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REPORTS

DATE:

Sept. 2, 1988

REPORT ON THE INSTALLATION OF A GROUND WATER MONITORING SYSTEM AT THE TENNECO VALDEZ A-1-E WELL SITE

September 2, 1988

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1.0 EXECUTIVE SUMMARY

During late June and early July, 1988, Geoscience Consultants, Ltd. (GCL) conducted a limited hydrogeologic study and monitor well installation program at Tenneco's Valdez A-1-E well site in San Juan County, New Mexico. The Valdez A-1-E well site is located approximately 3 miles east of Bloomfield. The site is an active natural gas producing well with an associated condensate storage tank, separator and water disposal facilities.

Six 2-inch PVC monitor wells were installed to determine the areal extent of any hydrocarbons in ground-water at the Valdez A-1-E facility. One of the monitor wells was abandoned due to entry of silt through a damaged screen. This well was replaced during August 1988.

Benzene, toluene, ethylbenzene and xylenes (BTEX) were present in ground water from monitor well V-6, near the southwest corner of the Valdez A-1-E site. BTEX was not detected in three monitor wells, nor in a domestic well adjacent to the site. One monitor well (V-5) showed BTEX concentrations two orders of magnitude below New Mexico Water Quality Control Commission (NMWQCC) standards.

2.0 METHODS OF INVESTIGATION

Drilling and monitor well installation at the Valdez A-1-E site were performed on June 29 through July 1, 1988. Monitor wells were located in those areas where ground-water contamination was suspected based on a preliminary survey by the New Mexico Oil Conservation Division (NMOCD). Up- and down-gradient locations of wells were selected by a Tenneco representative with NMOCD concurrence.

Drilling was performed with a CME-55 hollow-stem auger owned and operated by Western Technologies, Inc. of Farmington, New Mexico. All drilling equipment and associated materials were thoroughly steam-cleaned with a hot water washer generating temperatures greater than 180° Fahrenheit prior to setting up on each borehole location.

During drilling operations, soil samples were recovered and logged by a GCL on-site geologist. Boreholes V-2 and V-4 (see Appendix A) were cored with a continuous sampler to obtain detailed subsurface information; the cores were cased in Lexan tubing and stored at the Tenneco warehouse in Farmington, New Mexico. The boreholes and working area were monitored constantly during drilling operations with a combustible gas and oxygen indicator (CGI) and an H-Nu photoionization detector. No levels of suspected constituents requiring protective measures were encountered during drilling operations.

Flowing sands were encountered in well V-6. In order to complete this well, it was necessary to introduce 10 gallons of clean water into the borehole to build head on the water-bearing unit, this minimizing the flow of formational sand and silt into the borehole. Over 10 gallons of water were developed from the well immediately after completion, and additional amounts were removed prior to sampling the well. This procedure ensured that samples from the well were representative of water in the formation and were not diluted by the water introduced during well completion. Water was not introduced during completion of the other wells on the Valdez A-1-E site.

The monitor wells were developed and purged by bailing. Limited amounts of water introduced into the wells during installation were bailed out to ensure that ground-water quality was not compromised. An additional three casing volumes of water were removed from each well prior to sampling.

At least six (6) gallons of water, approximately three casing volumes, were developed from each monitor well immediately after completion, with the exception of monitor wells V-4 and V-6. Sixteen gallons of water were developed out of well V-6 because it had been necessary to introduce 10 gallons of water into the borehole during installation of that well. Monitor well V-4 was abandoned.

Before sampling the monitor wells at the Valdez A-1-E well site, three casing volumes of water were purged from each well to minimize well effects on ground-water quality and ensure that ground-water samples were representative of water in the aquifer. A 5-foot stainless bailer was used to purge and sample the monitor wells. The samples were collected in 40-milliliter glass septum vials and sent to the Radian Analytical Services Laboratory located in Austin, Texas. Water from a domestic well adjacent to the Valdez A-1-E site on the west was also sampled and included with the sampling suite.

Radian Analytical Services analyzed the samples taken from Valdez A-1-E monitor wells for purgeable halocarbons (EPA method 601), purgeable aromatics (EPA method 602), pH and total dissolved solids (TDS).

3.0 REGIONAL GEOLOGY AND HYDROLOGY

3.1 REGIONAL GEOLOGY

The Valdez A-1-E well site is located in northeastern San Juan County, New Mexico (Figure 3-1) in the central San Juan Basin. The San Juan Basin is located in the southeastern part of the Colorado Plateau and is approximately the eastern half of the Navajo physiographic section of the Colorado Plateau Province (Figure 3-2). The San Juan Basin is a Laramide (Late Cretaceous - early Tertiary) depression with maximum structural relief of 10,000 feet (Kelley, 1950). Local topographic relief is in the range of tens of feet. The central Basin is bounded on all sides except the south by the "Hogback" monocline. To the south the principal structural boundary is the domal northwestward-trending Zuni uplift. At the east end of this uplift the boundary is a low, wide divide along the axis of the southward-trending Mount Taylor syncline and the Acoma embayment (Kelley, 1950). The lithologic units exposed in the central Basin area are largely the San Jose, Nacimiento, and Animas formations of early Tertiary age (Kelley, 1950). Quaternary deposits are restricted mainly to major valleys.

Quaternary deposition in the San Juan Basin included the formation of outwash terraces along the San Juan River and its tributaries (Pleistocene), the growth and migration of sand dunes on higher plateaus (Pleistocene and Recent), and the cutting and filling of alluvial channels throughout the area (Stone and others, 1983). The Quaternary deposits consist of heterogeneous mixtures of gravel, sand, silt and clay. Texture and composition vary widely depending on age and source. In the valleys of the San Juan River and its tributaries, the alluvium does not exceed 100 feet in thickness (Stone and others, 1983). Terrace deposits consisting of boulder gravel rest on benches cut into the Tertiary bedrock of the area. The boulders are very well rounded and consist of various igneous and metamorphic rock types. These deposits can be traced upstream to late Pleistocene glacial moraines in the mountains of Colorado and are termed outwash terraces by Stone and others (1983, p. 24). The valley fill and terrace deposits form a disconformable contact with all underlying units. The Nacimiento Formation is

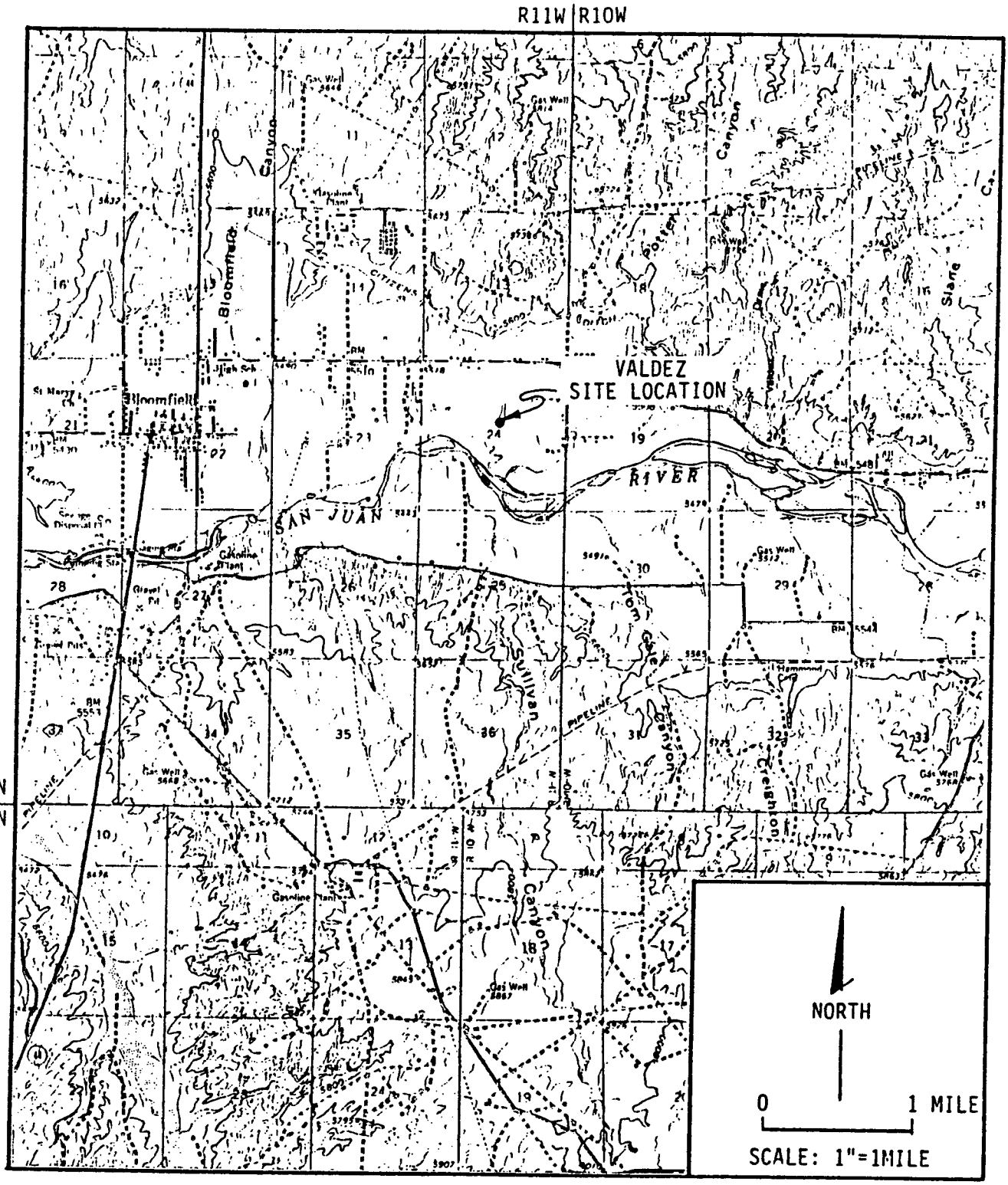


FIGURE 3-1

LOCATION MAP OF THE TENNECO VALDEZ SITE

(BASE FROM USGS 15 MINUTE BLOOMFIELD QUADRANGLE)

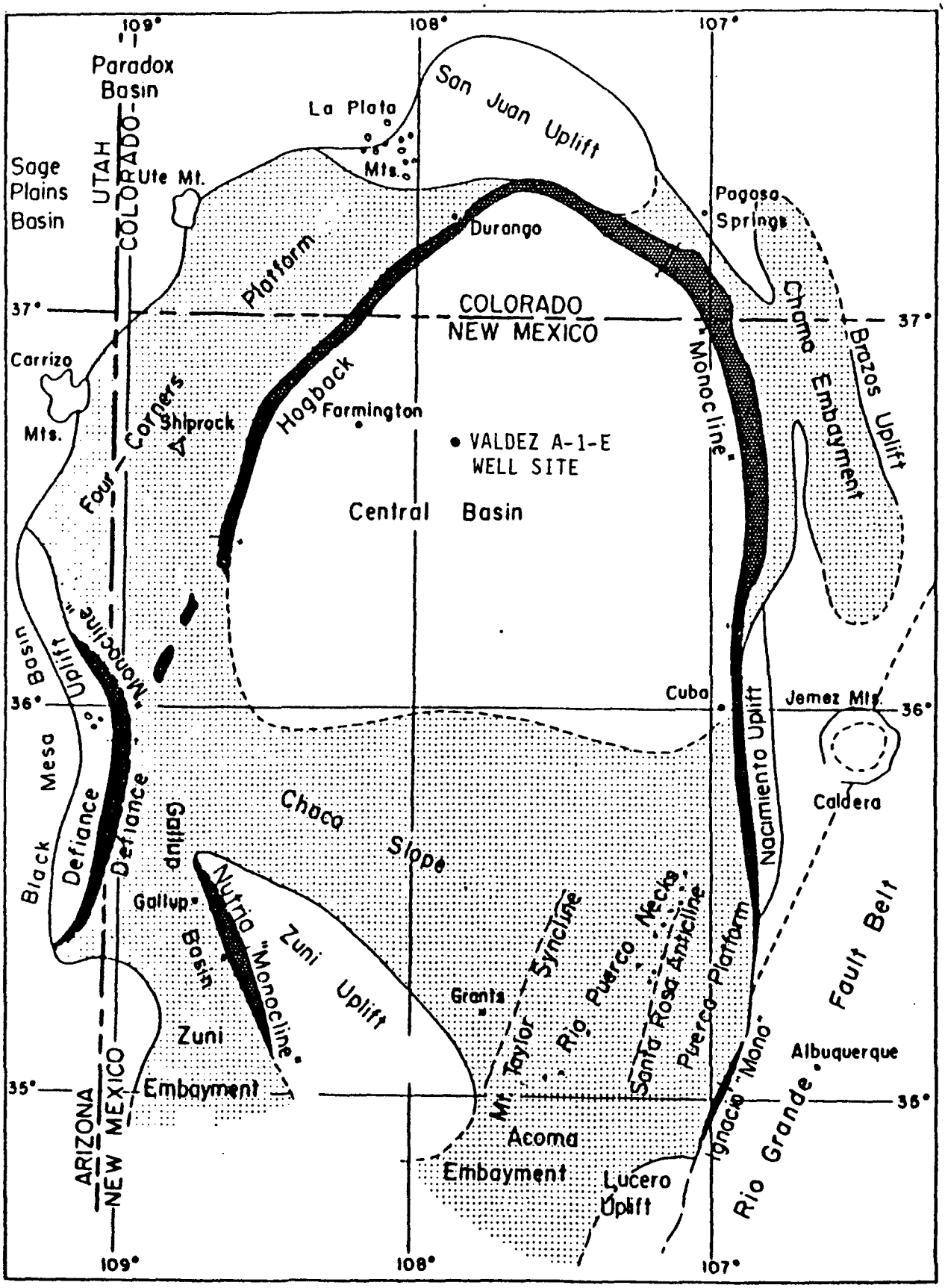


FIGURE 3-2

STRUCTURAL ELEMENTS OF THE SAN JUAN BASIN

(MODIFIED FROM KELLY 1951)

characterized by interbedded black, carbonaceous mudstones and white, coarse-grained sandstones, whereas the upper part of the formation is dominated by more somber beds of mudstone and sandstone. Thickness of the Nacimiento ranges from about 400 to 2200 feet (Stone and others, 1983). The Nacimiento Formation outcrops throughout the Central Basin and is in disconformable contact with Quaternary valley fill and San Juan River alluvium.

3.2 REGIONAL HYDROLOGY

Much of the recharge to ground water in the San Juan Basin occurs on the flanks of the Zuni, Chuska, and Cebolleta Mountains (Stone and others, 1983, p. 22). Numerous ephemeral-stream channels filled with alluvium are the principal sources of ground-water recharge in some areas and the principal locations of discharge in others.

Numerous shallow wells produce water from valley fill for stock and domestic users along some streams in the San Juan Basin. In many areas valley fill provides the only source of potable water for rural inhabitants. The transmissivity of valley fill varies widely, depending on the lithology and thickness of the fill materials. Highest transmissivities can be expected in the San Juan, Animas, and La Plata River valleys where coarse sand and gravel predominate (Stone and others, 1983).

Much of the water in the valley fill of the San Juan Valley currently comes from drainage of irrigated lands; the valley also receives water from underlying and adjacent bedrock units (Nacimiento). Although small in quantity compared with irrigation drainage, these contributions can appreciably affect water quality because of their relatively high dissolved-solids concentrations (Stone and others, 1983). Much of the water in the valley fill ultimately reaches the rivers and contributes to their dissolved-solids concentrations.

In the ephemeral-stream channels, most recharge to the valley fill results from infiltration of stormflow, but small quantities are also contributed from bedrock sources, especially in lower reaches. In their upper reaches, these channels may be major sources of water for recharge to underlying bedrock aquifers.

4.0 SITE CONDITIONS AT VALDEZ A-1-E WELL SITE

4.1 MONITOR WELL INSTALLATION

Drilling and monitor well installation were performed at the Valdez A-1-E well site during June 29 through July 1, 1988. Six 2-inch diameter PVC monitor wells were installed at the site (Figure 4-1). The boreholes were completed to the depth of auger refusal within a coarse gravel unit approximately 20 to 23 feet below ground level (BGL). The total depth of the monitor wells ranged from 20.17 feet BGL at monitor well V-1 to 23.13 feet BGL at monitor well V-5 (Appendix B). Flowing sands were encountered only in borehole V-4. Water was introduced into the borehole to build head on the sand to prevent it from flowing into the auger annulus and also aid in the installation of the well casing.

Monitor well V-4 was abandoned because, after completion, it was found that the well casing had collapsed and native sediment combined with some of the filter pack had entered the well casing, filling the casing up to the static water level. The upper portion of casing was removed from monitor well V-4 and the well was filled with bentonite powder to approximately two feet BGL. The remaining two feet was filled with grout to ensure a secure plug at the ground surface.

Monitor well V-4 was replaced by well V-4A on August 12, 1988. Monitor well V-4A is located four feet northwest of abandoned monitor well V-4. Minor amounts of hydrocarbon-stained soil were noted in the cuttings during drilling of well V-4A. Ground water was encountered at approximately 12 feet BGL and after installation of monitor V-4A one gallon of water was developed out to ensure alignment of the monitor well. Monitor well V-4A will be sampled in the next sampling event which is to take place in early September 1988.

4.2 SITE GEOLOGY AND HYDROLOGY

The subsurface geology at the Valdez A-1-E site is composed predominantly of clays, silty sands and gravels of the San Juan River alluvium. Lithologic logs of the monitor wells completed at the site are included in Appendix A.

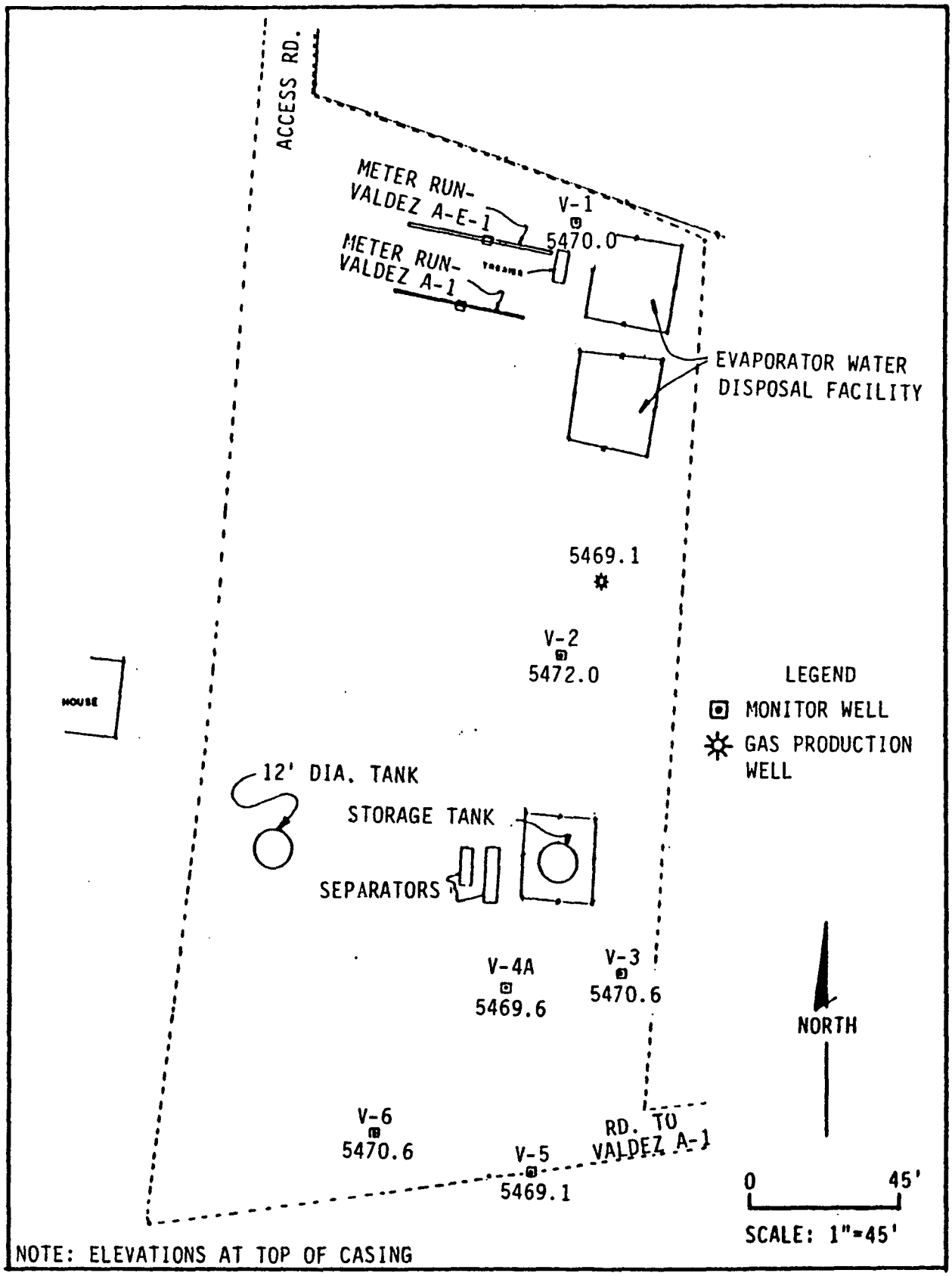


FIGURE 4-1

SITE MAP OF MONITOR WELL LOCATIONS AT VALDEZ A-1-E WELL SITE

Shallow ground water at the Valdez A-1-E well site occurs under water table conditions. Based on July 1988 data, ground water flows to the southwest with a hydraulic gradient of 0.01 (Figure 4-2). This trend is greatly influenced by the regional geology, irrigation return flows and the water level in the San Juan River. The uppermost saturated zone beneath the site is fine-grained San Juan River alluvium which overlies the Nacimiento Formation. The water table occurs at depths below the land surface ranging from 10.16 feet at monitor well V-1 to 12.79 feet in monitor well V-6 (Appendix A).

During development of the monitor wells, low yields were obtained. Each well yields a sustainable rate of less than 2 gallons per minute. The fine-grained sediments that occur beneath the site can typically be expected to exhibit hydraulic conductivities of 10^{-3} to 10^{2} gallons per day per square foot (Figure 4-3).

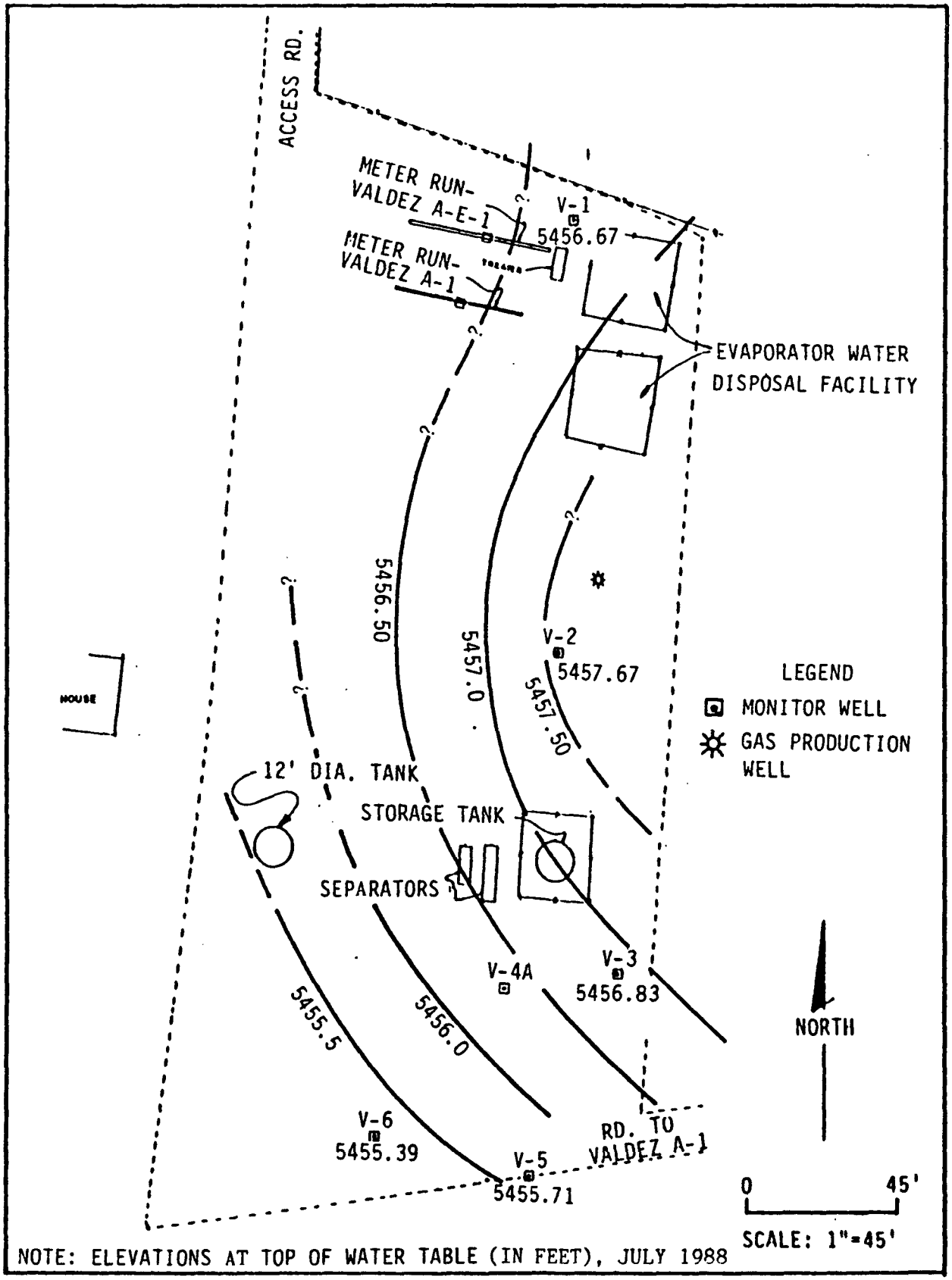


FIGURE 4-2

LOCAL HYDROLOGIC GRADIENT MAP OF TENNECO VALDEZ A-1-E WELL SITE

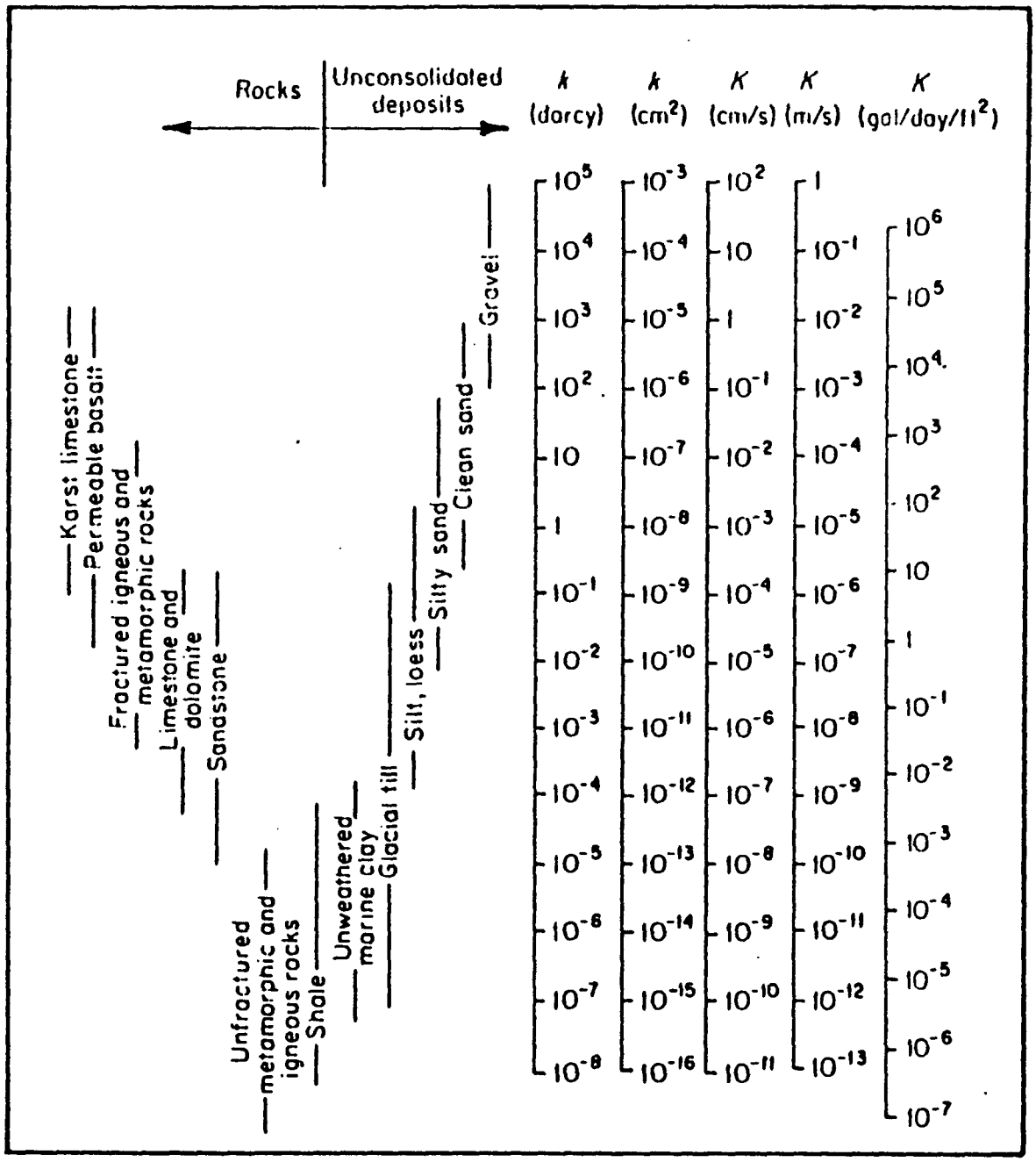


FIGURE 4-3

RANGE OF VALUES OF HYDRAULIC CONDUCTIVITY AND PERMEABILITY

(FROM FREEZE AND CHERRY, 1979)

5.0 ANALYTICAL RESULTS

Based on July 1988 data, benzene, toluene, ethylbenzene and xylene (BTEX) are limited in extent at the Valdez A-1-E well site. BTEX concentration is above New Mexico Water Quality Control Commission drinking water standards in only one of the five wells sampled to date. Monitor well V-6 analysis shows benzene at 1.5 parts per million (ppm), toluene at 3.3 ppm, ethylbenzene at 0.55 ppm and total xylenes at 4.567 ppm. Trace amounts of BTEX were also indicated in monitor well V-5, with toluene at 0.5 parts per billion (ppb) and total xylenes at 0.3 ppb. The analytical results are summarized in Table 5-1 and included in Appendix C of this report. Only a trace amount of chloroform, 3.7 ppb, was indicated from the sample analysis in monitor well V-6. Monitor well V-4 was not sampled due to damaged screen and well casing. All wells will be resampled during early September 1988.

TABLE 5-1

ANALYTICAL RESULTS, VALDEZ A-1-E SITE
JULY 1988

ANALYTE	WELL NUMBER V-1	V-2	V-3	V-4	V-5	V-6	DOMESTIC WELL	REGULATORY STANDARDS FOR DRINKING WATER	DETECTION LIMITS
pH	7.2	7.3	7.3	NA	7.2	7.1	7.1	6 TO 9	
BENZENE (ppb)	ND	ND	ND	NA	ND	1500	ND	10	0.20
TOLUENE (ppb)	ND	ND	ND	NA	0.5*	3300	ND	750	0.20
ETHYLBENZENE (ppb)	ND	ND	ND	NA	ND	550	ND	750	0.30
TOTAL XYLENES (ppb)	ND	ND	ND	NA	0.3*	4560	ND	620	0.20
CHLOROFORM (ppb)	ND	ND	ND	NA	ND	3.7	ND	100	0.05
FILTERABLE RESIDUE (TDS) (ppm)	3000	2300	2300	NA	2400	1800	2800	1000	3.00

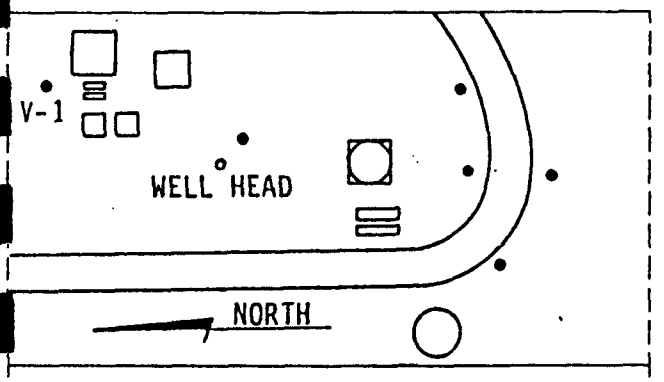
NOTES:
ND = NOT DETECTED
NA = NOT ANALYZED
* = LESS THAN 5 TIMES THE DETECTION LIMIT
V-4 NOT SAMPLED DUE TO DAMAGED CASING
REGULATORY STANDARDS TAKEN FROM THE NEW MEXICO WATER QUALITY CONTROL COMMISSION (1987)
ppb = PARTS PER BILLION
ppm = PARTS PER MILLION

TENN\BTEX1.FIG

APPENDIX A

LITHOLOGIC LOGS OF BOREHOLES

BOREHOLE LOG (SOIL)



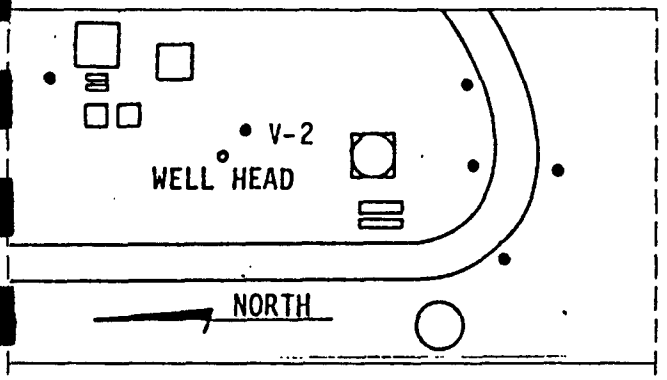
___1/4 ___1/4 ___1/4 ___1/4 S 24 T 29N R 11W

SITE ID: Valdez LOCATION ID: V-1
SITE COORDINATES (ft.): 2390 FNL, 2500 FEL
N _____ E _____
GROUND ELEVATION (ft. MSL): _____
STATE: New Mexico COUNTY: San Juan
DRILLING METHOD: HSA
DRILLING CONTR.: Western Technologies
DATE STARTED: 7/01/88 DATE COMPLETED: 7/01/88
FIELD REP.: W.S. Dubyk, P. Linley
COMMENTS: _____

LOCATION DESCRIPTION: _____

DEPTH	LITH.	REC	SAM	RUN #	RUN FROM	RUN TO	SAMPLE REC.	SAMPLE TYPE	USCS	VISUAL CLASSIFICATION
0									CH	0'-13' Clay - moderate brown 5 YR 3/4, plastic, damp, no odor.
5									MH	13'-17' Silt - dark yellowish brown, 10 YR 4/2, with clay and minor sand grains.
10									GC	17'-20.5' Gravel - with clay and sand, poor cutting return. Water noted at 17'.
15										
20	T.D. 20.17'									
25										
30										

BOREHOLE LOG (SOIL)



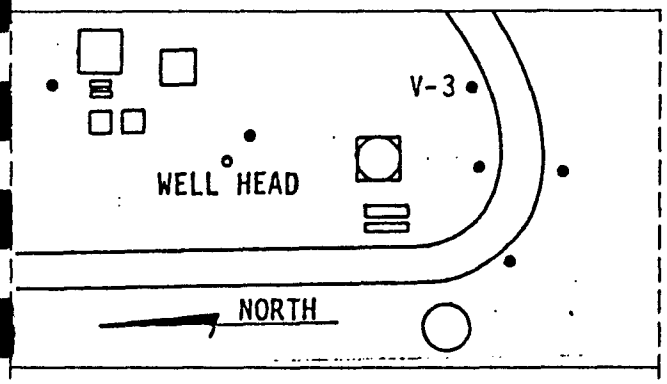
___1/4 ___1/4 ___1/4 ___1/4 S 24 T 29N R 11W

SITE ID: Valdez LOCATION ID: V-2
SITE COORDINATES (ft.): 2390 FNL, 2500 FEL
N _____ E _____
GROUND ELEVATION (ft. MSL): _____
STATE: New Mexico COUNTY: San Juan
DRILLING METHOD: HSA
DRILLING CONTR.: Western Technologies
DATE STARTED: 7/01/88 DATE COMPLETED: 7/01/88
FIELD REP.: W.S. Dubyk, P. Linley
COMMENTS: Cored.

LOCATION DESCRIPTION: _____

DEPTH	LITH.	REC	SAM	RUN #	RUN FROM	RUN TO	SAMPLE REC.	SAMPLE TYPE	USCS	VISUAL CLASSIFICATION
0				1	0'	3'	100%		CH	0'-3' Clay - silty, damp, pale brown 5 YR 5/2 plastic, no odor, fill material.
5				2	3'	8'	60%		SC	3'-8' Sand and Silt - clayey, poorly sorted, moderately rounded, very fine to coarse, yellowish gray damp, probably fill. Grayish Orange Pink 5 Y 7/2.
10				3	8'	13.5'	100%		CH	8'-13.5' Clay - slightly silty, plastic damp, no odor, caliche streaks in fracs. Dark yellowish brown 10 YR 4/2.
15				4	13.5'	18.5'	75%		CH	13.5'-18.5' Clay - as above. Gravel at 18.4', to 2" diameter, slightly rounded, in clay and sand matrix. No coring after 18.5'.
20	T.D. 21.5'			5	18.5'	21.5'	0%		GC	18.5'-21.5' Gravel - no recovery, very slow drilling.
25										
30										

BOREHOLE LOG (SOIL)



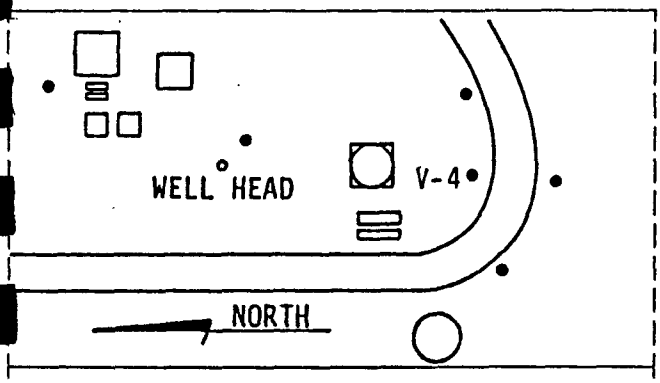
___1/4 ___1/4 ___1/4 ___1/4 S 24 T 29N R 11W

SITE ID: Valdez LOCATION ID: V-3
SITE COORDINATES (ft.): 2390 FNL, 2500 FEL
N _____ E _____
GROUND ELEVATION (ft. MSL): _____
STATE: New Mexico COUNTY: San Juan
DRILLING METHOD: HSA
DRILLING CONTR.: Western Technologies
DATE STARTED: 6/30/88 DATE COMPLETED: 6/30/88
FIELD REP.: W.S. Dubyk, P. Linley
COMMENTS: _____

LOCATION DESCRIPTION: _____

DEPTH	LITH.	REC	SAH	RUN #	RUN FROM	RUN TO	SAMPLE REC.	SAMPLE TYPE	USCS	VISUAL CLASSIFICATION
0									ML	0'-8' Fill - very fine grained silty clay, no odor, light brown 5 YR 6/4.
5									CH	8'-18' Clay - silty, minor rounded quartz grains; plastic, cohesive, carbonate, damp, no odor caliche in fracs. Water at 18' medium brown, 5 YR 4/4.
10										
15									GC	18'-23' Gravel - no sample return difficult drilling.
20										
	TD 22.94'									
25										
30										

BOREHOLE LOG (SOIL)



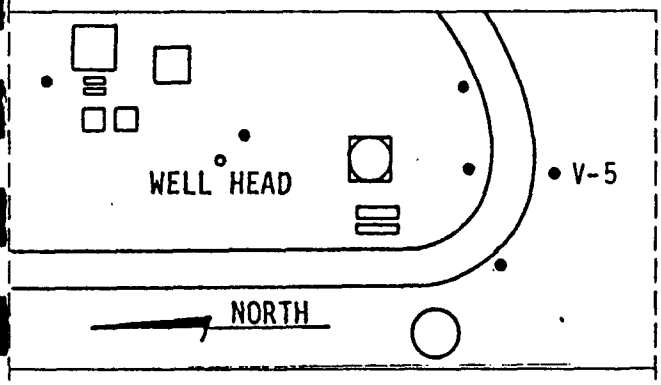
___1/4 ___1/4 ___1/4 ___1/4 S 24 T 29N R 11W

SITE ID: Valdez LOCATION ID: V-4
SITE COORDINATES (ft.): 2390 FNL, 2500 FEL
N _____ E _____
GROUND ELEVATION (ft. MSL): _____
STATE: New Mexico COUNTY: San Juan
DRILLING METHOD: HSA
DRILLING CONTR.: Western Technologies
DATE STARTED: 7/1/88 DATE COMPLETED: 7/1/88
FIELD REP.: W.S. Dubyk, P. Linley
COMMENTS: Cored with continuous sampler

LOCATION DESCRIPTION: _____

DEPTH	LITH.	REC	SAM	RUN #	RUN FROM	RUN TO	SAMPLE REC.	SAMPLE TYPE	USCS	VISUAL CLASSIFICATION
0				1	2'	7'	100%			0'-7' Fill - Clayey sand, no odor.
									CH	7'-13' Clay - Dusky, yellowish brown 10 YR 2/2, laminated, damp, plastic. Hydrocarbon string at 11', odor noted.
5				2	7'	12'	100%			
									CH	13'-17.5' Clay - as above, grades downward into sandy clay, medium yellowish brown, 10 YR 5/4.
10				3	12'	14'	50%			17.5'-18' Sand - with minor gravel moderately yellowish
									GC	brown 10 YR 5/4 moderately sorted, fine to coarse grained. Core to 18'.
15				4	14'	18'	100%		GC	18' Gravel - no sample, difficult drilling.
20										
	T.D. 23'									
25										
30										

BOREHOLE LOG (SOIL)



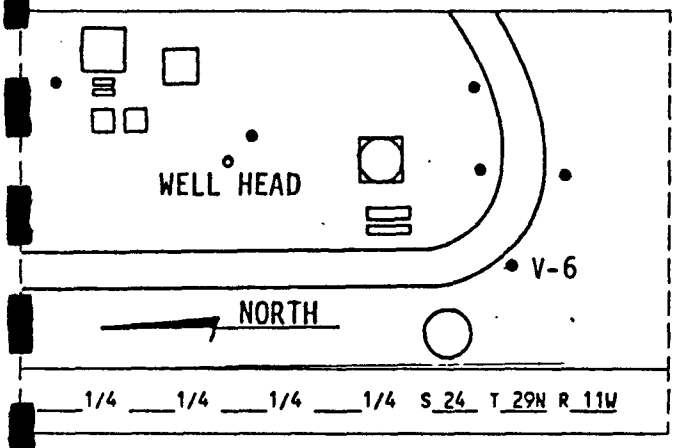
___1/4 ___1/4 ___1/4 ___1/4 S 24 T 29N R 11W

SITE ID: Valdez LOCATION ID: V-5
SITE COORDINATES (ft.): 2390 FNL, 2500 FEL
N _____ E _____
GROUND ELEVATION (ft. MSL): _____
STATE: New Mexico COUNTY: San Juan
DRILLING METHOD: HSA
DRILLING CONTR.: Western Technologies
DATE STARTED: 6/30/88 DATE COMPLETED: 6/30/88
FIELD REP.: W.S. Dubyk, P. Linley
COMMENTS: _____

LOCATION DESCRIPTION: _____

DEPTH	LITH.	REC	SAM	RUN #	RUN FROM	RUN TO	SAMPLE REC.	SAMPLE TYPE	USCS	VISUAL CLASSIFICATION
0										0'-8' Fill - Silty clay, light brown 5 YR 5/6, no odor.
									CH	9'-13' Clay - Silty, laminated, dusky brown 5 YR 2/2 plastic, damp, no odor.
5										
									MH	13'-17.5' Silt - with clay and ~20% medium to coarse sand grains. Laminated, dusky brown 5 YR 2/2 damp, no odor, plastic.
10										
									GC	17'-23' Gravel - no sample return. H_2O at 17' noted at top of hole. Difficult drilling at 18'.
15										
20										
	T.D. 23'									
25										
30										

BOREHOLE LOG (SOIL)



1/4 ___1/4 ___1/4 ___1/4 S 24 T 29N R 11W

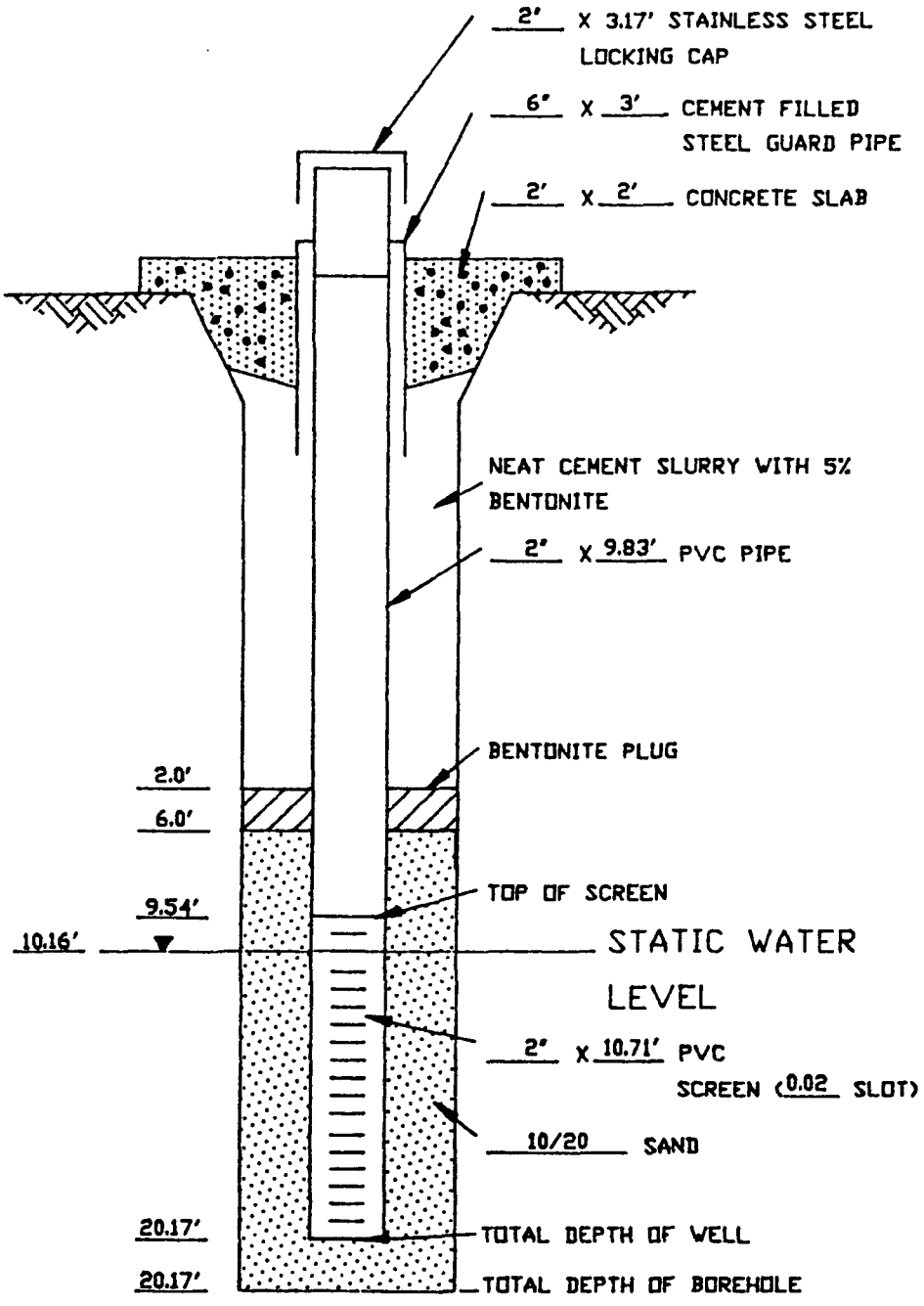
SITE ID: Valdez LOCATION ID: V-6
SITE COORDINATES (ft.): 2390 FNL, 2500 FEL
N _____ E _____
GROUND ELEVATION (ft. MSL): _____
STATE: New Mexico COUNTY: San Juan
DRILLING METHOD: HSA
DRILLING CONTR.: Western Technologies
DATE STARTED: 6/29/88 DATE COMPLETED: 6/30/88
FIELD REP.: W.S. Dubyk, P. Linley
COMMENTS: _____

LOCATION DESCRIPTION: _____

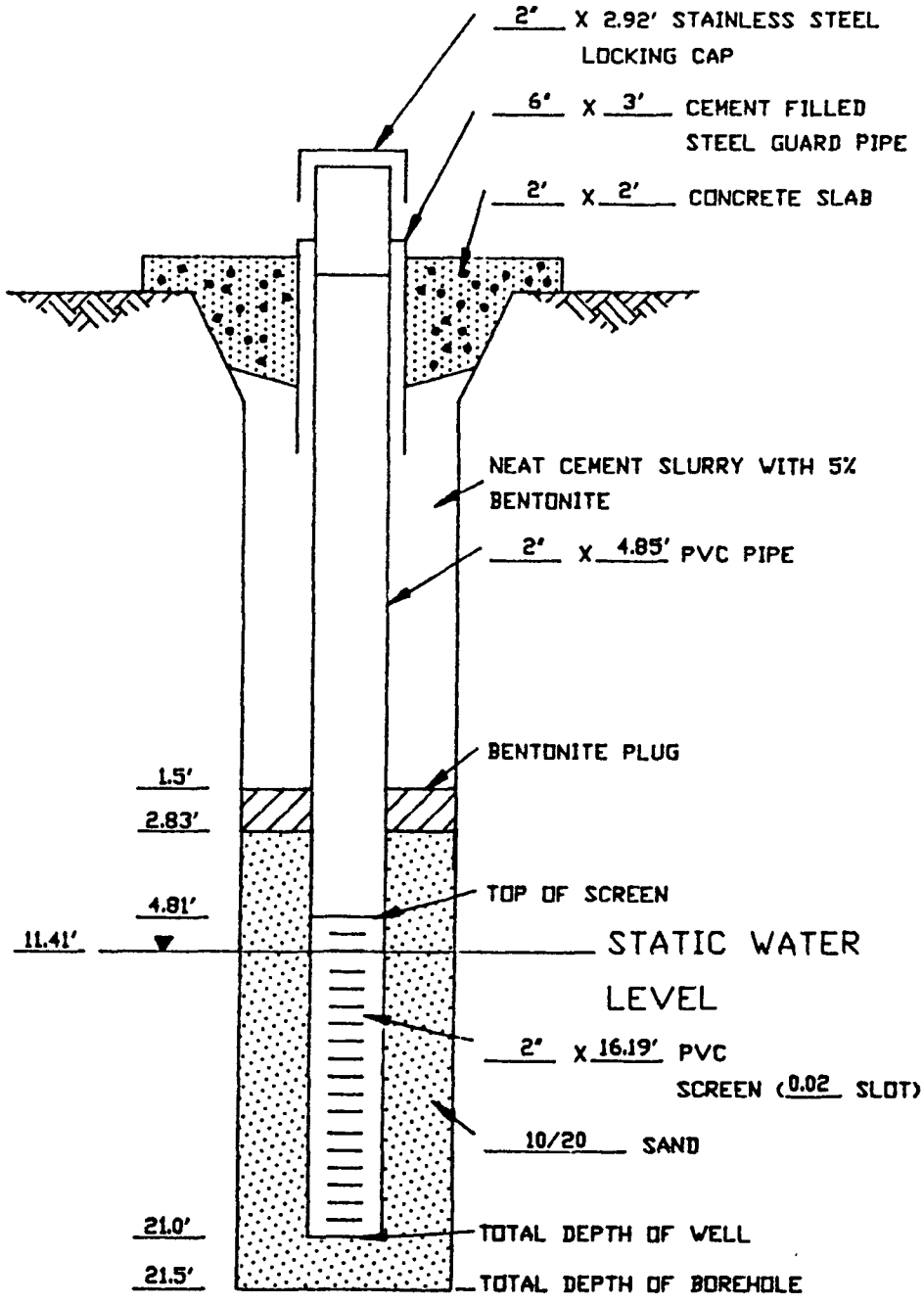
DEPTH	LITH.	REC	SAH	RUN #	RUN FROM	RUN TO	SAMPLE REC.	SAMPLE TYPE	USCS	VISUAL CLASSIFICATION
0										0'-9' Fill - Silty clay, pale brown 5 YR 5/2, very fine grained.
									CH	9'-17' Clay - Silty, carbonate, lined fracs. medium brown 5 YR 4/4, odor at 12'.
5										
									GC	17'-18' Gravel - cobbles, difficult drilling.
10										
									CH	18'-20' Clay - grayish brown 5 YR 3/2; odor noted; plastic, wet.
15									GC	20'-20.5' Cobbles - gravel, no sample return. Very difficult drilling (refusal).
20	TD 20.81'									
25										
30										

APPENDIX B

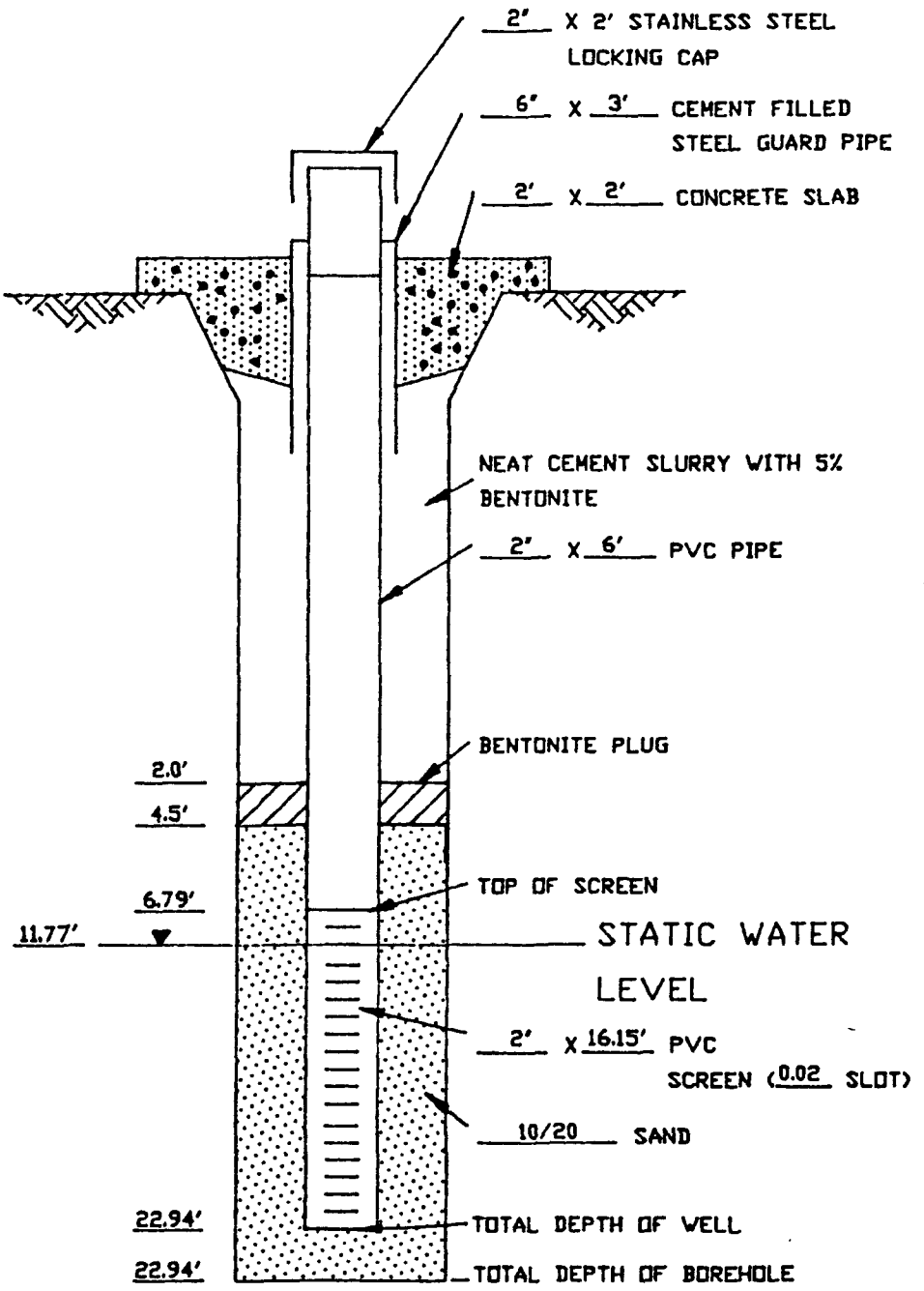
WELL COMPLETION DIAGRAMS



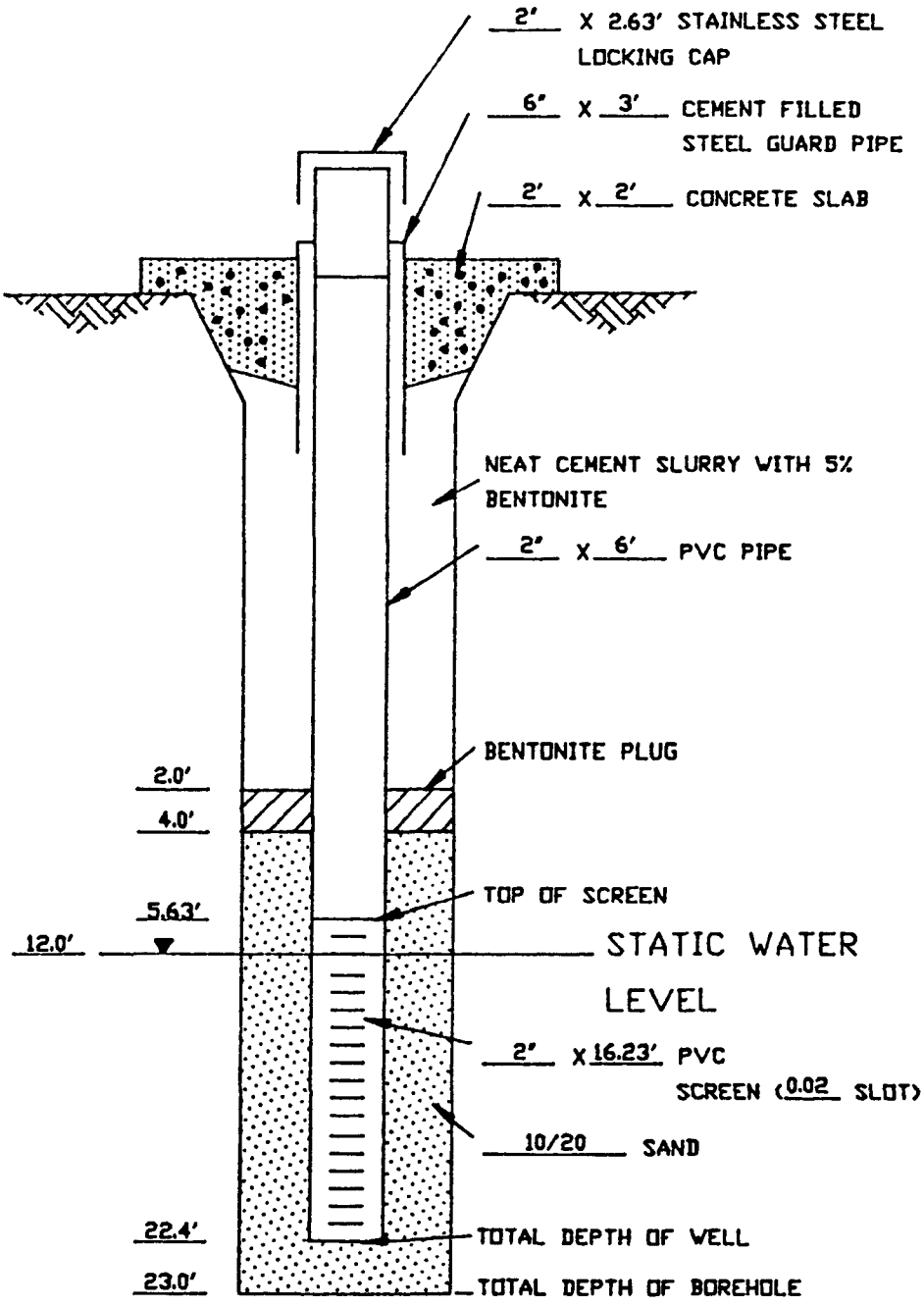
TENNECO WELL COMPLETION DIAGRAM
VALDEZ SITE: WELL V-1



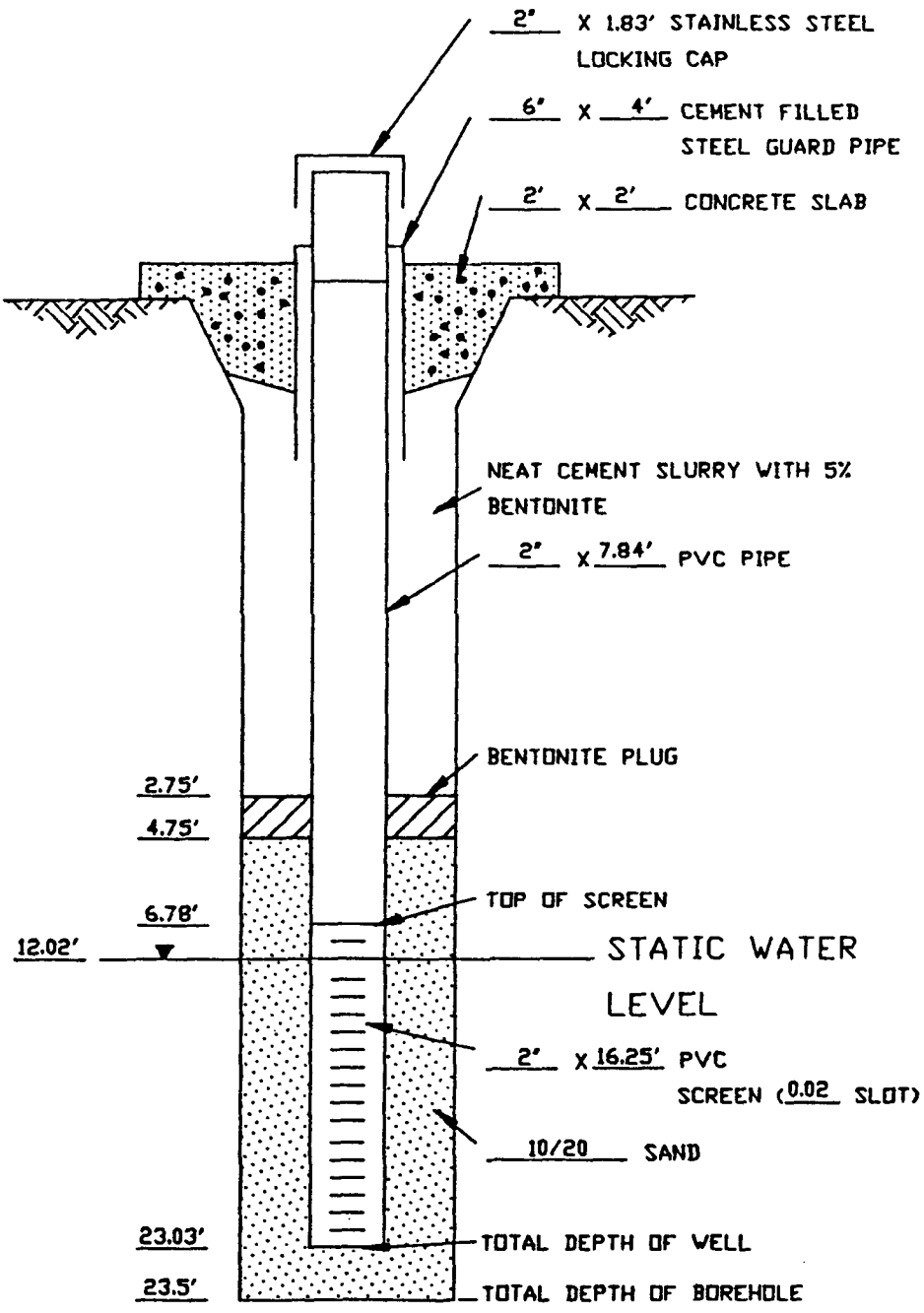
TENNECO WELL COMPLETION DIAGRAM
VALDEZ SITE, WELL V-2



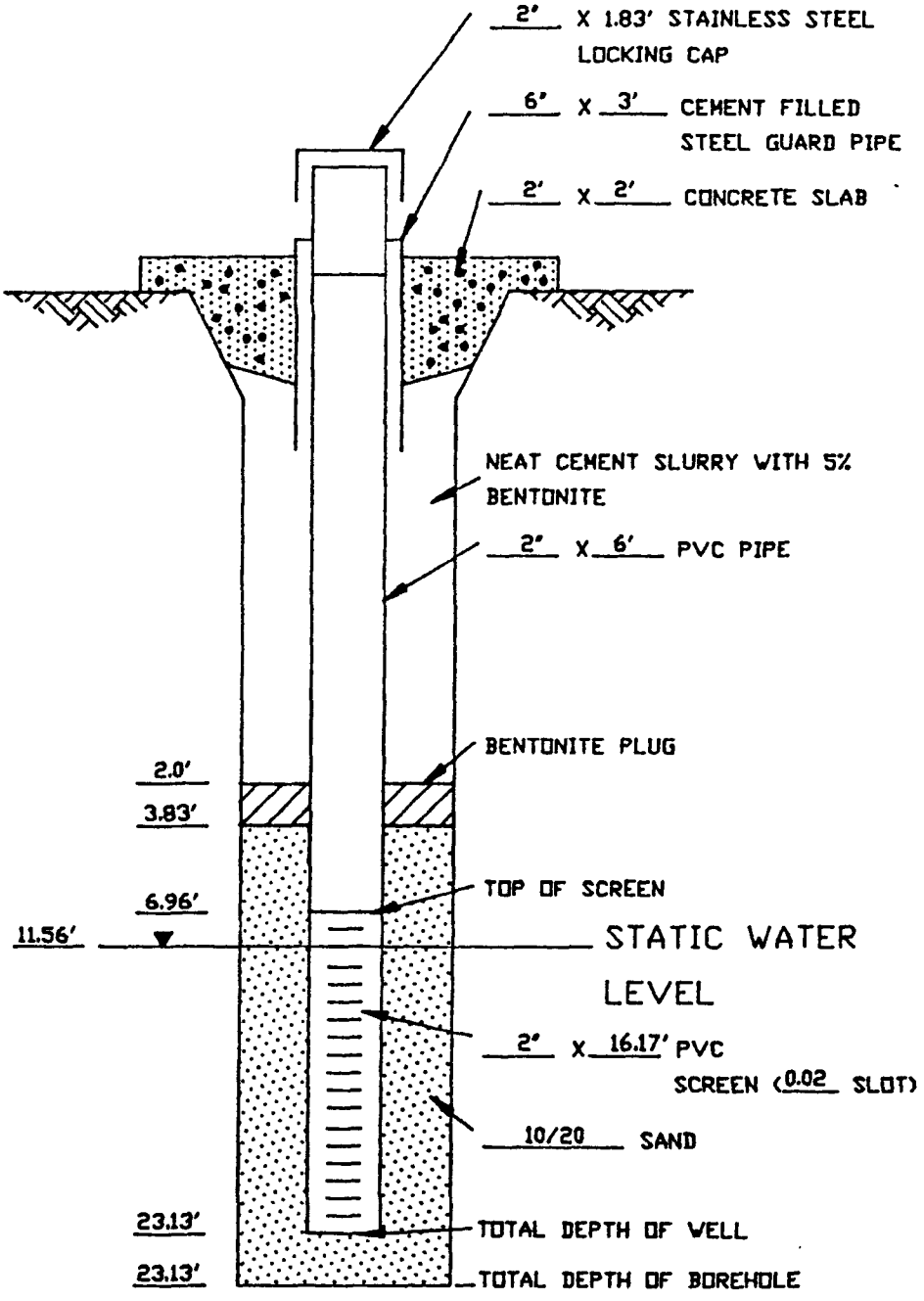
TENNECO WELL COMPLETION DIAGRAM
VALDEZ SITE: WELL V-3



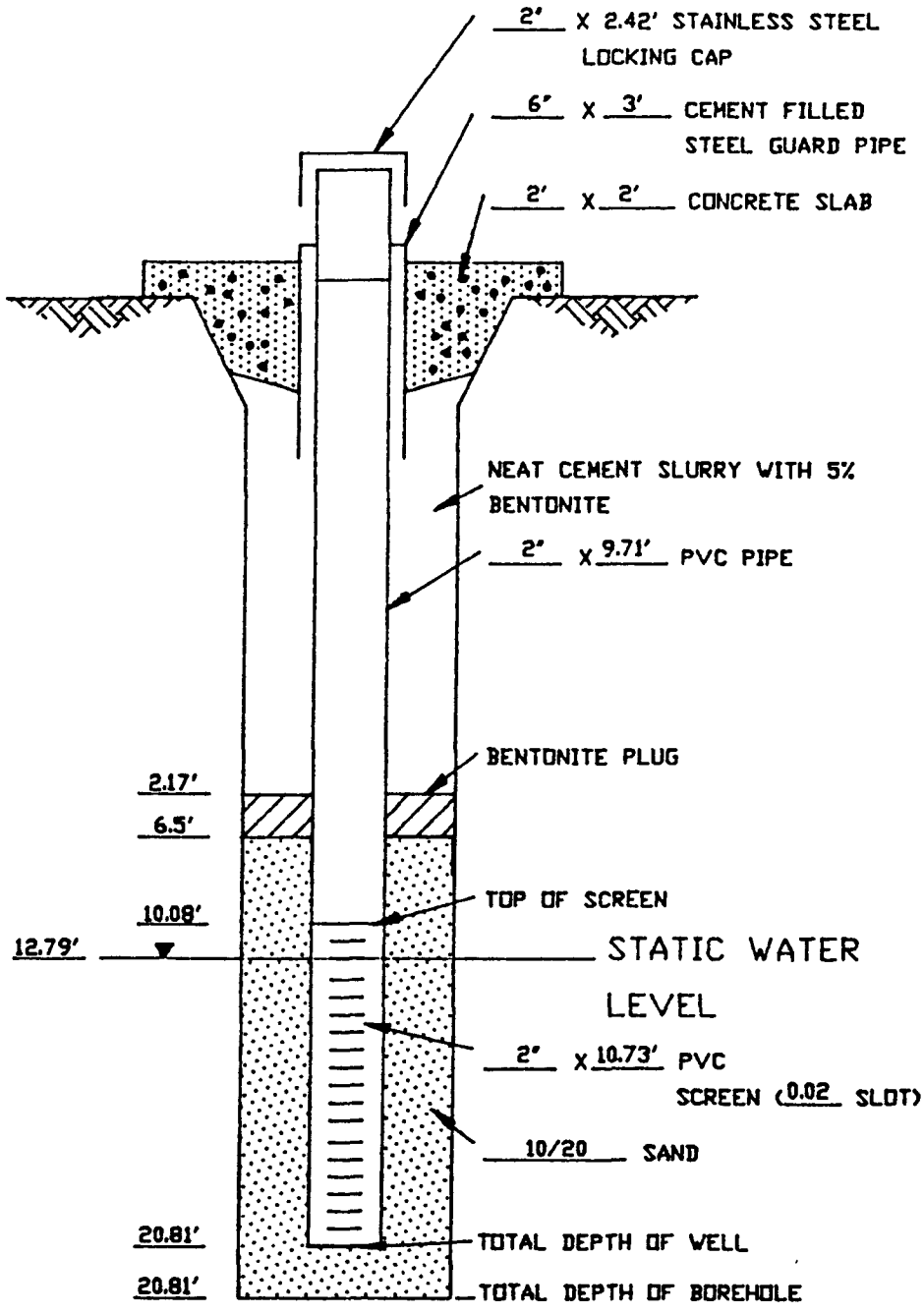
TENNECO WELL COMPLETION DIAGRAM
VALDEZ SITE: WELL V-4



TENNECO WELL COMPLETION DIAGRAM
VALDEZ SITE: WELL V-4A



TENNECO WELL COMPLETION DIAGRAM
VALDEZ SITE: WELL V-5



TENNECO WELL COMPLETION DIAGRAM
VALDEZ SITE: WELL V-6

APPENDIX C

RADIAN CORPORATION REPORTS OF ANALYTICAL RESULTS

RADIAN CORPORATION

Page 1 RAS - Austin REPORT Work Order # 88-07-021
Received: 07/08/88 07/27/88 07:22:16

RECEIVED JUL 30 1988

REPORT TO: Geoscience Consultants, Ltd.
500 Copper NW
Suite 200
Albuquerque, NM 87102
ATTEN: Anita Larson

PREPARED BY: Radian Analytical Services
8501 Mo-pac Bl.
PO Box 201088
Austin, TX 78720-1088
ATTEN:
PHONE: 512-454-4797

CERTIFIED BY

CONTACT GIBSON

CLIENT: GEOSCIENCE SAMPLES: 7
COMPANY: Geoscience Consultants, Ltd.
FACILITY:

Unknown compounds present in 602 analyses of -05 and -06.

WORK ID: Tenneco
TAKEN: PL
TRANS: Fed Ex
TYPE:
P.O. #: 88-0480-100
INV. #: 11974

Previously Reported on 07/26/88.
Footnotes and Comments

* Indicates a value less than 5 times the detection limit. Potential error for such low values ranges between 50 and 100%.

@ Indicates that spike recovery for this analysis on the specific matrix was not within acceptable limits indicating an interferent present.

SAMPLE IDENTIFICATION

01	V-1
02	V-2
03	V-3
04	V-5
05	V-6
06	equipment rinse
07	reagent blank

TEST CODES and NAMES used on this report

EPA601	EPA method 601
EPA602	EPA method 602
PH	pH
TDS	Total dissolved solids
XYLENE	Xylenes, EPA 602

SAMPLE Sample Id	Test: PH pH units
01 V-1	7.2
02 V-2	7.3
03 V-3	7.3
04 V-5	7.3
05 V-6	7.2

Received: 07/08/88

RAS - Austin REPORT Work Order # 88-07-021
Results by Sample

SAMPLE ID V-1 FRACTION 01B TEST CODE EPA601 NAME EPA method 601
Date & Time Collected 07/06/88 Category

ANALYST CL VERIFIED CL
INSTRMT B INJECTD 07/08/88 FILE # UNITS ug/L

CAS#	COMPOUND	RESULT	DET LIMIT
74-87-3	Chloromethane	ND	0.30
74-83-9	Bromomethane	ND	1.2
75-01-4	Vinyl chloride	ND	0.20
75-00-3	Chloroethane	ND	0.50
75-09-2	Methylene chloride	ND	0.30
75-69-4	Trichlorofluoromethane	ND	0.10
75-35-4	1,1-Dichloroethene	ND	0.10
75-34-3	1,1-Dichloroethane	ND	0.090
156-60-5	trans-1,2-Dichloroethene	ND	0.20
67-66-3	Chloroform	ND	0.050
107-06-2	1,2-Dichloroethane	ND	0.030
71-55-6	1,1,1-Trichloroethane	ND	0.090
56-23-5	Carbon tetrachloride	ND	0.10
75-27-4	Bromodichloromethane	ND	0.10

SAMPLE ID V-1 FRACTION 01B TEST CODE EPA601 NAME EPA method 601
Date & Time Collected 07/06/88 Category

CAS#	COMPOUND	RESULT	DET LIMIT
78-87-5	1,2-Dichloropropane	ND	0.10
10061-02-6	trans-1,3-Dichloropropene	ND	0.30
79-01-6	Trichloroethene	ND	0.20
124-48-1	Dibromochloromethane-A	ND	0.20
79-00-5	1,1,2-Trichloroethane-A	ND	0.070
10061-01-5	cis-1,3-Dichloropropene-A	ND	N\A
110-75-8	2-Chloroethylvinyl ether	ND	0.20
75-25-2	Bromoform	ND	0.30
79-34-5	1,1,2,2-Tetrachloroethane-B	ND	0.12
127-18-4	Tetrachloroethene-B	ND	0.030
108-90-7	Chlorobenzene	ND	0.30
541-73-1	1,3-Dichlorobenzene	ND	0.30
95-50-1	1,2-Dichlorobenzene	ND	0.50
106-46-7	1,4-Dichlorobenzene	ND	0.40
	SURROGATES		
74-97-5	Bromochloromethane	107	% Recovery
3017-95-6	2-Bromo-1-chloropropane	NA	% Recovery
110-56-5	1-4-Dichlorobutane	NA	% Recovery

SAMPLE ID V-1 FRACTION 01B TEST CODE EPA601 NAME EPA method 601
Date & Time Collected 07/06/88 Category

460-00-4 1-Bromo-4-fluorobenzene 106 % Recovery

NOTES AND DEFINITIONS FOR THIS REPORT.
DET LIMIT = DETECTION LIMIT
ND = not detected at detection limit
NA = not analyzed
* = less than 5 times the detection limit
N\A= not available
Second column confirmation NOT performed unless otherwise noted.
A-Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. Quantitated as dibromochloromethane unless otherwise noted.
B-1,1,2,2-tetrachloroethane and tetrachloroethene co-elute. Quantitated as tetrachloroethene unless otherwise noted.

SAMPLE ID V-1 FRACTION 01D TEST CODE EPA602 NAME EPA method 602
Date & Time Collected 07/06/88 Category

VERIFIED CL

ANALYST RP
INSTRMT D INJECTED 07/13/88 FILE # UNITS ug/L

CAS#	COMPOUND	RESULT	DET LIMIT
71-43-2	Benzene	ND	0.2
108-88-3	Toluene	ND	0.2
100-41-4	Ethylbenzene	ND	0.3
108-90-7	Chlorobenzene-A	ND	0.3
106-46-7	1,4-Dichlorobenzene	ND	0.3
541-73-1	1,3-Dichlorobenzene	ND	0.4
95-50-1	1,2-Dichlorobenzene	ND	0.4

SURROGATES

98-08-8	a,a,a-Trifluorotoluene	96% recovery

NOTES AND DEFINITIONS FOR THIS REPORT.
DET LIMIT = DETECTION LIMIT
ND = not detected at detection limit
NA = not analyzed
* = less than 5 times the detection limit
N\A = not available
Second column confirmation NOT performed
unless otherwise noted.

RAS - Austin REPORT
Results by Sample

Work Order # 88-07-021
Continued From Above

SAMPLE ID V-1 FRACTION 01D TEST CODE EPA602 NAME EPA method 602
Date & Time Collected 07/06/88 Category

A-Chlorobenzene and m-xylene co-elute.
Quantitated as chlorobenzene unless
otherwise noted.

SAMPLE ID V-1 FRACTION 01A TEST CODE TDS NAME Total dissolved solids
Date & Time Collected 07/06/88 Category

VERIFIED LM

ANALYST TBL
INSTRMT ANALYZED 07/11/88 UNITS mg/L

ANALYTE	RESULT	DET LIMIT
Filterable Residue (TDS)	3000	3.0

NOTES AND DEFINITIONS FOR THIS REPORT.
DET LIMIT = DETECTION LIMIT
ND = not detected at detection limit
NA = not analyzed
* = less than 5 times the detection limit
N\A = not available

SAMPLE ID V-1 FRACTION 01D TEST CODE XYLENE NAME Xylenes, EPA 602
Date & Time Collected 07/06/88 Category

VERIFIED CL

ANALYST RP FILE #
INSTRMT D INJECTD 07/13/88 UNITS ug/L

CAS #	COMPOUND	RESULT	DET LIMIT
106-42-3	p-Xylene	ND,Q	0.2
108-38-3	m-Xylene-A	ND	0.2
95-47-6	o-Xylene	ND	0.1

SAMPLE ID V-1 FRACTION Q1D TEST CODE XYLENE NAME Xylenes, EPA 602
Date & Time Collected 07/06/88 Category

SURROGATES

98-08-8 a,a,a-Trifluorotoluene 96% recovery

NOTES AND DEFINITIONS FOR THIS REPORT.

DET LIMIT = DETECTION LIMIT
ND = not detected at detection limit
NA = not analyzed
* = less than 5 times the detection limit
N\A = not available
Second column confirmation NOT performed unless otherwise noted.
Q = daily EPA standard recovery outside 95% confidence interval.
Chlorobenzene and m-xylene co-elute. Quantitated as chlorobenzene unless otherwise noted.

Received: 07/08/88

Results by Sample

SAMPLE ID V-2 FRACTION 02B TEST CODE EPA601 NAME EPA method 601

Date & Time Collected 07/06/88 Category

ANALYST BM VERIFIED CL

INSTRMT B INJECTD 07/08/88 FILE # UNITS ug/L

CAS#	COMPOUND	RESULT	DET LIMIT
74-87-3	Chloromethane	ND	0.30
74-83-9	Bromomethane	ND	1.2
75-01-4	Vinyl chloride	ND	0.20
75-00-3	Chloroethane	ND	0.50
75-09-2	Methylene chloride	ND	0.30
75-69-4	Trichlorofluoromethane	ND	0.10
75-35-4	1,1-Dichloroethene	ND	0.10
75-34-3	1,1-Dichloroethane	ND	0.090
156-60-5	trans-1,2-Dichloroethene	ND	0.20
67-66-3	Chloroform	ND	0.050
107-06-2	1,2-Dichloroethane	ND	0.030
71-55-6	1,1,1-Trichloroethane	ND	0.090
56-23-5	Carbon tetrachloride	ND	0.10
75-27-4	Bromodichloromethane	ND	0.10

SAMPLE ID V-2 FRACTION 02B TEST CODE EPA601 NAME EPA method 601
Date & Time Collected 07/06/88 Category

CAS#	COMPOUND	RESULT	DET LIMIT
78-87-5	1,2-Dichloropropane	ND	0.10
10061-02-6	trans-1,3-Dichloropropene	ND	0.30
79-01-6	Trichloroethene	ND	0.20
124-48-1	Dibromochloromethane-A	ND	0.20
79-00-5	1,1,2-Trichloroethane-A	ND	0.070
10061-01-5	cis-1,3-Dichloropropene-A	ND	N\A
110-75-8	2-Chloroethylvinyl ether	ND	0.20
75-25-2	Bromoform	ND	0.30
79-34-5	1,1,2,2-Tetrachloroethane-B	ND	0.12
127-18-4	Tetrachloroethene-B	ND	0.030
108-90-7	Chlorobenzene	ND	0.30
541-73-1	1,3-Dichlorobenzene	ND	0.30
95-50-1	1,2-Dichlorobenzene	ND	0.50
106-46-7	1,4-Dichlorobenzene	ND	0.40
	SURROGATES		
74-97-5	Bromochloromethane	109	% Recovery
3017-95-6	2-Bromo-1-chloropropane	NA	% Recovery
110-56-5	1-4-Dichlorobutane	NA	% Recovery

SAMPLE ID V-2 FRACTION 02B TEST CODE EPA601 NAME EPA method 601
Date & Time Collected 07/06/88 Category

460-00-4 1-Bromo-4-fluorobenzene 105 % Recovery

NOTES AND DEFINITIONS FOR THIS REPORT.
DET LIMIT = DETECTION LIMIT
ND = not detected at detection limit
NA = not analyzed
* = less than 5 times the detection limit
N\A= not available
Second column confirmation NOT performed unless otherwise noted.
A-Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. Quantitated as dibromochloromethane unless otherwise noted.
B-1,1,2,2-tetrachloroethane and tetrachloroethene co-elute. Quantitated as tetrachloroethene unless otherwise noted.

Received: 07/08/88 Results by Sample

SAMPLE ID V-3 FRACTION 02D TEST CODE EPA602 NAME EPA method 602
Date & Time Collected 07/06/88 Category

VERIFIED CL

ANALYST RP
INSTRMT D INJECTED 07/13/88 FILE # UNITS ug/L

CAS#	COMPOUND	RESULT	DET LIMIT
71-43-2	Benzene	ND	0.2
108-88-3	Toluene	ND	0.2
100-41-4	Ethylbenzene	ND	0.3
108-90-7	Chlorobenzene-A	ND	0.3
106-46-7	1,4-Dichlorobenzene	ND	0.3
541-73-1	1,3-Dichlorobenzene	ND	0.4
95-50-1	1,2-Dichlorobenzene	ND	0.4

SURROGATES

98-08-8	a,a,a-Trifluorotoluene	104% recovery

NOTES AND DEFINITIONS FOR THIS REPORT.
DET LIMIT = DETECTION LIMIT
ND = not detected at detection limit
NA = not analyzed
* = less than 5 times the detection limit
N\A = not available
Second column confirmation NOT performed
unless otherwise noted.

Received: 07/08/88

Results by Sample

Work Order # 88-07-021
Continued From Above

SAMPLE ID V-2

FRACTION 02D TEST CODE EPA602 NAME EPA method 602
Date & Time Collected 07/06/88 Category

A-Chlorobenzene and m-xylene co-elute. Quantitated as chlorobenzene unless otherwise noted.

Received: 07/08/88 Results by Sample

SAMPLE ID V-2 FRACTION 02A TEST CODE TDS NAME Total dissolved solids
Date & Time Collected 07/06/88 Category

VERIFIED LM

ANALYST TBL
INSTRMT

ANALYZED 07/11/88 UNITS mg/L

ANALYTE	RESULT	DET LIMIT
Filterable Residue (TDS)	2300	3.0

NOTES AND DEFINITIONS FOR THIS REPORT.
DET LIMIT = DETECTION LIMIT
ND = not detected at detection limit
NA = not analyzed
* = less than 5 times the detection limit
N\A = not available

SAMPLE ID V-2 FRACTION 02D TEST CODE XYLENE NAME Xylenes, EPA 602
Date & Time Collected 07/06/88 Category

VERIFIED CL

ANALYST RP
INSTRMT D

FILE #

INJECTD 07/13/88 UNITS ug/L

CAS #	COMPOUND	RESULT	DET LIMIT
106-42-3	p-Xylene	ND,Q	0.2
108-38-3	m-Xylene-A	ND	0.2
95-47-6	o-Xylene	ND	0.1

[redacted] RAS [redacted] Austin [redacted] REPORT [redacted] Work Order # 88-07-021
Received: 07/08/88 Results by Sample Continued From Above

SAMPLE ID V-2 FRACTION 02D TEST CODE XYLENE NAME Xylenes, EPA 602
Date & Time Collected 07/06/88 Category

SURROGATES

98-08-8 a,a,a-Trifluorotoluene 104% recovery

NOTES AND DEFINITIONS FOR THIS REPORT.

DET LIMIT = DETECTION LIMIT
ND = not detected at detection limit
NA = not analyzed
* = less than 5 times the detection limit
N\A = not available
Second column confirmation NOT performed unless otherwise noted.
Q = daily EPA standard recovery outside 95% confidence interval.
Chlorobenzene and m-xylene co-elute. Quantitated as chlorobenzene unless otherwise noted.

Received: 07/09/88

Results by Sample

SAMPLE ID V-3 FRACTION 03B TEST CODE EPA601 NAME EPA method 601

Date & Time Collected 07/06/88 Category

ANALYST BM VERIFIED CL

INSTRMT B INJECTD 07/08/88 FILE # UNITS ug/L

CAS#	COMPOUND	RESULT	DET LIMIT
74-87-3	Chloromethane	ND	0.30
74-83-9	Bromomethane	ND	1.2
75-01-4	Vinyl chloride	ND	0.20
75-00-3	Chloroethane	ND	0.50
75-09-2	Methylene chloride	ND	0.30
75-69-4	Trichlorofluoromethane	ND	0.10
75-35-4	1,1-Dichloroethene	ND	0.10
75-34-3	1,1-Dichloroethane	ND	0.090
156-60-5	trans-1,2-Dichloroethene	ND	0.20
67-66-3	Chloroform	ND	0.050
107-06-2	1,2-Dichloroethane	ND	0.030
71-55-6	1,1,1-Trichloroethane	ND	0.090
56-23-5	Carbon tetrachloride	ND	0.10
75-27-4	Bromodichloromethane	ND	0.10

SAMPLE ID V-3 FRACTION 03B TEST CODE EPA601 NAME EPA method 601
Date & Time Collected 07/06/88 Category

CAS#	COMPOUND	RESULT	DET LIMIT
78-87-5	1,2-Dichloropropane	ND	0.10
10061-02-6	trans-1,3-Dichloropropene	ND	0.30
79-01-6	Trichloroethene	ND	0.20
124-48-1	Dibromochloromethane-A	ND	0.20
79-00-5	1,1,2-Trichloroethane-A	ND	0.070
10061-01-5	cis-1,3-Dichloropropene-A	ND	N\A
110-75-8	2-Chloroethylvinyl ether	ND	0.20
75-25-2	Bromoform	ND	0.30
79-34-5	1,1,2,2-Tetrachloroethane-B	ND	0.12
127-18-4	Tetrachloroethene-B	ND	0.030
108-90-7	Chlorobenzene	ND	0.30
541-73-1	1,3-Dichlorobenzene	ND	0.30
95-50-1	1,2-Dichlorobenzene	ND	0.50
106-46-7	1,4-Dichlorobenzene	ND	0.40
	SURROGATES		
74-97-5	Bromochloromethane	105 % Recovery	
3017-95-6	2-Bromo-1-chloropropane	NA % Recovery	
110-56-5	1-4-Dichlorobutane	NA % Recovery	

SAMPLE ID V-3 FRACTION 03B TEST CODE EPA601 NAME EPA method 601
Date & Time Collected 07/06/88 Category

460-00-4 1-Bromo-4-fluorobenzene 106 % Recovery

NOTES AND DEFINITIONS FOR THIS REPORT.
DET LIMIT = DETECTION LIMIT
ND = not detected at detection limit
NA = not analyzed
* = less than 5 times the detection limit
N\A= not available
Second column confirmation NOT performed unless otherwise noted.
A-Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. Quantitated as dibromochloromethane unless otherwise noted.
B-1,1,2,2-tetrachloroethane and tetrachloroethene co-elute. Quantitated as tetrachloroethene unless otherwise noted.

SAMPLE ID V-3 FRACTION 03D TEST CODE EPA602 NAME EPA method 602
Date & Time Collected 07/06/88 Category

VERIFIED CL

ANALYST RP
INSTRMT D INJECTED 07/13/88 FILE # UNITS ug/L

CAS#	COMPOUND	RESULT	DET LIMIT
71-43-2	Benzene	ND	0.2
108-88-3	Toluene	ND	0.2
100-41-4	Ethylbenzene	ND	0.3
108-90-7	Chlorobenzene-A	ND	0.3
106-46-7	1,4-Dichlorobenzene	ND	0.3
541-73-1	1,3-Dichlorobenzene	ND	0.4
95-50-1	1,2-Dichlorobenzene	ND	0.4

SURROGATES

98-08-8	a,a,a-Trifluorotoluene	98% recovery

NOTES AND DEFINITIONS FOR THIS REPORT.
DET LIMIT = DETECTION LIMIT
ND = not detected at detection limit
NA = not analyzed
* = less than 5 times the detection limit
N\A = not available
Second column confirmation NOT performed
unless otherwise noted.

SAMPLE ID V-3 FRACTION 03D TEST CODE EPA602 NAME EPA method 602
Date & Time Collected 07/06/88 Category

A-Chlorobenzene and m-xylene co-elute.
Quantitated as chlorobenzene unless
otherwise noted.

SAMPLE ID V-3 FRACTION 03A TEST CODE TDS NAME Total dissolved solids
Date & Time Collected 07/06/88 Category

VERIFIED LM

ANALYST TBL
INSTRMT ANALYZED 07/11/88 UNITS mg/L

ANALYTE	RESULT	DET LIMIT
Filterable Residue (TDS)	2300	3.0

NOTES AND DEFINITIONS FOR THIS REPORT.
DET LIMIT = DETECTION LIMIT
ND = not detected at detection limit
NA = not analyzed
* = less than 5 times the detection limit
N\A = not available

SAMPLE ID V-3 FRACTION 03D TEST CODE XYLENE NAME Xylenes, EPA 602
Date & Time Collected 07/06/88 Category

VERIFIED CL

ANALYST RP FILE #
INSTRMT D INJECTD 07/13/88 UNITS ug/L

CAS #	COMPOUND	RESULT	DET LIMIT
106-42-3	p-Xylene	ND,Q	0.2
108-38-3	m-Xylene-A	ND	0.2
95-47-6	o-Xylene	ND	0.1

SAMPLE ID V-3 FRACTION 03D TEST CODE XYLENE NAME Xylenes, EPA 602
Date & Time Collected 07/06/88 Category

SURROGATES

98-08-8	a,a,a-Trifluorotoluene	98% recovery

NOTES AND DEFINITIONS FOR THIS REPORT.

DET LIMIT = DETECTION LIMIT
ND = not detected at detection limit
NA = not analyzed
* = less than 5 times the detection limit
N\A = not available
Second column confirmation NOT performed unless otherwise noted.
Q = daily EPA standard recovery outside 95% confidence interval.
Chlorobenzene and m-xylene co-elute. Quantitated as chlorobenzene unless otherwise noted.

SAMPLE ID V-5 FRACTION 04B TEST CODE EPA601 NAME EPA method 601
Date & Time Collected 07/06/88 Category

ANALYST BM VERIFIED CL
INSTRMT B INJECTD 07/08/88 FILE # UNITS ug/L

CAS#	COMPOUND	RESULT	DET LIMIT
74-87-3	Chloromethane	ND	0.30
74-83-9	Bromomethane	ND	1.2
75-01-4	Vinyl chloride	ND	0.20
75-00-3	Chloroethane	ND	0.50
75-09-2	Methylene chloride	ND	0.30
75-69-4	Trichlorofluoromethane	ND	0.10
75-35-4	1,1-Dichloroethene	ND	0.10
75-34-3	1,1-Dichloroethane	ND	0.090
156-60-5	trans-1,2-Dichloroethene	ND	0.20
67-66-3	Chloroform	ND	0.050
107-06-2	1,2-Dichloroethane	ND	0.030
71-55-6	1,1,1-Trichloroethane	ND	0.090
56-23-5	Carbon tetrachloride	ND	0.10
75-27-4	Bromodichloromethane	ND	0.10

SAMPLE ID V-5 FRACTION 04B TEST CODE EPA601 NAME EPA method 601
Date & Time Collected 07/06/88 Category

CAS#	COMPOUND	RESULT	DET LIMIT
78-87-5	1,2-Dichloropropane	ND	0.10
10061-02-6	trans-1,3-Dichloropropene	ND	0.30
79-01-6	Trichloroethene	ND	0.20
124-48-1	Dibromochloromethane-A	ND	0.20
79-00-5	1,1,2-Trichloroethane-A	ND	0.070
10061-01-5	cis-1,3-Dichloropropene-A	ND	N\A
110-75-8	2-Chloroethylvinyl ether	ND	0.20
75-25-2	Bromoform	ND	0.30
79-34-5	1,1,2,2-Tetrachloroethane-B	ND	0.12
127-18-4	Tetrachloroethene-B	ND	0.030
108-90-7	Chlorobenzene	ND	0.30
541-73-1	1,3-Dichlorobenzene	ND	0.30
95-50-1	1,2-Dichlorobenzene	ND	0.50
106-46-7	1,4-Dichlorobenzene	ND	0.40
	SURROGATES		
74-97-5	Bromochloromethane	109 % Recovery	
3017-95-6	2-Bromo-1-chloropropane	NA % Recovery	
110-56-5	1-4-Dichlorobutane	NA % Recovery	

SAMPLE ID V-5 FRACTION 04B TEST CODE EPA601 NAME EPA method 601
Date & Time Collected 07/06/88 Category

460-00-4 1-Bromo-4-fluorobenzene 106 % Recovery

NOTES AND DEFINITIONS FOR THIS REPORT.
DET LIMIT = DETECTION LIMIT
ND = not detected at detection limit
NA = not analyzed
* = less than 5 times the detection limit
N\A= not available
Second column confirmation NOT performed unless otherwise noted.
A-Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. Quantitated as dibromochloromethane unless otherwise noted.
B-1,1,2,2-tetrachloroethane and tetrachloroethene co-elute. Quantitated as tetrachloroethene unless otherwise noted.

RADIAN CORPORATION

Received: 07/08/88 Results by Sample

SAMPLE ID V-5 FRACTION Q4D TEST CODE EPA602 NAME EPA method 602
Date & Time Collected 07/06/88 Category

VERIFIED CL

ANALYST BM FILE #
INSTRMT D INJECTED 07/13/88 UNITS ug/L

CAS#	COMPOUND	RESULT	DET LIMIT
71-43-2	Benzene	ND	0.2
108-88-3	Toluene	0.5*	0.2
100-41-4	Ethylbenzene	ND	0.3
108-90-7	Chlorobenzene-A	ND	0.3
106-46-7	1,4-Dichlorobenzene	ND	0.3
541-73-1	1,3-Dichlorobenzene	ND	0.4
95-50-1	1,2-Dichlorobenzene	ND	0.4

SURROGATES

98-08-8	a,a,a-Trifluorotoluene	102% recovery

NOTES AND DEFINITIONS FOR THIS REPORT.
DET LIMIT = DETECTION LIMIT
ND = not detected at detection limit
NA = not analyzed
* = less than 5 times the detection limit
N\A = not available
Second column confirmation NOT performed
unless otherwise noted.

SAMPLE ID V-5 FRACTION 04D TEST CODE EPA602 NAME EPA method 602
Date & Time Collected 07/06/88 Category

A-Chlorobenzene and m-xylene co-elute.
Quantitated as chlorobenzene unless
otherwise noted.

SAMPLE ID V-5 FRACTION 04A TEST CODE TDS NAME Total dissolved solids
Date & Time Collected 07/06/88 Category

VERIFIED LM

ANALYST TBL
INSTRMT ANALYZED 07/11/88 UNITS mg/L

ANALYTE	RESULT	DET LIMIT
Filterable Residue (TDS)	2400	3.0

NOTES AND DEFINITIONS FOR THIS REPORT.
DET LIMIT = DETECTION LIMIT
ND = not detected at detection limit
NA = not analyzed
* = less than 5 times the detection limit
N\A = not available

SAMPLE ID V-5 FRACTION 04D TEST CODE XYLENE NAME Xylenes, EPA 602
Date & Time Collected 07/06/88 Category

VERIFIED CL

ANALYST BM FILE #
INSTRMT D INJECTD 07/13/88 UNITS ug/L

CAS #	COMPOUND	RESULT	DET LIMIT
106-42-3	p-Xylene	ND,G@	0.2
108-38-3	m-Xylene-A	0.3*@	0.2
95-47-6	o-Xylene	ND	0.1

SAMPLE ID V-5 FRACTION Q4D TEST CODE XYLENE NAME Xylenes, EPA 602
Date & Time Collected 07/06/88 Category

	SURROGATES	
98-08-8	a,a,a-Trifluorotoluene	102% recovery

NOTES AND DEFINITIONS FOR THIS REPORT.
DET LIMIT = DETECTION LIMIT
ND = not detected at detection limit
NA = not analyzed
* = less than 5 times the detection limit
N\A = not available
Second column confirmation NOT performed unless otherwise noted.
Q = daily EPA standard recovery outside 95% confidence interval.
Chlorobenzene and m-xylene co-elute. Quantitated as chlorobenzene unless otherwise noted.

SAMPLE ID V-6 FRACTION 05B TEST CODE EPA601 NAME EPA method 601
Date & Time Collected 07/06/88 Category

ANALYST BM VERIFIED CL
INSTRMT B INJECTD 07/08/88 FILE # UNITS ug/L

CAS#	COMPOUND	RESULT	DET LIMIT
74-87-3	Chloromethane	ND	0.30
74-83-9	Bromomethane	ND	1.2
75-01-4	Vinyl chloride	ND	0.20
75-00-3	Chloroethane	ND	0.50
75-09-2	Methylene chloride	ND	0.30
75-69-4	Trichlorofluoromethane	ND	0.10
75-35-4	1,1-Dichloroethene	ND	0.10
75-34-3	1,1-Dichloroethane	ND	0.090
156-60-5	trans-1,2-Dichloroethene	ND	0.20
67-66-3	Chloroform	3.7	0.050
107-06-2	1,2-Dichloroethane	ND	0.030
71-55-6	1,1,1-Trichloroethane	ND	0.090
56-23-5	Carbon tetrachloride	ND	0.10
75-27-4	Bromodichloromethane	ND	0.10

SAMPLE ID V-6 FRACTION 05B TEST CODE EPA601 NAME EPA method 601
Date & Time Collected 07/06/88 Category

CAS#	COMPOUND	RESULT	DET LIMIT
78-87-5	1,2-Dichloropropane	ND	0.10
10061-02-6	trans-1,3-Dichloropropene	ND	0.30
79-01-6	Trichloroethene	ND	0.20
124-48-1	Dibromochloromethane-A	ND	0.20
79-00-5	1,1,2-Trichloroethane-A	ND	0.070
10061-01-5	cis-1,3-Dichloropropene-A	ND	N\A
110-75-8	2-Chloroethylvinyl ether	ND	0.20
75-25-2	Bromoform	ND	0.30
79-34-5	1,1,2,2-Tetrachloroethane-B	ND	0.12
127-18-4	Tetrachloroethene-B	ND	0.030
108-90-7	Chlorobenzene	ND	0.30
541-73-1	1,3-Dichlorobenzene	ND	0.30
95-50-1	1,2-Dichlorobenzene	ND	0.50
106-46-7	1,4-Dichlorobenzene	ND	0.40
	SURROGATES		
74-97-5	Bromochloromethane	108 % Recovery	
3017-95-6	2-Bromo-1-chloropropane	NA % Recovery	
110-56-5	1-4-Dichlorobutane	NA % Recovery	

SAMPLE ID V-6 FRACTION 05B TEST CODE EPA601 NAME EPA method 601
Date & Time Collected 07/06/88 Category

460-00-4 1-Bromo-4-fluorobenzene 104 % Recovery

NOTES AND DEFINITIONS FOR THIS REPORT.
DET LIMIT = DETECTION LIMIT
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NA = not analyzed
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N\A= not available
Second column confirmation NOT performed unless otherwise noted.
A-Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. Quantitated as dibromochloromethane unless otherwise noted.
B-1,1,2,2-tetrachloroethane and tetrachloroethene co-elute. Quantitated as tetrachloroethene unless otherwise noted.

RADIAN CORPORATION

Received: 07/08/88
Results by Sample

SAMPLE ID V-6 FRACTION 05D TEST CODE EPA602 NAME EPA method 602
Date & Time Collected 07/06/88 Category

VERIFIED CL

ANALYST BM
INSTRMT D INJECTED 07/13/88 FILE # UNITS ug/L

CAS#	COMPOUND	RESULT	DET LIMIT
71-43-2	Benzene	1500	50
108-88-3	Toluene	3300	50
100-41-4	Ethylbenzene	550	80
108-90-7	Chlorobenzene-A	ND	80
106-46-7	1,4-Dichlorobenzene	ND	80
541-73-1	1,3-Dichlorobenzene	ND	100
95-50-1	1,2-Dichlorobenzene	ND	100

SURROGATES

98-08-8	a,a,a-Trifluorotoluene	106% recovery

NOTES AND DEFINITIONS FOR THIS REPORT.
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N\A = not available
Second column confirmation NOT performed
unless otherwise noted.

SAMPLE ID V-6 FRACTION 05D TEST CODE EPA602 NAME EPA method 602
Date & Time Collected 07/06/88 Category

A-Chlorobenzene and m-xylene co-elute. Quantitated as chlorobenzene unless otherwise noted.

SAMPLE ID V-6 FRACTION 05A TEST CODE TDS NAME Total dissolved solids
Date & Time Collected 07/06/88 Category

VERIFIED LM

ANALYST TBL
INSTRMT ANALYZED 07/11/88 UNITS mg/L

ANALYTE	RESULT	DET LIMIT
Filterable Residue (TDS)	1800	3.0

NOTES AND DEFINITIONS FOR THIS REPORT.
DET LIMIT = DETECTION LIMIT
ND = not detected at detection limit
NA = not analyzed
* = less than 5 times the detection limit
N\A = not available

SAMPLE ID V-6 FRACTION 05D TEST CODE XYLENE NAME Xylenes, EPA 602
Date & Time Collected 07/06/88 Category

VERIFIED CL

ANALYST BM FILE #
INSTRMT D INJECTD 07/13/88 UNITS ug/L

CAS #	COMPOUND	RESULT	DET LIMIT
106-42-3	p-Xylene	1600Q	50
108-38-3	m-Xylene-A	2300	50
95-47-6	o-Xylene	660	30

RADIAN CORPORATION

SAMPLE ID V-6 FRACTION 05D TEST CODE XYLENE NAME Xylenes, EPA 602
Date & Time Collected 07/06/88 Category

SURROGATES

98-08-8 a,a,a-Trifluorotoluene 106% recovery

NOTES AND DEFINITIONS FOR THIS REPORT.
DET LIMIT = DETECTION LIMIT
ND = not detected at detection limit
NA = not analyzed
* = less than 5 times the detection limit
N\A = not available
Second column confirmation NOT performed unless otherwise noted.
Q = daily EPA standard recovery outside 95% confidence interval.
Chlorobenzene and m-xylene co-elute. Quantitated as chlorobenzene unless otherwise noted.

RADIAN CORPORATION

Page 3 RAS - Austin REPORT Work Order # 88-07-020
Received: 07/08/88 Results by Sample

SAMPLE ID Domestic FRACTION 01B TEST CODE EPA601 NAME EPA method 601
Date & Time Collected 07/06/88 Category

ANALYST BM VERIFIED CL
INSTRMT G INJECTD 07/08/88 FILE # UNITS ug/L

CAS#	COMPOUND	RESULT	DET LIMIT
74-87-3	Chloromethane	ND	0.30
74-83-9	Bromomethane	ND	1.2
75-01-4	Vinyl chloride	ND	0.20
75-00-3	Chloroethane	ND	0.50
75-09-2	Methylene chloride	ND	0.30
75-69-4	Trichlorofluoromethane	ND	0.10
75-35-4	1,1-Dichloroethene	ND	0.10
75-34-3	1,1-Dichloroethane	ND	0.090
156-60-5	trans-1,2-Dichloroethene	ND	0.20
67-66-3	Chloroform	ND	0.050
107-06-2	1,2-Dichloroethane	ND	0.030
71-55-6	1,1,1-Trichloroethane	ND	0.090
56-23-5	Carbon tetrachloride	ND	0.10
75-27-4	Bromodichloromethane	ND	0.10

RADIAN CORPORATION

SAMPLE ID Domestic FRACTION 01B TEST CODE EPA601 NAME EPA method 601
Date & Time Collected 07/06/88 Category

CAS#	COMPOUND	RESULT	DET LIMIT
78-87-5	1,2-Dichloropropane	ND	0.10
10061-02-6	trans-1,3-Dichloropropene	ND	0.30
79-01-6	Trichloroethene	ND	0.20
124-48-1	Dibromochloromethane-A	ND	0.20
79-00-5	1,1,2-Trichloroethane-A	ND	0.070
10061-01-5	cis-1,3-Dichloropropene-A	ND	N\A
110-75-8	2-Chloroethylvinyl ether	ND	0.20
75-25-2	Bromoform	ND	0.30
79-34-5	1,1,2,2-Tetrachloroethane-B	ND	0.12
127-18-4	Tetrachloroethene-B	ND	0.030
108-90-7	Chlorobenzene	ND	0.30
541-73-1	1,3-Dichlorobenzene	ND	0.30
95-50-1	1,2-Dichlorobenzene	ND	0.50
106-46-7	1,4-Dichlorobenzene	ND	0.40
	SURROGATES		
74-97-5	Bromochloromethane	96 %	Recovery
3017-95-6	2-Bromo-1-chloropropane	NA %	Recovery
110-56-5	1-4-Dichlorobutane	NA %	Recovery

SAMPLE ID Domestic FRACTION 01B TEST CODE EPA601 NAME EPA method 601
Date & Time Collected 07/06/88 Category

460-00-4 1-Bromo-4-fluorobenzene 99 % Recovery

NOTES AND DEFINITIONS FOR THIS REPORT.
DET LIMIT = DETECTION LIMIT
ND = not detected at detection limit
NA = not analyzed
* = less than 5 times the detection limit
N\A= not available
Second column confirmation NOT performed unless otherwise noted.
A-Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. Quantitated as dibromochloromethane unless otherwise noted.
B-1,1,2,2-tetrachloroethane and tetrachloroethene co-elute. Quantitated as tetrachloroethene unless otherwise noted.

RADIAN CORPORATION

Received: 07/08/88 Results by Sample

SAMPLE ID Domestic FRACTION 01D TEST CODE EPA602 NAME EPA method 602
Date & Time Collected 07/06/88 Category

VERIFIED CL

ANALYST CL FILE #
INSTRMT D INJECTED 07/08/88 UNITS ug/L

CAS#	COMPOUND	RESULT	DET LIMIT
71-43-2	Benzene	ND	0.2
108-88-3	Toluene	ND	0.2
100-41-4	Ethylbenzene	ND	0.3
108-90-7	Chlorobenzene-A	ND	0.3
106-46-7	1,4-Dichlorobenzene	ND	0.3
541-73-1	1,3-Dichlorobenzene	ND	0.4
95-50-1	1,2-Dichlorobenzene	ND	0.4

SURROGATES

98-08-8	a,a,a-Trifluorotoluene	96% recovery

NOTES AND DEFINITIONS FOR THIS REPORT.
DET LIMIT = DETECTION LIMIT
ND = not detected at detection limit
NA = not analyzed
* = less than 5 times the detection limit
N\A = not available
Second column confirmation NOT performed
unless otherwise noted.

SAMPLE ID Domestic FRACTION Q1D TEST CODE EPA602 NAME EPA method 602
Date & Time Collected 07/06/88 Category

A-Chlorobenzene and m-xylene co-elute.
Quantitated as chlorobenzene unless
otherwise noted.

SAMPLE ID Domestic FRACTION 01A TEST CODE TDS NAME Total dissolved solids
Date & Time Collected 07/06/88 Category

VERIFIED LM

ANALYST TBL
INSTRMT ANALYZED 07/11/88 UNITS mg/L

ANALYTE	RESULT	DET LIMIT
Filterable Residue (TDS)	2800	3.0

NOTES AND DEFINITIONS FOR THIS REPORT.
DET LIMIT = DETECTION LIMIT
ND = not detected at detection limit
NA = not analyzed
* = less than 5 times the detection limit
N\A = not available

SAMPLE ID Domestic FRACTION 01D TEST CODE XYLENE NAME Xylenes, EPA 602
Date & Time Collected 07/06/88 Category

VERIFIED CL

ANALYST CL FILE #
INSTRMT D INJECTD 07/08/88 UNITS ug/L

CAS #	COMPOUND	RESULT	DET LIMIT
106-42-3	p-Xylene	ND,Q	0.2
108-38-3	m-Xylene-A	ND	0.2
95-47-6	o-Xylene	ND	0.1

RADIAN CORPORATION

SAMPLE ID Domestic FRACTION 01D TEST CODE XYLENE NAME Xylenes, EPA 602
Date & Time Collected 07/06/88 Category

SURROGATES

98-08-8	a,a,a-Trifluorotoluene	96% recovery

NOTES AND DEFINITIONS FOR THIS REPORT.
DET LIMIT = DETECTION LIMIT
ND = not detected at detection limit
NA = not analyzed
* = less than 5 times the detection limit
N\A = not available
Second column confirmation NOT performed unless otherwise noted.
Q = daily EPA standard recovery outside 95% confidence interval.
Chlorobenzene and m-xylene co-elute. Quantitated as chlorobenzene unless otherwise noted.

RADIAN CORPORATION

RAS - Austin REPORT

Work Order # 88-07-021

Received: 07/08/88

Results by Sample

SAMPLE ID reagent blank FRACTION 07A TEST CODE EPA601 NAME EPA method 601

Date & Time Collected not specified Category

ANALYST CL VERIFIED CL

INSTRMT B INJECTD 07/08/88 FILE # UNITS ug/L

CAS#	COMPOUND	RESULT	DET LIMIT
74-87-3	Chloromethane	ND	0.30
74-83-9	Bromomethane	ND	1.2
75-01-4	Vinyl chloride	ND	0.20
75-00-3	Chloroethane	ND	0.50
75-09-2	Methylene chloride	ND	0.30
75-69-4	Trichlorofluoromethane	ND	0.10
75-35-4	1,1-Dichloroethene	ND	0.10
75-34-3	1,1-Dichloroethane	ND	0.090
156-60-5	trans-1,2-Dichloroethene	ND	0.20
67-66-3	Chloroform	ND	0.050
107-06-2	1,2-Dichloroethane	ND	0.030
71-55-6	1,1,1-Trichloroethane	ND	0.090
56-23-5	Carbon tetrachloride	ND	0.10
75-27-4	Bromodichloromethane	ND	0.10

SAMPLE ID reagent blank FRACTION 07A TEST CODE EPA601 NAME EPA method 601
Date & Time Collected not specified Category

CAS#	COMPOUND	RESULT	DET LIMIT
78-87-5	1,2-Dichloropropane	ND	0.10
10061-02-6	trans-1,3-Dichloropropene	ND	0.30
79-01-6	Trichloroethene	ND	0.20
124-48-1	Dibromochloromethane-A	ND	0.20
79-00-5	1,1,2-Trichloroethane-A	ND	0.070
10061-01-5	cis-1,3-Dichloropropene-A	ND	N\A
110-75-8	2-Chloroethylvinyl ether	ND	0.20
75-25-2	Bromoform	ND	0.30
79-34-5	1,1,2,2-Tetrachloroethane-B	ND	0.12
127-18-4	Tetrachloroethene-B	ND	0.030
108-90-7	Chlorobenzene	ND	0.30
541-73-1	1,3-Dichlorobenzene	ND	0.30
95-50-1	1,2-Dichlorobenzene	ND	0.50
106-46-7	1,4-Dichlorobenzene	ND	0.40
	SURROGATES		
74-97-5	Bromochloromethane	N/A	% Recovery
3017-95-6	2-Bromo-1-chloropropane	NA	% Recovery
110-56-5	1-4-Dichlorobutane	NA	% Recovery

SAMPLE ID reagent blank FRACTION 07A TEST CODE EPA601 NAME EPA method 601
Date & Time Collected not specified Category

460-00-4 1-Bromo-4-fluorobenzene N/A % Recovery

NOTES AND DEFINITIONS FOR THIS REPORT.
DET LIMIT = DETECTION LIMIT
ND = not detected at detection limit
NA = not analyzed
* = less than 5 times the detection limit
N\A= not available
Second column confirmation NOT performed unless otherwise noted.
A-Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. Quantitated as dibromochloromethane unless otherwise noted.
B-1,1,2,2-tetrachloroethane and tetrachloroethene co-elute. Quantitated as tetrachloroethene unless otherwise noted.

RADIAN CORPORATION

Received: 07/08/88 Results by Sample

SAMPLE ID reagent blank FRACTION 07A TEST CODE EPA602 NAME EPA method 602
Date & Time Collected not specified Category

VERIFIED CL

ANALYST RP FILE #
INSTRMT D INJECTED 07/13/88 UNITS ug/L

CAS#	COMPOUND	RESULT	DET LIMIT
71-43-2	Benzene	ND	0.2
108-88-3	Toluene	ND	0.2
100-41-4	Ethylbenzene	ND	0.3
108-90-7	Chlorobenzene-A	ND	0.3
106-46-7	1,4-Dichlorobenzene	ND	0.3
541-73-1	1,3-Dichlorobenzene	ND	0.4
95-50-1	1,2-Dichlorobenzene	ND	0.4

SURROGATES

98-08-8	a,a,a-Trifluorotoluene	N/A% recovery

NOTES AND DEFINITIONS FOR THIS REPORT.
DET LIMIT = DETECTION LIMIT
ND = not detected at detection limit
NA = not analyzed
* = less than 5 times the detection limit
N\A = not available
Second column confirmation NOT performed
unless otherwise noted.

SAMPLE ID reagent blank FRACTION 07A TEST CODE EPA602 NAME EPA method 602
Date & Time Collected not specified Category

A-Chlorobenzene and m-xylene co-elute. Quantitated as chlorobenzene unless otherwise noted.

RADIAN CORPORATION

RAS - Austin REPORT Work Order # 88-07-021

Received: 07/08/88

Results by Sample

SAMPLE ID reagent blank FRACTION 07A TEST CODE XYLENE NAME Xylenes, EPA 602

Date & Time Collected not specified Category

VERIFIED CL

ANALYST RP

INSTRMT D INJECTD 07/13/88 FILE # UNITS ug/L

CAS #	COMPOUND	RESULT	DET LIMIT
106-42-3	p-Xylene	ND,Q	0.2
108-38-3	m-Xylene-A	ND	0.2
95-47-6	o-Xylene	ND	0.1

SURROGATES

98-08-8 a,a,a-Trifluorotoluene N/A% recovery

NOTES AND DEFINITIONS FOR THIS REPORT.

DET LIMIT = DETECTION LIMIT
ND = not detected at detection limit
NA = not analyzed
* = less than 5 times the detection limit
N\A = not available
Second column confirmation NOT performed unless otherwise noted.
Q = daily EPA standard recovery outside 95% confidence interval.
Chlorobenzene and m-xylene co-elute. Quantitated as chlorobenzene unless otherwise noted.

FRACTION AND TEST CODES FOR WORK NOT REPORTED ELSEWHERE

01C	:	SPR601	01E	:	SPR602						
02C	:	SPR601	02E	:	SPR602						
03C	:	SPR601	03E	:	SPR602						
04C	:	SPR601	04E	:	SPR602						
05C	:	SPR601	05E	:	SPR602	05F	:	SPR602	05G	:	SPR602