NUS CORPORATION
A Halliburton Company

130989
Oct '84 gw
sampling

# PROJECT FOR PERFORMANCE OF REMEDIAL RESPONSE ACTIVITIES AT UNCONTROLLED HAZARDOUS SUBSTANCE FACILITIES—ZONE 1

NUS CORPORATION
SUPERFUND DIVISION

R-585-2-5-2

# A FIELD TRIP REPORT FOR RAYMARK PREPARED UNDER

TDD NO. 8401-02
EPA NO. PA-678
CONTRACT NO. 68-01-6699

FOR THE

HAZARDOUS SITE CONTROL DIVISION
U.S. ENVIRONMENTAL PROTECTION AGENCY

FEBRUARY 20, 1985

NUS CORPORATION
SUPERFUND DIVISION

| SUBMITTED BY | REVIEWED BY | APPROVED BY |
|---|---|---|
| MARTIN R. HOWE | RICHARD CROMER | GARTH GLENN |
| GEOLOGIST/HYDRO. | ASST. MANAGER | MANAGER, FIT III |

Site Name: Raymark
TDD No.: F3-8401-02

# TABLE OF CONTENTS

# SECTION 1

# 1.0 INTRODUCTION

## 1.1 Authorization

NUS Corporation performed this work under Environmental Protection Agency Contract No. 68-01-6699. This specific report was prepared in accordance with Technical Directive Document No. F3-8401-02 for the Raymark site located in Hatboro, Pennsylvania.

## 1.2 Scope Of Work

The location of the proposed wells, pump testing requirements, and sampling parameters were designated by EPA Region III. All required subcontracting was performed according to the provisions of the Federal Procurement Regulations.

## 1.3 Summary

A project review meeting was held on site with EPA, in the early spring of 1984. The purpose of this meeting was to establish EPA's scope of work. At this meeting proposed well locations and alternate locations were designated. Pump testing and sampling requirements were identified. Also, existing wells, that would be utilized during the pump test and sampling were located. Upon review of EPA's requirements, it was determined that the most cost-effective approach to this project would be in phases. Phase I would consist of the drilling of bore holes and the installation of monitoring wells. Phase II would consist of the performance of the required pump testing with sampling being performed by FIT III.

Technical specifications were prepared and reviewed by EPA for Phase I of the project. Bids were solicited for this phase of the work in April 1984. The results of this solicitation were that only 1 bid was received; this bid was unreasonably high. In reviewing this situation with EPA, it was determined that this bid should be rejected and that a second solicitation should take place. The second solicitation resulted in an award, and drilling commenced on June 11, 1984. All drilling activities were performed under the direct supervision of NUS FIT III. Constant communication was maintained with the Site Investigation Officer during this phase of the project. Drilling was completed on June 20, 1984 and resulted in one 6-inch diameter and four 4-inch diameter monitoring wells being installed. All borings were advanced using air rotary drilling techniques. The as-solicited specifications are presented in appendix C and the boring logs are presented in appendix D. The subcontractor's report is attached in appendix I.

EPA's review of the specification and the solicitations of bids for the second phase of the project was concurrent with the drilling operations. This was done in order to prevent any unnecessary delays in completing the project. An award was made for Phase II on August 8, 1984, and field activities began on August 15, 1984. One of the initial requirements of this phase was the performance of a step test to determine maximum yields which would be used as the pumpage rate during the 24-hour pump test. The result of the step test demonstrated that this well produced insufficient yields of groundwater to conduct a meaningful pump test. Working on instructions received from EPA, various attempts were made to identify an acceptable well that would produce a sufficient yield of groundwater. All of these attempts failed; therefore, it was decided that, in the best interest of the project, this subcontract should be terminated. The subcontract was canceled on August 21, 1984. Attached in appendix E are the as-solicited specifications and in appendix J are the subcontractor's report, maps, and calculations.

During September 1984, meetings were held between EPA and FIT III in an effort to determine alternative sampling methods. EPA's recommended sampling plan and sampling methods are attached in appendix H. All sampling was performed in accordance with this plan during the last week of October 1984. Samples were shipped to the EPA Central Regional Laboratory in Annapolis for analysis. Results from these analyses are presented in attachment 1.

The following is a chronology of field events pertinent to the completion of this project. If we can be any further assistance to you in regards to this project, please do not hesitate to call.

# SECTION 2

# 2.0 FIELD TRIP REPORT

## 2.1 Synopsis of Daily Events

| | |
|---|---|
| June 8, 1984 | Subcontract awarded to Planning Design and Research Engineers (PDR) to drill bore holes and install monitoring wells. |
| June 11, 1984 | Subcontractor mobilized equipment to the job site. |
| June 12, 1984 | Subcontractor spent the day procuring equipment and supplies. |
| June 13, 1984 | Subcontractor decontaminated the drill rig and began drilling on R-3. |
| June 14, 1984 | Work continued on R-3. Bore hole was completed; final depth was 200 feet. |
| June 15, 1984 | Drill rig decontaminated and work began on R-2. Bore hole was completed; final depth was 170 feet. Permanent well casing was grouted in place for well R-2. |
| June 16, 1984 | Drill log was decontaminated and work began on R-1. Permanent well casing was grouted in place for well R-3. |
| June 18, 1984 | Work continued on R-1. Bore hole was completed; final depth was 170 feet. Permanent casing was installed and grouted in place for well R-1. Drill rig was decontaminated and work began on R-4. |
| June 19, 1984 | Completed drilling on R-4; final depth of the bore hole was 170 feet. Installed permanent casing and grouted it in place for well R-4. Decontaminated drill rig and began drilling R-5. Completed R-5; final depth of the bore hole was 170 feet. Installed permanent casing and grouted it in place for well R-5. |

June 20, 1984 — Performed final decontamination on the drill rig and associated equipment. Finished pouring cement aprons around the wells. Performed final cleanup of work areas. Demobilized equipment from the job site.

Listed below are static water levels for the newly constructed wells and the date these levels were obtained:

| | | |
|---|---|---|
| R-1 | 33.0 feet | 6/19/84 |
| R-2 | 33.4 feet | 6/19/84 |
| R-3 | 35.9 feet | 6/19/84 |
| R-4 | 36.5 feet | 6/19/84 |
| R-5 | 35.0 feet | 6/20/84 |

All water levels were taken with an electric drop line and depths were measured from the top of the casing.

August 8, 1984 — Subcontract was awarded to GMC Associates to develop the wells and for the performance of a pump test.

August 15, 1984 — Subcontractor mobilized equipment to the job site. Developed wells H-2, R-1, R-2, and R-4.

August 16, 1984 — Surveyor began work. Development of wells continued; wells that were developed included R-3, PF-1, FP-14, FP-13, and R-5.

August 17, 1984 — Static water levels were taken and the subcontractor prepared the equipment necessary to perform the step test.

August 20, 1984 — Began step test on well R-3. Well R-3 would not produce a sufficient yield to perform a meaningful pump test. Informed EPA of this situation. Working on instructions from EPA, it was decided to use well R-2 for the step test. Well R-2 was pumped dry after 4 minutes of pumping at 20 gallons per minute. EPA was informed of this and work ceased for the day.

August 21, 1984 — Working on instruction from EPA, it was determined that, in the best interest of the project, the subcontractor should be canceled. This decision was based on the fact that the wells produced insufficient amounts of groundwater; therefore, meaningful data could not be obtained. The subcontractor was informed of EPA's decision. He performed final cleanup of the work areas and demobilized his equipment from the site.

October 29 through 31, 1984 — Samples were obtained according to EPA's sampling plan and shipped to CRL for analysis.

The following is a table listing the volumes of water removed from wells prior to final sampling:

| Well Number | Calculated gallons to be removed | Actual Gallons Removed | Comments |
|---|---|---|---|
| R-1 | 264.98 | 843.75 | |
| R-2 | 259.90 | 328.00 | |
| R-3 | 697.50 | 652.50 | Pumped dry |
| R-4 | 259.99 | 344.00 | |
| R-5 | 235.99 | 798.75 | |
| RMK | 436.50 | 967.50 | |
| FP-13 | 625.95 | 832.50 | |
| FP-14 | 584.99 | 427.50 | Pumped dry |
| H-1 | 439.99 | 1615.00 | |

All wells were permitted to recharge prior to obtaining samples.

Site Name: Raymark
TDD No.: F3-8401-02

## SAMPLE POINTS

| Well Number | Elevation TOC* | Static Water Level | Sample Upper | Sample Middle | Sample Lower | Date |
|---|---|---|---|---|---|---|
| R-1 | 260.26 | 42.5 | 64.75 | 109.25 | 153.75 | 10/29/84 |
| R-4 | 262.55 | 46.0 | 68.00 | 111.00 | 154.00 | 10/29/84 |
| R-3 | 269.56 | 45.0 | 70.50 | 122.50 | 172.50 | 10/29/84 |
| R-4 | 270.30 | 42.0 | 65.00 | 108.32 | 150.65 | 10/30/84 |
| R-5 | 209.95 | 42.0 | 61.65 | 100.95 | 140.25 | 10/30/84 |
| FP-1 | 265.11 | 52.0 | 68.00 | 100.50 | 133.00 | 10/30/84 |
| FP-13 | 265.39 | 37.3 | 60.48 | 100.80 | 153.20 | 10/31/84 |
| FP-14 | 302.83 | 49.0 | 71.00 | 114.00 | 157.00 | 10/31/84 |
| H-1* | Not measured | 30.0 | ----- | 110.00 | ------- | 10/31/84 |

*TOC - Top of Casing (H-1 based on air line reading)

**All TOC elevations are based on mean sea level (MSL)

H-1 is located near H-2, but on a lower floor. H-2 was surveyed at 251.06.

Site Name: Raymark
TDD No.: F3-8401-02

## STATIC WATER LEVELS

| Well Number<br>Elevation TOC<br>Date | R-1<br>260.26 | R-2<br>262.55 | R-3<br>269.56 | R-4<br>270.30 | R-5<br>269.95 | PF-1<br>265.11 | FP-13<br>265.39 | FP-14<br>302.83 | H-1<br>----- | H-2<br>251.06 |
|---|---|---|---|---|---|---|---|---|---|---|
| 06/19/84 | 33.0 | 33.4 | 35.9 | 36.5 | | | | | | |
| 06/20/84 | | | | | 35.0 | | | | | |
| 08/15/84 | 39.3 | 38.9 | | 36.9 | | | | | | 36.0 |
| 08/16/84 | | | 38.5 | | 37.0 | 49.5 | 28.0 | 31.0 | | |
| 08/17/84 | 40.8 | 40.3 | 40.5 | 36.5 | 37.5 | 48.5 | 32.4 | 31.5 | | 56.0 |
| 08/20/84 | 41.4 | 41.0 | 40.5 | 37.5 | 37.3 | | | | | |
| 10/29/84 | 42.5 | 46.0 | 45.0 | | | 52.0 | | | | |
| 10/30/84 | | | | 42.0 | 42.0 | | | | | |
| 10/31/84 | | | | | | | 37.3 | 49.0 | 30.0 | |

## 2.2 PHOTOGRAPH LOG

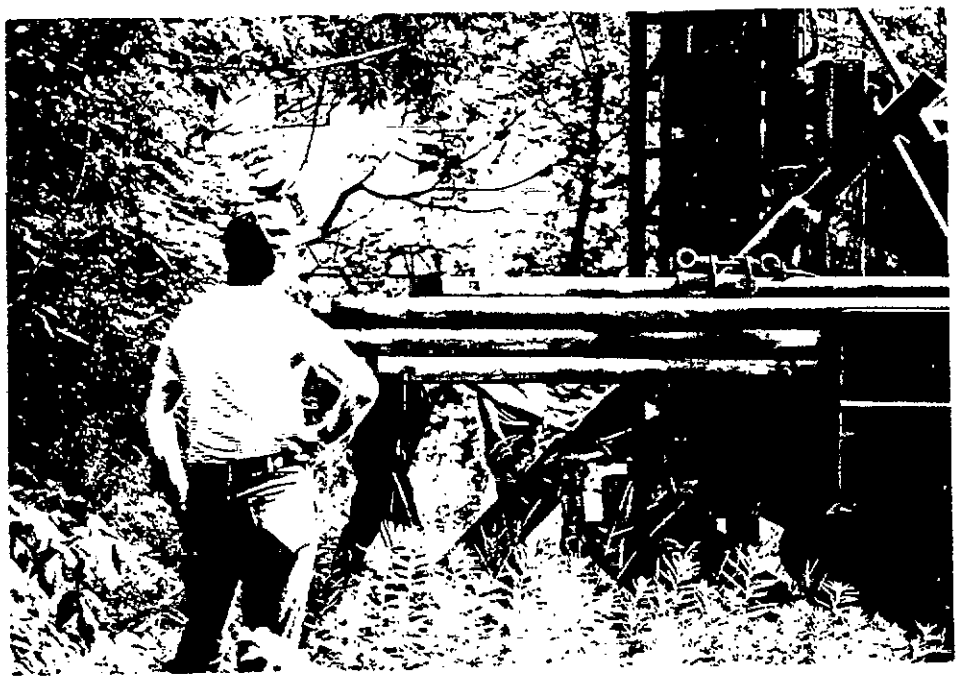


Photo 1 -
Drill rig being set up over R-3.

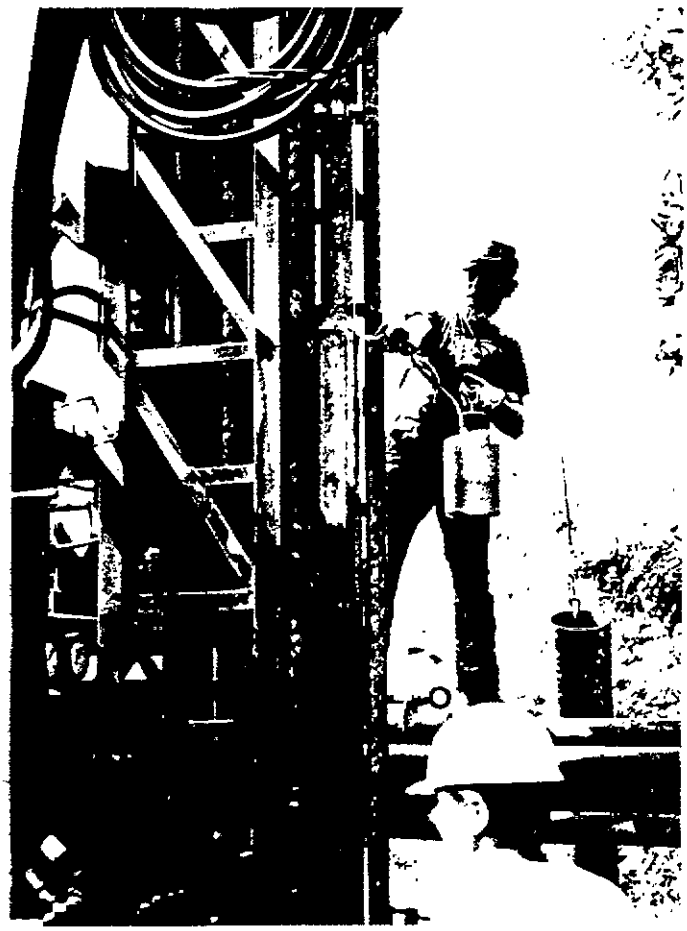


Photo 2 -
Hanlan Varden spraying methanol on drill rods and bit.

Raymark
F3-8401-02
6-13-84
Time: 0953

Photo # 1
Roll # 1
Neg. # 2
Log # Pg 10 #1

Subject: Drill rig being set up over R-3

Martin R. Howe

Raymark
F3-8401-02
6-13-84
Time: 1005

Photo #2
Roll #1
Neg. #3
Log # Pg. 10 #2

Subject:

Harlan Varden spraying methanol on drill rods and bit.

Martin R. Howe

AR001738

Photo 3 -
Houston Taylor steam cleaning outside of
casing.

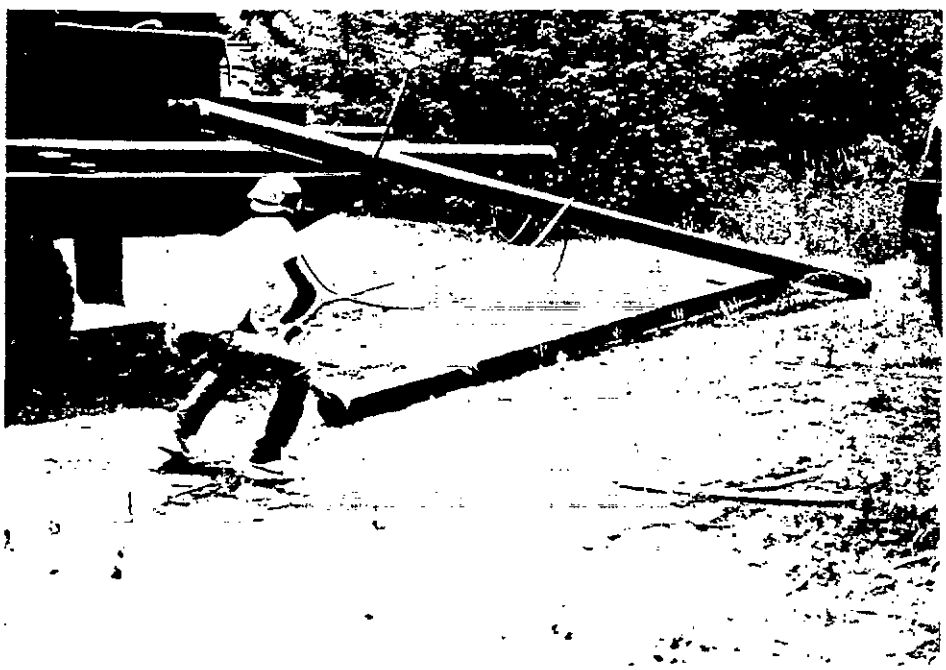


Photo 4 -
Houston Taylor steam cleaning inside of
casing.

Raymark
F3-8401-02
6-13-84
Time: 1518

Photo #3
Roll #1
Neg #4
Log # pg. 13 #3

Subject:

Houston Taylor steam cleaning
outside of casing.

Martin R. Howe
Martin R. Howe

Raymark
F3-8401-02
6-13-84
Time: 1518

Photo #4
Roll #1
Neg. #5
Log # pg. 13 #4

Subject:

Houston Taylor steam cleaning
inside of casing.

Martin R. Howe
Martin R. Howe

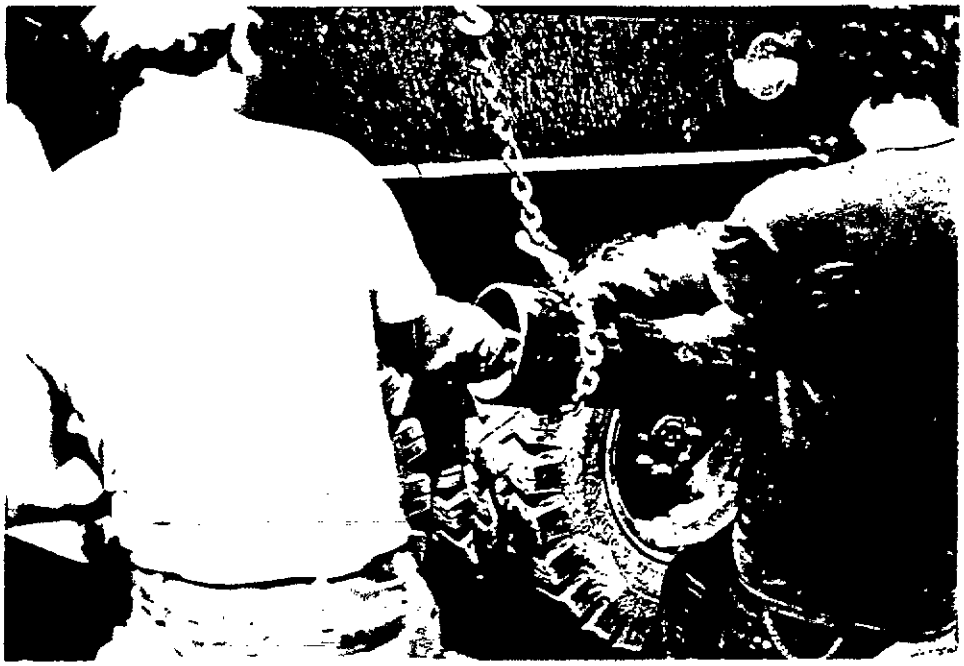


Photo 5 -
Bob Dean spraying methanol inside casing of R-3.

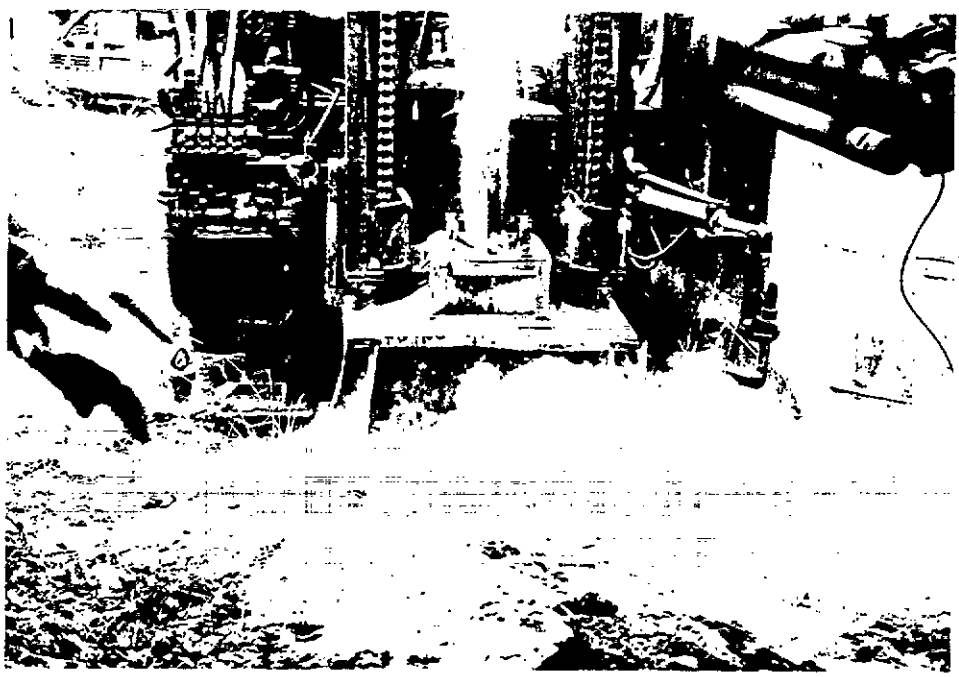


Photo 6 -
Cuttings being blown from R-3 at about 90 feet.

Raymark
F3-8401-02
6-14-84
Time: 1116

Photo #5
Roll #1
Neg #6
Log # pg 17 #6

Subject:

Bob Dean spraying methanol inside casing at R-3.

Martin R. Howe
Martin R. Howe

Raymark
F3-8401-02
6-14-84
Time: 1030

Photo #6
Roll #1
Neg #7
Log # pg 17 #5

Subject:

Cuttings being blown from R-3 at about 90 feet.

Martin R. Howe
Martin R. Howe

Photo 7 -
Cuttings from a red shale sandstone layer at R-3. Depth about 125 feet.

Photo 8 -
Cuttings from a sandstone layer at about 130 feet in R-3.

Raymark
F3-8401-02
6-14-84
Time: 1221

Photo #7
Roll #1
Neg #8
Log# pg. 18 #7

Subject:

Cuttings from a red shale-sandstone layer at R-3.
Depth about 125 feet.

Martin R. Howe
Martin R. Howe

Raymark
F3-8401-02
6-14-84
Time: ~1130

Photo #8
Roll #1
Neg. #10
Log# Not recorded

Subject:

Cuttings from a sandstone layer at about 130 feet in R-3.

Martin R. Howe
Martin R. Howe

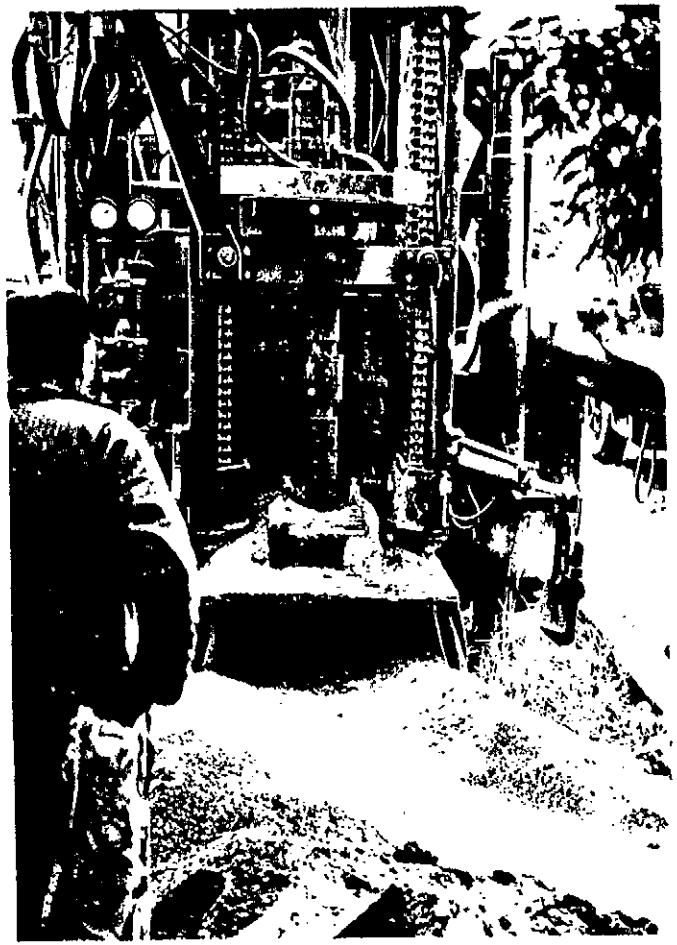


Photo 9 -
Water being blown from R-3 at about
140 feet.

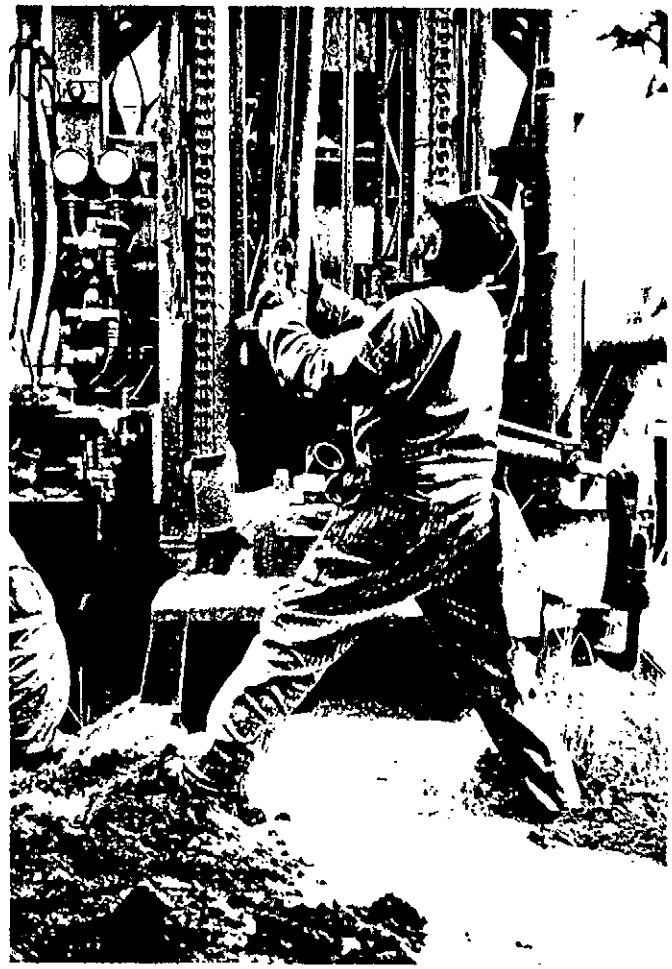


Photo 10 -
Grey arkosic sandstone hit at about
153 feet.

Raymark
F3-8401-02
6-14-84
Time: 1451

Photo #10
Roll #1
Neg #E(13)
Log # Pg 21
#10

Subject:

Grey arkosic sandstone
hit at about 153 feet.

Martin R. Howe
Martin R. Howe

Ray. rk
F3-8401-02
6-14-84
Time: 1358
Subject:

Photo #9
Roll #1
Neg: #12
Log # Pg 19
#9

Water being blown from
R-3 at about 140 feet.

Martin R. Howe
Martin R. Howe

AR301746

Photo 11 -
Water being blow out of R-3 at 200 feet
(second purge).

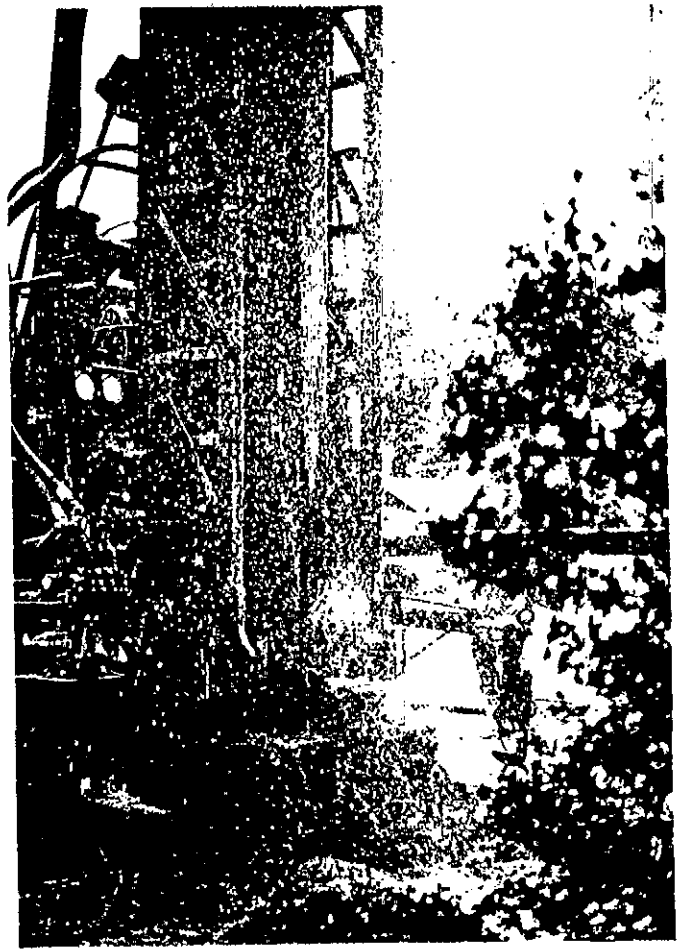


Photo 12 -
Well R-2 being blown a second time at
170 feet.

Raymark
F3-8401-02
6-15-84
Time: 1605

Photo #12
Roll #2
Neg. #3
Log # pg 26
#14

Subject:

well R-2 being blown a second time at 170 feet.

Martin R. Howe

Martin R. Howe

Raymark
F3-8401-02
6-14-84
Time: 1709

Photo #11
Roll #2
Neg # 5(0)
Log # pg. 23 #11

Subject:

Water being blown out of R-3 at 200 feet (second purge).

Martin R. Howe

Martin R. Howe

Photo 13 -
Collars used to make the casing "hang" in the borehole.

Photo 14 -
Grouting R-2.

Reynark
F3-8401-02
6-15-84
Time: 1634

Photo #13
Roll #2
Neg #4
Log # pg. Book 25 #16

Subject: Collars used to make the casing "hang" in the borehole.

Martin R. Howe
Martin R. Howe

Reynark
F3-8401-02
6-15-84
Time: 1725

Photo #14
Roll #2
Neg. #5
Log # pg. 27 #16

Martin R. Howe
Martin R. Howe

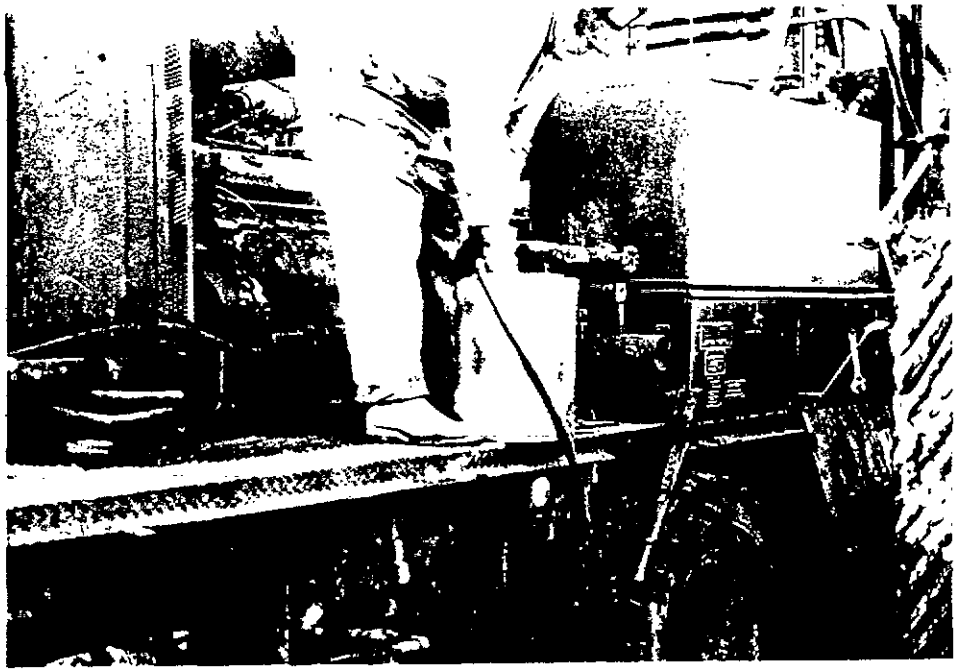


Photo 15 -
Walt Proctor cleaning the in-line air filter on the drill rig.

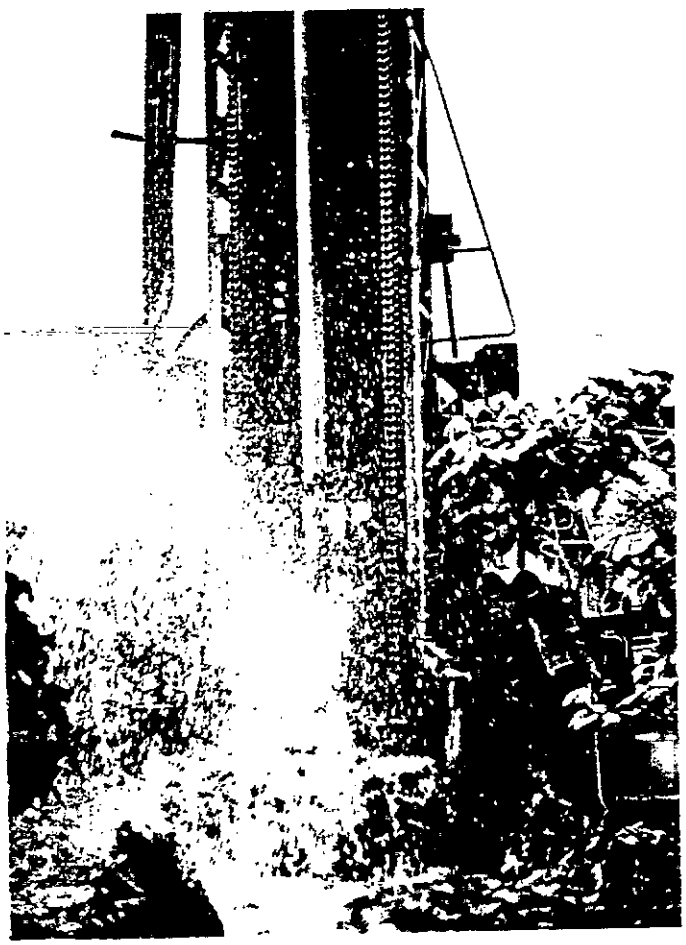


Photo 16 -
Well R-4 being blown a second time at 170 feet.

Raymark
F3-8401-02
6-16-84
Time: 0842

Photo #15
Roll #2
Neg #6
Log # Pg 28 #17

Subject: Walt Ford cleaning the in-line air filter on the drill rig.

Martin R. Howe
Martin R. Howe

Raymark
F3-8401-02
6-19-84
Time: 0942

Photo #16
Roll #2
Neg #10
Log # pg 32 #20

Subject:

Well R-4 being blown a second time at 170 feet.

Martin R. Howe
Martin R. Howe

Photo 17 -
Bob Dean adding 5 foot bentonite seal to R-4.

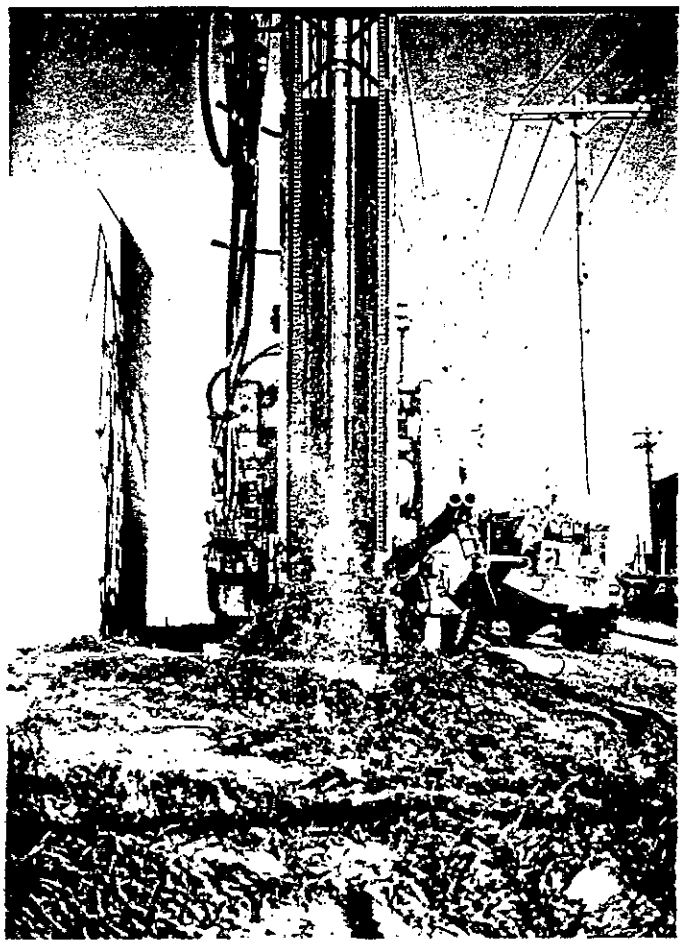


Photo 18 -
Well R-5 being blown a second time at 170 feet.

Raymark
FS-8401-02
6-17-84
Time: 1025

Photo # 17
Roll # 2
Neg # 11
Log # pg. 32 # 21

Subject:
Bob Dean adding 5 feet bentonite seal to R-4.

Martin R. Howe
Martin R. Howe

Raymark
FS-8401-02
6-18-84
Time: 1733

Photo # 18
Roll # 3
Neg # 1
Log # pg 37
Not recorded

Subject:
well R-5 being blown a second time at 170 feet.

Martin R. Howe
Martin R. Howe

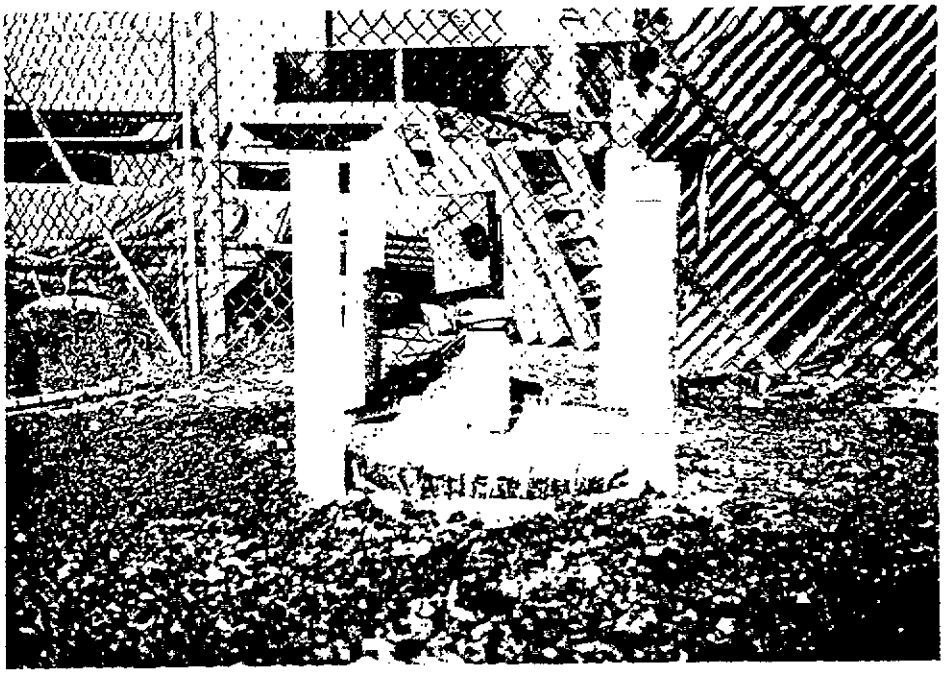


Photo 19 -
Well R-1

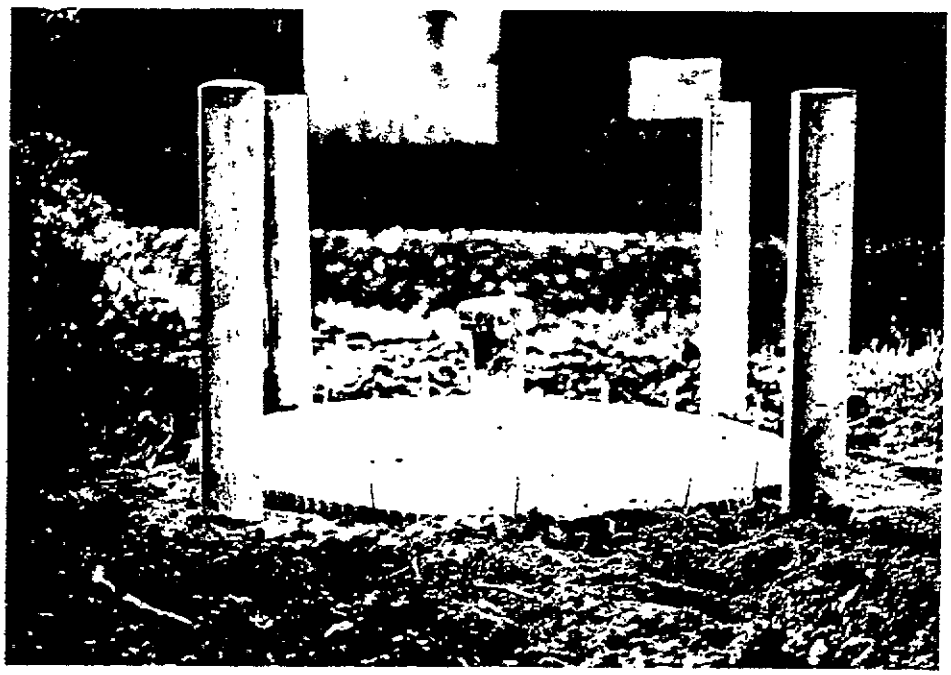


Photo 20 -
Well R-2

Raymark
F3-Sit-1-02
6-21-84
Time: 1045

Photo #19
Roll -3
Neg. -1
Log # pg 25 #23

Subject:
Well R-1

Eugene Dennis
Judith A. Delconte for ED
Judith A. Delconte

Raymark
F3-840-02
6-20-84
Time: 1045

Photo #20
Roll #30
Neg. #5
Log # pg. 35 #24

Subject: well R-2

Eugene Dennis
Martin R. Howe for
Eugene Dennis

Photo 21 -
Well R-3

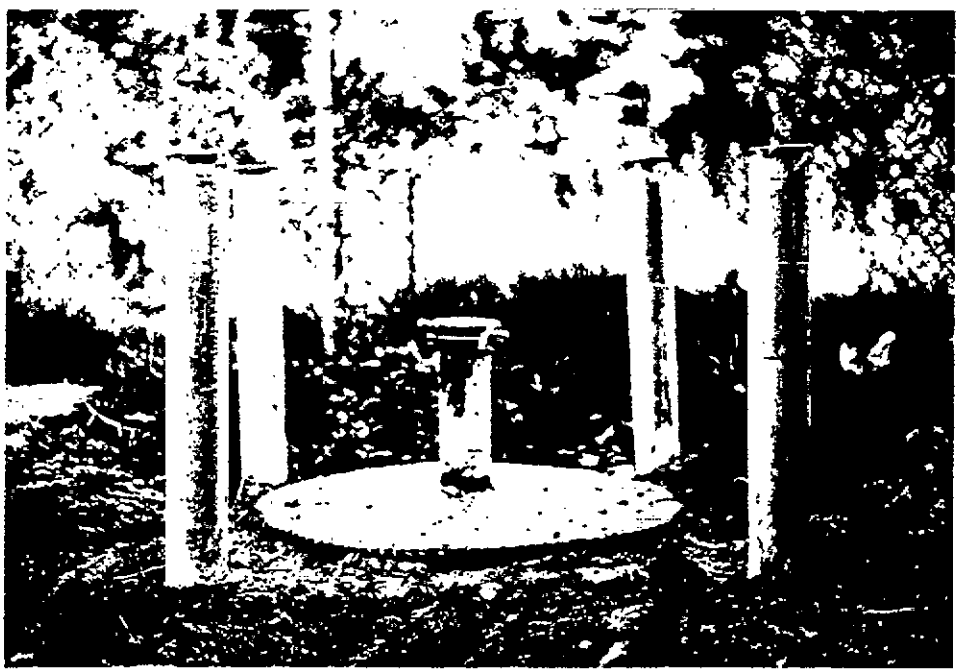


Photo 22 -
Well R-4

Raymark
F3-8401-02
6-20-84
Time: ~0745

Photo #21
Roll #3
Neg #6
Log # pg. 35
#25

Subject: Well R-3.

Eugene Dennis
Judith A. Delconte for ED
Judith A. Delconte

Raymark
F3-8401-02
6-20-84
Time: ~0745

Photo #22
Roll #3
Neg #7
Log # pg. 35 #26

Subject: Well R-4.

Eugene Dennis
Judith A. Delconte for ED
Judith A. Delconte

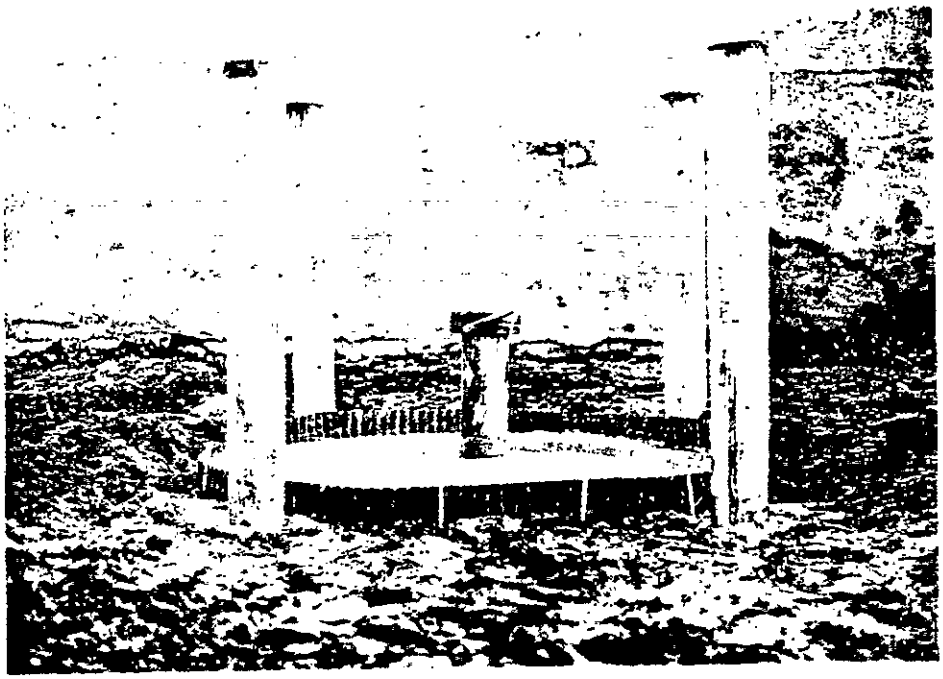


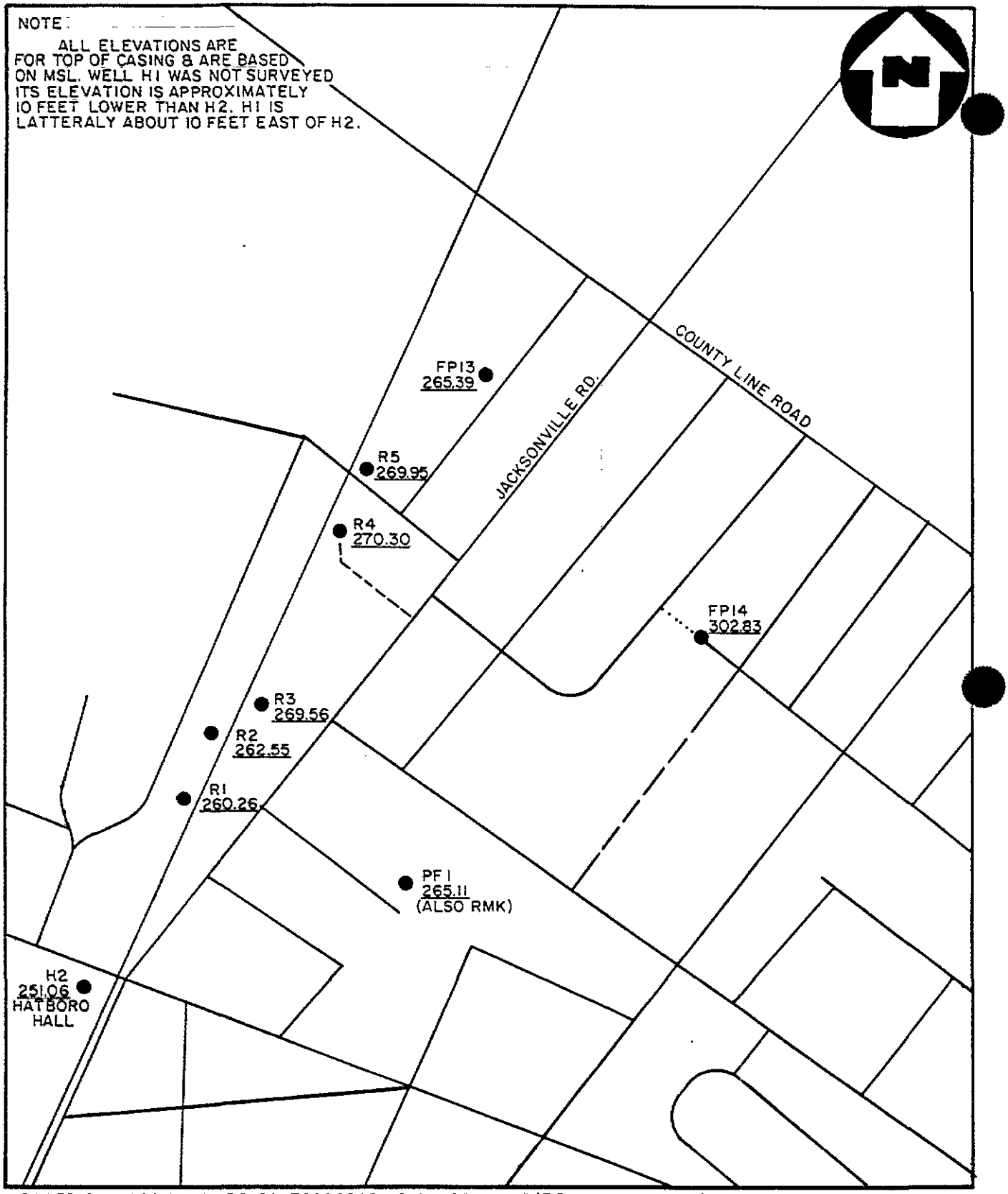
Photo 23 -
Well R-5

Raynet
FB-8+C1-02
6-20-8+
Time: ~0745
Subject: Will R-5

Photo #23
Roll #3
Neg. #8
Log # pg. 35 #27

..... Dennis
Judith A. Delcon... for ED
Judith A. D... ...te

ATTACHMENT 1




BASED ON USGS HATBORO, PA. TOPOGRAPHIC QUADRANGLE (7.5 MINUTE SERIES)

## SAMPLE LOCATION MAP

## RAYMARK, HATBORO, PA.

SCALE 1" = 50'

NUS CORPORATION
A Halliburton Company

AR301762

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
CENTRAL REGIONAL LABORATORY
839 BESTGATE ROAD
ANNAPOLIS, MARYLAND 21401

November 26, 1984

Mr. Martin Howe
NUS Corporation
992 Old Eagle School Road
Suite 916
Wayne, Pennsylvania 19087

Dear Mr. Howe:

Enclosed please find the organic analysis report for the Raymark sampling site. This report includes the samples from the three sampling days of October 29, October 30, and October 31.

Sincerely,

Dan Donnelly

Daniel K. Donnelly
Chief, Annapolis Laboratory

DKD:jr

Enclosure
a/s

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
CENTRAL REGIONAL LABORATORY
839 BESTGATE ROAD
ANNAPOLIS, MARYLAND 21401

301-224-2740
FTS-922-3752

DATE : November 26, 1984

SUBJECT: Raymark: Water Samples for TCE, PCE and other VOA's by Hall Detector with GC/MS Confirmation, Superfund Removal Enforcement 5TGB03R578 (10/31/84 - 11/16/84), 841030-05-13; 841031-05-21; 841101-01 - 11

FROM : Rick Dreisch
Cheimist

TO : Daniel K. Donnelly
Chief, Annapolis Lab

THRU : John Austin
Team Leader, Organic Analysis Section

The above samples were analyzed for the presence of Trichloroethylene (TCE), Tetrachloroethylene (PCE) and 1,1,1-Trichloroethane by the Hall detector using standard gas chromatography techniques. Other compounds identified by the Hall detector were noted when those peaks were prominent (generally >5 ppb). The identification of all peaks are speculative in the GC runs since dual column chromatography was not employed. However, all peaks identified are considered positive identification except the compounds trans + cis-1,2-Dichloroethylene. No cis-1,2-Dichloroethylene standard was available to compare with the standard run. The cis- compound is believed to occur after the trans isomer on this column but within the same retention window. GC/MS confirmation was performed after the GC analysis and all peak identification associated with those runs are highly confident.

Sample Description:

| Lab No. | Description |
|---|---|
| 841030-05 | Raymark, R1U, Sta. 1 |
| -06 | Raymark, R1M, Sta. 2 |
| -07 | Raymark, R1L, Sta. 3 |
| -08 | Raymark, R2U, Sta. 4 |
| -09 | Raymark, R2M, Sta. 5 |
| -10 | Raymark, R2L, Sta. 6 |
| -11 | Raymark, R3U, Sta. 7 |
| -12 | Raymark, R3M, Sta. 8 |
| -13 | Raymark, R3L, Sta. 9 |
| 841031-05 | Raymark, R1F, Sta. 10 |
| -06 | Raymark, R2F, Sta. 11 |
| -07 | Raymark, R3F, Sta. 12 |
| -08 | Raymark, RKU, Sta. 13 |
| -09 | Raymark, RKM, Sta. 14 |
| -10 | Raymark, RKL, Sta. 15 |
| -11 | Raymark, RKF, Sta. 16 |
| -12 | Raymark, R5U, Sta. 17 |

Sample Description (Con't):

| | |
|---|---|
| 841031-13 | Raymark, R5M, Sta. 18 |
| -14 | Raymark, R5L, Sta. 19 |
| -15 | Raymark, R5F, Sta. 20 |
| -16 | Raymark, Blank 10-29-84, Sta. 31 |
| -17 | Raymark, Blank 10-30-84, Sta. 32 |
| -18 | Raymark, R4U, Sta. 34 |
| -19 | Raymark, R4M, Sta. 35 |
| -20 | Raymark, R4L, Sta. 36 |
| -21 | Raymark, R4F, Sta. 37 |
| 841101-01 | Raymark, FP13U, Sta. 21 |
| -02 | Raymark, FP13M, Sta. 22 |
| -03 | Raymark, FP13L, Sta. 23 |
| -04 | Raymark, FP13F, Sta. 24 |
| -05 | Raymark, FP14U, Sta. 25 |
| -06 | Raymark, FP14M, Sta. 26 |
| -07 | Raymark, FP14L, Sta. 27 |
| -08 | Raymark, FP14F, Sta. 28 |
| -09 | Raymark, H1I, Sta. 29 |
| -10 | Raymark, H1F, Sta. 30 |
| -11 | Raymark, Blank 10-31-84, Sta. 33 |

Samples 841030-05 - 13 detection limit 1 ug/L
Sample 841030-05 detection limit 5 ug/L
Sample 841031-06 detection limit 10 ug/L
Samples 841031-07 - 11, 16 detection limit 1 ug/L
Samples 841031-12 - 15, 17-21 detection limit 10 ug/L
Samples 841101-01 - 11 detection limit 10 ug/L

Detection limits vary due to uncertainty of sample concentration. Due to the large amount of samples, some samples were run diluted 5 or 10x and the remainder straight.

GC/MS Selected Analysis Confirmation

| | 841030-05 | | 841031-07 | | 841101-03 | | 841101-07 | |
|---|---|---|---|---|---|---|---|---|
| | GC | GC/MS | GC | GC/MS | GC | GC/MS | GC | GC/MS |
| | ug/L | | ug/L | | ug/L | | ug/L | |
| 1,1-Dichloroethylene | 14 | 16 | X[2] | 9 | X[2] | 2 | -- | -- |
| 1,1,1-Trichloroethane | 50 | 54 | 16 | 17 | 5 | 8 | X[2] | Trace |
| Trichloroethylene | 190 | 190 | 2550 | >1000 | 49 | 40 | 4 | 5 |
| 1,1-Dichloroethane | -- | -- | X[2] | 2 | X[2] | 1.0 | -- | -- |
| Chloroform | -- | -- | X[2] | 5 | -- | -- | -- | -- |
| Carbon Tetrachloride | -- | -- | 10 | 9 | -- | -- | -- | -- |
| Tetrachloroethylene | -- | -- | 36 | 22 | X[2] | 1.4 | -- | -- |
| cis-1,2-Dichloroethylene | X[2] | (19) | X[2] | (5) | X[2] | (9) | -- | -- |
| 1,1,2-Trichloro-1,2,2-Triluoroethane | -- | -- | X[2] | (Trace) | -- | -- | -- | -- |
| Methylene Chloride | -- | -- | -- | -- | X[2] | 1.1 | X[1] | 2.3 |
| Trichlorofluoromethane | -- | -- | -- | -- | X[2] | (1) | -- | -- |

X[2] = Peaks noted not quantitated on GC runs.
GC/MS Detection Limits are a nominal 1 ppb (ug/L).

GC/MS QA Summary

| | Average % Recovery |
|---|---|
| | 11/8 |
| Bromochloromethane | 104 ± 4 |
| 1,4-Dichlorobutane | 98 ± 2 |
| para-Bromofluorobenzene | 97 ± 8 |
| n = | 6 |

RD:ad

cc: P. J. Krantz
QAO, CRL

GC R[illegible] Data

| | Lab No. | Trichloro-ethylene ug/L | 1,1,1-Trichloro-ethane ug/L | Carbon Tetra-chloride ug/L | Tetrachloro-ethylene ug/L | Chloroform ug/L | 1,1-Dichloro-ethylene ug/L | trans-1,2-Dichloro-ethylene ug/L | cis-1,2-Dichloro-ethylene ug/L |
|---|---|---|---|---|---|---|---|---|---|
| R1U | 841030-05 | 190 | 50 | -- | -- | -- | 14 | -- | -- |
| R1M | -06 | 1400 | 46 | -- | -- | -- | 22 | 6 | -- |
| R1L | -07 | 2300 | 55 | -- | -- | -- | 15 | 13 | -- |
| R2U | -08 | 540 | 9 | 22 | -- | 3 | 3 | 20 | -- |
| R2M | -09 | 620 | 31 | 23 | -- | 4 | 7 | 22 | -- |
| R2L | -10 | 500 | 9 | 16 | -- | 2 | 4 | 20 | -- |
| R3U | -11 | 1600 | 16 | 1 | 23 | 6 | 33 | 3 | -- |
| R3M | -12 | 1500 | 14 | 9 | 23 | 7 | 63 | 3 | -- |
| R3L | -13 | 1800 | 11 | 10 | 5 | 6 | 5 | -- | -- |
| R1F | 841031-05 | 3300 | 95 | -- | -- | -- | -- | -- | -- |
| R2F | -06 | 420 | 7 | 17 | -- | -- | -- | -- | -- |
| R3F | -07 | 2550 | 16 | 10 | 36 | -- | -- | -- | -- |
| RKU | -08 | 4100 | -- | -- | -- | -- | -- | -- | 65 |
| RKM | -09 | 800 | -- | -- | -- | -- | 9 | -- | 6 |
| RKL | -10 | 1100 | -- | -- | -- | -- | -- | -- | 6 |
| RKF | -11 | 3500 | -- | -- | -- | -- | 35 | -- | 6 |
| R5U | -12 | 375 | -- | -- | 32 | -- | -- | -- | 124 |
| R5M | -13 | 110 | -- | -- | 18 | -- | -- | -- | 95 |
| R5L | -14 | 230 | -- | -- | 19 | -- | -- | -- | 100 |
| R5F | -15 | 350 | -- | -- | 83 | -- | -- | -- | 130 |
| BLANK 10-29 | -16 | 2 | -- | -- | -- | -- | -- | -- | -- |
| BLANK 10-30 | -17 | 25 | -- | -- | -- | -- | -- | -- | -- |
| R4U | -18 | 4100 | -- | 15 | 130 | 19 | 85 | 195 | -- |
| R4M | -19 | 1000 | -- | 34 | 66 | 14 | -- | 36 | -- |
| R4L | -20 | 900 | -- | 31 | 130 | 21 | -- | 31 | -- |
| R4F | -21 | 3800 | -- | 8 | 89 | 14 | -- | 195 | -- |
| FP13U | 841101-01 | 30 | -- | -- | -- | -- | -- | -- | -- |
| FP13M | -02 | 69 | -- | -- | -- | -- | -- | -- | -- |
| FP13L | -03 | 49 | 5 | X[1] | -- | -- | -- | -- | -- |
| FP13F | -04 | 67 | -- | -- | -- | -- | -- | -- | -- |
| FP14U | -05 | 38 | -- | -- | -- | -- | -- | -- | -- |
| FP14M | -06 | 4 | -- | -- | -- | -- | -- | -- | -- |
| FP14L | -07 | 4 | -- | -- | -- | -- | -- | -- | -- |
| FP14F | -08 | 9 | -- | -- | -- | -- | -- | -- | -- |
| HI Initial | -09 | 19 | -- | -- | -- | -- | -- | -- | -- |
| HIF | -10 | 17 | -- | -- | -- | -- | -- | -- | -- |
| BLANK 10-31 | -11 | 9 | -- | -- | -- | -- | -- | -- | -- |

X[1] = Peak noted not quantitated
Values not corrected for blank contribution.

U - middle of upper 1/3 of water column
M - middle of middle 1/3 of water column
L - middle of lower 1/3 of water column
F - Final sample - composite

APPENDIX A

1. COST CENTER:

ACCOUNT NO.:

**REM/FIT ZONE CONTRACT**
**TECHNICAL DIRECTIVE DOCUMENT (TDD)**

2. NO.: F3-8401-02

3. PRIORITY:
- ☐ HIGH
- ☒ MEDIUM
- ☐ LOW

4. ESTIMATE OF TECHNICAL HOURS: 600 *

4A. ESTIMATE OF SUBCONTRACT COST: $90,000.00

5. EPA SITE ID: PA-678

5A. EPA SITE NAME: Raymark

6. COMPLETION DATE: 3 wks after QA complete

7. REFERENCE INFO.:
- ☒ YES ☐ NO
- ☒ ATTACHED
- ☐ PICK UP

8. GENERAL TASK DESCRIPTION: Subcontract drilling installation of 5 monitoring wells and pump testing. Sampling will be performed as directed by EPA.

9. SPECIFIC ELEMENTS:

1.) Establish scope of work with Robin Aitken.
2.) Subcontract according to scope of work and specifications developed by EPA.
3.) Prepare a Sampling Plan in conjunction with EPA.
4.) Make contract lab arrangements.
4A Well drilling To be complete by
5.) Conduct Sampling.
Arrange with CRL for
6.) ~~Perform~~ Quality Assurance of Lab data according to standard protocol.
7.) Submit a formal report.

10. INTERIM DEADLINES:

MAY 30, 1984 HC
JUNE 15, 1984 HG

11. DESIRED REPORT FORM: FORMAL REPORT ☒ LETTER REPORT ☐ FORMAL BRIEFING ☐

OTHER (SPECIFY): Contact Robin Aitken prior to work.

12. COMMENTS: * authorized overtime for ~~12~~ 24 hour pump testing and as required during drilling operations. HAB

13. AUTHORIZING RPO: Harold G Byer (SIGNATURE) 14. DATE: 3/21/84

15. RECEIVED BY: ☒ ACCEPTED ☐ ACCEPTED WITH EXCEPTIONS ☐ REJECTED (CONTRACTOR RPM SIGNATURE) 16. DATE: 3/22/84

Sheet 1 White – FITL Copy
Sheet 2 Canary – DPO Copy
Sheet 3 Pink – Contracting Officer's Copy (Washington, D. C.)
Sheet 4 Goldenrod – Project Officer's Copy (Washington, D. C.)

| 1. COST CENTER: | REM/FIT ZONE CONTRACT<br>TECHNICAL DIRECTIVE DOCUMENT (TDD) | 2. NO.: |
|---|---|---|
| ACCOUNT NO.: | | F3-8401-02A |

| 3. PRIORITY: | 4. ESTIMATE OF TECHNICAL HOURS: | 5. EPA SITE ID: | 6. COMPLETION DATE: | 7. REFERENCE INFO.: |
|---|---|---|---|---|
| ☐ HIGH | 900* | PA-678 | | ☒ YES ☐ NO |
| ☒ MEDIUM | 4A. ESTIMATE OF SUBCONTRACT COST: | 5A. EPA SITE NAME: | | ☒ ATTACHED |
| ☐ LOW | $ 90,000.00 | Raymark<br>Hatboro, PA | 3 wks after completion of pump test. | ☐ PICK UP |

8. GENERAL TASK DESCRIPTION: Subcontract drilling, installation of monitoring wells and pump testing. Sampling will be performed as directed by EPA.

9. SPECIFIC ELEMENTS:

1.) Establish scope of work with Robin Aitken.
2.) Subcontract according to scope of work and specifications developed by EPA.
3.) Prepare sampling plan in conjunction with EPA.
4.) Make contract lab arrangements.
5.) Conduct sampling.
6.) Arrange with CRL for Quality Assurance of lab data according to standard protocol.
7.) Submit a formal field trip report.

10. INTERIM DEADLINES:

11. DESIRED REPORT FORM: FORMAL REPORT ☒ LETTER REPORT ☐ FORMAL BRIEFING ☐

OTHER (SPECIFY): Contact Robin Aitken prior to work.

12. COMMENTS: Authorized overtime for pump testing and as required during drilling operations.
*Amendment due to additional hours required during drilling and to additional manpower requirements during pump test.

13. AUTHORIZING RPO: Harold G Byer (SIGNATURE) — 14. DATE: 7/2/84

15. RECEIVED BY: ☒ ACCEPTED ☐ ACCEPTED WITH EXCEPTIONS ☐ REJECTED
(CONTRACTOR RPM SIGNATURE) — 16. DATE: 7/6/84

Sheet 1 White — FITL Copy
Sheet 2 Canary — DPO Copy
Sheet 3 Pink — Contracting Officer's Copy (Washington, D. C.)
Sheet 4 Goldenrod — Project Officer's Copy (Washington, D. C.)

5-12
523

| 1. COST CENTER: | REM/FIT ZONE CONTRACT<br>TECHNICAL DIRECTIVE DOCUMENT (TDD) | 2. NO.: |
|---|---|---|
| ACCOUNT NO.: | | F3-8401-02B |

| 3. PRIORITY: | 4. ESTIMATE OF TECHNICAL HOURS: | 5. EPA SITE ID: | 6. COMPLETION DATE: | 7. REFERENCE INFO.: |
|---|---|---|---|---|
| ☐ HIGH<br>☒ MEDIUM<br>☐ LOW | 1100* | PA-678 | 3 wks after completion of sampling | ☒ YES ☐ NO<br>☒ ATTACHED<br>☐ PICK UP |
| | 4A. ESTIMATE OF SUBCONTRACT COST: | 5A. EPA SITE NAME: | | |
| | $90,000.00 | Raymark<br>Hatboro, PA | | |

8. GENERAL TASK DESCRIPTION: Subcontract drilling, installation of monitoring wells and pump testing, perform sampling as directed by EPA (enforcement support)

9. SPECIFIC ELEMENTS:

1.) Establish scope of work with Robin Aiken.
2.) Prepare specifications and procure subcontractor.
3.) Arrange with CRL for lab analysis and Quality Assurance Review of lab data.
4.) Take and ship samples according to standard protocol and instructions from EPA (see attached)
5.) Sample results and quality assurance review to be submitted to EPA Region III by CRL.
6.) Prepare and submit formal field trip report.

10. INTERIM DEADLINES:

11. DESIRED REPORT FORM: FORMAL REPORT ☒ LETTER REPORT ☐ FORMAL BRIEFING ☐

OTHER (SPECIFY): Coordinate all activities with Robin Aiken. - Enf Support

*Authorized overtime during drilling operations and pump test if needed.

12. COMMENTS: Ammendment A due additional hours required during drilling operations Ammendment B due to additional manhours required during sampling operations.
State code 042 County code 017

13. AUTHORIZING RPO: Harold G Bya (SIGNATURE) — 14. DATE: 1/2/85

15. RECEIVED BY: ☒ ACCEPTED ☐ ACCEPTED WITH EXCEPTIONS ☐ REJECTED
(CONTRACTOR RPM SIGNATURE) — 16. DATE: 1/7/85

Sheet 1 White – FITL Copy
Sheet 2 Canary – DPO Copy
Sheet 3 Pink – Contracting Officer's Copy (Washington, D. C.)
Sheet 4 Goldenrod – Project Officer's Copy (Washington, D. C.)

APPENDIX B

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region III – 6th & Walnut Sts.
Philadelphia, Pa. 19106

RECEIVED
MAR 06 1984
NUS CORPORATION
REGION III
SENT TO

SUBJECT: Proposed Sampling Schedule: Raymark Pump Test

DATE: MAR 06 1984

FROM: S. Stephen Platt, Hydrologist
Ground Water Protection Section (3WM42)

TO: Robin Aitken
Waste Enforcement Section (3AW22)

Provided below is the proposed sampling schedule and guidelines for the Raymark pump test. If you should have any questions please give me a call at 7-9017.

- One designated well will be pumped for 24 hours.
- Water level will be recorded continuously at all wells (pumped and observation) with a continuous recording device during the pump test and for at least six (6) hours after the conclusion of the pumping.
- Water quality sampling will be done at the pumping well at only those times noted below. Water quality sampling at the observation wells will occur as follows:
  - One sample at each monitoring well at 0 minutes; then
  - Observation wells should be monitored for a drop in water level no less than once per hour.
  - Upon observing a water level decline in an observation well, a water quality sample should be taken as soon as possible thereafter and the time recorded. Subsequent samples should then be taken as close to the pumping well water quality sampling schedule outlined below.

Water Quality Sampling Schedule Pumped Well
(minutes from start)

| |
|---|
| 0 |
| 5 |
| 30 |
| 60 |
| 120 |
| 240 |
| 360 |
| 600 |
| 840 |
| 1080 |
| 1440 |
| 1880 (6 hours after conclusion of pumping) |

cc: Garth Glenn, NUS Corporation
Bob Geigengack, Univ. of PA.

AR301773

APPENDIX C

# TECHNICAL SPECIFICATIONS FOR THE

# DRILLING OF BOREHOLES AND THE

# INSTALLATION OF MONITORING WELLS AT THE

# RAYMARK SITE

# HATBORO, PENNSYLVANIA

# TDD NO. F3-8401-02



NUS CORPORATION

## SCOPE OF WORK

**Time is of the essence in the performance of this subcontract; therefore, all action taken by NUS and the subcontractor(s) shall be taken to that end, all work shall be performed in an expeditious and professional manner.**

General: Drilling of boreholes and the installation of five (5) monitoring wells at the Raymark site in Hatboro, Pennsylvania.

Site Location: The project site is located approximately 1/4 mile from the Hatboro Town Hall, near Jacksonville Road, along the Reading Railroad in Montgomery County, Pennsylvania. The 5 monitoring wells shall be located north of Montgomery Avenue and south of Meadowbrook Avenue. The approximate locations are shown on Figure 1.

Site Activities: The activities for this project will include the drilling of five (5) boreholes and the installation of five (5) permanent monitoring wells. One of the boreholes (designated R-3) will be developed into a 6 inch inside diameter monitoring well; the remaining four (4) boreholes (designated R-1, R-2, R-4, and R-5) will be developed into 4 inch inside diameter monitoring wells. All five (5) boreholes will be cased in the overburden layer and into rock at least 2 feet. The remainder of the borehole shall be uncased, with a final depth of the boreholes to be 170 feet or as directed by the NUS field representative. The diameter of the overburden portions of each borehole shall be sufficient size as to facilitate the installation of temporary casing which will allow further advancement of the borehole and will prevent caving. The diameter for the remainder of the boreholes shall be 6 inches for R-3 and 4 inches for R-1, R-2, R-4, and R-5. This temporary casing will remain in place until permanent casing has been installed. See the attached Details for construction methods. All drilling activities and well installation will be performed under the direct supervision of NUS.

Standards: The monitoring wells will be permanent installations to monitor groundwater contamination and shall be installed in such a manner as to meet NUS requirements for the construction of a well. All drilling equipment, tools and well installation material shall be of good quality and in proper working order. The wells shall be installed in boreholes advanced using air rotary drilling, unless otherwise specified and approved by NUS. The air system shall include an air line oil filter, frequently replaced to remove essentially all oil residues from the air compressor.

Well Development: The subcontractor shall be responsible for developing the wells to establish a recharge rate to the satisfaction of the NUS field representative. Upon completion of each borehole and prior to the removal of the temporary casing, each well will be blown for at least 15 minutes. After a well has been blown, it will be allowed to recharge. If the recharge rate is not satisfactory to the NUS field representative, the subcontractor will then blow the well a second time or as directed by the NUS field representative.

Well Installation: The well casing will be standard steel water well pipe with a minimum wall thickness of 0.25 inches. The casing shall be of 5 or 10 foot lengths threaded flush joint type. NUS has estimated that each well will need an average of 25 feet of casing. No grease, oil, or other petroleum-based materials will be applied to the threads. The well casing shall be free of rust and scale and will be decontaminated prior to installation. For each well, the casing shall be installed inside the temporary casing and will extend from a point at least 1 foot above ground surface, through the entire overburden sequence, and will be seated at least 2 feet into bedrock. The depth to bedrock must be approved by the NUS field representative prior to installing the well casing. The bedrock portion of the wells shall not be cased unless otherwise specified by the NUS field representative. After the well casing has been seated into bedrock, the temporary casing will be removed from the borehole. The annulus between the borehole wall and the well casing, for each well, will be sealed with a mixture of bentonite clay/grout. The consistency of this mixture will be subject to the approval of the NUS field representative. The well casing pipe shall be surrounded at ground surface by a minimum of 6 inch thick concrete slab extending at least 2 feet in all directions. The upper surface of this concrete slab, and its immediate surroundings, shall be gently sloping so as to drain away from the well and prevent ponding. The concrete shall be a mixture of Type I Portland cement, sand, coarse aggragate, and water in the proportion of at least five (5) 94 pound bags of cement per cubic yard of concrete, to not more than 35 gallons of clean water.

Well Security and Identification: Each well casing shall be cemented in place and shall be fitted with a lockable bonnet cap to secure the installation. All hardware necessary to secure the wells, including locks, will be provided by the subcontractor at his expense. Each of the wells will be secured using an approved hardened steel lock. All locks used to secure the wells shall be keyed alike. The security of each well shall be to the satisfaction of the NUS field representative. The subcontractor will relinquish a set of keys to the NUS field representative upon securing the first well installation. All remaining keys will be given to the NUS field representative upon securing the final well installation. Each bonnet cap shall bear the number of the well as indicated on the site location map and as designated by the NUS field representative. Each well installation will be protected with four (4) 4 inch diameter, schedule 40 steel pipes (bumpers). Each pipe will be a minimum of 5 feet in length and will be cemented at least 2 feet in the ground and filled with concrete (see Details, Figure 7).

Waste Collection and Storage: Any drilling spoils/cuttings, spent decontamination water, or solutions considered by the NUS field representative to be suspected or known hazardous wastes cannot and will not be discharged to the environment.

It shall be the responsibility of the subcontractor to collect, containerize and dispose of all those materials generated in connection with the work under these Specifications and deemed potentially hazardous by NUS. Those waste materials, deemed by NUS field personnel not to be suspected/known hazardous wastes, need not be collected and containerized. These non-hazardous wastes may, with the property owner's permission, be disposed of on site by the subcontractor. Potentially hazardous wastes shall be drummed and segregated according to liquid, sludge, or solid phases. These drums shall be clearly and permanently labeled as per instructions from the NUS field representative.

The subcontractor shall provide, in sufficient quantities, 55-gallon steel drum containers for this waste material. These drums shall meet the U.S. Department of Transportation (DOT) requirements for hazardous substance.

The subcontractor will not have to assume the responsibility nor the role of a hazardous waste generator. The EPA will assume the responsibility as a RCRA Generator and shall complete the necessary manifests, waste analyses, and records required as a generator.

The subcontractor shall be responsible for the proper shipping, handling, and disposal of these wastes. It shall be the subcontractor's responsibility to select a disposal facility and to inform the NUS/EPA of this selection.

Drilling Records: The subcontractor shall so conduct his work as to accurately determine the nature of each stratum encountered. The following data shall be recorded on the driller's log for each borehole and shall be provided to the NUS field representative at the end of each boring:

a. Well or bore hole number.
b. The date borehole was started and the date borehole or well was completed.
c. Driller and helpers names.
d. Type of drill rig used.
e. Weather conditions.
f Any location or other identification information as supplied to the subcontractor by NUS.
g. Diameter and type of casing or auger used.
h. Depth to top and bottom of different materials penetrated.
i. Depth to top and bottom of each stratum of rock encountered.
j. Final depth of the borehole.
k. Overburden shall be described and recorded in accordance with the following descriptions:
   (1) Kind - topsoil, loam, clay, silt, sand, gravel, etc.
   (2) Color - brown, gray, dark, light, etc.
   (3) Moisture - dry, moist, wet, very wet, etc.
l. Rock shall be described and recorded in accordance with the following descriptions:
   (1) Shale, sandstone, slate, limestone, etc.
   (2) Hardness - broken weathered, soft, medium, hard, very hard, etc.
m. Any other pertinent remarks such as type of drilling fluid used, any cavities or voids that may have been encountered, boulders in overburden layer, loss or gain of drilling fluid, loss of sample, etc.
n. It will also be noted on the driller's log if respiratory protective eqiupment was required for the boring or monitoring well, and if so, what type(s) of protection was required. If any accidents or injuries occurred during the drilling of the borehole or the installation of a monitoring well, the date, time, nature of accident or injury and personnel involved will also be so noted on the driller's log.
o. Description of air system, including equipment, manufacture model, air pressure used, frequency of oil filter change, and evaluation of air line filtering.

The driller's log should be kept up to date and is subject to review by the NUS field representative at any time during the operation. Within ten (10) working days after the completion of all work, the subcontractor shall submit to NUS, at his business address, one (1) typed original boring log and two (2) copies. The information contained on these logs shall be the same as explained in the above section.

Safety: The performance of drilling and monitoring well installation for this project must be in accordance with the safety procedures set forth in the General Guidelines and the Southeastern Pennsylvania Transportation Authority (SEPTA) "Safety Rules for Work Close To Railroad Right of Way" (see Attachment A). The NUS field representative will make the final decision on all safety procedures.

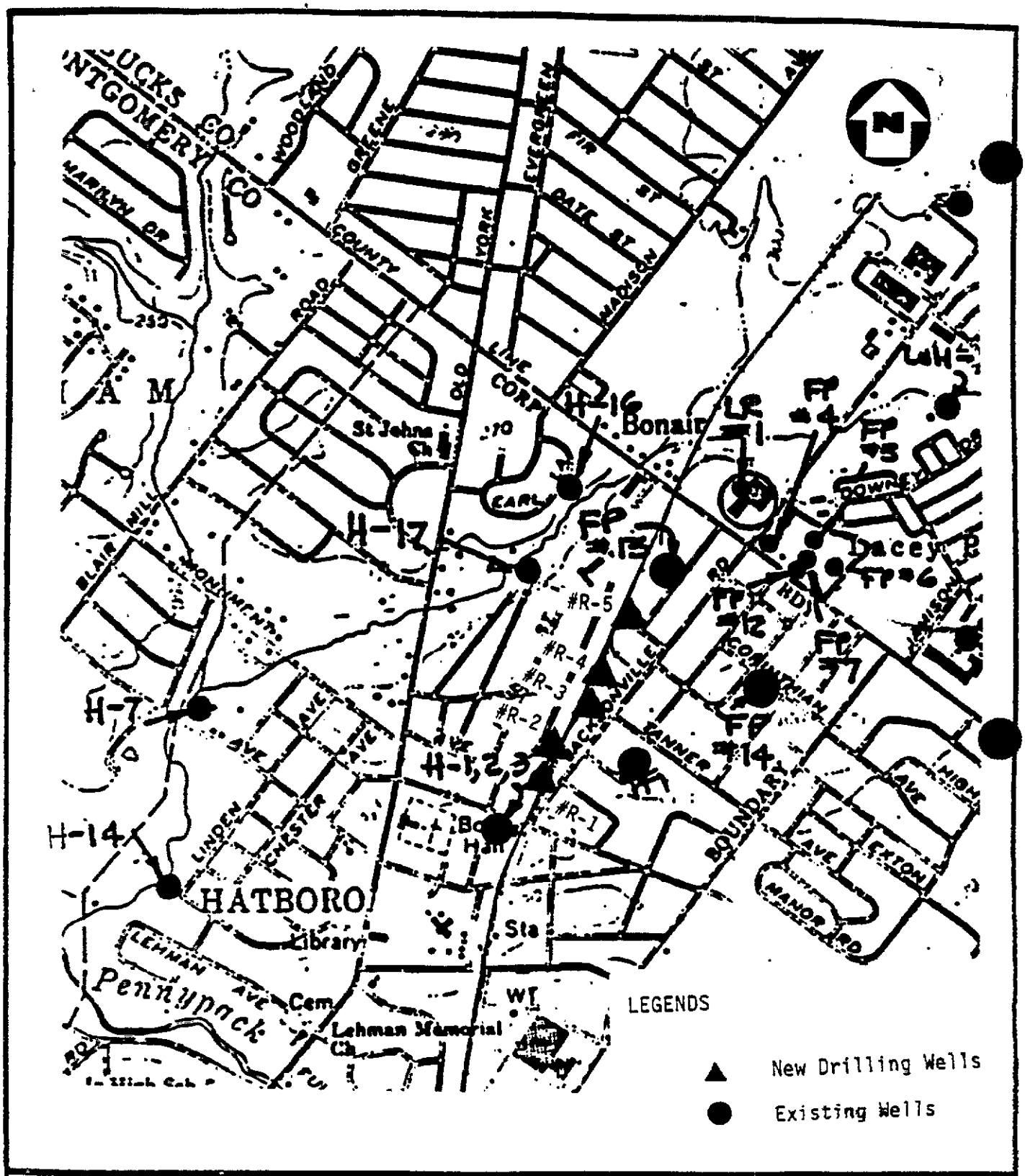



FIGURE 1

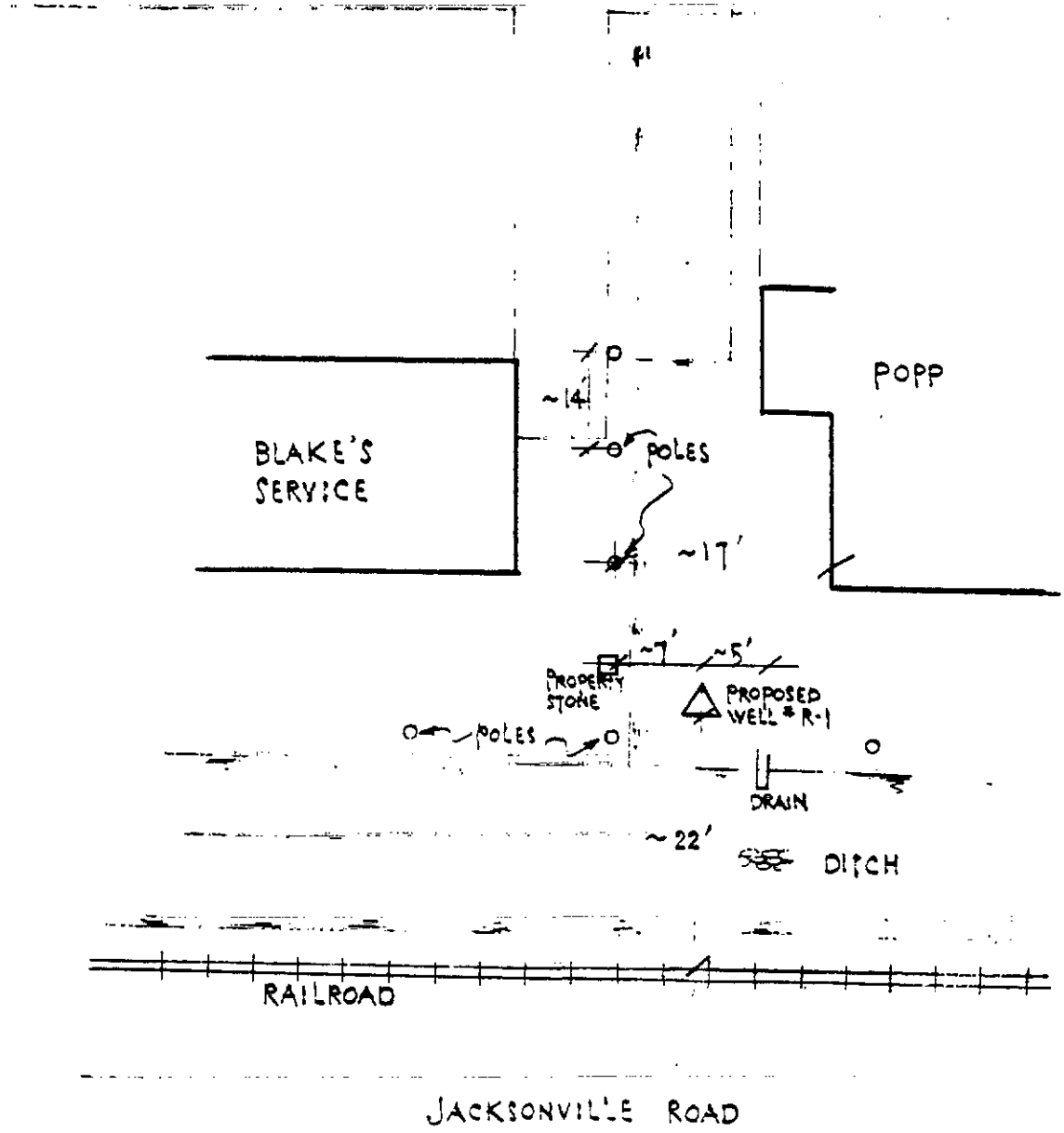
SITE LOCATION MAP

Scale 1"=2,000ft.

NUS CORPORATION

A Halliburton Company

AR301780




No scale

FIGURE 2

SITE SKETCH OF WELL # R-1

NUS CORPORATION
A Halliburton Company

AR301781

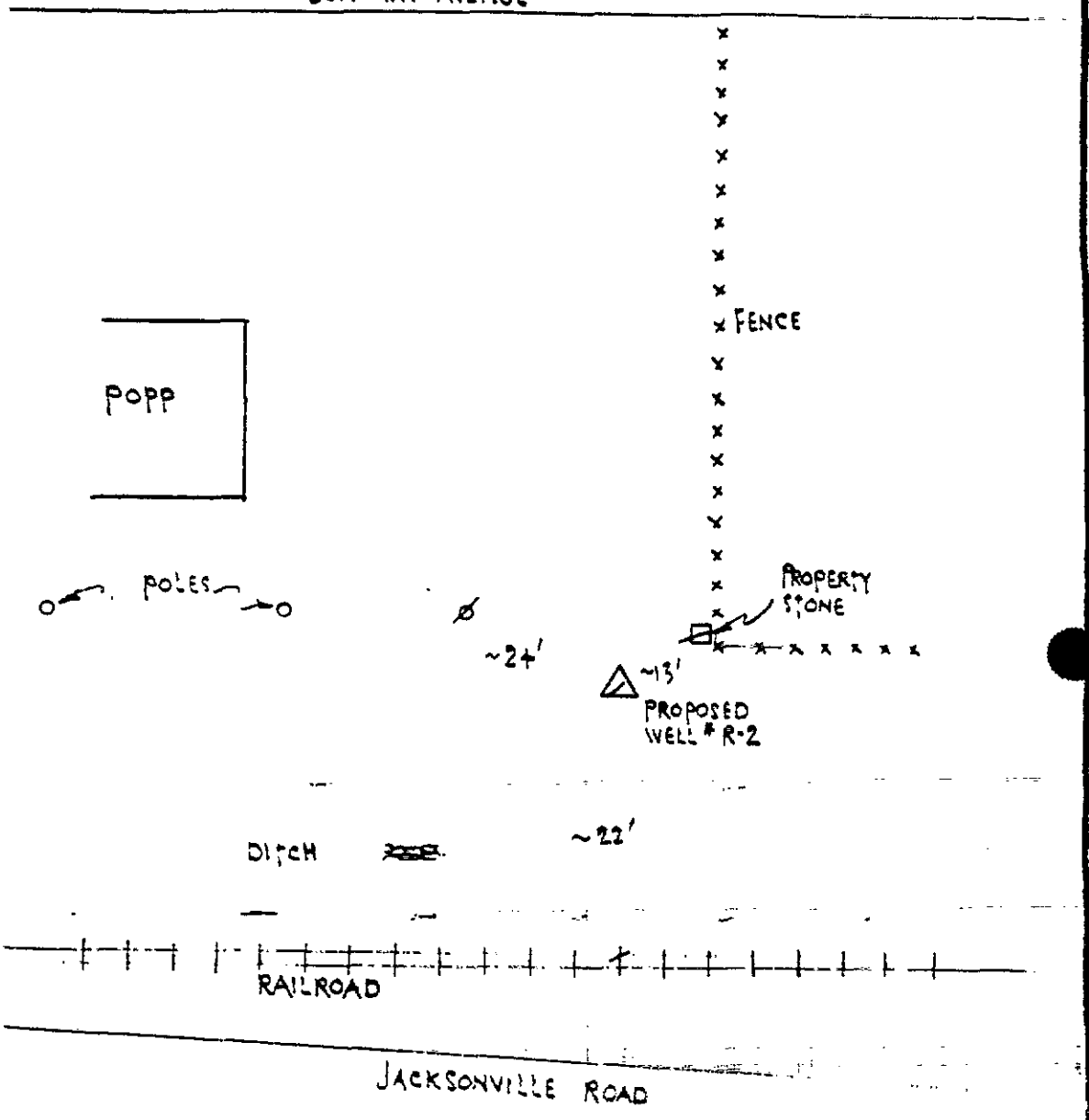
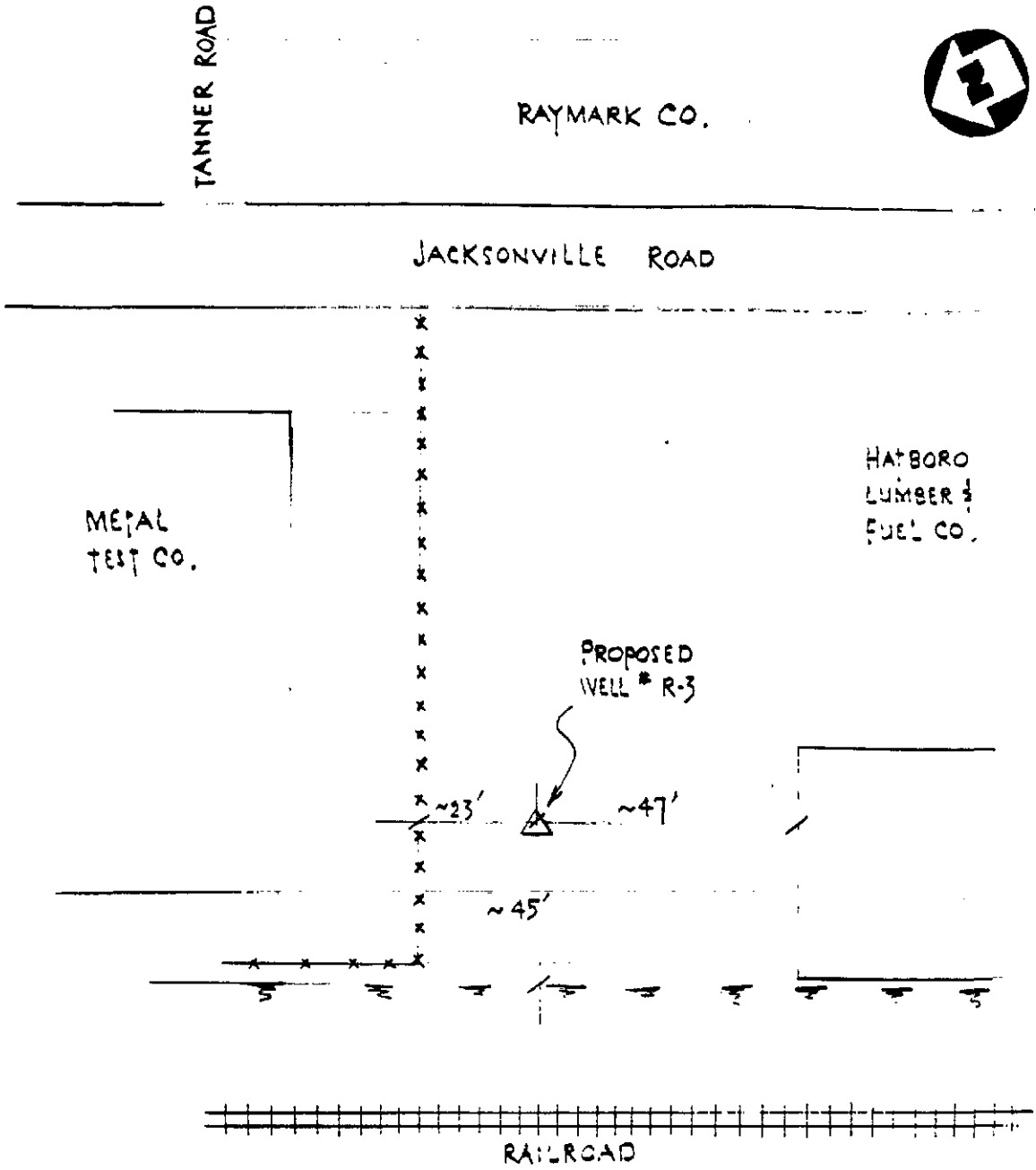



FIGURE 3

SITE SKETCH OF WELL # R-2

NUS CORPORATION
A Halliburton Company




No scale

FIGURE 4

SITE SKETCH OF WELL # R-3

NUS CORPORATION
A Halliburton Company

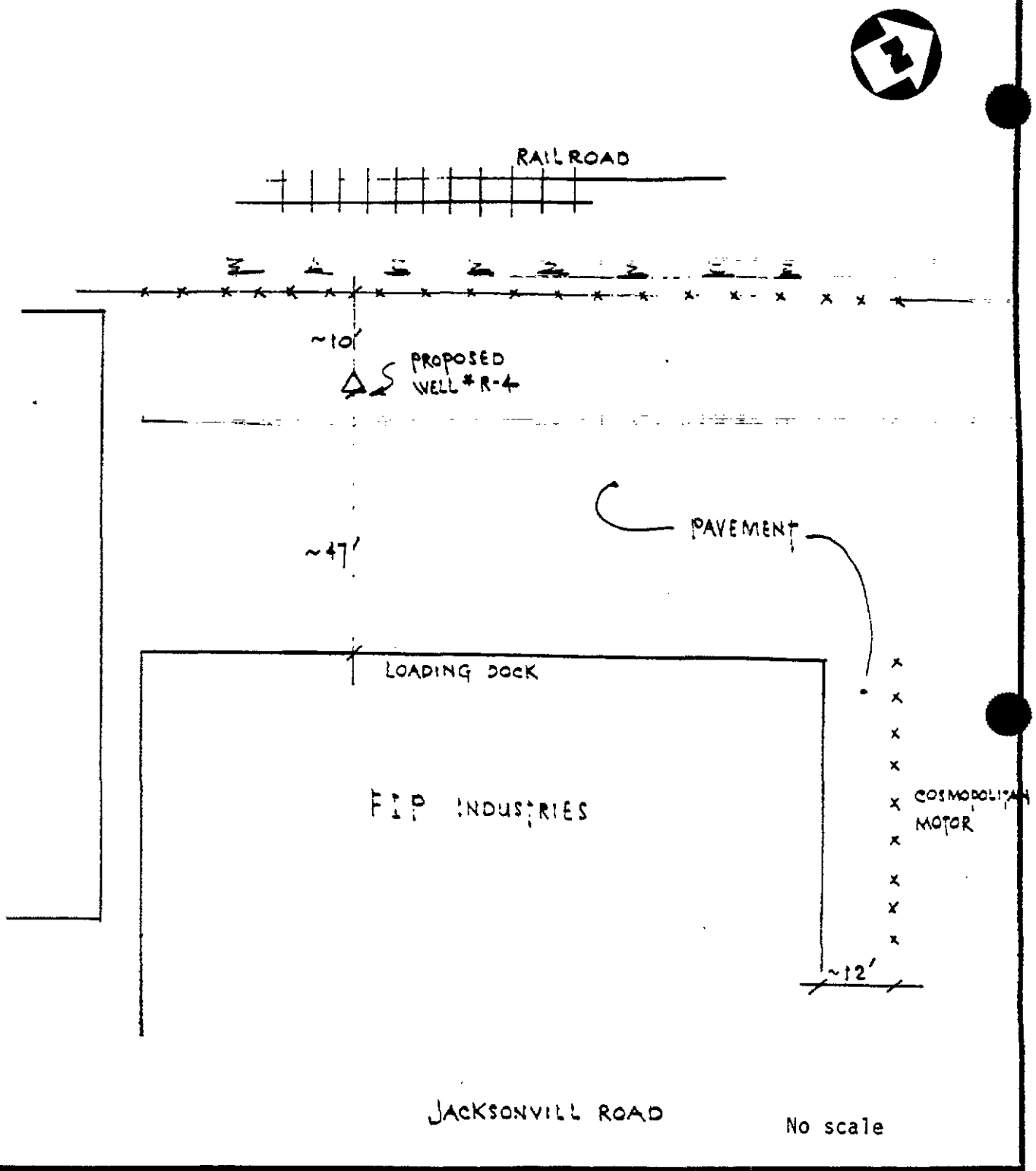



FIGURE 5

SITE SKETCH OF WELL # R-4

NUS CORPORATION

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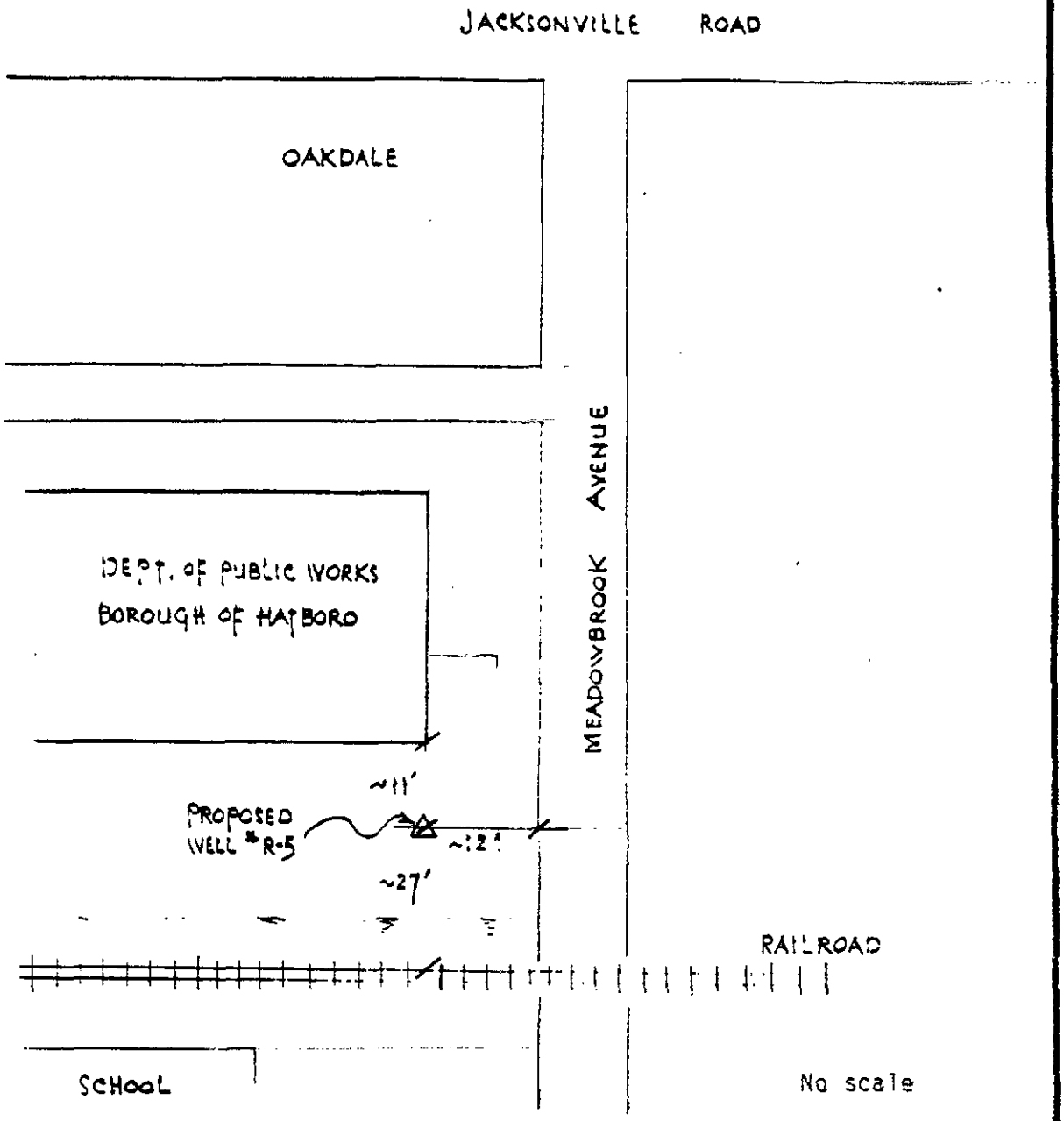


FIGURE 6

SITE SKETCH OF WELL # R-5

NUS CORPORATION
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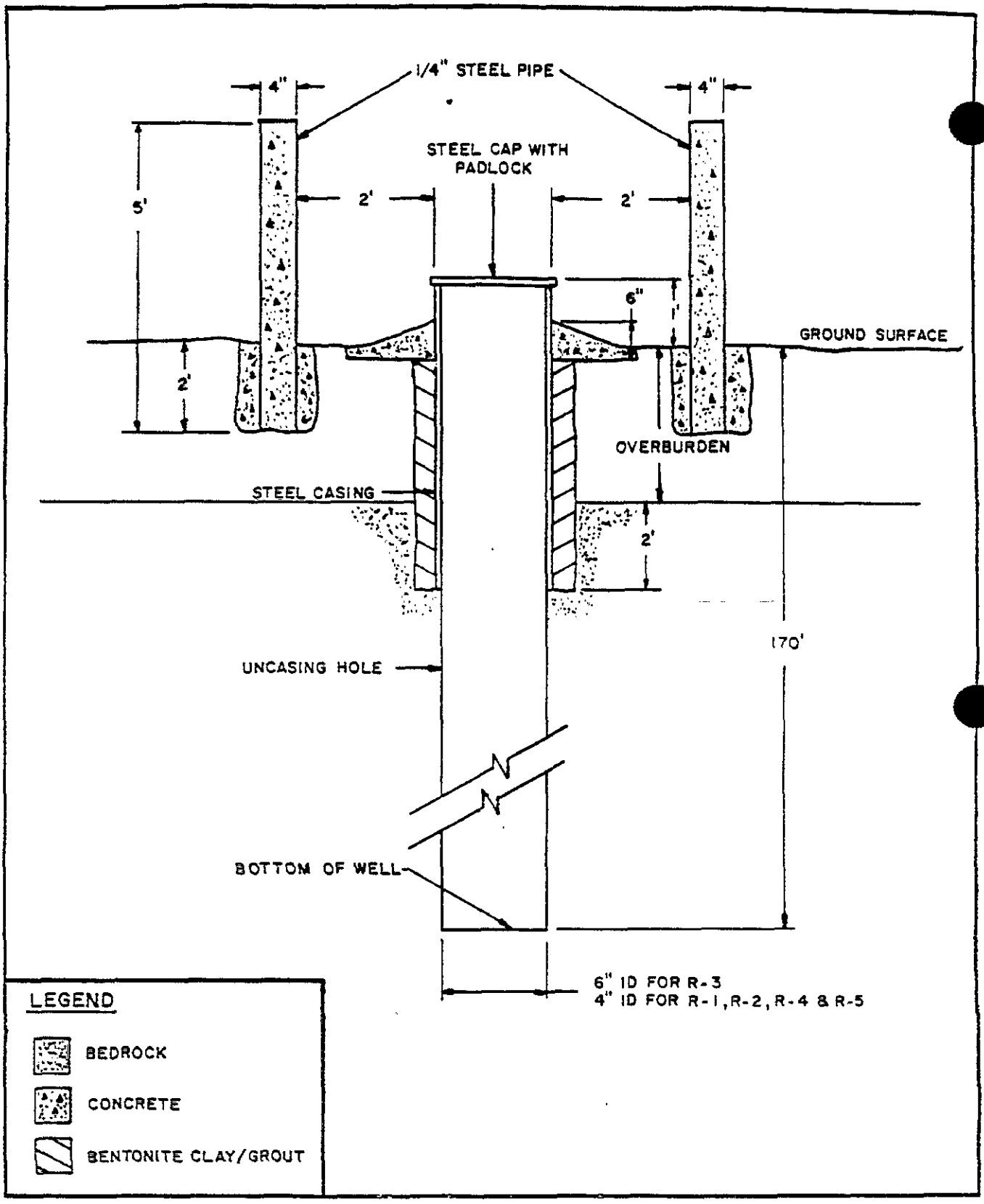



TYPICAL MONITORING WELL DETAIL
RAYMARK, HATBORRO, PA.
( NO SCALE )

FIGURE 7

NUS CORPORATION
A Halliburton Company

All work shall be performed in accordance with rules, regulations, procedures, and safe practices of SEPTA, OSHA, NESC, and all other governmental regulatory agencies having jurisdiction over this project. The following safety rules are highlighted and are considered especially applicable to all of the Contractor's employes in regard to conduct while in the track and are made a part of this agreement.

1. At the start of the project, all EPA and contractor employed supervisors, foremen and/or gang watchmen shall be required to attend a one day SEPTA safety seminar on operating rules. Supervisors, Foremen and/or Gang Watchmen added during the course of the project shall also be required to attend this seminar.

2. Consider all tracks as operating tracks and be on the alert for trains operating in either direction at all times. Walk facing the direction from which trains in regular operations will approach. No work shall be done in the track area when visibility is poor.

3. Before crossing any tracks, STOP, and look for trains approaching in either direction. Do not cross tracks unless you have time to walk slowly, and do not take chances. Do not step on the head of the rail.

4. When standing beside tracks be sure that clothing cannot catch on any part of a moving car. Loose clothing is dangerous.

5. Do not step on track behind stopped trains, particularly those arriving at stations, due to possibility of train being reversed to place doors properly for opening in case of overrunning platform.

6. EPA and contractor employed Supervisors, Foremen or Gang Watchmen shall be responsible for the safety, safety instructions and safe performance of all employes under their supervision. They must see that all men working under their immediate supervision receive warnings of approaching trains and other equipment in time to reach a safe place. Inexperienced employes must be instructed by immediate supervisors regarding safe methods in performing their duties.

7. Before permitting workmen to be on the track, the Foremen or Gang Watchmen will have an understanding with all employes as to where they will go when necessary to clear for trains.

8. Do not attempt to carry heavy material across the tracks without permission of proper authorities.

9. Until it has been ascertained that proper protection has been afforded, hoisting equipment shall not be swung into position where trains, engines, or cars on an adjacent track might strike it. While trains, engines or cars are passing on an adjacent track, the operator of hoisting equipment must know that the swinging mechanism is properly controlled to avoid boom swinging.

10. The SEPTA engineer shall have the right to restrict the operations of fouling or on-track equipment when in his opinion the equipment is not in satisfactory condition to be safely operated. The SEPTA engineer shall also have the right to prohibit the operation of any fouling or on-track equipment by any contractor employed operator who in his opinion is not qualified to operate said equipment in a safe manner.



11. Keep hands and feet clear of power switches.

a. All overhead wires including catenary, transmission and signal lines in electrified zones are to be considered alive at all times.

b. Insulating covering of wire should not be depended upon for protection against shock.

c. No employe shall do any work near high voltage wires or apparatus where it is possible for any part of his body or tools and material with which he is working to come within ten (10) feet of such wires, unless a SEPTA Overhead Maintenance employe is assigned to observe the safety of the operation.

d. When equipment is used in electrified territory or in the vicinity of any overhead wires, the contractor must exercise special care to safeguard all persons in the area. Special attention must be given in the vicinity of overhead bridges and other structures where the wires may be depressed. If, in the opinion of the engineer, the required clearances cannot be maintained or any hazards are involved, a SEPTA Overhead Maintenance employe must be requested. All required protection personnel shall be SEPTA employes and all costs shall be borne by the EPA and the Contractor.

13. The safety and continuity of operation of the trains of the Authority shall be of the first importance. They shall, at all times, be protected and the Contractor shall arrange his work accordingly. Whenever the work may affect the safety of movement of trains, the method of doing such work, together with the proposed sequence of operations and time schedules for same, shall be submitted to the Engineer for approval. No work shall be started until such approval has been obtained. However, such approval of the Engineer or his duly authorized representative will not be considered as a release from responsibility for any damage to the Authority by the acts of the Contractor, his employes, and/or his subcontractor's employes. Erection work in the vicinity of and over tracks shall require a plan for the Engineer's approval.

14. When any excavation extends below the bottom of the crossties, or where the stability of the railroad embankment and/or structure may be affected by the excavation, such excavation shall be adequately braced by the Contractor. Prior to starting any such excavation, detail drawings of the proposed bracing method shall be prepared and submitted to the Engineer for his approval.

15. The responsibility for cooperation between the Authority, EPA and their contractor's in the maintenance of railroad traffic will be entirely upon the EPA and their contractor and no claims may be made against SEPTA for delay or any other interference that may have caused the Contractor's operations to be delayed in connection with any work under this contract.

16. An operating track is fouled for operating safety purposes when any object is brought closer than ten (10) feet horizontally from the near rail of the track. Equipment shall be considered as fouling the tracks when working in such a position that failure of the same, with or without load, will obstruct the track.

17. The SEPTA engineer or his authorized representative shall have complete authority in matters related to the safety of SEPTA's operations and facilities. The SEPTA flagman shall have absolute authority to direct the stoppage of work or other measures required for the safe passage of trains.

The Contractor's Foremen or Gang Watchmen shall be responsible to insure the safety of all his personnel. The Contractor's Foremen or Gang Watchmen shall be equipped with air horns and flags to warn his personnel of the approach of trains.

18. In consideration of SEPTA's cooperation with the U.S. EPA on this project, SEPTA will be held harmless for the actions of the U.S. EPA and their contractors. U.S. EPA agrees that it will take no action against SEPTA for possible existance or clean up of pollutants or hazardous/toxic materials which may be discovered on SEPTA property as a result of this investigation. In further consideration of SEPTA's cooperation with U.S. EPA for this project, U.S. EPA shall use its best efforts to dissuade the Pennsylvania Department of Environmental Resources from taking any action against SEPTA for the possible existance or clean up of pollutants or hazardous/toxic materials which may be discovered on SEPTA property as a result of this investigation.

19. Water pumped from wells will be directed away from trackage and roadbed to prevent erosion, washout, or ponding. Any track settlement or other property damages due to soil subsidence shall be the sole liability of the U.S. EPA and all repairs will be performed by SEPTA or its contractor. Expenses for these repairs will be borne by the U.S. EPA.

20. All hazardous, toxic, or pollutional materials discovered by the U.S. EPA or its contractor, as coming from the adjacent property which is the subject of this investigation, will be removed from SEPTA property at no expense to SEPTA and will be subsequently disposed of in accordance with current Federal and State Regulations.

21. The U.S. Environmental Protection Agency (EPA) and their contractor will show evidence of adequate liability insurances prior to project commencement.

22. At the conclusion of this project, all loose equipment and materials not used as part of this project will be removed from SEPTA property.

23. Wells will be fitted with locking caps, in accordance with requirements of the Pennsylvania Department of Environmental Resources and the U.S. EPA. Drilled wells, casings, and appurtenances are the sole responsibility of the U.S. EPA and must be maintained by the U.S. EPA to all applicable standards. At project completion, and when the wells are no longer of value to the U.S. EPA, the U.S. EPA will arrange to have the well casings cut at ground level and grout filled.

## General Guidelines

The following guidelines will assist you in preparing your proposal and bid.

Contractor: NUS Corporation, hereafter referred to as NUS, a Maryland Corporation with headquarters at 910 Clopper Road, Gaithersburg, Maryland 20878, and with a business office at 992 Old Eagle School Road, Suite 916, Wayne, Pennsylvania 19087, has been engaged by the United States Environmental Protection Agency (EPA) to provide engineering, technical, and managerial services in support of the EPA Field Investigation of Uncontrolled Hazardous Waste Sites. The contract with EPA also provides that NUS shall solicit, accept bids, award subcontracts, and inspect the work for certain projects requiring the use of subcontractors.

Subcontractor: Successful bidder hereafter referred to as the subcontractor.

Contractural Relationship: In the performance of work hereunder the subcontractor shall operate as an independent contractor and not as an agent of NUS or EPA. No personnel furnished by the subcontractor shall be deemed, under any circumstances, as agents or servants of NUS or EPA. No portion of this subcontract may be sublet by the subcontractor without prior written authorization from NUS. Where such written authorization is given, it shall not relieve the subcontractor of any of its responsibilities under this subcontract.

Workmen's Compensation: The subcontractor is required to carry Workmen's Compensation Insurance, as provided by the Workmen's Compensation Act.

Equal Employment Opportunity: In the hiring of employees for the performance of work under this subcontract, the subcontractor nor any person acting on behalf of such subcontractor shall, by reason of race, creed, color, or sex, discriminate against any citizen of the United States who is qualified and available to perform the work to which employment relates.

Contractor's Field Representative: Throughout the duration of this subcontract, NUS will have on site various technical representatives. One of said personnel will be designated by NUS as the NUS Field Representative. The NUS field representative will have full and complete authority over any and all operations conducted in the field on this project. The opinions and interpretations of the NUS field representative pertaining to Specifications, Details, and Plans shall be the same as NUS Coporation and shall be final and binding on all parties.

Subcontractor's Superintendent: The subcontractor shall assign a capable, responsible representative to supervise the subcontractor's workmen at all times. This superintendent shall carry out the directions of the NUS field representative, and will be the only individual authorized to discuss disputes with the NUS field representative. When the subcontractor's superintendent must leave the site of work, a foreman or driller shall be designated full responsibility of superintendence on the site.

Subcontractor's Employees: An employee of the subcontractor, adjudged by NUS as unskilled or unfit, shall be promptly removed upon receipt of written notice from NUS and shall not be re-employed on the work except by written consent of NUS.

Specifications: The attached Stipulations, Specifications, and Details of work are defined and described as Specifications. It is understood and agreed to by all parties that everything herein contained is hereby made a part of the subcontract.

Anything mentioned in the Specifications and not shown on the Details, or shown on the Details and not mentioned in the Specifications, shall be of like effect as if shown and mentioned in both. In cases of conflict or inconsistency between the Specifications and the Details, or in cases of discrepancies, omissions, and/or errors, the matter shall be submitted immediately to NUS for determination.

Changes in Specifications and Details: NUS reserves the right to make any changes in the Specifications and/or Details. If such changes cause a material increase or decrease in the cost of performing the work or the time of performance, and written notice thereof is given to either party within ten (10) days after the giving of such notice of change, an equitable adjustment in the subcontract price and/or time of performance shall be made.

Subcontract: These Specifications, Plans, and Details forming a part thereof, will cover the furnishing of all materials, equipment, tools, labor, and work necessary for drilling of boreholes and installing monitor wells.

Plan and Details: The Plan and Details referred to above have been prepared by NUS Corporation and are attached as appendices to the Technical Specifications.

Intent of Specifications: Any questions as to the intent or meaning of these Technical Specifications or Details shall be referred to NUS Corporation's Zone Office, telephone number 703-522-8802 whose interpretation and decision shall be final and binding on all parties. Any questions concerning contract procedures should be addressed to Mr. John L Renehan, Contracting Officer, at NUS Corporation, 1300 North 17th Street, Suite 1320, Arlington, Virginia, 22209, phone number (703) 522-8802.

Points not Covered by Specifications: Wherever any feature of the work is not fully set forth in these Specifications, it must be understood that the same shall be governed by the rules of the best prevailing practice, as determined by NUS, for that class of work .

Extra Work: The subcontractor shall not be entitled to any additional compensation for the performance of any work not required under this subcontract unless prior to the performance of such work, he shall have received written authorization from NUS to perform such work.

Inspections: Ample facilities shall be furnished at all times to NUS and its representatives for inspection of the work. If any imperfect work is performed at any time, the defects therein shall be remedied by the subcontractor, at his expense, to the full satisfaction of the NUS field representative. Failure of the subcontractor to do so shall be cause for stopping the work.

Transportation Equipment and Materials: The subcontractor shall supply and furnish, at the location where the work is to be performed, all transportation, labor, tools, machinery, materials and bear all items of expense necessary for executing and completing in the best manner the work called for herein. Any equipment, materials, or services not specifically described in the Specifications or shown on the Details but which may be fairly implied as required or necessary to complete the work shall be within the scope of the subcontractor's work.

Injury to Person or Property: The subcontractor shall be responsible for all injuries to, or death of, any and all persons, and for loss of or damage to property either directly or indirectly that may result from his operations.

Manner of Prosecuting Work: The work shall be prosecuted in a manner best calculated to promote rapidity in execution, to produce the greatest accuracy in results, to secure safety of life, and the protection of property. Work shall be executed to the full satisfaction of the NUS field representative and in accordance with his directions.

Permits, Etc., Rules and Regulations: All permits, licenses, certificates, etc., of whatever nature, necessary for the prosecution of this work, shall be obtained by the subcontractor at his expense, with the exception of local well drilling permits which will be secured by EPA. The subcontractor shall comply strictly with all federal, state, and local laws, ordinances, rules, and regulations relating to his operation in the performance of the work hereunder.

Protection of Existing Structures, Etc.: The subcontractor shall protect all existing structures, walks, pipelines, and the like during the progress of the work. Trees, shrubbery, and other vegetation which do not require removal or clearing to gain access to a drilling location shall also be protected from damage by the subcontractor. The subcontractor shall also protect any existing boreholes or monitoring wells which may be located on site.

Pipes, Underground Cables, Underground Structures, Etc.: It shall be the sole responsibility of the subcontractor to contact utility companies before commencing any field operations, to verify the location of any and all pipes, underground cables, and underground structures. The location of drilling shall be altered from that shown, if necessary, to avoid any damage to existing utilities. During the progress of work, the subcontractor shall cooperate with the owners of utilities and permit their representatives access to the work area to determine if their utilities are being endangered in any way. However, access to the work area will be coordinated through the NUS field representative.

Access to Property: Access to property will be arranged by NUS and EPA prior to the start of work. All subcontractor's personnel must coordinate entry onto the site with NUS, and must be accompanied at all times by NUS personnel.

Performance of Work: The subcontractor shall perform his work in such a manner as not to unreasonably interfere or impede the work of others, on or adjacent to the site. NUS reserves the right to direct the subcontractor to schedule the order of performance of his work in such a manner as not to unreasonably interfere with the work of others.

Public Interest: NUS will implement in dealing with the press and any other public interest groups. Under no circumstances will any information about this subcontract, NUS, or EPA be passed by the subcontractor, or the subcontractor's employees to any other parties. Photographs may not be taken by the subcontractor of any part of the job site.

Scope: The subcontractor shall supply all labor, material, and necessary equipment for borehole drilling and installation of monitoring wells as per the Specification and attached Details for the subject project. The equipment described shall be considered satisfactory for use in drilling, and shall be subject to prior approval by NUS. All equipment and tools shall be modern and in a condition of good repair. Approval by NUS of the equipment for use shall not be construed as justification for measurement and payment for borings abandoned or lost before reaching the depth specified by NUS, unless NUS's approval or cause thereof. Each drilling machine shall be fully equipped and tooled for operation as an independent unit. Each drilling machine shall be manned to permit an efficient operation and to insure a comprehensive record of the boring and sampling operations. Faulty equipment or methods shall be corrected immediately, by the subcontractor. Failure of the subcontractor to correct faulty equipment or methods shall be cause for stopping the work.

The subcontractor's equipment, when not in use, shall be stored where directed by the property owner or the NUS field representative. The security of such equipment shall be the subcontractor's responsibility.

During the progress of the work, the NUS field representative will provide the subcontractor suitable points, lines, marks, locations, and elevations necessary to enable the subcontractor to perform the work.

Number of Boreholes/Wells: No deviation from the number of boreholes/wells as shown on the Plan shall be made, unless so ordered in writing by NUS.

Additional Boreholes/Wells: NUS shall have the right to order additional boreholes/well installations which shall be made and paid for in accordance with this subcontract and these Specifications. Such orders shall be made to the subcontractor in writing.

Abandoned Boreholes/Wells: No payment will be made for any borehole or well that has been abandoned by the subcontractor before reaching the required depth, unless approved by the NUS field representative. Any borehole or well abandoned by the subcontractor shall be backfilled (with a bentonite seal if necessary), at his expense, to the full satisfaction of the NUS field representative.

Depth of Boreholes/Wells: Boreholes/wells shall be carried only to the depths specified on the Plan or Details unless so ordered by the NUS field representative.

Location of Boreholes/Wells: All boreholes/wells will be located and marked in the field by NUS prior to commencement of work. No deviation from the locations will be permitted except where ordered or approved by the NUS field representative.

Accessibility: Every attempt to determine site field conditions that may affect site accessibility has been made by NUS. However, failure to visit the site by the bidder prior to start of work will not entitle the subcontractor to any additional compensation due to existing site conditions.

Clearing: The subcontractor shall obtain permission from the property owner(s) prior to any clearing of trees, shrubs, other vegetation, and obstructions in order to gain access to a drilling location. Said clearing is considered incidential to the work described herein and no additional compensation will be due the subcontractor in these instances. Such clearing shall be kept to a minimum in order to maintain the natural vegetative growth as much as possible.

Additional Equipment: Where site conditions warrant, the subcontractor shall provide, at his expense, any additional equipment such as bulldozers, backhoe, loaders, and materials that may be necessitated to allow access by the drilling equipment to a proposed borehole or well location. If access roads are required to gain entry to a drilling location, excavation shall be kept to a minimum.

Equipment Decontamination: When any work is performed in potentially contaminated areas, health, safety, and cross-contamination are of the utmost importance. Therefore, all drilling equipment must be decontaminated with decontamination solution(s) (as approved by NUS) and rinsed with drinking quality water prior to entering and before leaving the site. Personnel decontamination procedures will be explained later in the Specifications.

Prior to moving any equipment onto the first drilling location, between subsequent locations and before leaving the site, or at any other time deemed necessary by the NUS field representative, the entire drill rig to also include samples, drill rods, weights, augers, casing, core barrels and bits, drill fluid circulation system, pumps, hoses, etc., shall be decontaminated by the subcontractor's drilling personnel to the full satisfaction of the NUS field respresentative. This decontamination process will consist, at minimum requirements, of high pressure hot water cleaning of the above mentioned drilling equipment, all well casing will be rinsed with methanol and air dried prior to being installed into the boreholes. The subcontractor shall provide drinking quality water, in sufficient quantities to carry out decontamination procedures as described herein as well as to carry out, on site, personnel decontamination or any other decontamination determined necessary by the NUS field representative. The subcontractor shall also provide a mobile hot water high pressure washer (a high pressure portable steam jenny is suggested), tubs or other receptacles (of sufficient size) in which the tools, casing, weights, augers, etc. can be placed during the various stages of decontamination. The subcontractor shall also provide an ample supply of methanol. If spent materials or wastes generated from this decontamination process are deemed by the NUS field representative to be suspected/known hazardous wastes, said wastes must be collected and containerized in suitable 55-gallon drums for future waste disposal, said 55-gallon drums shall be decontaminated in the same manner as described above. Drum requirements and waste disposal will be explained later in the Specifications.

Number of Drill Rigs/Crews: The subcontractor shall supply a sufficient number of drill rigs as to satisfy the requirements of this subcontract. The subcontractor shall also have on site at all times ample, competent and trained personnel to perform all the requirements of these Specifications.

Drilling Fluid: The boreholes will be advanced using air rotary drilling. The air system shall include an in-line oil filter. This filter shall be replaced frequently. The purpose of this filter is to essentially remove all oil residue from the air compressor. The technique used for advancing the borehole shall be so explained on the driller's log (water or air).

Well Construction: Construction of the wells shall be in accordance with accepted standard industry practices. The well construction is explained in the Details. This construction is subject to change as subsurface conditions warrant, or as determined in the field by the NUS field representative. All materials shall conform to the latest provisions of the applicable American Standard Testing Methods (ASTM) and American Petroleum Institute (API) standards and are subject to NUS's approval.

Monitoring Well Casing: The type and size of the monitoring well casing to be installed is defined in the Details. The steel casing shall be clean of oil, dirt, etc. and must be free of rust and scale. Joints shall be threaded flush joint type, no grease, oil, or other petroleum-based material will be applied to the threads. All well casings regardless of type shall be decontaminated by the subcontractor as defined in the Equipment Decontamination section. The well casing shall extend at least 1 foot above the ground surface. The top of the well casing shall be capped by the subcontractor to prevent dirt or other contaminates from entering the well.

Lean Concrete/Natural Bentonite Grout: A lean concrete/natural bentonite grout shall be placed by tremie, if necessary, where directed by the NUS field representative. The lean concrete/natural bentonite shall be combined in a proportion of approximately twelve (12) pounds of bentonite per bag (94 pounds) of Type I Portland cement. The consistency of the grout will be approved by the NUS field representativeprior to placement.

Well Security: The well casing shall be cemented in place and be fitted with a lockable bonnet cap to secure the well. The cap shall be secured with an approved hardened steel padlock. All hardware necessary to secure the well, including the hardened steel padlocks, shall be provided by the subcontractor, at his expense. Each site shall have all of the wells keyed alike.

The subcontractor shall submit at least one (1) master key per completed well to the NUS field representative at the completion of the site work. The subcontractor will submit all remaining keys to the wells upon completion of the last well.

The well casing shall be surrounded at ground surface by a conical concrete mound. The mound shall be gently sloping, so as to drain water away from the well and shall extend radially outward from the security casing at ground surface approximately two (2) feet. The concrete for the slab and protective casing shall be a mixture of Type I Portland cement, sand, coarse aggregate, and water in the proportions of at least five (5) bags of cement per cubic yard of concrete, to not more than seven (7) gallons of potable water per bag (94 pounds) of cement. Commercially available concrete, such as Sakrete®, or trucked plant mix concrete is also acceptable.

Well Development: The initial development or purging of the monitor wells shall be performed by the subcontractor as soon as practical after the completion of the borehole and prior to the removal of the temporary casing. The borehole shall be blown for a period of 15 minutes or as directed by the NUS field representative. This is to ensure that the well will have a proper recharge rate. If a proper recharge rate is not obtained, the subcontractor shall blow the well a second time. After this procedure has been completed, the static water level will be measured and recorded on the driller's log.

Contractor's Safety Plan: Prior to the commencement of any field activities, NUS will develop a Safety Plan for the subject project. The subcontractor shall strictly comply with all articles of this Safety Plan. Failure to comply with this Safety Plan by the subcontractor or the subcontractor's employees shall be cause for stopping the work.

The performance of this work shall also conform to the safety procedures set forth in the attached guidelines and the Southeastern Pennsylvania Transportation Authority (SEPTA) "Safety Rules for Work Close to Railroad Right of Way" (see Attachment A).

Accidents or Injuries: Any accidents or injuries, occurring during the duration of this subcontract, involving any subcontractor's employees, employed for work on this project, shall immediately be reported to the NUS field representative.

Health and Safety: Due to the potentially hazardous nature of the materials which may be or may have been stored or disposed of on site, all personnel employed or retained for services by the subcontractor for this project may at times be required to wear personal protective clothing and/or respiratory protective equipment while drilling or working on and off site. The determination for type of protective clothing needed and the need and type of respiratory protective equipment will be based in part on air-borne health hazards, which will be constantly monitored by the NUS field personnel. The four (4) different levels of protection which may be required are listed below:

Level A Protection - is the highest level of both respiratory and skin protection available.

Protective equipment required:

- o Open circuit, positive pressure demand self-contained breathing apparatus (SCBA)
- o Totally encapsulating butyl rubber suit
- o Gloves, inner (surgical type)
- o Gloves, outer, chemical protective
- o Boots, chemical protective, steel toe and shank
- o Booties, chemical protective.

Level B Protection - is the second highest level of protection.

Protective equipment required:

- o Open circuit, positive pressure-demand self-contained breathing apparatus (SCBA)
- o Chemical protective coveralls and a butyl rubber apron
- o Gloves, inner (surgical type)
- o Gloves, outer, chemical protective
- o Boots, chemical protective, steel toe and shank
- o Booties, chemical protective.

Level C Protection - is used when a nominal level of protection is necessitated.

Protective equipment required:

- o Full facepiece cartridge-type air purifying respirator
- o Chemical protective coveralls
- o Gloves, inner (surgical type)
- o Gloves, outer, chemical protective
- o Boots, chemical protective, steel toe and shank
- o Booties, chemical protective.

Level D Protection - is the minimum protection necessary.

Protective equipment required:

- o Cotton coveralls
- o Safety boots/shoes
- o Safety glasses
- o Hard hat with optional faceshield
- o Air purifying respirators (readily available).

If at any time during the duration of this subcontract respiratory protective equipment is required, the subcontractor will be required to provide all protective equipment[1] to its employees. Respiratory protective equipment cannot and will not be used by individuals with long sideburns or beards, or by individuals who wear standard eyeglasses or contact lenses in the performance of their daily work routine. Special eyeglasses that can be worn with the respiratory equipment are available through respiratory protection device manufacturers and can be purchased by the subcontractor at his expense. Other protective equipment which may be required and shall be furnished by the subcontractor includes: chemically resistant coveralls (Tyvek), rubber overboots, steel toed safety shoes, hard hats, safety goggles, surgical gloves, and butyl rubber gloves, neoprene gloves may be substituted.

No smoking, eating, drinking, or use of drugs will be permitted while working on site.

The subcontractor is informed that the wearing of personal protective clothing and respiratory equipment places far more physical stress on an individual than would be normally experienced in normal working conditions. Therefore, the subcontractor's field personnel shall be individuals in good physical condition and without prior serious health problems, which may be manifested during the performance of this work. The NUS field representative reserves the right, at anytime, to request replacement of any individual employed or retained by the subcontractor who, in the NUS field representative's opinion, cannot function under these stressed working conditions. No additional compensation shall be due the subcontractor for delays or expenses incurred by the subcontractor for additional subcontractor personnel training as a result of such request.

Any field activities which may require the subcontractor's personnel to use respiratory protective equipment, (Level A or Level B equipment only), shall be paid for as a seperate bid item. No additional compensation will be due subcontractor's for Level C or Level D protection.

Anytime respiratory protective equipment is being used it shall be the joint responsibility of the NUS field representative and the subcontractor's superintendent to monitor the individuals who are wearing respiratory protective equipment.

[1]NUS will provide SCBA's, if required, on a loan basis; other items to be provided by subcontractor.

Personnel Decontamination: NUS shall be responsible for all personnel decontamination procedures. NUS will supply all the necessary detergents and solutions necessary for the decontamination procedures. The subcontractor shall supply, in sufficient quantities, drinking quality water for these procedures. All personnel entering the site and prior to leaving the site are required to pass through decontamination as determined necessary by the NUS field representative.

Waste Collection, Containerization and Disposal: Any drilling spoils/cuttings, spent decontamination water, or solutions considered by the NUS field representative to be suspected or known hazardous wastes cannot and will not be discharged to the environment.

It shall be the responsibility of the subcontractor to collect, containerize and store all those materials generated in connection with the work under these Specifications and deemed potentially hazardous by NUS. Those waste materials deemed by the NUS field representative not to be suspected/known hazardous wastes, need not be collected and containerized. These non-hazardous wastes may, with the property owner's permission, be disposed of on site by the subcontractor. Potentially hazardous wastes shall be drummed and segregated according to liquid, sludge, or solid phases. These drums shall be clearly and permanently labeled as per instructions from the NUS field representative.

The subcontractor shall provide, in sufficient quantities, 55-gallon steel drum containers for this waste material. These drums shall meet the U.S. Department of Transportation (DOT) requirements for hazardous substance.

Off-site waste removal, hauling, and disposal will be the responsibility of the subcontractor.

The subcontractor will not have to assume the responsibility nor the role of a hazardous waste generator. The EPA will assume the responsibility as a RCRA Generator and shall complete the necessary manifests, waste analyses, and records required as a generator.

Cleaning Up: Upon completion of all work described in these Specifications, the subcontractor shall remove from site all equipment brought by him to the site. The subcontractor shall also remove from the site all containers, drums, tanks, debris, and unused materials, and restore the site as nearly as practicable to its condition prior to commencment of the work provided for herein. All walks, drives, utilities, structures, or other property damage due to the subcontractor's negligence, shall be restored at his expense to as nearly as possible their original conditions. All cleanup operations shall be completed to the full satisfaction of the NUS field representative.

Delay Time: Time is of the essence in the performance of this subcontract and all actions taken by NUS and the subcontractor shall be taken to that end. However, any delays in excess of thirty (30) minutes per instance which are caused directly by NUS or EPA, shall be reimbursed to the subcontractor. Both the NUS field representative and the subcontractor's superintendent will jointly record and verify all such occurrences and the time involved in excess of thirty (30) minutes per instance. Upon completion of work, an agreement shall be reached between the NUS field representative and the subcontractor's superintendent as to the accumulated total number of delay hours and fraction thereof. Reimbursement will be based on a hourly rate and shall be a separate bid item.

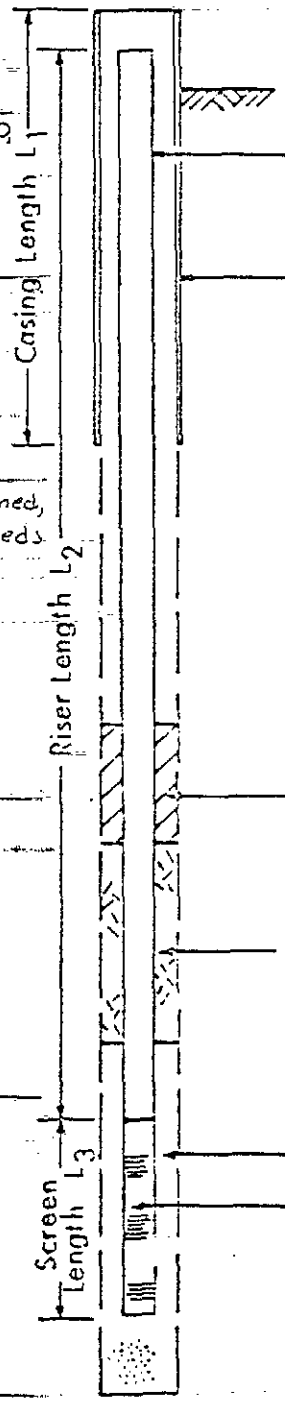
Delay time does not include delays that are the result of adverse weather conditions, difficult mobilization or demobilization, breakdown of subcontractor's equipment, difficulty in moving to boring locations, or untimely arrival of materials, equipment, labor, tools, etc. necessary to satisfactorily complete the work in accordance with the Specifications, and to the satisfaction of NUS. No payment will be due the subcontractor for shutdowns caused by the subcontractor or negligence on the part of an employee of the subcontractor or the temporary shutdown of work by the NUS field representative due to unsatisfactory, unsafe or negligent performance of the subcontractor or any personnel employed by the subcontractor. No payment will be due to subcontractor for delays, which are caused by the use and wearing of respiratory protective equipment.

APPENDIX D

GROUND WATER STANDPIPE INSTALLATION REPORT — STANDPIPE NO.: R-1

| | |
|---|---|
| Project Feature: RAYMARK | Drilling Contractor: P&L DRILLING CO. |
| Coordinates: (LATER) | Dates: Started 6-16-84; Completed 6-18-84 |
| Elevation (top of hole): Datum: (LATER) | Drill Rig Type: SCHRAMM T64HB |
| Description of accessibility | Static Water Depth: 33.0 Date: 6-20-84 |
| Capped and Locked ☒ | Total Depth: 170.0 |
| Screw cap ☐ | Signature of Inspector EUGENE DENNIS |

| Subsurface Conditions | | Standpipe Installation |
|---|---|---|
| Depth | Material Description | Schematic (NTS) Remarks |
| 1.0' | Brown TOPSOIL | |
| 12.0' | Brown to red-brown, silty SAND, some clay, slightly moist (SM) | |
| 21.0' | Gray to gray-brown, fine-grained SANDSTONE, locally shale interbeds; trace water @ 19.0' | |
| 24.0' | Brown to red-brown, fine-grained SANDSTONE, moist | |
| 90.0' | Gray to tan, fine to very fine-grained, SANDSTONE, locally with interbeds and stringers of shale; free water @ 71.0' | |
| 130.0' | White to gray, fine-grained, SANDSTONE | |
| 170.0' | Brown to red-brown, fine-grained SANDSTONE | |
| | Bottom of hole | |
| | NOTE: Hole logged by cuttings | $L_1$ = N/A $L_2$ = 170.0' $L_3$ = N/A - OPEN HOLE |




- Casing Stickup: 1.0'
- Riser Stickup: SEE CASING
- Backfill Material - GROUT
- Casing Type: CARBON STEEL
- Casing I.D.: 4"
- Casing Depth: 14.5'
- Riser I.D.: SEE CASING
- Borehole Diameter: OVERBURDEN 8 3/4"
- Grout Seal Length: 9.5'
- Bentonite Seal Length: 5.0'
- Depth-Top of Filter: N/A
- Riser Depth: N/A
- Filter Material - OPEN HOLE
- Screen Type - 5 3/4" OPEN HOLE
- Screen Slot Width: N/A
- Screen I.D.: N/A
- Screen Depth: N/A
- Boring Depth: 170.0'

| | | |
|---|---|---|
| Project: RAYMARK | Sheet 1 of 1 | Standpipe No.: R-1 |

AR500100 1

# GROUND WATER STANDPIPE INSTALLATION REPORT

STANDPIPE NO.: R-2

| | |
|---|---|
| Project Feature: RAYMARK | Drilling Contractor: P&L DRILLING CO. |
| Coordinates: (LATER) | Dates: Started 6-15-84 Completed 6-16-84 |
| Elevation (top of hole): Datum: (LATER) | Drill Rig Type: SCHRAMM T64HB |
| | Static Water Depth: 33.0 Date: 6-20-84 |
| Description of accessibility | Total Depth: 170.0' |
| Capped and Locked ☒ | Signature of Inspector RANDY DICKINSON |
| Screw cap ☐ | |

| Subsurface Conditions | | Standpipe Installation | |
|---|---|---|---|
| Depth | Material Description | Schematic (NTS) | Remarks |
| | Brown to red-brown TOPSOIL | | Casing Stickup 1.0' |
| 1.0' | | | Riser Stickup SEE CASING |
| | Brown to red-brown, silty SAND, slightly moist, (SM) | | Backfill Material - GROUT |
| 9.0' | water @ soil/rock interface | | |
| | Red to red-brown, fine-grained SANDSTONE, dry, locally interbedded with shale | | Casing Type CARBON STEEL |
| 39.0' | | | Casing I.D. 4" |
| | Gray to tan, fine to very fine-grained SANDSTONE, locally grades to siltstone | | Casing Depth 34.0' |
| | trace water @ 58.0' | | Riser I.D. SEE CASING |
| | free water @ 59.0' | | Borehole Diameter OVERBURDEN 8 3/4" |
| 66.0' | | | |
| | Red interbedded fine-grained SANDSTONE and SHALE | | Grout Seal Length 29.0' |
| 120.0' | | | Bentonite Seal Length 5.0' |
| | Light gray, fine to medium-grained, arkosic SANDSTONE | | Depth-Top of Filter N/A |
| | | | Riser Depth N/A |
| | | | Filter Material - OPEN HOLE |
| | | | Screen Type - 5 7/8" OPEN HOLE |
| | | | Screen Slot Width N/A |
| | | | Screen I.D. N/A |
| | | | Screen Depth N/A |
| 170.0' | | | Boring Depth 170.0' |
| | Bottom of hole | | |
| | NOTE: Hole logged by cuttings | | $L_1$ = N/A $L_2$ = 171.0' $L_3$ = N/A - OPEN HOLE |

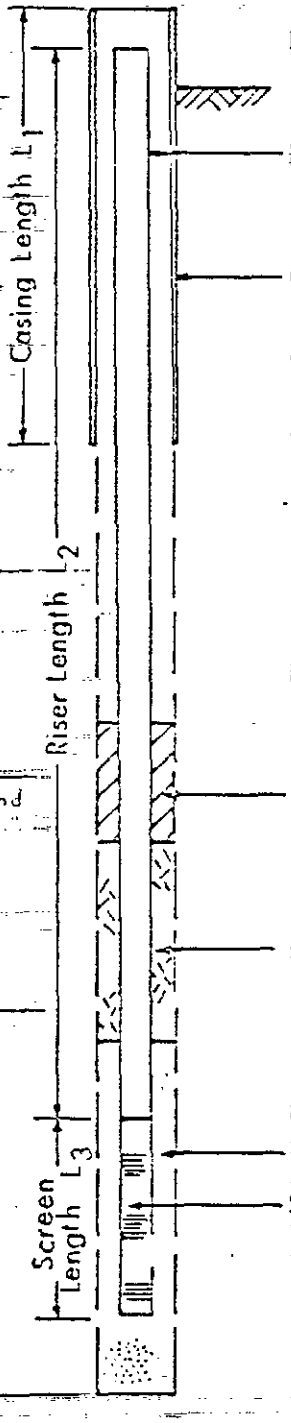
Casing Length $L_1$; Riser Length $L_2$; Screen Length $L_3$

| | | |
|---|---|---|
| Project: RAYMARK | Sheet 1 of 1 | Standpipe No.: R-2 |

GROUND WATER STANDPIPE INSTALLATION REPORT STANDPIPE NO.: R-3

| | |
|---|---|
| Project Feature: RAYMARK | Drilling Contractor: P&L DRILLING CO. |
| Coordinates: (LATER) | Dates: Started 6-13-84 Completed 6-14-84 |
| Elevation (top of hole): | Drill Rig Type: SCHRAMM T64HB |
| Datum: (LATER) | Static Water Depth: 35.0' |
| Description of accessibility | Date: # 6-20-84 |
| Capped and Locked ☒ | Total Depth: 200.0' |
| Screw cap ☐ | Signature of Inspector RANDY DICKINSON |

| Subsurface Conditions | | Standpipe Installation | |
|---|---|---|---|
| Depth | Material Description | Schematic (NTS) | Remarks |
| 1.0' | Brown TOPSOIL | | |
| 25.0' | Brown to red-brown, fine to medium-grained SAND, little silt, dry, well sorted (SM) no silt after ~8.0' grades to medium to coarse-grained sand @ ~20.0' (GM-SP) | | |
| 27.0' | Red-brown, medium GRAVEL, with some fine gravel (GW), wet | | |
| 73.0' | Red to red-brown, medium to fine grained SANDSTONE, locally interbedded with shale water trace @ ~29.0 | | |
| 99.0' | Light brown to tan, fine to very fine-grained SANDSTONE, dry | | |
| 150.0 | Red, interbedded sandy SHALE and SILTSTONE. free water @ 135.0' | | |
| 200.0 | Light grey, arkosic SANDSTONE, locally interbedded with black shale | | |
| | Bottom of hole | | |




| Remarks | |
|---|---|
| Casing Stickup | 1.0' |
| Riser Stickup | SEE CASING |
| Backfill Material | GROUT |
| Casing Type | CARBON STEEL |
| Casing I.D. | 6" |
| Casing Depth | 29.0' |
| Riser I.D. | SEE CASING |
| Borehole Diameter | OVERBURDEN 8 3/4" |
| Grout Seal Length | 24.0' |
| Bentonite Seal Length | 5.0' |
| Depth-Top of Filter | N/A |
| Riser Depth | N/A |
| Filter Material | OPEN HOLE |
| Screen Type | 5 7/8" OPEN HOLE |
| Screen Slot Width | N/A |
| Screen I.D | N/A |
| Screen Depth | N/A |
| Boring Depth | 200.0' |

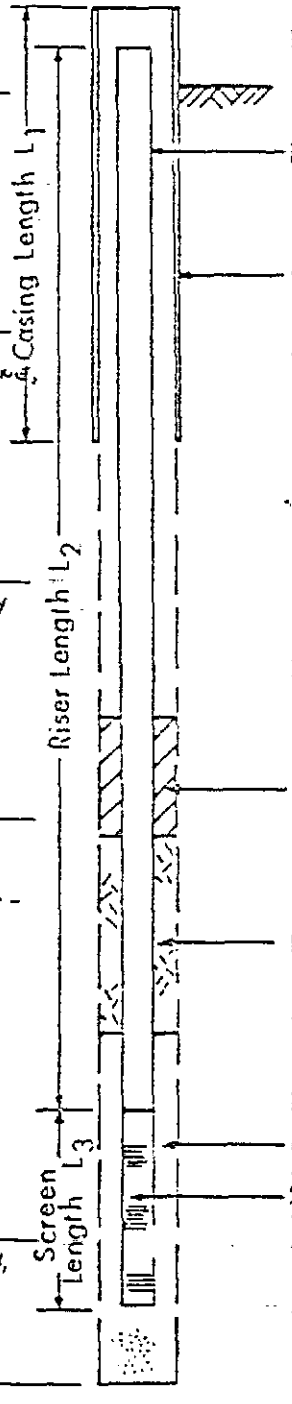
$L_1$ = N/A $L_2$ = 201.0' $L_3$ = N/A - OPEN HOLE

| | | |
|---|---|---|
| Project: RAYMARK | Sheet 1 of 1 | Standpipe No.: R-3 |

GROUND WATER STANDPIPE INSTALLATION REPORT STANDPIPE NO.: R-4

| | |
|---|---|
| Project Feature: RAYMARK | Drilling Contractor: P&L DRILLING CO. |
| Coordinates: (LATER) | Dates: Started 6-18-84 Completed 6-19-84 |
| Elevation (top of hole): Datum: (LATER) | Drill Rig Type: SCHRAMM T64HB |
| Description of accessibility | Static Water Depth: 36.0' Date: 6-20-84 |
| Capped and Locked ☒ | Total Depth: 170.0' |
| Screw cap ☐ | Signature of Inspector EUGENE DENNIS |

| Subsurface Conditions | | Standpipe Installation | |
|---|---|---|---|
| Depth | Material Description | Schematic (NTS) | Remarks |
| 1.0 | Brown to red-brown TOPSOIL | | |
| 15.0' | Brown to red-brown clayey SILT to silty CLAY, some sand, moist (ML) | | |
| 52.0' | Red-brown, interbedded sandy SHALE and fine-grained SANDSTONE, very to completely weathered to ~ 30.0' | | |
| 73.0' | Light brown to tan, fine to very fine-grained SANDSTONE | | |
| 156.0' | Dark red-brown to brown, fine-grained SANDSTONE, locally grades to siltstone, locally interbedded with shale<br>trace water @ 79.0'<br>free water @ 109.0' | | |
| 170.0 | Gray to white-gray, fine-grained, arkosic SANDSTONE<br>red shale interbeds @ 166.0' | | |
| | Bottom of hole<br>NOTE: Hole logged by cuttings | | |




Casing Stickup 1.0'
Riser Stickup SEE CASING
Backfill Material - GROUT
Casing Type CARBON STEEL
Casing I.D. 4.0"
Casing Depth 31.0'
Riser I.D. SEE CASING
Borehole Diameter OVERBURDEN 8 3/4"
Grout Seal Length 26.0'
Bentonite Seal Length 5.0'
Depth-Top of Filter N/A
Riser Depth N/A
Filter Material - OPEN HOLE
Screen Type - 5 3/4" OPEN HOLE
Screen Slot Width N/A
Screen I.D. N/A
Screen Depth N/A
Boring Depth 170.0'

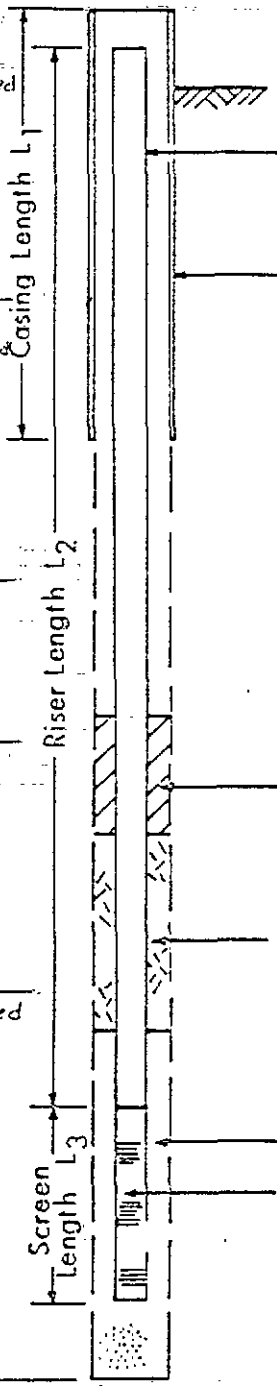
$L_1$ = N/A $L_2$ = 171.0' $L_3$ = N/A - OPEN HOLE

| | | |
|---|---|---|
| Project: RAYMARK | Sheet 1 of 1 | Standpipe No. R-4 |

GROUND WATER STANDPIPE INSTALLATION REPORT STANDPIPE NO.: R-5

| | |
|---|---|
| Project Feature: RAYMARK | Drilling Contractor: P&L DRILLING CO. |
| Coordinates: (LATER) | Dates: Started 6-19-84 Completed 6-20-84 |
| Elevation (top of hole): Datum: (LATER) | Drill Rig Type: SCHRAMM T64 HB |
| Description of accessibility | Static Water Depth: 35.0' Date: 6-20-84 |
| Capped and Locked ☒ | Total Depth: 170.0' |
| Screw cap ☐ | Signature of Inspector EUGENE DENNIS |

| Subsurface Conditions | | Standpipe Installation | |
|---|---|---|---|
| Depth | Material Description | Schematic (NTS) | Remarks |
| 2.0' | Brown TOP SOIL (FILL) | | |
| 16.0' | Brown to red-brown, fine-grained SANDY SILT to SILTY SANDY, some clay, moist (SM) | | |
| 77.0' | Gray to Brown, fine-grained SANDSTONE, dry, locally interbedded with Shale<br>grades to shaly sandstone @24.0'<br>trace water @~42.0'<br>trace water @~61.0'<br>trace water @~70.0'<br>free water @ 75.0' | | |
| 90.0' | Brown to red-brown, fine-grained SANDSTONE, wet | | |
| 146.0' | Gray to gray-brown, fine to medium-grained SANDSTONE, locally grades to red-brown, fine-grained, shaly sandstone | | |
| 170.0' | Brown to red-brown, fine-grained SANDSTONE, locally shaly | | |
| | Bottom of hole | | |
| | NOTE: Hole logged by cuHings. | | |




| | |
|---|---|
| Casing Stickup | 1.0 |
| Riser Stickup | SEE CASING |
| Backfill Material - | GROUT |
| Casing Type | CARBON STEEL |
| Casing I.D. | 4.0" |
| Casing Depth | 17.5' |
| Riser I.D. | — |
| Borehole Diameter | OVERBURDEN 8 3/4" |
| Grout Seal Length | 12.5' |
| Bentonite Seal Length | 5.0' |
| Depth-Top of Filter | N/A |
| Riser Depth | N/A |
| Filter Material - | OPEN HOLE |
| Screen Type - | 5 3/4" OPEN HOLE |
| Screen Slot Width | N/A |
| Screen I.D. | N/A |
| Screen Depth | N/A |
| Boring Depth | 170.0' |

$L_1$ = N/A $L_2$ = 170.0' $L_3$ = N/A OPEN HOLE

| | | |
|---|---|---|
| Project: RAYMARK | Sheet 1 of 1 | Standpipe No.: R-5 |

APPENDIX E

# TECHNICAL SPECIFICATIONS FOR

# THE DEVELOPMENT OF

# WELLS AND THE PERFORMANCE

# OF A PUMP TEST AT THE

# RAYMARK SITE

# HATBORO, PENNSYLVANIA

# TDD NO. F3-8401-02

## SCOPE OF WORK

**Time is of the essence in the performance of this subcontract; therefore, all action taken by NUS and the subcontractor(s) shall be taken to that end, all work shall be performed in an expeditious and professional manner.**

General: The scope of services required for this project consist of the following: development of existing monitoring wells, performance of a drawdown step test to determine specific capacity of the test well, performance of a 24 hour pump test, the installation of pumps and automatic continuous water level recorders in the observation wells, and a field survey to determine the horizontal and vertical locations of the existing monitoring wells.

Site Location: The project site is located in the vicinity of the Hatboro Town Hall, near Jacksonville Road, along the Reading Railroad in Montgomery County, Pennsylvania. The location of the wells are shown on Figure no. 1.

Well Development: The subcontractor shall be responsible for developing the following wells: H-1, PF-1, FP-13, FP-14, R-1, R-2, R-3, R-4, and R-5 (see Figure no. 1 for the locations of these wells. Figure no. 2 provides the construction detail for wells R-1 to R-5). Well H-1 is a production well with an installed pump. To develop this well, the pump will be operated by one of the following methods: (1) operate long enough to remove all water from the internal piping system (if the well is on-line); or (2) remove 3 well volumes (if the well is off-line). The remaining wells will be developed by method no. (2). Three volumes of water will be removed from each of the wells except in the case where a well goes dry. The subcontractor shall measure the static water level and the depth of the water column in each well prior to installation of any equipment and prior to the removal of each water well volume during well development. The subcontractor will record these values in a field notebook. The subcontractor will provide the NUS field representative with the initial values NUS will calculate the number of gallons to be removed from each well. The development of each well will be subject to the approval of the NUS field representative who has the option to amend the procedure as deemed necessary in order to develop each well to its full extent. In the event that a well is pumped or bailed dry, the subcontractor shall record the approximate volume of water removed from the well. Once 3 volumes of water has been removed from a well, the subcontractor shall measure the water level and record it in the field notebook. The subcontractor shall measure the water level again 1/2 hour after the 3 volumes were removed. The subcontractor shall report all measurements to the NUS field representative. During well development all water will be diverted away from the well and SEPTA tracks as directed by the NUS field representative.

All known information on well depths and casing diameter for the wells has been tabulated on Table no. 1. All equipment used to accomplish well development must be decontaminated as described in the attached General Guidelines.

## Pump Test

General: Prior to commencement of the pump test, sampling pumps and water level recorders are to be installed in observation wells and in the pump well. The pump test cannot begin until 48 hours after the completion of well development. Security of all equipment will be the subcontractors responsibility.

Installation of Equipment: With the exception of well H-1, the subcontractor shall install a submerisible pump in each of the wells including the pumping well. Prior to installing any equipment, the subcontractor shall make all equipment, to be installed, available to the NUS field representative for inspection. Any equipment which does not meet with the NUS field representative's approval shall be replaced by the subcontractor at his expense. All hoses, valves, and spigots downstream of the pump, including the sampling point, shall be new equipment which has not been used prior to this subcontract. The subcontractor shall provide a power source(s) for all electrically operated equipment. The observation wells will be fitted with pumps suitable for sampling purposes during the pump test. The pumping well shall be fitted with a variable speed pump capable of being placed through 6 inch I.D. casing and of discharging 50 to 300 gallons per minute (gpm) similar or equal to the type manufactured by Ingersoil-Rand. All of the pumps must have a discharge pressure of 1.0 pound per square inch or greater per foot of depth. The pumps shall not be of a type that discharges air or gasses to the water column. The pump discharge lines must be of a "hard plastic" or teflon coated so as not to bleed volatile organics to the water. No soft plastic or rubber will be acceptable. All discharge lines will lead to the surface. If sections of conduit are used, the sections must be threaded joints; no glues or adhesives will be permitted. Teflon tape is acceptable. The discharge line from the observation well pumps must be accessible for obtaining samples and must not come in contact with any surfaces in or around the well head. The sampling pumps will not be pumping continuously but at intervals throughout the pump test as indicated in the attached time table or as directed by the NUS field representative. Pumps shall be placed approximately 3 feet off of the bottom of the well or as directed by the NUS field representative.

The discharge hose from the pumping well will be connected to a "T" valve which can be used to shunt the discharge to a spigot from which samples can be taken. The valve and sampling spigot must be secured so that the spigot will not drain into the well and so that the spigot will not come in contact with the well or its surroundings. The pumping well shall be equipped with a water meter between the pump and the sampling valve. Discharge from the pumping well will be carried through a hose supplied by the subcontractor to a catch basin as designated by the NUS field representative. Approximately 1,500 feet of hose will be required. All equipment to be used in the pumping test, excluding the discharge hose downstream of the sampling valves, that will come in contact with the groundwater must be constructed of material(s) which do not react with organic solvents.

The subcontractor shall install in all the wells, excluding H-1, automatic continuous water level recorders (chart type), similar or equal to the product manufactured by Stevens. The recorders shall be installed so as not to impede ease of sampling. The floats shall be constructed of a material which will not react with organic solvents. All chart recorders must provide physical data and will be calibrated alike. It shall be the subcontractors responsibility to ensure that all equipment installed in the wells, excluding H-1, works properly when completely installed and in conjunction with other pieces of equipment installed by the subcontractor. The subcontractor will be responsible for maintaining equipment necessary for the performance of the pump test and for correcting any equipment-related problems immediately throughout the field activities. It will be the subcontractors responsibility to extricate any and all equipment that becomes entraped in a well because of malfunction, breakage, obstruction, entanglement, well collapse, siltation, faulty equipment, or negligence on the part of the subcontractor, unless otherwise directed by the NUS field representative. The subcontractor shall ground all electrical equipment securely to the satisfaction of the NUS field representative. All pumps, equipment, meters, floats, etc., must be decontaminated as described in the General Guidelines.

Attach with your proposal and price quotation a description and specifications of all pumps, meters, materials, hoses, lines, power sources, etc., needed to complete this task. In addition, attach resumes of salaried personnel, including the subcontractor's field supervisor, who will implement field activities. Also, include 5 case histories listing projects the subcontractor has performed similar to the requirements as stated herein.

Step Test: Prior to the 24 hour pump test, the subcontractor shall perform a step test to determine the specific capacity of pumping well, R-3. The step test procedure including number of incremental steps, rates of discharge, and length of time per step shall be outlined in your bid proposal. The step test shall not exceed 8 hours. A copy of all calculations to determine specific capacity of the well shall be submitted to the NUS field representative prior to the initiation of the 24 hour pump test. The pump test will start a minimum of 48 hours after the completion of the step test.

Pump Test Operations: The subcontractor will, upon installation of all equipment and the approval of the NUS field representative, begin the pump test at a time and date to be determined by NUS. This test will start a minimum of 48 hours after completion of well development and the step test. Prior to beginning starting the pump test, the subcontractor shall demonstrate, to the satisfaction of the NUS field representative, that all the installed equipment works properly with no leakage in any of the above ground equipment. Any equipment which does not work to the NUS field representative's satisfaction will be replaced by the subcontractor immediately. Unless otherwise directed by the NUS field representative, the pump test will begin at 6 a.m. on the next working day following the completion of equipment installation. Four hours prior to starting the pumping test, the water level recorders will be turned on and will remain on for a period of 6 hours after the pump in R-3 has been shut off, unless otherwise directed by the NUS field representative. The subcontractor will be responsible for pumping well R-3 at a minimum constant rate as determined by the results of the step test. Discharge from well R-3 will be directed to the designated catch basin via a hose supplied by the subcontractor. The subcontractor shall securely connect the hose to his equipment so that no leakage occurs.

The subcontractor will be present throughout the entire pump test to operate, maintain, and correct any problems that may arise. In the event that the pump test ends due to the subcontractor or equipment malfunction, the test will be rescheduled to begin at the next suitable time as determined by the NUS field representative.

Subcontractors Field Notebook: The subcontractor shall conduct his work accurately and record all information requested by NUS. In addition to information specifically asked for, the subcontractor shall record the following with a black ink pen in a field notebook.

a. The date and time of day each well is developed.
b. All measurements requested by NUS (to include date and time) (linear: to 10th of feet; volume: in gallons; rate: in gallons per minute).
c. Type, including manufacture's specifications, and quantity of equipment used.
d. Weather conditions.
e. Any locations or other identification information as supplied to the subcontractor by NUS.
f. Any pertinent remarks.
g. If any accidents or injuries occurred during the development of a monitoring well or pump test, the date, time, nature of accident or injury and personnel involved will also be so noted on the log.

The log should be kept up to date and is subject to review by the NUS field representative at any time during the field activities.

Field Survey: Within 2 weeks after the completion of all field activities, the subcontractor shall provide to NUS a professional quality drawing clearly and accurately depicting the locations of all wells and immediate surroundings (i.e., buildings, railroad tracks, roads, and pathways). One original and four copies of this drawing will be required. All wells shall be located to include both vertical and horizontal control to within an accuracy of one-hundredths of a foot including ground elevations, top of well head elevations, and stick-up height. Vertical control will be based on mean sea level (MSL) datum. All reference base datum such as base lines and/or benchmarks shall be shown on the final well location map. All survey work described herein shall be performed under the supervision of a Land Surveyor licensed to practice in the State of Pennsylvania. Attach with your proposal and price quotation resumes of the proposed Chief Surveyor, and all other salaried personnel. NUS reserves the right to reject the subcontractor's proposed personnel deemed inexperienced for their proposed position.

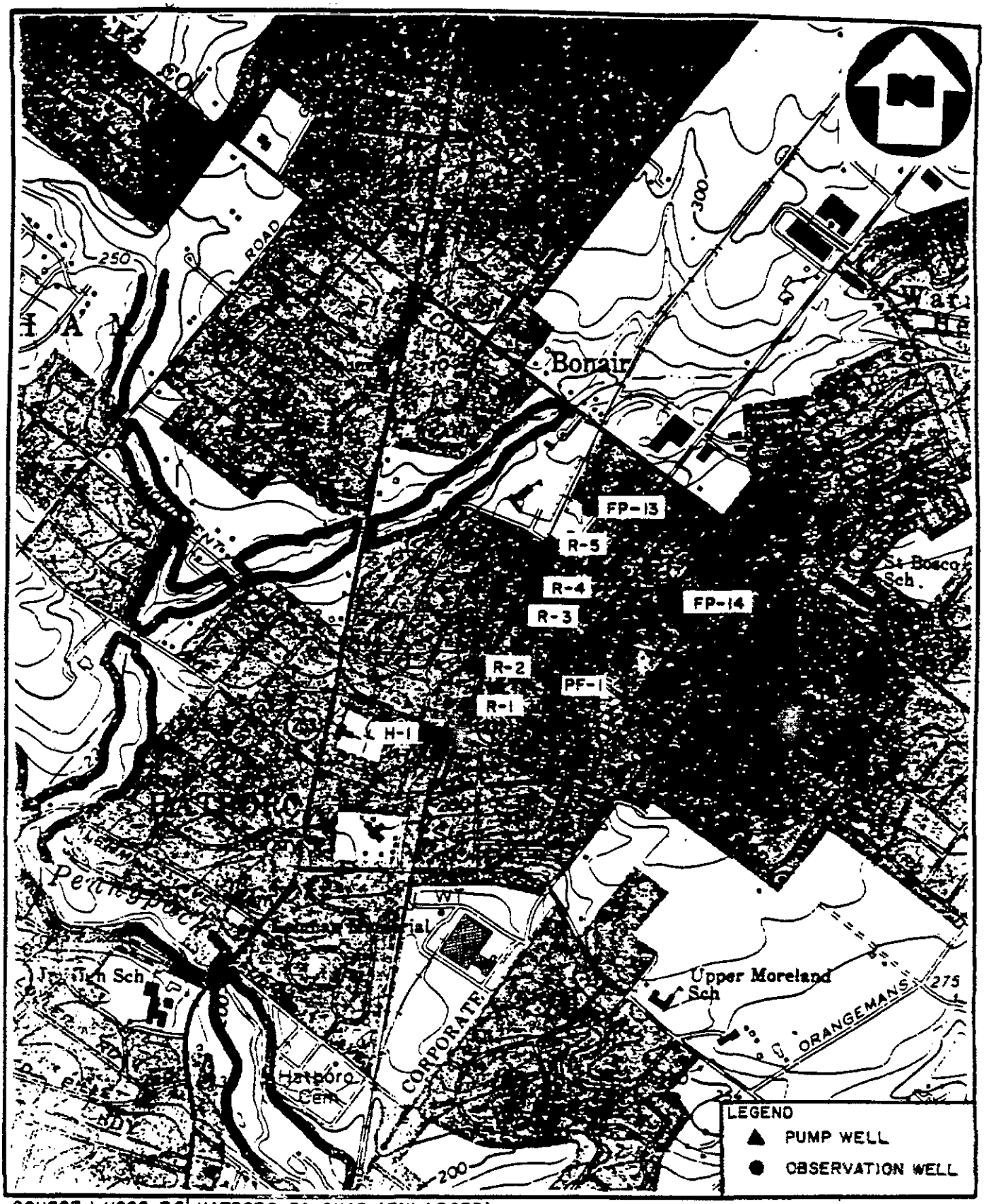
Final Report: In addition to the field survey, the subcontractor shall also submit to NUS within 2 weeks after the completion of all field activities all raw data, calculations, field notes, log books, drawings, details, and all other pertinent data pertaining to the field operations. This information will become the property of NUS/EPA and shall be presented in a legible and orderly manner. One original and four copies of this data will be required.

Safety: The performance of work for this project must be in accordance with the safety procedures set forth in the General Guidelines and the Southeastern Pennsylvania Transportation Authority (SEPTA) "Safety Rules for Work Close to Railroad Right of Way" (see Attachment A). The NUS field representative will make the final decision on all safety procedures.

**All of the above mentioned work is in support of EPA's enforcement action, therefore, all information and data collected during this subcontract will be considered confidential. The successful bidder will also be required to sign EPA's confidentiality agreements.**

Table 1

| Well No. | Approximate Depth in feet | Casing Diameter in inches |
|---|---|---|
| H-1 | 250 | 6 |
| PF-1 | 151 | 6 |
| FP-13 | 175 | greater than or equal to 4 |
| FP-14 | 175 | 4 |
| R-1 | 170 | 4 |
| R-2 | 170 | 4 |
| R-3 | 200 | 6 |
| R-4 | 170 | 4 |
| R-5 | 170 | 4 |




SOURCE : USGS 7.5' HATBORO, PA. QUAD. (ENLARGED)

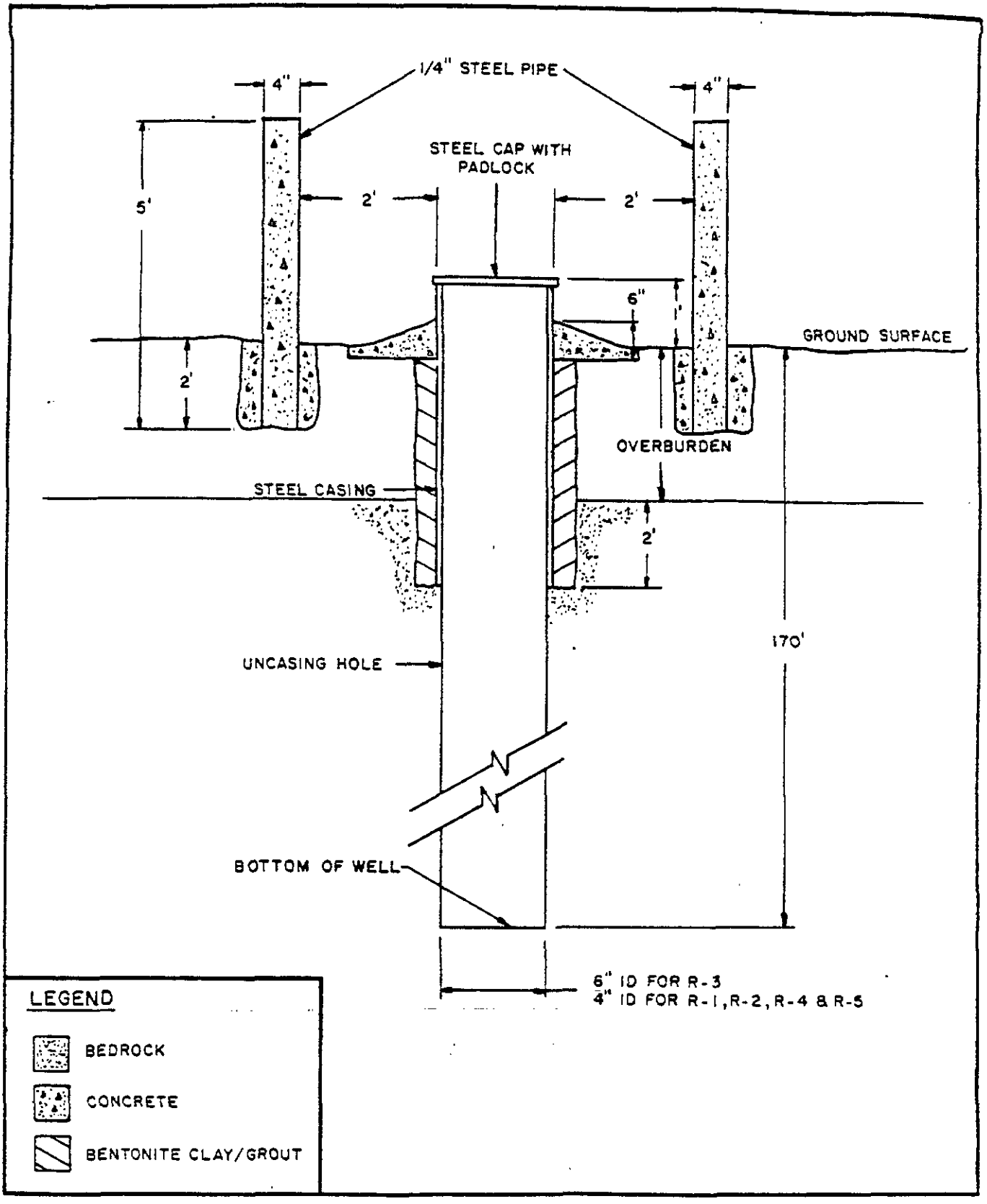
FIGURE 1

## WELL LOCATION MAP
## RAYMARK PUMP TEST, HATBORO, PA.

SCALE : 1" = 0.25 MILES

NUS CORPORATION
A Halliburton Company

AR301812




TYPICAL MONITORING WELL DETAIL
RAYMARK, HATBORRO, PA.
( NO SCALE )

FIGURE 2

NUS CORPORATION
A Halliburton Company

AR301813

Proposed sampling schedule for Raymark pump test.

- One designated well will be pumped for 24 hours.
- Water level will be recorded continuously at all wells (pumped and observations) with a continuous recording device during the pump test and for at least six (6) hours after the conclusion of the pumping.
- Water quality sampling will be done at the pumping well at only those times noted below. Water quality sampling at the observation wells will occur as follows:
  - o One sample at each monitoring well at 0 minutes; then
  - o Observation wells should be monitored for a drop in water level no less than once per hour.
  - o Upon observing a water level decline in an observation well, a water quality sample should be taken as soon as possible thereafter and the time recorded. Subsequent samples should be taken as close to the pumping well water quality sampling schedule outlined below.

Water Quality Sampling Schedule Pumped Well

(minutes from start)

| |
|---|
| 0 |
| 5 |
| 30 |
| 60 |
| 120 |
| 240 |
| 360 |
| 600 |
| 840 |
| 1080 |
| 1440 |
| 1880 (6 hours after conclusion of pumping) |

The Subcontractor will not be required to collect samples.

All work shall be performed in accordance with rules, regulations, procedures, and safe practices of SEPTA, OSHA, MESC, and all other governmental regulatory agencies having jurisdiction over this project. The following safety rules are highlighted and are considered especially applicable to all of the Contractor's employes in regard to conduct while in the track and are made a part of this agreement.

1. At the start of the project, all EPA and contractor employed supervisors, foremen and/or gang watchmen shall be required to attend a one day SEPTA safety seminar on operating rules. Supervisors, Foremen and/or Gang Watchmen added during the course of the project shall also be required to attend this seminar.

2. Consider all tracks as operating tracks and be on the alert for trains operating in either direction at all times. Walk facing the direction from which trains in regular operations will approach. No work shall be done in the track area when visibility is poor.

3. Before crossing any tracks, STOP, and look for trains approaching in either direction. Do not cross tracks unless you have time to walk slowly, and do not take chances. Do not step on the head of the rail.

4. When standing beside tracks be sure that clothing cannot catch on any part of a moving car. Loose clothing is dangerous.

5. Do not step on track behind stopped trains, particularly those arriving at stations, due to possibility of train being reversed to place doors properly for opening in case of overrunning platform.

6. EPA and contractor employed Supervisors, Foremen or Gang Watchmen shall be responsible for the safety, safety instructions and safe performance of all employes under their supervision. They must see that all men working under their immediate supervision receive warnings of approaching trains and other equipment in time to reach a safe place. Inexperienced employes must be instructed by immediate supervisors regarding safe methods in performing their duties.

7. Before permitting workmen to be on the track, the Foremen or Gang Watchmen will have an understanding with all employes as to where they will go when necessary to clear for trains.

8. Do not attempt to carry heavy material across the tracks without permission of proper authorities.

9. Until it has been ascertained that proper protection has been afforded, hoisting equipment shall not be swung into position where trains, engines, or cars on an adjacent track might strike it. While trains, engines or cars are passing on an adjacent track, the operator of hoisting equipment must know that the swinging mechanism is properly controlled to avoid boom swinging.

10. The SEPTA engineer shall have the right to restrict the operations of fouling or on-track equipment when in his opinion the equipment is not in satisfactory condition to be safely operated. The SEPTA engineer shall also have the right to prohibit the operation of any fouling or on-track equipment by any contractor employed operator who in his opinion is not qualified to operate said equipment in a safe manner.

11. Keep hands and feet clear of power equipment.

a. All overhead wires including catenary, transmission and signal lines in electrified zones are to be considered alive at all times.

b. Insulating covering of wire should not be depended upon for protection against shock.

c. No employe shall do any work near high voltage wires or apparatus where it is possible for any part of his body or tools and material with which he is working to come within ten (10) feet of such wires, unless a SEPTA Overhead Maintenance employe is assigned to observe the safety of the operation.

d. When equipment is used in electrified territory or in the vicinity of any overhead wires, the contractor must exercise special care to safeguard all persons in the area. Special attention must be given in the vicinity of overhead bridges and other structures where the wires may be depressed. If, in the opinion of the engineer, the required clearances cannot be maintained or any hazards are involved, a SEPTA Overhead Maintenance employe must be requested. All required protection personnel shall be SEPTA employes and all costs shall be borne by the EPA and the Contractor.

13. The safety and continuity of operation of the trains of the Authority shall be of the first importance. They shall, at all times, be protected and the Contractor shall arrange his work accordingly. Whenever the work may affect the safety of movement of trains, the method of doing such work, together with the proposed sequence of operations and time schedules for same, shall be submitted to the Engineer for approval. No work shall be started until such approval has been obtained. However, such approval of the Engineer or his duly authorized representative will not be considered as a release from responsibility for any damage to the Authority by the acts of the Contractor, his employes, and/or his subcontractor's employes. Erection work in the vicinity of and over tracks shall require a plan for the Engineer's approval.

14. When any excavation extends below the bottom of the crossties, or where the stability of the railroad embankment and/or structure may be affected by the excavation, such excavation shall be adequately braced by the Contractor. Prior to starting any such excavation, detail drawings of the proposed bracing method shall be prepared and submitted to the Engineer for his approval.

15. The responsibility for cooperation between the Authority, EPA and their contractor's in the maintenance of railroad traffic will be entirely upon the EPA and their contractor and no claims may be made against SEPTA for delay or any other interference that may have caused the Contractor's operations to be delayed in connection with any work under this contract.

16. An operating track is fouled for operating safety purposes when any object is brought closer than ten (10) feet horizontally from the near rail of the track. Equipment shall be considered as fouling the tracks when working in such a position that failure of the same, with or without load, will obstruct the track.

17. The SEPTA engineer or his authorized representative shall have complete authority in matters related to the safety of SEPTA's operations and facilities. The SEPTA flagman shall have absolute authority to direct the stoppage of work or other measures required for the safe passage of trains.

the safety of all his personnel. The Contractor's Foremen or Gang Watchmen shall be equipped with air horns and flags to warn his personnel of the approach of trains.

18. In consideration of SEPTA's cooperation with the U.S. EPA on this project, SEPTA will be held harmless for the actions of the U.S. EPA and their contractors. U.S. EPA agrees that it will take no action against SEPTA for possible existance or clean up of pollutants or hazardous/toxic materials which may be discovered on SEPTA property as a result of this investigation. In further consideration of SEPTA's cooperation with U.S. EPA for this project, U.S. EPA shall use its best efforts to dissuade the Pennsylvania Department of Environmental Resources from taking any action against SEPTA for the possible existance or clean up of pollutants or hazardous/toxic materials which may be discovered on SEPTA property as a result of this investigation.

19. Water pumped from wells will be directed away from trackage and roadbed to prevent erosion, washout, or ponding. Any track settlement or other property damages due to soil subsidence shall be the sole liability of the U.S. EPA and all repairs will be performed by SEPTA or its contractor. Expenses for these repairs will be borne by the U.S. EPA.

20. All hazardous, toxic, or pollutional materials discovered by the U.S. EPA or its contractor, as coming from the adjacent property which is the subject of this investigation, will be removed from SEPTA property at no expense to SEPTA and will be subsequently disposed of in accordance with current Federal and State Regulations.

21. The U.S. Environmental Protection Agency (EPA) and their contractor will show evidence of adequate liability insurances prior to project commencement.

22. At the conclusion of this project, all loose equipment and materials not used as part of this project will be removed from SEPTA property.

23. Wells will be fitted with locking caps, in accordance with requirements of the Pennsylvania Department of Environmental Resources and the U.S. EPA. Drilled wells, casings, and appurtenances are the sole responsibility of the U.S. EPA and must be maintained by the U.S. EPA to all applicable standards. At project completion, and when the wells are no longer of value to the U.S. EPA, the U.S. EPA will arrange to have the well casings cut at ground level and grout filled.

## General Guidelines

The following guidelines will assist you in preparing your proposal and bid.

Contractor: NUS Corporation, hereafter referred to as NUS, a Maryland Corporation with headquarters at 910 Clopper Road, Gaithersburg, Maryland 20878, and with a business office at 992 Old Eagle School Road, Suite 916, Wayne, Pennsylvania 19087, has been engaged by the United States Environmental Protection Agency (EPA) to provide engineering, technical, and managerial services in support of the EPA Field Investigation of Uncontrolled Hazardous Waste Sites. The contract with EPA also provides that NUS shall solicit, accept bids, award subcontracts, and inspect the work for certain projects requiring the use of subcontractors.

Subcontractor: Successful bidder hereafter referred to as the subcontractor.

Contractural Relationship: In the performance of work hereunder, the subcontractor shall operate as an independent contractor and not as an agent of NUS or EPA. No personnel furnished by the subcontractor shall be deemed, under any circumstances, as agents or servants of NUS or EPA. No portion of this subcontract may be sublet by the subcontractor without prior authorization from NUS. Where such written authorization is given, it shall not relieve the subcontractor of any of its responsibilities under this subcontract.

Workmen's Compensation: The subcontractor is required to carry Workmen's Compensation Insurance, as provided by the Workmen's Compensation Act.

Equal Employment Opportunity: In the hiring of employees for the performance of work under this subcontract, the subcontractor nor any person acting on behalf of such subcontractor shall, by reason of race, creed, color, or sex, discriminate against any citizen of the United States who is qualified and available to perform the work to which employment relates.

Contractor's Field Representative: Throughout the duration of this subcontract, NUS will have on site various technical representatives. One of said personnel will be designated by NUS as the NUS Field Representative. The NUS field representative will have full and complete authority over any and all operations conducted in the field on this project. The opinions and interpretations of the NUS field representative pertaining to Specifications, Details, and Plans shall be the same as NUS Corporation and shall be final and binding on all parties.

Subcontractor's Superintendent: The subcontractor shall assign a capable, responsible representative to supervise the subcontractor's workmen at all times. This superintendent shall carry out the directions of the NUS field representative, and will be the only individual authorized to discuss disputes with the NUS field representative. When the subcontractor's superintendent must leave the site of work, a foreman shall be designated full responsibility of superintendence on the site.

Subcontractor's Employees: An employee of the subcontractor, adjudged by NUS as unskilled or unfit, shall be promptly removed upon receipt of written notice from NUS and shall not be re-employed on the work except by written consent of NUS.

Specifications: The attached Stipulations, Specifications, and Details of work are defined and described as Specifications. It is understood and agreed to by all parties that everything herein contained is hereby made a part of the subcontract.

Anything mentioned in the Specifications and not shown on the Details, or shown on the Details and not mentioned in the Specifications, shall be of like effect as if shown and mentioned in both. In cases of conflict or inconsistency between the Specifications and the Details, or in cases of discrepancies, omissions, and/or errors, the matter shall be submitted immediately to NUS for determination.

Changes in Specifications: NUS reserves the right to make any changes in the Specifications. If such changes cause a material increase or decrease in the cost of performing the work or the time of performance, and written notice thereof is given to either party within ten (10) days after the giving of such notice of change, an equitable adjustment in the subcontract price and/or time of performance shall be made.

Subcontract: These Specifications, and Plans forming a part thereof, will cover the furnishing of all materials, equipment, tools, labor, and work necessary for the surveying, development, and installation of equipment in 9 wells and conducting a pump test.

Plan and Details: The Plan and Details referred to above have been prepared by NUS Corporation and are attached as appendices to the Technical Specifications.

Intent of Specifications: Any questions as to the intent or meaning of these Technical Specifications or Details shall be referred, in writing, to NUS Corporation at 992 Old Eagle School Road, Suite 916, Wayne, Pennsylvania 19087, (phone calls will not be accepted), whose interpertation and decision shall be final and binding on all parties. Any questions concerning contract procedures should be addressed to Mr. John L Renehan, Deputy Zone Project Manager, at NUS Corporation, 1300 North 17th Street, Suite 1320, Arlington, Virginia, 22209, phone number (703) 522-8802.

Points not Covered by Specifications: Wherever any feature of the work is not fully set forth in these Specifications, it must be understood that the same shall be governed by the rules of the best prevailing practice, as determined by NUS, for that class of work .

Extra Work: The subcontractor shall not be entitled to any additional compensation for the performance of any work not required under this subcontract unless prior to the performance of such work, he shall have received written authorization from NUS to perform such work.

Inspections: Ample facilities shall be furnished at all times to NUS and its representatives for inspection of the work. If any imperfect work is performed at any time, the defects therein shall be remedied by the subcontractor, at his expense, to the full satisfaction of the NUS field representative. Failure of the subcontractor to do so shall be cause for cessation of work.

Transportation Equipment and Materials: The subcontractor shall supply and furnish, at the location where the work is to be performed, all transportation, labor, tools, machinery, materials and bear all items of expense necessary for executing and completing in the best manner the work called for herein. Any equipment, materials, or services not specifically described in the Specifications, but which may be fairly implied as required or necessary to complete the work, shall be within the scope of the subcontractor's work.

Injury to Person or Property: The subcontractor shall be responsible for all injuries to, or death of, any and all persons, and for loss of or damage to property either directly or indirectly that may result from his operations.

Manner of Prosecuting Work: The work shall be prosecuted in a manner best calculated to promote rapidity in execution, to produce the greatest accuracy in results, to secure safety of life, and the protection of property. Work shall be executed to the full satisfaction of the NUS field representative and in accordance with his directions.

Permits, Etc., Rules and Regulations: All permits, licenses, certificates, etc., of whatever nature, necessary for the prosecution of this work, shall be obtained by the subcontractor at his expense, with the exception of local well drilling permits which will be secured by EPA. The subcontractor shall comply strictly with all federal, state, and local laws, ordinances, rules, and regulations relating to his operation in the performance of the work hereunder.

Protection of Existing Structures, Etc.: The subcontractor shall protect all existing wells, structures, walks, pipelines, and the like during the progress of the work. Trees, shrubbery, and other vegetation which do not require removal or clearing to gain access to a well location shall also be protected from damage by the subcontractor. The subcontractor shall also protect any additional boreholes or monitoring wells which may be located on site.

Pipes, Underground Cables, Underground Structures, Etc.: It shall be the sole responsibility of the subcontractor to contact utility companies before commencing any field subsurface operations, to verify the location of any and all pipes, underground cables, and underground structures. During the progress of work, the subcontractor shall cooperate with the owners of utilities and permit their representatives access to the work area to determine if their utilities are being endangered in any way. However, access to the work area will be coordinated through the NUS field representative.

Access to Property: Access to property will be arranged by NUS and EPA prior to the start of work. All subcontractor's personnel must coordinate entry onto the site with NUS, and must be accompanied at all times by NUS personnel.

Performance of Work: The subcontractor shall perform his work in such a manner as not to unreasonably interfere or impede the work of others, on or adjacent to the site. NUS reserves the right to direct the subcontractor to schedule the order of performance of his work in such a manner as not to unreasonably interfere with the work of others.

Public Interest: NUS will implement in dealing with the press and any other public interest groups. Under no circumstances will any information about this subcontract, NUS, or EPA be passed by the subcontractor, or the subcontractor's employees to any other parties. Photographs may not be taken by the subcontractor of any part of the job site.

Scope: The subcontractor shall supply all labor, material, and necessary equipment as per the Specification for the subject project. The equipment described shall be considered satisfactory by industry standards and shall be subject to prior approval by NUS. All equipment shall be modern and in a condition of good repair. Faulty equipment or methods shall be corrected immediately, by the subcontractor. Failure of the subcontractor to correct faulty equipment or methods shall be cause for cessation of work.

The subcontractor's equipment, when not in use, shall be stored where directed by the property owner or the NUS field representative. The security of such equipment shall be the subcontractor's responsibility.

Number of Wells: No deviation from the number of wells to be monitored as shown on the Plan shall be made, unless so ordered in writing by NUS.

Accessibility: Every attempt to determine site field conditions that may affect site accessibility has been made by NUS. However, failure to visit the site by the bidder prior to start of work will not entitle the subcontractor to any additional compensation due to existing site conditions.

Clearing: The subcontractor shall obtain permission from the property owner(s) prior to any clearing of trees, shrubs, other vegetation, and obstructions in order to gain access to a well location. Said clearing is considered incidential to the work described herein and no additional compensation will be due the subcontractor in these instances. Such clearing shall be kept to a minimum in order to maintain the natural vegetative growth as much as possible.

Equipment Decontamination: When any work is performed in potentially contaminated areas, health, safety, and cross-contamination are of the utmost importance. Therefore, all equipment must be decontaminated with decontamination solution(s) (as approved by NUS) and rinsed with drinking quality water prior to entering and before leaving the site. Personnel decontamination procedures will be explained later in the Specifications.

Pumps, hoses, etc., shall be decontaminated by the subcontractor's personnel to the full satisfaction of the NUS field representative prior to installing any equipment into a well, before leaving the site, or at any other time deemed necessary by the NUS field representative. This decontamination process will consist, at minimum requirements, of high pressure hot water cleaning of the above mentioned equipment and pumps and well hoses will be rinsed with methanol and air dried prior to being installed. The subcontractor shall provide drinking quality water, in sufficient quantities to carry out decontamination procedures as described herein as well as any other decontamination determined necessary by the NUS field representative. The subcontractor shall also provide a mobile hot water high pressure washer (a high pressure portable steam jenny is suggested), tubs or other receptacles (of sufficient size) in which equipment can be placed during the various stages of decontamination. The subcontractor shall also provide an ample supply of methanol.

Number of Pumps, Meters, etc.: The subcontractor shall supply a sufficient quantity of equipment as to satisfy the requirements of this subcontract. The subcontractor shall also have on site at all times ample, competent and trained personnel to perform all the requirements of these Specifications. In addition, the subcontractor will have on site sufficient backup pumps, meters, or tools and equipment to perform minor repairs should breakdowns occur.

Contractor's Safety Plan: Prior to the commencement of any field activities, NUS will develop a Safety Plan for the subject project. The subcontractor shall strictly comply with all articles of this Safety Plan. Failure to comply with this Safety Plan by the subcontractor or the subcontractor's employees shall be cause for stopping the work. NUS will provide a safety seminar prior to commencement of site work.

The performance of this work shall also conform to the safety procedures set forth in the attached guidelines and the Southeastern Pennsylvania Transportation Authority (SEPTA) "Safety Rules for Work Close to Railroad Right of Way" (see Attachment A). The subcontractor will not attend the seminar provided by SEPTA, but will be briefed by the NUS field representative who will represent the SEPTA safety codes in addition to NUS safety codes.

Accidents or Injuries: Any accidents or injuries, occurring during the duration of this subcontract, involving any subcontractor's employees, employed for work on this project, shall immediately be reported to the NUS field representative.

Health and Safety: All personnel employed or retained for services by the subcontractor for this project may at times be required to wear personal protective clothing and/or respiratory protective equipment while working on and off site. The determination for type of protective clothing needed will be by the NUS field personnel. In general the subcontractors personnel will be required to wear cotton coveralls, safety boots/shoes, safety glasses and hard hats or as determined by the NUS field representative.

No smoking, eating, drinking, or use of drugs will be permitted while working on site.

Personnel Decontamination: NUS shall be responsible for all personnel decontamination procedures. NUS will supply all the necessary detergents and solutions necessary for the decontamination procedures. The subcontractor shall supply, in sufficient quantities, drinking quality water for these procedures. All personnel entering the site and prior to leaving the site are required to pass through decontamination as determined necessary by the NUS field representative.

Cleaning Up: Upon completion of all work described in these Specifications, the subcontractor shall remove from site all equipment brought by him to the site. The subcontractor shall also remove from the site all containers, drums, tanks, debris, and unused materials, and restore the site as nearly as practicable to its condition prior to commencment of the work provided for herein. All walks, drives, utilities, structures, or other property damage due to the subcontractor's negligence, shall be restored at his expense to as nearly as possible their original conditions. All cleanup operations shall be completed to the full satisfaction of the NUS field representative.

Delay Time: Time is of the essence in the performance of this subcontract and all actions taken by NUS and the subcontractor shall be taken to that end. However, any delays in excess of thirty (30) minutes per instance which are caused directly by NUS or EPA, shall be reimbursed to the subcontractor. Both the NUS field representative and the subcontractor's superintendent will jointly record and verify all such occurrences and the time involved in excess of thirty (30) minutes per instance. Upon completion of work, an agreement shall be reached between the NUS field representative and the subcontractor's superintendent as to the accumulated total number of delay hours and fraction thereof. Reimbursement will be based on a hourly rate and shall be a separate bid item.

Delay time does not include delays that are the result of adverse weather conditions, difficult mobilization or demobilization, breakdown of subcontractor's equipment, difficulty in moving to well locations, or untimely arrival of materials, equipment, labor, tools, etc. necessary to satisfactorily complete the work in accordance with the Specifications, and to the satisfaction of NUS. No payment will be due the subcontractor for shutdowns caused by the subcontractor or negligence on the part of an employee of the subcontractor or the temporary shutdown of work by the NUS field representative due to unsatisfactory, unsafe or negligent performance of the subcontractor or any personnel employed by the subcontractor.

If the pumping of the pump well is interrupted at any time for more than 1 hour due to pump failure or any other cause not due to NUS actions, it shall be cause for NUS to request an increase in the pump test time or a complete new test to be conducted. If the failure is due to subcontractor actions or faulty equipment and is cause for a complete new test or extension of the test delay time.

In the event of a retest, the contractor shall provide the NUS field representative with all water level recorder records and copies of all field logs. The contractor shall include these with the final report at the original bid price.

APPENDIX F

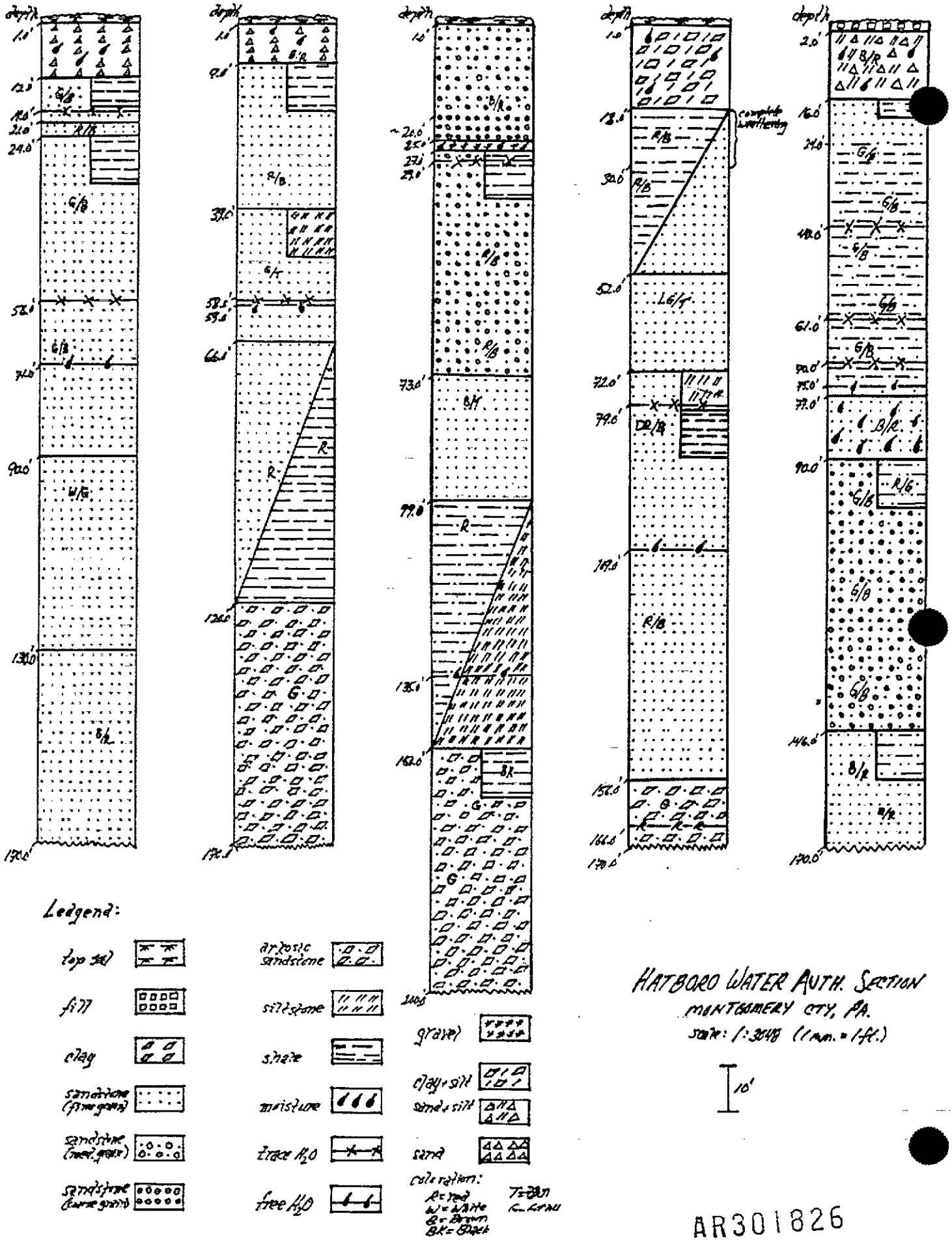
Meeting at EPA Region III Headquarters on September 11, 1984, from 1:00 PM to 3:00 PM, regarding Raymark.

Attending the meeting were:

| | |
|---|---|
| Martin R. Howe | Geologist/Hydrogeologist, NUS Corp. |
| Randall Dickinson | Geotechnical Engineer, NUS Corp. |
| Steve Platt | Water Supply, EPA III |
| Robin Aitken | CERCLA Enforcement, EPA III |
| Robert Giegengack | Consultant, University of Pennsylvania |
| Paula Luborsky | Hydrogeologist, EPA III |

A meeting was held to discuss what sampling alternatives exist as there is not sufficient yield from well no. R-3 to conduct a pump test. The value of the pump test was explained and numerous methods of increasing the capacity of the pumping well were evaluated. It was decided, by EPA, that the pumping well could not be modified easily or practically to facilitate a pump test. It was agreed upon, by all, that each of the 8 wells should be sampled, then pumped and sampled again. Prior to pumping a well, a discrete sample should be taken from the middle of the upper 1/3 of the well, from the exact middle of the well, and from the middle of the lower 1/3 of that well. A minimum of 3 standing well volumes should be removed from the well, unless it is pumped dry. Once the static level in the well returns to normal, a stainless steel bailer should be lowered to the bottom and retrieved to provide a composite sample of the water column. This procedure should be used on all of the wells except no. H-2. Sampling well no. H-2 can only be accomplished from the discharge spigot of the surface turbine pump. All samples collected should be shipped to Central Regional Laboratory daily.

Steve Platt will write a memo describing this sampling plan as an alternative to a pump test. Attached is a stratigraphic representation of the boring logs as interpreted by a student from University of Pennsylvania working under Robert Giegengack. Also attached is a compilation of well detail information for wells in the Raymark vicinity.




AR301826

6/24/89

| WELL NO. | APPROXIM GROUND ELEVATION (FT., MSL) | APPROXIM. DEPTH OF WELL (FT.) | CASING DIAMETER (INS) | CASING LENGTH (FT.) | YIELD (GPM) |
|---|---|---|---|---|---|
| H-1 | 250 | | | | (120) |
| H-2 | 250 | | | | (200) |
| H-3 | 250 | | | | (145) |
| H-7 | 225 | (±06) | | | (160) |
| H-14 | 210 | | | | |
| H-16 | 240 | | | | |
| H-17 | 235 | | | | |
| WH-1 | 280 | *(300) | 10-8 | 16 | |
| WH-2 | 300 | (300) | 8 | | |
| FP-1 | 300 | | | | |
| FP-2 | 300 | | | | |
| FP-4 | 288 | (190)? 40 | 6 | | (25) |
| FP-5 | 292 | 40 | 6 | | |
| FP-6 | 300 | (600)? 45 | (10-8) 6 | | |
| FP-7 | 292 | (474)? 298 | 8 | | |
| FP-9 | 300 | 40 | 6 | | |
| FP-12 | 292 | 150 | | | |
| FP-13 | 260 | 175 | | | |
| FP-14 | 305 | 175 | | | |
| FP-15 | 290 | 90 | | | |
| LR-1 | 285 | (600) | (6) | | (50) |
| MANDER STONE | 280 | 226 | 8 | | |
| PENN FASTNER | 265 | 151 | 6 | | |

( ) ABSTRACTED FROM "GROUNDWATER RESOURCES OF MONTGOMERY & BUCKS CO." AT NEARBY SITES

AR301827

APPENDIX G

Meeting at EPA Region III Headquarters on October 23, 1984, at 10:00 AM, regarding Raymark.

Attending the meeting were:

| | |
|---|---|
| Martin R. Howe | Geologist/Hydrogeologist, NUS Corp. |
| Randall Dickinson | Geotechnical Engineer, NUS Corp. |
| Harold Byer | D.P.O., EPA III |
| Robin Aitken | CERCLA Enforcement, EPA III |
| Steve Platt | Water Supply, EPA III |

Harold Byer wanted to discuss the possibility of conducting a well sampling at Raymark as per the instructions in a memo by Steve Platt, dated September 17, 1984. The memo is located in appendix H.

We discussed the memo in terms of sampling method, proposed sampling date, laboratories, who will coordinate the analysis, and what kind of report is wanted.

The sampling will be as follows:

- For wells FP-13 and FP-14, Raymark (PF-1), and R-1 through R-5, sample from middle of upper portion of water column, middle, and middle of lower portion of water column prior to pumping. For H-1, take an initial sample.
- Purge 3 to 5 volumes of water from each well with a pump. Then take a final sample near the bottom of each well. H-1 will be sampled as before.
- Decon will be to rinse off outside of pump.
- Samples after pumping will be taken with a stainless steel bailer.
- Samples will be shipped each night and will be shipped no later than Wednesday. CRL does not accept samples on Friday or Saturday.
- Will use kemmerer tube to sample horizons prior to pumping.

Harold Byer did not feel that the TDD needed to be amended, nor did he feel that a new TDD needed to be issued. He wanted NUS to do the work the first week of November 1984.

APPENDIX H

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Region III - 6th & Walnut Sts.
Philadelphia, Pa. 19106

**SUBJECT:** Recommended Alternative for Raymark Enforcement Case **DATE:** 9/13/84

**FROM:** S. Stephen Platt, Hydrogeologist
State Programs Section (3WM41)

**TO:** Garth Glenn, Manager
FIT III

On Tuesday, September 11, 1984 the following people met to discuss the status of the Raymark enforcement case and to determine what additional steps would be taken to gather additional data to support the case:

Dr. Robert Geigengack - University of Pennsylvania
Randy McMillan - FIT III
Marty Howe - FIT III
Robin Aitken - EPA
Paula Luborski - EPA
Steve Platt - EPA

With the knowledge that a pump test conducted at one of the newly drilled wells R1-R5 would be unproductive, we discussed additional alternatives that would provide us with important ground water quality information. It was decided that a well designed sampling program of wells R1-R5, Fischer Porter 13 and 14, Raymark and Hatboro #2 would be conducted. The sampling program is outlined in an attachment to this memo. Depending on the results of this sampling program, we may decide to conduct a pump test from Hatboro well #2.

We would prefer that this sampling program be conducted by no later than the end of October. The group also felt it would be more advantageous to have your staff conduct the sampling rather than having to go by way of contract.

RAYMARK SAMPLING PROGRAM

- SAMPLING PROCEDURES -

The following procedure will be utilized for sampling wells R1-R5, Fischer Porter 13 and 14, Raymark, and Hatboro #2.

1) Except for Hatboro well #2, water quality samples for TCE and PCE analysis, will be taken under static conditions in the upper third, middle, and lower third of each well. Water levels should be recorded for each well as well as the depths at which each water quality sample is taken. Sample depths should be consistent from well to well as much as possible.

   Due to the conditions which exist at Hatboro well #2 only one "static" sample can be taken; from the depth where the pump is located. Analysis for TCE and PCE will also be conducted.

2) After collecting the static samples, each well should be purged of three well volumes of water. After purging, one composite sample from each well should be collected and again analyzed for TCE and PCE.

3) Total Number of Samples

| | | |
|---|---|---|
| Static | - | 25 |
| Composite | - | 9 |
| Total | | 34 |

4) It would be a good idea when sampling Hatboro well #2 that it be done when Hatboro #17 is not pumping. We understand that Hatboro #17 operates one day out of every four. It would be ideal if Hatboro #2 could be sampled on the third day after Hatboro #17 has operated.

If you should have any questions, please give me a call at 597-9017.

Attachment

cc/with Attachment

Robert Geigengack, Univ. of Penn
Joe Melvin (3RC20)
Paula Luborski (3HW12)
Robin Aitken (3HW12)
Butch Byer (3HW12)

# APPENDIX I

**PLANNING DESIGN & RESEARCH ENGINEERS, INC.**

2910 LOUISE DRIVE
NASHVILLE, TENNESSEE 37211
615/333-0618

MINNEAPOLIS, MINNESOTA
612/541-1834

June 26, 1984

Mr. John L. Renehan
Vice President & Contracting Officer
NUS Corporation
1300 North 17 th Street, Suite 1320
Arlington, Virginia 22209

Re: Solicitation Z0840201-11
Raymark Site, Hatboro, Pennsylvania

Dear Mr. Renehan:

The work on this site was performed during June 12 and June 20, 1984. The drilling team attended a Safety Seminar on June 12. The drilling operation was started on June 13 and completed on June 19. Concreting work and cleaning and dressing up of site were completed on June 20, 1984. The team consisted of:

1. Subodh Kumar - Supervisor
2. Robert Dean - Driller
3. Walter Proctor - Helper
4. Houston Taylor - Helper
5. Harlan Varden - Helper

The starting and completion dates for various borings were as follows:

| BORING NO. | START DATE | END DATE |
|---|---|---|
| R-1 | June 16 | June 18 |
| R-2 | June 15 | June 15 |
| R-3 | June 13 | June 14 |
| R-4 | June 18 | June 19 |
| R-5 | June 19 | June 19 |

The general weather conditions at the site about mid morning time were as follows:

June 13: Hot and humid, temperatures in 90s
June 14: Warm and humid, temperatures in 80s
June 15: Humid, temperatures in 70s - 80s
June 16: Nice and cool, temperatures in 70s

June 18: Nice and cool, temperatures in 70s, drizzling
June 19: Nice, sunshine, partly cloudy, temperatures in 70s - 80s.

The air rotary method was specified and used for drilling. In this method the subsurface material is ejected by the drill under air pressure. Thus, the evaluation of material of strata and the depths of latter cannot be made accurately. Considerable difficulty was encountered in labeling various strata, particularly of rock material.

The logs of boring and information pertinent to drilling is provided in the Appendix attached herewith.

Should you have any questions, please contact us. It has been our pleasure to serve you. Please let us know if we can be of further assistance to you.

Sincerely,

PLANNING, DESIGN & RESEARCH ENGINEERS, INC.

AKupadhyaya

A.K. Upadhyaya, P.E.
President

AKU/sk

encl.

✓cc. Mr. Richard Cromer, NUS Corporation, Wayne, Pennsylvania.

# APPENDIX

# LOGS OF BORING

# A P P E N D I X

The following information is applicable to all the five borings for which the logs have been included here:

| | | |
|---|---|---|
| TYPE OF DRILL | : | Schramm T-64, HB |
| EQUIPMENT | : | Schramm T-64, HB Rotadrill |
| MANUFACTURER'S MODEL | : | A 001 001 2 |
| HAMMER | : | 5325 Mission |
| AIR SYSTEM | : | 425 cfm Piston type Air Comp. |
| AIR PRESSURE USED | : | 180 psi |
| DIAMETER & TYPE OF TEMPORARY CASING USED | : | 6 inches |
| FREQUENCY OF OIL FILTER CHANGE | : | After each boring |

No drilling fluid used

No respiratory protective equipment used

No accident or injury of personnel involved

NOTE: The air rotary method was specified and used for drilling. In this method the subsurface material is ejected by the drill under air pressure. Thus, the evaluation of material of strata and the depths of latter cannot be made accurately. Considerable difficulty was encountered in labeling various strata, particularly of rock material.

# PLANNING, DESIGN & RESEARCH ENGINEERS, INC.

2910 Louise Avenue
Nashville, TN 37211
(615) 333-0618

6174 Olson Memorial Highway
Minneapolis, MN 55422
(612) 541-1834


## LOG OF BORING

PROJECT: RAYMARK SITE, HATBORO, PENNSYLVANIA

JOB NO: 8420
DATE: June 16, 1984
DRILLER: Robert Dean
LOGGER: Subodh Kumar

BORING NO: R - 1
BORING TYPE: Air Rotary
GROUND ELEV:
LOCATION:

| DEPTH, FEET | SAMPLE TYPE AND NUMBER | SYMBOL | BLOWS/FOOT | DESCRIPTION OF STRATA |
|---|---|---|---|---|
| | | | | SILTY CLAY - Brown to black and moist - with org. matl. |
| | | | | SILTY CLAY - Brown and moist |
| | | | | SILTY SAND - Reddish brown, moist and loose |
| 10 | | | | SHALE - Red brown, fine, moist and weathered |
| | | | | SANDSTONE - Pinkish brown, moist and with shale incls. |
| 20 | | | | |
| 30 | | | | |
| 40 | | | | SANDSTONE - Pinkish brown and fine grained |
| 50 | | | | |
| 60 | | | | |
| 70 | ▼ | | | |

Continued

DEPTH TO WATER TABLE: 71 ft DEPTH TO THE BOTTOM OF HOLE: 170 ft

REMARKS: Page 1 of 3

PLATE A-1

# PLANNING, DESIGN & RESEARCH ENGINEERS, INC.

2910 Louise Avenue
Nashville, TN 37211
(615) 333-0618

6174 Olson Memorial Highway
Minneapolis, MN 55422
(612) 541-1834


## LOG OF BORING

PROJECT: RAYMARK SITE, HATBORO, PENNSYLVANIA

JOB NO: 8420
DATE: June 16,1984
DRILLER: Robert Dean
LOGGER: Subodh Kumar

BORING NO: R - 1
BORING TYPE: Air Rotary
GROUND ELEV:
LOCATION:

| DEPTH, FEET | SAMPLE TYPE AND NUMBER | SYMBOL | BLOWS/FOOT | DESCRIPTION OF STRATA |
|---|---|---|---|---|
| | | | | Continued |
| 80 | | | | |
| 90 | | | | |
| 100 | | | | |
| 110 | | | | SANDSTONE - Pinkish brown and fine grained |
| 120 | | | | |
| 130 | | | | |
| 140 | | | | Continued |

DEPTH TO WATER TABLE: _____ DEPTH TO THE BOTTOM OF HOLE: _____

REMARKS: Page 2 of 3

PLATE A-2

AR301640

# PLANNING, DESIGN & RESEARCH ENGINEERS, INC.

2910 Louise Avenue
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(615) 333-0618

6174 Olson Memorial Highway
Minneapolis, MN 55422
(612) 541-1834


## LOG OF BORING

PROJECT: RAYMARK SITE, HATBORO, PENNSYLVANIA

JOB NO: 8420
DATE: June 16, 1984
DRILLER: Robert Dean
LOGGER: Subodh Kumar

BORING NO: R - 1
BORING TYPE: Air Rotary
GROUND ELEV:
LOCATION:

| DEPTH, FEET | SAMPLE TYPE AND NUMBER | SYMBOL | BLOWS/FOOT | DESCRIPTION OF STRATA |
|---|---|---|---|---|
| | | | | Continued |
| 150 | | | | SANDSTONE - Gray with pink and white grains, fine grained |
| 160 | | | | |
| 170 | | | | End of Boring at 170 ft<br>June 18, 1984 |
| 180 | | | | |
| 190 | | | | |
| 200 | | | | |

DEPTH TO WATER TABLE: DEPTH TO THE BOTTOM OF HOLE:

REMARKS: Page 3 of 3

PLATE A-3

# PLANNING, DESIGN & RESEARCH ENGINEERS, INC.

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(615) 333-0618

6174 Olson Memorial Highway
Minneapolis, MN 55422
(612) 541-1834


## LOG OF BORING

PROJECT: RAYMARK SITE, HATBORO, PENNSYLVANIA

JOB NO: 8420
DATE: June 15,1984
DRILLER: Robert Dean
LOGGER: Subodh Kumar

BORING NO: R - 2
BORING TYPE: Air Rotary
GROUND ELEV:
LOCATION:

| DEPTH, FEET | SAMPLE TYPE AND NUMBER | SYMBOL | BLOWS/FOOT | DESCRIPTION OF STRATA |
|---|---|---|---|---|
| | | | | SILTY CLAY - Brown to black and moist - with org. matl. |
| | | | | SILTY CLAY - Brown and moist |
| | | | | SILTY SAND - Reddish brown, moist and loose |
| 10 | | | | SHALE - Reddish brown, fine, slighly moist, weathered |
| 20 | | | | SANDSTONE - Gray brown and coarse grained |
| 30 | | | | |
| 40 | | | | |
| 50 | | | | SHALE - Reddish brown and fine grained |
| 60 | ▼ | | | |
| 70 | | | | SANDSTONE - Gray and fine grained, with shale inclusions |

Continued

DEPTH TO WATER TABLE: 59 ft DEPTH TO THE BOTTOM OF HOLE: 170 ft

REMARKS: Page 1 of 3

PLATE A-4

# PLANNING, DESIGN & RESEARCH ENGINEERS, INC.

2910 Louise Avenue
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(615) 333-0618

6174 Olson Memorial Highway
Minneapolis, MN 55422
(612) 541-1834


## LOG OF BORING

PROJECT: RAYMARK SITE, HATBORO, PENNSYLVANIA

JOB NO: 8420
DATE: June 15, 1984
DRILLER: Robert Dean
LOGGER: Subodh Kumar

BORING NO: R - 2
BORING TYPE: Air Rotary
GROUND ELEV:
LOCATION:

| DEPTH, FEET | SAMPLE TYPE AND NUMBER | SYMBOL | BLOWS/FOOT | DESCRIPTION OF STRATA |
|---|---|---|---|---|
| 80 | | | | Continued |
| 90 | | | | SANDSTONE - Gray and fine grained, with shale inclusions |
| 100 | | | | |
| 110 | | | | |
| 120 | | | | SANDSTONE & SHALE - Strata of gray, fine grained sandstone and reddish brown fine grained shale - difficult to identify separately |
| 130 | | | | |
| 140 | | | | Continued |

DEPTH TO WATER TABLE: _____ DEPTH TO THE BOTTOM OF HOLE: _____

REMARKS: Page 2 of 3

PLATE A-5

AR301643

# PLANNING, DESIGN & RESEARCH ENGINEERS, INC.

2910 Louise Avenue
Nashville, TN 37211
(615) 333-0618

6174 Olson Memorial Highway
Minneapolis, MN 55422
(612) 541-1834


## LOG OF BORING

PROJECT: RAYMARK SITE, HATBORO, PENNSYLVANIA

JOB NO: 8420
DATE: June 15, 1984
DRILLER: Robert Dean
LOGGER: Subodh Kumar

BORING NO: R - 2
BORING TYPE: Air Rotary
GROUND ELEV:
LOCATION:

| DEPTH, FEET | SAMPLE TYPE AND NUMBER | SYMBOL | BLOWS/FOOT | DESCRIPTION OF STRATA |
|---|---|---|---|---|
| | | | | Continued |
| 150 | | | | SANDSTONE & SHALE - Strata of gray, fine grained sandstone and reddish brown fine grained shale - difficult to identify separately |
| 160 | | | | |
| 170 | | | | End of Boring at 170 ft<br>June 15, 1984 |
| 180 | | | | |
| 190 | | | | |
| 200 | | | | |

DEPTH TO WATER TABLE: _____ DEPTH TO THE BOTTOM OF HOLE: _____

REMARKS: Page 3 of 3

PLATE A-6

AR301344

# PLANNING, DESIGN & RESEARCH ENGINEERS, INC.

2910 Louise Avenue
Nashville, TN 37211
(615) 333-0618

6174 Olson Memorial Highway
Minneapolis, MN 55422
(612) 541-1834


## LOG OF BORING

PROJECT: RAYMARK SITE, HATBORO, PENNSYLVANIA

JOB NO: 8420
DATE: June 13,1984
DRILLER: Robert Dean
LOGGER: Subodh Kumar

BORING NO: R - 3
BORING TYPE: Air Rotary
GROUND ELEV:
LOCATION:

| DEPTH, FEET | SAMPLE TYPE AND NUMBER | SYMBOL | BLOWS/FOOT | DESCRIPTION OF STRATA |
|---|---|---|---|---|
| 10 | | | | SAND - Brown, slightly moist and medium fine |
| 20 | | | | SAND - Brown, slightly moist, coarse |
| 30 | | | | SHALE - Reddish brown, fine grained, slightly moist, with some mica particles |
| 40 | | | | |
| 50 | | | | SHALE - Very dark red brown, med. fine grained, some mica particles, some sandy shale |
| 60 | | | | |
| 70 | | | | SHALE - Reddish brown, fine grained, dry |

Continued

DEPTH TO WATER TABLE: 135 ft DEPTH TO THE BOTTOM OF HOLE: 200 ft

REMARKS: Page 1 of 3

PLATE A-7

# PLANNING, DESIGN & RESEARCH ENGINEERS, INC.

2910 Louise Avenue
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(615) 333-0618

6174 Olson Memorial Highway
Minneapolis, MN 55422
(612) 541-1834


## LOG OF BORING

PROJECT: RAYMARK SITE, HATBORO, PENNSYLVANIA

JOB NO: 8420
DATE: June 13, 1984
DRILLER: Robert Dean
LOGGER: Subodh Kumar

BORING NO: R - 3
BORING TYPE: Air Rotary
GROUND ELEV:
LOCATION:

| DEPTH, FEET | SAMPLE TYPE AND NUMBER | SYMBOL | BLOWS/FOOT | DESCRIPTION OF STRATA |
|---|---|---|---|---|
| 80 | | | | Continued<br><br>SHALE - Light chocolate brown, fine grained, dry |
| 90 | | | | SHALE - Reddish brown, fine grained, with shaley sandstone |
| 100 | | | | |
| 110 | | | | |
| 120 | | | | SANDSTONE - Light gray to dark gray, fine to coarse grained with shale inclusions, wet |
| 130 | ▼ | | | |
| 140 | | | | Continued |

DEPTH TO WATER TABLE: _____ DEPTH TO THE BOTTOM OF HOLE: _____

REMARKS: Page 2 of 3

PLATE A-8

AR301546

# PLANNING, DESIGN & RESEARCH ENGINEERS, INC.

2910 Louise Avenue
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(615) 333-0618

6174 Olson Memorial Highway
Minneapolis, MN 55422
(612) 541-1834


## LOG OF BORING

PROJECT: RAYMARK SITE, HATBORO, PENNSYLVANIA

JOB NO: 8420
DATE: June 13, 1984
DRILLER: Robert Dean
LOGGER: Subodh Kumar

BORING NO: R - 3
BORING TYPE: Air Rotary
GROUND ELEV:
LOCATION:

| DEPTH, FEET | SAMPLE TYPE AND NUMBER | SYMBOL | BLOWS/FOOT | DESCRIPTION OF STRATA |
|---|---|---|---|---|
| | | | | Continued |
| 150 | | | | SANDSTONE - Light gray to dark gray, fine to coarse grained with shale inclusions, wet |
| 160 | | | | |
| 170 | | | | SANDSTONE - Light gray to dark gray with coarse white color particles, coarse grained, wet |
| 180 | | | | |
| 190 | | | | |
| 200 | | | | End of Boring at 200 ft. June 14, 1984 |

DEPTH TO WATER TABLE: _____ DEPTH TO THE BOTTOM OF HOLE: _____

REMARKS: Page 3 of 3

Loud noise of cascading water heard at 144 ft depth

PLATE A-9

RR0047

# PLANNING, DESIGN & RESEARCH ENGINEERS, INC.

2910 Louise Avenue
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(612) 541-1834


## LOG OF BORING

PROJECT: RAYMARK SITE, HATBORO, PENNSYLVANIA

JOB NO: 8420
DATE: June 18, 1984
DRILLER: Robert Dean
LOGGER: Subodh Kumar

BORING NO: R - 4
BORING TYPE: Air Rotary
GROUND ELEV:
LOCATION:

| DEPTH, FEET | SAMPLE TYPE AND NUMBER | SYMBOL | BLOWS/FOOT | DESCRIPTION OF STRATA |
|---|---|---|---|---|
| | | | | SILTY CLAY - Dark reddish brown and moist |
| 10 | | | | SILT - Red brown and slightly moist |
| 20 | | | | SHALE - Dark red brown with white inclusions - Weathered |
| 30 | | | | SHALE - Red brown to dark red brown, fine grained - occ. medium or coarse grained due to sandstone inclusions |
| 40 | | | | |
| 50 | | | | |
| 60 | | | | |
| 70 | | | | |

Continued

DEPTH TO WATER TABLE: 79 ft DEPTH TO THE BOTTOM OF HOLE: 170 ft

REMARKS: Page 1 of 3

PLATE A-10

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(612) 541-1834


## LOG OF BORING

PROJECT: RAYMARK SITE, HATBORO, PENNSYLVANIA

JOB NO: 8420
DATE: June 18, 1984
DRILLER: Robert Dean
LOGGER: Subodh Kumar

BORING NO: R - 4
BORING TYPE: Air Rotary
GROUND ELEV:
LOCATION:

| DEPTH, FEET | SAMPLE TYPE AND NUMBER | SYMBOL | BLOWS/FOOT | DESCRIPTION OF STRATA |
|---|---|---|---|---|
| 80 | | | | Continued |
| 90 | | | | SHALE - Red brown to dark red brown, fine grained - occ. medium or coarse grained due to sandstone inclusions |
| 100 | | | | |
| 110 | | | | SANDSTONE & SHALE - Strata of dark gray and white coarse grained sandstone and dark red brown fine grained shale |
| 120 | | | | |
| 130 | | | | |
| 140 | | | | Continued |

DEPTH TO WATER TABLE: DEPTH TO THE BOTTOM OF HOLE:

REMARKS: Page 2 of 3

Water started to gush out at 105 ft depth

PLATE A-11

# PLANNING, DESIGN & RESEARCH ENGINEERS, INC.

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## LOG OF BORING

PROJECT: RAYMARK SITE, HATBORO, PENNSYLVANIA

JOB NO: 8420
DATE: June 18,1984
DRILLER: Robert Dean
LOGGER: Subodh Kumar

BORING NO: R - 4
BORING TYPE: Air Rotary
GROUND ELEV:
LOCATION:

| DEPTH, FEET | SAMPLE TYPE AND NUMBER | SYMBOL | BLOWS/FOOT | DESCRIPTION OF STRATA |
|---|---|---|---|---|
| | | | | Continued |
| 150 | | | | SANDSTONE & SHALE - Strata of dark gray and white coarse grained sandstone and dark red brown fine grained shale |
| 160 | | | | SANDSTONE - Light gray and white, coarse grained |
| 170 | | | | End of Boring at 170 ft. June 19, 1984 |
| 180 | | | | |
| 190 | | | | |
| 200 | | | | |

DEPTH TO WATER TABLE: _____ DEPTH TO THE BOTTOM OF HOLE: _____

REMARKS: Page 3 of 3
Water is clear from 160 ft down

PLATE A-12

AR301050

# PLANNING, DESIGN & RESEARCH ENGINEERS, INC.

2910 Louise Avenue
Nashville, TN 37211
(615) 333-0618

6174 Olson Memorial Highway
Minneapolis, MN 55422
(612) 541-1834


## LOG OF BORING

PROJECT: RAYMARK SITE, HATBORO, PENNSYLVANIA

JOB NO: 8420
DATE: June 19, 1984
DRILLER: Robert Dean
LOGGER: Subodh Kumar

BORING NO: R - 5
BORING TYPE: Air Rotary
GROUND ELEV:
LOCATION:

| DEPTH, FEET | SAMPLE TYPE AND NUMBER | SYMBOL | BLOWS/FOOT | DESCRIPTION OF STRATA |
|---|---|---|---|---|
| | | | | SILTY CLAY FILL - Dark brown to black and moist |
| | | | | CLAYEY SILT - Dark brown and gray and moist |
| | | | | CLAYEY SILT - Dark reddish brown, moist |
| 10 | | | | SHALE - Dark reddish brown, slighly moist, with mica particles - weathered |
| 20 | | | | |
| 30 | | | | |
| 40 | | | | |
| 50 | | | | SANDSTONE & SHALE - Strata of gray colored coarse sandstone with white coarse grains and red brown fine grained shale - difficult to identify separately |
| 60 | | | | |
| 70 | | | | |

Continued

DEPTH TO WATER TABLE: 75 ft DEPTH TO THE BOTTOM OF HOLE: 170 ft

REMARKS: Page 1 of 3

PLATE A-13

# PLANNING, DESIGN & RESEARCH ENGINEERS, INC.

2910 Louise Avenue
Nashville, TN 37211
(615) 333-0618

6174 Olson Memorial Highway
Minneapolis, MN 55422
(612) 541-1834


## LOG OF BORING

PROJECT: RAYMARK SITE, HATBORO, PENNSYLVANIA

JOB NO: 8420
DATE: June 19,1984
DRILLER: Robert Dean
LOGGER: Subodh Kumar

BORING NO: R - 5
BORING TYPE: Air Rotary
GROUND ELEV:
LOCATION:

| DEPTH, FEET | SAMPLE TYPE AND NUMBER | SYMBOL | BLOWS/FOOT | DESCRIPTION OF STRATA |
|---|---|---|---|---|
| | | | | Continued |
| 80 | | | | |
| 90 | | | | |
| 100 | | | | SANDSTONE & SHALE - Strata of gray colored coarse sandstone with white coarse grains and red brown fine grained shale - difficult to identify separately |
| 110 | | | | |
| 120 | | | | |
| 130 | | | | |
| 140 | | | | Continued |

DEPTH TO WATER TABLE: _____ DEPTH TO THE BOTTOM OF HOLE: _____

REMARKS: Page 2 of 3

PLATE A-14

# PLANNING, DESIGN & RESEARCH ENGINEERS, INC.

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6174 Olson Memorial Highway
Minneapolis, MN 55422
(612) 541-1834


## LOG OF BORING

PROJECT: RAYMARK SITE, HATBORO, PENNSYLVANIA

JOB NO: 8420
DATE: June 19, 1984
DRILLER: Robert Dean
LOGGER: Subodh Kumar

BORING NO: R - 5
BORING TYPE: Air Rotary
GROUND ELEV:
LOCATION:

| DEPTH, FEET | SAMPLE TYPE AND NUMBER | SYMBOL | BLOWS/FOOT | DESCRIPTION OF STRATA |
|---|---|---|---|---|
| | | | | Continued |
| 150 | | | | SANDSTONE & SHALE - Strata of gray colored coarse sandstone with white coarse grains and red brown fine grained shale - difficult to identify separately |
| 160 | | | | |
| 170 | | | | End of Boring at 170 ft<br>June 19, 1984 |
| 180 | | | | |
| 190 | | | | |
| 200 | | | | |

DEPTH TO WATER TABLE: DEPTH TO THE BOTTOM OF HOLE:

REMARKS: Page 3 of 3

PLATE A-15

**APPENDIX J**