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MEMORANDUM

To: Mr. Josh Lipsky, Brown Reavis & Manning
From: Stephen Perrigo, P.G., Principal
Date: October 27, 2004
File: 0180-003
Subject: Remediation Plan, Fox Cleaners, Kirkland, Washington

INTRODUCTION

This memorandum summarizes an approach for the remediation of solvent-related soil and ground water contamination on the Fox Cleaners property (339 Kirkland Avenue) and the adjoining property to the east, the 355 Kirkland Avenue property in Kirkland, Washington. In this memorandum the two properties will be referred to as the "Fox property" and the "adjoining property" respectively. The adjoining property is undergoing planning for a major redevelopment that is scheduled to begin at the end of 2004. TCR, the owners of that project have developed a cleanup plan addressing solvent-related contamination on the adjoining property. The TCR plan calls for removal of contaminated soil, construction of a barrier wall to prevent recontamination, ground water treatment, and ground water monitoring on the adjoining property. The TCR plan does not include any effort to address contamination on the Fox property. The remediation plan described in this memorandum is intended to remediate contamination on the adjoining property in a manner that does not impede TCR's development plans, while also addressing contamination on the Fox property. This plan is intended to be conducted instead of the plan proposed by TCR.

Collectively, the portions of the two affected properties with soil and/or ground water contamination are referred to as the "site." This is consistent with the definition of "site" used by Ecology (the Washington Department of Ecology) in their implementation of the cleanup rule that will be used to remediate contamination at the site – MTCA (the Model Toxics Control Act). In this memorandum, the use of the word "contaminated" is intended to mean that a contaminant is present at a concentration in excess of the cleanup level established by the MTCA rule.

This remediation plan is based on studies performed by Pinnacle GeoSciences on the Fox Cleaners property and studies performed on the adjoining property by GeoGroup (Geo Group Northwest, Inc.) and TCR's consultant, EPI (Environmental Partners, Inc.). The apparent source of soil and ground water contamination present on both properties addressed by this remediation plan is dry cleaning solvent and its breakdown products. The dry cleaning solvent used at the Fox Cleaners site is PCE (perchloroethene or tetrachloroethene). Its breakdown products that affect remediation design are TCE (trichloroethene), DCE (primarily cis-1,2-dichloroethene) and vinyl chloride. There is no history of use of other dry cleaning solvents (such as Stoddard Solvent) at Fox Cleaners nor have other cleaning compounds been detected in soil or ground water at the site.

Solvent-related soil and ground water contamination on the Fox Cleaners property is confined

to the southeastern and eastern margin of the property. There is no evidence of ground water contamination at the northern, down-gradient, margin of the property where there are sufficient ground water monitoring wells installed to detect its presence. Soil contamination on the adjoining property is confined to the western-most margin of the property, extending no more 20 feet eastward of the western property line. Ground water contaminated with vinyl chloride has been observed in one sample from the only ground water monitoring well installed on the adjoining property, near the northeastern corner of the Fox Cleaners property. Reconnaissance ground water samples obtained on the adjoining property have demonstrated the absence of contaminated ground water over most of the area examined. Three reconnaissance ground water samples from GeoProbe explorations on the adjoining property within about 10 feet of the property line did contain PCE and/or its breakdown products but we do not consider these samples to be necessarily representative of aquifer conditions.

The remediation approach described herein has been generally discussed with Ms. Sunny Linhao Becker, P.E., of Ecology who is the technical point-of-contact assigned by Ecology for the Fox Cleaners site. The next step with Ecology would be to present a formal work plan to them for their review. At that time we could request a letter detailing their opinion of the planned work. This type of letter is now referred to as a "comfort letter" and we understand that the owners of the project on the adjoining property intend to request such a letter for their proposed remediation plan.

The goal of the cleanup action described in this memorandum is to remediate solvent-related contamination on the site (both properties) and to generate sufficient documentation to request a "No Further Action" letter from Ecology.

ASSUMPTIONS

The approach described herein is based on a number of assumptions which affect the scope and cost of the remediation effort. The plan calls for additional site characterization on both properties which has a two-fold purpose – (a.) to better identify the areal extent and depth of contaminated soil, and (b.) to establish the limits of soil removal (precharacterization) so that sampling and chemical testing will not be required during the construction phase of the remediation project. The assumptions are consistent with our current understanding of the site. They are:

1. Soil contamination is limited to the approximate areas and depths shown in the attached figure which is based on the studies completed to date.
2. All of the contaminated soil excavated from the site would be suitable for disposal in a Subtitle D landfill in accordance with a "Contained-In" approval from Ecology.
3. Water collected by dewatering efforts would be suitable for disposal as non-contaminated in accordance with a "Contained-In" approval from Ecology. However, some sparging treatment of the water may be necessary.
4. Any permits required for the planned work will be forthcoming. We have been in contact with

the City of Kirkland and at this time foresee no significant problems with obtaining permits promptly.

CLEANUP APPROACH

The general cleanup concept includes the following elements:

A. **Pre-characterization of the extent of solvent contaminated soil.** This task will involve advancing approximately 25 GeoProbe explorations to depths of about 15 to 18 feet on the adjoining property, approximately 4 GeoProbes to depths of about 18 feet on the Fox Cleaners property and approximately 25 hand auger explorations on the Fox Cleaners property. Approximate locations of these explorations are shown in the attached figure. Two or more samples will be obtained from each exploration for chemical analysis. Evaluation of the distribution of contaminated soil will be based on field screening and the results of chemical testing. This information will be used to further refine our understanding of the limits of contaminated soil for the purpose of planning the construction requirements of the remediation. The analytical testing information will also serve as the confirmatory analyses used to document the removal of contaminated soil. No further soil analysis is expected to be necessary to support the cleanup effort, except possible additional testing required for disposal clearance purposes. The precharacterization sampling approach will result in greater efficiencies during the construction phase because the contractors will be following a pre-established cleanup plan as opposed to a cleanup driven by the results of testing conducted as excavation proceeds. This approach will likely result in overall project cost savings.

B. **Soil Excavation on the Adjoining Property**. This task addresses remediation of soil contamination on the adjoining property. The attached figure shows three areas of planned soil excavation, identified as areas A, B and C. Based on initial discussions with Ecology, it is expected that Ecology will require the excavation and removal of all of the contaminated soil identified on the adjoining property, including that identified by GeoGroup during their studies. EPI only planned for the removal of contaminated soil identified by their study in the vicinity of exploration EPI-B-3.

Excavation of area A will involve a "sawcut" excavation approach which entails excavating alternating trenches to the desired depth which will be immediately backfilled with CDF (controlled density fill). CDF is a soil-cement mixture that will provide structural support and act as a barrier to the movement of ground water. The excavation of area A will entail excavation of approximately 270 cubic yards of soil, disposal of 160 cubic yards of contaminated soil and the placement of 215 cubic yards of CDF. This approach is needed in this area to minimize the potential for damage to the Fox Cleaners building. A geotechnical

engineer (Cornerstone Geotechnical, Inc.) will support the project team by providing recommendations for support of the building.

Area B will also be excavated using a sawcut approach with CDF backfill. The depth and extent of excavation in area B will be better defined by the pre-characterization study. The excavation of area B as now envisioned will entail excavation of approximately 180 cubic yards of soil, disposal of 65 cubic yards of contaminated soil and the placement of 150 cubic yards of CDF.

Area C will be excavated using conventional excavation techniques and will be backfilled with imported fill. The excavation of area C as now envisioned will entail excavation of approximately 350 cubic yards of soil and the disposal of 190 cubic yards of contaminated soil.

This planned approach will result in establishing an eight-foot wide CDF barrier wall extending beyond the length of the edge of the Fox Cleaners property shared with the 355 Kirkland Avenue property. The barrier will be at least ten feet deep which will be sufficient to impede the shallow ground water flow documented at the site. CDF is the same material specified by EPI for their barrier wall structure which was designed to extend to a greater depth, presumably for the structural support of the Fox Cleaners building.

C. **Excavation on the Fox Cleaners Property.** This task addresses remediation of soil contamination on the Fox Cleaners property. The purpose of this task is to remove contaminated soil that is acting as a continued source of ground water contamination affecting the property to the east. To date, soil contamination has been observed in four locations on the property. Non-contaminated soil samples have been obtained from explorations located between each contaminated area which suggests that the areas are each localized and not wide-spread. We estimate that this action will remove approximately 150 cubic yards of contaminated soil from beneath and outside of the building.

The planned excavation will involve removing parts of the floor within the building, excavation of contaminated soil, and replacement with CDF. We anticipate the need for significant dewatering from sand and gravel fill beneath the building. The services of Cornerstone Geotechnical and a structural engineer will be used to minimize impacts to the building. This cleanup effort will affect on-going operations of the dry cleaning business.

D. **Installation and Testing of Ground Water Monitoring Wells.** Three ground water monitoring wells will be installed on the adjoining property and up to two additional wells will be installed on the Fox Cleaners property. These wells will be sampled and tested for the contaminants of concern. If ground water contamination is confirmed then ground water treatment and monitoring (next item) will be initiated.

E. **Ground Water Treatment and Monitoring**. If residual ground water contamination remains on the site then some type of in-situ treatment will be initiated. The treatment approach will not be specified here because this technology is evolving rapidly and treatment options will need to be tailored specifically to the existing site conditions. EPI has recommended the use of permanganate treatment which we believe to be a viable and likely option for this site.

If ground water treatment is pursued then continued ground water monitoring will be necessary to document effectiveness and to provide confirmation of attainment of cleanup goals. We assume that ground water monitoring of six wells will continue for a period of three years.

F. **Closure.** Upon achieving cleanup goals in the monitoring wells, the results of the cleanup action will be submitted to Ecology for review under the VCP program.

COSTS and UNCERTAINTIES

The cost estimate for this plan is presented in a separate memorandum. There is inherent uncertainty in developing a scope and cost estimate at this stage of the project. Even if the assumptions cited are all correct, a contingency factor should be applied to the estimate. There are several conditions or findings that could significantly increase the cost of this project, they are:

1. The quantity of contaminated soil could exceed the estimated volume.
2. The estimated extent of dewatering anticipated and volumes generated may be insufficient. Dewatering costs could also be affected by needs for additional treatment and/or disposal should there be limitations of the disposal of the water under Ecology's "Contained-In" criteria.
3. Soil disposal is based on all soil meeting "Contained-In" criteria. This allows disposal of the soil in a solid waste landfill instead of disposal as a Dangerous (Hazardous) Waste. Testing to date indicates that this criteria should be achievable throughout the subject site. Any soil not meeting this criteria would require disposal at a much higher disposal fee.

LIMITATIONS

Pinnacle GeoSciences, Inc. prepared this memorandum for use by Mr. Josh Lipsky on behalf of Fox Cleaners. The memorandum is not intended for use by others and the information contained herein is not applicable to other sites.

Our understanding of site conditions that form the basis of the approach and costs described here are based on our prior work on the site, work by others on the subject site, our general knowledge of area-wide soil and ground water conditions, and our experience in remediation of contaminated sites. Our services have been executed in accordance with generally accepted environmental science practices for environmental studies in Washington state at the time this memorandum was prepared. No warranty or other conditions, express or implied, should be understood.

Explanation

Pinnacle GeoSciences Explorations

- Hand Auger Exploration
- Hand Auger Exploration or Soil Probe with Ground Water Monitoring Well

Explorations by Others

- Soil Borings
- Soil Boring with a Ground Water Monitoring Well

Key

- Solvent-related contaminants present at concentrations exceeding two times MTCA Cleanup Levels
- Solvent-related contaminants present at concentrations between one and two times MTCA Cleanup Levels
- Solvent-related contaminants not detected or present at concentrations below MTCA Cleanup Levels
- Offsite soil excavation with CDF backfill
- Offsite soil excavation with soil backfill
- On-site soil excavation with CDF backfill
- Pre-Characterization exploration location

Excavation Plan
Fox Cleaners
339 Kirkland Avenue
Kirkland, Washington

Pinnacle GeoSciences