

**Norman, Yolande**

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**From:** Mark Stanek [mstanek@stepan.com]  
**Sent:** Tuesday, June 30, 2009 4:02 PM  
**To:** Norman, Yolande  
**Subject:** Fw: New Scan  
**Attachments:** SCAN4646\_000.pdf = *Stepan's June 29, 1987 Groundwater Sampling Program.*

Yolande,  
Below is the 6/29/87 letter that you referred to.  
John O'Brien has retired. I will be the new point of contact. I thought that a letter had been sent to Amir explaining this but I can't find a copy. I will send a letter to you under a separate heading for this change.  
Mark

----- Forwarded by Mark Stanek/Stepan/US on 06/30/2009 03:06 PM -----  
[mw-scanner@stepan.com](mailto:mw-scanner@stepan.com) To [mstanek@stepan.com](mailto:mstanek@stepan.com)  
cc  
Subject New Scan

06/30/2009 11:08 AM

New Scan from Maywood

**Stepan**

Stepan Company

100 West Hunter Avenue  
Maywood, New Jersey 07607  
Telephone 201 845 3030

**S**

June 29, 1987

Dr. Ed Shum  
USNRC  
7915 Eastern Ave.  
Silver Spring, MD. 20910

Dear Dr. Shum:

In response to your recent inquiry, Stepan offers the enclosed environmental monitoring information related to Source Materials License STC-1333 that is held by Stepan.

Mr. E. A. Swanson, previously named on the license as the contact at Stepan, has retired from the company. Please contact me if Stepan can furnish additional information that may be of help to you, as I have assumed Mr. Swanson's responsibilities for the license.

Sincerely,

John G. O'Brien  
General Manager

JGO:dc

bcc: C. P. Riley, Jr.  
J. Bartlett  
H. Mork  
H. Morton

## ENVIRONMENTAL MONITORING PROGRAM

### Site Description

About 18,000 cubic yards of ore tailings are buried in three sites on Stepan Chemical Company's property in Maywood, New Jersey, as described by Stepan's application for renewal of Materials License STC-1333. It is estimated that about 9,500 cubic yards of the tailings contain about 0.1% natural thorium, and about 8,600 cubic yards of the tailings contain about 0.25% natural thorium. The three burial sites are located where they are depicted in Figure 1.

### Present Environmental Monitoring

Stepan monitors the environment of the three burial sites to maintain a continuing awareness of their condition. The current monitoring program includes the following surveys.

Visual Inspection. The surface above and in the immediate vicinity of each burial site is examined visually at least one time each year to see whether there is any need for maintenance of the cover.

Radiation Above Ground. A survey of the gamma radiation exposure rate in air about one meter above the surface of each burial site is performed annually. If the exposure rate were to exceed 50 uR/hr over an area greater than 100 square meters, Stepan would consider appropriate action, such as additional cover, to keep personal exposure to the radiation within regulatory limits for members of the public.

Groundwater. Stepan has installed three monitoring wells near each of the three burial sites to measure any migration of radioactive material away from the burial pits in groundwater. Figure 1 describes the locations, and Appendix A describes the construction of these wells.

Groundwater, if present in sufficient amount, is sampled from each of the nine monitoring wells during each calendar quarter. Each water sample is analyzed for gross alpha activity or for specific radionuclides.

## Environmental Monitoring Results

### Visual Inspection

During the annual survey of gamma radiation above ground, the physical condition of the surface above and immediately adjacent each of the three burial sites is observed.

The burial site monitored by wells 1, 2, and 3, (ref. Figure 1) is beneath the concrete slab floor of a building. Land surface immediately adjacent the building is macadam. The burial site monitored by wells 4, 5, and 6 is a grass lawn. The burial site monitored by wells 7, 8, and 9 has a surface of macadam. The surfaces of these sites have remained essentially the same in appearance during the last 5 years.

### Radiation Above Ground

Each year, the gamma radiation exposure rate approximately one meter above the surface of each burial site and its immediate vicinity is surveyed. Measurements in the vicinity of the three burial sites during the last five years are recorded on a plan view of that part of the plant site, included herewith. The measurements do not appear to exhibit any systematic change during this period.

### Groundwater Monitoring

The nine groundwater monitoring wells were drilled in June, 1983, and were allowed to stabilize until initial sampling began in October and November, 1983. Subsequent to the initial samples, total alpha activity concentration in the groundwater samples has generally remained below 15 pCi/liter. The data, collected approximately quarterly, are summarized in Table 1. Monitoring well number 7 often has not contained enough water to allow an adequate volume of sample to be retrieved.

## Environmental Monitoring Program Conditions

The description of and data from Stepan's environmental monitoring of the licensed burial sites have been summarized. The generally low radioactivity concentrations observed in groundwater near the burial sites would seem to justify a twice yearly sampling and analysis frequency rather than the approximately quarterly frequency that has been followed. With that consideration, Stepan would like to adjust its environmental monitoring program to have the features described below.

The following surveys would be performed to monitor the three burial sites. A record of the results of each survey would be maintained.

#### Visual Inspection

The surface of each burial site would be examined visually at least once each year.

#### Radiation Above Ground

A survey of the gamma radiation dose rate in air about one meter above the surface of each burial site would be performed annually.

#### Groundwater

Groundwater in monitoring wells in the unconsolidated deposits overlying bedrock shown in Figure 1, if present in sufficient amount for analysis, would be sampled and analyzed regularly for radioactive material. Each well would be sampled and analyzed during each half of every calendar year.

Each water sample would be analyzed for dissolved gross alpha activity or for dissolved specific radionuclides. In the event the gross alpha activity concentration in well water exceeds 15 pCi/liter, water from that well would be re-sampled and re-analyzed. In the event the results confirm gross alpha activity in excess of 15 pCi/liter, water sampled from that well would be analyzed for thorium, uranium, and radium. If it were determined that the radioactivity concentration (except radon) in monitoring well water exceeds 50 pCi Ra-226 + Ra-228/liter, or 150 pCi gross alpha/liter (i.e., 10 times the USEPA Interim Primary Drinking Water Standard) Stepan would evaluate the migration potential and environmental significance, e.g., by additional groundwater monitoring and/or exposure pathway analysis.

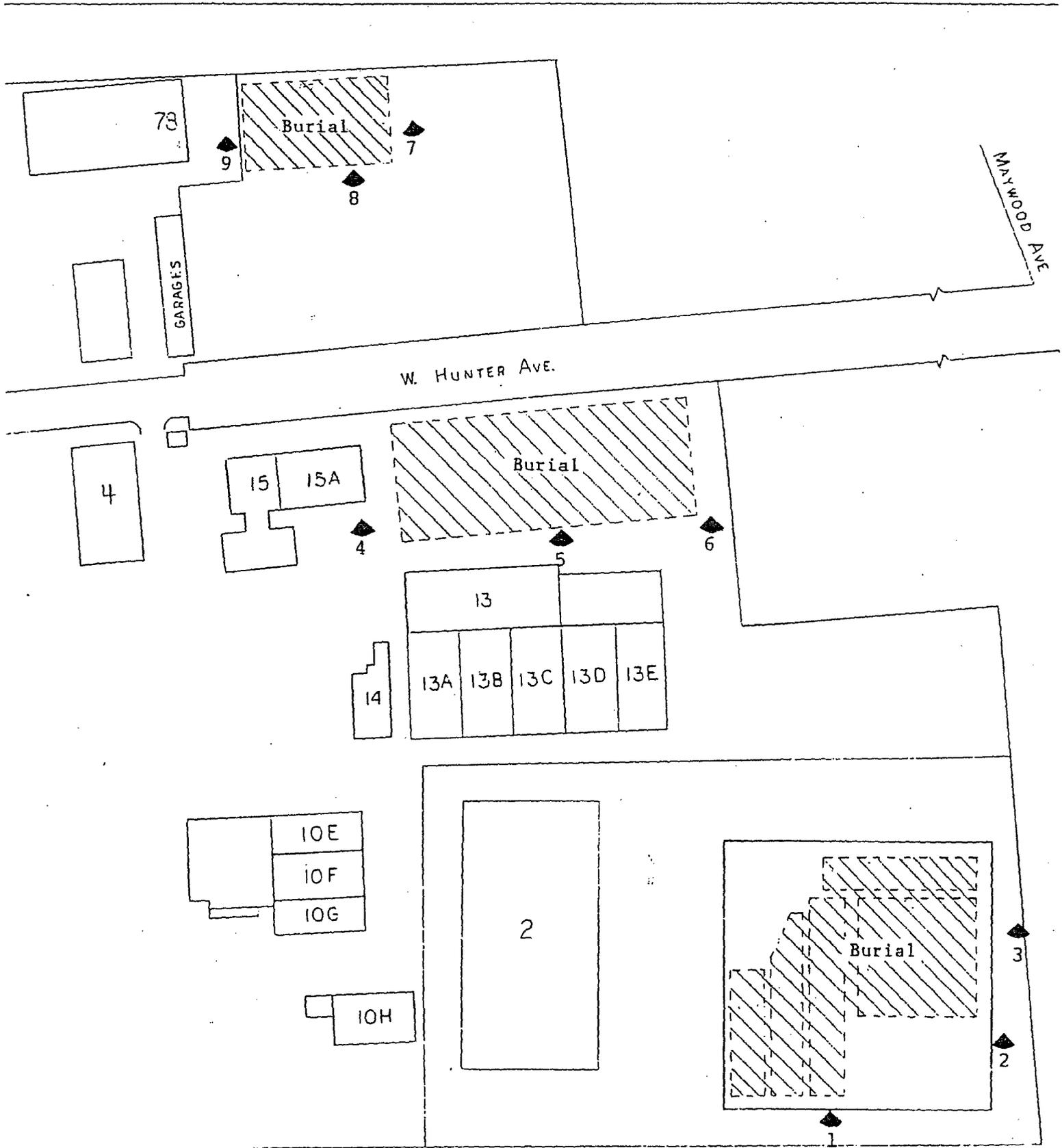


Figure 1. Location of Burial Sites and Monitoring Wells

APPENDIX A

BORING LOGS & WELL CONSTRUCTION DETAILS

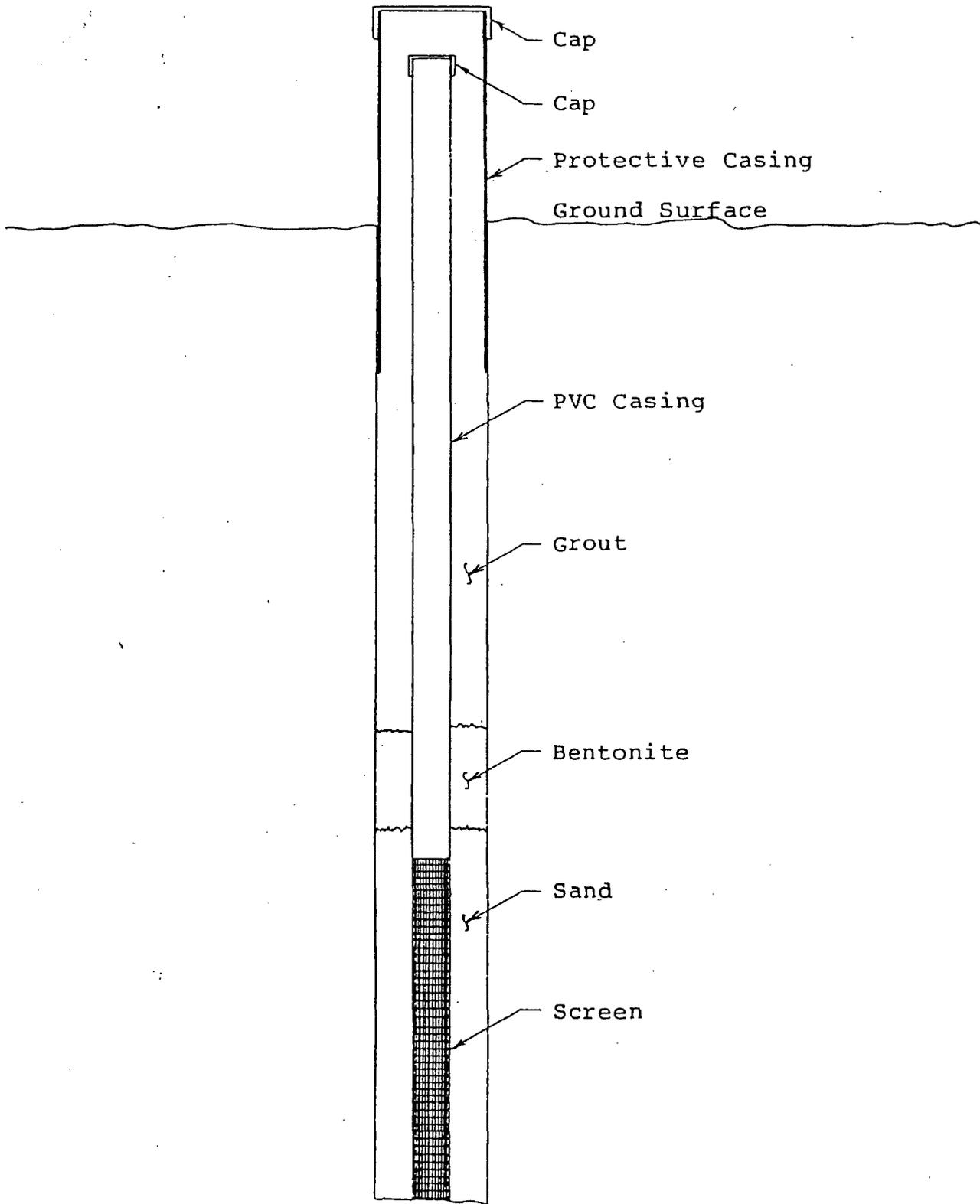


Figure 2. Monitoring Well

WELL LOG

WELL NO. 1

DATE DRILLED: 6/83

<u>DEPTH (FT.)</u>	<u>DESCRIPTION</u>
0 - 2	Asphalt cover underlain by fill containing concrete fragments and lumber (blow cts: 21-9-8-21)
2 - 4	Fill material containing concrete fragments and lumber (blow cts: 62-1-20-19)
4 - 6	Reddish brown silt with layer of fragmented, reddish brown mud/silt stone (blow cts: 16/2ft.)
6 - 8	Alternating layers of reddish brown clay, silt, and fine silty sand (blow cts: 9-19-16-22)
8 - 10	Sand grading to clay and poorly indurated mudstone, water at 9.5 ft. (blow cts:23-16-23-22)
10 - 12	Sand (10-11) underlain by reddish brown poorly indurated mudstone (11-12) (blow cts: 21-8-9-13)
12 - 14	Sand grading to silty sand with increasing clay content and mudstone fragments (blow cts: 14-20-26-26)
14 - 16	Interbedded mudstone and clay (64-67-57-100/2")

Water level measured 10/18/83:

WELL CONSTRUCTION DETAILS: Well #1

<u>DEPTH (FT.)</u>	
5 - 15	Screen
4 - 15	Sand packing
2 - 4	Bentonite seal
0 - 2	Grout

WELL LOG

WELL NO. 2

DATE DRILLED: 6/83

DEPTH (FT.)

DESCRIPTION

0 - 2	Asphalt cover underlain by fill material, poor sample recovery (blow cts: 13-3-1-2)
2 - 4	Loose silty fill material with some gravel and brick fragments (blow cts: 3-2-2-2)
4 - 6	Apparent fill material but no sample recovery (blow cts: 2-1-1-1)
6 - 8	Silty fill material grading to fine black fill material (charcoal?) at 6.5 ft (blow cts: 3-2-5-5)
8 - 10	Grey silt with poor sample recovery; water encountered at approximately 9.5 ft. (blow cts: 7-11-9-5)
10 - 12	Clayey silt grading to silty sand and fine to medium sand at 12 ft. (blow cts: 4-4-11-10)
12 - 14	Silty sand grading to clayey silt (blow cts: 19-12-20-21)
14 - 16	Fine to medium sand (blow cts: 22-19-20-25)
16 - 18	Fine sand (blow cts: 33-16-21-19)
18 - 20	Silty clay grading to weathered mudstone (blow cts: 32-26-19-60)

Water level measured 10/18/83: 11 ft. 2 in. from top of casing

WELL CONSTRUCTION DETAILS: Well #2

DEPTH (FT.)

9 - 19	Screen
8 - 19	Sand packing
6 - 8	Bentonite seal
0 - 6	Grout

WELL LOG

WELL NO. 3

DATE DRILLED: 6/83

<u>DEPTH (FT.)</u>	<u>DESCRIPTION</u>
0 - 2	Silty sand fill underlain by fine black fill (charcoal?) (blow cts: 2-1-1-2)
2 - 4	Cinders underlain by grey, clayey fill (blow cts: 2-2-1-2)
4 - 6	Grey clayey fill with some fine grit underlain by sandy silt grading to silty clay with a thin layer of sand at 6 ft; water a 4 ft. (blow cts: 2-3-6-22)
6 - 8	Weathered mudstone exhibiting encreasing competence with depth (blow cts: 13-16-18-32/4")
8 - 15	Mud/siltstone; drilled with roller bit - no samples taken

Water level measured 10/18/83: 5 ft. 8.5 in. from top of casing

WELL CONSTRUCTION DETAILS: Well #3

<u>DEPTH (FT.)</u>	
4 - 15	Screen
3.5 - 15	Sand pack
1.5 - 3.5	Bentonite seal
0 - 1.5	Grout

WELL LOG

WELL NO. 4

DATE DRILLED: 6/83

<u>DEPTH (FT.)</u>	<u>DESCRIPTION</u>
0 - 2	Red silty clay with some rock fragments (blow cts: 14-35-23-27)
2 - 4	Red silty clay with rock fragments
4 - 6	Red clay with rock fragments
6 - 9	Mudstone - auger refusal at 7 ft - continued drilling with roller bit
9 - 11	Alternating layers of silty clay, silt, and silty sand with some rock fragments (blow cts.-large spoon: 13-15-13-24)
11 - 15	Indurated sediments with vary degrees of induration/weathering as indicated by difficulty in drilling
15 - 17	Layer of poorly or non-indurated as indicated by ease of drilling
17 - 17.5	Indurated sediments with near refusal using large split spoon and hammer

Water level measured 10/19/83: 13 ft. 11.5 in. from top of casing

WELL CONSTRUCTION DETAILS: Well #4

<u>DEPTH (FT.)</u>	
6.5 - 16.5	Screen
5.5 - 16.5	Sand packing
3.5 - 5.5	Bentonite seal
0 - 3.5	Grout

WELL LOG

WELL NO. 5

DATE DRILLED: 6/83

<u>DEPTH (FT.)</u>	<u>DESCRIPTION</u>
0 - 4	Clayey silt with rock/mudstone fragments
4 - 6	Silty sand with rock fragments overlaying clayey silt with rock fragments (blow cts: 11-12-14-15) Water encountered at 4.5-5.0 ft.
6 - 8	Sandy silt overlaying clayey silt (blow cts: 16-19-16-23)
8 - 11	Indurated mudstone grading to fragmented rock with clayey silt (9-11 ft. blow cts: 95-60-46-36)
11 - 13	Indurated rock, rotary drilled with no samples

Water level measured 10/19/83: 8 ft. 1.5 in. from top of casing

WELL CONSTRUCTION DETAILS: Well #5

<u>DEPTH (FT.)</u>	
5 - 12	Screen
4 - 12	Sand packing
2 - 4	Bentonite seal
0 - 2	Grout

WELL LOG

WELL NO. 6

DATE DRILLED: 6/83

<u>DEPTH (FT.)</u>	<u>DESCRIPTION</u>
0 - 2	Gravel fill overlying fine sand (blow cts: 11-6-5-5)
2 - 4	Interbedded silty clays and silty sands with rock fragments grading to fractured silt/sandstone (blow cts:* 15-17-27-21)
4 - 6	Silty sand with some clay and rock fragments, water at 4 ft. (blow cts: 11-11-9-8)
6 - 8	Medium sand grading to silty clay with silt/mudstone fragments
8 - 9	Clay with mudstone fragments grading to indurated mudstone (blow cts:* 12-11-40/2 in.) refusal at 9 ft.

\* 300 lb. hammer and large spoon used

Water level measured 10/19/83: 7 ft. .5 in. from top of casing

WELL CONSTRUCTION DETAILS: Well #6

<u>DEPTH (FT.)</u>	
4 - 9	Screen
3.5 - 9	Sand packing
2 - 3.5	Bentonite seal
0 - 2	Grout

WELL LOG

WELL NO. 7

DATE DRILLED: 6/83

<u>DEPTH (FT.)</u>	<u>DESCRIPTION</u>
0 - 2	Asphalt and gravel underlain by red brown clayey silt (blow cts: 13-5-14-14)
2 - 4	Reddish brown clayey silt (blow cts: 10-9-11-12)
4 - 6	Silty sand with some clay and siltstone fragments (blow cts:12-30-19-17)
6 - 8	Fine silty sand with sandstone fragments (blow cts:* 12-17-11-13)
8 - 8.5	Silty clay with rock fragments grading to indurated mudstone, refusal at 8.5 ft.
8.5 - 19	Mud/silt/sandstone deposits with varying degrees of induration, rotary drilled with no samples

\* 300 lb. hammer used

Water level measured 11/7/83: 13 ft. 11 in. from top of casing

WELL CONSTRUCTION DETAILS: Well #7

<u>DEPTH (FT.)</u>	
19 - 16.5	Sand - unable to remove from borehole with water circulation
6.5 - 16.5	Screen
5 - 16.5	Sand packing
3 - 5	Bentonite seal
0 - 3	Grout

WELL LOG

WELL NO. 8

DATE DRILLED: 6/83

<u>DEPTH (FT.)</u>	<u>DESCRIPTION</u>
0 - 2	Reddish-brown silt
2 - 4	Reddish-brown silt (blow cts: 8-11-14-15)
4 - 6	Reddish-brown clayey silt grading to siltstone at 6 ft. (blow cts: 16-11-22-15)
6 - 8	Partially indurated deposits, poor spoon recovery (blow cts:* 11-12-15 12)
8 - 17	Mud/silt/sandstone deposits with varying degrees of induration, rotary drilled with no samples

\* 300 lb. hammer used

Water level measured 11/7/83: 14 ft. .5 in. from top of casing

WELL CONSTRUCTION DETAILS: Well #8

<u>DEPTH (FT.)</u>	
7 - 17	Screen
6 - 17	Sand packing
4 - 6	Bentonite seal
0 - 4	Grout

WELL LOG

WELL NO. 9

DATE DRILLED: 6/83

DEPTH (FT.)

DESCRIPTION

0 - 2	Clayey silt with cinders in top foot (blow cts: spoon pushed first foot; 16-13)
2 - 3	Silty clay with rock fragments grading to indurated deposits (blow cts: 12-19-30/3 in.) refusal at 3 ft.
3 - 20	Mud/silt/sandstone deposits with varying degrees of induration, rotary drilled with no samples

Water level measured 11/7/83: 19 ft. 1 in. from top of casing

WELL CONSTRUCTION DETAILS: Well #9

DEPTH (FT.)

9 - 19	Screen
7 - 19	Sand packing
5 - 7	Bentonite seal
0 - 5	Grout

Hold -

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APPENDIX B

SELECTED WELL RECOVERY TESTS

WELL RECOVERY DATA

WELL NO. 1

Time (min)	Depth (ft.) from top of casing
1	14.5
10	13.8
18	13.2
30	12.1
42	11.4
60	10.7
74	10.3
85	10.1
130	9.8

WELL RECOVERY DATA

WELL NO. 2

Time (min)	Depth (ft.) from top of casing
1	15.8
2.5	14.5
4	13.5
5	12.8
6	12.6
8	12.4
10	12.2
17	11.8
31	11.5

WELL RECOVERY DATA

WELL NO. 3

Time (min)	Depth (ft.) from top of casing
1	13.0
3	12.5
5	12.1
8	11.4
11	10.8
30	8.0
50	7.0