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Environmental Engineering, Inc.

FIELD SERVICES

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**INTERPRETIVE REPORT AND
OUTLINE REMEDIAL ACTION PLAN
FORMER BARONS TURBO BULK STATION NO. 2520
235 MAIN STREET
BARONS, ALBERTA**

SEACOR Job No. H0031-093

**Submitted by
SEACOR Environmental Engineering Inc.
Calgary, Alberta**

**for
Canadian Turbo (1993) Inc.
400, 630 - 4th Ave SW
Calgary, Alberta
T2P 0J9**

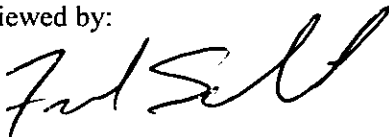
November 13, 1996

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Reviewed by: 

Date: Jan 9/06

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Canadian Turbo (1993) Inc
SEACOR

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1.0 DATA SYNTHESIS

1.1 INTRODUCTION

SEACOR Environmental Engineering Inc. (SEACOR) of Calgary, Alberta was retained by Canadian Turbo (1993) Inc. (CTI) to conduct an environmental assessment and delineation assessment of the former Barons Turbo Bulk Station located at 235 Main Street in Barons, Alberta. This report summarizes the results of the assessments and provides an outline remedial plan for your consideration. The initial assessment was completed in July 1993 and the delineation assessment in October 1996. The factual reports (under separate covers) were submitted in September 1993 and November 1996.

1.2 SUMMARY OF INVESTIGATION RESULTS

The initial environmental site assessment program of July 1993 included the following tasks:

- Advancing a total of nine boreholes on July 27, 1993, four on-site (BH's 1 to 4) in the area of the tank farm, and five off-site (BH's 5 to 9) on the adjacent hardware store property.
- Completing three boreholes (BH1 on-site and BH's 5 and 6, off-site) as 50 mm diameter groundwater monitoring wells.
- Field screening 76 soil samples at about 0.75 m intervals for the presence of volatile organic vapours.
- Submitting three soil samples and one groundwater sample for laboratory analysis of hydrocarbon component.
- The site was surveyed to determine hydraulic gradient.

The delineation assessment of October 1996 included the following tasks:

- Advancing fifteen boreholes (BH's 96-1 to 96-15) to depths of 4.6 to 6.1 m on October 25, 1996.
- Completing four boreholes (BH's 96-1, 96-4, 96-8, and 96-14) as 50 mm diameter groundwater monitoring wells.
- Field screening 100 soil samples at about 0.75 m intervals for the presence of volatile organic vapours.
- Submitting twelve soil samples and four groundwater samples for laboratory analysis of hydrocarbon components.
- Surveying the site to determine the hydraulic gradient.

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The results of the investigations are as follows:

- The soil profile generally encountered at the borehole locations consisted of a sand and gravel fill to 0.3 m followed by a native silt to depths of 1.5 to 1.8 m. The native silt was underlain by a native high plastic clay to depths between 2.8 to 3.7 m followed by a low plastic clay till to depths of 3.4 to 4.8 m. The native clay till was underlain by a weathered sandstone bedrock to a depth of 6.1 m, the maximum depth of the boreholes.
- Groundwater was encountered at depths of approximately 2.0 to 3.0 m below surface grade within the clay deposits. The groundwater elevation data taken on November 7, 1996 indicated the groundwater gradient toward the southwest.
- Elevated soil headspace vapour levels greater than 500 ppmv (parts per million by volume) were in BH1, BH4, and BH96-13 between depths of 1.5 to 3.2 m. A maximum vapour level of 3850 ppmv was recorded in BH4 at a depth of 3.0 m.
- The analytical chemistry results indicated hydrocarbon compounds in excess of the AEP RMC *Level II* criteria for fine grained soil (FGS) on-site within the loading rack area at depths of 1.5 to 3.0 m and off-site to the south underneath the Main Street boulevard at depths of 2.7 to 3.2 m below grade. The areal extent of the hydrocarbon contaminant plume is illustrated on Figure 2.
- Phase-separated hydrocarbons were observed for the first time on October 25, 1996 in BH1. The phase-separated hydrocarbon was removed immediately by hand bailing and a passive skimmer was installed to address any remaining phase-separated hydrocarbons. The groundwater analytical chemistry results from BH's 96-1, 96-4, 96-8, and 96-13 were all less than the AEP RMC *Level II* FGS criteria indicating that the impacted groundwater plume is closely associated with the impacted soil plume.

1.3 INTERPRETATION OF DATA

The location, type, matrix, level, and extent of the contamination has been interpreted from the field data and is summarized in Table 1.

Table 1: SUMMARY OF SUBSURFACE HYDROCARBONS						
Location	Matrix	RMC Levels ¹	Component	Depth (m)	Estimated Soil Volume (m ³) ²	Reference Holes
On-site Loading Rack	Soil	> Level II	benzene	1.5 - 3.0	200	BH1 & BH4
	Groundwater	Prob > Level II				
Off-site Main Street Boulevard	Soil	> Level II	benzene	2.7 - 3.2	50	BH96-13
	Groundwater					

- Note:
- ¹ Relative to AEP RMC Fine Grained Soil Guidelines
 - ² Estimated in-place soil volumes in excess of AEP RMC *Level II* Guidelines for fine grained soils (FGS), interpreted from many data points some of which were not proven conclusively by laboratory analysis. It should be noted that soils "bulk" between 25 and 40 % upon removal.
 - Prob. > or < - Probably greater or less than the level indicated based on soil headspace vapour levels and/or field observations of hydrocarbon staining and odours.

Residual gasoline-based hydrocarbon contamination in excess of the AEP RMC *Level II* FGS criteria is present within the fill and native soil on-site in the loading rack area and off-site to the south underneath the Main Street boulevard. The hydrocarbon contamination in the loading rack area was generally found at depths from 1.5 to 3.0 m below surface grade and off-site at depths of 2.7 to 3.2 m below grade. The inferred AEP RMC *Level II* soil contamination plume is illustrated on Figure 2.

An estimated 200 m³ (in place volume) of impacted soil (native clay and clay till) is present on-site in excess of the AEP RMC *Level II* criteria and a further 50 m³ is estimated off-site underneath the Main Street Boulevard.

The impacted groundwater plume is likely closely associated with the impacted soil plume. However, the impacted groundwater regime should not be considered a potable water source or compared with drinking water criteria.

2.0 SITE SENSITIVITY

2.1 SENSITIVITY ASSESSMENT

The site sensitivity assessment was undertaken in accordance with the AEP RMC criteria. The following table outlines the appropriate descriptive points required to determine the site sensitivity rankings.

TABLE 2: SITE SENSITIVITY DESCRIPTIVE POINTS				
Site Description	Retail service station, convenience store and automotive repair shop			
Surrounding Land Use		<u>ROADS</u>	<u>LAND USE</u>	<u>DISTANCE*</u>
	N	Alley	Residential	30 m
	NE	Progress Ave.	Residential	30 m
	E	Progress Ave.	Residential	20 m
	SE	Progress Ave.	Residential	35 m
	S	Main Street	Commercial	30 m
	SW	Main Street	Commercial	35 m
	W	-	Commercial	20 m
	NW	Alley	Residential	30 m
Groundwater Usage	No knowledge of potential shallow groundwater usage			
Surface Water	None in the immediate area			
Nearby Underground Structures	Underground utilities (natural gas, water, and telephone)			
Other Concerns	None			
Soil Type	Native silt, clay, and clay till overlying sandstone			
Groundwater	Located approximately 2.0 to 3.0 m below ground level			

Note * distance from potential contaminant source to property line and/or receptor

The following site sensitivity assessment table outlines the receptor sensitivity, impact potential, and sensitivity ranking.

TABLE 3: SITE SENSITIVITY RANKING				
Health Concern	Receptor	Receptor Sensitivity	Likelihood of Impact	Sensitivity Ranking
Ingestion	Surficial Groundwater	Low	Low	No Response
	Utilities	Medium	Low	No Response
Inhalation - Soil and Groundwater	Site Building	Medium	Medium	Moderate
	N Residential	High	Low	Moderate
	NE Residential	High	Low	Moderate
	E Residential	High	Low	Moderate
	SE Residential	High	Low	Moderate
	S Commercial	Medium	Low	Low
	SW Commercial	Medium	Low	Low
	W Commercial	Medium	Low	Low
	NW Residential	High	Low	Moderate

Overall Rating: Soil - Moderate (AEP RMC Level II FGS)
Groundwater - Moderate (AEP RMC Level II FGS)

2.2 CLEANUP CRITERIA

On the basis of current land use, geology, and human receptor pathways, AEP RMC *Level II* FGS criteria would be the applicable risk management criteria for soil and groundwater at the property.

3.0 REMEDIAL RECOMMENDATIONS

Mass excavation and the off-site disposal of impacted soils is the most feasible short term option available to achieve a complete RMC *Level II* cleanup of the property. Due to the low permeability qualities of the clays and silts, insitu cleanup techniques would have only limited success and are not considered a viable option for the fine grained soil. The impacted soil is identified in a confined area at depths of 1.5 to 3.2 m below surface level. The remediation will involve the following:

- Removal of the aboveground storage tanks and associated equipment.
- Surface stripping and stockpiling of approximately 200 m³ of clean overburden fill and over-excavation of impacted soil to a maximum depth of 3.2 m (or as determined by soil vapour testing).
- Off-site removal of an estimated 200 m³ (400 tonnes) of impacted soil to the Lethbridge Regional Landfill.
- Backfill with clean compacted backfill and stockpiled clean fill.

The approximate cost estimate is included in Appendix A.

The following remedial stages are anticipated:

1. Permitting

Alberta Environment, together with the Regional Health Unit, should be contacted prior to soil disposal to determine whether any special restrictions will be imposed on transportation to the landfill. Kedon Waste Services Ltd. will be contacted to obtain approval for disposal of the impacted soil at the Lethbridge Regional landfill.

2. Tank Removal

All aboveground tanks will be removed by an approved contractor. Tank purging and addition of dry ice will be specified prior to transporting the tanks off the property for destruction and disposal.

3. Excavation

An estimated volume (200 m³) of clean soils in the loading rack and tank farm areas will be excavated to a depth determined by headspace vapour testing and stockpiled on-site for subsequent backfilling. The impacted soils will be excavated to maximum depths of 3.0 m or as determined by headspace vapour testing and disposed of off-site. Soil samples will be field screened by SEACOR and laboratory analyzed to confirm that an acceptable level of clean-up has been achieved. The excavation stability should be reviewed by a qualified professional geotechnical engineer during the excavation due to the potential for wall collapse, particularly along the south property lines. The impacted soils will be landfilled at the Lethbridge Regional landfill. The excavated areas will be backfilled, with both clean fill and stockpiled soils, and compacted.

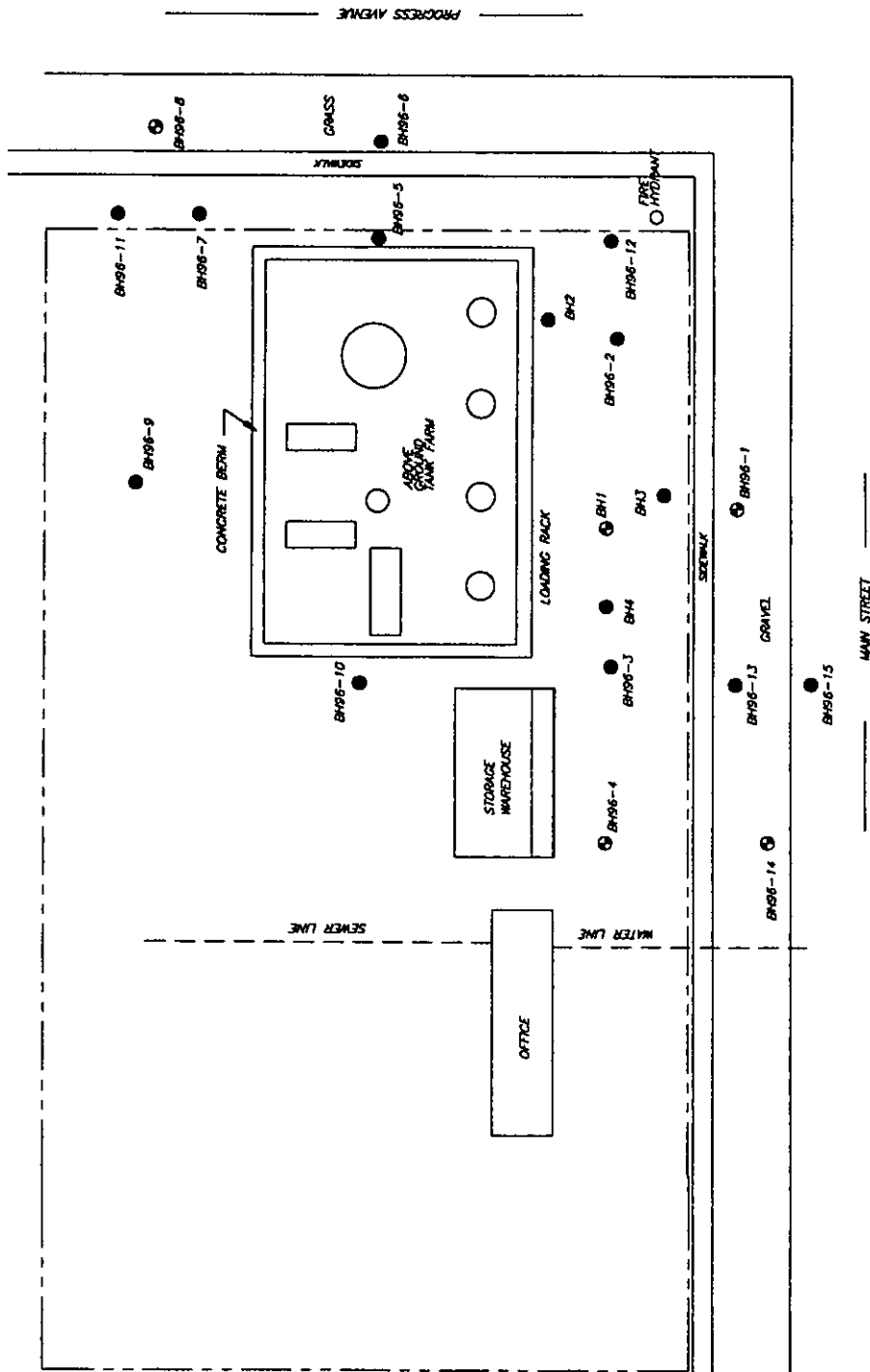
4. Risk Management

Due to probable restrictions in excavating off-site and the minimal volume of impacted soil identified, the off-site contamination south of the property will be addressed with a Risk Management Program. The program will involve semi-annual monitoring and groundwater sampling from the off-site monitoring wells for a period of two years. The source of contamination will have been removed and the remaining contamination will decrease in concentration over time.

4.0 CLOSURE

The remedial plan is based on the removal of all accessible impacted soil on-site and the risk management of the subsurface contamination off-site. If there is a change in circumstances, the plan should be reviewed by SEACOR to provide the appropriate cost-effective cleanup methodology given the change. The costs have been estimated based on similar projects undertaken by SEACOR and the estimated accessible impacted soil volumes. Actual costs may be higher, particularly if actual accessible impacted soil volumes are greater or if the project is delayed. This report is for the exclusive use of Canadian Turbo (1993) Inc. and its authorized agents.

FIGURES



LEGEND:

PROPERTY LINE

MONITORING WELL LOCATION

BORERHOLE LOCATION

NOTE:

841 TO 844 - JULY 1993
845-1 TO 846-12 OCT. 1996

5					
4					
3					
2					
1					
REV.	DESCRIPTION	DATE.	DRAWN.	CHECK.	

SEACOR

ENVIRONMENTAL ENGINEERING INC.

CANADIAN TURBO (1993) INC.
400-630 4th AVENUE S.W
CALGARY, ALBERTA

ARONS TURBO BULK STATION #2520
35 MAIN STREET
ARONS, ALBERTA

SITE PLAN

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

SCALE:	DATE:	FILE NAME:
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DRAWN:	CHECKED:	JOB NO.	FIGURE:
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LEGEND:

PROPERTY LINE

MONITORING WELL
LOCATION

BORERHOLE LOCATION

LIMITS OF EXCAVATION

NOTE:
BH1 TO BH4 - JULY 1993
BH96-1 TO BH96-12 - OCT. 1996

REV#	DESCRIPTION	DATE	DRAWN	CHKD
5				
4				
3				
2				
1				

SEACOR

ENVIRONMENTAL ENGINEERING INC.

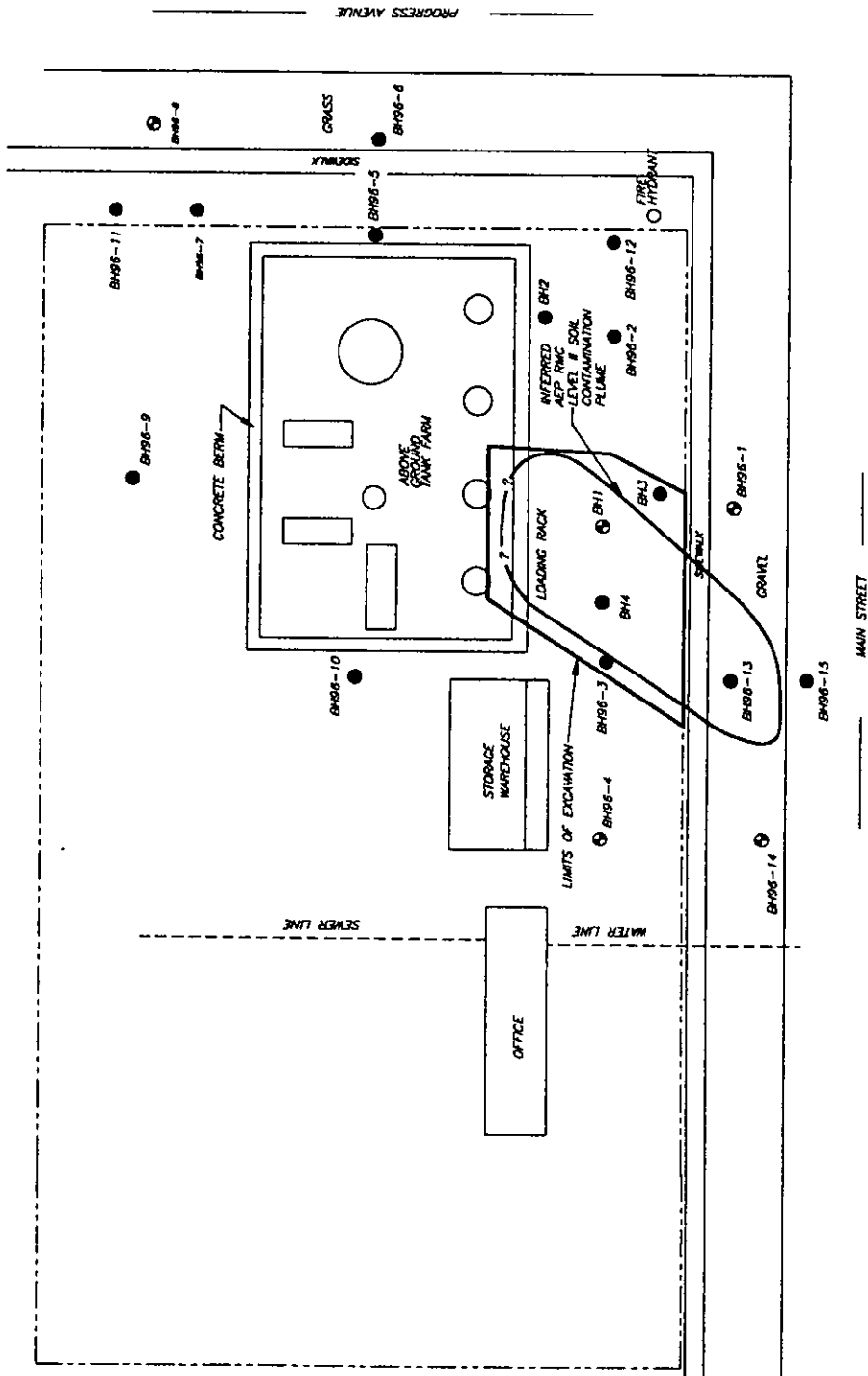
CANADIAN TURBO (1993) INC.
400-630 4th AVENUE S.W.
CALGARY, ALBERTA

BARONS TURBO BULK STATION #2520
235 MAIN STREET
BARONS, ALBERTA

INFERRED SOIL CONTAMINATION PLUME

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

SCALE: 1:250	DATE: 14 11 96	FILE NAME: 09J-4
DRAWN: G.C./T.S.	CHECKED:	JOB NO. H00J1-09J
		FIGURE: 2



APPENDIX A

REMEDIAL PLAN COST ESTIMATES

COMPLETE 1994 RMC LEVEL II CLEANUP

ITEM	WORK PARTY	COST
1. APPROVALS AND PERMITTING		
Liaison with Alberta Environment and Health Department for required approvals and permits	SEACOR	\$2,000
2. TANK REMOVAL		
Remove of aboveground tanks and associated equipment	Contractor	\$12,000
3. ON-SITE EXCAVATION		
Stripping and excavation and trucking of 200 m ³ of impacted soil ⁱ	Contractor	\$15,000
Backfill and compaction with clean fill	Contractor	3,000
Geotechnical review and compaction testing	Consultant	1,000
Installation and cost of RPE liner (if required)	SEACOR	500
Analytical testing	Laboratory	2,000
Planning, Management and consulting fees	SEACOR	10,000
		Subtotal
		\$31,500
4. RISK MANAGEMENT		
Semi-annual monitoring	Annual Monitoring Total	\$ 3,000

- Note: i) Estimated impacted soil volume accessible without the demolition of the site building.
 ii) No allowances has been made for re-asphalting or dewatering costs
 iii) Adequate compaction/backfill for any future development