GeoScience Management, Inc.

Environmental Consulting Services

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April 30, 1998

Ms. Kathy Bahnick Port of Seattle, Environmental Engineering PO Box 1209 Seattle, WA

Re: Results of Additional Monitoring and Extraction Well Installation, Wellhead Repair, High-vacuum Extraction Pilot Testing, and Hydrogen Peroxide Treatments Port of Seattle Terminal 115, Seattle, Washington

Dear Ms. Bahnick,

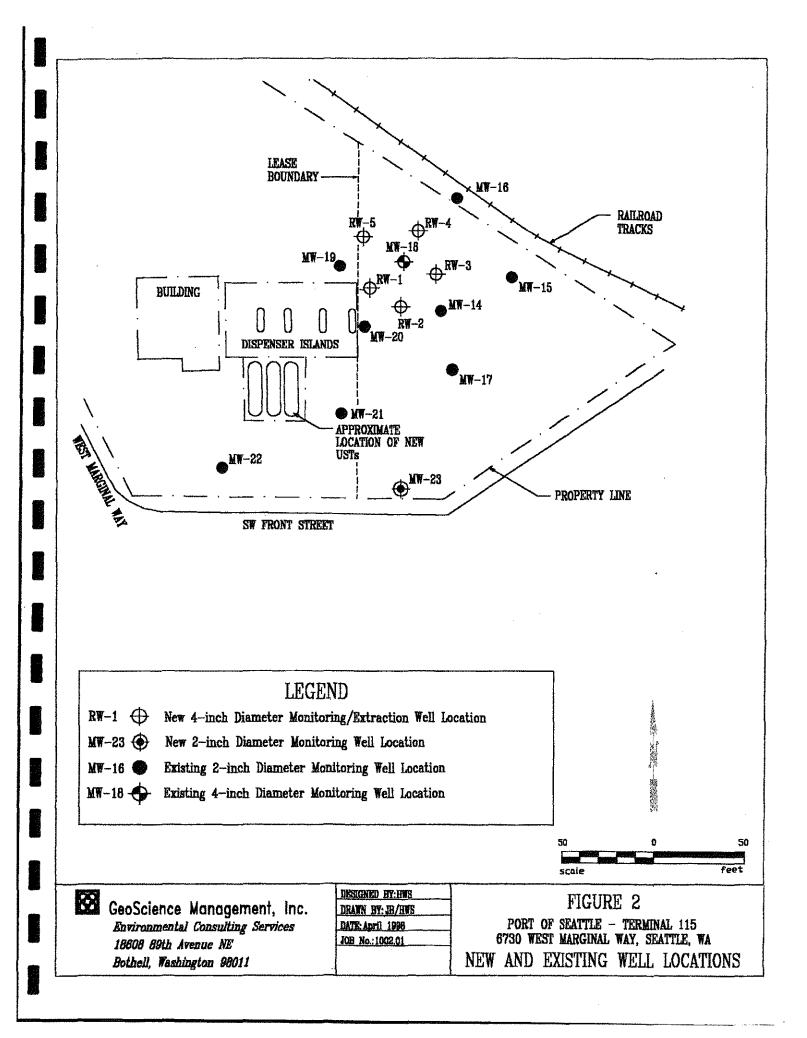
This report documents the results of pilot-scale vacuum extraction testing, the installation of new groundwater monitoring and extraction wells, and the repair of existing wellheads by GeoScience Management, Inc. (GSM). The work was performed at the Port of Seattle's (Port) Terminal 115 site located at 6730 West Marginal Way, Seattle, Washington. The work was performed in general accordance with our proposal to you dated April 10, 1997, under Professional Services Agreement Number P-950137 and subsequent amendments.

Project Background

The project site is located at the northeast corner of West Marginal Way SW, and SW Front Street in Seattle Washington, and is part of the Port of Seattle's (Port) Terminal 115 property (Figure 1). The site was purchased by the Port in the early 1990's and contained one empty warehouse structure with attached office space and shed. According to information supplied by the Port of Seattle, the original structure was apparently built by Materials Reclamation Company, Inc. (d.b.a. Maralco Aluminum) about 1952. A later addition was built on the north side of the structure in approximately the early 1970's. Architectural drawings obtained by the Port indicate that an 8,000-gallon fuel oil underground storage tank was installed immediately adjacent to the original building on the east side.

In November 1994, AGRA Earth and Environmental Technologies, Inc. (AGRA) conducted a geotechnical evaluation of the site for a prospective tenant who planned to install a card-lock fueling facility on the property. Approximately two feet (apparent thickness) of free petroleum product was discovered floating on the groundwater surface in a monitoring well completed by AGRA. Subsequent work at the site by GSM has identified a free product plume consisting of weathered diesel fuel in the vicinity of existing monitoring well MW-18 (Figure 2). The product release is suspected to have come from the former 8,000-gallon UST, which was removed by the Port in 1996. However, no detectable free product has been observed the area where the former UST was located (near existing monitoring well MW-17).

The purpose of the work described below was to complete definition of the aerial extent of the free product plume, to evaluate whether effective recovery of free product from the subsurface could be accomplished using high-vacuum extraction, and to determine whether additions of hydrogen peroxide subsurface could be used to enhance natural biodegradation of petroleum hydrocarbons in-situ.



Ge	eoScience Management, Inc. 18608 89th Avenue NE Bothell, WA 98011	- (1 1	Drillin Drillin	on: jist/Ei g Coi g Mei	6730 ngineer stractor hod:	West M	orf of Seattle, Terminal 115 Boring No: urginal Way, Seattle, WA Date Began Howard W. Small Date Comp Cascade Drilling, Inc. Total Dept Mod. B-50, 6-inch inside dia. HSA Sheet:	n: 5/10/97 pleted: 5/10/97
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			(L	9			Bottom of Boring at 15.0 feet. Installed 2-inch groundwater monitoring well.	diameter
REMA	Descriptive Modifiers:	Trace - split-bas	- < 5% rrel sa	; Slig mples	htly - 5 driven	to 12 %; using 140	Silty, Gravely, etc 12 to 30 %; Very - 30 to 50 %. Jb. free-falling hammer. Blow counts DO NOT represent SPT	values.

GeoScience Management, Inc. 18608 89th Avenue NE Bothell, WA 98011	- Loo Gea Dri Dri	illing (illing)	: t/En; Cont Meth	6730 gincer ractor: nod:	West M	ort of Seattle, Terminal 115 arginal Way, Seattle, WA Howard W. Small Cascade Drilling, Inc. Mod. B-50, 6-inch inside dia. HSA	Boring No: Date Began: Date Completed: Total Depth: Sheet:	RW-1 5/10/97 5/10/97 14.0 feet bgs 1 of 1
Construction Details	Sampling Method Sample Number	hes	Depth Sampled	Depth In Feet	Graphic Log and Soil Group Symbol (USCS)	Lithologic I (USCS Designation, density, mo Approximately 6 inches of concrete	isture, color, soil type an	d comments)
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REMA	Descriptive Modifiers:					diame	m of boring at 15.0 feet below groun ster monitoring/extraction well. Silty, Gravely, etc 12 to 30 %; Very - 30 to 50 -lb. free-falling hammer. Blow counts DO NO	0 %.	4-inch

GeoScience Management, Inc. 18608 89th Avenue NE Bothell, WA 98011	Drilling Drilling	st/Engineer: Contractor: Method:	Marginal Way, Seattle, WA Howard W. Small Cascade Drilling, Inc. Mod. B-50, 6-inch inside dia. HSA	Date Began: Date Completed: Total Depth: Sheet:	5/10/97 5/10/97 14.0 feet bgs 1 of 1
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