ROZAK ENGINEERING Civil, Construction & Environmental Consulting
P.O. Box 350 Kenai, Alaska 99611 (907) 283-5640 Fax (907) 283-0747

August 23, 2002

ORIGINAL

Alaska Dept. of Environmental Conservation
Division of Spill Prevention and Response
Storage Tank Program
43335 Kalifornsky Beach Rd, Suite 11
Soldotna, Alaska 99669

RE: Kenai Airport Fuel Service—Interim Remedial Action Report #4
UST Facility ID #2187, Reckey #90230026801

Attention: Monica English,

This document reports the installation of three additional monitor wells (MW-9, MW-10 and MW-11), construction of the evaporative pond, and results of water sampling of: MW-7, MW-8, MW-9, MW-10, and MW-11. The work was done in accordance with the Interim Remedial Action Plan Revision #2 we submitted to you May 7, 2002 and your approval on May 8, 2002.

Monitor Well Installation and Sample Collection

Three additional down-gradient monitor wells (MW-9, MW-10, and MW-11) were installed between the Airport Fuel site and the airport terminal at locations shown in Figures 2 & 3. Hughes Drilling installed the wells on May 20, 2002, using a hollow-stem rotary auger. Soil samples were collected for field screening analysis using a 340-pound hydraulic hammer and 2-inch diameter split spoon sampler. Soil boring and well installation logs are included with the report. The logs give detailed information on the soil type and monitor well design. Split spoon samples were collected at two-foot intervals from 4 to 14 feet bgs in each boring. A field screen sample was collected from each split spoon and was tested for the presence of volatile hydrocarbons using a PID. Soil samples were collected at locations with the highest PID readings for analytical testing of BTEX and GRO. The results are presented in Table 1.

The monitor wells were developed manually by bailing water from the wells using a stainless steel bailer. Each well was bailed until the water became clear and free of fines. About 60 gallons of water were bailed from MW-9, about 35 gallons from MW-10, and about 40 gallons from MW-11.

Evaporation Pond Construction

Excavation for the evaporation pond began on May 21 and continued until May 24. Soil conditions at the site allowed for a larger excavation then originally anticipated in the Interim Remedial Action Plan Revision #2 of May 7, 2002. Slope banks were excavated steeper than planned and contamination was not encountered in the soil until immediately above the water table. More clean material was removed from the pond than originally anticipated, which allowed for a larger surface area of the evaporation pond. Contaminated soil, excavated at

groundwater level and below, was spread over the slope banks. No contaminated soil was removed from the site. The slope banks around the culvert and runoff area from Alaska Flying Network parking apron were stabilized using filter fabric and drain rock; otherwise, the slope banks were stabilized by hydroseeding.

A sump pump and sprinkler at the west end of the pond are run intermittently to provide low-tech means of aeration. The sump draws water from the deep part of the pond. The sprinkler, mounted on post on the north bank of the pond, is a garden-variety unit that has a spray radius of about 10 to 15 feet. The water is directed onto the west portion of the pond. Sheen has not been observed on the pond since the excavation was completed.

Groundwater Monitoring

On May 30, 2002 we collected water samples from MW-7 through MW-11. Water samples were sent to CT&E Environmental Services Inc. for analytical testing to determine the presence of GRO and EDB. Before sampling, water was bailed from each well until it was free from sand and clear. The results of these samples can be reviewed in Tables 2-6. Analytical results from MW-9 exceeded cleanup levels for GRO, Benzene, and Toluene. The closest monitor well to MW-9 is MW-8. Analytical results from MW-8 were well below cleanup levels in every category. Analytical results from MW-10 revealed benzene exceeded cleanup levels and MW-11 exceeded cleanup levels for benzene and ethylbenzene.

A groundwater survey was done May 31, 2002, shortly after excavation of the evaporation pond was completed. Groundwater elevations measured during this survey are shown in Figure 2. Another groundwater survey was done on July 2, 2002, to determine if there were any changes in groundwater contour and direction of flow. Groundwater elevations from the July survey can be seen in figure 3. A significant alteration in groundwater contour around the evaporation pond was observed in the July 2nd survey.

Analytical Results

Results of analysis of soil samples collected during installation of monitor wells are shown in Table 1.

TABLE 1 – Soil Analytical Results, mg/kg – MW-9, 10, & 11

Sample ID#	Location	Depth	GRO	Benzene	Toluene	E-Benz	Xylenes
KAFS-02-01	MW-9	13.0	7.71	**1.19**	**1.52**	0.10	0.37
KAFS-02-02	MW-10	13.0	1.79U	**0.022**	0.083	0.036U	0.05
KAFS-02-03	MW-11	7.0	1.77U	0.009U	0.035U	0.035U	0.04U
Cleanup Level			300	0.02	0.54	0.55	78

Tables 2 - 6 report analytical results of water samples in mg/l. On Tables 2-6, "SWL" refers to the elevation in feet of the static water level at the monitor wells. The elevations are relative to a temporary reference elevation of 100.00 feet on the northeast corner of the concrete sidewalk

outside the southwest door of the Alaska Flying Network office. "NA" indicates no analysis was performed. "U" indicates analysis was performed but the analyte was not detected at the concentration shown. "NS" indicates no sample was collected. Concentrations that exceed the cleanup levels are bolded.

MW-7. Results of analytical testing on four rounds of groundwater samples are reported.

TABLE 2 – Groundwater Analytical Results – MW-7

Sample ID#	Date	SWL	GRO	Benz	Toluene	E-benz	Xylenes	EDB
KAFS-99-23W	11/29/99	91.3	0.26	**0.077**	0.002U	0.01	0.01	NA
KAFS-00-29W	7/06/00	91.3	**3.4**	**0.851**	0.53	0.04	0.14	NA
KAFS-00-38	12/13/00	90.8	0.47	**0.178**	0.09	0.02	0.03	NA
KAFS- 02-05	5/30/02	90.7	**2.65**	**0.301**	0.800	0.06	0.10	0.000019U
Cleanup Level			1.3	0.005	1.00	0.70	10.0	0.000050

MW-8. Results of analytical testing on four rounds of groundwater samples are reported.

TABLE 3 – Groundwater Analytical Results – MW-8

Sample ID#	Date	SWL	GRO	Benz	Toluene	E-Benz	Xylenes	EDB
KAFS-99-22W	11/29/99	90.8	0.64	**0.239**	0.002U	0.00U	0.00U	NA
KAFS-00-28W	7/06/00	90.3	**3.9**	**1.80**	0.02U	0.02U	0.02U	NA
KAFS-00-38	12/13/00	90.3	**1.6**	**0.830**	0.023	0.02	0.02U	NA
KAFS-02-04	5/30/02	90.1	0.4	**0.207**	0.002U	0.00U	0.00U	**0.000061**
Cleanup Level			1.3	0.005	1.00	0.70	10.0	0.000050

MW-9. Results of analytical testing from the first round of groundwater samples are reported.

TABLE 4 - Groundwater Analytical Results – MW-9

Sample ID#	Date	SWL	GRO	Benz	Toluene	E-Benz	Xylenes	EDB
KAFS-02-06	5/30/02	90.2	**29.1**	**5.48**	**6.92**	0.38	0.8	**0.000069**
Cleanup Level			1.3	0.005	1.00	0.70	10.0	0.000050

MW-10. Results of analytical testing from the first round of groundwater samples collected from this new monitor well are reported in Table 5. The lack of a history on this new well does

not provide trends in regards to the contamination; however, future water samples may reveal the effectiveness of the evaporation pond.

TABLE 5 - Groundwater Analytical Results - MW-10

Sample ID#	Date	SWL	GRO	Benz	Toluene	E-Benz	Xylenes	EDB
KAFS-02-06	5/30/02	90.9	0.3	**0.022**	0.05	0.01	0.02	0.000019U
Cleanup Level			1.3	0.005	1.00	0.70	10.0	0.000050

MW-11 Results of analytical testing from the first round of groundwater samples collected from this new monitor well are reported in Table 6. The lack of a history on this new well does not provide trends in regards to the contamination; however, future water samples may reveal the effectiveness of the evaporation pond.

TABLE 6 - Groundwater Analytical Results - MW-11

Sample ID#	Date	SWL	GRO	Benz	Toluene	E-Benz	Xylenes	EDB
KAFS-02-06	5/30/02	90.9	0.7	**0.093**	0.15	0.02	0.06	0.000034
Cleanup Level			1.3	0.005	1.00	0.70	10.0	0.000050

Interpretation of Results and Discussion

The first round of water samples taken at MW-9 yielded unexpectedly high levels of benzene and GRO when compared to samples taken at the other monitor wells during this and previous sample events. The benzene level at MW-9 is 26 times higher than MW-8, and the two wells are about the same distance from the UST site (620 to 650 ft.). The benzene at MW-9 is 18 times higher than at MW-7 and 60 to 250 times higher than MW-10 and MW-11, and these wells are about half the distance to the UST site; MW-10 and MW-11 are 320 ft. and MW-7 is 400 ft.

The groundwater flow during the last sample event was south to southeast (Figure 1), similar to the last four sample events. The flow has fluctuated a little but generally has been south to southeast and the gradient has been from 0.0021 to 0.0025 ft/ft. Figure 2 shows groundwater contours after the pond excavation work was completed on May 24, 2002. Figure 3 shows groundwater contours five weeks after excavation work was completed. These surveys show the groundwater flowed from the UST site toward MW-8 and MW-9. A comparison of the May and July 2002 surveys shows the contours were affected near the pond; however, this was localized and the pond is not expected to affect the overall direction and flow rate of the groundwater.

The level of benzene compared to other contaminants detected at MW-8 indicates this well is at the edge of the plume. If we assume most of the contamination at MW-9 has migrated from the KAFS UST site, then that could mean the center of the benzene plume is closer to MW-9 than MW-8, and the leading edge of the plume could be 100 to 200 feet south of MW-9. However, the elevated contaminate levels at MW-9 indicates there could be other sources contributing to

BASED ON WHAT?

the contamination, that are closer than the KAFS UST site. Until KAFS installed the UST system in 1984, aircraft parked along the east edge apron mp and were fueled with delivery trucks. During the summers in late-1970's and 1980's large quantities of fuel were delivered to aircraft hauling fish and general cargo. Aerial photographs taken during the 1960's and 1970's show airplanes, vehicles, drums, and possibly tanks, parked or stored on the parking apron to the north and west, and at the vehicle lot located to the north and east of MW-9. Aviation gas must have been spilled during the many years that fueling took place to the north of MW-9. SUPPORTING DOCUMENTATION?

To determine if another source is contributing to the contamination found in MW-9, we asked CT&E Technical Director Stephen Ede to compare the analytical results and chromatograph signature for the water sample at MW-9 to the samples collected at the other monitor wells. Mr. Ede said the gas range chromatograph signatures were inconclusive for source matching, but the presence of EDB at MW-9 indicates that the contamination is from aviation gas. Aviation gas is the product that contaminated the other monitor wells where EDB was detected.

Data previously collected from monitor wells did not provide information needed to quantify biological activity at the site, however, it is apparent that EDB levels have dropped significantly since June 16, 1999. The EDB level measured at MW-1 in 1999 was 1000 parts per trillion (ppt). In 2002, the EDB level at MW-11 (35 feet down-gradient from MW-1) was 34 ppt, only 1/30th of the EDB levels at that area three years earlier. EDB levels at MW-8 and MW-9 were slightly above the 50 ppt cleanup level, but it is expected these levels will gradually drop due to natural attenuation. It is interesting that the EDB levels at MW-8 and MW-9 are almost the same but the benzene level at MW-8 is 1/26th the level at MW-9.

Monitor wells MW-10 and MW-11 (both new) are about 35 feet down-gradient and across the pond from MW-1 and MW-6. MW-10 and MW-11 have significantly lower contaminant levels than previously detected at MW-1 and MW-6. This occurrence suggests that the drainage swale has contributed to the volatile loss between the monitor wells. The recent excavation to create the evaporation pond should continue to enhance volatile loss in this area. The low volume aeration process provides some water circulation in the west end and volatilization by spraying, but the results cannot be measured separately from the overall benefit of the pond.

Conclusions and Recommendations

It appears the contamination levels south of the evaporation pond have been reduced by natural attenuation. However, contamination levels exceed cleanup levels beyond the down-gradient monitor wells. The west side and leading edge of the plume from the KAFS UST site has not been defined, partially because higher than expected contamination at MW-9 does not fit with the contamination pattern developed from previous test results, and this indicates another source is contributing to the leading edge of the KAFS plume. The presence of another source should be investigated, and since spill records are not available, additional soil and groundwater sample points may need to be installed, especially around MW-9. Borings should be advanced to at least 10 feet below the water table and samples collected continuously from surface to bottom of hole.

DRILL DOWN GRADIENT TO DETERMINE LEADING EDGE OF PLUME.

Additional groundwater sampling is needed to evaluate whether the evaporation pond significantly contributes to the reduction of contaminate levels at down-gradient wells, particularly at MW-9, which is close to the large paved parking apron labeled "Airport Tarmac"

(Figure 1). During the next round of water samples, MW-1 and MW-6 should also be sampled so the contaminant levels across the pond can be compared with historical levels.

We recommend surveying the groundwater table at the monitor wells and the pond surface more frequently than sampling events until June 2003, especially after major rain events and snow melt, to see if there is a significant change in flow direction that could explain the elevated contaminate conditions at MW-9. We also recommend having an independent consultant evaluate our data and participate in developing any future monitoring programs, as well as evaluating whether air sparging or other remedial methods should be installed to reduce the levels of contamination migrating beyond the property boundary.

Closure

This work was performed in general accordance with the standards of care and diligence normally practiced by recognized consulting firms in performing services of a similar nature. The discussion, conclusions and recommendations relate the site conditions present at the time of our sampling, based on analytical results from a limited number of locations. The scope of this report is limited to matters expressly covered.

Sincerely,

Ronald T. Rozak, PE
Principal Investigator

Attachments:

Figure 1 – Groundwater Contamination Results for 5-30-02
Figures 2 and 3 – Groundwater Contour Maps
Photographs of Evaporation Pond Construction
Soil Boring and Monitor Well Logs
Laboratory Analysis Reports

cc: Dan Pitts
Dean Eicholtz

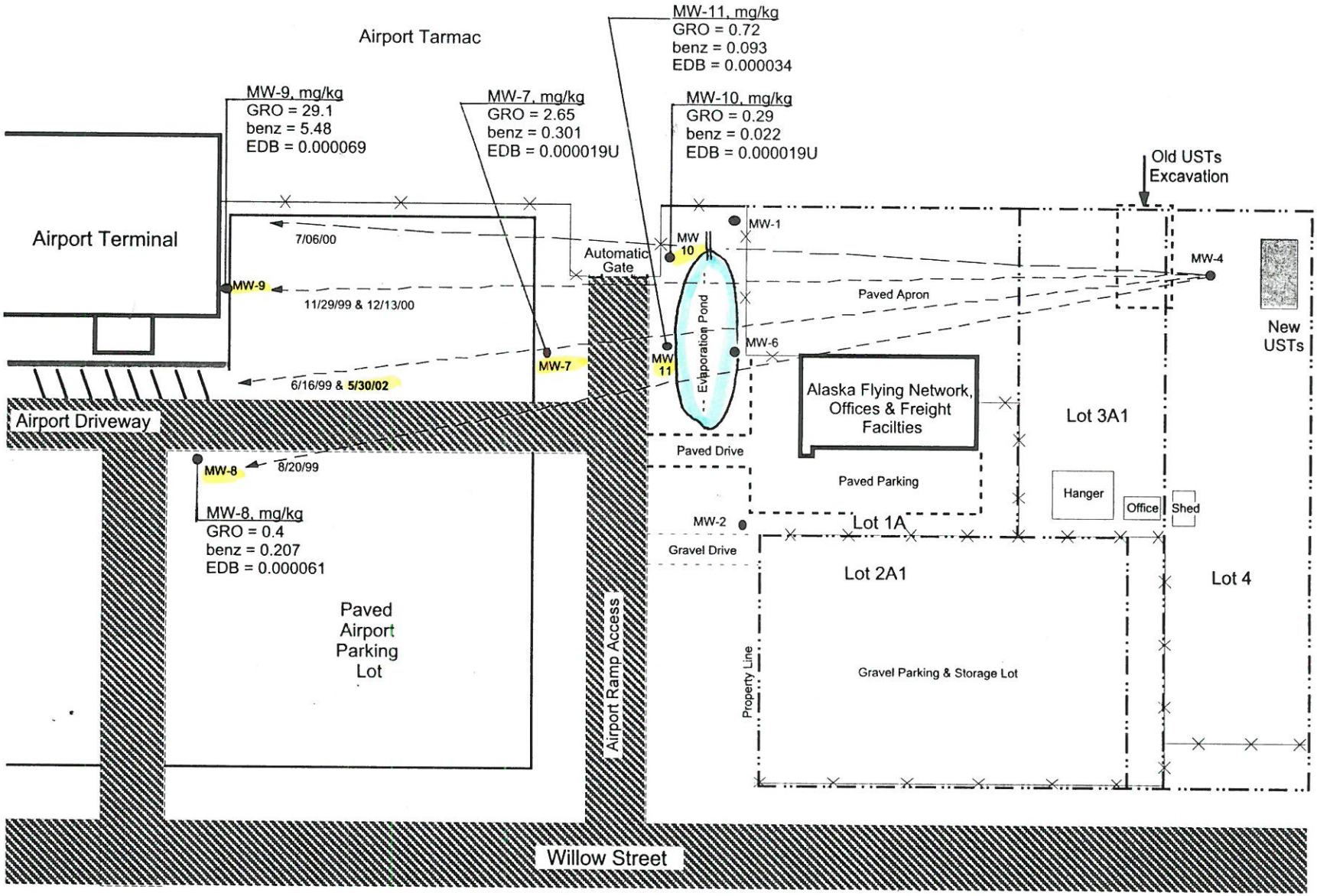


Figure 1. Groundwater Contamination Results for 5-30-02

Kenai Airport Fuel Service ADEC Reckey #90230026801

Rozak Engineering Rev. No. 4 8-16-02

Legend

Monitor Well MW

Property Line

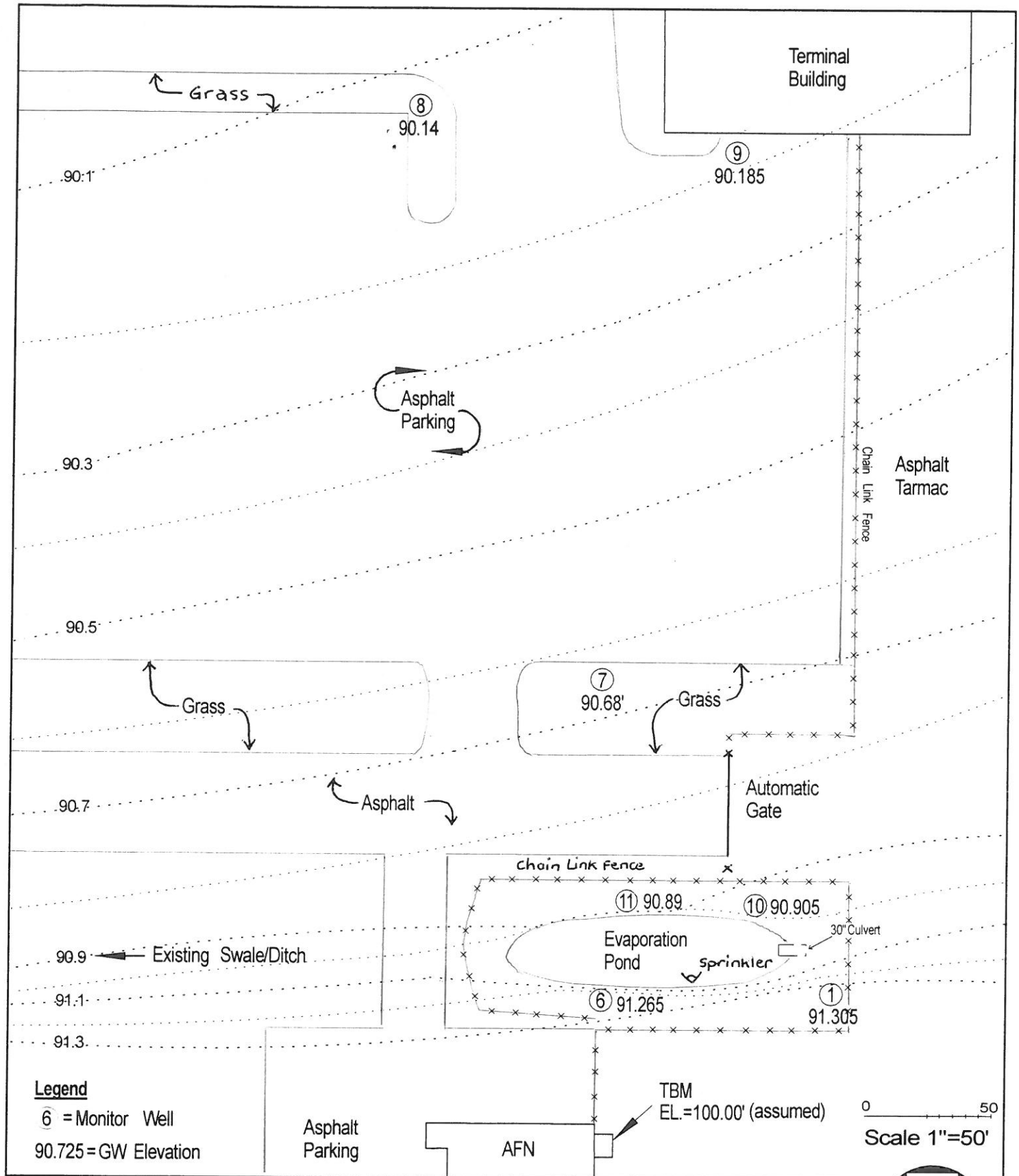
Chain Link Fence

Groundwater Flow

Asphalt Pavement

Plan North

0 50' 100'



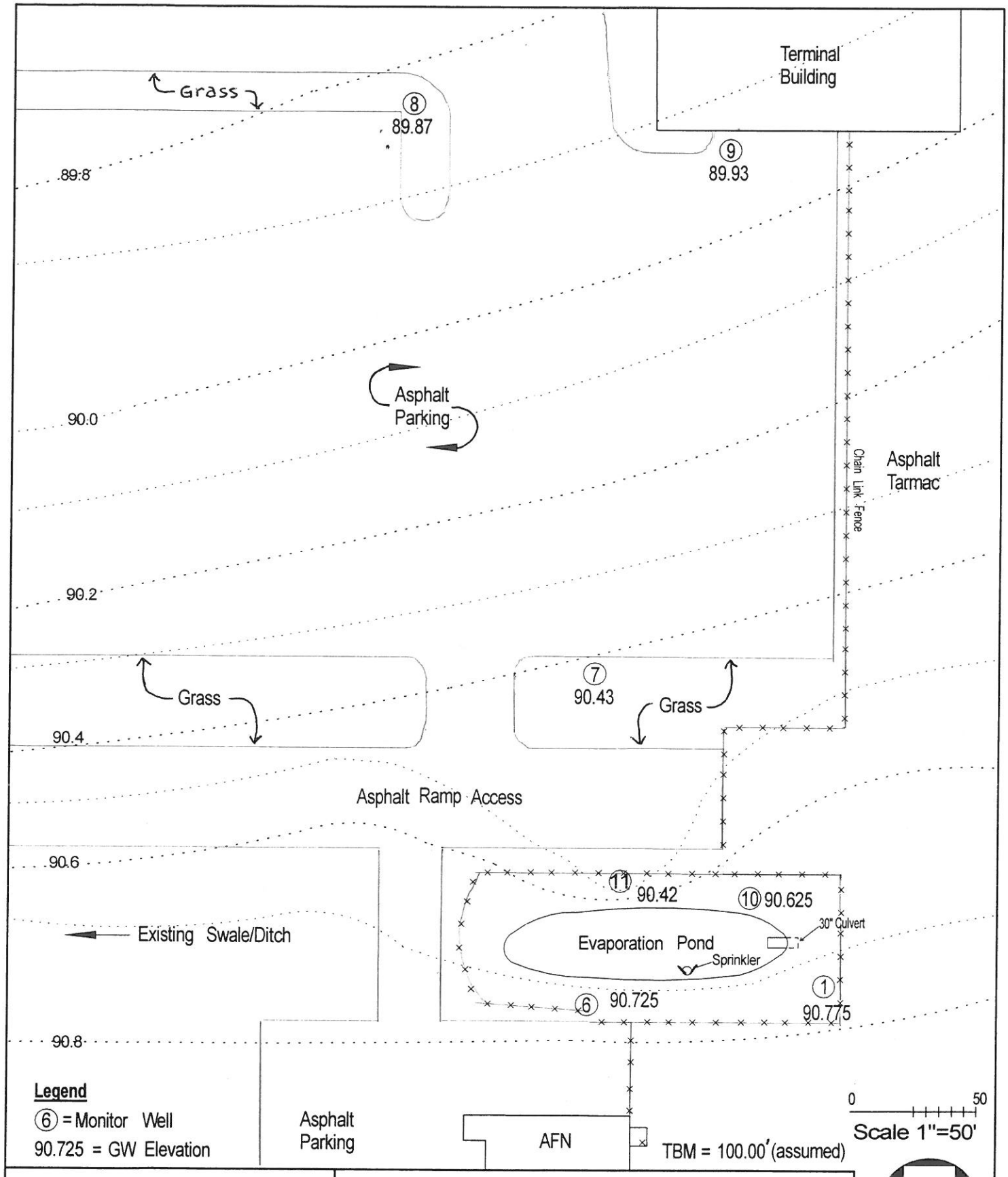
ROZAK ENGINEERING
PO BOX 350 KENAI, AK

Drawn by: EH 06.28.02
Rev. by: RMR 8.19.02

GROUNDWATER CONTOUR
KENAI AIRPORT FUEL SERVICE

Kenai Airport, Kenai, Alaska
Surveyed May 31, 2002

Figure 2



ROZAK ENGINEERING
PO BOX 350 KENAI, AK

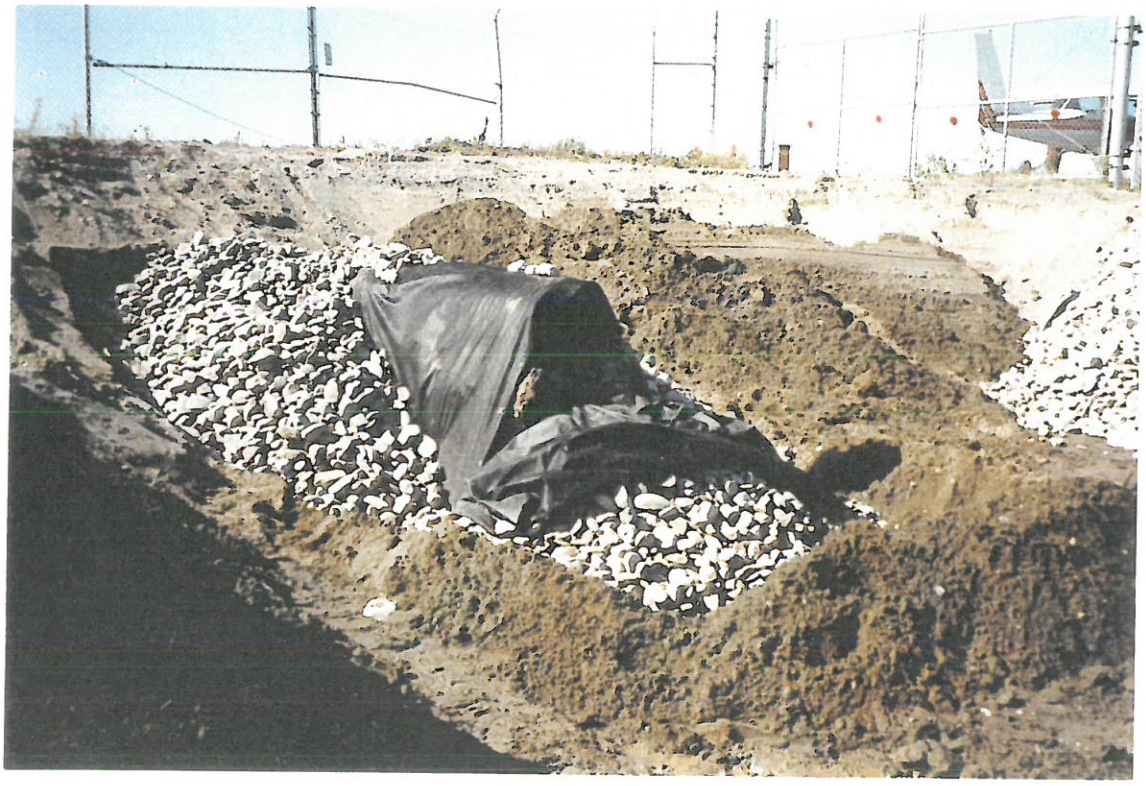
Drawn by: EH 06.28.02
Rev. by: RTR 8.19.02

GROUNDWATER CONTOUR
KENAI AIRPORT FUEL SERVICE

Kenai Airport, Kenai, Alaska
Surveyed July 2, 2002

Figure 3

1) View to the West. Excavating around culvert. Note groundwater at the left side of culvert.



2) View to the Northwest. After drain rock and filter fabric were placed.

3) View to the Southwest. Drain rock on the North bank to prevent erosion from runoff.

4) View to the Northeast. Placing filter fabric around culvert before placing drain rock.

5) View to the Northwest. Pond excavated to groundwater level.

6) View to the West after excavation completed, before hydroseeding and fencing installed. Note location of existing MW-1 & 6 and new MW-10 & 11.

PROJECT: KENAI AIRPORT FUEL SERVICE

SOIL BORING: MW-9

LEGEND

ATD = AT TIME OF DRILLING
BOH = BOTTOM OF HOLE
SWL = STATIC WATER LEVEL
▼ = WATER TABLE
F = FIELD SAMPLE
L = LAB SAMPLE
D = DEXIL PETROFLAG SAMPLE
| = SPLIT SPOON SAMPLE

DATE DRILLED: 5-20 TIME: START 0930 FINISH 1130

DRILLING COMPANY: HUGHES DRILLING - Pat S

DRILLING METHOD: HOLLOW STEM ROTARY, HYD. HAMMER 340#

INSPECTOR(S): R.T. ROZAK, Eric Henry

☒ PHOTOVAC HL-2000 ☐ TEI 580 B Calibrated 0830 w/100 ppm

PID (ppm) COLD	PID (ppm) WARM	GRD. WATER	DEPTH (ft)	SAMPLE LOC.	SAMPLE TIME	SAMPLE ID.	BLOWS/FT	MATERIALS DESCRIPTION AND REMARKS	ODOR N	ODOR L	ODOR M	ODOR H	USCS
			0					2" ASPHALT					
			1					GRAVEL FILL					
			2										
			3					SAND - GRAVEL					
			4		0945		3	GRVLY SAND, MED, OLIVE	X				
	0.6		5	F			5		X				
							7						
			6				8	GRVL, GRAY	X				
							3						
	0.3		7	F	1000		4	GRVLY SAND, MED W/SILT LAYER	X				
							3						
			8				3		X				
							2						
	0.2		9	F	1010		2	SAND, GRAY — SAT.	X				
		▽	.6		1015		2						
			10						X				
							1						
	18		11	F	1020		3		X				
							4						
			12				6		X				
							4						
	87		13	F/L	1030	KAFS-02-01	6			X			
							10						
			14				8			X			
			14.9	BOH									

MW.WELL: FLUSH MOUNT SECURITY CASING; #10-20 SAND; BENTONITE CHIPS; 2" PVC SOLID RISER; #10-20 SAND; 2" PVC SCREEN; CAP

0, 2', 4', 6', 8', 10', 12', 14'

ROZAK ENGINEERING, P.O. BOX 350, KENAI, ALASKA 99611 (907) 283-5640

PROJECT: KENAI AIRPORT FUEL SERVICE **SOIL BORING:** MW-10

LEGEND
ATD = AT TIME OF DRILLING
BOH = BOTTOM OF HOLE
SWL = STATIC WATER LEVEL
▼ = WATER TABLE
F = FIELD SAMPLE
L = LAB SAMPLE
D = DEXIL PETROFLAG SAMPLE
| | = SPLIT SPOON SAMPLE

DATE DRILLED: 5-20-02 TIME: START 1145 FINISH 1315
DRILLING COMPANY: HUGHES DRILLING, Pat S.
DRILLING METHOD: HOLLOW STEM ROTARY, HYD. HAMMER 340#
INSPECTOR(S): R.T. ROZAK, Eric Henry
☒ PHOTOVAC HL-2000 ☐ TEI 580 B

PID (ppm) COLD / WARM	GRD. WATER	DEPTH (ft)	SAMPLE LOC.	SAMPLE TIME	SAMPLE ID.	BLOWS/FT	MATERIALS DESCRIPTION AND REMARKS	ODOR N L M H	USCS
		0					Gravelly sand, olive brn		GW
		1							
		2							
		3					SAND, F-M, olive		GP
		4				3	sand, F-M, gray	X	GP
0.2		5	F	1145		4		X	
						4			
		6				5		X	
						2			
0.2		7	F	1205		3		X	
	▽	ATD 6.6				4			
		8				5		X	
						1			
						1			
0.2		9	F	1210		3		X	
						4			
		10				2		X	
						5			
2.5		11	F	1225		7		X	
						13			
		12				3		X	
						4			
3.1		13	F/L	1235	KAFS-02-02	6		?	
						9	BOH	?	
		14							

MW.WELL: STEEL SECURITY CASING W/ CAP & PADLOCK; NATIVE; BENTONITE CHIPS; 2" SCH. 40 PVC RISER; #10-20 SAND; 2" PVC SCREEN 6.2'-11.2'; CAP; 6.2'; 7.2'; 11.2'; 14'

PROJECT: KENAI AIRPORT FUEL SERVICE **SOIL BORING:** MW-11

LEGEND
ATD = AT TIME OF DRILLING
BOH = BOTTOM OF HOLE
SWL = STATIC WATER LEVEL
▼ = WATER TABLE
F = FIELD SAMPLE
L = LAB SAMPLE
D = DEXIL PETROFLAG SAMPLE
| | = SPLIT SPOON SAMPLE

DATE DRILLED: 5-20-02 TIME: START 1350 FINISH 1500
DRILLING COMPANY: HUGHES DRILLING, Pat S
DRILLING METHOD: HOLLOW STEM ROTARY, HYD. HAMMER 340#
INSPECTOR(S): R.T. ROZAK, ERIC HENRY
☒ PHOTOVAC HL-2000 ☐ TEI 580 B

PID (ppm) COLD / WARM	GRD. WATER	DEPTH (ft)	SAMPLE LOC.	SAMPLE TIME	SAMPLE ID.	BLOWS/FT	MATERIALS DESCRIPTION AND REMARKS	ODOR N L M H	USCS	MW.WELL
		0					GRVLY SAND, BRN/OLIVE		GW/SW	STEEL SECURITY CASING W/ PADLOCK
		1								NATIVE
		2								BENTONITE CHIPS
		3					SAND, F-M, GRAY		SP	2" PVC RISER W/ PLUG
		4				2		X		
0.2		5	F	1400		2		X		
		6				3	W/SILT STREAKS			
	▽	6.2		1415		2		X		
1.3		7	F/L	1410	KAFS-02-3	1		X		
		8				2		X		
						2				
						1				
0.6		9	F	1425		3		X		#10-20 SAND
						6				
		10				9		X		2" PVC SCREEN
		11								CAP
		.3					BOH			
		12								
		13								
		14								