A REPORT ON
PETROLEUM-CONTAMINATED SOIL CLEANUP

L&C Deli Site
13908 NE 20th Avenue
Vancouver, Washington

May 14, 1993

Prepared for:

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Project #1351

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EXECUTIVE SUMMARY

The 205 Group Inc., and Vancouver Oil Company, Inc., retained the environmental management firm of Hahn and Associates, Inc., to oversee soil cleanup activities at the L&C Deli site located at 13908 NE 20th Avenue in Clark County, Vancouver, Washington. The cleanup actions were undertaken in response to an Order issued by the Washington Department of Ecology.

Soil cleanup activities took place at the subject site in September 1992 with the removal of approximately 800 cubic yards of gasoline-contaminated soils from the site. In addition, approximately 600 cubic yards of clean overburden soil was excavated in order to access the contaminated soil. The contaminated soils were placed in a soil treatment cell for remediation at a later date.

The final depth of the soil excavation ranged from approximately 9 to 11 feet below the ground surface. Groundwater was encountered in the excavation pit at a depth of approximately 8 to 9 feet. The excavation of soil proceeded unencumbered in all directions, except to the east and southeast, where excavation activities were halted so as not to undermine underground utilities in these areas. The confirmation sampling indicated that the contaminated soil was removed both laterally and vertically to below regulatory cleanup levels, with the exception of the east and southeast walls where soil contamination was left in-place at concentrations of 43 to 1,100 parts per million of gasoline. The lateral and vertical extent of the remaining soil contamination at the site has been defined by the confirmation soil samples and the previous remedial investigation activities.

1.0 INTRODUCTION

The 205 Group Inc. and the Vancouver Oil Company, Inc. ("Clients") have retained the environmental management firm of Hahn and Associates, Inc. (HAI) to perform cleanup actions at the L&C Deli site located at 13908 NE 20th Avenue in Clark County, Vancouver, Washington (Figure 1). The cleanup actions were undertaken by the Clients in response to an Order issued by the Washington Department of Ecology (WDOE) in March 1992. This report presents the results of the removal of gasoline-contaminated soils that were previously identified at the subject site.

Soil cleanup activities took place in September 1992 with the removal of approximately 800 cubic yards of gasoline-contaminated soils from the subject site. The contaminated soils were placed in a soil treatment cell for subsequent remediation.

2.0 SCOPE OF WORK

The scope of work for the soil cleanup activities at the subject site included the following tasks:

1) Decommissioning of two monitoring wells at the subject site prior to excavation activities

2) Oversight of gasoline-contaminated soil excavation activities

3) Oversight of construction of soil treatment cell and placement of contaminated soils into the cell

4) Confirmation soil sampling of the excavation pit

5) Oversight of pit water removal activities

6) Data synthesis and report preparation

3.0 BACKGROUND

3.1 Site Description

The subject property, approximately one acre in size, is located at the northwest corner of the intersection of NE 20th Avenue and NE 139th Street in unincorporated Clark County near Vancouver, Washington (Figure 1). The site is bounded by NE 20th Avenue to the east, NE 17th Avenue to the south and west and by undeveloped property to the north. The intersection of Interstate Highways I-5 and I-205 lies about 500 feet west of the subject property.

The subject property is developed with a two-story commercial office building and is named the I-205 Center (Figure 2 and Photograph #1). A portion of the I-205 Center building was formerly occupied by the L&C Deli which operated a convenience store with retail gasoline sales. A pump island and three 12,000-gallon underground storage tanks (USTs) are located on the subject property to the southeast of the building (Photograph #2). The USTs were taken out-of-service in 1988 and brought back into service in 1992. The majority of the subject property is currently surfaced with asphalt.

The subject site is topographically located in a small depression between a hill to the north and east, a slight rise to the south and an above-grade portion of the I-5/I-205 interchange to the west. The subject site was modified during development by the addition of fill material and at the present time is essentially flat-lying at an elevation of approximately 177 feet above mean sea level (MSL). Salmon Creek lies approximately one mile to the east and south of the subject site and a small tributary of Salmon Creek lies about 700 feet south of the subject site.

3.2 Site History

In September 1987, gasoline product and vapors were discovered in a sanitary sewer line in a location near the L&C Deli site. In addition, gasoline product was discovered floating on the groundwater in a number of test pits excavated in the vicinity of the subject site. In November 1987, an extraction well and recovery system were installed by a WDOE contractor at the subject site to recover the free product gasoline floating on the groundwater in the soils.

Subsequent integrity testing of the USTs and lines located on the subject property indicated that although the tanks appeared to be sound, the associated lines may have been leaking product. The recovery of gasoline product from the extraction well diminished in late 1988, and in February 1989 the WDOE allowed the recovery system to be permanently shut down. A total of 524 gallons of gasoline product was recovered during the operation of the recovery system.

On August 10, 1990, the clients received an Order from the WDOE requiring that a remedial investigation and feasibility study (RI/FS) be performed to facilitate the remediation of the gasoline product that may have remained adsorbed in the soils and dissolved in the groundwater in the vicinity of the subject site.

HAI performed remedial investigative activities at the subject site from October 1990 to March 1991 through the installation of 11 soil borings and 7 groundwater monitoring wells (Figure 3). The remedial investigation appeared to define the extent of the impacts to the soil and groundwater on and in the vicinity of the subject site (Table 1). The results of the remedial investigation are presented in a document prepared by HAI entitled *Remedial Investigation, L&C Deli Site, 13908 NE 20th Avenue, Vancouver, Washington*, dated August 19, 1991. A feasibility study of remedial options was also prepared by HAI entitled *Feasibility Study, L&C Deli Site, 13908 NE 20th Avenue, Vancouver, Washington*, dated August 19, 1991.

In January 1992, WDOE prepared a Cleanup Action Plan (CAP) which summarized the results of the RI/FS and outlined the preferred cleanup alternative. In summary, the preferred cleanup alternative involved: 1) the partial removal of contaminated soils; 2) the surface treatment of the excavated soils by bioremediation; 3) the in-situ degradation of the remaining soil contamination by natural processes; and 4) a modified pump and treat method for remediation of the shallow groundwater from the excavation pit. Details of the RI/FS and CAP are not included in this document, therefore it is assumed that the reader is familiar with these documents.

On March 2, 1992, the Clients received an Enforcement Order from the WDOE requiring implementation of the preferred cleanup alternative as outlined in the CAP. Also included in the Enforcement Order was a request for additional documents as required by the Model Toxics Control Act (MTCA) including: 1) an engineering design report; 2) construction plans and specifications; 3) an operation and maintenance plan; 4) a compliance monitoring plan; 5) a sampling and analysis plan; and 6) a health and safety plan. A Work Plan was prepared by HAI to incorporate the documents required by the Enforcement Order that was entitled *A Work Plan for Site Cleanup and Monitoring, L&C Deli Site, 13908 NE 20th Avenue, Vancouver, Washington*, dated June 8, 1992.

This cleanup report covers the contaminated soil removal activities, the confirmation soil sampling activities and groundwater removal activities that took place in September 1992, and which were required by the CAP. Other activities required by the CAP were to be undertaken by the Clients, including the bioremediation treatment of the contaminated soils, the operation and maintenance of the soil treatment cell, and all post-cleanup compliance monitoring.

4.0 CONTAMINATED SOIL CLEANUP ACTIVITIES

4.1 Monitoring Well Decommissioning

Prior to the soil excavation activities, two groundwater monitoring wells that were located in the southeast portion of the proposed excavation area (MW-3 and MW-4) were abandoned under HAI oversight on September 18, 1992 by Geo-Tech Explorations, Inc. of Tualatin, Oregon. The monitoring wells were decommissioned in accordance with Chapter 173-160-560 Washington Administrative Code (WAC). The wells were over-drilled, the casing was withdrawn, and the borehole was filled with bentonite and hydrated. The abandoned monitoring well locations were not reached during the subsequent soil excavation activities, due to other limitations.

4.2 Contaminated Soil Excavation and Removal

Tom New Construction Company ("Tom New") of Portland, Oregon contracted directly with the Clients to perform the excavation activities at the subject site. Since the site was in use as an active service station, all motor fueling operations were suspended during the cleanup activities. The pump island, canopy and UST piping were decommissioned and removed by Tom New prior to the initiation of the excavation activities (Photograph #3). All of the underground pipelines were drained prior to their removal. The three existing USTs were not removed, however.

The excavation of all the accessible gasoline-contaminated soil took place under HAI oversight on September 18 through 25, 1992. During this time, approximately 800 cubic yards of gasoline-contaminated soil were excavated from the ground and transported to the nearby soil treatment cell (see Section 4.6). In addition, approximately 600 cubic yards of clean overburden soil was excavated in order to access the contaminated soil. The clean overburden soil was stockpiled north of the I-205 Center structure. The final excavation limits are shown on Figure 4. Photographs #4 through #7 show the excavation limits on various dates during the soil removal activities.

All excavation activities took place within soils which were composed of silts and clays that are referred to as the Silt/Clay Unit. The final depth of excavation ranged from approximately 9 feet bgs in the northwest portion of the excavation pit to 11 feet bgs in the southeastern portion of the pit. Underlying the Silt/Clay Unit is a water-bearing silty sand unit referred to as the Silty Sand Aquifer. The Silty Sand Aquifer was not apparently encountered during the excavation activities, although groundwater was encountered in the pit at a depth of approximately 8 to 9 feet bgs (see Section 4.4).

The extent of the soil excavation activities were guided by field screening procedures (visual and headspace vapor methods) and by confirmation soil sample results as they became available. The gasoline-contaminated soils were generally distinguished from the uncontaminated soils by a characteristic blue-gray staining. The zone of soil contamination was generally observed to occur in the Silt/Clay Unit between the depths of 5 feet bgs to 10 feet bgs. During the excavation activities, all accessible contaminated soils were removed from the excavation pit. However, contaminated soils were left in-place along the eastern and southeastern walls of the excavation pit due to the presence of underground utilities as was outlined in the CAP (see Section 4.5).

4.3 Confirmation Soil Sampling

During and following the excavation activities, confirmation soil samples were collected from the floor and walls of the excavation pit (Figure 5). The sampling procedures that were used to collect the samples are described in Appendix A. The soil samples were analyzed for total petroleum hydrocarbons (TPH) as gasoline by WDOE Method WTPH-G. A summary of the analytical results from the confirmation soil samples is presented in Table 2 and the laboratory reports and chain-of-custody documentation are included in Appendix C.

The results of the confirmation soil sampling indicate that gasoline was not detected above WDOE Method A Soil Cleanup Levels in the excavation floor or the north, west or south walls of the excavation pit (Figure 5). As proposed in the CAP, gasoline-contaminated

soils were left in-place in the east and southeast walls of the excavation pit. The analytical results indicate that the concentrations of TPH-gasoline remaining in the east and southeast walls of the excavation pit range from 43 parts per million (ppm) to 1,100 ppm.

4.4 Pit Water Removal

It was proposed in the CAP that groundwater would be pumped from the excavation pit during the excavation activities for the purpose of de-watering, and subsequent to the excavation activities, for remedial purposes. However, due to the very low water table conditions encountered during the excavation activities, very little pit water was required to be pumped for de-watering purposes. Groundwater was generally encountered in the excavation pit at a depth of approximately 8 to 9 feet bgs.

Pit water was pumped into a temporary storage tank that was located on-site. On September 23, 1992, Spencer Environmental Services, Inc. of Oregon City, Oregon, pumped 2,150 gallons of water from the storage tank for treatment and disposal at their facility (Appendix B). Additional pit water was not pumped from the excavation pit after this date.

4.5 Remaining Soil Contamination

Excavation proceeded unencumbered in all directions except to the east and southeast, where excavation activities were halted so as not to undermine a underground electrical, telephone and sewer utilities. The confirmation sampling indicated that the contaminated soil was removed both laterally and vertically to below regulatory standards with the exception of the east and southeast walls where soil contamination was left in-place. It was stated in the CAP that contaminated soils would be left in-place to the east and southeast. However, due to the presence of underground utilities, the entire proposed extent of excavation was not achieved in these directions. The lateral and vertical extent of the remaining soil contamination at the site has been defined by the confirmation samples and by the previous remedial investigation activities (see RI/FS report).

4.6 Soil Treatment Activities

The contaminated soil excavated from the subject site was trucked to a soil treatment cell which was constructed to the northwest of the I-205 Center structure (Photograph #8). In total, approximately 800 cubic yards of contaminated soil was placed in the soil treatment cell for remediation.

The soil treatment cell was constructed with a liner consisting of two 6-mil thickness polyethylene sheets. Prior to construction of the liner, the treatment area was graded to remove irregularities in the ground surface. The liner was composed of 20-foot by 100-foot sheets of polyethylene sheeting which were overlapped and sealed with an adhesive tape. Hay bales were placed around the treatment cell as a berm to prevent run-on and run-off of surface water. The polyethylene liner was placed over the berm and was tucked in on the outside of the hay bales.

Prior to placement of the contaminated soils into the treatment cell, a 0.5-foot lift of clean soil was placed in the cell and compacted. The purpose of this layer of clean soil at the base of the treatment cell was to protect the integrity of the liner during subsequent tilling operations. The contaminated soils were placed in the treatment cell and spread to an approximate 2.5-foot lift above the compacted soil. Following placement of the contaminated soils, the treatment cell was covered with polyethylene sheeting to minimize potential air emissions and saturation by rainfall.

The subsequent soil treatment activities, including the operation and maintenance of the treatment cell, were not overseen by HAI and thus are not discussed in this report.

4.7 Site Restoration Activities

Site restoration activities, including the backfilling and compaction of the excavation pit and reinstallation of the underground piping and pump island was performed by Tom New without the oversight of HAI, and thus is not discussed in this report.

5.0 ANALYTICAL TESTS

The soil samples collected during this project were shipped with chain-of-custody documentation in sealed and chilled containers to Pacific Environmental Laboratory Inc. of Beaverton, Oregon.

In total, 25 soil samples were analyzed for total petroleum hydrocarbon (TPH) as gasoline by WDOE Method WTPH-G. Analysis for volatile aromatics – benzene, toluene, ethylbenzene and xylene (BTEX) – was also performed for samples where gasoline was detected by Method WTPH-G and where the soils were to remain in-place. Analyses for BTEX constituents were performed on eight soil samples by U.S. Environmental Protection Agency (EPA) Method 8020. In addition, four soil samples were selected for analysis for total lead by EPA Method 7421.

The results of the analytical testing of the confirmation samples are summarized in Table 2. The laboratory reports and chain-of-custody documentation for the soil sampling and analyses are included in Appendix C.

The results of the analytical testing indicates that gasoline was detected in 14 of the confirmation soil samples at concentrations ranging from 43 ppm to 1,300 ppm. Gasoline was detected at concentrations in excess of the WDOE Method A Cleanup Level of 100 ppm in only four samples of the soils that remain in-place, all on the east and southeast walls. BTEX constituents were detected in excess of Method A Cleanup Levels in three of those four samples. Total lead was not detected at concentrations in excess of the Method A Cleanup Levels in the soil samples that were analyzed.

6.0 CONCLUSIONS

Soil cleanup activities took place at the subject site in September 1992 with the removal of approximately 800 cubic yards of gasoline-contaminated soils from the site. In addition, approximately 600 cubic yards of clean overburden soil was excavated in order to access the contaminated soil. The contaminated soils were placed in a soil treatment cell for remediation at a later date by the Clients.

All excavation activities overseen by HAI at the subject site took place within soils composed of silts and clays referred to as the Silt/Clay Unit. The final depth of the soil excavation ranged from approximately 9 feet bgs in the northwest portion of the excavation pit to 11 feet bgs in the southeastern portion of the pit. Groundwater was encountered in the pit at a depth of approximately 8 to 9 feet bgs.

Excavation proceeded unencumbered in all directions except to the east and southeast, where excavation activities were halted, so as not to undermine underground electrical, telephone and sewer utilities. The confirmation sampling conducted by HAI indicated that the contaminated soil was removed both laterally and vertically in the excavation to below WDOE Method A Soil Cleanup Levels, with the exception of the east and southeast walls, where soil contamination was left in-place as was stated in the CAP prepared by WDOE. The analytical results indicate that the concentrations of gasoline remaining in the east and southeast walls of the excavation pit range from 43 ppm to 1,100 ppm.

The lateral and vertical extent of the remaining soil contamination in the vicinity of the excavation at the site has been defined by the confirmation soil samples and the previous remedial investigation activities.

Any questions regarding the information presented in this report are welcome and should be referred to the undersigned project manager. Thank you for the opportunity to be of service in this matter.

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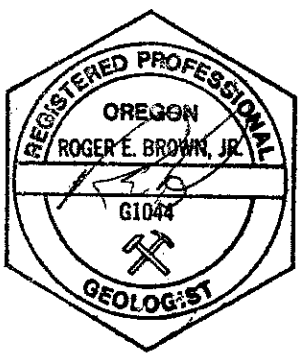

7.0 LIMITATIONS

Analytical results presented in this report document only the concentrations of the target analytes in the particular sample and not the property as a whole. We have taken samples from those areas we have identified as having the greatest risk of contamination. Unless a comprehensive statistical sampling program is conducted, however, one cannot conclude with confidence that contaminants may not be found in significantly higher or lower concentrations in other parts of the property. The scope of this investigation was dictated by the client's determination of an appropriate balance between cost and the increased certainty that flows from comprehensive investigation.

(HAI 10/90)

GLOSSARY OF ABBREVIATIONS

bgs	below existing ground surface
BTEX	benzene, toluene, ethylbenzene and xylene
CAP	Cleanup Action Plan
EPA	U.S. Environmental Protection Agency
HAI	Hahn and Associates, Inc.
HCID	hydrocarbon identification
MSL	mean sea level
MTCA	Model Toxics Control Act
MW	monitoring well
ppm	parts per million
RI/FS	remedial investigation and feasibility study
Tom New	Tom New Construction Company
TPH	total petroleum hydrocarbons
UST	underground storage tank
WAC	Washington Administrative Code
WDOE	Washington Department of Ecology