



EMS
Consultants, Inc.

RELEASE #421552
BEAR CREEK CC
Woodinville

P.O. Box 3460, Kent, WA 98089
(206) 824-1292 Fax (206) 824-5341

UST # 2461

October 19, 2004

Mr. Todd Connelly
American Golf Corporation
Bear Creek Country Club
13737 202nd Avenue NE
Woodinville, WA 98072

RE: Groundwater Monitoring Results – August 2004
Former UST Location
Bear Creek Country Club, Woodinville, WA

Dear Ms. Doran:

EMS Consultants, Inc. (EMS) has conducted monitoring and sampling of five groundwater monitoring wells in the vicinity of two former underground storage tanks (USTs) at the above-referenced location (the site). This letter report presents the results of the groundwater monitoring event.

Site Description

The site is located at the Bear Creek Country Club in Woodinville, Washington (Figure 1). Bear Creek Country Club is a private golf course, located in an area of residential land use. The nearest surface water is Bear Creek, located approximately 1,500 feet west of the site.

The site is located west of the maintenance building along the southern edge of the country club. The site is bounded by an access road to the south, the maintenance building to the east, and the golf course to the north and west (Figure 2). An aboveground fuel storage tank (AST) is located west of the maintenance building, in the approximate location of the former dispenser island. The area between the AST and the building is paved with asphalt and concrete. The area west of the AST is covered with grass and other vegetation. The site slopes toward the west and drainage swales are located northwest of the AST and along the access road.

Background

In March 1997, two 1,000-gallon USTs, used to store gasoline and diesel fuel, along with product piping and dispensers, were removed by PSCI Environmental of Bothell, Washington. Soil samples collected following removal indicated that one sample from the UST excavation slightly exceeded Model Toxics Control Act (MTCA) Method A Soil Cleanup Levels. However, a sample collected from beneath the dispenser contained 4,200 parts per million (ppm) of diesel (TPH-D). Further soil sampling was conducted toward the west and TPH-D was identified in 11 additional samples extending approximately 130 feet southwest of the former dispensers. The samples were collected at depths ranging from 5 to 9 feet below ground surface (bgs). No groundwater was apparently encountered during the UST removal or subsequent soil sampling.

RECEIVED

OCT 21 2004

DEPT OF ECOLOGY

ENTERED

In May 1997, Global Environmental, of Seattle, Washington (Global), excavated approximately 35 tons of contaminated soil from the area of the former dispenser for off-site treatment and disposal. A monitoring point (MP-1) was installed during backfilling of the excavation. Three groundwater monitoring wells (MW-1 through MW-3) were also installed downgradient of the former dispenser to facilitate testing of cleanup alternatives. Groundwater was encountered at depths of approximately three to four feet bgs.

Global installed and operated a soil remediation system consisting of bio-venting with extensive de-watering to increase the amount of soil exposed to treatment. Subsequent groundwater monitoring, conducted in April 1998, indicated that diesel-range hydrocarbons are present in samples from MW-2 and MW-3 at concentrations exceeding MTCA Method A Groundwater Cleanup Levels.

EMS conducted initial groundwater monitoring during May 1998. Monitoring results indicated that diesel-range hydrocarbons were present at concentrations above MTCA Method A Cleanup Levels in wells MW-1, MW-2, MW-3 and monitoring point MP-1. During October 1998, EMS installed and sampled three additional monitoring wells at the site (MW-4 through MW-6) to delineate the extent of groundwater impacts at the site. None of the additional wells contained hydrocarbon concentrations above Method A Cleanup Levels. Periodic groundwater monitoring has been conducted since October 1998.

Purpose and Scope of Work

The purpose of this investigation was to characterize the magnitude and extent of diesel-range hydrocarbon impacts to groundwater at the site. To meet this objective the following scope of work was performed:

- Measured groundwater depth in each of the five monitoring wells and one monitoring point,
- Collected groundwater samples from each of the five monitoring wells,
- Submitted the samples for laboratory analysis for diesel and oil-range hydrocarbons, and
- Prepared this report.

Groundwater Monitoring

Groundwater monitoring wells MW-1, MW-2, MW-3, MW-4 and MW-6 were monitored and sampled on August 18, 2004. Well MW-5 could not be located. Prior to sampling, depth to water was measured from the measuring points at the top of each PVC well casing using a Solinst water level indicator. The water level indicator was decontaminated prior to each use. Depth to water ranged from 2.93 to 6.12 feet. Consistent with the surface topography, the groundwater elevations slope toward the west. The depth to water measurements and groundwater elevations are presented on Table 1.

Groundwater Sampling and Analysis

Prior to sampling, the selected wells were purged with a peristaltic pump. Each of the wells pumped dry before three well casing volumes could be removed. The purge water was contained in a drum for off-site disposal. Following recharge, samples were collected using a peristaltic pump and disposable tubing. The samples were contained in laboratory-supplied glass jars and were properly labeled, sealed, and placed in a cooler with ice. The samples were transported under standard chain-of-custody protocol to Advanced Analytical Laboratory of Bellevue, Washington for laboratory analysis.

Mr. Todd Connelly
Page 3
October 19, 2004

The samples were analyzed for diesel and oil-range hydrocarbons (TPH-D and TPH-O) by Northwest Method NWTPH-Dx. The laboratory results indicated that TPH-D and TPH-O were not present in any of the samples at concentrations above the method detection limits. However, the presence of several gasoline-range compounds were tentatively identified in wells MW-2 and MW-3, although at very low concentrations. These concentrations could not be quantified because of the sampling containers utilized. The groundwater analytical results are presented on Table 2. The historical analytical results are presented on Table 3. The laboratory results are attached.

Based on the inconsistency with the previous groundwater results, the raw data from the August 2002 sampling event were obtained and submitted to Advanced Analytical for comparison. After review, the laboratory manager indicated that the diesel present in the 2002 samples appeared to be almost entirely absent. Further, he indicated that the trace gasoline-range compounds had been present in the 2002 samples but were essentially overshadowed by the diesel fraction.

Summary

The results of the groundwater monitoring event suggest that the diesel plume has degraded significantly. However, it may be that seasonal changes in precipitation and groundwater elevations will result in future detections of diesel-range hydrocarbons. The tentative identification of gasoline-range compounds is not likely a cause for significant concern, given the very low concentrations and age of the plume. However, the next monitoring event should include analysis for gasoline-range compounds.

Limitations

Services provided by EMS have been conducted in a manner consistent with the care and skill ordinarily exercised by members of the consulting industry in this area. No other representation, expressed or implied, is intended in this report.

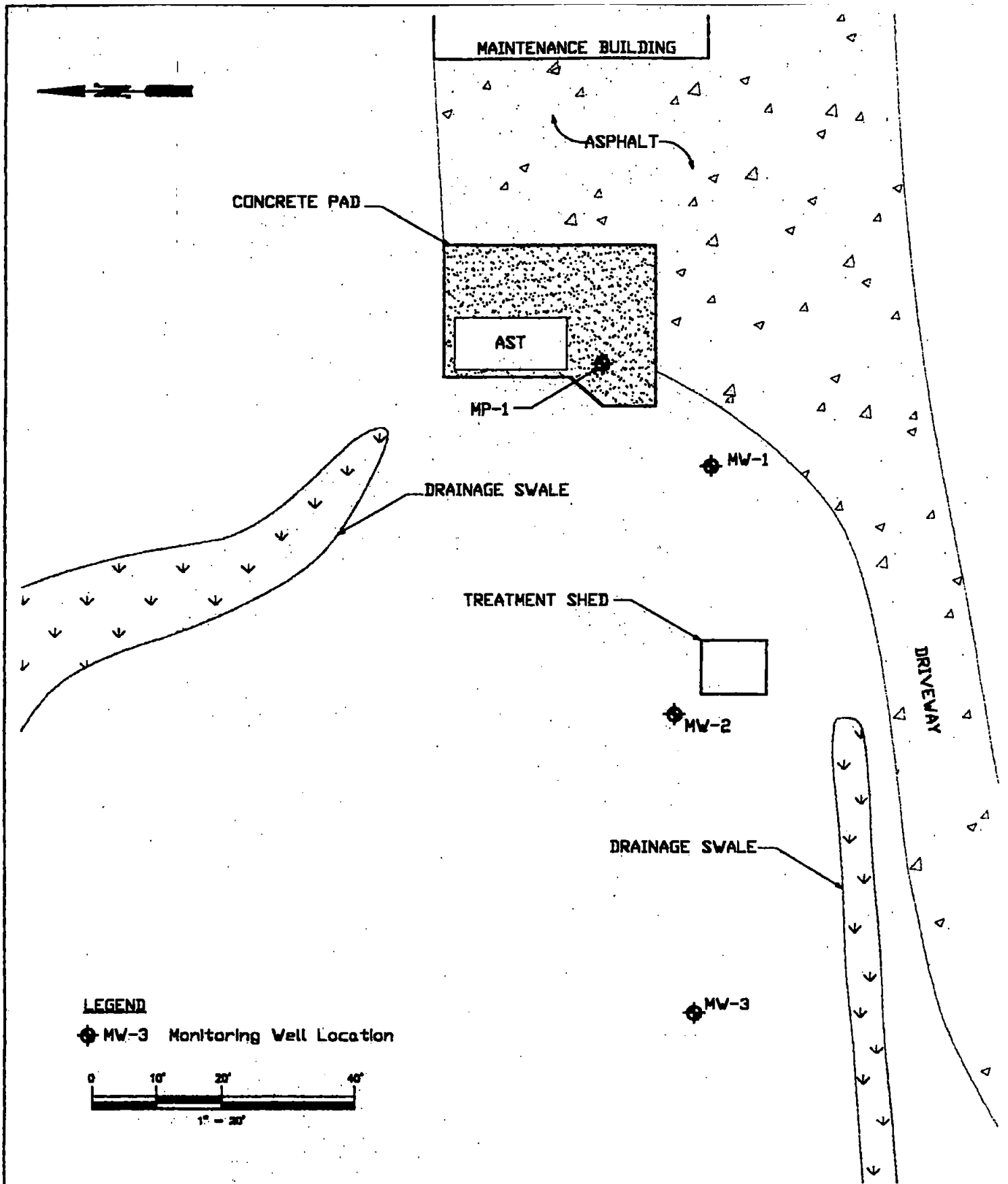
EMS appreciates the opportunity to provide American Golf Corporation with consulting services. If you have any questions or require additional information, please do not hesitate to call me at (206) 824-1292.

Sincerely



Chris L. Jones
EMS Consultants, Inc.

Attachments



Environmental Management Services, Inc.

42809 - 236th Avenue S.E.
Enumclaw, Washington 98022

DESIGNED BY:	CL
DRAWN BY:	JL
DATE:	June 1988
JOB No.:	

FIGURE 2

BEAR CREEK COUNTRY CLUB
WOODINVILLE, WA

SITE MAP

Table 1
Groundwater Monitoring Data

Bear Creek Country Club
Woodinville, Washington
August 18, 2004

Well Number	Top of Casing Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)
MP-1	99.18	6.11	93.07
MW-1	97.95	6.12	91.83
MW-2	95.44	4.61	90.83
MW-3	91.13	3.26	87.87
MW-4	95.11	2.93	92.18
MW-5	91.66	NM	-
MW-6	94.21	5.22	88.99

Note:

Top of Casing Elevations relative to a temporary benchmark with an assigned elevation of 100 feet above mean sea level.

NM = Not Monitored

Table 2
Groundwater Analytical Results

Bear Creek Country Club
Woodinville, Washington
August 18, 2004

Well Number	TPH-Diesel	TPH-Oil
MW-1	<0.20	<0.50
MW-2	<0.20	<0.50
MW-3	<0.20	<0.50
MW-4	<0.20	<0.50
MW-6	<0.20	<0.50
MTCA Method "A" Cleanup Level	0.5	0.5

Notes:

Analyses by Method NWTPH-Dx

TPH-Diesel = Diesel-range Total Petroleum Hydrocarbons

TPH-Oil = Oil-range Total Petroleum Hydrocarbons

All results in milligrams per liter (mg/L) or parts per million

< = Not detected at the referenced method reporting limit

Table 3 Historical Groundwater Analytical Results

Bear Creek Country Club
Woodinville, Washington

Well Number	Date	TPH-Diesel	TPH - Oil
MP-1	5/14/1998	20.8	<8.25
MW-1	5/14/1998	5.33	1.23
	3/22/1999	0.402	NA
	6/29/1999	<0.250	NA
	10/12/1999	1.18	NA
	1/4/2000	<0.455	NA
	8/12/2002	14	<0.50
	8/18/2004	<0.20	<0.50
MW-2	5/14/1998	1.11	<0.750
	3/22/1999	1.03	NA
	6/29/1999	<0.250	NA
	10/12/1999	3.34	NA
	1/4/2000	5.01	NA
	8/12/2002	5	<0.50
	8/18/2004	<0.20	<0.50
MW-3	5/14/1998	4.03	<0.750
	3/22/1999	0.613	NA
	6/29/1999	0.689	NA
	10/12/1999	1.07	NA
	1/4/2000	1.18	NA
	8/12/2002	23	<0.50
	8/18/2004	<0.20	<0.50
MW-4	10/13/1998	<0.250	NA
	3/22/1999	<0.250	NA
	10/12/1999	<0.250	NA
	8/12/2002	<0.20	<0.50
	8/18/2004	<0.20	<0.50
MW-5	10/13/1998	<0.250	NA
	3/22/1999	<0.250	NA
	10/12/1999	0.43	NA
	8/12/2002	<0.20	<0.50
	8/18/2004	Not Sampled	Not Sampled
MW-6	10/13/1998	0.323	NA
	3/22/1999	<0.250	NA
	10/12/1999	<0.250	NA
	8/12/2002	<0.20	<0.50
	8/18/2004	<0.20	<0.50
MTCA Method "A" Cleanup Level		0.5	0.5

Notes:

TPH-Diesel = Diesel-range Total Petroleum Hydrocarbons

TPH-Oil = Oil-range Total Petroleum Hydrocarbons

All results in milligrams per liter (mg/L) or parts per million

< = Not detected at the referenced method reporting limit

October 13, 1998 samples were grab samples collected during well installation

Bolded values exceed MTCA Method "A" Cleanup Levels

NA = Not Analyzed

ADVANCED ANALYTICAL

Environmental Testing Laboratory

September 14, 2004

Chris Jones
EMS Consultants, Inc.
P.O. Box 3460
Kent, WA 98089

Dear Mr. Jones:

Please find enclosed the analytical data report for the *Bear Creek C.C. (A40818-1)* Project.

Samples were received on *August 18, 2004*. The results of the analyses are presented in the attached tables. Applicable reporting limits, QA/QC data and data qualifiers are included. A copy of the chain-of-custody and an invoice for the work is also enclosed.

ADVANCED ANALYTICAL LABORATORY appreciates the opportunity to provide analytical services for this project. Should there be any questions regarding this report, please contact me at (425) 497-0110.

It was a pleasure working with you, and we are looking forward to the next opportunity to work together.

Sincerely,

V. Ivanov

Val G. Ivanov, Ph.D.
Laboratory Manager

Overlake Business Center ■ 2821 152 Avenue NE ■ Redmond, WA 98052
ph 425.497.0110 fax 425.497.8089
E-mail: aachemlab@yahoo.com

*This report is issued solely for the use of the person or company to whom it is addressed.
Any use, copying or disclosure other than by the intended recipient is unauthorized.*

AAL Job Number: A40818-1
Client: EMS Consultants, Inc
Project Manager: Chris Jones
Client Project Name: Bear Creek C.C.
Client Project Number: na
Date received: 08/18/04

Analytical Results		Dupl						
NWTPH-Dx, mg/l		MTH BLK	MW-1	MW-2	MW-3	MW-4	MW-6	MW-2
Matrix	Water	Water	Water	Water	Water	Water	Water	Water
Date extracted	Reporting	08/20/04	08/20/04	08/20/04	08/20/04	08/20/04	08/20/04	08/20/04
Date analyzed	Limits	08/20/04	08/20/04	08/20/04	08/20/04	08/20/04	08/20/04	08/20/04
				*	*			*
Kerosene/Jet fuel	0.20	nd	nd	nd	nd	nd	nd	nd
Diesel/Fuel oil	0.20	nd	nd	nd	nd	nd	nd	nd
Heavy oil	0.50	nd	nd	nd	nd	nd	nd	nd

Surrogate recoveries:								
Fluorobiphenyl		117%	118%	128%	129%	129%	127%	126%
o-Terphenyl		114%	115%	122%	124%	122%	123%	121%

*- Possible presence of "gasoline range" petroleum product

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits
na - not analyzed
C - coelution with sample peaks
M - matrix interference
J - estimated value
Acceptable Recovery limits: 70% TO 130%
Acceptable RPD limit: 30%

Laboratory Job #: A40818-1

2821 152 Avenue NE

Redmond, WA 98052

(425) 497-0110 fax: (425) 497-8089

aachemlab@yahoo.com

Client: EMS Consultants, Inc.

Project Name: Bear Creek C.C.

Project Manager: Chris Jones

joa@ems-consultants.com

Project Number:

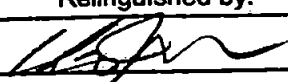
Address: P.O. Box 3460, Kent, WA 98089

Collector: Chris Jones

Phone: 206-824-81292 Fax: 206-824-5341

Date of collection: 8/18/04

	Sample ID	Time	Matrix	Container type														Notes, comments	# of containers
					8260 Volatiles	8021B Volatiles	BTEX	BTEX/NWTPH-Gx	NWTPH-Gx	NWTPH-Dx	NWTPH-HCID	8270 SemiVolatiles	8270 PAH	8082 PCBs	8081 Pesticides	RCRA 8 Metals	Lead		
1	MW-1	12:15	W						X										
2	MW-2	12:25	W						X										
3	MW-3	12:35	W						X										
4	MW-4	2:15	W						X										
5	MW-6	2:20	W						X										
6																			
7																			
8																			
9																			
10																			
11																			
12																			

Relinquished by:	Date/Time	Received by:	Date/Time
	8/18/04 15:15	V. Hannon	8/18/04 15:15
Relinquished by:	Date/Time	Received by:	Date/Time

Sample receipt info:

Total # of containers:

Condition (temp, °C)

Seals (intact?, Y/N)

Comments:

Turnaround time:

Same day ☐

24 hr ☐

48 hr ☐

Standard ☒