GW - 80

GENERAL CORRESPONDENCE

YEAR(S): 1992-1991

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

ANITA LOCKWOOD
CABINET SECRETARY

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87504
(505) 827-5800

December 29, 1992

Donna S. Mullins
U.S. Environmental Protection Agency
Region 6
1445 Ross Ave, Suite 1200
Dallas, Texas 75202-2733

RE: TRANSWESTERN PIPELINE COMPANY PCB CONTAMINANT CLEANUP

Dear Ms. Mullins:

The New Mexico Oil Conservation Division (OCD) is in receipt of your December 17, 1992 correspondence requesting comment on the U.S. Environmental Protection Agency's (EPA) intent to terminate the Consent Decree between the Transwestern Pipeline Company (TPC) and EPA for PCB contamination at various TPC compressor stations and ancillary sites in New Mexico. Your correspondence states that the required cleanup of PCB's at these sites has been completed to the satisfaction of EPA and that petroleum related contaminants identified during ground water monitoring at the Thoreau and Laguna compressor stations are being addressed by the appropriate state and tribal regulatory agencies.

The OCD has no comment on the termination of the Consent Decree for PCB remedial activities at the TPC sites. However, according to New Mexico Water Quality Control Commission (WQCC) Regulations, remaining petroleum contaminated ground water at the Thoreau and Laguna compressor stations is required to be remediated to ground water standards promulgated by the WQCC. The OCD is the constituent agency responsible for enforcement of WQCC regulations at these stations. As you know, the OCD and has been working with TPC to define the extent of petroleum contaminants at these sites and to determine options for remediation of contaminated ground water. The OCD will continue to oversee TPC's ground water remedial efforts to ensure that ground waters are remediated to state standards.

The OCD thanks EPA for keeping us apprised of the results of EPA's PCB contaminant investigations and remedial efforts at TPC's New Mexico sites.

In the future, if you have any questions regarding OCD required remedial actions at TPC's Thoreau and Laguna compressor stations, please contact William C. Olson of my staff at (505) 827-5885.

Sincerely,

Roger C. Anderson
Environmental Bureau Chief

xc: William J. LeMay, OCD Director
Frank Chavez, OCD Aztec District Supervisor

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

DEC 17 1992

William J. LeMay
Director
Oil Conservation Division
State of New Mexico
Energy, Minerals and Natural Resources Department
P.O. Box 2088
Santa Fe, New Mexico 87504

Dear Mr. LeMay:

As you are aware, the EPA PCB Program has been working with Transwestern Pipeline, under the auspices of a Consent Decree, for the cleanup of PCB contamination at four compressor stations and ancillary sites in New Mexico. As of this date, cleanup has been completed at the four compressor stations and ancillary sites according to the terms of the Consent Decree. Groundwater monitoring has also been conducted at the four compressor stations in accordance with the Consent Decree. PCB, in addition to Benzene, Toluene and Xylene (BTEX), contamination has been identified at the Thoreau and Laguna Compressor Stations. According to the terms of the Consent Decree, the company has submitted Groundwater Assessment Reports for both sites that have been approved by the EPA PCB Program. The Company has proposed and is conducting on-going groundwater monitoring at both of these sites.

The company has also conducted groundwater monitoring at the Belen Rio Grande River Crossing for a one year period. No PCBs or BTEX were detected at this site.

The purpose of this letter is two-fold. First, current on-going groundwater monitoring and/or remediation is not covered under the Consent Decree. Currently, the company is working with your Agency and the Navajo Tribe on on-going groundwater monitoring at the Thoreau Compressor Station. They are also conducting a pilot bioremediation program for hydrocarbon contamination, that has been approved by your Agency, at the site. The company is working with your Agency and the Laguna Tribe concerning on-going groundwater monitoring at the Laguna Compressor Station. Therefore, based on the lack of resources and the priority of other projects, the EPA PCB Program will no longer formally conduct oversight of on-going groundwater monitoring, as it pertains to PCB contamination. The EPA PCB Program reserves the right to enter into a formal oversight role, but this would have to be through the civil referral process or civil administrative complaint process.

Second, the EPA PCB Program will soon terminate the Consent Decree because the Company has met the terms and conditions of the Consent Decree. Before we terminate the Consent Decree, we want to give

interested parties a period of 30 days in which to comment or ask questions about the outcome of the cleanup. Please send in writing or call about any questions or comments that you might have by January 25, 1993.

Finally, we want to thank you for your assistance in this project. Your interest and assistance contributed to a project which resulted in the overall cleanup of the environment.

If you have any questions or comments concerning this letter or the Consent Decree, please call me at (214) 655-7576.

Sincerely,

Donna S. Mullins

Donna S. Mullins
EPA Project Contact

DANIEL B. STEPHENS & ASSOCIATES, INC.
ENVIRONMENTAL SCIENTISTS AND ENGINEERS

August 14, 1992

0655-2105-92

Mr. Bill Olson
New Mexico Oil Conservation Division
P.O. Box 2088
State Land Office Building
Santa Fe, New Mexico 87504

Dear Bill:

As we recently discussed, I am writing to request an amendment to the Thoreau discharge plan for the purpose of continuing the pilot bioremediation program at the Thoreau Compressor Station. The original permit that was granted by your department allowed for injection of ground water containing nitrate for a period of 120 days. Since nitrate injection began on May 15, 1992, the 120 day period will end on September 12, 1992.

The results from the tests to date show that BTEX degradation is occurring. Consequently, we would like to extend the test period for an additional 90 days with a modification to the Thoreau discharge plan. Currently, we are extracting and re-circulating ground water at a rate of approximately 0.35 to 0.40 gallons per minute. The system design and general operating conditions are the same as those originally permitted by OCD (correspondence dated September 5, 1991) with the exception that we are now adding phosphate (20 mg/l as NaH_2PO_4) as a nutrient.

If you would like any additional information on the pilot program, contact me or Jeff Forbes at 822-9400. Thank you for your assistance.

Sincerely,

DANIEL B. STEPHENS & ASSOCIATES, INC.

Joanne Hilton

Joanne Hilton
Project Manager

JH/lc
cc: Roger Anderson, OCD
Larry Campbell, Transwestern Pipeline Co.
Jim Alexander, Enron
Ted Ryther, Enron

SOIL AND GROUND-WATER INVESTIGATIONS • REMEDIAL ACTION • LITIGATION SUPPORT • VADOSE ZONE HYDROLOGY
6020 ACADEMY NE • SUITE 100 • ALBUQUERQUE, NM 87109 • (505) 822-9400 • FAX (505) 822-8877
ALBUQUERQUE • LAS CRUCES • SANTA FE

Phone (505) 623-2761
FAX (505) 625-8060

Transwestern Pipeline Company
TECHNICAL OPERATIONS
P. O. Box 1717 • Roswell, New Mexico 88202-1717

August 26, 1992

Mr. Bill Olson
New Mexico Oil Conservation Division
P.O. Box 2088
State Land Office Building
Santa Fe, New Mexico 87504

Dear Bill:

I am writing to request an amendment to the Thoreau discharge plan for the purpose of continuing the pilot bioremediation program at the Thoreau Compressor Station. The original permit that was granted by your department allowed for injection of ground water containing nitrate for a period of 120 days. Since nitrate injection began on May 15, 1992, the 120 day period will end on September 12, 1992.

The results from the tests to date show that BTEX degradation is occurring. Consequently, we would like to extend the test period for an additional 90 days with a modification to the Thoreau discharge plan. Currently, we are extracting and re-circulating ground water at a rate of approximately 0.35 to 0.40 gallons per minute. The system design and general operating conditions are the same as those originally permitted by OCD (correspondence dated September 5, 1991) with the exception that we are now adding phosphate (20 mg/l as NaH_2PO_4) as a nutrient.

If you would like any additional information on the pilot program, please contact Joanne Hilton or Jeff Forbes of Daniel B. Stephens & Associate, Inc. at 822-9400. Thank you for your assistance.

Sincerely,

Larry Campbell

Larry Campbell
Compliance Environmentalist
Transwestern Pipeline Company

cc: Roger Anderson, OCD
Jim Alexander, Enron
Ted Ryther, Enron
Joanne Hilton, DBS&A

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87504
(505) 827-5800

August 14, 1992

CERTIFIED MAIL
RETURN RECEIPT NUMBER P-670-683-586

James C. Alexander
ENRON Gas Pipeline Group
P.O. Box 1188
Houston, TX 77251-1188

RE: OFFSITE MONITOR WELL INSTALLATION
ENRON THOREAU COMPRESSOR STATION
MCKINLEY COUNTY, NEW MEXICO

Dear Mr. Alexander:

The New Mexico Oil Conservation Division (OCD) has completed a review of the August 14, 1992 offsite investigation work plan for the ENRON Thoreau Compressor Station submitted by Daniel B. Stephens & Associates (DBS&A) on behalf of ENRON.

The work plan proposes to install three monitor wells offsite and downgradient of the pig receiving station. The monitor wells are to be installed along the length of the plume at locations determined by the soil boring program results which are contained in the work plan.

The above referenced work plan is hereby approved. While the soil boring program appears to have defined the lateral extent of the plume, the work plan does not contain monitor wells in these locations. Please be aware, that in the future OCD will require monitor wells transverse to the length of the plume to demonstrate containment.

In addition, DBS&A on August 14, 1992 verbally requested to thin spread the drill cuttings onsite at the compressor station. This request is approved, based upon the soil sample results contained in the above work plan.

Please contact the OCD at least 48 hours prior to monitor well sampling so that the OCD may be given the opportunity to split samples with ENRON.

If you have any questions, please contact me at (505) 827-5885.

Sincerely,

William C. Olson
Hydrogeologist
Environmental Bureau

xc: Denny Foust, OCD Aztec District Office
Joanne Hilton, Daniel B. Stephens & Associates, Inc.
Jeff Robinson, EPA Region VI

DANIEL B. STEPHENS & ASSOCIATES, INC.
ENVIRONMENTAL SCIENTISTS AND ENGINEERS

OIL CONSERV[illegible]N DIVISION
REC[illegible]VED

'92 AUG 17 PM 9 08

August 14, 1992

0650-2105-92

Fax received on 8/14

Mr. Bill Olson
New Mexico Oil Conservation Division
P.O. Box 2088
State Land Office Building
Santa Fe, New Mexico 87504

Dear Bill:

As we discussed last week, we are currently conducting exploratory drilling and sampling at the Thoreau Compressor Station. The objective of the investigation is to define the areal extent of hydrocarbons in ground water. We anticipate completion of the exploratory drilling program this week, and would like to begin installation of monitor wells in select borings on August 14th or August 17th.

Locations of the exploratory borings are shown in Figure 1. The exploratory borings were constructed by advancing a 7¼ inch diameter hollow-stem auger to the top of the water table (approximately 50 feet below land surface). Geologic logs of the boreholes were developed based on cuttings return, with verification by split spoon samples at approximately 15-foot intervals.

Both a split spoon sample for soil analysis and a hydropunch sample for ground-water analysis were collected near the top of the water table in each boring. The samples from all borings were analyzed for BTEX and total petroleum hydrocarbons (EPA methods 8020 and 8015). Preliminary results from these analyses are presented in Tables 1 and 2, and preliminary benzene concentrations are shown in Figure 2. Additionally, soil and ground-water samples from borings SB-40 and SB-49 (Figure 1) were analyzed for polychlorinated biphenyls (PCBs; EPA method 8080) and preliminary PCB results are also shown in Table 1.

After sampling, the drill stem and augers were removed from the borehole and a 5-foot surface casing was set. A temporary locking mechanism was installed around the surface casing. Based upon previous drilling at the site, the boreholes should remain open until all exploratory drilling is complete.

We plan to install monitor wells in three of the exploratory boreholes. The proposed monitor well locations are shown in Figure 3. The monitor wells will be installed by placing the drill stem through the surface casing and continuing to advance the borehole to approximately 10 feet below the water table (approximately 60 feet below ground surface). If the open hole has collapsed, it will be redrilled at this time. The wells will be constructed with 15 feet of 0.010-slot 2-inch PVC screen, placed approximately ten (10) feet below to five (5) feet above the water table, and with 2-inch schedule 40 PVC casing. A filter pack of 10-20 silica sand will be placed approximately 1 foot above the well screen, followed by 1 foot of 16-40 silica sand and 4 to 5 feet of bentonite pellets. The remainder of the borehole will be sealed with neat cement grout

SOIL AND GROUND-WATER INVESTIGATIONS • REMEDIAL ACTION • LITIGATION SUPPORT • VADOSE ZONE HYDROLOGY
6020 ACADEMY NE • SUITE 100 • ALBUQUERQUE, NM 87109 • (505) 822-9400 • FAX (505) 822-8877
ALBUQUERQUE • LAS CRUCES • SANTA FE

(3% to 5% bentonite), and a flush-grade locking steel vault will be installed at the surface. The proposed monitor well construction is shown in Figure 4.

The remainder of the exploratory boreholes will be abandoned. Prior to abandonment, the total depth of the boreholes will be tagged with steel tape. If significant collapse has occurred above the water table, the borehole will be redrilled. Neat cement grout (3 to 5% bentonite) will then be poured into the borehole. The amount of grout placed into the borehole will be measured and compared to the calculated volume of the borehole to ensure that no bridging has occurred.

Please let me know if you need additional information or if you would like us to revise these procedures.

Sincerely,

DANIEL B. STEPHENS & ASSOCIATES, INC.

Joanne Hilton

Joanne Hilton
Project Manager

JH/lc
Enclosures
cc: Roger Anderson, OCD
Jim Alexander, Enron

TABLE 1. SUMMARY OF WATER CHEMISTRY RESULTS FROM JULY - AUGUST 1992 EXPLORATORY BORINGS

Well No.	Date M/D/Y	Lab	Concentration													
			TPH (mg/l)	Fuel Hydro-carbon Range	RL (mg/l)	Benzene (µg/l)	RL (µg/l)	Toluene (µg/l)	RL (µg/l)	Ethyl-benzene (µg/l)	RL (µg/l)	Total Xylene (µg/l)	RL (µg/l)	Total PCB* (µg/l)	RL (µg/l)
5-SB-38	07/21/92	ATI	ND	C6-C36	1	ND	0.5	ND	0.5	ND	0.5	ND	0.5	NA	NA
5-SB-39	07/22/92	ATI	1 5 ND	C6-C10 C10-C22 C22-C36	1 1 1	ND	0.5	ND	0.5	ND	0.5	0.8	0.5	NA	NA
5-SB-40	07/23/92	ATI	ND	C6-C36	1	ND	0.5	ND	0.5	ND	0.5	ND	0.5	ND	0.5
5-SB-41	07/24/92	ATI	1 ND	C6-C10 C10-C36	1 1	24	0.5	ND	0.5	0.6	0.5	ND	0.5	NA	NA
5-SB-42	07/28/92	ATI	ND	C6-C36	1	34	0.5	ND	0.5	ND	0.5	ND	0.5	NA	NA
5-SB-43	07/29/92	ATI	ND	C6-C36	1	ND	0.5	ND	0.5	ND	0.5	ND	0.5	NA	NA
5-SB-44	07/30/92	ATI	ND	C6-C36	1	ND	0.5	ND	0.5	ND	0.5	ND	0.5	NA	NA
5-SB-45	07/31/92	ATI	ND 1 ND	C6-C10 C10-C22 C22-C36	1 1 1	19	0.5	0.7	0.5	ND	0.5	ND	0.5	NA	NA
5-SB-46	08/03/92	ATI	ND	C6-C36	1	ND	0.5	ND	0.5	ND	0.5	ND	0.5	NA	NA
5-SB-47	08/04/92	ATI	ND	C6-C36	1	ND	0.5	ND	0.5	ND	0.5	ND	0.5	NA	NA

* Results pending

ND = Not detected

NA = Not analyzed

TPH = Total Petroleum Hydrocarbons

RL = Reporting Limit

ATI = Analytical Technologies, Inc.

TABLE 1. SUMMARY OF WATER CHEMISTRY RESULTS FROM JULY - AUGUST 1992 EXPLORATORY BORINGS

Well No.	Date M/D/Y	Lab	Concentration													
			TPH (mg/l)	Fuel Hydro-carbon Range	RL (mg/l)	Benzene (µg/l)	RL (µg/l)	Toluene (µg/l)	RL (µg/l)	Ethyl-benzene (µg/l)	RL (µg/l)	Total Xylene (µg/l)	RL (µg/l)	Total PCB* (µg/l)	RL (µg/l)
5-SB-48	08/05/92	ATI	48 11 ND	C6-C10 C10-C22 C22-C36	1 1 1	ND	5	45	5	130	5	1400	5	NA	NA
5-SB-49	08/06/92	ATI	ND	C6-C36	1	ND	0.5	ND	0.5	ND	0.5	ND	0.5	*	*
5-SB-50	08/06/92	ATI	ND	C6-C36	1	ND	0.5	ND	0.5	ND	0.5	ND	0.5	NA	NA
5-SB-51	08/10/92	ATI	ND	C6-C36	1	ND	0.5	ND	0.5	ND	0.5	ND	0.5	NA	NA
5-SB-52	08/11/92	ATI	ND	C6-C36	1	ND	0.5	ND	0.5	ND	0.5	ND	0.5	NA	NA
5-SB-53	08/12/92	ATI	*	*	*	*	*	*	*	*	*	*	*	*	*
5-SB-54	08/13/92	ATI	*	*	*	*	*	*	*	*	*	*	*	*	*
5-SB-55	08/14/92	ATI	*	*	*	*	*	*	*	*	*	*	*	*	*

* Results pending

ND = Not detected

NA = Not analyzed

TPH = Total Petroleum Hydrocarbons

RL = Reporting Limit

ATI = Analytical Technologies, Inc.

TABLE 2. SUMMARY OF SOIL CHEMISTRY RESULTS FROM JULY - AUGUST 1992 EXPLORATORY BORINGS

Well No.	Date M/D/Y	Lab	Concentration													
			TPH (mg/kg)	Fuel Hydro-carbon Range	RL (mg/kg)	Benzene (mg/kg)	RL (mg/kg)	Toluene (mg/kg)	RL (mg/kg)	Ethyl-benzene (mg/kg)	RL (mg/kg)	Total Xylene (mg/kg)	RL (mg/kg)	Total PCB (mg/kg)	RL (mg/kg)	
5-SB-38 @ 50-50.5'	07/21/92	ATI	ND	C6-C36	5	ND	0.025	ND	0.025	ND	0.025	0.038	0.025	NA	NA	
5-SB-39 @ 49-49.5'	07/22/92	ATI	ND	C6-C36	5	ND	0.025	ND	0.025	ND	0.025	ND	0.025	NA	NA	
5-SB-40 @ 46-46.5'	07/23/92	ATI	ND	C6-C36	5	ND	0.025	ND	0.025	ND	0.025	ND	0.025	*	*	
5-SB-41 @ 60-61.5'	07/24/92	ATI	ND	C6-C36	5	ND	0.025	ND	0.025	ND	0.025	ND	0.025	NA	NA	
5-SB-42 @ 62-63.5'	07/28/92	ATI	ND	C6-C36	5	ND	0.025	ND	0.025	ND	0.025	ND	0.025	NA	NA	
5-SB-43 @ 47-48.5'	07/29/92	ATI	ND	C6-C36	5	ND	0.025	ND	0.025	ND	0.025	ND	0.025	NA	NA	
5-SB-44 @ 49.5-51'	07/30/92	ATI	ND	C6-C36	5	ND	0.025	ND	0.025	ND	0.025	ND	0.025	NA	NA	
5-SB-45 @ 63-64.5'	07/31/92	ATI	ND	C6-C36	5	ND	0.025	ND	0.025	ND	0.025	ND	0.025	NA	NA	
5-SB-46	08/03/92	ATI	*	*	*	*	*	*	*	*	*	*	*	NA	NA	
5-SB-47	08/04/92	ATI	*	*	*	*	*	*	*	*	*	*	*	NA	NA	

* Results pending

ND = Not detected

TPH = Total Petroleum Hydrocarbons

ATI = Analytical Technologies, Inc.

** Not installed as of 8/11/92

NA = Not analyzed

RL = Reporting Limit

TABLE 2. SUMMARY OF SOIL CHEMISTRY RESULTS FROM JULY - AUGUST 1992 EXPLORATORY BORINGS

Well No.	Date M/D/Y	Lab	Concentration												
			TPH (mg/kg)	Fuel Hydro-carbon Range	RL (mg/kg)	Benzene (mg/kg)	RL (mg/kg)	Toluene (mg/kg)	RL (mg/kg)	Ethyl-benzene (mg/kg)	RL (mg/kg)	Total Xylene (mg/kg)	RL (mg/kg)	Total PCB (mg/kg)	RL (mg/kg)
5-SB-48	08/05/92	ATI	*	*	*	*	*	*	*	*	*	*	*	NA	NA
5-SB-49	08/06/92	ATI	*	*	*	*	*	*	*	*	*	*	*	*	*
5-SB-50	08/06/92	ATI	*	*	*	*	*	*	*	*	*	*	*	NA	NA
5-SB-51	08/10/92	ATI	*	*	*	*	*	*	*	*	*	*	*	NA	NA
5-SB-52	08/11/92	ATI	*	*	*	*	*	*	*	*	*	*	*	NA	NA
5-SB-53	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
5-SB-54	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
5-SB-55	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**

* Results pending

** Not installed as of 8/11/92

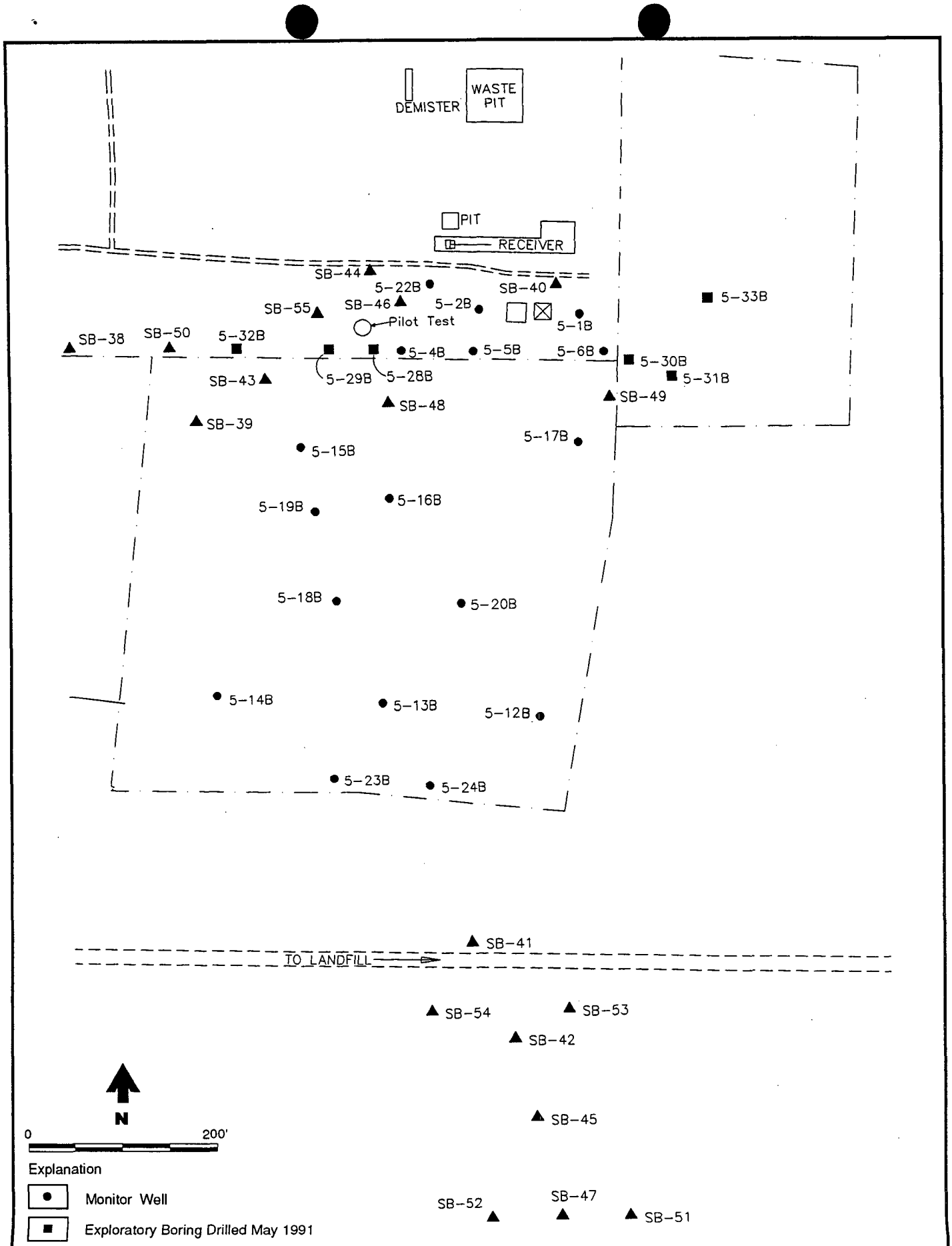
ND = Not detected

NA = Not analyzed

TPH = Total Petroleum Hydrocarbons

RL = Reporting Limit

ATI = Analytical Technologies, Inc.

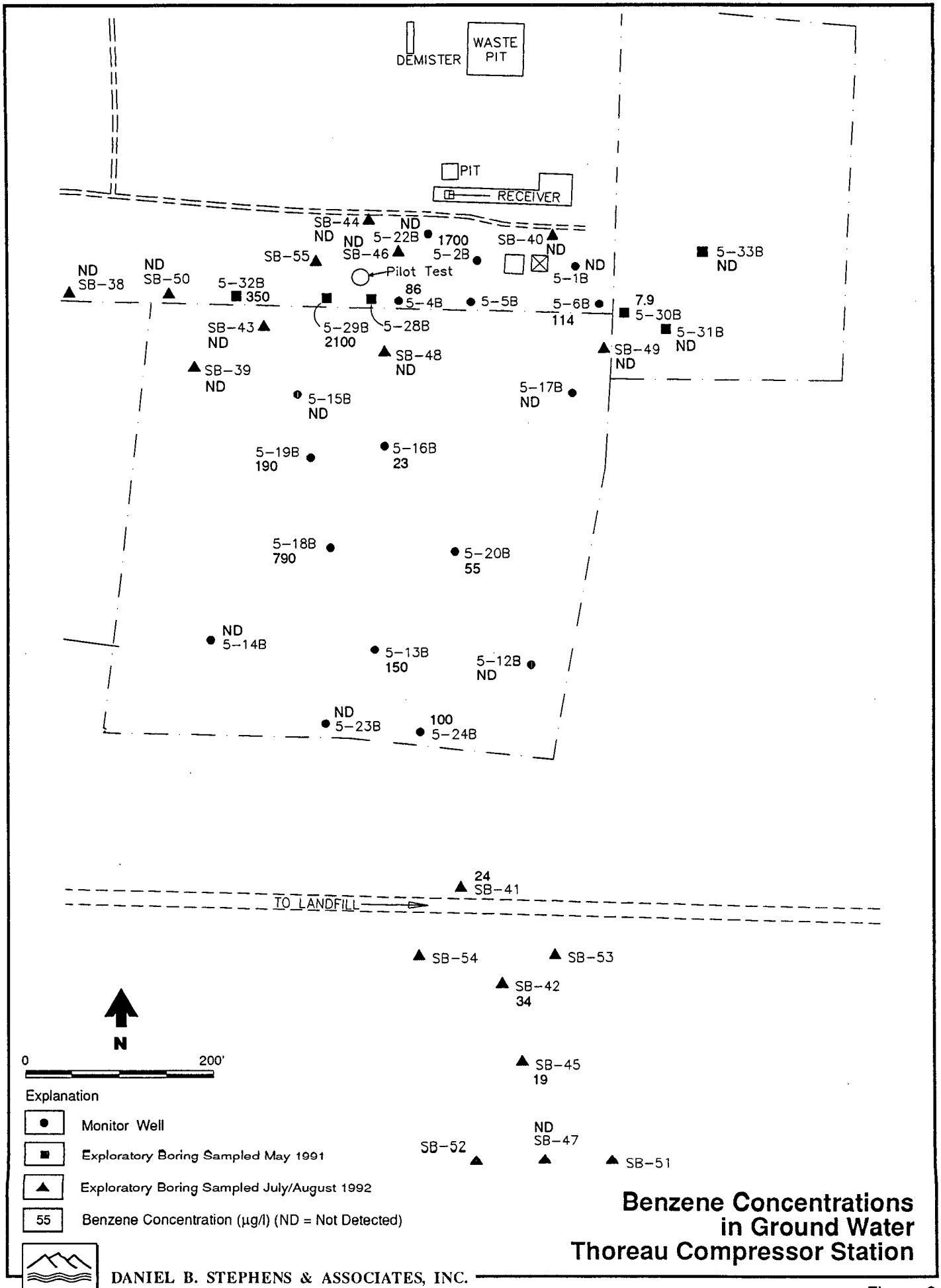


Locations of Exploratory Borings Thoreau Compressor Station

DANIEL B. STEPHENS & ASSOCIATES, INC.

8-92 JN 2105

Figure 1

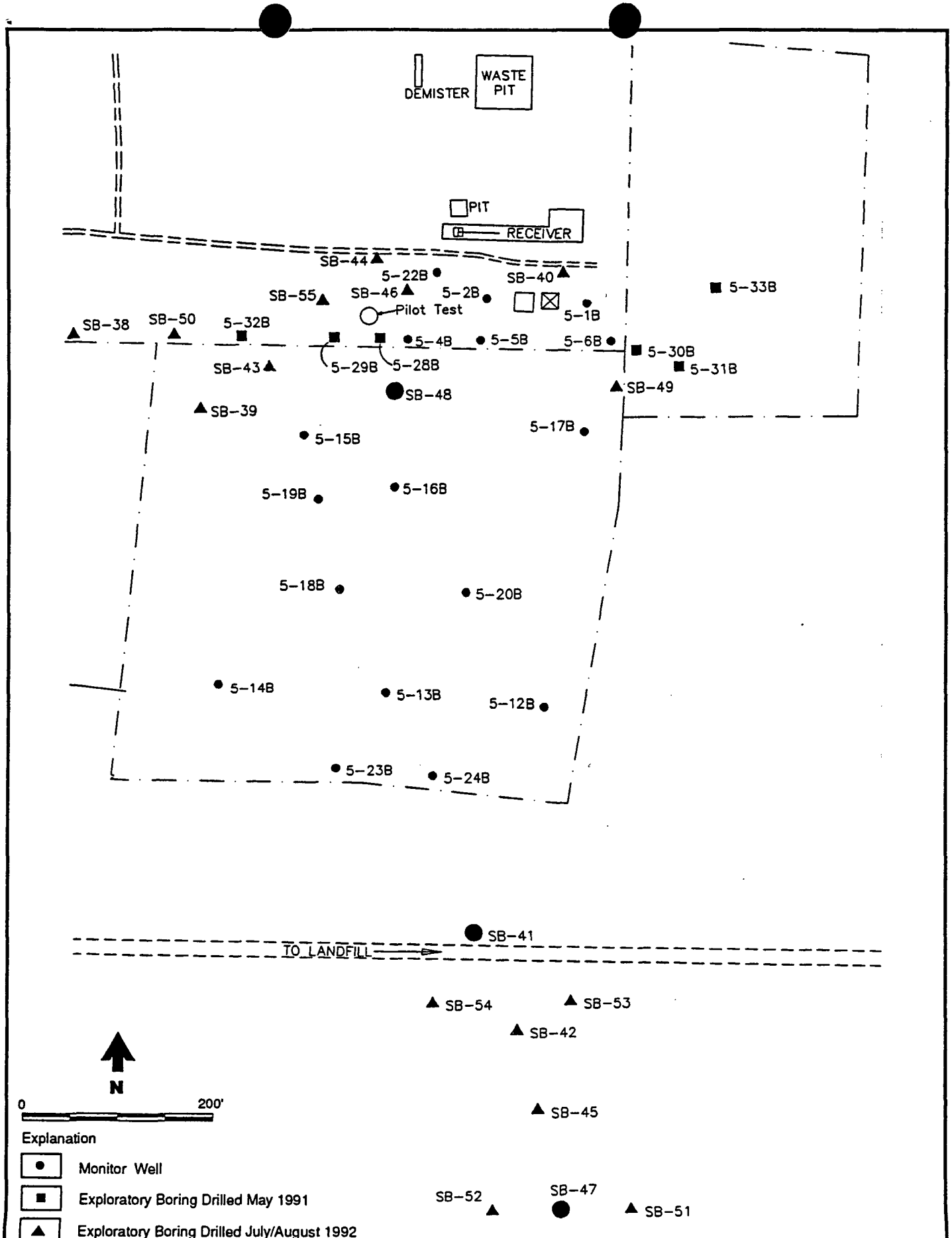


Benzene Concentrations in Ground Water Thoreau Compressor Station

DANIEL B. STEPHENS & ASSOCIATES, INC.

8-92 JN 2105

Figure 2

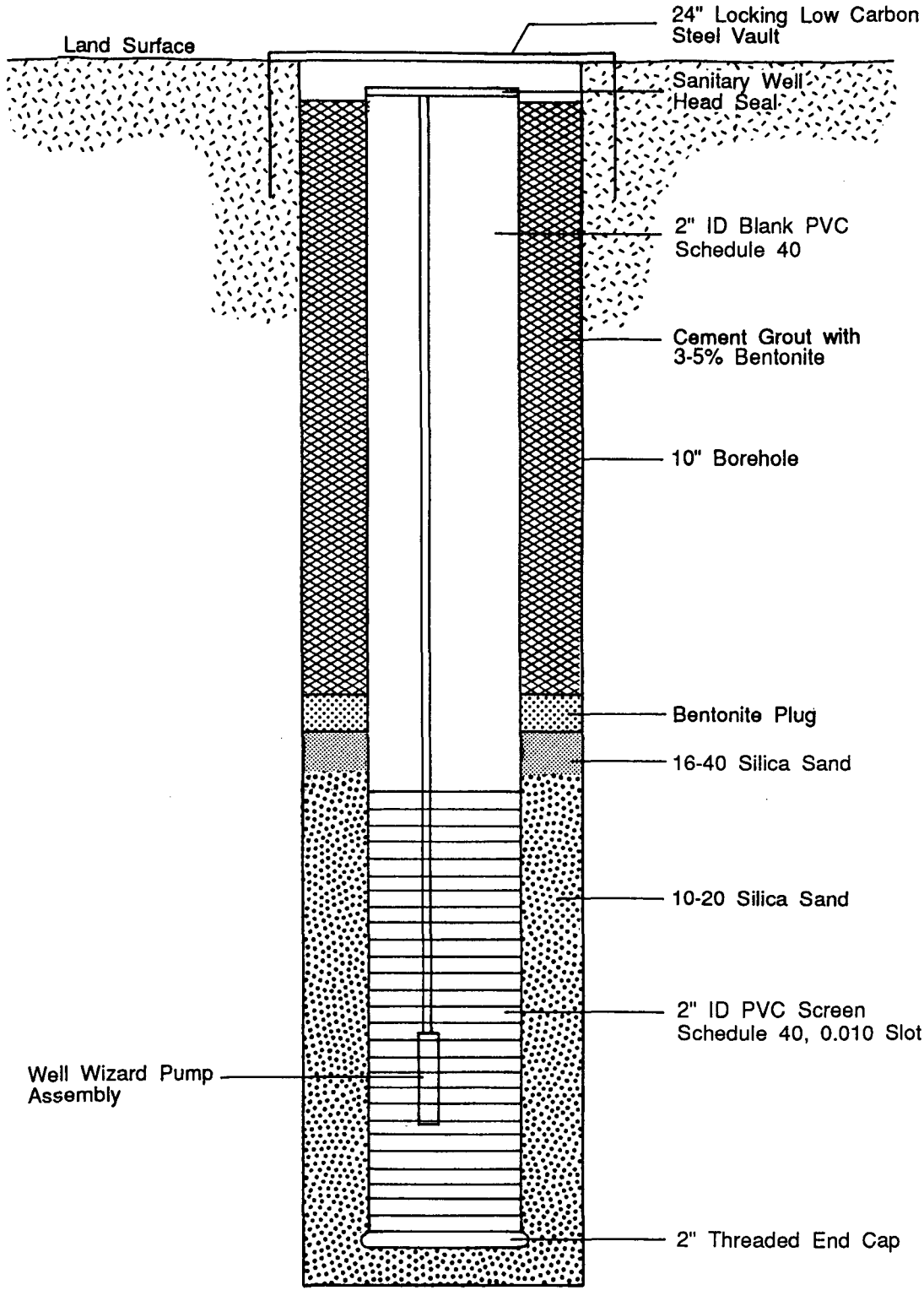


Locations of Proposed Monitor Wells
Thoreau Compressor Station

DANIEL B. STEPHENS & ASSOCIATES, INC.

8-92 JN 2105

Figure 3



Construction Design for Monitor Well

DANIEL B. STEPHENS & ASSOCIATES, INC.
8-91 JN 89-030T

Figure 4

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

July 27,1992

BRUCE KING
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87504
(505) 827-5800

CERTIFIED MAIL
RETURN RECEIPT NO P-667-242-121

Mr. Larry T. Campbell
Transwestern Pipeline Company
P.O. Box 1717
Roswell, New Mexico 88202-1717

Re: Discharge Plan GW-80
Thoreau Compressor Station
McKinley County, New Mexico

Dear Mr. Campbell:

The Oil Conservation Division (OCD) has received the discharge plan modification request, dated April 20, 1992, for the above referenced facility. The modification consists of the addition of purge water from the monitor wells to the discharge stream.

Based on the information provided in your request and WQCC Regulations 3-109.A, the requested discharge plan modification is hereby approved.

Please be advised approval of this modification does not relieve you of liability should your operation result in actual pollution of surface or ground waters actionable under other laws and/or regulations.

If you have any questions, please call Roger Anderson at (505) 827-5812.

Sincerely:

William J. LeMay
Director

xc: OCD Aztec Office

DANIEL B. STEPHENS & ASSOCIATES, INC.
ENVIRONMENTAL SCIENTISTS AND ENGINEERS

May 12, 1992

0387-21052.3-92

Mr. Roger Anderson
Oil Conservation Division
Land Office Building
310 Old Santa Fe Trail
Santa Fe, NM 87501

Dear Mr. Anderson:

Attached is the laboratory report from Analytical Technologies, Inc. (ATI) for PCB analysis of the TCLP extract performed on the composite sample of the drilling mud collected last week at Transwestern Compressor Station No. 5 located in Thoreau, New Mexico. The laboratory sample ID for this sample is 204985-1. None of the seven PCB Aroclors were detected in the extract. Based on these results, as well as the VOC and pesticide results faxed to you yesterday, the drilling mud is below TCLP limits for all parameters, and is therefore non-TCLP toxic.

We hereby request permission from OCD to dispose of the drilling mud at Basin Disposal in Bloomfield, New Mexico. Following your approval, Mr. Dudley Welch, a Certificated Carrier, will haul the approximately 2500 gallons of mud to the facility in a vacuum tanker truck. If possible, we would like to dispose of the mud tomorrow, pending your approval.

Assuming all is in order, please indicate your approval for disposal of the drilling mud as proposed by signing below and faxing back to me at the above number. If you require any additional information or clarification, please call me as soon as possible. Thank you very much for your assistance.

Sincerely,

DANIEL B. STEPHENS & ASSOCIATES, INC.

Jeffrey Forbes

Jeffrey Forbes
Senior Hydrogeochemist

APPROVED: Kathy Brown 5/12/92
Signature Date

2105\ANDERSON.512

Additional Compounds

The following additional compounds were analyzed by method TSW8.
The detection limits listed are based on instrument detection limits rather than a formal MDL study.

This notification is for accession numbers: 204855-1

Compound Name	Concentration	Units	Dilution Factor	Analysts Initials
SR 1016	< 0.5	ug/L	1	ym
1221				
1232				
1242				
1248				
1254				
1260				

5/19/92

PLEASE PLACE A COPY OF THIS NOTICE IN THE APPROPRIATE JOB FOLDERS

Daniel B. Stephens & Associates, Inc.
Environmental Scientists and Engineers
6020 Academy NE, #100
Albuquerque, NM 87109
(505) 822-9400
FAX: (505) 822-8877

Date Mon. 5/11/92 Project No. 2105.2.3

Sent to Bill Olson/Roger Anderson Sent from Joanne Hilton (by Judi Deeds)

Total Pages Including Cover Page 5

Fax No. 1-700-827-5741

DBS&A Form No. 008a Rev 2/92

Remarks

Bill/Roger - here are the VOC & PCB lab data for TCLP extract on the drilling mud from Thoreau. If acceptable, please fax back your approval to my attention at the above number. We hope to have the mud taken to Basin Disposal on Wed. (5-13). Thank you for your help.

- Joanne Hilton

Judy / Joanne Hilton

	1	2	3	4	5	6	7	8	9
1		TCLP 8080							
2	Methoxychlor, in µg/l (ppb)					<0.5			
3	Chlordane					<0.5			
4	Endrin					<0.1			
5	Lindane					<0.05			
6	Heptachlor					<0.05			
7	Heptachlor Epoxide					<0.05			
8	Toxaphene					<1.0			
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									

EFFICIENCY LINE-22-206

Sample ID: 204985-1 Date Received: 05/05/92 Date Extracted: 05/05/92

Method 8240

*** DIL. FACTOR: 1 ***

1 - Chloromethane		1 -		UG/L	(10
2 - Bromomethane		2 -		UG/L	(10
3 - Vinyl chloride		3 -		UG/L	(1
4 - Chloroethane		4 -		UG/L	(1
5 - Methylene chloride		5 -	39 B	UG/L	(5
6 - Acetone		6 -	6 B	UG/L	(10
7 - Carbon disulfide		7 -		UG/L	(1
8 - 1,1-Dichloroethene		8 -		UG/L	(1
9 - 1,1-Dichloroethane		9 -		UG/L	(1
10 - 1,2-Dichloroethene (Total)		10 -		UG/L	(1
11 - Chloroform		11 -		UG/L	(1
12 - 1,2-Dichloroethane		12 -		UG/L	(1
13 - 2-Butanone (MEK)		13 -		UG/L	(10
14 - 1,1,1-Trichloroethane		14 -		UG/L	(1
15 - Carbon tetrachloride		15 -		UG/L	(1
16 - Vinyl Acetate		16 -		UG/L	(10
17 - Bromodichloromethane		17 -		UG/L	(1
18 - 1,1,2,2-Tetrachloroethane		18 -		UG/L	(1
19 - 1,2-Dichloropropane		19 -		UG/L	(1
20 - trans-1,3-Dichloropropene		20 -		UG/L	(1
21 - Trichloroethene		21 -		UG/L	(1
22 - Dibromochloromethane		22 -		UG/L	(1
23 - 1,1,2-Trichloroethane		23 -		UG/L	(1
24 - Benzene		24 -	37	UG/L	(1
25 - cis-1,3-Dichloropropene		25 -		UG/L	(1
26 - 2-Chloroethylvinylether		26 -		UG/L	(10
27 - Bromoform		27 -		UG/L	(5
28 - 2-Hexanone (MBK)		28 -		UG/L	(10
29 - 4-Methyl-2-pentanone (MIBK)		29 -		UG/L	(10
30 - Tetrachloroethene		30 -		UG/L	(1
31 - Toluene	*	31 -	410	UG/L	(1
32 - Chlorobenzene		32 -		UG/L	(1
33 - Ethylbenzene		33 -	96	UG/L	(1
34 - Styrene		34 -		UG/L	(1
35 - Total Xylenes	*	35 -	680	UG/L	(1
36 - 1,2-Dichloroethane-d4		36 -	86	%	
37 - Bromofluorobenzene		37 -	108	%	
38 - Toluene-d8		38 -	93	%	

Below detection limit estimated Value

B - Found in reagent blank.

* - Run at 1:10 dilution.

Lab Sample ID: 92-05-022-01
Date Analyzed: 05/07/92 ANALYST INITIALS:

Sample ID: TCLP Blank Date Received: N/A Date Extracted: 05/05/92

Method 8240 204985-2

*** DIL. FACTOR: 1 ***

1 - Chloromethane	1	-	UG/L	(10
2 - Bromomethane	2	-	UG/L	(10
3 - Vinyl chloride	3	-	UG/L	(1
4 - Chloroethane	4	-	UG/L	(1
5 - Methylene chloride	5	- 27 B	UG/L	~~10~~ 98 5/11/92
6 - Acetone	6	- 21	UG/L	~~10~~
7 - Carbon disulfide	7	-	UG/L	(1
8 - 1,1-Dichloroethene	8	-	UG/L	(1
9 - 1,1-Dichloroethane	9	-	UG/L	(1
10 - 1,2-Dichloroethene (Total)	10	-	UG/L	(1
11 - Chloroform	11	-	UG/L	(1
12 - 1,2-Dichloroethane	12	-	UG/L	(1
13 - 2-Butanone (MEK)	13	-	UG/L	(10
14 - 1,1,1-Trichloroethane	14	-	UG/L	(1
15 - Carbon tetrachloride	15	-	UG/L	(1
16 - Vinyl Acetate	16	-	UG/L	(10
17 - Bromodichloromethane	17	-	UG/L	(1
18 - 1,1,2,2-Tetrachloroethane	18	-	UG/L	(1
19 - 1,2-Dichloropropane	19	-	UG/L	(1
20 - trans-1,3-Dichloropropene	20	-	UG/L	(1
21 - Trichloroethene	21	-	UG/L	(1
22 - Dibromochloromethane	22	-	UG/L	(1
23 - 1,1,2-Trichloroethane	23	-	UG/L	(1
24 - Benzene	24	-	UG/L	(1
25 - cis-1,3-Dichloropropene	25	-	UG/L	(1
26 - 2-Chloroethylvinylether	26	-	UG/L	(10
27 - Bromoform	27	-	UG/L	(5
28 - 2-Hexanone (MBK)	28	-	UG/L	(10
29 - 4-Methyl-2-pentanone (MIBK)	29	-	UG/L	(10
30 - Tetrachloroethene	30	-	UG/L	(1
31 - Toluene	31	-	UG/L	(1
32 - Chlorobenzene	32	-	UG/L	(1
33 - Ethylbenzene	33	-	UG/L	(1
34 - Styrene	34	-	UG/L	(1
35 - Total Xylenes	35	-	UG/L	(1
36 - 1,2-Dichloroethane-d4	36	- 86	%	
37 - Bromofluorobenzene	37	- 108	%	
38 - Toluene-d8	38	- 93	%	

B - Found in reagent blank.

Lab Sample ID: 92-05-022-00
Date Analyzed: 05/07/92

ANALYST INITIALS: [signature]

Sample ID: Reagent Blank Date Received: N/A Date Extracted: N/A

Method 8240

*** DIL. FACTOR: 1 ***

1	Chloromethane	1		UG/L	(10
2	Bromomethane	2		UG/L	(10
3	Vinyl chloride	3		UG/L	(1
4	Chloroethane	4		UG/L	(1
5	Methylene chloride	5	8	UG/L	(5 6/11/92
6	Acetone	6		UG/L	(10
7	Carbon disulfide	7		UG/L	(1
8	1,1-Dichloroethene	8		UG/L	(1
9	1,1-Dichloroethane	9		UG/L	(1
10	1,2-Dichloroethene (Total)	10		UG/L	(1
11	Chloroform	11		UG/L	(1
12	1,2-Dichloroethane	12		UG/L	(1
13	2-Butanone (MEK)	13		UG/L	(10
14	1,1,1-Trichloroethane	14		UG/L	(1
15	Carbon tetrachloride	15		UG/L	(1
16	Vinyl Acetate	16		UG/L	(10
17	Bromodichloromethane	17		UG/L	(1
18	1,1,2,2-Tetrachloroethane	18		UG/L	(1
19	1,2-Dichloropropane	19		UG/L	(1
20	trans-1,3-Dichloropropene	20		UG/L	(1
21	Trichloroethene	21		UG/L	(1
22	Dibromochloromethane	22		UG/L	(1
23	1,1,2-Trichloroethane	23		UG/L	(1
24	Benzene	24		UG/L	(1
25	cis-1,3-Dichloropropene	25		UG/L	(1
26	2-Chloroethylvinylether	26		UG/L	(10
27	Bromoform	27		UG/L	(5
28	2-Hexanone (MBK)	28		UG/L	(10
29	4-Methyl-2-pentanone (MIBK)	29		UG/L	(10
30	Tetrachloroethene	30		UG/L	(1
31	Toluene	31		UG/L	(1
32	Chlorobenzene	32		UG/L	(1
33	Ethylbenzene	33		UG/L	(1
34	Styrene	34		UG/L	(1
35	Total Xylenes	35		UG/L	(1
36	1,2-Dichloroethane-d4	36	91	%	
37	Bromofluorobenzene	37	103	%	
38	Toluene-d8	38	105	%	

Lab Sample ID: 92-05-022-00
Date Analyzed: 05/07/92 ANALYST INITIALS:

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

New Mexico DRUG FREE It's a State of Mind!

BRUCE KING
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87504
(505) 827-5800

March 12, 1992

CERTIFIED MAIL
RETURN RECEIPT NUMBER P-756-903-838

James C. Alexander
ENRON Gas Pipeline Group
P.O. Box 1188
Houston, TX 77251-1188

RE: CLOSURE OF MONITOR WELLS
ENRON THOREAU COMPRESSOR STATION
MCKINLEY COUNTY, NEW MEXICO

Dear Mr. Alexander:

The New Mexico Oil Conservation Division (OCD) has completed a review of the following correspondence supporting ENRON's request to plug and abandon several monitor wells, which were installed under the terms of a United States Environmental Protection Agency Consent Decree, to reduce the potential for the wells to act as conduits for contaminant migration:

1. ENRON's June 28, 1991 "CLOSURE OF MONITOR WELLS UNDER EPA CONSENT DECREE, THOREAU STATION".

2. DBS&A's July 1, 1991 "CLOSURE OF DEEP WELLS 5-1A AND 5-3A, AND SHALLOW DRY MONITOR WELLS 5-7B, 5-8B, 5-26B AND 5-27B AT TRANSWESTERN PIPELINE CO. COMPRESSOR STATION NO.5, THOREAU, NEW MEXICO".

3. DBS&A's January 8, 1992 correspondence transmitting current sampling data for deep monitor well 5-3A.

4. DBS&A's February 26, 1992 "ABANDONMENT OF MONITOR WELL 5-3A AT THE THOREAU COMPRESSOR STATION".

The OCD approves of the request to close monitor wells 5-1A, 5-3A, 5-7B, 5-8B, 5-25B, 5-26B and 5-27B at the ENRON Thoreau Compressor Station using the July 1, 1991 well decommissioning procedures

proposed by Daniel B. Stephens and Associates, Inc. with the following conditions:

1. All surface plugs will be emplaced from the surface to a minimum of 50 feet below the bottom of the existing surface casing.

2. A final plugging report containing the actual procedures used to abandon the monitor wells will be supplied to OCD within 30 days of completion of plugging activities.

Please contact the OCD at least 48 hours prior to closure so that the OCD may be given the opportunity to witness the well plugging activities.

If you have any questions, please contact me at (505) 827-5885.

Sincerely,

William C. Olson
Hydrogeologist
Environmental Bureau

xc: Denny Foust, OCD Aztec District Office
Joanne Hilton, Daniel B. Stephens & Associates, Inc.
Jeff Robinson, EPA Region VI

3/4/92 OCD/ENRON Meeting 1330 hrs

participants - Bill Olson — OCD Santa Fe
Roger Anderson - " "
Denny Foust - " Aztec
Kathy Brown - " Santa Fe
Joanne Hilton - OBS & Assoc.
Ted Ryther - ENRON

T.R. offsite thorium may be Navajo Trust land

J.H. Scheduled for March 23, 1992 to start pilot bioremediation
will run for approx. 90 days

End March, Early April will want to do MW closure

TR Disposal of ground purge water
*will submit new proposal to OCD on disposal

RCA can dispose of clean water @

Laguna

Check to see if proposal submitted for Laguna MW closure

Water disposal at Laguna

DANIEL B. STEPHENS & ASSOCIATES, INC.
ENVIRONMENTAL SCIENTISTS AND ENGINEERS

February 26, 1992

0166-2105-92

Fax recieved 2/28/92

Mr. Bill Olson
New Mexico Oil and Conservation Division
P.O. Box 2088
Santa Fe, New Mexico 87504-2088

Re: Abandonment of monitor well 5-3A at the Thoreau Compressor Station

Dear Mr. Olson:

Enclosed please find copies of the lithologic log and well construction record for Thoreau monitor well 5-3A. Also enclosed is a summary of water quality data collected from 5-3A, including analyses for polychlorinated biphenyls (PCBs) and benzene, toluene, ethylbenzene and xylene (BTEX). The table indicates that no PCB or BTEX were detected during the first three sampling events. Minor amounts of BTEX were detected in samples from monitor well 5-3A and in equipment blanks (rinse water from the rig bailer) beginning in September 1990. None of the BTEX concentrations exceeded New Mexico Water Quality Control Commission (NMWQCC) ground-water standards.

Monitor well 5-3A was installed in April 1989 by Salazar Drilling Company, Inc. Geologic logging and supervision of well construction were conducted by Ground Water Resource Consultants of Tucson, Arizona. In May 1990 additional grout was placed in the upper part of 5-3A to improve the surface seal. The field notes indicate that a hydraulic hose began leaking while the rig was near monitor well 5-3A, and it is possible that minor amounts of hydrocarbons were introduced to the well at that time.

Since monitor well 5-3A is located upgradient of the waste disposal areas, and an adjacent shallow well has not detected BTEX, we do not feel that the minor amounts of BTEX detected are representative of deep aquifer contamination. It is our opinion that the BTEX is most likely the result of low levels of hydrocarbons introduced during rig bailing activities or possibly during grout addition. Consequently, we recommend that 5-3A be abandoned this spring in conjunction with other abandonment activities.

Sincerely,

DANIEL B. STEPHENS & ASSOCIATES, INC.

Joanne Hilton

Joanne Hilton
Project Manager

Enclosures: As stated

SOIL AND GROUND-WATER INVESTIGATIONS • REMEDIAL ACTION • LITIGATION SUPPORT • VADOSE ZONE HYDROLOGY
6020 ACADEMY NE • SUITE 100 • ALBUQUERQUE, NM 87109 • (505) 822-9400 • FAX (505) 822-8877
ALBUQUERQUE • LAS CRUCES • SANTA FE

TABLE

LITHOLOGIC LOG

Location: ENRON Pumping Station #5, Thoreau, N.M.
Boring No.: 5-3A **Drilling Method:** Air Rotary
Rig type: Gardner-Denver 1500 with 750 cfm compressor
Drilling fluids: Foam/water/polymer
Date Started: 04/17/89 **Date Finished:** 04/28/89
Total Depth Drilled: 450 feet
Drilling Contractor: Joe I. Salazar Drilling, Inc.

DEPTH INTERVAL (feet)		DESCRIPTION OF MATERIAL
		ALLUVIUM
0 - 6	CLAYEY SAND WITH SILT	Orange brown, loose. Contains concrete blocks and fill.
6 - 38	SILTY SAND WITH SOME FINE GRAVEL	Orange brown, loose, sand is predomin--ately fine-grained, gravel fraction is sub-angular. Becomes slightly coarser below 25 feet.
38 - 43	SANDY CLAY	Red brown, firm.
43 - 56	CLAYEY SAND	Reddish brown, contains a trace of fine gravel, loose.
		CHINLE FORMATION
56 - 67	MUDSTONE	Red, moderately cemented, friable (WEATHERED CHINLE FORMATION)
67 - 100	MUDSTONE AND CLAY WITH SOME FINE-GRAINED SANDSTONE	Red brown, with some blue mottling, mud-mudstone and sandstone fractions are mod-erately to strongly cemented with calcareous cement, clay is dense and moderately plastic.
100 - 120	SANDSTONE WITH MUDSTONE	Reddish-grey, with trace of clay (< 10%), strongly cemented, sandstone is fine to medium grained. Trace of limestone or limestone gravels at 112 feet.
120 - 126	MUDSTONE WITH FINE-GRAINED SANDSTONE	Reddish grey, strongly cemented.

TABLE
(continued)
LITHOLOGIC LOG

Location: ENRON Pumping Station #5, Thoreau, N.M.
Boring No.: 5-3A

DEPTH INTERVAL (feet)		DESCRIPTION OF MATERIAL
126 - 146	SANDSTONE WITH MUDSTONE	Reddish-grey, strongly cemented, sandstone fraction is fine to medium grained.
146 - 172	CLAY	Reddish orange, with some mudstone and fine-grained sandstone, clay is moderately to highly plastic.
172 - 180	SANDSTONE	Light reddish grey, fine to medium grained.
180 - 190	SILTY SANDSTONE	Dark chocolate brown, moderately cemented, thin fissile layers.
190 - 196	SANDSTONE WITH MUDSTONE AND CLAY	Reddish brown, strongly cemented.
196 - 226	CLAY AND MUDSTONE	Orange brown, with some fine-grained sandstone, mudstone and sandstone are strongly cemented.
226 - 252	SANDSTONE AND MUDSTONE	Light reddish brown, strongly cemented.
252 - 296	CLAYSTONE AND MUDSTONE	Orange brown.
		Poor cuttings returns in this interval.
296 - 306	CLAY AND MUDSTONE	Red, with some clay.
306 - 326	CLAY AND MUDSTONE	Orange brown.
326 - 446	SILTY SANDSTONE AND MUDSTONE	Light grey, red dish brown fissile layers, strongly cemented.
		No returns from 346 feet to 356 feet, 360 feet to 372 feet, 396 feet to 406 feet, and 426 feet to 446 feet.
446 - 450	CLAY	Red, moderately compact and plastic.

TOTAL DEPTH OF BOREHOLE: 450 FEET

WELL COMPLETION SUMMARY

Well designation: 5-3A
Location: ENRON Pumping Station No. 5
Thoreau, New Mexico
Client: ENRON
Drilling contractor: Joe I. Salazar Drilling, Inc.
Rig type: Gardner Denver 1500 with 750 cfm compressor
Drilling fluids: Water/Foam/Polymer

Elevation of land surface: ---
Elevation of measuring point: ---

BOREHOLE DIAMETER SCHEDULE
14-inch Diam. borehole from 0' to 80' BLS (Below Land Surface)

8 3/4-inch Diam. borehole from 80' to 450' BLS

Total depth drilled - 450' BLS

CASING SCHEDULE
10-inch nom. blank steel from 0' to 79.6' BLS

6-inch nom. blank steel from 0' to 423.8' BLS

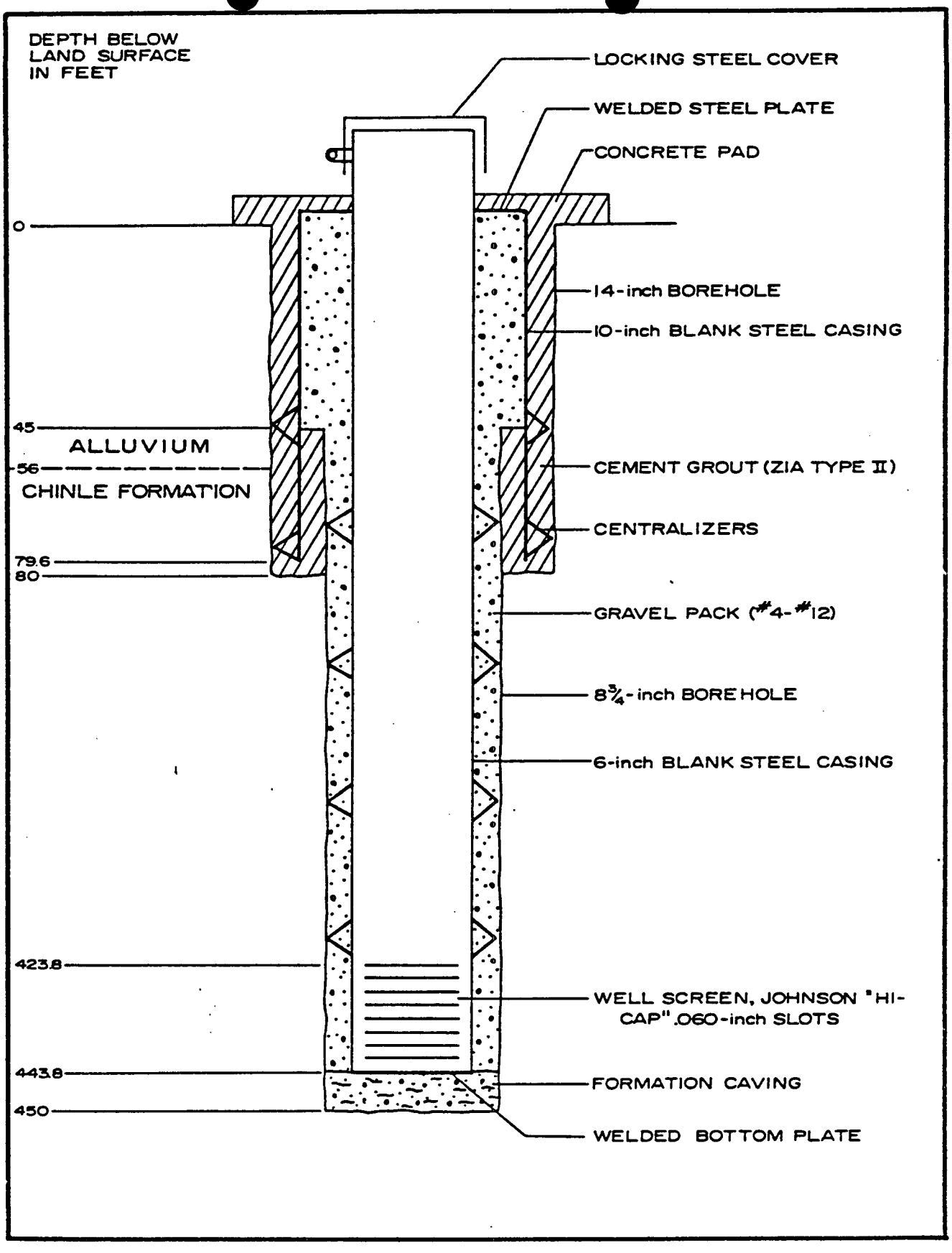
6-inch nom. well screen from 423.8' to 443.8' BLS
(Johnson "Hi-Cap," wire-wrap, 0.060-inch slot opening)

Note: All joints welded with Lincoln # 7018 rod

SUMMARY OF CONSTRUCTION - 5-3A

Date	Time	Action
4/17/89	12:30	Begin drilling 14-inch diam. borehole
	16:00	Complete drilling 14-inch borehole, run 10-inch casing, centralizers at 75, and 35' BLS
	18:15	Cement 14-inch casing with Zia Type I & II mixed at 50 sacks per 8 barrels of water
4/20/89	07:30	Cement is 6' BLS outside casing; topped off cement to land surface outside casing
4/21/89	12:30	Begin drilling 8 3/4-inch diam. borehole
	19:30	Finish drilling to 415' BLS
4/22/89	09:30	Borehole has caved to 360' BLS
4/23/89	09:20	Borehole has caved to 324' BLS, no water
4/27/89	15:30	Begin lowering rods to deepen borehole; Encountered caving to approx. 350' BLS

	18:00	Finished drilling to 450′ BLS
4/28/89	08:00	Re-entered borehole to clean it before geophysical logging and running casing; Encountered obstruction at 420′ BLS
	10:00	Run geophysics; got tool to 448′ BLS
	12:15	Set 6-inch casing to 443.8′ BSL with 20′ screen section on bottom and centralizers every 45′
	17:30	Poured gravel pack from surface, 51 5-gal. buckets of #4-#12 gravel



WELL SCHEMATIC
WELL 5-3A
THOREAU PUMPING STATION
THOREAU, NEW MEXICO

SUMMARY OF ANALYTICAL RESULTS
THOREAU MONITOR WELL 5-3A

DATE mo/yr	SAMPLE TYPE	CONCENTRATION (micrograms/liter)				
		Total PCB*	Benzene	Toluene	Ethyl-benzene	Xylene
12/89	GW	ND	ND	ND	ND	NA
04/90	GW	ND	ND	ND	ND	ND
05/90	GW	NA	ND	ND	ND	ND
09/90**	GW	ND	ND	1.6	ND	ND
11/90	GW	ND	1.4	0.67	ND	ND
	EB	ND	0.70	ND	ND	ND
01/91	GW	ND	ND	ND	ND	ND
	EB	ND	ND	0.50	ND	0.70
02/91	GW	ND	0.76	0.79	ND	ND
	EB	ND	ND	ND	ND	ND
03/91	GW	ND	1.5	0.90	ND	ND
	EB	ND	ND	0.62	ND	ND
04/91	GW	ND	1.2	0.74	ND	ND
	EB	ND	ND	ND	ND	ND
12/91[I]	GW	ND	ND	ND	ND	0.63
12/91[1]	GW	ND	0.76	0.61	ND	1.0
12/91[2]	GW	ND	0.62	ND	ND	ND
12/91[3]	GW	ND	0.86	ND	ND	ND

NOTES:

* Total PCB includes:
Aroclor 1016, Aroclor 1232, Aroclor 1248, Aroclor 1260
Aroclor 1221, Aroclor 1242, Aroclor 1254

** Analyzed by Assaigai Laboratories. Standard reporting limit (in micrograms/liter):
PCB = 0.1, Xylene = 1.0, Ethylbenzene = 1.0
Toluene = 1.0, Benzene = 1.0

GW = Ground Water; ND = Not detected at or above the reporting limit.

NA = Not analyzed; EB = Equipment Blank

[I] Initial, pre-purge sample; [1] 1st purge

[2] 2nd purge; [3] 3rd purge

Unless otherwise indicated, all samples analyzed by ENSECO's Rocky Mountain Analytical Laboratory.
Standard reporting limit (in micrograms/liter):
PCB = 1.0, Xylene = 0.5, Ethylbenzene = 0.5
Toluene = 0.5, Benzene = 0.5

New Mexico Water Quality Control Commission (NMWQCC) standards (in micrograms/liter):
PCB = 1, Xylene = 620, Ethylbenzene = 750
Toluene = 750, Benzene = 10

DANIEL B. STEPHENS & ASSOCIATES, INC.
ENVIRONMENTAL SCIENTISTS AND ENGINEERS

January 8, 1991

16-2105-92

Mr. Bill Olson
New Mexico Oil & Conservation Division
P.O. Box 2088
Santa Fe, New Mexico 87504-2088

Dear Mr. Olson:

We have previously submitted proposed well abandonment plans for both the Thoreau and the Laguna compressor stations. Enclosed please find additional water quality data for select wells to be abandoned.

As we discussed last month, additional samples were collected from the Thoreau monitor well 5-3A as per your request. The well was sampled four times. Sample 5-3AI was taken initially, prior to purging any water from the well. Samples 5-3A1, 5-3A2, and 5-3A3 were taken after the first, second and third purging events, respectively. Each purging event consisted of removing three casing volumes with a rig bailer. All downhole equipment was thoroughly steam cleaned prior to use. Results of the sampling event are enclosed and indicate that minor amounts of benzene, toluene, and xylene were detected in levels below New Mexico Water Quality Control Commission Water Quality (NMWQCC) ground-water standards. Toluene and xylene were not detected after the third and fourth purging events. Since the constituents detected were well below the NMWQCC standards, we recommend that this well be abandoned.

Also enclosed are the results of recent sampling of monitor wells 6-1S, 6-3S, and 6-5S at the Laguna compressor station. No PCB or BTEX were detected in any of the wells. Consequently, we recommend that the deep wells at Laguna be abandoned as previously proposed.

If you have any questions on the enclosed data, or if you would like any additional information, please contact me at 822-9400. Thank you for your assistance.

Sincerely,

DANIEL B. STEPHENS & ASSOCIATES

Joanne Hilton

Joanne Hilton
Project Manager

cc: Ted Ryther - ENRON

Enseco
A Corning Company

PCBs

Method 608

Client Name: Daniel B. Stephens & Associates, Inc.
Client ID: 9112095-3AI
Lab ID: 019630-0001-SA
Matrix: AQUEOUS Sampled: 09 DEC 91 Received: 11 DEC 91
Authorized: 11 DEC 91 Prepared: 12 DEC 91 Analyzed: 16 DEC 91

Parameter	Result	Units	Reporting Limit
Aroclor 1016	ND	ug/L	1.0
Aroclor 1221	ND	ug/L	1.0
Aroclor 1232	ND	ug/L	1.0
Aroclor 1242	ND	ug/L	1.0
Aroclor 1248	ND	ug/L	1.0
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0

ND = Not detected
NA = Not applicable

Reported By: Ron Eckert

Approved By: Robert Noga

Enseco
A Corning Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTEX)

Method 602

Client Name: Daniel B. Stephens & Associates, Inc.
Client ID: 9112095-3AI
Lab ID: 019630-0001-SA
Matrix: AQUEOUS
Authorized: 11 DEC 91

Sampled: 09 DEC 91
Prepared: NA

Received: 11 DEC 91
Analyzed: 13 DEC 91

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	0.63	ug/L	0.50
Surrogate	**Recovery**		
a,a,a-Trifluorotoluene	98	%	

ND = Not detected
NA = Not applicable

Reported By: Bret Collins

Approved By: Robert Noga

Enseco
A Corning Company

PCBs

Method 608

Client Name: Daniel B. Stephens & Associates, Inc.
Client ID: 9112115-3A1
Lab ID: 019715-0001-SA
Matrix: AQUEOUS Sampled: 11 DEC 91 Received: 13 DEC 91
Authorized: 13 DEC 91 Prepared: 15 DEC 91 Analyzed: 18 DEC 91

Parameter	Result	Units	Reporting Limit
Aroclor 1016	ND	ug/L	1.0
Aroclor 1221	ND	ug/L	1.0
Aroclor 1232	ND	ug/L	1.0
Aroclor 1242	ND	ug/L	1.0
Aroclor 1248	ND	ug/L	1.0
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0

ND = Not detected
NA = Not applicable

Reported By: Ron Eckert Approved By: Robert Noga

Enseco
A Corning Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTEX)

Method 602

Client Name: Daniel B. Stephens & Associates, Inc.
Client ID: 9112115-3A1
Lab ID: 019715-0001-SA
Matrix: AQUEOUS Sampled: 11 DEC 91 Received: 13 DEC 91
Authorized: 13 DEC 91 Prepared: NA Analyzed: 16 DEC 91

Parameter	Result	Units	Reporting Limit
Benzene	0.76	ug/L	0.50
Toluene	0.61	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	1.0	ug/L	0.50
Surrogate	**Recovery**		
a,a,a-Trifluorotoluene	95	%	

ND = Not detected
NA = Not applicable

Reported By: Bret Collins Approved By: Robert Noga

Enseco
A Coming Company

PCBs

Method 608

Client Name: Daniel B. Stephens & Associates, Inc.
Client ID: 9112125-3A2
Lab ID: 019767-0002-SA
Matrix: AQUEOUS Sampled: 12 DEC 91 Received: 14 DEC 91
Authorized: 14 DEC 91 Prepared: 17 DEC 91 Analyzed: 19 DEC 91

Parameter	Result	Units	Reporting Limit
Aroclor 1016	ND	ug/L	1.0
Aroclor 1221	ND	ug/L	1.0
Aroclor 1232	ND	ug/L	1.0
Aroclor 1242	ND	ug/L	1.0
Aroclor 1248	ND	ug/L	1.0
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0

ND = Not detected
NA = Not applicable

Reported By: Ron Eckert Approved By: Robert Noga

Enseco
A Corning Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTEX)

Method 602

Client Name: Daniel B. Stephens & Associates, Inc.
Client ID: 9112125-3A2
Lab ID: 019767-0002-SA
Matrix: AQUEOUS Sampled: 12 DEC 91 Received: 14 DEC 91
Authorized: 14 DEC 91 Prepared: NA Analyzed: 16 DEC 91

Parameter	Result	Units	Reporting Limit
Benzene	0.62	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	0.50
Surrogate	**Recovery**		
a,a,a-Trifluorotoluene	95	%	

ND = Not detected
NA = Not applicable

Reported By: Bret Collins Approved By: Robert Noga

Enseco
A Corning Company

PCBs

Method 608

Client Name: Daniel B. Stephens & Associates, Inc.
Client ID: 9112135-3A3
Lab ID: 019767-0009-SA
Matrix: AQUEOUS Sampled: 13 DEC 91 Received: 14 DEC 91
Authorized: 14 DEC 91 Prepared: 17 DEC 91 Analyzed: 19 DEC 91

Parameter	Result	Units	Reporting Limit
Aroclor 1016	ND	ug/L	1.4
Aroclor 1221	ND	ug/L	1.4
Aroclor 1232	ND	ug/L	1.4
Aroclor 1242	ND	ug/L	1.4
Aroclor 1248	ND	ug/L	1.4
Aroclor 1254	ND	ug/L	1.4
Aroclor 1260	ND	ug/L	1.4

ND = Not detected
NA = Not applicable

Reported By: Ron Eckert Approved By: Robert Noga

Enseco
A Corning Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTEX)

Method 602

Client Name: Daniel B. Stephens & Associates, Inc.
Client ID: 9112135-3A3
Lab ID: 019767-0009-SA
Matrix: AQUEOUS Sampled: 13 DEC 91 Received: 14 DEC 91
Authorized: 14 DEC 91 Prepared: NA Analyzed: 17 DEC 91

Parameter	Result	Units	Reporting Limit
Benzene	0.86	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	0.50

Surrogate	Recovery	
a,a,a-Trifluorotoluene	108	%

ND = Not detected
NA = Not applicable

Reported By: Bret Collins Approved By: Robert Noga

Enseco
A Corning Company

PCBs

Method 608

Client Name: Daniel B. Stephens & Associates, Inc.
Client ID: 9112066-1S
Lab ID: 019553-0004-SA
Matrix: AQUEOUS Sampled: 06 DEC 91 Received: 09 DEC 91
Authorized: 09 DEC 91 Prepared: 11 DEC 91 Analyzed: 17 DEC 91

Parameter	Result	Units	Reporting Limit
Aroclor 1016	ND	ug/L	1.0
Aroclor 1221	ND	ug/L	1.0
Aroclor 1232	ND	ug/L	1.0
Aroclor 1242	ND	ug/L	1.0
Aroclor 1248	ND	ug/L	1.0
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0

ND = Not detected
NA = Not applicable

Reported By: Ron Eckert Approved By: Robert Noga

Enseco
A Corning Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTEX)

Method 602

Client Name: Daniel B. Stephens & Associates, Inc.
Client ID: 9112066-1S
Lab ID: 019553-0004-SA
Matrix: AQUEOUS Sampled: 06 DEC 91 Received: 09 DEC 91
Authorized: 09 DEC 91 Prepared: NA Analyzed: 11 DEC 91

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	0.50

Surrogate	Recovery	
a,a,a-Trifluorotoluene	103	%

ND = Not detected
NA = Not applicable

Reported By: Bret Collins Approved By: Robert Noga

Enseco
A Corning Company

PCBs

Method 608

Client Name: Daniel B. Stephens & Associates, Inc.
Client ID: 9112066-3S
Lab ID: 019553-0012-SA
Matrix: AQUEOUS Sampled: 06 DEC 91 Received: 09 DEC 91
Authorized: 09 DEC 91 Prepared: 11 DEC 91 Analyzed: 17 DEC 91

Parameter	Result	Units	Reporting Limit
Aroclor 1016	ND	ug/L	1.0
Aroclor 1221	ND	ug/L	1.0
Aroclor 1232	ND	ug/L	1.0
Aroclor 1242	ND	ug/L	1.0
Aroclor 1248	ND	ug/L	1.0
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0

ND = Not detected
NA = Not applicable

Reported By: Ron Eckert Approved By: Robert Noga

Enseco
A Corning Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTEX)

Method 602

Client Name: Daniel B. Stephens & Associates, Inc.
Client ID: 9112066-3S
Lab ID: 019553-0012-SA
Matrix: AQUEOUS Sampled: 06 DEC 91 Received: 09 DEC 91
Authorized: 09 DEC 91 Prepared: NA Analyzed: 13 DEC 91

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	0.50
Surrogate	**Recovery**		
a,a,a-Trifluorotoluene	95	%	

ND = Not detected
NA = Not applicable

Reported By: Bret Collins Approved By: Robert Noga

Enseco
A Corning Company

PCBs

Method 8080

Client Name: Daniel B. Stephens & Associates, Inc.
Client ID: 9112046-5S
Lab ID: 019467-0003-SA
Matrix: AQUEOUS Sampled: 04 DEC 91 Received: 06 DEC 91
Authorized: 06 DEC 91 Prepared: 09 DEC 91 Analyzed: 11 DEC 91

Parameter	Result	Units	Reporting Limit
Aroclor 1016	ND	ug/L	1.0
Aroclor 1221	ND	ug/L	1.0
Aroclor 1232	ND	ug/L	1.0
Aroclor 1242	ND	ug/L	1.0
Aroclor 1248	ND	ug/L	1.0
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0

ND = Not detected
NA = Not applicable

Reported By: Ron Eckert Approved By: Robert Noga

Enseco
A Corning Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTEX)

Method 8020

Client Name: Daniel B. Stephens & Associates, Inc.
Client ID: 9112046-5S
Lab ID: 019467-0003-SA
Matrix: AQUEOUS Sampled: 04 DEC 91 Received: 06 DEC 91
Authorized: 06 DEC 91 Prepared: NA Analyzed: 08 DEC 91

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	0.50
Surrogate	**Recovery**		
a,a,a-Trifluorotoluene	96	%	

ND = Not detected
NA = Not applicable

Reported By: Garth Atkins Approved By: Robert Noga

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87504
(505) 827-5800

September 5, 1991

see DP file for proposal

CERTIFIED MAIL
RETURN RECEIPT No. P-106-675-364

James C. Alexander
ENRON Gas Pipeline Group
P.O. Box 1188
Houston, TX 77251-1188

RE: PILOT BIOREMEDIATION PROGRAM
TRANSWESTERN PIPELINE COMPANY THOREAU STATION
MCKINLEY COUNTY, NEW MEXICO

Dear Mr. Alexander:

The New Mexico Oil Conservation Division (OCD) has reviewed your August 28, 1991 request for permission to conduct a bioremediation pilot project for petroleum contaminated ground water at the above facility. ENRON requested that the project take place prior to completion of the investigation of the extent of contamination and approval of the facility discharge plan. The project proposes setting up a small scale hydraulically contained pumping cell and adding a nitrate source to the pumped contaminated ground water prior to reinjection.

Pursuant to New Mexico Water Quality Control Commission (WQCC) Regulation 3-106.B. you are hearby authorized to discharge, as requested in the bioremediation pilot project proposal, at the above facility without an approved discharge plan for a period not to exceed 120 days from the date of initiation of the discharge with the following conditions:

1. Potassium nitrate will be used as a nitrate source instead of sodium nitrate.

2. A report containing the results of the pilot project will be submitted to the OCD within 180 days from the date of initiation of the discharge.

The OCD understands that ENRON will be submitting a proposal to OCD to investigate the f ll extent of petroleum-related contamination associated with ENRON's activities as soon as ENRON resolves access problems with the adjacent landowners. The OCD looks forward to working with you to define the extent of contamination and the remediation of these contaminants.

Please be advised that OCD authorization does not relieve you of liability should your operation result in actual pollution of surface waters, ground waters or the environment which may be actionable under other laws and/or regulations. In addition, this authorization does not relieve you of responsibility for compliance with other city, county, state and federal laws and/or regulations.

If you have any questions please, contact William Olson of my staff at (505)827-5885.

Sincerely,

William J. LeMay
Director

WJL/WCO

xc : OCD Aztec Dist
Ted Ryther, Co
Daniel B. Step
Donna Mullins

● SENDER: Complete items 1 and 2 when additional services are desired, and complete items 3 and 4.
Put your address in the "RETURN TO" Space on the reverse side. Failure to do this will prevent this card from being returned to you. The return receipt fee will provide you the name of the person delivered to and the date of delivery. For additional fees the following services are available. Consult postmaster for fees and check box(es) for additional service(s) requested.
1. ☐ Show to whom delivered, date, and addressee's address. *(Extra charge)* 2. ☐ Restricted Delivery *(Extra charge)*

3. Article Addressed to:
James Alexander
ENRON Gas Pipeline
PO Box 1188
Houston, Tx 77251

4. Article Number
P 066 675 364

Type of Service:
☐ Registered ☐ Insured
☑ Certified ☐ COD
☐ Express Mail ☐ Return Receipt for Merchandise

Always obtain signature of addressee or agent and DATE DELIVERED.

5. Signature — Address
X

6. Signature — Agent
X

7. Date of Delivery SEP - 9 1991

8. Addressee's Address *(ONLY if requested and fee paid)*

Thoreau

PS Form 3811, Mar. 1988 * U.S.G.P.O. 1988-212-865 DOMESTIC RETURN RECEIPT

ENRON
Transwestern Pipeline Company

P. O. Box 1188 Houston, Texas 77251-1188 (713) 853-6161

August 5, 1991

Mr. Dave Boyer
Oil Conservation Division
Energy and Minerals Department
State of New Mexico
310 Old Santa Fe Trail
State Land Office Building , Room 206
Santa Fe, New Mexico 87501

Re: Groundwater Assessment Report, EPA Consent Decree, Thoreau Station

Dear Mr. Boyer:

Enclosed is a copy of the report, "Ground-water Assessment Report For Compressor Station No. 5, Thoreau, New Mexico", Volumes I and II dated July 26, 1991 by Daniel B. Stephens & Associates. The report has been prepared in accordance with the requirements of the Consent Decree between Transwestern Pipeline Company (Transwestern) and the USEPA. It contains the most comprehensive assessment which has been developed of the pertinent groundwater conditions at the site.

As soon as permission is received from the property owners to the south, additional explorations are planned to estimate the southern extent of the BTEX in the groundwater. Other investigations and assessments are also being planned as an aid in evaluating potential remedial actions. Information on these additional activities will be provided in the near future.

The enclosed report should provide you with information on activities to date but we also hope that a review of it will provide you with sufficient information to approve our proposal to close those monitor wells described in our letter of June 28, 1991. We would like to move to close these wells as soon as possible as they consist of unnecessary wells which provide an abnormal pathway to the subsurface environment.

Thank you for your consideration. In the meantime, should you have any questions please call me at (713) 853-3219 or Ted Ryther at (713) 853-5634.

Yours very truly,

James C. Alexander

James C. Alexander
Manager of Projects, Environmental Affairs

Enclosure

INTERNAL DISTRIBUTION:

Walker Sanders
Christie Patrick
Larry Campbell
Kevin McGlynn
Ted Ryther
EA File

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☑ Telephone ☐ Personal	Time 0900	Date 7/24/91
Originating Party		**Other Parties**
Ted Rythen - ENRON		Bill Olson - OCD Santa Fe

Subject

ENRON Thoreau MW closure

Discussion

Informed him of my 7/23/91 discussion with EPA

Told him OCD approves of dry well closure of wells 5-7B, 5-8B, 5-25B, 5-26B, 5-27B but not the deep wells until investigation report has been reviewed by OCD.

I can write him approval of dry well closure if want to move forward Report should go out in 1-2 weeks to EPA. Copy will be sent to OCD

Conclusions or Agreements

He will check and see if they want to do dry wells now or wait and do all wells at once

He or Either Ted or DBS&A will call back

Distribution

File

Signed Will Olson

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal	Time 1215	Date 7/24/91

Originating Party	Other Parties
Tod Pyther - ENRON	Bill Olson - OCD Santa Fe

Subject

ENRON Thoreau MW Closure

Discussion

ENRON has decided to wait until OCD has reviewed the investigation report to and at that time renew their request to close all the monitor wells listed in their 6/28/91 correspondence

Conclusions or Agreements

Distribution

Enron Thoreau File

Signed Bill Olson

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal	Time 1530	Date 7/23/91
Originating Party		**Other Parties**
Bill Olson - OCD Santa Fe		Jeff Robinson (EPA) (214) 655-7244

Subject

Enron Thoreau Monitor Well Closure
(Re: Enron 6/28/91 correspondence)

Discussion

EPA has no problem with closing the dry monitor wells 5-7B, 5-8B, 5-26B, 5-25-B, 5-27B

EPA has problem with language in letter "investigation of the perched groundwater continues for purposes other than the Consent Decree." EPA believes all work currently under Consent Decree.

Conclusions or Agreements

OCD, EPA agree closure of dry wells OK

Distribution

Enron Thoreau file

Signed Bill Olson

DANIEL B. STEPHENS & ASSOCIATES, INC.
Environmental Scientists and Engineers
6020 Academy NE, Suite 100
Albuquerque, NM 87109
Telephone: (505) 822-9400
FAX NO.: (505) 822-8877

Date: 7/23/91 **Project No.** 89-030-1

To: Kathy Brown / OCD

FAX #: 1-827-5741

From: Daniel B. Stephens & Associates

Joanne Hilton
(Individual)

Total Pages Including this Page: 3

REMARKS: Kathy, here is the water quality data for the two deep wells that will be abandoned @ Thoreau

TABLE 7.1 SUMMARY OF ANALYTICAL RESULTS THROUGH MAY 1991
THOREAU MONITOR WELLS
(Page 3 of 12)

SITE WELL NO.	DATE mo/yr	CONCENTRATION (ppb)				
		PCB	Benzene	Toluene	Ethyl-benzene	Xylene
	01/91	*	600.0[a]	730.0[a]	110.0[a]	940.0[b]
	02/91	*	460.0[a]	580.0[a]	75.0[a]	600.0[b]
	03/91	*	2400.0[m]	3300.0[m]	290.0[m]	2600.0[n]
	04/91	*	830.0[a]	1200.0[a]	110.0[a]	920.0[b]
	05/91	*	830.0[n]	1200.0[n]	150.0[h]	1300.0[a]
T 5-03A	12/89	*	*	*	*	NS
	09/90	*	*	11.6	*	*
	11/90	*	1.4	0.67	2.6	*
	01/91	*	*	0.50	*	0.70
	02/91	*	*	*	*	*
	03/91	*	1.5	0.9	*	*
	04/91	*	1.2	0.74	*	*
T 5-03B	05/89	*	*	*	*	NS
	11/89	*	*	*	*	NS

5-3A will also be abandoned

NOTES:

New Mexico Water Quality Control Commission (NM WQCC) standards:

PCB = 1 (ppb) Benzene = 10 (ppb) Toluene = 750 (ppb) Ethylbenzene = 750 (ppb) Xylene = 620 (ppb)

Normal Reporting limits from ENSECO's Houston laboratory:

PCB = 0.50 (ppb) Benzene = 0.50 (ppb) Toluene = 0.50 (ppb) Ethylbenzene = 0.50 (ppb) Xylene = 1.0 (ppb)

* = Indicates the well was sampled but the concentrations were below the reporting limits.

NYR = Analysis not yet received

NS = Not sampled in Nov/Dec/Jan rounds

[a] Reporting Limit = 50.0
[b] Reporting Limit = 100.0
[c] Reporting Limit = 0.5
[d] Reporting Limit = 5.0
[e] Reporting Limit = 10.0
[f] Reporting Limit = 0.3
[g] Reporting Limit = 0.6
[h] Reporting Limit = 25.0
[i] Reporting Limit = 1.0
[j] Reporting Limit = 2.0
[k] Reporting Limit = 20.0
[l] Reporting Limit = 2.5
[m] Reporting Limit = 120.0
[n] Reporting Limit = 250.0
[o] Reporting Limit = 12.0

TABLE 7.1 SUMMARY OF ANALYTICAL RESULTS THROUGH MAY 1991
THOREAU MONITOR WELLS
(Page 1 of 12)

SITE WELL NO.	DATE mo/yr	CONCENTRATION (ppb)				
		PCB	Benzene	Toluene	Ethyl-benzene	Xylene
T 5-01A	05/89	*	*	*	*	NS
	12/89	*	*	*	*	NS
	09/90	*	*	*	*	*
	11/90	*	*	*	*	*
	01/91	*	*	*	*	*
	02/91	*	*	*	*	*
	03/91	*	*	*	*	*
	04/91	*	*	*	*	*
T 5-01B	08/89	2.1	NS	NS	NS	NS
	12/89	2.0	*	6.3	*	NS
	03/90	94.0	*	*	*	25.0[e]
	06/90	11.0	*	*	*	*
	09/90	2.0	*	*	*	3.5
	11/90	5.5	*	*	*	3.0

5-1A will be abandoned

NOTES:

New Mexico Water Quality Control Commission (NM WQCC) standards:

PCB = 1 (ppb) Benzene = 10 (ppb) Toluene = 750 (ppb) Ethylbenzene = 750 (ppb) Xylene = 620 (ppb)

Normal Reporting limits from ENSECO's Houston laboratory:

PCB = 0.50 (ppb) Benzene = 0.50 (ppb) Toluene = 0.50 (ppb) Ethylbenzene = 0.50 (ppb) Xylene = 1.0 (ppb)

* = Indicates the well was sampled but the concentrations were below the reporting limits.

NYR = Analysis not yet received

NS = Not sampled in Nov/Dec/Jan rounds

[a] Reporting Limit = 50.0
[b] Reporting Limit = 100.0
[c] Reporting Limit = 0.5
[d] Reporting Limit = 5.0
[e] Reporting Limit = 10.0
[f] Reporting Limit = 0.3
[g] Reporting Limit = 0.6
[h] Reporting Limit = 25.0
[i] Reporting Limit = 1.0
[j] Reporting Limit = 2.0
[k] Reporting Limit = 20.0
[l] Reporting Limit = 2.5
[m] Reporting Limit = 120.0
[n] Reporting Limit = 250.0
[o] Reporting Limit = 12.0

ENRON CONSERVATION DIVISION
GAS PIPELINE GROUP RECEIVED

P. O. Box 1188 Houston, Texas 77251-1188 (713) 853-6161

'91 JUL 5 AM 11 25

June 28, 1991

Mr. Dave Boyer
Oil Conservation Division
Energy and Minerals Department
State of New Mexico
310 Old Santa Fe Trail
State Land Office Building , Room 206
Santa Fe, New Mexico 87501

Re: Closure of Monitor Wells Under EPA Consent Decree, Thoreau Station

Dear Mr. Boyer:

On behalf of Transwestern Pipeline Company (Transwestern), the area around and down gradient from the old waste pit at the Thoreau Station has been extensively investigated under a Consent Decree with EPA. As indicated to you in the past, a significant array of monitor wells presently exists in the area. Under the terms of that Decree the wells may now be closed. However, investigation of the perched ground water continues for purposes other than the Consent Decree. As the investigation progresses, some wells become unnecessary from time to time. Deep wells, 5-1A and 5-3A are sealed to the perched water while wells 5-7B, 5-8B, 5-25B, 5-26B, and 5-26B are all dry with their bottoms above the perched water table. As these are no longer needed and could provide pathways to the subsurface environment, we would like to close them.

Enclosed is a copy of a letter from our consultant, Daniel B. Stephens & Associates describing proposed closure methods and attaching schematic drawings of the wells.

We would like to move to close these wells as soon as we complete the closure which you have approved at Corona.

Thank you for your consideration. In the meantime, should you have any questions please call me at (713) 853-3219 or Ted Ryther at (713) 853- 5634.

Yours very truly,

James C. Alexander

James C. Alexander
Manager of Projects, Environmental Affairs

Enclosure

cc: Ms. Donna Mullins, USEPA Region VI, Dallas
Mr. Thomas H. McGraw, New Mexico Dept. Of Environment, Santa Fe
Mr. Ed Wise, Entrix, Houston

DANIEL B. STEPHENS & ASSOCIATES, INC.
ENVIRONMENTAL SCIENTISTS AND ENGINEERS

July 1, 1991

Mr. Ted Ryther
Environmental Affairs E-2575
ENRON Corporation
1400 Smith Street
P.O. Box 1188
Houston, TX 77002

Re: Closure of Deep Monitor Wells 5-1A and 5-3A, and Shallow Dry Monitor Wells 5-7B, 5-8B, 5-26B, and 5-27B at Transwestern Pipeline Co. Compressor Station No. 5, Thoreau, New Mexico.

Dear Mr. Ryther:

The purpose of this letter is to propose detailed closure (abandonment) plans for the subject monitor wells. These plans have been designed to eliminate potential pathways for contaminant migration both to the shallow perched alluvial aquifer and to deeper underlying bedrock aquifers. Daniel B. Stephens and Associates (DBS&A) has conservatively designed these closure plans to ensure that all concerned parties will have a high level of confidence that potential pathways will be eliminated when these plans are implemented. Draft ASTM procedures for closing wells (New Standard Practices for the Decommissioning of Ground Water Wells, Vadose Zone Monitoring Devices, Boreholes, and Other Devices for Environmental Activities) and State of New Mexico regulations have been consulted prior to developing these plans. The proposed plans in all cases meet or exceed the requirements specified in these guidance documents.

The general approach for eliminating potential contaminant migration pathways from the ground surface to deep bedrock aquifers penetrated by monitor wells 5-1A and 5-3A involves perforating the 6-inch diameter blank casing at regular intervals, and then filling the casing (and annular space surrounding the casing) with cement grout in stages to the ground surface. The length of any one grout stage (interval) should not exceed 100 feet. This restriction is necessary to prevent excessive grout loss to the formation. Evidence suggesting a potential for significant grout loss in these intervals comes from several sources. First, drilling logs indicate a loss of drilling fluid circulation over a number of intervals in the upper Chinle formation at depths greater than approximately 350 feet. Second, large amounts of grout were lost to the formation during pressure grouting of this same interval of Chinle during the closure of monitor well 5-2A at this site in 1990. The total cost of grouting monitor well 5-2A is estimated to have exceeded $100,000. To avoid the problems and expense encountered in closing this well, DBS&A proposes the stage grouting approach for monitor wells 5-1A and 5-3A to minimize the pressure head on the grout and therefore minimize loss to the formation.

However, if it is determined during the grouting of 5-1A and 5-3A that lower regions of Chinle take

excessive amounts of grout (eg. more than 3 times the amount calculated) even when grouting is conducted in stages less than 100 feet in thickness, DBS&A recommends an alternative method for sealing off the remaining open portions of these monitor wells. This approach is recommended in the draft ASTM procedures for decommissioning wells and has been previously proposed by DBS&A for closure of monitor wells at Transwestern Pipeline Co. Compressor Stations located in Corona and Mountainair, New Mexico where excessive grout losses to limestone fractures and/or cavities was a distinct possibility. This approach simply involves setting a plug (eg. cement basket) above the interval where grout loss is occurring (eg. near the base of the surface casing) and cement grouting to the ground surface. In summary, the interval where grout loss was occurring would simply be skipped and the overlying more competent regions of borehole would be grouted.

Detailed closure procedures for each deep well are listed below. These specific procedures have been based on pertinent well completion, drilling, and geologic data. Well completion data for each well (including the shallow dry wells) are summarized in schematic form in Attachment I. Pertinent geologic and drilling data for the deep wells are briefly summarized below in the introductory paragraphs of the closure procedures for each well.

The methods proposed to close the subject shallow dry wells are even simpler. Since these wells do not penetrate any free water and have a relatively thick volclay and cement grout surface seal (see Attachment I), they will be abandoned simply by filling the 2-inch PVC monitor well screen and casing with a bentonite neat cement grout, welding a steel cap plate on the casing at the ground surface, and applying the required New Mexico State identification information to the cap. Detailed procedures such as those developed for monitor wells 5-1A and 5-3A (see below) are not necessary for these shallow wells.

Monitor Well 5-1A

The well completion schematic for this deep monitor well (Attachment I) shows that it was screened from approximately 627 to 667 feet with the lower 27 feet of screen in the Sonsela sandstone bed of the Chinle formation. The 6-inch diameter steel monitor well casing was not gravel packed or grouted in place. A 10-inch diameter surface casing grouted to approximately 80 feet effectively seals off any alluvial shallow water that may be perched on top of the Chinle formation.

Drill logs indicated that there was little or no drilling fluid circulation from 360 to 400 feet and again from 540 to 650 feet. This suggests that these zones are highly fractured and may be difficult to seal with cement grout. In addition, the sandstones and siltstones encountered in these fractured intervals are probably unstable especially in the presence of water which currently rises above these zones to approximately 330 feet. DBS&A believes that it is very likely that these intervals have caved in on the monitor well casing, and therefore it will be very difficult to pull this casing. At the same time the removal of the steel monitor well casing would greatly simplify the closure of this well. For this reason, the detailed procedures described below include steps designed to attempt to pull this casing. If pulling is unsuccessful, the casing will be perforated prior to grouting.

Given this above information, DBS&A recommends the following approach to close this well.

1.1 Pull the entire monitor well casing from the borehole. Use hydraulic jacks together with the hydraulic system on a drill rig. If this is unsuccessful, the casing should

be perforated at 25 foot intervals from total depth to an elevation of approximately 100 feet from ground surface.

1.2 Run 2-inch steel tremie pipe to the bottom of the borehole.

1.3 For the first grout stage, pump (through the tremie) approximately 2.5 yards of bentonite neat-cement grout (4 lbs. of bentonite, plus 7.5 gallons of water, plus 94 lb. sack of neat cement, plus enough accelerator (e.g. KCl) to cause grout to set-up within two hours) to fill the borehole from approximately 570 to 670 feet from the ground surface. If no grout losses occur to the formation, it will take approximately l.6 yards of grout to fill the borehole over this approximately 100 foot interval. To compensate for inevitable loses to the formation, add an additional 0.9 yards of grout for a total 2.5 yards.

1.4 Allow sufficient time for the cement grout to set-up. Determine the level of grout in the borehole and add a second approximately 100 foot thick grout stage following procedures described in steps 1.3.

1.5 Continue adding grout in stages as described in steps 1.3 and 1.4 until the borehole is grouted to the ground surface.

1.6 If after any 3 stages of grouting, the level of grout raises less than a total of 100 feet in the borehole, further attempts to grout the lower portion of the borehole should be terminated and steps 1.7 and 1.8 followed. Otherwise proceed to step 1.9.

1.7 Using a cut-off tool, cut the 6-inch steel monitor well casing off at approximately 80 feet and remove cut-off tool and casing from the borehole.

1.8 Set a cement basket or an equivalent plug near 80 feet or at the bottom of the surface casing region of hole (see well schematic in Attachment I), and fill the surface casing with cement grout to the ground surface.

1.9 Cut off surface casing at the ground surface. Weld a surface cap on the casing and apply required identification information (New Mexico State Regulations) to the surface cap.

Monitor Well 5-3A

This well was drilled to a total depth of approximately 450 feet and screened from roughly 424 to 444 feet (see Attachment 1). The 6-inch diameter steel monitor well screen and casing was gravel packed from the bottom of the screen to the ground surface. A cement and/or clay grout seal was not installed in this borehole. The 10-inch diameter surface casing, which is grouted to a depth of approximately 80 feet, effectively seals off any alluvial shallow water that may be perched on top of the Chinle formation. Water levels have varied over the last four months from approximately 410 to 425 feet below the ground surface.

Drill logs indicate that circulation was lost or very poor from approximately 350 to 440 feet in the upper Chinle formation. DBS&A believes that there is a high potential for this depth interval to potentially take excessive amounts of grout during closure unless precautions are taken to minimize the pressure head on the grout. Therefore, DBS&A recommends grouting in stages similar to those described above for monitor well 5-1A. The only difference in procedures, (besides depths and volumes) is that no attempt will be made to pull the 5-3A casing since it has been gravel packed over its entire length.

Given this above information, DBS&A recommends the following approach to close this well.

2.1 Perforate the 6-inch steel well casing at 25 foot intervals from total depth to an elevation of approximately 100 feet from ground surface.

2.2 Run 2-inch steel tremie pipe to the bottom of the borehole.

2.3 For the first grout stage, pump (through the tremie) approximately 1.7 yards of bentonite neat-cement grout (4 lbs. of bentonite, plus 7.5 gallons of water, plus 94 lb. sack of neat cement, plus enough accelerator (e.g. KCl) to cause grout to set-up within one hour) to fill the borehole from approximately 340 to 440 feet from the ground surface. If no grout losses occur to the formation, it will take approximately l.2 yards of grout to fill the borehole over this approximately 100 foot interval. To compensate for possible loses to the formation, add an additional 0.5 yards of grout for a total 1.7 yards.

2.4 Allow sufficient time for the cement grout to set-up. Determine the level of grout in the borehole and add a second approximately 100 foot thick grout stage following procedures described in steps 1.3.

2.5 Continue adding grout in stages as described in steps 1.3 and 1.4 until the borehole is grouted to the ground surface.

2.6 If after any 3 stages of grouting, the level of grout raises less than a total of 100 feet in the borehole, further attempts to grout the lower portion of the borehole should be terminated and steps 2.7 and 2.8 followed. Otherwise proceed to Step 2.9.

2.7 Using a cut-off tool, cut the 6-inch steel monitor well casing off at approximately 80 feet and remove cut-off tool and casing from the borehole.

2.8 Set a cement basket or an equivalent plug near 80 feet at the bottom of the surface casing region of hole (see well schematic in Attachment I), and fill the surface casing with cement grout to the ground surface.

2.9 Cut off surface casing at the ground surface. Weld a surface cap on the casing and apply required identification information (New Mexico State Regulations) to the surface cap.

Sincerely,

DANIEL B. STEPHENS & ASSOCIATES

Joanne Hulter for

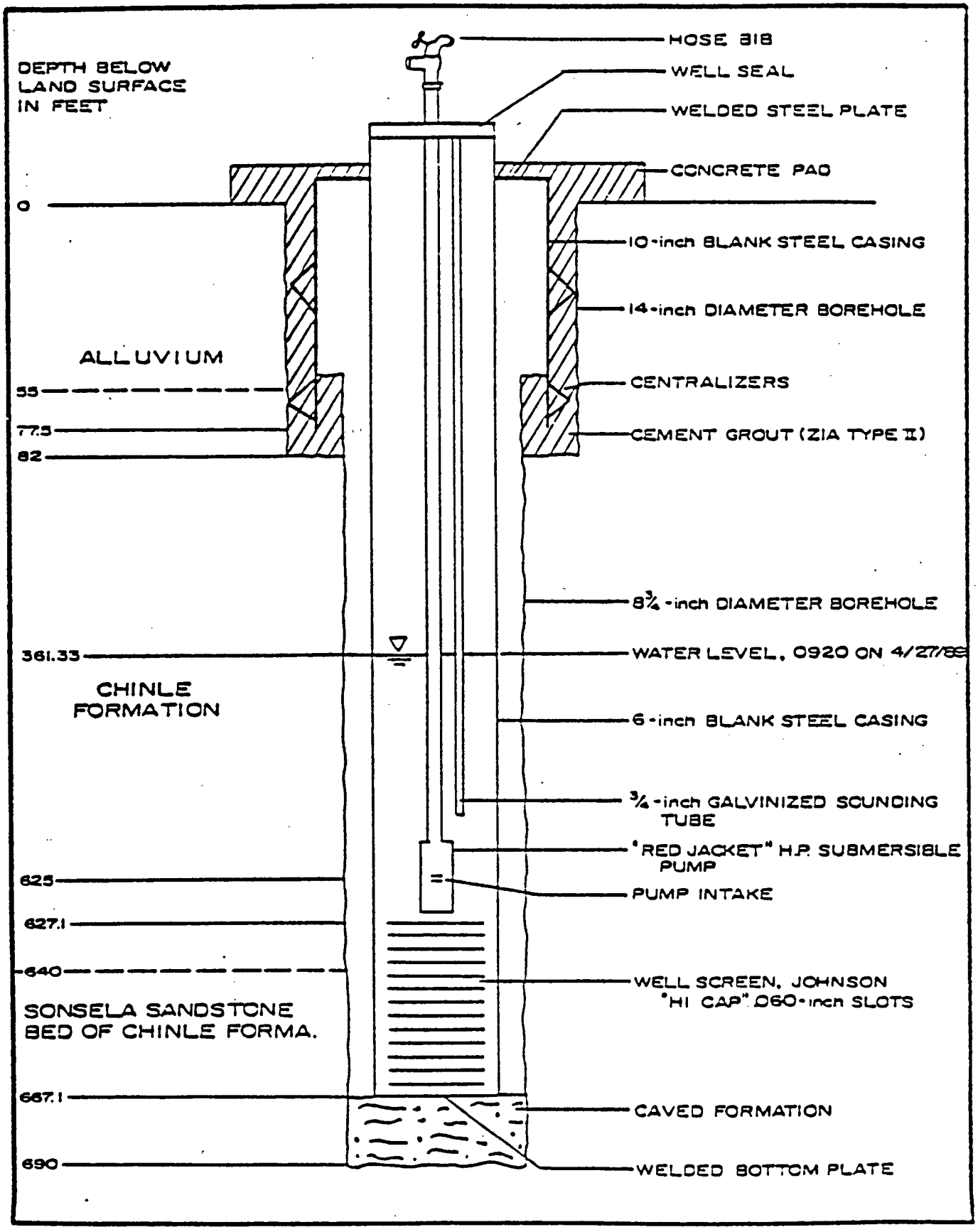
Dale Hammermeister
Senior Hydrologist

Bob Marley

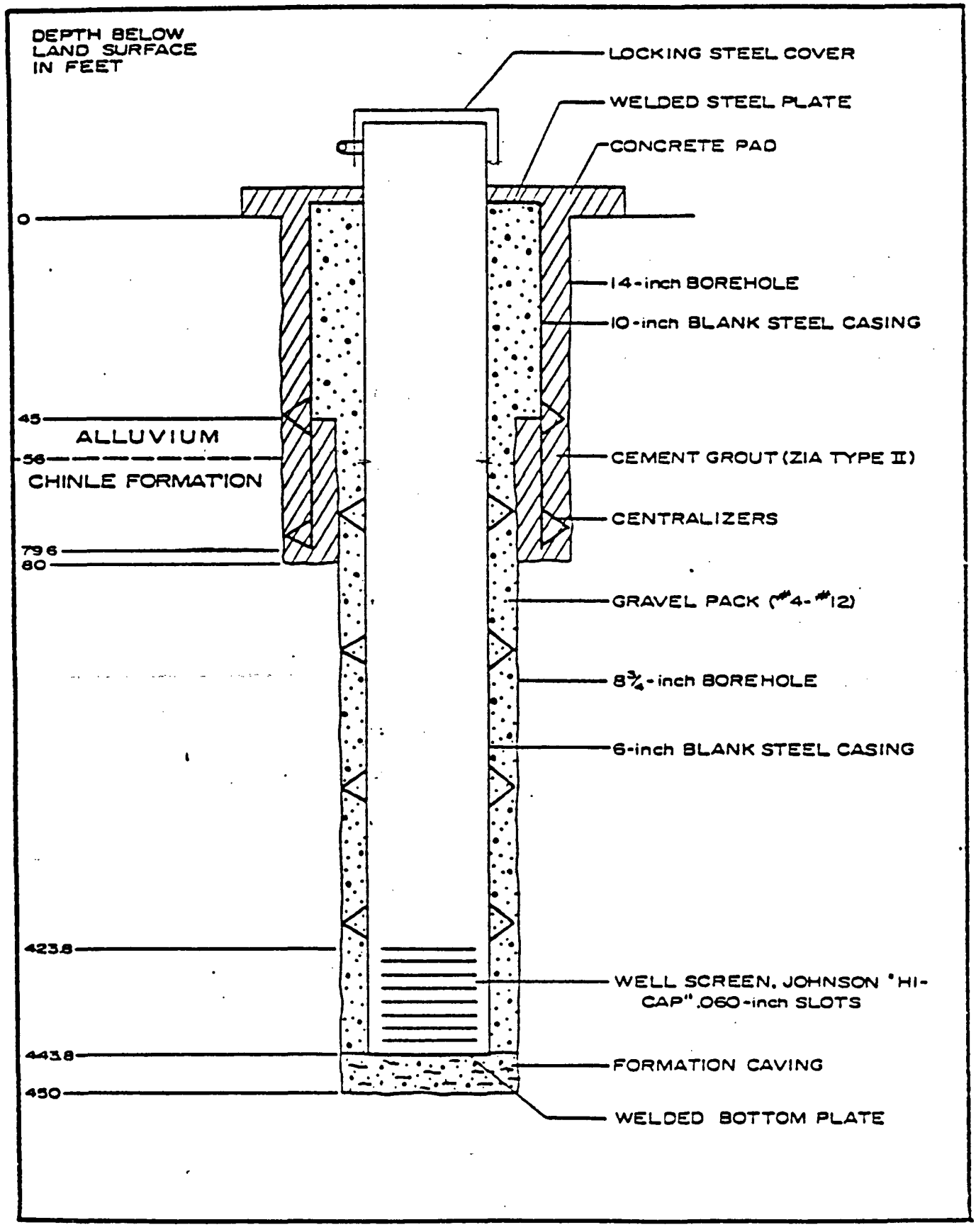
Bob Marley
Hydrogeologist

DH/dm

ATTACHMENT I



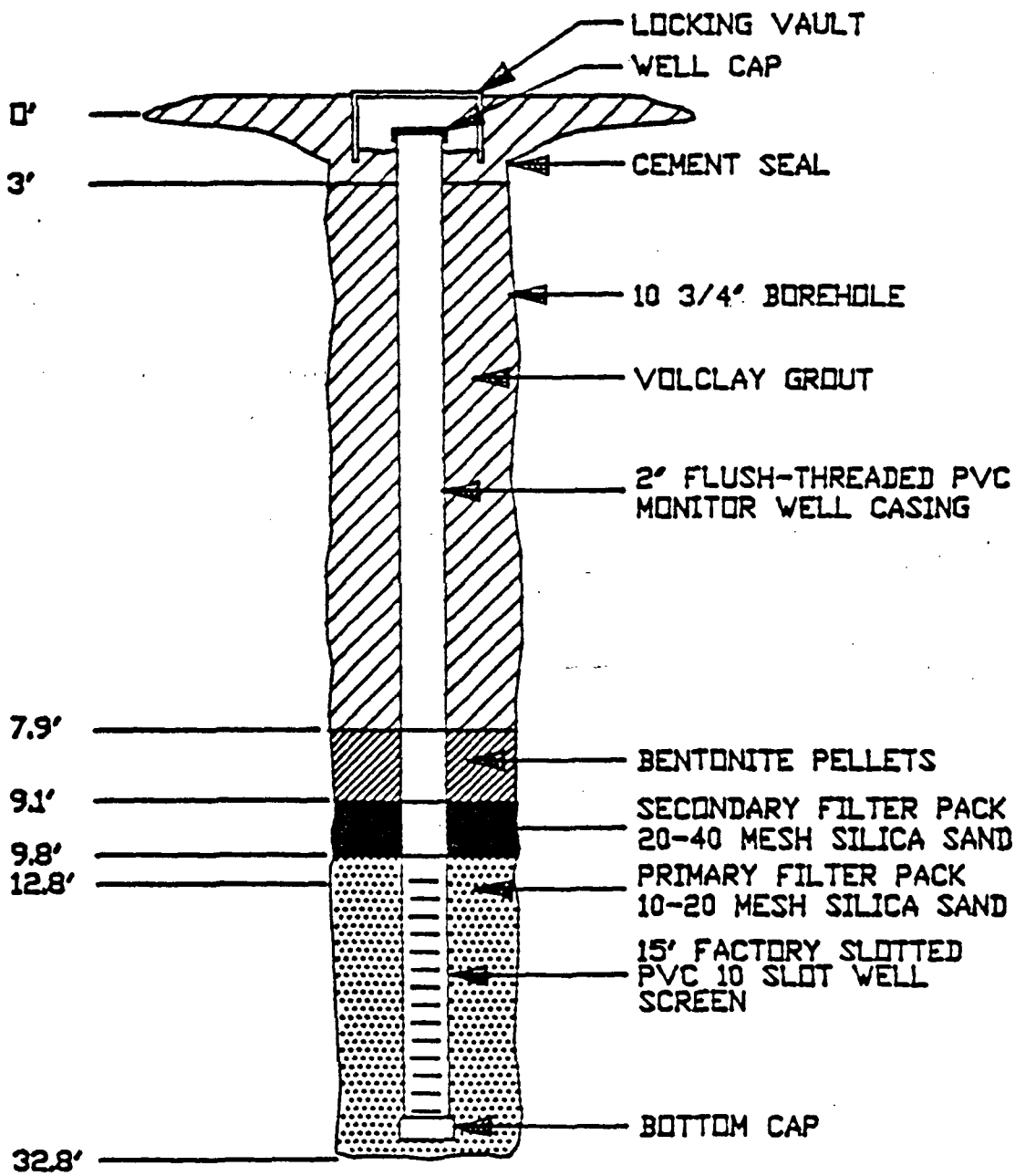
WELL SCHEMATIC
WELL 5-1A
BUREAU NEW MEXICO



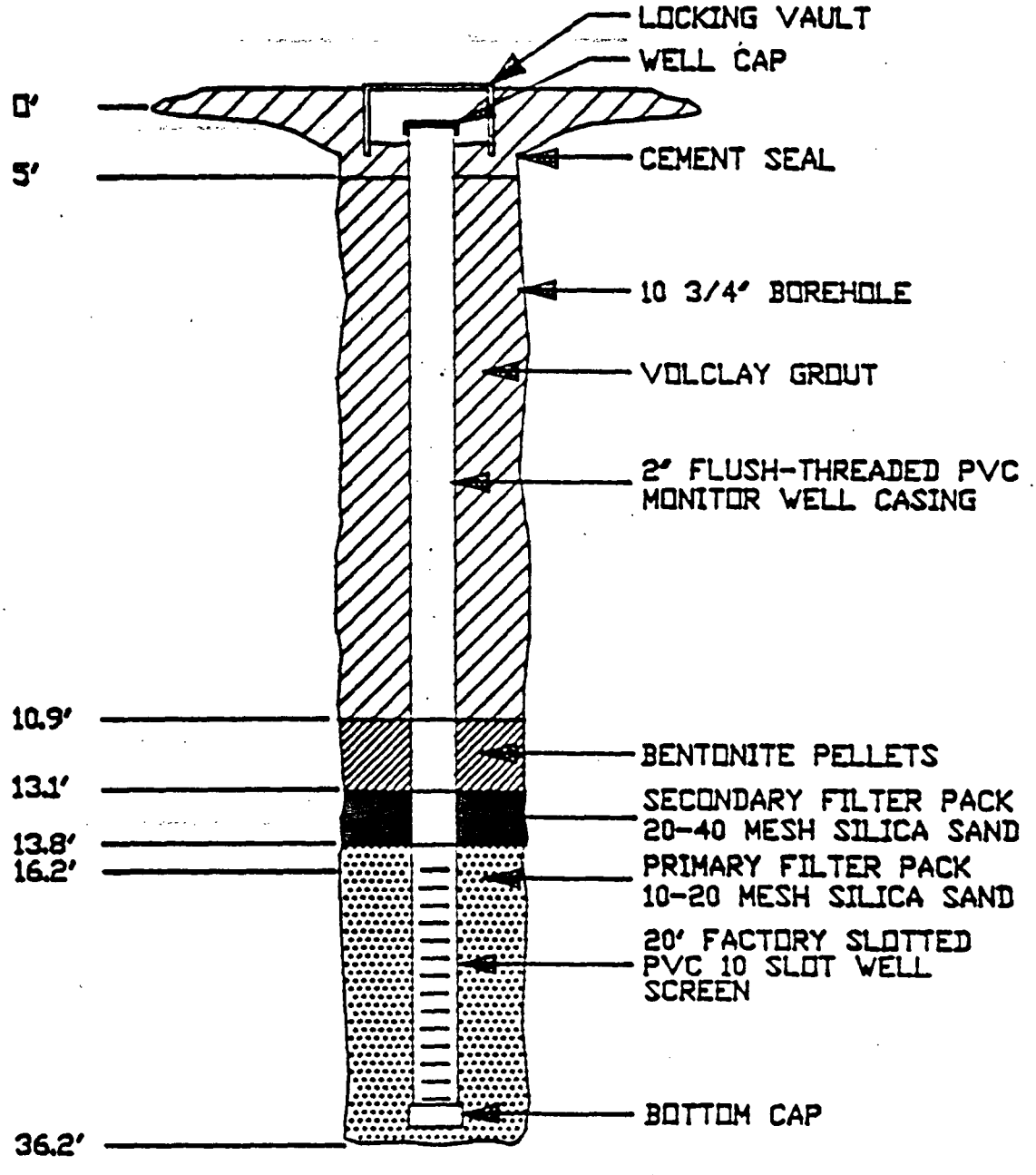
WELL SCHEMATIC
WELL 5-3A
THOREAU PUMPING STATION
THOREAU, NEW MEXICO

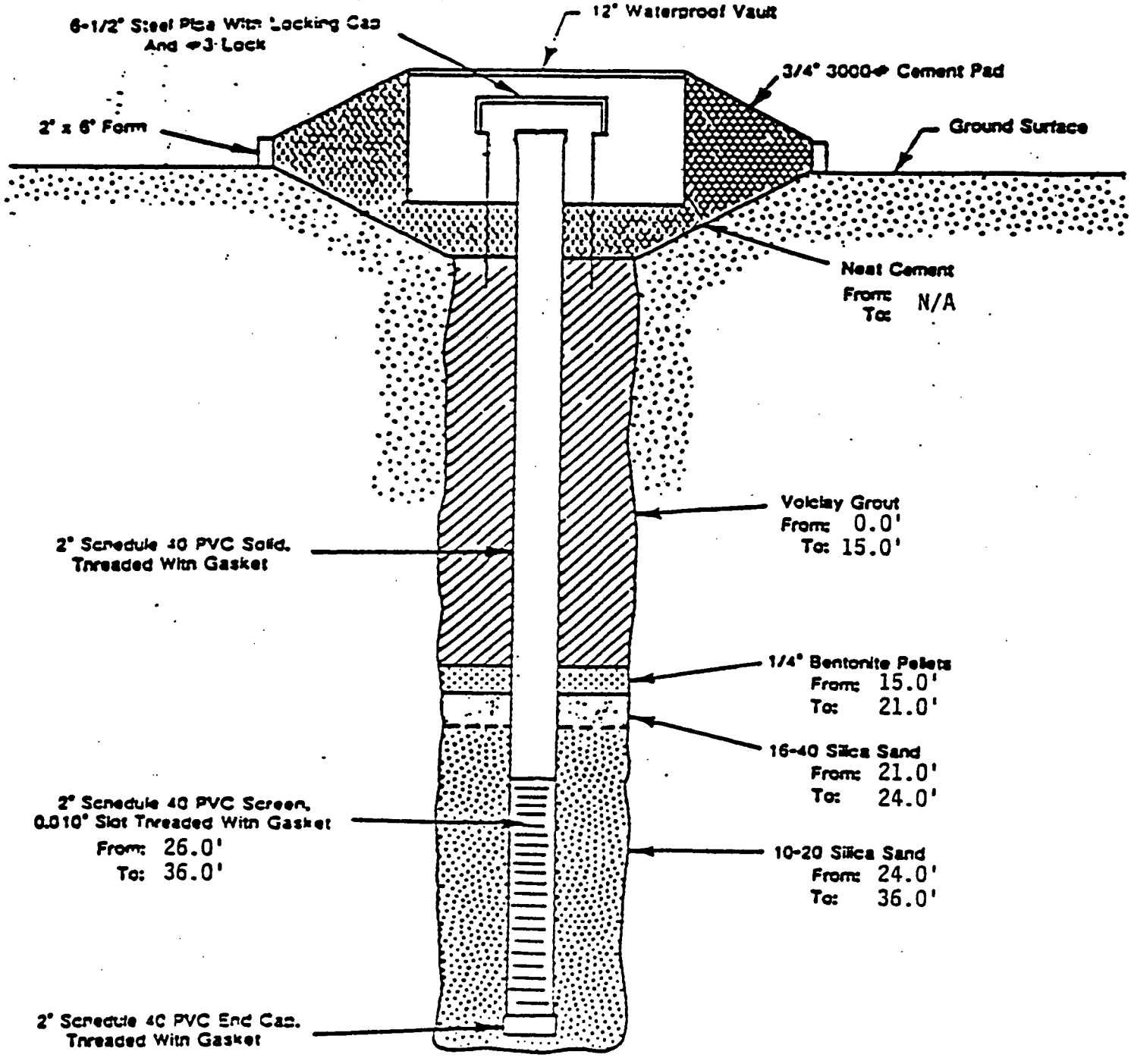
WELL SCHEMATIC

5-7B



WELL SCHEMATIC
5-8B



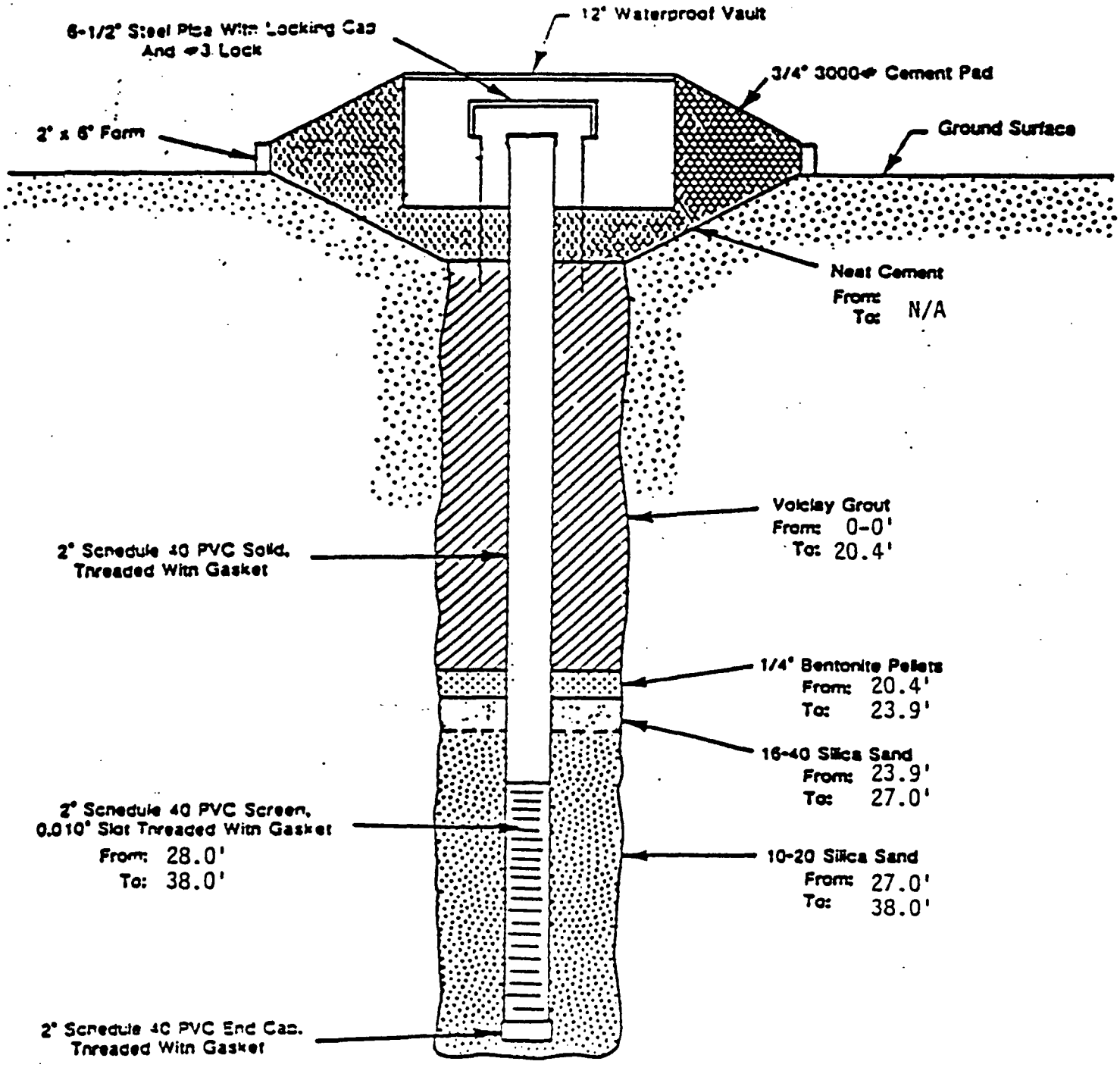


WELL #: 5-25 B

DATE DRILLED: 12/6 & 7/90

TOTAL DEPTH: 36.0' (taped)

ALL FOOTAGES FROM GROUND SURFACE

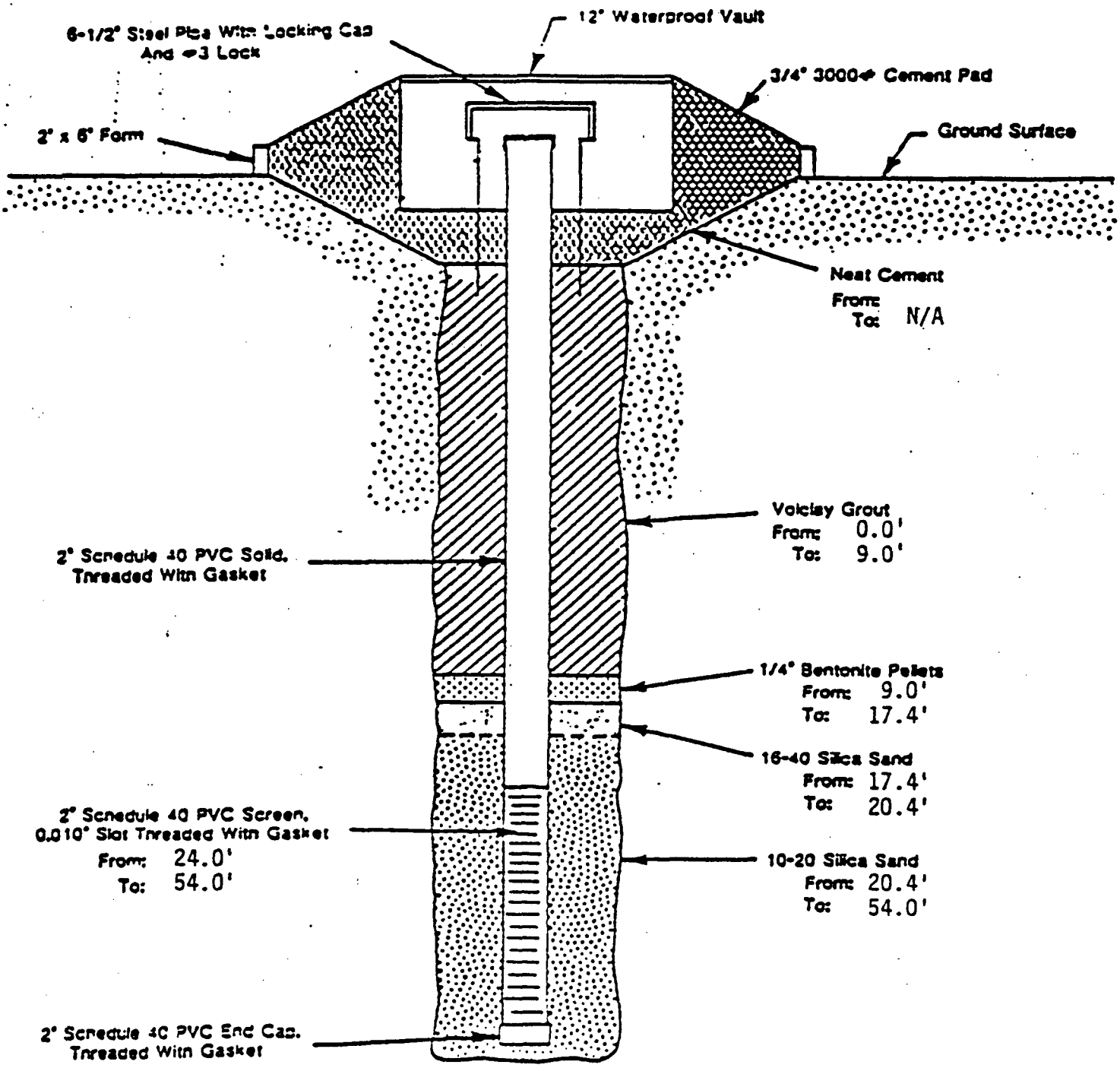


WELL #: 5-26 B

DATE DRILLED: 12/5 & 6/90

TOTAL DEPTH: 38.0' (taped)

ALL FOOTAGES FROM GROUND SURFACE



WELL #: 5-27 B

DATE DRILLED: 12/7, 10 & 11/90

TOTAL DEPTH: 54.0' **(taped)**

ALL FOOTAGES FROM GROUND SURFACE

ENRON
GAS PIPELINE GROUP

P. O. Box 1188 Houston, Texas 77251-1188 (713) 853-6161

May 22, 1991

Ms. Donna Mullins
USEPA Region VI
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202

RE: PRELIMINARY DATA ON WELL LOGS FOR THOREAU STATION 5

Dear Donna:

Enclosed please find the preliminary data on well logs for Thoreau Station 5, as requested by Jeff Robinson. Although this is not an officially required submittal under the consent decree, we are sending copies to Ed Wise at Entrix and Tom McGraw at EID for their information.

In addition, since we will ultimately have to obtain permission from New Mexico OCD for closure of the wells, we are sending a copy of these data to Dave Boyer at OCD in New Mexico.

As further site information is gathered, or when the final Groundwater Assessment Report is complete, we will forward it to you at that time.

In the meantime, should you have any questions, please call me at (713) 853-3219, or Ted Ryther at (713) 853-5634.

Yours very truly,

James C. Alexander

James C. Alexander
Manager, Special Projects
Environmental Affairs

JCA:sb

Enclosure

cc: Tom McGraw, EID
Ed Wise, Entrix
Dave Boyer, OCD

THOREAU5

DANIEL B. STEPHENS & ASSOCIATES, INC.
ENVIRONMENTAL SCIENTISTS AND ENGINEERS

May 9, 1991

Mr. Ted Ryther
Consulting Engineering Services
1400 Smith St.
ENRON Bldg. #2577
Houston, Texas 77002

Re: Drilling and Well Completion Logs for Shallow Monitor Wells and Boreholes Drilled at Transwestern Pipeline Compressor Station No. 5, Thoreau, New Mexico.

Dear Ted:

As per your request I'm transmitting the subject logs. Attachment I on contains logs of shallow boreholes and monitor wells included in the February, 1990 report entitled "Hydrology at the Transwestern Pipeline Compressor Station No. 5 Thoreau, New Mexico". Attachment II contains draft versions of shallow boreholes and monitor wells drilled and completed during the last half of 1990. Final version of these logs will appear in the final GAR report for Thoreau scheduled to be completed later this year. Please note that well completion logs only exist for monitor wells. If you have any questions concerning this transmittal, please do not hesitate to call me.

Sincerely,

DANIEL B. STEPHENS & ASSOCIATES

Dale Hammermesiter

Dale Hammermesiter
Senior Hydrologist

DH/dm
ENC.

cc: Gordon Wassell

ATTACHMENT I

TABLE

LITHOLOGIC LOG

Location: ENRON Pumping Station #5, Thoreau, N.M.
Boring No.: 5-1B
Drilling Method: Hollow Stem Auger
Rig type: CME 75
Drilling fluids: None
Date Started: 5/15/89 **Date Finished:** 5/16/89
Total Depth Drilled: 53 feet
Drilling Contractor: Western Technologies Inc.

DEPTH INTERVAL (feet)		DESCRIPTION OF MATERIAL
5	SILTY SAND	Fine to medium grained sand, with silt. Moderate Reddish Brown (10 R 4/6).
10	SAND	Fine to medium grained sand, minor silt. Moderate Reddish Brown (10 R 4/6).
15	GRAVELLY SAND	Damp sand and gravel. Moderate Reddish Brown (10 R 4/6).
20	SILTY SAND	Fine grained sand and silt. Bedding evident. Fine bands of clay. Moderate Reddish Brown (10 R 4/6).
25	SAND	Fine to medium grained sand. Some minor clay. Pale Reddish Brown (10 R 5/4).
30	CLAYEY SAND	Fine grained sand and clay. Moderate Reddish Brown (10 R 4/6).
35	SANDY CLAY	Fine grained sand, uniform texture. Moderate Reddish Brown (10 R 4/6).
40	SILTY SAND	Medium to coarse grained sands with silt and clay. Moist. Pale Reddish Brown (10 R 5/4).

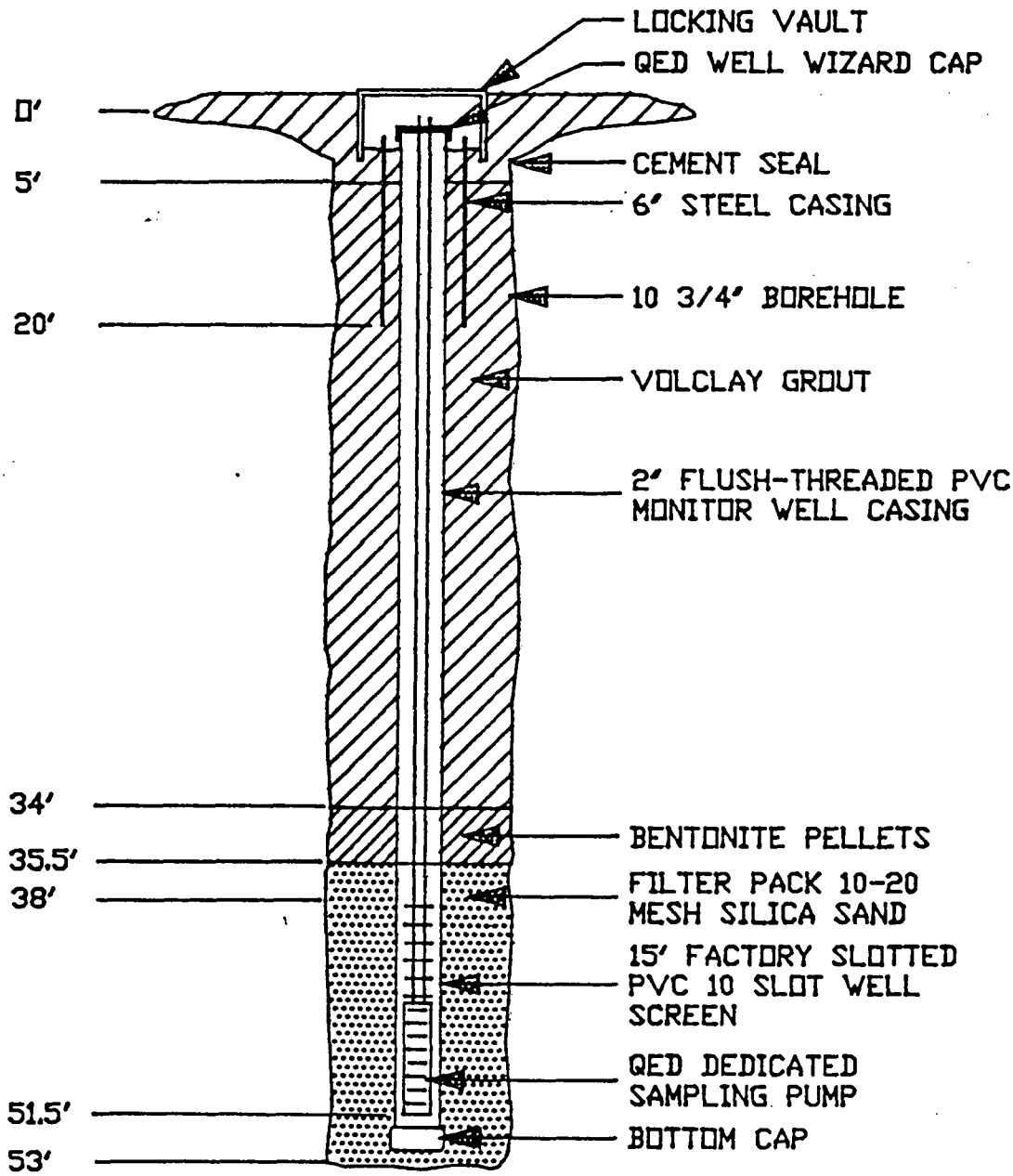
TABLE
(continued)
LITHOLOGIC LOG

45	SAND	Coarse sands with limestone fragments. Minor amounts of silt and clay. More gravel down to 49 feet. Moist. Pale Red (10 R 6/2).
50	CLAY	Stiff plastic clay. Just penetrated top of Chinle. Moist. Moderate Reddish Brown (10 R 4/6).

T.D. = 53 Feet.

WELL SCHEMATIC

5-1B



TABLE

LITHOLOGIC LOG

Location: ENRON Pumping Station #5, Thoreau, N.M.
Boring No: 5-2B **Drilling Method:** Hollow Stem Auger
Rig Type: CME75
Drilling Fluids: None
Date Started: 5/12/89 **Date Finished:** 5/12/89
Total Depth Drilled: 55.5 Feet
Drilling Contractor: Western Technologies Inc.

Depth Interval (feet)		DESCRIPTION OF MATERIAL
0 - 8	SILTY SAND	Reddish-brown; medium-grained; moist.
8 - 15.4	SILTY SAND	Reddish-brown; medium,-grained; Gravel up to 1" diameter; minor caliche seams; moist.
15.4 - 16.3	SANDY GRAVEL	Mottled reddish-brown and grayish yellow; coarse-grained sand and fine to medium-grained gravel; loose; damp.
16.3 - 17.5	SILTY SAND	Reddish-brown; medium-grained; moist.
17.5 - 18	SANDY CLAYEY SILT	Reddish-brown; minor caliche; damp.
18 - 20	SILTY SAND	Reddish-brown, medium to coarse-grained; damp.
20 - 22	SILTY SAND	Reddish-brown; medium-grained; some clay; damp.
22 - 24.5	SILTY SAND	Pale reddish-brown; medium-grained; damp.
24.5 - 28	CLAYEY TO SILTY SAND	Reddish-brown; medium-grained; more clayey and hard @ 27.8'; damp to moist.
	INTERLAYERED WITH: SAND	Light brown; medium to coarse-grained; damp to moist.

TABLE
(continued)
LITHOLOGIC LOG

Location: ENRON Pumping Station #5, Thoreau, N.M.

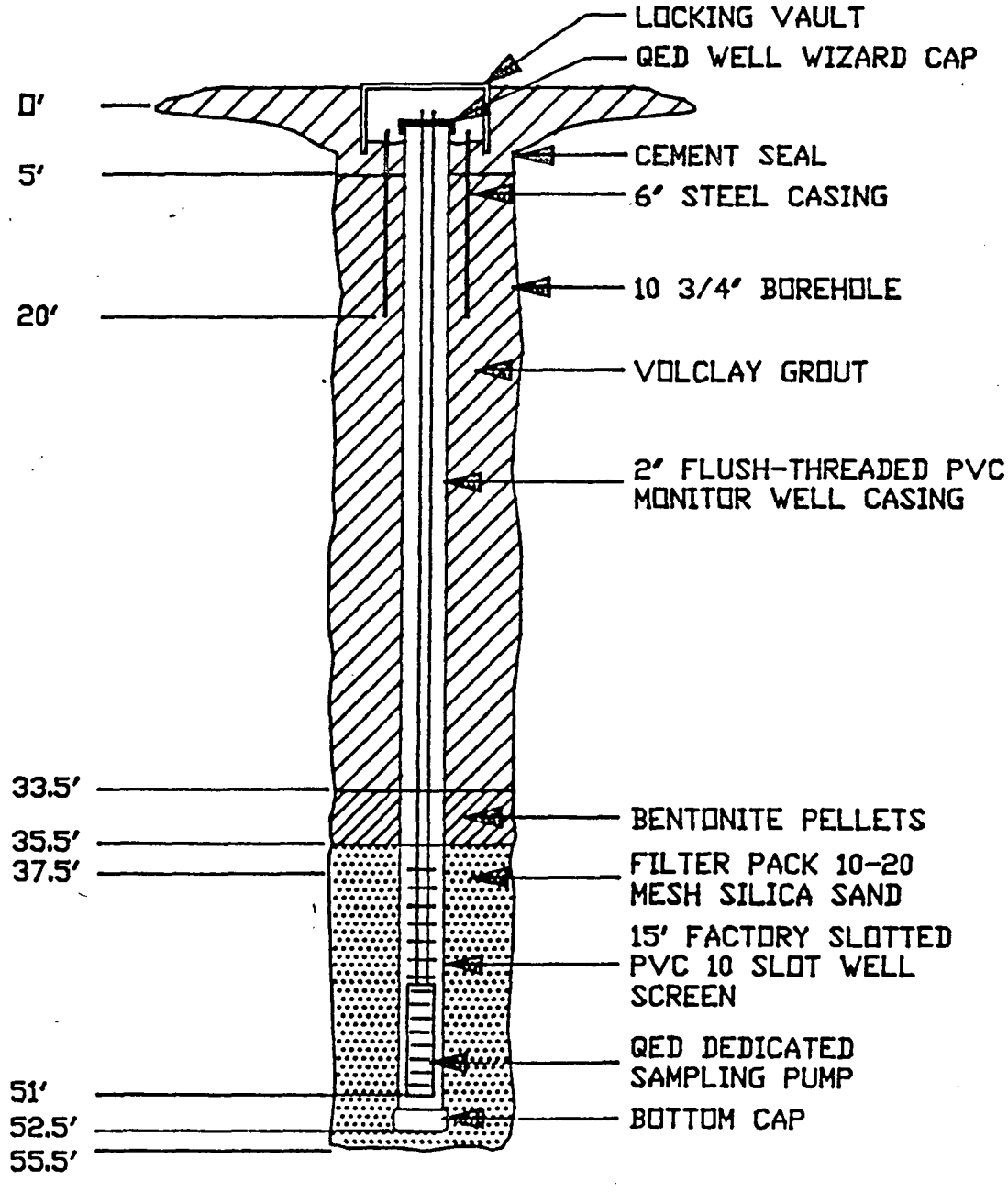
DEPTH INTERVAL (feet)		DESCRIPTION OF MATERIAL
	SLIGHTLY SILTY SAND	Brown to reddish-brown; medium-grained; damp to moist.
28 - 30.5	SLIGHTLY SILTY SAND	Reddish-brown; medium to coarse-grained; moist.
30.5 - 31.8	GRAVELLY SAND	Reddish-brown; medium-grained, damp.
31.8 - 33.5	SANDY CLAY	Reddish-brown; sand is fine-grained; moist.
33.5 - 34	GRAVELLY CLAY	Moderate to dark reddish-brown; some sand; moist.
34 - 34.8	CLAYEY GRAVELLY SAND	Moderate to dark reddish-brown; medium-grained; damp.
34.8 - 41	SILTY SAND	Reddish-brown; fine-grained; some gravel from 37.4 to 38; moist.
41 - 41.5	CLAYEY SAND TO SANDY CLAY	Dark reddish-brown; with chips of light greenish-gray sand; hard; moist.
41.5 - 42.6	SANDY CLAY	Moderate to dark reddish-brown; minor caliche seams; very hard; damp.
42.6 - 43	SILTY SAND	Orange to reddish-brown; fine to medium-grained; moist.
43 - 44	CLAYEY SAND	Reddish-brown; fine to medium-grained; moist.
44 - 46	CLAYEY SAND	Reddish-brown; fine to medium-grained; some limestone and sandstone gravel and cobbles; harder drilling from 45' to 46'; wet.

TABLE
(continued)
LITHOLOGIC LOG

Location: ENRON Pumping Station #5, Thoreau, N.M.

DEPTH INTERVAL (feet)		DESCRIPTION OF MATERIAL
46 - 48	CLAYEY SAND WITH GRAVEL	Reddish-brown; fine to medium-grained; saturated; soupy from 46' to 47'.
48 - 55.1	CLAYEY SILTY SAND	Reddish-brown; fine-grained; 1" to 2" seam of coarse sand and fine gravel at 52'; saturated.
55.1 - 55.5	CLAYEY SAND TO SANDY CLAY	Reddish-brown; minor caliche seams; saturated; refusal at 55.5'.

WELL SCHEMATIC
5-2B



TABLE

LITHOLOGIC LOG

Location: ENRON Pumping Station #5, Thoreau, N.M.
Boring No.: 5-3B **Drilling Method:** Hollow Stem Auger
Rig type: CME 75
Drilling fluids: None
Date Started: 5/10/89 **Date Finished:** 5/11/89
Total Depth Drilled: 58 feet
Drilling Contractor: Western Technologies Inc.

DEPTH INTERVAL (feet)		DESCRIPTION OF MATERIAL
		ALLUVIUM
0 - 2	SILTY SAND	Dark brown; fine-grained; with rootlets and brick rubble; damp.
2 - 4.5	SILTY SAND	Brown; fine-grained; with fine gravel; rootlets replaced by caliche; dry.
4.5 - 8.5	SAND	Reddish-brown; fine to medium grained sand with silt and cobbles; minor white caliche specks; dry.
8.5 - 9	GRAVELLY SAND	Reddish-brown; with chert cobbles; damp.
9 - 12	SAND	Reddish-brown; fine to coarse grained sand with silt and fine gravel; damp.
12 - 13.5	SILTY SAND	Light reddish-brown; fine-grained; with minor white caliche specks; damp.
13.5 - 18.5	SAND	Reddish brown; fine-grained sand with silt; well-sorted; with gravel below 18 ft.; damp.
18.5 - 29.5	SILTY SAND	Reddish brown; fine-grained; well-sorted; minor gravel 21.5-24 ft.; damp.
29.5 - 34.5	SAND	Light reddish-brown; fine sand with silt and yellowish sandstone cobbles; damp.

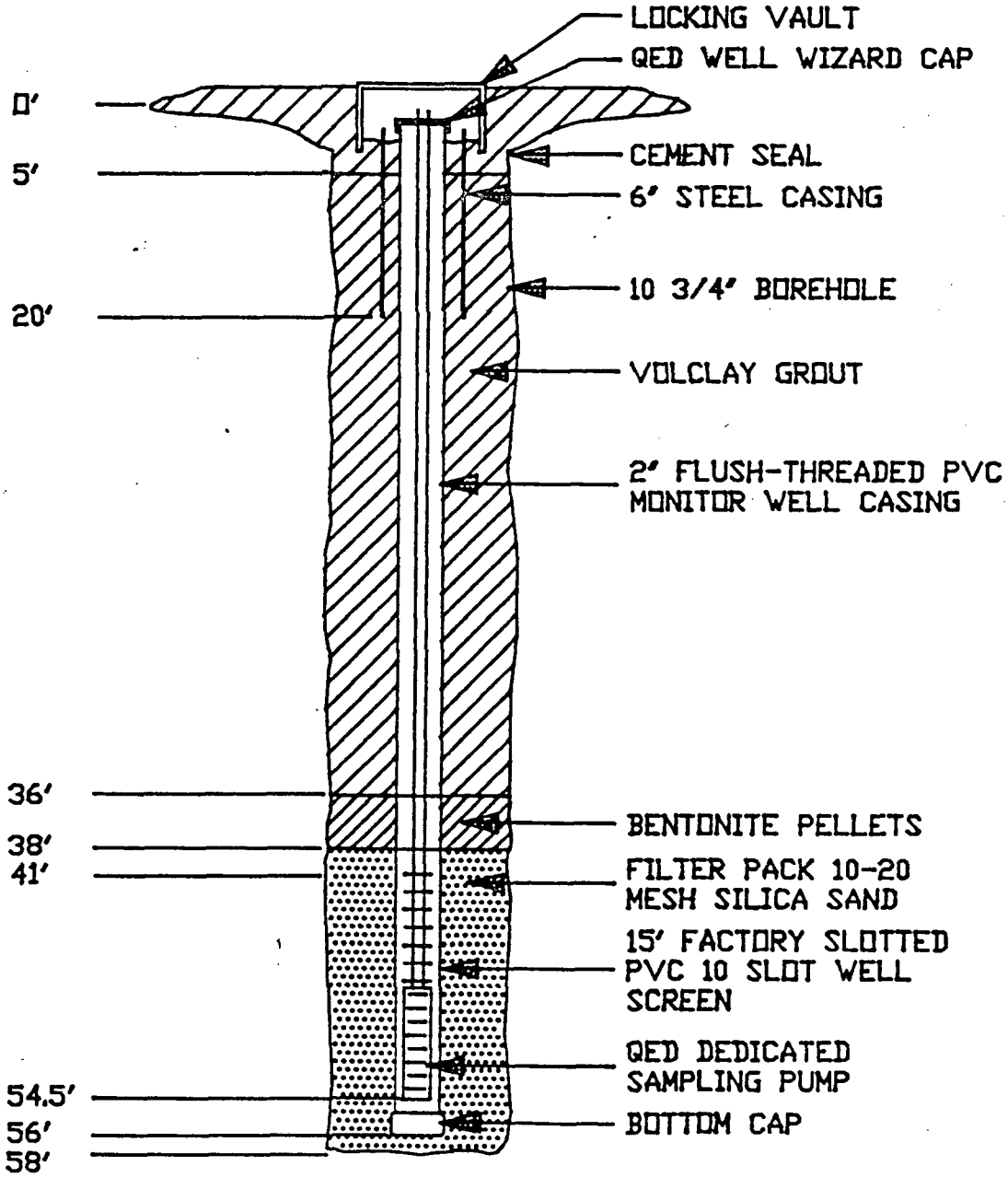
TABLE
(continued)
LITHOLOGIC LOG

Location: ENRON Pumping Station #5, Thoreau, N.M.

DEPTH INTERVAL (feet)		DESCRIPTION OF MATERIAL
34.5 - 38.5	SAND CLAY	Reddish-brown; with gravel and cobbles; damp.
38.5 - 42.5	CLAY	Dark reddish-brown; with sand and minor gravel; moist.
42.5 - 45	SANDY CLAY	Dark reddish-brown; sand is fine-grained; moist to wet.
45 - 47.5	CLAY	Reddish-brown; with sand and some cobbles; wet.
47.5 - 48	CLAY	Reddish-brown; with sand and gravel; saturated (soupy).
48 - 49.5	SANDY CLAY	Reddish-brown; sand is coarse; with fine gravel; wet.
49.5 - 51.5	GRAVELY CLAY	Reddish-brown; with sand; some gravel is purple mudstone; wet.
51.5 - 55.25	SILTY SAND	Light reddish-brown; fine-grained, well-sorted; saturated.
		CHINLE FORMATION
55.25 - 58	CLAY	Dark reddish-brown; with gray mottling; moist to damp.

WELL SCHEMATIC

5-3B



TABLE

LITHOLOGIC LOG

Location: ENRON Pumping Station #5, Thoreau, N.M.
Boring No.: 5-4B
Drilling Method: Hollow Stem Auger
Rig type: CME 75
Drilling fluids: None
Date Started: 9/18/89 **Date Finished:** 9/18/89
Total Depth Drilled: 58.75 feet
Drilling Contractor: Western Technologies Inc.

DEPTH INTERVAL (feet)		DESCRIPTION OF MATERIAL
5	SAND	Very fine grained sand, well sorted. Pale Red (10 R 6/2). BC = 3,4,3.
10	SAND	Very fine grained sand, minor silt. Moderate Reddish Brown (10 R 4/6). BC = 3,4,5.
15	SAND	Very fine grained sand. Moderate Reddish Brown (10 R 4/6). BC = 3,5,5.
20	SAND	Very fine and fine grained sand. Moderate Reddish Brown (10 R 4/6). BC = 3,4,6.
25	SAND	Very fine and fine grained sand. Some minor clay. Moderate Reddish Brown (10 R 4/6). BC = 3,4,6.
30	SILTY SAND	Silty very fine grained sand. Some minor clay. Moderate Reddish Brown (10 R 4/6). BC = 4,3,4.
35	SANDSTONE	Fine grained, not calcite cemented. Yellowish Grey (5 Y 7/12). BC = 22,14,18.
40	SILTY SAND	Medium to coarse grained sands in a silt and clay matrix. Calcite cemented. Pale Reddish Brown (10 R 5/4). BC = 2,12,18.

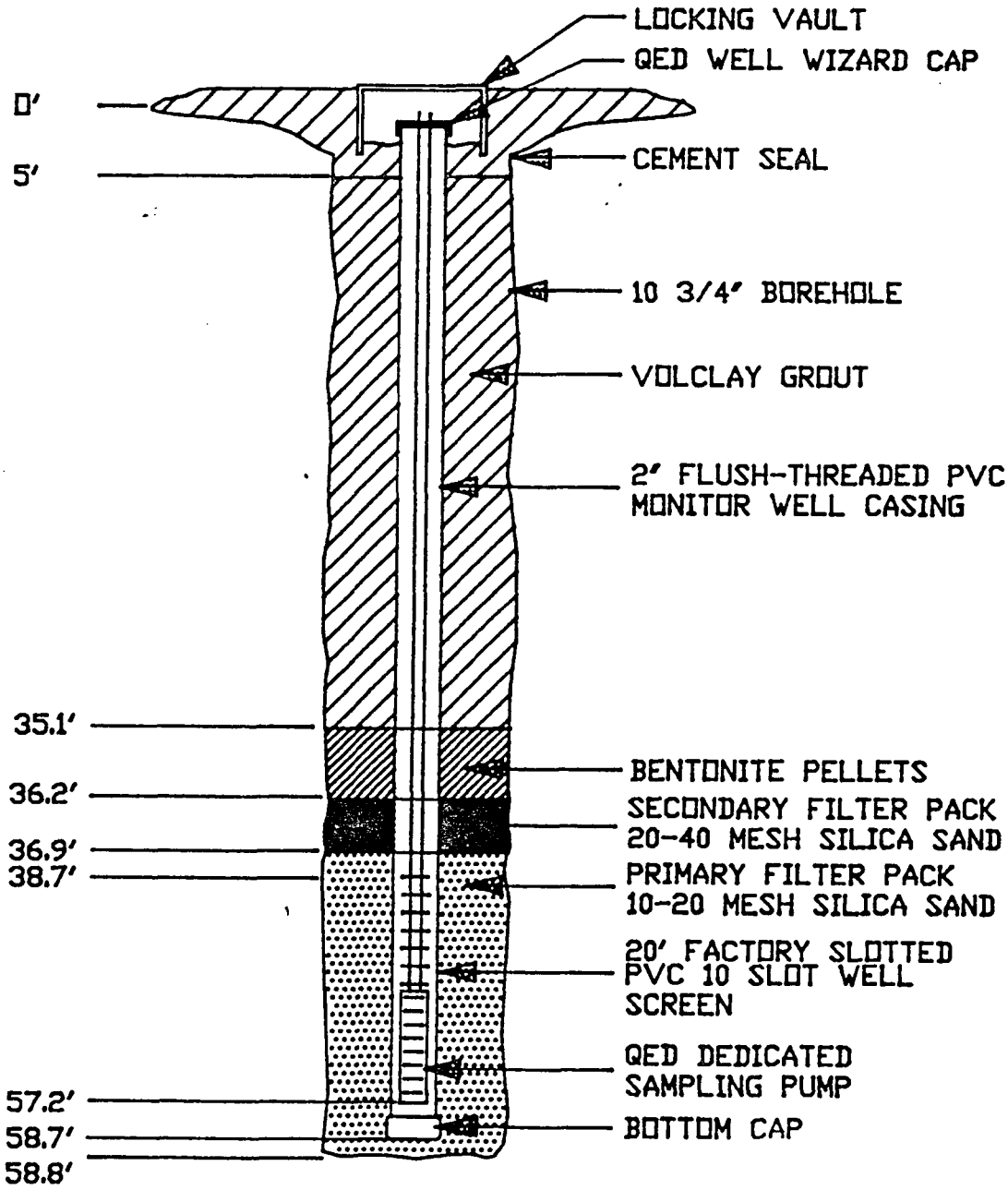
TABLE
(continued)
LITHOLOGIC LOG

45	SAND	Calcite cemented sand, limestone fragments. Minor amounts of silt and clay. Pale Red (10 R 6/2). BC = 5,22,30.
50	SAND	Very fine grained sand and silt, very minor clay. Moist. Moderate Reddish Brown (10 R 4/6). BC = 10,27,54.
55	SAND	Fine grained sand, with less silt and clay than above. Moist. Moderate Reddish Brown (10 R 4/6). BC = 8,16,27.
58	CLAY	Clay with silt. Moderate Reddish Brown (10 R 4/6).

T.D. = 58 Feet 9 Inches.

WELL SCHEMATIC

5-4B



TABLE

LITHOLOGIC LOG

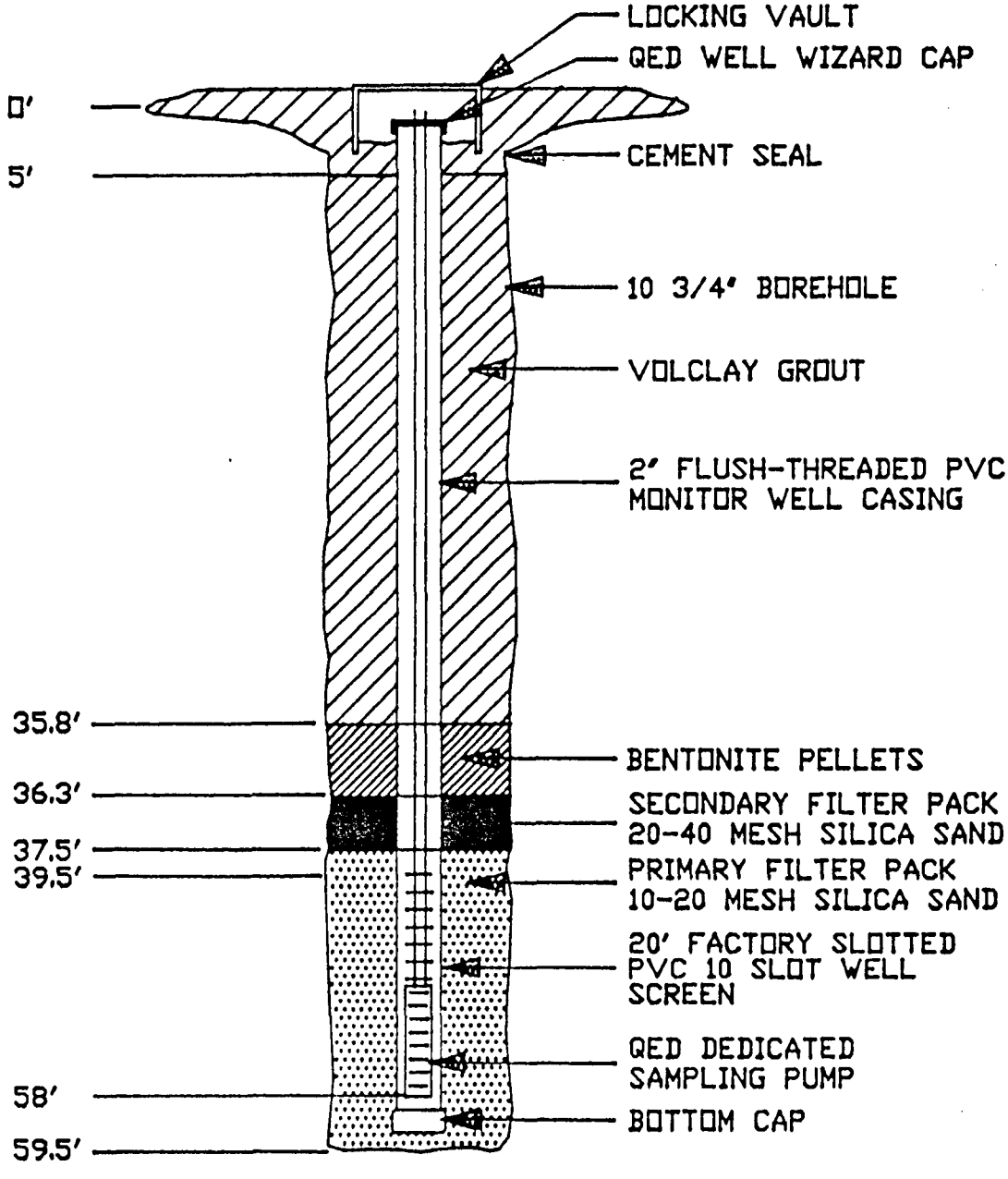
Location: ENRON Pumping Station #5, Thoreau, N.M.
Boring No.: 5-5B
Drilling Method: Hollow Stem Auger
Rig type: CME 75
Drilling fluids: None
Date Started: 9/19/89 **Date Finished:** 9/19/89
Total Depth Drilled: 59.5 feet
Drilling Contractor: Western Technologies Inc.

DEPTH INTERVAL (feet)		DESCRIPTION OF MATERIAL
30	SAND	Very fine to fine grained sand. Damp. Pale Reddish Brown (10 R 5/4). BC = 3,5,10.
35	SAND	Very fine grained sand and silt. Damp. Pale Reddish Brown (10 R 5/4). BC = 4,5,8.
40	SILTY CLAY	Silty clay with minor grains of limestone fragments. Damp. Pale Reddish Brown (10 R 5/4). BC = 2,3,8.
45	SAND	Very fine grained sand and minor silt. Moderate Reddish Brown (10 R 4/6). Saturated. BC = 4,7,15.
50	SAND	Very fine grained sand. Well sorted. Saturated. Moderate Reddish Brown (10 R 4/6). BC = 7,15,26.
55	SAND	Fine grained sand. Well sorted. Saturated. Moderate Reddish Brown (10 R 4/6). BC = 5,28,105.
59	CLAY	Dense massive clay. Moderate Reddish Brown (10 R 4/6). Damp. BC = 9,26,27. Chinle Fm. (?).

T.D. = 59.5 Feet.

WELL SCHEMATIC

5-5B



TABLE

LITHOLOGIC LOG

Location: ENRON Pumping Station #5, Thoreau, N.M.
Boring No.: 5-6B
Drilling Method: Hollow Stem Auger
Rig type: CME 75
Drilling fluids: None
Date Started: 9/18/89 **Date Finished:** 9/18/89
Total Depth Drilled: 57 feet
Drilling Contractor: Western Technologies Inc.

DEPTH INTERVAL (feet)		DESCRIPTION OF MATERIAL
5	SAND	Very fine grained sand, well sorted. Not calcite cemented. Moderate Reddish Brown (10 R 4/6). BC = 2,3,3.
10	SAND	Fine grained sand. Moderate Reddish Brown (10 R 4/6). BC = 3,4,5.
15	SAND	Fine grained sand. Moderate Reddish Brown (10 R 4/6). BC = 3,3,4.
20	SAND	Very fine grained sand, minor silt. Moderate Reddish Brown (10 R 4/6). BC = 2,4,5.
25	SAND	Very fine and fine grained sand. Moderate Reddish Brown (10 R 4/6). Well-site logger reports limestone gravel in cuttings. BC = 3,8,6.
30	SILTY SAND	Silty very fine grained sand. Some minor clay. Moderate Reddish Brown (10 R 4/6). Calcite cement. BC = 8,11,17.
35	SILTY SAND	Very fine grained sand, some silt. Moderate Reddish Brown (10 R 4/6). BC = 8,7,12.

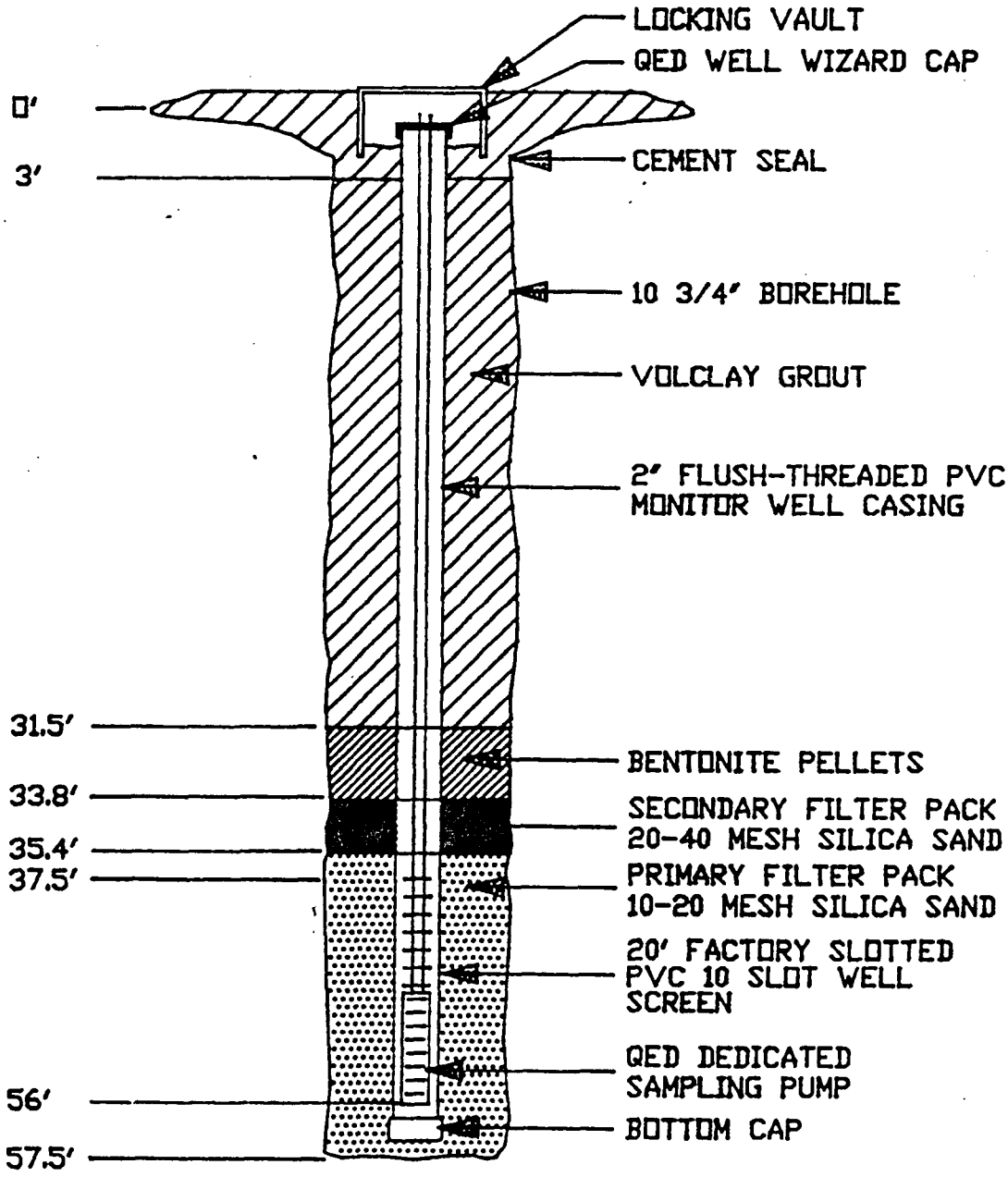
TABLE
(continued)
LITHOLOGIC LOG

40	SILTY SAND	Very fine grained sand, with more silt and clay than above. Moderate Reddish Brown (10 R 4/6). BC = 6,8,11.
45	SILTY SAND	Very fine grained sand, with more silt and clay than above. Moderate Reddish Brown (10 R 4/6). Well-site logger reports limestone fragments in cuttings. BC = 5,10,18.
50	CLAY	Dense clay. Pale Reddish Brown (10 R 5/4). BC = 17,74,83.
51	CLAY	Clay with some gravel and limestone. Pale Reddish Brown (10 R 5/4). BC = 15,42,0.
55	CLAY	Clay with fine grained sand, lumps of massive clay. Pale Reddish Brown (10 R 5/4). BC = 100 for 5 inches.
57	CLAY	Dense clay. Dark Reddish Brown (10 R 3/4). BC = N.R.

T.D. = 57 Feet.

WELL SCHEMATIC

5-6B



TABLE

LITHOLOGIC LOG

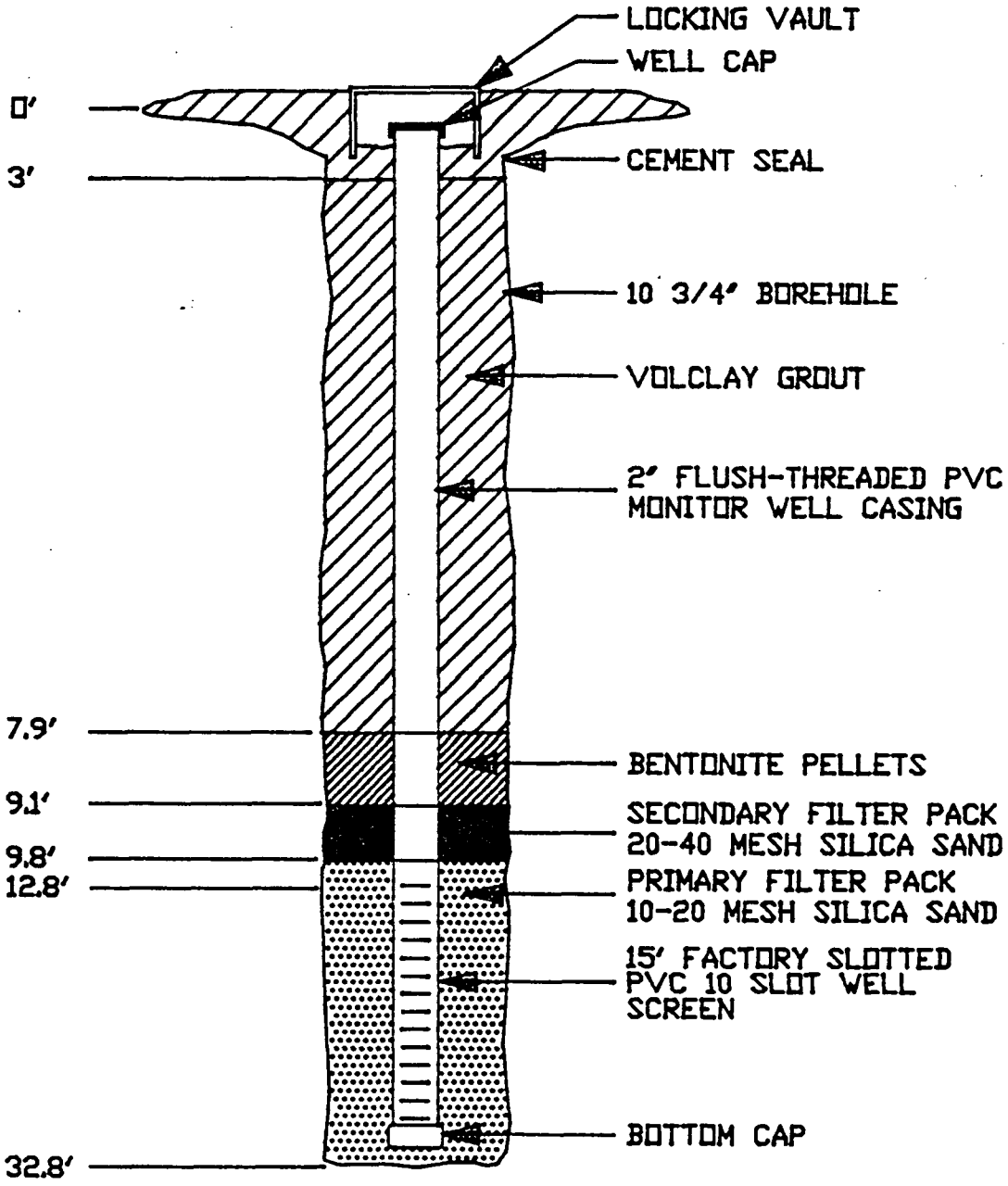
Location: ENRON Pumping Station #5, Thoreau, N.M.
Boring No.: 5-7B
Drilling Method: Hollow Stem Auger
Rig type: CME 75
Drilling fluids: None
Date Started: 9/27/89 **Date Finished:** 9/27/89
Total Depth Drilled: 32 feet
Drilling Contractor: Western Technologies Inc.

DEPTH INTERVAL (feet)		DESCRIPTION OF MATERIAL
5	SAND	Very fine grained sand, well sorted. Pale Red (10 R 6/2). BC = 4,3,5.
10	SAND	Fine grained sand, well sorted. Moderate Reddish Brown (10 R 4/6). BC = 2,10,12.
15	CLAYEY SAND	Very fine grained sand and silt with clay. Moderate Reddish Brown (10 R 4/6). BC = 4,10,10.
20	SILTY SAND	Very fine grained sand with silt. Pale Reddish Brown (10 R 5/4). Drill-site logger reports caliche seams, hard drilling @ 17 & 22 feet. BC = 11,17,18.
25	SANDY SILT	Silt with very fine grained sand. Moderate Reddish Brown (10 R 4/6). BC = 10,16,27.
30	SAND	Calcite cemented fine to medium grained sand with minor silt and clay. Moderate Reddish Brown (10 R 4/6). BC = 12,22,35.
32	SILTY SAND	Fine grained to very fine grained sand, some minor coarse to medium grained sand. Calcite cement. Moderate Reddish Brown (10 R 4/6). BC = 6,8,10.

T.D. = 32 Feet.

WELL SCHEMATIC

5-7B



TABLE

LITHOLOGIC LOG

Location: ENRON Pumping Station #5, Thoreau, N.M.
Boring No.: 5-8B
Drilling Method: Hollow Stem Auger
Rig type: CME 75
Drilling fluids: None
Date Started: 9/25/89 **Date Finished:** 9/25/89
Total Depth Drilled: 37 feet
Drilling Contractor: Western Technologies Inc.

DEPTH INTERVAL (feet)		DESCRIPTION OF MATERIAL
5	SILTY SAND	Very fine grained sand and silt. Moderate Reddish Brown (10 R 4/6). BC = 3,7,8. Dry.
10	SILTY SAND	Very fine grained sand and silt. Pale Reddish Brown (10 R 5/4). BC = 3,9,11. Dry.
15	SAND	Very fine grained sand and minor silt. Calcite cement. Moderate Reddish Brown (10 R 4/6). Damp. BC = 9,13,11.
20	SAND	Very fine grained sand and occasional pebbles of grey limestone. Moist. Moderate Reddish Brown (10 R 4/6). BC = 5,11,18.
24	SAND	Very fine grained calcite cemented sand. Very hard drilling. Moderate Reddish Brown (10 R 4/6).
25	SAND	Very fine grained calcite cemented sand and silt. Separate grey limestone fragments. BC = 18,31,36. Moderate Reddish Brown (10 R 4/6).
30	CLAYEY SILT	Calcite cemented clayey silt. Damp. Moderate Reddish Brown (10 R 4/6). BC = 7,18,30.

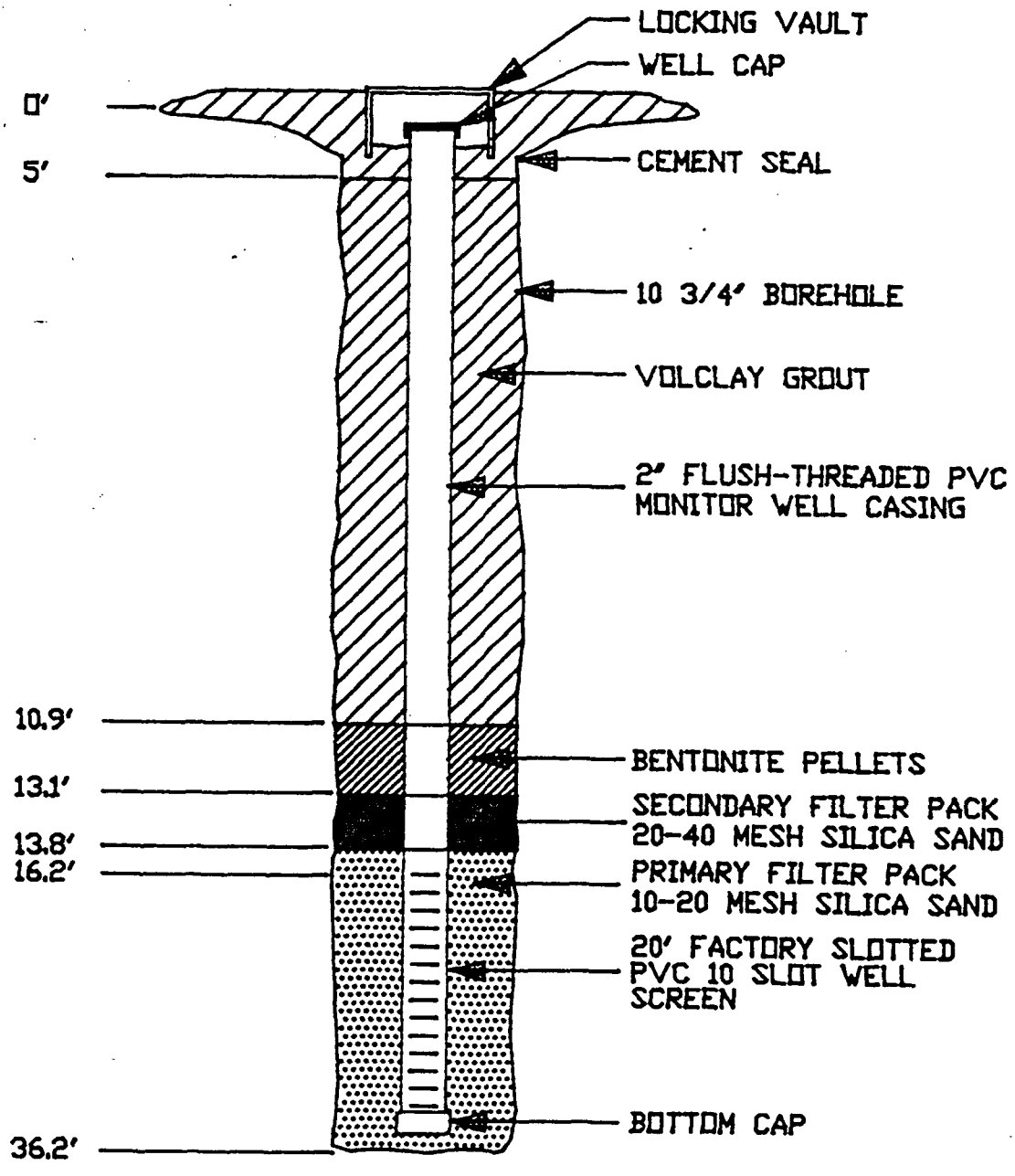
TABLE
(continued)
LITHOLOGIC LOG

35	CLAYEY SILT	Clayey silt with occasional fragments of grey limestone. Moderate Red (5 R 4/6). Moist. BC = 18,57 for 5 inches.
37	CLAY	Dense clay, some calcite cement. Alteration spots. Damp. Pale Red (10 R 6/2). BC = 1,3,31.

T.D. = 37 Feet.

WELL SCHEMATIC

5-8B



TABLE

LITHOLOGIC LOG

Location: ENRON Pumping Station #5, Thoreau, N.M.
Boring No.: 5SB-1
Drilling Method: Hollow Stem Auger
Rig type: CME 75
Drilling fluids: None
Date Started: 9/29/89 **Date Finished:** 9/29/89
Total Depth Drilled: 35 feet
Drilling Contractor: Western Technologies Inc.

DEPTH INTERVAL (feet)		DESCRIPTION OF MATERIAL
5	SILTY SAND	Sand is very fine grained and well sorted. Moderate Reddish Brown (10 R 4/6). BC = 3,4,4.
10	SAND	Medium to fine grained sand, occasional calcareous fragments up to 3 cm. Moderate Reddish Brown (10 R 4/6). BC = 2,3,4.
15	SAND	Medium to fine grained, less than 2% coarse sand and gravel. Damp. Moderate Reddish Brown (10 R 4/6). BC = 5,9,14.
20	SANDY SILT	Very fine grained sand and silt. Minor clay. Well sorted. Damp. Moderate Reddish Brown (10 R 4/6). BC = 7,10,13.
25	SAND	Graded sand from very coarse sand and small gravel to very fine grained sand and silt. Moist. Moderate Reddish Brown (10 R 4/6). BC = 6,7,8.
30	SAND	Very coarse sand and gravel to fine grained sand. Moist. Moderate Reddish Brown (10 R 4/6). BC = 6,8,10.
35	SANDY SILT	Medium to fine grained sandy silt with minor clay. Damp. Moderate Reddish Brown (10 R 4/6). BC = 10,27,32.

T.D. = 35 Feet.

ATTACHMENT II

Client: Transwestern Pipeline
Compressor Station No. 5
Thoreau, NM

Boring No.: 5-9SB

Rig Type: CME-75

Date Started: 6/21/90

Date Completed: 6/21/90

Drilling Contractor: Western Technologies, Inc.
Albuquerque, NM

Drilling Method: 7.5-inch O.D. Hollow Stem Auger

Drilling Fluids: None

Total Depth Drilled: 46.5 ft

Depth Interval (ft)	Material	Description
0 - 1.5	Clayey sand	Fine-grained, dry, light reddish brown (5 YR 6/13). At 0 ft, BC = 3, 4, 5.
1.5 - 6.5	Clayey sand	Fine-grained, damp, moderate to dark reddish brown. At 5 ft, BC = 13, 10, 10.
6.5 - 10	Silt/clay	Sandy, slightly damp, hard, sand is very fine-grained, moderately to well sorted, reddish brown (2.5 YR 5/4). At 10 ft, BC = 7, 6, 6.
10 - 13	Sand	Clayey/silty, fine-grained, moderately sorted, unconsolidated, damp, yellowish red (5 YR 5/6).
13 - 14.5	Gravel	Silty/clayey, dominantly limestone particles, to 1.5-inch diameter, average 0.75-inch diameter, angular to subrounded.
14.5 ≈ 20	Sand	Clayey/silty, poorly sorted, unconsolidated, fine-grained, to 0.5-inch diameter, rounded, composed of limestone, chert and sandstone. Sand lense 21.5 to 22 ft.
23 - 28	Sand	Clayey, fine-grained, moderately to well sorted, hard, traces of root fragments, traces of gypsum/caliche, reddish brown (2.5 YR 5/4). At 25 ft, BC = 7, 14, 16.
28 - 36.5	Clay	Sandy, hard, dry clay, sand is very fine-grained, reddish brown (2.5 YR 5/4). At 30 ft, BC = 50 for 3-inches.
36.5 - 40	Sand	Silty/clayey fine- to medium-grained, some light gray, sandstone, gravel zones very damp, reddish (10 R 4/6). At 35 ft, BC = 23, 14, 12.
40 - 45	Sand	Silty/clayey, fine-grained, well sorted, slightly damp, reddish brown (2.5 YR 5/4). At 40 ft, BC = 11, 20, 26.
45 - 46.5	Sand	Fine-grained, trace space to some silt, saturated from 43.3, reddish brown (2.5 YR 5/4).

PRELIMINARY
Subject to revision

Client:	Transwestern Pipeline Compressor Station No. 5 Thoreau, NM	**Drilling Contractor:**	Western Technologies, Inc. Albuquerque, NM
Boring No.:	5-10SB	**Drilling Method:**	7.5-inch O.D. Hollow Stem Auger
Rig Type:	CME-75	**Drilling Fluids:**	None
Date Started:	6/21/90	**Total Depth Drilled:**	55.5 ft
Date Completed:	6/22/90		

Depth Interval (ft)	Material	Description
0 - 20	Sand	Silty/clayey, fine-grained, moderately to well sorted, dry reddish brown (2.5 YR 514). At 0 ft, BC = 8, 14, 12; at 5 ft, BC = 3, 4, 6; at 10 ft, BC = 4, 4, 7; at 15 ft, BC = 6, 8, 10.
20 - 25	Sand	Silty, fine-grained and very coarse-grained, angular, traces of fine gravel, reddish brown (2.5 YR 5/4). At 20 ft, BBC = 3, 5, 6.
25 - 31.5	Sand	Silty, fine- to coarse-grained, moderately to poorly sorted, trace of some gravel/pebbles, golf ball in cuttings, reddish brown (2.5 YR 4/6). At 25 ft, BC = 7, 14, 26.
31.5 - 35	Sand	Silty, coarse-grained, moderately to well sorted, light reddish brown (5 YR 6/4), with gravelly interbeds, gravel are 0.25-inch to 1-inch diameter. At 30 ft, BC = 16, 16, 20.
35 - 40	Sand	Silty/clayey, moderately to well sorted, traces of fine gravel, red (2.5 YR 4/6). Upper rings show clay, sticky, plastic, with trace sand and fine gravel, traces of gypsum, hard. At 35 ft, BC = 10, 18, 27.
40 - 55.5	Clay/Claystone	Chinle Formation, traces of fine to coarse sands, very hard, conchoidal fractures, light gray/green reduction spots, trace damp to dry, reddish brown (2.5 YR 4/4). At 40 ft, BC = 20, 63, 100+; at 45 ft, BC = 93/refusal at 6-inches; at 50 ft, BC = 99 for 6-inch refusal; and at 55 ft, BC = 50 for 3-inch refusal.

PRELIMINARY
Subject to revision

Client:	Transwestern Pipeline Compressor Station No. 5 Thoreau, NM	**Drilling Contractor:**	Stewart Brothers Grants, NM
Boring No.:	5-11SB	**Drilling Method:**	7.5-inch O.D. Hollow Stem Auger
Rig Type:	Failing F10-WT	**Drilling Fluids:**	None
Date Started:	7/6/90	**Total Depth Drilled:**	26 ft
Date Completed:	7/6/90		

Depth Interval (ft)	Material	Description
0 - 1	Sand	Silty/clayey, fine-grained, wet, reddish brown (5 YR 5/3). At 0 ft, BC = 3, 3, 4.
1 - 5	Sand	Trace to some silt, wet to damp plastic pit cover encountered at 1 ft, HNu in sample hole = 30 ppm, oil saturated, very dark brown (10 YR 2/2) to black (10 YR 2/1). Drillers note rotten gas odor passing through respirator cartridges.
5 - 10	Sand	Silty, fine-grained, wet, dark gray (2.6 YR N4/) to dark brown (7.5 YR 3/2). At 5 ft, BC = 2, 4, 6.
10 - 14	Sand	Silty, fine-grained, damp brown (7.5 YR 4/2). At 10 ft, BC = 6 for 18-inches. HNu = 20 ppm on cuttings.
14 - 18	Sand	Silty, fine-grained, trace fine gravel, very dark grayish brown (10 YR 3/2). At 15 ft, BC = 5 for 18-inches.
18 - 26	Sand	Silty, fine-grained moderately to well sorted, damp brown (10 YR 3/2). At 20 ft, BC = 7 for 18-inches; at 25 ft, BC = 19 for 18-inches.

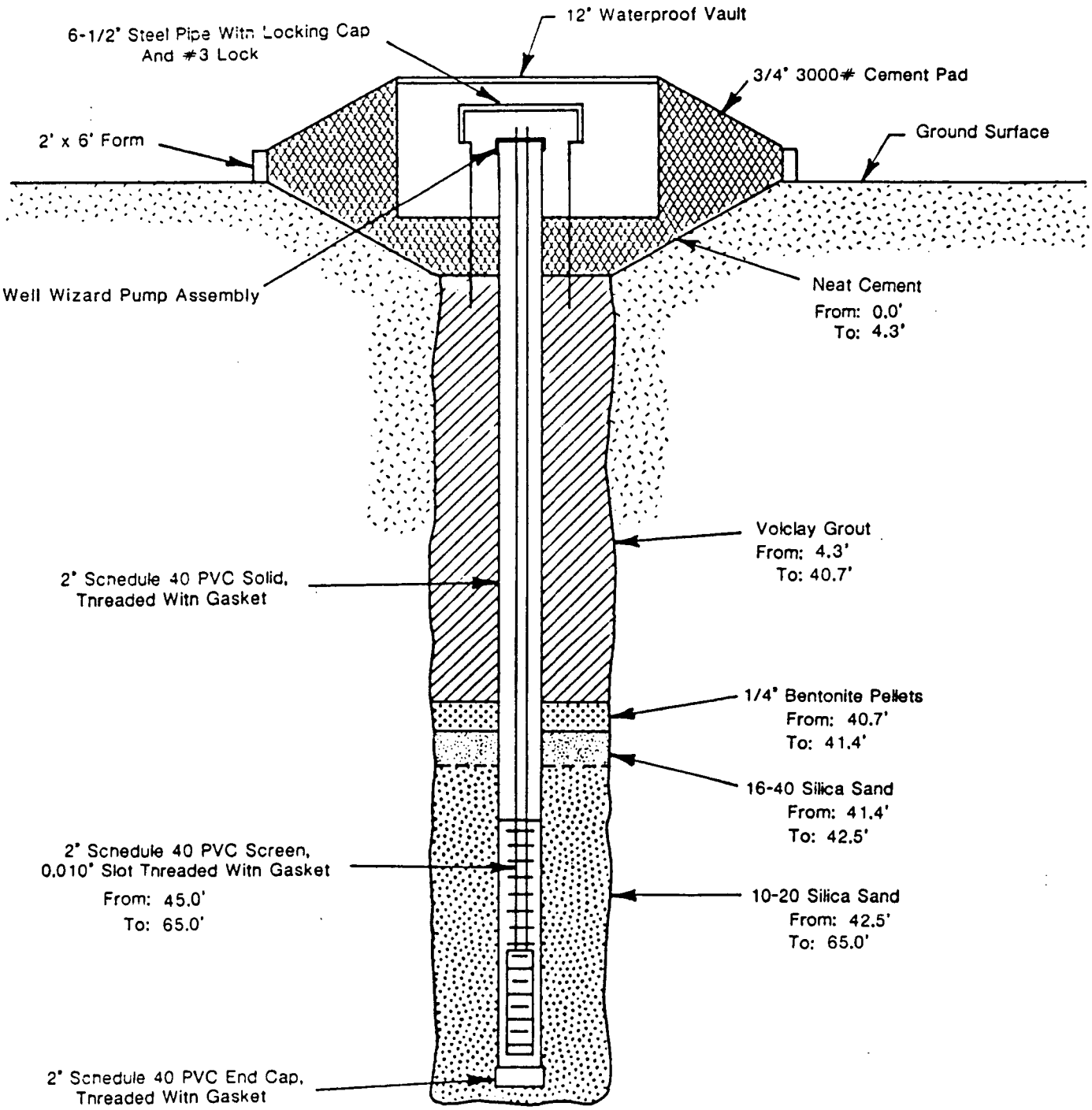
NOTE: Borehole terminated at 26 ft due to strong solvent-like odor passing through respirator cartridges of all drilling personnel. HNu = 150 ppm on soil headspace.

PRELIMINARY
Subject to revision

Client:	Transwestern Pipeline Compressor Station No. 5 Thoreau, NM	**Drilling Contractor:**	Stewart Brothers Grants, NM
Boring No.:	5-12B	**Drilling Method:**	7.5-inch O.D. Hollow Stem Auger
Rig Type:	Failing F-10 WT	**Drilling Fluids:**	None
Date Started:	6/28/90	**Total Depth Drilled:**	65.0 ft
Date Completed:	6/28/90		

Depth Interval (ft)	Material	Description
0 - 8	Sand	Silty, fine- to very fine-grained, traces of fine gravel, silty interbeds, dry (damp from 6 ft to 8 ft), reddish brown (5 YR 5/4).
8 - 26.5	Sand	Medium to fine-grained, trace to some silt, dry (damp 8 ft to 9 ft), reddish brown (5 YR 5/4).
26.5 - 31	Sand	Silty, medium- to fine-grained, traces to caliche interbeds, damp, reddish brown.
31 - 38	Gravel	Up to 2-inch diameter, subangular to subrounded, dominantly limestone with caliche coatings, dry.
38 - 40	Sand	Medium- to fine-grained, dry, reddish brown.
40 - 48	Sandy Gravel/ Gravelly Sand	Sand is medium- to fine-grained, damp, reddish brown; gravel is subrounded to subangular, to 1.5-inch diameter, sandstone and limestone fragments with caliche coatings. Sand dominant from 46 ft to 48 ft.
48 - 53	Clay/silt	Sandy, moist from 50-53 ft, sand is medium-grained, reddish brown.
53 - 58	Clay/silt	Sandy, damp to dry, reddish brown, becomes wet 53 ft to 56 ft.
58 ≈ 63	Sand	Silty/clayey, medium- to coarse-grained, with some limestone and sandstone to dry claystone, gravels, saturated, hard.
≈63 - 65	Claystone	Chinle Formation, thin bedded, numerous light gray reduction spots to 0.5-inch diameter, dry, red.

PRELIMINARY
Subject to revision



WELL #: 5-12B

DATE DRILLED: 6/28/90

TOTAL DEPTH: 65.0' (taped)

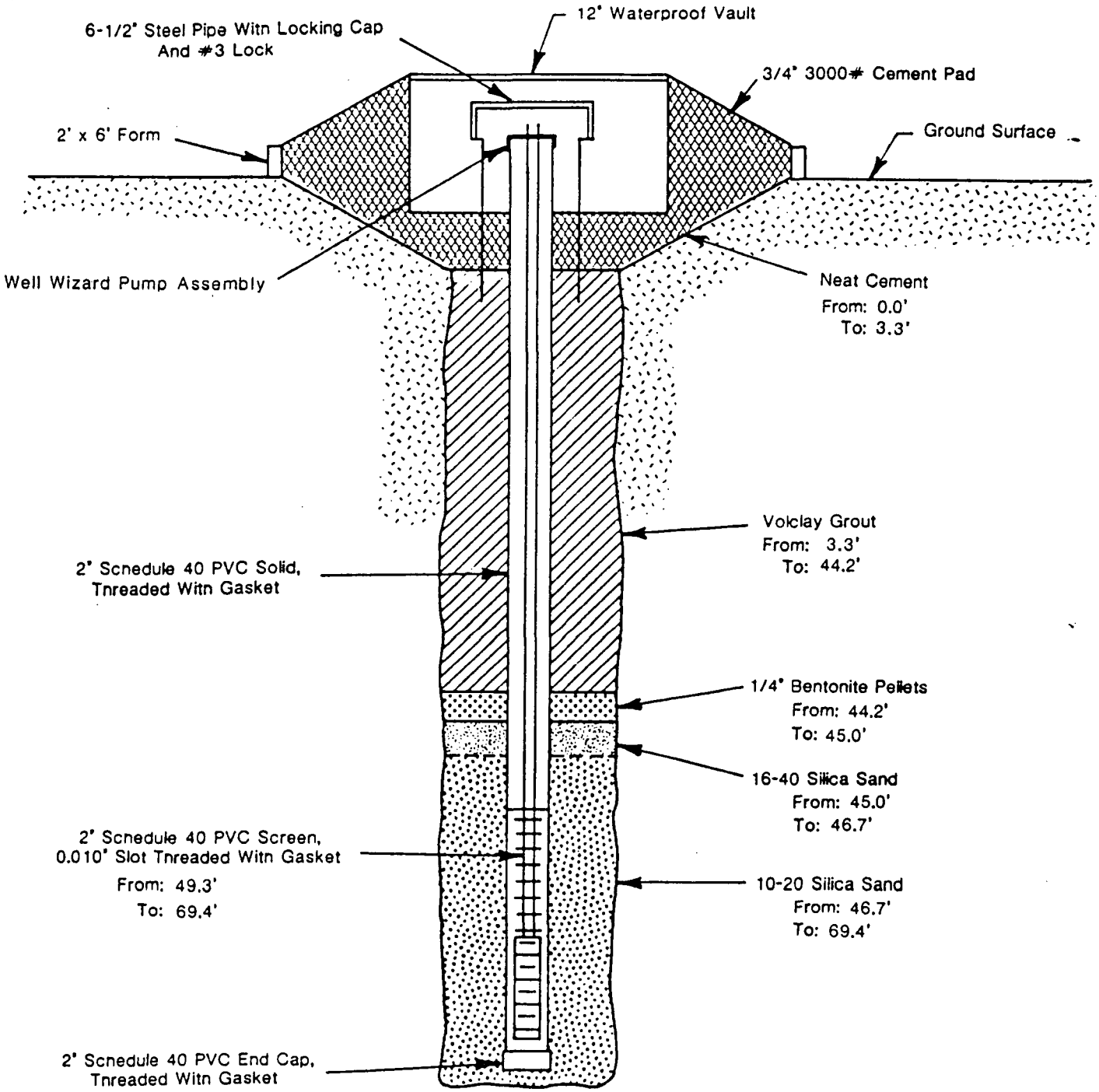
ALL FOOTAGES FROM GROUND SURFACE

PRELIMINARY
Subject to revision

Client:	Transwestern Pipeline Compressor Station No. 5 Thoreau, NM	**Drilling Contractor:**	Stewart Brothers Grants, NM
Boring No.:	5-13B	**Drilling Method:**	7.5-inch O.D. Hollow Stem Auger
Rig Type:	Failing F-10 WT	**Drilling Fluids:**	None
Date Started:	6/28/90	**Total Depth Drilled:**	69.4 ft
Date Completed:	6/28/90		

Depth Interval (ft)	Material	Description
0 - 6	Sand	Silty, fine- to very fine-grained, silty interbeds, dry reddish brown (5 YR 5/3).
6 - 7	Gravel	Dominantly sandstone.
7 - 21	Sand	Silty/clayey, dry-damp, reddish brown (5 YR 5/3).
21 - 31	Sand	Silty, fine- to medium-grained, yellowish red (5 YR 5/8), interbedded with sand, silty fine to medium-grained, reddish brown (5 YR 5/3). Slightly damp from 30 ft to 31 ft.
31 - 32	Gravel	To 1.5-inch diameter, equidimensional, angular, dominantly limestone, with caliche coatings.
32 - 35	Sand	Silty, fine- to medium-grained, reddish brown (5 YR 5/3).
35 - 41	Gravel	To 1.75-inch diameter, caliche coatings, dry.
41 - 47	Sand	Silty, medium- to fine-grained, reddish brown (5 YR 5/3), from 44 ft to 47 ft, becomes gravelly (sandstone and limestone average 0.5-inch diameter.
47 - 48	Gravel	To 1.5-inch diameter, average 0.5-inch, subrounded to subangular, some sand and silt. Dominantly limestone.
48 ≈ 58	Silt	Sandy and clayey, traces of organics, sand is medium- to fine-grained, rounded, dark reddish brown.
≈58 - 60.5	Sand	Silty/clayey, medium- to coarse-grained, damp, reddish brown.
60.5 - 62.5	Sand	Silty/clayey, medium- to fine-grained, dark reddish brown and reddish brown. Possible water at 60 ft.
62.5 - 67	?	Cuttings saturated, clayey and sandy, reddish brown.
67 - 69.4	Claystone	Chinle Formation, sandy claystone with light gray reduction spots, dry, red/purple.

PRELIMINARY
Subject to revision



WELL #: 5-13B

DATE DRILLED: 6/28/90

TOTAL DEPTH: 69.4' (taped)

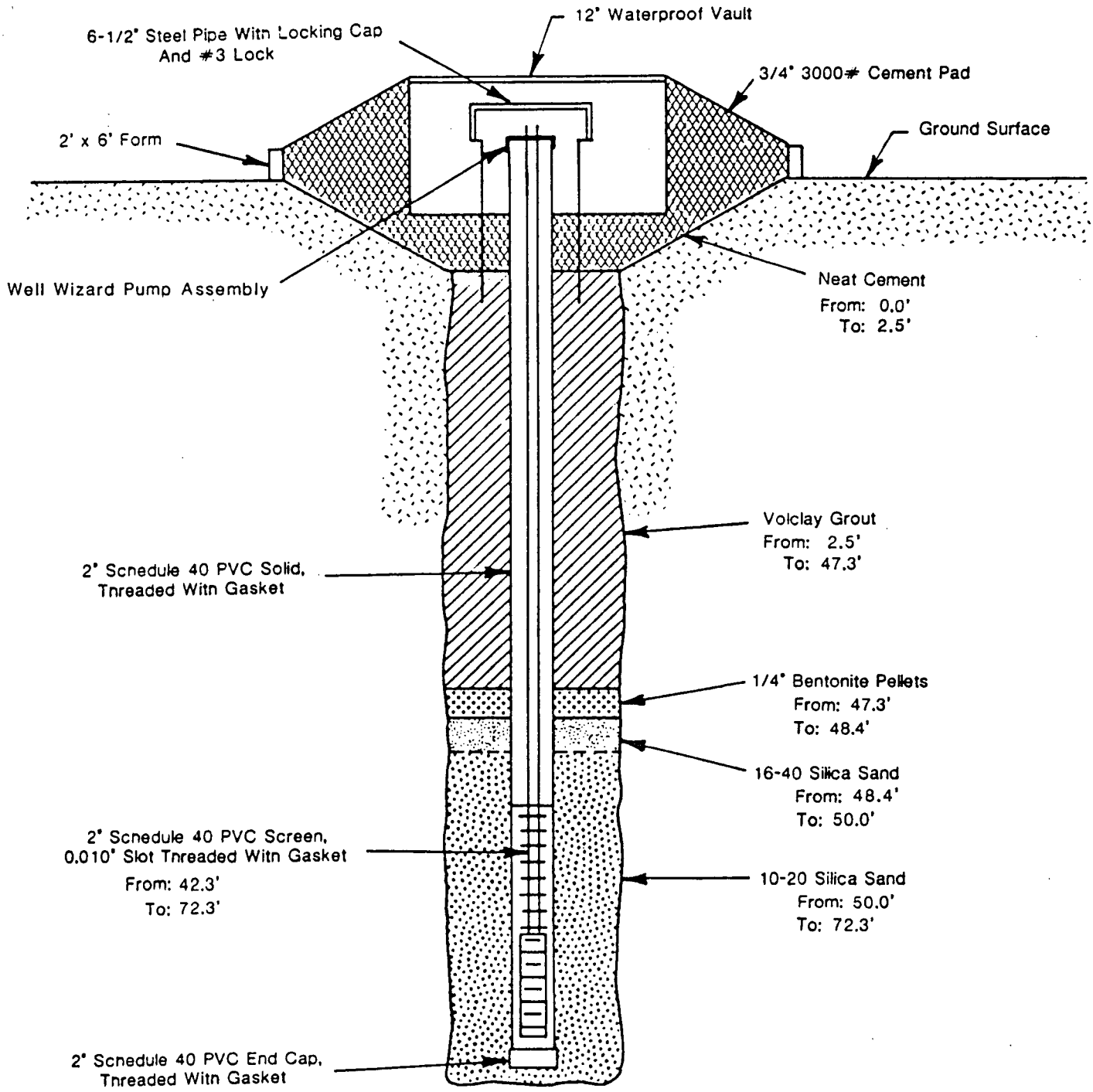
ALL FOOTAGES FROM GROUND SURFACE

PRELIMINARY
Subject to revision

Client:	Transwestern Pipeline Compressor Station No. 5 Thoreau, NM	**Drilling Contractor:**	Stewart Brothers Grants, NM
Boring No.:	5-14B	**Drilling Method:**	7.5-inch O.D. Hollow Stem Auger
Rig Type:	Failing F-10 WT	**Drilling Fluids:**	None
Date Started:	6/27/90	**Total Depth Drilled:**	72.3 ft
Date Completed:	6/27/90		

Depth Interval (ft)	Material	Description
0 - 31	Sand	Silty, fine- to very fine-grained, dry with traces of dampness at 15 ft and 18 ft, reddish brown (5 YR 5/3).
31 - 32	Clay/Silt	Sandy, traces of caliche, reddish brown (5 YR 5/3).
32 - 37	Gravel	Sandy and silty, dominantly limestone, to 1.5-inch diameter, subangular.
37 - 47	Sand	Silty, fine- to very fine-grained, dry, traces of dampness, reddish brown.
47 - 48	Gravel	To 1-inch diameter, dominantly limestone with caliche coatings.
48 - 53	Sand	Silty, fine-grained, dry with traces of dampness, reddish brown (5 YR 5/3).
53 - 57	Sand	Silty/clayey, medium- to fine-grained, damp to moist, reddish brown. Gravel 55 ft to 55.5 ft.
57 - 59	Clayey Silt/ Silty Clay	Sandy, moist, reddish brown (25 YR 5/4).
59 ≈ 60	Gravel	No cuttings return.
60 - 68	?	Interbedded clays and sands? No cuttings return.
68 - 72	Claystone	Possible top of Chinle Formation, closely spaced conchoidal fractures, moderately weathered, white to light gray reduction spots, red.

PRELIMINARY
Subject to revision



WELL #: 5-14B

DATE DRILLED: 6/27/90

TOTAL DEPTH: 72.3' (taped)

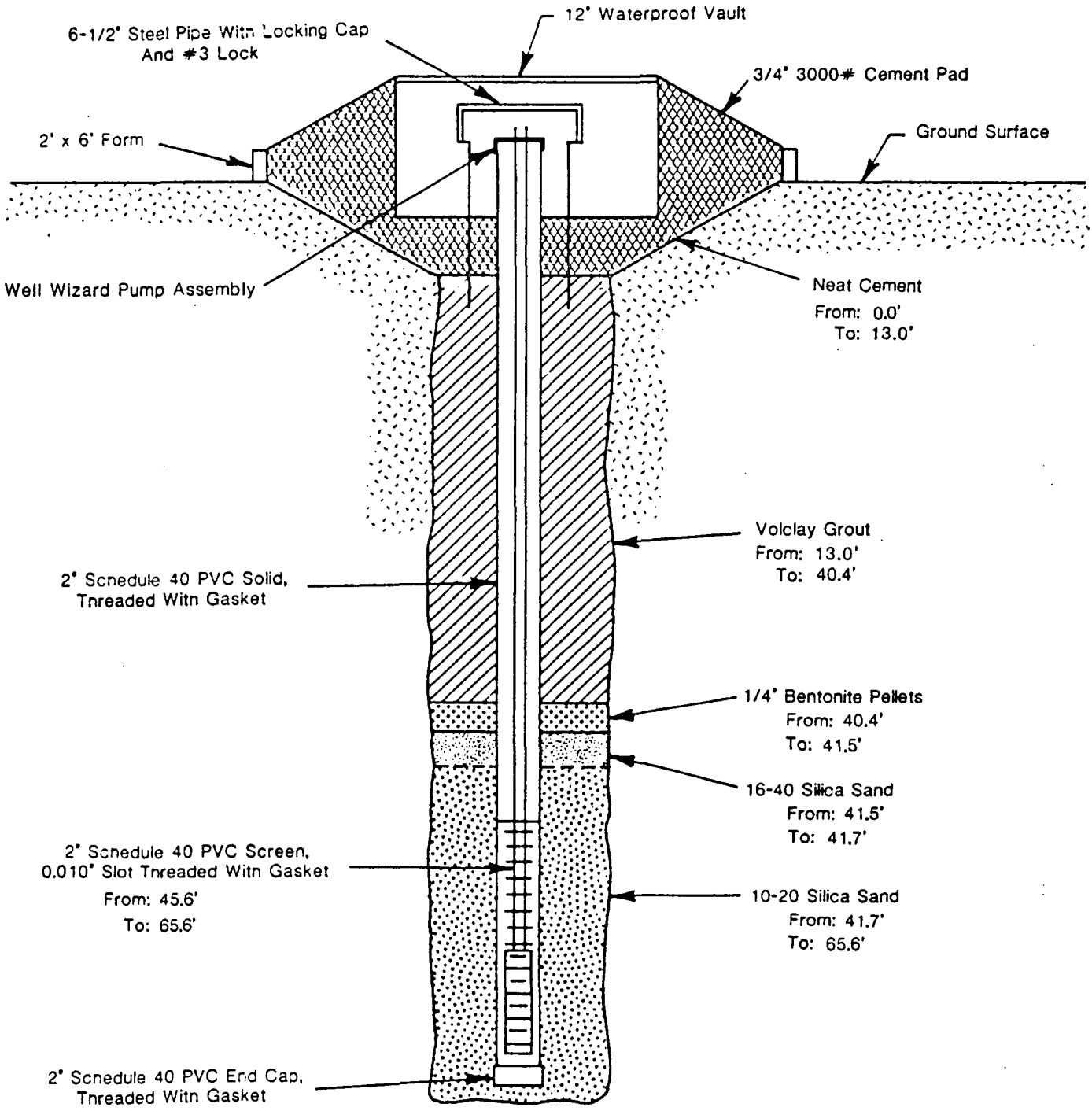
ALL FOOTAGES FROM GROUND SURFACE

PRELIMINARY
Subject to revision

Client:	Transwestern Pipeline Compressor Station No. 5 Thoreau, NM	**Drilling Contractor:**	Stewart Brothers Grants, NM
Boring No.:	5-15B	**Drilling Method:**	7.5-inch O.D. Hollow Stem Auger
Rig Type:	Failing F-10 WT	**Drilling Fluids:**	None
Date Started:	6/29/90	**Total Depth Drilled:**	65.6 ft
Date Completed:	6/29/90		

Depth Interval (ft)	Material	Description
0 - 8	Sand	Silty, fine- to very fine-grained, dry reddish brown (5 YR 5/4).
8 - 11	Sand	Silty, fine- to very fine-grained, dry light brown (7.5 YR 6/4).
11 - 24	Sand	Silty, medium- to fine-grained, with sandy silt/clay interbeds, traces of dampness, reddish brown (5 YR 5/4).
24 - 25	Gravel	Sandy, coarse to fine gravels, caliche coatings.
25 - 39	Sand	Silty, medium- to fine-grained, dry, damp from 33 ft to 39 ft, reddish brown, becomes redder from 36 ft to 39 ft.
39 - 47	Gravel	Sandy, composed of red sandstones, gray limestones and light grayish brown sandstones, to 1.5-inch diameter, dry, equidimensional, subangular to subrounded. Sand interbeds at 42 to 43 ft and 43.5 to 44 ft.
47 - 60	Sandy Clay/ Clayey Sand	Sand is fine- to course-grained, traces of fine gravel, damp to moist, dark reddish brown (5 YR 3/4).
60 - 64	Clay	Heavily weathered Chine Formation, fractured, no reduction spots, damp, saturated medium-grained sand, red.
64 - 65.6	Clay/Claystone	Fractured claystone, damp, no reduction spots.

PRELIMINARY
Subject to revision



WELL #: 5-15B

DATE DRILLED: 6/29/90

TOTAL DEPTH: 65.55' (taped)

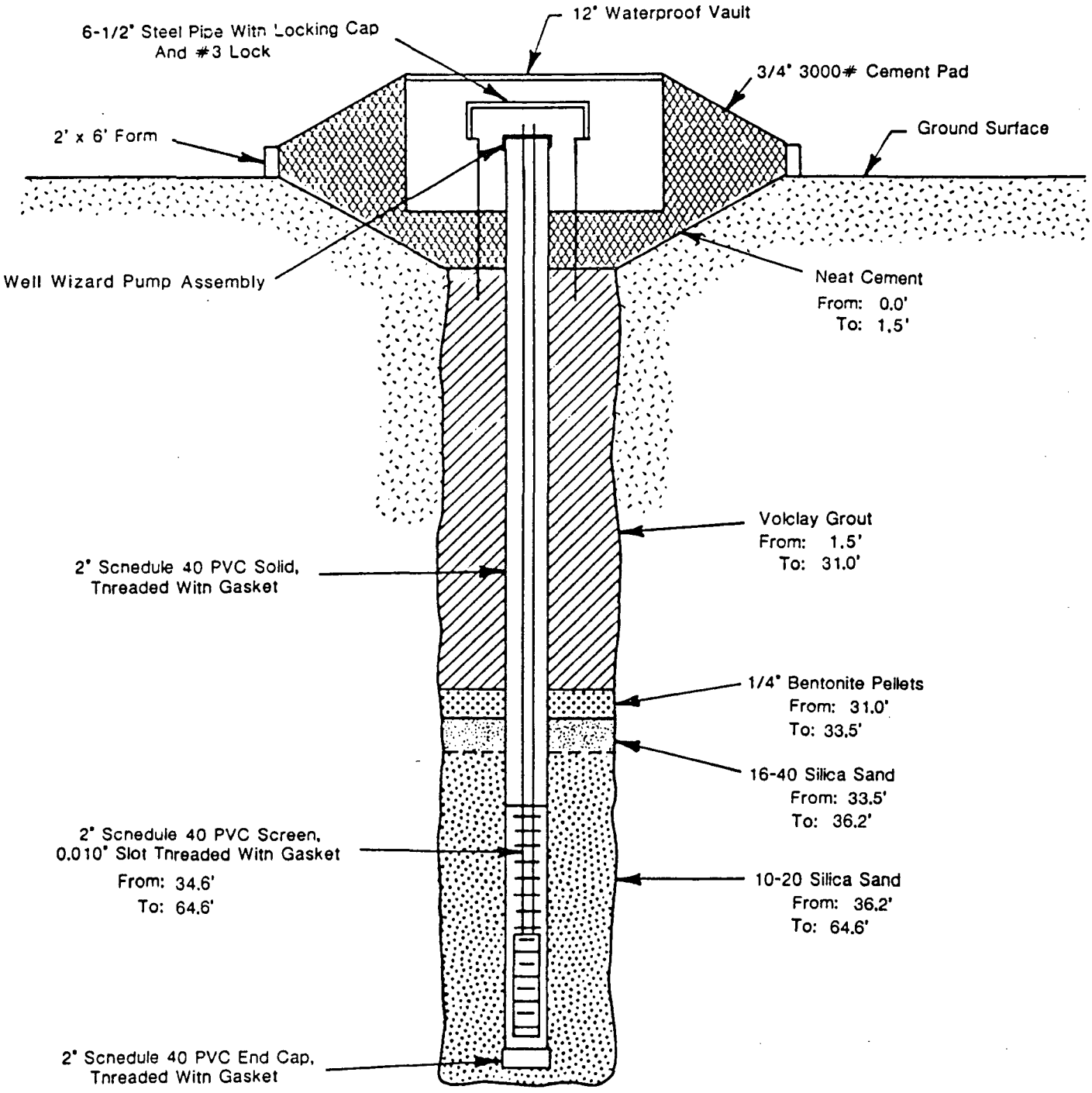
ALL FOOTAGES FROM GROUND SURFACE

PRELIMINARY
Subject to revision

Client:	Transwestern Pipeline Compressor Station No. 5 Thoreau, NM	**Drilling Contractor:**	Western Technologies, Inc. Albuquerque, NM
Boring No.:	5-16B	**Drilling Method:**	7.5-inch O.D. Hollow Stem Auger
Rig Type:	Failing F-10 WT	**Drilling Fluids:**	None
Date Started:	7/5/90	**Total Depth Drilled:**	64.6 ft
Date Completed:	7/5/90		

Depth Interval (ft)	Material	Description
0 - 7	Sand	Silty, fine- to very fine-grained, light reddish brown (5 YR 6/4), dry at surface. Trace silt/clay interbeds and very fine to fine gravel.
7 - 12	Sand	Silty, fine- to very fine-grained, brown to reddish brown, trace damp, trace silt/clay interbeds.
12 - 15	Sand	Silty, fine- to very fine-grained, light reddish brown to reddish brown, moderate to well sorted, and rounded grains.
15 - 24	Silt	Sandy, sand is fine- to medium-grained, brown, damp, moderately sorted, subrounded.
24 - 28.5	Sand	Silty, fine- to very fine-grained, slightly damp, trace fine gravel, moderately sorted, 3-inch thick gravel bed at 28 ft.
28.5 - 36	Sand	Locally silty, fine- to very fine-grained, light yellow brown and reddish brown, trace fine to medium gravel, gravel interbeds at 34 ft and 36 ft. Gravel is fine to medium, mixed lithology with calcite coatings, rounded to subrounded to 1.5-inch average, 0.5-inch diameter.
36 - 40	Sand	Silty, medium- to fine-grained, traces of fine gravel, reddish brown, moderately sorted, subrounded to subangular.
40 - 45	Gravel	Silty and sandy, to 1-inch diameter, average 0.5-inch diameter, dominantly limestone, slightly damp.
45 ≈ 48	Clay/Silt	Sandy, damp, dark reddish brown (5 YR 3/4).
≈48 - 61	Sandy Clay/ Clayey Sand	Sand is very fine- to medium-grained, clay is plastic, damp to moist, reddish brown (5 YR 5/4).
61 ≈ 64	Clay	Probable top of weathered Chinle Formation. Sandy, with surface gravel, plastic, red.
≈64 - 65	Claystone?	Unweathered Chinle Formation, sandy red with light gray reduction spots. Strong mercaptan-like odor in sample at 64 to 65 ft.

PRELIMINARY
Subject to revision



WELL #: 5-16B

DATE DRILLED: 7/5/90

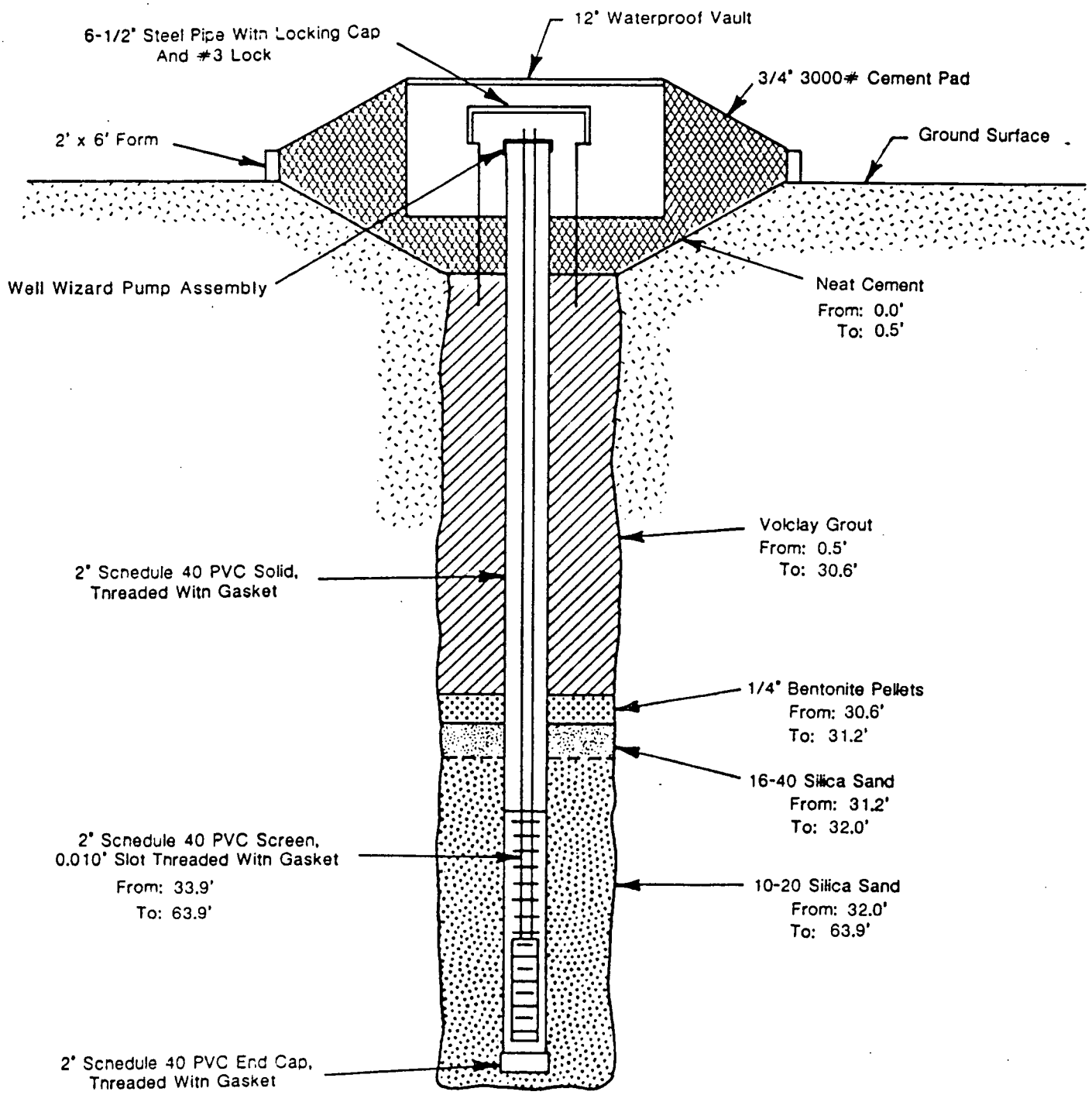
TOTAL DEPTH: 64.6' (taped)

ALL FOOTAGES FROM GROUND SURFACE

PRELIMINARY
Subject to revision

Client:	Transwestern Pipeline Compressor Station No. 5 Thoreau, NM	**Drilling Contractor:**	Western Technologies, Inc. Albuquerque, NM
Boring No.:	5-17B	**Drilling Method:**	7.5-inch O.D. Hollow Stem Auger
Rig Type:	Failing F-10 WT	**Drilling Fluids:**	None
Date Started:	7/3/90	**Total Depth Drilled:**	63.9 ft
Date Completed:	7/3/90		

Depth Interval (ft)	Material	Description
0 - 7	Sand	Silty, fine- to very fine-grained, light reddish brown dry.
7 - 15	Sand	Silty, fine- to medium-grained, silty interbeds at 12 ft, dark reddish brown.
15 - 23	Sand	Silty, medium- to coarse-grained, moderately sorted, trace fine gravels of mixed lithology, gravels are dry, sand is damp, reddish brown to brown.
23 - 25	Gravel	Gravel to cobble zone. No cuttings return.
25 - 27	Sand	Silty, medium- to coarse-grained, reddish brown to brown.
27 - 31	Gravel	0.25-inch to 1.5-inch diameter, mixed lithology, caliche coatings.
31 - 34	Clay/Silt	Sandy, stiff, sand is medium- to fine-grained, moderately sorted, slightly damp, dark reddish brown. May be silty sand.
34 - 39	Sand	Trace to some silt, medium- to coarse-grained, dark reddish brown, damp.
39 - 42	Sand	Trace to some plastic clay, fine- to medium-grained, moist to very moist, dark reddish brown, gravel/cobble zone 43 to 44 ft.
44 - 45	Sand?	No cuttings return.
45 - 51.5	Clay	Sandy, stiff, sand is fine- to very fine-grained, clay is moist to very moist, dark reddish brown to red.
51.5 - 56	Sand?	No cuttings return
56 - 57	Clay	Hard, dark, reddish brown to red, weathered Chinle Formation.
57 - 63.9	Claystone	Chinle Formation, sandy claystone, thin bedded, light gray reduction spots, red.



WELL #: 5-17B

DATE DRILLED: 7/3/90

TOTAL DEPTH: 63.9' (taped)

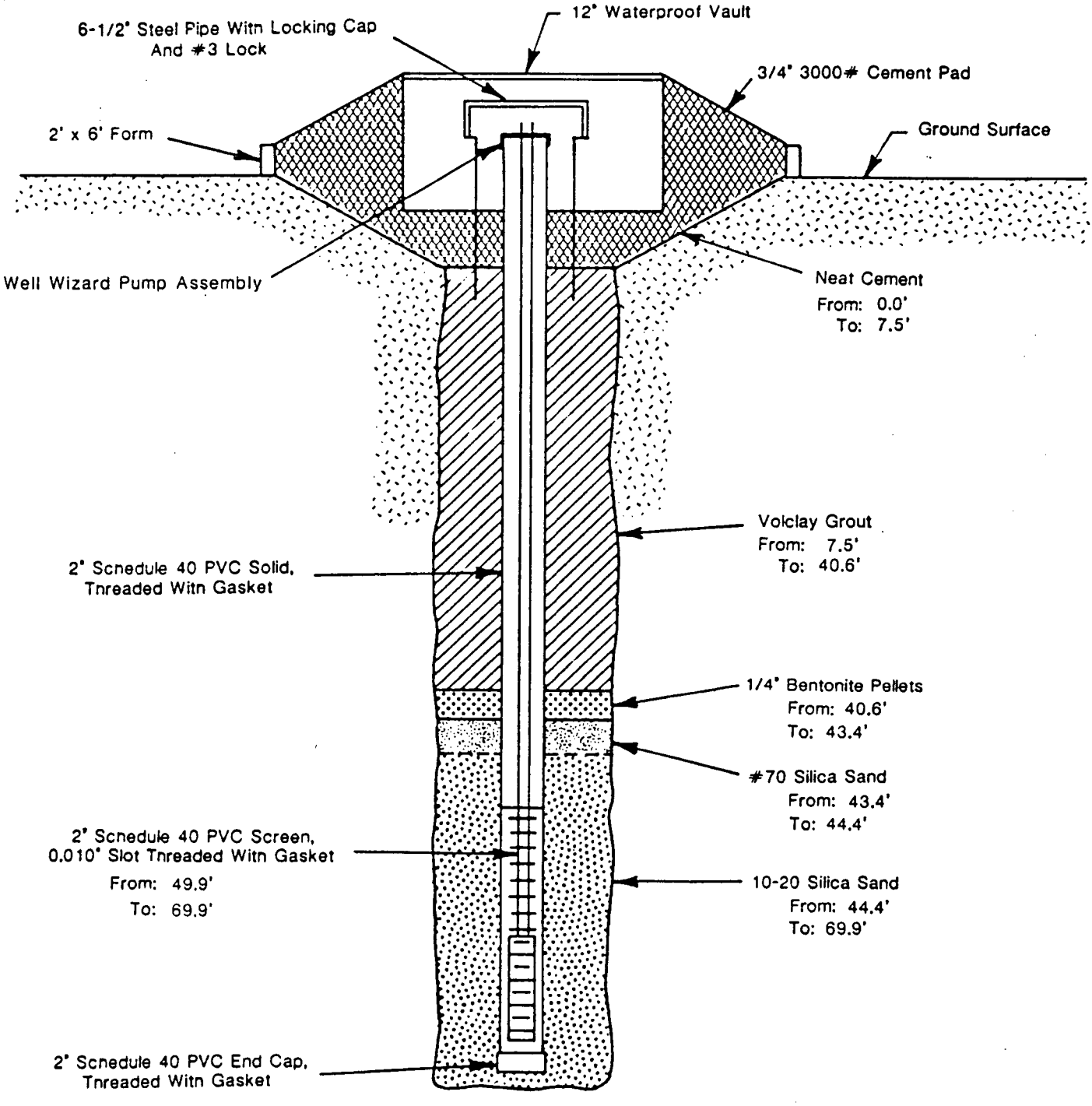
ALL FOOTAGES FROM GROUND SURFACE

PRELIMINARY
Subject to revision

Client:	Transwestern Pipeline Compressor Station No. 5 Thoreau, NM	**Drilling Contractor:**	Western Technologies, Inc. Albuquerque, NM
Boring No.:	5-18B	**Drilling Method:**	7.5-inch O.D. Hollow Stem Auger
Rig Type:	Failing F-10 WT	**Drilling Fluids:**	None
Date Started:	7/9/90	**Total Depth Drilled:**	69.9 ft
Date Completed:	7/9/90		

Depth Interval (ft)	Material	Description
0 - 3	Sand	Silty, fine- to very fine-grained, dry, reddish brown (5 YR 5/4).
3 - 5	Silt	Sandy, reddish brown, dry.
5 - 8	Sand	Silty, fine- to very fine-grained, reddish brown.
8 ≈ 10	Gravel	Sandy and silty, fine gravel, rounded.
10 ≈ 13	Silt?	Sandy, caliche fracture fill, strong brown (7.5 YR 5/6) and reddish brown (5 YR 5/4).
13 - 16	Sand	Silty, fine- to medium-grained, moderate to well sorted, silty interbeds, reddish brown.
16 - 17	Silt	Sandy, dry, brown (7.5 YR 5/4).
17 - 26	Sand	Silty, very fine- to medium-grained, reddish brown, slightly damp.
26 - 29	Silt/Clay	Sandy, grayish brown (10 YR 5/2) hard, dry.
29 - 36	Sand	Silty, very fine-grained, dry, reddish brown.
36 - 37.5	Gravel	Angular to subrounded, mixed lithology, caliche coatings.
37.5 - 44	Sand	Silty, very fine-grained, moderate to well sorted, dry, reddish brown, becomes moist and medium-grained at 42 ft.
44 - 53	Clay/Silt	Sandy, with sand interbeds, damp to dry, dark reddish brown (5 YR 3/4).
53 - 60	?	No cuttings return. Sand contact not detected.
60 - 60.5	Sand	Very fine-grained, saturated, running, reddish brown.
60.5 - 66	Clay	Weathered Chinle Formation, sandy, some fine gravel, damp.
66 - 69.9	Claystone	Unweathered Chinle Formation, sandy red claystone with light gray reduction spots.

PRELIMINARY
Subject to revision



WELL #: 5-18B

DATE DRILLED: 7/9/90

TOTAL DEPTH: 69.9' (taped)

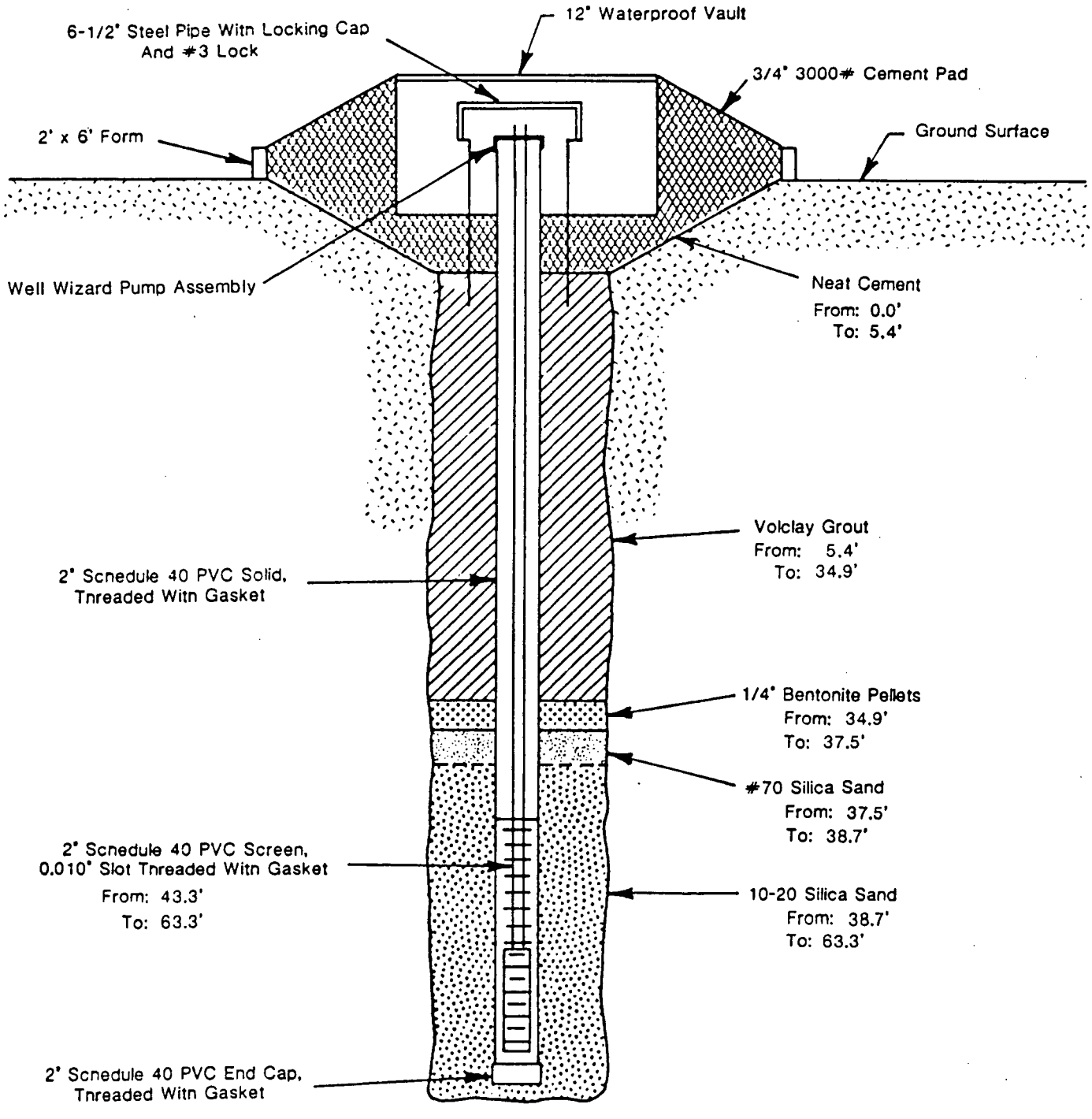
ALL FOOTAGES FROM GROUND SURFACE

PRELIMINARY
Subject to revision

Client:	Transwestern Pipeline Compressor Station No. 5 Thoreau, NM	**Drilling Contractor:**	Western Technologies, Inc. Albuquerque, NM
Boring No.:	5-19B	**Drilling Method:**	7.5-inch O.D. Hollow Stem Auger
Rig Type:	Failing F-10 WT	**Drilling Fluids:**	None
Date Started:	7/10/90	**Total Depth Drilled:**	63.3 ft
Date Completed:	7/10/90		

Depth Interval (ft)	Material	Description
0 - 25	Sand	Silty, fine- to very fine-grained, dry to slightly damp, silty interbeds, traces of gravel to 1.25-inch.
25 - 38	Sand	Silty, fine- to very fine-grained, dry silty interbeds, no gravels, reddish brown (5 YR 5/4).
38 - 39.5	Gravel	No cuttings return.
39.5 - 46	Sand	Silty, fine- to very fine-grained, dry silty interbeds, reddish brown (5 YR 5/4).
46 - 48	Gravel	To 1-inch diameter, average 0.5-inch diameter, subangular to subrounded, mixed lithology, dry, caliche coatings.
48 - 52.5	Sand	Silty, fine-grained, dry, silty interbeds, reddish brown (5 YR 5/4).
52.5 - 60.5	Clay/Silt	Sandy, plastic, moist dark reddish brown.
60.5 - 63	Clay	Weathered Chinle Formation
63 - 63.3	Claystone	Chinle Formation, claystone, light gray reduction spots, red, dry.

PRELIMINARY
Subject to revision



WELL #: 5-19B

DATE DRILLED: 7/10/90

TOTAL DEPTH: 63.3' (taped)

ALL FOOTAGES FROM GROUND SURFACE

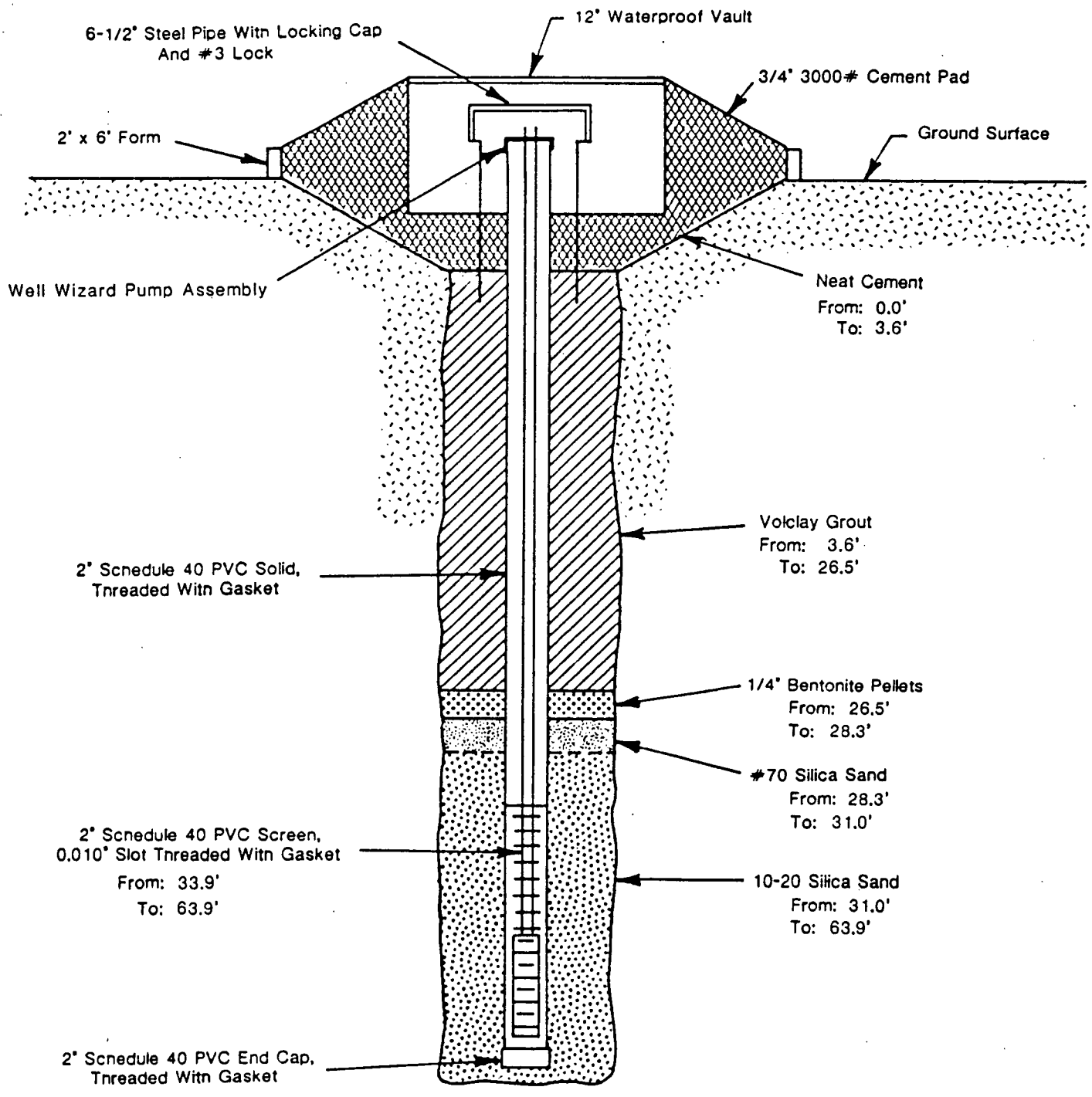
PRELIMINARY
Subject to revision

Client:	Transwestern Pipeline Compressor Station No. 5 Thoreau, NM	**Drilling Contractor:**	Western Technologies, Inc. Albuquerque, NM
Boring No.:	5-20B	**Drilling Method:**	7.5-inch O.D. Hollow Stem Auger
Rig Type:	Failing F-10 WT	**Drilling Fluids:**	None
Date Started:	7/11/90	**Total Depth Drilled:**	64.0 ft
Date Completed:	7/11/90		

Depth Interval (ft)	Material	Description
0 - 10	Sand	Silty, fine- to very fine-grained, dry, silty interbeds, trace to some gravel, reddish brown (5 YR 5/4).
10 - 11	Sand	Silty, fine- to very fine-grained, dry, brown (7.5 YR 4/4).
11 - 13.5	Sand	Silty, fine-grained, dry reddish brown (5 YR 5/4).
13.5 - 16	Clay/Silt	Sandy, sand is medium- to fine-grained, damp, trace to some fine gravel, hard, reddish brown.
16 ≈ 17	Caliche?	Possible caliche horizon, silty sand, fine- to very fine-grained, light gray to light brown.
≈17 - 30	Sand	Silty, fine-grained, dry, damp from 20 to 23 ft, reddish brown.
30 - 35	Sand	Silty, fine-grained, dry, reddish brown, more silty/clay from 17 to 30 ft.
35 - 41.5	Gravel	Sandy and silty, to 1.5-inch diameter, subangular to subrounded, sand interbed from 38 to 39 ft.
41.5 - 51	Sand	Silty, fine-grained, dry to damp, reddish brown.
51 - 61.5	Sandy Clay	Fine-grained sands, moist plastic, probably top of water, dark reddish brown (5 YR 3/4).
61.5 - 62.5	Clay	Weathered Chinle Formation, sandy, wet, trace fine gravel, red (10 R 4/6).
62.5 - 64	Clay	Chinle Formation, sandy, fine-grained, dry light gray reduction spots, bedding planes, dusky red (5 R 3/4).

NOTE: While running tool in auger at 60 ft, a vapor was displaced that gave an OVA meter reading of 90 ppm total hydrocarbon.

PRELIMINARY
Subject to revision



WELL #: 5-20B

DATE DRILLED: 7/11/90

TOTAL DEPTH: 63.9 (taped)

ALL FOOTAGES FROM GROUND SURFACE

PRELIMINARY
Subject to revision

Client:	Transwestern Pipeline Compressor Station No. 5 Thoreau, NM	**Drilling Contractor:**	Stewart Brothers Grants, NM
Boring No.:	5-21B	**Drilling Method:**	7.5-inch O.D. Hollow Stem Auger
Rig Type:	Failing F-10 WT	**Drilling Fluids:**	None
Date Started:	9/19/90	**Total Depth Drilled:**	26.0 ft
Date Completed:	9/19/90		

Depth Interval (ft)	Material	Description
0 - 5	Sand	Silty, fine-grained, damp, reddish brown (2.5 YR 5/4), becomes dry at 1 ft, becomes light yellowish brown (10 YR 6/4) from 3 to 4.5 ft.
5 - 12	Sand	Silty, medium- to fine-grained, moderately sorted, slightly damp, reddish brown (2.5 YR 5/4). At 10 ft, possible detrital organics; at 5 ft, BC = 5, 6; at 10 ft, BC = 2, 3.
12 - 20	Sand	Trace silt, medium- to coarse-grained, moderately sorted, traces of fine gravel, damp, silt/clay interbeds, reddish brown (2.5 YR 5/4). At 20 ft, BC = 8, 12.
20 - 25	Sand	Trace silt, medium- to coarse-grained, trace to some sandstone cobbles to > 2-inch diameter (sandstone cobbles are friable, white, possibly bleached), reddish brown (2.5 YR 4/4). At 25 ft, BC = 9, 18. OVA meter > 100 ppm total hydrocarbon in workspace.
25 - 26	Gravel/Cobble	Strong solvent odor broke through respirator cartridges. OVA meter in headspace sample > 1000 ppm total hydrocarbon. Borehole abandoned at 26 ft.

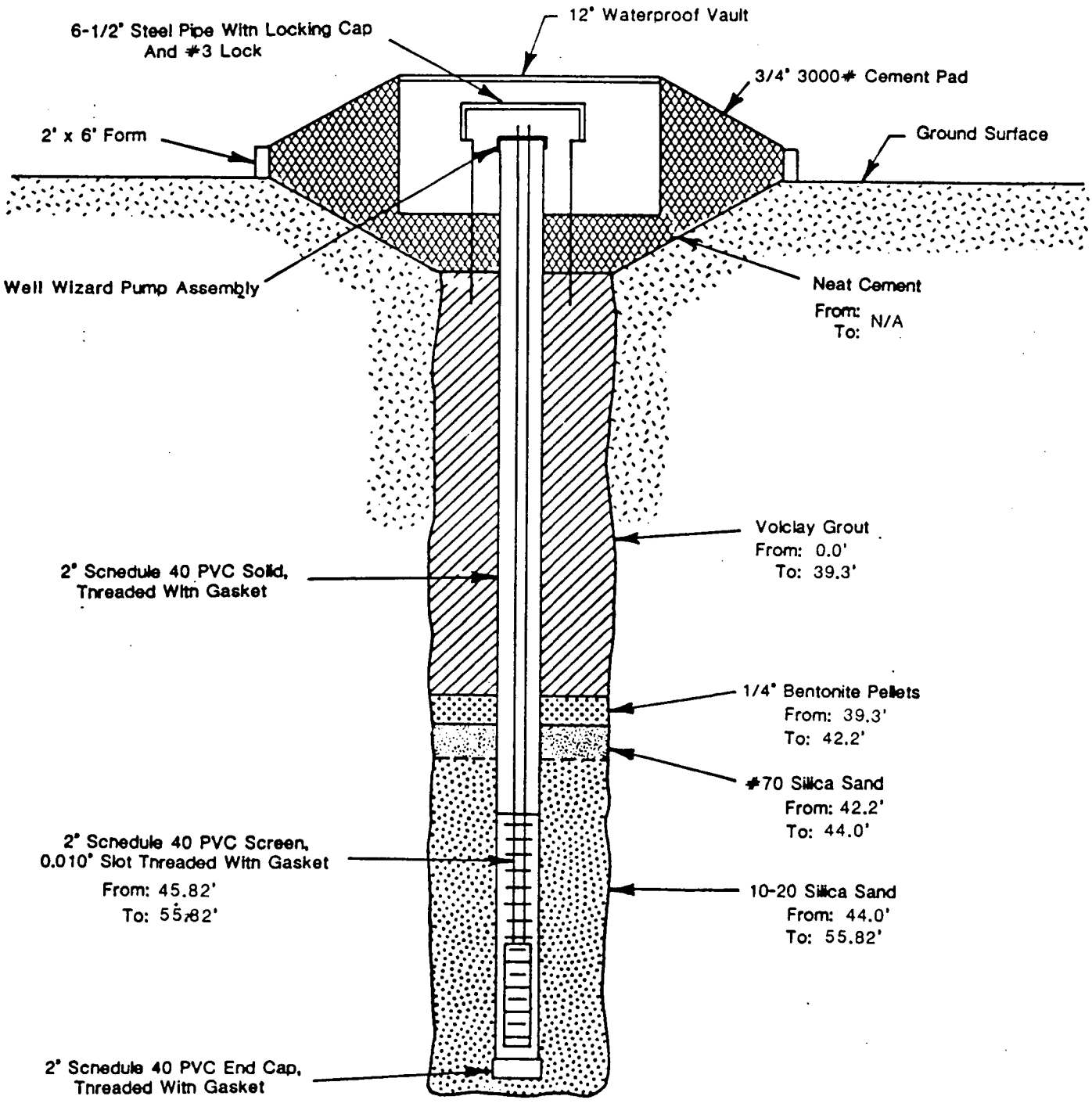
Client:	Transwestern Pipeline Compressor Station No. 5 Thoreau, NM	**Drilling Contractor:**	Stewart Brothers Grants, NM
Boring No.:	5-22B	**Drilling Method:**	7.5-inch O.D. Hollow Stem Auger
Rig Type:	Failing F-10 WT	**Drilling Fluids:**	None
Date Started:	9/13/90	**Total Depth Drilled:**	55.0 ft
Date Completed:	9/13/90		

Depth Interval (ft)	Material	Description
0 - 0.5	Sand	Silty, very fine-grained, dry, light brown (7.5 YR 6.4).
0.5 - 8	Sand	Silty, or sandy silt, medium- to fine-grained, with thin clayey/silty interbeds, damp to slightly damp, sand is dark reddish brown (5 YR 3/3?), clays/silts are dark brown (7.5 YR 3/2). At 5 ft, BC = 4, 5.
8 - 10	Sand	Silty, medium- to fine-grained, trace fine gravels, slightly damp to dry, reddish brown (5 YR 4?/4. At 10 ft, BC = 6, 11.
10 - 14	Gravel	No cuttings return.
14 - 15	Sand	Silty, medium- to fine-grained, traces of fine gravel, slightly damp, reddish brown (5 YR 4?/4). From 17 to 18 ft, OVA meter = 70 ppm on cuttings.
15 - 18	Gravel	Sandy, to 1-inch diameter, subangular to subrounded, gravel is caliche coated, dry.
18 - 19.5	Sand	Slightly silty, traces of fine gravel, damp, reddish brown (5 YR 4?/4). At 20 ft, BC = 6, 13, OVA = 35 ppm total hydrocarbons from 20 to 25 ft. At 25 ft, BC = 3, 6, OVA = 146 ppm from 25 to 30 ft. At 30 ft, BC = 12, 28.
19.5 - 31	Gravel	Sandy, to 1.5-inch diameter, average 0.5-inch to 0.75-inch diameter, angular to subangular, dominantly limestone, caliche coatings, dry, sand is silty, medium- to coarse-grained, reddish brown (5 YR 5/4).
31 - 34	Sand	Silty, medium-grained, trace gravel, damp to dry, reddish brown (5 YR 5/4).
34 - 40	Clay	Sandy, with thin sandy interbeds and traces of limestone gravel to 0.5-inch diameter, clay is slightly damp, contains fragments of weathered Chinle Formation claystones, red (10 R 4/6) to dark red (10 R 3/6), sands are silty, medium- to fine-grained, red (10 R 3/6). From 35 to 40 ft, OVA meter = 15 ppm total hydrocarbons. At 35 ft, BC = 8, 13; at 40 ft, BC = 21, 25.

PRELIMINARY
Subject to revision

Boring No.: 5-22B (continued)

Depth Interval (ft)	Material	Description
40 - 45	Sand	Silty, medium- to fine-grained, traces of sandstone gravel to 0.5-inch diameter, damp, reddish brown (5 YR 5/4). From 40 to 45 ft, OVA meter = 5 ppm total hydrocarbons; at 45 ft, BC = 19, 25.
45 - 48	Sand	Traces of silt, fine- to very fine-grained, moderate to well sorted, saturated and running, reddish brown (5 YR 5/4). At 50 ft, BC = 12, 25.
48 - 55	Claystone	Chinle Formation, sandy, dry, dark red (10 R 3/6), with very light gray (N8) reduction spots.



WELL #: 5-22B

DATE DRILLED: 9/13 & 18/90

TOTAL DEPTH: 55.82' (taped)

ALL FOOTAGES FROM GROUND SURFACE

PRELIMINARY
Subject to revision

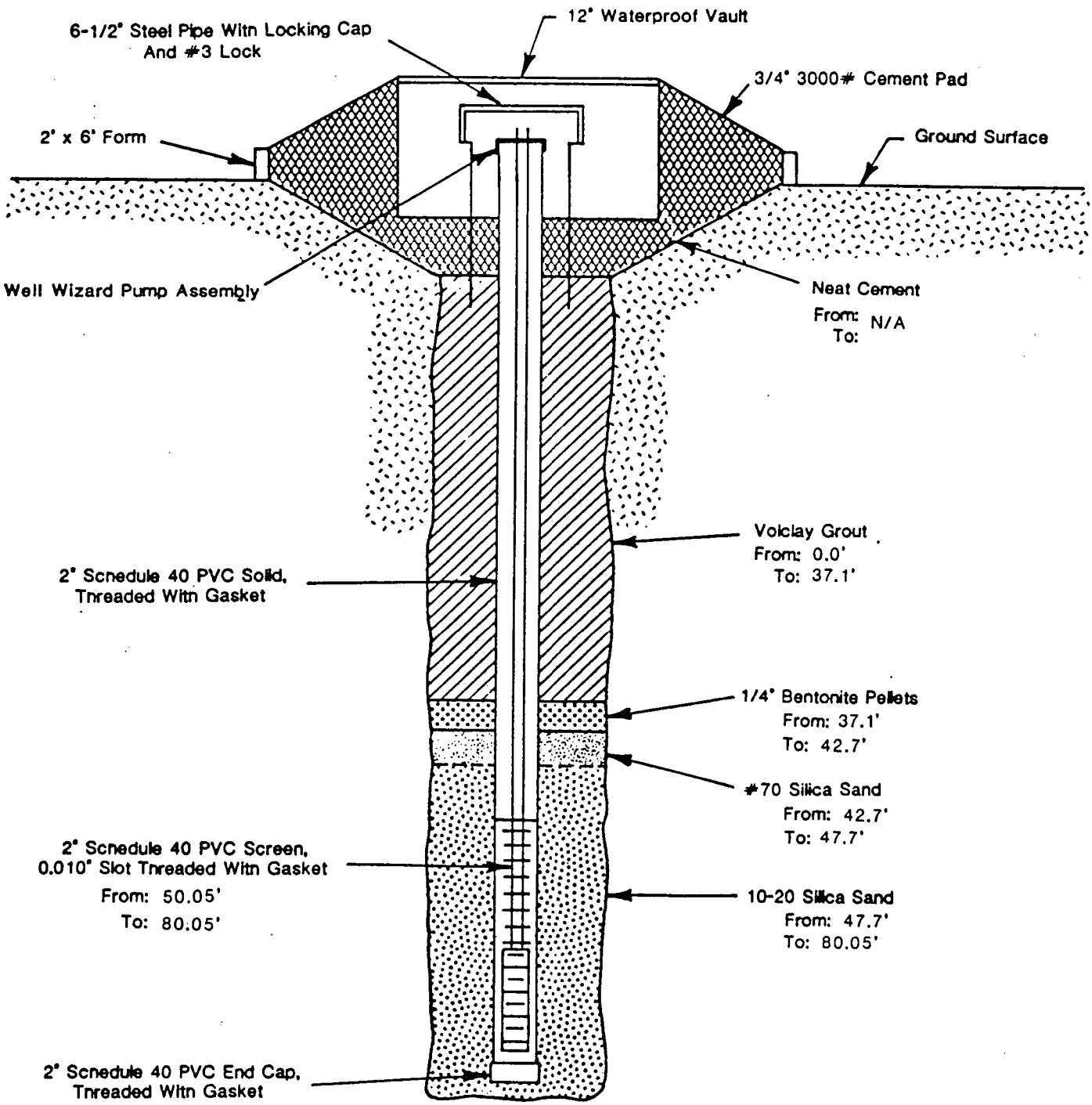
Client:	Transwestern Pipeline Compressor Station No. 5 Thoreau, NM	**Drilling Contractor:**	Stewart Brothers Grants, NM
Boring No.:	5-23B	**Drilling Method:**	7.5-inch O.D. Hollow Stem Auger
Rig Type:	Failing F-10 WT	**Drilling Fluids:**	None
Date Started:	9/20/90	**Total Depth Drilled:**	80.1 ft
Date Completed:	9/21/90		

Depth Interval (ft)	Material	Description
0 - 4	Sand	Silty, fine- to very fine-grained, damp to slightly damp, reddish brown (5 YR 5/4).
4 - 4.5	Sand	Silty, fine-grained, slightly damp to dry, one gravel clast to 3.5-inch diameter, some roots, reddish brown (5 YR 5/4).
4.5 - 7.5	Sand	Silty, fine-grained, dry to slightly moist, brown (7.5 YR 4/4?).
7.5 - 9.5	Sand	Trace to some silt, fine- to very fine-grained, some fine gravels, at 10 ft, dark reddish brown (2.5 YR 3?/4). OVA meter = 1.5 ppm total hydrocarbon.
9.5 - 13	Sand	Silty, gravelly (15 to 25%), gravels are subangular to subrounded and composed of fine-grained sandstone, sand is fine-grained, moderately to well sorted, slightly damp to dry, reddish brown (5 YR 4?/4).
13 - 13.5	Sand	Silty/clayey, fine-grained, slightly damp, dark reddish brown (2.5 YR 3?/4) to reddish brown (5 YR 4?/4).
13.5 - 14	Sand	Silty, fine-grained, moderately to well sorted, slightly damp, reddish brown (5 YR 4?/4).
14 - 15	Sand	Clayey, very fine-grained, trace to some medium-grained sand, damp, dark reddish brown (2.5 YR 3/4).
15 ≈ 16	Sand	Silty, fine- to very fine-grained, damp, reddish brown (5 YR 4/4).
≈16 - 18	Sand	Silty, moderately to well sorted, fine-grained, trace to some gravel (caliche coated?), damp, reddish brown (2.5 YR 3?/4).
18 - 19.5	Sand	Silty, fine-grained possibly thin-bedded, slightly damp, gravelly to 1-inch diameter at 21 ft, reddish brown (5 YR 4/4) to dark reddish brown (2.5 YR 3/4). At 20 ft, OVA meter = 10 ppm total hydrocarbon.
19.5 - 21	Sand	Silty to slightly silty, fine- to very fine-grained, moderately to well sorted, slightly damp, reddish brown (5 YR 4/4) with grayish zone from 26 to 27 ft. At 25 ft, OVA meter = 20 ppm total hydrocarbon.

PRELIMINARY
Subject to revision

Boring No.: 5-23B (continued)

Depth Interval (ft)	Material	Description
21 - 29	Gravel/Cobble	Sandy and silty, to 3-inch diameter, subangular to subrounded, composed of limestone and sandstone. At 30 ft and 50 ft, OVA meter = 0 ppm total hydrocarbon; at 35 ft, BC = refusal.
38.5 - 50.5	Sand	Silty, fine- to very fine-grained, slightly moist to dry, some caliche streaks, trace to some fine to coarse gravel from 45 to 50 ft, gravel is subangular to subrounded, reddish brown (5 YR 4/4). At 40 ft, BC = 15, 30; OVA meter = 0 ppm total hydrocarbon. At 45 ft, BC = 10, 15; OVA meter = 0 ppm. At 50 ft, BC = 6, 15; OVA meter = 0 ppm.
50.5 - 55.5	Sand/Silt	Clayey, sand is fine- to very fine-grained, traces of coarse sand and fine gravels, moist, reddish brown (5 YR 4/4). At 55 ft, OVA meter = 0 ppm total hydrocarbon.
55.5 ≈ 57	Sand	Silty, fine- to very fine-grained, saturated, trace cobbles, some medium-grained sand, reddish brown (5 YR 4/4). OVA meter = 0 ppm total hydrocarbons.
≈57 ≈ 74.5	Sand	Silty and clayey, fine- to very fine-grained, very moist to saturated, trace to some fine gravel at 65 ft, gravel is light gray sandstone. At 60, 65, and 70 ft, OVA meter = 0 ppm total hydrocarbons.
74.5 - 77.5	Clay	Weathered Chinle Formation, sandy with thin interbeds of silty/clayey sand and sandstone, slightly damp, red (10 R 4/6) to reddish brown (2.6 YR 4/4).
77.5 - 80.05	Claystone	Unweathered Chinle Formation, slightly sandy, slightly moist, thin laminates to beds of 2-inch thickness, fractured with carbon on fracture planes, red (10 R 4/6) with light gray (5 YR 7/1) reduction spots.



WELL #: 5-23B

DATE DRILLED: 9/20 & 21/90

TOTAL DEPTH: 80.05' (taped)

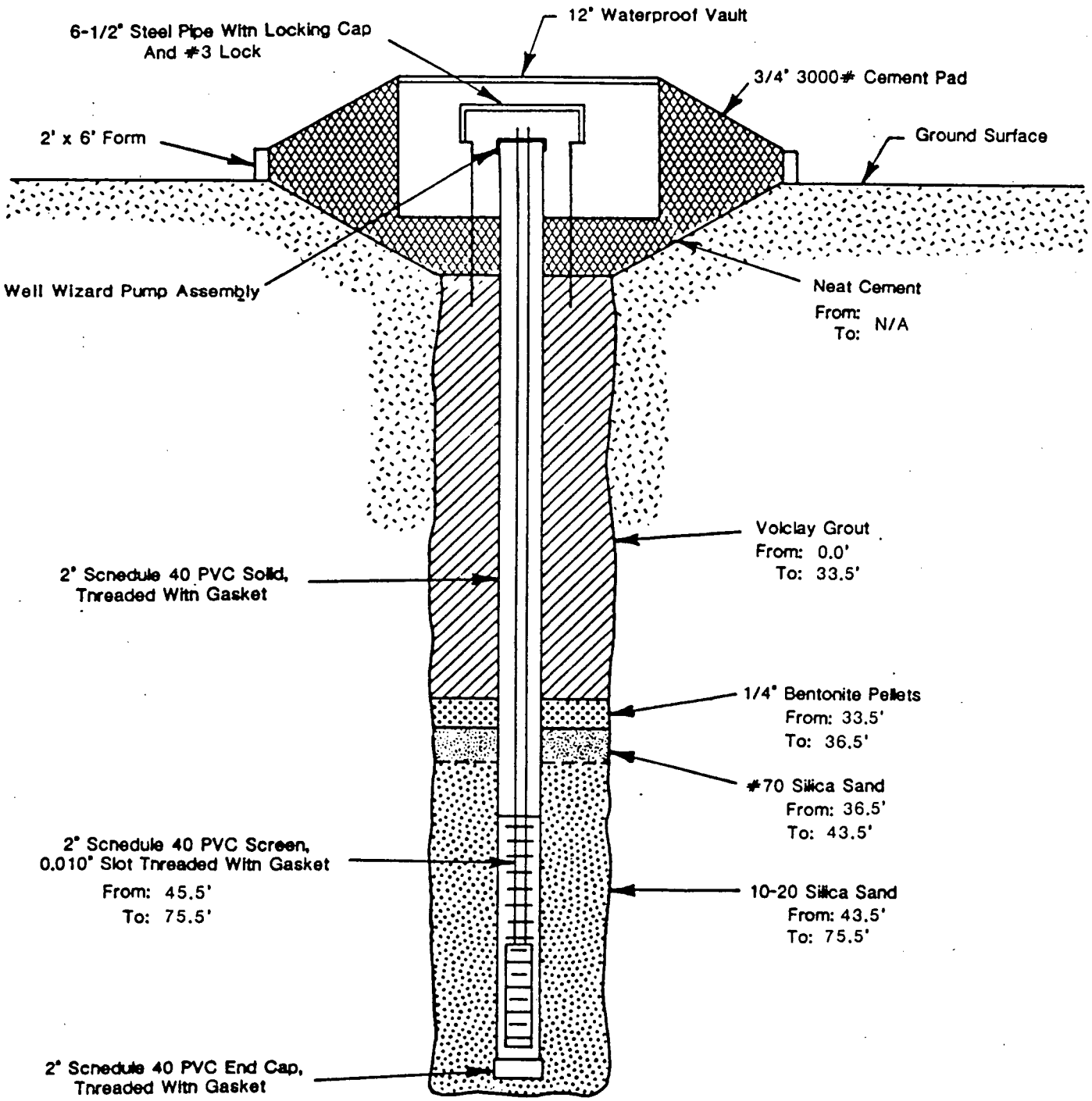
ALL FOOTAGES FROM GROUND SURFACE

PRELIMINARY
Subject to revision

Client:	Transwestern Pipeline Compressor Station No. 5 Thoreau, NM	**Drilling Contractor:**	Stewart Brothers Grants, NM
Boring No.:	5-24B	**Drilling Method:**	7.5-inch O.D. Hollow Stem Auger
Rig Type:	Failing F-10 WT	**Drilling Fluids:**	None
Date Started:	9/24/90	**Total Depth Drilled:**	75.7 ft
Date Completed:	9/25/90		

Depth Interval (ft)	Material	Description
0 - 5	Sand	Silty, very fine- to fine-grained, dry, light reddish brown (2.5 YR 6/4).
5 - 10	Sand	Silty, fine- to very fine-grained, slightly damp, light reddish brown (5 YR 6/4).
10 - 29	Sand	Silty, fine- to very fine-grained, slightly damp to dry, light reddish brown (5 YR 6/4) to reddish brown (2.5 YR 4/4).
29 - 35	Sand	Silty, and gravelly, fine- to very fine-grained, slightly damp to dry, reddish brown (2.5 YR 5/4), gravels are pebble to cobble size and dominantly gray limestone.
35 - 36	Sand	Silty, very fine-grained, slightly damp, with minor caliche stringers in fractures, light reddish brown (5 YR 4/4). At 35 ft, BC = 7, 17; OVA meter = 0 ppm total hydrocarbons.
36 - 40	Gravel	No cuttings return.
40 - 41	Sand	Silty, very fine-grained, slightly damp, with minor caliche stringers in fractures, light reddish brown (5 YR 4/4). At 40 ft, BC = 18, 40; OVA meter = 0 ppm total hydrocarbons.
41 - 50	Unknown	No cuttings return, water added. At 45 ft, BC = 15, 15; OVA meter = 0 ppm total hydrocarbons.
50 - 56	Sand	Silty/clayey, very fine-grained, damp, traces of calcite/caliche fracture fill, reddish brown (2.5 YR 4/4). At 50 ft, BC = 10, 16; OVA meter = 0 ppm total hydrocarbons. At 55 ft, BC = 7, 15; OVA meter = 0 ppm total hydrocarbons.
56 - 75	Sand	Silty/clayey, fine- to very fine-grained, traces of caliche, saturated, reddish brown (2.5 YR 4/4).
75 - 75.5	Claystone	Chinle Formation, slightly sandy, conchoidal/hackly fracture, dry to slightly damp, light gray (5 YR 7/1), reduction spots, red (10 R 4/6).

PRELIMINARY
Subject to revision



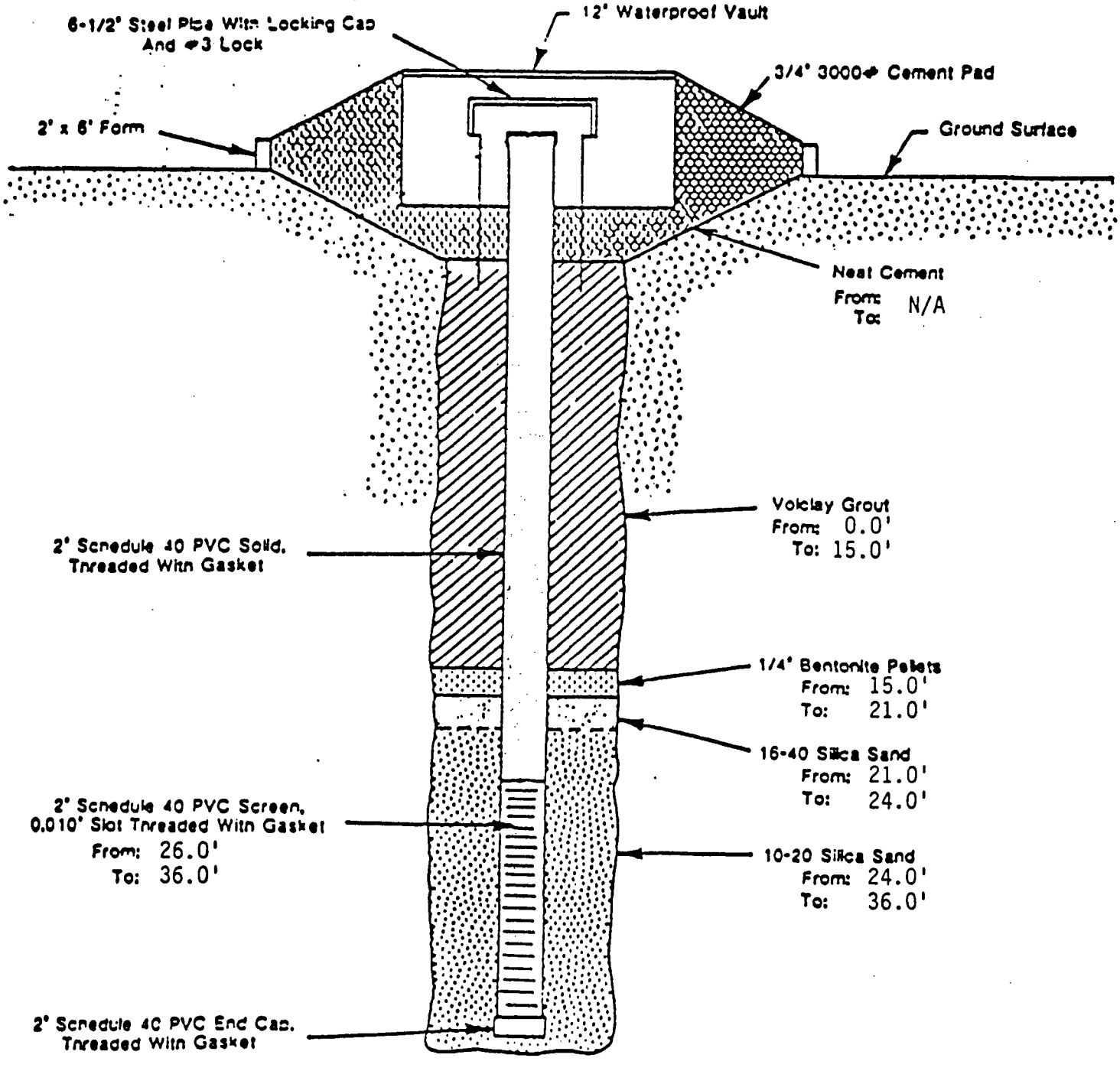
WELL #: 5-24B

DATE DRILLED: 9/24 & 25/90

TOTAL DEPTH: 75.5' (taped)

ALL FOOTAGES FROM GROUND SURFACE

PRELIMINARY
Subject to revision



WELL #: 5-25 B

DATE DRILLED: 12/6 & 7/90

TOTAL DEPTH: 36.0' (taped)

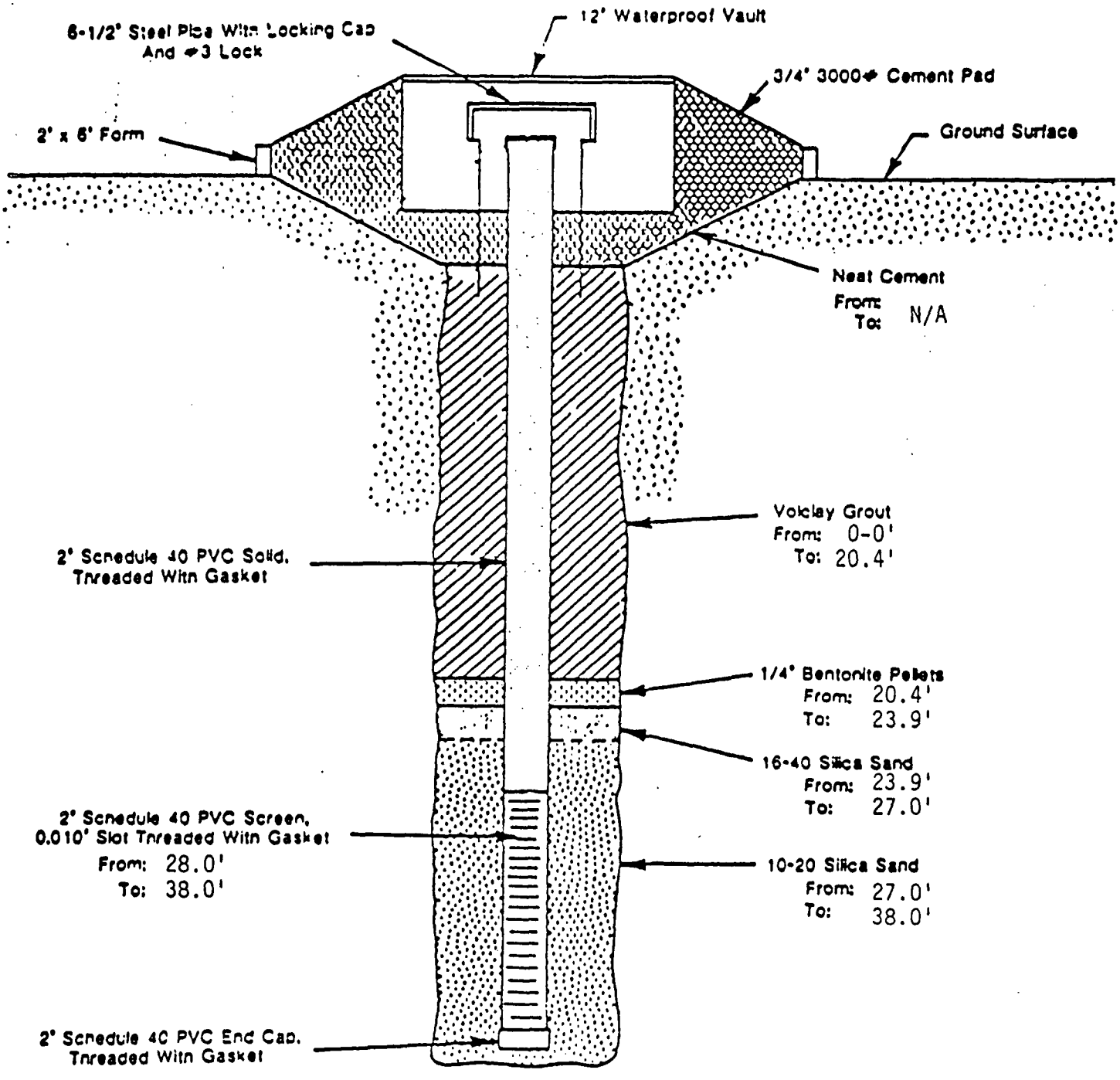
ALL FOOTAGES FROM GROUND SURFACE

PRELIMINARY
Subject to revision

Client:	Transwestern Pipeline Compressor Station No. 5 Thoreau, NM	**Drilling Contractor:**	Sergent, Hauskins, Beckwith Albuquerque, NM
		Drilling Method:	8.0-inch O.D. Hollow Stem Auger
Boring No.:	5-26B		
Rig Type:	CME-55	**Drilling Fluids:**	None
Date Started:	12/5/90	**Total Depth Drilled:**	38 ft
Date Completed:	12/6/90		

Depth Interval (ft)	Material	Description
0 - 5	Sand	Silty, fine- to very fine-grained, dry to slightly damp, reddish brown (2.5 YR 5/4) to light reddish brown (2.5 Yr 6/6). At 5 ft, BC = 7, 8.
5 - 15	Sand	Silty, fine- to very fine-grained, traces of caliche, traces of root fragments, unconsolidated, dry to slightly damp, yellowish red (5 YR 4/6). At 50 ft, BC = 7, 8.
15 - 20	Clay	Sandy, or clayey sand, sand is fine- to very fine-grained, trace to some caliche as veinlets, hard, reddish brown (2.5 YR 5/4). At 15 ft, BC = 9, 15; at 20 ft, BC = 12, 15.
20 - 28	Sand	Silty, fine- to very fine-grained, no caliche, unconsolidated, reddish brown (2.5 YR 5/4). At 22 ft, BC = 12, 15; at 24 ft, BC = 16, 21; at 26 ft, BC = 12, 40; at 28 ft, BC = 27, 66.
28 - 32	Sand	Silty, fine- to very fine-grained, traces of caliche as veinlets, slightly consolidated, dry, light reddish brown (2.5 YR 6/4). At 30 ft, BC = 42, 30; at 31 ft, OVA = 18 ppm total hydrocarbons.
32 - 33.5	Sand	Silty to very silty, fine- to very fine-grained, traces of caliche as veinlets, medium to fine gravelly zones ≈1-inch thick, slightly consolidated, dry to slightly damp, reddish brown (2.5 YR 5/4). At 32 ft, BC = 16, 35.
33.5 - 34	Gravel	To 1-inch diameter, average 0.4-inch diameter, rounded, dominantly limestone.
34 ≈ 37	Clay	Sandy, silty and gravelly, trace to some caliche as gravel coatings and veinlets, clay is composed of massive to blocky fragments of weathered Chinle Formation material, 1-inch diameter, fine-grained, light gray sand at 34.5 ft, cobble at 34 ft, dry, red (2.5 YR 4/6). At 34 ft, BC = 80.52, OVA = 18 ppm total hydrocarbon peak; at 36 ft, BC = 146/6-inches.
≈37 - 38	Claystone	Chinle Formation, trace to no fine sand, slightly weathered, dry, red (2.5 YR 4/6) with light gray reduction spots.

PRELIMINARY
Subject to revision



WELL #: 5-26 B

DATE DRILLED: 12/5 & 6/90

TOTAL DEPTH: 38.0' **(taped)**

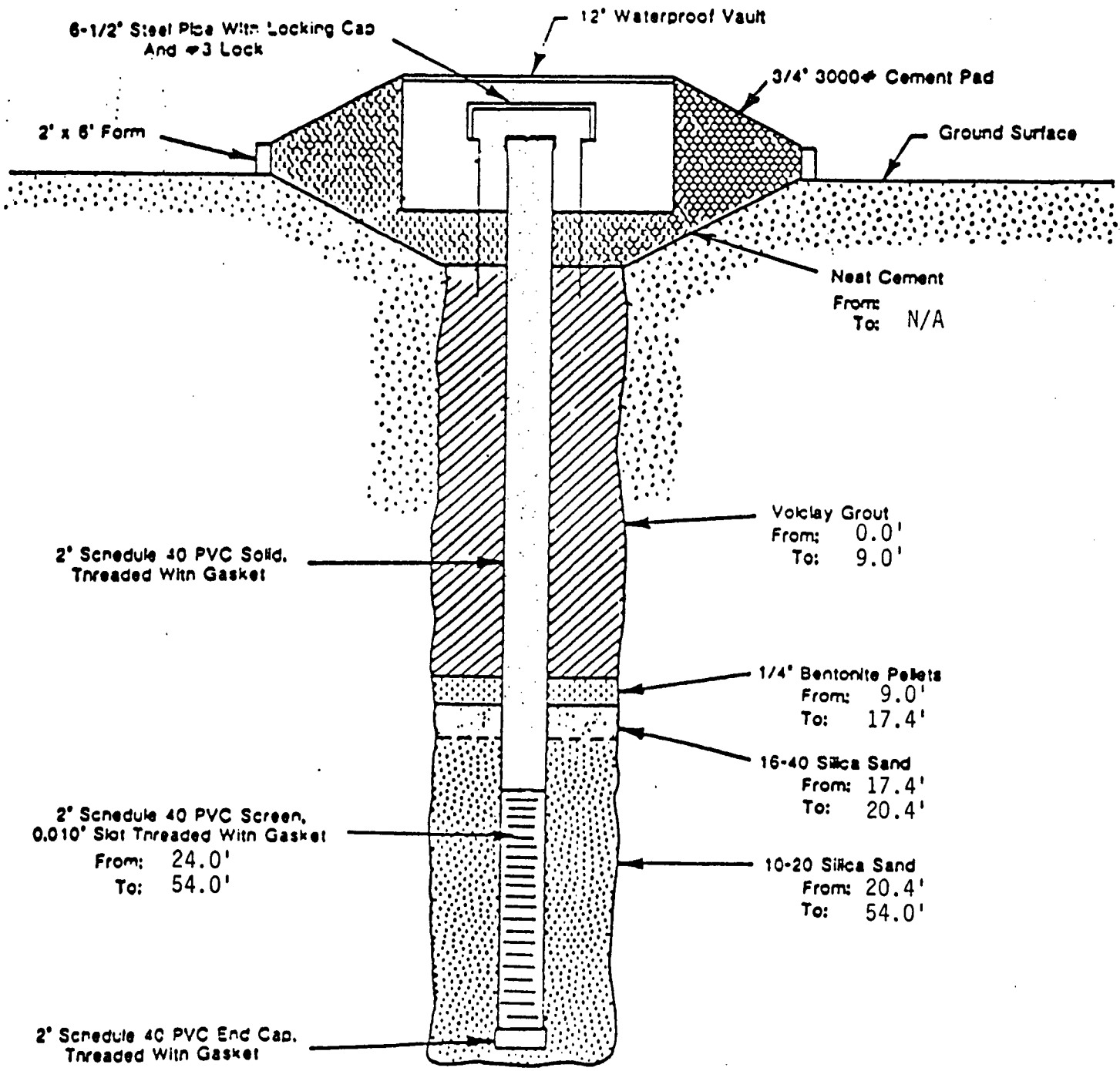
ALL FOOTAGES FROM GROUND SURFACE

PRELIMINARY
Subject to revision

Client:	Transwestern Pipeline Compressor Station No. 5 Thoreau, NM	**Drilling Contractor:**	Sergent, Hauskins, Beckwith Albuquerque, NM
		Drilling Method:	8.0-inch O.D. Hollow Stem Auger
Boring No.:	5-27B		
Rig Type:	CME-55	**Drilling Fluids:**	None
Date Started:	12/7/90	**Total Depth Drilled:**	54 ft
Date Completed:	12/11/90		

Depth Interval (ft)	Material	Description
0 - 11	Sand	Silty, fine- to very fine-grained, becomes very moist at 3 ft, unconsolidated, dark reddish brown (2.5 YR 5/4). At 5 ft, BC = 6, 8; at 10 ft, BC = 4, 3.
11 - 17	Sand	Silty, fine- to very fine-grained, trace moist to moist, unconsolidated, reddish brown (5 YR 3/4 and 4/4). At 15 ft, BC = 10, 15.
17 - 18	Clay?	Sandy, sand is medium- to very fine-grained, damp to dry, dark reddish brown (2.5 YR 2.5/4).
18 - 22	Sand	Silty, fine- to very fine-grained, dry to slightly damp, slightly indurated, light reddish brown (5 YR 4/4). At 20 ft, BC = 28, 46.
22 - 27.5	Sand	Silty, fine- to very fine-grained, local traces of fine gravel, dry to slightly damp, slightly indurated, light reddish brown (5 YR 4/4) to reddish brown (2.5 YR 5/4). At 22 ft, BC = 40, 30; at 24 ft, BC = 23, 19; at 26 ft, BC = 26, 19.
27.5 - 36.2	Gravel	Sandy with traces of silt, to 2-inch diameter, average 0.75-inch diameter, subangular to subrounded, equidimensional to platy, dominantly gray limestone, silty fine-grained sand from 30 to 31 ft. At 28 ft, BC = 27, 83; at 30 ft, BC = 28, 50/3 inches; at 32 ft, BC = 60/3-inches; at 34 ft, BC = 50/1-inch; at 36 ft, BC = 49, 50/1-inch.
36.2 - 36.7	Sand	Silty, fine-grained, dry, unconsolidated, light reddish brown (5 YR 4/4).
36.7 - 54	Claystone	Chinle Formation traces of sand, hackly fractures, dry, red (10 R 4/6) with light gray (5 YR 7/1) reduction spots. At 38 ft, BC = 65/6-inches; at 40 ft, BC = 73/6-inches; at 42 ft, BC = 70/3-inches; at 44 ft, BC = 100/6-inches; at 46 ft, BC = 100/4.5-inches; at 48 ft, BC = 74/6-inches; at 50 ft, BC = 52, 50/2-inches; at 52 ft, BC = 100/7-inches; at 54 ft, BC = 100/4.6-inches.

PRELIMINARY
Subject to revision



WELL #: 5-27 B

DATE DRILLED: 12/7, 10 & 11/90

TOTAL DEPTH: 54.0' **(taped)**

ALL FOOTAGES FROM GROUND SURFACE

PRELIMINARY
Subject to revision

DANIEL B. STEPHENS & ASSOCIATES, INC.
ENVIRONMENTAL SCIENTISTS AND ENGINEERS

May 8, 1991

Mr. Dave Boyer
New Mexico Oil Conservation Division
P.O. Box 2088
Santa Fe, NM 87504-2088

Re: Summary of BTEX and PCB Analyses for Monitor Wells at Transwestern Pipeline Compressor Station No. 5, located in Thoreau, New Mexico.

Dear Mr. Boyer:

Ted Ryther (ENRON Corp., Houston, TX) requested that I send to you the subject summary of analyses. If you have any questions, please do no hesitate to call me at (505) 822-9400.

Sincerely,

Judith Deeds
Staff Geologist

JD/dm
ENC.

DANIEL B. STEPHENS & ASSOCIATES, INC.
ENVIRONMENTAL SCIENTISTS AND ENGINEERS

April 5, 1991

Mr. Dave Boyer
New Mexico Oil Conservation Division
P.O. Box 2088
Santa Fe, NM 87504-2088

RE: Notice of intent and request for a permit to discharge monitor well purge water at Transwestern Pipeline Compressor Station No. 5 at Thoreau, New Mexico

Dear Mr. Boyer:

Daniel B. Stephens & Associates (DBS&A) is under contract to conduct hydrogeologic investigations at the subject compressor station. This work included sampling approximately 20 ground water monitor wells on a monthly basis. Water samples are being analyzed for BTEX and PCBs (1242). Approximately 2,000 gallons of purge water is generated from this monthly sampling program. In a typical month, about 100 gallons of the 2,000 gallon volume contain levels of BTEX that exceed New Mexico WQCC standards, approximately 40 gallons contain levels of PCBs which exceed WQCC standards, and the remaining water is free of these contaminants. Attachment I summarizes BTEX and PCB concentrations found in monitor wells during sampling. A map showing the location of these monitor wells in relation to other site features is presented in Attachment II.

The relatively small proportion (less than 10%) of purge water that contains concentrations of BTEX and/or PCBs above WQCC standards is passed through an activated carbon filter system to remove these contaminants. The filtered water is then analyzed for BTEX and PCBs to demonstrate that levels of these contaminants are below standards. To date, approximately 2,500 gallons of contaminated water has been filtered and determined by chemical analysis to be free of these contaminants. This filtered water is currently being held in stock tanks until permission to discharge it is received from the State of New Mexico.

One of the monitor wells described above presently shows levels of benzene in excess of 500 µg/l, and one additional well in the past has exhibited levels of benzene in excess of this 500 µg/l value. Based on recent conversations with OCD, DBS&A is currently storing purge water from these wells separately from other purge water. This approach will be continued until further discussions on this subject can be held with OCD.

DBS&A requests that a one-time temporary discharge permit be granted to dispose of the approximately 2,500 gallons of filtered water that has been accumulated at Thoreau. DBS&A proposes to dispose of this filtered water on the ground surface within the boundaries of the facility. This area of disposal will be bermed to prevent surface run off. DBS&A will deliver to OCD the results of chemical analysis performed on this filtered water to demonstrate that it meets WQCC standards with regard to BTEX and PCBs. DBS&A will also deliver to OCD electrical

conductivity data on this filtered water which will indicate that it contains less than 1000 mg/l total dissolved solids. Finally, as requested by OCD, Attachment III contains results of major cation and anion inorganic analyses performed recently on samples collected from an upgradient monitor well (5-3B) and several downgradient monitor wells (5-6B, 5-12B, and 5-18B).

In addition to the one-time temporary discharge permit requested above, DBS&A requests a discharge permit to dispose of the approximately 150 gallons of filtered purge water (and the approximately 1,800 gallons of contaminant-free purge water) that will be generated in future monthly monitor well sampling events. This discharge permit should also cover the disposal of water (up to an additional 2,000 gallons/month) resulting from shallow perched aquifer pump tests that DBS&A plans to conduct during the next several months at Thoreau. These tests are required to determine the feasibility of employing an extraction well collection system during possible future ground water remediation efforts. The majority of this aquifer pump test water is expected to contain elevated levels of BTEX. A small portion of this water may contain elevated PCB concentrations. DBS&A plans to conduct prototype treatment tests that will involve air stripping methods (to removed BTEX) in addition to carbon filtering methods described previously. These prototype tests are required to optimize the design of treatment systems used during possible future ground-water remediation efforts at Thoreau.

This monthly sampling and prototype testing is expected to continue for an extended period of time. The same procedures described above for the temporary one-time discharge permit will be followed when discharging this water. These procedures include supplying OCD with analytical data demonstrating that both the filtered and unfiltered water meets BTEX and PCB standards and that the total dissolved solids in this water does not exceed 1,000 mg/l. Finally, this water will be discharged on the ground surface in a bermed area within the boundaries of the site as described previously.

At some time in the future, it is likely that Transwestern Pipeline Company will install a ground water remediation treatment system at this site. A request for a revised discharge permit will be submitted to OCD prior to starting ground water remediation.

Thank you for your attention. If you have any questions concerning this transmittal, please do not hesitate to call Dale Hammermeister at (505) 822-9400.

Sincerely,

DANIEL B. STEPHENS & ASSOCIATES

Dale Hammermeister

DH/fg
Enclosures: As stated

Disk: 87-033 (5)
File: Boyer.405

ATTACHMENT I

SUMMARY OF ANALYTICAL RESULTS
ENRON THOREAU MONITOR WELLS
MARCH 6, 1991

		Concentration of Contaminants				
SITE WELL No.	DATE Mo/Yr	PCB-1242 (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylene (ppb)
T 5-01A	02/91	*	*	*	*	*
	01/91	*	*	*	*	*
	11/90	*	*	*	*	*
	09/90	*	*	*	*	*
	05/89	*	*	*	*	NS
	12/89	*	*	*	*	NS
T 5-01B	02/91	*	1.6	*	*	4.6
	01/91	28.0	*	4.8	*	*
	11/90	5.5	*	*	*	3.0
	09/90	2.0	*	*	*	3.5
	12/89	*	*	6.3	*	NS
T 5-02A	01/90	*	42.0	2100.0	24.0	NS
	12/89	*	*	490.0	56.0	NS
	08/89	*	*	*	*	NS
T 5-02B	02/91	*	460.0_1	580.0_1	75.0_1	600.0_2
	01/91	*	600.0_1	730.0_1	110.0_1	940.0_2
	11/90	*	1500.0	2400.0	230.0	1900.0
	09/90		1400.0	2300.0	180.0	1700.0
	11/89	*	1800.0	3100.0	50.0	NS
	08/89	*	2500.0	4700.0	*	NS
	05/89	*	1800.0	2000.0	*	NS
T 5-03A	02/91	*	* 1.5	* 9.	*	*
	01/91	*	*	0.50	*	0.70
	11/90	*	1.4	0.67	2.6	*
	09/90	*	*	11.6	*	*

		Concentration of Contaminants				
SITE WELL No.	DATE Mo/Yr	PCB-1242 (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylene (ppb)
	12/89	*	*	*	*	NS
T5-03B	02/91	*	*	*	*	*
	01/91	*	*	*	*	*
	11/90	*	*	*	*	*
	09/90	*	*	*	*	*
	11/89	*	*	*	*	NS
	05/89	*	*	*	*	NS
T 5-04B	02/91	*	22.0	1.6	0.75	5.6
	11/90	*	25.0	*	*	*
	09/91	*	63.0	9.5	*	15.0
	01/90	*	21.0	*	*	NS
	12/89	*	18.0	*	*	NS
	10/89	*	*	*	*	NS
T 5-05B	02/91	*	49.0_4	35.0_4	7.44_4	56.0_5
	01/91	*	*	*	*	0.56_3
	11/90	2.4	1.4	*	*	2.9
	09/90	0.19	2.5	*	*	4.6
	11/89	*	*	*	*	NS
	10/89	*	*	*	*	NS
T 5-06B	02/91	*	12.0	2.5	*	21.0
	01/91	39.0_4	*	*	*	31.0
	11/90	65.0	1.8	*	0.5	21.0
	09/90	1.1	*	*	1.5	*
	01/90	*	*	*	8.3	NS
	12/89	*	7.4	35.0	21.0	NS
	10/89	*	15.0	*	*	NS
T 5-12B	02/91	*	*	*	*	*
	01/91	*	1.5	4.7	.79	3.8

SUMMARY OF ANALYTICAL RESULTS
ENRON MONITOR WELLS
MARCH 6, 1991
(continued)

		Concentration of Contaminants				
SITE WELL No.	DATE Mo/Yr	PCB-1242 (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylene (ppb)
	11/90	*	*	*	*	*
	09/90	*	*	*	*	*
T 5-13B	02/91	*	270.0_5	25.0_5	*	460.0_{11}
	01/91	*	180.0_4	17.0_4	*	310.0_5
	11/90	*	61.0	*	*	480.0
	09/90	*	63.0	12.0	1.3	350.0
T 5-14B	02/91	*	*	*	*	*
	01/91	*	*	*	*	*
	11/90	*	*	*	*	*
	09/90	*	*	*	*	*
T 5-15B	02/91	*	*	*	*	*
	01/91	*	*	0.3_6	*	1.0_7
	11/90	*	2.1	*	*	*
	09/90	*	*	*	*	*
T 5-16B	02/91	*	320.0_5	46.0_5	170.0_5	860.0_{11}
	01/91	*	*	*	*	*
	11/90	*	*	*	*	*
	09/90	*	19.0	25.0	50.0	320.0
T 5-17B	02/91	*	*	*	*	*
	01/91	*	*	*	*	*
	11/90	*	*	*	*	*
	09/90	*	*	*	*	*
T 5-18B	02/91	*	970.0_8	11.0_4	*	170.0_5

SUMMARY OF ANALYTICAL RESULTS
ENRON MONITOR WELLS
MARCH 6, 1991
(continued)

		Concentration of Contaminants				
SITE WELL No.	DATE Mo/Yr	PCB-1242 (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylene (ppb)
	01/91	*	1300.0[8]	*	*	170.0[8]
	11/90	*	1900.0	*	*	320.0
	08/90		1100.0	14.0	*	220.0
T 5-19B	02/90	*	200.0[12]	5.8[12]	*	14.0[4]
	01/91	*	150.0[6]	*	0.6[6]	15.0[7]
	11/90	*	180.0	11.0	*	*
	09/90	*	190.0	3.5	5.8	44.0
T 5-20B	02/91	*	280.0[5]	14.0[5]	*	46.0[11]
	01/91	*	93.0[9]	14.0[9]	*	23.0[10]
	11/90	*	*	*	*	12.0
	09/90	*	58.0	8.0	*	51.0
T 5-22B	02/91	*	*	*	*	*
	01/91	*	*	*	*	*
	11/90	2.2	180.0	*	*	*
	09/90	*	*	*	*	*
T 5-23B	02/91	*	6.6	*	*	*
	01/91	*	3.0	*	*	*
	11/90	*	5.1	*	*	*
	09/90	*	*	*	*	*
T 5-24B	02/90	*	150.0[4]	16.0[4]	*	21.0[5]
	01/91	*	40.0	0.55	0.74	*
	11/90	*	100.0	*	2.0	1.6
	09/90	*	*	*	*	*

SUMMARY OF ANALYTICAL RESULTS
ENRON MONITOR WELLS
MARCH 6, 1991
(continued)

NYR = Analysis not yet received

NS = Not sampled in Nov/Dec/Jan rounds

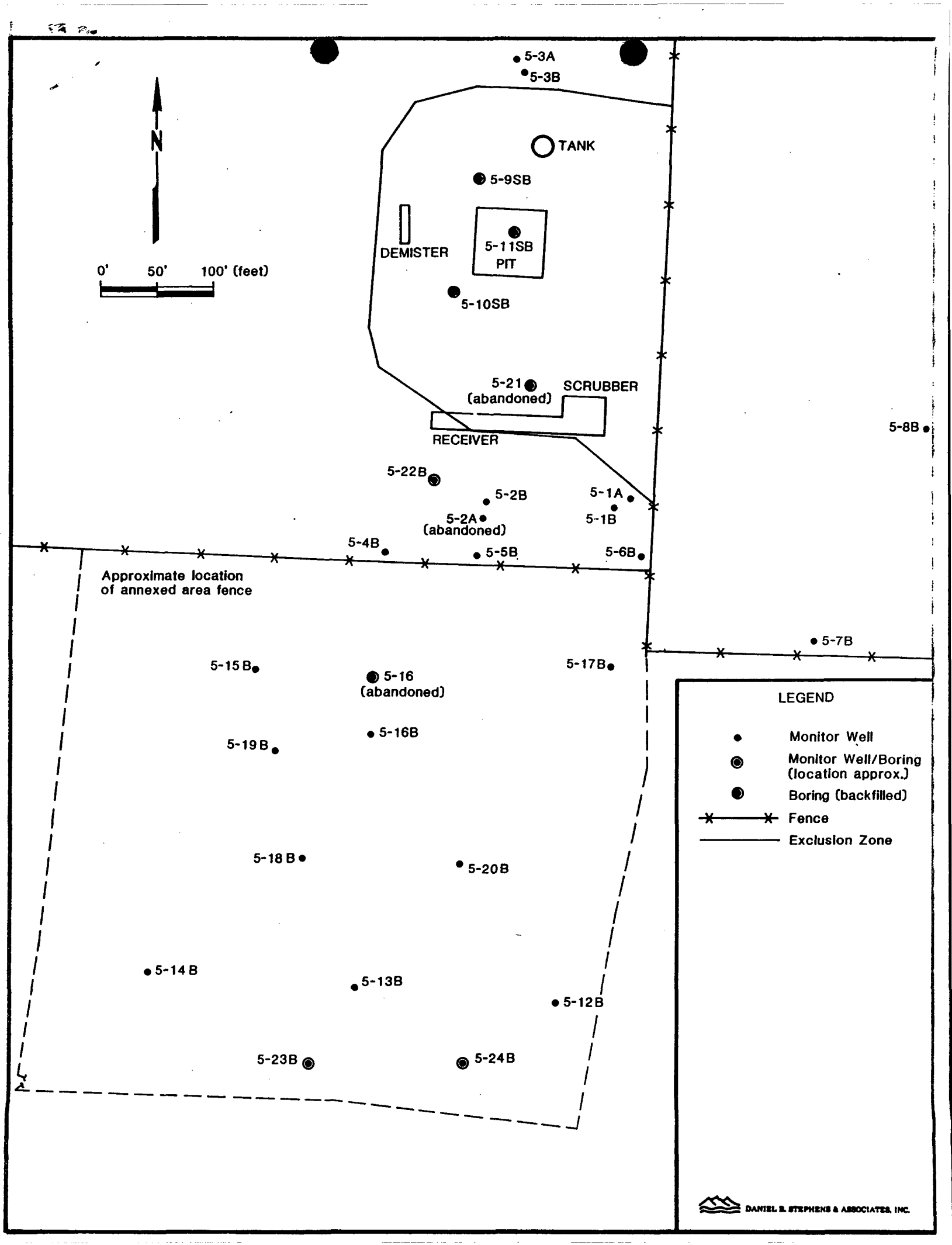
New Mexico Water Quality Control Commission (NM WQCC) enforceable standards:
PCB = 1 (ppb) Benzene = 10 (ppb) Toluene = 750 (ppb)
Ethylbenzene = 750 (ppb) Xylene = 620 (ppb)

* Indicates the well was sampled but the contaminants were below the reporting limits.

Normal Reporting limits from ENSECO's Houston laboratory:
PCB = 0.50 (ppb) Benzene = 0.50 (ppb) Toluene = 0.50 (ppb)
Ethylbenzene = 0.50 (ppb) Xylene = 1.0 (ppb)

1 Reporting Limit = 50.0
2 " " = 100.0
3 " " = 0.5
4 " " = 5.0
5 " " = 10.0
6 " " = 0.3
7 " " = 0.6
8 " " = 25.0
9 " " = 1.0
10 " " = 2.0
11 " " = 20.0
12 " " = 2.5

ATTACHMENT II


5-3A
5-3B
N
TANK
5-9SB
DEMISTER
5-11SB
PIT
0' 50' 100' (feet)
5-10SB
5-21
(abandoned)
SCRUBBER
RECEIVER
5-8B
5-22B
5-2B
5-1A
5-2A
(abandoned)
5-1B
5-4B
5-5B
5-6B
Approximate location
of annexed area fence
5-7B
5-15B
5-16
(abandoned)
5-17B
5-16B
5-19B
5-18B
5-20B
5-14B
5-13B
5-12B
5-23B
5-24B
LEGEND
Monitor Well
Monitor Well/Boring
(location approx.)
Boring (backfilled)
Fence
Exclusion Zone
DANIEL B. STEPHENS & ASSOCIATES, INC.

SUMMARY OF ANALYTICAL RESULTS
ENRON THOREAU MONITOR WELLS
MAY 7, 1991

		Concentration of Contaminants				
SITE WELL No.	DATE Mo/Yr	PCB-1242 (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylene (ppb)
T 5-01A	04/91	*	*	*	*	*
	03/91	*	*	*	*	*
	02/91	*	*	*	*	*
	01/91	*	*	*	*	*
	11/90	*	*	*	*	*
	09/90	*	*	*	*	*
	05/89	*	*	*	*	NS
	12/89	*	*	*	*	NS
T 5-01B	04/91	*	1.2	*	*	3.6
	03/91	*	2.0	*	*	5.2
	02/91	*	1.6	*	*	4.6
	01/91	28.0	*	4.8	*	*
	11/90	5.5	*	*	*	3.0
	09/90	2.0	*	*	*	3.5
	12/89	*	*	6.3	*	NS
T 5-02A	01/90	*	42.0	2100.0	24.0	NS
	12/89	*	*	490.0	56.0	NS
	08/89	*	*	*	*	NS
T 5-02B	04/91	*	830.0[1]	1200.0[1]	110.0[1]	920.0[2]
	03/91	*	2400.0[13]	3300.0[13]	290.0[13]	2600.0[14]
	02/91	*	460.0[1]	580.0[1]	75.0[1]	600.0[2]
	01/91	*	600.0[1]	730.0[1]	110.0[1]	940.0[2]
	11/90	*	1500.0	2400.0	230.0	1900.0
	09/90	*	1400.0	2300.0	180.0	1700.0

		Concentration of Contaminants				
SITE WELL No.	DATE Mo/Yr	PCB-1242 (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylene (ppb)
	11/89	*	1800.0	3100.0	50.0	NS
	08/89	*	2500.0	4700.0	*	NS
	05/89	*	1800.0	2000.0	*	NS
T 5-03A	04/91	*	1.2	0.74	*	*
	03/91	*	1.5	0.9	*	*
	02/91	*	*	*	*	*
	01/91	*	*	0.50	*	0.70
	11/90	*	1.4	0.67	2.6	*
	09/90	*	*	11.6	*	*
	12/89	*	*	*	*	NS
T 5-03B	04/91	*	*	*	*	*
	03/91	*	*	*	*	*
	02/91	*	*	*	*	*
	01/91	*	*	*	*	*
	11/90	*	*	*	*	*
	09/90	*	*	*	*	*
	11/89	*	*	*	*	NS
	05/89	*	*	*	*	NS
T 5-04B	04/91	*	39.0,	0.66	*	2.9
	03/91	*	76.0,	11.0	*	5.7
	02/91	*	22.0	1.6	0.75	5.6
	11/90	*	25.0	*	*	*
	09/91	*	63.0	9.5	*	15.0
	01/90	*	21.0	*	*	NS
	12/89	*	18.0	*	*	NS
	10/89	*	*	*	*	NS
T 5-05B	04/91	*	1.3	*	*	*
	03/91	*	12.0	1.2	*	*

SUMMARY OF ANALYTICAL RESULTS
ENRON MONITOR WELLS
MAY 7, 1991
(continued)

		Concentration of Contaminants				
SITE WELL No.	DATE Mo/Yr	PCB-1242 (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylene (ppb)
	02/91	*	49.0	35.0	7.44	56.0
	01/91	*	*	*	*	0.56
	11/90	2.4	1.4	*	*	2.9
	09/90	0.19	2.5	*	*	4.6
	11/89	*	*	*	*	NS
	10/89	*	*	*	*	NS
T 5-06B	04/91	*	5.2	*	*	12.0
	03/91	*	2.0	*	*	5.1
	02/91	*	12.0	2.5	*	21.0
	01/91	39.0	*	*	*	31.0
	11/90	65.0	1.8	*	0.5	21.0
	09/90	1.1	*	*	1.5	*
	01/90	*	*	*	8.3	NS
	12/89	*	7.4	35.0	21.0	NS
	10/89	*	15.0	*	*	NS
T 5-07B		DRY	ABOVE	WATER	TABLE	
T 5-08B		DRY	ABOVE	WATER	TABLE	
T 5-12B	04/91	*	*	*	*	*
	03//91	*	*	*	*	*
	02/91	*	*	*	*	*
	01/91	*	1.5	4.7	.79	3.8
	11/90	*	*	*	*	*
	09/90	*	*	*	*	*
T 5-13B	04/91	*	430.0	*	*	620.0

SUMMARY OF ANALYTICAL RESULTS
ENRON MONITOR WELLS
MAY 7, 1991
(continued)

		Concentration of Contaminants				
SITE WELL No.	DATE Mo/Yr	PCB-1242 (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylene (ppb)
	03/91	*	240.0[1]	*[1]	*[1]	480.0[2]
	02/91	*	270.0[3]	25.0[3]	*	460.0[11]
	01/91	*	180.0[4]	17.0[4]	*	310.0[3]
	11/90	*	61.0	*	*	480.0
	09/90	*	63.0	12.0	1.3	350.0
T 5-14B	04/91	*	*	*	*	*
	03.91	*	*	*	*	*
	02/91	*	*	*	*	*
	01/91	*	*	*	*	*
	11/90	*	*	*	*	*
	09/90	*	*	*	*	*
T 5-15B	04/91	*	*	*	*	*
	03/91	*	*	*	*	*
	02/91	*	*	*	*	*
	01/91	*	*	0.3[6]	*	1.0[7]
	11/90	*	2.1	*	*	*
	09/90	*	*	*	*	*
T 5-16B	04/91	*	92.0[4]	*	0.68	9.2
	03/91	*	920.0[1]	*	*	130.0[2]
	02/91	*	320.0[3]	46.0[3]	170.0[3]	860.0[11]
	01/91	*	*	*	*	*
	11/90	*	*	*	*	*
	09/90	*	19.0	25.0	50.0	320.0

SUMMARY OF ANALYTICAL RESULTS
ENRON MONITOR WELLS
MAY 7, 1991
(continued)

		Concentration of Contaminants				
SITE WELL No.	DATE Mo/Yr	PCB-1242 (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylene (ppb)
T 5-17B	04/91	*	*	*	*	*
	03/91	*	*	*	*	*
	02/91	*	*	*	*	*
	01/91	*	*	*	*	*
	11/90	*	*	*	*	*
	09/90	*	*	*	*	*
T 5-18B	04/91	*	1000.0[8]	*[9]	*[9]	78.0[10]
	03/91	*	260.0[13]	1.8	*	23.0
	02/91	*	970.0[8]	11.0[4]	*	170.0[9]
	01/91	*	1300.0[8]	*	*	170.0[8]
	11/90	*	1900.0	*	*	320.0
	08/90	*	1100.0	14.0	*	220.0
T 5-19B	04/91	*	290.0[8]	*	210.0[8]	880.0[1]
	03/91	*	200.0[8]	30.0[8]	180.0[8]	880.0[1]
	02/90	*	200.0[12]	5.8[12]	*	14.0[4]
			[6]		[6]	[7]
	11/90	*	180.0	11.0	*	*
	09/90	*	190.0	3.5	5.8	44.0
T 5-20B	04/91	*	180.0[13]	*[9]	*[9]	19.0[10]
	03/90	*	200.0[4]	*[4]	*[4]	*[2]
	02/91	*	280.0[9]	14.0[9]	*	46.0[11]
	01/91	*	93.0[9]	14.0[9]	*	23.0[10]

SUMMARY OF ANALYTICAL RESULTS
ENRON MONITOR WELLS
MAY 7, 1991
(continued)

		Concentration of Contaminants				
SITE WELL No.	DATE Mo/Yr	PCB-1242 (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylene (ppb)
	11/90	*	*	*	*	12.0
	09/90	*	58.0	8.0	*	51.0
T 5-22B	04/91	*	*	*	*	*
	03/91	*	*	*	*	*
	02/91	*	*	*	*	*
	01/91	*	*	*	*	*
	11/90	2.2	180.0	*	*	*
	09/90	*	*	*	*	*
T 5-23B	04/91	*	5.0	*	*	*
	03/91	*	8.5	*	*	1.2
	02/91	*	6.6	*	*	*
	01/91	*	3.0	*	*	*
	11/90	*	5.1	*	*	*
	09/90	*	*	*	*	*
T 5-24B	04/91	*	230.0[1,9]	*[9]	*[9]	6.3[10]
	03/91	*	89.0[12]	9.8[12]	*	3.5
	02/90	*	150.0[4]	16.0[4]	*	21.0[9]
	01/91	*	40.0	0.55	0.74	*
	11/90	*	100.0	*	2.0	1.6
	09/90	*	*	*	*	*
T 5-25B	12/90	DRY	ABOVE	WATER	TABLE	
T 5-26B	12/90	DRY	ABOVE	WATER	TABLE	
T 5-27B	12/90	DRY	ABOVE	WATER	TABLE	

SUMMARY OF ANALYTICAL RESULTS
ENRON MONITOR WELLS
MAY 7, 1991
(continued)

NYR = Analysis not yet received

NS = Not sampled in Nov/Dec/Jan rounds

New Mexico Water Quality Control Commission (NM WQCC) enforceable standards:

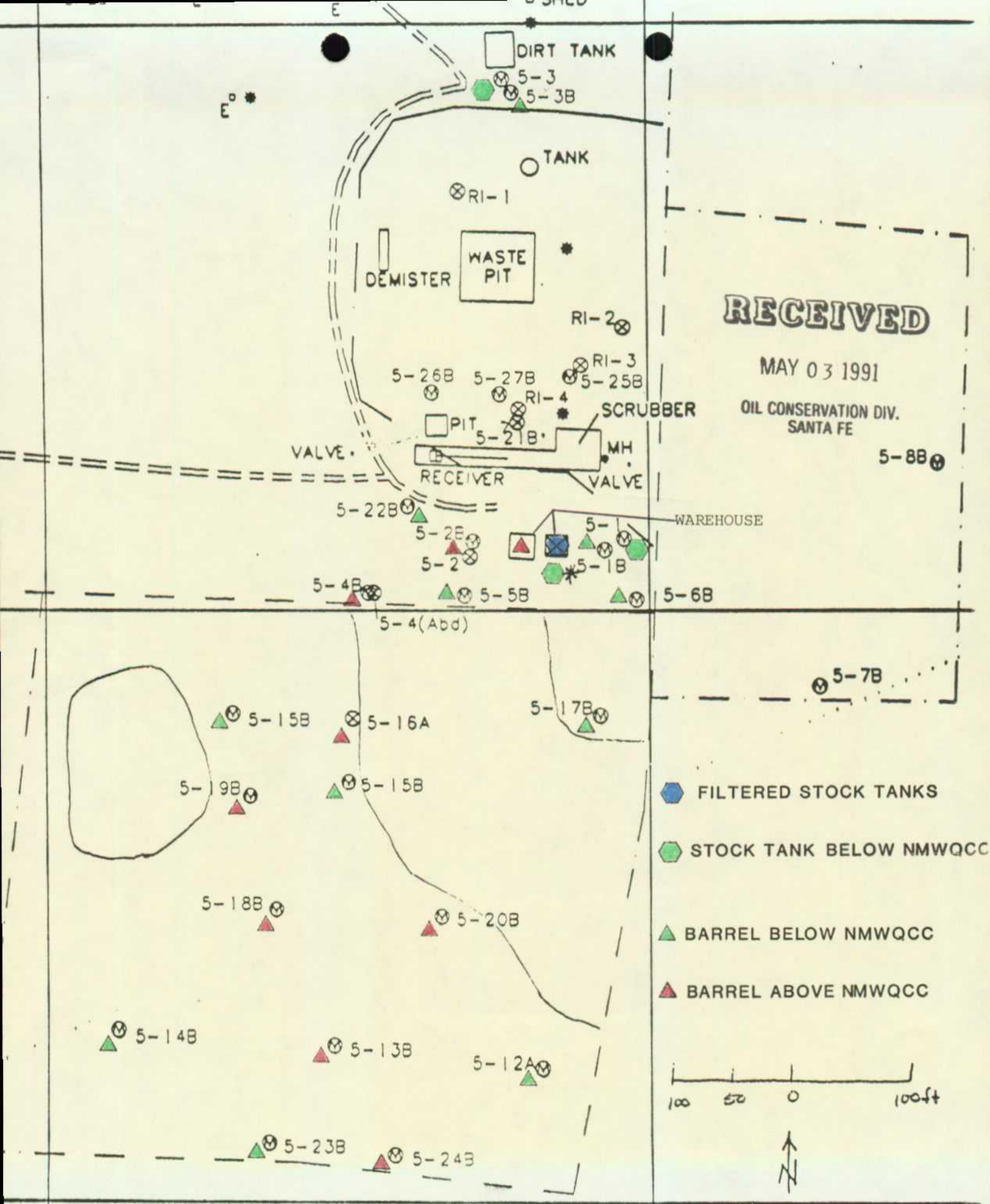
PCB = 1 (ppb) Benzene = 10 (ppb) Toluene = 750 (ppb)
Ethylbenzene = 750 (ppb) Xylene = 620 (ppb)

* Indicates the well was sampled but the contaminants were below the reporting limits.

Normal Reporting limits from ENSECO's Houston laboratory:

PCB = 0.50 (ppb) Benzene = 0.50 (ppb) Toluene = 0.50 (ppb)
Ethylbenzene = 0.50 (ppb) Xylene = 1.0 (ppb)

1 Reporting Limit = 50.0
2 " " = 100.0
3 " " = 0.5
4 " " = 5.0
5 " " = 10.0
6 " " = 0.3
7 " " = 0.6
8 " " = 25.0
9 " " = 1.0
10 " " = 2.0
11 " " = 20.0
12 " " = 2.5
13 " " = 120.0
14 " " = 250.0
15 " " = 12.0



RECEIVED
MAY 03 1991
OIL CONSERVATION DIV.
SANTA FE

FILTERED WATER AND WATER IN WAREHOUSE WAS ACCUMULATED PRIOR TO 4/91
ALL OTHER WATER WAS ACCUMULATED DURING 4/91 SAMPLING

Thoreau Stock Tank Analysis

Stock Tank	Sample Date	Results
1	3-15-91	Clean
2	3-28-91	Clean
3	3-28-91	Clean
4	3-15-91	Clean
5	3-28-91	Benzene 0.74 ug/L Ethylbenzene 0.63 ug/L Xylenes 2.10 ug/L

Benzene, Toluene, Ethyl Benzene and Xylenes (BTEX)

Method 8020

Client Name: Applied Energy Company
Client ID: 91-3-15-STK-TNK-5-1
Lab ID: 000984-0002-SA
Matrix: AQUEOUS — Sampled: 15 MAR 91 — Received: 18 MAR 91
Authorized: 18 MAR 91 — Prepared: NA — Analyzed: 23 MAR 91

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	1.0

Surrogate	Recovery	
a,a,a-Trifluorotoluene	104	%

PCBs

Method 8080

Client Name: Applied Energy Company
Client ID: 91-3-15-STK-TNK-5-1
Lab ID: 000984-0002-SA
Matrix: AQUEOUS — Sampled: 15 MAR 91 — Received: 18 MAR 91
Authorized: 18 MAR 91 — Prepared: 20 MAR 91 — Analyzed: 21 MAR 91

Parameter	Result	Units	Reporting Limit
Aroclor 1016	ND	ug/L	0.50
Aroclor 1221	ND	ug/L	0.50
Aroclor 1232	ND	ug/L	0.50
Aroclor 1242	ND	ug/L	0.50
Aroclor 1248	ND	ug/L	0.50
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0

Enseco
A Corning Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTEX)

Method 8020

Client Name: Applied Energy Company
Client ID: 91-3-28-STK-TNK-2 Station 5
Lab ID: 001040-0002-SA
Matrix: AQUEOUS Sampled: 28 MAR 91 Received: 30 MAR 91
Authorized: 30 MAR 91 Prepared: NA Analyzed: 05 APR 91

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	1.0

Surrogate	Recovery	
a,a,a-Trifluorotoluene	96.0	%

Enseco
A Corning Company

PCBs

Method 8080

Client Name: Applied Energy Company
Client ID: 91-3-28-STK-TNK-2 Station 5
Lab ID: 001040-0002-SA
Matrix: AQUEOUS Sampled: 28 MAR 91 Received: 30 MAR 91
Authorized: 30 MAR 91 Prepared: 01 APR 91 Analyzed: 02 APR 91

Parameter	Result	Units	Reporting Limit
Aroclor 1016	ND	ug/L	0.50
Aroclor 1221	ND	ug/L	0.50
Aroclor 1232	ND	ug/L	0.50
Aroclor 1242	ND	ug/L	0.50
Aroclor 1248	ND	ug/L	0.50
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0

Benzene, Toluene, Ethyl Benzene and Xylenes (BTEX)

Method 8020

Client Name: Applied Energy Company
Client ID: 91-3-28-STK-TNK-3 Station 5
Lab ID: 001040-0003-SA
Matrix: AQUEOUS Sampled: 28 MAR 91 Received: 30 MAR 91
Authorized: 30 MAR 91 Prepared: NA Analyzed: 05 APR 91

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	1.0

Surrogate	Recovery	
a,a,a-Trifluorotoluene	97.0	%

PCBs

Method 8080

Client Name: Applied Energy Company
Client ID: 91-3-28-STK-TNK-3 Station 5
Lab ID: 001040-0003-SA
Matrix: AQUEOUS Sampled: 28 MAR 91 Received: 30 MAR 91
Authorized: 30 MAR 91 Prepared: 01 APR 91 Analyzed: 02 APR 91

Parameter	Result	Units	Reporting Limit
Aroclor 1016	ND	ug/L	0.50
Aroclor 1221	ND	ug/L	0.50
Aroclor 1232	ND	ug/L	0.50
Aroclor 1242	ND	ug/L	0.50
Aroclor 1248	ND	ug/L	0.50
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0

Benzene, Toluene, Ethyl Benzene and Xylenes (BTEX)

Method 8020

Client Name: Applied Energy Company
Client ID: 91-3-15-STK-TNK-5-4
Lab ID: 000984-0003-SA
Matrix: AQUEOUS Sampled: 15 MAR 91 Received: 18 MAR 91
Authorized: 18 MAR 91 Prepared: NA Analyzed: 23 MAR 91

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	1.0

Surrogate	Recovery	
a,a,a-Trifluorotoluene	105	%

PCBs

Method 8080

Client Name: Applied Energy Company
Client ID: 91-3-15-STK-TNK-5-4
Lab ID: 000984-0003-SA
Matrix: AQUEOUS Sampled: 15 MAR 91 Received: 18 MAR 91
Authorized: 18 MAR 91 Prepared: 20 MAR 91 Analyzed: 21 MAR 91

Parameter	Result	Units	Reporting Limit
Aroclor 1016	ND	ug/L	0.50
Aroclor 1221	ND	ug/L	0.50
Aroclor 1232	ND	ug/L	0.50
Aroclor 1242	ND	ug/L	0.50
Aroclor 1248	ND	ug/L	0.50
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0

Benzene, Toluene, Ethyl Benzene and Xylenes (BTEX)

Enseco A Corning Company

Method 8020

Client Name: Applied Energy Company
Client ID: 91-3-28-STK-TNK-5 Station 5
Lab ID: 001040-0004 SA
Matrix: AQUEOUS Sampled: 28 MAR 91 Received: 30 MAR 91
Authorized: 30 MAR 91 Prepared: NA Analyzed: 05 APR 91

Parameter	Result	Units	Reporting Limit
Benzene	0.74	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	0.63	ug/L	0.50
Xylenes (total)	2.1	ug/L	1.0

Surrogate	Recovery	
a,a,a-Trifluorotoluene	97.0	%

PCBs

Enseco A Corning Company

Method 8080

Client Name: Applied Energy Company
Client ID: 91-3-28-STK-TNK-5 Station 5
Lab ID: 001040-0004-SA
Matrix: AQUEOUS Sampled: 28 MAR 91 Received: 30 MAR 91
Authorized: 30 MAR 91 Prepared: 01 APR 91 Analyzed: 02 APR 91

Parameter	Result	Units	Reporting Limit
Aroclor 1016	ND	ug/L	0.50
Aroclor 1221	ND	ug/L	0.50
Aroclor 1232	ND	ug/L	0.50
Aroclor 1242	ND	ug/L	0.50
Aroclor 1248	ND	ug/L	0.50
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0

ATTACHMENT III

General Inorganics

Client Name: Applied Energy Company
Client ID: 910212-5-3B
Lab ID: 000866-0003-SA
Matrix: AQUEOUS
Authorized: 15 FEB 91

Sampled: 12 FEB 91
Prepared: See Below

Received: 15 FEB 91
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Total as CaCO3 at pH 4.5	395	mg/L	5.0	310.1	NA	15 FEB 91
Alkalinity, Bicarb. as CaCO3 at pH 4.5	395	mg/L	5.0	310.1	NA	15 FEB 91
Alkalinity, Carb. as CaCO3 at pH 8.3	ND	mg/L	5.0	310.1	NA	15 FEB 91
Alkalinity, Hydrox. as CaCO3	ND	mg/L	5.0	310.1	NA	15 FEB 91
Fluoride	0.42	mg/L	0.10	340.2	NA	18 FEB 91
Ammonia as N	ND	mg/L	0.10	350.1	NA	21 FEB 91
Nitrate as N	3.1	mg/L	0.10	353.2	NA	23 FEB 91
pH	7.7	units		9040	NA	15 FEB 91
Sulfate	65.0	mg/L	25.0	9038	NA	20 FEB 91
Specific Conductance at 25 deg.C	982	umhos/cm	1.0	120.1	NA	18 FEB 91
Total Dissolved Solids	716	mg/L	10.0	160.1	NA	20 FEB 91

ND = Not detected
NA = Not applicable

Reported By: Bose Lawal

Approved By:

PRELIMINARY DATA

General Inorganics

Client Name: Applied Energy Company
Client ID: 910212-5-3B
Lab ID: 000866-0003-SA
Matrix: AQUEOUS Sampled: 12 FEB 91 Received: 15 FEB 91
Authorized: 15 FEB 91 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Hardness as CaCO3	120	mg/L	0.70	200.7	NA	19 FEB 91
Nitrite as N	ND	mg/L	0.010	354.1	NA	15 FEB 91
Chloride	74.4	mg/L	3.0	9252	NA	21 FEB 91

ND = Not detected
NA = Not applicable

Reported By: Bose Lawal Approved By:

PRELIMINARY DATA

Enseco

Client Name: Applied Energy Company
Client ID: 910212-5-3B
Lab ID: 000866-0003-SA
Matrix: AQUEOUS Sampled: 12 FEB 91 Received: 15 FEB 91
Authorized: 15 FEB 91 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Silica as SiO2	20.4	mg/L	0.20	6010	NA	19 FEB 91
Calcium	35.2	mg/L	0.20	6010	NA	19 FEB 91
Iron	ND	mg/L	0.10	6010	NA	19 FEB 91
Magnesium	8.6	mg/L	0.20	6010	NA	19 FEB 91
Manganese	ND	mg/L	0.010	6010	NA	19 FEB 91
Potassium	ND	mg/L	5.0	6010	NA	19 FEB 91
Sodium	221	mg/L	5.0	6010	NA	19 FEB 91

ND = Not detected
NA = Not applicable

Reported By: David Bravo Approved By: Kurt Ill

Ensecc

General Inorganics

Client Name: Applied Energy Company
Client ID: 910212-5-6B
Lab ID: 000866-0001-SA
Matrix: AQUEOUS Sampled: 12 FEB 91 Received: 15 FEB 91
Authorized: 15 FEB 91 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Total as CaCO3 at pH 4.5	341	mg/L	5.0	310.1	NA	15 FEB 91
Alkalinity, Bicarb. as CaCO3 at pH 4.5	341	mg/L	5.0	310.1	NA	15 FEB 91
Alkalinity, Carb. as CaCO3 at pH 8.3	ND	mg/L	5.0	310.1	NA	15 FEB 91
Alkalinity, Hydrox. as CaCO3	ND	mg/L	5.0	310.1	NA	15 FEB 91
Fluoride	0.30	mg/L	0.10	340.2	NA	18 FEB 91
Ammonia as N	ND	mg/L	0.10	350.1	NA	21 FEB 91
Nitrate as N	2.8	mg/L	0.10	353.2	NA	23 FEB 91
pH	7.6	units		9040	NA	15 FEB 91
Sulfate	88.0	mg/L	25.0	9038	NA	20 FEB 91
Specific Conductance at 25 deg.C	1050	umhos/cm	1.0	120.1	NA	18 FEB 91
Total Dissolved Solids	752	mg/L	10.0	160.1	NA	20 FEB 91

ND = Not detected
NA = Not applicable

Reported By: Bose Lawal Approved By:

PRELIMINARY DATA

Ensecc
A COMPANY

Client Name: Applied Energy Company
Client ID: 910212-5-6B
Lab ID: 000866-0001-SA
Matrix: AQUEOUS Sampled: 12 FEB 91 Received: 15 FEB 91
Authorized: 15 FEB 91 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Silica as SiO2	20.1	mg/L	0.20	6010	NA	19 FEB 91
Calcium	43.9	mg/L	0.20	6010	NA	19 FEB 91
Iron	ND	mg/L	0.10	6010	NA	19 FEB 91
Magnesium	10.8	mg/L	0.20	6010	NA	19 FEB 91
Manganese	0.019	mg/L	0.010	6010	NA	19 FEB 91
Potassium	ND	mg/L	5.0	6010	NA	19 FEB 91
Sodium	217	mg/L	5.0	6010	NA	19 FEB 91

ND = Not detected
NA = Not applicable

Reported By: David Bravo Approved By: Kurt Ill

Ensecc

General Inorganics

Client Name: Applied Energy Company
Client ID: 910212-5-6B
Lab ID: 000866-0001-SA
Matrix: AQUEOUS Sampled: 12 FEB 91 Received: 15 FEB 91
Authorized: 15 FEB 91 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Hardness as CaCO3	150	mg/L	0.70	200.7	NA	19 FEB 91
Nitrite as N	0.16	mg/L	0.010	354.1	NA	15 FEB 91
Chloride	107	mg/L	3.0	9252	NA	21 FEB 91

ND = Not detected
NA = Not applicable

Reported By: Bose Lawal

Approved By:

PRELIMINARY DATA

Ensecc

General Inorganics

Client Name: Applied Energy Company
Client ID: 910213-5-128
Lab ID: 000865-0001-SA
Matrix: AQUEOUS Sampled: 13 FEB 91 Received: 15 FEB 91
Authorized: 15 FEB 91 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Total as CaCO3 at pH 4.5	323	mg/L	5.0	310.1	NA	15 FEB 91
Alkalinity, Bicarb. as CaCO3 at pH 4.5	323	mg/L	5.0	310.1	NA	15 FEB 91
Alkalinity, Carb. as CaCO3 at pH 8.3	ND	mg/L	5.0	310.1	NA	15 FEB 91
Alkalinity, Hydrox. as CaCO3	ND	mg/L	5.0	310.1	NA	15 FEB 91
Fluoride	0.29	mg/L	0.10	340.2	NA	18 FEB 91
Ammonia as N	ND	mg/L	0.10	350.1	NA	21 FEB 91
Nitrate as N	5.7	mg/L	0.20	353.2	NA	23 FEB 91
pH	7.6	units		9040	NA	15 FEB 91
Sulfate	95.0	mg/L	25.0	9038	NA	20 FEB 91
Specific Conductance at 25 deg.C	1150	umhos/cm	1.0	120.1	NA	18 FEB 91
Total Dissolved Solids	837	mg/L	10.0	160.1	NA	20 FEB 91

ND = Not detected
NA = Not applicable

Reported By: Bose Lawal Approved By:

PRELIMINARY DATA

Client Name: Applied Energy Company
Client ID: 910213-5-12B
Lab ID: 000865-0001-SA
Matrix: AQUEOUS Sampled: 13 FEB 91 Received: 15 FEB 91
Authorized: 15 FEB 91 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Hardness as CaCO3	180	mg/L	0.70	200.7	NA	19 FEB 91
Nitrite as N	0.018	mg/L	0.010	354.1	NA	15 FEB 91
Chloride	168	mg/L	3.0	9252	NA	21 FEB 91

ND = Not detected
NA = Not applicable

Reported By: Bose Lawal Approved By:

PRELIMINARY DATA

Client Name: Applied Energy Company
Client ID: 910213-5-12B
Lab ID: 000865-0001-SA
Matrix: AQUEOUS Sampled: 13 FEB 91 Received: 15 FEB 91
Authorized: 15 FEB 91 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Silica as SiO2	22.3	mg/L	0.20	6010	NA	19 FEB 91
Calcium	48.6	mg/L	0.20	6010	NA	19 FEB 91
Iron	0.16	mg/L	0.10	6010	NA	19 FEB 91
Magnesium	14.4	mg/L	0.20	6010	NA	19 FEB 91
Manganese	ND	mg/L	0.010	6010	NA	19 FEB 91
Potassium	ND	mg/L	5.0	6010	NA	19 FEB 91
Sodium	225	mg/L	5.0	6010	NA	19 FEB 91

ND = Not detected
NA = Not applicable

Reported By: David Bravo Approved By: Kurt Ill

General Inorganics

Client Name: Applied Energy Company
Client ID: 910213-5-18B
Lab ID: 000865-0002-SA
Matrix: AQUEOUS Sampled: 13 FEB 91 Received: 15 FEB 91
Authorized: 15 FEB 91 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Total as CaCO3 at pH 4.5	328	mg/L	5.0	310.1	NA	15 FEB 91
Alkalinity, Bicarb. as CaCO3 at pH 4.5	328	mg/L	5.0	310.1	NA	15 FEB 91
Alkalinity, Carb. as CaCO3 at pH 8.3	ND	mg/L	5.0	310.1	NA	15 FEB 91
Alkalinity, Hydrox. as CaCO3	ND	mg/L	5.0	310.1	NA	15 FEB 91
Fluoride	0.39	mg/L	0.10	340.2	NA	18 FEB 91
Ammonia as N	0.29	mg/L	0.10	350.1	NA	21 FEB 91
Nitrate as N	0.26	mg/L	0.10	353.2	NA	23 FEB 91
pH	7.6	units		9040	NA	15 FEB 91
Sulfate	80.0	mg/L	25.0	9038	NA	20 FEB 91
Specific Conductance at 25 deg.C	944	umhos/cm	1.0	120.1	NA	18 FEB 91
Total Dissolved Solids	673	mg/L	10.0	160.1	NA	20 FEB 91

ND = Not detected
NA = Not applicable

Reported By: Bose Lawal Approved By:

Client Name: Applied Energy Company
Client ID: 910213-5-18B
Lab ID: 000865-0002-SA
Matrix: AQUEOUS
Authorized: 15 FEB 91

Sampled: 13 FEB 91
Prepared: See Below

Received: 15 FEB 91
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Silica as SiO2	18.8	mg/L	0.20	6010	NA	19 FEB 91
Calcium	39.5	mg/L	0.20	6010	NA	19 FEB 91
Iron	0.16	mg/L	0.10	6010	NA	19 FEB 91
Magnesium	11.9	mg/L	0.20	6010	NA	19 FEB 91
Manganese	0.10	mg/L	0.010	6010	NA	19 FEB 91
Potassium	ND	mg/L	5.0	6010	NA	19 FEB 91
Sodium	190	mg/L	5.0	6010	NA	19 FEB 91

ND = Not detected
NA = Not applicable

Reported By: David Bravo

Approved By: Kurt Ill

Ensecc
A CORNING Company

General Inorganics

Client Name: Applied Energy Company
Client ID: 910213-5-18B
Lab ID: 000865-0002-SA
Matrix: AQUEOUS
Sampled: 13 FEB 91
Received: 15 FEB 91
Authorized: 15 FEB 91
Prepared: See Below
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Hardness as CaCO3	150	mg/L	0.70	200.7	NA	19 FEB 91
Nitrite as N	0.14	mg/L	0.010	354.1	NA	15 FEB 91
Chloride	105	mg/L	3.0	9252	NA	21 FEB 91

ND = Not detected
NA = Not applicable

Reported By: Bose Lawal

Approved By:

PRELIMINARY DATA