine if the hydrocarbon concentrations are below guidelines.



Information for the public is available on the following website:

The following information is available on the following website:

The following information is available on the following website:

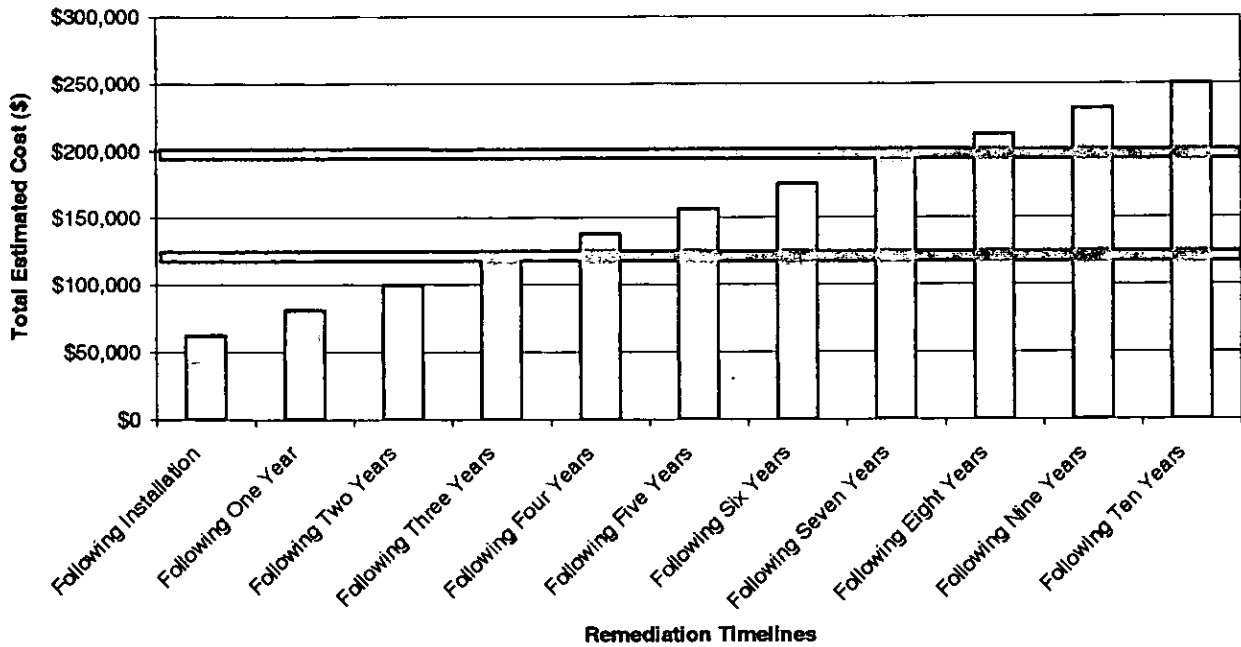
The following information is available on the following website:

Reference: Proposed Remedial Action Plan - RAP  
419 - 10<sup>th</sup> Avenue, Carstairs, AB

The estimated cost to conduct the drilling assessment would be approximately \$10,000. Stantec would provide a more detailed cost prior to commencing these activities.

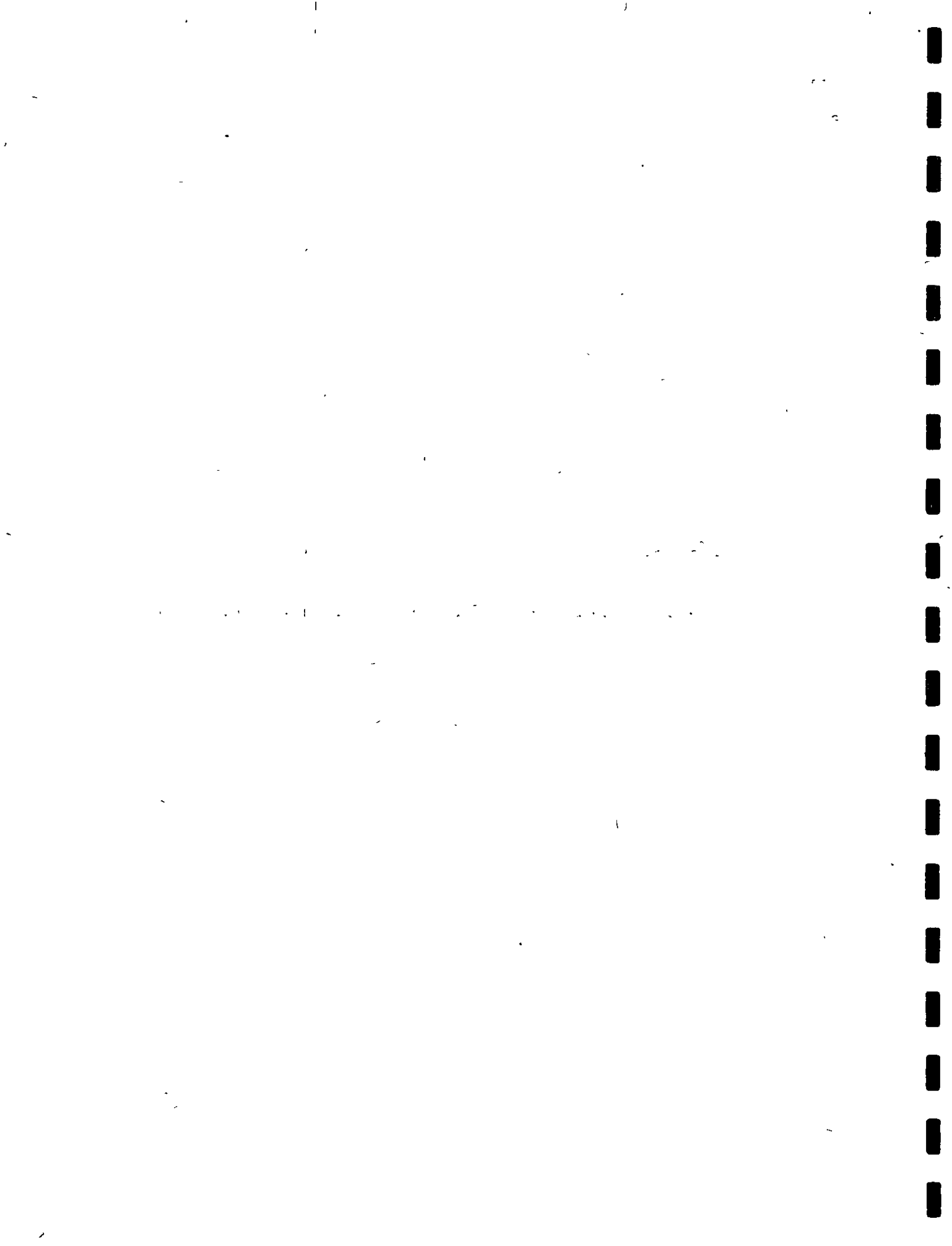
#### 4.4 Total Estimated Cost

It is difficult to provide a total estimated cost for an insitu system since the remediation timelines are unknown. It is anticipated that hydrocarbon concentrations would be reduced below the applicable guidelines following 3 to 7 years of operation. The following graphical interpretation presents the estimated total costs versus the remediation timeline, where the red lines indicate the estimated remedial timeline and associated cost range



#### 5.0 REPORTING

Stantec would provide Vaughn Wyant with monthly update letters on the operation and performance of the SVE system. Annual reports would be completed for the operation and performance of the remedial systems and the groundwater monitoring and sampling program. Stantec would provide reporting to the Safety Codes Council, Alberta Environment and affected third parties, as required.



June 29, 2005

Mr. Vaughn Wyant

Page 14 of 14

**Reference: Proposed Remedial Action Plan - RAP  
419 – 10<sup>th</sup> Avenue, Carstairs, AB**

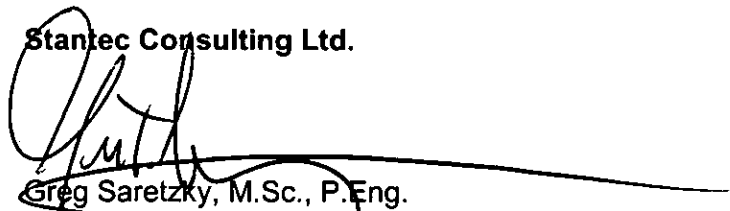
## **6.0 DISCUSSION**

Discussions should be held between Vaughn Wyant and Stantec to discuss the proposed remedial approach. Once a course of action has been agreed upon, discussions with the Safety Codes Council should be conducted. Discussions should also be held with the Town of Carstairs Infrastructure Department to get approval to complete the work required on 10<sup>th</sup> Avenue.

Should you have any comments or questions, please contact the undersigned at (306) 667-2400.

Sincerely,

**Stantec Consulting Ltd.**



**Greg Saretzky, M.Sc., P.Eng.**

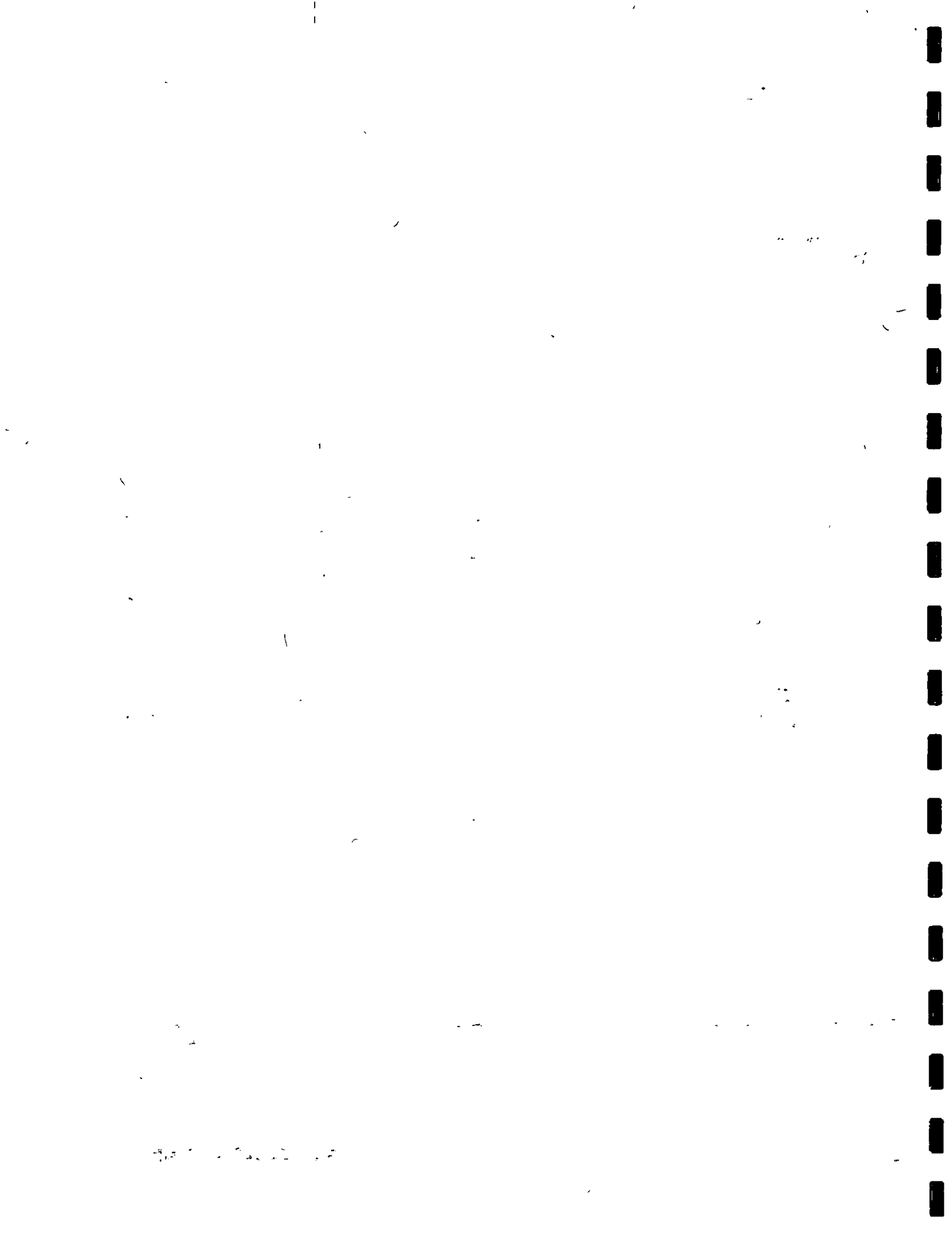
**Environmental Engineer**

Tel: 306-667-2456

Fax: 306-667-2500

[gsaretzky@stantec.com](mailto:gsaretzky@stantec.com)

cc- Steve Hoare, Safety Codes Council (2 Copies)





CARSTAIRS

**SUBJECT  
PROPERTY**



V:\active\11325299\environmental\_assessment\report\Final RAP and RMP Submissions\figure\_1\_rap.doc  
7.4.05.



**Stantec**

Client/Project

VAUGHN WYANT INVESTMENTS LTD.  
REMEDIAL ACTION PLAN  
419 - 10<sup>TH</sup> AVENUE, CARSTAIRS, AB

Figure No.

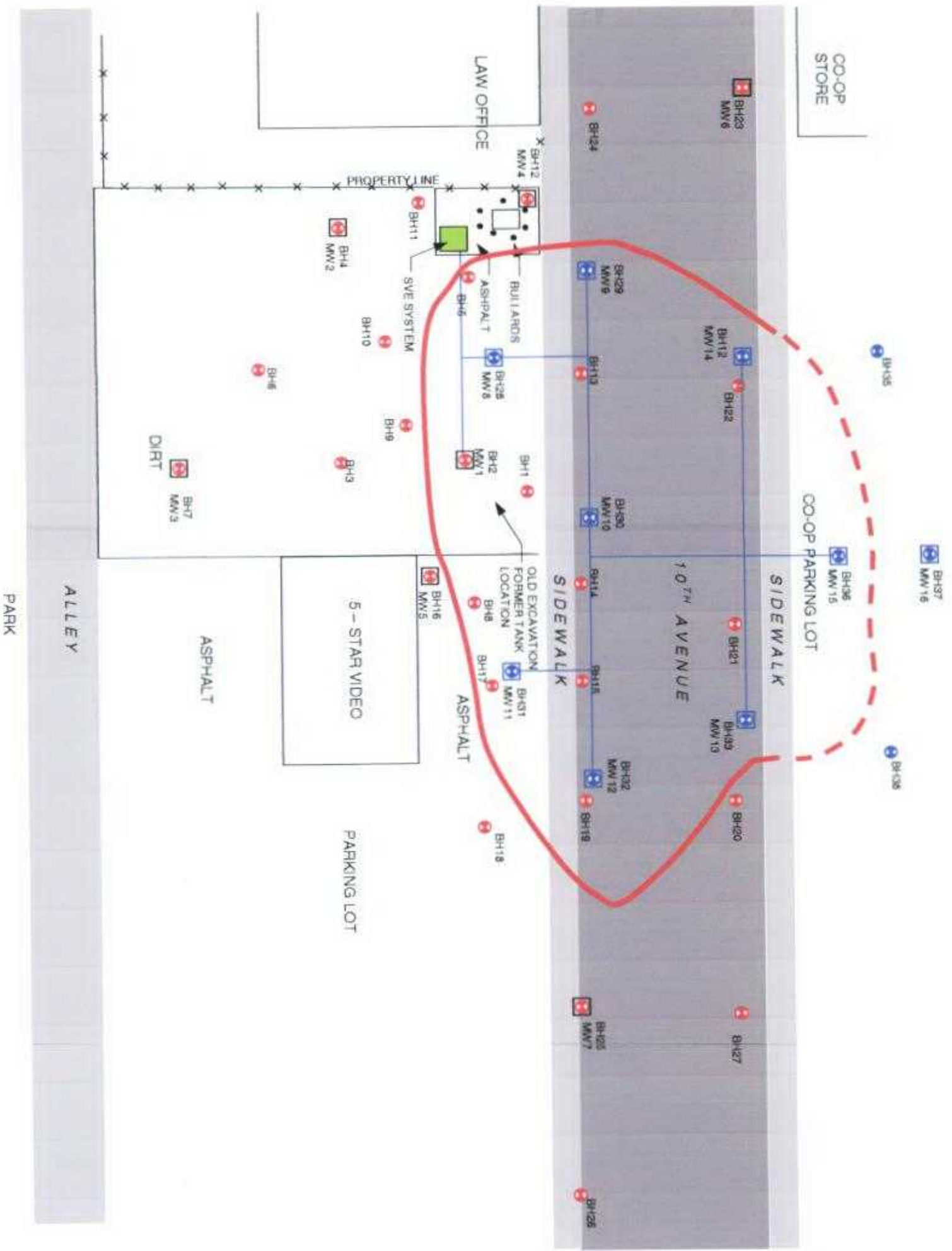
**1**

Title

**Site Location Map**



GROUNDWATER FLOW



V:\001\13262919\environmental\_assessment\report\Final RAR and RVR Submissions\Figure\_2\_LRP.doc  
7/4/05

Legend  
Taken from Petroleum Enviro Services, 2003

Legend

Legend



- Current Borehole Location
- Current Monitoring Well Location
- Proposed Borehole Location
- Proposed Monitoring Well Location
- Proposed Header Pipe



Stantec

Client/Project  
VAUGHAN WYANT INVESTMENTS LTD.  
REMEDIAL ACTION PLAN  
419 - 10<sup>TH</sup> AVENUE CARSTAIRS AB

Figure No  
**2**

Title  
**Site Plan and Proposed Remediation Layout**

Stantec Consulting Ltd.  
100 - 75 - 24th Street East  
Saskatoon SK S7K 0K3  
Tel: (306) 667-2400 Fax: (306) 667-2500  
stantec.com



**Stantec**

January 11, 2006  
File: 1132-52998.200

Vaughn Wyant Investments Ltd.  
419 Brand Place  
Saskatoon, SK S7J 5L6

**Attention: Vaughn Wyant**

Dear Mr. Wyant:

**Reference: Revised Remedial Action and Risk Management Plans - Addendum  
419 - 10<sup>th</sup> Avenue  
Carstairs, Alberta**

Stantec Consulting Ltd. is pleased to provide Vaughn Wyant Investments Ltd. with the following addendum to the revised remedial action and risk management plans, dated June 29, 2005. The addendum has been developed to provide a proactive monitor program for the drinking water at the Five Star Movies building, located at 419 - 10<sup>th</sup> Avenue in Carstairs, Alberta.

In addition to the tasks outlined in the remedial action plan, the drinking water located in the Five Star Movies will be sampled on a quarterly basis to assess the dissolved phase hydrocarbons including benzene, toluene, ethylbenzene and xylene (BTEX) and petroleum hydrocarbon fractions. Results of the sampling programs will be summarized to Alberta Environment in a quarterly letter. Additional remediation activities may be required if hydrocarbon concentrations are further observed.

Should you have any comments or questions, please contact the undersigned at (306) 667-2400.

Sincerely,

**STANTEC CONSULTING LTD.**

  
Greg Saretzky, M.Sc., P.Eng.  
Environmental Engineer  
Tel: (306) 667-2456  
Fax: (306) 667-2500  
gsaretzky@stantec.com

cc: Kim Kirilló (Alberta Environment), Steve Hoare (Safety Codes Council) and Jeanette Austin (Town of Carstairs)

190795





Regional Services  
Southern Region

2<sup>nd</sup> floor, Deerfoot Square  
2938 – 11 Street NE  
Calgary, Alberta  
Canada T2E 7L7

Alberta Centennial  
Telephone (403) 297-7605  
Fax: (403) 297-2749

July 13, 2005

Our File: 190795  
SCC Site # 9302

Vaughn Wyant  
Vaughn Wyant Investments Ltd  
419 Brand Place  
Saskatoon, Saskatchewan  
S7J 5L6

Dear Mr Wyant:

**Re: Remediation and Risk Management  
419 – 10 Avenue, Carstairs, Alberta**

Thank you for providing a revised remediation and risk management plan based on the comments of our June 14, 2005 letter. Alberta Environment has reviewed the following Stantec Consulting Ltd documents:

*Proposed Remedial Action Plan-Revised, 29 June 2005*  
*Proposed Risk Management Plan - Revised, 29 June 2005*

Alberta Environment accepts the above plans for remediation and risk management at the site.

The review presented in this letter is based on the remediation process and objectives presented in Alberta Environment's *Risk Management Guidelines for Petroleum Storage Tank Sites, October 2001*. This letter is not intended to absolve any party from the potential for future liability for remediating this site in situations where either the land use may change or additional concerns arise from the contaminants remaining on or off-site.

Should you wish further discussion, please contact me at (403) 297 – 8270.

Sincerely,



Kim Kirillo  
Petroleum Storage Tank Sites Specialist

cc: Steve Hoare, Safety Codes Council  
Greg Saretzky, Stantec Consulting



190795

***SAFETY CODES COUNCIL***

---

Underground Tank Remediation Program  
16<sup>th</sup> Floor, Commerce Place  
10155 – 102 Street  
Edmonton Alberta T5J 4L4

Tel: (780) 415-8666  
Fax: (780) 415-8664

**File # 00123-9302**

July 6, 2005

Alberta Environment  
3<sup>rd</sup> Floor Deerfoot Square  
2938 – 11 Street NE  
Calgary, AB T2E 7L7



Dear Kim Kirillo:

**Re: Revised Remedial Action Plan (RAP)/Risk Management Plan (RMP)  
Site 9302, Carstairs**

Enclosed for your review are copies of the RAP and RMP dated June 29, 2005.

We welcome any comments you have regarding the site.

Yours truly,

Steve Hoare  
Technical Coordinator

Enc.



**Stantec**

**Proposed Risk Management Plan -  
Revised**

**419 – 10<sup>th</sup> Avenue**

**Carstairs, AB**

Prepared For:  
Vaughn Wyant Investments Ltd.

Prepared By:  
Stantec Consulting Ltd.  
100 – 75 24<sup>th</sup> Street East  
Saskatoon, SK S7K 0K3  
[www.stantec.com](http://www.stantec.com)

June, 2005  
File: 1132-52998

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stantec.com



**Stantec**

June 29, 2005  
File: 1132-52998

Vaughn Wyant Investments Ltd.  
419 Brand Place  
Saskatoon, SK S7J 5L6

**Attention: Mr. Vaughn Wyant**

Dear Mr. Wyant:

**Reference: Proposed Risk Management Plan - Revised  
419 – 10<sup>th</sup> Avenue, Carstairs, AB**

Stantec Consulting Ltd. (Stantec) is pleased to provide Vaughn Wyant Investments Ltd. (Vaughn Wyant) with this letter presenting our revised risk management plan (RMP) for the property located at 419 – 10<sup>th</sup> Avenue in Carstairs, Alberta (Site). The RMP encompasses the Site, the adjacent Five Star Video property, a portion of 10<sup>th</sup> Avenue and the Co-op property located across 10<sup>th</sup> Avenue. The RMP has been designed to be a supplement to the previously completed remedial action plan (RAP), which was developed based on a request from Kim Kirillo at Alberta Environment. A Site location map and Site plan are provided in Figure 1 and Figure 2, respectively.

## **1.0 WORK TO DATE**

The following reports were reviewed prior to completing this RAP:

- Petroleum Enviro Services., May 2002. Phase II Hydrocarbon Environmental Site Assessment (ESA), 419 – 10th Avenue, Carstairs, Alberta.
- Petroleum Enviro Services., February 2003. Phase III Hydrocarbon Environmental Site Assessment (ESA) - Delineation, 419 – 10th Avenue, Carstairs, Alberta.
- Stantec Consulting Ltd., May 2005. Proposed Remedial Action Plan, 419 – 10<sup>th</sup> Avenue, Carstairs, Alberta.

Reference: Risk Management Plan  
419 - 10<sup>th</sup> Avenue, Carstairs, AB

Best Copy Available

## 2.0 SITE CONDITIONS

The upper subsurface geology at the Site consists of clay till and is relatively consistent across the Site. A sandy clay layer was identified at several locations throughout the Site (Petroleum Enviro Services, 2003).

Groundwater levels ranged from approximately 1.6 m below grade level (mBGL) to 3.8 mBGL during groundwater monitoring activities completed on February 4, 2003. The groundwater flow is generally towards the south and southwest based on the measured groundwater elevations (Petroleum Enviro Services, 2003).

Petroleum Enviro Services estimated the volume of petroleum hydrocarbon (PHC) impacted soils to be approximately 3,300 m<sup>3</sup> (Petroleum Enviro Services, 2003). The volume estimate is based on a limited number of boreholes drilled at the Site and an estimated value for the hydrocarbon impacted soil on the Co-op Food Store property without complete delineation.

Liquid phase hydrocarbon (LPH) was detected in monitoring well MW#1, observed as small droplets on the water surface during the February 4, 2003 groundwater monitoring event (Petroleum Enviro Services, 2003).

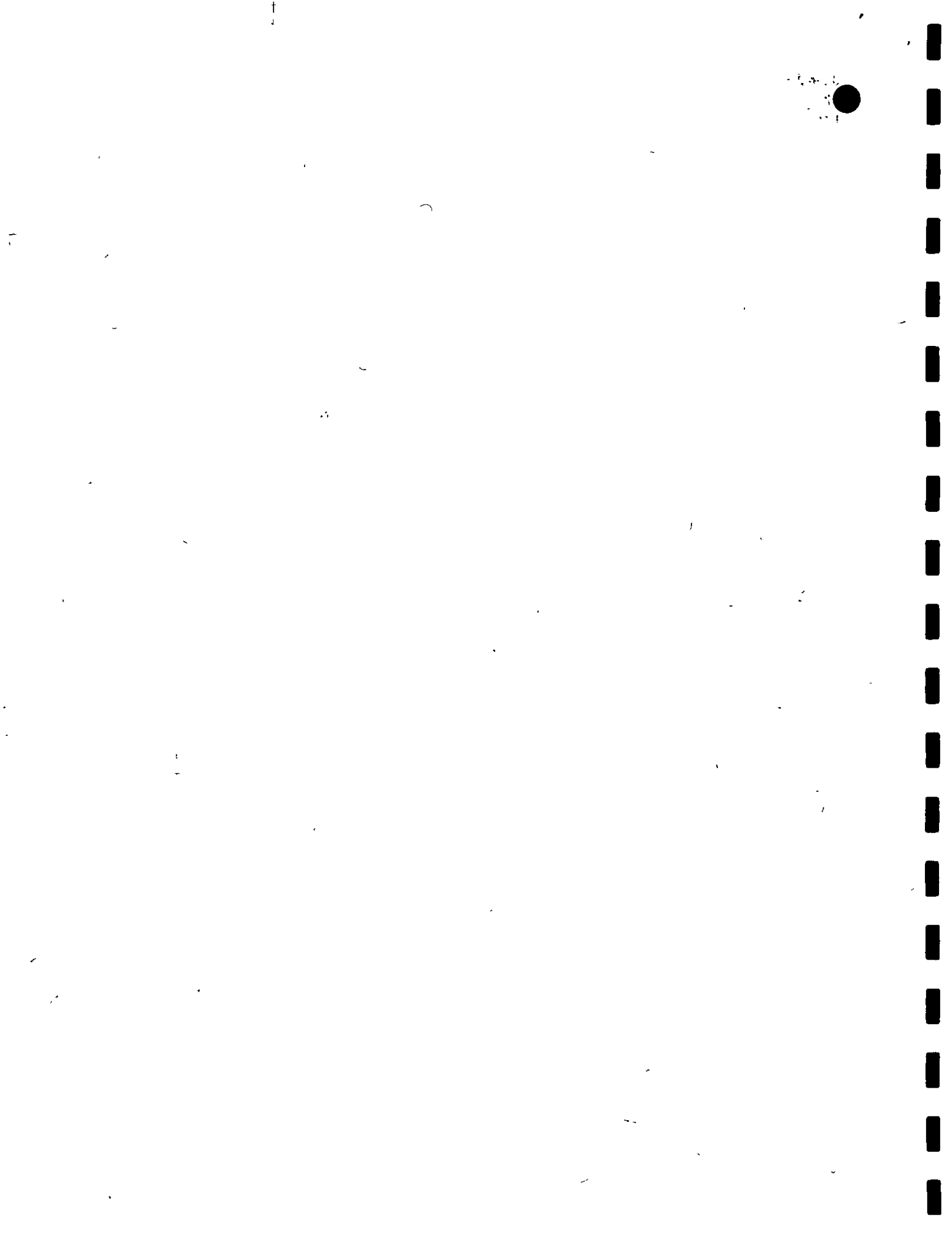
Groundwater samples were obtained from six monitoring wells on February 6, 2003 and analysed for benzene, toluene, ethylbenzene and xylene (BTEX) and petroleum hydrocarbon (PHC) Fractions F1 and F2. Monitoring well MW#1 displayed a benzene concentration that exceeded commercial criteria during the sampling event. The remaining five monitoring wells (MW#2, MW#3, MW#4, MW#5 and MW#6) displayed petroleum hydrocarbon concentrations below criteria.

Petroleum Enviro Services compared to soil and groundwater concentration to the Alberta Environment Risk Management Guidelines for Petroleum Storage Tanks, October 2001. Generic hydrocarbon guidelines for fine grained soils were used for comparison purposes.

## 3.0 REMEDIAL ACTION PLAN SUMMARY

A utility corridor assessment is required to determine the hydrocarbon concentrations that are potentially present along the water service connection line. The water service connection is located near the original source of the hydrocarbon impacts and is anticipated to represent the worst case area. Hydrocarbons situated along water lines have the potential to degrade the construction materials, which could result in hydrocarbons entering the water distributions system.

✓ Sewer  
consider  
impacted.  
>Comm



**Reference: Risk Management Plan  
419 – 10<sup>th</sup> Avenue, Carstairs, AB**

The utility assessment would consist of excavating a test pit above the service connection within the Site boundary and exposing the granular fill surrounding the water line. A soil sample will be collected from the fill and analysed for BTEX and PHC Fractions F1 to F4. The analytical results, along with the construction materials of the service connections, will be analysed to determine the associated risk to human health and safety. The following is a summary of the proposed remedial action plan, however, the plan may need to be revised if a higher human health risk is associated with the utility corridor.

Stantec conducted a detailed review of historical reports for the Site to determine which remedial option would be most viable at the Site. Options that were analysed included dual phase vacuum extraction (DPVE), soil vapour extraction (SVE) and excavation. It was determined that the operation of an SVE system would be the best remedial option given the site conditions and the presence of roadways and underground infrastructure.

Soil vapour extraction systems utilize vacuum technology to recover hydrocarbon vapours from the unsaturated zones. In addition, the movement of air through the unsaturated zone stimulates indigenous microorganisms to aerobically degrade petroleum hydrocarbons in the soil. The use of a SVE system does not directly recover LPH or dissolved phase petroleum hydrocarbons from the subsurface.

The SVE system would extract contaminants from eight to ten extraction wells located within the identified hydrocarbon plume. The extraction wells would also be used to control the pneumatic gradient to reduce the possibility of contaminant migration off the Site. The SVE system cannot effectively control the hydraulic gradients as it does not recover groundwater.

Remediation timelines cannot be estimated without conducting a SVE pilot study at the Site, however, it is estimated that hydrocarbon concentrations would be reduced below the applicable guidelines in approximately 3 to 7 years of operation. This estimate is based on Stantec's knowledge and experience in operating SVE systems in various types of subsurface conditions and various contaminant types. Stantec would be able to provide Vaughn Wyant with a more definitive remedial timeline, based on hydrocarbon recovery rates in comparison to an estimated hydrocarbon volume present at the Site prior to remediation, following approximately six months of SVE operations.

The use of an SVE system is an effective option to effectively remove hydrocarbon vapours and stimulate the microbial activity in the subsurface, however, is limited in its ability to address LPH. The SVE system has the ability to volatilize the LPH by formation airflow, but cannot directly remove the LPH since fluids are not recovered. Liquid phase hydrocarbons are not considered to be a significant concern at the Site since LPH was been identified as small droplets on the water table during past assessments. In addition, SVE operations cannot





**Reference: Risk Management Plan  
419 – 10<sup>th</sup> Avenue, Carstairs, AB**

address the dissolved phase hydrocarbons, however, groundwater concentrations would be expected to decline as the SVE system decreases the hydrocarbon concentrations in the soils.

An annual groundwater monitoring and sampling program would also be conducted to assess the dissolved phase hydrocarbon concentrations.

### **3.0 RISK MANAGEMENT PLAN**

The RMP has been developed using the Alberta Environment 'Review Checklist for Risk Management Plans', and addresses each point of the checklist individually. It is important to note that several points of the checklist are not relevant since were not relying solely on risk management, but rather active remediation by an SVE system.

Stantec has a significant amount of experience with insitu remediation systems such as the one proposed for the Site. We have designed and implemented insitu remediation systems at a wide range of sites, each presenting different contaminants and geological conditions. Stantec personnel managing this Site have been responsible for operation of over 50 insitu remediation systems operating at oil and gas facilities, rail yards, chemical facilities and retail fuel facilities.

#### **Section A – Is the Risk Management Plan Appropriate for Site Conditions?**

##### **1. Delineation is complete (soil and groundwater).**

The hydrocarbon impacts have not been fully delineated on the Co-op property, located across 10<sup>th</sup> Avenue, due to access restrictions to the area. The Co-op has indicated that they are in a litigation process with a contractor over the quality of the asphalt in their parking lot. The Co-op does not want any additional activities conducted on this asphalt parking lot until the litigation process is complete. A Co-op representative has indicated that obtaining access to the parking lot for drilling activities should not be a problem following the litigation process, which is anticipated to be completed within the next couple of months. Stantec has submitted a workplan to the Safety Codes Council, which will be conducted following approval from the Co-op.

##### **2. There is no liquid product (onsite or offsite).**

Liquid phase hydrocarbon was observed in monitoring well MW#1 as small droplets on the water surface during the February 4, 2003 groundwater monitoring event (Petroleum Enviro Services, 2003). The area surrounding monitoring well MW#1 is considered to be the source area, thus, LPH is not anticipated to consist of more than small droplets. The operation of the SVE system is an active remediation procedure that has the ability to volatilize the small LPH droplets.

100  
100  
100



Reference: Risk Management Plan  
419 – 10<sup>th</sup> Avenue, Carstairs, AB

**3. There are no heavily impacted soils present in the source area(s) that may limit the effectiveness of the risk management strategy.**

Elevated residual hydrocarbon concentrations have been observed in areas surrounding the source, however, the actual source area has been removed during past activities. The RAP proposes that a SVE system be implemented with recovery wells near the source area to effectively reduce the residual hydrocarbon concentrations. Soil vapour extraction systems have been successfully proven to be an effective insitu remedial option for addressing the source area of highly volatile gasoline impacts.

**4. If liquid product and/or heavily impacted soils are present (2 and 3 above), is there are remedial component to deal with it.**

The RAP was designed to address the small droplets of LPH and the elevated residual hydrocarbon concentrations.

**5. The identified contamination is unlikely to cause adverse effect to third parties (including adjacent landowners, groundwater users and buried infrastructure). Supporting rationale must be provided. If adverse effect is likely, a remedial response is required under EPEA.**

The identified hydrocarbon impacts are not anticipated to cause adverse effects to third parties. No permanent surface water bodies are present within 300 m of the Site, which eliminates the protection of aquatic life. The Town receives their water supply from a groundwater well located approximately 1.8 km south of the Site, thus, groundwater ingestion is not anticipated to be a concern. } website

Possible exposure pathways at the Site include indoor, soil ingestion and soil dermal contact, however, areas that displayed elevated vapour readings are overlaid by cement or asphalt which greatly reduces the risk of soil contact or soil ingestion. The presence of impacted soil within 10<sup>th</sup> Avenue could be a potential risk to workers during excavation within the roadway or repairing underground utilities.

It is possible that hydrocarbon impacts could cause adverse effects to buried infrastructure, however, based on the concentrations observed within 10<sup>th</sup> Avenue, the associated risk is considered low. The active remediation utilizing the SVE system is the most viable method of reducing hydrocarbon concentrations in the vicinity of the utility corridors. A utility corridor assessment will be conducted prior to implementing the RAP activities to determine the associated health and safety risk associated with the hydrocarbons and the underground water service connection.

*Rem plan for utilities*

Reference: Risk Management Plan  
419 – 10<sup>th</sup> Avenue, Carstairs, AB

The hydrocarbon impacts on the adjacent Co-op property have not been fully delineated, thus, adverse effects cannot be completely evaluated. It is Stantec's opinion that the hydrocarbon impacts exceeding the applicable guidelines will be limited to a small portion the Co-op property, based on an analysis of the laboratory results from past drilling assessments. Hydrocarbon impacts on the adjacent Co-op property are not anticipated to have an adverse effect to third party since potentially sensitive receptors are not present.

**6. Water use restrictions will not be required in the short or long term.**

The Town water supply is from a water well that is located approximately 1.8 km south of the Site, which does not have the potential to be affected by the hydrocarbon impacts. }?

An assessment of utility corridor surrounding the water line service connection at the Site will be conducted to determine if hydrocarbon impacts have migrated along the utility corridor. Hydrocarbons situated around underground utilities have the potential to degrade the infrastructure, which could ultimately allow hydrocarbons to enter the water distribution system. The utility corridor assessment proposed in the RAP will provide sufficient information to assess the health and safety risk associated with the hydrocarbons and the water supply line. ✓

**7. There are no cost effective and/or practical remedial alternatives.**

Not applicable. A cost effective remedial solution, which consists of a SVE system, was provided in the RAP.

**Section B – Have the necessary stakeholder commitments been obtained?**

**8. Written approval from all potentially affected third-parties has been provided.**

Written approval has not been obtained by potentially affected third parties. Stantec will be sending out a letter to each of the parties with the RAP and RMP attached upon receiving approval from Alberta Environment. The approval to proceed with this project will be pending approvals from the third parties.

**9. The owner has committed to maintaining the risk management plan indefinitely or until compliance with the governing risk management objectives has been demonstrated (i.e. beyond the timeframe estimated by the consultant, if necessary).**

The owner of the Site has committed to maintaining the activities proposed in the previously submitted RAP until compliance with the applicable guidelines. A letter has

**Reference: Risk Management Plan  
419 – 10<sup>th</sup> Avenue, Carstairs, AB**

been sent by Vaughn Wyant to Alberta Environment demonstrating the owners commitment. ✓

**10. All land use restrictions and/or institutional controls have been clearly communicated to the affected stakeholders.**

Currently, no land use restrictions should be imposed on the affected stakeholders. Each stakeholder will be provided with a copy of the RAP and RMP, which will identify the hydrocarbon impacts associated with their property.

The Town of Carstairs is aware of the hydrocarbon impacts beneath 10<sup>th</sup> Avenue and will be provided with a copy of the RAP and RMP. An administrative control will be filed with the Town to provide a notification of the hydrocarbon impacts present beneath the street should future ground disturbance activities be conducted. The control would include a plan for proper handling and disposal of the hydrocarbon impacted soil. ✓

**Section C – Is the proposed risk management plan technically and financially adequate?**

**11. The risk management plan is adequate to:**

- **Protect human health and environment through the program. Supporting rationale must be provided in all cases.**

Yes. The operation of the SVE system will actively address the residual and vapour phase hydrocarbons. Operation of the SVE system will result in controlling the migration of vapour phase hydrocarbons. Vapours will be drawn towards the recovery wells, which will be positioned to effectively reduce the footprint of the hydrocarbon impacts. The gradient provided by the SVE system will also reduce the potential for hydrocarbons to migrate to the surface.

The utility corridor assessment will provide adequate information to assess the health and safety risk associated with the hydrocarbons and the underground water supply line.

- **Monitor vapour concentrations near buildings.**

Yes. Monitoring wells are located outside the hydrocarbon impacted area, which will act as monitoring points to determine if hydrocarbon vapours have migrated towards any buildings. Surrounding wells will be monitored for combustible vapour concentrations during monthly site visits. It is not anticipated that hydrocarbon vapours will migrate away from the identified hydrocarbon impacts once the SVE system is operational.

Reference: Risk Management Plan  
419 – 10<sup>th</sup> Avenue, Carstairs, AB

- **Prevent worsening of offsite conditions.**

Yes. Active remediation by the SVE system provides a method of not only preventing the worsening of offsite conditions, but also reducing the hydrocarbon concentrations.

- **Monitor onsite and offsite conditions.**

Yes. The monthly monitoring has been addressed in the RAP. Monitoring will consist of evaluating the operation of the SVE system and surrounding monitoring wells to assess potential subsurface vapour migration.

- **Manage contamination if disturbed by future activities (eg. excavation).**

Yes. The affected stakeholders will be notified prior to commencing with the activities defined in the RAP. The stakeholders will also be informed that prior to disturbing potentially impacted soil, discussions should be held with the owner to develop a plan to manage the impacted soils.

- **Notify future affected parties of site conditions.**

It is not anticipated that additional parties will be adversely affected by the hydrocarbon impacts once the SVE system has been installed. If vapour monitoring activities suggest that the hydrocarbon impacts have further migrated, additional assessment activities may be required and notification of affected parties would be conducted.

**12. The plan includes adequate contingency measures to:**

- **Respond to adverse changes in site conditions.**

Yes. The monthly monitoring program will identify adverse changes in the conditions of the Site. Adverse changes will be dealt with by the addition of recovery wells and additional delineating, if required.

- **Implement alternate risk management measures if contaminant concentrations are not decreasing with time or the plume is not stable.**

The RAP proposes to conduct an active remediation program utilizing and SVE system, which will result in hydrocarbon concentrations decreasing with time. In the event that a reduction in hydrocarbon concentrations is not evident, additional enhancement technologies may be required to optimize the SVE system. Such enhancement technologies could include pneumatic fracturing, air sparging or nutrient injection.

**Reference: Risk Management Plan  
419 – 10<sup>th</sup> Avenue, Carstairs, AB**

- **Initiate renewed stakeholder consultations.**

Stakeholder communications will be renewed in the event that a change in hydrocarbon impacts occur which has the potential to adversely affect the stakeholder.

- 13. The scope and frequency of the monitoring program is adequate to assess the effectiveness of the risk management plan and enable a proactive response to changes in environmental conditions.**

Yes. The monthly monitoring of the SVE system and surrounding wells will provide adequate information to assess the effectiveness of the active remediation program and the risk management program. The information will be used to proactively address the site conditions and respond to any adverse affects resulting from the hydrocarbon impacts.

- 14. The monitoring program is adequate to demonstrate the effectiveness of any institutional controls that were put in place to protect potential receptors.**

Yes. The monthly monitoring program will adequately assess the effectiveness of the SVE system, which has been installed to protect potential receptors and remediate the Site.

- 15. The future cost of risk management has been adequately estimated.**

Yes. A detailed cost of the proposed program has been provided in the RAP.

- 16. A closure plan (and costs) has been provided to demonstrate compliance with the governing risk management objectives.**

The proposed RAP indicates that a delineation drilling program would be required following the remediation program to provide closure for the Site and provides associated costs.

- 17. The plan includes a clearly defined monitoring schedule with reporting, as needed, to Alberta Environment and any affected stakeholders.**

Yes. The monitoring and reporting schedules are outlined in the RAP.

**Section D – Additional requirements specific to monitored natural attenuation (MNA) or other risk management methods that rely on natural attenuation processes.**

- 18. The plan includes source removal (considered to include liquid product and heavily impacted soil) in accessible areas.**

Reference: Risk Management Plan  
419 – 10<sup>th</sup> Avenue, Carstairs, AB

The source and the impacted soils in the immediate vicinity have been removed during past remedial activities. The proposed RAP is to operate an SVE system which would be an effective solution to remove the remaining residual and liquid phase hydrocarbons.

**19. Historical data has been provided to demonstrate that natural attenuation processes are occurring.**

Not applicable since the proposed RAP is to actively remediate the Site and surrounding impacted areas. The proposed RAP does not include natural attenuation processes to remediate the hydrocarbon impacts.

**20. If historical data are not available, a suitable trial program has been proposed to determine if natural attenuation will be effective the site. This program should include specific hydrogeological or geochemical indicator parameters of natural attenuation.**

Not applicable since natural attenuation processes are not being used to remediate the hydrocarbon impacts.

**21. The plan will address hydrocarbon contamination within the vadose zone.**

Soil vapour extraction systems have been proven to effectively address hydrocarbon impacted soil in the vadose zone.

**22. The performance monitoring program is adequate to demonstrate that natural attenuation is occurring according to expectations.**

Not applicable since natural attenuation processes are not be used to remediate the hydrocarbon impacts.

**23. Natural attenuation is occurring (or expected to occur) at a rate that will achieve the desired endpoints in a reasonable period of time (10 to 15 years).**

Not applicable since active remediation using a SVE system is proposed to accelerate the remedial timelines.

**24. An appropriate timeframe has been used to estimate costs and evaluate natural attenuation vis-a-vis the alternatives.**

Not applicable since natural attenuation processes are not be used to remediate the hydrocarbon impacts.

**25. The risk management plan is sufficiently well developed technically.**



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**Reference: Risk Management Plan  
419 – 10<sup>th</sup> Avenue, Carstairs, AB**

Yes. The proposed remedial strategy outlined in the RAP has been proven at several sites to be a viable remedial solution.

**26. The plan includes contingency measures for more aggressive risk management if the proposed natural attenuation program is found to be ineffective.**

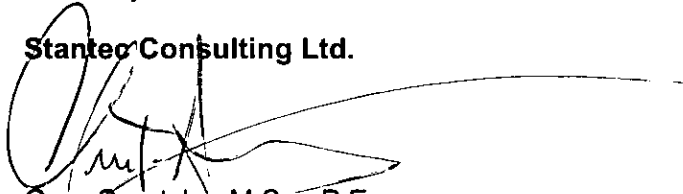
Not applicable since active remediation techniques are already proposed to remediate the hydrocarbon impacts.

**5.0 DISCUSSION**

Should you have any comments or questions, please contact the undersigned at (306) 667-2400.

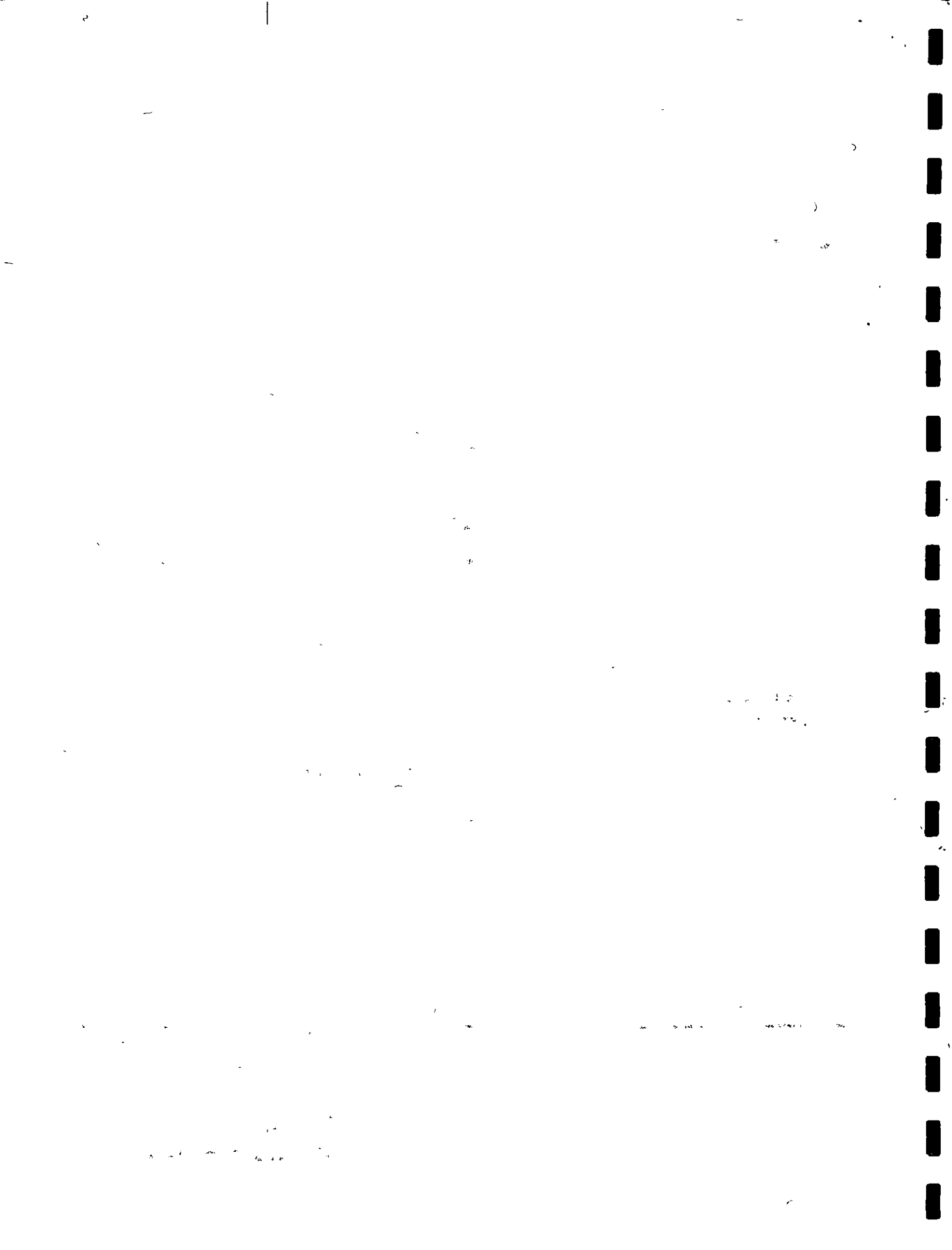
Sincerely,

**Stantec Consulting Ltd.**



Greg Saretzky, M.Sc., P.Eng.  
Environmental Engineer  
Tel: 306-667-2456  
Fax: 306-667-2500  
[gsaretzky@stantec.com](mailto:gsaretzky@stantec.com)

cc – Steve Hoare, Safety Codes Council (2 Copies)





**SUBJECT  
PROPERTY**





GROUNDWATER FLOW



Legend

Taken from Petroleum Enviro Services, 2003

Legend

- Current Borehole Location
- Current Monitoring Well Location
- Proposed Borehole Location
- Proposed Monitoring Well Location
- Proposed Header Pipe

Legend



Stantec

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7.4.05



Client/Project

VAUGHN WYANT INVESTMENTS LTD.  
RISK MANAGEMENT PLAN  
419 - 10<sup>TH</sup> AVENUE CARSTAIRS, AB

Figure No

2

Title

Site Plan and Proposed  
Remediation Layout



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 TANK PROGRAM

<b>1 REPORT AND FORM INFORMATION</b>			
Title of report	2009 Insitu Bioremediation Program, 419 - 10 <sup>th</sup> Avenue, Carstairs, Alberta		
Report date (dd-mon-yyyy)	January 2010	Record of Site Condition (RSC) ID No. <sup>ψ</sup>	

<b>2 SITE IDENTIFICATION AND PHYSICAL LOCATION</b>								
<b>2.1 Site name</b>		Commercial Building						
<b>2.2 Address of site</b>		419 - 10th Avenue, Carstairs, Alberta						
		<b>Municipality</b>	Mountain View County				Alberta	
<b>2.3 Legal land description of site (if multiple, list all.)</b>								
Plan, Block, Lot (PBL)			Alberta Township System (ATS)					
Plan	Block	Lot	LSD	Quarter	Section	Township	Range	Meridian
3845CO	28	5,6,7,8						

<b>3 STAKEHOLDERS</b>			
<b>3.1 Operator</b>			
Company	Vaughn Wyant Investments	Contact person	Vaughn Wyant
Mailing address	419 Brand Place Saskatoon, SK S7J 5L6	Position held	Owner
		Business phone No.	306-373-4444
		Business fax No.	
		Business e-mail	vaughnw@jubileeford.com
<b>3.2 Consultant</b> <input type="checkbox"/> Not applicable			
Company	Stantec Consulting Ltd.	Contact person	Jeremy Lang
Mailing address	100 - 75 24 <sup>th</sup> Street East Saskatoon, SK S7K 0K3	Position held	Senior Associate
		Business phone No.	306-667-2462
		Business fax No.	306-667-2500
		Business e-mail	jeremy.lang@stantec.com
<b>3.3 Landowner(s)</b>			
Land type	<input checked="" type="checkbox"/> Private <input type="checkbox"/> Special Areas <input type="checkbox"/> Parks and protected area <input type="checkbox"/> Public (if not private, provide Disposition No.: _____)		
Landowner(s)	<input checked="" type="checkbox"/> Same as operator <input type="checkbox"/> Other		

<sup>ψ</sup>: Do not fill in. Reserved for internal administrative purposes only.



# RECORD OF SITE CONDITION

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<b>3.4 Occupant(s)</b>			
Are there occupants at the site?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> To be determined (TBD)
Occupant(s)	<input type="checkbox"/> Same as operator	<input type="checkbox"/> Same as landowner	<input checked="" type="checkbox"/> Other
What is the type of occupancy?	<input type="checkbox"/> Apartment building	<input type="checkbox"/> Town house	<input type="checkbox"/> Single detached house
	<input type="checkbox"/> Agricultural	<input type="checkbox"/> Industrial	<input checked="" type="checkbox"/> Commercial
	<input type="checkbox"/> Other (specify) _____		

<b>4 OPERATING STATUS</b>			
<input type="checkbox"/> Operating	<input type="checkbox"/> Suspended	<input type="checkbox"/> Abandoned	<input type="checkbox"/> Decommissioning in progress
<input type="checkbox"/> Reclaimed (provide Reclamation Certificate No.(s): _____)			<input checked="" type="checkbox"/> Not applicable
<input type="checkbox"/> Closed			

## 5 TYPE OF ACTIVITY AND SITE

<b>5.1 Petroleum Storage Tank Site</b>	<input checked="" type="checkbox"/> Yes
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<b>5.1.1 AENV file No.(s)</b>	9302	<b>PTMAA site No.</b>	
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<b>5.1.2 Types of activity</b>			
<input checked="" type="checkbox"/> Retail gas station	<input type="checkbox"/> Aviation fuelling station	<input type="checkbox"/> Bulk fuel	<input type="checkbox"/> Other (specify): _____

<b>5.2 Upstream Oil and Gas Facility</b>	<input type="checkbox"/> Yes
--	------------------------------

<b>5.2.1 AENV file No.(s)</b>		<b>ERCB authorization No.(s)</b>	
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<b>5.2.2 ERCB authorization type</b>	<input type="checkbox"/> Approval	<input type="checkbox"/> License	<input type="checkbox"/> Permit	<input type="checkbox"/> Order	<input type="checkbox"/> Other (specify) _____
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<b>5.2.3 Types of activity</b>					
<input type="checkbox"/> Wellsite and associated facility	<input type="checkbox"/> Satellite	<input type="checkbox"/> Battery	<input type="checkbox"/> Pipeline		
<input type="checkbox"/> Compressor and pumping station	<input type="checkbox"/> Other (specify): _____				

<b>5.3 Approved Facility Under Environmental Protection and Enhancement Act (EPEA)</b>	<input type="checkbox"/> Yes
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<b>5.3.1 AENV approval No.(s)</b>	
-----------------------------------	--

<b>5.3.2 Types of approved activity</b>					
<input type="checkbox"/> Chemical manufacturing plant	<input type="checkbox"/> Enhanced recovery in-situ oil sands or heavy oil processing plant	<input type="checkbox"/> Fertilizer manufacturing plant	<input type="checkbox"/> Landfill		
<input type="checkbox"/> Metal manufacturing plant	<input type="checkbox"/> Oil refinery	<input type="checkbox"/> Oilsands processing plant	<input type="checkbox"/> Oil production site		
<input type="checkbox"/> Pesticide manufacturing plant	<input type="checkbox"/> Petrochemical manufacturing plant	<input type="checkbox"/> Pipeline	<input type="checkbox"/> Power plant		
<input type="checkbox"/> Pulp and paper processing plant	<input type="checkbox"/> Sour gas processing plant	<input type="checkbox"/> Sulphur manufacturing or processing plant	<input type="checkbox"/> Waste management facility		
<input type="checkbox"/> Wood treatment plant	<input type="checkbox"/> Other (specify): _____				

Attached to  
[unclear]



# RECORD OF SITE CONDITION

<b>5.4 Facility Under EPEA Code of Practice</b>		<input type="checkbox"/> Yes	
<b>5.4.1 AENV registration No.(s)</b>			
<b>5.4.2 Type of Code of Practice</b>			
<input type="checkbox"/> Asphalt paving plant	<input type="checkbox"/> Compressor and pumping station	<input type="checkbox"/> Concrete producing plant	<input type="checkbox"/> Landfill
<input type="checkbox"/> Pesticides	<input type="checkbox"/> Pipeline	<input type="checkbox"/> Land treatment of soils containing hydrocarbons	<input type="checkbox"/> Sand and gravel pit
<input type="checkbox"/> Small incinerator	<input type="checkbox"/> Sweet gas processing plant	<input type="checkbox"/> Other (specify): _____	
<b>5.5 Other Activity</b>		<input type="checkbox"/> Yes	
<b>5.5.1 AENV file No.(s)</b>	<b>Other site ID No.(s)</b>	<b>Authorized by</b>	
<b>5.5.2 Types of activity</b>			
<input type="checkbox"/> Dry cleaning operation	<input type="checkbox"/> Highway maintenance yard	<input type="checkbox"/> Transportation	
<input type="checkbox"/> Other (specify): _____			

<b>6 SITE CHARACTERIZATION</b>			
<b>6.1 What Environmental Site Assessments (ESA) Have Been Conducted and Completed to Date?</b>			
<input type="checkbox"/> Phase I ESA <input checked="" type="checkbox"/> Phase II ESA (check all that apply.) <input checked="" type="checkbox"/> Initial intrusive sampling <input type="checkbox"/> delineation completed <input checked="" type="checkbox"/> post-remediation monitoring <input type="checkbox"/> final confirmatory sampling			
<b>6.2 Contaminants of Potential Concern (COPC)</b>			
<b>6.2.1 Does the site have any of the conditions that require the mandatory use of Alberta Tier 2 Soil and Groundwater Remediation Guidelines (2008), as amended? (check all that apply in Section 6.2.1.1.)</b>			
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (→ proceed to Section 6.2.2.)			
<b>6.2.1.1 Identify any conditions that require the approaches of the Alberta Tier 2 guidelines. (see Alberta Tier 1 Soil and Groundwater Remediation Guidelines (2008), as amended, for details.)</b>			
<input type="checkbox"/> Contamination within 30 cm of building foundation	<input type="checkbox"/> Unusual building feature (eg. earthen floor)	<input type="checkbox"/> Contamination within 10 m distance of surface water body	
<input type="checkbox"/> Fractured bedrock	<input type="checkbox"/> Potentially high hydraulic conductivity (> 10 <sup>-5</sup> m/sec.)	<input type="checkbox"/> Other (see Alberta Tier 1 guidelines and specify): _____	
<b>6.2.1.2 Did the Alberta Tier 2 approach lead to a soil or groundwater guideline that was lower than the corresponding Tier 1 guideline for the same contaminant(s)?</b>			
<input type="checkbox"/> Yes <input type="checkbox"/> TBD <input type="checkbox"/> No (→ proceed to Section 6.2.2.)			
<b>6.2.1.3 If you answered 'yes' or 'TBD' to Section 6.2.1.2, identify the group of contaminants for each COPC with a mandatory Tier 2 guideline that is lower than the corresponding Tier 1 guideline (check all that apply, see Alberta Tier 1 guidelines, Tables 1-4 for detailed listing).</b>			
<input type="checkbox"/> General and inorganic parameters	<input type="checkbox"/> Metals		
<input type="checkbox"/> Hydrocarbons	<input type="checkbox"/> Halogenated aliphatics		
<input type="checkbox"/> Chlorinated aromatics	<input type="checkbox"/> Pesticides		
<input type="checkbox"/> Other organics	<input type="checkbox"/> Radionuclides		
<input type="checkbox"/> Salt	<input type="checkbox"/> Other (specify): _____		



## RECORD OF SITE CONDITION

<b>6.2.1.4</b> Did any past or current ESA relevant to this investigation identify an exceedance of the mandatory Tier 2 guidelines referred to in Section 6.2.1.3 (e.g. Tier 2 guidelines that are lower than the corresponding Tier 1 guidelines)?		<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> TBD
<b>6.2.1.5</b> If you answered 'yes' in Section 6.2.1.4, have all relevant COPC been remediated to meet the mandatory Tier 2 guidelines?		<input type="checkbox"/> Yes	<input type="checkbox"/> No	
<b>6.2.2.</b> Did any past or current ESA relevant to this investigation identify a drilling waste disposal area?				
		<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No (→proceed to Section 6.2.3.)	
<b>6.2.2.1</b> If a drilling waste disposal area was identified, did any past or current ESA identify non-compliance with the compliance options outlined in <i>Assessing Drilling Waste Disposal Areas: Compliance Options for Reclamation Certification</i> (AENV, 2007), as amended?				
		<input type="checkbox"/> Yes	<input type="checkbox"/> No	
<b>6.2.2.2</b> If you answered 'yes' in Section 6.2.2.1, have all COPC been remediated to meet the compliance options outlined in <i>Assessing Drilling Waste Disposal Areas: Compliance Options for Reclamation Certification</i> (AENV, 2007), as amended?				
		<input type="checkbox"/> Yes	<input type="checkbox"/> No	
<b>6.2.2.3</b> For any COPC that did not meet the compliance options in <i>Assessing Drilling Waste Disposal Areas</i> , identify the group of contaminants (check of all that apply, see the Alberta Tier 1 guidelines, Tables 1-4 for detailed listing).				
<input type="checkbox"/>	General and inorganic parameters	<input type="checkbox"/>	Metals	
<input type="checkbox"/>	Hydrocarbons	<input type="checkbox"/>	Halogenated aliphatics	
<input type="checkbox"/>	Chlorinated aromatics	<input type="checkbox"/>	Pesticides	
<input type="checkbox"/>	Other organics	<input type="checkbox"/>	Radionuclides	
<input type="checkbox"/>	Salt	<input type="checkbox"/>	Other (specify): _____	
<b>6.2.3</b> For all areas and COPCs not assessed under Sections 6.2.1 or 6.2.2, did any ESA relevant to this investigation identify an exceedance over the Alberta Tier 1 guidelines?				
		<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No (→proceed to Section 6.3.)	
<b>6.2.3.1</b> If you answered 'yes' in Section 6.2.3, have all COPC been remediated to meet the Alberta Tier 1 guidelines?				
		<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> TBD
<b>6.2.3.2</b> For any COPC that exceeded Alberta Tier 1 guidelines in Section 6.2.3.1, identify the group of contaminants. (check all that apply, see the Alberta Tier 1 guidelines, Tables 1-4 for detailed listing.)				
<input type="checkbox"/>	General and inorganic parameters	<input type="checkbox"/>	Metals	
<input checked="" type="checkbox"/>	Hydrocarbons	<input type="checkbox"/>	Halogenated aliphatics	
<input type="checkbox"/>	Chlorinated aromatics	<input type="checkbox"/>	Pesticides	
<input type="checkbox"/>	Other organics	<input type="checkbox"/>	Radionuclides	
<input type="checkbox"/>	Salt	<input type="checkbox"/>	Other (specify): _____	



<b>6.3 Status of Investigation</b>	
<b>6.3.1 Identify soil and groundwater guidelines used to assess the COPCs that are the subject of this investigation</b> (check all that apply).	
<input checked="" type="checkbox"/> Alberta Tier 1 Soil and Groundwater Remediation Guidelines – 2008, as amended <input checked="" type="checkbox"/> Coarse grained <input type="checkbox"/> Fine grained	
<input type="checkbox"/> Alberta Tier 2 Soil and Groundwater Remediation Guidelines – 2008, as amended <input type="checkbox"/> Pathway exclusion <input type="checkbox"/> Guideline adjustment <input type="checkbox"/> Site specific remediation objectives	
<input type="checkbox"/> Assessing Drilling Waste Disposal Areas: Compliance Options for Reclamation Certification (AENV, 2007), as amended	
<input type="checkbox"/> Other (specify): _____	
<b>6.3.2 What land use classification(s) is used?</b>	
<input type="checkbox"/> Natural <input type="checkbox"/> Agricultural <input type="checkbox"/> Residential <input checked="" type="checkbox"/> Commercial <input type="checkbox"/> Industrial <input type="checkbox"/> Other (specify: _____)	
<b>6.3.3 What is the outcome of the investigation?</b> (check one only.)	
<input type="checkbox"/> For all COPCs on-site and off-site, no exceedance has been found above any applicable soil and groundwater guidelines in any prior and current assessments.	
<input type="checkbox"/> All contamination on-site and off-site has been completely remediated and meets the applicable soil and groundwater guidelines.	
<input checked="" type="checkbox"/> One or more COPC still exceeds the applicable soil or groundwater guidelines.	
<b>6.3.4 How many contaminated areas are there currently at the site?</b>	
<u>1</u> <input type="checkbox"/> None <input type="checkbox"/> TBD	
<b>6.3.5 Are all contaminated areas and potential contaminated areas assessed during this investigation?</b>	
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
<b>6.3.6 For all areas of potential environmental concern, list the dates when the contamination was discovered</b> (specify dd-mon-yyyy): <u>May 2002</u> ; _____	
<b>6.3.7 For all areas that have been identified in Section 6.3.4, have all substance releases been reported to AENV?</b>	
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable	
<b>6.3.8 If the answer to Section 6.3.7 is 'yes', list all Incident No.(s)</b> (attach separate sheet if necessary): _____ ; _____ <input checked="" type="checkbox"/> Not assigned	
<b>6.3.9 What is the approximate, cumulative amount of land area remaining exceeding applicable remediation guidelines?</b>	
<u>2500</u> (m <sup>2</sup> ) <input type="checkbox"/> None <input type="checkbox"/> TBD	
<b>6.3.10 Is there non-aqueous phase liquid (NAPL) product remaining on site?</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> TBD
<b>6.3.11 Is there non-aqueous phase liquid (NAPL) product remaining off site?</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> TBD
<b>6.3.12 What is the remediation status of the contaminated areas at site?</b>	
<input type="checkbox"/> No remediation required	<input type="checkbox"/> Site has exceedance but no remediation plan
<input checked="" type="checkbox"/> Remediation plan developed	<input checked="" type="checkbox"/> Active remediation
<input type="checkbox"/> Remediation completed	<input type="checkbox"/> Post remediation assessment completed
<input type="checkbox"/> Ongoing risk management plan – on-site	<input type="checkbox"/> Ongoing risk management plan – off-site
<input type="checkbox"/> Remediation Certificate issued for some area(s) (provide Remediation Certificate No.(s): _____)	
<input type="checkbox"/> Remediation Certificate cancelled for some area(s) (provide Remediation Certificate No.(s): _____)	



### Direction for Completing the Remainder of the Form

Attach the analytical summary tables of the COPCs that are the subject of this investigation and still present at this site. A detailed listing of COPCs can be found with Tables 1-4 in *Alberta Tier 1 Soil and Groundwater Remediation Guidelines* (AENV, 2008), as amended. Refer to the *RSC User's Guide* for detailed information on format and other requirements regarding the summary table.

For the remainder of the form, follow the directions below:

- If the COPCs on-site and off-site have never exceeded any applicable soil and groundwater guidelines in any prior and current assessments, → proceed to Section 8, or
- If the COPCs on-site and off-site have been completely remediated and meet the applicable soil and groundwater guidelines, → proceed to Section 8, or
- For all other circumstances, continue with Section 6.4.

### 6.4 Key Transport Factors for Existing COPCs

6.4.1 What is the horizontal distance to the nearest water well from the edge of the nearest contaminated area?  
 0-50 m     50-100 m     100-300 m     300-1000 m     > 1000 m

6.4.2 What is the horizontal distance to the nearest surface water body from the edge of the contaminated area?  
 ≤10 m     10-50 m     50-100 m     100-300 m     300-1000 m     > 1000 m

6.4.3 Does delineation achieve closure above the groundwater water table that is nearest to the ground surface?  
 Yes (→ go to Section 6.5.)     No     TBD

6.4.4 Is the groundwater that is nearest the ground surface a domestic use aquifer (DUA) as defined in Alberta Tier 2 guidelines?  
 Yes     No     TBD     Not required (NR)

6.4.5 Is there a hydraulic barrier, as defined in Alberta Tier 2 guidelines, between the base of the contaminated area and the DUA?  
 Yes     No     TBD     NR

6.4.6 If you answered 'yes' to Section 6.4.5, provide the measured largest value of the hydraulic conductivity (as value  $\times 10^{-7}$  m/sec.) for the 5.0 m vertical layer from the bottom of the contaminated zone.  
 \_\_\_\_\_ ( $\times 10^{-7}$  m/sec.)     TBD     NR

### 6.5 On-site Characterization

6.5.1 What is the dominant soil texture that governs substance transport at the site?  
 Coarse grained     Fine grained     TBD     Not applicable (*must identify reason in Section 6.2.1.1.*)

6.5.2 What are the shallowest and deepest measured depths (meters below ground surface) of the water table at site?  
 Shallowest: 1.0 (m)    Deepest: 2.0(m)     TBD     NR (*specify max. depth assessed: \_\_\_\_\_(m)*)

6.5.3 What is the dominant horizontal direction of groundwater flow for the near surface water table?  
 (N, NW, etc.: SW)     TBD     NR

6.5.4 What is the existing land use classification?  
 Natural     Agricultural     Residential     Commercial     Industrial     Other (*specify*) \_\_\_\_\_

6.5.5 What is the end land use classification?  
 Natural     Agricultural     Residential     Commercial     Industrial     Other (*specify*) \_\_\_\_\_

# RECORD OF SITE CONDITION

<b>6.5.6 Identify exposure pathways for which the applicable guidelines are exceeded on-site (check all that apply).</b>			
<input checked="" type="checkbox"/>	Vapour inhalation	<input type="checkbox"/>	Soil ingestion
<input checked="" type="checkbox"/>	Ingestion of potable water	<input type="checkbox"/>	Soil dermal (skin) contact
<input checked="" type="checkbox"/>	Fresh water aquatic life	<input checked="" type="checkbox"/>	Soil contact for plants and invertebrates
<input type="checkbox"/>	TBD	<input type="checkbox"/>	Other (specify): _____

<b>6.6 Off-site Characterization</b>			
<b>6.6.1 Are there COPCs off-site exceeding applicable soil or groundwater guidelines?</b>			
<input type="checkbox"/> No (→ if on-site contamination was reported, proceed to Section 7, otherwise, proceed to Section 8.) <input checked="" type="checkbox"/> Yes <span style="margin-left: 150px;"><input type="checkbox"/> TBD</span>			
<b>6.6.2 What is the current land use classification for any off-site area(s) identified in Section 6.6.1?</b>			
<input type="checkbox"/> Natural <input type="checkbox"/> Agricultural <input type="checkbox"/> Residential <input checked="" type="checkbox"/> Commercial <input type="checkbox"/> Industrial <input type="checkbox"/> Other (specify) _____			
<b>6.6.3 What is the end land use classification for any off-site area(s) identified in Section 6.6.1?</b>			
<input type="checkbox"/> Natural <input type="checkbox"/> Agricultural <input type="checkbox"/> Residential <input checked="" type="checkbox"/> Commercial <input type="checkbox"/> Industrial <input type="checkbox"/> Other (specify) _____			
<b>6.6.4 Is there any substance concentration under a road allowance exceeding the applicable soil or groundwater guidelines?</b>			
<input checked="" type="checkbox"/> Yes <span style="margin-left: 100px;"><input type="checkbox"/> No (→ proceed to Section 6.6.6.)</span> <span style="margin-left: 100px;"><input type="checkbox"/> TBD</span>			
<b>6.6.5 What is the most sensitive land use classification adjacent to the road allowance?</b>			
<input type="checkbox"/> Natural <input type="checkbox"/> Agricultural <input type="checkbox"/> Residential <input checked="" type="checkbox"/> Commercial <input type="checkbox"/> Industrial <input type="checkbox"/> Other (specify) _____			
<b>6.6.6 Identify exposure pathways for which the applicable guidelines are exceeded off-site (check all that apply).</b>			
<input checked="" type="checkbox"/>	Vapour inhalation	<input type="checkbox"/>	Soil ingestion
<input checked="" type="checkbox"/>	Ingestion of potable water	<input type="checkbox"/>	Soil dermal (skin) contact
<input checked="" type="checkbox"/>	Fresh water aquatic life	<input checked="" type="checkbox"/>	Soil contact for plants and invertebrates
<input type="checkbox"/>	TBD	<input type="checkbox"/>	Other (specify): _____



# RECORD OF SITE CONDITION

## 7 RISK MANAGEMENT PLAN (RMP)

**7.1 What is the Plan for Contaminated Areas Still Remaining on and off the Site? (check one only.)**

Complete remediation (→ *proceed to Section 8*).  
 Partial remediation with risk management for some residual contamination.  
 Risk management for all remaining contamination.

## 7.2 Key Progress of RMP

**7.2.1 If the site needs an on-going RMP, answer all the following questions that apply to the RMP.**

<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Are contaminated areas completely delineated horizontally and vertically in soil?
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Are contaminated areas completely delineated horizontally and vertically in groundwater?
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Is source identified and completely delineated?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Is source migrating or has migrated off-site?
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Is source left as is?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Is source partially removed and residual source being managed?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Is source controlled with physical or administrative methods?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Are all pathways of concern identified?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Have all relevant receptors been identified and protected?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Is there a monitoring program in place to verify RMP success?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Are there third parties related to this RMP? (if the answer is 'no', skip the next question.)
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	If there are third parties, have all of them accepted the RMP?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Is there a commitment from person(s) responsible to implement and monitor the RMP until final remediation guidelines are achieved?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Is there a contingency plan in place should the RMP fail?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Is the RMP implemented for the site?

## Public Disclosure and Privacy Notification

The *Record of Site Condition* form is a public record that is disclosed in accordance with section 35 of the *Environmental Protection and Enhancement Act*, *Disclosure of Information Regulation*, and *Ministerial Order 23/2004*. Reasonable efforts have been made to minimize collection of personal information where possible. Personal information on the form is collected under the authority of section 12(c) and other provisions of the *Environmental Protection and Enhancement Act* and is in compliance with section 33(a) and 33(c) of the *Freedom of Information and Protection of Privacy Act* (FOIP). Personal information collected on this form will be used by Alberta Environment for the purposes of administering its programs.

## Accuracy of Information

The information in this document has been submitted by persons other than Alberta Environment. The Department and the Government of Alberta cannot and do not warrant that the information in this document is current, accurate, complete, or free of errors. Persons accessing the information provided should not rely on it, and any reliance on the information provided is taken at the sole risk of the user. Users of this information are advised to conduct their own due diligence to satisfy themselves of the environmental condition of the property of interest.



## 8 DECLARATION

This *Record of Site Condition* form was prepared for the purpose of reporting on the state of environmental site conditions and, where applicable, for the purpose of remediation or reclamation, for:

419 - 10<sup>th</sup> Avenue, Carstairs, Alberta (site name) (the "Site").

I, as the licensed operator or authorized representative, have reviewed all information that was used in preparation of this form and I am satisfied that it was prepared in a manner consistent with the Applicable Standard<sup>1</sup> together with any relevant additional guidance that is available from Alberta Environment as of this date for conducting environmental site assessments.

Having conducted reasonable inquiries to obtain all relevant information, to my knowledge, the statements made in this form are true as of this date. I have disclosed all pertinent information of which I am aware concerning the historical and current environmental condition of the Site to the Director.

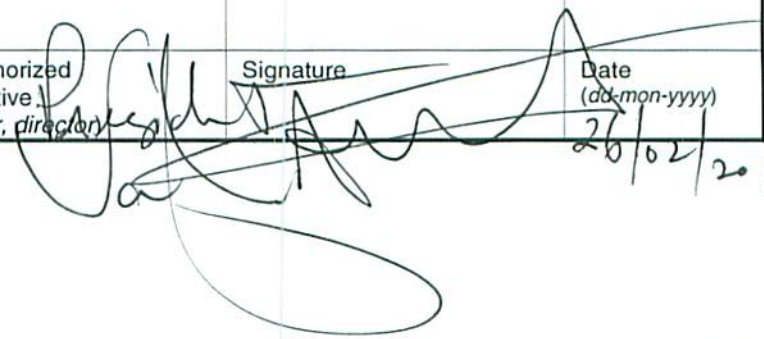
Any use which a third party, other than the Crown in right of Alberta, makes of this form, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. The undersigned accepts no responsibility for damages, if any, suffered by any third party, other than the Crown in right of Alberta, as a result of decisions made or actions based on this form. Any exclusions or disclaimers to the contrary contained in any attachment to this form are of no force or effect as against the Crown in right of Alberta.

Footnote 1:

"Applicable Standard" means

- a) for the purposes of upstream oil and gas sites,
  - i) *Alberta Environment Phase I Environmental Site Assessment Guideline for Upstream Oil and Gas Sites* (AENV 2001),
  - ii) *CSA Standard Z769, Phase II Environmental Site Assessment*, as amended, for any Phase II site assessment information used in preparation of this form on all upstream oil and gas sites not included in a) i);
- b) for the purposes of all other sites, *CSA Standard Z768, Phase I Environmental Site Assessment*, as amended, for any Phase I site assessment information and with *CSA Standard Z769, Phase II Environmental Site Assessment*, as amended, for any Phase II site assessment information used in preparation of this form.

By signing below, I as the licensed operator or authorized representative, confirm the information provided herein is correct and complete, to the best of my knowledge and belief.

Vaughn Wyant	Vaughn Wyant			
Name of operator	Name of authorized representative	Title of authorized representative <small>(e.g. officer, director)</small>	Signature	Date <small>(dd-mon-yyyy)</small>
				26/02/2010

## Fish, Myles

---

**From:** Jouhayna Abouelmouna <jouhayna.abouelmouna@gov.ab.ca>  
**Sent:** January 23, 2006 3:46 PM  
**To:** AENV EASCommunications  
**Subject:** Letter for SCC site #9302 for Red Deer

Attached is a letter intended to got Kim Kirillo in Red Deer



9302.pdf

Thank you  
*Jouhayna Abouelmouna*  
*Safety Codes Council*  
*Underground Tank Remediation Program*  
*(780) 415-8660*



DUPLICATE

*SAFETY CODES COUNCIL*

Underground Tank Remediation Program  
16<sup>th</sup> Floor, Commerce Place  
10155 – 102 Street  
Edmonton, Alberta T5J 4L4

Tel: 780/415-8666  
Fax: 780/415-8664

FILE #00123-9302

January 23, 2006

Vaughn Wyant Investments Ltd.  
419 Brand Place  
Saskatoon, SK S7J 5L6

Dear Vaughn Wyant:

**Re: Risk Management Plan Addendum/Additional Environmental Site Assessment  
Site 9302, Carstairs**

Thank you for the Addendum dated January 11, 2006 to the Revised Risk Management Plan that was submitted to Alberta Environment (AENV) by your Consultant, Stantec Consulting. AENV has completed its review of the submission and we have received a copy of the review letter dated January 17, 2006.

Based on comments made by AENV, acceptance of the Remedial Action Plan and Risk Management Plan dated June 29, 2006 has been rescinded and further investigative work is required. **Please have your Consultant respond to the comments made by AENV by February 21, 2006. If for some reason this deadline cannot be met, please contact us immediately.**

The reviews are based on technical information submitted by your Consultant. Acceptance or non-acceptance of the plans does not absolve you from the responsibility for remediating your site in accordance with Alberta Environment's Risk Management Guidelines for Petroleum Storage Tank Sites - October 2001 or from future liability for remediating the site in situations where either the land use may change or additional concerns arise from the contaminants remaining on or off-site.

Yours truly,

Steve Hoare  
Technical Coordinator

cc: Chris Mathies, Stantec Consulting  
Kim Kirillo, Alberta Environment  
Paul von Schoenberg, Calgary Health Region



Regional Services  
Southern Region

2<sup>nd</sup> floor, Deerfoot Square  
2938 - 11 Street NE  
Calgary, Alberta  
Canada T2E 7L7

Our File. 190795  
SCC Site # 9302

September 12, 2005

Vaughn Wyant  
Vaughn Wyant Investments Ltd  
419 Brand Place  
Saskatoon, Saskatchewan  
S7J 5L6

Dear Mr Wyant:

**Re: Assessment and Risk Management Activities  
419 - 10 Avenue, Carstairs, Alberta**

Thank you for completing an assessment of the private water and sanitary sewer utility corridors at the above referenced site. Alberta Environment has reviewed the Stantec Consulting Ltd *Utility Corridor Assessment* dated September 1, 2005 and has the following comments.

Analytical results of soil sampled from the sanitary sewer and water line trenches indicated that petroleum hydrocarbons (PHC) were present. Although the analytical results provide evidence that PHCs are present in the corridor material, the level of risk to the water line is still not clear. AENV recommends analysis of a water sample from the private water line to further demonstrate the level of potential risk.

In reference to the accepted risk management plan dated June 29, 2005, it was stated that the construction materials of the service connections would be assessed. Please provide information about the material the utility lines are made of and any visible changes to the material. It was also stated that based on the concentrations observed within 10<sup>th</sup> Avenue, the associated risk is considered low. Please provide further information to support this statement. ]

The review presented in this letter is based on the remediation process and objectives presented in Alberta Environment's *Risk Management Guidelines for Petroleum Storage Tank Sites, October 2001*. This letter is not intended to absolve any party from the potential for future liability for remediating this site in situations where either the land use may change or additional concerns arise from the contaminants remaining on or off-site.



Should you wish further discussion, please contact me at (403) 297 – 8270.

Sincerely,

A handwritten signature in cursive script, appearing to read "K Kirillo".

Kim Kirillo  
Petroleum Storage Tank Sites Specialist

cc: Steve Hoare, Safety Codes Council  
Greg Saretzky, Stantec Consulting



Stantec Consulting Ltd.  
100 - 75 - 24th Street East  
Saskatoon SK S7K 0K3  
(306) 667-2400 Fax: (306) 667-2500  
stantec.com



**Stantec**

190795  
SCC 9302



September 2, 2005  
File: 1132-52998.200

Tel. (306) 667-2460  
Fax. (306) 667-2500  
cmathies@stantec.com

Vaughn Wyant Investments Ltd.  
419 Brand Place  
Saskatoon, SK S7J 5L6

**Attention: Vaughn Wyant  
Owner**

Dear Mr. Wyant:

**Reference: Utility Corridor Assessment  
419 - 10<sup>th</sup> Avenue, Carstairs, Alberta**

Please find enclosed one final copy of the above referenced report. If you should have any questions, please contact the undersigned at (306) 667-2460.

Sincerely,

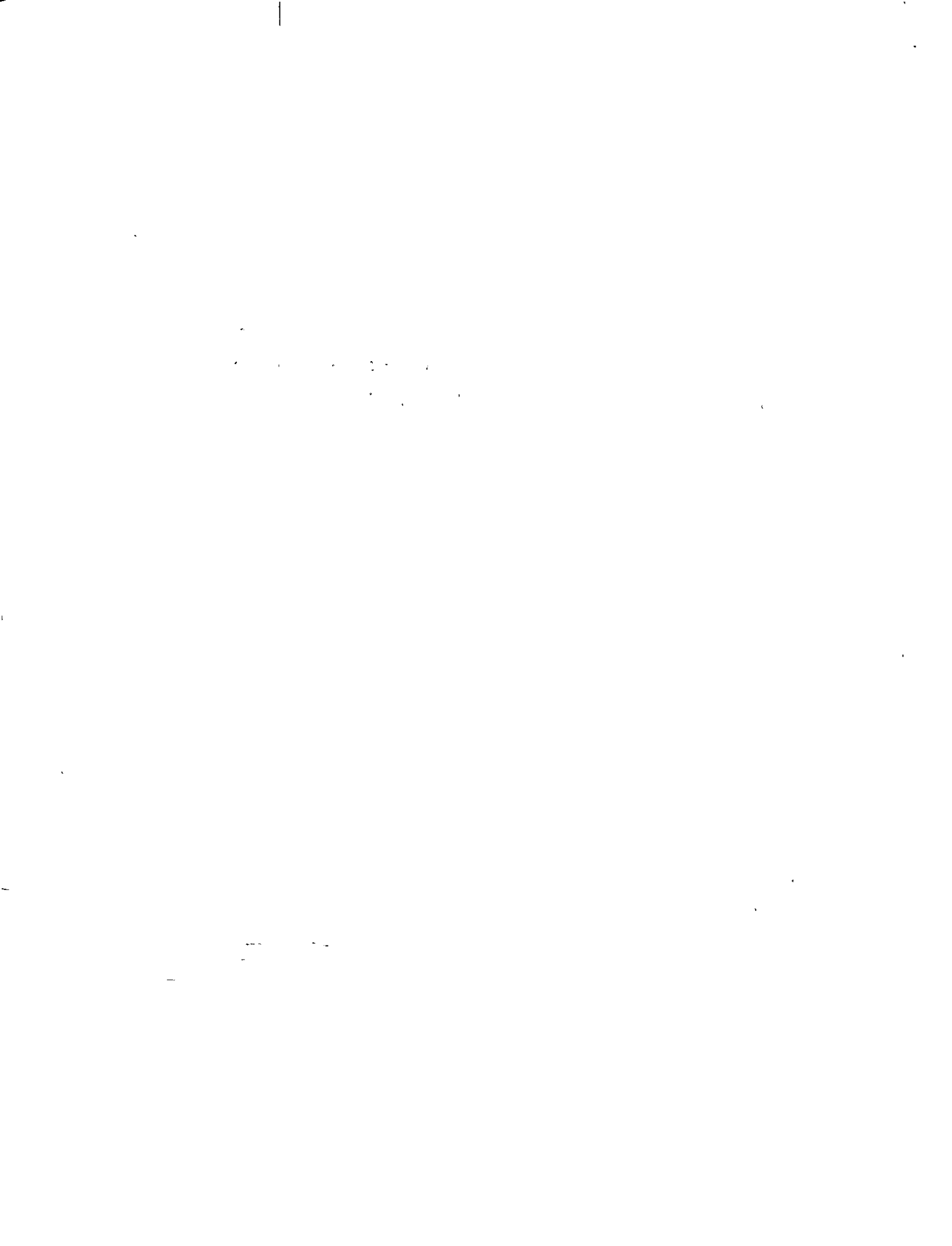
**STANTEC CONSULTING LTD.**

Chris Mathies, B.E., E.I.T.  
Environmental Engineer-in-Training

Attachment

cc:  
Steve Hoare  
Safety Codes Council

Kim Kirillo  
Alberta Environment



190795



**Stantec**

**Utility Corridor Assessment  
419 – 10<sup>th</sup> Avenue,  
Carstairs, Alberta**

Prepared For:  
Vaughn Wyant Investments Ltd.

Prepared By:  
Stantec Consulting Ltd.  
100 – 75 24<sup>th</sup> Street East  
Saskatoon, SK S7K 0K3  
[www.stantec.com](http://www.stantec.com)

September, 2005  
File: 1132-52998.200

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Stantec Consulting Ltd.  
100 - 75 - 24th Street East  
Saskatoon SK S7K 0K3  
(306) 667-2400 Fax: (306) 667-2500  
stantec.com



**Stantec**

September 1, 2005  
File. 113252998.200

Vaughn Wyant Investments Ltd.  
419 Brand Place  
Saskatoon, SK S7J 5L6

**Attention: Vaughn Wyant  
Owner**

Dear Mr. Wyant:

**Reference: Utility Corridor Assessment  
Carstairs, Alberta**

Stantec Consulting Ltd. (Stantec) is pleased to provide Vaughn Wyant Investments Ltd. (Vaughn Wyant) with this letter report summarizing the utility corridor assessment that occurred on the property located at 419 – 10<sup>th</sup> Avenue, Carstairs, Alberta (Site). A Site location map and a Site plan are provided in Figure 1 and Figure 2, respectively.

### **Background**

Stantec was retained by Vaughn Wyant to complete a utility corridor assessment on the property located at 419 – 10<sup>th</sup> Avenue, Carstairs, Alberta at the request of Alberta Environment (AENV). A Phase II and Phase III ESA have previously been conducted at the Site by Petroleum Enviro Services in 2002 and 2003 in which petroleum hydrocarbon (PHC) impacted soil was detected.

Petroleum Enviro Services estimated the volume of PHC impacted soils to be approximately 3,300 m<sup>3</sup> (Petroleum Enviro Services, 2003). The volume estimate is based on a limited number of boreholes drilled at the Site and an estimated value for the hydrocarbon impacted soil on the Co-op Food Store property without complete delineation.

190795



## **Stantec**

September 1, 2005  
Vaughn Wyant Investments Ltd.  
Page 2 of 9

**Reference: Utility Corridor Assessment  
Carstairs, Alberta**

### **Objective**

The main objective of the assessment was to determine if PHC impacts, previously identified on Site, have migrated into the utility corridor servicing the Site. The presence of lead in the subject Site's utility corridor was also investigated.

### **Scope of Work**

Stantec conducted the following activities in order to accomplish the study objectives:

- Located underground lines and utilities.
- Hydrovaced the utility lines in two locations along the utility corridor.
- Excavated soil along the utility lines.
- Obtained two soil samples adjacent to each utility line.
- Analyzed soil samples.
- Prepared a report documenting the observations and results from the assessment program.

### **Field Investigation Methodology**

A safety meeting was held that covered job safety, planning checklists, equipment checklists, emergency information and work site hazards prior to commencing work at the Site.

Underground and aboveground utility locates were conducted by Alberta One Call. Hydrovac activities were performed by Badger Daylighting to clearly identify the location of the underground utilities prior to commencing the excavation program.

Kowal Construction Alta Ltd. was retained by Stantec to provide the necessary equipment and personnel to excavate soil along the utility corridor to expose the underground infrastructure.

### **Soil Sampling**

Soil previously located adjacent to the underground water and sanitary utility lines was removed from the bucket of the backhoe at depths between 1.5 and 1.75 m below ground level (mBGL).

Soil samples were obtained for field screening purposes and potential laboratory analysis. Soil samples collected for soil combustible vapour concentration (SCVC) measurements were

**Reference: Utility Corridor Assessment  
Carstairs, Alberta**

placed in resealable plastic bags filled one half full and sealed. The soil samples were allowed to reach an ambient temperature of approximately 20°C, after which time the combustible soil vapour concentration that accumulated in the headspace of the bag was measured with a GasTech Model 1238ME, calibrated for hexane, set for no methane response.

Soil samples collected for potential laboratory analysis were placed in 125 mL glass jars fitted with Teflon-lined screw down lids. Jars were completely filled to provide zero headspace. Soil samples submitted for laboratory analysis were chosen based on the results of the SCVC measurements and visual and olfactory indicators.

**Analytical Program**

Four soil samples, two samples from each exposed utility line, were submitted on August 2, 2005 under chain of custody to EnviroTest Laboratories (ETL) in Calgary, Alberta and analyzed for benzene, toluene, ethylbenzene and xylene (BTEX), PHC Fractions F1 to F4 and lead concentrations.

**Assessment Criteria**

The soil conditions at the Site were compared against the following guidelines:

- Alberta Environment (AENV) *Risk Management Guidelines for Petroleum Storage Tank Sites, October, 2001* (PST Guidelines).

The Risk Management Guidelines for Petroleum Storage Tank Sites have been developed to assist both the owners and operators of petroleum storage tank systems and the regulatory authority in the remediation or management of site, impacted by leakage or spillage of petroleum products. The guidelines have been developed through use of a risk based approach which is designed to ensure the protection of human health, safety and the environment. The guidelines provide uniform standards for the remediation and management of impacted petroleum storage tanks sites in Alberta. The specific guidelines chosen for comparison are the Generic Hydrocarbon and Lead Criteria for Fine-Grained Soil in a commercial / industrial setting.

**Results**

Soil – Field Results

The utility corridor was exposed by hydrovac activities at two locations along the utility corridor on August 2, 2005. The locations of the exposures, the extent of excavation and sample locations are presented in Figure 2.

**Reference: Utility Corridor Assessment  
Carstairs, Alberta**

A visible hydrocarbon sheen was observed on water remaining in the excavations. Hydrocarbon odour and staining was present in samples Water1, Water2, Sewer1, and Sewer2.

Soil – Analytical Results

A total of 4 soil samples were collected for SCVC measurements during the investigation program. The SCVC readings were obtained from the two excavated areas between 1.5 and 1.75 mBGL. The SCVC readings ranged from 2,200 parts per million (ppm) to 11,000 ppm.

Four soil samples collected from the Site were submitted for laboratory analysis of BTEX, PHC Fractions F1 to F4 and lead concentrations. Samples Water1 (1.5 m to 1.75 m), Water2 (1.5 m to 1.75 m), Sewer1 (1.5 m to 1.75 m) and Sewer2 (1.5 m to 1.75 m) were submitted to ETL.

Samples submitted for analysis were selected from the depths, which in the assessor's opinion had the greatest risk of impact, or from locations to confirm that hydrocarbon impacts were less than the applicable guidelines. The selection was based on SCVC results and visual and olfactory field observations of the soil collected from the backhoe. Analytical results for the soil samples collected on August 2, 2005 are presented in Table 1 and analytical reports are attached in Appendix A.

Reference: Utility Corridor Assessment  
 Carstairs, Alberta

**Table 1**  
**Soil Analytical Results**

Parameters	Units	Detection Limit	Guidelines <sup>1</sup>	Water1	Water2	Sewer1	Sewer2
<b>General Information</b>							
Stantec Sample ID		N/A	N/A	Water1 (1.5 - 1.75 m)	Water2 (1.5 - 1.75 m)	Sewer1 (1.5 - 1.75 m)	Sewer2 (1.5 - 1.75 m)
Lab Sample ID		N/A	N/A	L296267-1	L296267-2	L296267-3	L296267-4
Date Sampled	(dd-mm-yy)	N/A	N/A	02-Aug-05	02-Aug-05	02-Aug-05	02-Aug-05
Sample Depth	(mBGL)	N/A	N/A	1.65	1.65	1.65	1.65
<b>Soil Sample Information</b>							
Soil Type		N/A	N/A	Sandy-Silt with Clay	Sandy-Silt with Clay	Sandy-Silt with Clay	Sandy-Silt with Clay
SCVCs	ppm	N/A	N/A	11,000	8,800	3,080	2,200
% Moisture	%	0.1	NG	14	17	15	19
<b>BTEX and PHC Fraction</b>							
<b>Hydrocarbons</b>							
Benzene	mg/kg	0.005	9	7.7	5.4	16	13
Toluene	mg/kg	0.01	450	7.5	3.7	1.1	1.8
Ethylbenzene	mg/kg	0.001	690	9.8	4.3	67	53
Xylenes	mg/kg	0.01	1,500	52	21	390	310
F1 (C <sub>8</sub> -C <sub>10</sub> )	mg/kg	5	660	450	170	<b>2,500</b>	<b>2,000</b>
F2 (C <sub>11</sub> -C <sub>16</sub> )	mg/kg	5	1,500	63	<5	150	130
F3 (C <sub>17</sub> -C <sub>34</sub> )	mg/kg	5	2,500	22	11	60	89
F4 (C <sub>35</sub> -C <sub>50</sub> )	mg/kg	5	6,600	31	14	41	48
Total Hydrocarbons	mg/kg	5	NG	570	200	2800	2300
Lead (Pb)	mg/kg	5	260	16	20	26	20

Notes:  
<sup>1</sup>Alberta Environment Risk Management Guidelines for Petroleum Storage Tank Sites, October 2001, PST Guidelines, Fine Grained, Commercial/Industrial Land Use  
 SCVC - indicates soil combustible vapour concentration.  
 BTEX - indicates benzene, toluene, ethylbenzene and xylene  
 mBGL - indicates meters below ground level.  
 N/A - indicates not applicable.  
 NG - indicates no guideline.  
**BOLD** - indicates AENV Guideline exceedance

Chromatograms provided by the laboratory show hydrocarbon distributions typical of gasoline, ranging from approximately C8 to C15.

The laboratory results from soil samples submitted for laboratory analysis are summarized below:

- Samples Water1 and Water2 exhibited hydrocarbon staining and hydrocarbon odours were observed within the upper 1.75 m of soil. The maximum SCVC readings were 11,000 ppm and 8,800 ppm, respectively. Laboratory analysis from a depth of 1.5 mBGL to 1.75 mBGL indicated that parameters analyzed from samples Water 1 and Water2 were within the applicable AENV guidelines.
- Samples Sewer1 and Sewer2 had SCVC readings of 3,080 ppm and 2,200 ppm, respectively. Sewer samples contained concentrations of benzene and F1 hydrocarbons greater than the applicable AENV guidelines.
- Lead concentrations in the samples analyzed were found to be below applicable guidelines.

*note - the less the water line is impacted to PHC  
 ↑  
 take water line sample down gradient of plume?*

**Reference: Utility Corridor Assessment  
Carstairs, Alberta**

Soil analytical results, SCVC's and olfactory observations indicate that PHC impacted soil exceeding guidelines exists at the utility corridor locations sampled during the assessment with respect to the Site.

**Discussion**

The utility corridor assessment was conducted to determine if PHC impacts, previously identified on Site, had migrated into the utility corridor that services the Site. Water and sanitary sewer utility lines located on the Site were exposed by hydrovac prior to the excavation activities.

Soil combustible vapour concentrations of soil samples collected from the backhoe ranged from 2,200 ppm to 11,000 ppm. Four soil samples were submitted for laboratory analysis. Analytical results indicate that soil samples Sewer1 and Sewer2 exceeded applicable guidelines for benzene and PHC Fraction 1 concentrations. Results indicate that samples collected adjacent to the sewer utility line were generally double the concentrations of samples collected adjacent to the water utility line. The results may be due to several factors including a difference in depth of the sewer line than the water line, coarser bedding material or the sewer line may be in closer proximity to the source.

Chromatograms provided by the laboratory also indicate hydrocarbon distributions typical of gasoline.

Soil analytical results, SCVC's and olfactory observations indicate that hydrocarbon impacted soil exceeding guidelines exists at the utility corridor located on the northwest edge of the Site. The utility corridor drain away from the Site toward the northeast, therefore, PHC impacts may have potentially migrated offsite towards the northeast. High concentrations of PHCs in soil have the potential to degrade utility lines and impact their contents as a result.

**Limitations and Qualifications**

In conducting this environmental site assessment, Stantec confirms that it had access to the experience and capability necessary to perform and did perform in accordance with generally accepted professional standards at the time and location in which the services were provided. No other representations, warranties or guarantees are made concerning the accuracy or completeness of the data or conclusions contained within this report, including no assurance that this assessment has uncovered all potential liabilities associated with the identified property.

This report provides an evaluation of environmental conditions associated with the identified property at the time the assessments were conducted and are based on information obtained by and/or provided to Stantec at that time. All information received from the client or third parties in

**Stantec**

September 1, 2005  
Loughn Wyant Investments Ltd.  
Page 7 of 9

**Reference: Utility Corridor Assessment  
Carstairs, Alberta**

the preparation of this report has been assumed by Stantec to be correct. Stantec assumes no responsibility for any deficiency or inaccuracy in information received from others.

The opinions in this report can only be relied upon as they relate to the condition of the identified property at the time the assessments and/or investigations were conducted. Activities at the property subsequent to Stantec's assessment may have significantly altered the property's condition. Conclusions made within this report are a professional opinion, not a certification of the property's environmental condition.

This report has been prepared for the exclusive use of the client identified herein. Stantec assumes no responsibility for losses, damages, liabilities or claims, howsoever arising, from third party use of this report.

This report is limited by the following:

- Soil samples were collected in the locations as present in Figure 2.
- The investigation was limited to those parameters specifically outlined in this report.
- The subsurface investigation was based on the utility corridor locations selected. Conditions may vary between selected locations.

The locations of any utilities illustrated in this report, if any, including pole lines, conduits, water mains, sewers and other surface or sub-surface utilities and structures are not necessarily as described in this report or its appendices, and where shown or described, the accuracy of the position of such utilities and structures is not guaranteed. Before starting work, any Contractor should confirm the exact location of all such utilities and structures and assume all liability for damage to them.

If Stantec's services include destructive testing, it should be noted that there are limitations that are inherent in any intrusive work of this nature. Conditions may vary between sample locations and the parameters tested for may be limited by factors such as the areas of greatest risk identified in any previous site assessment, the site conditions (e.g. utility placements) and cost factors. Accordingly, no representations can be made regarding parameters that were not tested for. A potential remains for the presence of unknown, unidentified, or unforeseen surface and sub-surface environmental conditions.

Should you have any questions or comments, please contact the undersigned at (306) 667-2400.

Sincerely,

**STANTEC CONSULTING LTD.**

**Stantec**

September 1, 2005  
Vaughn Wyant Investments Ltd.  
Page 8 of 9

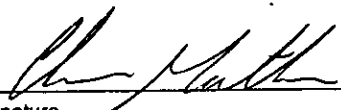
**Reference: Utility Corridor Assessment  
Carstairs, Alberta**

This report was written by the following individuals:

Jackie Bronson, M.A., B.Sc.  
Environmental Consultant

<sup>For</sup> Katie Clarke, M.Sc., E.I.T.  
Environmental Consultant

  
\_\_\_\_\_  
Signature

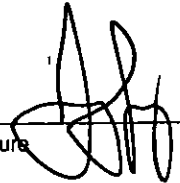
  
\_\_\_\_\_  
Signature

This report was reviewed by the following individuals:

Chris Mathies, B.E., E.I.T.  
Environmental Engineer-in-Training

<sup>For</sup> Greg Saretzky, M.Sc., P.Eng.  
Environmental Engineer

  
\_\_\_\_\_  
Signature

  
\_\_\_\_\_  
Signature

Attachment

cc:  
Steve Hoare  
Safety Codes Council

Kim Kirillo  
Alberta Environment



**SUBJECT  
PROPERTY**



**Stantec**

Client/Project:

**Vaughn Wyant Investments Ltd.  
Utility Corridor Assessment,  
419 -10th Avenue, Carstairs, AB**

Figure No.:

**1**

Title:

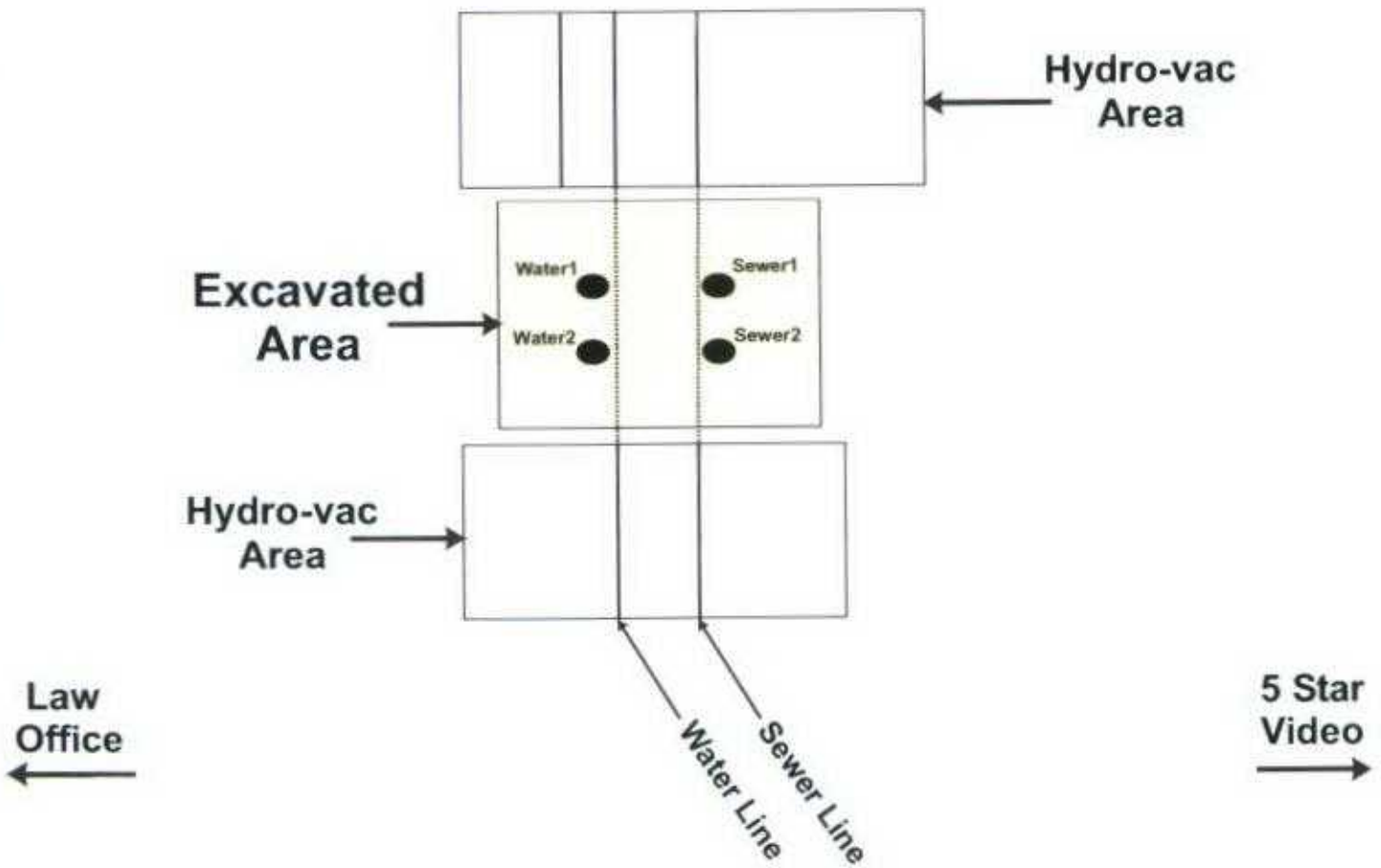
**Site Location Map**





10th Avenue

Sidewalk



NOT TO SCALE

Client/Project:

Vaughn Wyant Investments Ltd.  
Utility Corridor Assessment  
419 - 10th Avenue, Carstairs, AB



Stantec

● Approximate  
Sample  
Location

Figure No.:

2

Title:

Site Layout

**Stantec**

September 1, 2005  
Vaughn Wyant Investments Ltd.  
Page 9 of 9

**Reference: Utility Corridor Assessment  
Carstairs, Alberta**

# **APPENDIX A Analytical Report**



# Enviro-Test

LABORATORIES

Received

AUG 22 2005

Stantec Consulting Ltd

## ANALYTICAL REPORT

STANTEC CONSULTING LTD

DATE: 11-AUG-05 09:58 AM

ATTN: KATIE CLARKE

SUITE 200, 325 - 25 STREET S E.

CALGARY AB T2A 7H8

Lab Work Order #: L296267

Sampled By: KATIE

Date Received: 02-AUG-05

Project P.O. #: NA

Project Reference: 113252998.200, CARSTAIRS 1B

Other Information:

Comments:

RON MINKS  
Director of Operations, Calgary

SUSAN MARLEEN PULSIFER  
Account Manager

THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN AUTHORITY OF THE LABORATORY  
ANY REMAINING SAMPLES WILL BE DISPOSED OF AFTER 30 DAYS FOLLOWING ANALYSIS. PLEASE CONTACT THE LAB IF YOU  
REQUIRE ADDITIONAL SAMPLE STORAGE TIME.

ENVIRO-TEST ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier	D.L.	Units	Extracted	Analyzed	By	Batch
L296267-1 WATER 1								
Sample Date: 02-AUG-05 09:30								
Matrix: SOIL								
CCME TVHs and TEHs								
CCME Total Hydrocarbons								
F1 (C6-C10)	450		5	mg/kg		05-AUG-05		
F1-BTEX	370		5	mg/kg		05-AUG-05		
F2 (C10-C16)	63		5	mg/kg		05-AUG-05		
F3 (C16-C34)	22		5	mg/kg		05-AUG-05		
F4 (C34-C50)	31		5	mg/kg		05-AUG-05		
Total Hydrocarbons (C6-C50)	570		5	mg/kg		05-AUG-05		
Chromatogram to baseline at nC50	YES					05-AUG-05		
CCME Total Extractable Hydrocarbons								
Prep/Analysis Dates								
					02-AUG-05	04-AUG-05	MEL	R309934
CCME BTEX								
Benzene	7.7		0.005	mg/kg	02-AUG-05	05-AUG-05	OOG	R310590
Toluene	7.5		0.01	mg/kg	02-AUG-05	05-AUG-05	OOG	R310590
Ethylbenzene	9.8		0.01	mg/kg	02-AUG-05	05-AUG-05	OOG	R310590
Xylenes	52		0.01	mg/kg	02-AUG-05	05-AUG-05	OOG	R310590
% Moisture	14		0.1	%	02-AUG-05	03-AUG-05	HCW/	R309447
Lead (Pb)	16		5	mg/kg		06-AUG-05	HSC	R310806
L296267-2 WATER 2								
Sample Date: 02-AUG-05 09:30								
Matrix: SOIL								
CCME TVHs and TEHs								
CCME Total Hydrocarbons								
F1 (C6-C10)	170		5	mg/kg		05-AUG-05		
F1-BTEX	140		5	mg/kg		05-AUG-05		
F2 (C10-C16)	<5		5	mg/kg		05-AUG-05		
F3 (C16-C34)	11		5	mg/kg		05-AUG-05		
F4 (C34-C50)	14		5	mg/kg		05-AUG-05		
Total Hydrocarbons (C6-C50)	200		5	mg/kg		05-AUG-05		
Chromatogram to baseline at nC50	YES					05-AUG-05		
CCME Total Extractable Hydrocarbons								
Prep/Analysis Dates								
					02-AUG-05	04-AUG-05	RXP	R310335
CCME BTEX								
Benzene	5.4		0.005	mg/kg	02-AUG-05	04-AUG-05	OOG	R310172
Toluene	3.7		0.01	mg/kg	02-AUG-05	04-AUG-05	OOG	R310172
Ethylbenzene	4.3		0.01	mg/kg	02-AUG-05	04-AUG-05	OOG	R310172
Xylenes	21		0.01	mg/kg	02-AUG-05	04-AUG-05	OOG	R310172
% Moisture	17		0.1	%	02-AUG-05	03-AUG-05	HCW/	R309447
Lead (Pb)	20		5	mg/kg		06-AUG-05	HSC	R310806
L296267-3 SEWER 1								
Sample Date: 02-AUG-05 09:30								
Matrix: SOIL								
CCME TVHs and TEHs								
CCME Total Hydrocarbons								
F1 (C6-C10)	2500		5	mg/kg		09-AUG-05		
F1-BTEX	2000		5	mg/kg		09-AUG-05		
F2 (C10-C16)	150		5	mg/kg		09-AUG-05		
F3 (C16-C34)	60		5	mg/kg		09-AUG-05		
F4 (C34-C50)	41		5	mg/kg		09-AUG-05		

**ENVIRO-TEST ANALYTICAL REPORT**

Sample Details/Parameters	Result	Qualifier	D.L.	Units	Extracted	Analyzed	By	Batch
<b>L296267-3 SEWER 1</b> Sample Date: 02-AUG-05 09:30 Matrix: SOIL								
<b>CCME TVHs and TEHs</b>								
<b>CCME Total Hydrocarbons</b>								
F4G-SG (GHH-Silica)	<100		100	mg/kg		09-AUG-05		
Total Hydrocarbons (C6-C50)	2800		5	mg/kg		09-AUG-05		
Chromatogram to baseline at nC50	NO					09-AUG-05		
<b>CCME Total Extractable Hydrocarbons</b>								
Prep/Analysis Dates					02-AUG-05	05-AUG-05	RXP	R310335
<b>CCME BTEX</b>								
Benzene	16		0.005	mg/kg	02-AUG-05	05-AUG-05	OOG	R310590
Toluene	11		0.01	mg/kg	02-AUG-05	05-AUG-05	OOG	R310590
Ethylbenzene	67		0.01	mg/kg	02-AUG-05	05-AUG-05	OOG	R310590
Xylenes	390		0.01	mg/kg	02-AUG-05	05-AUG-05	OOG	R310590
% Moisture	15		0.1	%	02-AUG-05	03-AUG-05	HCW/	R309447
Prep/Analysis Dates					08-AUG-05	09-AUG-05	CUP	R311612
Lead (Pb)	26		5	mg/kg		06-AUG-05	HSC	R310806
<b>L296267-4 SEWER 2</b> Sample Date: 02-AUG-05 09:30 Matrix: SOIL								
<b>CCME TVHs and TEHs</b>								
<b>CCME Total Hydrocarbons</b>								
F1 (C6-C10)	2000		5	mg/kg		09-AUG-05		
F1-BTEX	1600		5	mg/kg		09-AUG-05		
F2 (C10-C16)	130		5	mg/kg		09-AUG-05		
F3 (C16-C34)	89		5	mg/kg		09-AUG-05		
F4 (C34-C50)	48		5	mg/kg		09-AUG-05		
F4G-SG (GHH-Silica)	<100		100	mg/kg		09-AUG-05		
Total Hydrocarbons (C6-C50)	2300		5	mg/kg		09-AUG-05		
Chromatogram to baseline at nC50	NO					09-AUG-05		
<b>CCME Total Extractable Hydrocarbons</b>								
Prep/Analysis Dates					02-AUG-05	05-AUG-05	RXP	R310335
<b>CCME BTEX</b>								
Benzene	13		0.005	mg/kg	02-AUG-05	05-AUG-05	OOG	R310590
Toluene	1.8		0.01	mg/kg	02-AUG-05	05-AUG-05	OOG	R310590
Ethylbenzene	53		0.01	mg/kg	02-AUG-05	05-AUG-05	OOG	R310590
Xylenes	310		0.01	mg/kg	02-AUG-05	05-AUG-05	OOG	R310590
% Moisture	19		0.1	%	02-AUG-05	03-AUG-05	HCW/	R309447
Prep/Analysis Dates					08-AUG-05	09-AUG-05	CUP	R311612
Lead (Pb)	20		5	mg/kg		06-AUG-05	HSC	R310806
Refer to Referenced Information for Qualifiers (if any) and Methodology								

Reference Information

Methods Listed (if applicable):

ETL Test Code	Matrix	Test Description	Preparation Method Reference(Based On)	Analytical Method Reference(Based On)
ETL-BTX,TVH-CCME-CL	Soil	CCME BTEX	CCME CWS-PHC DEC2000	CCME CWS-PHC Dec-2000 - Pub# 1310
ETL-OGG-CCME-CL	Soil	CCME Gravimetric Heavy Hydrocarbons (SG)	CCME CWS-PHC DEC2000	CCME CWS-PHC Dec-2000 - Pub# 1310
ETL-TEH-CCME-CL	Soil	CCME Total Extractable Hydrocarbons	CCME CWS-PHC DEC2000	CCME CWS-PHC Dec-2000 - Pub# 1310
ETL-TVH,TEH-CCME-CL	Soil	CCME Total Hydrocarbons		CCME CWS-PHC Dec-2000 - Pub# 1310

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

Hydrocarbon results are expressed on a dry weight basis

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.  
In samples where BTEX and F1 were analyzed, F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:

1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:

1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

PB-MUST-CL	Soil	Lead	SW 3050/7420
PREP-MOISTURE-CL	Soil	% Moisture	Oven dry 105C-Gravimetric

\*\* Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.

Chain of Custody numbers.

179620

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
CL	Enviro-Test Laboratories - Calgary, Alberta, Canada		

Reference Information

**GLOSSARY OF REPORT TERMS**

*Surr* - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in environmental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds. The reported surrogate recovery value provides a measure of method efficiency. The Laboratory warning units are determined under column heading D.L.

*mg/kg (units)* - unit of concentration based on mass, parts per million

*mg/L (units)* - unit of concentration based on volume, parts per million

< - Less than

D.L. - Detection Limit

N/A - Result not available. Refer to qualifier code and definition for explanation

*Test results reported relate only to the samples as received by the laboratory*

*UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.*

*UNLESS OTHERWISE STATED, SAMPLES ARE NOT CORRECTED FOR CLIENT FIELD BLANKS.*

*Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.*

*Enviro-Test Laboratories has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, Enviro-Test Laboratories assumes no liability for the use or interpretation of the results.*



**Enviro-Test Quality Control Report**

Workorder: L296267

Client: STANTEC CONSULTING LTD  
SUITE 200, 325 - 25 STREET S.E  
CALGARY AB T2A 7H8

Contact: KATIE CLARKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>ETL-BTX,TVH-CCME-CL</b>		<b>Soil</b>						
Batch	R310172							
WG332991-3	DUP	L295149-2						
Benzene		<0.005	<0.005	RPD-NA	mg/kg	N/A	35	03-AUG-05
Ethylbenzene		<0.01	<0.01	RPD-NA	mg/kg	N/A	35	03-AUG-05
Toluene		<0.01	<0.01	RPD-NA	mg/kg	N/A	35	03-AUG-05
TVH (C6-C10 / No BTEX Correction)		<5	<5	RPD-NA	mg/kg	N/A	40	03-AUG-05
Xylenes		<0.01	<0.01	RPD-NA	mg/kg	N/A	35	03-AUG-05
WG332991-2	MB							
Benzene			<0.005		mg/kg		0.005	03-AUG-05
Ethylbenzene			<0.01		mg/kg		0.01	03-AUG-05
Toluene			<0.01		mg/kg		0.01	03-AUG-05
TVH (C6-C10 / No BTEX Correction)			<5		mg/kg		5	03-AUG-05
Xylenes			<0.01		mg/kg		0.01	03-AUG-05
WG332991-5	MB							
Benzene			<0.005		mg/kg		0.005	04-AUG-05
Ethylbenzene			<0.01		mg/kg		0.01	04-AUG-05
Toluene			<0.01		mg/kg		0.01	04-AUG-05
TVH (C6-C10 / No BTEX Correction)			<5		mg/kg		5	04-AUG-05
Xylenes			<0.01		mg/kg		0.01	04-AUG-05
WG332991-4	MS	L295149-3						
Benzene			87		%		60-130	03-AUG-05
Ethylbenzene			99		%		60-130	03-AUG-05
Toluene			94		%		60-130	03-AUG-05
TVH (C6-C10 / No BTEX Correction)			85		%		60-130	03-AUG-05
Xylenes			95		%		60-130	03-AUG-05
Batch	R310590							
WG333554-3	DUP	L296282-102						
Benzene		<0.005	<0.005	RPD-NA	mg/kg	N/A	35	04-AUG-05
Ethylbenzene		<0.01	<0.01	RPD-NA	mg/kg	N/A	35	04-AUG-05
Toluene		<0.01	<0.01	RPD-NA	mg/kg	N/A	35	04-AUG-05
TVH (C6-C10 / No BTEX Correction)		<5	<5	RPD-NA	mg/kg	N/A	40	04-AUG-05
Xylenes		<0.01	<0.01	RPD-NA	mg/kg	N/A	35	04-AUG-05
WG333554-2	MB							
Benzene			<0.005		mg/kg		0.005	04-AUG-05
Ethylbenzene			<0.01		mg/kg		0.01	04-AUG-05



**Enviro-Test Quality Control Report**

Workorder: L296267

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>ETL-BTX,TVH-CCME-CL</b> <u>Soil</u>								
Batch	R310590							
WG333554-2	MB							
Toluene			<0.01		mg/kg		0.01	04-AUG-05
TVH (C6-C10 / No BTEX Correction)			<5		mg/kg		5	04-AUG-05
Xylenes			<0.01		mg/kg		0.01	04-AUG-05
<b>ETL-OGG-CCME-CL</b> <u>Soil</u>								
Batch	R311612							
WG334827-1	MB							
Gravimetric Heavy Hydrocarbons (Silica)			<100		mg/kg		100	11-AUG-05
WG334827-5	MS	L296582-2						
Gravimetric Heavy Hydrocarbons (Silica)			82		%		75-125	11-AUG-05
<b>ETL-TEH-CCME-CL</b> <u>Soil</u>								
Batch	R309934							
WG332453-11	DUP	L298137-1						
TEH (C10-C16)			<5	RPD-NA	mg/kg		35	05-AUG-05
TEH (C16-C34)			<5	RPD-NA	mg/kg		35	05-AUG-05
TEH (C34-C50)			<5	RPD-NA	mg/kg		35	05-AUG-05
WG332453-3	DUP	L296435-1						
TEH (C10-C16)			<5	RPD-NA	mg/kg		35	03-AUG-05
TEH (C16-C34)			6	J	mg/kg	0	15	03-AUG-05
TEH (C34-C50)			<5	RPD-NA	mg/kg		35	03-AUG-05
WG332453-5	DUP	L296143-1						
TEH (C10-C16)			<5	RPD-NA	mg/kg		35	03-AUG-05
TEH (C16-C34)			44	J	mg/kg	12	15	03-AUG-05
TEH (C34-C50)			20	J	mg/kg	2	15	03-AUG-05
WG332453-1	MB							
TEH (C10-C16)			<5		mg/kg		5	03-AUG-05
TEH (C16-C34)			<5		mg/kg		5	03-AUG-05
TEH (C34-C50)			<5		mg/kg		5	03-AUG-05
WG332453-7	MB							
TEH (C10-C16)			<5		mg/kg		5	04-AUG-05
TEH (C16-C34)			<5		mg/kg		5	04-AUG-05
TEH (C34-C50)			<5		mg/kg		5	04-AUG-05
WG332453-9	MB							
TEH (C10-C16)			<5		mg/kg		5	05-AUG-05
TEH (C16-C34)			<5		mg/kg		5	05-AUG-05
TEH (C34-C50)			<5		mg/kg		5	05-AUG-05
WG332453-12	MS	L298137-2						
TEH (C10-C16)			70		%		65-135	05-AUG-05
TEH (C16-C34)			70		%		65-135	05-AUG-05
TEH (C34-C50)			70		%		65-135	05-AUG-05

**Enviro-Test Quality Control Report**

Workorder: L296267

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>ETL-TEH-CCME-CL</b>		<b>Soil</b>						
Batch	R309934							
WG332453-4	MS	L296435-2						
TEH (C10-C16)			87		%		65-135	03-AUG-05
TEH (C16-C34)			87		%		65-135	03-AUG-05
TEH (C34-C50)			87		%		65-135	03-AUG-05
WG332453-6	MS	L296267-1						
TEH (C10-C16)			70		%		65-135	04-AUG-05
TEH (C16-C34)			70		%		65-135	04-AUG-05
TEH (C34-C50)			70		%		65-135	04-AUG-05
Batch	R310335							
WG333237-1	MB							
TEH (C10-C16)			<5		mg/kg		5	04-AUG-05
TEH (C16-C34)			<5		mg/kg		5	04-AUG-05
TEH (C34-C50)			<5		mg/kg		5	04-AUG-05
WG333237-3	MB							
TEH (C10-C16)			<5		mg/kg		5	04-AUG-05
TEH (C16-C34)			<5		mg/kg		5	04-AUG-05
TEH (C34-C50)			<5		mg/kg		5	04-AUG-05
<b>PB-MUST-CL</b>		<b>Soil</b>						
Batch	R310806							
WG333815-4	DUP	L296267-1						
Lead (Pb)		16	15	J	mg/kg	1	15	06-AUG-05
WG333815-3	IRM	PBIRM-CL						
Lead (Pb)			118		%		75-125	06-AUG-05
WG333815-1	LCS							
Lead (Pb)			96	H	%		96-102	06-AUG-05
WG333815-2	MB							
Lead (Pb)			<5		mg/kg		5	06-AUG-05
WG333815-5	MS	L296267-1						
Lead (Pb)			91		%		71-107	06-AUG-05
<b>PREP-MOISTURE-CL</b>		<b>Soil</b>						
Batch	R309447							
WG332149-2	DUP	L296140-1						
% Moisture		13	12		%	6.8	15	03-AUG-05
WG332149-4	DUP	L296566-2						
% Moisture		17	16		%	2.3	15	03-AUG-05
WG332149-5	DUP	L296435-1						
% Moisture		23	23		%	0.94	15	03-AUG-05
WG332149-6	DUP	L295586-60						
% Moisture		15	15		%	2.7	15	04-AUG-05

# ENVIRO-TEST QC REPORT

Workorder # L296267

## Legend

Limit 95% Confidence Interval (Laboratory Warning Limits)  
DUP Duplicate  
RPD Relative Percent Difference  
N/A Not Available  
LCS Laboratory Control Sample  
SRM Standard Reference Material  
MS Matrix Spike  
MSD Matrix Spike Duplicate  
ADE Average Desorption Efficiency  
MB Method Blank  
IRM Internal Reference Material  
CRM Certified Reference Material  
CCV Continuing Calibration Verification  
CVS Calibration Verification Standard  
LCSD Laboratory Control Sample Duplicate

Best Copy Available

## Qualifier:

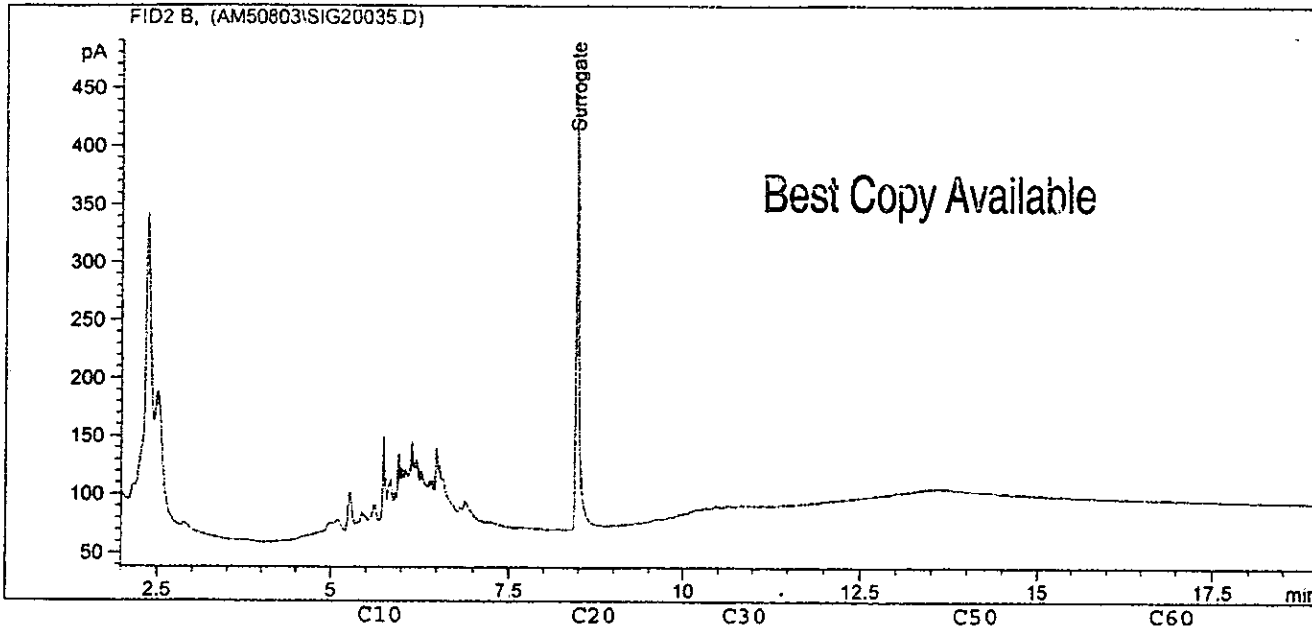
RPD-NA Relative Percent Difference Not Available due to result(s) being less than detection limit.  
A Method blank exceeds acceptance limit. Blank correction not applied, unless the qualifier "RAMB" (result adjusted for method blank) appears in the Analytical Report.  
B Method blank result exceeds acceptance limit, however, it is less than 5% of sample concentration. Blank correction not applied.  
E Matrix spike recovery may fall outside the acceptance limits due to high sample background.  
F Silver recovery low, likely due to elevated chloride levels in sample.  
G Outlier - No assignable cause for nonconformity has been determined.  
H Result falls within the 99% Confidence Interval (Laboratory Control Limits).  
J Duplicate results and limit(s) are expressed in terms of absolute difference.  
K The sample referenced above is of a non-standard matrix type; standard QC acceptance criteria may not be achievable.



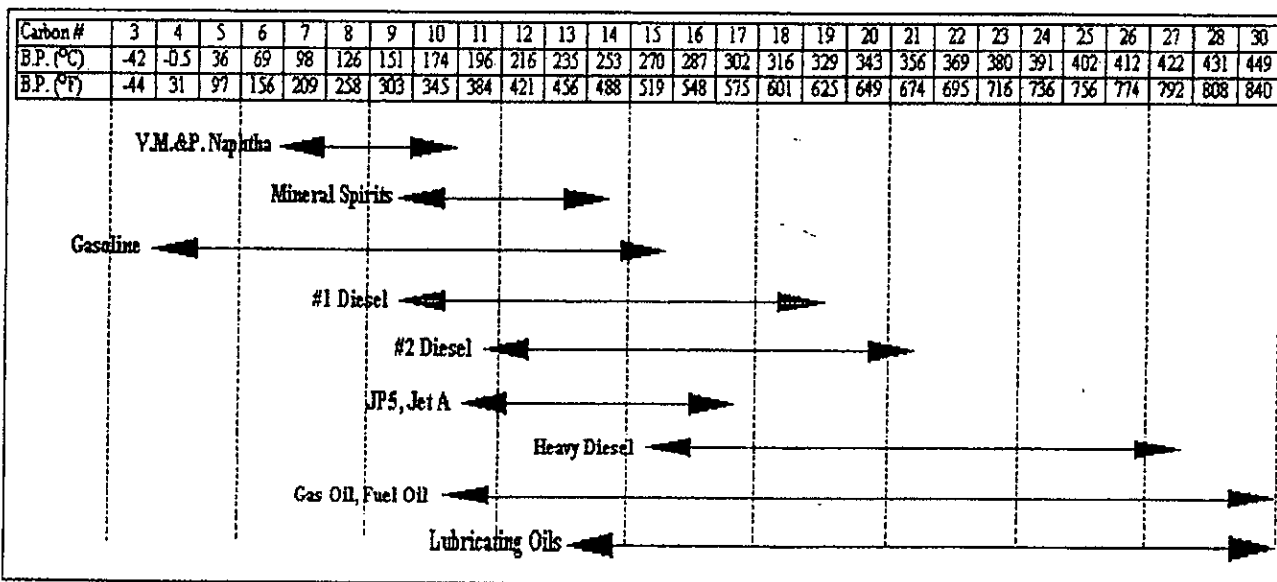
Client ID: WATER 1



Sample ID: L296267-1 v3  
 Injection Date: 8/4/2005 3:09:24 AM  
 Injection Time: 8/4/2005 3:09:24 AM  
 Instrument ID: 6890HP9  
 Operator: organics



Boiling Point Distribution Range for Petroleum Based Fuel Products



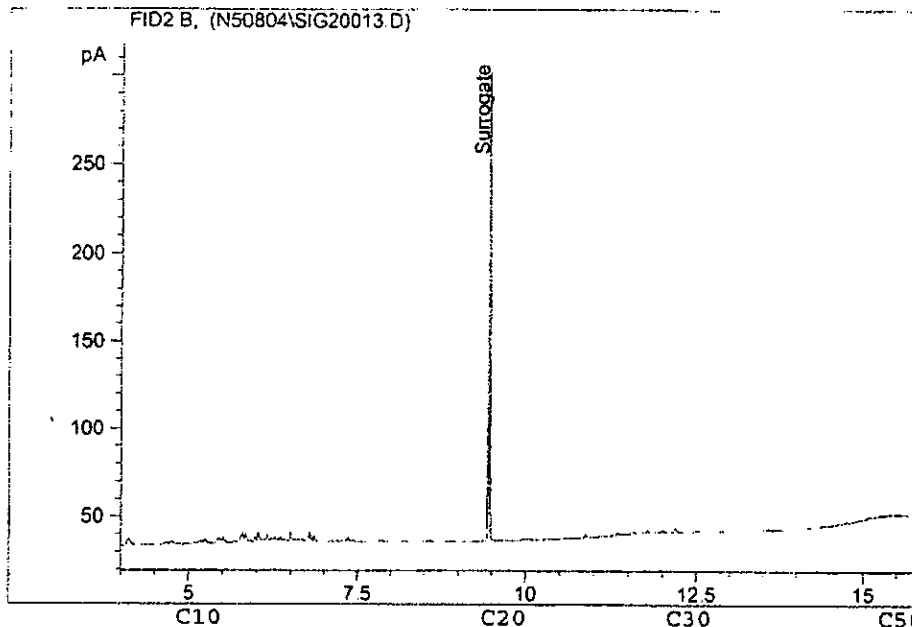
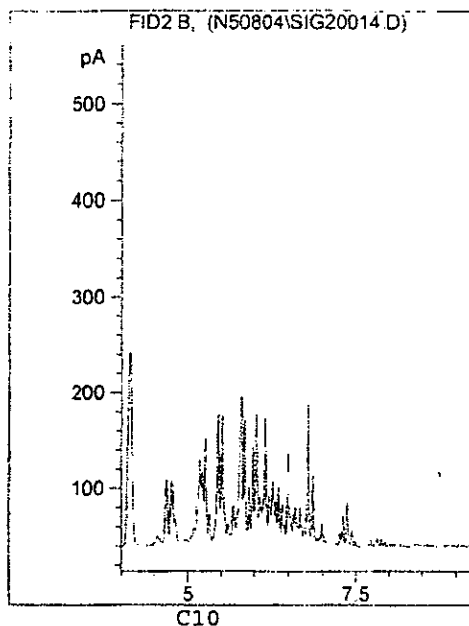
Adapted from: Drews, A.W., ED. Manual on Hydrocarbon Analysis, 4th ed, American Society for Testing and Materials: Philadelphia, PA., 1989. p XVIII

Client ID: SEWER 1

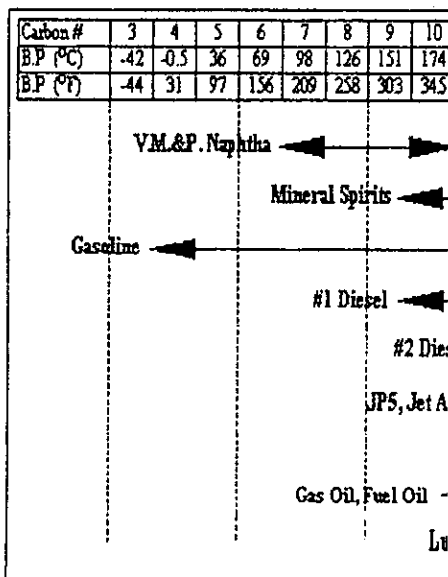
Client ID: WATER 2

Sample ID: L296267-3 v3  
 Injection Date: 8/5/05 12:20  
 Injection Time: 8/5/05 12:20  
 Instrument ID: Instrument 1  
 Operator: cgy

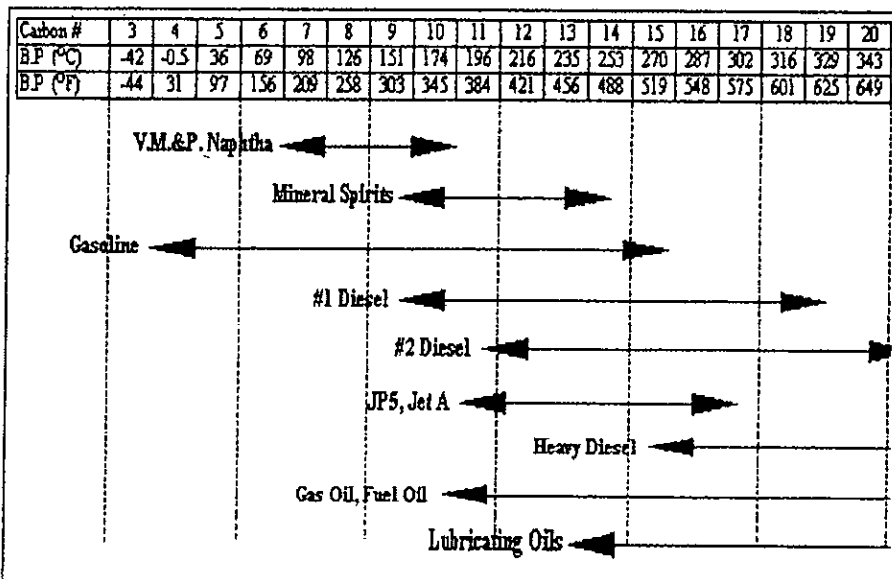
Sample ID: L296267-2 v3  
 Injection Date: 8/4/05 11:45:30 PM  
 Injection Time: 8/4/05 11:45:30 PM  
 Instrument ID: Instrument 1  
 Operator: cgy



Boiling Point Distribution Bar



Boiling Point Distribution Range for Petroleum Based Fuel



Adapted from: Drews, A.W., ED  
 Society for Testing and Materials

Adapted from: Drews, A.W., ED. Manual on Hydrocarbon Analysis  
 Society for Testing and Materials. Philadelphia, PA, 1989:

JOB STATUS REPORT

TIME : 01/17/2006 16:43  
NAME :  
FAX# :  
TEL# :  
SER. # : BRO3J2515159

DATE, TIME	01/17 16:42
FAX NO. /NAME	913066672500
DURATION	00:00:32
PAGE(S)	02
RESULT	OK
MODE	STANDARD ECM

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Approvals

2938 11 Street NE  
Calgary Alberta, Canada T2E 7L7  
Tel 403/297-7605 Fax 403/297-2749

Our File: 190795  
SCC Site # 9302

January 17, 2006

Vaughn Wyant  
Vaughn Wyant Investments Ltd  
419 Brand Place  
Saskatoon, Saskatchewan  
S7J 5L6

Post-it™ Fax Note	7671E	Date	17-Jan-06	# of pages	2
To	Greg Saretzky	From	Kim Kirillo		
Co./Dept	Stantec	Co	AENV		
Phone #	306-667-2456	Phone #	403-297-8270		
Fax #	306-667-2500	Fax #			

Dear Mr Wyant:

Re: **Assessment and Remediation Activities**  
**419 – 10 Avenue, Carstairs, Alberta**

Alberta Environment (AENV) has reviewed the Stantec Consulting Ltd (Stantec) *Utility Corridor Assessment - Revised* dated October 2005, which was updated to include sampling and analysis of drinking water for petroleum hydrocarbons (PHC). PHC concentrations were found to be below Canadian drinking water quality standards in four water samples taken from the private water line of the adjacent Five Stars Movies building.

AENV agrees with adding a drinking water sampling program to the risk management plan, as outlined in the January 11, 2006 Stantec letter. AENV has some additional comments about assessment and remediation activities at the site as follows:

- In our September 12, 2005 letter, we had asked for more information about the level of risk to the municipal utilities underneath 10th Avenue. Soil sampled from boreholes BH13, BH14, BH15, BH19, BH22 and BH 21 had benzene and PHC fraction F1 concentrations exceeding commercial criteria at approximately 2.2 - 7.0 m below

January 17, 2006

Our File 190795  
SCC Site # 9302

Vaughn Wyant  
Vaughn Wyant Investments Ltd  
419 Brand Place  
Saskatoon, Saskatchewan  
S7J 5L6

Dear Mr Wyant:

**Re: Assessment and Remediation Activities  
419 – 10 Avenue, Carstairs, Alberta**

Alberta Environment (AENV) has reviewed the Stantec Consulting Ltd (Stantec) *Utility Corridor Assessment - Revised* dated October 2005, which was updated to include sampling and analysis of drinking water for petroleum hydrocarbons (PHC). PHC concentrations were found to be below Canadian drinking water quality standards in four water samples taken from the private water line of the adjacent Five Stars Movies building.

AENV agrees with adding a drinking water sampling program to the risk management plan, as outlined in the January 11, 2006 Stantec letter. AENV has some additional comments about assessment and remediation activities at the site as follows:

- 1 In our September 12, 2005 letter, we had asked for more information about the level of risk to the municipal utilities underneath 10th Avenue. Soil sampled from boreholes BH13, BH14, BH15, BH19, BH22 and BH 21 had benzene and PHC fraction F1 concentrations exceeding commercial criteria at approximately 2.2 – 3.0 m below grade. The municipal water line runs through this general area, and there may be PHC contamination in contact with the utility line. The concern is that there is the potential for the drinking water supply to be contaminated, and for workers to be exposed to contamination during utility repair/upgrade. We recommend that you conduct an assessment to evaluate any potential adverse effects to the municipal water line.
- 2 The proposed soil vapour extraction system (SVES) as a remediation option by itself is not sufficient to remediate the PHC contamination in a reasonable timeframe, considering the potential risks. We recommend that you explore other remediation options to use in conjunction with or as an alternative to SVES.

You will need to deal with additional concerns of the Calgary Health Region, as outlined in their January 11, 2006 letter to AENV. In summary, we recommend that you complete additional assessment activities, and consider additional remediation options for the site.





The review presented in this letter is based on the remediation process and objectives presented in Alberta Environment's *Risk Management Guidelines for Petroleum Storage Tank Sites, October 2001*. This letter is not intended to absolve any party from the potential for future liability for remediating this site in situations where either the land use may change or additional concerns arise from the contaminants remaining on or off-site.

Should you wish further discussion, please contact me at (403) 297 – 8270

Sincerely,

A handwritten signature in black ink, appearing to read "K Kirillo". The signature is fluid and cursive, with the first letter "K" being particularly large and stylized.

Kim Kirillo  
Petroleum Storage Tank Sites Specialist

cc: Steve Hoare, Safety Codes Council  
Greg Saretzky, Stantec Consulting  
Paul von Schoenberg, Calgary Health Region





# calgary health region

## Southeast Community Portfolio

Environmental Health  
1509 Centre Street SW  
Calgary, Alberta Canada T2G 2E6  
Facsimile: (403) 943-8056

January 11, 2006

**Kirillo, Kim**  
**Contaminated Sites Coordinator**  
Industrial Approvals Team  
Alberta Environment  
2nd fl Deerfoot Square  
2938 - 11 Street NE  
Calgary, AB, T2E 7L7



Best Copy Available . . . Via facsimile: 403 297-2749

Dear Ms: Kirillo,

**RE: Contamination Issues at 419 10<sup>th</sup> Avenue, Carstairs Alberta**

Thank you for informing the Calgary Health Region (CHR) concerning the contamination concerns on the above referenced property. The CHR has had the opportunity to review the following documents:

- Utility Corridor Assessment, Revised, 419 10<sup>th</sup> Avenue, Carstairs, Alberta, prepared by Stantec Consulting Ltd., October, 2005
- Proposed Remedial Action Plan – Revised, 419 10<sup>th</sup> Avenue, Carstairs, Alberta, prepared by Stantec Consulting Ltd., June, 2005
- Proposed Risk Mangement Plan – Revised, 419 10<sup>th</sup> Avenue, Carstairs, Alberta, prepared by Stantec Consulting Ltd., June, 2005
- Phase III Hydrocarbon Environmental Site Assessment (ESA) – Delineation, 419 10<sup>th</sup> Avenue, Carstairs, Alberta, prepared by Ms. J. Bachand, Environmental Technologist, Petroleum Enviro Services, February 21, 2003.

Based on our review, the CHR would like to forward the following comments for your consideration:

**Indoor Air Quality Monitoring**

1. Based on the described delineation of the subsurface hydrocarbon contaminant plume, the CHR is of the opinion that initial indoor air quality monitoring should be conducted for the Five Star Movies building (address: 411 10 Avenue, Carstairs) located directly adjacent to the site to verify that no vapours are infiltrating into the building structure. The CHR would like to have the opportunity to review and comment on the results of the recommended monitoring.

from AENU's experience, vapour intrusion is not an issue on most sites where a building is located near a PHC plume

**Impacts to 10 Avenue Utility Line**

2. The Utility Corridor Assessment identified the possibility that there exists hydrocarbon contamination from within the main utility corridor below 10<sup>th</sup> Avenue. The hydrocarbon contamination is an important consideration in the event of any local water main breaks or low pressure events that might introduce contamination into the drinking water supply. The CHR recommends that a proper assessment be conducted to evaluate any potential impacts on the municipal water utility line underneath 10<sup>th</sup> Avenue.



not a  
concern  
of AENV

The potential impact on the utility line within 10<sup>th</sup> Avenue presents a concern for any workers during excavation of the roadway or repairs to underground utilities. The CHR recommends that the owner of the property (or the environmental consultants on behalf of the owner) contact Alberta Workplace Health and Safety for their input and recommendation.

### Drinking Water Sampling

3. The CHR concurs with Stantec Consulting Ltd's recommendation that quarterly drinking water sampling be conducted for the Five Star Movies Building. Furthermore, the CHR concurs that samples should be analysed for BTEX, F1 and F2 fractions and MTBE concentrations. The CHR would like to have the opportunity to review monitoring results as they become available.
4. Please be advised that the CHR is in the process of assessing drinking water quality in the surrounding area with respect to potential impacts on the water service connection lines. The CHR would be pleased to forward these assessment results to Alberta Environment when they become available.

### Delineation of Contamination

5. Contamination on the property of the Carstairs Co-op Marketplace has been described as being suspected in the Phase III ESA prepared by Petroleum Enviro Services. The CHR is of the view that efforts to properly delineate contamination towards the Carstairs Co-op Marketplace should continue by the owner of the property (or the environmental consultants on behalf of the owner). It is our understanding that the consultant has been unable to drill exploratory boreholes in the proximity of the Co-op due to an outstanding litigation between the Co-op and a paving company.

### Groundwater Monitoring Program

6. It is our understanding that the implementation of an annual groundwater monitoring program designed to evaluate the effectiveness of the proposed remedial system has been proposed in the Remedial Action Plan. The CHR would like to have the opportunity to review more information on the details of the proposed monitoring program.

### Remedial Action Plan

7. The CHR is of the view that the currently proposed remedial action plan (soil vapour extraction (SVE system)) may not remediate the contaminants in a timely efficient manner. Accordingly, the CHR recommends that the consultant consider exploring other available remedial technology options that may address the contamination concerns in a more timely fashion than the proposed remedial plan for the site.

### Risk Management Plan

8. The Risk Management Plan (RMP) states that if monitoring activities suggest that hydrocarbon impacts have further migrated, additional assessment may be required, and affected parties will be notified. Furthermore, the RMP states that if adverse changes in the conditions on the site are discovered that additional recovery wells may be added to the SVE system network, and additional delineation activities will be carried out, if necessary. The CHR concurs with these recommendations.



(The following text is extremely faint and illegible due to low contrast and blurring. It appears to be a single line of text, possibly a title or a header, located in the upper middle section of the page.)

419 10<sup>th</sup> AVENUE, CARSTAIRS

JANUARY 11, 2006

PAGE 3

The CHR looks forward to having the opportunity to review additional information related to the subject site, and to working with Alberta Environment and the environmental consultants in the future. If you have any questions in the meantime, please contact the undersigned at 403-943-8054.

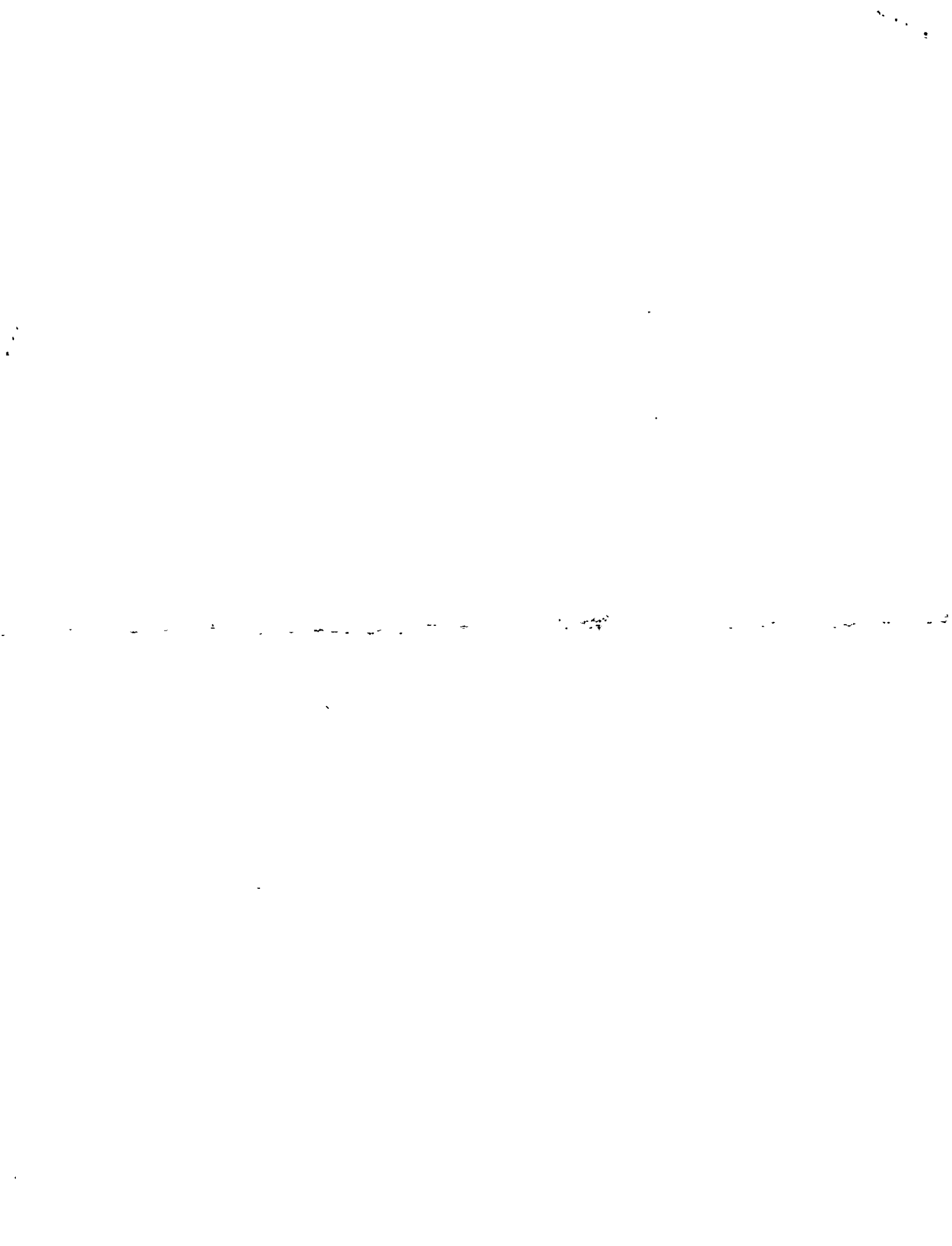
Sincerely,



Paul von Schoenberg  
Environmental Health Advisor  
Environmental Health Risk Assessment and Management  
Environmental Health

cc. Greg Saretzky, Environmental Engineer, Stantec Consulting Ltd., (fax only- 306-667-2500)  
cc. Carl McDonnell, CAO, Town of Carstairs





Stantec Consulting Ltd.  
100 - 75 - 24th Street East  
Saskatoon SK S7K 0K3  
(306) 667-2400 Fax: (306) 667-2500  
stantec.com

190795

MA site 9302



**Stantec**

December 12, 2005  
File: 1132-52998.200

Tel: (306) 667-2460  
Fax: (306) 667-2500  
cmathies@stantec.com

Vaughn Wyant Investments Ltd.  
419 Brand Place  
Saskatoon, SK S7J 5L6

**Attention: Vaughn Wyant  
Owner**

Dear Mr. Wyant:

**Reference: Utility Corridor Assessment - Revised  
419 - 10<sup>th</sup> Avenue, Carstairs, Alberta**

Please find enclosed one final copy of the above referenced report, which has been revised to reflect the comments from Alberta Environment. If you should have any questions, please contact the undersigned at (306) 667-2460.

Sincerely,

**STANTEC CONSULTING LTD.**

Chris Mathies, B.E., E.I.T.  
Environmental Engineer-in-Training

Attachment

cc:  
Steve Hoare  
Safety Codes Council

Kim Kirillō  
Alberta Environment





**Stantec**

**Utility Corridor Assessment  
Revised  
419 – 10<sup>th</sup> Avenue  
Carstairs, Alberta**

Prepared For:  
Vaughn Wyant Investments Ltd.

Prepared By:  
Stantec Consulting Ltd.  
100 – 75 – 24<sup>th</sup> Street East  
Saskatoon, SK S7K 0K3  
www.stantec.com

October 2005  
File: 1132-52998

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Stantec Consulting Ltd.  
100 - 75 - 24th Street East  
Saskatoon SK S7K 0K3  
(306) 667-2400 Fax: (306) 667-2500  
stantec.com



**Stantec**

October 31, 2005  
File: 113252998.200

Vaughn Wyant Investments Ltd.  
419 Brand Place  
Saskatoon, SK S7J 5L6

**Attention: Vaughn Wyant  
Owner**

Dear Mr. Wyant:

**Reference: Utility Corridor Assessment - Revised  
Carstairs, Alberta**

Stantec Consulting Ltd. (Stantec) is pleased to provide Vaughn Wyant Investments Ltd. (Vaughn Wyant) with this revised letter report summarizing the utility corridor assessment that occurred on the property located at 419 – 10<sup>th</sup> Avenue, Carstairs, Alberta (Site). A Site location map and a Site plan are provided in Figure 1 and Figure 2, respectively.

### **Background**

Stantec was retained by Vaughn Wyant to complete a utility corridor assessment on the property located at 419 – 10<sup>th</sup> Avenue, Carstairs, Alberta at the request of Alberta Environment (AENV). A Phase II and Phase III ESA have previously been conducted at the Site by Petroleum Enviro Services in 2002 and 2003 in which petroleum hydrocarbon (PHC) impacted soil was detected.

Petroleum Enviro Services estimated the volume of PHC impacted soils to be approximately 3,300 m<sup>3</sup> (Petroleum Enviro Services, 2003). The volume estimate is based on a limited number of boreholes drilled at the Site and an estimated value for the hydrocarbon impacted soil on the Co-op Food Store property without complete delineation.

**Reference: Utility Corridor Assessment - Revised  
Carstairs, Alberta**

The lateral extents of hydrocarbon impacts at the Site suggest that hydrocarbon constituents may be present within utility corridors. Hydrocarbon impacts have been observed on the north and south sides of the service connections that supply the Five Star Movies building with water and sanitary sewer services.

**Objective**

The main objective of the assessment was to determine if PHC impacts, previously identified at the Site, have migrated into the utility corridor servicing the Site and adversely affected the underground utilities.

**Scope of Work**

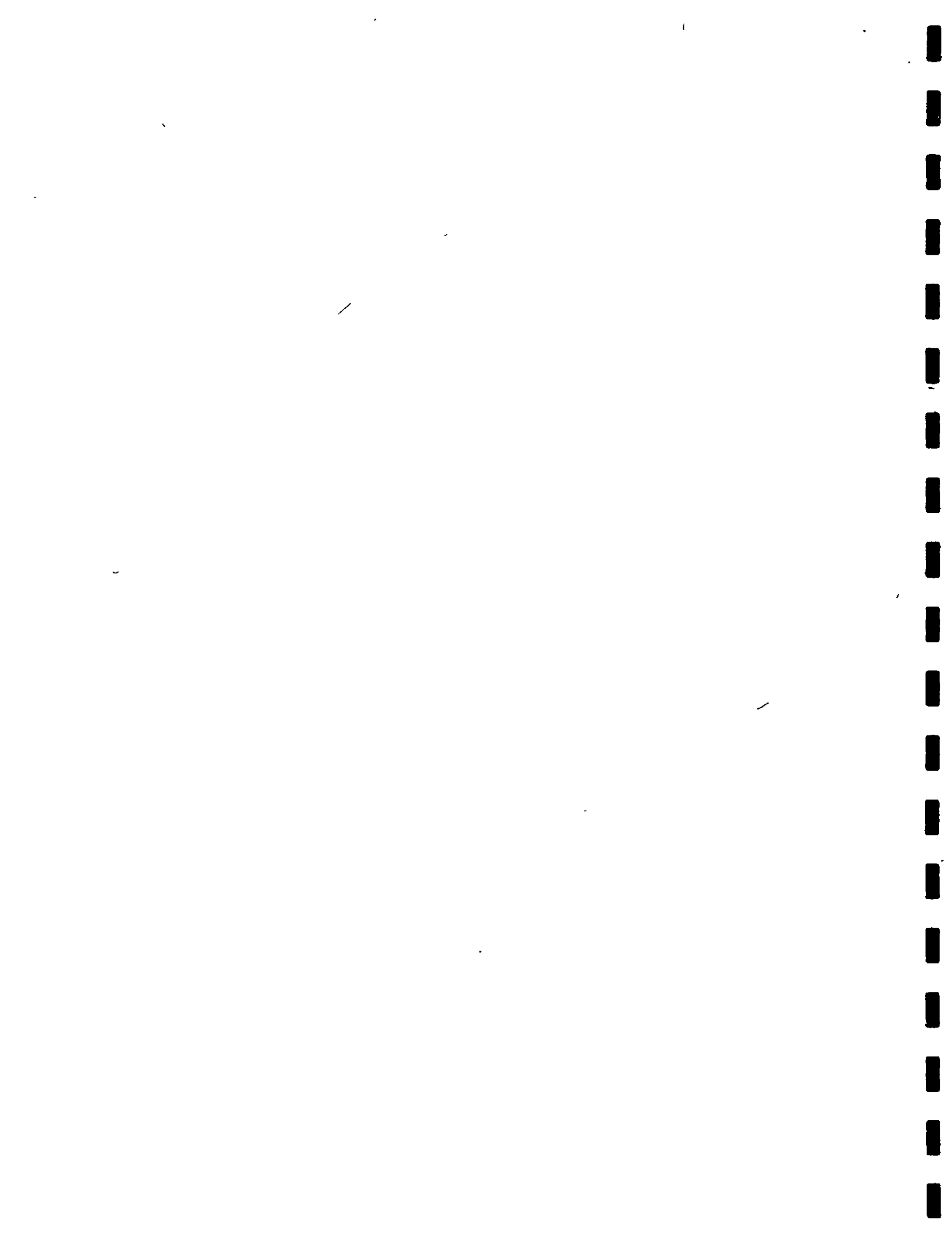
Stantec conducted the following activities in order to accomplish the study objectives:

- Conducted a desktop review to determine the construction materials of the underground utilities.
- Located underground lines and utilities.
- Hydrovaced the utility lines in two locations along the utility corridor.
- Excavated soil to expose the underground utilities.
- Obtained two soil samples adjacent to each utility line.
- Analyzed soil samples for select hydrocarbon parameters and lead concentrations.
- Collected water samples from the potable water within the Five Star Movies building.
- Analyzed the water samples for select hydrocarbon parameters.
- Prepared a report documenting the observations and results from the assessment program.

**Methodology**

Desktop Review

A desktop review was conducted to determine the construction material used for the underground utilities in the vicinity of the Site. Individuals from the Town of Carstairs were contacted to provide information on the construction materials, including the compositional material of the utility lines and the type of gaskets present.



**Reference: Utility Corridor Assessment - Revised  
Carstairs, Alberta**

### Soil Sampling

A safety meeting was held that covered job safety, planning checklists, equipment checklists, emergency information and work site hazards prior to commencing work at the Site.

Underground and aboveground utility locates were conducted by Alberta One Call. Abacus Datagraphics Ltd was also retained to locate underground utilities for the Site. Hydrovac activities were performed by Badger Daylighting to clearly identify the location of the underground utilities prior to commencing the excavation program.

Kowal Construction Alta Ltd. was retained by Stantec to provide the necessary equipment and personnel to excavate soil along the utility corridor to expose the underground infrastructure on August 2, 2005.

Soil previously located adjacent to the underground water and sanitary utility lines was removed from the bucket of the backhoe at depths between 1.5 and 1.75 m below ground level (mBGL).

Soil samples were obtained for field screening purposes and potential laboratory analysis. Soil samples collected for soil combustible vapour concentration (SCVC) measurements were placed in resealable plastic bags filled one half full and sealed. The soil samples were allowed to reach an ambient temperature of approximately 20°C, after which time the combustible soil vapour concentration that accumulated in the headspace of the bag was measured with a GasTech Model 1238ME, calibrated for hexane, set for no methane response.

Soil samples collected for potential laboratory analysis were placed in 125 mL glass jars fitted with Teflon-lined screw down lids. Jars were completely filled to provide zero headspace. Soil samples submitted for laboratory analysis were chosen based on the results of the SCVC measurements and visual and olfactory indicators.

### Water Sampling

Water samples were collected from the kitchen tap within the Five Star Movies building to evaluate the quality of water. Water samples were collected from the kitchen tap on September 29, 2005 and October 7, 2005.

The initial sample was collected on September 29, 2005 at approximately 4:30 pm. The second set of water samples were collected on October 7, 2005 at 11:00 am prior to water being consumed in the building. Three water samples were collected on October 7, 2005 to assess the hydrocarbon concentrations at different locations within the service connection and water main.

**Reference: Utility Corridor Assessment - Revised  
Carstairs, Alberta**

The first water sample, labeled as 'Service Connection Five Star Movies', was collected after purging approximately 5 L of water. It was calculated that approximately 5 L of stagnant water was present between the kitchen tap and the service connection that was surrounded by hydrocarbon impacted soil. The sample consisted of a composite sample collected over the next 4 L, which represents the volume in the service connection that was surrounded by hydrocarbon impacts.

The second water sample, labeled as 'Main Line Five Star Movies', was collected after a total of approximately 15 L of water was purged. The sample represents the water present within the main header line, near the service connection.

The third water sample, labeled as 'Main Header Five Star Movies', was collected after allowing the kitchen tap to purge water for approximately 5 minutes following the collection of the second sample. The sample represents the water present in the main header line after a period of continuous flushing.

**Analytical Program**

Four soil samples, two samples from each exposed utility line, were submitted on August 2, 2005 under chain of custody to EnviroTest Laboratories (ETL) in Calgary, Alberta and analyzed for benzene, toluene, ethylbenzene and xylene (BTEX), PHC Fractions F1 to F4 and lead concentrations.

The water samples collected on September 29, 2005 and October 7, 2005 were submitted to ETL for analysis of BTEX and PHC Fractions F1 to F2. The water sample collected on October 7, 2005 was also analysed for methyl ter-butyl ether (MTBE).

**Assessment Criteria**

Soil Criteria

The soil conditions at the Site were compared against the following guidelines:

- Alberta Environment (AENV) *Risk Management Guidelines for Petroleum Storage Tank Sites, October 2001* (PST Guidelines).

The Risk Management Guidelines for Petroleum Storage Tank Sites have been developed to assist both the owners and operators of petroleum storage tank systems and the regulatory authority in the remediation or management of site, impacted by leakage or spillage of petroleum products. The guidelines have been developed through use of a risk based approach which is designed to ensure the protection of human health, safety and the environment. The guidelines provide uniform standards for the remediation and management of impacted



**Reference: Utility Corridor Assessment - Revised  
Carstairs, Alberta**

petroleum storage tanks sites in Alberta. The specific guidelines chosen for soil comparison are the Generic Hydrocarbon and Lead Criteria for Fine-Grained Soil in a commercial setting.

The Alberta or Canadian based guidelines do not provide specific processes and criteria for residual hydrocarbon impacts near water lines, therefore, soil concentrations were also assessed to the following South Dakota guidelines. The South Dakota Guidelines have been used for comparison and informational purposes since no other guidelines exist. Stantec suggests that the protocol identified in these guidelines be used based on the sensitive receptors applicable at the Site.

- South Dakota Department of Environment and Natural Resources, *Handbook for Investigation and Corrective Action Requirements for Discharges from Storage Tanks, Piping System and Other Releases*, March 2003 (South Dakota Guidelines).

The South Dakota Guidelines provide protocol for assessing hydrocarbon concentrations in soils surrounding underground water lines. The guidelines indicate that if hydrocarbon concentrations exceed the Tier 1 Action Levels a water sample must be collected. The guidelines also provide information in regards to liquid phase hydrocarbons contacting underground water lines.

The South Dakota Guidelines also provide criteria for dissolved phase hydrocarbons that are in contact with an underground polyvinyl chloride (PVC) water line. The guidelines indicate that impacts occur to a PVC water line when the dissolved fractions of chemicals of concern exceed the maximum allowable concentration in the groundwater. Softening of the PVC occurs when certain hydrocarbon constituents are in contact with the water line, which makes it susceptible to permeation. The South Dakota Guidelines suggest that if hydrocarbon concentrations exceed the maximum allowable guidelines, the water line must be rerouted or replaced with a petroleum resistant material. Gaskets, if used, must should be replaced with a hydrocarbon resistant material.

Potable Water Criteria

The hydrocarbon concentrations for the potable water samples within the Five Star Movies building were compared to the PST Guidelines for potable water since individuals within the facility are consuming the water.

**Reference: Utility Corridor Assessment - Revised  
Carstairs, Alberta**

## **Results**

### Desktop Review

The Town of Carstairs was contacted to provide information on the construction details of the underground water lines. The Town of Carstairs indicated that the construction materials for the service connections are not recorded and are the responsibility of the landowner at the time of installation. Field observations indicated that the water and sewer lines were comprised of PVC, however, this could not be confirmed with documentation from the Town or landowner. Gaskets were not identified during the pipe exposure, however, it is likely that either rubber gaskets or solvent welds are present.

The Town of Carstairs indicated that the water main within 10<sup>th</sup> Avenue consists of PVC pipe connected by rubber gaskets. The water main was installed in approximately 1987.

The type of construction material is important in conducting a utility corridor assessment as different types of construction materials are more resilient than others to hydrocarbon impacts. Softening of PVC pipes can occur when hydrocarbon constituents are in contact with a water line, which makes the line susceptible to permeation. It has been demonstrated that PVC provides greater protection against hydrocarbon impacts than polybutylene (PB) and polyethylene (PE). PVC pipes are considered as one of the most resistant plastic materials, however, gaskets located at pipe joints represent a weak spot in the system that may allow ingress of petroleum hydrocarbons. A common gasket material used with PVC pipe is styrene butadiene rubber (SBR). This material is readily permeated by hydrocarbons such as gasoline. The gasket may also swell to such a degree that there can be physical failure of the joint allowing the access of impacted water if the main goes under negative pressure.

The South Dakota Guidelines provide a lookup table for dissolved benzene and toluene concentrations in groundwater. Maximum allowable concentrations in groundwater are provided for benzene and toluene, which have been developed to provide a maximum concentration that can be present in the groundwater if the impacts surround an underground PVC water line. Groundwater samples were not collected from within the utility corridor due to dilution by the hydrovacating activities, however, dissolved phase hydrocarbon concentration have been recorded during past sampling events in surrounding monitoring wells. Monitoring well MW1, which is located to the north of the service connection to the Five Star Movies building, has been sampled for dissolved phase hydrocarbon concentrations on two occasions. Monitoring well MW1 is considered to be representative of the water in the utility corridor due to its close proximity. The dissolved hydrocarbon concentrations are provided in Table 1, along with the maximum allowable concentrations provided by the South Dakota Guidelines.

October 31, 2005

Maughn Wyant Investments Ltd.

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Reference: **Utility Corridor Assessment - Revised**  
**Carstairs, Alberta**

**Table 1**  
**Dissolved Hydrocarbon Concentrations in Monitoring Well MW1**

Parameters	Units	Detection Limit	Guidelines <sup>1</sup>	Sample Location	
<b>General Information</b>					
Sample ID		N/A	N/A	MW #1	MW #1
Date Sampled	(dd-mm-yy)	N/A	N/A	23-May-02	06-Feb-03
<b>BTEX and PHC Fraction Hydrocarbons</b>					
Benzene	mg/L	0.0005	3.2	<b>14</b>	<b>25</b>
Toluene	mg/L	0.0005	6.3	0.12	0.1
Ethylbenzene	mg/L	0.0005	NG	1.5	2.7
Xylenes	mg/L	0.0005	NG	3.6	4.1
F1 (C <sub>6</sub> -C <sub>10</sub> )	mg/L	0.1	NG	19	0.3
F2 (C <sub>11</sub> -C <sub>19</sub> )	mg/L	0.05	NG	1.8	1.7

## Notes

<sup>1</sup> South Dakota Department of Environment and Natural Resources, Handbook for Investigation and Corrective Action Requirements for Discharges from Storage Tanks, Piping Systems and Other Releases, March 2003.

BTEX – indicates benzene, toluene, ethylbenzene and xylene.

N/A – indicates not applicable.

NG – indicates no guideline.

**BOLD** – indicates South Dakota Guideline exceedance.

The results from the samples obtained from monitoring well MW1 on May 23, 2002 and February 6, 2003 indicate that benzene concentrations exceeded the maximum allowable guidelines for groundwater situated near a PVC water line. Monitoring well MW1 is approximately 5 m to the north of the PVC water line, however, it is considered to be representative of the groundwater situated within the hydrocarbon plume.

The desktop review indicated that further testing and evaluation was warranted to assess the potential risks of the hydrocarbon impacts situated near the PVC water line.

#### Utility Corridor Assessment - Soil Results

The utility corridor was exposed by hydrovac activities at two locations along the utility corridor on August 2, 2005. The locations of the exposures, the extent of excavation and sample locations are presented in Figure 2. Field observations indicated that water and sewer lines consisted of PVC.

A visible hydrocarbon sheen was observed on the water remaining in the excavation. Hydrocarbon odour and staining was present at the sampling locations identified as Water1, Water2, Sewer1, and Sewer2.

A total of 4 soil samples were collected for SCVC measurements during the investigation program. The SCVC readings were obtained from the two excavated areas between 1.5 mBGL and 1.75 mBGL. The SCVC readings ranged from 2,200 parts per million (ppm) to 11,000 ppm.

Four soil samples collected from the Site were submitted for laboratory analysis of BTEX, PHC Fractions F1 to F4 and lead concentrations. Samples Water1 (1.5 m to 1.75 m), Water2 (1.5 m

**Reference: Utility Corridor Assessment - Revised  
Carstairs, Alberta**

to 1.75 m), Sewer1 (1.5 m to 1.75 m) and Sewer2 (1.5 m to 1.75 m) were submitted to ETL for analysis.

Samples submitted for analysis were selected from the depths, which in the assessor's opinion had the greatest risk of impact, or from locations to confirm that hydrocarbon impacts were less than the applicable guidelines. The selection was based on SCVC results and visual and olfactory field observations of the soil collected from the backhoe. Analytical results for the soil samples collected on August 2, 2005 are presented in Table 1 and analytical reports are attached in Appendix A.

**Table 2  
Soil Analytical Results**

Parameters	Units	Detection Limit	PST Guidelines <sup>1</sup>	South Dakota Guidelines <sup>2</sup>	Water1	Water2	Sewer1	Sewer2
<b>General Information</b>								
Stantec Sample ID		N/A	N/A	N/A	Water1 (1.5 - 1.75 m)	Water2 (1.5 - 1.75 m)	Sewer1 (1.5 - 1.75 m)	Sewer2 (1.5 - 1.75 m)
Lab Sample ID		N/A	N/A	N/A	L296267-1	L296267-2	L296267-3	L296267-4
Date Sampled	(dd-mm-yy)	N/A	N/A	N/A	02-Aug-05	02-Aug-05	02-Aug-05	02-Aug-05
Sample Depth	(mBGL)	N/A	N/A	N/A	1.65	1.65	1.65	1.65
<b>Soil Sample Information</b>								
Soil Type		N/A	N/A	N/A	Sandy-Silt with Clay	Sandy-Silt with Clay	Sandy-Silt with Clay	Sandy-Silt with Clay
SCVCs	ppm	N/A	N/A	N/A	11,000	8,800	3,080	2,200
% Moisture	%	0.1	NG	N/A	14	17	15	19
<b>BTEX and PHC Fraction</b>								
<b>Hydrocarbons</b>								
Benzene	mg/kg	0.005	9	0.2	7.7	5.4	<b>16</b>	<b>13</b>
Toluene	mg/kg	0.01	450	15	7.5	3.7	1.1	1.8
Ethylbenzene	mg/kg	0.001	690	10	9.8	4.3	67	53
Xylenes	mg/kg	0.01	1,500	300	52	21	390	310
F1 (C <sub>6</sub> -C <sub>10</sub> )	mg/kg	5	660	NG	450	170	<b>2,500</b>	<b>2,000</b>
F2 (C <sub>11</sub> -C <sub>16</sub> )	mg/kg	5	1,500	NG	63	<5	150	130
F3 (C <sub>17</sub> -C <sub>34</sub> )	mg/kg	5	2,500	NG	22	11	60	89
F4 (C <sub>35</sub> -C <sub>50</sub> )	mg/kg	5	6,800	NG	31	14	41	48
Total Hydrocarbons	mg/kg	5	NG	NG	570	200	2800	2300
Lead (Pb)	mg/kg	5	260	NG	16	20	26	20

Notes:

<sup>1</sup>Alberta Environment Risk Management Guidelines for Petroleum Storage Tank Sites, October 2001, PST Guidelines, Fine Grained, Commercial/Industrial Land Use.

<sup>2</sup>South Dakota Department of Environment and Natural Resources, Handbook for Investigation and Corrective Action Requirements for Discharges from Storage Tanks, Piping Systems and Other Releases, March 2003.

SCVC - indicates soil combustible vapour concentration

BTEX - indicates benzene, toluene, ethylbenzene and xylene

mBGL - indicates meters below ground level.

N/A - indicates not applicable.

NG - indicates no guideline.

**BOLD** - indicates AENV Guideline exceedance.

The laboratory results from soil samples submitted for laboratory analysis are summarized below:

- Samples Water1 and Water2 exhibited hydrocarbon staining and hydrocarbon odours were observed within the upper 1.75 m of soil. The maximum SCVC readings were 11,000 ppm and 8,800 ppm, respectively. Laboratory analysis from a depth of

**Reference: Utility Corridor Assessment - Revised  
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1.5 mBGL to 1.75 mBGL indicated that parameters analyzed from samples Water1 and Water2 were within the applicable AENV guidelines.

- Benzene concentrations in samples Water1 and Water2 exceeded the South Dakota Guidelines for maximum allowable concentrations near a PVC water line.
- Samples Sewer1 and Sewer2 had SCVC readings of 3,080 ppm and 2,200 ppm, respectively. Sewer samples contained concentrations of benzene and F1 hydrocarbons greater than the applicable AENV guidelines.
- Benzene, ethylbenzene and xylene concentrations in samples Sewer1 and Sewer2 exceeded the South Dakota Guidelines for maximum allowable concentrations near a PVC water line. The samples Sewer1 and Sewer2 were obtained directly adjacent to the sewer line, however, were also located near the water line. The hydrocarbon concentrations are not anticipated to vary between the soil situated near the water line or sewer line. The variations observed in the analytical results between the water and sewer lines are considered to be a result of the heterogeneous nature of the subsurface and hydrocarbon concentrations. Hydrocarbon concentrations identified near the sewer line may also be present at locations surrounding the water line.
- Lead concentrations in the samples analyzed were found to be below applicable guidelines.
- Chromatograms provided by the laboratory show hydrocarbon distributions typical of gasoline, ranging from approximately C8 to C15.

Soil analytical results indicate that PHC concentrations in soil exceed the PST guidelines within the utility corridor at the sampled locations. Concentrations of benzene, ethylbenzene and xylene were also present at concentrations exceeding the South Dakota Guidelines. The presence of benzene, ethylbenzene and xylene in exceedance of the South Dakota Tier 1 Action Levels indicated that water samples should be collected from the potable water source that passes through the utility line located in the hydrocarbon impacted soil.

Potable Water Results

Water samples were collected from the kitchen tap of the Five Star Movies building on September 29, 2005 and October 7, 2005. The analytical results of the potable water sampling are presented in Table 2 and analytical reports are attached in Appendix A.

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Vaughn Wyant Investments Ltd.

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Reference: **Utility Corridor Assessment - Revised**  
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**Table 3**  
**Potable Water Results**

Parameters	Units	Detection Limit	Guidelines <sup>1</sup>	Water Sample			
<b>General Information</b>							
Stantec Sample ID		N/A	N/A	MW1 Kitchen Tap	Service Connection Fivestar Movies	Main Line Fiverstar Movies	Main Header Fivestar Movies
Lab Sample ID		N/A	N/A	L325179-1	L327919-1	L327919-2	L327919-3
Date Sampled	(dd-mm-yy)	N/A	N/A	29-Sept-05	08-Oct-05	08-Oct-05	08-Oct-05
<b>BTEX and PHC Fraction</b>							
<b>Hydrocarbons</b>							
Benzene	mg/L	0.0005	0.005	0.0008	<0.0005	<0.0005	<0.0005
Toluene	mg/L	0.0005	0.024	<0.0005	<0.0005	<0.0005	<0.0005
Ethylbenzene	mg/L	0.0005	0.0024	<0.0005	<0.0005	<0.0005	<0.0005
Xylenes	mg/L	0.0005	0.3	0.0019	<0.0005	<0.0005	<0.0005
F1 (C <sub>8</sub> -C <sub>10</sub> )	mg/L	0.1	5	<0.1	<0.1	<0.1	<0.1
F2 (C <sub>11</sub> -C <sub>16</sub> )	mg/L	0.05	2	<0.05	<0.05	<0.05	<0.05
Methyl tert-butyl ether	mg/L	0.005	NG	N/A	<0.005	<0.005	<0.005

## Notes:

<sup>1</sup> Alberta Environment Risk Management Guidelines for Petroleum Storage Tank Sites, October 2001, PST Guidelines, Generic Hydrocarbon Criteria for the Groundwater Ingestion Pathway  
 BTEX – indicates benzene, toluene, ethylbenzene and xylene.  
 N/A – indicates not applicable.  
 NG – indicates no guideline  
 BOLD – indicates AENV PST Guideline exceedance.

The laboratory results from the potable water samples collected from the kitchen tap of the Five Star Movies building are summarized below:

- The benzene and xylene concentrations exceeded the laboratory detection limits with concentrations of 0.0008 mg/L and 0.0019 mg/L, respectively. The laboratory results, although below the applicable guidelines, indicated that hydrocarbon concentrations were present within the potable drinking water. The water sample represented a specific period in time, therefore, additional samples were warranted.
- Additional water samples were collected on October 7, 2005 to represent stagnant water present within the service connection overnight, water within the main line and water within the main header line after further purging. The laboratory results indicated that the three samples displayed nondetectable hydrocarbon and MTBE concentrations.

The October 7, 2005 samples indicate that hydrocarbon impacts were below the laboratory detection limits. The September 29, 2005 results suggest that hydrocarbon concentrations can be present in the drinking water at low concentrations. Different pathways exist for the hydrocarbons to enter the water line, which include permeation of the pipe and the saturation or cracking of rubber gaskets located on the water service or the main line. It is difficult to determine the specific pathway in this situation since the construction materials are not completely known.

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It is also possible that the hydrocarbon concentrations observed within the Five Star Movies building are originating from within the main line within 10<sup>th</sup> Avenue. The Town of Carstairs indicated that the line was installed in approximately 1987 and consists of PVC with rubber gaskets. The presence of hydrocarbon impacts surrounding the water main may have resulted in permeation of the PVC or saturation or cracking of the rubber gaskets. The possibility of hydrocarbons entering the main water line also poses a potential concern to other downgradient water users in the Town of Carstairs.

The tenants of the Five Star Movies have been notified and advised not to use the water for drinking water purposes.

**Summary**

The utility corridor assessment was conducted to determine if PHC impacts, previously identified at the Site, have migrated into the utility corridor that services the Site. Water and sanitary sewer utility lines located on the Site were exposed by a hydrovac prior to the excavation activities.

Soil combustible vapour concentrations of soil samples collected from the backhoe ranged from 2,200 ppm to 11,000 ppm. Four soil samples were submitted for laboratory analysis. Analytical results indicate that soil samples exceeded applicable guidelines for benzene and PHC Fraction 1 concentrations. Results indicate that samples collected adjacent to the sewer utility line were generally double the concentrations of samples collected adjacent to the water utility line. The results may be due to several factors including a difference in depth of the sewer line than the water line, coarser bedding material or the sewer line may be in closer proximity to the source.

Water samples were collected from the kitchen tap of the Five Star Movies on September 29, 2005. The sample displayed detectable benzene and xylene concentrations, however, concentrations were below the potable guidelines. Three additional samples were collected on October 7, 2005 to represent stagnant water present within the service connection overnight, water within the main line and water within the main line after further purging. The laboratory results indicated that three samples displayed nondetectable hydrocarbon and MTBE concentrations.

**Recommendations**

The tenant of the Five Star Movies has been notified by Vaughn Wyant to discontinue using the tap water for drinking water purposes. The samples collected from the tap displayed nondetectable concentrations on three occasions, however, it is recommended that a quarterly sampling program be implemented. A water sample would be collected in the morning prior to other water being consumed in the building, preferably on a Monday morning. The sample

**Reference: Utility Corridor Assessment - Revised  
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would represent the stagnant water present in the service connection overnight. The water sample would be analyzed for BTEX, F1 and F2 PHC Fractions and MTBE concentrations. A quality control program would also be implemented to ensure the analytical results are not affected by an outside source, such as laboratory inaccuracies or cross contamination.

Additional activities may need to be conducted if hydrocarbon concentrations are further observed in the water. Stantec recommends that activities outlined in the remedial action plan be implemented at the Site, which include the installation of a soil vapour extraction system.

**Limitations and Qualifications**

In conducting this environmental site assessment, Stantec confirms that it had access to the experience and capability necessary to perform and did perform in accordance with generally accepted professional standards at the time and location in which the services were provided. No other representations, warranties or guarantees are made concerning the accuracy or completeness of the data or conclusions contained within this report, including no assurance that this assessment has uncovered all potential liabilities associated with the identified property.

This report provides an evaluation of environmental conditions associated with the identified property at the time the assessments were conducted and are based on information obtained by and/or provided to Stantec at that time. All information received from the client or third parties in the preparation of this report has been assumed by Stantec to be correct. Stantec assumes no responsibility for any deficiency or inaccuracy in information received from others.

The opinions in this report can only be relied upon as they relate to the condition of the identified property at the time the assessments and/or investigations were conducted. Activities at the property subsequent to Stantec's assessment may have significantly altered the property's condition. Conclusions made within this report are a professional opinion, not a certification of the property's environmental condition.

This report has been prepared for the exclusive use of the client identified herein. Stantec assumes no responsibility for losses, damages, liabilities or claims, howsoever arising, from third party use of this report.

This report is limited by the following:

- Soil samples were collected in the locations as present in Figure 2.
- The investigation was limited to those parameters specifically outlined in this report.



**Reference: Utility Corridor Assessment - Revised  
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- The subsurface investigation was based on the utility corridor locations selected. Conditions may vary between selected locations.
- The potable water samples from within the Five Star Movies building were taken at specific points in time. Concentrations of specific parameters may change with time and may be different than displayed at the sampling times.

The locations of any utilities illustrated in this report, if any, including pole lines, conduits, water mains, sewers and other surface or sub-surface utilities and structures are not necessarily as described in this report or its appendices, and where shown or described, the accuracy of the position of such utilities and structures is not guaranteed. Before starting work, any Contractor should confirm the exact location of all such utilities and structures and assume all liability for damage to them.

If Stantec's services include destructive testing, it should be noted that there are limitations that are inherent in any intrusive work of this nature. Conditions may vary between sample locations and the parameters tested for may be limited by factors such as the areas of greatest risk identified in any previous site assessment, the site conditions (e.g. utility placements) and cost factors. Accordingly, no representations can be made regarding parameters that were not tested for. A potential remains for the presence of unknown, unidentified, or unforeseen surface and sub-surface environmental conditions.

**Stantec**

October 31, 2005  
Laughn Wyant Investments Ltd.  
Page 14 of 14

**Reference: Utility Corridor Assessment - Revised  
Carstairs, Alberta**

**Closure**

Should you have any questions or comments, please contact the undersigned at  
(306) 667-2400.

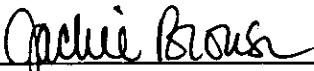
Sincerely,


**STANTEC CONSULTING LTD.**

This report was written by the following individuals:

Jackie Bronson, M.A., B.Sc.  
Environmental Consultant

<sup>For</sup>  
Katie Clarke, M.Sc., E.I.T.  
Environmental Consultant

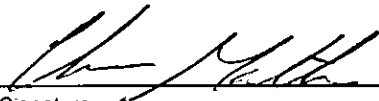
  
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Signature

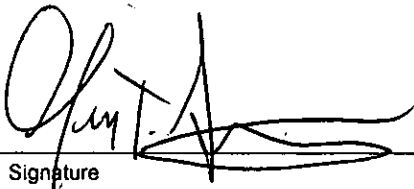
  
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Signature

This report was reviewed by the following individuals:

Chris Mathies, B.E., E.I.T.  
Environmental Engineer-in-Training

Greg Saretzky, M.Sc., P.Eng.  
Environmental Engineer

  
\_\_\_\_\_  
Signature

  
\_\_\_\_\_  
Signature

**Attachment**

cc:  
Steve Hoare  
Safety Codes Council

Kim Kirillo  
Alberta Environment



CARSTAIRS

**SUBJECT  
PROPERTY**



**Stantec**

Client/Project:

**Vaughn Wyant Investments Ltd.  
Utility Corridor Assessment,  
419 -10th Avenue, Carstairs, AB**

Figure No.:

**1**

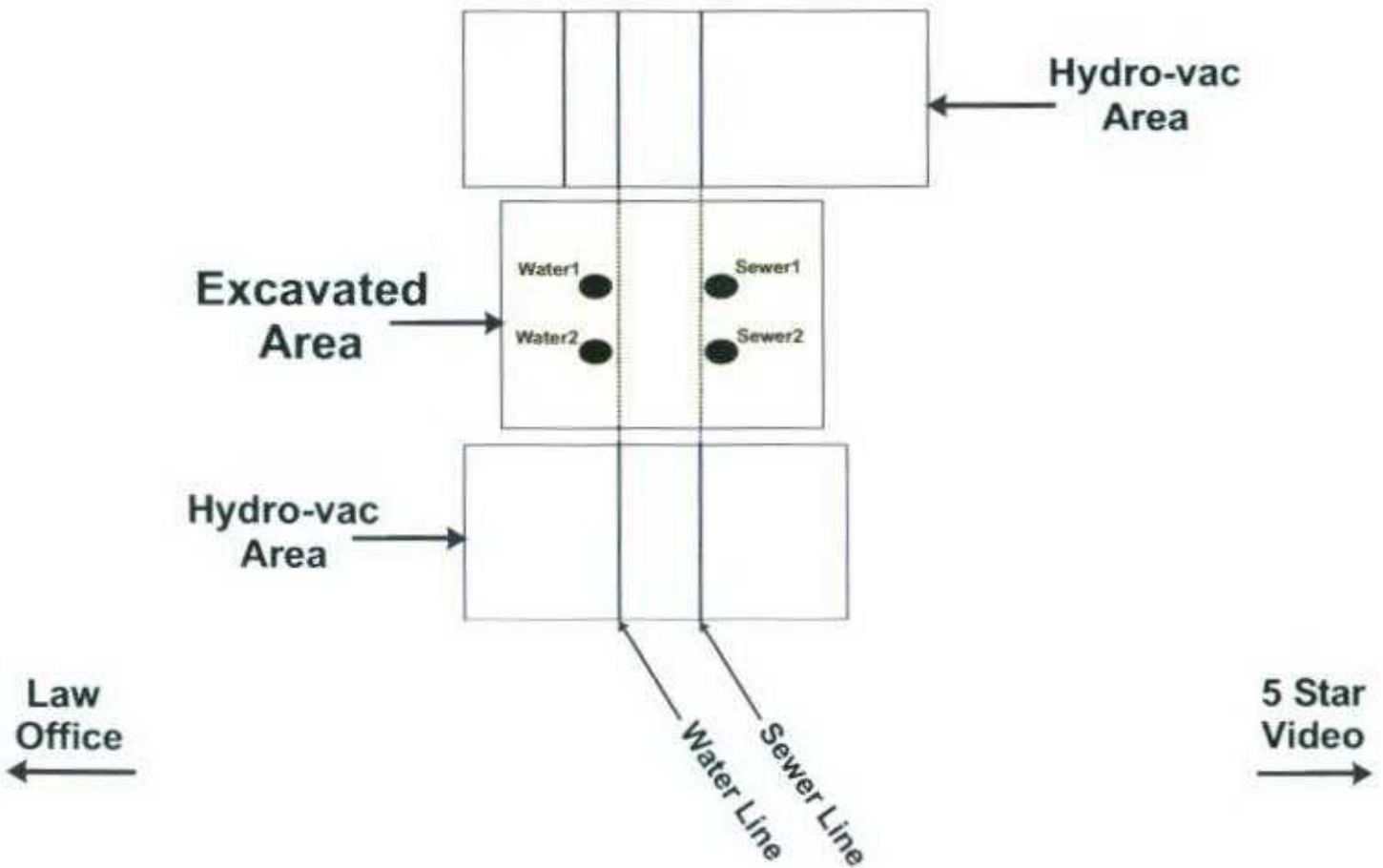
Title:

**Site Location Map**



# 10th Avenue

Sidewalk



NOT TO SCALE

Client/Project:

Vaughn Wyant Investments Ltd.  
Utility Corridor Assessment  
419 - 10th Avenue, Carstairs, AB

Figure No.:

2

Title:

Site Layout



Stantec

● Approximate  
Sample  
Location

**APPENDIX A**  
**Analytical Report**



**Enviro-Test**  
LABORATORIES

Received

AUG 22 2005

Stantec Consulting Ltd

ANALYTICAL REPORT

STANTEC CONSULTING LTD

DATE: 11-AUG-05 09:58 AM

ATTN: KATIE CLARKE

SUITE 200, 325 - 25 STREET S E

CALGARY AB T2A 7H8

Lab Work Order #: L296267

Sampled By: KATIE

Date Received: 02-AUG-05

Project P.O. #: NA

Project Reference: 113252998.200, CARSTAIRS 1B

Other Information:

Comments:

RON MINKS  
Director of Operations, Calgary

SUSAN MARLEEN PULSIFER  
Account Manager

THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN AUTHORITY OF THE LABORATORY.  
ANY REMAINING SAMPLES WILL BE DISPOSED OF AFTER 30 DAYS FOLLOWING ANALYSIS. PLEASE CONTACT THE LAB IF YOU  
REQUIRE ADDITIONAL SAMPLE STORAGE TIME.

1313 44th Avenue NE, Calgary AB T2E 6L5 Tel: (403) 291-9897 Fax: (403) 291-0298  
Canada Wide 1-800-668-3878 www.envirotest.com

Edmonton, Calgary, Fort McMurray, Fort St. John, Grande Prairie, Saskatoon, Winnipeg, Thunder Bay, Waterloo, Ottawa, London

**ENVIRO-TEST ANALYTICAL REPORT**

Best Copy Available

Sample Details/Parameters	Result	Qualifier	D.L.	Units	Extracted	Analyzed	By	Batch
<b>L296267-1 WATER 1</b> Sample Date: 02-AUG-05 09:30 Matrix: SOIL <b>CCME TVHs and TEHs</b> <b>CCME Total Hydrocarbons</b> F1 (C6-C10) 450 5 mg/kg 05-AUG-05 F1-BTEX 370 5 mg/kg 05-AUG-05 F2 (C10-C16) 63 5 mg/kg 05-AUG-05 F3 (C16-C34) 22 5 mg/kg 05-AUG-05 F4 (C34-C50) 31 5 mg/kg 05-AUG-05 Total Hydrocarbons (C6-C50) 570 5 mg/kg 05-AUG-05 Chromatogram to baseline at nC50 YES 05-AUG-05 <b>CCME Total Extractable Hydrocarbons</b> Prep/Analysis Dates 02-AUG-05 04-AUG-05 MEL R309934 <b>CCME BTEX</b> Benzene 7.7 0.005 mg/kg 02-AUG-05 05-AUG-05 OOG R310590 Toluene 7.5 0.01 mg/kg 02-AUG-05 05-AUG-05 OOG R310590 Ethylbenzene 9.8 0.01 mg/kg 02-AUG-05 05-AUG-05 OOG R310590 Xylenes 52 0.01 mg/kg 02-AUG-05 05-AUG-05 OOG R310590 % Moisture 14 0.1 % 02-AUG-05 03-AUG-05 HCW/ R309447 Lead (Pb) 16 5 mg/kg 06-AUG-05 HSC R310806								
<b>L296267-2 WATER 2</b> Sample Date: 02-AUG-05 09:30 Matrix: SOIL <b>CCME TVHs and TEHs</b> <b>CCME Total Hydrocarbons</b> F1 (C6-C10) 170 5 mg/kg 05-AUG-05 F1-BTEX 140 5 mg/kg 05-AUG-05 F2 (C10-C16) <5 5 mg/kg 05-AUG-05 F3 (C16-C34) 11 5 mg/kg 05-AUG-05 F4 (C34-C50) 14 5 mg/kg 05-AUG-05 Total Hydrocarbons (C6-C50) 200 5 mg/kg 05-AUG-05 Chromatogram to baseline at nC50 YES 05-AUG-05 <b>CCME Total Extractable Hydrocarbons</b> Prep/Analysis Dates 02-AUG-05 04-AUG-05 RXP R310335 <b>CCME BTEX</b> Benzene 5.4 0.005 mg/kg 02-AUG-05 04-AUG-05 OOG R310172 Toluene 3.7 0.01 mg/kg 02-AUG-05 04-AUG-05 OOG R310172 Ethylbenzene 4.3 0.01 mg/kg 02-AUG-05 04-AUG-05 OOG R310172 Xylenes 21 0.01 mg/kg 02-AUG-05 04-AUG-05 OOG R310172 % Moisture 17 0.1 % 02-AUG-05 03-AUG-05 HCW/ R309447 Lead (Pb) 20 5 mg/kg 06-AUG-05 HSC R310806								
<b>L296267-3 SEWER 1</b> Sample Date: 02-AUG-05 09:30 Matrix: SOIL <b>CCME TVHs and TEHs</b> <b>CCME Total Hydrocarbons</b> F1 (C6-C10) 2500 5 mg/kg 09-AUG-05 F1-BTEX 2000 5 mg/kg 09-AUG-05 F2 (C10-C16) 150 5 mg/kg 09-AUG-05 F3 (C16-C34) 60 5 mg/kg 09-AUG-05 F4 (C34-C50) 41 5 mg/kg 09-AUG-05								





Reference Information

Best Copy Available

Methods Listed (if applicable):

ETL Test Code	Matrix	Test Description	Preparation Method Reference(Based On)	Analytical Method Reference(Based On)
ETL-BTX,TVH-CCME-CL	Soil	CCME BTEX	CCME CWS-PHC DEC2000	CCME CWS-PHC Dec-2000 - Pub# 1310
ETL-OGG-CCME-CL	Soil	CCME Gravimetric Heavy Hydrocarbons (SG)	CCME CWS-PHC DEC2000	CCME CWS-PHC Dec-2000 - Pub# 1310
ETL-TEH-CCME-CL	Soil	CCME Total Extractable Hydrocarbons	CCME CWS-PHC DEC2000	CCME CWS-PHC Dec-2000 - Pub# 1310
ETL-TVH,TEH-CCME-CL	Soil	CCME Total Hydrocarbons		CCME CWS-PHC Dec-2000 - Pub# 1310

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

Hydrocarbon results are expressed on a dry weight basis

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.  
 In samples where BTEX and F1 were analyzed, F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:

1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges.

1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

PB-MUST-CL	Soil	Lead	SW 3050/7420
------------	------	------	--------------

PREP-MOISTURE-CL	Soil	% Moisture	Oven dry 105C-Gravimetric
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\*\* Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.

Chain of Custody numbers

179620

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
CL	Enviro-Test Laboratories - Calgary, Alberta, Canada		

## Reference Information

Best Copy Available

### GLOSSARY OF REPORT TERMS

*Surr* - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in environmental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds. The reported surrogate recovery value provides a measure of method efficiency. The Laboratory warning units are determined under column heading D.L.

mg/kg (units) - unit of concentration based on mass, parts per million

mg/L (units) - unit of concentration based on volume, parts per million

< - Less than

D.L. - Detection Limit

N/A - Result not available. Refer to qualifier code and definition for explanation

*Test results reported relate only to the samples as received by the laboratory*

*UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.*

*UNLESS OTHERWISE STATED, SAMPLES ARE NOT CORRECTED FOR CLIENT FIELD BLANKS.*

*Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary*

*Enviro-Test Laboratories has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, Enviro-Test Laboratories assumes no liability for the use or interpretation of the results.*

**Enviro-Test Quality Control Report**

Workorder: L296267

Client: STANTEC CONSULTING LTD  
SUITE 200, 325 - 25 STREET S E  
CALGARY AB T2A 7H8

Contact: KATIE CLARKE

Best Copy Available

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>ETL-BTX,TVH-CCME-CL Soil</b>								
Batch	R310172							
WG332991-3	DUP	L295149-2						
Benzene		<0.005	<0.005	RPD-NA	mg/kg	N/A	35	03-AUG-05
Ethylbenzene		<0.01	<0.01	RPD-NA	mg/kg	N/A	35	03-AUG-05
Toluene		<0.01	<0.01	RPD-NA	mg/kg	N/A	35	03-AUG-05
TVH (C6-C10 / No BTEX Correction)		<5	<5	RPD-NA	mg/kg	N/A	40	03-AUG-05
Xylenes		<0.01	<0.01	RPD-NA	mg/kg	N/A	35	03-AUG-05
WG332991-2	MB							
Benzene			<0.005		mg/kg		0.005	03-AUG-05
Ethylbenzene			<0.01		mg/kg		0.01	03-AUG-05
Toluene			<0.01		mg/kg		0.01	03-AUG-05
TVH (C6-C10 / No BTEX Correction)			<5		mg/kg		5	03-AUG-05
Xylenes			<0.01		mg/kg		0.01	03-AUG-05
WG332991-5	MB							
Benzene			<0.005		mg/kg		0.005	04-AUG-05
Ethylbenzene			<0.01		mg/kg		0.01	04-AUG-05
Toluene			<0.01		mg/kg		0.01	04-AUG-05
TVH (C6-C10 / No BTEX Correction)			<5		mg/kg		5	04-AUG-05
Xylenes			<0.01		mg/kg		0.01	04-AUG-05
WG332991-4	MS	L295149-3						
Benzene			87		%		60-130	03-AUG-05
Ethylbenzene			99		%		60-130	03-AUG-05
Toluene			94		%		60-130	03-AUG-05
TVH (C6-C10 / No BTEX Correction)			85		%		60-130	03-AUG-05
Xylenes			95		%		60-130	03-AUG-05
Batch	R310590							
WG333554-3	DUP	L296282-102						
Benzene		<0.005	<0.005	RPD-NA	mg/kg	N/A	35	04-AUG-05
Ethylbenzene		<0.01	<0.01	RPD-NA	mg/kg	N/A	35	04-AUG-05
Toluene		<0.01	<0.01	RPD-NA	mg/kg	N/A	35	04-AUG-05
TVH (C6-C10 / No BTEX Correction)		<5	<5	RPD-NA	mg/kg	N/A	40	04-AUG-05
Xylenes		<0.01	<0.01	RPD-NA	mg/kg	N/A	35	04-AUG-05
WG333554-2	MB							
Benzene			<0.005		mg/kg		0.005	04-AUG-05
Ethylbenzene			<0.01		mg/kg		0.01	04-AUG-05

**Enviro-Test Quality Control Report**

Workorder L296267

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>ETL-BTX,TVH-CCME-CL</b>		<b>Soil</b>						
Batch	R310590							
WG333554-2	MB							
Toluene			<0.01		mg/kg		0.01	04-AUG-05
TVH (C6-C10 / No BTEX Correction)			<5		mg/kg		5	04-AUG-05
Xylenes			<0.01		mg/kg		0.01	04-AUG-05
<b>ETL-OGG-CCME-CL</b>		<b>Soil</b>						
Batch	R311612							
WG334827-1	MB							
Gravimetric Heavy Hydrocarbons (Silica)			<100		mg/kg		100	11-AUG-05
WG334827-5	MS	L296582-2						
Gravimetric Heavy Hydrocarbons (Silica)			82		%		75-125	11-AUG-05
<b>ETL-TEH-CCME-CL</b>		<b>Soil</b>						
Batch	R309934							
WG332453-11	DUP	L298137-1						
TEH (C10-C16)		<5	<5	RPD-NA	mg/kg	N/A	35	05-AUG-05
TEH (C16-C34)		<5	<5	RPD-NA	mg/kg	N/A	35	05-AUG-05
TEH (C34-C50)		<5	<5	RPD-NA	mg/kg	N/A	35	05-AUG-05
WG332453-3	DUP	L296435-1						
TEH (C10-C16)		<5	<5	RPD-NA	mg/kg	N/A	35	03-AUG-05
TEH (C16-C34)		6	6	J	mg/kg	0	15	03-AUG-05
TEH (C34-C50)		<5	<5	RPD-NA	mg/kg	N/A	35	03-AUG-05
WG332453-5	DUP	L296143-1						
TEH (C10-C16)		<5	<5	RPD-NA	mg/kg	N/A	35	03-AUG-05
TEH (C16-C34)		44	32	J	mg/kg	12	15	03-AUG-05
TEH (C34-C50)		20	22	J	mg/kg	2	15	03-AUG-05
WG332453-1	MB							
TEH (C10-C16)			<5		mg/kg		5	03-AUG-05
TEH (C16-C34)			<5		mg/kg		5	03-AUG-05
TEH (C34-C50)			<5		mg/kg		5	03-AUG-05
WG332453-7	MB							
TEH (C10-C16)			<5		mg/kg		5	04-AUG-05
TEH (C16-C34)			<5		mg/kg		5	04-AUG-05
TEH (C34-C50)			<5		mg/kg		5	04-AUG-05
WG332453-9	MB							
TEH (C10-C16)			<5		mg/kg		5	05-AUG-05
TEH (C16-C34)			<5		mg/kg		5	05-AUG-05
TEH (C34-C50)			<5		mg/kg		5	05-AUG-05
WG332453-12	MS	L298137-2						
TEH (C10-C16)			70		%		65-135	05-AUG-05
TEH (C16-C34)			70		%		65-135	05-AUG-05
TEH (C34-C50)			70		%		65-135	05-AUG-05

**Enviro-Test Quality Control Report**

Workorder L296267

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>ETL-TEH-CCME-CL</b>		<b>Soil</b>						
Batch	R309934							
WG332453-4	MS	L296435-2						
TEH (C10-C16)			87		%		65-135	03-AUG-05
TEH (C16-C34)			87		%		65-135	03-AUG-05
TEH (C34-C50)			87		%		65-135	03-AUG-05
WG332453-6	MS	L296267-1						
TEH (C10-C16)			70		%		65-135	04-AUG-05
TEH (C16-C34)			70		%		65-135	04-AUG-05
TEH (C34-C50)			70		%		65-135	04-AUG-05
Batch	R310335							
WG333237-1	MB							
TEH (C10-C16)			<5		mg/kg		5	04-AUG-05
TEH (C16-C34)			<5		mg/kg		5	04-AUG-05
TEH (C34-C50)			<5		mg/kg		5	04-AUG-05
WG333237-3	MB							
TEH (C10-C16)			<5		mg/kg		5	04-AUG-05
TEH (C16-C34)			<5		mg/kg		5	04-AUG-05
TEH (C34-C50)			<5		mg/kg		5	04-AUG-05
<b>PB-MUST-CL</b>		<b>Soil</b>						
Batch	R310806							
WG333815-4	DUP	L296267-1						
Lead (Pb)		16	15	J	mg/kg	1	15	06-AUG-05
WG333815-3	IRM	PBIRM-CL						
Lead (Pb)			118		%		75-125	06-AUG-05
WG333815-1	LCS							
Lead (Pb)			96	H	%		96-102	06-AUG-05
WG333815-2	MB							
Lead (Pb)			<5		mg/kg		5	06-AUG-05
WG333815-5	MS	L296267-1						
Lead (Pb)			91		%		71-107	06-AUG-05
<b>PREP-MOISTURE-CL</b>		<b>Soil</b>						
Batch	R309447							
WG332149-2	DUP	L296140-1						
% Moisture		13	12		%	6.8	15	03-AUG-05
WG332149-4	DUP	L296566-2						
% Moisture		17	16		%	2.3	15	03-AUG-05
WG332149-5	DUP	L296435-1						
% Moisture		23	23		%	0.94	15	03-AUG-05
WG332149-6	DUP	L295586-60						
% Moisture		15	15		%	2.7	15	04-AUG-05

# ENVIRO-TEST QC REPORT

Page 4 of 4

Workorder # L296267

## Legend

Limit 95% Confidence Interval (Laboratory Warning Limits)  
DUP Duplicate  
RPD Relative Percent Difference  
N/A Not Available  
LCS Laboratory Control Sample  
SRM Standard Reference Material  
MS Matrix Spike  
MSD Matrix Spike Duplicate  
ADE Average Desorption Efficiency  
MB Method Blank  
IRM Internal Reference Material  
CRM Certified Reference Material  
CCV Continuing Calibration Verification  
CVS Calibration Verification Standard  
LCSD Laboratory Control Sample Duplicate

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## Qualifier

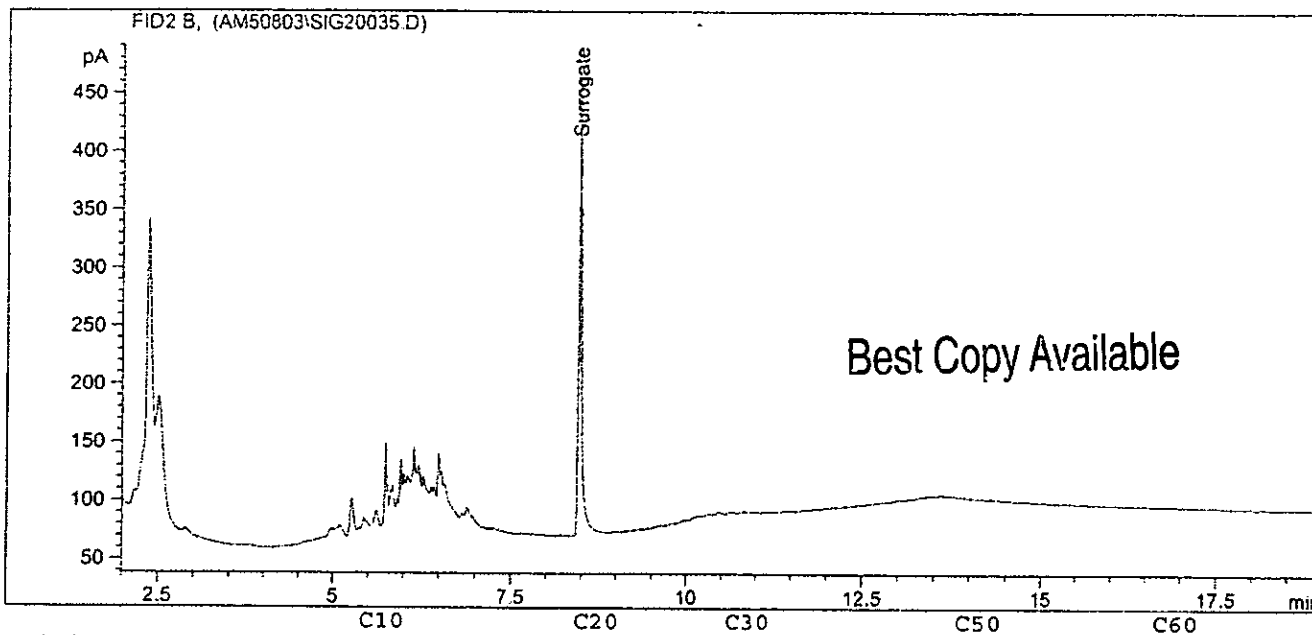
RPD-NA Relative Percent Difference Not Available due to result(s) being less than detection limit.  
A Method blank exceeds acceptance limit. Blank correction not applied, unless the qualifier "RAMB" (result adjusted for method blank) appears in the Analytical Report.  
B Method blank result exceeds acceptance limit, however, it is less than 5% of sample concentration. Blank correction not applied.  
E Matrix spike recovery may fall outside the acceptance limits due to high sample background  
F Silver recovery low, likely due to elevated chloride levels in sample.  
G Outlier - No assignable cause for nonconformity has been determined  
H Result falls within the 99% Confidence Interval (Laboratory Control Limits)  
J Duplicate results and limit(s) are expressed in terms of absolute difference  
K The sample referenced above is of a non-standard matrix type; standard QC acceptance criteria may not be achievable.

Client ID: ●

WATER 1

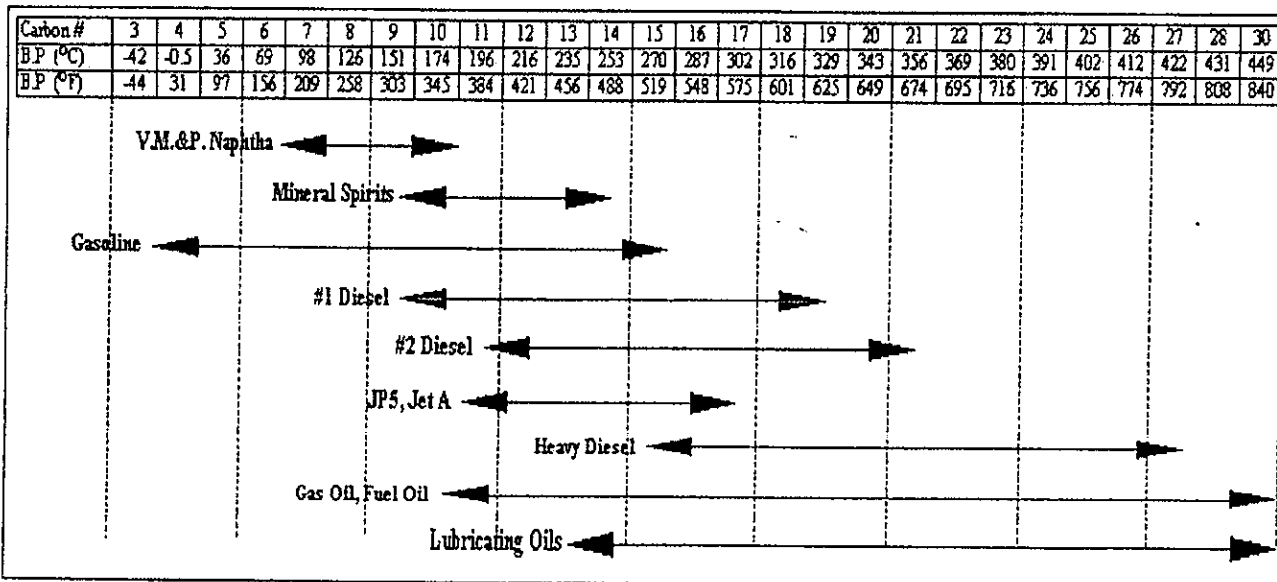


Sample ID: L296267-1 v3  
 Injection Date: 8/4/2005 3:09:24 AM  
 Injection Time: 8/4/2005 3:09:24 AM  
 Instrument ID: 6890HP9  
 Operator: organics



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Boiling Point Distribution Range for Petroleum Based Fuel Products



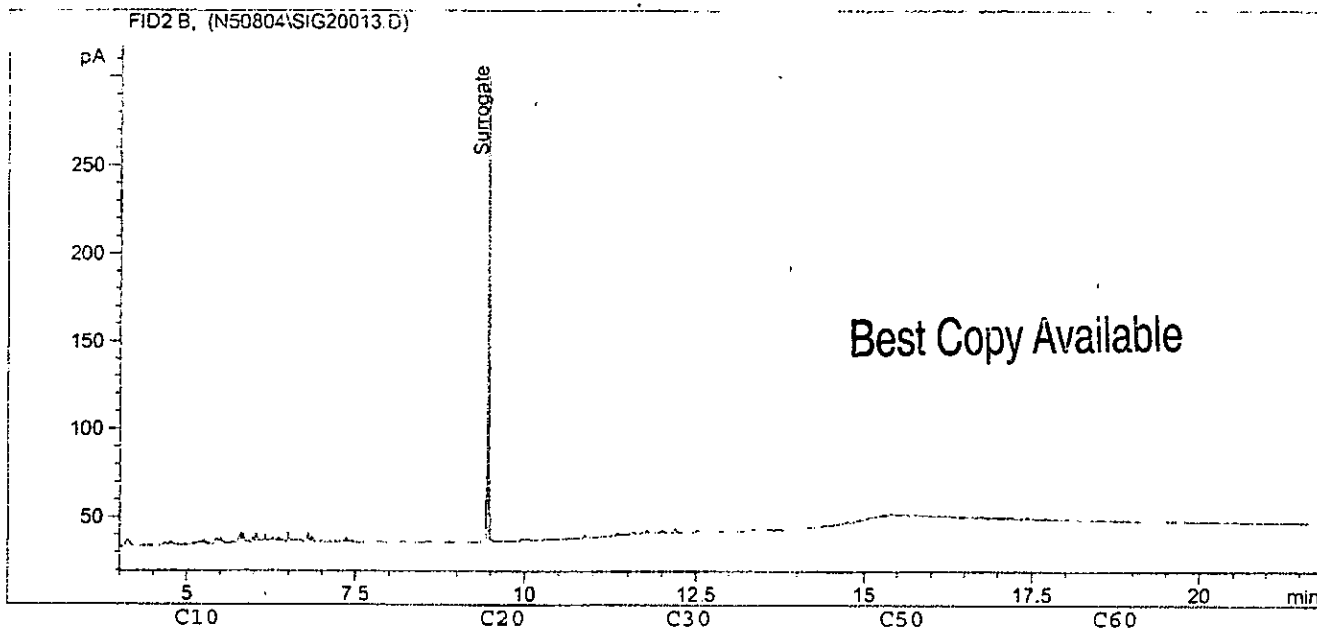
Adapted from Drews, A W, ED. Manual on Hydrocarbon Analysis, 4th ed.; American Society for Testing and Materials: Philadelphia, PA., 1989: p XVIII

Client ID

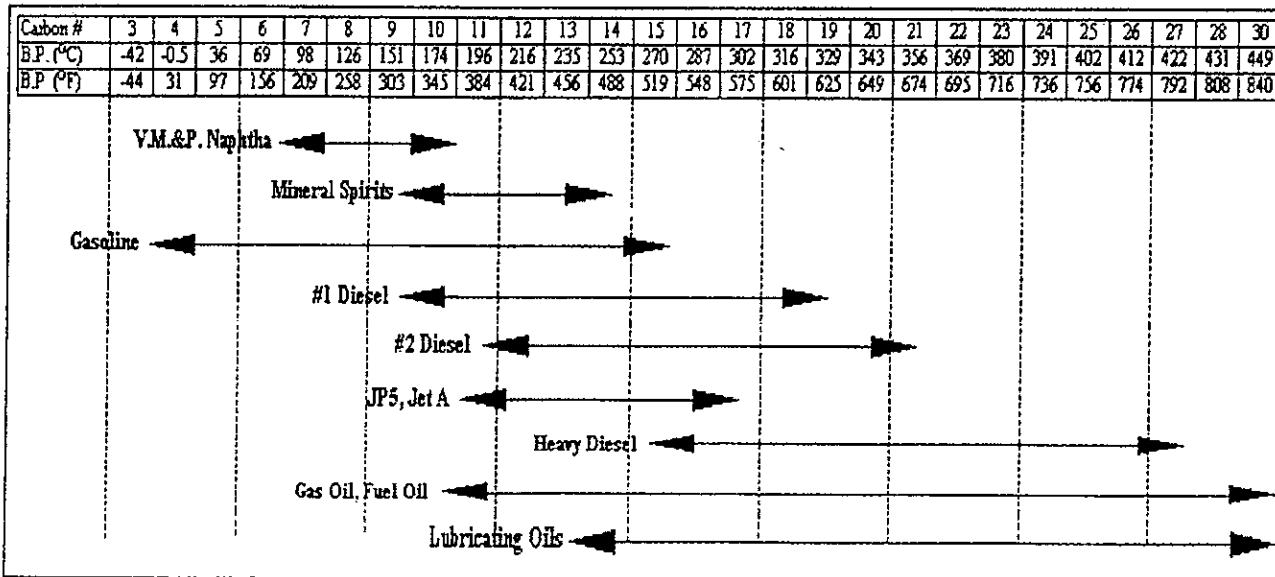
WATER 2



Sample ID: L296267-2 v3  
 Injection Date: 8/4/05 11 45 30 PM  
 Injection Time: 8/4/05 11:45.30 PM  
 Instrument ID: Instrument 1  
 Operator: cgy



Boiling Point Distribution Range for Petroleum Based Fuel Products



Adapted from: Drews, A W, ED. Manual on Hydrocarbon Analysis, 4th ed, American Society for Testing and Materials. Philadelphia, PA, 1989. p XVIII.

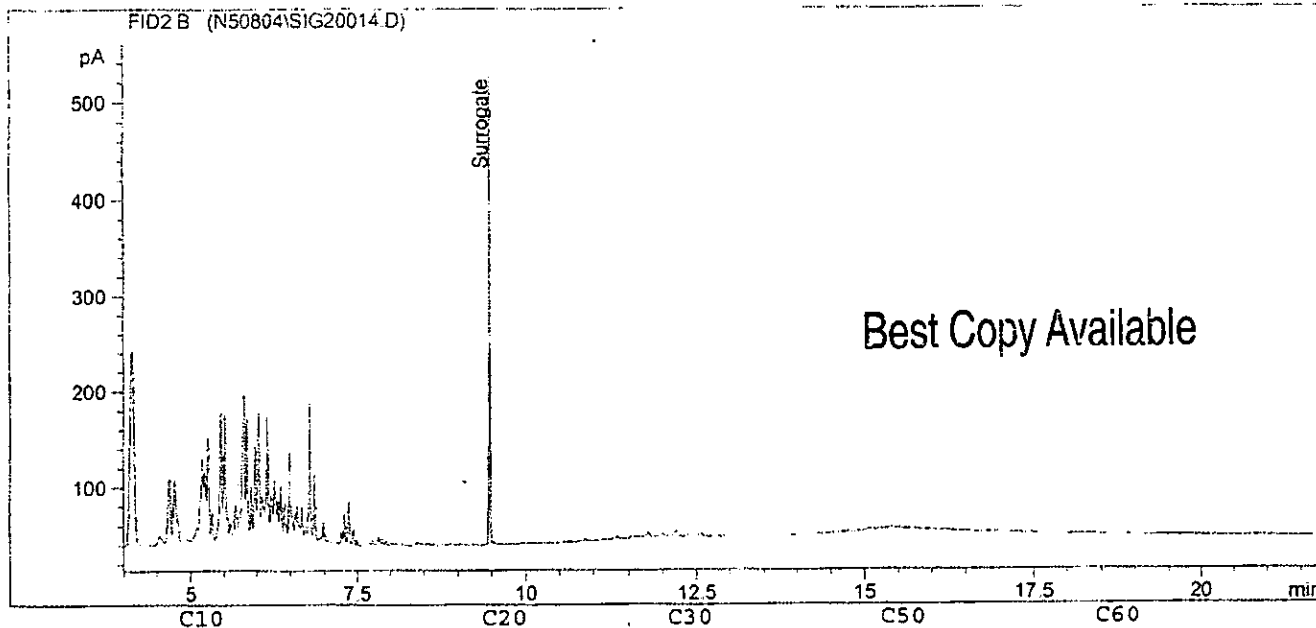


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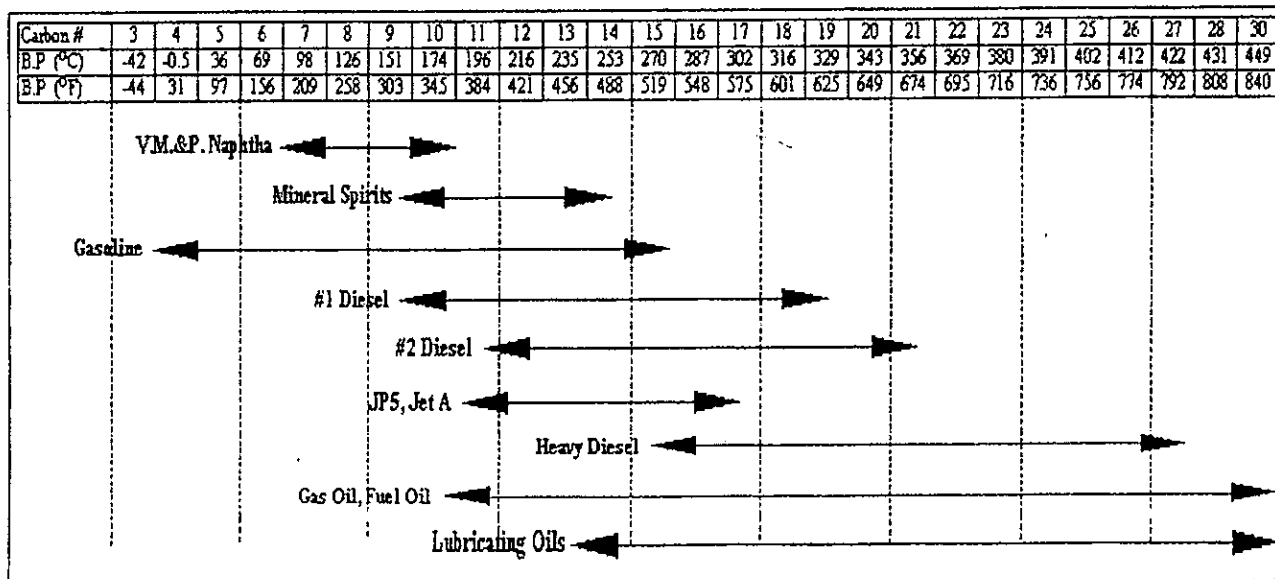
SEWER 1



Sample ID L296267-3 v3  
 Injection Date 8/5/05 12:20:04 AM  
 Injection Time 8/5/05 12:20:04 AM  
 Instrument ID Instrument 1  
 Operator cgy



Boiling Point Distribution Range for Petroleum Based Fuel Products



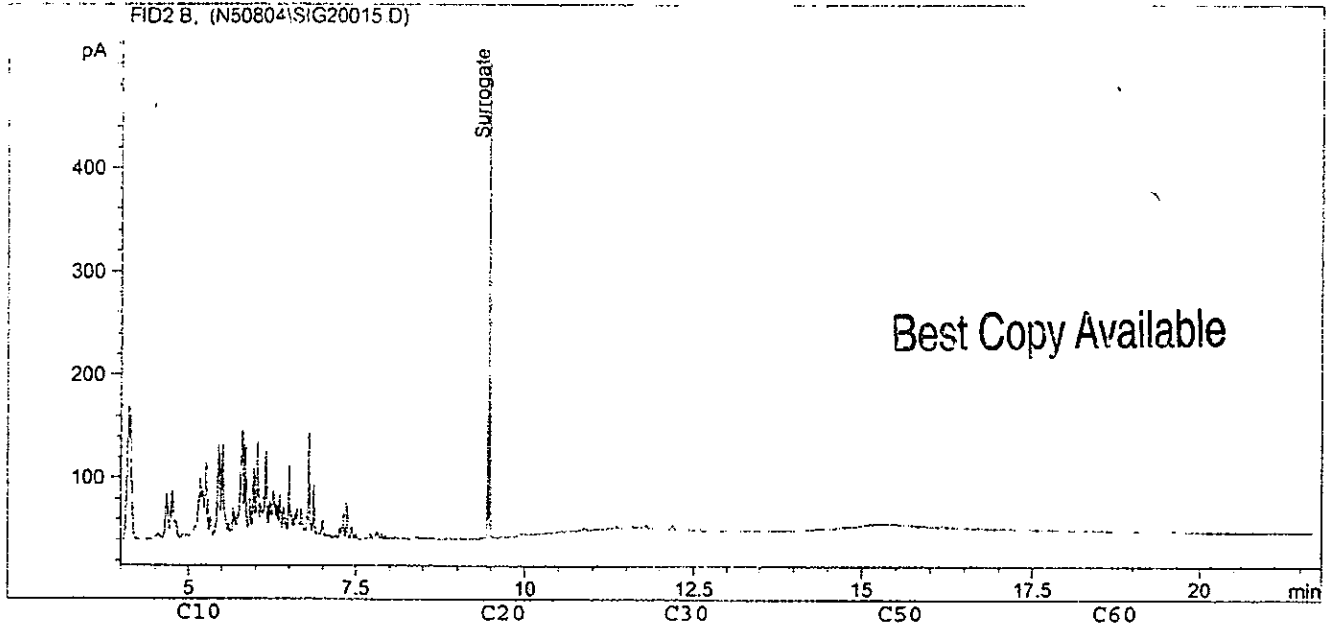
Adapted from: Drews, A W, ED Manual on Hydrocarbon Analysis, 4th ed., American Society for Testing and Materials: Philadelphia, PA., 1989: p XVIII

Client ID:

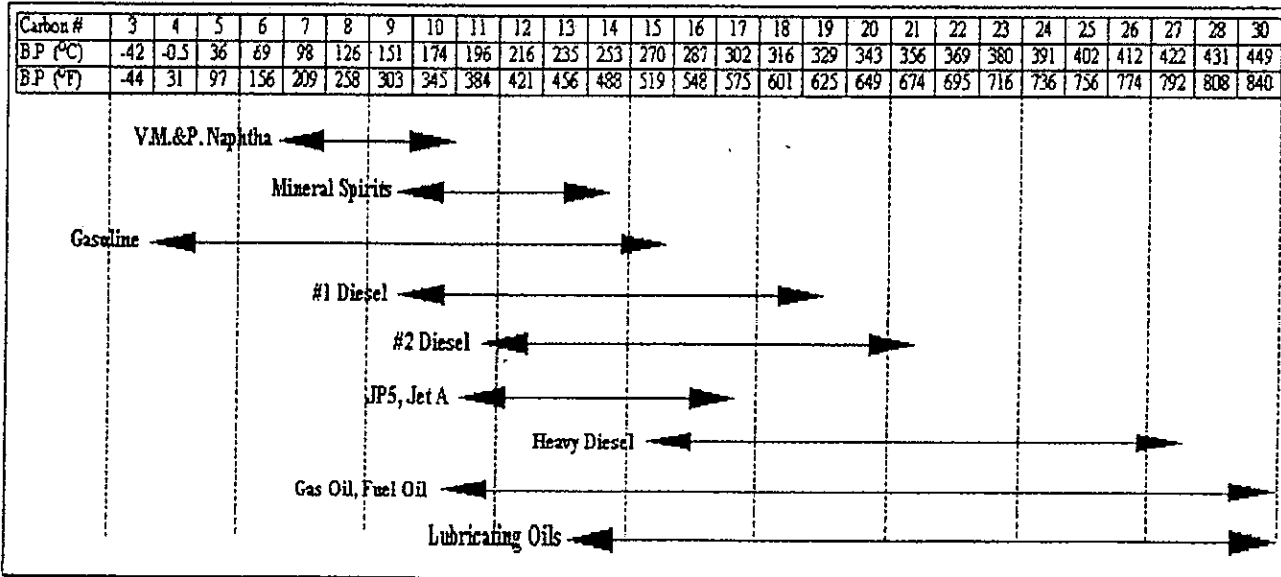
SEWER 2



Sample ID: L296267-4 v3  
 Injection Date: 8/5/05 12:55:37 AM  
 Injection Time: 8/5/05 12:55:37 AM  
 Instrument ID: Instrument 1  
 Operator: cgy



Boiling Point Distribution Range for Petroleum Based Fuel Products



Adapted from: Drews, A W, ED Manual on Hydrocarbon Analysis, 4th ed, American Society for Testing and Materials, Philadelphia, PA, 1989: p XVIII.





ENVIRO-TEST ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier	D.L.	Units	Extracted	Analyzed	By	Batch
L325179-1 MW1 KITCHEN TAP								
Sample Date: 29-SEP-05								
Matrix: WATER								
BTEX, F1 (C6-C10) and F2 (>C10-C16)								
F2 (>C10-C16)	<0.05		0.05	mg/L	01-OCT-05	03-OCT-05	ICD	R331091
BTEX and F1 (C6-C10)								
Benzene	0.0008		0.0005	mg/L	30-SEP-05	01-OCT-05	DKG	R330519
Toluene	<0.0005		0.0005	mg/L	30-SEP-05	01-OCT-05	DKG	R330519
EthylBenzene	<0.0005		0.0005	mg/L	30-SEP-05	01-OCT-05	DKG	R330519
Xylenes	0.0019		0.0005	mg/L	30-SEP-05	01-OCT-05	DKG	R330519
F1(C6-C10)	<0.1		0.1	mg/L	30-SEP-05	01-OCT-05	DKG	R330519
F1-BTEX	<0.1		0.1	mg/L	30-SEP-05	01-OCT-05	DKG	R330519
<b>Routine Water Analysis</b>								
Chloride (Cl)	23.4		0.1	mg/L	01-OCT-05	01-OCT-05	HSC	R330911
Nitrate+Nitrite-N	0.14		0.05	mg/L	01-OCT-05	01-OCT-05	HSC	R330911
Nitrate-N	0.14		0.05	mg/L	01-OCT-05	01-OCT-05	HSC	R330911
Nitrite-N	<0.05		0.05	mg/L	01-OCT-05	01-OCT-05	HSC	R330911
Sulphate (SO4)	18.0		0.5	mg/L	01-OCT-05	01-OCT-05	HSC	R330911
<b>pH, Conductivity and Total Alkalinity</b>								
pH	7.3		0.1	pH		03-OCT-05	LHH	R331078
Conductivity (EC)	383		3	uS/cm		03-OCT-05	LHH	R331078
Bicarbonate (HCO3)	172		5	mg/L		03-OCT-05	LHH	R331078
Carbonate (CO3)	<5		5	mg/L		03-OCT-05	LHH	R331078
Hydroxide (OH)	<5		5	mg/L		03-OCT-05	LHH	R331078
Alkalinity, Total (as CaCO3)	141		5	mg/L		03-OCT-05	LHH	R331078
<b>Ion Balance Calculation</b>								
Ion Balance	107			%		04-OCT-05		
TDS (Calculated)	202			mg/L		04-OCT-05		
Hardness (as CaCO3)	186			mg/L		04-OCT-05		
<b>ICP metals for routine water</b>								
Calcium (Ca)	51.0		0.5	mg/L		03-OCT-05	KG	R331203
Potassium (K)	2.2		0.1	mg/L		03-OCT-05	KG	R331203
Magnesium (Mg)	14.3		0.1	mg/L		03-OCT-05	KG	R331203
Sodium (Na)	8		1	mg/L		03-OCT-05	KG	R331203

Refer to Referenced Information for Qualifiers (if any) and Methodology

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## Reference Information

Methods Listed (if applicable).				
ETL Test Code	Matrix	Test Description	Preparation Method Reference(Based On)	Analytical Method Reference(Based On)
BTX,F1-CL	Water	BTEX and F1 (C6-C10)	EPA 5030B	EPA 5030/8015& 8260-P&T GC-MS/FID
CL-CL	Water	Chloride (Cl)		APHA 4110 B-Ion Chromatography
ETL-ROUTINE-ICP-CL	Water	ICP metals for routine water		APHA 3120 B-ICP-OES
F2-CL	Water	F2 (>C10-C16)	EPA 3550B	EPA 3510/8000-GC-FID
IONBALANCE-CL	Water	Ion Balance Calculation		APHA 1030E
N2N3-CL	Water	Nitrate+Nitrite-N		APHA 4110 B-Ion Chromatography
NO2-CL	Water	Nitrite-N		APHA 4110 B-Ion Chromatography
NO3-IC-CL	Water	Nitrate-N		APHA 4110 B-Ion Chromatography
PH/EC/ALK-CL	Water	pH, Conductivity and Total Alkalinity		APHA 4500H,2510,2320
SO4-CL	Water	Sulfate (SO4)		APHA 4110 B-Ion Chromatography

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\*\* Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.

**Chain of Custody numbers.**

193622

*The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below.*

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
CL	Enviro-Test Laboratories - Calgary, Alberta, Canada		

**GLOSSARY OF REPORT TERMS**

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*mg/kg (units) - unit of concentration based on mass, parts per million  
mg/L (units) - unit of concentration based on volume, parts per million  
< - Less than*

*D.L. - Detection Limit*

*N/A - Result not available. Refer to qualifier code and definition for explanation*

*Test results reported relate only to the samples as received by the laboratory UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION. UNLESS OTHERWISE STATED, SAMPLES ARE NOT CORRECTED FOR CLIENT FIELD BLANKS.*

*Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary*

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**Enviro-Test Quality Control Report**

Workorder: L325179

**Client** STANTEC CONSULTING LTD  
SUITE 200, 325 - 25 STREET S E.  
CALGARY AB T2A 7H8

**Best Copy Available**

**Contact** KATIE CLARKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>BTX,F1-CL</b>		<u>Water</u>						
<b>Batch</b>	<b>R330519</b>							
<b>WG358405-7</b>	<b>DUP</b>	<b>L325085-1</b>						
Benzene		<0.0005	<0.0005	RPD-NA	mg/L	N/A	20	02-OCT-05
EthylBenzene		<0.0005	<0.0005	RPD-NA	mg/L	N/A	20	02-OCT-05
Toluene		<0.0005	<0.0005	RPD-NA	mg/L	N/A	20	02-OCT-05
F1(C6-C10)		<0.1	<0.1	RPD-NA	mg/L	N/A	25	02-OCT-05
Xylenes		<0.0005	<0.0005	RPD-NA	mg/L	N/A	20	02-OCT-05
<b>WG358405-8</b>	<b>DUP</b>	<b>L324254-1</b>						
Benzene		3.5	3.3		mg/L	7.1	20	04-OCT-05
EthylBenzene		0.43	0.44		mg/L	0.32	20	04-OCT-05
Toluene		0.72	0.72		mg/L	0.014	20	04-OCT-05
F1(C6-C10)		8.7	8.6		mg/L	0.63	25	04-OCT-05
Xylenes		1.4	1.4		mg/L	0.73	20	04-OCT-05
<b>WG358405-1</b>	<b>LCS</b>							
Benzene			100		%		87-113	30-SEP-05
EthylBenzene			105		%		88-114	30-SEP-05
Toluene			104		%		88-113	30-SEP-05
F1(C6-C10)			102		%		86-112	30-SEP-05
Xylenes			106		%		89-117	30-SEP-05
<b>WG358405-2</b>	<b>MB</b>							
Benzene			<0.0005		mg/L		0.0005	30-SEP-05
EthylBenzene			<0.0005		mg/L		0.0005	30-SEP-05
Toluene			<0.0005		mg/L		0.0005	30-SEP-05
F1(C6-C10)			<0.1		mg/L		0.1	30-SEP-05
Xylenes			<0.0005		mg/L		0.0005	30-SEP-05
<b>WG358405-3</b>	<b>MS</b>	<b>L324983-1</b>						
Benzene			97		%		70-118	30-SEP-05
EthylBenzene			101		%		70-118	30-SEP-05
Toluene			100		%		70-118	30-SEP-05
F1(C6-C10)			97		%		70-130	30-SEP-05
Xylenes			101		%		70-118	30-SEP-05
<b>WG358405-5</b>	<b>MS</b>	<b>L323275-27</b>						
Benzene			110		%		70-118	01-OCT-05
EthylBenzene			113		%		70-118	01-OCT-05
Toluene			113		%		70-118	01-OCT-05

**Enviro-Test Quality Control Report**

Workorder: L325179

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>BTX.F1-CL</b>		<b>Water</b>						
Batch	R330519							
WG358405-5	MS	L323275-27						
F1(C6-C10)			73		%		70-130	01-OCT-05
Xylenes			115		%		70-118	01-OCT-05
<b>CL-CL</b>		<b>Water</b>						
Batch	R330911							
WG358857-2	DUP	L325085-1						
Chloride (Cl)		13	13		mg/L	4.4	10	01-OCT-05
WG358857-4	DUP	L325179-1						
Chloride (Cl)		23.4	23.2		mg/L	1.0	10	01-OCT-05
WG358857-5	DUP	L325440-1						
Chloride (Cl)		73	7.2		mg/L	1.1	10	01-OCT-05
WG358857-6	DUP	L325109-3						
Chloride (Cl)		14.8	14.7		mg/L	0.44	10	01-OCT-05
WG358857-7	DUP	L325127-5						
Chloride (Cl)		14.5	14.6		mg/L	0.53	10	01-OCT-05
WG358857-8	DUP	L325354-2						
Chloride (Cl)		28.2	28.1		mg/L	0.54	10	01-OCT-05
WG358857-1	LCS							
Chloride (Cl)			102		%		93-108	01-OCT-05
WG358857-3	MS	L325085-1						
Chloride (Cl)			93		%		91-107	01-OCT-05
<b>ETL-ROUTINE-ICP-CL</b>		<b>Water</b>						
Batch	R331203							
WG359110-2	DUP	L325085-3						
Calcium (Ca)		128	127		mg/L	0.74	10	03-OCT-05
Magnesium (Mg)		23.3	23.1		mg/L	0.97	10	03-OCT-05
Potassium (K)		0.9	1.0	J	mg/L	0.0	0.31	03-OCT-05
Sodium (Na)		9	9	J	mg/L	0	3.1	03-OCT-05
WG359110-4	DUP	L325127-3						
Calcium (Ca)		46.0	45.3		mg/L	1.4	10	03-OCT-05
Magnesium (Mg)		15.1	14.9		mg/L	0.99	10	03-OCT-05
Potassium (K)		2.5	2.4		mg/L	2.4	10	03-OCT-05
Sodium (Na)		116	115		mg/L	0.17	10	03-OCT-05
WG359110-5	DUP	L325354-2						
Calcium (Ca)		57.7	58.1		mg/L	0.58	10	03-OCT-05
Magnesium (Mg)		33.8	33.9		mg/L	0.39	10	03-OCT-05
Potassium (K)		4.4	4.4		mg/L	1.2	10	03-OCT-05
Sodium (Na)		22	22		mg/L	0.67	10	03-OCT-05
WG359110-6	DUP	L325460-9						
Calcium (Ca)		263	262		mg/L	0.059	10	03-OCT-05
Magnesium (Mg)		124	123		mg/L	0.80	10	03-OCT-05



**Enviro-Test Quality Control Report**

Workorder: L325179

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>ETL-ROUTINE-ICP-CL</b>		<b>Water</b>						
Batch	R331203							
WG359110-6	DUP	L325460-9						
Potassium (K)		12.9	12.7		mg/L	1.4	10	03-OCT-05
Sodium (Na)		199	198		mg/L	0.35	10	03-OCT-05
WG359110-8	DUP	L325578-6						
Calcium (Ca)		91.4	91.0		mg/L	0.36	10	03-OCT-05
Magnesium (Mg)		28.5	28.5		mg/L	0.029	10	03-OCT-05
Potassium (K)		1.9	1.8		mg/L	0.31	10	03-OCT-05
Sodium (Na)		15	15		mg/L	0.19	10	03-OCT-05
WG359110-1	LCS							
Calcium (Ca)			104		%		99-111	03-OCT-05
Magnesium (Mg)			98		%		94-106	03-OCT-05
Potassium (K)			101		%		95-107	03-OCT-05
Sodium (Na)			100		%		95-107	03-OCT-05
WG359110-3	MS	L325085-3						
Calcium (Ca)			97		%		90-114	03-OCT-05
Magnesium (Mg)			98		%		93-107	03-OCT-05
Potassium (K)			105	H	%		90-104	03-OCT-05
Sodium (Na)			101		%		87-113	03-OCT-05
<b>F2-CL</b>		<b>Water</b>						
Batch	R331091							
WG359093-3	DUP	L325109-1						
F2 (>C10-C16)		<0.05	<0.05	RPD-NA	mg/L	N/A	25	03-OCT-05
WG359093-2	MB							
F2 (>C10-C16)			<0.05		mg/L		0.05	02-OCT-05
WG359093-4	MS	L325109-2						
F2 (>C10-C16)			89		%		65-125	03-OCT-05
<b>N2N3-CL</b>		<b>Water</b>						
Batch	R330911							
WG358857-2	DUP	L325085-1						
Nitrate+Nitrite-N		0.17	0.16	J	mg/L	0.01	0.15	01-OCT-05
WG358857-4	DUP	L325179-1						
Nitrate+Nitrite-N		0.14	0.16	J	mg/L	0.02	0.15	01-OCT-05
WG358857-5	DUP	L325440-1						
Nitrate+Nitrite-N		54.4	54.2		mg/L	0.43	13	01-OCT-05
WG358857-6	DUP	L325109-3						
Nitrate+Nitrite-N		0.47	0.43	J	mg/L	0.04	0.15	01-OCT-05
WG358857-7	DUP	L325127-5						
Nitrate+Nitrite-N		0.07	0.07	J	mg/L	0.00	0.15	01-OCT-05
WG358857-8	DUP	L325354-2						
Nitrate+Nitrite-N		1.38	1.38		mg/L	0.39	13	01-OCT-05
WG358857-1	LCS							

**Enviro-Test Quality Control Report**

Workorder: L325179

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b><u>N2N3-CL</u></b>		<b><u>Water</u></b>						
Batch	R330911							
WG358857-1	LCS							
Nitrate+Nitrite-N			98		%		94-105	01-OCT-05
WG358857-3	MS	L325085-1						
Nitrate+Nitrite-N			99		%		93-109	01-OCT-05
<b><u>NO2-CL</u></b>		<b><u>Water</u></b>						
Batch	R330911							
WG358857-2	DUP	L325085-1						
Nitrite-N		<0.05	<0.05	RPD-NA	mg/L	N/A	13	01-OCT-05
WG358857-4	DUP	L325179-1						
Nitrite-N		<0.05	<0.05	RPD-NA	mg/L	N/A	13	01-OCT-05
WG358857-5	DUP	L325440-1						
Nitrite-N		1.05	1.00		mg/L	4.3	13	01-OCT-05
WG358857-6	DUP	L325109-3						
Nitrite-N		<0.05	<0.05	RPD-NA	mg/L	N/A	13	01-OCT-05
WG358857-7	DUP	L325127-5						
Nitrite-N		<0.05	<0.05	RPD-NA	mg/L	N/A	13	01-OCT-05
WG358857-8	DUP	L325354-2						
Nitrite-N		0.08	0.08	J	mg/L	0.00	0.15	01-OCT-05
VG358857-1	LCS							
Nitrite-N			95		%		93-107	01-OCT-05
WG358857-3	MS	L325085-1						
Nitrite-N			99		%		94-110	01-OCT-05
<b><u>NO3-IC-CL</u></b>		<b><u>Water</u></b>						
Batch	R330911							
WG358857-2	DUP	L325085-1						
Nitrate-N		0.17	0.16	J	mg/L	0.01	0.15	01-OCT-05
WG358857-4	DUP	L325179-1						
Nitrate-N		0.14	0.16	J	mg/L	0.02	0.15	01-OCT-05
WG358857-5	DUP	L325440-1						
Nitrate-N		53.4	53.2		mg/L	0.36	13	01-OCT-05
WG358857-6	DUP	L325109-3						
Nitrate-N		0.47	0.43	J	mg/L	0.04	0.15	01-OCT-05
WG358857-7	DUP	L325127-5						
Nitrate-N		0.07	0.07	J	mg/L	0.00	0.15	01-OCT-05
WG358857-8	DUP	L325354-2						
Nitrate-N		1.29	1.30		mg/L	0.70	13	01-OCT-05
WG358857-1	LCS							
Nitrate-N			98		%		92-106	01-OCT-05
WG358857-3	MS	L325085-1						
Nitrate-N			95		%		94-106	01-OCT-05
<b><u>EC/ALK-CL</u></b>		<b><u>Water</u></b>						

Enviro-Test Quality Control Report

Workorder: L325179

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<u>PH/EC/ALK-CL</u>		<u>Water</u>						
Batch	R331078							
WG359097-2	DUP	L325085-1						
Alkalinity, Total (as CaCO3)		295	295		mg/L	0.26	5	03-OCT-05
Bicarbonate (HCO3)		359	360		mg/L	0.27	25	03-OCT-05
Carbonate (CO3)		<5	<5	RPD-NA	mg/L	N/A	25	03-OCT-05
Conductivity (EC)		517	517		uS/cm	0.0	7.5	03-OCT-05
Hydroxide (OH)		<5	<5	RPD-NA	mg/L	N/A	25	03-OCT-05
pH		6.9	7.0	J,H	pH	0.2	0.1	03-OCT-05
WG359097-3	DUP	L325127-1						
Alkalinity, Total (as CaCO3)		415	406		mg/L	2.2	5	03-OCT-05
Bicarbonate (HCO3)		506	495		mg/L	2.2	25	03-OCT-05
Carbonate (CO3)		<5	<5	RPD-NA	mg/L	N/A	25	03-OCT-05
Conductivity (EC)		780	782		uS/cm	0.26	7.5	03-OCT-05
Hydroxide (OH)		<5	<5	RPD-NA	mg/L	N/A	25	03-OCT-05
pH		7.5	7.5	J	pH	0.0	0.1	03-OCT-05
WG359097-4	DUP	L325209-1						
Alkalinity, Total (as CaCO3)		1960	1920		mg/L	1.8	5	03-OCT-05
Bicarbonate (HCO3)		2390	2340		mg/L	1.8	25	03-OCT-05
Carbonate (CO3)		<5	<5	RPD-NA	mg/L	N/A	25	03-OCT-05
Conductivity (EC)		3500	3520		uS/cm	0.57	7.5	03-OCT-05
Hydroxide (OH)		<5	<5	RPD-NA	mg/L	N/A	25	03-OCT-05
pH		7.5	7.5	J	pH	0.0	0.1	03-OCT-05
WG359097-5	DUP	L325421-1						
Alkalinity, Total (as CaCO3)		276	264		mg/L	4.4	5	03-OCT-05
Bicarbonate (HCO3)		337	322		mg/L	4.4	25	03-OCT-05
Carbonate (CO3)		<5	<5	RPD-NA	mg/L	N/A	25	03-OCT-05
Conductivity (EC)		1110	1110		uS/cm	0.090	7.5	03-OCT-05
Hydroxide (OH)		<5	<5	RPD-NA	mg/L	N/A	25	03-OCT-05
pH		8.2	8.1	J	pH	0.1	0.1	03-OCT-05
WG359097-6	DUP	L325460-10						
Alkalinity, Total (as CaCO3)		383	402		mg/L	4.6	5	03-OCT-05
Bicarbonate (HCO3)		468	490		mg/L	4.6	25	03-OCT-05
Carbonate (CO3)		<5	<5	RPD-NA	mg/L	N/A	25	03-OCT-05
Conductivity (EC)		3030	3030		uS/cm	0.0	7.5	03-OCT-05
Hydroxide (OH)		<5	<5	RPD-NA	mg/L	N/A	25	03-OCT-05
pH		6.8	6.8	J	pH	0.0	0.1	03-OCT-05
WG359097-7	DUP	L325530-1						
Alkalinity, Total (as CaCO3)		867	850		mg/L	2.0	5	03-OCT-05
Bicarbonate (HCO3)		1060	1040		mg/L	2.0	25	03-OCT-05
Carbonate (CO3)		<5	<5	RPD-NA	mg/L	N/A	25	03-OCT-05

**Enviro-Test Quality Control Report**

Workorder: L325179

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<u>PH/EC/ALK-CL</u>		<u>Water</u>						
Batch	R331078							
WG359097-7	DUP	L325530-1						
Conductivity (EC)		3960	3970		uS/cm	0.25	7.5	03-OCT-05
Hydroxide (OH)		<5	<5	RPD-NA	mg/L	N/A	25	03-OCT-05
pH		8.0	8.0	J	pH	0.0	0.1	03-OCT-05
WG359097-1	LCS							
Alkalinity, Total (as CaCO3)			98		%		93-105	03-OCT-05
Carbonate (CO3)			92		%		89-102	03-OCT-05
Conductivity (EC)			101		%		93-105	03-OCT-05
pH			7.1		pH		6.9-7.1	03-OCT-05
<u>SO4-CL</u>		<u>Water</u>						
Batch	R330911							
WG358857-2	DUP	L325085-1						
Sulphate (SO4)		2.5	2.4	J	mg/L	0.1	1.5	01-OCT-05
WG358857-4	DUP	L325179-1						
Sulphate (SO4)		18.0	17.7		mg/L	2.1	10	01-OCT-05
WG358857-5	DUP	L325440-1						
Sulphate (SO4)		253	251		mg/L	0.88	10	01-OCT-05
WG358857-6	DUP	L325109-3						
Sulphate (SO4)		99.2	98.1		mg/L	1.1	10	01-OCT-05
WG358857-7	DUP	L325127-5						
Sulphate (SO4)		12.7	12.8		mg/L	0.98	10	01-OCT-05
WG358857-8	DUP	L325354-2						
Sulphate (SO4)		30.7	30.5		mg/L	0.82	10	01-OCT-05
WG358857-1	LCS							
Sulphate (SO4)			95		%		94-107	01-OCT-05
WG358857-3	MS	L325085-1						
Sulphate (SO4)			101		%		90-112	01-OCT-05

# ENVIRO-TEST QC REPORT

Workorder # L325179

## Legend

Limit 95% Confidence Interval (Laboratory Warning Limits)  
DUP Duplicate  
RPD Relative Percent Difference  
N/A Not Available  
LCS Laboratory Control Sample  
SRM Standard Reference Material  
MS Matrix Spike  
MSD Matrix Spike Duplicate  
ADE Average Desorption Efficiency  
MB Method Blank  
IRM Internal Reference Material  
CRM Certified Reference Material  
CCV Continuing Calibration Verification  
CVS Calibration Verification Standard  
LCSD Laboratory Control Sample Duplicate

Best Copy Available

## Qualifier

RPD-NA Relative Percent Difference Not Available due to result(s) being less than detection limit.  
A Method blank exceeds acceptance limit. Blank correction not applied, unless the qualifier "RAMB" (result adjusted for method blank) appears in the Analytical Report.  
B Method blank result exceeds acceptance limit, however, it is less than 5% of sample concentration. Blank correction not applied.  
E Matrix spike recovery may fall outside the acceptance limits due to high sample background.  
F Silver recovery low, likely due to elevated chloride levels in sample.  
G Outlier - No assignable cause for nonconformity has been determined.  
H Result falls within the 99% Confidence Interval (Laboratory Control Limits).  
J Duplicate results and limit(s) are expressed in terms of absolute difference.  
K The sample referenced above is of a non-standard matrix type, standard QC acceptance criteria may not be achievable.



# EnviroTest

LABORATORIES

## ANALYTICAL REPORT

STANTEC CONSULTING LTD  
ATTN: CLARK PIECHOTTA  
SUITE 200, 325 - 25 STREET S E  
CALGARY AB T2A 7H8

DATE: 08-OCT-05 02:59 PM

Lab Work Order #: L327919

Sampled By: CP

Date Received: 07-OCT-05

Project P.O. #: NA

Job Reference: 1132 52998.400

Other Information:

Comments:

RON MINKS  
Director of Operations, Calgary

SUSAN MARLEEN PULSIFER  
Account Manager

THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN AUTHORITY OF THE LABORATORY  
ANY REMAINING SAMPLES WILL BE DISPOSED OF AFTER 30 DAYS FOLLOWING ANALYSIS. PLEASE CONTACT THE LAB IF YOU  
REQUIRE ADDITIONAL SAMPLE STORAGE TIME.

## ENVIRO-TEST ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier	D.L.	Units	Extracted	Analyzed	By	Batch
L327919-1 SERVICE CONNECTION FIVESTAR MOVIES								
Sample Date: 07-OCT-05								
Matrix: WATER								
BTEX, F1 (C6-C10) and F2 (>C10-C16)								
F2 (>C10-C16)	<0.05		0.05	mg/L	07-OCT-05	07-OCT-05	GVZ	R333094
BTEX and F1 (C6-C10)								
Benzene	<0.0005		0.0005	mg/L	07-OCT-05	08-OCT-05	NZL	R333174
Toluene	<0.0005		0.0005	mg/L	07-OCT-05	08-OCT-05	NZL	R333174
EthylBenzene	<0.0005		0.0005	mg/L	07-OCT-05	08-OCT-05	NZL	R333174
Xylenes	<0.0005		0.0005	mg/L	07-OCT-05	08-OCT-05	NZL	R333174
F1 (C6-C10)	<0.1		0.1	mg/L	07-OCT-05	08-OCT-05	NZL	R333174
F1-BTEX	<0.1		0.1	mg/L	07-OCT-05	08-OCT-05	NZL	R333174
Methyl tert-butyl ether	<0.005		0.005	mg/L	07-OCT-05	08-OCT-05	NZL	R333174
L327919-2 MAIN LINE FIVESTAR MOVIES								
Sample Date: 07-OCT-05								
Matrix: WATER								
BTEX, F1 (C6-C10) and F2 (>C10-C16)								
F2 (>C10-C16)	<0.05		0.05	mg/L	07-OCT-05	07-OCT-05	GVZ	R333094
BTEX and F1 (C6-C10)								
Benzene	<0.0005		0.0005	mg/L	07-OCT-05	08-OCT-05	NZL	R333174
Toluene	<0.0005		0.0005	mg/L	07-OCT-05	08-OCT-05	NZL	R333174
EthylBenzene	<0.0005		0.0005	mg/L	07-OCT-05	08-OCT-05	NZL	R333174
Xylenes	<0.0005		0.0005	mg/L	07-OCT-05	08-OCT-05	NZL	R333174
F1 (C6-C10)	<0.1		0.1	mg/L	07-OCT-05	08-OCT-05	NZL	R333174
F1-BTEX	<0.1		0.1	mg/L	07-OCT-05	08-OCT-05	NZL	R333174
Methyl tert-butyl ether	<0.005		0.005	mg/L	07-OCT-05	08-OCT-05	NZL	R333174
L327919-3 MAIN HEADER FIVESTAR MOVIES								
Sample Date: 07-OCT-05								
Matrix: WATER								
BTEX, F1 (C6-C10) and F2 (>C10-C16)								
F2 (>C10-C16)	<0.05		0.05	mg/L	07-OCT-05	07-OCT-05	GVZ	R333094
BTEX and F1 (C6-C10)								
Benzene	<0.0005		0.0005	mg/L	07-OCT-05	08-OCT-05	NZL	R333174
Toluene	<0.0005		0.0005	mg/L	07-OCT-05	08-OCT-05	NZL	R333174
EthylBenzene	<0.0005		0.0005	mg/L	07-OCT-05	08-OCT-05	NZL	R333174
Xylenes	<0.0005		0.0005	mg/L	07-OCT-05	08-OCT-05	NZL	R333174
F1 (C6-C10)	<0.1		0.1	mg/L	07-OCT-05	08-OCT-05	NZL	R333174
F1-BTEX	<0.1		0.1	mg/L	07-OCT-05	08-OCT-05	NZL	R333174
Methyl tert-butyl ether	<0.005		0.005	mg/L	07-OCT-05	08-OCT-05	NZL	R333174
Refer to Referenced Information for Qualifiers (if any) and Methodology								

## Reference Information

### Methods Listed (if applicable):

ETL Test Code	Matrix	Test Description	Preparation Method Reference(Based On)	Analytical Method Reference(Based On)
BTX,F1-CL	Water	BTEX and F1 (C6-C10)	EPA 5030B	EPA 5030/8015& 8260-P&T GC-MS/FID
F2-CL	Water	F2 (>C10-C16)	EPA 3550B	EPA 3510/8000-GC-FID
MTBE-CL	Water	MTBE		EPA 5030/8260B-P&T GC-MSD

\*\* Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies

### Chain of Custody numbers

213888

*The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below*

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
CL	Enviro-Test Laboratories - Calgary, Alberta, Canada		

### GLOSSARY OF REPORT TERMS

*Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in environmental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds. The reported surrogate recovery value provides a measure of method efficiency. The Laboratory warning units are determined under column heading D.L.*

*mg/Kg (units) - unit of concentration based on mass, parts per million*

*mg/L (units) - unit of concentration based on volume, parts per million*

*< - Less than*

*D.L. - Detection Limit*

*N/A - Result not available. Refer to qualifier code and definition for explanation*

*Test results reported relate only to the samples as received by the laboratory*

*UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.*

*UNLESS OTHERWISE STATED, SAMPLES ARE NOT CORRECTED FOR CLIENT FIELD BLANKS.*

*Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary*

*Enviro-Test Laboratories has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, Enviro-Test Laboratories assumes no liability for the use or interpretation of the results.*



**Enviro-Test Quality Control Report**

Workorder: L327919

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>F2-CL</b>		<b>Water</b>						
Batch	R333094							
WG361677-9	MB							
F2 (>C10-C16)			<0.05		mg/L		0.05	07-OCT-05
WG361677-4	MS	L327919-2						
F2 (>C10-C16)			87		%		65-125	07-OCT-05
WG361677-6	MS	L326782-3						
F2 (>C10-C16)			90		%		65-125	08-OCT-05
<b>MTBE-CL</b>		<b>Water</b>						
Batch	R333174							
WG361775-7	DUP	L327919-1						
Methyl tert-butyl ether		<0.005	<0.005	RPD-NA	mg/L	N/A	20	08-OCT-05
WG361775-5	LCS							
Methyl tert-butyl ether			102		%		85-115	08-OCT-05
WG361775-6	MB							
Methyl tert-butyl ether			<0.005		mg/L		0.005	08-OCT-05
WG361775-8	MS	L327919-3						
Methyl tert-butyl ether			97		%		70-118	08-OCT-05

Workorder # L327919

Legend

- Limit 95% Confidence Interval (Laboratory Warning Limits)
- DUP Duplicate
- RPD Relative Percent Difference
- N/A Not Available
- LCS Laboratory Control Sample
- SRM Standard Reference Material
- MS Matrix Spike
- MSD Matrix Spike Duplicate
- ADE Average Desorption Efficiency
- MB Method Blank
- IRM Internal Reference Material
- CRM Certified Reference Material
- CCV Continuing Calibration Verification
- CVS Calibration Verification Standard
- LCSD Laboratory Control Sample Duplicate

Qualifier

- RPD-NA Relative Percent Difference Not Available due to result(s) being less than detection limit.
- A Method blank exceeds acceptance limit. Blank correction not applied, unless the qualifier "RAMB" (result adjusted for method blank) appears in the Analytical Report.
- B Method blank result exceeds acceptance limit, however, it is less than 5% of sample concentration. Blank correction not applied.
- E Matrix spike recovery may fall outside the acceptance limits due to high sample background
- F Silver recovery low, likely due to elevated chloride levels in sample
- G Outlier - No assignable cause for nonconformity has been determined
- H Result falls within the 99% Confidence Interval (Laboratory Control Limits)
- J Duplicate results and limit(s) are expressed in terms of absolute difference.
- K The sample referenced above is of a non-standard matrix type; standard QC acceptance criteria may not be achievable

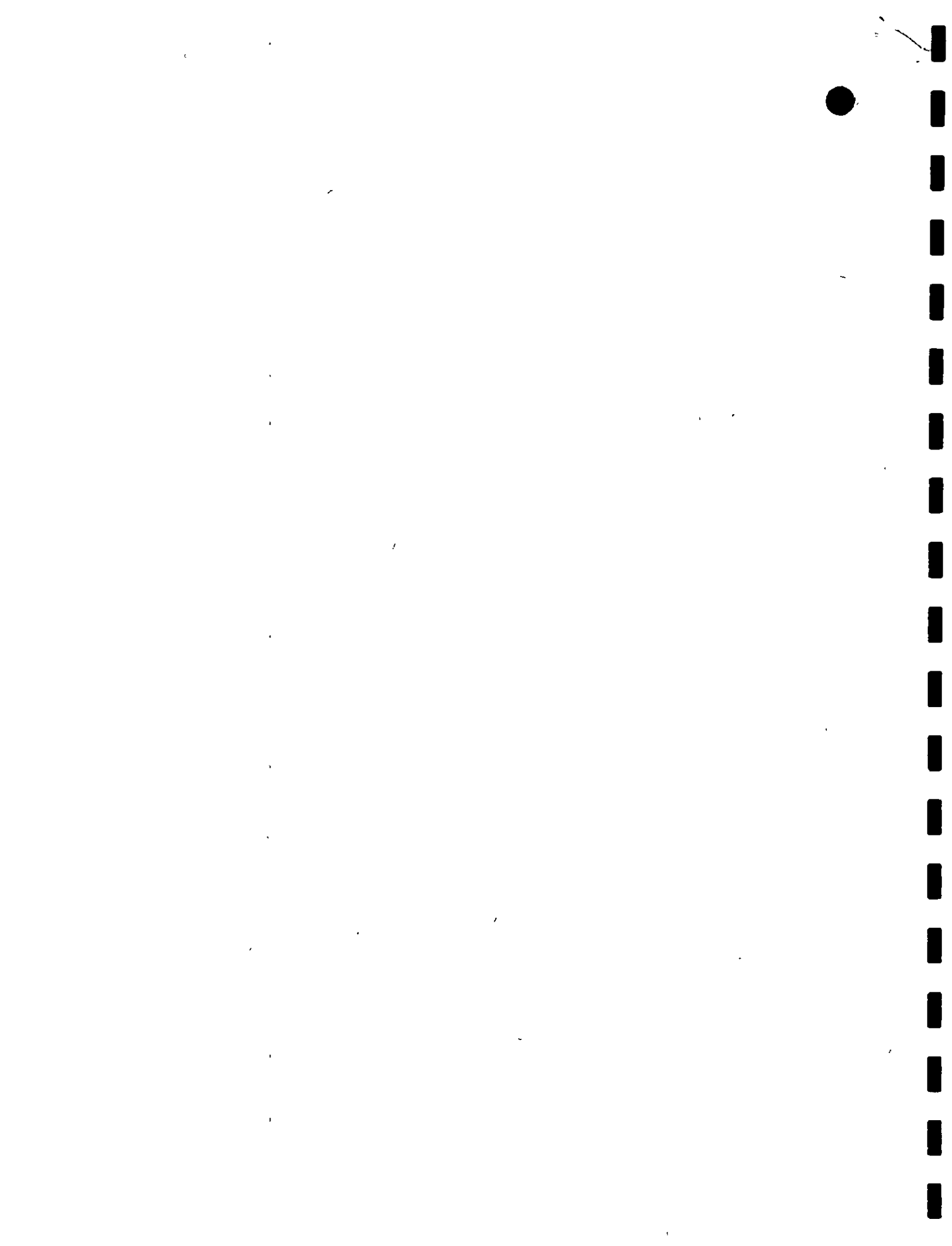
**Enviro-Test Quality Control Report**

Workorder: L327919

Client: STANTEC CONSULTING LTD  
SUITE 200, 325 - 25 STREET S E  
CALGARY AB T2A 7H8

Contact: CLARK PIECHOTTA

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>BTX,F1-CL</b>		<u>Water</u>						
Batch	R333174							
WG361775-3	DUP	L327919-1						
Benzene		<0.0005	<0.0005	RPD-NA	mg/L	N/A	20	08-OCT-05
EthylBenzene		<0.0005	<0.0005	RPD-NA	mg/L	N/A	20	08-OCT-05
Toluene		<0.0005	<0.0005	RPD-NA	mg/L	N/A	20	08-OCT-05
F1(C6-C10)		<0.1	<0.1	RPD-NA	mg/L	N/A	20	08-OCT-05
Xylenes		<0.0005	<0.0005	RPD-NA	mg/L	N/A	20	08-OCT-05
WG361775-1	LCS							
Benzene			104		%		87-113	08-OCT-05
EthylBenzene			104		%		88-114	08-OCT-05
Toluene			102		%		88-113	08-OCT-05
F1(C6-C10)			106		%		86-112	08-OCT-05
Xylenes			105		%		89-117	08-OCT-05
WG361775-2	MB							
Benzene			<0.0005		mg/L		0.0005	08-OCT-05
EthylBenzene			<0.0005		mg/L		0.0005	08-OCT-05
Toluene			<0.0005		mg/L		0.0005	08-OCT-05
F1(C6-C10)			<0.1		mg/L		0.1	08-OCT-05
Xylenes			<0.0005		mg/L		0.0005	08-OCT-05
WG361775-4	MS	L327919-3						
Benzene			108		%		70-118	08-OCT-05
EthylBenzene			104		%		70-118	08-OCT-05
Toluene			102		%		70-118	08-OCT-05
F1(C6-C10)			88		%		70-130	08-OCT-05
Xylenes			87		%		70-118	08-OCT-05
<b>F2-CL</b>		<u>Water</u>						
Batch	R333094							
WG361677-3	DUP	L327919-1						
F2 (>C10-C16)		<0.05	<0.05	RPD-NA	mg/L	N/A	25	07-OCT-05
WG361677-5	DUP	L326782-1						
F2 (>C10-C16)		0.41	0.39	J	mg/L	0.02	0.15	08-OCT-05
WG361677-7	DUP	L327166-1						
F2 (>C10-C16)		0.24	0.24	J	mg/L	0.00	0.15	08-OCT-05
WG361677-1	MB							
F2 (>C10-C16)			<0.05		mg/L		0.05	07-OCT-05
WG361677-9	MB							



# **APPENDIX “B”**

**2314174 ALBERTA LTD.**

**PURCHASE FROM**

**BDO CANADA LIMITED, in its capacity as Court-Appointed Receiver and Manager of  
1652563 Alberta Ltd., and not in its personal or corporate capacities and without personal  
or corporate liability**

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**AGREEMENT OF PURCHASE AND SALE**

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## AGREEMENT OF PURCHASE AND SALE

THIS AGREEMENT dated the 29<sup>th</sup> day of July, 2021.

**B E T W E E N:**

**2314174 ALBERTA LTD.**

(hereinafter called the “**Purchaser**”)

- and -

**BDO CANADA LIMITED, in its capacity as Court-Appointed Receiver and Manager of 1652563 Alberta Ltd., and not in its personal or corporate capacities and without personal or corporate liability**

(hereinafter called the “**Vendor**”)

### **Article 1 Definitions and Schedules**

#### **1.1 Definitions**

In this Agreement, the following terms shall have the following meanings:

- (a) “**Additional Costs of Administration**” means:
- (i) all of the reasonable taxable fees, costs and expenses associated with the Receiver’s administration of the Debtor’s estate pursuant to the Receivership Order that are in excess of the Receiver’s Borrowing Amount; and
  - (ii) all of the reasonable taxable fees, costs and expenses of the trustee in bankruptcy of the Debtor, should the Debtor be assigned into bankruptcy;
- provided that such Additional Costs of Administration shall not exceed a total of \$40,000, unless otherwise agreed to in writing by the parties.
- (b) “**Agreement**”, “**hereto**”, “**hereby**”, “**hereunder**”, “**hereof**” and similar expressions when used in this Agreement and in the attached schedules refer to the whole of this Agreement and the attached Schedules and not to any particular Article or Section or portion thereof and includes any and every instrument supplemental hereto, and any reference to an Article or Section by number means

the appropriate Article or Section of this Agreement and any reference to a schedule by letter means the appropriate schedule attached to and forming a part of this Agreement, unless in any of the cases aforesaid the context is expressly to the contrary.

- (c) “**Applicable Laws**” means, with respect to the Property and any Person, property, transaction or event, all laws, by-laws, rules, regulations, orders, statutes, codes, laws, judgments, decrees, decisions or other requirements having the force of law relating to or applicable to such Property, Person, property, transaction or event.
- (d) “**Approval and Vesting Order**” has the meaning ascribed to it in Section 4.3.
- (e) “**Assignment Agreement**” means the Assignment of Indebtedness and Security Agreement dated January 13, 2021 between the Purchaser and Bank of Montreal.
- (f) “**Broker**” means Tyler Realty Corp Ltd.
- (g) “**Building**” means, collectively, the building, structures and fixed improvements located on, in or under the Property, and improvements and fixtures contained in or on such building and structures used in the operation of such building, but excluding those improvements and fixtures (i) not owned by the Debtor; and/or (ii) which are removable by any tenant pursuant to its lease.
- (h) “**Building Lot**” has the meaning ascribed thereto in Schedule “A”.
- (i) “**Business Day**” means any day other than a Saturday, Sunday or statutory holiday in Alberta.
- (j) “**Cash Amount**” means the amount of the Additional Costs of Administration.
- (k) “**Closing**” means the completion of the Transaction.
- (l) “**Closing Date**” means the date that is Twenty (20) Business Days following the date on which the conditions in Section 4.3 are satisfied by the Parties or such earlier date as the Parties may agree in writing.
- (m) “**Closing Deliveries**” means the agreements, instruments and other documents and items to be delivered by the Vendor to the Purchaser or the Purchaser’s Solicitors pursuant to Section 9.1 and the agreements, instruments, monies and other documents and items to be delivered by the Purchaser to the Vendor or the Vendor’s Solicitors pursuant to Section 10.1.
- (n) “**Confidential Information**” has the meaning ascribed thereto in Section 13.7.
- (o) “**Court**” means the Alberta Court of Queens Bench.
- (p) “**Credit Bid Amount**” means a non-cash credit reduction in the total amount of \$362,500 payable by way of non-cash reduction in credit as follows: (i) a reduction



of the Receiver's Borrowing Amount to \$0; and (ii) a reduction to the amount of the Secured Debt equal to the amount of \$362,500 less the amount set out in section 1.1(p)(i).

- (q) **"Debtor"** means 1652563 Alberta Ltd.
- (r) **"Encumbrance"** means, any mortgage, pledge, charge, lien, debenture, trust deed, assignment by way of security, security interest, conditional sales contract or similar interest or instrument charging, or creating a security interest in, the Property or any part thereof or interest therein, and any agreement, option, easement, right of way, restriction, execution or other encumbrance (including any notice or other registration in respect of any of the foregoing) affecting title to the Property or any part thereof or interest therein.
- (s) **"Environmental Laws"** means all Applicable Laws now or hereafter in existence concerning contamination, pollution, protection or preservation of the environment or otherwise relating to the environment (including the air within any structure or underground space) or to environmental aspects of occupational health and safety, product safety and product liability, including Applicable Laws pertaining to (i) reporting, licensing, permitting, investigating and remediating the presence of Hazardous Substances; and (ii) the storage, generation, use, handling, manufacture, processing, transportation, treatment, Release and disposal of Hazardous Substances.
- (t) **"ETA"** has the meaning ascribed thereto in Section 8.1(b).
- (u) **"Execution Date"** means the date upon which this Agreement is executed and delivered by each of the Parties hereto.
- (v) **"Governmental Authority"** means any federal, provincial or municipal government, parliament, legislature, or any regulatory authority, agency, ministry, department, commission or board or other representative thereof, or any political subdivision thereof, or any court or (without limitation to the foregoing) any other law, regulation or rule-making entity, having jurisdiction over the relevant circumstances, or any person acting under the authority of any of the foregoing.
- (w) **"GST"** has the meaning ascribed thereto in Section 8.1(b).
- (x) **"Hazardous Substances"** means any contaminants, pollutants, substances or materials that, when released to the natural environment, could cause, at some immediate or future time, harm or degradation to the natural environment or risk to human health, whether or not such contaminants, pollutants, substances or materials are or shall become prohibited, controlled or regulated by any Governmental Authority, and any "contaminants", "dangerous substances", "hazardous materials", "hazardous substance", "hazardous waste", "industrial wastes", "liquid wastes", "pollutants" and "toxic substances", all as defined in, referred to or contemplated in any federal, provincial or municipal legislation, regulations, orders or ordinances relating to environmental, health or safety matters.

- (y) “**ITA**” means the *Income Tax Act* (Canada).
- (z) “**Loan Documents**” means the “Loan Documents” as defined in the Assignment Agreement and includes, without limitation, the documents listed in Schedule “D” attached hereto.
- (aa) “**Lot 413**” has the meaning ascribed thereto in Schedule “A”.
- (bb) “**Lot 417**” has the meaning ascribed thereto in Schedule “A”.
- (cc) “**MDT**” means Mountain Daylight Time.
- (dd) “**Parties**” means, collectively, the Vendor and the Purchaser and individually, a “**Party**”.
- (ee) “**Permitted Encumbrances**” means those Encumbrances listed in Schedule “B” attached hereto.
- (ff) “**Person**” means an individual, partnership, limited partnership, company, corporation, trust, unincorporated organization, government, or any department or agency thereof, and the successors and assigns thereof or the heirs, executors, administrators or other legal representatives of an individual.
- (gg) “**Property**” means the real and immovable property being more particularly described in Schedule “A”, together with the Building and all easements, rights of way and other rights enjoyed by the Debtor as appurtenant to or in conjunction with or as owner of such real or immovable properties.
- (hh) “**Purchase Price**” has the meaning ascribed thereto in Section 2.2.
- (ii) “**Purchaser’s Closing Documents**” has the meaning ascribed thereto in Article 10.
- (jj) “**Purchaser’s Solicitors**” means Cassels Brock & Blackwell LLP or such other firm or firms of solicitors or agents as are retained by the Purchaser from time to time and notice of which is provided to the Vendor.
- (kk) “**Receiver’s Borrowing Amount**” means the amounts advanced under the Receiver’s Borrowing Certificates, plus all interest due and owing under the Receiver’s Borrower Certificates as at the date the Receiver’s Borrowing Certificates are repaid.
- (ll) “**Receiver’s Borrowing Certificates**” means Receiver’s Certificate No. 1 dated April 6, 2021 in the principal amount of \$13,000 and Receiver’s Certificate No. 2 dated April 30, 2021 in the principal amount of \$100,000, each of which was issued by BDO Canada Limited, in its capacity as receiver and manager of the assets, undertakings and properties of 1652563 Alberta Ltd., pursuant to the Receivership Order.

- (mm) **“Receivership Order”** means the order of the Court appointing BDO Canada Limited as receiver and manager of the assets, undertaking and property of the Debtor dated February 11, 2021 on the application of 2314174 Alberta Ltd. pursuant to section 243(1) of the *Bankruptcy and Insolvency Act (Canada)* and section 13(2) of the *Judicature Act (Alberta)*.
- (nn) **“Release”** means, in addition to the meaning given to it under any applicable Environmental Laws, any release, spill, leak, pumping, pouring, emission, emptying, discharge, migration, injection, escape, leaching, disposal, dumping, deposit, spraying, burial, abandonment, incineration, seepage or placement.
- (oo) **“Sales Process”** has the meaning ascribed to it in the Order Approving Sales Process pronounced on April 13, 2021 in Court of Queen’s Bench of Alberta court file number 2101-00810.
- (pp) **“Secured Debt”** means all amounts due and owing by the Debtor pursuant to the Assignment Agreement and Loan Documents, which is the amount of \$654,753.57 as of January 11, 2021.
- (qq) **“Transaction”** means the purchase and sale of the Property provided for in this Agreement.
- (rr) **“Vendor’s Closing Documents”** has the meaning ascribed thereto in Article 9.
- (ss) **“Vendor’s Deliveries”** has the meaning ascribed to it in Section 5.1.
- (tt) **“Vendor’s Solicitors”** means Borden Ladner Gervais LLP or such other firm or firms of solicitors or agents as are retained by the Vendor from time to time and notice of which is provided to the Purchaser.

## 1.2 Schedules

The following Schedules form part of this Agreement:

- (a) Schedule “A” – Legal Description.
- (b) Schedule “B” – Permitted Encumbrances.
- (c) Schedule “C” – Form of Approval and Vesting Orders
- (d) Schedule “D” – Loan Documents.

## **Article 2 Purchase Price and Terms**

### **2.1 Agreement of Purchase and Sale**

The Vendor hereby agrees to sell, transfer and assign the Property to the Purchaser and the Purchaser hereby agrees to purchase and acquire the Property from the Vendor pursuant to the Approval and Vesting Order on the Closing Date.

### **2.2 Purchase Price**

The aggregate purchase price, exclusive of GST, for the Property shall be equal to (a) the Credit Bid Amount; plus (b) the Cash Amount (collectively, the “**Purchase Price**”).

### **2.3 Payment of Purchase Price**

Subject to the terms and conditions of this Agreement, the Purchase Price shall be payable at the Closing Date as follows:

- (a) the Purchaser shall deliver to the Vendor an acknowledgement that all indebtedness owed pursuant to the Receiver’s Borrowing Certificates has been indefeasibly paid in full;
- (b) the Purchaser shall deliver to the Vendor an acknowledgement that the amount of the Secured Debt owing by the Debtor to the Purchaser pursuant to the Loan Documents has been indefeasibly paid in the amount of the Credit Bid Amount, less the Receiver’s Borrowing Amount; and
- (c) a wire transfer in accordance with the Vendor’s direction on Closing in the amount of the Cash Amount, but subject to adjustments in accordance with this Agreement.

### **2.4 Allocation of Purchase Price**

The Purchase Price shall be allocated among the Property as follows:

- (a) The Building Lot – 64% of the Purchase Price; and
- (b) Lot 413 and Lot 417 – 36% of the Purchase Price.

**Article 3  
Closing Date**

**3.1 Closing**

The Closing shall be on the Closing Date.

**Article 4  
Conditions**

**4.1 Purchaser Conditions**

The obligation of the Purchaser to complete this Agreement shall be subject to the following conditions (provided that these conditions are for the benefit of the Purchaser and may be waived in whole or in part by the Purchaser by written notice to the Vendor prior to the date for its satisfaction):

- (a) on Closing, the Debtor shall have made an assignment or been assigned into bankruptcy or a bankruptcy order shall have been issued against the Debtor and no person shall have appealed the bankruptcy assignment or order;
- (b) on Closing, all covenants and agreements of the Vendor in this Agreement have been performed as at the Closing Date; and
- (c) on Closing, all representations and warranties of the Vendor in this Agreement shall be true in all material respects as if made on the Closing Date.

**4.2 Vendor Conditions**

The obligation of the Vendor to complete this Agreement shall be subject to the following conditions (provided that these conditions are for the benefit of the Vendor and may be waived in whole or in part by the Vendor by written notice to the Purchaser prior to the date for its satisfaction):

- (a) on Closing, all covenants and agreements of the Purchaser in this Agreement have been performed as at the Closing Date; and
- (b) on Closing, all representations and warranties of the Purchaser in this Agreement shall be true in all material respects as if made on the Closing Date.

**4.3 Mutual Conditions**

The obligation of the Parties to complete the Agreement shall be subject to satisfaction of the following conditions:

- (a) within twenty (20) days of this Agreement being mutually accepted by the Purchaser and Vendor, or such other date as the Parties may agree to in writing, the Court shall have made an order substantially in the form attached hereto as

Schedule "C" approving the sale of the Property to the Purchaser as contemplated by this Agreement and ordering that the Property shall vest in the Purchaser after the payment of the Purchase Price and the satisfaction of the conditions set out in this Agreement, free and clear of all Encumbrances against the Property, excepting Permitted Encumbrances (an "**Approval and Vesting Order**");

- (b) on or before the Closing Date, the Approval and Vesting Order shall not have been stayed, varied or vacated, and no order shall have been issued to restrain or prohibit the completion of the Transaction;
- (c) on or before the Closing Date, all applicable appeal periods in respect of the Approval and Vesting Order shall have expired without there being extant any appeal thereof, or any timely appeal or application for leave to appeal the Approval and Vesting Order shall have been dismissed; and
- (d) on or before the Closing Date, the parties shall have entered into the GST Side Letter Agreement contemplated by Section 8.1 of this Agreement.

The Vendor covenants and agrees to apply to the Court for the Approval and Vesting Order as soon as possible following the mutual acceptance of this Agreement by the Purchaser and the Vendor.

#### **4.4 Waiver and Satisfaction of Conditions**

- (a) **Closing Conditions for the Benefit of the Purchaser** - If any of the conditions set out in Section 4.1 are not satisfied or waived on or before the Closing Date, the Purchaser may terminate this Agreement by notice in writing to the Vendor given on or before the Closing Date, in which event this Agreement shall be terminated, null and void and of no further force or effect whatsoever, the Vendor and the Purchaser shall be released from all of their respective liabilities and obligations under this Agreement (save and except for the obligation expressed to survive termination except use of remedies or Closing).
- (b) **Closing Conditions for the Benefit of the Vendor** - If any of the conditions set out in Section 4.2 are not satisfied or waived on or before the Closing Date, the Vendor may terminate this Agreement by notice in writing to the Purchaser given on or before the Closing Date, in which event this Agreement shall be terminated, null and void and of no further force or effect whatsoever, the Vendor and the Purchaser shall be released from all of their respective liabilities and obligations under this Agreement (save and except for the obligation expressed to survive termination except use of remedies or Closing).
- (c) **Mutual Condition** - If the mutual conditions in Section 4.3 are not satisfied as therein provided or waived by both the Vendor and the Purchaser on or before the applicable time and date referred to therein, in which event this Agreement shall be terminated, null and void and of no further force or effect whatsoever, each Party shall be released from all of its liabilities and obligations under this Agreement (save and except for the obligation expressed to survive termination except use of

remedies or Closing).

- (d) **Good Faith** - Each of the Vendor and the Purchaser agrees that it shall each act in good faith and use reasonable commercial efforts to satisfy, or cause to be satisfied, the conditions set out in this Article 4. In the event that a Party waives any conditions contained in this Article 4, the Party who waives such condition or conditions shall have no further rights or remedies against the other Party, at law or in equity, in respect of the matter or matters so waived.
- (e) **Closing Conditions**- All conditions to be satisfied on or before Closing shall be deemed to be satisfied if Closing occurs.

## **Article 5**

### **Delivery of Documents and Purchaser's Acknowledgements**

#### **5.1 Property Documents**

The Vendor shall have no obligation to provide copies of documentation requested by the Purchaser, all such documents shall be provided by the brokerage advertising the Property for sale (all such documents collectively, the "**Vendor's Deliveries**"). Without limiting the generality of Section 5.2 of this Agreement, the Purchaser acknowledges that the Vendor has not made any independent investigation or verification of the information provided or made available to the Purchaser and that, save as herein or in the Closing Deliveries otherwise provided, the Vendor makes no representations and warranties, either express or implied, and shall have no liability with respect to the accuracy or completeness of the information, data or conclusions contained in the information provided or made available; to the Purchaser.

#### **5.2 As Is, Where Is**

The Purchaser acknowledges that the Vendor does not make any representations or warranties, expressed or implied, as to the accuracy or completeness of the information or statements contained in the Vendor's Deliveries and such information should not be relied upon by the Purchaser without independent investigation and verification, and the Vendor expressly disclaims any and all liability for any matter set out therein including without limitation any errors or omissions in the Vendor's Deliveries, in any other information or any other written or oral communication transmitted or made available to the Purchaser by the Vendor or on the Vendor's behalf. Without limiting the generality of the foregoing, any and all conditions, warranties or representations expressed or implied pursuant to the *Sale of Goods Act* (Alberta) do not apply hereto and have been waived by the Purchaser.

The Purchaser acknowledges that the Vendor is selling, and the Purchaser is purchasing, the Property on an "as is, where is" basis, and further agrees no covenant, agreement, representation, warranty or condition is expressed or can be implied as to use, zoning, title, description, condition, size, cost, fitness for purpose, existence or non-existence of Hazardous Substances, merchantability, latent defects, any environmental matter, quality or quantity of the Property or any part thereof or as to any other matter whatsoever save as expressly set forth in this Agreement. The Purchaser further acknowledges that it is relying upon its own investigations and inspections in proceeding with the purchase contemplated in the Agreement and confirms that it

shall complete and shall satisfy itself regarding such investigations and inspections. All written and oral information obtained by the Purchaser from the Vendor has been provided solely for the convenience of the Purchaser.

## **Article 6**

### **Covenants, Representations and Warranties**

#### **6.1 Vendor Representations**

The Vendor hereby represents and warrants to the Purchaser, as of the date hereof and on Closing, as follows:

- (a) the Vendor is not now and does not intend to become, prior to Closing, a non-resident of Canada within the meaning and purpose of Section 116 of the *Income Tax Act* (Canada) and the Vendor is not now and does not intend to become, prior to Closing, an agent or a trustee of such non-resident;
- (b) the Vendor has been duly appointed as receiver and manager of the assets, undertaking and property of the Debtor pursuant to the Receivership Order with authority to solicit and accept offers to purchase the Property; and
- (c) subject to the granting of the Approval and Vesting Order, the Vendor has the right to enter into this Agreement and to complete the Transaction contemplated herein.

#### **6.2 Vendor Covenants**

The Vendor hereby covenants with the Purchaser that the Vendor shall continue operating the Property or shall cause the Property to continue to be operated in a manner consistent with its past practice until the Closing Date.

#### **6.3 Purchaser Representations**

The Purchaser hereby represents and warrants to the Vendor, as follows;

- (a) as of the date hereof and on Closing, the Purchaser is a corporation duly incorporated, organized and validly subsisting under the laws of Alberta and has all requisite corporate power, authority and capacity to execute and deliver and to perform each of its obligations pursuant to this Agreement; neither the execution of this Agreement nor the performance (such performance shall include, without limitation, the exercise of any of the Purchaser's rights and compliance with each of the Purchaser's obligations hereunder) by the Purchaser of the transaction contemplated hereunder will violate:
  - (i) the Purchaser's articles of incorporation and by-laws;
  - (ii) any agreement to which the Purchaser is bound;
  - (iii) any judgment or order of a court of competent authority or any



Governmental Authority; or

- (iv) any applicable law;

and the Purchaser has duly taken, or has caused to be taken, all requisite corporate action required to be taken by it to authorize the execution and delivery of this Agreement and the performance of each of its obligations hereunder; and

- (b) the Purchaser is not a non-Canadian person as defined in the *Investment Canada Act*.

#### **6.4 Survival**

The representations and warranties of the Vendor and the Purchaser described herein shall not merge on and shall survive Closing.

#### **6.5 Purchaser's Acknowledgment**

The Purchaser acknowledges that the Vendor is selling the Property pursuant to the Vendor's powers as authorized by the Receivership Order and pursuant to the Approval and Vesting Order.

### **Article 7 Adjustments**

#### **7.1 Adjustments**

- (a) All operating costs and recoveries, realty taxes, water, sewer, local improvement rates and charges, utility deposits and other applicable income and expense items and adjustments established by usual practice in the Town of Carstairs for the purchase and sale of a similar property shall be apportioned and allowed to the Closing Date (the day itself to be apportioned to the Purchaser) to the extent that the Vendor will bear and pay all expenses and receive all income related to the Property prior to the Closing Date and the Purchaser will bear and pay all expenses and receive all income related to the Property from and after and including the Closing Date. The Vendor acknowledges that the Purchaser shall be arranging its own insurance coverage to be effective on Closing and no adjustment shall be made in this regard.
- (b) The adjustments will be made to the extent reasonably possible on Closing as of the Closing Date. The Vendor will prepare a statement of the adjustments for the Property and a copy thereof (to which there will be annexed complete details of the calculations made therein and applicable invoices) will be delivered to the Purchaser at least Ten (10) Business Days prior to the Closing Date. The Purchaser and the Vendor agree that if the final cost or amount of any item which is to be adjusted under this Article 7 cannot be determined at Closing, then an initial adjustment for such item shall be made at Closing, and such amount shall be reasonably estimated by the Vendor as at the end of the day preceding the

adjustment date on the basis of the best evidence available at the Closing as to what the final cost or amount of such item will be. In each case when such cost or amount is determined, either the Vendor or the Purchaser, as the case may be, shall within three (3) days of determination, provide a complete statement thereof to the other and within fifteen (15) days thereafter the Parties hereto shall make a final adjustment as of the end of the day preceding the adjustment date for the item in question, provided that in any event such final adjustment shall be made no later than thirty (30) days from the Closing Date (the “**Final Adjustment Date**”). In the absence of agreement by the Parties hereto within thirty (30) days of the Closing Date, the final cost or amount of an item shall be determined by the Court. For the purposes of this Section, the term “adjustment date” means 11:59 p.m. MDT on the day prior to the Closing Date, with the adjustment date being for the account of the Vendor and the Closing Date being for the account of the Purchaser. Notwithstanding any other provisions of this Agreement and for the avoidance of doubt, the Parties agree that their respective rights to adjustment and/or re-adjustment of any item or matter in relation to this transaction after Closing, shall not extend beyond the Final Adjustment Date, and any specific claim for adjustment and/or re-adjustment not made within such period shall expire and be extinguished on the expiry of such period and neither party shall have any further right to claim for adjustment or re-adjustment of the Purchase Price for any reason whatsoever.

## **Article 8**

### **GST**

#### **8.1 GST**

The Purchaser hereby represents, warrants and certifies to the Vendor with respect to the Property, as follows:

- (a) subject to the Parties entering into a mutually satisfactory agreement whereby the principal of the Purchaser, being Mr. Jerry Roberts, shall personally agree to indemnify and hold the Receiver harmless with respect to any applicable goods and services tax (“**GST**”) obligations arising on the Closing of the Property (the “**GST Side Letter Agreement**”), the parties agree that the Vendor shall not collect GST from the Purchaser in connection with the transaction contemplated by this Agreement if, on the Closing Date the Purchaser shall be purchasing the Property on the Closing Date, as principal for its own account and not as an agent, trustee or otherwise on behalf of another person and the Purchaser is a registrant for the purposes of Division V of Part IX of the *Excise Tax Act* (Canada) (the “**ETA**”) and the Purchaser delivers to the Vendor an undertaking by the Purchaser to pay all applicable GST in connection with the transaction contemplated by this Agreement; and
- (b) subject to the terms of Section 8.1(a), the Vendor shall collect any applicable GST on Closing regarding the Property and shall not allow the Purchaser (or the Purchaser Beneficial Owner, if applicable) to self-assess and remit GST to the Receiver General in accordance with Division V of Part IX of the ETA.

**Article 9**  
**Vendor's Closing Documents**

**9.1 Vendor Closing Deliveries**

The Vendor agrees to deliver or cause to be delivered the following to the Purchaser on or before the Closing Date:

- (a) a certificate of the Vendor certifying that the Vendor is not a non-resident of Canada pursuant to Section 116 of the ITA;
- (b) the statement of adjustments, to be provided at least ten Business Days prior to the Closing Date;
- (c) any keys in the Vendor's possession and control with respect to the Property;
- (d) an undertaking by the Vendor to readjust all items on or omitted from the statement of adjustments in accordance with Article 7 of this Agreement;
- (e) a Certificate by the Vendor confirming that those Vendor's representations and warranties contained in this Agreement that are to be true as at the Closing Date, are true, in all material respects, as at the Closing Date;
- (f) a copy of the entered Approval and Vesting Order filed with the Court; and
- (g) such other documents as are required by the terms of this Agreement or are customary in similar transactions or are reasonably required by the Purchaser's Solicitors

(the "**Vendor's Closing Documents**")

All documentation shall be in form and substance acceptable to the Purchaser and the Vendor, each acting reasonably and in good faith, provided that neither Party shall be required to provide covenants, representations or warranties which are in addition to or more onerous upon it than those expressly set forth in this Agreement.

**Article 10**  
**Purchaser's Closing Documents**

**10.1 Purchaser Closing Deliveries**

The Purchaser agrees to deliver or cause to be delivered the following to the Vendor on or before the Closing Date:

- (a) the Cash Amount;
- (b) an undertaking by the Purchaser to readjust all items on or omitted from the statement of adjustments in accordance with Article 7 of this Agreement;

- (c) a Certificate by the Purchaser confirming that those Purchaser's representations and warranties contained in this Agreement that are to be true as at the Closing Date, are true, in all material respects, as at the Closing Date; and
- (d) such other documents as are required by the terms of this Agreement or are customary in similar transactions or are reasonably required by the Vendor's Solicitors,

(the "**Purchaser's Closing Documents**").

All documentation shall be in form and substance acceptable to the Purchaser and the Vendor, each acting reasonably and in good faith, provided that neither Party shall be required to provide covenants, representations or warranties which are in addition to or more onerous upon it than those expressly set forth in this Agreement.

## **Article 11 Assignment, Successors**

### **11.1 Assignment**

The Purchaser shall not assign its rights and/or obligations hereunder or direct title to the Property to any other person without the prior written consent of the Vendor, which consent may be unreasonably withheld, conditioned or delayed. If the Vendor provides its consent to an assignment (i) the assignee shall enter into an agreement with the Vendor at the time of such assignment whereby the assignee agrees to be bound by all of the obligations and liabilities of the Purchaser under this Agreement as if it was the original Purchaser hereunder; and (ii) the Purchaser shall not be released from its obligations and liabilities under this Agreement.

## **Article 12 Operation of Property**

### **12.1 Agreements**

After the Execution Date and except as expressly contemplated in this Agreement, the Vendor shall not enter into any leases, licenses, occupancy agreements or other agreements of any kind pursuant to which any Person or entity relating to the Property of any part thereof without the prior written approval of the Purchaser, such approval to be at the reasonable discretion of the Purchaser.

## **Article 13 Termination**

### **13.1 Termination of this Agreement**

This Agreement may be validly terminated:

- (a) upon the mutual written agreement of the Parties; and

- (b) pursuant to sections 4.4, 14.1 and 15.2 hereof; and
- (c) by the Purchaser if the Additional Costs of Administration exceed \$40,000.

If this Agreement is terminated, then all obligations of each of the Vendor and the Purchaser hereunder shall end completely, except those that expressly survive the termination of this Agreement.

#### **Article 14**

##### **Amendment to Property and Purchase Price**

14.1 In the event that a third-party is determine to be the Successful Bidder (as defined in the Sales Process) for a portion, but not all of the Property, the Purchaser may (acting in its sole discretion) elect to terminate this Agreement on written notice to the Vendor (in which case this Agreement shall be terminated and of no further force or effect on receipt of written notice by the Vendor of such election by the Purchaser) and, in lieu of this Agreement, submit a non-*en bloc* offer in a form and content similar to this Agreement for either: (i) the Building Lot; or (ii) Lot 413 and Lot 417 (collectively, the “**Vacant Lots**”), on the condition that the purchase price being offered for the Building Lot or the Vacant Lots shall be the purchase price allocated to those lots as set out in Section 2.4 hereto and the price and method of payment shall be adjusted as determined by the Purchaser.

#### **Article 15**

##### **General**

##### **15.1 Agreement for Whole of Property**

This Agreement is for the purchase of the Property as a whole and not any particular or individual portion thereof.

##### **15.2 Risk Until Closing**

The interest of the Debtor and the Vendor in and to the Building being purchased and acquired pursuant to the terms and conditions of this Agreement shall be at the risk of the Debtor and the Vendor until Closing. If any loss or damage occurs before Closing to the Building, the cost to repair of which is (i) in excess of 25% of the Purchase Price or (ii) less than or equal to 25% of the Purchase Price (but the Vendor does not carry insurance for the Building in sufficient amounts to cover such cost of repair), which cost to repair is determined by the Vendor’s arm’s length, independent architect, engineer or other qualified expert, the Purchaser shall, within Ten (10) days following written disclosure to the Purchaser by the Vendor of the loss or damage and the extent thereof, at its option, by written notice to the Vendor, elect either (i) to complete the purchase of the Property, in which event the Purchaser shall be entitled to the proceeds of insurance, if any, in respect of the loss or damage to the Property and the Vendor shall pay any deductibles in respect of such loss or damage and the Purchaser shall accept the Building subject to the applicable loss or damage, or (ii) not to complete the purchase of the Property in which case this Agreement shall be deemed to be terminated and of no further force and effect (save for those provisions which provide for their survival).

If any loss or damage occurs before Closing to the Building, the cost to repair of which is less than or equal to 25% of the Purchase Price, as determined by the Vendor's arm's length, independent architect, engineer or other qualified expert, the Purchaser shall have no right to terminate this Agreement in the event that the Vendor has insurance for the Building in amounts sufficient to cover such cost of repair and shall accept the Building subject to the loss or damage, the Vendor shall pay any insurance deductibles in respect of such loss or damage, the Purchaser shall be entitled to an assignment from the Vendor of all proceeds of insurance in respect of such loss or damage, and the parties shall complete the within transaction.

### **15.3 Time of the Essence**

Time shall in all respects be of the essence hereof provided that the time for doing or the completing of any matter provided for herein may be extended or abridged by an agreement in writing signed by the Vendor and the Purchaser or by their respective solicitors, who are hereby expressly appointed in this regard. In the event that any date or expiration of time period provided for in the Agreement falls upon a Saturday, Sunday or statutory holiday, it is understood and agreed that such date or time period shall be deemed extended to the Business Day next following such Saturday, Sunday or statutory holiday.

### **15.4 Notices**

Any notice, document, or communication required or permitted to be given shall be given by delivery, electronic mail or other means of electronic communication to the recipient as follows:

(a) to the Purchaser:

2314174 Alberta Ltd.  
3810, Bankers Hall West  
888 – 3 Street S.W.  
Calgary, Alberta T2P 5C5

Attention: Jerry Roberts  
Email: jdrsjr@telus.net

and to the Purchaser's Solicitors:

Cassels Brock & Blackwell LLP  
3810, Bankers Hall West  
888 – 3 Street S.W.  
Calgary, Alberta T2P 5C5

Attention: Danielle Marechal  
Email: dmarechal@cassels.com

(b) to the Vendor:

BDO Canada Limited

110, 5800 – 2 Street S.W.  
Calgary, Alberta T2H 0H2

Attention: Marc Kelly  
Email: makelly@bdo.ca

and to the Vendor's Solicitors:

Borden Ladner Gervais LLP  
Centennial Place, East Tower  
1900, 520-3<sup>rd</sup> Avenue SW  
Calgary AB, T2P 0R3

Attention: Jessica Cameron/Paul S. Taylor  
Email: jcameron@blg.com/pataylor@blg.com

or to such other address or electronic mail address as either Party may in writing advise by notice given in accordance with this Section. Any notice, document or communication will be conclusively deemed to have been given, in the case of delivery, on the day of actual delivery thereof, and, in the case of recorded electronic communication, at the time and on the date of transmittal.

### **15.5 Entire Agreement**

This Agreement shall constitute the entire agreement between the Purchaser and the Vendor and there is no representation, warranty, collateral agreement or condition affecting this Agreement or the Property or supported hereby other than expressed hereby in writing. This Agreement shall be read with all changes of gender or number required by the context and shall enure to the benefit of and be binding upon the Parties hereto and their respective heirs, executors, administrators, successors and assigns.

### **15.6 Governing Law**

The Agreement shall be governed by and construed in accordance with the laws of the Province of Alberta. All references to currency shall be Canadian currency. All references to time shall be local time in Calgary, Alberta.

### **15.7 Confidentiality**

The Purchaser and its consultants, agents, bankers, lenders, advisors and solicitors (collectively, "**Representatives**") shall keep confidential all information, documentation and records obtained from the Vendor or its consultants, agents, advisors or solicitors, including the Vendor's Deliveries, with respect to the Vendor or the Property, as well as any information arising out of the Purchaser's access to the Vendor's records and the Property and its due diligence with respect thereto (collectively, "**Confidential Information**"). The Purchaser shall not use any Confidential Information for any purposes not related to the proposed purchase of the Property or in any way detrimental to the Vendor. Nothing herein contained shall restrict or prohibit the Purchaser from disclosing the Confidential Information to its Representatives as long as such

parties agree to keep such Confidential Information confidential or the Vendor receives such other assurances that are acceptable to it. The Confidential Information referred to in this Section shall not include:

- (a) the Receiver's Borrowing Certificates or any other amounts owing by the Vendor to the Purchaser or documents evidencing same, whether arising pursuant to this Agreement or otherwise;
- (b) public information or information in the public domain at the time of receipt by the Purchaser or its Representatives;
- (c) information which becomes public through no fault or act of the Purchaser or its Representatives;
- (d) information in the possession of the Purchaser not provided by the Vendor or its Representatives;
- (e) information required to be disclosed by law; or
- (f) information received in good faith from a third party lawfully in possession of the information and not in breach of any confidentiality obligations.

If the Vendor and the Purchaser do not complete this Agreement for any reason, the Purchaser shall promptly return to the Vendor all Confidential Information (other than the Purchaser's notes and due diligence materials) including all copies, and shall destroy all of the Purchaser's notes and due diligence materials containing Confidential Information related to the transaction and the Property.

- (i) If the Purchaser is required or requested by legal process to disclose any Confidential Information, the Purchaser will provide the Vendor with prompt notice of such requirement or request so that the Vendor may seek an appropriate protective order or waive compliance with the provisions of this requirement or both. If the Purchaser is compelled to disclose Confidential Information to any court or tribunal or else stand liable for contempt or suffer other censures or penalty, the Purchaser may disclose same without liability hereunder provided that it shall give the Vendor advance written notice of the information to be disclosed and, at the request of the Vendor, shall seek to obtain assurances that such information will be accorded confidential treatment.

## **15.8 No Registration**

The Purchaser agrees that it will not register this Agreement or any notice thereof or any notice of a purchaser's lien or certificate of pending litigation against the Property, notwithstanding that the Purchaser may allege some interest in and against the Deposit or the Property which might otherwise support such registration or notice.



## **15.9 Costs**

Each of the Parties hereto shall be responsible for and shall pay all taxes, costs, expenses and legal or other fees incurred by it in connection with the negotiations, settlement and execution of this Agreement and all matters related thereto and shall indemnify and hold harmless the other Parties from and against any and all liabilities or claims in respect of any such expenses, costs or fees in relation to the Transaction. Without limiting the generality of the foregoing, the Vendor shall pay the commission or fee payable to the Broker in relation to the Transaction. The Purchaser represents and warrants to the Vendor that the Purchaser has not used the services of any real estate agent or broker in connection with the purchase and sale of the Property contemplated hereby other than the Broker. The Purchaser will pay any commissions or fees payable to any other real-estate broker or agent hired by the Purchaser. This Section shall survive Closing.

## **15.10 Solicitors as Agents and Tender**

Any notice, approval, waiver, agreement, instrument, document or communication permitted, required or contemplated in this Agreement may be given or delivered and accepted or received by the Purchaser's Solicitors on behalf of the Purchaser and by the Vendor's Solicitors on behalf of the Vendor and a tender of the documentation and funds provided for herein may be made upon the Vendor's Solicitors and the Purchaser's Solicitors as the case may be.

## **15.11 Generally Accepted Accounting Principles**

Except as specifically provided otherwise in this Agreement, all calculations made and referred to in this Agreement shall be made in accordance with accepted practices in the commercial real estate industry in Canada and applied on a consistent basis.

## **15.12 Several Obligations**

The rights available to the Parties under this Agreement and at law shall be deemed to be several and not dependent on each other and each such right shall be accordingly construed as complete in itself and not by reference to any other such right. Any one or more and/or any combination of such rights may be exercised by a party from time to time and, subject to the provisions of this Agreement, no such exercise shall exhaust the rights of such party or preclude any other party from exercising any one or more of such rights or combination thereof from time to time thereafter or simultaneously.

## **15.13 Further Assurances**

Each of the Parties hereto shall from time to time hereafter and upon any reasonable request of the other, execute and deliver, make or cause to be made all such further acts, deeds, assurances and things as may be required or necessary to more effectually implement and carry out the true intent and meaning of this Agreement.

## **15.14 Counterparts and Electronic Signatures**

This Agreement may be executed electronically in any number of counterparts and all such electronic copies and counterparts shall for all purposes constitute one agreement binding all the

Parties hereto, notwithstanding that all Parties are not signatory to the same counterpart. The Vendor and the Purchaser acknowledge and agree that counterparts to this Agreement may be communicated by electronic mail which shall be equally binding and duly accepted as an original agreement. Such counterparts shall be deemed communicated at the time and on the date of electronic mail transmission.

*[Execution Page Follows]*

**IN WITNESS WHEREOF** the Parties have executed this Agreement as of the date first written above.

**2314174 ALBERTA LTD.**

Per: E-SIGNED by Jerry Roberts  
on 2021-07-29 15:53:16 MDT  
Name: **Jerry Roberts**  
Title:

I have authority to bind the corporation.

**BDO CANADA LIMITED**, in its capacity as Court-Appointed Receiver and Manager of 1652563 Alberta Ltd., and not in its personal or corporate capacities and without personal or corporate liability

Per: \_\_\_\_\_  
Name:  
Title:

Per: \_\_\_\_\_  
Name:  
Title:

I/We have authority to bind the corporation.

**IN WITNESS WHEREOF** the Parties have executed this Agreement as of the date first written above.

**2314174 ALBERTA LTD.**

Per: \_\_\_\_\_  
Name:  
Title:

I have authority to bind the corporation.

**BDO CANADA LIMITED**, in its capacity as Court-Appointed Receiver and Manager of 1652563 Alberta Ltd., and not in its personal or corporate capacities and without personal or corporate liability

Per:  \_\_\_\_\_  
Name: Marc Kelly  
Title: Senior Vice President

Per: \_\_\_\_\_  
Name:  
Title:

I/We have authority to bind the corporation.

**SCHEDULE "A"**  
**LEGAL DESCRIPTION OF PROPERTY**

No.	Municipal Address	Legal Description	Detail
1	419, 10 Avenue South, Carstairs, AB, TOM ONO	PLAN 3845CO THAT PORTION OF THE ROADWAY SOUTH OF LOT 8 BLOCK 28 AND NORTH OF LOT 1 BLOCK 29 EXCEPTING THEREOUT ALL MINES AND MINERALS	Commercial building and parking space (the " <b>Building Lot</b> ")
2	417, 10 Avenue South, Carstairs, AB, TOM ONO	PLAN 3845CO BLOCK 28 LOTS 7 AND 8 EXCEPTING THEREOUT ALL MINES AND MINERALS AND THE RIGHT TO WORK THE SAME	Vacant commercial zoned land (" <b>Lot 417</b> ")
3	413, 10 Avenue South, Carstairs, AB, TOM ONO	PLAN 3845CO BLOCK 28 LOTS 5 AND 6 EXCEPTING THEREOUT ALL MINES AND MINERALS AND THE RIGHT TO WORK THE SAME	Vacant commercial zoned land (" <b>Lot 413</b> ")

**SCHEDULE “B”  
PERMITTED ENCUMBRANCES**

**PERMITTED ENCUMBRANCES (GENERAL)**

1. Any inchoate lien for municipal realty taxes, public utility charges or other governmental charges or levies accrued but not yet due and payable or, if due and payable, are adjusted for on Closing.
2. Any defects, discrepancies and encroachments or matters that might be revealed by an up-to-date real property report of the Property provided same do not, in the aggregate, materially impair the servicing, development, construction, operating, occupation, use, management, marketability or value of the Property.
3. Any and all interest (including liens, charges, adverse claims, security interests or other encumbrances) of any nature whatsoever now or hereafter claimed or held by Her Majesty the Queen in Right of Canada, Her Majesty the Queen in Right of any province of Canada, or by any other governmental department, agency or authority under or pursuant to any applicable legislation, statute or regulation and which do not, individually or in the aggregate materially impair the servicing, development, construction, operation, occupation, use, management, marketability or value of the Property.
4. Any municipal by-laws or regulations affecting the Property or its use, and any other municipal land use instrument including, without limitation, official plans and zoning and building by-laws, as well as decisions of any competent authority permitting variances therefrom and all applicable building codes provided same have in each case been complied with in all material respects to the Closing Date and which do not materially impair the use or operation of any part of the Property for the purposes for which it is being used as of the Execution Date.
5. Any subsisting reservations, limitations, provisos, conditions or executions, including royalties, contained in the original grant of the Property from the Crown.
6. Any and all licences, easements, rights-of-way, rights in the nature of easements and agreements with respect thereto including, without limitation, agreements, easements, licences, rights-of-way and interest in the nature of easements for sidewalks, public ways, sewers, drains, utilities, gas, steam and water mains or electric light and power, or telephone and telegraphic conduits, poles, wires and cables and which do not, individually or in the aggregate materially impair the servicing, development, construction, operation, occupation, use, management, marketability or value of the Property.
7. Any reservations, exceptions, limitations, provisos and conditions to title contained in Section 61 of the *Land Titles Act* (Alberta) and reservations or exceptions of mines and minerals.

**SCHEDULE "C"**  
**FORM OF APPROVAL AND VESTING ORDER**

COURT FILE NUMBER                   **2101-00810**

COURT                                    COURT OF QUEEN'S BENCH OF ALBERTA

JUDICIAL CENTRE                    CALGARY

PLAINTIFF                            **2314174 ALBERTA LTD.**

DEFENDANT                           **1652563 ALBERTA LTD.**

**IN THE MATTER OF THE RECEIVERSHIP OF 1652563  
ALBERTA LTD.**

DOCUMENT                            **SALE APPROVAL AND VESTING ORDER**

ADDRESS FOR SERVICE AND  
CONTACT INFORMATION OF  
PARTY FILING THIS  
DOCUMENT                            **BORDEN LADNER GERVAIS LLP**  
1900, 520-3<sup>rd</sup> Ave. S.W.  
Calgary AB, T2P 0R3

Attention: Jessica L. Cameron/Myles Fish  
Telephone: (403) 232-9715/9764  
Facsimile: (403) 266-1395  
Email: [jcameron@blg.com](mailto:jcameron@blg.com)/[mfish@blg.com](mailto:mfish@blg.com)  
File No. 440777/000010

**DATE ON WHICH ORDER WAS PRONOUNCED:**                   August 11, 2021

**LOCATION WHERE ORDER WAS PRONOUNCED:**                   Calgary

**NAME OF JUDGE WHO MADE THIS ORDER:**                   The Honourable Justice L.B. Ho

**UPON THE APPLICATION** of BDO Canada Limited in its capacity as the Court-appointed receiver and manager (“**Receiver**”) of the undertakings, property, and assets of 1652563 Alberta Ltd. (the “**Debtor**”) for an order approving the sale transaction (the “**Transaction**”) contemplated by the agreement of purchase and sale between the Receiver and 2314174 Alberta Ltd. (the “**Purchaser**”) dated July 29, 2021 (the “**Purchase Agreement**”) and appended as Appendix “B” to the Receiver’s Second Report, dated August 3, 2021, filed (the “**Second Report**”), and vesting in the Purchaser all of the Debtor’s right, title and interest in and to the “**Property**” (as defined in the Purchase Agreement);

**AND UPON HAVING READ** the Receivership Order, dated February 11, 2021 (the “**Receivership Order**”), the Report previously filed by the Receiver, the Affidavit of Service, filed, and all other material and evidence filed to date in the within proceedings; **AND UPON HEARING** the submissions of counsel



for the Receiver, the Purchaser, and any other interested parties appearing at the hearing of this application, which occurred via WebEx Video Conference, having regard to the Court's procedures for the COVID-19 pandemic;

**IT IS HEREBY ORDERED AND DECLARED THAT:**

**SERVICE**

1. Service of notice of this application and supporting materials is hereby declared to be good and sufficient, and no other person is required to have been served with notice of this application, and time for service of this application is abridged to that actually given.

**APPROVAL OF THE TRANSACTION**

2. The Purchase Agreement, including the Transaction contemplated thereby, is hereby authorized, ratified and approved, with such minor amendments as the Receiver may deem necessary.
3. The Receiver is hereby authorized and directed to take all such steps, perform, consummate, implement, execute and deliver all such conveyance documents, bills of sale, assignments, conveyances, transfers, deeds, representations, indicia of title, tax elections, documents and instruments of whatsoever nature or kind as may be reasonably necessary or desirable for the completion of the Transaction and for the conveyance of the Property to the Purchaser in accordance with the terms of the Purchase Agreement, including, without limitation, making such amendments to the Purchase Agreement as the Receiver and the Purchaser may approve in writing and which do not materially alter the Purchase Agreement.

**VESTING OF PROPERTY**

4. Upon the delivery of the Receiver's certificate to the Purchaser substantially in the form and substance set out in **Schedule "A"** hereto (the "**Receiver's Certificate**"), all of the Debtor's right, title and interest in and to the Property listed in **Schedule "B"** hereto, shall vest absolutely in the name of the Purchaser, free and clear of and from all estate, right, title, interest, royalty, rental and equity of redemption of the Debtor and all persons who claim by, through, or under the Debtor, and any and all caveats, security interests (whether contractual, statutory, or otherwise), hypothecs, pledges, mortgages, liens, trusts or deemed trusts, reservations of ownership, royalties, options, rights of pre-emption, privileges, interests, assignments (whether contractual, statutory, or otherwise), actions, judgments, executions, levies, taxes, writs of enforcement, charges, encumbrances, other financial or monetary claims, or interests, whether or not they have attached

or been perfected, registered or filed and whether secured, unsecured or otherwise, and whether by payment, set off or otherwise (collectively, the "**Claims**") including, without limiting the generality of the foregoing:

- (a) any encumbrances or charges created by the Receivership Order;
- (b) all charges, security interests or claims against the Property, whether or not evidenced by registrations pursuant to the *Personal Property Security Act* (Alberta) or any other personal property registry system;
- (c) any liens or claims under the *Builders' Lien Act* (Alberta);
- (d) any municipal property tax claims under the *Municipal Government Act*, or otherwise, including any municipal property tax claims which accrued or were payable from February 11, 2021 until Closing; and
- (e) those Claims listed in **Schedule "C"** hereto;

all of which are collectively referred to as the "**Encumbrances**", which term shall not include the permitted encumbrances, caveats, interests, easements, and restrictive covenants listed in **Schedule "D"** (collectively, the "**Permitted Encumbrances**"). For greater certainty, this Court orders that all of the Encumbrances affecting or relating to the Property and all charges, security interests or Claims evidenced by registrations under any personal property registry system, or otherwise where any Claim of any kind may be registered or recorded are hereby expunged, ordered removed and otherwise unconditionally discharged and terminated as against the Property.

5. Upon the delivery of the Receiver's Certificate to the Purchaser, and upon the filing of a certified copy of this Order, together with any applicable registration fees, all governmental authorities including those referred to below in this paragraph (collectively, the "**Governmental Authorities**") are hereby authorized, requested and directed to accept delivery of such Receiver's Certificate and certified copy of this Order as though they were originals and to register such transfers, interest authorizations, discharges and discharge statements of conveyance as may be required to convey to the Purchaser clear title to the Property subject only to the Permitted Encumbrances. Without limiting the foregoing:

- (a) the Registrar of Land Titles of Alberta (the "**Land Titles Registrar**") shall and is hereby authorized, requested and directed to forthwith:

- (i) cancel existing Certificates of Title, as applicable, for those lands and premises described in **Schedule "E"** hereto (the "**Lands**");
  - (ii) issue new Certificates of Title, as applicable, for the Lands in the name of the Purchaser, subject only to the Permitted Encumbrances;
  - (iii) discharge and expunge the Encumbrances listed in **Schedule "C"** to this Order and discharge and expunge any Claims including Encumbrances (but excluding Permitted Encumbrances) which may be registered after the date of the Purchase Agreement against the existing Certificates of Title to the Lands, as applicable; and
- (b) the Registrar of the Alberta Personal Property Registry shall and is hereby directed to forthwith cancel and discharge any registrations (including any writs of enforcement) at the Alberta Personal Property Registry (whether made before or after the date of this Order) claiming security interests, charges or other interest (other than Permitted Encumbrances) in the estate or interest of the Debtor in any of the Property.
6. In order to effect the transfers and discharges described above, this Court directs each of the Governmental Authorities to take such steps as are necessary to give effect to the terms of this Order and the Purchase Agreement. Presentment of this Order and the Receiver's Certificate shall be the sole and sufficient authority for the Governmental Authorities to make and register transfers of title or interest and cancel and discharge registrations against any of the Property of any Claims including Encumbrances but excluding Permitted Encumbrances.
7. No authorization, approval or other action by and no notice to or filing with any Governmental Authority or regulatory body exercising jurisdiction over the Property is required for the due execution, delivery and performance by the Receiver of the Purchase Agreement.
8. Upon delivery of the Receiver's Certificate together with a certified copy of this Order, this Order shall be immediately registered by the Land Titles Registrar in accordance with the *Land Titles Act* (Alberta) and notwithstanding the requirements of section 191(1) of the *Land Titles Act*, RSA 2000, c. L-7, and notwithstanding that the appeal period in respect of this Order has not elapsed, which appeal period is expressly waived. The Land Titles Registrar is hereby directed to accept all Affidavits of Corporate Signing Authority submitted by the Receiver in its capacity as Receiver of the Debtor and not in its personal capacity.

9. The Purchaser shall, by virtue of the completion of the Transaction, have no liability of any kind whatsoever in respect of any Claims against the Receiver or the Debtor, other than as described in the Purchase Agreement.
10. Upon completion of the Transaction, the Debtor and all persons who claim by, through or under the Debtor in respect of the Property, and all persons or entities having any Claims of any kind whatsoever in respect of the Property, save and except for persons entitled to the benefit of the Permitted Encumbrances, shall stand absolutely and forever barred, estopped and foreclosed from and permanently enjoined from pursuing, asserting or claiming any and all estate, right, title, interest, royalty, rental and equity of redemption or other Claim whatsoever in respect of the Property and, to the extent that any such persons or entities remain in possession or control of any of the Property, or any artifacts, certificates, instruments or other indicia of title representing or evidencing any right, title, estate, or interest in and to the Property, they shall forthwith deliver possession thereof to the Purchaser.
11. The Purchaser shall be entitled to enter into and upon, hold and enjoy the Property for its own use and benefit without any interference of or by the Debtor, or any person claiming by through, under or against the Debtor.
12. Immediately upon closing of the Transaction, holders of Permitted Encumbrances shall have no claim whatsoever against the Receiver.
13. The Receiver is directed to file with the Court a copy of the Receiver's Certificate, forthwith after delivery thereof to the Purchaser.

#### **HANDLING OF NET PROCEEDS**

14. For the purposes of determining the nature and priority of Claims, the net proceeds from the sale of the Property (to be held in an interest bearing trust account by the Receiver) shall stand in the place and stead of the Property and from and after the delivery of the Receiver's Certificate any encumbrances or charges created by the Receivership Order and all Claims and Encumbrances (but excluding Permitted Encumbrances) shall not attach to, and shall cease to be attached to, encumber or otherwise form a charge, security interest, lien, builders' lien, or other Claim against the Property and shall attach to the net proceeds from the sale of the Property with the same priority as they had with respect to the Property immediately prior to the sale, as if the Property had not been sold and remained in the possession or control of the person having that possession or control immediately prior to the sale.

**MISCELLANEOUS MATTERS**

15. Notwithstanding:

- (a) the pendency of these proceedings and any declaration of insolvency made herein;
- (b) the pendency of any applications for a bankruptcy order now or hereafter issued pursuant to the *Bankruptcy and Insolvency Act*, R.S.C. 1985, c. B-3, as amended (the “**BIA**”), in respect of the Debtor, and any bankruptcy orders issued pursuant to any such applications;
- (c) any assignment in bankruptcy made in respect of the Debtor; and
- (d) the provisions of any federal or provincial statute;

the assignment, transfer, conveyance and vesting of the Debtor’s right, title, estate and interest in and to the Property to the Purchaser pursuant to this Order shall be binding on any trustee in bankruptcy that may be appointed in respect of the Debtor and shall not be void or voidable by creditors of the Debtor, nor shall it constitute nor be deemed to be a settlement, fraudulent preference, assignment, fraudulent conveyance, transfer at undervalue, or other reviewable transaction under the BIA or any other applicable federal or provincial legislation, nor shall it constitute oppressive or unfairly prejudicial conduct pursuant to any applicable federal or provincial legislation.

16. The Receiver, the Purchaser and any other interested party shall be at liberty to apply for further advice, assistance and direction as may be necessary in order to give full force and effect to the terms of this Order and to assist and aid the parties in closing the Transaction.
17. This Honourable Court hereby requests the aid and recognition of any court, tribunal, regulatory or administrative body having jurisdiction in Canada or in any of its provinces or territories or in any foreign jurisdiction, to act in aid of and to be complimentary to this Court in carrying out the terms of this Order, to give effect to this Order and to assist the Receiver and its agents in carrying out the terms of this Order. All courts, tribunals, regulatory and administrative bodies are hereby respectfully requested to make such order and to provide such assistance to the Receiver, as an officer of the Court, as may be necessary or desirable to give effect to this Order or to assist the Receiver and its agents in carrying out the terms of this Order.
18. Service of this Order shall be deemed good and sufficient by serving the same on:

- a. the persons listed on the electronic service list created in these proceedings;
- b. the Purchaser or on the Purchaser's solicitors; and
- c. by posting a copy of this Order on the Receiver's website at:  
<https://www.bdo.ca/en-ca/extranets/1652563alberta>;

and service on any other Person is hereby dispensed with.

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Justice of the Court of Queen's Bench of Alberta

**The Following Schedules Form Part of this Vesting Order:**

Schedule A – Receiver’s Certificate

Schedule B – Property

Schedule C – Encumbrances

Schedule D – Permitted Encumbrances

Schedule E – Land Title Certificates





- C. Unless otherwise indicated herein, terms with initial capitals have the meanings set out in the Purchase Agreement.

**THE RECEIVER CERTIFIES** the following:

1. The Purchaser has paid in full the Purchase Price to be paid for the Property on the Closing Date pursuant to the Purchase Agreement and the Receiver has received the cash portion of the Purchase Price for the Property payable on the Closing Date pursuant to the Purchase Agreement;
2. Any conditions to Closing as set out in the Sale Agreement have been satisfied or waived by the Receiver and/or the Purchaser where applicable; and
3. The Transaction contemplated by the Purchase Agreement has been completed to the satisfaction of the Receiver, subject to the post-closing obligations provided for therein.

This Certificate was delivered by the Receiver at [Time] on [Date], 2021.

**BDO CANADA LIMITED, SOLELY IN  
ITS CAPACITY AS RECEIVER AND  
MANAGER OF THE ASSETS,  
UNDERTAKINGS AND PROPERTIES  
OF 1652563 ALBERTA LTD. AND NOT  
IN ITS PERSONAL OR CORPORATE  
CAPACITY**

Per: \_\_\_\_\_  
Name:  
  
Title:

**SCHEDULE "B"**  
**PROPERTY**

No.	Municipal Address	Legal Description	Detail
1	419, 10 Avenue South, Carstairs, AB, TOM ONO	PLAN 3845CO THAT PORTION OF THE ROADWAY SOUTH OF LOT 8 BLOCK 28 AND NORTH OF LOT 1 BLOCK 29 EXCEPTING THEREOUT ALL MINES AND MINERALS	Commercial building and parking space (the " <b>Building Lot</b> ")
2	417, 10 Avenue South, Carstairs, AB, TOM ONO	PLAN 3845CO BLOCK 28 LOTS 7 AND 8 EXCEPTING THEREOUT ALL MINES AND MINERALS AND THE RIGHT TO WORK THE SAME	Vacant commercial zoned land (" <b>Lot 417</b> ")
3	413, 10 Avenue South, Carstairs, AB, TOM ONO	PLAN 3845CO BLOCK 28 LOTS 5 AND 6 EXCEPTING THEREOUT ALL MINES AND MINERALS AND THE RIGHT TO WORK THE SAME	Vacant commercial zoned land (" <b>Lot 413</b> ")

**SCHEDULE “C”  
ENCUMBRANCES**

**Parcel 1: Certificate of Title No. 201 137 322, 419, 10 Avenue South, Carstairs, AB, TOM ONO**

<b>Instrument No.</b>	<b>Date</b>	<b>Description</b>
201 208 518	10/11/2020	Caveat – Amending Agreement  Caveator – 2314174 Alberta Ltd.

**Parcel 2 & Parcel 3: Certificate of Title No.’s 201 128 945 and 201 128 945 +1, 413 and 417 Avenue South, Carstairs AB, TOM ONO**

<b>Instrument No.</b>	<b>Date</b>	<b>Description</b>
181 209 630	28/09/2018	Mortgage  Mortgagee – 2314174 Alberta Ltd.  Original Principal Amount: \$500,000
211 018 902	22/01/2021	Writ  Creditor – Sterling Trailer Sales  Amount: \$22,250 and Costs if Any
211 042 766	24/02/2021	Writ  Creditor – Alberta Treasury Branches  Amount: \$171,735 and Costs if Any

**SCHEDULE "D"**  
**PERMITTED ENCUMBRANCES**

1. None

**SCHEDULE "E"**  
**LAND TITLE CERTIFICATES**

No.	Municipal Address	Land Title Certificate No.
1	419, 10 Avenue South, Carstairs, AB, TOM ONO	201 137 322
2	417, 10 Avenue South, Carstairs, AB, TOM ONO	201 128 945
3	413, 10 Avenue South, Carstairs, AB, TOM ONO	201 128 945 +1



HISTORICAL LAND TITLE CERTIFICATE  
CURRENT TITLE WITH HISTORICAL DATA

S  
LINC                      SHORT LEGAL                      TITLE NUMBER  
0019 707 009            3845CO;OT                      201 137 322

LEGAL DESCRIPTION

PLAN 3845CO  
THAT PORTION OF THE ROADWAY  
SOUTH OF LOT 8 BLOCK 28  
AND NORTH OF LOT 1 BLOCK 29  
EXCEPTING THEREOUT ALL MINES AND MINERALS

ATS REFERENCE: 5;1;30;17;SE  
ESTATE: FEE SIMPLE

MUNICIPALITY: TOWN OF CARSTAIRS

REFERENCE NUMBER: 851 042 530

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REGISTERED OWNER(S)				
REGISTRATION	DATE (DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
201 137 322	07/08/2020	TRANSFER OF LAND	\$240,000	NOMINAL

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OWNERS

1652563 ALBERTA LTD.  
OF BOX 2144  
CARSTAIRS  
ALBERTA T0M 0N0

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ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION	DATE (D/M/Y)	PARTICULARS
NUMBER		
871 228 700	11/12/1987	CAVEAT RE : LEASE CAVEATOR - NORTH HILL MOTORS (1975) LTD. C/O WILLIAM J SHACHNOWICH, 1200,840-7 AVENUE S.W., CALGARY ALBERTA T2P3G2 AGENT - W J SHACHNOWICH

## REGISTRATION

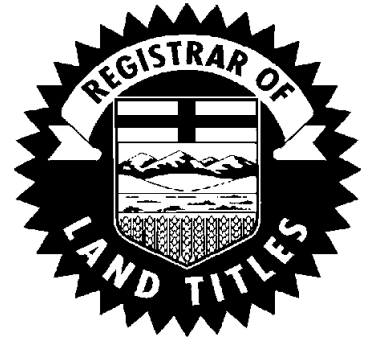
NUMBER	DATE (D/M/Y)	PARTICULARS
201 141 534	13/08/2020	DISCHARGE OF CAVEAT 871228700
201 208 518	10/11/2020	CAVEAT RE : AMENDING AGREEMENT CAVEATOR - 2314174 ALBERTA LTD. STE 3810, BANKERS HALL WEST 888-3 ST SW CALGARY ALBERTA T2P5C5 (DATA UPDATED BY: TRANSFER OF CAVEAT 211052698)
211 052 698	11/03/2021	TRANSFER OF CAVEAT 201208518 TRANSFeree - 2314174 ALBERTA LTD. STE 3810, BANKERS HALL WEST 888-3 ST SW CALGARY ALBERTA T2P5C5

TOTAL INSTRUMENTS: 004

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN  
ACCURATE REPRODUCTION OF THE CERTIFICATE OF  
TITLE REPRESENTED HEREIN THIS 30 DAY OF APRIL,  
2021 AT 11:55 A.M.

ORDER NUMBER: 41563339

CUSTOMER FILE NUMBER: 440777.10



\*END OF CERTIFICATE\*

THIS ELECTRONICALLY TRANSMITTED LAND TITLES PRODUCT IS INTENDED  
FOR THE SOLE USE OF THE ORIGINAL PURCHASER, AND NONE OTHER,  
SUBJECT TO WHAT IS SET OUT IN THE PARAGRAPH BELOW.

THE ABOVE PROVISIONS DO NOT PROHIBIT THE ORIGINAL PURCHASER FROM  
INCLUDING THIS UNMODIFIED PRODUCT IN ANY REPORT, OPINION,  
APPRAISAL OR OTHER ADVICE PREPARED BY THE ORIGINAL PURCHASER AS  
PART OF THE ORIGINAL PURCHASER APPLYING PROFESSIONAL, CONSULTING  
OR TECHNICAL EXPERTISE FOR THE BENEFIT OF CLIENT(S).





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ENCUMBRANCES, LIENS & INTERESTS

PAGE 2  
# 201 128 945

REGISTRATION

NUMBER DATE (D/M/Y) PARTICULARS  
-----

211052697)

211 018 902 22/01/2021 WRIT  
CREDITOR - STERLING TRAILER SALES (A PARTNERSHIP).  
1935-2 AVE  
DUNMORE  
ALBERTA T0J1A0  
DEBTOR - 1652563 ALBERTA LTD.  
419-10 AVE S  
CARSTAIRS  
ALBERTA TOM0N0  
AMOUNT: \$22,250 AND COSTS IF ANY  
ACTION NUMBER: 210800008

211 042 766 24/02/2021 WRIT  
CREDITOR - ALBERTA TREASURY BRANCHES.  
2100, 1K0020 - 100 STREET  
EDMONTON  
ALBERTA T5J0N3  
DEBTOR - 1652563 ALBERTA LTD.  
419-10 AVE S  
CARSTAIRS  
ALBERTA TOM0N0  
AMOUNT: \$171,735 AND COSTS IF ANY  
ACTION NUMBER: 2001-11460

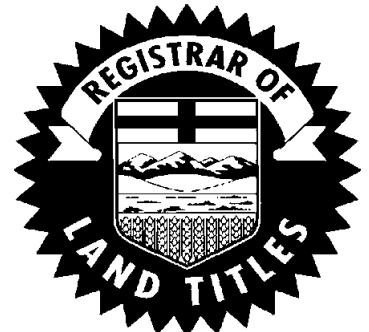
211 052 697 11/03/2021 TRANSFER OF MORTGAGE 181209630  
TRANSFEREE - 2314174 ALBERTA LTD.  
STE 3810, BANKERS HALL WEST  
888-3 ST SW  
CALGARY  
ALBERTA T2P5C5

TOTAL INSTRUMENTS: 004

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN  
ACCURATE REPRODUCTION OF THE CERTIFICATE OF  
TITLE REPRESENTED HEREIN THIS 30 DAY OF APRIL,  
2021 AT 11:59 A.M.

ORDER NUMBER: 41563411

CUSTOMER FILE NUMBER: 440777.10



\*END OF CERTIFICATE\*

( CONTINUED )

THIS ELECTRONICALLY TRANSMITTED LAND TITLES PRODUCT IS INTENDED FOR THE SOLE USE OF THE ORIGINAL PURCHASER, AND NONE OTHER, SUBJECT TO WHAT IS SET OUT IN THE PARAGRAPH BELOW.

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-----  
ENCUMBRANCES, LIENS & INTERESTS

PAGE 2

# 201 128 945 +1

REGISTRATION

NUMBER      DATE (D/M/Y)      PARTICULARS

-----

211052697)

211 018 902      22/01/2021 WRIT  
CREDITOR - STERLING TRAILER SALES (A PARTNERSHIP).  
1935-2 AVE  
DUNMORE  
ALBERTA T0J1A0  
DEBTOR - 1652563 ALBERTA LTD.  
419-10 AVE S  
CARSTAIRS  
ALBERTA TOM0N0  
AMOUNT: \$22,250 AND COSTS IF ANY  
ACTION NUMBER: 210800008

211 042 766      24/02/2021 WRIT  
CREDITOR - ALBERTA TREASURY BRANCHES.  
2100, 1K0020 - 100 STREET  
EDMONTON  
ALBERTA T5J0N3  
DEBTOR - 1652563 ALBERTA LTD.  
419-10 AVE S  
CARSTAIRS  
ALBERTA TOM0N0  
AMOUNT: \$171,735 AND COSTS IF ANY  
ACTION NUMBER: 2001-11460

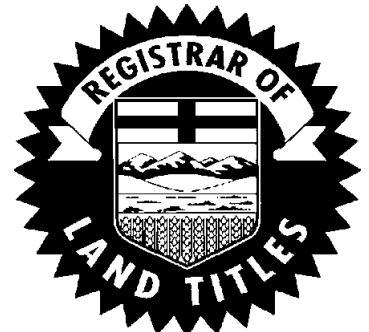
211 052 697      11/03/2021 TRANSFER OF MORTGAGE 181209630  
TRANSFEREE - 2314174 ALBERTA LTD.  
STE 3810, BANKERS HALL WEST  
888-3 ST SW  
CALGARY  
ALBERTA T2P5C5

TOTAL INSTRUMENTS: 004

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN  
ACCURATE REPRODUCTION OF THE CERTIFICATE OF  
TITLE REPRESENTED HEREIN THIS 30 DAY OF APRIL,  
2021 AT 11:59 A.M.

ORDER NUMBER:      41563411

CUSTOMER FILE NUMBER:      440777.10



\*END OF CERTIFICATE\*

( CONTINUED )

THIS ELECTRONICALLY TRANSMITTED LAND TITLES PRODUCT IS INTENDED FOR THE SOLE USE OF THE ORIGINAL PURCHASER, AND NONE OTHER, SUBJECT TO WHAT IS SET OUT IN THE PARAGRAPH BELOW.

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**SCHEDULE "D"**  
**LOAN AND SECURITY DOCUMENTS**

1. Letter Agreement between Purchaser and Debtor dated June 18, 2018 as amended and restated by agreements dated August 15, 2018 and February 7, 2020.
2. A mortgage (the "**165 Mortgage**") dated July 6, 2018 granted by the Debtor in the principal amount of CAD\$500,000 against the property municipally described as 413 and 417, 10 Avenue S., Carstairs, AB T0M 0N0 and legally described as:

Plan 3845CO  
Block 28  
Lots 5 to 8 inclusive  
Excepting thereout all mines and minerals and the right to work the same

(the "**165 Property**").

3. A mortgage amending agreement dated October 26, 2020 among Debtor and Purchaser.
4. A Chattel Mortgage (P.P.S.A.), granted by the Debtor against Chattels described as:

<b>Date</b>	<b>Description</b>	<b>Serial Number</b>	<b>Location</b>
February 10, 2020	2019 Ford Expedition	1FMJK2AT7KEA59647	419, 10 <sup>th</sup> Ave S. Carstairs, AB T0M 0N0
	2019 Jaguar F-Pace	SADCJ2FX5KA616580	

5. The following security (collectively, the "**Bank Act Security Documents**") granted pursuant to the Section 427 of the *Bank Act*, SC 1991, c 46 (the "**Bank Act**):
  - (a) Notice of Intention to grant security under Section 427 of the Bank Act granted by the Debtor dated July 17, 2018;
  - (b) Security under Section 427 of the Bank Act dated July 20, 2018 executed by the Debtor;
  - (c) Application for Credit and Promise to Give Bills of Lading, Warehouse Receipts or Security under Section 427 of the Bank Act dated July 10, 2018 executed by the Debtor;
  - (d) Agreement as to Loans and Advances and Security therefor dated July 20, 2018 executed by the Debtor; and
  - (e) Agreement regarding the Dating of Documents executed by the Debtor (undated).
6. Guarantees for Indebtedness of an Incorporated Company (the "**Guarantees**") by the following:

<b>Date</b>	<b>Guarantor</b>	<b>Amount</b>
February 7, 2020	Courtney Moffatt	\$1,645,000 plus interest at 3% per annum above the Assignor's prime rate in effect from the date of demand until payment and legal or other costs, charges and expenses
February 11, 2020	Jerry Roberts and Sandi Roberts (jointly and severally)	\$1,645,000 plus interest at 3% per annum above the Assignor's prime rate in effect from the date of demand until payment and legal or other costs, charges and expenses

7. Assignment Postponement and Subordination Agreement in favour of the Purchaser executed by the Guarantors dated July 6, 2018.
8. Assignment Postponement and Subordination Agreement in favour of the Purchaser executed by the Guarantors dated February 10, 2020.
9. Priority Agreement dated July 13, 2018 among the Purchaser, Debtor and NextGear Capital Corporation.
10. Priority Agreement dated July 18, 2018 among the Purchaser, Debtor and Wells Fargo Capital Finance Corporation Canada.
11. Forbearance Agreement dated June 15, 2020 among the Purchaser, Debtor and Guarantors.
12. Forbearance Extension Agreement dated August 15, 2020 among the Purchaser, Debtor and Guarantors.
13. Second Forbearance Extension Agreement dated October 15, 2020 the among Purchaser, Debtor and Guarantors.

<b>Date</b>	<b>Guarantor</b>	<b>Amount</b>
February 7, 2020	Courtney Moffatt	\$1,645,000 plus interest at 3% per annum above the Assignor's prime rate in effect from the date of demand until payment and legal or other costs, charges and expenses
February 11, 2020	Jerry Roberts and Sandi Roberts  (jointly and severally)	\$1,645,000 plus interest at 3% per annum above the Assignor's prime rate in effect from the date of demand until payment and legal or other costs, charges and expenses

7. Assignment Postponement and Subordination Agreement in favour of the Purchaser executed by the Guarantors dated July 6, 2018.
8. Assignment Postponement and Subordination Agreement in favour of the Purchaser executed by the Guarantors dated February 10, 2020.
9. Priority Agreement dated July 13, 2018 among the Purchaser, Debtor and NextGear Capital Corporation.
10. Priority Agreement dated July 18, 2018 among the Purchaser, Debtor and Wells Fargo Capital Finance Corporation Canada.
11. Forbearance Agreement dated June 15, 2020 among the Purchaser, Debtor and Guarantors.
12. Forbearance Extension Agreement dated August 15, 2020 among the Purchaser, Debtor and Guarantors.
13. Second Forbearance Extension Agreement dated October 15, 2020 the among Purchaser, Debtor and Guarantors.



# APPENDIX “C”



June 9, 2021

COURTNEY MOFFATT  
DIRECTOR  
1652563 ALBERTA LTD.  
C/O BDO CANADA LIMITED  
110 - 5800 2 ST SW  
CALGARY AB T2H 0H2

Dear Courtney Moffatt:

**Subject: Examination of the goods and services tax/harmonized sales tax (GST/HST)  
return for the period 2021-02-12 to 2021-02-28  
Business number: 83050 3488 RT0002**

We have been unable to reach you by telephone at 403-940-1919 to advise you that your GST/HST return for the period noted above has been selected for examination. At this time, we request your immediate attention to ensure all requested information is sent within the time limit, or earlier, so that we may process your return promptly. In addition, please provide us with updated contact information, including phone number(s) to reach you during business hours.

You have the choice of sending your documents through the **Submit documents** service, which is found in My Business Account, or Represent a Client. Submit documents is a secure online service that allows registrants or their representatives to send their records to the Canada Revenue Agency (CRA) electronically. You must enter the following case number **46930441** to make sure your documents are transmitted properly. Failure to enter the case number can result in delays in finalizing your file. For more information, please go to [Submit documents online](#).

Alternatively, you may fax the documents to the fax number listed or mail it to the address indicated on the last page of this letter. **All documents should be directed to my attention and marked "Personal and Confidential"**.

If you are a Canadian individual or business, you can view, add, or modify an authorized representative (such as an accountant, a lawyer, or a family member/friend) by using our online services at [canada.ca/cra-login-services](https://canada.ca/cra-login-services). Doing so gives your representative instant access to your information and online services to easily manage your account. Or, you can send us a completed **AUT-01 Authorize a Representative for Access by Phone and Mail** form. This will allow them to communicate on your behalf with the CRA only by phone, fax, and mail. If it is necessary to cancel consent for an existing representative or delegated authority, a completed **AUT-01X Cancel Authorization for a Representative** form must be sent. Further information on authorizing or cancelling authorization for a representative can be found at [Representative authorization](#).

The processing of your return will not be completed until we have reviewed the return and all the supporting documents requested. We expect the following information and documents to be received by **July 9, 2021**:

1. A detailed description of your business activity, including a summary of your taxable and non-taxable revenues.
2. An explanation as to why no sales and GST/HST collected/collectible was reported on the return for the above period.
3. A detailed listings of the input tax credits (ITCs) claimed for periods ending **2021-03-31 and 2021-04-30**. The listings detail should include, for each purchase, the invoice date, supplier name, description of goods or services purchased, and the amount of GST/HST paid or payable. The listings should also show the total GST/HST paid or payable for the period. If the total shown on the listing differs from the amount claimed, please provide an explanation.
4. From the detailed listings of ITCs claimed for periods ending **2021-03-31 and 2021-04-30**, copies of the 10 largest invoices for each period, each of which were received from different suppliers. Each invoice should show, at minimum, the invoice date, the supplier's name and business number, and the amount of GST/HST paid or payable. If there are any discrepancies between the supplier invoices, the amount recorded in the listing, and the amount claimed on your return, please provide an explanation.

Please note that we require a copy of the original invoice(s) for each entry above. Statements of account, credit card statements, received on account receipts, and cancelled cheques are not considered sufficient documentation to support an ITC.

5. A listing of all accounts payable up to and including the date of bankruptcy.
6. A listing of all accounts payable that have been paid after the date of bankruptcy.
7. A listing of all accounts payable that that you expect will be paid and the source of funds for those payments.
8. A listing of any inventory, equipment or other assets still owned by the company as of the date of bankruptcy.
9. A listing of any inventory, equipment or other assets sold on or after the date of bankruptcy and the details of those sales.
10. A copy of the trustee's current Statement of Account or Statement of Affairs.

11. On your corporate tax return (T2) for the period ending 2020-01-31 you reported revenue of \$2,680,972.00. However, on your GST/HST returns for the same period you reported \$0.00. This results in a discrepancy of \$2,680,972.00. Please provide an explanation for this discrepancy and advise if GST/HST should have been collected on this amount.

Additional information may be requested at a later time in order to verify the amounts reported on each of the returns under review.

If the information is not received by **July 9, 2021**, the ITCs claimed for the period noted above may be reduced to zero under subsection 169(4) of the Excise Tax Act and the GST/HST collected/collectible may be adjusted under subsection 221(1) of the Act, based on the information we have available. Further, failure to provide the requested documentation may result in a \$100 penalty being assessed for each failure under section 284 of the Act.

Under subsection 286(1) of the Act, every person who carries on a business or is engaged in a commercial activity in Canada, and every person who is required to file a return or apply for a rebate or a refund, is required to keep records that will allow the CRA to determine a person's liabilities and obligations under this Act.

Under subsection 288(1) of the Act, officers of the CRA are authorized to inspect, audit, and examine your records. During the examination, the CRA will closely review your books and records to confirm whether you are fulfilling your obligations, applying tax laws correctly, and receiving any refunds to which you are entitled. For an examination, you must make available all of your relevant records and supporting documents, both paper and electronic, to the examiner.

For general information on examinations and audits please see our Pamphlet RC4188, What You Should Know About Audits. To help you understand your rights as a taxpayer, we also recommend that you see RC17, Taxpayer Bill of Rights Guide: Understanding your rights as a taxpayer.

If you have any questions or concerns during the course of the examination, **please call me on my CRA cellular phone at 306-491-5192 or leave a message on my office number at 1-855-427-5240, extension 306-975-5022**. My team leader, Mirsada Hadzihanovic, can be reached at 306-975-5540.

Yours truly,



Amin Vadasariya  
Examiner  
GST/HST Refund Integrity Program  
Audit Division

Saskatchewan TSO  
340 3rd Avenue North  
Saskatoon SK S7K 0A8

Cellular: 306-491-5192 or  
1-855-427-5240 extension 306-975-5022  
Facsimile: 1-855-975-6723  
Website: [canada.ca/revenue-agency](http://canada.ca/revenue-agency)

# **APPENDIX “D”**

**1652563 Alberta Ltd., in receivership**  
**Summary of Professional Fees and Disbursements\***

	<u>Invoice Number</u>	<u>Invoice Date</u>	<u>Amount</u>	<u>GST</u>	<u>Total</u>
<b><u>Receiver's Fees and Disbursements</u></b>					
	CINV1038579	1-Apr-21	\$ 16,542.75	\$ 827.14	\$ 17,369.89
	CINV1222667	10-Jun-21	14,419.86	720.99	15,140.85
			<u>\$ 30,962.61</u>	<u>\$ 1,548.13</u>	<u>\$ 32,510.74</u>
<b><u>Legal Fees and Disbursements - (CDN)</u></b>					
	697959366	5-Apr-21	\$ 16,114.50	\$ 805.73	\$ 16,920.23
	697973566	6-May-21	14,761.57	730.53	15,492.10
	697982745	2-Jun-21	5,041.00	252.05	5,293.05
	697993569	6-Jul-21	2,132.00	106.60	2,238.60
			<u>38,049.07</u>	<u>1,894.91</u>	<u>39,943.98</u>
<b><u>Legal Fees and Disbursements - (US)</u></b>					
	Retainer	5-Apr-21	\$ 9,426.75	\$ -	\$ 9,426.75

\* All funds reflected in \$CDN

# APPENDIX “E”

**1652563 Alberta Ltd., in receivership**  
**Receiver's Statement of Receipts and Disbursements**  
**as at July 27, 2021**

**Receipts**

Receiver Certificates	\$ 113,000.00	
		113,000.00

**Disbursements**

Legal fees and disbursements - Canadian counsel	38,049.07	
Receiver's fees	30,962.61	
Legal fees and disbursements - American counsel	9,426.75	
Property taxes	6,794.48	
Insurance	7,794.00	
GST paid	3,489.32	
Utilities	1,283.19	
Miscellaneous	71.54	
		<u>97,870.96</u>
Cash on hand		<u>\$ 15,129.04</u>