60-Day Report

Hot Oil Release Area
Tesoro Refinery

ADEC Spill# 992399088804

Prepared for

Tesoro Alaska Company

Prepared by

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Environmental Consultants

Project No. 01-28.5
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INTRODUCTION

Tesoro Alaska Company (Tesoro) verbally notified the Alaska Department of Environmental Conservation (ADEC) on April 1, 1999 of a release discovered on April 1, 1999 in the southeast portion of the Tesoro refinery (Figure 1). The release occurred from a pipeline system used to heat trace heavy product lines and is referred to as the "hot oil release". Tesoro installed monitoring well E-204 at the release site on June 1, 1999, and field data from that work shows that contamination from the release extends to groundwater. EPA requested that further work at the release be performed pursuant to condition III.H.1 of Tesoro's Resource Conservation and Recovery Act (RCRA) Post-Closure Permit (Permit) which contains the requirements for releases not currently addressed by the Permit. Tesoro submitted a letter to EPA on June 11, 1999 to comply with Permit condition III.H.1.a which provides a description of the hot oil release event and Tesoro's initial response actions.

This report summarizes the results of activities performed since Tesoro's initial response, including an on-going field investigation, and provides additional information as required by Permit condition III.H.1.b.

ADDITIONAL ACTIVITIES PERFORMED

The following activities have been performed to assess the nature and extent of the hot oil release.

- One soil sample (labeled "hot oil leak") was collected from the bottom of the soil excavation to characterize the released product. The sample was analyzed for gasoline-range organics (GRO) using Alaska method AK101, diesel-range organics (DRO) using Alaska method AK102, and benzene, toluene, ethylbenzene, and xylenes (BTEX) using EPA method 8021B. Table 1 summarizes the analytical results obtained from that sample. Attachment A contains the laboratory report.
- Two monitoring wells were installed at the locations shown on Figure 1 to assess potential impacts to groundwater. Well E-204 was installed within the excavation area to assess the vertical extent of soil contamination and was constructed so that it could be used as a bioventing well in the future. Well E-208 was installed approximately 400 feet southwest of well E-204 to assess the downgradient extent of groundwater contamination associated with the release. Soil samples were collected during drilling at five-foot depth intervals for logging and field screening. Attachment B contains the boring and monitoring well construction logs for these two wells.
- Hydropunch samples were collected from the water table in wells E-204 and E-208 during drilling and analyzed for BTEX at the Tesoro refinery laboratory. Table 1 includes the data from these samples, and Attachment A contains the laboratory reports.
- Groundwater samples were collected from downgradient wells E-208 and E-94 and analyzed for BTEX and samples from well E-208 were also sampled for GRO and DRO. Table 1 includes a summary of the analytical data from these samples, and Attachment A contains the laboratory reports.
- A sample was collected of liquid non-aqueous phase liquid (LNAPL) in well E-204 for fingerprinting.

- Water levels were gauged in the new wells and other nearby monitoring wells to assess groundwater flow directions in the hot oil release area. Table 2 summarizes the gauging data, and Figure 2 provides a groundwater contour map.

ADDITIONAL INFORMATION REQUIRED BY RCRA PERMIT

III.H.1.b.i The concentrations and estimated quantities of any hazardous wastes or hazardous constituents released

Tesoro estimates that approximately 15 barrels (630 gallons) of hot oil were released from a 90-degree elbow in an underground portion of a hot oil line (Figure 1). "Hot oil" is similar to Jet A aviation fuel and consists primarily of DRO with low concentrations of BTEX constituents. The analytical data obtained from the initial response and subsequent release investigation are consistent with spilled hot oil. The soil sample collected from the base of the excavation contained elevated levels of DRO and relatively low levels of BTEX, and the hydropunch groundwater sample collected at the time of drilling from well E-204 also contained relative low BTEX concentrations (Table 1). The chromatograms from the excavation soil sample and the LNAPL in well E-204 are also consistent with weathered jet A fuel.

Approximately 15 cubic yards of soil were excavated during the initial response within an area that was approximately eight feet in diameter and 17 feet deep. The distribution of contamination observed in the excavation suggests that lateral spreading in the vadose zone was minimal. The amount of contaminated soil that remains in place below the excavation is estimated to be approximately 85 cubic yards assuming that soil contamination extends laterally approximately eight feet and vertically approximately 45 feet. In addition, up to 2.5 feet of LNAPL are present in well E-204.

III.H.1.b.ii The known, or expected, pathway(s) through which the contamination is migrating (or may migrate), and the extent, rate, and direction of that migration

The primary migration pathways for spilled hot oil remaining in the environment is downward through the soil column and then southwestward via groundwater flow (Figure 2).

The extent of groundwater currently impacted by the release is constrained to the well E-204 area which contains LNAPL. Groundwater samples collected downgradient from the release area in wells E-94 and E-208 did not contain detectable concentrations of BTEX, GRO, or DRO (Table 1).

LNAPL in well E-204 is not expected to migrate significantly because the release has been stopped. Dissolved-phase contaminants are expected to migrate at maximum rates of approximately one-half groundwater flow velocities due to sorption, degradation, and dilution processes. Groundwater velocities in this area have been estimated between two and five feet/day in previous Quarterly Progress Reports. Contaminant transport retardation relative to groundwater flow is estimated based on typical levels of total organic carbon in the unconfined aquifer within the Tesoro refinery project area.

Treated groundwater from Tesoro's groundwater treatment system is injected into the unconfined aquifer west (downgradient) of the hot oil release area. The injection causes mounding in the unconfined aquifer which strongly influences groundwater flow directions in the area. Water on the north side of the injection trenches is captured by the refinery's groundwater recovery system whereas water on the south side is not. Groundwater impacted by the hot oil release will flow to the north of the injection trenches and be captured by Tesoro's groundwater recovery system. The potential for some of the affected groundwater to flow southwestward around the injection trench mound will be monitored in conjunction with Tesoro's quarterly monitoring program as described below.

III.H.1.b.iii The projected fate and transport of the release

The principal transport mechanisms for the remaining contamination is via infiltration of precipitation in the soil column and via convection in the groundwater. The existing groundwater contamination is expected to migrate only a limited amount since natural processes in the subsurface will result in the hydrocarbons being sorbed onto soil, degraded, and diluted. The affected groundwater would ultimately be recovered by Tesoro's groundwater recovery system in the event that these processes do not naturally control the migration of hydrocarbons in the groundwater.

III.H.1.b.iv The likely exposure pathway(s) for potential receptors, and the consequences of exposure to these receptors

Potential receptors or exposure pathways have not been identified for the remaining contamination. The upper 17 feet of the spill have been excavated, and thus the release area poses little to no exposure potential to refinery workers. The unconfined aquifer is not used for drinking water downgradient from the release area and poses little exposure potential to humans.

III.H.1.b.v An outline of proposed Interim Measures to arrest the release, as well as a schedule for implementing the Measures. The schedule should be justified by a discussion of possible consequences arising from any delay in implementing Interim Measures.

Tesoro plans to implement the activities listed below along with the purpose for each activity.

- LNAPL will be recovered from well E-204 using passive collection and/or hand-bailing methods. Recovery will continue until less than 0.1 feet of LNAPL remains in the well.
- Residual hydrocarbon in the vadose zone will be remediated by bioventing using the nested air injection points installed in well E-204 (Appendix B). The bioventing system will supply oxygen to the subsurface to facilitate aerobic biodegradation of the hydrocarbon.
- Monitoring wells in the hot oil release area will be gauged on a quarterly basis for one year (beginning October 1999) as part of Tesoro's regular quarterly gauging to assess seasonal fluctuations in groundwater flow directions in the release area. Water and free-phase product levels will be measured in wells E-73, E-94, E-117, E-116, E-204, E-208, and T-114 in addition to wells E-76 and E-96 which are part of Tesoro's quarterly groundwater gauging network. The hot oil water gauging data will be contoured each quarter.
- Two downgradient wells will be sampled on a quarterly basis for one year (beginning in October 1999) in conjunction with Tesoro's regular quarterly sampling to monitor for potential migration of the

dissolved-phase plume. Samples will be collected from wells E-94 and E-208 and analyzed for BTEX using EPA method 8021. If samples from these wells exceed Target Groundwater Protection Standards (TGPS) contained in Tesoro's Permit, Tesoro will re-evaluate this recovery and monitoring plan.

- The results of the recovery, gauging, and sampling activities described above will be reported as a separate appendix in Tesoro's quarterly progress reports (beginning in October 1999) for one year unless TGPS criteria are exceeded in downgradient wells.

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Table 1

Summary of Analytical Data

Hot Oil Release Area

Well Location	Sample ID	Sample Matrix	Sample Date	Lab ID	Sample Type	Units	Benzene	Toluene	Ethyl-benzene	Xylenes	GRO	DRO
Excavation	Hot Oil Leak	Soil	4/9/99	991556001	Grab	mg/Kg	**0.704**	**12.7**	**34.9**	**114.4**	**3,020**	**4,480**
E-208	Hot Oil 65-67	GW	6/1/99	Refinery GC	Hydropunch	ug/L	**8.96**	**39.4**	1 U	**226**	--	--
E-208	E-208 70-72	GW	7/14/99	Refinery GC	Hydropunch	ug/L	1 U	1 U	1 U	1 U	--	--
E-208	E-208	GW	7/15/99	907018-1	MW	ug/L	2 U	2 U	2 U	2 U	100 U	250 U
E-094	E-94	GW	7/6/99	AM86F	MW	ug/L	1 U	1 U	1 U	1 U	--	--

Benzene, toluene, ethylbenzene, and total xylenes analyzed by EPA Method 8021M.

BOLD This analyte was detected in the sample.

-- Not analyzed.

DRO Diesel-range organics by Alaska method AK102.

GRO Gasoline-range organics by Alaska method AK101.

MW Monitoring well sample.

U Not detected. The detection limit is shown on the table.

Table 2

Summary of Gauging Data

Hot Oil Release Area

Well No	Gauge Date	Elevation TOC *(ft MLLW)*	DTW *(feet)*	DTO *(feet)*	Potentiometric Surface Elevation *(ft MLLW)*	LNAPL Thickness *(feet)*
E-071	22-Jul-99	144.81	67.42	--	77.39	--
E-073	22-Jul-99	143.56	66.93	--	76.63	--
E-076	22-Jul-99	145.68	69.12	--	76.56	--
E-077	28-Jun-99	140.36	62.88	62.70	77.63	0.18
E-094	22-Jul-99	142.43	65.92	--	76.51	--
E-096	22-Jul-99	142.77	66.19	--	76.58	--
E-116	28-Jun-99	147.19	68.26	--	78.93	--
E-117	22-Jul-99	146.38	68.51	--	77.87	--
E-204	28-Jun-99	140.26	63.31	61.78	78.22	1.53
E-208	22-Jul-99	146.35	68.81	--	77.54	--
T-114	22-Jul-99	143.67	66.79	--	76.88	--

Water level elevations are corrected for the presence of LNAPL assuming a product density of 0.83.

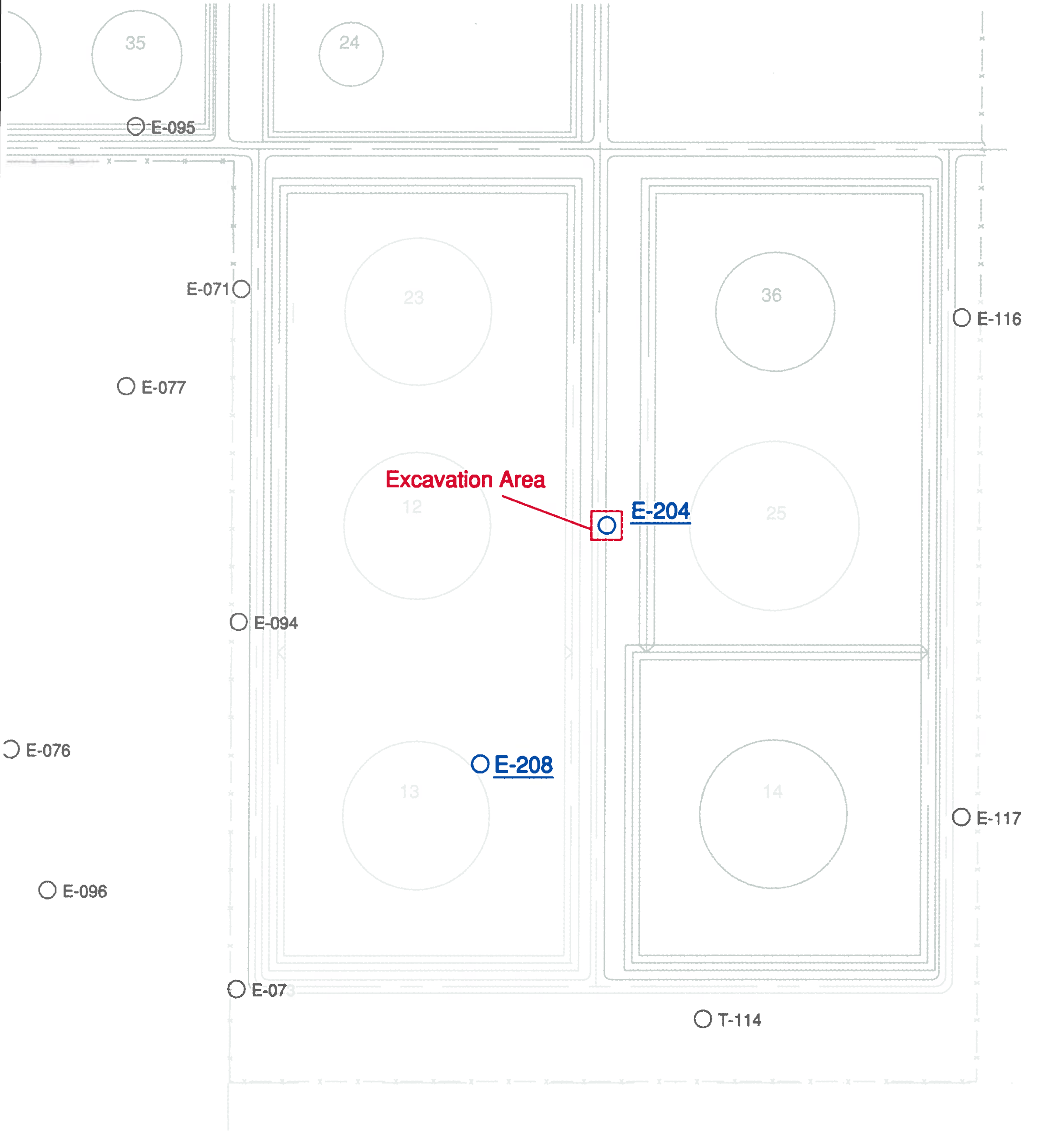
-- Not present.

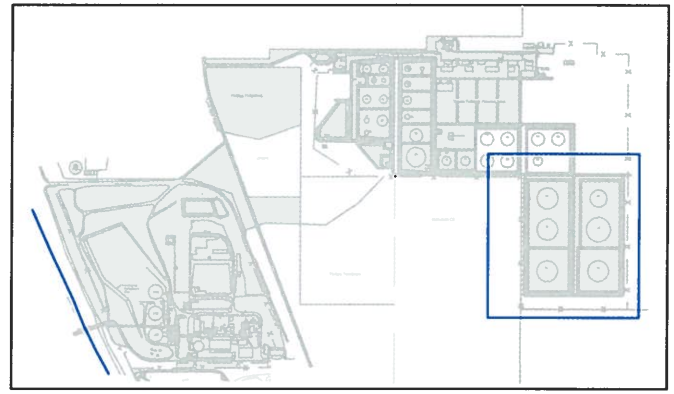
ft MLLW Feet above mean lower low water.

DTO Depth to oil (in feet below TOC).

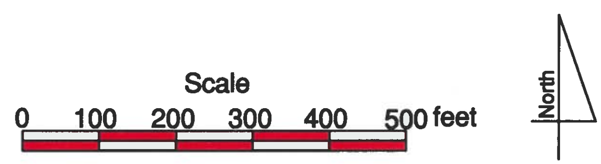
DTW Depth to groundwater (in feet below TOC).

TOC Top of casing.





EXPLANATION



E-208 New well location

E-094 Existing well location

Hot Oil Release Vicinity Map

TESORO ALASKA COMPANY

Date: 5/21/99 Drawn by: HRF

Proj. No.: 01-13 Checked by:

File: S:\01-28\60-day Report\Vicinity Map

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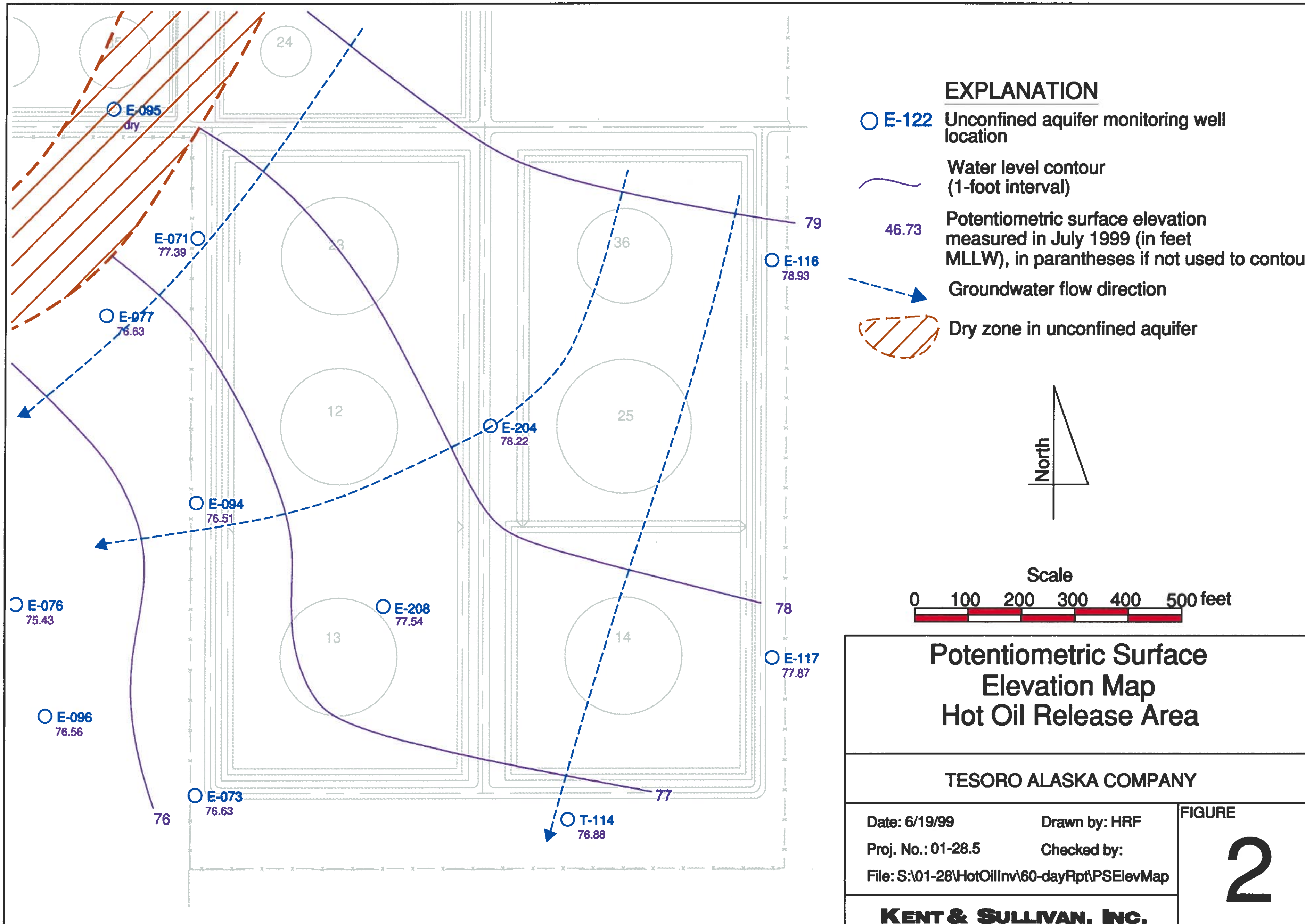
FIGURE 1



Potentiometric Surface
Elevation Map
Hot Oil Release Area

TESORO ALASKA COMPANY

Date: 6/19/99 Drawn by: HRF
Proj. No.: 01-28.5 Checked by:
File: S:\01-28\HotOilInv\60-dayRpt\PSElevMap

FIGURE 2

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APPENDIX B

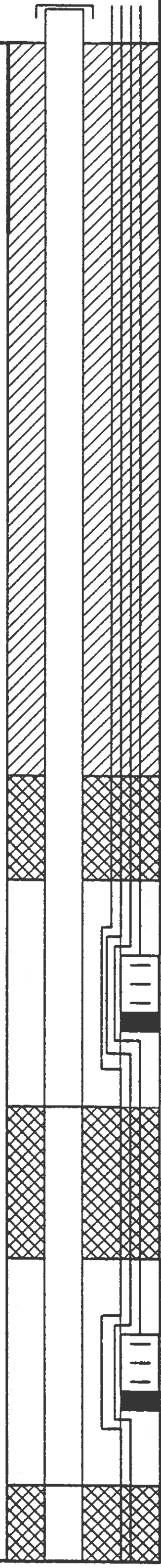
Boring and Monitoring Well Construction Logs

Boring and Well Construction Log

Well E-204

Elevation Ground: 139.99
Elevation TOC: 140.26
Total BH Depth: 70.4 ft.
Total Well Depth: 70.4 ft.

Client:	Tesoro Alaska Co.	**Driller:**	Hughes Drilling
Project Site:	Refinery	**Drilling Method:**	Hollow-stem auger
Project No.:	01-28.5	**Sampling Method:**	2.5-in split spoon
Area:	Hot Oil Release Investigation	**Start Date:**	6/1/99
Geologist:	J. Lipka	**End Date:**	6/1/99



Well Materials	Depth (feet)	Sample ID	Blow Count (per 6 inches)	Sample Interval/Recovery	PID/FID Readings (ppm)	USCS	Description
Conductor Casing; 5-feet, 18-inch diameter welded mild steel	0		nm	ns	nm		No sample.
Volclay Grout	5		nm	ns	nm		No sample.
Riser Pipe 2-inch diameter; flush-threaded; Schedule 40 PVC	10		4 5 6 7		6		Loose, brown-gray, fine to coarse SAND with 40% fine gravel (up to 0.5 inch), moist, very slight hydrocarbon odor.
Note: See As-built diagram for biovent well construction detail	15		4 7 7 11		9		Same: with 40% fine gravel (up to 0.75 inch), some iron-staining.
Bentonite Seal medium chips	20		3 6 8 4		11	SW	Same: loose, with 40% fine to coarse gravel (up to 1.5 inch).
Sand Pack 10/20 Colorado Silica Sand	25		3 7 9 11		448		Same: medium dense, color change to gray-brown,with 40% fine gravel (up to 0.75 inch) and less than 5% coarse gravel (up to 2.5 inch), strong hydrocarbon odor, some iron-staining.
Bentonite Seal medium chips	30		9 7 8 10		1267 27		Same: with 15% fine gravel (up to 0.5 inch) and less than 5% coarse gravel (up to 2.5 inch), very strong hydrocarbon odor, trace iron-staining. @ 31.5 feet: 30% fine to coarse gravel.
Sand Pack 10/20 Colorado Silica Sand	35		5 8 10 13		1468		Same: with 40% fine to coarse gravel (up to 2 inch), abundant iron-staining. @ 36.0 feet: 5% silt.
Bentonite Seal medium chips	40						

Boring and Well Construction Log

Well E-204

Client:	Tesoro Alaska Co.	**Driller:**	Hughes Drilling
Project Site:	Refinery	**Drilling Method:**	Hollow-stem auger
Project No.:	01-28.5	**Sampling Method:**	2.5-in split spoon
Area:	Hot Oil Release Investigation	**Start Date:**	6/1/99
Geologist:	J. Lipka	**End Date:**	6/1/99

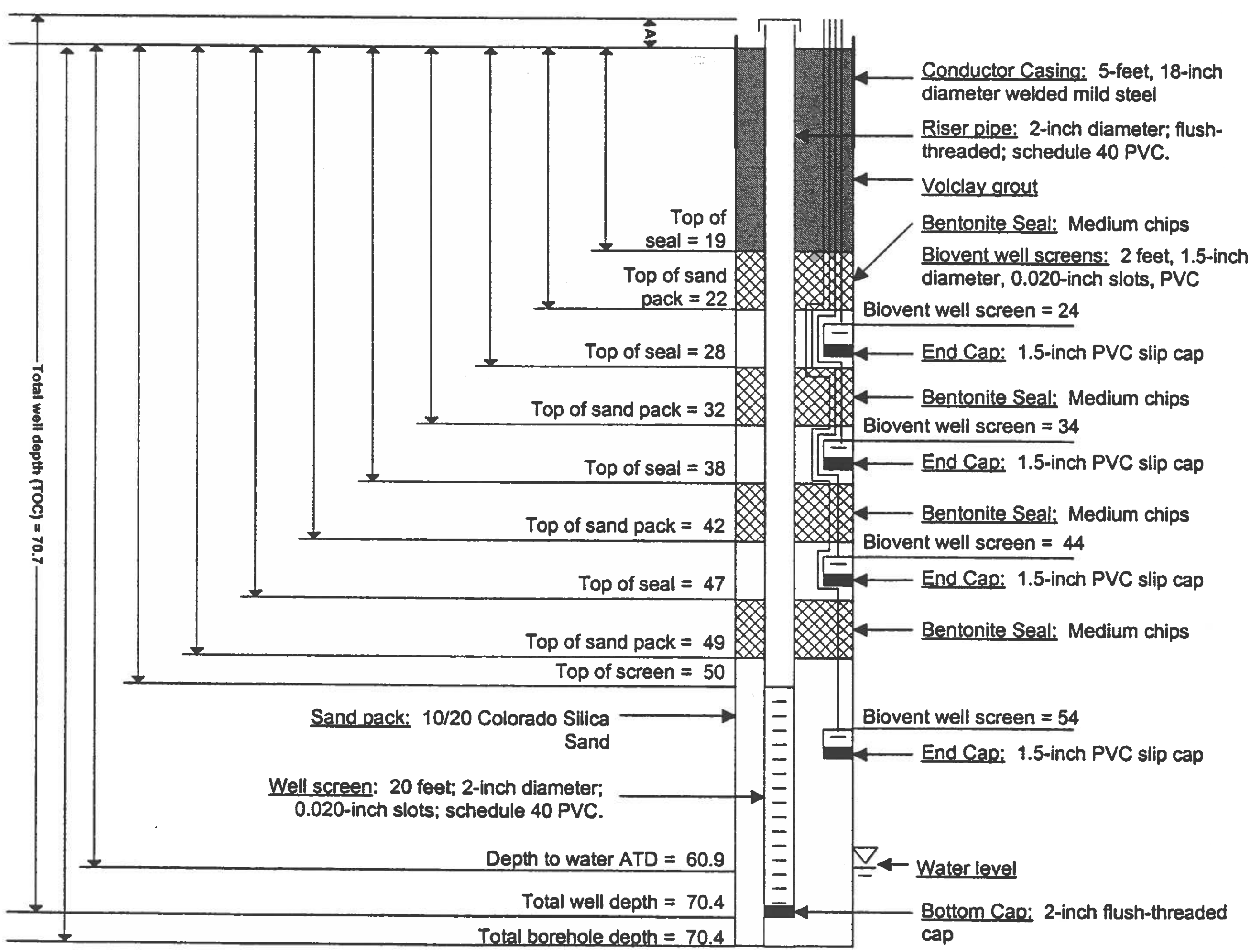
Well Materials	Depth (feet)	Sample ID	Blow Count (per 6 inches)	Sample Interval	PID/FID Readings (ppm)	USCS	Description
Bentonite Seal medium chips	40		4, 12, 11, 16		166, 140, 100		Medium dense, gray-brown, fine to coarse SAND, moist, moderate hydrocarbon odor, some iron-staining. @ 41.0 feet: 40% fine gravel. @ 41.5 feet: 5% silt.
Sand Pack 10/20 Colorado Silica Sand	45		10, 12, 10, 11		875		Same: color change to brown-gray, with 40% fine to coarse gravel, strong hydrocarbon odor. @ 45.5 feet: 1foot of abundant iron-staining. @ 46.5 feet: less than 5% black organic matter.
Bentonite Seal medium chips; **Sand Pack** 10/20 Colorado Silica Sand	50		4, 8, 11, 17		957		Same: with 15% fine to coarse gravel (up to 2 inch), strong hydrocarbon odor, some iron-staining. @ 50.5 feet: 1-inch layer of black organic matter.
Well Screen 20 feet; 2-inch diameter; 0.020-inch slots; Schedule 40 PVC	55		5, 9, 12, 15		900	SW	Same: color change to gray, with 15% fine to coarse gravel, moderate hydrocarbon odor, trace iron-staining. @ 56.5 feet: 2-inch layer of partially carbonized woody debris.
	60		6, 8, 12, 14		2316	▼ 60.9	Same: color change to brown-gray, with 10% fine to coarse gravel, wet, very strong hydrocarbon odor. @ 60.5 feet: 3-inch thickness of carbonized wood, very fine to fine sand, black organic matter, and interbedded clay (0.5 inch thick), abundant hydrocarbon staining.
	65	E204-gw-65-67	nm	ns	nm		
Bottom Cap 2-inch flush-threaded cap	70						Hydropunch groundwater sample from 65 to 67 feet.
							Total depth = 70.4 feet
	75						
	80						

As-Built Diagram

Well E-204

Well Location: Hot Oil Release	**Date Installed: 6/1/99**	Depth Drilled: 70.4	TD After Development: 70.4
Ground Elevation: 139.99	**Project Number: 01-28.5**	Drilling Rig: CME-75	Drilling Method: HSA, 6.5" x 10"
TOC Elevation: 140.26	**Geologist: J. Lipka**	Hole Diameter: 10"	Soil Sampler Type: Splitspoon
Northing: 9460.71	**Drilling Company: Hughes**	Number of Soil Samples: 0	Elevation Datum: MLLW
Easting: 11878.79	**Driller: P. Kelly**	Depth to Water at Time of Drilling (feet, bgs): 60.9	Checked by:

A = 0.27 feet (stick-up)
B = N/A



TOC = top of casing

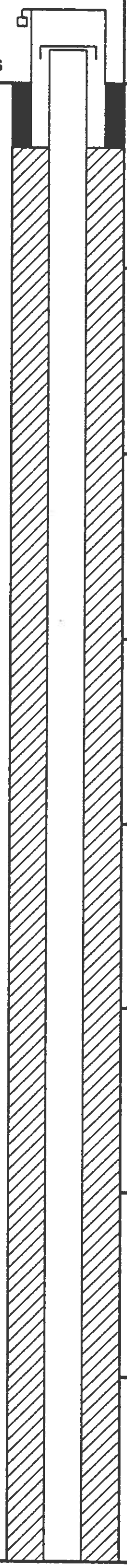
Boring and Well Construction Log

Well E-208

Elevation Ground: 143.3 ft
Elevation TOC: 146.35 ft
Total BH Depth: 79 ft
Total Well Depth: 76.9 ft

Client: Tesoro Alaska Co.	**Driller:** Hughes Drilling
Project Site: Refinery	**Drilling Method:** Hollow-stem auger
Project No.: 01-28.5	**Sampling Method:** 2.5-in split spoon 10 -60 feet, 2.0-in split spoon 65 - 76.5 feet.
Area: Hot Oil Investigation	**Start Date:** 7/7/99
Geologist: J. Lipka	**End Date:** 7/7/99

Well Materials



Surface Casing; 5 feet of 6-inch diameter mild steel

Concrete Surface Pad

Riser Pipe 4-inch diameter; flush-threaded; Schedule 40 PVC

Volclay Grout

Depth (feet)	Sample ID	Blow Count (per 6 inches)	Sample Interval/Recovery	PID/FID Readings (ppm)	USCS	Description
0		nm	ns	nm		Loose, brown, fine to coarse SAND with 30% fine to coarse gravel, moist. Note: Boring hand excavated from 0 to 4 feet.
5		nm	ns	nm		Same as above.
10		2 6 8 11		0.0		Medium dense, brown-gray, fine to coarse SAND with 40% fine to coarse subround to subangular gravel, less than 5% silt, moist, no odor, some iron-staining.
15		4 4 6 7		0.0	sw	Same: loose, with 20% fine to coarse gravel (up to 2.5 inch), trace iron-staining. @ 16.5 feet: 5% fine to coarse gravel.
20		4 6 10 11		0.0		Same: medium dense, with 15% fine to coarse gravel (up to 2 inch), moist to wet. @ 21.0 feet: 1-inch layer of red-brown organic matter.
25		5 7 12 13		0.0		Same: with 20% fine to coarse gravel (up to 2.5 inch), moist.
30		2 5 5 9		0.0		Same: loose, with 20% fine to coarse gravel (up to 1.5 inch), some iron-staining. @ 30.5 feet: 1-inch layer of hydrocarbon stained fined to coarse gravel.
						Loose, gray-brown, fine to coarse SAND with 10% silt, moist, no odor, abundant iron-staining.
35				0.0	sw-sm	Same: medium dense, color change to brown-gray, with 30% fine to coarse subround gravel (up to 1 inch), trace iron-staining.
40						

BORING AND WELL CONSTRUCTION LOG

WELL E-208

CLIENT: Tesoro Alaska Co.
DRILLER: Hughes Drilling
PROJECT SITE: Refinery
DRILLING METHOD: Hollow-stem auger
PROJECT NO.: 01-28.5
SAMPLING METHOD: 2.5-in split spoon 10 -60 feet, 2.0-in split spoon 65 - 76.5 feet.
AREA: Hot Oil Investigation
START DATE: 7/7/99
GEOLOGIST: J. Lipka
END DATE: 7/7/99

Well Materials:

- **Volclay Grout**
- **Bentonite Seal** medium chips
- **Sand Pack** 10/20 Colorado Silica Sand
- **Well Screen** 20 feet; 4-inch diameter; 0.020-inch slots; Schedule 40 PVC
- **Bottom Cap** 4-inch flush-threaded cap

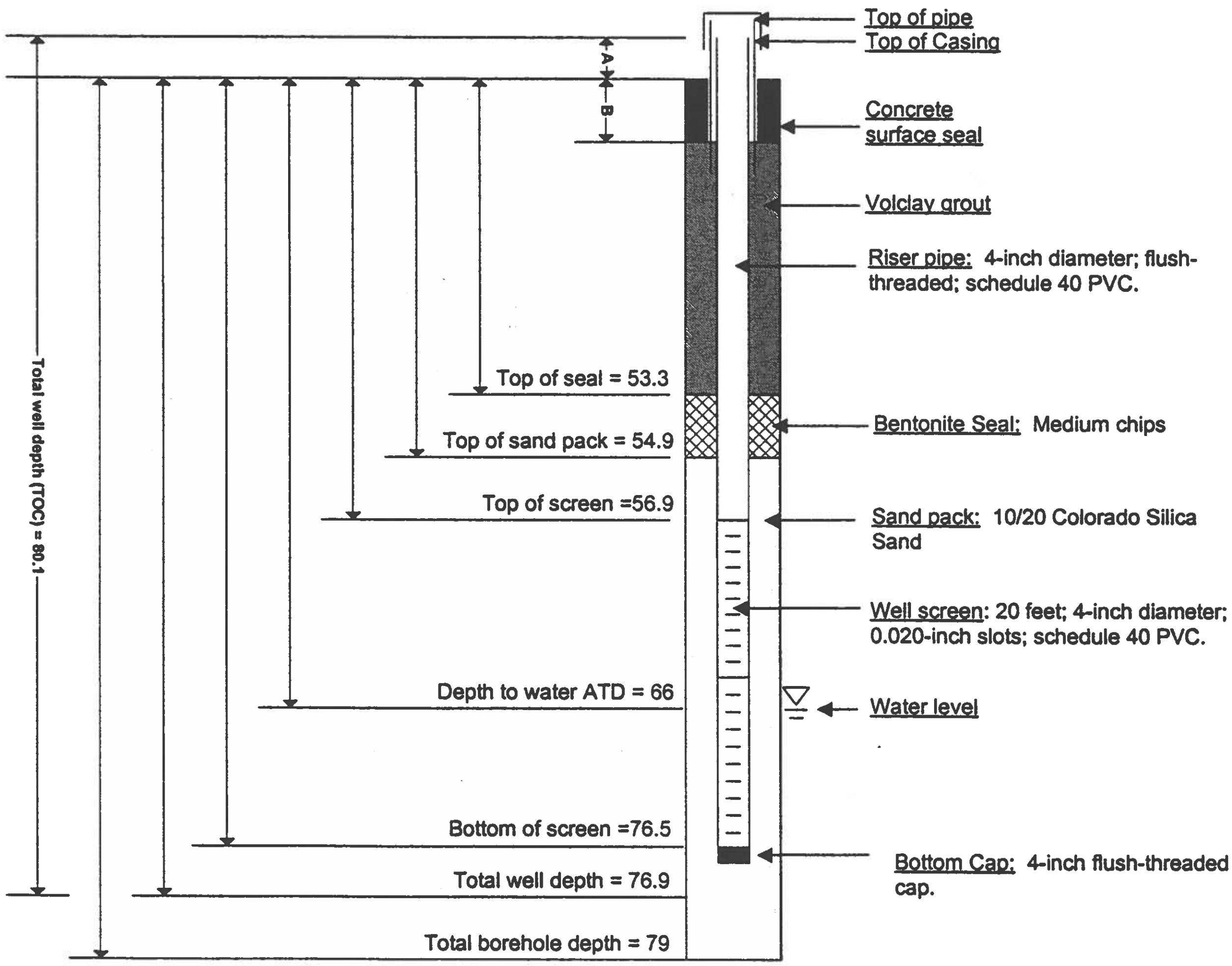
DEPTH (FEET)	SAMPLE ID	BLOW COUNT (PER 6 INCHES)	PID/FID READINGS (PPM)	USCS	Description
40		1, 1, 2, 2	0.0	sw	Loose, brown-gray, fine to coarse SAND with 40% fine to coarse gravel (up to 1 inch), moist, no odor, abundant iron-staining.
				sp	Loose, light gray, very fine to fine SAND wet, no odor, thixotropic. @ 41.5 feet: Very thin (less than 0.25-inch thick) layer of light brown silt.
45		8, 8, 14, 14	0.0		Medium dense, brown-gray, fine to coarse SAND with 20% fine to coarse subround gravel (up to 1 inch), less than 5% silt, scattered black to dark brown organic matter, moist to very moist, no odor, some iron-staining.
50		4, 6, 13, 14	0.0		Same: with 15% fine to coarse subround gravel, no silt, some black organic matter, very moist. @ 51.5 feet: 3-inch layer of coarse sand with 40% fine gravel and abundant iron-staining.
55		4, 10, 12, 12	0.0	sw	Medium dense, gray, fine to coarse SAND with 10% fine to coarse gravel (up to 0.75 inch), moist, slight organic odor.
60		6, 15, 16, 18	0.0		Medium dense, brown-gray, fine to coarse SAND with 30% fine to coarse subround gravel with less than 5% silt, scattered black organic matter, moist to very moist, no odor, some iron-staining. @ 60.5 feet: 1-inch layer of woody material. @ 61.5 feet: 1-inch layer of woody material.
65		9, 16, 16, 8	0.0	66.0	Same: color change to gray, gravel (up to 2 inch), 5% silt, moist. @ 66.5 feet: very fine to coarse sand, wet, no iron-staining.
70	E208-gw-70-72 ft	4, 5, 7	0.0	sp	Loose, gray, very fine to fine SAND with 5% silt, with fine laminations of organic matter, saturated. Hydropunch groundwater sample from 70 to 72 feet.
75		7, 9, 14	0.0	sw	Medium dense, gray, very fine to medium SAND with 5% silt, saturated, no odor, thixotropic. @ 76.5 feet: very thin (0.25 inch) silt interbed.
80					Total depth = 79 feet

As-Built Diagram

Well E-208

Well Location: Hot Oil Inv.	**Date Installed: 7/7/99**	Depth Drilled: 79 ft.	TD After Development: 79 ft.
Ground Elevation: 143.3	**Project Number: 01-28.5**	Drilling Rig: CME-75	Drilling Method: HSA, 6.5" x 10"
TOC Elevation: 146.35	**Geologist: J. Lipka**	Hole Diameter: 10"	Soil Sampler Type: Splitspoon
Northing: 9122.5917	**Drilling Company: Hughes**	Number of Soil Samples: 0	Elevation Datum: MLLW
Easting: 11679.2399	**Driller: P. Kelly**	Depth to Water at Time of Drilling (feet, bgs): 66.0 ft.	Checked by: ______________

A = 3.05 feet (stick-up)
B = 1.95



TOC = top of casing