Y-12
OAK RIDGE
Y-12
PLANT

Y/TS-760

CALENDAR YEARS 1989
AND 1990 MONITORING WELL
INSTALLATION PROGRAM
FOR THE DEPARTMENT OF ENERGY
Y-12 PLANT
OAK RIDGE, TENNESSEE

October 1991

Prepared by
ERCE
Under Purchase Order 21B-99005V
for
Environmental Management Department
Health, Safety, Environment, and
Accountability Division

MANAGED BY
MARTIN MARIETTA ENERGY SYSTEMS, INC.
FOR THE UNITED STATES
DEPARTMENT OF ENERGY
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CALENDAR YEARS 1989 AND 1990
MONITORING WELL INSTALLATION PROGRAM
Y-12 PLANT, OAK RIDGE, TENNESSEE

Prepared by

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725 Pellissippi Parkway
P.O. Box 22879
Knoxville, Tennessee 37933-0879
Under Purchase Order 21B-99005V

October 1991

for

Environmental Management Department
Health, Safety, Environment, and Accountability Division

Oak Ridge Y-12 Plant
Oak Ridge, Tennessee 37831
managed by
MARTIN MARIETTA ENERGY SYSTEMS, INC
for the
U.S. DEPARTMENT OF ENERGY
Under Contract No. DE-AC05-84OR21400

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1.0 INTRODUCTION

This report documents the well-construction activities at the Y-12 Plant in Oak Ridge, Tennessee during 1989 and 1990. The well-construction program consisted of installing seventy-five monitoring wells. Geologists from ERCE (formally the Engineering, Design and Geosciences Group) and Martin Marietta Energy Systems (Energy Systems), supervised and documented well-construction activities and monitored for health and safety concerns. Sixty-seven monitoring wells were installed under the supervision of an ERCE geologist from March 1989 to September 1990. Beginning in September 1990, Energy Systems supervised drilling activities for eight monitoring wells, the last of which was completed in December 1990.

2.0 GENERAL GEOLOGY

The Y-12 Plant is located in Bear Creek Valley and on immediately adjacent portions of Pine Ridge to the north and Chestnut Ridge to the south. The area is located on the leading edge of the White Oak Mountain thrust sheet, which is within the Valley and Ridge Province of the Appalachian Orogenic Belt. The stratigraphy of the valley and adjacent ridges consists of sediments of the Cambrian through Ordovician age. The stratigraphic units, from oldest to youngest, are the Early Cambrian Rome Formation, Middle and Late Cambrian Conasuaga Group, and the Late Cambrian and Early Ordovician Knox Group. The Rome Formation crops out on Pine Ridge, the Conasuaga Group underlies Bear Creek Valley, and the Knox Group underlies Chestnut Ridge. From oldest to youngest, the Conasuaga Group can be differentiated into six formations: the Pumpkin Valley Shale, the Rutledge Limestone, the Rogersville Shale, the Maryville Limestone, the Nolichucky Shale, and the Maynardville Limestone. The Copper Ridge Dolomite crops out on Chestnut Ridge adjacent to the Y-12 Plant and is the basal unit of the Knox Group. The strike of the strata varies locally from N47°E to N67°E, and the dip of the rocks near the surface is 35° to 50° to the southeast (King and Haase, 1987). For detailed discussions of the geology and stratigraphy of the area, the reader is referred to King and Haase (1987), DeBuchanan...
and Richardson (1956), and Rothschild and others (1984). A Geologic Map of the area is presented in Figure 2-1, and a Geologic Cross-Section is shown in Figure 2-2.

3.0 WELL INSTALLATION

3.1 Location

Well drilling activities at the Y-12 Plant occurred at several different sites in Bear Creek Valley and on Chestnut Ridge. The sites located on Chestnut Ridge included the United Nuclear Site, the Sanitary Landfill Expansion, and the Chestnut Ridge Security Pits (See Figure 3-1). Drilling sites located in Bear Creek Valley included the Y-12 Plant area, S-3 Ponds, Y-12 Plant Fuel Station, Oil Landfarm, Burial Grounds, Salvage Yard, Lysimeter Demonstration Site, Rust Spoil Area, and New Hope Pond (Figure 3.1). Additionally, exit pathway monitoring wells were installed in the Maynardville Limestone. Table 3-1 lists the wells that were installed at each site. Detailed well location maps are presented in Appendix I and lithologic logs are included in Appendix II.

3.2 Drilling Contractors

Highland Drilling Company installed 59 of the 75 wells completed in 1989 and 1990. Fifteen wells were installed by Charlie Young Drilling, a subcontractor to Highland Drilling. One well was drilled by Geologic Associates Technical Services, a division of ERCE.

Three air-rotary rigs, an auger rig, and a backhoe with an attached auger tool were used to install the wells. Highland Drilling operated two of the air-rotary rigs (an Ingersoll-Rand RD-10 and an Ingersoll-Rand XL-750) and the backhoe with an attached auger tool. The backhoe equipped with the auger allowed access to areas that could not be reached with a conventional auger rig. Charlie Young Drilling operated a Driltech D40K air rotary rig and Geologic Associates Technical Services operated a CME-55 auger rig.
FIGURE 2-1. GENERALIZED GEOLOGIC MAP IN THE VICINITY OF THE Y-12 PLANT [AFTER MCMAST 1963]
FIGURE 2-2.
GEOLOGIC CROSS-SECTION IN THE VICINITY OF THE Y-12 PLANT (MODIFIED AFTER GERAGHTY & MILLER, 1988)
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3.3 Installation Methods

Fifty of the seventy five monitoring wells were completed in bedrock. The remaining twenty-five wells were completed in the unconsolidated zone. Wells completed in the bedrock ranged in depth from 19.1 to 356.0 feet, while wells completed in the unconsolidated zone ranged in depth from 12.0 to 84.5 feet. All wells completed in bedrock were drilled by the air rotary method. Wells completed in the unconsolidated zone were augered, except for wells GW-657 and GW-708 which were drilled with an air rotary rig. Well construction diagrams for all wells completed in the 1989 and 1990 drilling program are presented in Appendix III.

3.3.1 Bedrock Monitoring Wells

Wells completed in bedrock generally were isolated from the overlying unconsolidated soil material through the use of surface casing. This casing consisted of either 10-inch diameter threaded steel installed in a 14-inch diameter borehole or 12-inch diameter welded steel installed in a 15-inch diameter borehole.

The screened intervals of bedrock wells were constructed in the following manner. The well casing consisted of 4-inch diameter stainless steel casing with flush-joint threads attached to a 10 to 20-foot section of 0.01-inch continuous wound stainless steel screen. The well casings were installed into nominal 10-inch diameter boreholes. Stainless steel centralizers were affixed to the well casing above the top of the screen and at varying distances up hole (depending upon depth and hole conditions) in order to insure plumbness of the well casing. Once the well casing was installed in the borehole, a filter pack of silica sand was introduced around the screen to a height of approximately two feet above the screen. In bedrock wells, the sand was tremied with water from an approved water source. In shallow bedrock wells, sand was commonly poured from the surface with caution to prevent bridging of the sand pack. A bentonite seal was then installed on top of the sand pack by pouring bentonite pellets to a height of at least two feet above the sand pack. If necessary, water was added to hydrate the bentonite pellets. The remainder of the annular space above the bentonite seal was filled with grout using a tremie pipe.
Several monitoring wells installed into the bedrock were constructed with open intervals, that is, without screens. After the installation of the surface casing, a nominal 10-inch diameter borehole was drilled to the top of the zone to be monitored into which nominal 7-inch diameter black steel casing was inserted and pressure grouted. The interval to be monitored was then drilled to a nominal 6-inch diameter.

3.3.2 Unconsolidated-Zone Monitoring Wells

Unconsolidated-zone monitor wells generally were constructed in the same manner as the screened bedrock wells, except that surface casing was not necessary, and, in many cases, the well screens were 5 feet in length. Boreholes for the unconsolidated-zone wells were generally drilled to a nominal 10-inch diameter.

3.4 Grouting Procedures

Grouting procedures were utilized to seal the annular space between well casings and the borehole wall above the monitoring interval. The cement grout consisted of a mixture of Class A, Type 1 Cement mixed with 1 to 2% bentonite by weight. In unconsolidated zone wells and screened bedrock wells, the well casing was grouted by placing the cement slurry through a tremie pipe, the bottom of which was initially located near the top of the bentonite seal. As grout was tremied into the annular space, the tremie pipe was raised.

Surface and intermediate casings were pressure grouted into place. The calculated volume of cement required to fill the annulus was pumped into the casing and then a cement plug was either pushed or pumped down the casing, forcing the cement out of the casing through a float shoe and into the annular space. The cement was allowed to cure a minimum of twelve hours before drilling operations continued.

Lost-circulation zones were occasionally encountered in both unconsolidated material and in bedrock within the Knox Group and Maynardville Limestone. Grout additives such as Flowseal™ and bentonite gel were mixed with the cement in order to seal off these zones. Flowseal™ added bulk to the slurry, whereas bentonite increased the viscosity.
4.0 WELL DEVELOPMENT

A water level measurement was taken and the well volume calculated for each well prior to development. One well volume was defined as the volume of standing water in the well casing and screen plus 30% of the volume of the sand pack (i.e., the approximate porosity of the sand). A minimum of five well volumes were evacuated from each well. Dissolved solids and pH of the produced water were measured periodically during development. The color and visual turbidity of the water were also recorded. The well was considered developed if the dissolved solids, pH, color, and turbidity had stabilized after 5 well volumes. Two of the wells, GW-625 and GW-628, were not developed due to the presence of Dense, Non-Aqueous Phase Liquids (DNAPLs) in the well.

The majority of the wells were developed by swabbing. Swabbing was accomplished by inserting 2 3/8-inch diameter steel tubing equipped with a bottom check valve to the bottom of the casing or open interval. The swab was then moved repeatedly up and down the length of the tubing to evacuate water to the surface where the volume removed was measured.

Removal of more than five well volumes was often necessary in open interval wells, wells screened in clay-filled cavities or fractures, and in some wells completed in the unconsolidated zone where turbidity was high. A summary of monitoring-well development data is presented in Table 4-1 and the monitoring well development forms are presented in Appendix IV.

5.0 QUALITY ASSURANCE

During the 1989 and 1990 drilling program at the Y-12 Plant, quality control procedures were stringently followed to assure that wells were installed to specifications prepared by Geraghty and Miller, Inc. (1985), and procedures outlined by Energy Systems (1990). Drilling operations, well-construction, and well development were documented by
geologists from Energy Systems and ERCE. An Energy Systems geologist provided quality control for eight monitoring wells (GW-683, GW-684, GW-685, GW-703, GW-704, GW-657, GW-707, and GW-708). Quality control for the remaining sixty seven monitoring wells installed during 1989 and 1990 was provided by geologists from ERCE.

Prior to drilling, the drill rig, tooling, and well-casing materials were decontaminated by steam-cleaning. During drilling, the drill rig was periodically checked for hydraulic oil leaks with repairs being made immediately, if discovered.

6.0 HEALTH AND SAFETY

A Health and Safety Plan (ERCE, 1988) specified protection protocols and action levels for implementation of protection procedures. All on-site personnel involved with the well drilling program attended a 40-hour hazardous-waste training course and annual updates. All personnel were enrolled in an annual medical monitoring program. ERCE geologists acting as site health and safety officers followed the plan during drilling, well construction, and well development for sixty seven monitoring wells. Energy Systems geologists acted as site health and safety officers for eight of the monitoring wells. On-site health and safety operations consisted of monitoring radiation and volatile organic levels.

Based on a review of the hazard potential at any specific site prior to drilling operations, safety level D was selected for most of the sites. In areas where the presence of DNAPLs and/or polychlorinated biphenyls (PCBs) were known or suspected, safety level C was selected.

Instrumentation used to assist in evaluating potential site hazards included a Photovac TIP II and a Century Organic Vapor Analyzer (OVA 128GC) to monitor organic volatile concentrations. Radioactivity was monitored with a Ludlum Model 3 portable radiation meter.
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<td>SWAB</td>
<td>450</td>
<td>8.7</td>
<td>7.9</td>
<td>410</td>
<td>410</td>
</tr>
<tr>
<td>615</td>
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<td>1110</td>
<td>6.5</td>
<td>6.2</td>
<td>2200</td>
<td>2000</td>
</tr>
<tr>
<td>616</td>
<td>SWAB</td>
<td>1290</td>
<td>10.2</td>
<td>9.7</td>
<td>2350</td>
<td>2000</td>
</tr>
<tr>
<td>617</td>
<td>SWAB</td>
<td>54</td>
<td>7.4</td>
<td>7.3</td>
<td>230</td>
<td>110</td>
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<tr>
<td>618</td>
<td>SWAB</td>
<td>230</td>
<td>7.9</td>
<td>7.1</td>
<td>990</td>
<td>400</td>
</tr>
<tr>
<td>619</td>
<td>SWAB</td>
<td>235</td>
<td>10.1</td>
<td>9.2</td>
<td>150</td>
<td>110</td>
</tr>
<tr>
<td>620</td>
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<td>215</td>
<td>10.2</td>
<td>8.6</td>
<td>370</td>
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<tr>
<td>621</td>
<td>SWAB</td>
<td>2240</td>
<td>8.4</td>
<td>8.2</td>
<td>460</td>
<td>440</td>
</tr>
<tr>
<td>622</td>
<td>SWAB</td>
<td>103</td>
<td>8.4</td>
<td>8.3</td>
<td>370</td>
<td>370</td>
</tr>
<tr>
<td>623</td>
<td>AIR LIFT</td>
<td>983</td>
<td>12.2</td>
<td>9.5</td>
<td>5500</td>
<td>1100</td>
</tr>
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<td>624</td>
<td>SWAB</td>
<td>111</td>
<td>7.8</td>
<td>7.7</td>
<td>380</td>
<td>350</td>
</tr>
<tr>
<td>625</td>
<td></td>
<td>DID NOT DEVELOP DUE TO THE PRESENCE OF DNAPL*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>626</td>
<td>SWAB</td>
<td>282</td>
<td>9.1</td>
<td>8.5</td>
<td>170</td>
<td>170</td>
</tr>
<tr>
<td>627</td>
<td>SWAB</td>
<td>2040</td>
<td>8.5</td>
<td>8.5</td>
<td>1290</td>
<td>1150</td>
</tr>
<tr>
<td>628</td>
<td></td>
<td>DID NOT DEVELOP DUE TO THE PRESENCE OF DNAPL*</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>629</td>
<td>SWAB</td>
<td>275</td>
<td>8.8</td>
<td>8.8</td>
<td>800</td>
<td>820</td>
</tr>
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<td>630</td>
<td>SWAB</td>
<td>123</td>
<td>8.6</td>
<td>8.4</td>
<td>380</td>
<td>355</td>
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<td>SWAB</td>
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<td>637</td>
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<td>9.4</td>
<td>8.4</td>
<td>390</td>
<td>540</td>
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<td>638</td>
<td>SWAB</td>
<td>48</td>
<td>8.1</td>
<td>7.7</td>
<td>940</td>
<td>985</td>
</tr>
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<td>SWAB</td>
<td>645</td>
<td>9.9</td>
<td>9.8</td>
<td>90</td>
<td>403</td>
</tr>
<tr>
<td>640</td>
<td>SWAB</td>
<td>170</td>
<td>8.1</td>
<td>8.0</td>
<td>100</td>
<td>35</td>
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<tr>
<td>641</td>
<td>SWAB</td>
<td>75</td>
<td>8.0</td>
<td>7.4</td>
<td>47</td>
<td>12</td>
</tr>
<tr>
<td>642</td>
<td>SWAB</td>
<td>120</td>
<td>8.7</td>
<td>7.0</td>
<td>45</td>
<td>26</td>
</tr>
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<td>643</td>
<td>SWAB</td>
<td>210</td>
<td>8.8</td>
<td>6.9</td>
<td>500</td>
<td>310</td>
</tr>
<tr>
<td>644</td>
<td>SWAB</td>
<td>120</td>
<td>7.8</td>
<td>6.7</td>
<td>450</td>
<td>270</td>
</tr>
</tbody>
</table>

* DNAPL - Dense Non-Aqueous Phase Liquid
<table>
<thead>
<tr>
<th>WELL NO.</th>
<th>DEVELOPMENT METHOD</th>
<th>GALLONS EVACUATED</th>
<th>pH INITIAL</th>
<th>pH FINAL</th>
<th>DISSOLVED SOLIDS</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>INITIAL</td>
<td>FINAL</td>
<td>INITIAL</td>
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<tr>
<td>645</td>
<td>SWAB</td>
<td>60</td>
<td>8.3</td>
<td>8.4</td>
<td>510</td>
</tr>
<tr>
<td>646</td>
<td>SWAB</td>
<td>215</td>
<td>11.7</td>
<td>7.8</td>
<td>2000</td>
</tr>
<tr>
<td>647</td>
<td>SWAB</td>
<td>205</td>
<td>12.2</td>
<td>8.1</td>
<td>6700</td>
</tr>
<tr>
<td>648</td>
<td>SWAB</td>
<td>335</td>
<td>8.2</td>
<td>7.2</td>
<td>490</td>
</tr>
<tr>
<td>649</td>
<td>SWAB</td>
<td>150</td>
<td>7.9</td>
<td>7.8</td>
<td>340</td>
</tr>
<tr>
<td>651</td>
<td>SWAB</td>
<td>205</td>
<td>11.7</td>
<td>8.3</td>
<td>1700</td>
</tr>
<tr>
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<td>SWAB</td>
<td>150</td>
<td>8.4</td>
<td>7.7</td>
<td>550</td>
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<tr>
<td>653</td>
<td>SWAB</td>
<td>120</td>
<td>8.4</td>
<td>7.8</td>
<td>150</td>
</tr>
<tr>
<td>654</td>
<td>SWAB</td>
<td>145</td>
<td>7.6</td>
<td>7.6</td>
<td>350</td>
</tr>
<tr>
<td>655</td>
<td>SWAB</td>
<td>180</td>
<td>11.9</td>
<td>8.6</td>
<td>1500</td>
</tr>
<tr>
<td>656</td>
<td>AIR LIFT</td>
<td>54</td>
<td>8.3</td>
<td>8.0</td>
<td>930</td>
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<tr>
<td>657</td>
<td>SWAB</td>
<td>82</td>
<td>8.1</td>
<td>7.9</td>
<td>500*</td>
</tr>
<tr>
<td>658</td>
<td>AIR LIFT</td>
<td>61</td>
<td>8.0</td>
<td>7.9</td>
<td>460</td>
</tr>
<tr>
<td>659</td>
<td>AIR LIFT</td>
<td>53</td>
<td>8.5</td>
<td>7.9</td>
<td>500</td>
</tr>
<tr>
<td>683</td>
<td>SWAB</td>
<td>780</td>
<td>7.4</td>
<td>6.8</td>
<td>450</td>
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<tr>
<td>684</td>
<td>SWAB</td>
<td>700</td>
<td>10.2</td>
<td>8.5</td>
<td>1120</td>
</tr>
<tr>
<td>685</td>
<td>SWAB</td>
<td>840</td>
<td>6.9</td>
<td>6.8</td>
<td>550</td>
</tr>
<tr>
<td>703</td>
<td>SWAB</td>
<td>1145</td>
<td>9.0</td>
<td>7.7</td>
<td>420</td>
</tr>
<tr>
<td>704</td>
<td>SWAB</td>
<td>2320</td>
<td>7.3</td>
<td>7.2</td>
<td>470</td>
</tr>
<tr>
<td>707</td>
<td>SWAB</td>
<td>69</td>
<td>8.0</td>
<td>7.6</td>
<td>440*</td>
</tr>
<tr>
<td>708</td>
<td>SWAB</td>
<td>70</td>
<td>7.7</td>
<td>7.7</td>
<td>550*</td>
</tr>
</tbody>
</table>

* Specific Conductance
7.0 Special Notes on Drilling, Installation, and Development

During the drilling, installation, and development of the seventy-five monitoring wells installed in 1989 and 1990 at the Y-12 Plant, the following special conditions were noted on the well logs and/or the activity/progress forms for the listed wells:

GW-183 - A fairly strong hydrocarbon odor was detected during drilling from 6 to 20 feet.

GW-193 - A strong hydrocarbon odor was detected during drilling and development.

GW-204 - The well was a very poor producer during development. The development water had a hydrocarbon and septic smell.

GW-601 - A petroliferous odor was detected at a depth of 275 feet during drilling. Photovac readings ranged from 15 to 18 ppm.

GW-602 - The development water had a sulfur smell.

GW-607 - A slight organic odor was detected during drilling from the surface to 70 feet. Photovac readings ranged from 6 to 10 ppm.

GW-608 - The first attempt to drill GW-608 had to be abandoned after twisting off a drill bit and one joint of drill steel. Attempts to retrieve the twisted-off steel were unsuccessful. The abandoned boring was grouted from total depth to the surface, thereby encapsulating the drill bit and drill steel.

GW-623 - A poor producing well. Considerable difficulty was encountered in defining the best zone to complete. Well was completed with 2-inch diameter stainless steel screen and casing. Refer to the 14 page activity/progress report for
details. A slight petroliferous odor and an oil sheen were detected during development.

GW-625 - PCB-contaminated DNAPL was encountered during drilling from 274 to 275 feet. Therefore, the well was not developed. Refer to Haase and King (1990) for a detailed discussion.

GW-627 - The development water had a very slight odor of diesel fuel.

GW-628 - PCB-contaminated DNAPL was encountered during drilling from 212 to 213 feet and from 269 to 270 feet. Therefore, the well was not developed. Refer to Haase and King (1990) for a detailed discussion.

GW-629 - PCB-contaminated DNAPL was suspected during drilling. Refer to Haase and King (1990) for a detailed discussion.

GW-645 - The loss of circulation at 34 feet required the use of drilling foam. The foam used was Quick Foam supplied by Baroid, Houston, Texas. It contained isopropyl alcohol, ethyl alcohol, and alcohol ether sulfate.

GW-647 - The first attempt to drill GW-647 was abandoned at 43 feet due to caving from 13 to 20 feet. A hydrogen sulfide smell was detected during drilling at 91 feet.

GW-657 - A strong sewage odor was detected during development.

GW-658 - A petroleum odor was detected during drilling at one foot. A strong petroliferous odor was detected during development and an oil film was observed on the surface of the produced water.
GW-659 - A petroleum odor was detected during drilling at one foot. An oil film was observed on the surface of the produced water.

GW-683 - A strong petroliferous odor was detected during drilling in the interval from 137 to 149 feet.

GW-707 - A slight sewage odor was detected during development.

GW-708 - A strong petroleum (gasoline) odor was detected during drilling from 5 to 11 feet.

During the drilling of GW-645, GW-646, GW-647 and GW-648, hydraulic oil leaks occurred on the drill rig. None of the leaks contaminated these wells.
8.0 REFERENCES


APPENDIX I

MONITORING WELL LOCATION MAPS
Y-12 CENTRALIZED
SANITARY LANDFILL II

1989 & 1990
Y-12
BOREHOLE
LOCATION MAP
APPENDIX II
LITHOLOGIC LOGS
## Y-12 WELL INSTALLATION PROGRAM

**LOCATION:** Y-12 Near Building 9754-2  
**DRILLER:** James C. Draper  
**HELPER:** Gregg Shillings  
**DRILL:** DrilTech D40k  

**NOTES:** 12" Auger from 0.0 to 0.5'

### WELL LOG

**DATE:** START: 8/1/89  
**FINISH:** 8/2/89  
**LOGGED BY:** Michael L. Ebers

**THICKNESS OF SOIL:** 20'  
**DEPTH DRILLED IN ROCK:** 10.6'  
**TOTAL DEPTH OF WELL:** 30.6'

<table>
<thead>
<tr>
<th>Depth (feet)</th>
<th>Sample (number &amp; interval)</th>
<th>Soil/Bedrock Description</th>
<th>Hydrocarbons</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 – 0.5</td>
<td></td>
<td>Asphalt</td>
<td></td>
</tr>
<tr>
<td>0.5 – 1.5</td>
<td></td>
<td>Gravels</td>
<td></td>
</tr>
<tr>
<td>1.5 – 6.0</td>
<td>*Shale, soft</td>
<td></td>
<td>no odor</td>
</tr>
<tr>
<td>6.0 – 20.0</td>
<td>Shale, soft</td>
<td></td>
<td>fairly strong</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>odor 20 ppm</td>
</tr>
<tr>
<td>20.0 – 30.6</td>
<td>Shale, medium soft</td>
<td></td>
<td>faint odor</td>
</tr>
<tr>
<td>30.6</td>
<td>Total Depth</td>
<td></td>
<td>~10 ppm on OVA</td>
</tr>
</tbody>
</table>

*Detailed Lithologic Log not available from 5.0' to 30.6' T.D. Due to the use of a containment box.*
**Y-12 WELL INSTALLATION PROGRAM**

**LOCATION:** Y-12 Rust Scrap Yard  
**DRILLER:** James C. Draper  
**HELPER:** Gregg Shillings  
**DRILL:** DrilTech D40K  

**DATE:** START: 7/31/89  
FINISH: 8/1/89  
**LOGGED BY:** Michael L. Ebers

**NOTES:** Auger boring drilled 30' west encountered strong organic odors and 500+ ppm on OVA at 3' from well bore at 8.0'.

**THICKNESS OF SOIL:** 8.0'  
**DEPTH DRILLED IN ROCK:** 18.2'  
**TOTAL DEPTH OF WELL:** 26.2'

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
<th>HYDROCARBONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROM TO</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.0 1.5</td>
<td>Gravels</td>
<td>no odor, 1 ppm</td>
<td></td>
</tr>
<tr>
<td>1.5 8.0</td>
<td>Clay, brown, silty, damp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.0 26.2</td>
<td>Shale, weathered, olive gray and greenish-gray, damp, wet in lower 7'</td>
<td>on OVA</td>
<td>(see notes above)</td>
</tr>
<tr>
<td>26.2</td>
<td>Total depth</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Y-12 WELL INSTALLATION PROGRAM**

**LOCATION:** Y-12 Near Building 9201-1  
**DRILLER:** James C. Draper  
**HELPER:** Gregg Shilling  
**DRILL:** DrilTech P40k

**DATE:** START: 8/3/89  
**FINISH:** 8/4/89  
**LOGGED BY:** Michael L. Fners

**NOTES:** Checked for water at 17', had 6' water in 40 minutes

**THICKNESS OF SOIL:** 2.5'

**DEPTH DRILLED IN ROCK:** 15.95'

**TOTAL DEPTH OF WELL:** 18.45'

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
<th>HYDROCARBONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROM</td>
<td>TO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.0 0.5</td>
<td>Asphalt</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>0.5 1.0</td>
<td>Gravel Fill</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>1.0 2.5</td>
<td>Clay, reddish-brown, crumbly, with chert</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>2.5 5.0</td>
<td>Limestone, light gray, hard drilling, dry</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>5.0 6.5</td>
<td>*Limestone, hard drilling, soft at 6.0 - 7.0' possibly with some water</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>9.0 12.0</td>
<td>Cavity, mud filled with water</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>12.0 18.45</td>
<td>Limestone, hard drilling</td>
<td>Strong hydrocarbon odor when checking for water at 17', 20 to 30 ppm on OVA</td>
<td></td>
</tr>
<tr>
<td>18.45</td>
<td>Total Depth</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Detailed Lithologic Log not available from 5.0' to 18.45' due to the use of a containment box
Y-12 WELL INSTALLATION PROGRAM

LOCATION: Y-12 Building 9204-2
DRILLER: Donald Key
HELPER: Scott Gilbert
DRILL: Backhoe with Auger Tool

NOTES: Bottom of excavation at 4.1'. Encountered water at 5.6'.
       Penetrated bottom of first water bearing zone at 15.0'.

THICKNESS OF SOIL: 10.0'
DEPTH DRILLED IN ROCK: 7.5'
TOTAL DEPTH OF WELL: 17.5'

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROM</td>
<td>TO</td>
<td></td>
</tr>
<tr>
<td>4.1</td>
<td>5.6</td>
<td>Clay, silty moderate brown, medium dense, damp, w/chert, very pale orange, subangular</td>
</tr>
<tr>
<td>5.6</td>
<td>10.0</td>
<td>Clay, silty, light olive gray to moderate olive brown, loose, wet (in saturated zone), w/shale, light olive gray</td>
</tr>
<tr>
<td>10.0</td>
<td>17.5</td>
<td>Shale, moderate olive brown to olive gray</td>
</tr>
<tr>
<td>17.5</td>
<td></td>
<td>Total Depth</td>
</tr>
</tbody>
</table>
### Y-12 WELL INSTALLATION PROGRAM

**LOCATION:** United Nuclear

**DRILLER:** J.C. Draper

**HELPER:** Greg Shillings

**DRILL:** DrillTech D&K

**NOTES:** Surface casing set at top of weathered bedrock; problems with caving. This geologist recommends all other wells drilled at United Nuclear site to scratch top of bedrock.

---

### WELL LOG

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 - 0.5</td>
<td></td>
<td>Top soil</td>
</tr>
<tr>
<td>0.5 - 20</td>
<td></td>
<td>Clay, reddish-brown, slightly silty, weathered, chert fragments, scattered</td>
</tr>
<tr>
<td>20 - 45</td>
<td></td>
<td>Clay, reddish-brown, slightly silty, weathered chert fragments, scattered, moist at 23' as we approach 45' clay becoming browner</td>
</tr>
<tr>
<td>45 - 63</td>
<td></td>
<td>Clay, brown to reddish-brown with weathered chert fragments</td>
</tr>
<tr>
<td>63 - 66</td>
<td></td>
<td>Dolostone, olive gray, fine to medium crystalline, chert black, flinty</td>
</tr>
<tr>
<td>66 - 70</td>
<td></td>
<td>Dolostone, olive gray, fine to medium crystalline</td>
</tr>
<tr>
<td>70 - 75</td>
<td></td>
<td>Clay filled cavity @ 70'-73' went to clay, brown, dolostone olive gray, and chert</td>
</tr>
<tr>
<td>75 - 80</td>
<td></td>
<td>Clay, dolostone and chert, clay reddish-brown, dolostone and chert weathered</td>
</tr>
<tr>
<td>80 - 85</td>
<td></td>
<td>Clay, dolostone and chert, dolostone, olive gray</td>
</tr>
<tr>
<td>85 - 90</td>
<td></td>
<td>86-88 cavity, clay, dolostone and chert, clay, reddish-brown to brown, dolostone and chert weathered</td>
</tr>
<tr>
<td>90 - 95</td>
<td></td>
<td>Clay, chert and dolostone, clay, reddish-brown, chert, black flinty, dolostone, olive gray</td>
</tr>
<tr>
<td>95 - 100</td>
<td></td>
<td>Clay, dolostone, chert, clay, brown, dolostone, olive gray</td>
</tr>
</tbody>
</table>

**DATE:** START: 11/2/89

**FINISH:** 11/10/89

**LOGGED BY:** David B. Wright
<table>
<thead>
<tr>
<th>Depth (Feet) From</th>
<th>Sample Number &amp; Interval</th>
<th>Soil/Bedrock Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td></td>
<td>Top of bedrock at 102' dolostone, dark olive gray, medium to coarsely crystalline</td>
</tr>
<tr>
<td>105</td>
<td></td>
<td>Dolostone, dark olive gray, medium crystalline with minor calcite veinlets, chert, black, flinty</td>
</tr>
<tr>
<td>110</td>
<td></td>
<td>Dolostone, dark olive gray, fine to medium crystalline with more calcite veinlets</td>
</tr>
<tr>
<td>115</td>
<td></td>
<td>Dolostone, olive gray, fine to medium crystalline, minor staining, chert, black, flinty</td>
</tr>
<tr>
<td>120</td>
<td></td>
<td>Dolostone, olive gray to light olive gray, fine to medium crystalline, minor chert, clear to black</td>
</tr>
<tr>
<td>125</td>
<td></td>
<td>Dolostone, olive gray, fine to medium crystalline at 128' head dropped 2' and quit dusting, very &quot;ratty drilling&quot; at 127' and 131' indication of fracturing and recrystallization adjacent to fracture and/or cavity</td>
</tr>
<tr>
<td>132</td>
<td></td>
<td>Dolostone, olive gray, medium crystalline, much contamination from above, poor returns</td>
</tr>
<tr>
<td>136</td>
<td></td>
<td>Total Depth</td>
</tr>
</tbody>
</table>

PAGE 2 OF 2
### WELL INSTALLATION PROGRAM

**LOCATION:** United Nuclear  
**DRILLER:** J.C. Draper  
**HELPER:** Greg Shillings  
**DRILL:** DrillTech D40K  
**NOTES:**

---

### THICKNESS OF SOIL: & weathered rock: 91' top of weathered rock @ 45'

**DEPTH DRILLED IN ROCK:** 69'

**TOTAL DEPTH OF WELL:** 114'

### SOIL/BEDROCK DESCRIPTION

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROM</td>
<td>TO</td>
<td>Top soil</td>
</tr>
<tr>
<td>0.0</td>
<td>1.0</td>
<td>Clay, reddish-brown, slightly silty chert fragments, weathered</td>
</tr>
<tr>
<td>1.0</td>
<td>45.0</td>
<td>Dolostone, olive gray, medium crystalline</td>
</tr>
<tr>
<td>45.0</td>
<td>50.0</td>
<td>Dolostone, olive gray, fine to medium crystalline, minor chert</td>
</tr>
<tr>
<td>54.0</td>
<td>63.0</td>
<td>no samples Clay, filled cavity drilled in 1.5 min.</td>
</tr>
<tr>
<td>63.0</td>
<td>67.0</td>
<td>Clay, reddish-brown, dolomite, olive gray, medium crystalline</td>
</tr>
<tr>
<td>67.0</td>
<td>78.0</td>
<td>no samples Clay, filled cavity drilled in 1.0 min.</td>
</tr>
<tr>
<td>78.0</td>
<td>82.0</td>
<td>Dolostone, olive gray, medium crystalline</td>
</tr>
<tr>
<td>82.0</td>
<td>91.0</td>
<td>no samples Clay filled cavity drilled in 45 sec.</td>
</tr>
<tr>
<td>91.0</td>
<td>97.0</td>
<td>TD Pilot Hole Dolostone, olive gray to dark olive gray, fine to coarsely crystalline, chert opaque to black, flinty</td>
</tr>
<tr>
<td>97.0</td>
<td>105.0</td>
<td>Few cuttings, dolostone, olive gray, medium crystalline</td>
</tr>
<tr>
<td>105.0</td>
<td>109.0</td>
<td>Dolostone, olive gray, fine to coarsely crystalline, minor staining</td>
</tr>
<tr>
<td>109.0</td>
<td>114.0</td>
<td>Dolostone, olive gray, fine to coarsely crystalline, chert, opaque to black, flinty, few cuttings, staining and vugs evident I think H2O hit at 107' - 108.5'</td>
</tr>
<tr>
<td>114.0</td>
<td></td>
<td>Total Depth</td>
</tr>
</tbody>
</table>
## Y-12 WELL INSTALLATION PROGRAM

**LOCATION:** Lysimeter Installation Site  
**DRILLER:** Steve Brown  
**HELPER:** Greg Shillings  
**DRILL:** Drilltech D40K  

**NOTES:** Stabilizer + Sub + Bit = 24.1 ft. Table height = 1.9 ft.  
Cuttings were monitored as drilling progressed but no samples were retained.

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 - 8.0</td>
<td></td>
<td>Clay, dark brown to red brown, very silty, moist</td>
</tr>
<tr>
<td>8.0 - 10.0</td>
<td></td>
<td>Silt, medium brown to tan, highly argillaceous with scattered highly weathered shale fragments, dry</td>
</tr>
<tr>
<td>10.0 - 13.1</td>
<td></td>
<td>Clay, dark brown, very silty, scattered highly weathered shale fragments, moist</td>
</tr>
<tr>
<td>13.1 - 18.1</td>
<td></td>
<td>Silt, medium brown to tan, highly argillaceous, scattered highly weathered shale fragments, dry</td>
</tr>
<tr>
<td>18.1 - 20.0</td>
<td></td>
<td>Clay, chocolate brown to dark brown, very silty, with scattered shale fragments, moist</td>
</tr>
<tr>
<td>20.0 - 23.0</td>
<td></td>
<td>Clay, tan to medium brown, slight olive green tint, very silty, abundant highly weathered shale fragments, dry</td>
</tr>
<tr>
<td>23.0 - 24.2</td>
<td></td>
<td>Shale, olive green to medium gray, weathering to tan to olive brown silty clay, very slightly moist to dry</td>
</tr>
<tr>
<td>24.2 - 27.2</td>
<td></td>
<td>Shale, dark brown, highly weathered, (dusting stopped) apparently wet</td>
</tr>
<tr>
<td>27.2 - 28.0</td>
<td></td>
<td>Shale, olive green to drak gray, weathering to brown clay, very silty, slightly moist (resumed dusting)</td>
</tr>
<tr>
<td>28.0 - 30.1</td>
<td></td>
<td>Clay, very dark brown with abundant highly weathered shale fragments, very wet</td>
</tr>
<tr>
<td>30.1</td>
<td></td>
<td>Total Depth, water @ 26.1 ft after 30 minutes</td>
</tr>
</tbody>
</table>

**DATE:** START: 5/2/90  
**FINISH:** 5/2/90  
**LOGGED BY:** Jeff Carter
<table>
<thead>
<tr>
<th>DEPTH (FEET) FROM</th>
<th>TO</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>10.0</td>
<td>Silty clay, mottled, light brown and moderate brown, also contains roots, and bark, clay is slightly damp.</td>
<td></td>
</tr>
<tr>
<td>10.0</td>
<td>16.0</td>
<td>Clay with some silt, mottled, moderate yellowish orange and moderate yellowish brown, clay soft, moist.</td>
<td></td>
</tr>
<tr>
<td>16.0</td>
<td>20.0</td>
<td>Shale, laminated, medium gray and medium bluish gray, highly weathered, dry.</td>
<td></td>
</tr>
<tr>
<td>20.0</td>
<td>21.0</td>
<td>Shale, medium bluish gray, competent with some clay, medium gray very moist. Hard drilling.</td>
<td></td>
</tr>
<tr>
<td>21.0</td>
<td>22.0</td>
<td>Silty clay, medium gray, also contains shale fragments, dark greenish gray, saturated. Cavity at 21.0', produced some water but not enough to set well.</td>
<td></td>
</tr>
<tr>
<td>22.0</td>
<td>22.5</td>
<td>Shale, light bluish gray, competent, dry, hard drilling.</td>
<td></td>
</tr>
<tr>
<td>22.5</td>
<td>23.0</td>
<td>Cavity, clay filled, medium gray, damp, no free water.</td>
<td></td>
</tr>
<tr>
<td>23.5</td>
<td>26.0</td>
<td>Shale, light bluish gray, dry, hard drilling.</td>
<td></td>
</tr>
<tr>
<td>26.0</td>
<td>27.5</td>
<td>Clay, dark yellowish orange, contains shale fragments, medium bluish gray, clay is firm and wet.</td>
<td></td>
</tr>
<tr>
<td>27.5</td>
<td>30.5</td>
<td>Shale, light bluish gray, dry, hard drilling.</td>
<td></td>
</tr>
<tr>
<td>30.5</td>
<td>31.0</td>
<td>Silty clay, olive gray, also contains shale fragments, medium gray, moist.</td>
<td></td>
</tr>
<tr>
<td>DEPTH (FEET)</td>
<td>SAMPLE (NUMBER &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>-----------------------------</td>
<td>---------------------------</td>
<td></td>
</tr>
<tr>
<td>31.0 - 33.0</td>
<td></td>
<td>Shale, medium bluish gray, dry, hard drilling.</td>
<td></td>
</tr>
<tr>
<td>33.0 - 34.0</td>
<td></td>
<td>Silty clay, olive gray, also contains shale fragments, medium gray, moist.</td>
<td></td>
</tr>
<tr>
<td>34.0 - 38.5</td>
<td></td>
<td>Shale, light bluish gray, dry, hard drilling.</td>
<td></td>
</tr>
<tr>
<td>38.5 - 39.0</td>
<td></td>
<td>Clay, medium gray, also contains shale fragments, dark medium gray, damp.</td>
<td></td>
</tr>
<tr>
<td>39.0 - 42.0</td>
<td></td>
<td>Shale, light bluish gray, dry, hard drilling</td>
<td></td>
</tr>
<tr>
<td>42.0 - 47.0</td>
<td></td>
<td>Clay with some silt, light bluish gray, also contains shale fragments, medium bluish gray, saturated. Hit water at 42.0'.</td>
<td></td>
</tr>
<tr>
<td>47.0</td>
<td></td>
<td>Total depth.</td>
<td></td>
</tr>
</tbody>
</table>
### Y-12 WELL INSTALLATION PROGRAM

**LOCATION:** Lysimeter Installation Site

**DRILLER:** Mark Baker

**HELPERS:**
- Billy Ray Strader
- Ingersol Rand XL-750

**DATE:**
- START: 3/22/89
- FINISH: 4/03/89

**LOGGED BY:** C. Allison Hodges

**NOTES**

**THICKNESS OF SOIL:** 20.0'

**DEPTH DRILLED IN ROCK:** 22.5'

**TOTAL DEPTH OF WELL:** 42.5'

<table>
<thead>
<tr>
<th>DEPTH (FEET) FROM</th>
<th>DEPTH (FEET) TO</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>5.0</td>
<td></td>
<td>Silty clay, mottled, dark yellowish brown and light brown, dry, clay is soft.</td>
</tr>
<tr>
<td>5.0</td>
<td>10.0</td>
<td></td>
<td>Silty clay, grayish orange, slight shaley, clay is hard and brittle.</td>
</tr>
<tr>
<td>10.0</td>
<td>17.0</td>
<td></td>
<td>Silty clay, mottled, moderate yellowish brown and moderate brown and moderate brown, slight damp, clay is firm.</td>
</tr>
<tr>
<td>17.0</td>
<td>18.5</td>
<td></td>
<td>Clay, dark yellowish brown, clay is firm and damp. Also contains shale, brownish gray, highly weathered, brittle.</td>
</tr>
<tr>
<td>18.5</td>
<td>19.0</td>
<td></td>
<td>Shale, light gray, highly weathered, brittle.</td>
</tr>
<tr>
<td>19.0</td>
<td>20.0</td>
<td></td>
<td>Silty clay, brownish gray, with shale, medium gray, highly weathered, brittle.</td>
</tr>
<tr>
<td>20.0</td>
<td>24.0</td>
<td></td>
<td>Shale, brownish gray and olive gray, small powdered fragments dry.</td>
</tr>
<tr>
<td>24.0</td>
<td>31.0</td>
<td></td>
<td>Shale, medium light gray and medium bluish gray, highly weathered, laminated, larger fragments.</td>
</tr>
<tr>
<td>31.0</td>
<td>32.0</td>
<td></td>
<td>Shale, medium light gray, laminated, competent, and clay, grayish brown, firm, wet. Hit a cavity at 31.0 feet.</td>
</tr>
<tr>
<td>32.0</td>
<td>37.0</td>
<td></td>
<td>Silty clay, greenish gray, also contains shale, medium light gray, saturated water is gray with an oily/shaely sheen produced from the shale.</td>
</tr>
<tr>
<td>DEPTH (FEET)</td>
<td>SAMPLE (NUMBER &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td>----------------------------</td>
<td>---------------------------</td>
<td></td>
</tr>
<tr>
<td>37.0 - 37.5</td>
<td>Shale, medium light gray, laminated, hard drilling, move water produced.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>37.5 - 42.5</td>
<td>Silty clay, greenish gray, also contains shale, medium light gray, saturated. Hit a cavity at 37.5'.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>42.5</td>
<td>Total depth.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Y-12 WELL INSTALLATION PROGRAM**

**LOCATION:** Y-12 Sanitary Landfill II  
**DRILLER:** Mark Baker  
**HELPER:** John Young  
**DRILL:** Ingersol Rand XL-750

**DATE:** START: 4/26/89  
**FINISH:** 5/11/89  
**LOGGED BY:** C. Allison Hodges

**NOTES**  
Began drilling with water at 15.0' to 97.0'. Drilled dry from 97.0' to 156.0'. Representative samples taken every 10.0' from 0.0' to 156.0' used rotary rig.

**THICKNESS OF SOIL:** 74.0'  
**DEPTH ERODED IN ROCK:** 82.0'  
**TOTAL DEPTH OF WELL:** 156.0'

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 to 1.0</td>
<td>Gravel, roots, clay (top soil) grayish brown.</td>
<td></td>
</tr>
<tr>
<td>1.0 to 10.0</td>
<td>Clay, light brown, brittle, dry.</td>
<td></td>
</tr>
<tr>
<td>10.0 to 74.5</td>
<td>Clay, mottled, light brown and very pale orange, brittle, also contains some chert, medium light gray, flinty. Damp at 11.0'. At 11.5 hit mud filled cavity, light brown and free flowing water. At 18.0' encountered another mud filled cavity. At 71.0' hit a soft spot dropped 2.0'. No free flowing water.</td>
<td></td>
</tr>
<tr>
<td>74.0 to 80.0</td>
<td>Dolomite, light medium gray, medium grained, clay light brown and chert light gray, white flinty, rough drilling. Increasing chert and dolomite at 77.0'.</td>
<td></td>
</tr>
<tr>
<td>80.0 to 97.0</td>
<td>Dolomite, light gray, fine to medium grained, sugary texture large fragments. 82.5 to 83.0 chert layer, light gray, flinty. 85.0' dolomite is light gray and brownish gray.</td>
<td></td>
</tr>
<tr>
<td>97.0 to 110.0</td>
<td>Dolomite, light gray, and pinkish gray, fine to medium grained, sugary, few scattered pyrite crystals, 5% chert, olive gray, glassy, dry.</td>
<td></td>
</tr>
<tr>
<td>110.0 to 149.0</td>
<td>Dolomite, light gray, fine to medium grained sugary texture, or</td>
<td></td>
</tr>
<tr>
<td>149.0 to 150.0</td>
<td>Dolomite, medium gray, ironstained, medium grained, sugary texture</td>
<td></td>
</tr>
<tr>
<td>150.0 to 155.0</td>
<td>Dolomite, medium grained, ironstained, fine grained, sugary texture, very hard drilling.</td>
<td></td>
</tr>
<tr>
<td>DEPTH (FEET)</td>
<td>SAMPLE (NUMBER &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
</tr>
<tr>
<td>-------------</td>
<td>-----------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>155.0 - 156.0</td>
<td>Dolomite, medium grained, coarse grained with some coarse grained quartz crystals. Damp at 155.0 - sample moist at 156.0'.</td>
<td></td>
</tr>
<tr>
<td>156.0</td>
<td>Total depth.</td>
<td></td>
</tr>
<tr>
<td>DEPTH (FEET)</td>
<td>SAMPLE (NUMBER &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
</tr>
<tr>
<td>--------------</td>
<td>----------------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>0.0 - 10.0</td>
<td>Clay, silty, light brown, firm dry, w/chert fragments, very pale orange, encountered water zone at 4.0'.</td>
<td></td>
</tr>
<tr>
<td>10.0 - 20.0</td>
<td>Clay, silty, light brown, w/chert fragments, very pale orange</td>
<td></td>
</tr>
<tr>
<td>20.0 - 30.0</td>
<td>Clay, light brown, with significant chert, yellowish gray/pale olive, flinty.</td>
<td></td>
</tr>
<tr>
<td>30.0 - 40.0</td>
<td>Clay, light brown, with significant chert, yellowish gray/pale orange, sugary texture.</td>
<td></td>
</tr>
<tr>
<td>40.0 - 50.0</td>
<td>Clay, light brown with significant chert, very pale orange yellowish orange sugary.</td>
<td></td>
</tr>
<tr>
<td>50.0 - 60.0</td>
<td>Clay, light brown, with chert, pale orange.</td>
<td></td>
</tr>
<tr>
<td>60.0 - 70.0</td>
<td>Clay, light brown, with flinty chert, light gray and oolitic chert light gray, thin chert beds.</td>
<td></td>
</tr>
<tr>
<td>70.0 - 80.0</td>
<td>Clay, moderate yellowish brown, with significant chert, light gray, flinty, fine grained, with chert dark yellowish orange, sandy (sandstone) texture pinhead vugs.</td>
<td></td>
</tr>
<tr>
<td>80.0 - 90.0</td>
<td>Clay, moderate yellowish brown, with chert, light gray, sugary to flinty, with minor dark oolitic chert fragments.</td>
<td></td>
</tr>
<tr>
<td>90.0 - 100.0</td>
<td>Clay, grayish orange, with chert, sugary, fine grained, and chert flinty, light gray, ratty drilling.</td>
<td></td>
</tr>
<tr>
<td>100.0 - 110.0</td>
<td>Clay, grayish orange, with chert, light gray, flinty w/chert, moderate yellowish orange, sugary.</td>
<td></td>
</tr>
<tr>
<td>DEPTH</td>
<td>SAMPLE</td>
<td>DESCRIPTION</td>
</tr>
<tr>
<td>--------</td>
<td>--------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>110.0</td>
<td>111.3</td>
<td>Chert, moderate yellowish brown, high porosity (sponge chert, pinhead rugs).</td>
</tr>
<tr>
<td>115.0</td>
<td>116.0</td>
<td>Chert, light gray, flinty, oolitic.</td>
</tr>
<tr>
<td>110.0</td>
<td>115.0</td>
<td>Clay, moderate yellowish brown, with significant chert.</td>
</tr>
<tr>
<td>120.0</td>
<td>125.0</td>
<td>Chert, light gray, flinty.</td>
</tr>
<tr>
<td>125.0</td>
<td>132.0</td>
<td>Clay - clay, light brown.</td>
</tr>
<tr>
<td>132.0</td>
<td>139.0</td>
<td>Clay moderate yellowish brown, with significant chert, light gray, flinty, locally oolitic.</td>
</tr>
<tr>
<td>139.0</td>
<td>143.0</td>
<td>Clay.</td>
</tr>
<tr>
<td>143.0</td>
<td>144.0</td>
<td>Dolomite, dark gray, and olive gray, sugary with significant chert, light gray, flinty. 50/50.</td>
</tr>
<tr>
<td>144.0</td>
<td>149.0</td>
<td>Clay, light brown.</td>
</tr>
<tr>
<td>149.0</td>
<td>150.0</td>
<td>Dolomite, light gray, sugary, with chert, light gray, flinty.</td>
</tr>
<tr>
<td>150.0</td>
<td>160.0</td>
<td>Chert, very pale orange, flinty.</td>
</tr>
<tr>
<td>160.0</td>
<td>162.0</td>
<td>Dolomite, light medium gray, fine to medium grained, sugary texture.</td>
</tr>
<tr>
<td>162.0</td>
<td>164.0</td>
<td>Dolomite, light olive gray and ironstained, dark yellowish orange with sand, fine to medium grained, subrounded, quartz crystals.</td>
</tr>
<tr>
<td>164.0</td>
<td>165.0</td>
<td>Dolomite, pale brown and light olive gray, fine to medium grained, subrounded, quartz crystals.</td>
</tr>
<tr>
<td>165.0</td>
<td>166.5</td>
<td>Dolomite, dark yellowish brown, fine to medium grained, sugary texture.</td>
</tr>
<tr>
<td>1665.</td>
<td>170.0</td>
<td>Dolomite, pale brown and light olive gray, with some sand, fine grained, subrounded, and chert, white and light gray, earthy to flinty.</td>
</tr>
<tr>
<td>170.0</td>
<td>171.5</td>
<td>Dolomite, olive gray, and brownish gray, with sand, fine grained, subangular to rounded.</td>
</tr>
<tr>
<td>171.5</td>
<td></td>
<td>Total depth.</td>
</tr>
<tr>
<td>DEPTH (FEET)</td>
<td>SAMPLE (NUMBER &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
</tr>
<tr>
<td>-------------</td>
<td>----------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>0.0 - 1.0</td>
<td>Gravel (fill material).</td>
<td></td>
</tr>
<tr>
<td>1.0 - 54.0</td>
<td>Clay, light brown, with chert fragments, light gray, flinty.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chert layer fragments 16.0 to 17.0' and again fragments 35.0' to 38.0'.</td>
<td></td>
</tr>
<tr>
<td>54.0 - 56.0</td>
<td>Clay, light brown, with chert, light gray, white and pinkish gray, flinty, and porous. Also shale, light olive gray, with ironstains, laminated, weathered.</td>
<td></td>
</tr>
<tr>
<td>56.0 - 57.0</td>
<td>Dolomite, light brownish gray, fine to medium grained, with chert, light gray, flinty, and shale, light olive gray, with ironstains, laminated, weathered.</td>
<td></td>
</tr>
<tr>
<td>57.0 - 63.0</td>
<td>Dolomite, light brownish gray, fine grained, with some chert, light medium gray, flinty. Hit good water at 60.5'.</td>
<td></td>
</tr>
<tr>
<td>63.0 - 69.5</td>
<td>Dolomite, medium light gray, fine grained. Some chert at 66.5'. Hit a cavity at 69.0 to 69.5'. Clay and chert filled. No water.</td>
<td></td>
</tr>
<tr>
<td>69.5 - 104.5</td>
<td>Dolomite, light gray, fine to medium grained, sugary texture, oolitic chert, medium light gray, flinty, sugary texture. Soft drilling at 86.0'. Sample damp at 95.5'. Sample wet at 96.5'. Saturated at 98.5'.</td>
<td></td>
</tr>
<tr>
<td>104.5</td>
<td>Total depth.</td>
<td></td>
</tr>
</tbody>
</table>
## Y-12 WELL INSTALLATION PROGRAM

| LOCATION: | Y-12 Sanitary Landfill II |
| DRILLER: | Mark Baker |
| HELPER: | Mark Coapman |
| DRILL: | Ingersol Rand XL-750 |

### WELL LOG

| DATE: START: | 5/16/89 |
| DATE: FINISH: | 5/18/89 |
| LOGGED BY: | C. Allison Hodges |

### NOTES

Drilling dry from 0.0' to 6.0'. Drilling with water from 6.0' to 77.5'. Representative samples taken every 10.0'.

### THICKNESS OF SOIL:

77.5'+

### DEPTH DRILLED IN ROCK:

N/A

### TOTAL DEPTH OF WELL:

77.5'

### DEPTH (FEET)

<table>
<thead>
<tr>
<th>FROM</th>
<th>TO</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>0.5</td>
</tr>
<tr>
<td>0.5</td>
<td>9.0</td>
</tr>
<tr>
<td>9.0</td>
<td>22.5</td>
</tr>
<tr>
<td>22.5</td>
<td>45.0</td>
</tr>
<tr>
<td>45.0</td>
<td>73.0</td>
</tr>
<tr>
<td>73.0</td>
<td>76.0</td>
</tr>
</tbody>
</table>

### SAMPLE (NUMBER & INTERVAL)

<table>
<thead>
<tr>
<th>Gravel (fill material)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silty clay, mottled moderate yellowish brown and light brown, with chert fragments white and medium light gray earthy and flinty, fine to medium grained, sugary texture, slightly damp. Chert layer from 8.0' to 9.0'.</td>
</tr>
<tr>
<td>Sandy clay, light brown, sand, very pale orange, fine to medium grained, subrounded to rounded. Also contains chert fragments, medium light gray, flinty.</td>
</tr>
<tr>
<td>Clay, light brown, with oolitic chert, medium gray and white, fine to medium grained, with some medium to coarse grained quartz crystals, sugary texture, flinty and earthy.</td>
</tr>
<tr>
<td>Clay, light brown, with oolitic chert, medium gray, white and ironstained dark yellowish orange, fine to medium grained, with some weathered porous chert, sugary texture flinty and earthy. Also contains 1% dark black brown carbonaceous mineral, soft. Soft drilling from 45.0' to 67.5'. Bit bouncing at 67.5' to 73.0'.</td>
</tr>
<tr>
<td>Clay, light brown, with oolitic chert, medium gray, flinty, and white ironstained, earthy, fine to medium grained, vugs</td>
</tr>
<tr>
<td>DEPTH (FEET)</td>
</tr>
<tr>
<td>--------------</td>
</tr>
<tr>
<td>75.0 / 77.5</td>
</tr>
<tr>
<td>77.5</td>
</tr>
<tr>
<td>77.5</td>
</tr>
</tbody>
</table>

Y-12 CHARACTERIZATION WELL LOG

PAGE 2 OF 2
### Y-12 WELL INSTALLATION PROGRAM

**LOCATION:** Y-12 Sanitary Landfill II  
**DRILLER:** Mark Baker  
**HELPER:** Mark Coapman  
**DRILL:** Ingersol Rand XL-750

### WELL LOG

**DATE:**  
**START:** 5/25/89  
**FINISH:** 6/02/89  
**LOGGED BY:** C. Allison Hodges

**NOTES**
Representative samples taken every 10.0'. Drilled dry from 0.0' to 7.0'. Drilled with water from 7.0' to 36.0'. Drilled dry from 36.0' to 85.5'. Drilled with water from 85.5' to 94.0'.

**THICKNESS OF SOIL:** 16.0'  
**DEPTH DRILLED IN ROCK:** 78.0'  
**TOTAL DEPTH OF WELL:** 94.0'

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 to 0.5</td>
<td>Gravel (fill material)</td>
<td></td>
</tr>
<tr>
<td>0.5 to 3.0</td>
<td>Clay, mottled, dark yellowish orange and light brown, with 5% flinty chert light medium gray, damp.</td>
<td></td>
</tr>
<tr>
<td>3.0 to 5.0</td>
<td>Clay, light brown, with 30% flinty chert medium light gray, white and light brownish gray. Some of the light brownish gray chert is porous, other chert of the same type contains a black rhombohedran shaped mineral (hematite). Slightly damp.</td>
<td></td>
</tr>
<tr>
<td>5.0 to 16.0</td>
<td>Clay, light brown, 2% flinty chert, light medium gray. Some water at 14.0', not much.</td>
<td></td>
</tr>
<tr>
<td>16.0 to 18.0</td>
<td>Dolomite, light olive gray, fine grained, sugary texture with 30% flinty chert, light medium gray, and 20% clay, light gray rough drilling.</td>
<td></td>
</tr>
<tr>
<td>18.0 to 19.5</td>
<td>Dolomite, light olive gray, fine grained sugary texture, 5% clay, light brown, 5% flinty chert, light medium gray.</td>
<td></td>
</tr>
<tr>
<td>19.5 to 21.0</td>
<td>Dolomite, light olive gray and light brownish gray, medium to coarse grained, sugary texture 2% clay, light olive gray, and 2% flinty chert.</td>
<td></td>
</tr>
<tr>
<td>DEPTH (FEET)</td>
<td>SAMPLE (NUMBER &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
</tr>
<tr>
<td>--------------</td>
<td>----------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>21.0 to 22.0</td>
<td>Dolomite, light olive gray and light brownish gray, medium to coarse grained, sugary texture, 40% flinty chert, light medium gray and white, 5% clay, light olive gray.</td>
<td></td>
</tr>
<tr>
<td>22.0 to 36.0</td>
<td>Dolomite, light olive gray and light brownish gray, medium to coarse grained, sugary texture, with chert, very pale orange, earthy fine, to medium grained, weathered, porous and light gray, fine grained, flinty, highly fractured. Also contains sand, very light gray, medium to coarse grained, angular to subrounded (source-highly weathered crushed chert?) and clay, light olive gray. Hit some water at 23.0', not much.</td>
<td></td>
</tr>
<tr>
<td>36.0 to 37.0</td>
<td>Sandy clay, dark yellowish orange, sand, fine to medium grained, subrounded, dolomite, medium light gray, fine to medium grained, sugary texture, and chert, medium gray flinty, moist.</td>
<td></td>
</tr>
<tr>
<td>37.0 to 47.0</td>
<td>Dolomite, light brownish gray, medium to coarse grained, sugary texture, sand, pale orange and dark yellowish orange, fine to medium grained, subrounded, and clay, dark yellowish orange. Damp at 37.0'. Hit a soft spot at 39.0', small amount of water. Chert at 44.0', very light gray and white with ironstains, flinty and earthy.</td>
<td></td>
</tr>
<tr>
<td>47.0 to 60.0</td>
<td>Dolomite, light brownish gray, fine to medium grained, sugary texture, some small chert fragments, light gray, flinty. Bit jumping around at 51.0', sand, pale orange and dark yellowish orange, fine to medium grained, subrounded from 51.0' to 55.0'.</td>
<td></td>
</tr>
<tr>
<td>60.0 to 78.0</td>
<td>Dolomite, light brownish gray and light gray, fine to medium grained, sugary texture, with chert fragments, medium light gray, flinty.</td>
<td></td>
</tr>
<tr>
<td>DEPTH (FEET)</td>
<td>SAMPLE (NUMBER &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
</tr>
<tr>
<td>--------------</td>
<td>----------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>78.0 - 88.5</td>
<td>Dolomite, medium light gray, fine to medium grained, sugary texture. Damp at 85.0' but no free flowing water.</td>
<td></td>
</tr>
<tr>
<td>85.5 - 88.0</td>
<td>Dolomite, light olive gray and medium light gray, fine to medium grained, sugary texture, with chert very light gray flinty and white, ironstained, very porous, earthy, fine to medium grained with some coarse grained quartz crystals, also contains some sandy clay, dark yellowish orange, sand fine to medium subrounded. Sample wet at 85.5' free flowing water at 86.0'.</td>
<td></td>
</tr>
<tr>
<td>88.0 - 94.0</td>
<td>Dolomite, medium gray, fine to medium grained, sugary texture</td>
<td></td>
</tr>
<tr>
<td>94.0</td>
<td>Total depth.</td>
<td></td>
</tr>
</tbody>
</table>
**Y-12 WELL INSTALLATION PROGRAM**

**WELL LOG**

<table>
<thead>
<tr>
<th>LOCATION:</th>
<th>Y-12 Sanitary Landfill II</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRILLER:</td>
<td>Mark Baker</td>
</tr>
<tr>
<td>HELPER:</td>
<td>Mark Coapman</td>
</tr>
<tr>
<td>DRILL:</td>
<td>Ingersol Rand XL-750</td>
</tr>
<tr>
<td>DATE: START:</td>
<td>5/18/89</td>
</tr>
<tr>
<td>DATE: FINISH:</td>
<td>5/30/89</td>
</tr>
<tr>
<td>LOGGED BY:</td>
<td>C. Allison Hodges</td>
</tr>
</tbody>
</table>

**NOTES**

Water was used to drill from 4.5' to 5.5'. Drilled dry from 5.5 to 100.0'. Representative 10' samples collected from 0.0' to 110.0'.

**THICKNESS OF SOIL:** 47.0'

**DEPTH ERODED IN ROCK:** 63.0'

**TOTAL DEPTH OF WELL:** 110.0'

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 - 0.5</td>
<td>Gravel, roots, clay, light brown, dry</td>
<td></td>
</tr>
<tr>
<td>0.5 - 2.5</td>
<td>Sandy clay, mottled, light brown and dark yellowish orange, sand grains are fine to medium. Some chert fragments, very light gray to white, milky to clear in appearance, fine grained.</td>
<td></td>
</tr>
<tr>
<td>2.5 - 22.0</td>
<td>Clay, light brown, contains 1 to 2% sand, fine to medium grained also chert fragments that range from an ironstained, milky white, fine grained type to a medium gray, flinty, fine to medium grained, with a sugary texture.</td>
<td></td>
</tr>
<tr>
<td>22.0 - 27.5</td>
<td>Clay, light brown, chert fragments, white and medium gray, fine to medium grained. Sample also contains 15% sandstone which is dark yellowish orange, fine to medium grained, with subrounded grains. The sandstone also contains 1% of a dark mineral.</td>
<td></td>
</tr>
<tr>
<td>27.5 - 30.0</td>
<td>Clay, light brown, with chert, white and medium gray, fine to medium grained. 10% sandstone, dark yellowish orange and light brown, medium to coarse grained, with subrounded grains.</td>
<td></td>
</tr>
<tr>
<td>30.0 - 44.0</td>
<td>Clay, light brown, with 30% chert, medium gray, fine to medium grained, flinty type. Hit some water at 44.0'.</td>
<td></td>
</tr>
<tr>
<td>DEPTH (FEET)</td>
<td>SAMPLE (NUMBER &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
</tr>
<tr>
<td>-------------</td>
<td>-----------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>44.0 - 47.0</td>
<td>Clay, light brown, chert, light olive gray, fine grained with some medium sized quartz crystals, and light gray, fine grained, glassy, flinty type. Sample also contains 10% dolomite, dusky brown, medium to coarse grained with some coarse grained quartz crystals.</td>
<td></td>
</tr>
<tr>
<td>47.0 - 50.5</td>
<td>Dolomite, sandy, pale yellowish brown, fine to medium grained, sand grains are rounded and not well cemented (loose). Sample effervesces with HCl. Also contains 5% chert, light gray, fine grained, glassy (flinty type), and 30% clay, light brown.</td>
<td></td>
</tr>
<tr>
<td>50.0 - 51.5</td>
<td>Dolomite, sandy (10% sand) medium light gray, fine grained, sand grains are rounded and not well cemented. Also contains 20% clay, light brown.</td>
<td></td>
</tr>
<tr>
<td>51.5 - 52.5</td>
<td>Dolomite, medium gray, fine grained, has a sugary texture. Contains 15% clay, light brown.</td>
<td></td>
</tr>
<tr>
<td>52.5 - 55.0</td>
<td>Dolomite, medium gray, fine grained, sugary texture, with 5% chert, medium grained quartz crystals. Contains 5% clay, light brown.</td>
<td></td>
</tr>
<tr>
<td>55.0 - 59.5</td>
<td>Dolomite, medium light gray, fine to medium grained, sugary texture, contains 5% clay, light brown.</td>
<td></td>
</tr>
<tr>
<td>59.5 - 98.0</td>
<td>Dolomite, medium light gray, fine to medium grained, sugary texture, also contains chert, light gray and light brownish grain, flinty, damp.</td>
<td></td>
</tr>
<tr>
<td>98.0 - 99.0</td>
<td>Dolomite, medium light gray, fine to medium grained, sugary texture, also contains chert, light gray and light brownish grain, flinty, damp.</td>
<td></td>
</tr>
<tr>
<td>99.0 - 103.0</td>
<td>Dolomite, light olive gray, fine to medium grained, with chert, white, light gray and light brownish gray, flinty, damp.</td>
<td></td>
</tr>
<tr>
<td>103.0 - 104.0</td>
<td>Dolomite, light brownish gray, and light medium gray, with 15% chert, light gray and light brownish gray, flinty. Rough drilling at 103.5'.</td>
<td></td>
</tr>
<tr>
<td>104.0 - 107.0</td>
<td>Dolomite, light brownish gray, fine to medium grained with medium sized quartz grains, with 10% chert, light gray, white and clear, flinty. Hit some H₂O at 104.0' not much.</td>
<td></td>
</tr>
<tr>
<td>DEPT. (FEET)</td>
<td>SAMPLE (NUMBER &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
</tr>
<tr>
<td>-------------</td>
<td>---------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>107.0 - 110.0</td>
<td>Dolomite, light brownish gray, no chert. Hit water at 107.0 ft.</td>
<td></td>
</tr>
<tr>
<td>110.0</td>
<td>Total depth.</td>
<td></td>
</tr>
<tr>
<td>Depth (Feet)</td>
<td>Sample (Number &amp; Interval)</td>
<td>Soil/Bedrock Description</td>
</tr>
<tr>
<td>-------------</td>
<td>-----------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>0.0 - 1.5</td>
<td>Gravel (fill material), clay, light brown.</td>
<td></td>
</tr>
<tr>
<td>1.5 - 8.0</td>
<td>Sandy clay, light brown, sand, very pale orange, fine to medium grained, subrounded to rounded. Chert fragments from 4.0' to 8.0'. Chert is light gray, flinty. Damp from 3.0' to 5.0' and moist from 5.0 to 8.0'.</td>
<td></td>
</tr>
<tr>
<td>8.0 - 10.0</td>
<td>Clay, light brown, with chert fragments, light gray and pinkish gray, fine to medium grained with a sugary texture.</td>
<td></td>
</tr>
<tr>
<td>10.0 - 26.0</td>
<td>Clay, mottled, pale yellowish orange and light brown, with chert fragments, light gray and medium light gray, flinty.</td>
<td></td>
</tr>
<tr>
<td>26.0 - 54.5</td>
<td>Clay, light brown, with chert, medium light gray and medium gray fine to medium grained, with some coarse grained quartz crystals, sugary texture, flinty.</td>
<td></td>
</tr>
<tr>
<td>54.5 - 56.5</td>
<td>Dolomite, light gray, fine to medium grained, sugary texture, chert, medium gray, flinty, clay, light brown and some snail light olive gray, laminated, weathered. Hard drilling, bit bouncing. Hit some water at 55.0'.</td>
<td></td>
</tr>
<tr>
<td>56.5 - 60.5</td>
<td>Dolomite, medium light gray, fine to medium grained, some clay, light brown, and chert medium light gray, flinty. Hit some more water at 59.0'.</td>
<td></td>
</tr>
<tr>
<td>DEPTH (FEET)</td>
<td>SAMPLE (NUMBER &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
</tr>
<tr>
<td>--------------</td>
<td>----------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>60.5 - 67.0</td>
<td>67.0</td>
<td>Dolomite, medium gray and light olive gray, fine to medium grained, sugary texture, with oolitic chert, light gray, flinty.</td>
</tr>
<tr>
<td>67.0</td>
<td></td>
<td>Total depth.</td>
</tr>
</tbody>
</table>
**Y-12 WELL INSTALLATION PROGRAM**

**LOCATION:** Y-12 Sanitary Landfill II  
**DRILLER:** Mark Baker  
**HELPER:** Mark Coapman  
**DRILL:** Ingersol Rand XL-750

**WELL LOG**

**DATE:** START: 6/05/89  
FINISH: 6/07/89  
**LOGGED BY:** C. Allison Hodges

**NOTES**  
Drilled dry from 0.0 - 8.0'. Drilled with water from 8.0' to 84.5'. Representative samples were taken every 10.0'.

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 - 1.0</td>
<td></td>
<td>Gravel, clay, light brown (top soil).</td>
</tr>
<tr>
<td>1.0 - 6.0</td>
<td></td>
<td>Clay, light brown, with 2% chert, white and light gray, earthy, moist.</td>
</tr>
<tr>
<td>6.0 - 18.0</td>
<td></td>
<td>Clay, light brown, brittle, with 25% chert, light gray and white, flinty and earthy. Hit a cavity at 13.0', mud and chert filled, bit dropped 1.5'. Very soft drilling from 14.5' to 18.0'.</td>
</tr>
<tr>
<td>18.0 - 46.0</td>
<td></td>
<td>Clay, dark yellowish orange, 15% chert, light gray and white, flinty and earthy, 1% dark carbonaceous mineral. Hit a cavity at 22.5', dropped to 24.5', clay and chert filled, no free flowing water. At 36.5' hit a chert layer, medium light gray, flinty. Very soft drilling 18.0' to 46.0'.</td>
</tr>
<tr>
<td>46.0 - 54.5</td>
<td></td>
<td>Clay, light brown, with chert, medium gray, flinty, very soft drilling 46.0' to 54.5'.</td>
</tr>
<tr>
<td>54.5 - 66.5</td>
<td></td>
<td>Clay, light brown, chert, oolitic and flinty, also contains 1% coarse grained chert.</td>
</tr>
<tr>
<td>66.5 - 73.0</td>
<td></td>
<td>Clay, dark yellowish orange with chert medium light gray flint. Some water at 71.5'. Soft drilling. Loss of circulation at 72.5'.</td>
</tr>
<tr>
<td>Depth (Feet)</td>
<td>Sample &amp; Interval</td>
<td>Soil/Bedrock Description</td>
</tr>
<tr>
<td>-------------</td>
<td>-------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>73.0-74.5</td>
<td></td>
<td>Clay, moderate yellowish brown, 5% chert white and pinkish gray, earthy.</td>
</tr>
<tr>
<td>74.5-78.0</td>
<td></td>
<td>Dolomite, light olive gray, fine to medium grained, contains some coarse grained quartz crystals, also clay, light brown, oolitic chert medium dark gray, flinty and some shale, dusky brown and moderate brown, ironstained, laminated. Harder drilling, move water.</td>
</tr>
<tr>
<td>78.0-82.5</td>
<td></td>
<td>Dolomite, light olive gray and light gray, fine to medium with coarse grained quartz crystals. Clay, light brown, and chert, light gray and white, flinty and earthy, also some porous, coarse grained chert, dark gray, move water at 82.5'.</td>
</tr>
<tr>
<td>82.5-83.5</td>
<td></td>
<td>Dolomite, light brownish gray, fine to medium grained, with chert, light gray and brownish black, fine and coarse grained with quartz crystals, weathered.</td>
</tr>
<tr>
<td>83.5-84.5</td>
<td></td>
<td>Dolomite, light olive gray, fine to medium grained, sugary texture, some chert; light medium gray. flinty, clay, chert. light brown.</td>
</tr>
<tr>
<td>84.5</td>
<td></td>
<td>Total Depth.</td>
</tr>
</tbody>
</table>

**Y-12 Characterization Well Log**

**Page 2 of 2**
### Y-12 WELL INSTALLATION PROGRAM

**LOCATION:** Oil Landfarm  
**DRILLER:** Mark Baker  
**HELPER:** Earl Sexton  
**DRILL:** XL 750 Ingersol Rand

### WELL LOG

**DATE:** 8/3/89  
**START:** 8/31/89  
**FINISH:**  
**LOGGED BY:** David B. Wright

**THICKNESS OF SOIL:** 13'  
**DEPTH DRILLED IN ROCK:** 343'  
**TOTAL DEPTH OF WELL:** 356'

<table>
<thead>
<tr>
<th>Depth (Feet)</th>
<th>Sample (Number &amp; Interval)</th>
<th>Soil/Bedrock Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 - 0.5</td>
<td></td>
<td>Gravel pad</td>
</tr>
<tr>
<td>0.5 - 8.0</td>
<td></td>
<td>Clay, reddish-brown with weathered chert</td>
</tr>
<tr>
<td>8.0 - 15.0</td>
<td></td>
<td>Dolomite, light gray; minor clay, reddish-brown</td>
</tr>
<tr>
<td>15.0 - 19.0</td>
<td></td>
<td>Dolomite, light olive gray to olive gray</td>
</tr>
<tr>
<td>19.0 - 24.0</td>
<td></td>
<td>Dolomite, olive gray, finely crystalline; minor clay from up hole, chert dark gray to black; drilling break 23'-25'</td>
</tr>
<tr>
<td>24.0 - 29.0</td>
<td></td>
<td>Dolomite, olive gray; minor shale light olive gray; minor chert, dark gray</td>
</tr>
<tr>
<td>29.0 - 34.0</td>
<td></td>
<td>Dolomite, olive gray to dark olive gray</td>
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<tr>
<td>34.0 - 39.0</td>
<td></td>
<td>Dolomite, olive gray minor break at 38'</td>
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<tr>
<td>39.0 - 44.0</td>
<td></td>
<td>Dolomite and Dolostone, olive gray to dark olive gray; minor chert, dark gray; minor shale light olive gray. TD 15 1/2&quot; hole at 44'</td>
</tr>
<tr>
<td>44.0 - 49.0</td>
<td></td>
<td>Dolostone, olive gray; chert, light gray to dark gray, oolitic; weathered shale dark gray H₂O at 46'</td>
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<tr>
<td>49.0 - 54.0</td>
<td></td>
<td>Dolostone, olive gray, chert light gray to dark gray, weathered (solutional activity)</td>
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<tr>
<td>54.0 - 59.0</td>
<td></td>
<td>Dolostone, olive gray, chert light to dark gray, flinty in part minor olive green shale</td>
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<tr>
<td>59.0 - 64.0</td>
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<td>Dolostone, olive gray; minor chert, milky white</td>
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<td>SAMPLE (NUMBER &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
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<tr>
<td>FROM TO</td>
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<tr>
<td>64.0 - 69.0</td>
<td></td>
<td>Dolostone, olive gray</td>
</tr>
<tr>
<td>69.0 - 74.0</td>
<td></td>
<td>Dolostone, dark olive gray, minor calcite spars</td>
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<tr>
<td>74.0 - 79.0</td>
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<td>Dolostone, light olive gray to dark olive gray, minor spars</td>
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<td>79.0 - 84.0</td>
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<td>Dolostone, olive gray, minor chert, dark gray, flinty</td>
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<tr>
<td>84.0 - 89.0</td>
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<td>Dolostone, light olive gray</td>
</tr>
<tr>
<td>89.0 - 94.0</td>
<td></td>
<td>Dolostone, olive gray, minor limestone, dark gray</td>
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<tr>
<td>94.0 - 99.0</td>
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<td>Dolostone, light olive gray</td>
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<tr>
<td>99.0 - 104</td>
<td></td>
<td>Dolostone, olive gray, chert, dark gray, to light gray, flinty to oolitic some staining</td>
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<tr>
<td>104 - 109</td>
<td></td>
<td>Dolostone, olive gray</td>
</tr>
<tr>
<td>109 - 114</td>
<td></td>
<td>Dolostone, light olive gray</td>
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<tr>
<td>114 - 119</td>
<td></td>
<td>Dolostone, light olive gray to olive gray</td>
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<tr>
<td>119 - 124</td>
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<td>Dolostone, olive gray, some staining from solutional activity</td>
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<td>124 - 129</td>
<td></td>
<td>Dolostone, light olive gray, minor staining</td>
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<tr>
<td>129 - 134</td>
<td></td>
<td>Limestone, dark gray, medium grained</td>
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<tr>
<td>134 - 139</td>
<td></td>
<td>Dolostone, olive gray, minor limestone, dark gray, medium grained</td>
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<tr>
<td>139 - 144</td>
<td></td>
<td>Dolostone, olive gray to dark gray</td>
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<tr>
<td>144 - 149</td>
<td></td>
<td>Dolostone, olive black</td>
</tr>
<tr>
<td>149 - 154</td>
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<td>Dolostone, olive gray to black, minor calcite</td>
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<tr>
<td>154 - 159</td>
<td></td>
<td>Dolostone, olive gray to brownish black, minor calcite</td>
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<tr>
<td>159 - 164</td>
<td></td>
<td>Dolostone, olive gray to brownish gray, leaning towards a limestone, good porosity</td>
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<tr>
<td>164 - 169</td>
<td></td>
<td>Dolostone and limestone, olive black, calcite spars</td>
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<tr>
<td>169 - 174</td>
<td></td>
<td>Dolostone, olive black, calcite veinlets and spars</td>
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<tr>
<td>174 - 179</td>
<td></td>
<td>Dolostone, olive black, sucrosic</td>
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<tr>
<td>179 - 184</td>
<td></td>
<td>Dolostone, olive black with calcite veinlets and spars</td>
</tr>
<tr>
<td>184 - 189</td>
<td></td>
<td>Dolostone, olive black with calcite veinlets and spars</td>
</tr>
<tr>
<td>189 - 194</td>
<td></td>
<td>Dolostone, olive black with calcite veinlets and spars</td>
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<tr>
<td>194 - 199</td>
<td></td>
<td>Dolostone and dolomitic limestone, olive black and fine to medium grained minor vugs</td>
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<tr>
<td>199 - 204</td>
<td></td>
<td>Dolostone and dolomitic limestone, olive black, and fine to</td>
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<td>SAMPLE (NUMBER &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
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<tr>
<td>204-209</td>
<td>Dolostone and dolomitic limestone, olive black, fine to medium grained</td>
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<tr>
<td>209-214</td>
<td>Dolostone and dolomitic limestone, olive black medium grained vuggy</td>
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<tr>
<td>214-219</td>
<td>Dolostone and dolomitic limestone, olive black, sucrosic</td>
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<tr>
<td>219-224</td>
<td>Dolostone and dolomitic limestone, olive black, sucrosic with minor vugs</td>
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<td>224-229</td>
<td>Dolomitic limestone, olive black, sucrosic</td>
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<tr>
<td>229-234</td>
<td>Dolomitic limestone, olive black, sucrosic, minor vugs</td>
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<td>234-239</td>
<td>Dolomitic limestone, olive black, sucrosic, minor vugs</td>
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<td>239-244</td>
<td>Dolomitic limestone, olive black, sucrosic</td>
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<tr>
<td>244-249</td>
<td>Dolomitic limestone, olive black, sucrosic, minor vugs</td>
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<td>249-254</td>
<td>Dolomitic limestone, olive black, sucrosic</td>
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<td>254-259</td>
<td>Dolomitic limestone, olive black, sucrosic</td>
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<tr>
<td>259-264</td>
<td>Dolomitic limestone, olive black, sucrosic</td>
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<tr>
<td>264-269</td>
<td>Limestone, dark gray, medium grained H₂O at 268'</td>
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<td>269-274</td>
<td>Limestone, medium dark gray to dark gray, fine grained gas smell at 275'. Photovac 15-18 ppm</td>
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<td>274-279</td>
<td>Limestone, dark gray to grayish black, fine grained, dolomitic</td>
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<td>medium grained, minor oolitics at 275'.</td>
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<tr>
<td>279-284</td>
<td>Limestone, dark gray, fine grained, minor oolitics</td>
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<td>284-289</td>
<td>Limestone, dark gray, medium grained, minor oolitics</td>
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</tr>
<tr>
<td>289-294</td>
<td>Limestone, medium dark gray to dark gray, micritic</td>
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<tr>
<td>289-294</td>
<td>to medium grained, minor oolitics</td>
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</tr>
<tr>
<td>294-299</td>
<td>Limestone, brownish gray to dark gray, micritic to medium grained</td>
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<tr>
<td>299-304</td>
<td>Limestone, gray, medium grained, small oolitic nodules</td>
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<tr>
<td>304-309</td>
<td>Limestone, gray, fine to medium grained slightly oolitic</td>
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</tr>
<tr>
<td>309-314</td>
<td>Limestone medium gray to dark gray, fine to medium grained, slightly oolitic, minor oolitic nodules</td>
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<tr>
<td>314-314</td>
<td>no/8&quot; hole Limestone, brownish gray to dark gray, medium grained, minor oolitics</td>
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<td>Depth (feet) From</td>
<td>Depth (feet) To</td>
<td>Sample Number &amp; Interval</td>
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<td>329</td>
<td>334</td>
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<td>334</td>
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<td>344</td>
<td>349</td>
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<td>349</td>
<td>356</td>
<td>TD of</td>
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<td>6 1/4&quot;hole</td>
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<td>356</td>
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</tr>
<tr>
<td>0 to 55</td>
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<td>Clay, reddish-orange, chert fragments, gray to dark gray flinty to oolitic, 3' cavity at 26; minor H₂O</td>
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<td>55 to 65</td>
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<td>Dolostone, dark gray, vuggy; chattering of rig at 58', minor H₂O at 60', minor clay, reddish-orange, and chert dark gray, flinty</td>
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<td>65 to 67</td>
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<td>Clay, reddish-orange, with dolomite, dark gray, vuggy, medium crystalline</td>
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<td>67 to 70</td>
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<td>Dolomite, dark gray, sparry (minor), medium crystalline</td>
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<td>70 to 80</td>
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<td>Dolomite, and dolostone, gray to dark gray, some spars in dolomite fragments</td>
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<td>80 to 85</td>
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<td>Dolomite, dark gray, minor spars within dolomite</td>
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<td>85 to 90</td>
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<td>Dolostone and dolomite, gray to dark gray, chert, light gray, flinty with some iron staining H₂O at 86'</td>
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<tr>
<td>90 to 95</td>
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<td>Dolostone and dolomite, dark gray, minor chert, gray to dark gray, flinty very minor weathered, chert fragment yellowish-gray</td>
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<td>95 to 100</td>
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<td>Dolostone and dolomite, dark gray some minor spars, very minor chert, light gray, some fragments show solutional activity ie (Fe stains, vugs)</td>
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<td>100 to 105</td>
<td></td>
<td>Dolostone and dolomite, dark gray</td>
</tr>
<tr>
<td>Depth (Feet)</td>
<td>Sample (Number &amp; Interval)</td>
<td>Soil/Bedrock Description</td>
</tr>
<tr>
<td>-------------</td>
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<tr>
<td>105-110</td>
<td>Dolostone and dolomite, dark gray, minor spars, very minor shale, grayish olive green</td>
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<td>110-115</td>
<td>Dolostone and dolomite, dark gray, minor spars</td>
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<tr>
<td>115-120</td>
<td>Dolostone and dolomite, dark gray, minor spars, minor banded (gray and dark gray) dolomitic siltstone</td>
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<td>120-125</td>
<td>Dolostone and dolomite, dark gray, minor limestone, gray medium grained</td>
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<td>125-130</td>
<td>Dolomite and dolostone, dark gray, dolomite has minor calcite veinlets</td>
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<tr>
<td>130-135</td>
<td>Dolomite and dolostone, dark gray, finely crystalline</td>
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<tr>
<td>135-140</td>
<td>Dolomite, light gray to gray, finely crystalline</td>
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<tr>
<td>140-145</td>
<td>Dolomite, dolostone, gray to dark gray, minor chert, very pale orange, dolomite grades to light olive gray, finely crystalline</td>
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<tr>
<td>145-150</td>
<td>Dolomite, dolostone, dark gray to light olive gray, finely crystalline</td>
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<td>150-155</td>
<td>Dolostone, dark gray to olive gray</td>
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<tr>
<td>155-160</td>
<td>Dolostone, dark gray to olive gray with calcite veinlets</td>
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<tr>
<td>160-165</td>
<td>Dolostone, dark gray to olive gray, finely crystalline</td>
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<tr>
<td>165-170</td>
<td>Dolostone, dark gray to olive gray, minor calcite veinlets</td>
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<td>170-175</td>
<td>Dolostone, dark gray to olive gray, minor dark gray shale rough drilling at 173' H2O at 173'</td>
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<tr>
<td>175-180</td>
<td>Dolostone, light olive gray, finely crystalline</td>
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</tr>
<tr>
<td>180-185</td>
<td>Dolostone, light olive gray, finely crystalline</td>
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<td>185-190</td>
<td>Dolostone, light olive gray, shale dark gray to black, minor mud (solutional activity)</td>
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<td>190-195</td>
<td>Dolostone, light olive gray to dark gray, finely crystalline</td>
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<tr>
<td>195-200</td>
<td>Dolostone, light olive gray to dark gray, finley crystalline</td>
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<tr>
<td>200-205</td>
<td>Dolostone, light olive gray, finely crystalline</td>
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<tr>
<td>205-210</td>
<td>Dolostone, light gray to olive gray, finely crystalline</td>
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<td>DEPTH (FEET)</td>
<td>SAMPLE (NUMBER &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
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<td>FROM</td>
<td>TO</td>
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<tr>
<td>210</td>
<td>212</td>
<td>H₂O at 206', slight drilling break, minor calcite</td>
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<tr>
<td>210</td>
<td>212</td>
<td>Dolostone, light gray to olive gray, finely crystalline with minor calcite</td>
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<td>212</td>
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<td>Total depth</td>
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<tr>
<td>DEPTH (FEET)</td>
<td>SAMPLE (NUMBER &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
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<tr>
<td>FROM TO</td>
<td>From 0.0 To 1.0</td>
<td>Top soil</td>
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<td>1.0 10.0</td>
<td>Clay, silty with some rock fragments, brown, (fill material)</td>
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<td>10.0 15.0</td>
<td>Clay, silty, some rock fragments, orange brown, wet H₂O at 13'</td>
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<tr>
<td>15.0 24.0</td>
<td>Clay, silty, brown</td>
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<tr>
<td>24.0 30.0</td>
<td>Dolostone, olive gray, shale, black, minor limestone, light gray, fine grained, minor chert, fragment</td>
<td></td>
</tr>
<tr>
<td>30.0 32.0</td>
<td>TD Pilot hole 32'</td>
<td>Dolostone, olive gray, minor shale, black, minor limestone light to dark gray</td>
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<tr>
<td>32.0 35.0</td>
<td>Dolostone, light olive gray to gray, minor dolomitic limestone(?)</td>
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<tr>
<td>35.0 40.0</td>
<td>Dolostone, olive gray, minor dolomitic limestone, small cavity at 39'</td>
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<tr>
<td>40.0 45.0</td>
<td>Dolostone, olive gray, 2' Drop at 45' moist</td>
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<tr>
<td>45.0 50.0</td>
<td>Dolostone, light olive gray</td>
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<tr>
<td>50.0 55.0</td>
<td>Dolostone and dolomitic limestone, olive gray</td>
<td></td>
</tr>
<tr>
<td>55.0 60.0</td>
<td>Dolostone and dolomitic, limestone, olive gray to light olive gray 3' drop at 55' moist</td>
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</tr>
<tr>
<td>60.0 65.0</td>
<td>1 oolitic chert fragment, dolostone and dolomitic limestone fine grained olive gray</td>
<td></td>
</tr>
<tr>
<td>DEPTH (FEET)</td>
<td>SAMPLE (NUMBER &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
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<tr>
<td>65.0 - 70.3</td>
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<td>H₂O at 67' limestone, olive gray to dark gray, medium grained, limey siltstone olive gray</td>
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<td>70.0 - 75.2</td>
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<td>Limestone, gray to dark gray, fine to medium grained, minor oolitics, dolomitic limestone, olive gray, fine grained</td>
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<tr>
<td>75.2</td>
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<td>Total depth</td>
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</table>
### Y-12 WELL INSTALLATION PROGRAM

**LOCATION:** New Hope Pond  
**DRILLER:** Mark Baker  
**HELPER:** Earl Sexton  
**DRILL:** XL 750 Ingersol Rand

**NOTES:**

**DATE:** START: 9/18/89  
**DATE:** FINISH: 9/25/89  
**LOGGED BY:** David B. Wright

### WELL LOG

**THICKNESS OF SOIL:** 31'

**DEPTH DRILLED IN ROCK:** 81'

**TOTAL DEPTH OF WELL:** 112.4'

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/Bedrock Description</th>
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<tbody>
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<td>TO</td>
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<tr>
<td>0.0</td>
<td>1.0</td>
<td>Topsoil</td>
</tr>
<tr>
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<td>10.0</td>
<td>Clay, silty, dark brown rock fragments (fill) moist at 8'</td>
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<td>10.0</td>
<td>17.0</td>
<td>Clay, silty, brown to dark brown, H₂O at 15'</td>
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<tr>
<td>17.0</td>
<td>20.0</td>
<td>Clay, slightly silty, reddish-brown</td>
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<tr>
<td>20.0</td>
<td>25.0</td>
<td>Clay, slightly silty, reddish-brown, with chert fragments, olive gray</td>
</tr>
<tr>
<td>25.0</td>
<td>30.0</td>
<td>Clay, reddish-brown, chert and dolostone fragments</td>
</tr>
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<td>30.0</td>
<td>35.0</td>
<td>Top of rock at 31' dolostone, olive gray, minor chert</td>
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<tr>
<td>35.0</td>
<td>40.0</td>
<td>Cavity at 35-39 dropped quickly dolostone, olive gray to gray, 2 fragments of oolitic chert</td>
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<tr>
<td>40.0</td>
<td>45.0</td>
<td>Mud cavity from 43' - 47'; dolostone fragments, olive gray</td>
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<tr>
<td>45.0</td>
<td>50.0</td>
<td>Continued of cavity to 47'; dolostone, olive gray, dolomitic limestone olive gray, fine grained; minor limestone, gray, fine to medium very minor green shale</td>
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<td>50.0</td>
<td>55.0</td>
<td>Dolostone, olive gray, dolomitic limestone, olive gray, fine grained, shale, black; cavity 52.5 - 54.5'</td>
</tr>
<tr>
<td>55.0</td>
<td>60.0</td>
<td>Dolostone and dolomitic limestone, olive gray; limestone dark gray, medium grained, minor shale, green to black</td>
</tr>
<tr>
<td>60.0</td>
<td>65.0</td>
<td>Limestone, gray to dark gray, fine to medium grained; dolomitic limestone, olive gray, fine grained minor green shale</td>
</tr>
<tr>
<td>Depth (Feet)</td>
<td>Sample (Number &amp; Interval)</td>
<td>Soil/Bedrock Description</td>
</tr>
<tr>
<td>-------------</td>
<td>---------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>65.0 - 70.0</td>
<td>Dolostone, dolomitic limestone, and limestone olive gray to dark gray</td>
<td></td>
</tr>
<tr>
<td>70.0 - 75.0</td>
<td>Dolostone, dolomitic limestone and limestone dark olive gray to dark gray</td>
<td></td>
</tr>
<tr>
<td>75.0 - 80.0</td>
<td>Limestone, gray to dark gray, fine to medium grained</td>
<td></td>
</tr>
<tr>
<td>80.0 - 85.0</td>
<td>Dolomitic limestone and limestone, fine to medium grained, olive gray to gray, chert fragments</td>
<td></td>
</tr>
<tr>
<td>85.0 - 90.0</td>
<td>Limestone, dark gray, medium grained, dolomitic limestone, olive gray minor green shale minor H₂O at 86'</td>
<td></td>
</tr>
<tr>
<td>90.0 - 95.0</td>
<td>Limestone gray to dark gray, medium grained, shale, green</td>
<td></td>
</tr>
<tr>
<td>95.0 - 97.0</td>
<td>Limestone gray to dark gray, fine to medium grained very minor oolitic limestone fragments</td>
<td></td>
</tr>
<tr>
<td>97.0 - 100.0</td>
<td>Limestone, gray, fine to medium grained</td>
<td></td>
</tr>
<tr>
<td>100.0 - 105.0</td>
<td>H₂O at 104.5', limestone, gray to dark gray, fine to medium grained</td>
<td></td>
</tr>
<tr>
<td>105.0 - 112.4</td>
<td>Limestone, gray to dark gray, medium grained, few fragments slightly oolitic</td>
<td></td>
</tr>
<tr>
<td>112.4</td>
<td>Total Depth</td>
<td></td>
</tr>
</tbody>
</table>
**Y-12 WELL INSTALLATION PROGRAM**

**LOCATION:** Y-12 Chestnut Ridge  
**DRILLER:** Mark Baker  
**HELPER:** Mark Coapman  
**DRILL:** XL 750 Ingersol Rand

**NOTES:** Encountered very muddy H₂O at 143.0'. Area has received most rain for much of June since creation of TVA.

**THICKNESS OF SOIL:** 107.0'  
**DEPTH DRILLED IN ROCK:** 44.3'  
**TOTAL DEPTH OF WELL:** 151.3'

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROM</td>
<td>TO</td>
<td>Clay, reddish-brown with chert, white to light bluish gray, slight organic odor, 6 to 10 ppm on Photovac.</td>
</tr>
<tr>
<td>0.0</td>
<td>30.0</td>
<td></td>
</tr>
<tr>
<td>30.0</td>
<td>70.0</td>
<td></td>
</tr>
<tr>
<td>70.0</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>100.0</td>
<td>107.0</td>
<td></td>
</tr>
<tr>
<td>107.0</td>
<td>115.5</td>
<td></td>
</tr>
<tr>
<td>115.5</td>
<td>120.0</td>
<td></td>
</tr>
<tr>
<td>120.0</td>
<td>130.0</td>
<td></td>
</tr>
<tr>
<td>130.0</td>
<td>140.0</td>
<td></td>
</tr>
<tr>
<td>140.0</td>
<td>151.3</td>
<td></td>
</tr>
<tr>
<td>151.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Dolomite, light olive gray, fine crystalline, few thin white dolomitic filled fractures, chert, white to medium gray, oolitic, flinty, solid-no cavities or voids

Dolomite, light olive gray, brown, fine crystalline, chert, gray, flinty, with minor oolitic chert fragments, gray

Dolomite, mottled brown and gray, fine crystalline, minor chert, gray

Dolomite, gray, fine to medium crystalline, minor chert, gray to black, oolitic

Dolomite, gray, brown, vuggy, mud filled, dolostone, brown, water at 143.0', very muddy

Total depth.
**Y-12 WELL INSTALLATION PROGRAM**

**LOCATION:** Chestnut Ridge  
**DRILLER:** Mark Baker  
**HELPER:** Earl Sexton  
**DRILL:** XL 750 Ingersol Rand

**NOTES:**

**WELL LOG**

**DATE:** START: 9/26/89  
**FINISH:** 10/5/89  
**LOGGED BY:** David B. Wright

**THICKNESS OF SOIL:** + weathered BDR 140'  
**DEPTH DRILLED IN ROCK:** 80'  
**TOTAL DEPTH OF WELL:** 220'

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0-1.0</td>
<td>Gravel pad</td>
<td></td>
</tr>
<tr>
<td>1.0-19.0</td>
<td>Clay, reddish-brown with chert fragments, gray to black, flinty</td>
<td></td>
</tr>
<tr>
<td>19.0-65.0</td>
<td>Clay, reddish-brown with chert fragments, grey to black flinty to oolitic</td>
<td></td>
</tr>
<tr>
<td>65.0-70.0</td>
<td>Clay, reddish-brown, chert, grey to black, flinty, 20-40%, minor H₂O at 67'</td>
<td></td>
</tr>
<tr>
<td>70.0-75.0</td>
<td>Clay, reddish-brown, chert, grey to black, flinty, 20-40%</td>
<td></td>
</tr>
<tr>
<td>75.0-80.0</td>
<td>Clay, reddish-brown, chert, light grey to black, flinty, 10-20%</td>
<td></td>
</tr>
<tr>
<td>80.0-85.0</td>
<td>Clay, reddish-brown, chert, light grey to dark grey, flinty 10-20%</td>
<td></td>
</tr>
<tr>
<td>85.0-90.0</td>
<td>Clay, reddish-brown, chert, light grey to black, oolitic to flinty 10-20%</td>
<td></td>
</tr>
<tr>
<td>90.0-95.0</td>
<td>Clay, reddish-brown, chert, light grey to black, oolitic to flinty 40-50%</td>
<td></td>
</tr>
<tr>
<td>95.0-100.0</td>
<td>Chert, light grey to black, oolitic to flinty, 60-70%, clay, reddish-brown</td>
<td></td>
</tr>
<tr>
<td>100.0-105.0</td>
<td>Clay, reddish-brown, chert, light grey to black, oolitic to flinty 30-40%</td>
<td></td>
</tr>
<tr>
<td>DEPTH (FEET) FROM</td>
<td>DEPTH (FEET) TO</td>
<td>SAMPLE (NUMBER &amp; INTERVAL)</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------------</td>
<td>-------------------------------------</td>
</tr>
<tr>
<td>105.0</td>
<td>110</td>
<td>Clay, reddish-brown, chert light gray to black, oolitic to flinty, 30 to 40%</td>
</tr>
<tr>
<td>110</td>
<td>115</td>
<td>Thought top of BDR was</td>
</tr>
<tr>
<td>115</td>
<td>120</td>
<td>Very fast drilling to 119', clay, reddish-brown, chert light to dark gray, minor olive gray, dolostone, drilled from 114' to 139' in 12 minutes, this zone looks like an erosional surface or sink feature</td>
</tr>
<tr>
<td>120</td>
<td>125</td>
<td>Clay, reddish-brown, chert light gray to dark gray, oolitic to flinty 20-30%</td>
</tr>
<tr>
<td>125</td>
<td>130</td>
<td>Clay, reddish-brown, chert light gray to black, oolitic to flinty 20-30%</td>
</tr>
<tr>
<td>130</td>
<td>135</td>
<td>Clay, reddish-brown, chert, light gray to black, flinty 20-30%</td>
</tr>
<tr>
<td>135</td>
<td>140</td>
<td>Top of rock Clay and chert to 140', dolostone at 140', olive gray, 140' chert, light to dark gray, oolitic to flinty</td>
</tr>
<tr>
<td>140</td>
<td>145</td>
<td>Dolostone, olive gray, chert gray to black, flinty</td>
</tr>
<tr>
<td>145</td>
<td>152</td>
<td>TD Pilot Dolostone, light olive gray, minor chert, translucent to black, flinty</td>
</tr>
<tr>
<td>152</td>
<td>155</td>
<td>Dolostone, light olive gray, chert, black, flinty and oolitic</td>
</tr>
<tr>
<td>155</td>
<td>160</td>
<td>Dolostone, light olive gray to olive black, minor calcite veinlets</td>
</tr>
<tr>
<td>160</td>
<td>165</td>
<td>Dolostone, olive black, sucrosic minor calcite veinlets</td>
</tr>
<tr>
<td>165</td>
<td>170</td>
<td>Dolostone, olive gray, fine grained, minor calcite veinlets</td>
</tr>
<tr>
<td>DEPTH (FEET)</td>
<td>SAMPLE (NUMBER &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
</tr>
<tr>
<td>-------------</td>
<td>----------------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>175–180</td>
<td></td>
<td>Dolostone, olive gray to dark olive gray, fine to medium grained, minor calcite veinlets</td>
</tr>
<tr>
<td>180–185</td>
<td></td>
<td>Dolostone, dark olive gray to olive gray, fine grained, minor calcite veinlets</td>
</tr>
<tr>
<td>185–190</td>
<td></td>
<td>Dolostone, brownish gray to olive gray, fine grained, minor calcite veinlet, very minor chert</td>
</tr>
<tr>
<td>190–195</td>
<td></td>
<td>Dolostone, olive gray to brownish gray, fine grained, minor calcite veinlets, minor chert</td>
</tr>
<tr>
<td>195–200</td>
<td></td>
<td>Dolostone, olive gray, fine grained, minor calcite veinlets</td>
</tr>
<tr>
<td>200–205</td>
<td></td>
<td>Dolostone, olive gray, fine grained, minor calcite veinlets very minor oolitic chert</td>
</tr>
<tr>
<td>205–210</td>
<td></td>
<td>Dolostone, olive gray, fine to medium grained, minor calcite veinlets</td>
</tr>
<tr>
<td>210–215</td>
<td></td>
<td>Dolostone, olive gray fine to medium grained, few fragments, vuggy with staining, close to water? calcite veinlets abundant</td>
</tr>
<tr>
<td>216–218</td>
<td></td>
<td>Dolostone, olive brown to gray, chert, flinty, very conduit muddy good H₂O, vugs and staining abundant</td>
</tr>
<tr>
<td>218–220</td>
<td></td>
<td>Dolostone, olive gray to dark olive gray, fine grained and fragments from cavity</td>
</tr>
<tr>
<td>220</td>
<td></td>
<td>Total Depth</td>
</tr>
</tbody>
</table>

PAGE 3 OF 3
**Y-12 WELL INSTALLATION PROGRAM**

| LOCATION: | Chestnut Ridge Sec. Pits |
| DRILLER: | Mark Baker |
| HELPER: | Earl Sexton |
| DRILL: | XL 750 Ingersol Rand |

**WELL LOG**

| DATE: START: | 10/9/89 |
| DATE: FINISH: | 10/18/89 |
| LOGGED BY: | David B. Wright |

**THICKNESS OF SOIL:** 107'

**DEPTH DRILLED IN ROCK:** 162'

**TOTAL DEPTH OF WELL:** 269'

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 to 2.0</td>
<td>Top Soil</td>
<td></td>
</tr>
<tr>
<td>2.0 to 44.0</td>
<td>Clay, slightly silty, reddish-brown, with weathered chert fragments (I had to leave site at 44.0')</td>
<td></td>
</tr>
<tr>
<td>44.0 to 92.0</td>
<td>Clay, reddish-brown, with chert fragments</td>
<td></td>
</tr>
<tr>
<td>92.0 to 97.0</td>
<td>Clay, reddish-brown, weathered dolostone, and chert fragments</td>
<td></td>
</tr>
<tr>
<td>97.0 to 107.0</td>
<td>Cavity, mud filled, H₂O at 97' = Chris Wallen</td>
<td></td>
</tr>
<tr>
<td>107.0 to 117.0</td>
<td>Dolostone, olive gray, fine to medium crystalline</td>
<td></td>
</tr>
<tr>
<td>117.0 to 120.0</td>
<td>Dolostone, olive gray, fine to medium crystalline</td>
<td></td>
</tr>
<tr>
<td>120.0 to 125.0</td>
<td>Dolostone, olive gray, fine to medium crystalline, some staining, minor chert, brown to black</td>
<td></td>
</tr>
<tr>
<td>125.0 to 130.0</td>
<td>Cavity at 125' dropped to 129.5' in approximately 75 sec. Dolostone, olive gray fine crystalline to medium crystalline</td>
<td></td>
</tr>
<tr>
<td>130.0 to 135.0</td>
<td>Dolostone, olive gray, fine to medium crystalline, minor chert, dark gray, some staining</td>
<td></td>
</tr>
<tr>
<td>135.0 to 140.0</td>
<td>Dolostone, olive black, fine to medium crystalline</td>
<td></td>
</tr>
<tr>
<td>140.0 to 145.0</td>
<td>Dolostone, olive gray to olive black, fine to medium crystalline, minor chert, gray to dark gray</td>
<td></td>
</tr>
<tr>
<td>145.0 to 150.0</td>
<td>Dolostone, olive black, fine to medium crystalline</td>
<td></td>
</tr>
<tr>
<td>150.0 to 155.0</td>
<td>Dolostone, olive gray to olive black, fine to medium crystalline, minor calcite veinlets</td>
<td></td>
</tr>
<tr>
<td>Depth (Feet)</td>
<td>Sample (Number &amp; Interval)</td>
<td>Soil/Bedrock Description</td>
</tr>
<tr>
<td>-------------</td>
<td>-----------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>155-160</td>
<td>Dolostone, olive gray to olive black, fine to medium crystalline, minor staining, chert fragments</td>
<td></td>
</tr>
<tr>
<td>160-165</td>
<td>Dolostone, olive gray, fine to medium crystalline, minor chert</td>
<td></td>
</tr>
<tr>
<td>165-170</td>
<td>Dolostone, olive gray, fine to medium crystalline</td>
<td></td>
</tr>
<tr>
<td>170-175</td>
<td>Dolostone, olive gray, fine to medium crystalline, minor staining at 172.5', minor calcite veinlets, very minor chert</td>
<td></td>
</tr>
<tr>
<td>175-180</td>
<td>Dolostone, dark olive gray to olive black, fine to medium crystalline, minor calcite veinlets</td>
<td></td>
</tr>
<tr>
<td>180-185</td>
<td>Dolostone, dark olive gray to olive black, fine to medium crystalline, minor calcite veinlets</td>
<td></td>
</tr>
<tr>
<td>185-190</td>
<td>Dolostone, dark olive gray, fine to medium crystalline, minor calcite veinlets</td>
<td></td>
</tr>
<tr>
<td>190-195</td>
<td>Dolostone, olive gray, finely crystalline</td>
<td></td>
</tr>
<tr>
<td>195-200</td>
<td>Dolostone, light olive gray to olive gray, fine to medium crystalline, minor shale, dark gray</td>
<td></td>
</tr>
<tr>
<td>200-205</td>
<td>Dolostone, dark olive gray, medium to coarsely crystalline</td>
<td></td>
</tr>
<tr>
<td>205-210</td>
<td>Dolostone, olive gray, fine to medium crystalline</td>
<td></td>
</tr>
<tr>
<td>210-215</td>
<td>Dolostone, olive gray, fine to medium crystalline, minor calcite veinlets</td>
<td></td>
</tr>
<tr>
<td>215-220</td>
<td>Dolostone, olive gray to light olive gray, fine to medium crystalline, more calcite veinlets, chert at 219.5'</td>
<td></td>
</tr>
<tr>
<td>220-225</td>
<td>Dolostone, olive gray, finely crystalline, minor chert</td>
<td></td>
</tr>
<tr>
<td>225-230</td>
<td>Dolostone, olive gray, fine to medium crystalline, minor shale, dark gray, very minor chert some staining</td>
<td></td>
</tr>
<tr>
<td>230-235</td>
<td>Dolostone, olive gray, fine to medium crystalline, staining more abundant getting close to H2O</td>
<td></td>
</tr>
<tr>
<td>235-240</td>
<td>Dolostone, olive gray to brownish gray, finely crystalline staining as the 230-235 interval</td>
<td></td>
</tr>
<tr>
<td>240-245</td>
<td>Dolostone, brownish-gray to olive gray, fine to medium crystalline, staining abundant</td>
<td></td>
</tr>
<tr>
<td>DEPTH (FEET)</td>
<td>SAMPLE (NUMBFR &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
</tr>
<tr>
<td>-------------</td>
<td>-----------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>250 to 255</td>
<td>Dolostone, olive gray to dark olive gray-black, fine to medium crystalline, staining very sporadic, very minor chert</td>
<td></td>
</tr>
<tr>
<td>255 to 260</td>
<td>Dolostone, olive gray to dark olive gray, fine to medium crystalline, minor staining</td>
<td></td>
</tr>
<tr>
<td>260 to 265</td>
<td>H₂O at 262', dolostone, olive gray, fine to medium crystalline, highly stained, minor chert</td>
<td></td>
</tr>
<tr>
<td>265 to TD @ 269</td>
<td>Dolostone, olive black, fine to medium crystalline</td>
<td></td>
</tr>
<tr>
<td>TD @ 269</td>
<td>Total Depth</td>
<td></td>
</tr>
</tbody>
</table>
Y-12 WELL INSTALLATION PROGRAM

**LOCATION:** CRSP  
**DRILLER:** J.C. Draper  
**HELPER:** Greg Shillings  
**DRILL:** DrillTech D40K  

**DATE:** START: 12/6/89  
**FINISH:** 12/15/89  
**LOGGED BY:** David B. Wright  

**NOTES:**  
- 15 1/2" Big Stab. & Bit 25.8'  
- 9 1/2 DT4B & Sub. 24.0'  

**THICKNESS OF SOIL:** 39'  
**DEPTH DRILLED IN ROCK:** 78.4'  
**TOTAL DEPTH OF WELL:** 117.4'  

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROM</td>
<td>TO</td>
<td>Gravel &amp; clay of road bed</td>
</tr>
<tr>
<td>0</td>
<td>2.0</td>
<td>Clay, slightly silty, brown, chert fragments, weathered</td>
</tr>
<tr>
<td>2.0</td>
<td>15.0</td>
<td>Clay, slightly silty, reddish-brown, weathered, chert fragments. Top of weathered rock at 39'</td>
</tr>
<tr>
<td>15.0</td>
<td>39.0</td>
<td>Clay, reddish-brown, dolostone, olive gray, chert, opaque to black</td>
</tr>
<tr>
<td>39.0</td>
<td>45.0</td>
<td>Dolostone, gray to olive gray, weathered, chert fragments</td>
</tr>
<tr>
<td>45.0</td>
<td>50.0</td>
<td>Dolostone, dark olive gray, coarsely crystalline, some sandy fragments, chert, light gray (minor)</td>
</tr>
<tr>
<td>50.0</td>
<td>55.0</td>
<td>Clay filled cavity no samples, drilled in 35 sec. J.C. (Driller) eased back into rock to keep hole as straight as possible</td>
</tr>
<tr>
<td>55.0</td>
<td>63.0</td>
<td>Dolostone, dark olive gray to olive gray, fine to medium crystalline, top of fresh rock 75'±</td>
</tr>
<tr>
<td>63.0</td>
<td>65.0</td>
<td>Oolitic interval; dolomite and silica replacement, dark olive gray, medium to coarsely crystalline</td>
</tr>
<tr>
<td>Depth (Feet)</td>
<td>Sample (Number &amp; Interval)</td>
<td>Soil/Bedrock Description</td>
</tr>
<tr>
<td>-------------</td>
<td>--------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>80.0 - 85.0</td>
<td></td>
<td>Dolostone, olive gray, fine to medium grained, minor oolitic chert, 3 fragments of calcite crystals</td>
</tr>
<tr>
<td>85.0 - 89.0 TD Pilot Hole</td>
<td>Dolostone, olive gray, fine to medium crystalline, minor chert, flinty, minor calcite veinlets in dolostone</td>
<td></td>
</tr>
<tr>
<td>89.0 - 97.0</td>
<td></td>
<td>Dolostone, dark olive gray, fine to medium crystalline, minor calcite veinlets, minor chert, flinty</td>
</tr>
<tr>
<td>97.0 - 102</td>
<td></td>
<td>Dolostone, olive gray, fine to medium crystalline some staining observed, could be within 20' of H2O</td>
</tr>
<tr>
<td>102 - 107</td>
<td></td>
<td>Dolostone, dark olive gray, medium crystalline, staining still observed</td>
</tr>
<tr>
<td>107 - 112</td>
<td></td>
<td>Dolostone, dark olive gray, medium to coarsely crystalline slightly heavier staining</td>
</tr>
<tr>
<td>112 - 117 TD of Hole</td>
<td>Dolostone, olive gray, fine to medium crystalline, dusting almost quit at this interval staining still evident, H2O at 112' - 113'</td>
<td></td>
</tr>
<tr>
<td>DEPTH (FEET)</td>
<td>SAMPLE (NUMBER &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
</tr>
<tr>
<td>-------------</td>
<td>-----------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>0 to 5</td>
<td></td>
<td>Clay, red-brown with weathered chert fragments</td>
</tr>
<tr>
<td>5 to 10</td>
<td></td>
<td>Clay, red-brown with weathered chert fragments</td>
</tr>
<tr>
<td>10 to 15</td>
<td></td>
<td>Clay, red-brown with weathered chert fragments</td>
</tr>
<tr>
<td>15 to 20</td>
<td></td>
<td>Clay, red-brown with weathered chert fragments</td>
</tr>
<tr>
<td>20 to 25</td>
<td></td>
<td>Clay, brown with weathered chert and dolomite fragments</td>
</tr>
<tr>
<td>25 to 30</td>
<td></td>
<td>Clay, red-brown with weathered chert and dolomite</td>
</tr>
<tr>
<td>30 to 35</td>
<td></td>
<td>Limestone, medium to dark gray trace green tint, dolomitic, abundant clay filled cavities</td>
</tr>
<tr>
<td>35 to 40</td>
<td></td>
<td>Clay, red-brown with weathered limestone fragments</td>
</tr>
<tr>
<td>40 to 45</td>
<td></td>
<td>Clay, red-brown with weathered limestone fragments</td>
</tr>
<tr>
<td>45 to 50</td>
<td></td>
<td>Dolostone, dark brown with green tint, highly stained with abundant red clay</td>
</tr>
<tr>
<td>50 to 55</td>
<td></td>
<td>Dolostone, dark brown with green tint, highly stained with abundant red clay</td>
</tr>
<tr>
<td>55 to 60</td>
<td></td>
<td>Dolostone, dark brown to dark gray, highly weathered, abundant clay filled cavities</td>
</tr>
<tr>
<td>60 to 65</td>
<td></td>
<td>Dolostone, dark brown to dark gray stained and weathered to 63.8 feet. TOP OF FRESH ROCK AT 63.8 FEET</td>
</tr>
<tr>
<td>65 to 70</td>
<td></td>
<td>Dolostone, dark brown to gray slight olive green tint, scattered calcite crystals</td>
</tr>
<tr>
<td>DEPTH (FEET)</td>
<td>SAMPLE (NUMBER &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
</tr>
<tr>
<td>-------------</td>
<td>-----------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>70 - 76.6</td>
<td>Dolostone, olive green to dark brown, occasional calcite crystals (fine grained). 76.6 FEET TD OF PILOT HOLE</td>
<td></td>
</tr>
<tr>
<td>76.6 - 80</td>
<td>Dolostone, dark brown, occasional calcite crystal, fine to medium grained, scattered fractures filled with siliceous material</td>
<td></td>
</tr>
<tr>
<td>80 - 85</td>
<td>Dolostone, dark brown, fine to medium grained, trace staining occasional fracture filled with siliceous material</td>
<td></td>
</tr>
<tr>
<td>85 - 90</td>
<td>Dolostone, medium to light brown tan in part abundant fractures, filled with siliceous material, fine to medium grained, abundant staining</td>
<td></td>
</tr>
<tr>
<td>90 - 95</td>
<td>Dolostone, light gray to light tan, white in part, fine grained, abundant orange staining</td>
<td></td>
</tr>
<tr>
<td>95 - 98</td>
<td>Dolostone, light to medium gray, tan in part, fine grained, abundant staining, occasional quartz crystals</td>
<td></td>
</tr>
<tr>
<td>98 - 100</td>
<td>Dolostone, dark to medium brown, fine to medium grained, trace of quartz, occasional staining</td>
<td></td>
</tr>
<tr>
<td>100 - 105</td>
<td>Dolostone, medium to dark gray, mottled, brown tint in part abundant chert, no staining</td>
<td></td>
</tr>
<tr>
<td>105 - 110</td>
<td>Dolostone, medium brown-gray, fine grained, very slightly calcareous, scattered staining</td>
<td></td>
</tr>
<tr>
<td>110 - 115</td>
<td>Dolostone, medium brown-gray, fine grained, calcareous, trace staining</td>
<td></td>
</tr>
<tr>
<td>115 - 120</td>
<td>Dolostone, very dark brown, very fine grained, trace staining, occasional quartz, filled fracture</td>
<td></td>
</tr>
<tr>
<td>121.6</td>
<td>Total Depth</td>
<td></td>
</tr>
</tbody>
</table>
Y-12 WELL INSTALLATION PROGRAM

LOCATION: Chestnut Ridge
DRILLER: Mark Baker
HELPER: Earl Sexton
DRILL: 750 XL Ingersol Rand

WELL LOG

DATE: START: 10/23/89
FINISH: 11/1/89
LOGGED BY: David B. Wright

NOTES:

THICKNESS OF SOIL: 78', 3' Cavity after drilling 2' of rock

DEPTH DRILLED IN ROCK:

TOTAL DEPTH OF WELL:

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROM</td>
<td>TO</td>
<td></td>
</tr>
<tr>
<td>0.0</td>
<td>0.5</td>
<td>Top soil</td>
</tr>
<tr>
<td>0.5</td>
<td>4.0</td>
<td>Clay, reddish-brown, slight silty</td>
</tr>
<tr>
<td>4.0</td>
<td>9.0</td>
<td>Clay, reddish-brown, chert, light gray, oolitic</td>
</tr>
<tr>
<td>9.0</td>
<td>78.0</td>
<td>Clay, reddish-brown, chert fragments</td>
</tr>
<tr>
<td>78.0</td>
<td>81.0</td>
<td>Clay, reddish-brown, dolostone, gray, chert, black</td>
</tr>
<tr>
<td>81.0</td>
<td>84.0</td>
<td>Cavity, clay filled, with minor dolostone and chert</td>
</tr>
<tr>
<td>84.0</td>
<td>90.0</td>
<td>Dolostone, gray to olive gray, magenta spots, chert, black flinty, minor shale, brown stained.</td>
</tr>
<tr>
<td>90.0</td>
<td>95.0</td>
<td>Dolostone, olive gray, fine to medium crystalline, minor chert and shale</td>
</tr>
<tr>
<td>95.0</td>
<td>100.0</td>
<td>Dolostone, olive gray, fine to medium crystalline, minor stained; chert oolitic and flinty; minor brown iron stained shale</td>
</tr>
<tr>
<td>100.0</td>
<td>104.0</td>
<td>Dolostone, olive gray, fine to medium crystalline, minor chert and shale</td>
</tr>
<tr>
<td>104.0</td>
<td>110.0</td>
<td>Cavity (fast drilling)</td>
</tr>
<tr>
<td>110.0</td>
<td>115.0</td>
<td>Cavity few samples, very ugly and stained</td>
</tr>
<tr>
<td>115.0</td>
<td>119.5</td>
<td>Cavity no samples</td>
</tr>
<tr>
<td>119.5</td>
<td>125.0</td>
<td>Dolostone, olive gray, fine to medium crystalline, chert white to gray, vugular chert from above</td>
</tr>
<tr>
<td>DEPTH (FEET)</td>
<td>SAMPLE (NUMBER &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>125 to 130</td>
<td>Dolostone, olive gray, fine to medium crystalline; abundant chert, flinty to oolitic</td>
<td></td>
</tr>
<tr>
<td>130 to 135</td>
<td>Dolostone, olive gray, fine to medium crystalline, minor chert and shale</td>
<td></td>
</tr>
<tr>
<td>135 to 141</td>
<td>TD Pilot, Started soap at 138', poor returns, Dolostone, olive gray, fine to medium crystalline; shale iron stained</td>
<td></td>
</tr>
<tr>
<td>141 to 150</td>
<td>Poor returns</td>
<td></td>
</tr>
<tr>
<td>150 to 155</td>
<td>Dolostone, olive gray, fine to medium crystalline; chert dark brown to white, oolitic to flint; scattered cement</td>
<td></td>
</tr>
<tr>
<td>155 to 160</td>
<td>Dolostone, olive gray, fine to medium crystalline, minor stains; chert</td>
<td></td>
</tr>
<tr>
<td>160 to 165</td>
<td>Dolostone, olive gray, fine to medium crystalline, minor stains; chert, flinty to oolitic</td>
<td></td>
</tr>
<tr>
<td>165 to 170</td>
<td>Dolostone, olive gray, fine to medium crystalline, minor stains, chert, dark brown to white, flinty to oolitic</td>
<td></td>
</tr>
<tr>
<td>170 to 175</td>
<td>Dolostone, olive gray, fine to medium crystalline, very minor stains; chert flinty, scattered cement fragments</td>
<td></td>
</tr>
<tr>
<td>175 to 180</td>
<td>Damp @ 178', Dolostone, dark olive gray, fine to medium crystalline; very minor chert</td>
<td></td>
</tr>
<tr>
<td>180 to 185</td>
<td>Dolostone, dark olive gray, fine to medium crystalline, very minor chert</td>
<td></td>
</tr>
<tr>
<td>185 to 190</td>
<td>Dolostone, dark olive gray, fine to medium crystalline; very minor chert</td>
<td></td>
</tr>
<tr>
<td>190 to 195</td>
<td>Damp (cutting dust): Dolostone, olive gray, fine to medium crystalline chert</td>
<td></td>
</tr>
<tr>
<td>195 to 200</td>
<td>Damp (cut dust) Dolostone, olive gray, fine to medium crystalline, chert</td>
<td></td>
</tr>
<tr>
<td>200 to 205</td>
<td>Damp (dust cut) Dolostone, olive gray, fine to medium crystalline, abundant chert</td>
<td></td>
</tr>
<tr>
<td>205 to 210</td>
<td>Damp (dust cut) dolostone, olive gray, fine to medium crystalline; abundant chert, flinty to oolitic</td>
<td></td>
</tr>
<tr>
<td>DEPTH (FEET)</td>
<td>SAMPLE (NUMBER &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
</tr>
<tr>
<td>-------------</td>
<td>----------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>210-215</td>
<td></td>
<td>Damp (dust cut) dolostone, olive gray, fine to medium crystalline; abundant, chert, flinty. Shut down @ 215' for weekend</td>
</tr>
<tr>
<td>215-220</td>
<td></td>
<td>Back in hole after weekend, had approximately 20' water</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Photovac 7-9 ppm RAD, 0.1 MR Water coming from 178' zone, Poor returns</td>
</tr>
<tr>
<td>220-225</td>
<td></td>
<td>Dolostone, olive gray, fine to medium crystalline, staining chert, poor returns</td>
</tr>
<tr>
<td>225-230</td>
<td></td>
<td>Dolostone, olive gray, fine to medium crystalline, minor staining; chert, poor returns; start water @ 225'</td>
</tr>
<tr>
<td>230-235</td>
<td>TD 10 5/8&quot; Hole</td>
<td>Dolostone, olive gray, fine to medium crystalline, stains, chert, flinty to banded</td>
</tr>
<tr>
<td>235-240</td>
<td></td>
<td>Dolostone, olive gray, fine to medium crystalline, stains, chert, flinty; minor cement</td>
</tr>
<tr>
<td>240-245</td>
<td></td>
<td>Dolostone, olive gray, fine to medium crystalline, highly stained, ( H_2O ) @ 244' very minor chert</td>
</tr>
<tr>
<td>245-250</td>
<td></td>
<td>Dolostone, olive gray to brownish gray, fine to medium crystalline, highly stained, water evident; minor chert</td>
</tr>
<tr>
<td>250-254</td>
<td>TD @ 254'</td>
<td>Dolostone, olive gray to brownish-gray, fine to medium crystalline, highly stained, ( H_2O ) evident, minor chert</td>
</tr>
</tbody>
</table>
**Y-12 WELL INSTALLATION PROGRAM**

**LOCATION:** S-3 Waste Management Area

**DRILLER:** Mark Baker

**HELPER:** Earl Sexton

**DRILL:** XL 750

**NOTES:**

**THICKNESS OF SOIL:** 15.0'

**DEPTH DRILLED IN ROCK:** 27.0'

**TOTAL DEPTH OF WELL:** 42.0'

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 - 0.6</td>
<td></td>
<td>Gravel pad</td>
</tr>
<tr>
<td>0.6 - 2.0</td>
<td></td>
<td>Clay, silty, brown with roots</td>
</tr>
<tr>
<td>2.0 - 5.0</td>
<td></td>
<td>Clay, silty, brown slightly moist</td>
</tr>
<tr>
<td>5.0 - 10.0</td>
<td></td>
<td>Clay, silty, brown</td>
</tr>
<tr>
<td>10.0 - 15.0</td>
<td></td>
<td>Clay, silty, brown with shale fragments, olive to brown top of weathered rock at 15'</td>
</tr>
<tr>
<td>15.0 - 17.0</td>
<td></td>
<td>Shale, brown, stained, very minor limestone fragments, gray, medium crystalline</td>
</tr>
<tr>
<td>17.0 - 20.0</td>
<td></td>
<td>Shale, brown and olive gray moist to very moist</td>
</tr>
<tr>
<td>20.0 - 25.0</td>
<td></td>
<td>Shale, brown and olive gray moist to very moist with staining</td>
</tr>
<tr>
<td>25.0 - 30.0</td>
<td></td>
<td>Shale, olive gray and brown, stained; siltstone, brown, grading to a gray shale</td>
</tr>
<tr>
<td>30.0 - 42.0</td>
<td></td>
<td>Shale, greenish-gray, brown; siltstone, brown, blocky, water at 34'</td>
</tr>
<tr>
<td>42.0</td>
<td></td>
<td>Total depth</td>
</tr>
</tbody>
</table>

**DATE:** 7/5/89  
**START:** 7/5/89  
**FINISH:** 7/8/89  
**LOGGED BY:** David B. Wright

---

**NOTES:**

- Thickness of soil: 15.0'
- Depth drilled in rock: 27.0'
- Total depth of well: 42.0'

---

**Y-12 WELL INSTALLATION PROGRAM**

**LOCATION:** S-3 Waste Management Area

**DRILLER:** Mark Baker

**HELPER:** Earl Sexton

**DRILL:** XL 750

**NOTES:**

**THICKNESS OF SOIL:** 15.0'

**DEPTH DRILLED IN ROCK:** 27.0'

**TOTAL DEPTH OF WELL:** 42.0'

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<td>Gravel pad</td>
</tr>
<tr>
<td>0.6 - 2.0</td>
<td></td>
<td>Clay, silty, brown with roots</td>
</tr>
<tr>
<td>2.0 - 5.0</td>
<td></td>
<td>Clay, silty, brown slightly moist</td>
</tr>
<tr>
<td>5.0 - 10.0</td>
<td></td>
<td>Clay, silty, brown</td>
</tr>
<tr>
<td>10.0 - 15.0</td>
<td></td>
<td>Clay, silty, brown with shale fragments, olive to brown top of weathered rock at 15'</td>
</tr>
<tr>
<td>15.0 - 17.0</td>
<td></td>
<td>Shale, brown, stained, very minor limestone fragments, gray, medium crystalline</td>
</tr>
<tr>
<td>17.0 - 20.0</td>
<td></td>
<td>Shale, brown and olive gray moist to very moist</td>
</tr>
<tr>
<td>20.0 - 25.0</td>
<td></td>
<td>Shale, brown and olive gray moist to very moist with staining</td>
</tr>
<tr>
<td>25.0 - 30.0</td>
<td></td>
<td>Shale, olive gray and brown, stained; siltstone, brown, grading to a gray shale</td>
</tr>
<tr>
<td>30.0 - 42.0</td>
<td></td>
<td>Shale, greenish-gray, brown; siltstone, brown, blocky, water at 34'</td>
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<tr>
<td>42.0</td>
<td></td>
<td>Total depth</td>
</tr>
</tbody>
</table>

**DATE:** 7/5/89  
**START:** 7/5/89  
**FINISH:** 7/8/89  
**LOGGED BY:** David B. Wright

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**NOTES:**

- Thickness of soil: 15.0'
- Depth drilled in rock: 27.0'
- Total depth of well: 42.0'

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**Y-12 WELL INSTALLATION PROGRAM**

**LOCATION:** S-3 Waste Management Area

**DRILLER:** Mark Baker

**HELPER:** Earl Sexton

**DRILL:** XL 750

**NOTES:**

**THICKNESS OF SOIL:** 15.0'

**DEPTH DRILLED IN ROCK:** 27.0'

**TOTAL DEPTH OF WELL:** 42.0'

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<td></td>
<td>Gravel pad</td>
</tr>
<tr>
<td>0.6 - 2.0</td>
<td></td>
<td>Clay, silty, brown with roots</td>
</tr>
<tr>
<td>2.0 - 5.0</td>
<td></td>
<td>Clay, silty, brown slightly moist</td>
</tr>
<tr>
<td>5.0 - 10.0</td>
<td></td>
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<td>10.0 - 15.0</td>
<td></td>
<td>Clay, silty, brown with shale fragments, olive to brown top of weathered rock at 15'</td>
</tr>
<tr>
<td>15.0 - 17.0</td>
<td></td>
<td>Shale, brown, stained, very minor limestone fragments, gray, medium crystalline</td>
</tr>
<tr>
<td>17.0 - 20.0</td>
<td></td>
<td>Shale, brown and olive gray moist to very moist</td>
</tr>
<tr>
<td>20.0 - 25.0</td>
<td></td>
<td>Shale, brown and olive gray moist to very moist with staining</td>
</tr>
<tr>
<td>25.0 - 30.0</td>
<td></td>
<td>Shale, olive gray and brown, stained; siltstone, brown, grading to a gray shale</td>
</tr>
<tr>
<td>30.0 - 42.0</td>
<td></td>
<td>Shale, greenish-gray, brown; siltstone, brown, blocky, water at 34'</td>
</tr>
<tr>
<td>42.0</td>
<td></td>
<td>Total depth</td>
</tr>
</tbody>
</table>

**DATE:** 7/5/89  
**START:** 7/5/89  
**FINISH:** 7/8/89  
**LOGGED BY:** David B. Wright

---

**NOTES:**

- Thickness of soil: 15.0'
- Depth drilled in rock: 27.0'
- Total depth of well: 42.0'

---
<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROM 0.0</td>
<td>TO 0.5</td>
<td>Gravel pad</td>
</tr>
<tr>
<td>FROM 0.5</td>
<td>TO 0.9</td>
<td>Topsoil</td>
</tr>
<tr>
<td>FROM 0.9</td>
<td>TO 4.5</td>
<td>Clay, silty, dark yellowish-orange, medium dense, damp</td>
</tr>
<tr>
<td>FROM 4.5</td>
<td>TO 5.4</td>
<td>Clay, silty, dusky yellow, medium dense, w/streaks, dark yellowish-orange</td>
</tr>
<tr>
<td>FROM 5.4</td>
<td>TO 7.0</td>
<td>Clay, light olive gray, dense, dry</td>
</tr>
<tr>
<td>FROM 7.0</td>
<td>TO 8.8</td>
<td>Shale, light olive gray, weathered</td>
</tr>
<tr>
<td>FROM 8.8</td>
<td>TO 10.0</td>
<td>Shale, dark yellowish-orange, iron stained, weathered</td>
</tr>
<tr>
<td>FROM 10.0</td>
<td>TO 11.5</td>
<td>Shale, dark yellowish-brown, soft, damp, w/ light clay</td>
</tr>
<tr>
<td>FROM 11.5</td>
<td>TO 11.8</td>
<td>Siltstone, dusky yellow, w/shale, dark yellowish-brown</td>
</tr>
<tr>
<td>FROM 11.8</td>
<td>TO 12.5</td>
<td>Shale, moderate olive brown, crumble, dirty</td>
</tr>
<tr>
<td>FROM 12.5</td>
<td>TO 18.3</td>
<td>Shale, pale olive, moderate olive brown, iron stains</td>
</tr>
<tr>
<td>FROM 18.3</td>
<td>TO 19.5</td>
<td>Shale, moderate olive brown, iron stains, highly weathered very damp</td>
</tr>
<tr>
<td>FROM 19.5</td>
<td>TO 20.4</td>
<td>Shale, moderate olive brown, iron stained, weathered, wet</td>
</tr>
<tr>
<td>FROM 20.4</td>
<td>TO 23.0</td>
<td>Shale, light olive brown, thinly bedded, dry</td>
</tr>
<tr>
<td>FROM 23.0</td>
<td>TO 24.2</td>
<td>Shale, moderate olive brown/medium gray, w/clay, dark yellowish-brown, wet</td>
</tr>
<tr>
<td>FROM 24.2</td>
<td>TO 25.3</td>
<td>Shale, medium bluish gray, thinly, bedded, wet</td>
</tr>
<tr>
<td>FROM 25.3</td>
<td>TO 30.0</td>
<td>Shale, medium dark gray, thinly bedded w/scattered</td>
</tr>
</tbody>
</table>

**NOTES:**

**DATE:** START: 7/10/89
FINISH: 7/19/89

**LOGGED BY:** Chris Wallen
<table>
<thead>
<tr>
<th>Depth (Feet)</th>
<th>Sample (Number &amp; Interval)</th>
<th>Soil/Bedrock Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>limestone, medium dark gray, w/little calcite, very light gray, scattered siltstone, light olive brown, iron stained.</td>
</tr>
<tr>
<td>30.0-31.5</td>
<td>Shale, limy, medium dark gray, w/limestone, medium dark gray, sugary, w/calcite, very light gray, shale.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>moderate olive brown/light olive brown, iron stained.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>siltstone in thin beds, minor siltstone.</td>
<td></td>
</tr>
<tr>
<td>31.5-34.0</td>
<td>Shale, medium dark gray/dark gray, thinly bedded, friable, w/calcite, medium dark gray, sugary, w/calcite streaks, very light gray, shale, light olive brown, thin beds, iron stained.</td>
<td></td>
</tr>
<tr>
<td>34.0-37.5</td>
<td>Limestone, medium dark gray, massive, w/streaks calcite, very light gray to pinkish gray, w/siltstone, moderate olive brown, light olive brown often iron stained, thin beds, shale, limy, dark gray.</td>
<td></td>
</tr>
<tr>
<td>37.5-50.8</td>
<td>Shale, dark greenish-gray/medium bluish gray/brownish gray, siltstone, (minor) light olive gray, iron stained.</td>
<td></td>
</tr>
<tr>
<td>50.8-52.5</td>
<td>Limestone, olive gray, sugary w/calcite minor, bluish white, shale, greenish black, thinly bedded, friable.</td>
<td></td>
</tr>
<tr>
<td>52.5-53.5</td>
<td>Shale, greenish black/medium bluish gray, thinly bedded, scattered limestone, olive gray, w/minor calcite.</td>
<td></td>
</tr>
<tr>
<td>53.5-57.0</td>
<td>Shale, greenish black, thinly bedded.</td>
<td></td>
</tr>
<tr>
<td>57.0-59.5</td>
<td>Shale, greenish black, thinly bedded, w/scattered limestone, olive gray, sugary.</td>
<td></td>
</tr>
<tr>
<td>59.5-61.4</td>
<td>Limestone, olive gray, coarse grained, sugary, w/scattered shale, greenish black/dark gray.</td>
<td></td>
</tr>
<tr>
<td>61.4-67.0</td>
<td>Shale, greenish black, w/limestone scattered, olive gray greenish gray.</td>
<td></td>
</tr>
<tr>
<td>67.0-73.0</td>
<td>Shale, greenish black, thin to blocky, w/limestone scattered, olive gray, w/calcite 15%.</td>
<td></td>
</tr>
<tr>
<td>73.0-75.5</td>
<td>Limestone, olive gray/dark greenish gray, sugary, w/shale greenish black, thinly bedded, calcite, minor bluish-white pinkish-gray.</td>
<td></td>
</tr>
<tr>
<td>DEPTH (FEET)</td>
<td>SAMPLE (NUMBER &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>73.0 - 75.5</td>
<td>Limestone, olive gray/dark greenish gray, sugary, w/shale</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Greenish black, thinly bedded, calcite, minor bluish-white</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pinkish-gray</td>
<td></td>
</tr>
<tr>
<td>75.5 - 77.0</td>
<td>Shale, limy, greenish black, thinly bedded, reacts</td>
<td>Slightly with HCl</td>
</tr>
<tr>
<td>77.0 - 84.0</td>
<td>Shale, greenish black, thinly bedded, w/limestone, olive gray</td>
<td>Calcite, minor white/very light gray</td>
</tr>
<tr>
<td>84.0 - 86.0</td>
<td>Shale, greenish black, fine beds, w/limestone, olive gray, sugary, significant calcite, bluish-white, pinkish-gray</td>
<td></td>
</tr>
<tr>
<td>86.0 - 87.4</td>
<td>Limestone, olive gray, sugary, w/calcite, scattered shale, greenish black, thinly bedded,</td>
<td></td>
</tr>
<tr>
<td>87.4 - 90.2</td>
<td>Shale, greenish black, thinly bedded, friable, w/limestone, minor, olive gray, sugary texture, calcite, trace, bluish-white</td>
<td></td>
</tr>
<tr>
<td>90.2</td>
<td>Total depth</td>
<td></td>
</tr>
<tr>
<td>DEPTH (FEET)</td>
<td>SAMPLE (NUMBER &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
</tr>
<tr>
<td>-------------</td>
<td>-----------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>0 - 4.8</td>
<td></td>
<td>Random fill-soil, bricks, boulders, metal, etc.</td>
</tr>
<tr>
<td>4.8 - 13.5</td>
<td></td>
<td>Mixture of random fill and clay-brown, silty with limestone fragments</td>
</tr>
<tr>
<td>13.5 - 15.0</td>
<td></td>
<td>Clay-brown, silty with roots occasional gray limestone fragments. Water at 10.7 ft. in hole after hole had been undisturbed for 2 hours.</td>
</tr>
<tr>
<td>15.0 - 26.7</td>
<td></td>
<td>Shale, maroon to gray-green, very silty, non calcareous, highly weathered, very soft, highly stained</td>
</tr>
<tr>
<td>26.7 - 30.0</td>
<td></td>
<td>Limestone, dark gray, mottled, oolitic, with calcite filled fractures, very rough drilling, highly stained in part. Limestone appears to be interbedded with shale, evidence of clay filled cavities very slight.</td>
</tr>
<tr>
<td>30.0 - 35.0</td>
<td></td>
<td>Limestone, dark gray, medium grained, very silty, with abundant calcite filled fractures, clay filled cavity 33.5 to 34.5', highly stained in part.</td>
</tr>
<tr>
<td>35.0 - 40.0</td>
<td></td>
<td>Limestone, dark gray, mottled, oolitic with abundant calcite filled fractures, abundant staining, clay filled cavity from 36.0 to 38.5'</td>
</tr>
<tr>
<td>40.0 - 45.0</td>
<td></td>
<td>Limestone, dark gray, argillaceous, highly oolitic in part. Occasional calcite filled fracture, medium to coarse grained</td>
</tr>
<tr>
<td>DEPTH (FEET)</td>
<td>SAMPLE NUMBER &amp; INTERVAL</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>45.0 - 50.0</td>
<td></td>
<td>Shale, medium gray to green, maroon, very silty, occasional trace of oolitic limestone with calcite filled fractures</td>
</tr>
<tr>
<td>50.0 - 55.0</td>
<td></td>
<td>Shale, maroon to medium gray-green, very silty grading to siltstone, occasional trace bright red siltstone, oolitic limestone, dark gray and mottled white from 51.0 to 53.0 ft.</td>
</tr>
<tr>
<td>55.0 - 60.0</td>
<td></td>
<td>Shale, maroon to gray-green, very silty grading to maroon siltstone</td>
</tr>
<tr>
<td>60.0 - 65.0</td>
<td></td>
<td>Shale, maroon to gray-green, very silty grading to dark maroon siltstone, occasional trace of orange-brown siltstone Abundant staining between shale layers.</td>
</tr>
<tr>
<td>65.0 - 70.0</td>
<td></td>
<td>Limestone, dark gray, mottled, oolitic, occasional fossil fragment, medium to very coarse grained, argillaceous in part, occasional calcite filled fracture</td>
</tr>
<tr>
<td>70.0 - 75.0</td>
<td></td>
<td>Shale, medium gray to dark green, maroon in part, occasional thin limestone bed, scattered stain</td>
</tr>
<tr>
<td>75.0 - 83.5</td>
<td></td>
<td>Shale, dark gray-green in part, calcareous grading into argillaceous limestone, no apparent cavities</td>
</tr>
<tr>
<td>DEPTH (FEET)</td>
<td>SAMPLE (NUMBER &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
</tr>
<tr>
<td>-------------</td>
<td>----------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>83.5 - 95</td>
<td>Shale, green to maroon brown, limestone, gray, medium crystalline with some individual crystals</td>
<td></td>
</tr>
<tr>
<td>95 - 105</td>
<td>Shale, green to maroon, minor limestone, gray, oolitic to coarsely crystalline</td>
<td></td>
</tr>
<tr>
<td>105 - 115</td>
<td>Shale, green to maroon, minor limestone, gray, medium crystalline</td>
<td></td>
</tr>
<tr>
<td>115 - 125</td>
<td>Shale, green to maroon brown, minor limestone, gray, medium crystalline</td>
<td></td>
</tr>
<tr>
<td>125 - 135</td>
<td>Limestone, gray, medium crystalline, individual crystals, minor fracturing, calcareous siltstone, gray-green</td>
<td></td>
</tr>
<tr>
<td>135 - 145</td>
<td>Calcareous siltstone, gray-green, limestone, gray, medium crystalline</td>
<td></td>
</tr>
<tr>
<td>145 - 155</td>
<td>Calcareous siltstone, gray-green to brown, limestone, gray, medium crystalline with filled fractures</td>
<td></td>
</tr>
<tr>
<td>155 - 165</td>
<td>Calcareous siltstone gray-green, shale, green to brown, minor limestone, gray-brown, oolitic to medium crystalline</td>
<td></td>
</tr>
<tr>
<td>165 - 175</td>
<td>Calcareous siltstone and shale, gray-green, limestone, gray brown, medium crystalline</td>
<td></td>
</tr>
<tr>
<td>175 - 185</td>
<td>Calcareous siltstone and shale, gray-green to brown, minor limestone, gray-brown, medium crystalline</td>
<td></td>
</tr>
<tr>
<td>185 - 195</td>
<td>Calcareous siltstone, gray-green, limestone, gray, medium crystalline, filled fractures</td>
<td></td>
</tr>
<tr>
<td>195 - 205</td>
<td>Shale, gray-green, limestone, gray-brown, medium crystalline</td>
<td></td>
</tr>
<tr>
<td>205 - 215</td>
<td>Calcareous siltstone and shale, gray-green, limestone, gray, medium crystalline, filled fractures</td>
<td></td>
</tr>
<tr>
<td>215 - 222.5</td>
<td>Calcareous siltstone and shale, gray-green, limestone, gray-brown, coarsely crystalline</td>
<td></td>
</tr>
</tbody>
</table>

Hole

5 10 5/8"
## WELL LOG

**LOCATION:** Near Portal 17 S-3 Ponds  
**DRILLER:** Steve Brown  
**HELPER:** Greg Skillings/Dan Scott  
**DRILL:** DrillTech D40K  
**DATE:** START: 1-25-90  
FINISH: 2-13-90  
**LOGGED BY:** Timothy A. Lee  

### THICKNESS OF SOIL:

### DEPTH DRILLED IN ROCK:

### TOTAL DEPTH OF WELL:

<table>
<thead>
<tr>
<th>Depth (Feet)</th>
<th>Sample (Number &amp; Interval)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>224-225</td>
<td></td>
<td>Shale, silty, gravish-green, friable; scattered fragments of limestone, light olive gray, medium crystalline.</td>
</tr>
<tr>
<td>225-230</td>
<td></td>
<td>Limestone, olive gray, oolitic, medium crystalline; shale, gravish green, friable.</td>
</tr>
<tr>
<td>230-235</td>
<td></td>
<td>Limestone, olive gray, oolitic, medium crystalline; shale, gravish green, friable.</td>
</tr>
<tr>
<td>235-240</td>
<td></td>
<td>Limestone, olive gray, oolitic and fossiliferous, medium crystalline; shale, gravish green, friable.</td>
</tr>
<tr>
<td>240-245</td>
<td>TD of 6½&quot;</td>
<td>Shale, olive gray; shale, gravish green; scattered limestone, olive gray, oolitic and fossiliferous medium crystalline.</td>
</tr>
</tbody>
</table>

Hole
**ERCE Environmental and Energy Services Co.**

**WELL NO. SW-616**

**LOCATION:** S-3 Ponds  
**DRILLER:** Steve Brown  
**HELPERS:** Greg Shillings  
**DRILL:** DrillTech D40K  
**DATE:** START: 2/16/90  
**FINISH:** 3/10/90  
**LOGGED BY:** David Wright

**NOTES:**  
9 1/2" bit + stab. 24.1' Table at 3.5'
10 5/8" bit + stab. 27.3' Table at 3.6'

**THICKNESS OF SOIL:** + Fill 42'

**DEPTH DRILLED IN ROCK:** 227'

**TOTAL DEPTH OF WELL:** 269'

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROM TO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 3</td>
<td>Fill material; gravel, silty clay and debris, hit limestone boulder could not auger any deeper</td>
<td></td>
</tr>
<tr>
<td>3 10</td>
<td>Silty clay, brown, weathered limestone, gray-brown, still fill material</td>
<td></td>
</tr>
<tr>
<td>10 16.5</td>
<td>Head dropped quickly at 11.7' also minor moisture, silty</td>
<td></td>
</tr>
<tr>
<td>16.5 20</td>
<td>Clay, slightly silty, reddish-brown, good soil</td>
<td></td>
</tr>
<tr>
<td>20 30</td>
<td>Clay, slightly silty, reddish-brown, minor shale fragments green</td>
<td></td>
</tr>
<tr>
<td>30 35</td>
<td>Clay, reddish-brown, shale, green, minor limestone fragments, gray</td>
<td></td>
</tr>
<tr>
<td>35 40</td>
<td>Shale, green-gray, weathered, limestone, gray, fine to medium crystalline</td>
<td></td>
</tr>
<tr>
<td>40 45.6 TD Pilot Hole</td>
<td>Limestone, gray, medium crystalline, shale, green top of unweathered rock at 42'</td>
<td></td>
</tr>
<tr>
<td>45.6 58</td>
<td>Limestone, gray, fine to medium crystalline</td>
<td></td>
</tr>
<tr>
<td>58 68</td>
<td>Limestone, gray, fine to medium crystalline, shale, gray-green, fissile</td>
<td></td>
</tr>
<tr>
<td>68 78</td>
<td>Ratty drilling at 69-70', limestone, gray, fine to medium crystalline, highly stained, H₂O at 69-70' interval; limestone became oolitic at 75-78'</td>
<td></td>
</tr>
<tr>
<td>DEPTH (FEET)</td>
<td>SAMPLE (NUMBER &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
</tr>
<tr>
<td>-------------</td>
<td>-----------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>78-88</td>
<td></td>
<td>Shale, gray-green, minor limestone, gray, medium crystalline</td>
</tr>
<tr>
<td>88-98</td>
<td></td>
<td>Limestone, gray to olive gray, finely crystalline, very minor shale, gray-green</td>
</tr>
<tr>
<td>98-108</td>
<td></td>
<td>Shale, gray-green to brown, minor limestone, gray-brown finely crystalline</td>
</tr>
<tr>
<td>108-118</td>
<td></td>
<td>Shale, gray-green, stained, minor limestone, gray, finely crystalline, more H₂O at 112-113'</td>
</tr>
<tr>
<td>118-128</td>
<td></td>
<td>Shale, gray-green to maroon-brown, minor limestone, gray fine to medium crystalline</td>
</tr>
<tr>
<td>128-138</td>
<td></td>
<td>Ratty drilling at 131', shale and calcareous siltstone, gray-green to brown, limestone, gray, micritic</td>
</tr>
<tr>
<td>138-148</td>
<td></td>
<td>Shale, gray-green to maroon brown, very minor limestone, gray finely crystalline</td>
</tr>
<tr>
<td>148-158</td>
<td></td>
<td>Shale and calcareous siltstone, gray-green to brown, limestone, gray, micritic</td>
</tr>
<tr>
<td>158-168</td>
<td></td>
<td>Limestone, gray, fine to medium crystalline, minor shale, gray-green, fissile</td>
</tr>
<tr>
<td>168-178</td>
<td></td>
<td>Limestone, gray to light gray, micritic to finely crystalline gray-green shale, fissile</td>
</tr>
<tr>
<td>178-188</td>
<td></td>
<td>Limestone, gray, fine to medium crystalline, siltstone and shale, gray-green</td>
</tr>
<tr>
<td>188-198</td>
<td></td>
<td>Shale, gray-green to maroon brown, minor limestone, gray, fine to medium crystalline</td>
</tr>
<tr>
<td>198-208</td>
<td></td>
<td>Shale, gray-green to maroon-brown</td>
</tr>
<tr>
<td>208-219.7</td>
<td>TD 0f</td>
<td>Siltstone and shale, gray-green to maroon-brown</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 5/8&quot; hole</td>
</tr>
<tr>
<td>219.7-224</td>
<td></td>
<td>Limestone, gray, medium crystalline with minor oolitic fragments, minor shale</td>
</tr>
<tr>
<td>224-234</td>
<td></td>
<td>Shale, maroon-brown to gray-green, soft drilling</td>
</tr>
<tr>
<td>234-244</td>
<td></td>
<td>Shale, maroon-brown to gray-green, limestone 243-244', gray medium crystalline</td>
</tr>
<tr>
<td>Depth (Feet)</td>
<td>Sample (Number &amp; Interval)</td>
<td>Soil/Bedrock Description</td>
</tr>
<tr>
<td>-------------</td>
<td>----------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>244-254</td>
<td>Shale, maroon-brown to gray-green, limestone, gray, medium crystalline</td>
<td></td>
</tr>
<tr>
<td>254-264</td>
<td>Limestone, gray, medium crystalline to oolitic, fractures prevalent, minor shale, maroon-brown</td>
<td></td>
</tr>
<tr>
<td>264-269 TD of</td>
<td>Limestone, gray, medium crystalline to oolitic, minor shale</td>
<td></td>
</tr>
<tr>
<td>6 1/4&quot; hole</td>
<td>maroon-brown to gray-green, slight drilling break at 264-265'</td>
<td></td>
</tr>
<tr>
<td>269</td>
<td>Total Depth</td>
<td></td>
</tr>
</tbody>
</table>
### WELL LOG

**LOCATION:** S-3 Ponds  
**DRILLER:** Steve Brown  
**HELPER:** Greg Shillings  
**DRILL:** D40K  
**DATE:** START: 3/16/90  
**FINISH:** 3/19/90  
**LOGGED BY:** David B. Wright  

**NOTES:** 9 1/2" bit + Stabilizer = 24.1'; Table at 2.6'  

**THICKNESS OF SOIL:** 18.0'  
**DEPTH DRILLED IN ROCK:** 0.0'  
**TOTAL DEPTH OF WELL:** 18.0'  

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 - 1.0</td>
<td>Gravel and clay, red-brown.</td>
<td></td>
</tr>
<tr>
<td>1.0 - 6.0</td>
<td>Clay, reddish-brown, slightly silty.</td>
<td></td>
</tr>
<tr>
<td>6.0 - 18.0</td>
<td>Clay, brown to dark brown, slightly silty, weathered limestone fragments.</td>
<td></td>
</tr>
</tbody>
</table>
# Well Log

**Location:** S-3 Ponds  
**Driller:** Steve Brown  
**Helper:** Greg Shillings  
**Drill:** Drillteck D40K  
**Date Start:** 3/12/90  
**Finish:** 3/15/90  
**Logged By:** David B. Wright

**Notes:**
- 15 1/2" bit + Stabilizer = 27.4'; Table at 3'
- 9 1/2" bit + Stabilizer = 24.1'; Table at 3''

**Thickness of Soil:** 27.0'

**Depth Drilled in Rock:** 10.0'

**Total Depth of Well:** 37.0'

<table>
<thead>
<tr>
<th>Depth (Feet)</th>
<th>Sample (Number &amp; Interval)</th>
<th>Soil/Bedrock Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 - 1.0</td>
<td>Gravel.</td>
<td></td>
</tr>
<tr>
<td>1.0 - 8.0</td>
<td>Clay, silty, reddish-brown.</td>
<td></td>
</tr>
<tr>
<td>8.0 - 18.0</td>
<td>Clay, slightly silty, light brown to brown.</td>
<td></td>
</tr>
<tr>
<td>18.0 - 27.0</td>
<td>Clay, slightly silty, light brown to brown, minor limestone fragments (weathered) 25 - 27'.</td>
<td></td>
</tr>
<tr>
<td>27.0 - 29.5</td>
<td>Limestone, gray, fine to medium crystalline; top of rock (fresh) 27'.</td>
<td></td>
</tr>
<tr>
<td>29.5 - 32.0</td>
<td>Limestone, gray, fine to medium crystalline; H₂O at 31'; minor filled fractures</td>
<td></td>
</tr>
</tbody>
</table>
| 32.0 - 37.0  | Total Depth  
Limestone, light gray to gray, medium crystalline filled of 9 1/2" fractures abundant. |

**Hole**
**Y-12 WELL INSTALLATION PROGRAM**

**LOCATION:** S-3 Ponds

**DRILLER:** Steve Brown

**HELPER:** Greg Shillings

**DRILL:** Driltech D40K

**DATE:**
- **START:** 3/27/90
- **FINISH:**

**LOGGED BY:** David B. Wright

**NOTES:** 9 1/3" bit stab. 24.1', Table at 2.4'

---

**THICKNESS OF SOIL:** 40'

**DEPTH DRILLED IN ROCK:** 8'

**TOTAL DEPTH OF WELL:** 40.8'

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>.5</td>
<td>Grass and top soil</td>
</tr>
<tr>
<td>.5</td>
<td>40</td>
<td>Clay, reddish-brown, slightly silty</td>
</tr>
<tr>
<td>40</td>
<td>40.8</td>
<td>Limestone, gray, medium crystalline</td>
</tr>
</tbody>
</table>
**Y-12 WELL INSTALLATION PROGRAM**

**LOCATION:** S-3 Ponds  
**DRILLER:** Steve Brown  
**HELPER:** Greg Shillings  
**DRILL:** Driltech Da0K

**DATE: START:** 3/20/90  
**FINISH:** 3/27/90  
**LOGGED BY:** David B. Wright

**NOTES:**  
9 1/2" bit + stab. = 24.1' Table at 3.5'  
15 1/2" bit + stab. = 27.4' to 15 1/2" bit = 25.9' Table at 3.4'  
3/23/90 9 1/2" bit + stab. = 24.1' Table at 3.8' 3/26/90 Table at 3.6'

**THICKNESS OF SOIL:** 41'  
**DEPTH DRILLED IN ROCK:** 34'  
**TOTAL DEPTH OF WELL:** 75'

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROM</td>
<td>TO</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>.5</td>
<td></td>
</tr>
<tr>
<td>.5</td>
<td>41</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>46</td>
<td></td>
</tr>
<tr>
<td>46</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>54.5</td>
<td></td>
</tr>
<tr>
<td>54.5</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>65</td>
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</tr>
<tr>
<td>65</td>
<td>70</td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>75</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Y-12 WELL INSTALLATION PROGRAM

**LOCATION:** Y-12 Burial Grounds - Bear Creek Rd  
**DRILLER:** Randy Phillips  
**HELPER:** Ronnie Phillips & Steve Brown  
**DRILL:** Ingersol-Rand T-4

---

### WELL LOG

| LOCATION: Y-12 Burial Grounds - Bear Creek Rd | DATE: START: 9/14/89  
| DRILLER: Randy Phillips | FINISH: 9/19/89  
| HELPER: Ronnie Phillips & Steve Brown | LOGGED BY: Michael J. Ebers

**NOTES:**

---

**THICKNESS OF SOIL:** 22.0

**DEPTH DRILLED IN ROCK:** 21.0

**TOTAL DEPTH OF WELL:** 43.0

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 to 0.5</td>
<td>Gravel</td>
<td></td>
</tr>
<tr>
<td>0.5 to 5.5</td>
<td>Clay, silty, yellowish-brown with shale, weathered brown, damp</td>
<td></td>
</tr>
<tr>
<td>5.5 to 22.0</td>
<td>Clay, medium brown with tan to brown chert, damp, soft drilling, very damp in lower 4'</td>
<td></td>
</tr>
<tr>
<td>22.0 to 27.0</td>
<td>Limestone, fine grained, medium gray to medium dark gray, dense, hard, no water</td>
<td></td>
</tr>
<tr>
<td>27.0 to 43.0</td>
<td>Mud-filled caves, limestone/chert gravel</td>
<td></td>
</tr>
<tr>
<td>43.0</td>
<td>Total depth</td>
<td></td>
</tr>
<tr>
<td>LOCATION:</td>
<td>Y-12 Burial Ground</td>
<td></td>
</tr>
<tr>
<td>DRILLER:</td>
<td>Mark Baker</td>
<td></td>
</tr>
<tr>
<td>HELPER:</td>
<td>Earl Sexton</td>
<td></td>
</tr>
<tr>
<td>DRILL:</td>
<td>Ingersol Rand XL-750</td>
<td></td>
</tr>
</tbody>
</table>

**WELL LOG**

| DATE: | START: 12/1/89 |
|       | FINISH: 12/1/89 |
| LOGGED BY: | Bryn Howze |

**NOTES:**

**THICKNESS OF SOIL:** 14.2'

**DEPTH DRILLED IN ROCK:** 6.3'

**TOTAL DEPTH OF WELL:** 20.5'

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
<th>HYDROCARBONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 - 4.5</td>
<td>Silt, clayey, light brown</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.5 - 14.2</td>
<td>Silt and highly weathered shale, light to medium brown, mottled yellow, maroon, slightly moist at 12.0'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.2 - 20.5</td>
<td>Limestone, shaley, light gray interbedded with shale, medium brown, weathered</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.5</td>
<td>Total Depth</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Y-12 WELL INSTALLATION PROGRAM**

**LOCATION:** Y-12 Burial Grounds  
**DRILLER:** Mark Baker  
**HELPER:** Earl Sexton  
**DRILL:** Ingersoll Rand XL-750

**NOTES:** Water at 35', 130-139', 267' and 298'

**WELL LOG**

**DATE:**  
**START:** 11/22/89  
**FINISH:** 12/1/89  
**LOGGED BY:** Michael L. Ebers  
**HELPED BY:** Bruce McMaster

**THICKNESS OF SOIL:** 16'  
**DEPTH DRILLED IN ROCK:** 333'  
**TOTAL DEPTH OF WELL:** 349'

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROM TO</td>
<td>FROM TO</td>
<td></td>
</tr>
<tr>
<td>0 5</td>
<td>Clay, silty, tan</td>
<td></td>
</tr>
<tr>
<td>5 9</td>
<td>Clay, silty, tan and shale, weathered, dark brown</td>
<td></td>
</tr>
<tr>
<td>9 16</td>
<td>Shale, clayey, maroon gray, weathered</td>
<td></td>
</tr>
<tr>
<td>16 19</td>
<td>Dolostone, fine grained, gray; minor limestone</td>
<td></td>
</tr>
<tr>
<td>19 23</td>
<td>Limestone, fine grained, gray with minor shale</td>
<td></td>
</tr>
<tr>
<td>23 28</td>
<td>Limestone, gray, blue-gray; minor dolostone, fairly hard</td>
<td></td>
</tr>
<tr>
<td>28 38</td>
<td>Shale, gray and light purple, highly weathered, small water at 35'</td>
<td></td>
</tr>
<tr>
<td>38 45</td>
<td>Shale, gray and light purple; minor limestone with calcite veins</td>
<td></td>
</tr>
<tr>
<td>45 50</td>
<td>Limestone, dark gray with calcite veins; shale, dark gray maroon</td>
<td></td>
</tr>
<tr>
<td>50 60</td>
<td>Shale, fissile, dark gray-maroon; minor limestone with calcite</td>
<td></td>
</tr>
<tr>
<td>60 65</td>
<td>Shale, gray-green; minor limestone with calcite</td>
<td></td>
</tr>
<tr>
<td>65 70</td>
<td>Shale, green laminated with limestone, minor calcite in limestone</td>
<td></td>
</tr>
<tr>
<td>70 72</td>
<td>Shale, laminated, green and maroon, minor limestone with calcite</td>
<td></td>
</tr>
<tr>
<td>72 75</td>
<td>Shale, fissile, laminated, maroon</td>
<td></td>
</tr>
<tr>
<td>DEPTH (FEET)</td>
<td>SAMPLE (NUMBER &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
</tr>
<tr>
<td>-------------</td>
<td>-----------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>75 - 85</td>
<td>Shale, laminated, maroon, minor limestone</td>
<td></td>
</tr>
<tr>
<td>85 - 90</td>
<td>Shale, laminated, maroon; minor oolitic limestone; and shale, laminated, green</td>
<td></td>
</tr>
<tr>
<td>90 - 95</td>
<td>Limestone, coarse grained, with calcite veins, minor shale, green</td>
<td></td>
</tr>
<tr>
<td>95 - 100</td>
<td>Shale, dark green and maroon; minor limestone</td>
<td></td>
</tr>
<tr>
<td>100 - 105</td>
<td>Shale, laminated, light maroon and green</td>
<td></td>
</tr>
<tr>
<td>105 - 110</td>
<td>Shale, laminated, maroon, silty: minor green shale and limestone</td>
<td></td>
</tr>
<tr>
<td>110 - 125</td>
<td>Shale, dark maroon and green, laminated, minor limestone</td>
<td></td>
</tr>
<tr>
<td>125 - 139</td>
<td>Shale, dark maroon; minor shale, green and oolitic limestone with calcite stringers, hit additional water from 130' to 139'</td>
<td></td>
</tr>
<tr>
<td>139 - 141</td>
<td>Limestone, gray-green, oolitic; minor green shale</td>
<td></td>
</tr>
<tr>
<td>141 - 145</td>
<td>Shale, laminated, dark maroon and dark green; minor limestone</td>
<td></td>
</tr>
<tr>
<td>145 - 146</td>
<td>Shale, dark maroon and limestone, gray-green; minor green shale</td>
<td></td>
</tr>
<tr>
<td>146 - 150</td>
<td>Shale, dark green; minor gray limestone</td>
<td></td>
</tr>
<tr>
<td>150 - 155</td>
<td>Limestone, gray-green, with calcite veins; minor green and maroon shale</td>
<td></td>
</tr>
<tr>
<td>155 - 160</td>
<td>Shale, dark maroon and green, minor limestone with calcite</td>
<td></td>
</tr>
<tr>
<td>160 - 165</td>
<td>Shale, dark green, minor maroon shale, and minor limestone</td>
<td></td>
</tr>
<tr>
<td>165 - 170</td>
<td>Shale, dark maroon; minor green shale and minor limestone</td>
<td></td>
</tr>
<tr>
<td>170 - 180</td>
<td>Shale, dark maroon and green; limestone, gray-green, with calcite</td>
<td></td>
</tr>
<tr>
<td>180 - 183</td>
<td>Shale, dark maroon and green; limestone, oolitic with calcite</td>
<td></td>
</tr>
<tr>
<td>183 - 190</td>
<td>Shale, dark green and maroon; minor limestone, gray-green</td>
<td></td>
</tr>
<tr>
<td>190 - 195</td>
<td>Shale, dark green; minor limestone, gray-green and maroon shale</td>
<td></td>
</tr>
<tr>
<td>195 - 200</td>
<td>Limestone, dark green with calcite veins; shale, dark green</td>
<td></td>
</tr>
</tbody>
</table>
### Y-12 CHARACTERIZATION WELL LOG

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROM TO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>200 205</td>
<td>Limestone, dark green with calcite veins, shale, dark green; shale, olive gray</td>
<td></td>
</tr>
<tr>
<td>205 210</td>
<td>Limestone, gray-green, slightly oolitic, with calcite veins; minor green shale</td>
<td></td>
</tr>
<tr>
<td>210 215</td>
<td>Limestone, gray-green with calcite veins; minor green shale</td>
<td></td>
</tr>
<tr>
<td>215 219</td>
<td>Limestone, green-gray, oolitic, with calcite veins</td>
<td></td>
</tr>
<tr>
<td>219 245</td>
<td>Shale, very silty, greenish-gray, thinly bedded with limestone, olive gray, fine grained, scattered pink calcite filled fractures</td>
<td></td>
</tr>
<tr>
<td>245 250</td>
<td>Limestone, light olive gray, fine to medium grained, oolitic with thin greenish gray shale partings</td>
<td></td>
</tr>
<tr>
<td>250 270</td>
<td>Shale, greenish-gray, locally silty; and limestone, light olive gray, fine grained, locally oolitic, few thin greenish-gray partings, with pink calcite filled fractures, minor water at 267'</td>
<td></td>
</tr>
<tr>
<td>270 280</td>
<td>Limestone, medium light gray, fine to medium grained, locally oolitic; and shale, greenish-gray, silty; few pink calcite filled fractures</td>
<td></td>
</tr>
<tr>
<td>280 300</td>
<td>Shale, medium dark gray and greenish-gray, locally silty; and limestone, medium light gray, fine grained, water at 298', killed dust</td>
<td></td>
</tr>
<tr>
<td>300 310</td>
<td>Limestone, light olive gray to medium gray, fine grained, locally oolitic, scattered green glauconite grains; shale greenish-gray, silty</td>
<td></td>
</tr>
<tr>
<td>310 324</td>
<td>Shale, greenish-gray, fissile, micaceous, locally silty; limestone, fine to medium grained, light olive gray, locally abundant green glauconite</td>
<td></td>
</tr>
<tr>
<td>324 349</td>
<td>Shale, fissile, dark maroon, locally greenish-gray, micaceous; limestone, light olive gray, fine to medium grained</td>
<td></td>
</tr>
<tr>
<td>349</td>
<td>Total Depth</td>
<td></td>
</tr>
</tbody>
</table>

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PAGE 3 OF 4
<table>
<thead>
<tr>
<th>DEPTH (FEET) FROM TO INTERVAL</th>
<th>SAMPLE NUMBER</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOTES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small water at 35'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water at 130' to 139'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minor water at 267'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water at 298'</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Y-12 WELL INSTALLATION PROGRAM

<table>
<thead>
<tr>
<th>LOCATION:</th>
<th>Burial Ground</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRILLER:</td>
<td>Mark Baker</td>
</tr>
<tr>
<td>HELPER:</td>
<td>Earl Sexton</td>
</tr>
<tr>
<td>DRILL:</td>
<td>Ingersol Rand XL 750</td>
</tr>
</tbody>
</table>

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### WELL LOG

<table>
<thead>
<tr>
<th>DATE:</th>
<th>START:</th>
<th>FINISH:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1/5/90</td>
<td>1/5/90</td>
</tr>
</tbody>
</table>

---

### NOTES:

---

### THICKNESS OF SOIL:

- 25'

### DEPTH DRILLED IN ROCK:

- 2.2'

### TOTAL DEPTH OF WELL:

- 27.5'

### DEPTH (FEET) | SAMPLE (NUMBER & INTERVAL) | SOIL/BEDROCK DESCRIPTION |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2</td>
<td>Crusher run and gravel pad</td>
</tr>
<tr>
<td>2</td>
<td>7</td>
<td>Clay, silty, light brown to brown; slightly moist</td>
</tr>
</tbody>
</table>
| 7              | 12                          | Clay, silty, brown, shale fragments, reddish-brown to 
                       | gray green moisture at 10' |
| 12             | 17                          | Shale (weathered) maroon |
| 17             | 22                          | Shale, maroon to gray green (weathered) H₂O at 22.0, minor 
                       | limestone, gray, oolitic |
| 22             | 27.2 TD of hole             | Shale, maroon to gray green minor limestone, fragments, gray 
                       | oolitic |

---
**Y-12 WELL INSTALLATION PROGRAM**

**LOCATION:** Burial Ground  
**DRILLER:** Mark Baker  
**HELPER:** Earl Sexton  
**DRILL:** Ingersol Rand XL 750  
**DATE:** START: 12/20/89  
**DATE:** FINISH: 1/5/90  
**LOGGED BY:** David B. Wright

**NOTES:** 9 1/2'' bit + Stab 28' Table at 3.4'

**THICKNESS OF SOIL:** 20’

**DEPTH DRILLED IN ROCK:** 263’

**TOTAL DEPTH OF WELL:** 283’

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROM</td>
<td>TO</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>3</td>
<td>Gravel pad</td>
</tr>
<tr>
<td>3</td>
<td>15</td>
<td>Weathered shale and silt; shale green to maroon and stained</td>
</tr>
<tr>
<td>15</td>
<td>22</td>
<td>Limestone, light gray to gray, medium to coarsely crystalline shale olive green to maroon, stained</td>
</tr>
<tr>
<td>22</td>
<td>30</td>
<td>Shale, olive green to maroon, with limestone stringers dark gray, coarsely crystalline</td>
</tr>
<tr>
<td>30</td>
<td>35</td>
<td>Limestone, dark gray, oolitic, shale gray green to maroon</td>
</tr>
<tr>
<td>35</td>
<td>50</td>
<td>Limestone, gray, oolitic, shale partings green to maroon</td>
</tr>
<tr>
<td>50</td>
<td>55</td>
<td>Limestone, gray, oolitic to medium crystalline, shale, green to maroon</td>
</tr>
<tr>
<td>55</td>
<td>62</td>
<td>TD Pilot Hole</td>
</tr>
<tr>
<td>62</td>
<td>69</td>
<td>Limestone, gray, oolitic, medium grained, oolites are brownish-gray, shale, green and maroon, thinly laminated</td>
</tr>
<tr>
<td>69</td>
<td>70.5</td>
<td>Shale, green and maroon, thickly laminated. Limestone gray, oolitic, medium grained, oolites are brownish-gray and some are very large and irregular shaped (elongated)</td>
</tr>
<tr>
<td>70.5</td>
<td>71.5</td>
<td>Limestone, gray, oolitic, medium grained, oolites are brownish-gray, shale, maroon and green, thickly laminated</td>
</tr>
<tr>
<td>71.5</td>
<td>102</td>
<td>Shale, gravish-red purple and pale green, fissile, and 10%</td>
</tr>
<tr>
<td>DEPTH (FEET)</td>
<td>SAMPLE (NUMBER &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
</tr>
<tr>
<td>--------------</td>
<td>----------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>102-110</td>
<td>Shale, greyish-red purple and minor pale green, fissile to blocky and 20% limestone, maroon, medium grained, trace green glauconite</td>
<td></td>
</tr>
<tr>
<td>110-120</td>
<td>Shale, greyish-red purple and pale green, blocky, few thin silty lenses and 15% limestone, gray, oolitic</td>
<td></td>
</tr>
<tr>
<td>120-130</td>
<td>Siltstone, shaly, dark greenish-gray and 20% shale, maroon and 15% limestone, light olive gray, medium grained oolitic</td>
<td></td>
</tr>
<tr>
<td>130-140</td>
<td>Shale, maroon and pale green; 20% siltstone, shaly, dark greenish gray and 15% limestone, olive gray, fine grained and calcite, pink (2%)</td>
<td></td>
</tr>
<tr>
<td>140-150</td>
<td>Shale, maroon and pale green; siltstone, olive gray, fine grained, oolitic</td>
<td></td>
</tr>
<tr>
<td>150-160</td>
<td>Siltstone, dark greenish-gray, shaly and lesser shale, maroon and pale green; 20% limestone, medium grained, olive gray</td>
<td></td>
</tr>
<tr>
<td>160-170</td>
<td>Limestone, light olive gray, fine grained, with white calcite filled fractures, locally brecciated; and shale, maroon and pale green, silty to locally siltstone</td>
<td></td>
</tr>
<tr>
<td>170-180</td>
<td>Shale, maroon and pale green, siltv with minor limestone fine grained, light olive gray</td>
<td></td>
</tr>
<tr>
<td>180-185</td>
<td>Siltstone, dark greenish gray and limestone, olive gray, fine grained; minor shale, maroon and pale green</td>
<td></td>
</tr>
<tr>
<td>185-210</td>
<td>Shale, silty, dark greenish-grav, trace maroon shale; 30% limestone, light olive gray, fine grained, locally oolitic, locally pink calcite filled fractures</td>
<td></td>
</tr>
<tr>
<td>210-231</td>
<td>Shale, silty, dark greenish-gray; 15% limestone, olive gray</td>
<td></td>
</tr>
<tr>
<td>231.5</td>
<td>Bottom of 10 5/8&quot; hole</td>
<td></td>
</tr>
<tr>
<td>231.5-235</td>
<td>Shale, gray green, minor cement</td>
<td></td>
</tr>
<tr>
<td>235-240</td>
<td>Shale, gray to gray green, minor limestone, gray,oolitic</td>
<td></td>
</tr>
<tr>
<td>240-245</td>
<td>Shale, gray green,blocky</td>
<td></td>
</tr>
<tr>
<td>245-248</td>
<td>Shale, gray green, blocky to fissile minor limestone, gray,</td>
<td></td>
</tr>
<tr>
<td>Depth (Feet) From</td>
<td>Depth (Feet) To</td>
<td>Sample Interval Description</td>
</tr>
<tr>
<td>------------------</td>
<td>----------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>245</td>
<td>255</td>
<td>Medium crystalline</td>
</tr>
<tr>
<td>255</td>
<td>260</td>
<td>Shale, gray green to green, blocky to fissile, limestone, gray, oolitic</td>
</tr>
<tr>
<td>260</td>
<td>265</td>
<td>Shale, gray green, blocky, minor limestone, gray, oolitic</td>
</tr>
<tr>
<td>265</td>
<td>270</td>
<td>Shale, gray green, blocky to fissile, limestone, gray, oolitic</td>
</tr>
<tr>
<td>270</td>
<td>275</td>
<td>Shale, gray green, blocky, limestone, gray, oolitic, cuit dusting at 274 - 275' in limestone interval</td>
</tr>
<tr>
<td>275</td>
<td>283</td>
<td>Shale, gray green, blocky, limestone, gray, oolitic</td>
</tr>
</tbody>
</table>

ID of hole: Shale, gray green, blocky, limestone, gray, oolitic
**Y-12 WELL INSTALLATION PROGRAM**

**LOCATION:** Y-12 Burial Ground  
**DRILLER:** Mark Baker  
**HELPER:** Earl Sexton  
**DRILL:** Ingersol Rand XL-750

**WELL LOG**

<table>
<thead>
<tr>
<th>DATE:</th>
<th>START: 12/12/89</th>
<th>FINISH: 12/15/89</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOGGED BY:</td>
<td>Bryn Howze</td>
<td></td>
</tr>
</tbody>
</table>

**NOTES:**

**THICKNESS OF SOIL:** 48.0'  
**DEPTH DRILLED IN ROCK:** 30.0'  
**TOTAL DEPTH OF WELL:** 78.0'

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 - 2.0</td>
<td></td>
<td>Silt, clayey, medium brown, mottled orange, black</td>
</tr>
<tr>
<td>2.0 - 48.0</td>
<td></td>
<td>Shale, highly weathercd, medium brown, mottled orange, black, water at 18'</td>
</tr>
<tr>
<td>48.0 - 64.0</td>
<td></td>
<td>Shale, olive gray, medium brown (weathered), interbedded with limestone, light gray to medium gray with calcite veins, iron stained chips, harder drilling</td>
</tr>
<tr>
<td>64.0 - 78.0</td>
<td></td>
<td>Shale, olive gray, interbedded with limestone, light gray, fine-grained, minor oolitic limestone, some iron-stained chips, calcite veins, water at 73.0' well made 28' of water in one hour</td>
</tr>
<tr>
<td>78.0</td>
<td></td>
<td>Total Depth</td>
</tr>
</tbody>
</table>

**TOTAL DEPTH** 78.0'
## Y-12 WELL INSTALLATION PROGRAM

**LOCATION:** Y-12 Burial Ground  
**DRILLER:** Mark Baker  
**HELPER:** Earl Sexton  
**DRILL:** Ingersol Rand XL-750  
**DATE:** START: 12/5/89  
**FINISH:** 12/11/89  
**LOGGED BY:** Bryn Howze

### THICKNESS OF SOIL:

43.0'

### DEPTH DRILLED IN ROCK:

227.0'

### TOTAL DEPTH OF WELL:

270.0'

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 - 3.0</td>
<td></td>
<td>Silt, clayey, medium brown</td>
</tr>
<tr>
<td>3.0 - 43.0</td>
<td></td>
<td>Shale, highly weathered, medium brown, mottled, black, yellow, orange, moist at 22'</td>
</tr>
<tr>
<td>43.0 - 47.0</td>
<td></td>
<td>Shale, olive gray, medium gray, interbedded with limestone light to medium gray, fine-grained</td>
</tr>
<tr>
<td>47.0 - 53.0</td>
<td></td>
<td>Shale, olive gray, medium gray, interbedded with limestone light to medium gray, calcite veins</td>
</tr>
<tr>
<td>53.0 - 55.0</td>
<td></td>
<td>Shale, olive gray, medium gray with minor limestone, light gray</td>
</tr>
<tr>
<td>55.0 - 64.0</td>
<td></td>
<td>Shale, olive gray to medium gray, interbedded with limestone, light gray, fine-grained, calcite veins, minor iron-stained cuttings</td>
</tr>
<tr>
<td>64.0 - 70.0</td>
<td></td>
<td>Oolitic limestone, light to medium gray with calcite veins and some interbedded shale, medium gray</td>
</tr>
<tr>
<td>70.0 - 80.0</td>
<td></td>
<td>Interbedded shale, olive gray to medium gray and limestone light to medium gray, fine-grained with some oolitic limestone and calcite veins, water at 74'</td>
</tr>
<tr>
<td>80.0 - 88.0</td>
<td></td>
<td>Limestone, light to medium gray, some oolitic limestone, calcite veins, minor shale, medium gray</td>
</tr>
<tr>
<td>88.0 - 163.0</td>
<td></td>
<td>Shale, olive gray medium gray with minor limestone, light</td>
</tr>
<tr>
<td>DEPTH FROM TO (FEET)</td>
<td>SAMPLE NUMBER INTERVAL</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>163 175</td>
<td></td>
<td>to medium gray, minor oolitic limestone</td>
</tr>
<tr>
<td>175 185</td>
<td></td>
<td>Oolitic limestone, light to medium gray, calcite veins present, interbedded with minor olive gray shale</td>
</tr>
<tr>
<td>185 192</td>
<td></td>
<td>Shale, olive gray to medium gray interbedded with limestone light gray</td>
</tr>
<tr>
<td>192 194</td>
<td></td>
<td>Shale, olive gray to medium gray with minor limestone, light gray</td>
</tr>
<tr>
<td>194 233</td>
<td></td>
<td>Limestone, light to medium gray with calcite veins, minor shale, medium gray</td>
</tr>
<tr>
<td>233 270</td>
<td></td>
<td>Shale, olive gray to medium gray interbedded with limestone light to medium gray, some oolitic limestone, calcite veins</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Shale, olive gray to medium gray with limestone, light to medium gray, calcite veins, less limestone than before, water at 256'</td>
</tr>
</tbody>
</table>
### Y-12 WELL INSTALLATION PROGRAM

**LOCATION:** Burial Grounds  
**DRILLER:** Mark Baker  
**ASSISTANT:** Morris McMillan  
**DRILL:** Ingersol Rand XL-750

**DATE:** START: 1/11/90  
**FINISH:** 1/22/90  
**LOGGED BY:** David B. Wright

**NOTES:**  
16.8' 9 1/2 Bit + Stabilizer  
3.8' Table off ground  
24.1' 15 1/2" bit + Stabilizer

**THICKNESS OF SOIL:** 13'  
**DEPTH DRILLED IN ROCK:** 275'  
**TOTAL DEPTH OF WELL:** 288'

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROM</td>
<td>TO</td>
<td>Gravel pad</td>
</tr>
<tr>
<td>0</td>
<td>3</td>
<td>Clay, brown, silty, weathered shale, gray green</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>Clay, brown, silty, weathered shale, green, maroon brown</td>
</tr>
<tr>
<td>8</td>
<td>13</td>
<td>Shale, maroon brown, green, minor limestone, gray, medium crystalline</td>
</tr>
<tr>
<td>13</td>
<td>18</td>
<td>Shale, maroon brown, green, minor limestone, gray, medium crystalline</td>
</tr>
<tr>
<td>18</td>
<td>23</td>
<td>Shale, maroon brown, green, minor limestone, gray, medium crystalline</td>
</tr>
<tr>
<td>23</td>
<td>28</td>
<td>Shale, maroon to green, fissile, stained, minor oolitic limestone</td>
</tr>
<tr>
<td>28</td>
<td>33</td>
<td>Shale, gray green to green, blocky, stained, limestone, gray, medium crystalline to oolitic</td>
</tr>
<tr>
<td>33</td>
<td>38</td>
<td>Shale, gray green-green to maroon brown, stained, limestone, gray, medium crystalline to oolitic</td>
</tr>
<tr>
<td>38</td>
<td>43</td>
<td>Shale, maroon brown to green; green is calcareous in nature minor limestone, gray, medium crystalline</td>
</tr>
<tr>
<td>43</td>
<td>48</td>
<td>Shale, maroon brown to green, calcareous, blocky, stained (minor), limestone, gray, medium crystalline</td>
</tr>
<tr>
<td>48</td>
<td>53</td>
<td>Shale, maroon brown to green, calcareous, blocky to fissile, limestone, gray medium crystalline to oolitic</td>
</tr>
<tr>
<td>53</td>
<td>58</td>
<td>Shale, maroon brown to green, limestone, gray, oolitic to medium crystalline</td>
</tr>
<tr>
<td>DEPTH (FEET)</td>
<td>SAMPLE (NUMBER &amp; INTERVAL)</td>
<td>SOIL/Bedrock Description</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>58-61</td>
<td>TD of 9 1/2&quot; Pilot Hole staining</td>
<td>Limestone, gray, oolitic to medium crystalline, calcareous siltstone, green-gray, minor shale, maroon brown, minor</td>
</tr>
<tr>
<td>62-67</td>
<td>Shale, maroon to green, limestone, gray, oolitic</td>
<td></td>
</tr>
<tr>
<td>67-72</td>
<td>Limestone, gray, medium crystalline to oolitic, shale green blocky to fissile</td>
<td></td>
</tr>
<tr>
<td>72-77</td>
<td>Limestone, gray, medium crystalline, shale, green</td>
<td></td>
</tr>
<tr>
<td>77-82</td>
<td>Shale, maroon to green, minor limestone, gray, medium crystalline</td>
<td></td>
</tr>
<tr>
<td>82-87</td>
<td>Limestone, gray-brown, medium to coarsely crystalline, shale, maroon</td>
<td></td>
</tr>
<tr>
<td>87-92</td>
<td>Shale, maroon to green, limestone stringers, gray, medium crystalline</td>
<td></td>
</tr>
<tr>
<td>92-97</td>
<td>Shale, maroon to green, minor limestone, gray, medium crystalline</td>
<td></td>
</tr>
<tr>
<td>97-102</td>
<td>Shale, maroon to green, minor limestone, medium crystalline to oolitic</td>
<td></td>
</tr>
<tr>
<td>102-107</td>
<td>Shale, maroon to green, minor limestone, gray medium crystalline</td>
<td></td>
</tr>
<tr>
<td>107-112</td>
<td>Siltstone, green, blocky, limestone, gray, medium crystalline minor maroon shale</td>
<td></td>
</tr>
<tr>
<td>112-117</td>
<td>Siltstone, green, blocky, limestone, gray, medium crystalline</td>
<td></td>
</tr>
<tr>
<td>117-122</td>
<td>Shale, maroon and green, minor limestone, gray, medium crystalline</td>
<td></td>
</tr>
<tr>
<td>122-127</td>
<td>Siltstone, green, blocky, limestone, gray, medium crystalline</td>
<td></td>
</tr>
<tr>
<td>127-132</td>
<td>Siltstone, green, blocky, limestone, gray, medium crystalline</td>
<td></td>
</tr>
<tr>
<td>132-137</td>
<td>Siltstone green to maroon, blocky, minor limestone gray, medium crystalline</td>
<td></td>
</tr>
<tr>
<td>137-147</td>
<td>Siltstone and shale, green, limestone, gray, medium to coarsely crystalline</td>
<td></td>
</tr>
<tr>
<td>147-157</td>
<td>Siltstone and shale, green-gray, limestone, gray, medium crystalline</td>
<td></td>
</tr>
<tr>
<td>Depth (Feet)</td>
<td>Sample (Number &amp; Interval)</td>
<td>Soil/Bedrock Description</td>
</tr>
<tr>
<td>-------------</td>
<td>-----------------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>157-167</td>
<td></td>
<td>Siltstone, green, limestone, gray, medium crystalline, shale, gray</td>
</tr>
<tr>
<td>167-177</td>
<td></td>
<td>Siltstone and shale, green, calcareous, limestone, gray, medium crystalline</td>
</tr>
<tr>
<td>177-187</td>
<td></td>
<td>Siltstone and shale, green-gray, limestone, gray-brown, oolitic</td>
</tr>
<tr>
<td>187-197</td>
<td></td>
<td>Siltstone and shale, gray-green, limestone, gray-brown, medium crystalline</td>
</tr>
<tr>
<td>197-207</td>
<td></td>
<td>Shale and siltstone, green, minor limestone, gray-brown, oolitic</td>
</tr>
<tr>
<td>207-213</td>
<td>Sampled</td>
<td>Hit something at 212-213', deep brown, I think same smell at 625, siltstone and shale gray green, limestone, gray, 1/17/90 medium crystalline</td>
</tr>
<tr>
<td>213-223</td>
<td></td>
<td>Siltstone and shale, gray-green; limestone, olive gray, medium crystalline, oolitic. Poor returns in first five ft.</td>
</tr>
<tr>
<td>223-228</td>
<td></td>
<td>Siltstone and shale, gray-green to reddish-brown; limestone gray to gray-brown, medium crystalline, oolitic</td>
</tr>
<tr>
<td>228-232</td>
<td></td>
<td>Siltstone and shale, gray-green; limestone, gray to gray-brown, medium crystalline, oolitic</td>
</tr>
<tr>
<td>232-236.9</td>
<td></td>
<td>Siltstone and shale, gray-green; limestone, gray to gray-brown, medium crystalline, oolitic. Scattered fragments of reddish-brown siltstone</td>
</tr>
<tr>
<td>238-248</td>
<td></td>
<td>Shale, gray, fissile, limestone, gray, fine to medium crystalline, might have hit a little H₂O at 241', easy drilling</td>
</tr>
<tr>
<td>248-258</td>
<td></td>
<td>Shale, gray to brown, limestone, gray, oolitic to medium crystalline</td>
</tr>
<tr>
<td>258-268</td>
<td></td>
<td>Shale and siltstone, gray-green, minor limestone, gray-brown, oolitic to fine crystalline, minor filled fractures</td>
</tr>
<tr>
<td>268-278</td>
<td></td>
<td>Shale and siltstone, maroon and green, limestone, gray, oolitic to medium crystalline, filled fractures, slight drilling break at 269-270'</td>
</tr>
<tr>
<td>DEPTH (FEET)</td>
<td>SAMPLE (NUMBER &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
</tr>
<tr>
<td>--------------</td>
<td>----------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>278</td>
<td>TD 6 1/2&quot;</td>
<td>Shale and siltstone, gray-green to gray, minor limestone.</td>
</tr>
<tr>
<td></td>
<td>Hole</td>
<td>grav, fine to medium crystalline, filled fractures</td>
</tr>
</tbody>
</table>
Y-12 WELL INSTALLATION PROGRAM

LOCATION: Burial Grounds
DRILLER: Mark Baker
HELPERS: Earl Saxton
DRILL: XL 750 Ingersol Rand

WELL LOG
DATE: START: 1/23/90
FINISH: 2/2/90
LOGGED BY: David B. Wright

NOTES: Table at 3.1'
Stabilizer + Bit 16.7' - Bit = 15.8' Hole opener 3'; 1.5 to Bit 15 1/2''
Stabilizer + 15 1/2''Bit = 18.8''; Stabilizer + 10 5/8'' Bit = 16.8''
Table at 4.5'

THICKNESS OF SOIL: 11' to weathered shale
DEPT DRILLED IN ROCK: 301'
TOTAL DEPTH OF WELL: 312'

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROM 0 TO 2</td>
<td>Gravel pad</td>
<td></td>
</tr>
<tr>
<td>1 6</td>
<td>Clav, brownish-orange, silty</td>
<td></td>
</tr>
<tr>
<td>6 12</td>
<td>Clav, brown, weathered shale fragments</td>
<td></td>
</tr>
<tr>
<td>12 22</td>
<td>Silty clav, brown and shale, brown, H2O at 20'</td>
<td></td>
</tr>
<tr>
<td>22 32</td>
<td>Shale, mottled gray green and brown, stained</td>
<td></td>
</tr>
<tr>
<td>32 42</td>
<td>Shale, gray-green to maroon brown, minor limestone, gray, fine to medium crystalline, minor staining of shale</td>
<td></td>
</tr>
<tr>
<td>42 47.5</td>
<td>TD Pilot Hole</td>
<td>Shale, siltstone, gray to gray-green, limestone, gray, medium crystalline</td>
</tr>
<tr>
<td>47.5 57</td>
<td>Shale, gray to gray brown, limestone, gray, fine to medium crystalline</td>
<td></td>
</tr>
<tr>
<td>57 67</td>
<td>Shale, gray to gray green, minor maroon, limestone, gray, fine to medium crystalline</td>
<td></td>
</tr>
<tr>
<td>67 77</td>
<td>Shale, gray, fissle to blocky, limestone, gray, fine to medium crystalline, oolitic, individual pink calcite crystals</td>
<td></td>
</tr>
<tr>
<td>77 87</td>
<td>Shale, gray, limestone, gray to light gray, medium crystalline with minor pink calcite crystals</td>
<td></td>
</tr>
<tr>
<td>87 97</td>
<td>Shale, gray, limestone, gray, medium crystalline, minor veinlets with calcite crystals or calcite rich dolomite</td>
<td></td>
</tr>
<tr>
<td>DEPTH (FEET)</td>
<td>SAMPLE (NUMBER &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
</tr>
<tr>
<td>--------------</td>
<td>----------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>97 to 107</td>
<td>Very few cuttings; shale, gray to gray-green, calcareous siltstone, gray</td>
<td></td>
</tr>
<tr>
<td>107 to 117</td>
<td>Shale, gray, green, maroon, brown, limestone, gray, medium Drilling at crystalline, shale, highly stained and rounded. 117'</td>
<td></td>
</tr>
<tr>
<td>117 to 127</td>
<td>Shale, gray-green, maroon and brown, stained, rounded, calcareous siltstone, gray, minor limestone, gray medium crystalline</td>
<td></td>
</tr>
<tr>
<td>127 to 137</td>
<td>Shale, gray-green, maroon, brown, rounded and stained</td>
<td></td>
</tr>
<tr>
<td>137 to 147</td>
<td>Hard Calcareous, siltstone, gray to gray-green, limestone, gray Drilling to fine to medium crystalline 146'</td>
<td></td>
</tr>
<tr>
<td>147 to 157</td>
<td>Shale and calcareous, siltstone, gray to gray-green, blocky limestone, light gray-brown to gray, oolitic</td>
<td></td>
</tr>
<tr>
<td>157 to 167</td>
<td>Shale, green, calcareous, siltstone, gray-green, limestone, gray, medium crystalline</td>
<td></td>
</tr>
<tr>
<td>167 to 177</td>
<td>Calcareous, siltstone, gray to gray-green, limestone, gray-brown, medium crystalline to oolitic, shale, gray; veinlets and minor fracturing observed; slight dark brown cut in drilling H2O</td>
<td></td>
</tr>
<tr>
<td>177 to 187</td>
<td>Calcareous, siltstone, gray-green, shale, gray-green, limestone, brown-gray, medium crystalline to oolitic; cut increased slightly. No odor could be discerned</td>
<td></td>
</tr>
<tr>
<td>187 to 197</td>
<td>Hit creosote, sweet odor 194'-195', calcareous, siltstone, gray-green, limestone, gray-brown, medium crystalline to oolitic. Shown of influx of brown fluid in limestone facies I think; also individual pink calcite or CA Rich Dolomite crystals</td>
<td></td>
</tr>
<tr>
<td>197 to 207</td>
<td>Calcareous, siltstone, gray-green, shale, green, minor limestone, gray-brown, oolitic, individual crystals</td>
<td></td>
</tr>
<tr>
<td>207 to 212.5</td>
<td>Calcareous, siltstone, gray-green, limestone, gray-brown,</td>
<td></td>
</tr>
<tr>
<td>DEPTH (FEET)</td>
<td>SAMPLE (NUMBER &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
</tr>
<tr>
<td>-------------</td>
<td>----------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>212.5-222</td>
<td>oolitic to medium crystalline</td>
<td></td>
</tr>
<tr>
<td>222-232</td>
<td>Calcareous, siltstone, gray-green, blocky</td>
<td></td>
</tr>
<tr>
<td>232-242</td>
<td>Calcareous, siltstone, gray-green, limestone, gray-brown, medium crystalline, fracture features</td>
<td></td>
</tr>
<tr>
<td>242-252</td>
<td>Calcareous, siltstone and shale, gray-green to maroon, minor limestone, gray-brown, medium crystalline</td>
<td></td>
</tr>
<tr>
<td>252-262.5 TD</td>
<td>Ratty drilling at 256' and 258' might have another show here; 10 5/8&quot; limestone, gray-green, coarsely crystalline, crystal growth, Hole calcareous siltstone, gray-green, minor shale, green</td>
<td></td>
</tr>
<tr>
<td>262-272</td>
<td>H₂O at Shale, gray, fissile, extremely soft</td>
<td></td>
</tr>
<tr>
<td>268-269'</td>
<td>Stab + Bit 27' Table at 4.2'</td>
<td></td>
</tr>
<tr>
<td>272-282</td>
<td>Calcareous, siltstone, gray, limestone, gray, medium crystalline</td>
<td></td>
</tr>
<tr>
<td>282-292</td>
<td>Shale, gray to maroon brown, very minor limestone fragments brown-gray, medium crystalline</td>
<td></td>
</tr>
<tr>
<td>292-298</td>
<td>Shale, gray, limestone, gray, brown, medium crystalline</td>
<td></td>
</tr>
<tr>
<td>298-305</td>
<td>Shale, gray-green to maroon brown, limestone at 304-305', gray, coarsely crystalline</td>
<td></td>
</tr>
<tr>
<td>305-312 TD</td>
<td>Shale, gray, limestone, gray to gray-brown, medium to coarsely 6 1/2 hole crystalline</td>
<td></td>
</tr>
</tbody>
</table>
**Y-12 WELL INSTALLATION PROGRAM**

**LOCATION:** Lysimeter Installation Site  
**DRILLER:** Steve Brown  
**HELPER:** Greg Shillings  
**DRILL:** Drilltech D40K

**WELL LOG**

**DATE:** START: 5/3/90  
FINISH: 5/3/90

**LOGGED BY:** Jeff Carter

**NOTES:** Stabilizer + Sub + Bit = 24.1 ft. Table height = 2.0 ft.  
Cuttings were monitored as drilling progressed but no samples were retained.

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/ROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0-6.0</td>
<td></td>
<td>Clay, medium brown to tan, scattered shale fragments, moist</td>
</tr>
<tr>
<td>6.0-10.0</td>
<td></td>
<td>Crushed limestone fill with brown clay</td>
</tr>
<tr>
<td>10.0-11.0</td>
<td></td>
<td>Limestone, medium to dark gray, very fine grained, highly argillaceous, dry (dusting)</td>
</tr>
<tr>
<td>11.0-19.6</td>
<td></td>
<td>Shale, dark to medium gray, calcareous, highly friable dry (dusting)</td>
</tr>
<tr>
<td>19.6-28.6</td>
<td></td>
<td>Shale, dark gray, slightly calcareous, silty, friable connection @ 22.1 ft, water built up 2.5 ft. from bottom in 4 minutes</td>
</tr>
<tr>
<td>28.6</td>
<td></td>
<td>Total Depth</td>
</tr>
</tbody>
</table>

**THICKNESS OF SOIL:** 10.0'  
**DEPTH DRILLED IN ROCK:** 18.6'  
**TOTAL DEPTH OF WELL:** 28.6'
### Y-12 WELL INSTALLATION PROGRAM

**LOCATION:** Bear Creek Burial Grounds/Oil

**DRILLER:** Mark Baker

**HELPER:** Bucky Young/Mark Coapman

**DRILL:** Ingersoll Rand XL 750

**DATE:** START: 5/23/90

**FINISH:** 5/31/90

**LOGGED BY:** C.G. Hagegeorge

**NOTES:** Hit good flow of water at 107 ft. Water level 4 ft. above ground level would flow at ground level.

### WELL LOG

**THICKNESS OF SOIL:** 8.0 ft.

**DEPTH DRILLED IN ROCK:** 109 ft.

**TOTAL DEPTH OF WELL:** 117 ft.

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROM</td>
<td>TO</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>56</td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>70</td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>90</td>
<td></td>
</tr>
</tbody>
</table>

- Clay, yellow-brown.
- Weathered-shale, olive green, fissile.
- Fresh rock -- limestone, gray fine crystalline. Some shale, olive green, heavily weathered. Suspect weathered shale from up the hole.
- Limestone, medium gray, fine crystalline with shale, olive green, weathered.
- Limestone, medium gray, fine crystalline, shale, olive green, silty. Some siltstone. Some weathering. Water coming in.
- Shale, gray green, fissile.
- Shale, gray green, fissile. Some iron staining.
- Limestone, medium gray, very fine to fine crystalline.
- Scattered iron staining.
- Shale, gray green and gray with limestone, medium gray, fine crystalline. Shale and limestone probably interbedded.
- Shale, medium to dark gray, fissile.
- Shale, gray-green and dark gray, some mottled, fissile, with limestone, medium to dark gray, fine crystalline.
- Shale, gray-green, and dark gray, some mottled, fissile, with limestone, medium to dark gray, fine crystalline.
<table>
<thead>
<tr>
<th>Depth (feet)</th>
<th>Sample (Number &amp; Interval)</th>
<th>Soil/Bedrock Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 to 99</td>
<td></td>
<td>Shale, medium to dark gray and gray green, fissile.</td>
</tr>
<tr>
<td>99 to 107</td>
<td></td>
<td>Limestone gray brown, fine crystalline with shale, gray-green fissile.</td>
</tr>
<tr>
<td>107 to 117</td>
<td></td>
<td>Limestone, medium gray to gray-brown, fine crystalline.</td>
</tr>
<tr>
<td>117</td>
<td></td>
<td>TOTAL DEPTH</td>
</tr>
</tbody>
</table>

NOTES:

*Water at approximately 33 ft.

*Water at 107 ft. Flowing in hole at rate of 1 ft/1 to 2 min. Water level 4 ft above ground level. Would probably be artesian at ground level.
**Y-12 WELL INSTALLATION PROGRAM**

<table>
<thead>
<tr>
<th>LOCATION:</th>
<th>Bear Creek Burial Grounds/oil landfarm</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRILLER:</td>
<td>Mark Baker</td>
</tr>
<tr>
<td>HELPER:</td>
<td>Steve Brown</td>
</tr>
<tr>
<td>DRILL:</td>
<td>Ingersoll Rand XL 750</td>
</tr>
</tbody>
</table>

**WELL LOG**

<table>
<thead>
<tr>
<th>DATE: START:</th>
<th>5/31/90</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATE: FINISH:</td>
<td>6/1/90</td>
</tr>
</tbody>
</table>

LOGGED BY: Charles G. Hagegeorge

**NOTES:**

-...

**THICKNESS OF SOIL:** 5.0'

**DEPTH Drilled in ROCK:** 22.5'

**TOTAL DEPTH of WELL:** 27.5'

<table>
<thead>
<tr>
<th>DEPTH</th>
<th>SAMPLE</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROM</td>
<td>TO</td>
<td></td>
</tr>
<tr>
<td>INTERVAL</td>
<td></td>
<td>Clay, yellow brown and limestone, medium to fine crystalline. Poor return of cuttings.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Large diameter 24 inch casing causing loss of air pressure resulting in loss of cuttings.</td>
</tr>
<tr>
<td>0</td>
<td>5</td>
<td>OVA 71 PPM Radmeter 0 MR/ hr.</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
<td>Clay, yellow brown and limestone as above.</td>
</tr>
<tr>
<td>10</td>
<td>12</td>
<td>Fresh shale, gray green, fissile and clay.</td>
</tr>
<tr>
<td>12</td>
<td>15</td>
<td>Shale, gray green fissile</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OVA 1 PPM, Radmeter 0 MR/hr.</td>
</tr>
<tr>
<td>16</td>
<td>20</td>
<td>Light gray, finely crystalline limestone, recrystallized</td>
</tr>
<tr>
<td>20</td>
<td>22</td>
<td>Light gray, finely crystalline limestone, recrystallized</td>
</tr>
<tr>
<td>22</td>
<td>27.5</td>
<td>Dark green fissile shale</td>
</tr>
<tr>
<td>27.5</td>
<td></td>
<td>TOTAL DEPTH</td>
</tr>
</tbody>
</table>
### Y-12 WELL INSTALLATION PROGRAM

<table>
<thead>
<tr>
<th>LOCATION:</th>
<th>Y-12 Bear Creek Burial Grounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRILLER:</td>
<td>Mark Baker</td>
</tr>
<tr>
<td>HELPER:</td>
<td>Donald Kee</td>
</tr>
<tr>
<td>DRILL:</td>
<td>Ingersoll Rand XL 750</td>
</tr>
</tbody>
</table>

### WELL LOG

<table>
<thead>
<tr>
<th>DATE:</th>
<th>START: 6/5/90</th>
</tr>
</thead>
<tbody>
<tr>
<td>FINISH:</td>
<td>6/5/90</td>
</tr>
</tbody>
</table>

### NOTES:


### THICKNESS OF SOIL:

12'

### DEPTH DRILLED IN ROCK:

0'

### TOTAL DEPTH OF WELL:

11.5

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDECK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>3</td>
<td>Gravel pad</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>Tan, slightly silt - native</td>
</tr>
<tr>
<td>8</td>
<td>11</td>
<td>Weathered, tan - maroon shale; crumbly</td>
</tr>
<tr>
<td>11</td>
<td>12</td>
<td>Shale; tan - maroon; fresh rock</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>TOTAL DEPTH</td>
</tr>
</tbody>
</table>
**Y-12 WELl INSTALLATION PROGRAM**

**LOCATION:** Y-12 Bear Creek Burial Grounds  
**DRILLER:** Mark Baker  
**HELPER:** Mark Coapman  
**DRILL:** Ingersoll Rand XL 750

**WELL LOG**

**DATE:** START: 6/11/90  
**FINISH:** 6/15/90  
**LOGGED BY:** Bruce McMaster

**NOTES:**

**THICKNESS OF SOIL:** 3'

**DEPTH DRILLED IN ROCK:** 122.5'

**TOTAL DEPTH OF WELL:** 125.5'

<table>
<thead>
<tr>
<th>DEPTH (FEET) FROM TO</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 3</td>
<td>Gravel pad, dark tan, native sandy silt</td>
<td></td>
</tr>
<tr>
<td>3 10</td>
<td>Brown-maroon fissile shale, weathered</td>
<td></td>
</tr>
<tr>
<td>10 20</td>
<td>Brown-maroon fissile shale, weathered</td>
<td></td>
</tr>
<tr>
<td>20 26</td>
<td>Gray-green to brown &amp; maroon shale, silty, crumbly to fissile</td>
<td></td>
</tr>
<tr>
<td>26 30</td>
<td>Gray-green to brown &amp; maroon shale, silty, crumbly to fissile</td>
<td></td>
</tr>
</tbody>
</table>
| 30 31.5              | Gray-green to maroon shale w/minor gray oolitic limestone.  
                        | Tight drilling |
| 31.5 33              | Gray-green limestone, finely crystalline w/calcite fillings.  
<pre><code>                    | Minor maroon shale |
</code></pre>
<p>| 33 40                | Gray-maroon fissile shale w/unit-green limestone; finely crystalline |
| 40 43.0              | Oolitic and fine grained limestone gray to green; minor shale |
| 43.0 43.5            | Gray to green oolitic &amp; fine grained limestone |
| 43.5 47              | Gray to olive green fissile shale, slightly micaceous. Minor light gray limestone |
| 47 50                | Green fissile, slightly micaceous shale. Equal light gray limestone, finely crystalline |
| 50 53                | Gray to olive green fissile shale w/minor gray oolitic limestone with macro-calcite clasts |
| 53 58                | Major gray-green limestone, finely crystalline; minor gray shale |</p>
<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROM</td>
<td>TO</td>
<td></td>
</tr>
<tr>
<td>58</td>
<td>60</td>
<td>Olive green, fissile shale and gray finely crystalline limestone.</td>
</tr>
<tr>
<td>60</td>
<td>65</td>
<td>Major maroon &amp; green shale minor light gray limestone w/calcite banding.</td>
</tr>
<tr>
<td>65</td>
<td>70</td>
<td>Major maroon &amp; green shale, slight amount light gray limestone.</td>
</tr>
<tr>
<td>70</td>
<td>75</td>
<td>Light gray to dark limestone w/sparry calcite. Minor light brown shale.</td>
</tr>
<tr>
<td>75</td>
<td>78</td>
<td>Dark green finely micaceous shale, fissile, minor dark gray limestone w/calcite banding, finely crystalline.</td>
</tr>
<tr>
<td>78</td>
<td>80</td>
<td>Dark green finely micaceous shale, fissile, equal light to dark gray limestone w/sparry calcite.</td>
</tr>
<tr>
<td>80</td>
<td>85</td>
<td>Major dark green shale w/slight amount of calcite cementing. Minor dark brown shale.</td>
</tr>
<tr>
<td>85</td>
<td>90</td>
<td>Major dark green shale w/slight amount of calcite cementing. Minor dark brown shale.</td>
</tr>
<tr>
<td>90</td>
<td>92</td>
<td>Major light to dark gray limestone. recrystallized minor dark green shale.</td>
</tr>
<tr>
<td>92</td>
<td>95.5</td>
<td>Dark green shale w/small amount of calcite cementing fissile. Dark gray limestone, finely crystalline.</td>
</tr>
<tr>
<td>95.5</td>
<td>100</td>
<td>Dark gray-green limestone, finely crystalline, minor dark gray shale.</td>
</tr>
<tr>
<td>100</td>
<td>110</td>
<td>Dark gray-green limestone (w/calcite veinings) minor dark gray shale.</td>
</tr>
<tr>
<td>110</td>
<td>120</td>
<td>Massive dark gray-green shale, fissile.</td>
</tr>
<tr>
<td>120</td>
<td>125.5</td>
<td>Recrystallized limestone, dark gray.</td>
</tr>
<tr>
<td>125.5</td>
<td></td>
<td>TOTAL DEPTH</td>
</tr>
</tbody>
</table>
## Y-12 WELL INSTALLATION PROGRAM

**LOCATION:** Y-12 Bear Creek burial Grounds  
**DRILLER:** Mark Baker  
**HELPER:** Mark Coapman  
**DRILL:** Ingersoll Rand XL 750

### NOTES:

-...

### THICKNESS OF SOIL: 3'

### DEPTH DRILLED IN ROCK: 44.4'

### TOTAL DEPTH OF WELL: 47.4'

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 1.5</td>
<td>Gravel Pad</td>
<td></td>
</tr>
<tr>
<td>1.5 - 3.0</td>
<td>Native soil - tan sandy silt.</td>
<td></td>
</tr>
<tr>
<td>3 - 10</td>
<td>Weathered maroon to light brown shale, blocky, massive crumbly.</td>
<td></td>
</tr>
<tr>
<td>10 - 20</td>
<td>Weathered maroon to light brown shale, blocky, massive, minor light green weathered shale, crumbly.</td>
<td></td>
</tr>
<tr>
<td>20 - 25</td>
<td>Weathered maroon to light brown shale; blocky, massive crumbly</td>
<td></td>
</tr>
<tr>
<td>25 - 30</td>
<td>Fresh shale, maroon, light brown, fissile, slightly micaceous.</td>
<td></td>
</tr>
<tr>
<td>30 - 35.5</td>
<td>Shale, maroon, light brown, fissile, slightly micaceous</td>
<td></td>
</tr>
<tr>
<td>35.5 - 41.0</td>
<td>Shale, maroon, light brown, fissile, slightly micaceous</td>
<td></td>
</tr>
<tr>
<td>41.0 - 47.4</td>
<td>Limestone, light to dark gray, recrystallized</td>
<td></td>
</tr>
<tr>
<td>47.4</td>
<td>TOTAL DEPTH</td>
<td></td>
</tr>
</tbody>
</table>
# Y-12 WELL INSTALLATION PROGRAM

**LOCATION:** Y-12 Bear Creek Burial Grounds  
**DRILLER:** Mark Baker  
**HELPER:** Mark Coapman  
**DRILL:** Ingersoll Rand XL 750

**DATE:**  
**START:** 5/19/90  
**FINISH:** 6/19/90  
**LOGGED BY:** Bruce McMaster

**THICKNESS OF SOIL:** 11'  
**DEPTH DRILLED IN ROCK:** 13.3'  
**TOTAL DEPTH OF WELL:** 24.3'

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 2</td>
<td>Gravel Pad</td>
<td></td>
</tr>
<tr>
<td>2 - 11</td>
<td>Tan, sandy silt - native</td>
<td></td>
</tr>
<tr>
<td>11 - 16.5</td>
<td>Tan-maroon weathered shale, crumbly, dry.</td>
<td></td>
</tr>
<tr>
<td>16.5 - 20.0</td>
<td>Moist shale, weathered, tan - maroon</td>
<td></td>
</tr>
<tr>
<td>20 - 22</td>
<td>Weathered moist shale, tan - maroon</td>
<td></td>
</tr>
<tr>
<td>22 - 24.3</td>
<td>Fresh shale; tan - maroon, fissile.</td>
<td></td>
</tr>
<tr>
<td>24.3</td>
<td>TOTAL DEPTH</td>
<td></td>
</tr>
<tr>
<td>DEPTH (FEET)</td>
<td>SAMPLE (NUMBER &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>0</td>
<td>0.5</td>
<td>Gravel pad</td>
</tr>
<tr>
<td>0.5</td>
<td>1.0</td>
<td>Native tan-maroon sandy silt.</td>
</tr>
<tr>
<td>1.0</td>
<td>5.0</td>
<td>Variegated maroon-tan-dark green weathered shales. Some glauconite blebs in bonded layers of light green shale.</td>
</tr>
<tr>
<td>5.0</td>
<td>10.0</td>
<td>Maroon siltstones and shales, slightly micaceous; weathered.</td>
</tr>
<tr>
<td>10.0</td>
<td>14.0</td>
<td>Maroon siltstones and shales, slightly micaceous, weathered.</td>
</tr>
<tr>
<td>14.0</td>
<td>20.0</td>
<td>Mostly fresh maroon siltstones and shales - siltstones competent, shales fissile.</td>
</tr>
<tr>
<td>20.0</td>
<td>21.5</td>
<td>Maroon siltstones and shales, minor limestone.</td>
</tr>
<tr>
<td>21.5</td>
<td>30</td>
<td>Light maroon shale - dark green shale - fissile minor limestone at 25'. Water at 30'.</td>
</tr>
<tr>
<td>30</td>
<td>36.5</td>
<td>Maroon shale - fissile with landing of light tan - green. Glauconite partings in shale.</td>
</tr>
</tbody>
</table>
**Y-12 WELL INSTALLATION PROGRAM**

**LOCATION:** Bear Creek Burial Grounds/Oil Landfarm  
**DRILLER:** Mark Baker  
**HELPER:** Mark Coapland  
**DRILL:** Ingersoll Rand T-4

**DATE:** START: 5/22/90  
**FINISH:** 5/25/90  
**LOGGED BY:** Timothy A. Lee

**NOTES:**

**THICKNESS OF SOIL:** 0.5'  
**DEPTH DRILLED IN ROCK:** 28.8'  
**TOTAL DEPTH OF WELL:** 29.3'

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROM</td>
<td>TO</td>
<td></td>
</tr>
<tr>
<td>0.0</td>
<td>0.5</td>
<td>Gravel fill</td>
</tr>
<tr>
<td>0.5</td>
<td>5.0</td>
<td>Weathered shale, dark yellowish orange to brownish yellow, iron stains.</td>
</tr>
<tr>
<td>5.0</td>
<td>10.0</td>
<td>Weathered shale, dark yellowish orange to reddish brown, iron stains; scattered sandstone fine gravel. RAD=0.05-0.1</td>
</tr>
<tr>
<td>10.0</td>
<td>15.0</td>
<td>Weathered shale, dark yellowish orange to reddish brown, iron stains; scattered sandstone, fine grained. RAD=Background</td>
</tr>
<tr>
<td>15.0</td>
<td>20.0</td>
<td>Weathered shale and siltstone, dark yellowish orange to reddish brown, iron stains; scattered sandstone, fine grained. RAD=Background.</td>
</tr>
<tr>
<td>20.0</td>
<td>25.0</td>
<td>Weathered shale, dark yellowish orange, reddish brown and greenish grey, iron stains; scattered sandstone fragments, fine grained.</td>
</tr>
<tr>
<td>25.0</td>
<td>29.3</td>
<td>Weathered shale, dark yellowish orange, reddish brown, greenish grey, iron stains; scattered sandstone, fine grained. RAD ≤ Background</td>
</tr>
<tr>
<td>29.3</td>
<td>TOTAL DEPTH</td>
<td></td>
</tr>
</tbody>
</table>

**PAGE 1 OF 1**
Y-12 WELL INSTALLATION PROGRAM

**LOCATION:** Y-12 Bear Creek Burial Grounds

**DRILLER:** Mark Baker

**HELPER:** Mark Coapman

**DRILL:** Ingersoll Rand XL 750

**DATE:** START: 6/19/90

**FINISH:** 6/2/90

**LOGGED BY:** Bruce Mc MASTER

**NOTES:**

**THICKNESS OF SOIL:** 1

**DEPTH DRILLED IN ROCK:** 22.4

**TOTAL DEPTH OF WELL:** 23.4

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>Gravel pad</td>
</tr>
<tr>
<td>1</td>
<td>3.2</td>
<td>Orange - Brown, weathered shale, slightly damp</td>
</tr>
<tr>
<td>3.2</td>
<td>5.2</td>
<td>Tan - Brown weathered shale</td>
</tr>
<tr>
<td>5.2</td>
<td>8.0</td>
<td>Dark orange - brown, weathered shale, slightly sandy</td>
</tr>
<tr>
<td>8.0</td>
<td>10.0</td>
<td>Tan - Dark brown shale, weathered deeply</td>
</tr>
<tr>
<td>10.0</td>
<td>15.5</td>
<td>Tan - Dark brown weathered shale</td>
</tr>
<tr>
<td>15.5</td>
<td>16.2</td>
<td>Gray - maroon shale, weathered slightly micaceous</td>
</tr>
<tr>
<td>16.2</td>
<td>23.4</td>
<td>Top fresh shale at 16.5-gray-maroon; fissile minor light gray, finely crystalline limestone</td>
</tr>
<tr>
<td>23.4</td>
<td></td>
<td>TOTAL DEPTH</td>
</tr>
</tbody>
</table>
**Y-12 WELL INSTALLATION PROGRAM**

| LOCATION: | Burial Grounds/Oil Landform |
| DRILLER:  | Mark Baker                  |
| HELPER:   | Mark Coaplard               |
| DRILL:    | Ingersoll Rand T-4 750     |

**WELL LOG**

| DATE: | START: 6-26-90 |
|       | FINISH: 7-03-90 |
| LOGGED BY: | Timothy A. Lee |

**NOTES:** Loss of circulation at 34.0' required sparingly use of drill soap/foam used Quick foam from Baroid drilling fluid, Houston, TX. (isopropyl alcohol; ethyl alcohol; alcohol ether sulfate)

**THICKNESS OF SOIL:** 19.0'

**DEPTH DRILLED IN ROCK:** 66.8'

**TOTAL DEPTH OF WELL:** 85.8'

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROM</td>
<td>TO</td>
<td>INTERVAL</td>
</tr>
<tr>
<td>0.0</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>0.5</td>
<td>10.0</td>
<td></td>
</tr>
<tr>
<td>10.0</td>
<td>17.5</td>
<td></td>
</tr>
<tr>
<td>17.5</td>
<td>19.0</td>
<td></td>
</tr>
<tr>
<td>19.0</td>
<td>23.5</td>
<td></td>
</tr>
<tr>
<td>23.5</td>
<td>27.0</td>
<td></td>
</tr>
<tr>
<td>27.0</td>
<td>28.0</td>
<td></td>
</tr>
<tr>
<td>28.0</td>
<td>30.0</td>
<td></td>
</tr>
<tr>
<td>30.0</td>
<td>34.0</td>
<td></td>
</tr>
<tr>
<td>34.0</td>
<td>41.0</td>
<td></td>
</tr>
<tr>
<td>41.0</td>
<td>45.0</td>
<td></td>
</tr>
<tr>
<td>45.0</td>
<td>46.5</td>
<td></td>
</tr>
<tr>
<td>46.5</td>
<td>58.0</td>
<td></td>
</tr>
</tbody>
</table>

**PAGE OF**
<table>
<thead>
<tr>
<th>Depth (Feet)</th>
<th>Sample (Number &amp; Interval)</th>
<th>Soil/Bedrock Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>58.0-60.0</td>
<td></td>
<td>Cavity, softer drilling, no returns.</td>
</tr>
<tr>
<td>60.0-63.5</td>
<td></td>
<td>No returns, &quot;ratty drilling&quot;.</td>
</tr>
<tr>
<td>63.5-65.0</td>
<td>Dolomite, olive gray to tan, medium grained.</td>
<td></td>
</tr>
<tr>
<td>65.0-70.0</td>
<td>Dolomite, olive gray, medium grained, hard drilling.</td>
<td></td>
</tr>
<tr>
<td>70.0-75.0</td>
<td>Dolomite, olive gray, medium grained, silty. Slight drilling break from 73.5 to 74.0 feet with iron staining.</td>
<td></td>
</tr>
<tr>
<td>75.0-80.0</td>
<td>Dolomite, olive gray, dark olive gray and brownish olive gray, silty, &quot;sugary&quot; texture, drilling break from 76.0 to 77.5 feet. (Possible fracture?)</td>
<td></td>
</tr>
<tr>
<td>80.0-83.0</td>
<td>Dolomite and limey dolomite, olive gray to brownish olive gray, medium grained; scattered fragments of black silty shale, scattered chert fragments.</td>
<td></td>
</tr>
<tr>
<td>83.0-85.8</td>
<td>Dolomite, light olive gray, &quot;sugary&quot; texture, scattered iron staining.</td>
<td></td>
</tr>
<tr>
<td>85.8</td>
<td>Total Depth</td>
<td></td>
</tr>
</tbody>
</table>
Y-12 WELL INSTALLATION PROGRAM

**LOCATION:** Bear Creek Burial Grounds
**DRILLER:** Mark Baker
**HELPERS:** Mark Coapman
**DRILL:** Ingersoll Rand XL 750

**DATE:** START: 7-06-90
**FINISH:** 7-23-90

**NOTES:** b.g.s. = below ground surface; hydraulic hose leak detected at 36.0 feet; down @ 51.0 feet to fix leak; down @ 62.5 feet to fix hydraulic pump.

**THICKNESS OF SOIL:** 29.8'

**DEPTH DRILLED IN ROCK:** 46.1'

**TOTAL DEPTH OF WELL:** 75.9'

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROM</td>
<td>TO</td>
<td>INTERVAL</td>
</tr>
<tr>
<td>0.0</td>
<td>0.5</td>
<td>Gravel pad.</td>
</tr>
<tr>
<td>0.5</td>
<td>20.0</td>
<td>Clay, dark yellowish orange, scattered chert, weathered chert. (flint) OVA less than 0.05 ppm.</td>
</tr>
<tr>
<td>20.0</td>
<td>25.0</td>
<td>Clay, dark yellowish orange, scattered fragments of weathered chert and chert (flint).</td>
</tr>
<tr>
<td>25.0</td>
<td>29.8</td>
<td>Clay, dark yellowish orange, scattered fragments of chert (flint) OVA less than .05 ppm, RAD background.</td>
</tr>
<tr>
<td>29.8</td>
<td>35.0</td>
<td>&quot;Fresh rock&quot;</td>
</tr>
<tr>
<td>35.0</td>
<td>38.8</td>
<td>Dolomite, very hard, siliceous, light olive gray, medium crystalline, scattered chert (flint). RAD background.</td>
</tr>
<tr>
<td>38.8</td>
<td>45.0</td>
<td>Dolomite, hard, light gray, medium crystalline, &quot;sugary&quot; texture, scattered fragments of chert. RAD background.</td>
</tr>
<tr>
<td>45.0</td>
<td>51.0</td>
<td>Dolomite, hard, light gray to olive gray, medium crystalline &quot;sugary&quot; texture, scattered fragments of chert.</td>
</tr>
<tr>
<td>51.0</td>
<td>55.0</td>
<td>Dolomite, hard, olive gray, fine to medium crystalline, scattered chert fragments.</td>
</tr>
<tr>
<td>55.0</td>
<td>60.0</td>
<td>Dolomite, hard, olive gray, fine to medium crystalline; scattered chert fragments; scattered dolomite, light gray, &quot;sugary&quot; texture.</td>
</tr>
<tr>
<td>DEPTH (FEET)</td>
<td>SAMPLE (NUMBER &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
</tr>
<tr>
<td>-------------</td>
<td>---------------------------</td>
<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td>60.0 - 63.8</td>
<td>Dolomite, hard, olive gray, fine to medium crystalline,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>scattered chert fragments.</td>
<td></td>
</tr>
<tr>
<td>63.8 - 65.0</td>
<td>Dolomite, light olive gray, fine crystalline, with 2 dark</td>
<td></td>
</tr>
<tr>
<td></td>
<td>gray glassy, oolitic, chert.</td>
<td></td>
</tr>
<tr>
<td>65.0 - 75.9</td>
<td>Dolomite, olive gray to dark olive gray, with thin hairline</td>
<td></td>
</tr>
<tr>
<td></td>
<td>fractures filled with white dolomite.</td>
<td></td>
</tr>
<tr>
<td>75.9</td>
<td>Total Depth</td>
<td></td>
</tr>
</tbody>
</table>

*Note: Water at 68', had 26' of fillup in 1 3/4 hours.
**Y-12 WELL INSTALLATION PROGRAM**

**LOCATION:** Y-12 Bear Creek Burial Grounds  
**DRILLER:** Mark Baker  
**HELPER:** Mark Coapman  
**DRILL:** Ingersoll Rand XL-750

**DATE:** START: 8/17/90  
**DATE:** FINISH: 8/24/90  
**LOGGED BY:** Timothy A. Lee

**NOTES:** Weathered chert at 10.0 feet, fresh rock at 11.5 feet, hydraulic oil leak at 29.0 feet which did not appear to contaminate well, another hydraulic leak at 59 feet which did not appear to contaminate well.

**THICKNESS OF SOIL:** 10.0'

**DEPTH DRILLED IN ROCK:** 81.0'

**TOTAL DEPTH OF WELL:** 91.0'

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 - 10.0</td>
<td></td>
<td>Clay, sticky, dark yellowish orange to moderate brown, scattered fragments of weathered chert (RAD ≤ Background; OVA &lt; 0.05 ppm).</td>
</tr>
<tr>
<td>10.0 - 11.5</td>
<td></td>
<td>Predominately weathered chert, very hard. (RAD ≤ Background; OVA &lt; 0.05 ppm).</td>
</tr>
<tr>
<td>11.5 - 20.0</td>
<td></td>
<td>Dolostone, siliceous, hard, fine to medium crystalline, light olive gray to yellowish gray, scattered chert. (RAD ≤ Background, OVA &lt; 0.05 ppm).</td>
</tr>
<tr>
<td>20.0 - 25.0</td>
<td></td>
<td>Dolostone, siliceous, very hard, fine to medium crystalline, sugary texture, medium dark gray to dark gray, scattered fragments of &quot;dead oil&quot; or tar.</td>
</tr>
<tr>
<td>25.0 - 29.0</td>
<td></td>
<td>Dolostone, siliceous, very hard, medium to coarse crystalline, sugary texture, dark gray, platey.</td>
</tr>
<tr>
<td>29.0 - 35.0</td>
<td></td>
<td>Dolostone, fine crystalline, sugary textured, olive gray, hard; minor shale, olive black; scattered chert fragments.</td>
</tr>
<tr>
<td>35.0 - 45.0</td>
<td></td>
<td>Dolostone, very sugary texture, light olive gray, very slight iron staining.</td>
</tr>
<tr>
<td>45.0 - 50.0</td>
<td></td>
<td>Dolostone, fine to medium crystalline, sugary textured, hard, scattered chert fragments, slight iron staining. (RAD ≤ Background)</td>
</tr>
<tr>
<td>DEPTH (FEET)</td>
<td>SAMPLE (NUMBER &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
</tr>
<tr>
<td>--------------</td>
<td>----------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>50.0 - 56.0</td>
<td>Dolostone, fine crystalline, hard, olive gray to brownish</td>
<td>gray, definite drilling break at 54.0 feet, dark olive gray fracture filling, cherty. (RAD ≤ Background)</td>
</tr>
<tr>
<td>56.0 - 61.0</td>
<td>Dolostone, fine crystalline, hard, olive gray.</td>
<td></td>
</tr>
<tr>
<td>61.0 - 66.0</td>
<td>Dolostone, fine crystalline, olive gray, hard, siliceous, scattered fragments of chert. (RAD ≤ Background)</td>
<td></td>
</tr>
<tr>
<td>66.0 - 71.0</td>
<td>Dolostone, olive gray, fine to medium crystalline, hard, scattered fragments of chert. (RAD ≤ Background)</td>
<td></td>
</tr>
<tr>
<td>71.0 - 76.0</td>
<td>Dolostone, olive gray, fine to medium crystalline, hard, (PV = .5 ppm and RAD ≤ Background).</td>
<td></td>
</tr>
<tr>
<td>76.0 - 81.0</td>
<td>Dolostone, light olive gray, medium crystalline, iron staining; scattered fragments of oolitic chert. (Slight odor detected by driller, photovac = .5 ppm; RAD ≤ Background).</td>
<td></td>
</tr>
<tr>
<td>81.0 - 86.0</td>
<td>Dolostone, olive gray to brownish gray, fine to medium crystalline, styolites.</td>
<td></td>
</tr>
<tr>
<td>86.0 - 91.0</td>
<td>Dolostone, light olive gray to olive gray, fine to medium crystalline, definite iron stains, scattered chert fragments, RAD Background, PV = .5 ppm.</td>
<td></td>
</tr>
<tr>
<td>91.0</td>
<td>Total Depth</td>
<td></td>
</tr>
<tr>
<td>DEPTH (FEET)</td>
<td>SAMPLE (NUMBER &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>0.0 to 11.0</td>
<td>Clay, moist, dark yellowish orange, scattered weathered chert. (RAD ≤ Background, PV = less than 05 ppm).</td>
<td></td>
</tr>
<tr>
<td>11.0 to 39.0</td>
<td>Clay, dark yellowish orange mottled with yellowish gray; weathered chert; soft drilling, poor returns (RAD ≤ Background, PV less than 05 ppm).</td>
<td></td>
</tr>
<tr>
<td>39.0 to 49.5</td>
<td>Clay, dark yellowish orange; weathered chert; shale. weathered, grayish yellowish green. (RAD ≤ Background, PV less than 05 ppm)</td>
<td></td>
</tr>
<tr>
<td>49.5 to 51.0</td>
<td>Dolostone, light olive gray, siliceous, sugary textured, hard drilling.</td>
<td></td>
</tr>
<tr>
<td>51.0 to 53.0</td>
<td>Cavity, soft, clay filled.</td>
<td></td>
</tr>
<tr>
<td>53.0 to 57.5</td>
<td>Dolostone, light olive gray, siliceous, sugary textured, chert.</td>
<td></td>
</tr>
<tr>
<td>57.5 to 60.0</td>
<td>Cavity, clay filled, poor returns.</td>
<td></td>
</tr>
<tr>
<td>60.0 to 62.5</td>
<td>Dolostone, siliceous, light olive gray, sugary textured, chert.</td>
<td></td>
</tr>
<tr>
<td>62.5 to 64.0</td>
<td>Cavity, clay filled, poor returns.</td>
<td></td>
</tr>
<tr>
<td>64.0 to 70.5</td>
<td>Dolostone, light olive gray, sugary texture, hard drilling, chert (RAD ≤ Background, PV = less than 05 ppm).</td>
<td></td>
</tr>
<tr>
<td>70.5 to 73.0</td>
<td>Dolostone, light olive gray, iron staining, sugary texture,</td>
<td></td>
</tr>
<tr>
<td>Depth (Feet)</td>
<td>Sample (Number &amp; Interval)</td>
<td>Soil/Bedrock Description</td>
</tr>
<tr>
<td>-------------</td>
<td>----------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>70.5 - 73.0</td>
<td>(Continued from page 1) ratty drilling, chert, (fractures?).</td>
<td></td>
</tr>
<tr>
<td>73.0 - 80.1</td>
<td>Dolostone, light olive gray to olive gray, iron staining, sugary texture, hard, chert fragments.</td>
<td></td>
</tr>
<tr>
<td>80.1</td>
<td>Total Depth.</td>
<td></td>
</tr>
</tbody>
</table>
Y-12 WELL INSTALLATION PROGRAM

LOCATION: Oil Landfarm
DRILLER: Mark Baker
HELPER: Mark Coapman
DRILL: Ingersoll Rand XL 750

NOTES:

THICKNESS OF SOIL: 7.0'
DEPTH DRILLED IN ROCK: 13.8'
TOTAL DEPTH OF WELL: 20.8'

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROM 0.0 0.5</td>
<td>Crushed rock pad.</td>
<td></td>
</tr>
<tr>
<td>0.5 1.0</td>
<td>Topsoil, brown.</td>
<td></td>
</tr>
<tr>
<td>1.0 7.0</td>
<td>Clay, light brown and tan.</td>
<td></td>
</tr>
<tr>
<td>7.0 9.5</td>
<td>Shale, weathered, soft, medium dark gray, silty, brown iron stained jointing.</td>
<td></td>
</tr>
<tr>
<td>9.5 12.0</td>
<td>Siltstone, moderate olive brown, slightly weathered, medium hard to hard, thin banded, abundant joints perpendicular to bedding, scattered thin micaceous partings.</td>
<td></td>
</tr>
<tr>
<td>12.0 15.0</td>
<td>Shale, silty, moderate olive brown, slightly weathered.</td>
<td></td>
</tr>
<tr>
<td>15.0 20.5</td>
<td>Shale, medium bluish gray, fissile.</td>
<td></td>
</tr>
<tr>
<td>20.8</td>
<td>Total Depth</td>
<td></td>
</tr>
</tbody>
</table>
# Y-12 Well Installation Program

**Location:** Y-12 Bear Creek Burial Grounds  
**Driller:** Mark Baker  
**Helper:** Mark Coapman  
**Drill:** Ingersoll Rand XL-750  

**Notes:** Water encountered at 11.0'  
Weathered Rock at 7.5 feet; Fresh Rock at 11.0 feet  

**Thickness of Soil:** 11.0'  
**Depth Drilled in Rock:** 40.5'  
**Total Depth of Well:** 51.5'

<table>
<thead>
<tr>
<th>Depth (Feet)</th>
<th>Sample (Number &amp; Interval)</th>
<th>Soil/Bedrock Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 - 3.5</td>
<td>Clay, moderate brown, scattered vegetation</td>
<td></td>
</tr>
<tr>
<td>3.5 - 7.5</td>
<td>Clay dark yellowish orange, scattered weathered chert fragments moist at 7.5 feet (RAD: Background, OVA: .5 ppm)</td>
<td></td>
</tr>
<tr>
<td>7.5 - 11.0</td>
<td>Weathered shale, olive gray, iron staining</td>
<td></td>
</tr>
<tr>
<td>11.0 - 13.5</td>
<td>Limestone, olive gray, wet, medium fine crystalline, hard, massive; scattered fragments of shale, olive gray (RAD: Background; OVA: .05 ppm)</td>
<td></td>
</tr>
<tr>
<td>13.5 - 18.0</td>
<td>Limestone, olive gray, medium fine crystalline, hard massive, scattered fragments of shale, olive gray (RAD: Background; OVA: .05 ppm)</td>
<td></td>
</tr>
<tr>
<td>18.0 - 24.0</td>
<td>Shale dark greenish gray, softer, scattered fragments of limestone, olive gray, medium fine crystalline</td>
<td></td>
</tr>
<tr>
<td>24.0 - 26.0</td>
<td>Limestone, olive gray, hard, medium crystalline</td>
<td></td>
</tr>
<tr>
<td>26.0 - 32.0</td>
<td>Shale, olive gray to dark greenish gray, soft, scattered fragments of limestone, olive gray to brownish gray, medium crystalline</td>
<td></td>
</tr>
<tr>
<td>32.0 - 41.0</td>
<td>Limestone, olive gray, medium crystalline, sucrosic hard; scattered shale, dark greenish gray, minor scattered sandstone reddish brown (RAD: Background; OVA: .05 ppm)</td>
<td></td>
</tr>
<tr>
<td>41.0 - 43.0</td>
<td>Shale, dark greenish gray, soft (RAD: Background; OVA: .05 ppm)</td>
<td></td>
</tr>
<tr>
<td>Depth (Feet)</td>
<td>Sample (Number &amp; Interval)</td>
<td>Soil/Bedrock Description</td>
</tr>
<tr>
<td>-------------</td>
<td>---------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>13.0 - 31.5</td>
<td></td>
<td>Shale, dark greenish gray to olive gray, soft.</td>
</tr>
<tr>
<td>31.5</td>
<td></td>
<td>Total Depth</td>
</tr>
</tbody>
</table>
**Y-12 WELL INSTALLATION PROGRAM**

**LOCATION:** Bear Creek Burial Grounds

**DRILLER:** Mark Baker

**HELPER:** Mark Coapman

**DRILL:** Ingersoll Rand XL 750

**DATE:** START: 7-25-90

**DATE:** FINISH: 7-30-90

**LOGGED BY:** Timothy A. Lee/ Michael L. Ebers

**NOTES:** Water encountered at 17.0'. Water level at 11.0'.

---

**THICKNESS OF SOIL:** 9.5'

**DEPTH DRILLED IN ROCK:** 21.7'

**TOTAL DEPTH OF WELL:** 31.2'

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 - 9.5</td>
<td></td>
<td>Clay, moderate yellowish brown, locally fine silty, abundant chert, off white to medium light gray, hard, flinty.</td>
</tr>
<tr>
<td>9.5 - 13.5</td>
<td></td>
<td>Limestone, olive gray, medium fine grained, sucrosic, hard dense, massive, several limestone chips have an etched crystalline calcite druse on one side indicating solution cavities.</td>
</tr>
<tr>
<td>13.5 - 17.0</td>
<td></td>
<td>Limestone, olive gray, medium fine grained, sucrosic, hard, dense, massive, several chips have a crystalline calcite, dense.</td>
</tr>
<tr>
<td>17.0 - 18.0</td>
<td></td>
<td>Clay filled cavity, very wet, moderate yellowish orange, gravel sized fragments of limestone, brown to olive gray, secondary calcite.</td>
</tr>
<tr>
<td>18.0 - 19.0</td>
<td></td>
<td>Limestone, olive gray, medium fine crystalline, sucrosic, hard, dense, massive.</td>
</tr>
<tr>
<td>19.0 - 22.5</td>
<td></td>
<td>Shale, medium dark gray, blocky.</td>
</tr>
<tr>
<td>22.5 - 27.0</td>
<td></td>
<td>Limestone, olive gray, medium fine crystalline, sucrosic, &quot;ratty&quot; drilling, iron staining.</td>
</tr>
<tr>
<td>27.0 - 31.2</td>
<td></td>
<td>Shale, medium dark gray, blocky.</td>
</tr>
<tr>
<td>31.2</td>
<td>Total Depth</td>
<td></td>
</tr>
</tbody>
</table>
**Y-12 WELL INSTALLATION PROGRAM**

**LOCATION:** Y-12 Bear Creek Burial Grounds

**DRILLER:** Mark Baker

**HELPER:** Mark Coapman

**DRILL:** Ingersoll Rand XL 750

**DATE:** START: 8/9/90

**DATE:** FINISH: 8/10/90

**LOGGED BY:** Timothy A. Lee

**NOTES:** Top of weathered rock at 3.5', top of fresh rock at 35.0'

Water at 23.7 feet

**THICKNESS OF SOIL:** 35.0'

**DEPTH DRILLED IN ROCK:** 3.5'

**TOTAL DEPTH OF WELL:** 38.5'

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0-3.5</td>
<td>Clay, moderate yellowish orange, slightly silty, slightly damp.</td>
<td>RAD ≤ Background, OVA = 0.1 ppm</td>
</tr>
<tr>
<td>3.5-20.0</td>
<td>Clay and weathered shale; clay, moderate yellowish orange, silty, damp; weathered shale, moderate yellowish brown to grayish orange, iron stained (RAD ≤ 0.5 MR hr., OVA ≤ 0.05 ppm)</td>
<td></td>
</tr>
<tr>
<td>20.0-35.0</td>
<td>Weathered shale, moist, moderate yellowish brown to grayish orange, iron stained, minor amounts of clay, moderate yellowish silty, moist (RAD = 0.05 to 0.8 MR/hr, OVA = 0.05 ppm)</td>
<td></td>
</tr>
<tr>
<td>35.0-38.5</td>
<td>Shale, less weathered, light olive gray, moist, iron staining</td>
<td>RAD ≤ 0.5 MR/hr; OVA ≤ 0.05 ppm</td>
</tr>
<tr>
<td>38.5</td>
<td>Total Depth</td>
<td></td>
</tr>
</tbody>
</table>
**Y-12 WELL INSTALLATION PROGRAM**

| LOCATION: | Y-12 Bear Creek Burial Grounds |
| DRILLER:  | Mark Baker |
| HELPER:   | Mark Coapman |
| DRILL:    | Ingersoll Rand XL 750 |

**WELL LOG**

| DATE: | START: 5/10/90 |
|       | FINISH: 5/13/90 |
|       | LOGGED BY: Timothy A. Lee |

**NOTES:**
Top of weathered rock at 4' and top of fresh rock at 7'. Water level at 4.0 feet below ground level.

**THICKNESS OF SOIL:** 7.0'

**DEPTH DRILLED IN ROCK:** 8.5'

**TOTAL DEPTH OF WELL:** 15.5'

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>1.0</td>
<td>Gravel fill.</td>
</tr>
<tr>
<td>1.0</td>
<td>4.0</td>
<td>Clay, wet, dark yellowish orange, silty and sandy, wet.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RAD ≤ Background, OVA &lt; .05 ppm.</td>
</tr>
<tr>
<td>4.0</td>
<td>7.0</td>
<td>Weathered shale, grayish orange to moderate yellowish brown, wet, iron stains.</td>
</tr>
<tr>
<td>7.0</td>
<td>15.5</td>
<td>Shale, wet, slight iron staine, olive gray to dark greenish gray, sandy streaks.</td>
</tr>
<tr>
<td>15.5</td>
<td></td>
<td>Total Depth.</td>
</tr>
</tbody>
</table>
ERC/EDGe
Environmental and Energy Services Co.

**Y-12 WELL INSTALLATION PROGRAM**

<table>
<thead>
<tr>
<th>LOCATION:</th>
<th>Y-12 Burial Grounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRILLER:</td>
<td>Mark Baker</td>
</tr>
<tr>
<td>HELPER:</td>
<td>Mark Coapman</td>
</tr>
<tr>
<td>DRILL:</td>
<td>Ingersoll Rand XL-750</td>
</tr>
</tbody>
</table>

**NOTES:**
First water at 57.0 feet. Well had 30 feet of water overnight.

**DATE:** START: 9-05-90  
FINISH: 9-06-90

**LOGGED BY:** Michael L. Ebers

**THICKNESS OF SOIL:** and weathered rock = 47.0 feet

**DEPTH DRILLED IN ROCK:** 18.0 feet

**TOTAL DEPTH OF WELL:** 65.0 feet

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROM TO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.0 9.0</td>
<td></td>
<td>Clay, reddish brown, silty with weathered sandstone fragments, moderate red, black and yellow, damp, soft.</td>
</tr>
<tr>
<td>9.0 17.0</td>
<td></td>
<td>Shale, weathered, moderate red with thin beds of light olive gray weathered siltstone, dry, soft, friable.</td>
</tr>
<tr>
<td>17.0 36.0</td>
<td></td>
<td>Sandstone, deeply weathered, light olive gray, dry, interbedded with shale, moderate red, dry, soft, friable, weathered.</td>
</tr>
<tr>
<td>36.0 37.0</td>
<td></td>
<td>Sandstone, fine grained, medium light gray, fairly hard, dry.</td>
</tr>
<tr>
<td>37.0 47.0</td>
<td></td>
<td>Shale, medium gray and moderate red, soft, weathered micaceous, slightly damp.</td>
</tr>
<tr>
<td>47.0 57.0</td>
<td>Top of Bedrock</td>
<td>Shale, medium dark gray, slightly weathered, medium soft to medium hard, dry.</td>
</tr>
<tr>
<td>57.0 65.0</td>
<td></td>
<td>Siltstone, light greenish gray, hard, moist, water at 57.0 feet.</td>
</tr>
<tr>
<td>65.0</td>
<td>Total Depth</td>
<td></td>
</tr>
<tr>
<td>DEPTH (FEET)</td>
<td>SAMPLE (NUMBER &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>0.0 - 1.3</td>
<td>Concrete</td>
<td></td>
</tr>
<tr>
<td>1.3 - 3.5</td>
<td>Crushed stone with silt, brown</td>
<td></td>
</tr>
<tr>
<td>3.5 - 5.0</td>
<td>s-1/3-4-4 Clay, silty brown, mottled gray w/shale fragments firm (fill)</td>
<td></td>
</tr>
<tr>
<td>5.0 - 6.0</td>
<td>Probably fill to natural</td>
<td></td>
</tr>
<tr>
<td>6.0 - 7.5</td>
<td>s-2/4-5-7 Clay, silty, brown, mottled gray, stiff (NAT)</td>
<td></td>
</tr>
<tr>
<td>7.5 - 9.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.0 - 10.5</td>
<td>s-3-7-3-16-15 Clay, silty, brown, mottled gray w/shale fragments to weathered shale, brown, very stiff</td>
<td></td>
</tr>
<tr>
<td>10.5 - 12.0</td>
<td>Probably weathered shale, brown</td>
<td></td>
</tr>
<tr>
<td>12.0 - 13.5</td>
<td>s-3-4-4-19 Weathered shale, brown</td>
<td></td>
</tr>
<tr>
<td>13.5 - 15.0</td>
<td>Probably weathered shale, brown</td>
<td></td>
</tr>
<tr>
<td>17.0 - 18.5</td>
<td>s-3-7-1-9 Weathered shale, brown</td>
<td></td>
</tr>
<tr>
<td>18.5 - 20.0</td>
<td>Probably weathered shale, brown to gray</td>
<td></td>
</tr>
<tr>
<td>20.0 - 21.5</td>
<td>s-3-5-11-11 Weathered shale, gray</td>
<td></td>
</tr>
</tbody>
</table>

**NOTES:**

- Water encountered at 18.4' upon completion.
<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>SAMPLE (NO. &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 35</td>
<td>Drill thru asphalt (1&quot;) and into fill material - light tan silty clay</td>
<td></td>
</tr>
<tr>
<td>35 - 10.0</td>
<td>Believe to be drilling concrete - cuts very hard and even; drilling fluid is light colored with sand particles as in concrete cuttings.</td>
<td></td>
</tr>
<tr>
<td>10 - 17</td>
<td>Very soft, drilling with holdback; drill steel has dark, wet, silty sand on it.</td>
<td></td>
</tr>
</tbody>
</table>
**Y-12 WELL INSTALLATION PROGRAM**

<table>
<thead>
<tr>
<th>LOCATION:</th>
<th>Y-12 Gas Station</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRILLER:</td>
<td>Mark Baker</td>
</tr>
<tr>
<td>HELPER:</td>
<td>David B. Wright/Mark Coapman</td>
</tr>
<tr>
<td>DRILL:</td>
<td>Ford 555B Back Hoe/Band XL-750</td>
</tr>
</tbody>
</table>

**WELL LOG**

| NOTES: | Petroleum odor detected at 1.0', top of weathered rock at 1.5', definite product encountered, water level at 8.7 feet with skim oil/gas. |

**THICKNESS OF SOIL:** 1.5'

**DEPTI) DRILLED IN ROCK:**

**TOTAL DEPTH OF WELL:** 19'

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 - 0.3</td>
<td>Augered</td>
<td>Asphaltic concrete.</td>
</tr>
<tr>
<td>0.3 - 0.8</td>
<td>Augered</td>
<td>Gravel fill.</td>
</tr>
<tr>
<td>0.8 - 1.5</td>
<td>Augered</td>
<td>Clay, dark yellowish orange, moist, silty, petroleum odor detected at 1.0' OVA.</td>
</tr>
<tr>
<td>1.5 - 3.5</td>
<td>Augered</td>
<td>Weathered shale, dark yellowish orange, iron stains, petroleum odor.</td>
</tr>
<tr>
<td>3.5 - 16.0</td>
<td>Air Rotary</td>
<td>* Soft, weathered shale (PV = 30 ppm, RAD ≤ Background).</td>
</tr>
<tr>
<td>16.0 - 19.0</td>
<td>Air Rotary</td>
<td>* Harder, shale (PV = 9 - 13 ppm, RAD ≤ Background).</td>
</tr>
<tr>
<td>19.0</td>
<td>Total Depth.</td>
<td></td>
</tr>
</tbody>
</table>

* No detailed lithologic description available from 3.5 to 19.0 feet due to the use of containment box.
**Y-12 WELL INSTALLATION PROGRAM**

**LOCATION:** Y-12 Fuel Station

**DRILLER:** Steve Brown

**HELPER:** Mark Coapman

**DRILL:** Ingersoll Rand XL-750/Ford 555B Backhoe

**DATE:** START: 8-29-90  
FINISH: 9-02-90

**LOGGED BY:** Timothy A. Lee

**NOTES:**  
Top of weathered rock at 1.4', petroleum odor detected at 1.0', skim oil detected on water level at 8.8' below ground surface.

**THICKNESS OF SOIL:** 1.4'

**DEPTH DRILLED IN ROCK:**

**TOTAL DEPTH OF WELL:** 16.7'

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>SAMPLE (NUMBER &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>0.4 Augered</td>
<td>Asphaltic concrete.</td>
</tr>
<tr>
<td>0.4</td>
<td>1.4 Augered</td>
<td>Gravel fill (odor detected, RAD ≤ Background, PV = 7.3 ppm).</td>
</tr>
<tr>
<td>1.4</td>
<td>3.4 Augered</td>
<td>Clay and weathered shale, dark yellowish orange, iron stains. (RAD ≤ Background, PV = 3.1 ppm, odor detected).</td>
</tr>
<tr>
<td>3.4</td>
<td>16.7 Air Rotary</td>
<td>*Shale, soft; Photovac = 17 ppm at 13'; Photovac = 33 ppm at 15'; RAD ≤ Background.</td>
</tr>
<tr>
<td>16.7</td>
<td>Total Depth</td>
<td></td>
</tr>
</tbody>
</table>

* No detailed lithologic description available from 3.4 to 16.7 feet due to the use of containment box.
## Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

### WELL NO. GH-683

### WELL LOG

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>DATE: START</th>
<th>FINISH: 10/24/90</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chestnut Ridge - Bear Creek Valley</td>
<td>10/11/90</td>
<td></td>
</tr>
</tbody>
</table>

**DRILLER:** Randy Phillips

**HELPER:** Ronnie Phillips

**DRILL:** IR XL 1050

**LOGGED BY:** B. McMaster

**DATE:**

**DRILLING METHOD:** Air Rotary

### NOTES:

- Table - 2.8' Depth drilled in rock - 171'
- Stabilizer & bit - 20.7' Total depth of well - 197.5 ft.
- Thickness of soil - 26'

<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>SAMPLE (NO. &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROM</td>
<td>TO</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>26</td>
<td>Clay and chert fragments</td>
</tr>
<tr>
<td>26</td>
<td>30</td>
<td>Light to dark gray dolostone, micritic to fine grained.</td>
</tr>
<tr>
<td>30</td>
<td>35</td>
<td>Light to dark olive gray dolostone, micritic to fine grained.</td>
</tr>
<tr>
<td>35</td>
<td>40</td>
<td>Light to dark gray dolostone, minor ribbon banding in some fragments, minor silica veinlets, fine grained. Hard drilling.</td>
</tr>
<tr>
<td>40</td>
<td>45</td>
<td>Light to dark gray dolostone, minor ribbon banding in some fragments, minor silica veinlets, fine grained.</td>
</tr>
<tr>
<td>45</td>
<td>50</td>
<td>Predominantly light gray dolostone, with minor dark gray; silica replacements gives mottled appearance, fine grained.</td>
</tr>
<tr>
<td>50</td>
<td>55</td>
<td>Light gray, fine grained dolostone, minor silica veinlets. Hard drilling.</td>
</tr>
<tr>
<td>DEPTH (ft)</td>
<td>SAMPLE (NO. &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>FROM</td>
<td>TO</td>
<td></td>
</tr>
<tr>
<td>55</td>
<td>60</td>
<td>Light gray sucrosic dolostone, ribbon banding in some fragments.</td>
</tr>
<tr>
<td>60</td>
<td>65</td>
<td>Light gray sucrosic dolostone. Hard drilling.</td>
</tr>
<tr>
<td>65</td>
<td>70</td>
<td>Predominantly light gray sucrosic dolostone, minor dark gray with silica fillings.</td>
</tr>
<tr>
<td>70</td>
<td>75</td>
<td>Light gray sucrosic dolostone with minor bluish-gray chert fragments.</td>
</tr>
<tr>
<td>75</td>
<td>80</td>
<td>Light gray sucrosic dolostone with minor bluish-gray chert fragments.</td>
</tr>
<tr>
<td>80</td>
<td>85</td>
<td>Light gray, fine grained dolostone. Hard drilling.</td>
</tr>
<tr>
<td>85</td>
<td>90</td>
<td>Light gray, fine grained dolostone.</td>
</tr>
<tr>
<td>90</td>
<td>92.5</td>
<td>Slightly darker (medium gray), fine grained dolostone, minor silica veinlets, minor oolitic chert fragments.</td>
</tr>
<tr>
<td>92.5</td>
<td>97.5</td>
<td>Medium gray, very fine grained dolostone and oolitic chert.</td>
</tr>
<tr>
<td>97.5</td>
<td>102.5</td>
<td>Medium gray, fine grained dolostone with black chert fragments.</td>
</tr>
</tbody>
</table>
| 102.5     | 108                     | Very fine-grained, medium gray dolostone with more abundant silica fragments and replacements. Minor light gray to light pink chert; minor oolitic
<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>SAMPLE (NO &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>102.5 - 108</td>
<td>chert. Small amount staining. Ribbon banding wider in fragments.</td>
<td></td>
</tr>
<tr>
<td>108 - 113</td>
<td>Very fine grained medium gray dolostone (slightly darker than previous).</td>
<td></td>
</tr>
<tr>
<td>113 - 118</td>
<td>Very fine grained medium gray dolostone; some water.</td>
<td></td>
</tr>
<tr>
<td>118 - 123</td>
<td>Light gray dolostone, fine grained to micritic, minor black chert fragments.</td>
<td></td>
</tr>
<tr>
<td>123 - 127.5</td>
<td>Dark gray very fine grained dolostone - higher silica content (recrystallization) with thread veinings. Minor black chert. Pick up more water.</td>
<td></td>
</tr>
<tr>
<td>127.5 - 134</td>
<td>Medium gray, very fine grained dolostone; highly recrystallized with silica veinings and fillings. Minor black chert.</td>
<td></td>
</tr>
<tr>
<td>134 - 139</td>
<td>Medium gray very fine grained dolostone; highly recrystallized with silica veinings and fillings. Minor black chert.</td>
<td></td>
</tr>
<tr>
<td>139 - 144</td>
<td>Medium gray very fine grained dolostone, highly recrystallized with silica veinings and fillings. Minor black chert.</td>
<td></td>
</tr>
<tr>
<td>144 - 149</td>
<td>Fine grained medium gray dolostone, minor stylolites. Very hard drilling - drill returns pulverized. Note stronger petrolierous odor.</td>
<td></td>
</tr>
<tr>
<td>DEPTH (ft)</td>
<td>SAMPLE (NO. &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
</tr>
<tr>
<td>-----------</td>
<td>------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>144-149</td>
<td></td>
<td>last 10'-12'.</td>
</tr>
<tr>
<td>149-150</td>
<td></td>
<td>Large volume of water at 150', ratty drilling to approximately 158'. Looks like honeycombed - last 3'-4' drilling relatively soft, looks like clay. Cannot contain water in pit.</td>
</tr>
<tr>
<td>150-178.5</td>
<td></td>
<td>No samples - lost circulation. Large volume water when got circulation back.</td>
</tr>
<tr>
<td>178.5-183.5</td>
<td></td>
<td>Dolostone; fine grained, light gray. Several varieties chert - banded, jasper, and oolitic. Vugs prominent, much reworked and recrystallized in fragments. Soft drilling.</td>
</tr>
<tr>
<td>183.5-188.5</td>
<td></td>
<td>Dolostone; dark gray, more prevalent than last interval. Several varieties chert - banded, jasper, oolitic. Prominent vugs, much reworked and recrystallized in fragments. Soft drilling.</td>
</tr>
<tr>
<td>188.5-192.5</td>
<td></td>
<td>Dolostone; dark gray, fine grained. Minor black chert, minor silica replacement. Hard.</td>
</tr>
<tr>
<td>192.5-197.5</td>
<td></td>
<td>Dolostone; dark gray, fine grained. Minor black chert, minor silica replacement. Hard.</td>
</tr>
</tbody>
</table>
## Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

### WELL LOG

**LOCATION:** Bear Creek Road  
**DATE:** START: 9/18/90  
**DRILLER:** Mark Baker  
**DATE:** FINISH: 11/6/90  
**HELPER:** Mark Coapman  
**DRILL:** IR XL-750  
**LOGGED BY:** Jeff Carter/B. McMaster

### NOTES:
- Begin drilling 9½" hole
- Table Height - 2.7 ft.
- Stabilizer and Bit - 16.5'

<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>SAMPLE (NO. &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROM TO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.0 9.5</td>
<td></td>
<td>Unconsolidated soils and rock fragments.</td>
</tr>
<tr>
<td>9.5 12.0</td>
<td></td>
<td>Dolostone - medium to dark gray brown, sucrosic, minor silica filled fractures.</td>
</tr>
<tr>
<td>12.0 13.8</td>
<td></td>
<td>Dolostone - medium to dark gray, sucrosic, silica filled fractures.</td>
</tr>
<tr>
<td>13.8 20.0</td>
<td></td>
<td>Dolostone - medium to dark gray brown, very fine grained, abundant silica filled fractures, minor staining and weathering noted.</td>
</tr>
<tr>
<td>20.0 25.0</td>
<td></td>
<td>Dolostone - dark to medium gray, abundant silica filled fractures, sucrosic, no staining.</td>
</tr>
<tr>
<td>25.0 35.0</td>
<td></td>
<td>Dolostone - dark to medium gray brown, abundant black chert with scattered oolites, abundant silica filled fractures, trace of staining. Open cavity from 31.0 to 32.0 feet (1.0 ft)</td>
</tr>
<tr>
<td>35.0 38.0</td>
<td></td>
<td>Dolostone - medium to dark brown gray, very fine grained, abundant silica filled fractures, scattered black chert, occasional staining.</td>
</tr>
<tr>
<td>DEPTH (ft)</td>
<td>SAMPLE (NO &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>38.8 - 40.0</td>
<td>Dolostone - medium to dark gray - black, brown in part, abundant silica oolites, fine grained; abundant silica filled fractures.</td>
<td></td>
</tr>
<tr>
<td>40.0 - 45.0</td>
<td>Dolostone - medium to dark brown gray, fine grained, abundant silica filled fractures.</td>
<td></td>
</tr>
<tr>
<td>45.0 - 52.0</td>
<td>Dolostone - medium to dark brown gray, slightly calcareous, scattered oolites. Suspect top of Maynardville at 47 feet b.g.s.</td>
<td></td>
</tr>
<tr>
<td>52.0 - 63.8</td>
<td>Dolostone - medium to dark brown gray, fine grained, slightly to very slightly calcareous, trace calcareous filled fractures, occasional oolites.</td>
<td></td>
</tr>
<tr>
<td>63.8 - 75.0</td>
<td>Dolostone - medium to dark gray brown, slight to very slightly calcareous, scattered calcite filled fractures, sucrosic. Soft drilling from 71 to 78 feet (7 feet) Cavity from 72.0 to 73.0 (1 foot)</td>
<td></td>
</tr>
<tr>
<td>75.0 - 90.0</td>
<td>Dolostone - medium to dark gray brown, very slightly calcareous, sucrosic, trace calcite filled fractures. Soft drilling from 85.0 to 87.0 feet</td>
<td></td>
</tr>
<tr>
<td>90.0 - 100.0</td>
<td>Dolostone - medium to dark gray, very slightly calcareous, scattered calcite filled fractures, fine grained, sucrosic. Ream to 15½-inch diameter hole to 100 ft depth set casing.</td>
<td></td>
</tr>
</tbody>
</table>
## Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

### WELL LOG - continued

<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>SAMPLE (NO &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>100-102</td>
<td>Light olive gray dolostone with silica fillings, fine grained, minor staining noted.</td>
<td></td>
</tr>
<tr>
<td>102-104</td>
<td>Light olive gray dolostone, fine grained, minor silica veinlets. Small amount of staining.</td>
<td></td>
</tr>
<tr>
<td>104-105</td>
<td>Light olive gray dolostone with silica veinlets. Fine grained.</td>
<td></td>
</tr>
<tr>
<td>105-110</td>
<td>Light olive gray, fine grained dolostone, minor calcite veinlets and fillings, minor staining.</td>
<td></td>
</tr>
<tr>
<td>110-115</td>
<td>Light olive gray, fine grained dolostone, minor silica veinlets, stylolites noted, some staining, picking up small amount of water.</td>
<td></td>
</tr>
<tr>
<td>115-117</td>
<td>Light to dark olive gray, fine grained dolostone, minor stylolites, some staining.</td>
<td></td>
</tr>
<tr>
<td>117-120</td>
<td>Predominantly limestone, minor dolostone. Light to dark olive gray, fine grained; minor oolites and calcite veinlets.</td>
<td></td>
</tr>
<tr>
<td>120-122</td>
<td>Limestone with minor dolostone, light to dark olive gray, fine grained. Hard drilling at 121' (chattering of rig).</td>
<td></td>
</tr>
<tr>
<td>122-124</td>
<td>Cavity - large volume of water - can't contain.</td>
<td></td>
</tr>
<tr>
<td>124-129</td>
<td>Total Depth</td>
<td>No samples - washing bit down with Halliburton aid.</td>
</tr>
</tbody>
</table>

WELL NO. GW-684
## Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

### WELL LOG

**LOCATION:** Bear Creek Road @ Chestnut Ridge Road  
**DATE:** START: 10/29/90  
**DRILLER:** Randy Phillips  
**HELPER:** Ronnie Phillips  
**DRILL:** IR RD-10  
**DATE:** FINISH: 11/12/90  
**DRILLING METHOD:** Air Rotary  
**LOGGED BY:** B. McMaster

**NOTES:**
- Depth drilled in rock - 133.5'
- Stabilizer and bit - 16.7'  
- Total depth of well - 138.5'  
- Thickness of soil - 5'

<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>SAMPLE (NO. &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
</table>
| 5          | 10                       | Medium gray, coarsely crystalline dolostone.  
            |                           | Massive with pinhole vugs, minor silica replacements. |
| 10         | 15                       | Medium gray, coarsely crystalline dolostone.  
            |                           | Massive with prominent porosity - vugs; minor silica replacements. |
| 15         | 20                       | Medium gray, coarsely crystalline dolostone.  
            |                           | Massive with prominent porosity - vugs; minor silica replacements. |
| 20         | 25                       | Medium gray, coarsely crystalline dolostone.  
            |                           | Massive with prominent porosity - vugs; minor silica replacements. |
| 25         | 30                       | Medium gray, coarsely crystalline dolostone.  
            |                           | Very minor porosity features in vugs; minor silica replacement. |
| 30         |                          | Medium gray, medium crystalline dolostone.  
            |                           | Slightly more silica replacement than previous.  
            |                           | Very small amount of black chert and
<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>SAMPLE (NO. &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROM</td>
<td>TO</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>38.2</td>
<td>Slightly darker gray, coarsely crystalline dolostone. Significant porosity in vugs. Very minor silica replacement.</td>
</tr>
<tr>
<td>38.2</td>
<td>42</td>
<td>Dark gray, coarsely crystalline dolostone. Minor porosity features in pinhole vugs.</td>
</tr>
<tr>
<td>42</td>
<td>47</td>
<td>Dark gray, coarsely crystalline dolostone. Minor porosity in vugs. Very small amount silica replacement.</td>
</tr>
<tr>
<td>47</td>
<td>52</td>
<td>Dark gray, medium crystalline dolostone. Minor porosity in vugs. Small amount silica replacement</td>
</tr>
<tr>
<td>52</td>
<td>57</td>
<td>Medium to coarsely grained dolostone. Slightly more silica replacement gives some fragments a mottled look. Very small amount of wispy or ribbon banding.</td>
</tr>
<tr>
<td>57</td>
<td>62</td>
<td>Medium to coarsely grained dolostone. Slight content of limestone fragments wispy or banded. Silica replacement in dolostone gives some fragments a mottled look.</td>
</tr>
<tr>
<td>62</td>
<td>67</td>
<td>Very fine to medium grained limestone, light to medium gray. Minor dolostone with silica replacements.</td>
</tr>
<tr>
<td>DEPTH (ft)</td>
<td>SAMPLE (NO &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
</tr>
<tr>
<td>-----------</td>
<td>------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>67 - 70.2</td>
<td>Dark gray, fine-medium grained limestone. Some fragments banded with micritic dove gray limestone to dark gray limestone. Minor silica replacement.</td>
<td></td>
</tr>
<tr>
<td>70.2 - 75</td>
<td>Dark gray, fine to medium grained limestone. Some fragments banded with micritic dove gray limestone. Minor silica replacement.</td>
<td></td>
</tr>
<tr>
<td>75 - 80.2</td>
<td>Dark gray, fine to medium grained limestone. Some fragments banded. Small amount oolites present. Minor silica replacement.</td>
<td></td>
</tr>
<tr>
<td>80.2 - 85</td>
<td>Dark gray, medium-coarse grained oolitic limestone. Minor silica replacement. Minor dark gray massive shale.</td>
<td></td>
</tr>
<tr>
<td>85 - 89</td>
<td>7&quot; casing @ 88.5'</td>
<td>Dark gray, medium coarse grained oolitic limestone. Minor dark gray massive shale.</td>
</tr>
<tr>
<td>89 - 94</td>
<td>Medium to dary gray limestone, coarsely crystalline. Minor dove gray micritic limestone, scattered oolites. Fair amount of staining in fragments. Minor calcite veins and replacement.</td>
<td></td>
</tr>
<tr>
<td>94 - 100</td>
<td>Medium to dark gray coarsely crystalline limestone. Minor dove gray micritic limestone. Oolites more abundant than previous interval. Minor calcite replacement. Minor wispy banding observed in few fragments.</td>
<td></td>
</tr>
<tr>
<td>DEPTH (ft)</td>
<td>SAMPLE (NO. &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>100 - 105</td>
<td></td>
<td>Medium to dark gray, medium crystalline limestone. Minor micritic limestone. Small amount banding observed - micritic limestone to dark gray shale. Minor oolites.</td>
</tr>
<tr>
<td>105 - 110</td>
<td></td>
<td>Medium to dark gray, medium crystalline oolitic limestone. Oolites more prevalent than previous interval. Very minor micritic limestone and one fragment of light gray dolostone.</td>
</tr>
<tr>
<td>116 - 121</td>
<td></td>
<td>Medium gray limestone. Medium to coarsely crystalline. Smaller amount oolites than previous. Minor calcite replacement.</td>
</tr>
<tr>
<td>121 - 124</td>
<td></td>
<td>Medium gray limestone, medium to coarsely crystalline. Minor micritic limestone. Dark gray massive shale more abundant than previous (still minor amount). Scattered oolitic limestone fragments.</td>
</tr>
<tr>
<td>124 - 129</td>
<td></td>
<td>Light gray finely crystalline limestone. Minor dark gray shale and scattered dark gray medium crystalline limestone.</td>
</tr>
<tr>
<td>129 - 134</td>
<td></td>
<td>Light gray, fine to medium crystalline limestone. Small amount wispy banding in some fragments.</td>
</tr>
</tbody>
</table>
### Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

#### WELL NO. GW-685

#### WELL LOG - continued

<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>SAMPLE (NO. &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>134 - 138.5</td>
<td>Total Depth</td>
<td>Medium gray - medium crystalline limestone.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Small amount calcite replacement. Minor staining.</td>
</tr>
</tbody>
</table>
Y-12 PLANT GROUNDWATER PROTECTION PROGRAM  

WELL LOG

WELL NO. GW-703

LOCATION: Bear Creek Road
DRILLER: Mark Baker
HELPER: Mark Coapman
DRILL: IR XL-750

DATE: START: 11/27/90
FINISH: 12/7/90
DRILLING METHOD: Air Rotary
LOGGED BY: B. McMaster

NOTES:
Stabilizer and bit - 19.0' 10-5/8"-diameter hole to 135'
Table - 2.7' 6½"-diameter hole to 182'

<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>SAMPLE FROM TO (NO. &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 7</td>
<td>Clay, chert fragments</td>
<td></td>
</tr>
<tr>
<td>7 to 10</td>
<td>Top weathered rock at 7'; fresh rock at 10'</td>
<td></td>
</tr>
<tr>
<td>10 to 20</td>
<td>Light to medium gray banded dolostone, fine grained</td>
<td></td>
</tr>
<tr>
<td>20 to 30</td>
<td>Light gray, fine grained dolostone.</td>
<td></td>
</tr>
<tr>
<td>30 to 40</td>
<td>Light gray, fine grained to sucrosic dolostone, minor silica replacements.</td>
<td></td>
</tr>
<tr>
<td>40 to 50</td>
<td>Light gray, fine to medium grained dolostone. Minor staining and small amount porosity fractures; vugs, healed fractures. Water at 47.5'.</td>
<td></td>
</tr>
<tr>
<td>50 to 60</td>
<td>Medium to dark gray dolostone, medium grained, small amount of staining and vugs.</td>
<td></td>
</tr>
<tr>
<td>60 to 65</td>
<td>Medium gray dolostone; medium to coarse grained, small amount of staining and vugs.</td>
<td></td>
</tr>
<tr>
<td>65 to 67</td>
<td>Medium gray dolostone; medium to coarse grained, small amount of staining and vugs.</td>
<td></td>
</tr>
<tr>
<td>DEPTH (ft)</td>
<td>SAMPLE (NO. &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
</tr>
<tr>
<td>-----------</td>
<td>--------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>FROM</td>
<td>TO</td>
<td></td>
</tr>
<tr>
<td>67</td>
<td>72</td>
<td>Medium gray, medium grained dolostone. Minor staining.</td>
</tr>
<tr>
<td>72</td>
<td>77</td>
<td>Medium gray, medium crystalline dolostone; small amount staining.</td>
</tr>
<tr>
<td>77</td>
<td>82</td>
<td>Medium gray, medium grained dolostone. Slightly more silica replacement and veinings than previous cuttings look &quot;mottled&quot;.</td>
</tr>
<tr>
<td>82</td>
<td>87</td>
<td>Medium to dark gray dolostone, medium to coarsely crystalline; minor silica replacements; small amount of vugs.</td>
</tr>
<tr>
<td>87</td>
<td>92</td>
<td>Medium to dark gray dolostone, medium to coarsely crystalline; minor silica replacement; small amount vugs.</td>
</tr>
<tr>
<td>92</td>
<td>100</td>
<td>Medium to dark gray dolostone, medium to coarsely crystalline; minor banded micritic dolostone.</td>
</tr>
<tr>
<td>100</td>
<td>110</td>
<td>Medium to dark gray dolostone, medium grained, minor staining and porosity.</td>
</tr>
<tr>
<td>110</td>
<td>112</td>
<td>Medium to dark gray dolostone, medium grained, minor staining and porosity.</td>
</tr>
<tr>
<td>112</td>
<td>117</td>
<td>Medium to dark gray dolomitic limestone, fine to medium grained. Minor silica veinlets and stylolites. (Pick top Maynardville at 111'-112').</td>
</tr>
<tr>
<td>DEPTH (ft) FROM</td>
<td>TO</td>
<td>SAMPLE (NO &amp; INTERVAL)</td>
</tr>
<tr>
<td>----------------</td>
<td>----</td>
<td>------------------------</td>
</tr>
<tr>
<td>117</td>
<td>122</td>
<td></td>
</tr>
<tr>
<td>122</td>
<td>127</td>
<td></td>
</tr>
<tr>
<td>127</td>
<td>132</td>
<td></td>
</tr>
<tr>
<td>132</td>
<td>135</td>
<td>7&quot; casing</td>
</tr>
<tr>
<td>135</td>
<td>140</td>
<td></td>
</tr>
<tr>
<td>140</td>
<td>145</td>
<td></td>
</tr>
<tr>
<td>145</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>150</td>
<td>155</td>
<td></td>
</tr>
<tr>
<td>DEPTH (ft)</td>
<td>SAMPLE (NO. &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
</tr>
<tr>
<td>------------</td>
<td>-------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>155-160</td>
<td></td>
<td>Medium gray, medium grained dolomitic limestone. Scattered oolites. Minor staining and silica replacement.</td>
</tr>
<tr>
<td>160-165</td>
<td></td>
<td>Medium gray, medium grained dolomitic limestone, scattered oolites. Minor dark gray shale at 163'. Small amount of water in this interval.</td>
</tr>
<tr>
<td>155-170</td>
<td></td>
<td>Medium gray, medium grained dolomitic limestone, scattered oolites. Minor dark gray massive shale. Small amount silica replacement.</td>
</tr>
<tr>
<td>170-175</td>
<td></td>
<td>Medium to dark gray dolomitic limestone, scattered oolites. Very minor silica replacement.</td>
</tr>
<tr>
<td>175-180</td>
<td></td>
<td>Dark gray medium grained limestone, (higher content than previous). Minor stylolites and oolites. Small amount calcite replacement.</td>
</tr>
<tr>
<td>180-182</td>
<td>Total Depth</td>
<td>Dark gray medium grained limestone. Minor stylolites and oolites. Small amount calcite replacement.</td>
</tr>
</tbody>
</table>
Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL LOG

WELL NO. GW-704

<table>
<thead>
<tr>
<th>LOCATION: Bear Creek Road</th>
<th>DATE: START: 12/10/90</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRILLER: Mark Baker</td>
<td>DATE: FINISH: 12/20/90</td>
</tr>
<tr>
<td>HELPER: Mark Coapman</td>
<td>DRILLING METHOD: Air Rotary</td>
</tr>
<tr>
<td>DRILL: IR XL-750</td>
<td>LOGGED BY: R. McMaster</td>
</tr>
</tbody>
</table>

NOTES: Weathered rock @ 16', fresh rock @ 23'

<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>SAMPLE (NO. &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>28-38</td>
<td>Olive gray dolostone, medium crystalline with very minor oolites. Vugs larger, more prevalent.</td>
<td></td>
</tr>
<tr>
<td>38-48</td>
<td>Olive gray dolostone, coarsely crystalline with high porosity in pin-hole vugs. Vugs have small amount calcite replacement.</td>
<td></td>
</tr>
<tr>
<td>48-58</td>
<td>Olive gray dolostone, coarsely crystalline with high porosity in pin-hole vugs. Vugs exhibit small amount of calcite replacement. Minor silica replacement.</td>
<td></td>
</tr>
<tr>
<td>58-68</td>
<td>Olive gray dolomitic limestone coarsely crystalline with high porosity. Vugs show small amount of calcite replacement.</td>
<td></td>
</tr>
<tr>
<td>68-78</td>
<td>Dark gray, medium crystalline limestone. Minor calcite replacement.</td>
<td></td>
</tr>
</tbody>
</table>
### Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

**WELL LOG - continued**

<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>SAMPLE (NO &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>78-88</td>
<td>Dark gray, medium crystalline limestone. Minor calcite veining; small amount of wispy or stylolitic banding.</td>
<td></td>
</tr>
<tr>
<td>88-98</td>
<td>Dark gray, medium crystalline limestone slightly oolitic with calcite veinings more prominent. One fragment of banded micritic limestone with dark gray shale.</td>
<td></td>
</tr>
<tr>
<td>108-118</td>
<td>Dark gray, medium crystalline limestone; mottled. Minor oolites and several fragments of dark gray micritic limestone.</td>
<td></td>
</tr>
<tr>
<td>118-128</td>
<td>Dark gray, medium crystalline limestone, slightly oolitic with minor calcite replacement.</td>
<td></td>
</tr>
<tr>
<td>128-138</td>
<td>Dark gray, medium crystalline limestone; mottled. Minor oolites and minor dark gray massive shale.</td>
<td></td>
</tr>
<tr>
<td>138-148</td>
<td>Dark gray, medium crystalline limestone, slightly oolitic. Minor amount of light gray micritic limestone.</td>
<td></td>
</tr>
<tr>
<td>148-158</td>
<td>Olive gray, medium crystalline limestone slightly oolitic. Small amount of fragments look mottled and slightly stylolitic. Minor light gray, fine grained limestone.</td>
<td></td>
</tr>
</tbody>
</table>
### WELL LOG - continued

<table>
<thead>
<tr>
<th>DEPTH (ft) FROM</th>
<th>DEPTH (ft) TO</th>
<th>SAMPLE (NO &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>158</td>
<td>168</td>
<td>Olive gray, medium crystalline limestone slightly oolitic and stylolitic. Some fragments have mottled look. Minor light gray fine grained limestone.</td>
<td></td>
</tr>
<tr>
<td>168</td>
<td>178</td>
<td>Olive gray, medium crystalline limestone, oolitic and stylolitic. Minor light gray fine grained limestone.</td>
<td></td>
</tr>
<tr>
<td>178</td>
<td>188</td>
<td>Olive gray, medium crystalline oolitic limestone. Minor calcite replacement.</td>
<td></td>
</tr>
<tr>
<td>188</td>
<td>198</td>
<td>Dark gray, medium crystalline limestone. Slightly oolitic.</td>
<td></td>
</tr>
<tr>
<td>198</td>
<td>208</td>
<td>Olive gray, medium crystalline limestone, moderately oolitic and stylolitic.</td>
<td></td>
</tr>
<tr>
<td>208</td>
<td>218</td>
<td>Olive gray, medium crystalline limestone, moderately oolitic and stylolitic.</td>
<td></td>
</tr>
<tr>
<td>218</td>
<td>228</td>
<td>Olive gray, medium crystalline limestone. Moderately oolitic and stylolitic. Minor light gray fine grained limestone.</td>
<td></td>
</tr>
<tr>
<td>228</td>
<td>238</td>
<td>Olive gray, medium grained oolitic limestone, equal amount light olive gray oolitic limestone. Small amount calcite replacement.</td>
<td></td>
</tr>
<tr>
<td>DEPTH (ft)</td>
<td>SAMPLE (NO. &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
<td></td>
</tr>
<tr>
<td>-----------</td>
<td>--------------------------</td>
<td>---------------------------</td>
<td></td>
</tr>
<tr>
<td>238-245</td>
<td></td>
<td>Dark gray, medium grained oolitic limestone.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Smaller amount light olive gray limestone and light gray micritic dolostone.</td>
<td></td>
</tr>
<tr>
<td>245-256</td>
<td>Total Depth</td>
<td>Olive gray, medium crystalline limestone.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Small amount oolites.</td>
<td></td>
</tr>
</tbody>
</table>
Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-707

WELL LOG

LOCATION: Y-12 Plant Adjacent to Bldg.  
DRILLER: Mark Baker  9201-1  
HELPER: Mark Coapman  
DRILL: IR XL 750

DATE: START: 10/03/90  
FINISH: 10/11/90  
DRILLING METHOD: Air Rotary  
LOGGED BY: B. McMaster

NOTES: All cuttings after augering to 4' were diverted into containment box. No detailed log available to TD of hole.

<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>SAMPLE (NO. &amp; INTERVAL)</th>
<th>SOIL/BEDROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROM</td>
<td>TO</td>
<td>0-4</td>
</tr>
<tr>
<td>4-10</td>
<td>Believe to be cutting concrete; very hard and even; drilling fluid is light tan colored with sand particles like concrete cuttings.</td>
<td></td>
</tr>
<tr>
<td>10-20</td>
<td>Believe still cutting concrete - no breaks during drilling or any indication of cutting rock. No water encountered.</td>
<td></td>
</tr>
<tr>
<td>20-26</td>
<td>TD</td>
<td>Start digging in containment box and find small amount of limestone cuttings - appears to be what we are cutting presently. Assume top rock very roughly @ 20'. No evidence of water after blowing hole.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>*Check hole with flashlight after pulling drill steel and can see trickle of water at approximately 9'. Very slow. Hole makes 5' water in 3 hours.</td>
</tr>
<tr>
<td>DEPTH (ft)</td>
<td>SAMPLE (NO. &amp; INTERVAL)</td>
<td>SOIL/BEDROCK DESCRIPTION</td>
</tr>
<tr>
<td>------------</td>
<td>-------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>0 - 4</td>
<td>Drill through asphalt (1') and into fill material; light tan silty clay.</td>
<td></td>
</tr>
<tr>
<td>4 - 5</td>
<td>Concrete</td>
<td></td>
</tr>
<tr>
<td>5 - 11</td>
<td>Cavity - very soft, strong odor of gasoline. *Also pick up water.</td>
<td></td>
</tr>
<tr>
<td>11 - 13.9</td>
<td>TD</td>
<td></td>
</tr>
</tbody>
</table>

*NOTE: All cuttings after augering to 4' were diverted into containment box. No detailed log available to TD of hole.*
APPENDIX III
WELL CONSTRUCTION DIAGRAMS
**WELL INSTALLATION DIAGRAM**

**Y-12 WELL INSTALLATION PROGRAM**

**LOGGED BY:** Michael L. Ebers

**DRILLING COMPANY:** Charlie Young

**DRILLER:** James C. Draper  **HELPER:** Gregg Shillings

---

- **N/A INCH DIAMETER STEEL, PROTECTIVE CASING N/A FT. ABOVE GROUND TO N/A FT. BELOW GROUND SURFACE**
- **8 INCH DIAMETER BOREHOLE**
- **GROUT SEAL 0.0 TO 3.4 FEET**
- **CENTRALIZERS AT 9.0 FEET 29.0 FEET**
- **BED TONITE PELLET SEAL 3.4 TO 5.0 FEET**
- **SAND PACK 5.0 TO 30.6 FEET**
- **4 INCH DIAMETER STAINLESS STEEL CASING 3.0 FT. ABOVE GROUND SURFACE TO 9.5 FT. BELOW GROUND SURFACE**
- **HOLE CLEANED OUT TO 30.6 FEET**
- **4 INCH DIAMETER STAINLESS STEEL SPLIT TRAP/SCAP 29.5 TO 29.8 FEET**

**NOTE:**

ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED.

---

**NOT TO SCALE**
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: Michael L. Ebers

DRILLING COMPANY: Charlie Young

DRILLER: James C. Draper  HELPER: Gregg Shillings

NOT TO SCALE
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: Y-12, Near Building 9201-1

DRILLING COMPANY: Charlie Young Drilling

DRILLER: James C. Draper  HELPER: Gregg Shilling

NOT TO SCALE
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: Christopher M. Wallen

DRILLING COMPANY: Highland Drilling

DRILLER: Donald Key HELPER: Scott Gilbert

NOT TO SCALE

S/A INCH DIAMETER STEEL PROTECTIVE CASING S/A FT. ABOVE GROUND TO S/A FT. BELOW GROUND SURFACE

6.0 INCH DIAMETER BOREHOLE

GROUT SEAL S/A TO S/A FEET

CENTRALIZERS AT S/A FEET

S/A FEET

S/A FEET

BENTONITE PELLET SEAL 4.1 TO 6.5 FEET

SAND PACK 6.5 TO 17.3 FEET

4.0 INCH DIAMETER STAINLESS STEEL CASING 2.7 FT. ABOVE GROUND SURFACE TO 7.3 FT. BELOW GROUND SURFACE

4.0 INCH DIAMETER STAINLESS STEEL S/10 SLOTTED SCREEN 7.3 TO 11.1 FEET

HOLE CLEARED OUT TO 11.3 FEET

S/A INCH DIAMETER STAINLESS STEEL Silt Trap/Cap S/A TO S/A FEET

NOTE: ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED.

BOTTOM OF BOREHOLE 12.5 FEET

DRILLING DATES:
STARTED: 5/10/89
FINISHED: 5/30/89

WELL No. 72-20-2

LOGGED BY: Christopher M. Wallen

DRILLING COMPANY: Highland Drilling

DRILLER: Donald Key HELPER: Scott Gilbert

NOTE: ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED.
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED
BY: David B. Wright

DRILLING COMPANY: Highland Drilling

DRILLER: J.C. Draper    HELPER: Greg Shillings

NOT TO SCALE

HOLE CLEANED OUT TO 136 FEET

NOTE: ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

10 3/4\(\text{in.}\) DIA. SURFACE/CASING 1 FEET ABOVE GROUND SURFACE TO 63.8 FEET BELOW GROUND SURFACE

9 1/2\(\text{in.}\) DIA. BORE HOLE

H\(\text{2}O\) AT 99.8'

CENTRALIZERS AT 40 FEET
80 FEET
116 FEET

4 9\(\text{in.}\) STAINLESS STEEL CASING 4.9 FEET ABOVE GROUND SURFACE TO 124.5 FEET BELOW GROUND SURFACE

N/A SEAL 0.0 TO N/A FEET

BENTONITE PELLET SEAL 148.5 TO 121.5 FEET

SAND PACK 121.5 TO 134.5 FEET

N/A 8\(\text{in.}\) DIA. STAINLESS STEEL SET TRAP/CAP N/A TO N/A FEET

DRILLING DATES:
STARTED: 11/2/89
FINISHED: 11/19/89

EDGE Engineering, Design & Geosciences Group, Inc.
725 Pellissippi Parkway
P.O. Box 23010 Knoxville, TN 37933-1010 (615)986-9788

WELL No. GW-332
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED
BY: David B. Wright

DRILLING COMPANY: Highland Drilling

DRILLER: J.C. Draper  HELPER: Greg Shillings

LOCKING CAP

10 3/4 IN. DIA. SURFACE/ CASING 0.0 FEET
ABOVE GROUND SURFACE TO 91 FEET BELOW GROUND SURFACE

30 FEET
60 FEET
90 FEET

CENTRALIZERS AT

9 1/2 IN. DIA. BORE HOLE  0 TO 97 FEET

4 IN. STAINLESS STEEL CASING 4.7 FEET ABOVE GROUND SURFACE TO 109.9 FEET BELOW GROUND SURFACE

N/A SEAL N/A TO N/A FEET

GROUT SEAL 0 TO 91 FEET

GROUT SEAL 0 TO 114 FEET

HOLE CLEANED OUT TO 114 FEET

BENTONITE MUD SEAL 98.5 TO 101 FEET

SAND PACK 101 TO 114 FEET

N/A DIA. STAINLESS STEEL SLOTTED SCREEN 102.1 TO 114 FEET

BOTTOM OF BORE HOLE 114 FEET

NOT TO SCALE

NOTE:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:
WELL INSTALLATION DIAGRAM
Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: Jeff Carter

DRILLING COMPANY: Highland Drilling
DRILLER: Steve Brown  HELPER: Greg Shillings

NOTE: ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

WELL No. GW-533

DRILLING DATES:
STARTED: 5/2/98
FINISHED: 5/7/98

N/A INCH DIAMETER
STEEL PROTECTIVE CASING
___FT. ABOVE GROUND
TO ___FT. BELOW GROUND SURFACE

9 1/2 INCH DIAMETER BOREHOLE

CENTRALIZERS AT 10.1 FEET
___ FEET
___ FEET

GROUT SEAL _0_ TO
16.0 FEET

4 INCH DIAMETER STAINLESS STEEL CASING ___FT. ABOVE GROUND SURFACE TO 19.1 FT. BELOW GROUND SURFACE

MONTORITE PELLET SEAL 16.0 TO 18.0 FEET

SAND PACK 18.0 TO 30.1 FEET

4 INCH DIAMETER STAINLESS STEEL SLOTTED SCREEN 19.1 TO 30.1 FEET

HOLE CLEARED OUT TO ___ FEET

N/A INCH DIAMETER STAINLESS STEEL Silt Trap/Cap ___ TO ___ FEET

BOTTOM OF BOREHOLE 30.1 FEET

NOT TO SCALE
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: C. Allison Hodges

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker           HELPER: Billy Ray Strader

NOT TO SCALE
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: C. Allison Hodges

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker  HELPER: Billy Ray Strader

94 INCH DIAMETER BOREHOLE

N/A INCH DIAMETER STAINLESS STEEL PROTECTIVE CASING
N/A FT. ABOVE GROUND TO N/A FT. BELOW GROUND SURFACE

94 INCH DIAMETER BOREHOLE

GRAOUT SEAL 0.0 TO 22.2 FEET

CENTRALIZERS AT 15.0 FEET
40.0 FEET

4.0 INCH DIAMETER STAINLESS STEEL CASING FT. ABOVE GROUND SURFACE TO 26.9 FT. BELOW GROUND SURFACE

BENTONITE PIGLET SEAL 22.2 TO 25.5 FEET

SAND PACK 25.5 TO 42.2 FEET

4.0 INCH DIAMETER STAINLESS STEEL SLOTTED SCREEN 26.9 TO 41.9 FEET

HOLE CLEARED OUT TO 41.9 FEET

4.0 INCH DIAMETER STAINLESS STEEL Silt Trap/Gap 41.9 TO 42.5 FEET

BOTTOM OF BOREHOLE 42.5 FEET

NOT TO SCALE

NOTE: ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

WELL NO. GW-538

DRILLING DATES:
STARTED: 03-22-89
FINISHED: 04-03-89
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: C. Allison Hodges

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker  HELPER: John Young

10 IN. DIA. SURFACE/CASING 0.0 TO 79.0 FEET ABOVE GROUND SURFACE TO 19.0 FEET BELOW GROUND SURFACE

15 1/2 IN. DIA. BORE HOLE: 0.0 TO 80.0 FEET

CONCRETE PAD

BEDROCK LEVEL: 74.0'

9 1/4 IN. DIA. BORE HOLE

CENTRALIZERS AT: 35.0 FEET 80.0 FEET 150.0 FEET

NOTE:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

MOLE CLEANED OUT TO 156.0 FEET

BENTONITE PELLET SEAL: 135.0 TO 136.4 FEET

SAND PACK: 136.4 TO 156.0 FEET

4.0 IN. DIA. STAINLESS STEEL SLOTTED SCREEN: 139.0 TO 155.7 FEET

BOTTOM OF BORE HOLE: 156.0 FEET

NOT TO SCALE

DRILLING DATES:
STARTED: 04-26-89
FINISHED: 05-11-89

N/A SEAL N/A TO N/A FEET
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: C. Allison Hodges/Chris Wallen

DRILLING COMPANY: Highland Drilling

DRILLER: John Young HELPER: Ronnie Phillips

10.0 in. dia. surface/casing 0.0 feet above ground surface to 154.9 feet below ground surface

Grout seal 0.0 to 154.9 feet

4 in. stainless steel casing 161.7 feet above ground surface to 154.9 feet below ground surface

N/A seal N/A to N/A' feet

15 1/2 in. dia. bore hole 0.0 to 160.0 feet

Bedrock level

9 1/2 in. dia. bore hole

Centralizers at 30.0 feet 80.0 feet 120.0 feet 160.0 feet

Grout seal 0.0 to 155.9 feet

4.0 in. dia. stainless steel slotted screen 61.2 to 71.5 feet

N/A in. dia. stainless steel silt trap/cap N/A to N/A feet

NOTE: All depths are measured from ground surface unless otherwise noted:

Hole cleaned out to 71.5 feet

Bentonite pellet seal 125.9 to 155.5 feet

Sand pack 158.5 to 171.5 feet

Bottom of bore hole 71.5 feet

Not to scale
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: C. Allison Hodges

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPERS: John Young

NOTE:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

HOLE CLEANED OUT TO 104.5 FEET

BENTONITE PELLET SEAL 85.1 TO 86.7 FEET

SAND PACK 86.7 TO 104.5 FEET

4.0 IN. DIA. STAINLESS STEEL SLABBED SCREEN 86.8 TO 104.5 FEET

4.0 IN. DIA. STAINLESS STEEL SCREEN N/A TO N/A FEET

BOTTOM OF BORE HOLE 104.5 FEET

NOT TO SCALE
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: C. Allison Hodges

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker  HELPER: Mark Coapman

NOT TO SCALE

NOTE:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: C. Allison Hodges

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker__ HELPER: Mark Coapman

WELL No. GW-543

LOCKING CAP

10 IN. DIA. SURFACE/ CASING 0.0 FEET
ABOVE GROUND SURFACE TO 29.3 FEET BELOW GROUND SURFACE

CONCRETE PAD

15.1 IN. DIA. BORE HOLE
0.0 TO 30.0 FEET

BEDROCK LEVEL 16.0

9.1 IN. DIA. BORE HOLE

CENTRALIZERS AT 40.0 FEET
80.0 FEET

HOLE CLEANED OUT TO 93.5 FEET

75.15 FEET

NOT TO SCALE

NOTE:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

4.0 IN. DIA. STAINLESS STEEL SLOTTED SCREEN 77.95 TO 93.50 FEET

75.15 TO 78.15 FEET

93.60 FEET

N/A IN. DIA. STAINLESS STEEL SET TRAP/CAP N/A TO N/A FEET

STARTED: 05/25/89
FINISHED: 06/02/89

WELL INSTALLATION DATES:

EDGE Engineering, Design & Geosciences Group, Inc.

725 Pellissippi Parkway
P.O. Box 23010 Knoxville, TN 37933-1010 (615)986-9788
NOTE:
ALL DEPTHS ARE MEASURED
FROM GROUND SURFACE
UNLESS OTHERWISE NOTED:

10 IN. DIA SURFACE/ CASING 0 FEET
ABOVE GROUND SURFACE TO
54.5 FEET BELOW GROUND SURFACE

GROUT SEAL 0.0 TO 54.5 FEET

6 IN. STAINLESS STEEL CASING
FEET ABOVE GROUND SURFACE TO 53.4 FEET BELOW GROUND SURFACE

N/A SEAL N.A TO N/A FEET

9.5 IN. DIA BORE HOLE
CENTRALIZERS AT 50.0 FEET
94.5 FEET

GROUT SEAL 0.0 TO 89.0 FEET

4 IN. DIA STAINLESS STEEL SLOTTED SCREEN 93.5 TO
109.3 FEET

BENTONITE PELLET SEAL 89.0 TO 93.4 FEET

SAND PACK 93.4 TO
109.3 FEET

N/A IN. DIA STAINLESS STEEL
SILT TRAP/CAP N/A TO N/A FEET

HOLE CLEARED OUT TO 09.3 FEET

LOCKING CAP

CONCRETE PAD

BEDROCK LEVEL 47.0

BOTTOM OF BORE HOLE 110.0 FEET

NOT TO SCALE
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED
BY: C. Allison Hodges

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker  HELPER: Mark Coapman

N/A INCH DIAMETER STEEL PROTECTIVE CASING
N/A INCH DIAMETER STAINLESS STEEL CASING

N/A FT. ABOVE GROUND TO N/A FT. BELOW GROUND SURFACE
GROUND SURFACE TO 56.7 FT. BELOW GROUND SURFACE

91 INCH DIAMETER BOREHOLE

CENTRALIZERS AT 7.0 FEET

56.0 FEET

BENTONITE PELLET SEAL
54.1 TO 55.1 FEET

SAND PACK
55.2 TO 67.0 FEET

4.0 INCH DIAMETER STAINLESS STEEL SCREEN
56.7 TO 67.0 FEET

HOLE CLEANED OUT TO 67.0 FEET

N/A INCH DIAMETER STAINLESS STEEL SALT TRAP/CAP
N/A TO N/A FEET

NOTE:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

BOTTOM OF BOREHOLE 67 FEET

NOT TO SCALE
WELL INSTALLATION DIAGRAM
Y-12 WELL INSTALLATION PROGRAM
LOGGED BY: C. Allison Hodges
DRILLING COMPANY: Highland Drilling
DRILLER: Mark Baker HELPER: Mark Coapman

NOT TO SCALE

NOTES:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

BENTONITE PELLET SEAL
64.40 TO 66.15 FEET

SAND PACK
66.15 TO 84.35 FEET

4.0 INCH DIAMETER STAINLESS STEEL CASING 68.62 TO 84.35 FEET
HOLE CLEANED OUT TO _____ FEET
N/A INCH DIAMETER STAINLESS STEEL Silt Trap Cap N/A TO N/A FEET

9\(\frac{1}{2}\) INCH DIAMETER BOREHOLE

CONCRETE PAD

GROUT SEAL 0.0 TO 64.40 FEET

4.0 INCH DIAMETER STAINLESS STEEL PROTECTIVE CASING TO N/A FEET BELOW GROUND SURFACE
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: David B. Wright

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker    HELPER: Earl Sexton

NOTES:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

6½" INCH DIA. OPEN HOLE
118.5 TO 126.5 FEET

BOTTOM OF BORE HOLE 256 FEET
NOT TO SCALE

11 3/4" DIA. SURFACE/CASING 25 FEET
ABOVE GROUND SURFACE TO 135 FEET BELOW GROUND SURFACE

GROUT SEAL 0.0 TO 45 FEET

7" MILD STEEL CASING
45 FEET ABOVE GROUND SURFACE TO 317.2 FEET BELOW GROUND SURFACE

N/A SEAL N/A TO N/A FEET

CENTRALIZERS AT 75 FEET
150 FEET
225 FEET
300 FEET

FLOATSHOE
317.2 TO 318.5 FEET

DRILLING DATES:
STARTED: 8/3/59
FINISHED: 8/31/59
Y-12 CHARACTERIZATION WELL PROGRAM
ORNL MONITORING WELL PROGRAM

LOGGED
BY: David B. Wright

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker  HELPER: Earl Sexton

LOCKING CAP
11 3/4 IN. DIA. SURFACE

PROTECTIVE CASING 0.8 FEET

ABOVE GROUND SURFACE TO
13.5 FEET BELOW GROUND

SURFACE CONCRETE PAD

GROUT SEAL 0 TO
80 FEET

15 1/2 IN. DIA. BORE HOLE
TO 80 FEET

7 IN. MILD STEEL CASING
2.0 FEET ABOVE GROUND
SURFACE TO 193 FEET BELOW GROUND SURFACE

BEDROCK LEVEL 55

10 5/8 IN. DIA. BORE HOLE

GROUT SEAL 0 TO
195 FEET

FLOATORSHOE 193 TO
194.3 FEET

2 IN. STAINLESS STEEL CASING
2.5 FEET ABOVE GROUND SURFACE
TO 193.1 FEET BELOW GROUND SURFACE

GROUT SEAL 0 TO
193 FEET

6 1/4 IN. DIA. BORE HOLE

ALL DEPTHS ARE MEASURED
FROM GROUND SURFACE
UNLESS OTHERWISE NOTED.

NOTE:

HOLE CLEANED OUT TO 211.5 FEET

WELL No. GW-602

DRILLING DATES:
STARTED: 7/18/89
FINISHED: 10/17/89

LOGGED BY: David B. Wright

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker  HELPER: Earl Sexton
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED
BY: David B. Wright

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker
HELPER: Earl Sexton

WELL No. GW-603

DRILLING DATES:
STARTED: 9/12/89
FINISHED: 9/15/89

LOOKING CAP

10 3/4" IN. DIA. SURFACE/CASING 18 FEET ABOVE GROUND SURFACE TO 31.9 FEET BELOW GROUND SURFACE

15 IN. DIA. BORE HOLE
0.0 TO 32.0 FEET

CONCRETE PAD

4 IN. STAINLESS STEEL CASING
4.8 FEET ABOVE GROUND SURFACE TO 64.9 FEET BELOW GROUND SURFACE

BEDROCK LEVEL 24'

9 1/2" IN. DIA. BORE HOLE

H2O LEVEL AT 56.5

CENTRALIZERS AT 11 FEET
40 FEET
60 FEET

GROUT SEAL 0.0 TO 11.8 FEET

N/A SEAL N/A TO N/A FEET

NOTE:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:
HOLE CLEARED OUT TO 75 FEET

4 IN. DIA. STAINLESS STEEL SLOTTED SCREEN 64.9 TO 75.2 FEET
BENTONITE PELLET SEAL 60.8 TO 63.4 FEET
SAND PACK 63.4 TO 75.2 FEET
N/A IN. DIA. STAINLESS STEEL SET TRAP/CAP N/A TO N/A FEET

NOT TO SCALE
**WELL INSTALLATION DIAGRAM**

**Y-12 WELL INSTALLATION PROGRAM**

**LOGGED**  BY: David B. Wright

**DRILLING COMPANY:** Highland Drilling

**DRILLER:** Mark Baker **HELPER:** Earl Sexton

---

**LOCKING CAP**

10 3/4" N. DIA. SURFACE/ CASING 16 FEET ABOVE GROUND SURFACE TO 95.2 FEET BELOW GROUND SURFACE

**GROUT SEAL 0.0 TO 92 FEET**

15 1/2" N. DIA. BORE HOLE 0.0 TO 95.5 FEET

**CONCRETE PAD**

**BEDROCK LEVEL 31**

**9 1/2" N. DIA. BORE HOLE**

CENTRALIZERS AT 20 FEET

50 FEET

85 FEET

**GROUT SEAL 0.0 TO 97.1 FEET**

NOTE: ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

**HOLE CLEANED OUT TO 124 FEET**

1 1/2" N.DIA. STAINLESS STEEL SLOTTED SCREEN 102.5 TO 124.4 FEET

**BENTONITE PELLET SEAL**

97.1 TO 100.2 FEET

**SAND PACK 100.2 TO 102.4 FEET**

**N/A N.DIA. STAINLESS STEEL Silt Trap/Cap N/A TO N/A FEET**

**BOTTOM OF BORE HOLE 124 FEET**

**NOT TO SCALE**

---

**DRILLING DATES:**

**STARTED:** 9/18/89

**FINISHED:** 9/23/89

**LOGGED BY:** David B. Wright

**DRILLER:** Mark Baker **HELPER:** Earl Sexton

**HELP FROM:** Highland Drilling

---

**HELP FROM:** Mark Baker

---

**NOTE:**

ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

**HOLE CLEANED OUT TO 124 FEET**

1 1/2" N.DIA. STAINLESS STEEL SLOTTED SCREEN 102.5 TO 124.4 FEET

**BENTONITE PELLET SEAL**

97.1 TO 100.2 FEET

**SAND PACK 100.2 TO 102.4 FEET**

**N/A N.DIA. STAINLESS STEEL Silt Trap/Cap N/A TO N/A FEET**

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**PAGE 1 OF 1**
WELL INSTALLATION DIAGRAM
Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: David B. Wright

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Mark Coapman

LOOKING CAP

10 IN. DIA. SURFACE CASING 0.0 FEET
ABOVE GROUND SURFACE TO 106.8 FEET BELOW GROUND SURFACE

GROUT SEAL 0.0 TO 113.5 FEET

15 1/2 IN. DIA. BORE HOLE
0.0 TO 15.5 FEET

BEDROCK LEVEL 107.0

9 1/2 IN. DIA. BORE HOLE

CENTRALIZERS AT 130.0 FEET
90.0 FEET
30.0 FEET

GROUT SEAL 0.0 TO 135.5 FEET

HOLE CLEANED OUT TO 15 1/2 FEET

4 IN. DIA. STAINLESS STEEL SLOTTED SCREEN 141.0 TO 161.5 FEET

BENTONITE PELLET SEAL 145.5 TO 138.0 FEET

SAND PACK 138.0 TO 151.3 FEET

N/A IN. DIA. STAINLESS STEEL SET TRAP/STAINLESS STEEL SET TRAP/CANALU TO N/A FEET

NOTE:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

PAGE ____ OF ____
WELL INSTALLATION/DIAGRAM

LOGGED
BY: David B. Wright

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Earl Sexton

---

15 1/2 IN DIA. BORE HOLE TO 150 FEET

10 3/4 IN DIA. SURFACE/PROTECTIVE CASING 8 FEET ABOVE GROUND SURFACE TO 148 FEET BELOW GROUND SURFACE

140' BEDROCK LEVEL

9 1/2 INCH DIA. OPEN HOLE 150 TO 220 FEET

NOTE:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

BOTTOM OF BORE MINE 220 FEET

NOT TO SCALE
WELL INSTALLATION DIAGRAM
Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: Timothy Lee
DRILLING COMPANY: Highland Drilling
DRILLER: Mark Baker HELPER: Earl Sexton

10 3/4 in. dia. surface/casing 1.5 feet above ground surface to 107.0 feet below ground surface

14 1/2 in. dia. bore hole 0.0 to 15.5 feet

Concrete pad

Grout seal 0.0 to 15.5 feet

Bedrock level 107.0

9 1/2 in. dia. bore hole

Centralizers at 76 feet, 157 feet, 245 feet

Grout seal 0.0 to 253.2 feet

Hole cleaned out to 269 feet

4 in. dia. stainless steel slotted screen 258.0 to 269.0 feet

Bentonite pellet seal 253.2 to 256.4 feet

Sand pack 256.4 to 269 feet

N/A 1 in. dia. stainless steel N/A to N/A

Bottom of bore hole 269.0 feet

NOT TO SCALE

NOTE:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: David B. Wright

DRILLING COMPANY: Highland Drilling

DRILLER: J. C. Draper  HELPER: Greg Shillings

WELL No. GW 610

DRILLING DATES:
STARTED: 12/06/89
FINISHED: 12/02/90

10.75 in. dia. surface/casing 8 ft above ground surface to 84 ft below ground surface

CONCRETE PAD

LOCKING CAP

GROUT SEAL 0 ft to 101 ft

9.5 in. dia. bore hole

BETROCK LEVEL 39 ft

CENTRALIZERS AT 30 ft

80 ft

15.5 in. dia. bore hole

MOL.E CLEANED OUT TO 111 ft

N/A in. dia. stainless steel slotted screen 111.4 ft to 117.4 ft

N/A in. dia. stainless steel slotted screen 114.1 ft to 117.4 ft

BENTONITE PELLET SEAL 111.4 ft to 117.4 ft

SAND PACK 105.1 ft to 111.4 ft

N/A in. dia. stainless steel slotted screen 107.1 ft to 105.1 ft

NOTE:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED.
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: Jeff Carter

DRILLING COMPANY: Charlie Young Drilling

DRILLER: Steve Brown  HELPER: Greg Shilling

NOTE: All depths are measured from ground surface unless otherwise noted:

- Hole cleaned out to 121 feet
- Note: Not to scale

10 3/4 in. dia. surface casing 0 feet above ground surface to 73.0 feet below ground surface

73.0 ft

Grout seal 0 to 33.0 ft

8 in. stainless steel casing feet above ground surface to 107.0 ft below ground surface

107.0 ft

S/A seal S/A to 3/A ft

Bedrock level 45 ft

9 1/2 in. dia. bore hole

Centralizers at 30.0 feet

87.3 feet

3 8 in. dia. stainless steel slotted screen to 177.6 feet

177.6 ft

Bentonite pellet seal 97.5 to 101.5 feet

Sand pack 101.5 to 121.5 feet

4 in. dia. stainless steel salt trap/cap 117.0 to 117.0 feet

117.0 ft
WELL INSTALLATION DIAGRAM
Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: David B. Wright/Timothy Lee

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Earl Sexton

LOCKING CAP

11 3/4 IN. DIA. SURFACE/CASING 10 FEET ABOVE GROUND SURFACE TO 136.9 FEET BELOW GROUND SURFACE

15 1/2 IN. DIA. BORE HOLE 0 TO 140 FEET

GROUT SEAL 0 TO 140 FEET

7 IN. MILD STEEL CASING 1 FEET ABOVE GROUND SURFACE TO 230.9 FEET BELOW GROUND SURFACE

N/A SEAL N/A TO N/A FEET

BEDROCK LEVEL 78 FEET

10 5/8 IN. DIA. BORE HOLE

CENTRALIZERS AT 60 FEET

130 FEET

170 FEET

210 FEET

GROUT SEAL 0 TO 235 FEET

FLOATSHOE N/A TO N/A FEET

6 1/4 INCH DIA. OPEN HOLE 235 TO 254 FEET

BOTTOM OF BORE HOLE 254 FEET

NOT TO SCALE

NOTE:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

WELL NO. GW 612

DRILLING DATES:
STARTED: 10/23/89
FINISHED: 11/17/89

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725 Pellissippi Parkway
P.O. Box 23010 Knoxville, TN 37933-1010 (865) 688-9788
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: David B. Wright

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Earl Sexton

NOT TO SCALE

NOTE: ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

MATERIALS USED:
- 4\(\frac{1}{2}\) IN. STAINLESS STEEL SLEET TRAP/CAP N/A TO N/A FEET
- 4 IN. DIA. STAINLESS STEEL SLOTTED SCREEN 31.66 TO 42.0 FEET
- 4 IN. DIA. STAINLESS STEEL CASING 27.5 TO 30.0 FEET
- 4 IN. DIA. CASING 0.0 TO 17.0 FEET
- 15\(\frac{1}{2}\) IN. DIA. BORE HOLE 0 TO 17.0 FEET
- 9\(\frac{1}{2}\) IN. DIA. BORE HOLE

CENTRALIZERS AT 10 FEET
- 25 FEET
- 42 FEET

HOLE CLEANED OUT TO 42.0 FEET

GROUT SEAL 0.0 TO 17.0 FEET

GROUT SEAL N/A TO N/A FEET

BENTONITE PELLET SEAL 27.5 TO 30.0 FEET

SAND PACK 30.0 TO 42.0 FEET
WELL INSTALLATION DIAGRAM
Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: David B. Wright

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Earl Sexton

NOTE:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

HOLE CLEANED OUT TO 90.4 FEET

4 7/8 IN. DIA. STAINLESS STEEL SLOTTED SCREEN 72.4 TO 90.2 FEET

Bentonite Pellet Seal 64.0 TO 71.6 FEET

Sand Pack 71.6 TO 90.2 FEET

N/A 7/8 IN. DIA. STAINLESS STEEL Silt Trap/Cap N/A TO N/A FEET

BOTTOM OF BORE HOLE 90.2 FEET

LOCGING CAP

10 3/4 IN. DIA. SURFACE CASING 0.0 FEET ABOVE GROUND SURFACE TO 44.4 FEET BELOW GROUND SURFACE

4 IN. STAINLESS STEEL CASING 13 FEET ABOVE GROUND SURFACE TO 15.2 FEET BELOW GROUND SURFACE

N/A SEAL N/A TO N/A FEET

BEDROCK LEVEL 12.5

9 1/2 IN. DIA. BORE HOLE

CENTRALIZERS AT 32.0 FEET
52.0 FEET
73.5 FEET
89.0 FEET

GROUT SEAL 0.0 TO 64.0 FEET

GROUT SEAL 0.0 TO 64.0 FEET

PAGE 1 OF 1
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED
BY: David B. Wright and Jeff Carter

DRILLING COMPANY: Highland Drilling

DRILLER: Steve Brown HELPERS: Greg Shillings

LOCKING CAP

11 3/4 in. dia. surface casing 0 feet above ground surface to 84.5 feet below ground surface

CIMENTATION PAD

15 1/2 in. dia. bore hole 0 to 84.5 feet

BEDROCK LEVEL 15'

10 5/8 in. dia. bore hole

CENTRALIZERS AT ___ FEET

GROUT SEAL ___ TO ___ FEET

7 in. mild steel casing .8 feet above ground surface to 211.2 feet below ground surface

N/A SEAL N/A TO N/A FEET

FLOATSHOE 221.2 TO 222.5 FEET

6 1/4 in. dia. open hole 222.5 TO 245 FEET

BOTTOM OF BORE HOLE 245 FEET

NOT TO SCALE

DRILLING DATES:
STARTED: 1/25/90
FINISHED: 5/13/90
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: David B. Wright

DRILLING COMPANY: Highland Drilling

DRILLER: Steve Brown  HELPER: Greg Shillings

NOTE:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

BOTTOM OF BORE HOLE 269 FEET
NOT TO SCALE
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: David B. Wright

DRILLING COMPANY: Highland Drilling

DRILLER: Steve Brown  HELPER: Greg Shillings

NOT TO SCALE

BOTTOM OF BOREHOLE 18.0 FEET

DRILLING DATES:
STARTED: 3/16/90
FINISHED: 3/19/90

N/A INCH DIAMETER STEEL PROTECTIVE CASING
N/A FT ABOVE GROUND TO N/A FT BELOW GROUND SURFACE

9 1/2 INCH DIAMETER BOREHOLE

GROUT SEAL 0 TO 4.4 FEET

4 INCH DIAMETER STAINLESS STEEL CASING 2.2 FT. ABOVE GROUND SURFACE TO 7.3 FT. BELOW GROUND SURFACE

CENTRALIZERS AT 3 FEET

Bentonite Pellet Seal 4.4 TO 6.8 FEET

SAND PACK 6.8 TO 18.0 FEET

4 INCH DIAMETER STAINLESS STEEL SD 001 SLOTTED SCREEN 13.3 TO 15.6 FEET

HOLE CLEANED OUT TO _____ FEET

4 INCH DIAMETER STAINLESS STEEL Silt Trap/Trap 17.6 TO 18.0 FEET

NOTE:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: David B. Wright

DRILLING COMPANY: Highland Drilling

DRILLER: Steve Brown  HELPER: Greg Shillings

NOTE:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

HOLE CLEANED OUT TO 37.0 FEET

0.01 IN. DIA. STAINLESS STEEL SLOTTED SCREEN 26.1 TO 27.0 FEET

BENTONITE PELLET SEAL 23.7 TO 26.0 FEET

SAND PACK 26.0 TO 37.0 FEET

N/A IN. DIA. STAINLESS STEEL SALT TRAP/CAP N/A TO N/A FEET

NOT TO SCALE

15 1/2 IN. DIA. BORE HOLE 0.0 TO 28.0 FEET

CONCRETE PAD

LOCKING CAP

10 3/4 IN. DIA. SURFACE/CASING 5 FEET ABOVE GROUND SURFACE TO 27.5 FEET BELOW GROUND SURFACE

GRAOUT SEAL 0 TO 28.0 FEET

4 IN. STAINLESS STEEL CASING 2.9 FEET ABOVE GROUND SURFACE TO 28.2 FEET BELOW GROUND SURFACE

N/A SEAL N/A TO N/A FEET

CENTRALIZERS AT 20.0 FEET

GRAYOUT SEAL 0 TO 23.7 FEET

BEDROCK LEVEL 27.0

9 1/2 IN. DIA. BORE HOLE

PAGE ___ OF ___
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: David B. Wright

DRILLING COMPANY: Highland Drilling

DRILLER: Steve Brown  Helper: Greg Shillings

NOT TO SCALE

WELL No. C-260

DRILLING DATES:
STARTED: 3/27/90
FINISHED: 3/27/90

9 1/2 INCH DIAMETER BOREHOLE

CENTRALIZERS AT 20 FEET

GROUT SEAL 0 TO 22.3 FEET

4 INCH DIAMETER STAINLESS STEEL CASING 22.3 FT ABOVE GROUND SURFACE TO 40.8 FT. BELOW GROUND SURFACE

BENTONITE PELLET SEAL 22.3 TO 26.8 FEET

SAND PACK 26.8 TO 40.8 FEET

4 INCH DIAMETER STAINLESS STEEL CASING 40.8 FT TO 40.8 FT. BELOW GROUND SURFACE

NOTE:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED.

BOTTOM OF BOREHOLE 40.8 FEET

ERC / EDGE
Environmental and Energy Services Co.
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: David B. Wright

DRILLING COMPANY: Highland Drilling

DRILLER: Steve Brown  HELPER: Greg Shilling

LOCKING CAP

10 3/4 IN DIA. SURFACE CASING:

FEET ABOVE GROUND SURFACE TO

42.5 FEET BELOW GROUND SURFACE

GROUT SEAL 0 TO

42.5 FEET

15 1/2 IN. DIA. BORE HOLE:

0 TO 6.25 FEET

CONCRETE PAD

4 IN STAINLESS STEEL CASING:

2.5 FEET ABOVE GROUND SURFACE TO 5.4 FEET BELOW GROUND SURFACE

N/A SEAL N/A TO

N/A FEET

BEDROCK LEVEL 41

9 1/2 IN. DIA. BORE HOLE

CENTRALIZERS AT

20 FEET

40 FEET

60 FEET

GROUT SEAL 0 TO

52.4 FEET

NOTE:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

MOLE CLEANED OUT TO 75 FEET

4 IN. DIA. STAINLESS STEEL SLOTTED SCREEN:

15.02 TO 15.0 FEET

BENTONITE PELLET SEAL

9.4 TO 61.7 FEET

SAND PACK 61.7 TO

7.2 FEET

N/A IN DIA. STAINLESS STEEL SILT TRAP/CAP N/A TO

N/A FEET

BOTTOM OF BORE HOLE 25 FEET

NOT TO SCALE
**WELL INSTALLATION DIAGRAM**

**Y-12 WELL INSTALLATION PROGRAM**

**LOGGED BY:** Christopher M. Wallen/Michael L. Ebers

**DRILLING COMPANY:** Highland Drilling

**DRILLER:** Randy Phillips **HELPER:** Ronnie Phillips

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**WELL NO. GW-621**

**DESIGN & GEOSCIENCES GROUP, INC.**

725 Pellissippi Parkway
P.O. Box 23010 Knoxville, TN 37933-1010 (815) 998-9788

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**DRILLING DATES:**

STARTED: 9/14/89
FINISHED: 9/13/89

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**NOTE:**
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

- **HOLE CLEANED OUT TO 43.9 FEET**
- **BENTONITE PELLET SEAL**
  - 20.4 FEET TO 23.3 FEET
  - 40.3 FEET
- **N/A IN. DIA. STAINLESS STEEL SLOTTED SCREEN**
  - 24.8 TO 40.5 FEET
- **N/A IN. DIA. STAINLESS STEEL SET TRAP/CAP**
  - N/A TO N/A FEET

---

**CONCRETE PAD**

**LOCKING CAP**

**10 3/4 IN. DIA. SURFACE/ CASING 0.5 FEET ABOVE GROUND SURFACE TO 24.0 FEET BELOW GROUND SURFACE**

**24.0 FEET**

**GROUT SEAL 0.0 TO 24.0 FEET**

**7 7/8 IN. DIA. BORE HOLE**

**BEDROCK LEVEL 22.0**

**15.0 IN. DIA. BORE HOLE**

**0.0 TO 24.0 FEET**

**4.0 IN. STAINLESS STEEL CASING**

**N/A SEAL N/A TO N/A FEET**

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**CENTRALIZERS AT:**

- 5.0 FEET
- 25.0 FEET
- ***NOT TO SCALE***
**WELL INSTALLATION DIAGRAM**

**Y-12 WELL INSTALLATION PROGRAM**

**DRILLING COMPANY:** Highland Drilling

**DRILLER:** Mark Baker  
**HELPER:** Earl Sexton

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**WELL No. GW-622**

**DRILLING DATES:**
- **STARTED:** 12/1/89
- **FINISHED:** 12/1/89

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**INCH DIAMETER STEEL PROTECTIVE CASING**
- FT. ABOVE GROUND TO FT. BELOW GROUND SURFACE

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**INCH DIAMETER STAINLESS STEEL CASING**
- 1.2 FT. ABOVE GROUND SURFACE TO 8.6 FT. BELOW GROUND SURFACE

---

**CENTRALIZERS AT**
- 7.0 FEET
- FEET
- FEET

---

**BENTONITE PELLET SEAL**
- 4.6 TO 6.8 FEET

---

**SAND PACK**
- 6.8 TO 20.5 FEET

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**INCH DIAMETER STAINLESS STEEL SLEET TRAP/CAP**
- 18.7 TO 18.9 FEET

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**NOTE:**
- ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

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**BOTTOM OF BOREHOLE**
- 20.5 FEET

---

**NOT TO SCALE**
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: Bruce McMaster & Michael L. Ebers

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Earl Sexton

NOTES:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

6 INCH DIA. OPEN HOLE
219 TO 349 FEET

BOTTOM OF BORE HOLE 349 FEET

NOT TO SCALE

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WELL No. GW-623

DRILLING DATES:
STARTED: 11/23/89
FINISHED: 12/11/89

14 1/8 IN. DIA. BORE HOLE
0.0 TO 28 FEET

10 5/8 IN. DIA. BORE HOLE

11 IN. DIA. SURFACE/CASING 50 FEET
ABOVE GROUND SURFACE TO 26 FEET BELOW GROUND SURFACE

GROUT SEAL 0.0 TO 28 FEET

7 IN. MILD STEEL CASING
1.0 FEET ABOVE GROUND SURFACE TO 219 FEET BELOW GROUND SURFACE

N/A SEAL ___ TO ___ FEET

CENTRALIZERS AT ___ FEET
___ FEET
___ FEET

FLOAT SHOE
218 TO 219 FEET

BEDROCK LEVEL 19'
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: David B. Wright

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker  HELPER: Earl Sexton

S/A INCH DIAMETER STEEL PROTECTIVE CASING
5.5 FT. ABOVE GROUND TO S/A FT. BELOW GROUND SURFACE

9 1/2 INCH DIAMETER BOREHOLE

CENTRALIZERS AT 11 FEET

GROUT SEAL TO 11.9 FEET

4 INCH DIAMETER STAINLESS STEEL CASING 8 FT. ABOVE GROUND SURFACE TO 16.3 FT. BELOW GROUND SURFACE

BENTONITE PELLET SEAL 11.9 TO 14.4 FEET

SAND PACK 14.4 TO 27.2 FEET

4 INCH DIAMETER STAINLESS STEEL SLOTTED SCREEN 15.9 TO 27.2 FEET

HOLE CLEANED OUT TO 27.2 FEET

S/A INCH DIAMETER STAINLESS STEEL SEAL TRAP/CAP S/A TO S/A FEET

NOTE:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

BOTTOM OF BOREHOLE 317.5 FEET

NOT TO SCALE
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: David B. Wright

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker  HELPER: Earl Sexton

LOCKING CAP

11 3/4 IN. DIA. SURFACE/CASING 1.0 FEET ABOVE GROUND SURFACE TO 4.5 FEET BELOW GROUND SURFACE

CONCRETE PAD

15 1/2 IN. DIA. BORE HOLE 0 TO 62 FEET

7 IN. MILD STEEL CASING 2.0 FEET ABOVE GROUND SURFACE TO 231.5 FEET BELOW GROUND SURFACE

N/A SEAL N/A TO

BEDROCK LEVEL 20

10 5/8 IN. DIA. BORE HOLE

CENTRALIZERS AT __________ FEET

GROUT SEAL 0.0 TO -31.5 FEET

FLOATS 230.2 TO 231.5 FEET

6 1/2 INCH DIA. OPEN HOLE 231.5 TO 283 FEET

BOTTOM OF BORE HOLE 283 FEET

NOTE:
ALL DEPTHS ARE MEASURED
FROM GROUND SURFACE
UNLESS OTHERWISE NOTED:

DRILLING DATES:
STARTED: 1/7/84
FINISHED: 1/7/84

PAGE 1 OF 1
WELL INSTALLATION DIAGRAM
Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: Bryn Howze

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Earl Sexton

LOOKING CAP

11 3/4 IN. DIA. SURFACE/CASING 0 FEET ABOVE GROUND SURFACE TO 62.5 FEET BELOW GROUND SURFACE

GROUP SEAL 0 TO 62.5 FEET

5 IN. DIA. BORE HOLE 0 TO 62.5 FEET

GROUP SEAL 0 TO 62.5 FEET

4 IN. STAINLESS STEEL CASING 2.0 FEET ABOVE GROUND SURFACE TO 67.7 FEET BELOW GROUND SURFACE

NA SEAL TO

BETONITE BULLET SEAL 56.0 TO 63.0 FEET

SAND PACK 63.0 TO 78.0 FEET

4 IN. DIA. STAINLESS STEEL SLOTTED SCREEN 71.1 TO 78.0 FEET

BENTONITE BULLET SEAL

BOTTOM OF BORE HOLE 18.4 FEET

NOT TO SCALE

NOTE:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

HOLE CLEANED OUT TO 78.0 FEET

PAGE 1 OF 1
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: Bryn Howze

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Earl Sexton

WELL No. GW-627

DRILLING DATES:
STARTED: 12/5/89
FINISHED: 12/11/89

LOCKING CAP

11 3/4 IN. DIA. SURFACE CASING 15 FEET ABOVE GROUND SURFACE TO 41.5 FEET BELOW GROUND SURFACE

GROUT SEAL 0 TO 41.5 FEET

14 IN. DIA. BORE HOLE
0.0 TO 41.5 FEET

7 IN. MILD STEEL CASING
0.7 FEET ABOVE GROUND SURFACE TO 252.7 FEET BELOW GROUND SURFACE

NA SEAL TO

BEDROCK LEVEL 43

10 5/8 IN. DIA. BORE HOLE

CENTRALIZERS AT NA FEET

GROUT SEAL 0 TO 254 FEET

FLOA TD HOLE 252.7 TO 254 FEET

6 1/4 INCH DIA. OPEN HOLE
254 TO 270 FEET

BOTTOM OF BORE HOLE 270 FEET

NOTE:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

NOT TO SCALE
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: David B. Wright

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker  HELPER: Earl Sexton

11 3/4" M. DIA. SURFACE/CASING 0 FEET ABOVE GROUND SURFACE TO 58.6 FEET BELOW GROUND SURFACE

15 1/2" M. DIA. BORE HOLE 0 TO 58.6 FEET

7" MILD STEEL CASING 1 FEET ABOVE GROUND SURFACE TO 234.5 FEET BELOW GROUND SURFACE

10 5/8" M. DIA. BORE HOLE

CENTRALIZERS AT ______ FEET

GROUT SEAL 0 TO 58.6 FEET

GROUT SEAL ______ TO 236.2 FEET

FLOATSHOE 234.5 TO 235.8 FEET

BEDROCK LEVEL 13'

NOTE:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

6 1/2" INCH DIA. OPEN HOLE 235.8 TO 288 FEET

BOTTOM OF BORE HOLE 288 FEET

NOT TO SCALE

DRILLING DATES:
STARTED: 1/11/90
FINISHED: 1/29/90

WELL NO. GW-628

PAGE 1 OF 1
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: David B. Wright

DRILLING COMPANY: Highland

DRILLER: Mark Baker  HELPER: Earl Sexton

11 3/4 in. dia. surface/casing 32 feet above ground surface to 45.1 feet below ground surface

15 1/2 in. dia. bore hole 0 to 46 feet

10 5/8 in. dia. bore hole

Centralizers at 100 feet
200 feet

Grout seal 0 to 46 feet

7 in. mild steel casing 1.5 feet above ground surface to 261 feet below ground surface

N/A seal N/A to

N/A feet

Bedrock level 11'

Float shoe 261.0 to 52.3 feet

6 1/2 inch dia. open hole 262.3 to 312 feet

Bottom of bore hole 312 feet

NOTE: ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

WELL No. GW-629

DRILLING DATES:
STARTED: 1/23/90
FINISHED: 1/27/90

LOGGED IN DIA GRAM/DIG

PAGE 1 OF 1
WELL INSTALLATION DIAGRAM

LOGGED BY: Jeff Carter

DRILLING COMPANY: Highland Drilling

DRILLER: Steve Brown  HELPER: Greg Shillings

N/A INCH DIAMETER STEEL PROTECTIVE CASING
FT. ABOVE GROUND TO FT. BELOW GROUND SURFACE

9 1/2 INCH DIAMETER BOREHOLE

CONCRETE PAD

CENTRALIZED AT 7.0 FEET

BENTONITE PELLET SEAL 12.4 TO 14.8 FEET

SAND PACK 14.8 TO 28.6 FEET

4 INCH DIAMETER STAINLESS STEEL CASING 2.3 FT. ABOVE GROUND SURFACE TO 17.2 FT. BELOW GROUND SURFACE

NOTE: ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

BOTTOM OF BOREHOLE 28.6 FEET

NOT TO SCALE

DRILLING DATES:
STARTED: 5/3/90
FINISHED: 5/3/90

WELL No. GW-63C
WELL INSTALLATION DIAGRAM
Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: C.G. Hagegeorge

DRILLING COMPANY: Highland Drilling

DRILLER: M. Baker HELP: B. Young/M. Coapman

DRILLING DATES:
STARTED: 5/23/90
FINISHED: 5/31/90

IN. DIA SURFACE/PROTECTIVE CASING FEET
ABOVE GROUND SURFACE TO FEET BELOW GROUND SURFACE

20 IN. DIA BORE HOLE 0 TO 8.0 FEET

CENTRALIZERS AT 20.0 FEET 72.0 FEET 80.0 FEET

BEDROCK LEVEL 8.0

16 IN. DIA STEEL CASING (DIVERTER) FEET ABOVE GROUND SURFACE 0 FEET BELOW GROUND SURFACE 3.0 FEET
GROUT SEAL 0 TO 8.0 FEET
GROUT SEAL 0 TO 23.0 FEET

11 3/4 IN. DIA STEEL CASING 0 FEET ABOVE GROUND SURFACE 67.0 FEET BELOW GROUND SURFACE
GROUT SEAL 0 TO 99.0 FEET

10 3/4 IN. DIA BORE HOLE 0 TO 99.0 FEET

7 IN. DIA STEEL CASING 2.0 FEET ABOVE GROUND SURFACE 97.5 FEET BELOW GROUND SURFACE
FLOAT SEAM 97.5 TO 98.5 FEET

6 1/4 IN. DIA OPEN HOLE 0 TO 17 FEET

BOTTOM OF BORE HOLE 117.0 FEET

ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED.
NOTE:
WELL INSTALLATION/DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: Bruce McMaster

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker  HELPER: Bucky Young

LOCKING CAP

10 IN. DIA. SURFACE/ PROTECTIVE CASING ______ FEET

ABOVE GROUND SURFACE TO ______ FEET BELOW GROUND SURFACE

CONCRETE PAD

14K IN. DIA. BORE HOLE 0 TO ______ FEET

GROUT SEAL 0 TO ______ FEET

4 IN. STAINLESS STEEL CASING ______ FEET ABOVE GROUND SURFACE TO ______ FEET BELOW GROUND SURFACE

BEDROCK LEVEL 12.0

10 IN. DIA. BORE HOLE

GROUT SEAL 0 TO ______ FEET

CENTRALIZERS AT ______ FEET.

_______ FEET.

CENTRALIZER

BENTONITE PELLET SEAL 11.8 TO 14.5 FEET

SAND PACK 14.5 TO 27.5 FEET

4 IN. DIA. STAINLESS STEEL SLOTTED SCREEN 27.2 TO ______ FEET

4 IN. DIA. STAINLESS STEEL Silt Trap/Cap 27.2 TO 27.5 FEET

HOLE CLEANED OUT TO 27.5 FEET

BOTTOM OF BORE HOLE 27.5 FEET

ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

NOTE:
WELL INSTALLATION DIAGRAM
Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: Bruce McMaster

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Donald Kee

INCH DIAMETER STEEL PROTECTIVE CASING FT ABOVE GROUND TO FT BELOW GROUND SURFACE

10 INCH DIAMETER BOREHOLE

CENTRALIZERS AT FEET

GROUT SEAL TO FEET

4 INCH DIAMETER STAINLESS STEEL CASING FT ABOVE GROUND SURFACE TO FT BELOW GROUND SURFACE

BENTONITE PELLET SEAL TO FEET

SAND PACK TO FEET

4 INCH DIAMETER STAINLESS STEEL SLOTTED SCREEN FT TO FEET

HOLE CLEANED OUT TO FEET

4 INCH DIAMETER STAINLESS STEEL SILT TRAP/CAP TO FEET

BOTTOM OF BOREHOLE FEET

NOTE: ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

NOT TO SCALE

DRILLING DATES:
STARTED: 6/13/90
FINISHED: 6/25/90

PAGE _ OF _
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: Bruce McMaster

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker  HELPER: Mark Coapman

SURFACE CASING PREMIE GROUTED

YES ☐  NO ☐

WELL COVER USED

☐ LOCKING STEEL COVER
☐ FLUSH MOUNTED WELL COVER
☐ OTHER

CENTRALIZERS AT

40 FEET.

FEET.

FEET.

NOTE:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

BOTTOM OF BORE HOLE 125.5 FEET

NOT TO SCALE
WELL INSTALLATION/DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED
BY: Bruce McMaster

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker  HELPER: Mark Coapman

WELL No. 74-542

DRILLING DATES:
STARTED: 6/15/90
FINISHED: 6/18/90

- LOOKING CAP
- 10 IN. DIA. SURFACE/
- PROTECTIVE CASING ______ FEET
- ABOVE GROUND SURFACE TO
- 35.5 FEET BELOW GROUND
- CONCRETE PAD
- 14 IN. DIA. BORE HOLE
- 9 TO 33.5 FEET
- GROUT SEAL 0 TO
- 33.5 FEET
- 4 IN. STAINLESS STEEL CASING
- FEET ABOVE GROUND
- SURFACE TO 33.5 FEET BELOW GROUND SURFACE
- BEDROCK LEVEL 25
- 9½ IN. DIA. BORE HOLE
- GROUT SEAL 0 TO
- 33.5 FEET
- CENTRALIZERS AT ______ FEET.
- ______ FEET.
- ______ FEET.
- ALL DEPTHS ARE MEASURED
FROM GROUND SURFACE
UNLESS OTHERWISE NOTED.
NOTE:
- HOE CLEANED OUT
TO 47.4 FEET
- BOTTOM OF BORE
HOLE 47.4 FEET

CENTRALIZER
- BENTONITE PELLET SEAL
- 33.5 TO 35 FEET
- SAND PACK 35 TO
- 47.4 FEET

4 IN. DIA. STAINLESS STEEL
- SLOTTED SCREEN 36 TO
- 47.4 FEET

4 IN. DIA. STAINLESS STEEL
- SALT TRAP/CAP 47.4 TO
- 47.4 FEET
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: Bruce McMaster

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker  HELPER: Mark Coapman

NOTE:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

CONCRETE PAD

9 1/2 INCH DIAMETER BOREHOLE

CENTRALIZERS AT 12 FEET

11.0 TO 24.3 FEET

SAND PACK

BENTONITE PELLET SEAL 9.0 TO 11.0 FEET

BOTTOM OF BOREHOLE 24.3 FEET

INCH DIAMETER STEEL PROTECTIVE CASING

FT. ABOVE GROUND TO 9.0 FEET

FT. BELOW GROUND SURFACE

INCH DIAMETER STAINLESS STEEL CASING FT. ABOVE GROUND SURFACE TO 13.0 FT.

BELOW GROUND SURFACE

INCH DIAMETER STAINLESS STEEL SILT TRAP/CAP 24.0 TO 24.3 FEET

DRILLING DATES:
STARTED: 6/19/90
FINISHED: 6/20/90

WELL NO. GW-641

PAGE ___ OF ___
WELL INSTALLATION/DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED
BY: Timothy A. Lee

DRILLING COMPANY: Highland Driller

DRILLER: Mark Baker       HELPER: Mark Coapland

LOCKING CAP
10 IN. DIA. SURFACE/
PROTECTIVE CASING 1.0 FEET

ABOVE GROUND SURFACE TO
21.5 FEET BELOW GROUND

SURFACE
CONCRETE PAD

14.5 IN. DIA. BORE HOLE
11.0 TO 11.7 FEET

GROUT SEAL 0.0 TO
21.5 FEET

- 4 IN. STAINLESS STEEL CASING
FEET ABOVE GROUND
SURFACE TO 44.3 FEET BELOW GROUND SURFACE

BEDROCK LEVEL 1.0

9.5 IN. DIA. BORE HOLE

GROUT SEAL 0.0 TO
16.0 FEET

CENTRALIZERS AT 11.0 FEET.

CENTRALIZER

BENTONITE PELLET SEAL
15.0 TO 18.5 FEET

SAND PACK 18.5 TO
36.9 FEET

4 IN. DIA. STAINLESS STEEL
SLUCED SCREEN 20.3 TO
36.5 FEET

4 IN. DIA. STAINLESS STEEL
SLUC TRAP/CAP 36.5 TO
36.9 FEET

HOLE CLEARED OUT TO 36.9 FEET

BOTTOM OF BORE HOLE 36.9 FEET

ALL DEPTHS ARE MEASURED FROM GROUND SURFACE
UNLESS OTHERWISE NOTED.

NOTE:
WELL INSTALLATION DIAGRAM
Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: Timothy A. Lee

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Mark Coapland

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NOTE:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

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END OF MANUSCRIPT
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: Bruce McMaster

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker  HELPER: Mark Coapman

INCH DIAMETER STEEL PROTECTIVE CASING
FT. ABOVE GROUND TO FT. BELOW GROUND SURFACE

9\(\frac{1}{4}\) INCH DIAMETER BOREHOLE

CENTRALIZERS AT FEET

8.5 TO 10.3 FEET

BEYONDITE PELLET SEAL

10.3 TO 23.4 FEET

NOTE:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

BOTTOM OF BOREHOLE 23.4 FEET
WELL INSTALLATION/DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED
BY: Timothy A. Lee

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker 
HELPER: Mark Coapland

LOCKING CAP
10 3/4 IN. DIA. SURFACE/
PROTECTIVE CASING 1.0 FEET

ABOVE GROUND SURFACE TO
62.5 FEET BELOW GROUND

SURFACE
CONCRETE PAD

1.5 IN. DIA. BORE HOLE
0.0 TO 62.5 FEET

GROUT SEAL 0.0 TO
62.5 FEET

- 6 IN. STAINLESS STEEL CASING
FEET ABOVE GROUND
SURFACE TO 58.5 FEET BELOW
GROUND SURFACE

BEDROCK LEVEL 19.0

10.0 IN. DIA. BORE HOLE

GROUT SEAL 0.0 TO
56.1 FEET

CENTRALIZERS AT 30.0
FEET.
65.0
FEET.

CENTRALIZER

BENTONITE PELLET SEAL
26.1 TO 57.6 FEET

SAND PACK 57.6 TO
85.8 FEET

- 4 IN. DIA. STAINLESS STEEL
SLEETED SCREEN 58.5 TO
19.8 FEET

4 IN. DIA. STAINLESS STEEL
SILT TRAP/CAP 79.8 TO
80.2 FEET

HOLE CLEANED OUT TO 85.8 FEET
BOTTOM OF BORE HOLE 85.8 FEET

ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED.
NOTE:
WELL INSTALLATION / DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED
BY: Michael L. Ebers

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker          HELPER: Mark Coapman

WELL No. GW-646

DRILLING DATES:
STARTED: 7-06-90
FINISHED: 7-23-90

LOCKING CAP
11.5 in. dia. surface
PROTECTIVE CASING 0.0 FEET
ABOVE GROUND SURFACE TO
58.8 FEET BELOW GROUND
SURFACE
CONCRETE PAD
15.5 in. dia. BORE HOLE
7.5 to 56.5 FEET
GROUT SEAL 0.0 TO
58.8 FEET
4.0 in. STAINLESS STEEL CASING
FEET ABOVE GROUND
SURFACE TO 54.5 FEET BELOW
GROUND SURFACE
BEDROCK LEVEL 29.8
9.5 in. dia. BORE HOLE
GROUT SEAL 0.0 TO
61.4 FEET

CENTRALIZERS AT
15.0 FEET.
55.0 FEET.
CENTRALIZER

MONTOMOLY FELT SEAL
61.4 TO 63.3 FEET

SAND PACK 63.3 TO
75.9 FEET

4.0 in. dia. STAINLESS STEEL
SLOTTED SCREEN 69.8 TO
75.9 FEET

4.0 in. dia. STAINLESS STEEL
SLET TRAP/CAP 75.9 TO
75.9 FEET

HOLE CLEANED OUT TO 75.9 FEET
BOTTOM OF BORE HOLE 75.9 FEET

ALL DEPTHS ARE MEASURED
FROM GROUND SURFACE
UNLESS OTHERWISE NOTED:

NOTE:
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: Timothy A. Lee
DRILLING COMPANY: Highland Drilling
DRILLER: Mark Baker  HELPER: Mark Coapman

LOCKING CAP
10 IN. DIA. SURFACE/PROTECTIVE CASING 0.0 FEET ABOVE GROUND SURFACE TO 15.5 FEET BELOW GROUND SURFACE
SURFACE CONCRETE PAD

15 1/2 IN. DIA. BORE HOLE 0.0 TO 15.5 FEET

4.0 IN. STAINLESS STEEL CASING 4.0 FEET ABOVE GROUND SURFACE TO 91.0 FEET BELOW GROUND SURFACE

BEDROCK LEVEL 10.0
9 1/2 IN. DIA. BORE HOLE

CENTRALIZERS AT 45.0 FEET,
73.0 FEET,

GROUT SEAL 0.0 TO 15.5 FEET
76.1 FEET

NOTE:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

HOLE CLEANED OUT TO 71.0 FEET

BENTONITE PELLET SEAL 76.1 TO 78.0 FEET
SAND PACK 78.0 TO 91.0 FEET
4.0 IN. DIA. STAINLESS STEEL SLOTTED SCREEN 81.0 TO 91.0 FEET
4.0 IN. DIA. STAINLESS STEEL SALT TRAP/CAP 91.0 TO 91.0 FEET

NOT TO SCALE

WELL No. GW-647
DRILLING DATES:
STARTED: 8/17/95
FINISHED: 8/24/95
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: Timothy A. Lee
DRILLING COMPANY: Highland Drilling
DRILLER: Mark Baker  HELPER: Mark Coapman

DRILLING DATES:
STARTED: 9/10/90
FINISHED: 9/17/90

NOTE:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

HOLE CLEANED OUT TO 80.1 FEET
CONCRETE PAD
9 ½ IN. DIA. BORE HOLE
BEDROCK LEVEL 49.5
CENTRALIZERS AT 30 FEET.
60 FEET.

LOCKING CAP
10 IN. DIA. SURFACE PROTECTIVE CASING 2.3 FEET ABOVE GROUND SURFACE TO 64.5 FEET BELOW GROUND SURFACE
SURFACE CONCRETE PAD

GROUT SEAL 0.0 TO 64.5 FEET
4 IN. STAINLESS STEEL CASING 4.9 FEET ABOVE GROUND SURFACE TO 70.1 FEET BELOW GROUND SURFACE

GROUT SEAL 0.0 TO 63.5 FEET
63.8 TO 65 FEET
SAND PACK 65 TO 80.1 FEET
4 IN. DIA. STAINLESS STEEL SISHED SCREEN 80.1 TO 80.1 FEET
4 IN. DIA. STAINLESS STEEL BROKEN CAP 80.1 TO 80.1 FEET

NOT TO SCALE
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: Michael L. Ebers

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Mark Coapman

NOTE:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE
UNLESS OTHERWISE NOTED:

BOTTOM OF BOREHOLE 20.8 FEET
**WELL INSTALLATION/DIAGRAM**

Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: Timothy A. Lee

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker

HELPER: Mark Coapman

**LOCKING CAP**

10.0 IN. DIA. SURFACE /

PROTECTIVE CASING 1.5 FEET

ABOVE GROUND SURFACE TO

39.0 FEET BELOW GROUND

SURFACE

CONCRETE PAD

9-1/4 IN. DIA. BORE HOLE

13.5 TO 29.2 FEET

GROUT SEAL 0.0 TO

39.3 FEET

4.0 IN. STAINLESS STEEL CASING

8.0 FEET ABOVE GROUND SURFACE TO 51.6 FEET BELOW GROUND SURFACE

BEDROCK LEVEL 11.0'

9-1/4 IN. DIA. BORE HOLE

GROUT SEAL 0.0 TO

37.3 FEET

CENTRALIZERS AT

10.0 FEET.

35.0 FEET.

GENTONITE PELLET SEAL

37.3 TO 39.8 FEET

SAND PACK 39.8 TO

51.0 FEET

4.0 IN. DIA. STAINLESS STEEL

SLOTTED SCREEN 52.0 TO

52.0 FEET

4.0 IN. DIA. STAINLESS STEEL SUPERWELL CAP 52.0 TO

52.0 FEET

MOUND CLEANED OUT TO 52.0 FEET

BOTTOM OF BORE

MOUNT 51.5 FEET

ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED.

NOTE:
WELL INSTALLATION/DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED
BY: Michael L. Ebers

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELP: Mark Coopman

LOCKING CAP TO 3/4 IN. DIA. SURFACE/
PROTECTIVE CASING 1.2 FEET ABOVE GROUND SURFACE TO 12.6 FEET BELOW GROUND
SURFACE CONCRETE PAD

15 1/2 IN. DIA. BORE HOLE
11.0 FEET TO 12.2 FEET

GROUT SEAL 0.0 TO 12.2 FEET

- 4 IN. STAINLESS STEEL CASING
4.4 FEET ABOVE GROUND SURFACE TO 14.5 FEET BELOW GROUND SURFACE

BEDROCK LEVEL 9.5'
9 1/2 IN. DIA. BORE HOLE

GROUT SEAL 0.0 TO 12.2 FEET

CENTRALIZERS AT 11.0 FEET.
CENTRALIZERS AT 13.4 FEET.
CENTRALIZERS AT 31.2 FEET.

MIXED PANEL SEAL 12.2 TO 13.4 FEET
SAND PACK 13.4 TO 31.2 FEET

4 IN. DIA. STAINLESS STEEL SLOT TRAP/CAP 30.8 TO 31.2 FEET

NOTE:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED.
WELL INSTALLATION DIAGRAM
Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: Timothy A. Lee

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker HELPER: Mark Coadman

NOT TO SCALE

LOCKING CAP

CONCRETE PAD

9 1/2 INCH DIAMETER BOREHOLE

GROUT SEAL 0.0 TO 25.5 FEET

4 INCH DIAMETER STAINLESS STEEL CASING 1.0 FT ABOVE GROUND SURFACE TO 29.0 FT. BELOW GROUND SURFACE

CENTRALIZERS AT 20 FEET

3 FEET

3 FEET

SAND PACK 26.3 TO 39.0 FEET

4.0 INCH DIAMETER STAINLESS STEEL SLOTTED SCREEN 29.0 TO 39.0 FEET

HOLE CLEANED OUT TO 39.0 FEET

BOTTOM OF BOREHOLE 38.5 FEET

NOTE:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

DRILLING DATES:
STARTED: 8/08/90
FINISHED: 8/18/90

WELL NO. SW-553
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED
BY: Timothy A. Lee

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker  HELPER: Mark Coapman

LOCKING CAP

CONCRETE PAD

9 1/2 INCH DIAMETER BOREHOLE

GROUT SEAL 0.0 TO 2.9 FEET

4.0 INCH DIAMETER STAINLESS
STEEL CASING 0.1 FT ABOVE
GROUND SURFACE TO 5.3 FT
BELOW GROUND SURFACE

CENTRALIZERS AT
____ FEET
____ FEET
____ FEET

BENTONITE PELLET SEAL
2.9 TO 3.6 FEET

SAND PACK
4.2 TO 15.3 FEET

4.0 INCH DIAMETER
STAINLESS STEEL
SLOTTED SCREEN
5.3 TO 15.3 FEET

HOLE CLEANED OUT
TO 15.3 FEET

BOTTOM OF BOREHOLE
15.3 FEET

NOT TO SCALE

NOTE:
ALL DEPTHS ARE MEASURED
FROM GROUND SURFACE
UNLESS OTHERWISE NOTED:

ERCE
Environmental
and Energy
Services Co.

WELL No. GW-654

DRILLING DATES:
STARTED: 8/10/90
FINISHED: 8/13/90

L O G G E D
B Y:
T i m o t h y A. L e e

D R I L L I N G C O M P A N Y:
H i l l a n d D r i l l i n g

D R I L L E R :
M a r k B a k e r
H E L P E R :
M a r k C o a p m a n

8.2 TO 15.3 FEET

4.0 INCH DIAMETER STAINLESS
STEEL SET TRAP/CAP
15.3 TO 15.3 FEET
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: Michael L. Ebers

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker          HELPER: Mark Coopman

LOCKING CAP

CONCRETE PAD

9 1/2 INCH DIAMETER BOREHOLE

CIMENTERS AT 10.0 FEET
40.0 FEET

GROUT SEAL 0.0 TO 44.8 FEET

4 INCH DIAMETER STAINLESS STEEL CASING 4 FT ABOVE GROUND SURFACE TO 49.1 FT. BELOW GROUND SURFACE

BENTONITE PELLET SEAL 44.8 TO 47.7 FEET

SAND PACK 47.7 TO 65.0 FEET

4 INCH DIAMETER STAINLESS STEEL SLOTTED SCREEN 49.1 TO 65.0 FEET

N/A INCH DIAMETER STAINLESS STEEL SILT TRAP/CAP

NOTE: ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

NOT TO SCALE

PAGE OF
WELL INSTALLATION DIAGRAM
Y-12 WELL INSTALLATION PROGRAM
LOGGED BY: Carol L. Goldinger
DRILLING COMPANY: GA Technical Services, Inc.
DRILLER: Tom Jenkins  HELPER: Jim Martin

WELL No. SN-65

FLUSH MOUNTED WELL COVER

3.5 INCH DIAMETER BOREHOLE

CENTRALIZER AT 8.7 FEET

GROUT SEAL 1.2 TO 6.8 FEET

4 INCH DIAMETER STAINLESS STEEL CASING 0.7 FT. BELOW GROUND SURFACE TO 10.7 FT. BELOW GROUND SURFACE

BENTONITE PELLET SEAL
6.8 TO 8.3 FEET

SAND PACK
8.3 TO 21.5 FEET

4 INCH DIAMETER STAINLESS STEEL SINTERED SCREEN
10.7 TO 20.7 FEET

HOLE CLEANED OUT TO 21.5 FEET

4 INCH DIAMETER STAINLESS STEEL BILLET TRAP/CAP
20.7 TO 20.9 FEET

NOTE:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

BOTTOM OF BOREHOLE 21.5 FEET

NOT TO SCALE
Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL INSTALLATION DIAGRAM

WELL NO. GW-657

LOGGED BY: R. McMaster

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker  HELPER: Mark Coapman

DRILLING DATES:
STARTED: 10/3/90  FINISHED: 10/11/90

22 IN. DIA. STEEL MAN-HOLE COVER
FLUSH MOUNTED WITH PAVEMENT

22 IN. DIA. BOREHOLE TO 3.0 FEET

11 3/4 IN. DIA. CONDUCTOR CASING FROM 0.8 TO 3.0 FEET

9½ IN. DIA. BOREHOLE FROM 2.0 TO 17.1 FEET

TOP OF WEATHERED BEDROCK _____ FEET
TOP OF FRESH BEDROCK _____ FEET

CENTRALIZERS AT 7.0 FEET.

BENTONITE PELLET SEAL 2.0 TO 4.0 FEET

4 IN. DIA. STAINLESS STEEL SPIRAL WOUND SCREEN 5.3 TO 15.1 FEET

4 IN. DIA. STAINLESS STEEL DRILLING CAP 15.3 TO 15.6 FEET

HOLE CLEANED OUT TO 16 FEET

NOTE:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED

SAND PACK 4.0 TO 17.1 FEET

NOTE TO SCALE
WELL INSTALLATION DIAGRAM
Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: Timothy A. Lee

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker  HELPER: Mark Coapman

LOCKING CAP
10 in. dia. surface/protective casing 0.9 feet above ground surface to 1.2 feet below ground surface

SURFACE CONCRETE PAD

CONCRETE PAD

16 in. dia. bore hole 0.0 to 3.5 feet

GROUT SEAL 0.0 to 3.5 feet

4 in. stainless steel casing 1.2 feet above ground surface to 5.0 feet below ground surface

BEDROCK LEVEL N/A

9 ½ in. dia. bore hole

CENTRALIZERS AT 4 FEET.

GROUT SEAL 0.0 to 5 FEET

NOTE:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

HOLE CLEANED OUT TO 19.1 FEET

BENTONITE PELLET SEAL 5 to 6.9 FEET

SAND PACK 6.9 to 19.1 FEET

4 in. dia. stainless steel slotted screen 8.8 to 18.1 FEET

4 in. dia. stainless steel silt trap/cap 18.8 to 19.1 FEET

NOT TO SCALE

WELL No. GW-558

DRILLING DATES:
STARTED: 8-21-90
FINISHED: 8-31-90
WELL INSTALLATION DIAGRAM

Y-12 WELL INSTALLATION PROGRAM

LOGGED BY: Timothy A. Lee

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker   HELPER: Mark Coapman

LOCKING CAP
10 in. dia. surface/protective casing 0.6 ft. feet

Concrete Pad Below

16 in. dia. bore hole 0.0 to 2.9 ft.

Grout seal 0.0 to 2.9 ft.

4 in. stainless steel casing below

0.5 ft. above ground surface to 2.9 ft. below ground surface

Bedrock level N/A

9.5 in. dia. bore hole

Centralizers at:

Grout seal 0.6 to 2.5 ft.

Bentonite pellet seal 2.5 to 4.5 ft.

Sand back 4.5 to 16.1 ft.

4 in. dia. stainless steel slotted screen 3.1 to 16.2 ft.

4 in. dia. stainless steel slotted trap/cap 16.2 to 16.7 ft.

Hole cleaned out to 16.1 ft.

Bottom of bore hole 16.7 ft.

NOT TO SCALE

NOTE:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

NOTE:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED:

DRILLING DATES:
STARTED: 8-29-90
FINISHED: 9-02-90
Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL INSTALLATION DIAGRAM

LOGGED BY: B. McMaster
DRILLING COMPANY: Highland Drilling
DRILLER: Randy Phillips
HELPER: Ronnie Phillips
Bucky Young

WELL NO. CW-683

DRILLING DATES:
STARTED: 10/11/90
FINISHED: 12/3/90

11-3/4 IN. DIA. SURFACE/
PROTECTIVE CASING 0 FEET
ABOVE GROUND SURFACE TO
82.0 FEET BELOW GROUND
SURFACE

GROUT SEAL 0 TO
82.0 FEET

4 IN. DIA. STAINLESS STEEL/
X-RAY CASING 2.5 FEET ABOVE
GROUND SURFACE TO 166 FEET
BELOW GROUND SURFACE

15/16 IN. DIA. BOREHOLE
0 TO 82 FEET

TOP OF WEATHERED BEDROCK 22 FEET
TOP OF FRESH BEDROCK 26 FEET

10-5/8 IN. DIA. BORE HOLE

CENTRALIZERS AT N/A FEET.
______ FEET.
______ FEET.

NOTE:
ALL DEPTHS ARE MEASURED
FROM GROUND SURFACE
UNLESS OTHERWISE NOTED

NOT TO SCALE
**Y-12 PLANT GROUNDWATER PROTECTION PROGRAM**

**WELL INSTALLATION DIAGRAM**

| LOGGED BY: | B. McMaster |
| DRILLING COMPANY: | Highland Drilling |
| DRILLER: | Randy Phillips | HELPER: | Ronnie Phillips |
| Mark Baker |

**WELL NO. GW-684**

**DRILLING DATES:**

- **STARTED:** 9/18/90
- **FINISHED:** 10/9/90

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**Diagram Details:**

- **11 3/4 IN DIA SURFACE:**
  - PROTECTIVE CASING 0 FEET
  - ABOVE GROUND SURFACE TO 87.0 FEET BELOW GROUND SURFACE

- **GROUT SEAL**
  - 0 TO 92 FEET

- **4 IN DIA STAINLESS STEEL/**
  - **GREASING** FEET ABOVE
  - GROUND SURFACE TO 128.4 FEET
  - BELOW GROUND SURFACE

- **15 1/2 IN DIA BOREHOLE**
  - 0 TO 92 FEET

- **TOP OF WEATHERED BEDROCK** N/A FEET
- **TOP OF FRESH BEDROCK** 9 FEET

- **10 3/4 IN DIA BORE HOLE**

- **CENTRALIZERS AT**
  - N/A FEET
  - _______ FEET
  - _______ FEET

**Note:**

- All depths are measured from ground surface unless otherwise noted.

- **HOLE CLEANED OUT**
  - TO N/A FEET

- **DRILLED DEPTH OF BOREHOLE** 128.4 FEET

**NOT TO SCALE**
Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-685

WELL INSTALLATION DIAGRAM

LOGGED BY: B. McMaster

DRILLING COMPANY: Highland Drilling

DRILLER: Randy Phillips  HELPERS: Ronnie Phillips

DRILLING DATES:
STARTED: 10/29/90
FINISHED: 11/12/90

<table>
<thead>
<tr>
<th>Depth</th>
<th>Description</th>
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<tbody>
<tr>
<td>N/A IN. DIA. BOREHOLE</td>
<td>TO ____ FEET</td>
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<tr>
<td>TOP OF WEATHERED BEDROCK</td>
<td>5.0 FEET</td>
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<tr>
<td>TOP OF FRESH BEDROCK</td>
<td>15.5 FEET</td>
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<tr>
<td>10-5/8 IN. DIA. BOREHOLE</td>
<td>TO 88.5 FEET</td>
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<td>CENTRALIZERS AT</td>
<td>N/A FEET.</td>
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<td>____ FEET.</td>
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<tr>
<td>6-5/8 IN. DIA. OPEN HOLE</td>
<td>88.5 TO 138.3 FEET</td>
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NOT TO SCALE

NOTE:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED
Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL INSTALLATION DIAGRAM

LOGGED BY: B. McMaster

DRILLING DATES:
STARTED: 11/27/90
FINISHED: 12/7/90

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker   HELPER: Mark Coapman

LOCKING CAP
CONCRETE PAD

15 1/2 IN. DIA. BOREHOLE
0 TO 65 1/2 FEET

TOP OF WEATHERED BEDROCK 7 FEET
TOP OF FRESH BEDROCK 10 FEET

10-5/8 IN. DIA. BOREHOLE
65 1/2 TO 135 FEET

CENTRALIZERS AT N/A FEET.
____ FEET.
____ FEET.
____ FEET.

6-1/4 IN. DIA. OPEN HOLE
135 TO 182 FEET

DRILLED DEPTH OF BOREHOLE 182 FEET

N/A IN. DIA. STEEL CONDUCTOR CASING
____ TO ____ FEET
(See Progress Report)

GROUT SEAL 0 TO 65 1/2 FEET

7 IN. DIA STEEL CASING
____ FEET ABOVE GROUND SURFACE TO 32.8 FEET BELOW GROUND SURFACE

GROUT SEAL 0 TO 135 FEET

FLOATSHOE 32.8 TO 133.8 FEET

NOTE:
ALL DEPTHS ARE MEASURED FROM GROUND SURFACE UNLESS OTHERWISE NOTED

NOT TO SCALE
Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL INSTALLATION DIAGRAM

LOGGED BY: Bruce McMaster

DRILLING COMPANY: Highland Drilling Company

DRILLER: Mark Baker HELPER: Mark Coapman

DRILLING DATES:
STARTED: 12/10/90
FINISHED: 12/20/90

WELL NO. GW-04

LOCKING CAP
CONCRETE PAD

11-7/8 IN. DIA. STEEL
CONDUCTOR CASING
0 TO 21 FEET

15%- IN. DIA. BOREHOLE
0 TO 26 FEET

TOP OF WEATHERED BEDROCK 16 FEET
TOP OF FRESH BEDROCK 23 FEET

10-5/8 IN. DIA. BOREHOLE
26 TO 246 FEET

CENTRALIZERS AT N/A FEET.

7 IN. DIA STEEL CASING
2.8 FEET ABOVE GROUND
SURFACE TO 243.5 FEET
BELOW GROUND SURFACE

GROUT SEAL 0 TO
242.5 FEET

6%- IN. DIA. OPEN HOLE
246 TO 256 FEET

FLOATSHOE 243.5 TO
244.5 FEET

NOT TO SCALE

NOTE
ALL DEPTHS ARE MEASURED
FROM GROUND SURFACE
UNLESS OTHERWISE NOTED
Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL NO. GW-70

WELL INSTALLATION DIAGRAM

LOGGED BY: R. McMaster
DRILLING COMPANY: Highland Drilling
DRILLER: Mark Baker HELPER: Mark Coapman

DRILLING DATES:
STARTED: 10/05/90
FINISHED: 10/11/90

22 IN. DIA. STEEL MAN-HOLE COVER
FLUSH MOUNTED WITH PAVEMENT

11 3/4 IN. DIA. CONDUCTOR CASING FROM 0.8 TO
3 FEET

9 1/2 IN. DIA. BOREHOLE FROM 3 TO 26 FEET

TOP OF WEATHERED BEDROCK ?? FEET
TOP OF FRESH BEDROCK 20 FEET

CENTRALIZERS AT 8 FEET.
8 FEET.
8 FEET.

NOTE:
ALL DEPTHS ARE MEASURED
FROM GROUND SURFACE
UNLESS OTHERWISE NOTED

Backfilled
HOLE TO 17.2 FEET

DRILLED DEPTH OF
BOREHOLE, 26.0 FEET

NOT TO SCALE
Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

WELL INSTALLATION DIAGRAM

LOGGED BY: B. McMaster

DRILLING COMPANY: Highland Drilling

DRILLER: Mark Baker

HELPER: Mark Coapman

DRILLING DATES:
STARTED: 10/09/90
FINISHED: 10/12/90

22 IN. DIA. STEEL MAN-HOLE COVER
FLUSH MOUNTED WITH PAVEMENT

11 3/4 IN. DIA CONDUCTOR
CASING FROM 0.8 TO 3.0 FEET

9 5/8 IN. DIA BOREHOLE
FROM 3.0 TO 13.9 FEET

TOP OF WEATHERED BEDROCK ______ FEET
TOP OF FRESH BEDROCK ______ FEET

CENTRALIZERS AT ______ FEET.
______ FEET.
______ FEET.

NOTE:
ALL DEPTHS ARE MEASURED
FROM GROUND SURFACE
UNLESS OTHERWISE NOTED

HOLE CLEANED OUT TO 13.7 FEET

NOT TO SCALE
APPENDIX IV
WELL DEVELOPMENT FORMS
**Y-12 MONITORING WELL DEVELOPMENT FORM**

**DEVELOPMENT DETAILS**

**METHOD OF DEVELOPMENT:** Stainless steel submersible pump  
**DEVELOPMENT BEGAN DATE:** 5/7/90  
**DEVELOPMENT ENDING DATE:** 5/11/90  
**DEVELOPMENT OBSERVED BY:** Bruce McMaster

**ONE WELL VOLUME:** 29.2 GALLONS  
**TOTAL GALLONS PUMPED:** 153  
**TOTAL WELL VOLUMES PUMPED:** 5.2  
**INITIAL pH:** 7.2  
**FINAL pH:** 7.1  
**INITIAL DISSOLVED SOLIDS (μS):** 530  
**FINAL DISSOLVED SOLIDS (μS):** 480  
**DESCRIPTION OF INITIAL TURBIDITY:** Very muddy  
**DESCRIPTION OF FINAL TURBIDITY:** Slightly silty  
**FINAL MEASURED TURBIDITY:** N/A

**WELL APPROVED BY:** Bruce McMaster

**ODOR OF WATER:** Hydrocarbon odor  
**WATER DISCHARGED TO:**  
- [ ] GROUND SURFACE  
- [ ] STORM SEWERS  
- [ ] DRUMS  
- [ ] TANK TRUCK  
- [ ] STORAGE TANKS  
- [ ] OTHER

**INITIAL PRE-DEVELOPMENT WATER DEPTH:** 8.0 feet from surface

**DEVELOPMENT OBSERVATIONS**

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**OBSERVER SIGNATURE/DATE**  
Bruce McMaster  
5/11/90  
Bruce McMaster
Y-12 MONITORING WELL

DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Stainless steel submersable electric pump

DEVELOPMENT TOOK DATE: 5/3/90

DEVELOPMENT ENDING DATE: 5/3/90

DEVELOPMENT OBSERVED BY: Bruce McMaster

ONE WELL VOLUME: 21.7 GALLONS

TOTAL GALLONS PUMPED: 40

TOTAL WELL VOLUMES PUMPED: 1.8

INITIAL pH: 8.2

FINAL pH: 8.2

INITIAL DISSOLVED SOLIDS (μS): 140

FINAL DISSOLVED SOLIDS (μS): 140

DESCRIPTION OF INITIAL TURBIDITY: Clear

DESCRIPTION OF FINAL TURBIDITY: Clear

FINAL MEASURED TURBIDITY: NA

WELL APPROVED BY: Bruce McMaster

SOURCE OF WATER: None

WATER DISCHARGED TO:

- GROUND SURFACE
- STORM SEWERS
- DRUMS
- TANK TRUCK
- STORAGE TANKS
- OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH: 10 feet from surface

DEVELOPMENT OBSERVATIONS

---

OBSERVER SIGNATURE/DATE: Bruce McMaster 5/3/90

Bruce McMaster
Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Stainless steel submersible pump

DEVELOPMENT BEGAN DATE: 5/15/90

DEVELOPMENT ENDING DATE: 5/18/90

DEVELOPMENT OBSERVED BY: Bruce McMaster

ONE WELL VOLUME: 7.6 GALLONS

TOTAL GALLONS PUMPED: 35  TOTAL WELL VOLUMES PUMPED: 4.6

INITIAL pH: 8.0  FINAL pH: 7.8

INITIAL DISSOLVED SOLIDS (μS): 760  FINAL DISSOLVED SOLIDS (μS): 710

DESCRIPTION OF INITIAL TURBIDITY: Dirty

DESCRIPTION OF FINAL TURBIDITY: Cloudy

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: Bruce McMaster

ODOR OF WATER: Hydrocarbon odor

WATER DISCHARGED TO:

☐ GROUND SURFACE  ☐ STORM SEWERS  ☐ TANK TRUCK
☐ DRUMS  ☐ STORAGE TANKS  ☐ OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH: 5.6' from ground surface

DEVELOPMENT OBSERVATIONS

Observer Signature/Date: Bruce McMaster 5/18/90

Bruce McMaster
Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Stainless steel submersible pump

DEVELOPMENT BEGAN DATE: 5/14/90

DEVELOPMENT ENDING DATE: 5/17/90

DEVELOPMENT OBSERVED BY: Bruce McMaster

ONE WELL VOLUME: 6.5 GALLONS

TOTAL GALLONS PUMPED: 33

TOTAL WELL VOLUMES PUMPED: 5.1

INITIAL pH: 8.1

FINAL pH: 8.0

INITIAL DISSOLVED SOLIDS (μS): 545

FINAL DISSOLVED SOLIDS (μS): 550

DESCRIPTION OF INITIAL TURBIDITY: Dirty

DESCRIPTION OF FINAL TURBIDITY: Slightly cloudy

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: Bruce McMaster

ODOR OF WATER: Hydrocarbon/sewage odor

WATER DISCHARGED TO:

- ☐ GROUND SURFACE
- ☐ STORM SEWERS
- ☐ DRUMS
- ☐ TANK TRUCK
- ☐ STORAGE TANKS
- ☐ OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH: 5.4' from ground surface

DEVELOPMENT OBSERVATIONS

__________________________________________

OBESERVER SIGNATURE/DATE: Bruce McMaster 5/17/90

Bruce McMaster
Y-12 MONITORING WELL DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Swab through 2 3/8" tubing

DEVELOPMENT BEGAN DATE: 11/21/89

DEVELOPMENT ENDING DATE: 11/22/89

DEVELOPMENT OBSERVED BY: David B. Wright

ONE WELL VOLUME: 27.1 GALLONS

TOTAL GALLONS PUMPED: 225 TOTAL WELL VOLUMES PUMPED: 8.3

INITIAL pH: 8.5 FINAL pH: 8.3

INITIAL DISSOLVED SOLIDS (μS): 670 FINAL DISSOLVED SOLIDS (μS): 580

DESCRIPTION OF INITIAL TURBIDITY: Muddy

DESCRIPTION OF FINAL TURBIDITY: Very cloudy

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: David B. Wright

ODOR OF WATER: No Odor

WATER DISCHARGED TO:

[ ] GROUND SURFACE [ ] TANK TRUCK

[ ] STORM SEWERS [ ] STORAGE TANKS

[ ] DRUMS [ ] OTHER

INITIAL PRE-DEVELOPMENT WATERDEPTH: 99.8' from surface

DEVELOPMENT OBSERVATIONS

[Signature and Date]

David B. Wright
Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Swab through 2 3/8" tubing

DEVELOPMENT BEGAN DATE: 12/7/89

DEVELOPMENT ENDING DATE: 12/15/89

DEVELOPMENT OBSERVED BY: David B. Wright CPG TN0061

ONE WELL VOLUME: 33.8 GALLONS

TOTAL GallONS PUMPED: 250 TOTAL WELL VOLUMES PUMPED: 7.4

INITIAL pH: 11.2 FINAL pH: 8.5

INITIAL DISSOLVED SOLIDS (µS): 1110 FINAL DISSOLVED SOLIDS (µS): 370

DESCRIPTION OF INITIAL TURBIDITY: Cloudy

DESCRIPTION OF FINAL TURBIDITY: Clear

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: David B. Wright

ODOR OF WATER: No Odor

WATER DISCHARGED TO:

- [ ] GROUND SURFACE
- [ ] STORM SEWERS
- [ ] DRUMS
- [ ] TANK TRUCK
- [ ] STORAGE TANKS
- [ ] OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH: 69.5' from surface

DEVELOPMENT OBSERVATIONS

[Handwritten text]

OBSERVER SIGNATURE/DATE: David B. Wright 12/15/89
Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Workover rig with steel cable and swab.

DEVELOPMENT BEGAN DATE: 5/17/90

DEVELOPMENT ENDING DATE: 5/30/90

DEVELOPMENT OBSERVED BY: Bruce McMaster & C. G. Hagegeorge

ONE WELL VOLUME: 25 GALLONS

TOTAL GALLONS PUMPED: 234 TOTAL WELL VOLUMES PUMPED: 9.4

INITIAL pH: 8.0 FINAL pH: 7.5

INITIAL DISSOLVED SOLIDS (μS): 140 FINAL DISSOLVED SOLIDS (μS): 60

DESCRIPTION OF INITIAL TURBIDITY: Cloudy

DESCRIPTION OF FINAL TURBIDITY: Slimy Cloudy

FINAL MEASURED TURBIDITY: 60

WELL APPROVED BY: Bruce McMaster

ODOR OF WATER: None

WATER DISCHARGED TO:
- □ GROUND SURFACE
- □ STORM SEWERS
- □ DRUMS

INITIAL PRE-DEVELOPMENT WATER DEPTH:

DEVELOPMENT OBSERVATIONS

Observer Signature/Date: Bruce W. McIver 5/30/90
**Y-12 MONITORING WELL DEVELOPMENT FORM**

**DEVELOPMENT DETAILS**

**METHOD OF DEVELOPMENT:** Swabbing through 2 3/8" upset tubing

**DEVELOPMENT BEGAN DATE:** 04/03/89

**DEVELOPMENT ENDING DATE:** 04/07/89

**DEVELOPMENT OBSERVED BY:** C. Allison Hodges

**ONE WELL VOLUME:** 46.22 GALLONS

**TOTAL GALLONS PUMPED:** 335

**TOTAL WELL VOLUMES PUMPED:** 7.25

**INITIAL pH:** 7.94

**FINAL pH:** 7.77

**INITIAL DISSOLVED SOLIDS (μS):** 406

**FINAL DISSOLVED SOLIDS (μS):** 415

**DESCRIPTION OF INITIAL TURBIDITY:** Opaque

**DESCRIPTION OF FINAL TURBIDITY:** Clear

**FINAL MEASURED TURBIDITY:**

**WELL APPROVED BY:** C. Allison Hodges, EDGE

**ODOR OF WATER:** None

**WATER DISCHARGED TO:**
- □ GROUND SURFACE
- □ STORM SEWERS
- □ DRUMS
- □ TANK TRUCK
- □ STORAGE TANKS
- □ OTHER

**INITIAL PRE-DEVELOPMENT WATER DEPTH:** 3.78' from surface

**DEVELOPMENT OBSERVATIONS**

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**OBSERVER SIGNATURE/DATE:** C. Allison Hodges 04-07-89
**Y-12 MONITORING WELL DEVELOPMENT FORM**

**DEVELOPMENT DETAILS**

**METHOD OF DEVELOPMENT:** Swabbing through 2 3/8" upset tubing

**DEVELOPMENT BEGAN DATE:** 03/31/89

**DEVELOPMENT ENDING DATE:** 04/07/89

**DEVELOPMENT OBSERVED BY:** C. Allison Hodges

**ONE WELL VOLUME:** 35.4 GALLONS

**TOTAL GALLONS PUMPED:** 305  **TOTAL WELL VOLUMES PUMPED:** 8.6

**INITIAL pH:** 7.5  **FINAL pH:** 7.8

**INITIAL DISSOLVED SOLIDS (μS):** 340  **FINAL DISSOLVED SOLIDS (μS):** 359

**DESCRIPTION OF INITIAL TURBIDITY:** Translucent

**DESCRIPTION OF FINAL TURBIDITY:** Clear

**FINAL MEASURED TURBIDITY:**

---

**WELL APPROVED BY:** C. Allison Hodges

**ODOR OF WATER:** None

**WATER DISCHARGED TO:**

- Ground surface
- Storm sewers
- Drums
- Tank truck
- Storage tanks
- Other

**INITIAL PRE-DEVELOPMENT WATER DEPTH:** 13.77' from surface

**DEVELOPMENT OBSERVATIONS**

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**OBSERVER SIGNATURE/DATE:** C. Allison Hodges 04-07-89
Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Swabbing through 2 3/8" upset tubing

DEVELOPMENT BEGAN DATE: 05/08/89

DEVELOPMENT ENDING DATE: 05/22/89

DEVELOPMENT OBSERVED BY: C. Allison Hodges

ONE WELL VOLUME: 66.50 GALLONS

TOTAL GALLONS PUMPED: 540 TOTAL WELL VOLUMES PUMPED: 8.1

INITIAL pH: 8.2 FINAL pH: 8.4

INITIAL DISSOLVED SOLIDS (μS): 34.0 FINAL DISSOLVED SOLIDS (μS): 39.0

DESCRIPTION OF INITIAL TURBIDITY: Opaque

DESCRIPTION OF FINAL TURBIDITY: Transparent

FINAL MEASURED TURBIDITY: 

WELL APPROVED BY: C. Allison Hodges, EDGE

ODOR OF WATER: None

WATER DISCHARGED TO: 

GROUND SURFACE
STORM SEWERS
DRUMS

TANK TRUCK
STORAGE TANKS
OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH: 88.65' from surface

DEVELOPMENT OBSERVATIONS

________________________
Observer Signature/Date: C. Allison Hodges 05-22-89

C. Allison Hodges
Y-12 MONITORING WELL DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Swab with rubbers through 2 3/8" tubing

DEVELOPMENT BEGAN DATE: 6/19/89

DEVELOPMENT ENDING DATE: 6/23/89

DEVELOPMENT OBSERVED BY: David B. Wright

ONE WELL VOLUME: 89.49 GALLONS

TOTAL GALLONS PUMPED: 540 TOTAL WELL VOLUMES PUMPED: 6

INITIAL pH: 11.3 FINAL pH: 8.3

INITIAL DISSOLVED SOLIDS (μS): Off scale FINAL DISSOLVED SOLIDS (μS): 320

DESCRIPTION OF INITIAL TURBIDITY: Murky

DESCRIPTION OF FINAL TURBIDITY: Slightly Cloudy

FINAL MEASURED TURBIDITY: ______________________

WELL APPROVED BY: ______________________

ODOR OF WATER: No Odor

WATER DISCHARGED TO:

☐ GROUND SURFACE ☐ TANK TRUCK
☐ STORM SEWERS ☐ STORAGE TANKS
☐ DRUMS ☐ OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH: 65.5' from ground surface

DEVELOPMENT OBSERVATIONS

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Observer Signature/Date: David B. Wright CPG TN 0061

7/11/89
Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Swabbing through 2 3/8" upset tubing

DEVELOPMENT BEGAN DATE: 05/16/89

DEVELOPMENT ENDING DATE: 05/23/89

DEVELOPMENT OBSERVED BY: C. Allison Hodges

WELL VOLUME: 49.54 GALLONS

TOTAL GALLONS PUMPED: 660

INITIAL pH: 10.7

FINAL pH: 13.3

INITIAL DISSOLVED SOLIDS (dS): 1040

FINAL DISSOLVED SOLIDS (dS): 180

DESCRIPTION OF INITIAL TURBIDITY: Translucent/cloudy

DESCRIPTION OF FINAL TURBIDITY: Translucent/cloudy

FINAL MEASURED TURBIDITY: ________________

WELL APPROVED BY: C. Allison Hodges, EDGe

ODOR OF WATER: None

GROUND SURFACE

STORM SEWERS

DRUMS

TANK TRUCK

STORAGE TANKS

OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH: 58.0' from surface

DEVELOPMENT OBSERVATIONS

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Observer Signature: Date: C. Allison Hodges 05-23-87

C. Allison Hodges

PAGE _ OF _
**Y-12 MONITORING WELL DEVELOPMENT FORM**  

**DEVELOPMENT DETAILS**

**METHOD OF DEVELOPMENT:** Swabbing through 2 3/8" upset tubing

**DEVELOPMENT BEGAN DATE:** 05/23/89

**DEVELOPMENT ENDING DATE:** 06/02/89

**DEVELOPMENT OBSERVED BY:** C. Allison Hodges

**ONE WELL VOLUME:** 21.78 GALLONS

**TOTAL GALLONS PUMPED:** 655  **TOTAL WELL VOLUMES PUMPED:** 30.0

**INITIAL pH:** 8.7  **FINAL pH:** 8.4

**INITIAL DISSOLVED SOLIDS (mg/L):** 430  **FINAL DISSOLVED SOLIDS (mg/L):** 310

**DESCRIPTION OF INITIAL TURBIDITY:** Opaque/muddy

**DESCRIPTION OF FINAL TURBIDITY:** Clear

**FINAL MEASURED TURBIDITY:**

**WELL APPROVED BY:** C. Allison Hodges

**ODOR OF WATER:** None

**WATER DISCHARGED TO:**

- [ ] GROUND SURFACE
- [ ] STORM SEWERS
- [ ] DRUMS
- [ ] TANK TRUCK
- [ ] STORAGE TANKS
- [ ] OTHER

**INITIAL PRE-DEVELOPMENT WATER DEPTH:** 66.6' from surface

**DEVELOPMENT OBSERVATIONS**

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**OBSERVER SIGNATURE/DATE:**

C. Allison Hodges 06-02-89

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Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Swabbing through 2 3/8" upset tubing

DEVELOPMENT BEGAN DATE: 06/05/89

DEVELOPMENT ENDING DATE: 06/15/89

DEVELOPMENT OBSERVED BY: C. Allison Hodges

ONE WELL VOLUME: 38.43 GALLONS

TOTAL GALLONS PUMPED: 240 TOTAL WELL VOLUMES PUMPED: 6.25

INITIAL pH: 9.5 FINAL pH: 10.6

INITIAL DISSOLVED SOLIDS (μS): 960 FINAL DISSOLVED SOLIDS (μS): 820

DESCRIPTION OF INITIAL TURBIDITY: Opaque/muddy

DESCRIPTION OF FINAL TURBIDITY: Transparent/cloudy

FINAL MEASURED TURBIDITY:

WELL APPROVED BY: C. Allison Hodges

ODOR OF WATER: None

WATER DISCHARGED TO:

GROUND SURFACE

STORM SEWERS

DRUMS

TANK TRUCK

STORAGE TANKS

OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH: 61.70' from surface

DEVELOPMENT OBSERVATIONS

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OBSERVER SIGNATURE/DATE: C. Allison Hodges 06-15-89

C. Allison Hodges
DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Swabbing through 2 3/8" upset tubing

DEVELOPMENT BEGAN DATE: 06/06/89

DEVELOPMENT ENDING DATE: 06/14/89

DEVELOPMENT OBSERVED BY: C. Allison Hodges

ONE WELL VOLUME: 54.5 GALLONS

TOTAL GALLONS PUMPED: 515 TOTAL WELL VOLUMES PUMPED: 8.6

INITIAL pH: 12.7 FINAL pH: 9.2

INITIAL DISSOLVED SOLIDS (µS): 1410 FINAL DISSOLVED SOLIDS (µS): 340

DESCRIPTION OF INITIAL TURBIDITY: Transparent/cloudy

DESCRIPTION OF FINAL TURBIDITY: Transparent

FINAL MEASURED TURBIDITY: 

WELL APPROVED BY: C. Allison Hodges

ODOR OF WATER: None

WATER DISCHARGED TO:

[ ] GROUND SURFACE  [ ] STORM SEWERS  [ ] TANK TRUCK

[ ] DRUMS  [ ] STORAGE TANKS  [ ] OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH: 64.5' from surface

DEVELOPMENT OBSERVATIONS

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DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Swabbing through 2 3/8" upset tubing

DEVELOPMENT BEGAN DATE: 05/22/89

DEVELOPMENT ENDING DATE: 06/14/89

DEVELOPMENT OBSERVED BY: C. Allison Hodges

ONE WELL VOLUME: 15.37 GALLONS

TOTAL GALLONS PUMPED: 175

TOTAL WELL VOLUMES PUMPED: 11.4

INITIAL pH: 12.1

FINAL pH: 11.5

INITIAL DISSOLVED SOLIDS (μS): *

FINAL DISSOLVED SOLIDS (μS): *

DESCRIPTION OF INITIAL TURBIDITY: Opaque/muddy

DESCRIPTION OF FINAL TURBIDITY: Transparent

FINAL MEASURED TURBIDITY: 

WELL APPROVED BY: C. Allison Hodges

ODOR OF WATER: None

WATER DISCHARGED TO:

- X GROUND SURFACE
- DRUMS

TANK TRUCK

STORM SEWERS

STORAGE TANKS

OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH: 59.8' from surface

DEVELOPMENT OBSERVATIONS

Well is a low producer of water

* The dissolved solids were greater than the instrument could read.

C. Allison Hodges

OBSERVER SIGNATURE/DATE: C. Allison Hodges 6-21-89
Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Swab with Rubbers through 2 3/8" tubing

DEVELOPMENT BEGAN DATE: 6/23/89

DEVELOPMENT ENDING DATE: 6/28/89

DEVELOPMENT OBSERVED BY: David B. Wright CPG TN 0061

ONE WELL VOLUME: 25.35 GALLONS

TOTAL GALLONS PUMPED: 860 TOTAL WELL VOLUMES PUMPED: 34

INITIAL pH: 8.2 FINAL pH: 8.0

INITIAL DISSOLVED SOLIDS (μS): 420 FINAL DISSOLVED SOLIDS (μS): 340

DESCRIPTION OF INITIAL TURBIDITY: Muddy

DESCRIPTION OF FINAL TURBIDITY: Slightly Cloudy

FINAL MEASURED TURBIDITY: 

WELL APPROVED BY: [Signature]

ODOR OF WATER: No Odor

WATER DISCHARGED TO:

GROUND SURFACE
STORM SEWERS
DRUMS

INITIAL PRE-DEVELOPMENT WATER DEPTH: 71.0' from ground surface

DEVELOPMENT OBSERVATIONS

[Blank lines]

OBSERVER SIGNATURE/DATE: [Signature] 7/11/89

David B. Wright CPG TN 0061
Y-12 MONITORING WELL DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Swabbing

DEVELOPMENT BEGAN DATE: 9/5/89

DEVELOPMENT ENDING DATE: 9/11/89

DEVELOPMENT OBSERVED BY: David B. Wright

ONE WELL VOLUME: 460.7 GALLONS

TOTAL GALLONS PUMPED: 2445 TOTAL WELL VOLUMES PUMPED: 5.4

INITIAL pH: 8.5 FINAL pH: 7.9

INITIAL DISSOLVED SOLIDS (ms): 740 FINAL DISSOLVED SOLIDS (ms): 730

DESCRIPTION OF INITIAL TURBIDITY: Cloudy

DESCRIPTION OF FINAL TURBIDITY: Clear

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: David B. Wright

ODOR OF WATER: None

WATER DISCHARGED TO:

- GROUND SURFACE
- STORM SEWERS
- DRUMS
- TANK TRUCK
- STORAGE TANKS
- OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH: 88' from surface (ground)

DEVELOPMENT OBSERVATIONS

Observer Signature/Date: David B. Wright 9/11/89
Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Swab through 2 3/8" tubing and air lift through 2" casing

DEVELOPMENT BEGAN DATE: 8/3/89

DEVELOPMENT ENDING DATE: 10/16/89

DEVELOPMENT OBSERVED BY: David B. Wright

ONE WELL VOLUME: 215.7 GALLONS

TOTAL GALLONS PUMPED: 276.0 TOTAL WELL VOLUMES PUMPED: 12.8

INITIAL pH: 12.3 FINAL pH: 8.4

INITIAL DISSOLVED SOLIDS (μS): 890.0 FINAL DISSOLVED SOLIDS (μS): 800

DESCRIPTION OF INITIAL TURBIDITY: Very cloudy

DESCRIPTION OF FINAL TURBIDITY: Clear

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: David B. Wright

ODOR OF WATER: Sulfur smell

WATER DISCHARGED TO:
- [□] GROUND SURFACE
- [□] STORM SEWERS
- [□] DRUMS
- [□] TANK TRUCK
- [□] STORAGE TANKS
- [□] OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH: 86.5' from ground surface

DEVELOPMENT OBSERVATIONS

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OBSERVER SIGNATURE/DATE

David B. Wright

PAGE 1 OF 1
**Y-12 MONITORING WELL**

**DEVELOPMENT FORM**

**DEVELOPMENT DETAILS**

**METHOD OF DEVELOPMENT:** Swab through 2 3/8" tubing

**DEVELOPMENT BEGAN DATE:** 9/29/89

**DEVELOPMENT ENDING DATE:** 10/4/89

**DEVELOPMENT OBSERVED BY:** David B. Wright CPG Tn 0061

**ONE WELL VOLUME:** 15.1 GALLONS

**TOTAL GALLONS PUMPED:** 410 **TOTAL WELL VOLUMES PUMPED:** 27.2

**INITIAL pH:** 8.3 **FINAL pH:** 8.1

**INITIAL DISSOLVED SOLIDS (μS):** 700 **FINAL DISSOLVED SOLIDS (μS):** 570

**DESCRIPTION OF INITIAL TURBIDITY:** Muddy

**DESCRIPTION OF FINAL TURBIDITY:** Cloudy

**FINAL MEASURED TURBIDITY:**

**WELL APPROVED BY:** David B. Wright

**ODOR OF WATER:** No Odor

**WATER DISCHARGED TO:**
- GROUND SURFACE
- STORM SEWER
- DRUMS

**INITIAL PRE-DEVELOPMENT WATER DEPTH:** 55.4' from surface

**DEVELOPMENT OBSERVATIONS**

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**OBSERVER SIGNATURE/DATE:**

David B. Wright, TN 0061
Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Swab through 2 3/8" tubing

DEVELOPMENT BEGAN DATE: 10/6/89

DEVELOPMENT ENDING DATE: 10/6/89

DEVELOPMENT OBSERVED BY: David B. Wright CPG TN 0061

ONE WELL VOLUME: 43.7 GALLONS

TOTAL GALLONS PUMPED: 330

TOTAL WELL VOLUMES PUMPED: 7.6

INITIAL pH: 9.5

FINAL pH: 7.8

INITIAL DISSOLVED SOLIDS (μS): 630

FINAL DISSOLVED SOLIDS (μS): 480

DESCRIPTION OF INITIAL TURBIDITY: Muddy

DESCRIPTION OF FINAL TURBIDITY: Muddy

FINAL MEASURED TURBIDITY: 

WELL APPROVED BY: David B. Wright

ODOR OF WATER: No Odor

WATER DISCHARGED TO:

- GROUND SURFACE
- STORM SEWERS
- DRUMS
- TANK TRUCKS
- STORAGE TANKS
- OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH: 55.2 from surface

DEVELOPMENT OBSERVATIONS

Observer Signature/Date

David B. Wright
Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Swab with rubbers through 2 3/8" tubing

DEVELOPMENT BEGAN DATE: 6/23/89

DEVELOPMENT ENDING DATE: 7/5/89

DEVELOPMENT OBSERVED BY: David B. Wright CPG TN 0061

ONE WELL VOLUME: 54.60 GALLONS

TOTAL GALLONS PUMPED: 1155 TOTAL WELL VOLUMES PUMPED: 21.2

INITIAL pH: 12.0 FINAL pH: 10.0

INITIAL DISSOLVED SOLIDS (μS): off scale FINAL DISSOLVED SOLIDS (μS): 230

DESCRIPTION OF INITIAL TURBIDITY: Muddy

DESCRIPTION OF FINAL TURBIDITY: Cloudy

FINAL MEASURED TURBIDITY:

WELL APPROVED BY: David B. Wright CPG TN 0061

ODOR OF WATER: No Odor

WATER DISCHARGED TO: GROUND SURFACE

TANK TRUCK

STORM SEWERS

DRUMS

OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH: 79.5' from ground surface

DEVELOPMENT OBSERVATIONS

Had heavy rain 6/28/89 pm

Observer Signature/Date: David B. Wright CPG TN 0061
# Y-12 MONITORING WELL DEVELOPMENT FORM

## DEVELOPMENT DETAILS

**METHOD OF DEVELOPMENT:** Swab through 2 3/8" tubing

**DEVELOPMENT BEGAN DATE:** 10/17/89

**DEVELOPMENT ENDING DATE:** 10/20/89

**DEVELOPMENT OBSERVED BY:** David B. Wright

**ONE WELL VOLUME:** 390.9 GALLONS

**TOTAL GALLONS PUMPED:** 3250  TOTAL WELL VOLUMES PUMPED: 8.3

**INITIAL pH:** 9.3  **FINAL pH:** 8.2

**INITIAL DISSOLVED SOLIDS (mg/L):** 390  **FINAL DISSOLVED SOLIDS (mg/L):** 300

**DESCRIPTION OF INITIAL TURBIDITY:** Extremely muddy

**DESCRIPTION OF FINAL TURBIDITY:** Muddy

**FINAL MEASURED TURBIDITY:** N/A

**WELL APPROVED BY:** David B. Wright

**ODOR OF WATER:** No Odor

**WATER DISCHARGED TO:**
- [ ] GROUND SURFACE
- [ ] STORM SEWERS
- [ ] DRUMS
- [ ] TANK TRUCK
- [ ] STORAGE TANKS
- [ ] OTHER

**INITIAL PRE-DEVELOPMENT WATER DEPTH:** 118' from ground surface

## DEVELOPMENT OBSERVATIONS

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**OBSERVER SIGNATURE/DATE**

David B. Wright 10/23/89
DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Swab through 2 3/8" tubing

DEVELOPMENT BEGAN DATE: 10/27/89

DEVELOPMENT ENDING DATE: 10/31/89

DEVELOPMENT OBSERVED BY: David B. Wright

ONE WELL VOLUME: 82 GALLONS

TOTAL GALLONS PUMPED: 545
TOTAL WELL VOLUMES PUMPED: 6.6

INITIAL pH: 11.1
FINAL pH: 8.4

INITIAL DISSOLVED SOLIDS (μS): 750
FINAL DISSOLVED SOLIDS (μS): 390

DESCRIPTION OF INITIAL TURBIDITY: Cloudy

DESCRIPTION OF FINAL TURBIDITY: Clear

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: David B. Wright CPG 0061 TN

ODOR OF WATER: No Odor

WATER DISCHARGED TO:  
- GROUND SURFACE
- TANK TRUCK
- STORM SEWERS
- STORAGE TANKS
- DRUMS
- OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH: 160.3' from ground surface

DEVELOPMENT OBSERVATIONS

Observer Signature/Date: David B. Wright 10/31/89
Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Swab through 2 3/8" tubing

DEVELOPMENT BEGAN DATE: 1/3/90

DEVELOPMENT ENDING DATE: 1/9/90

DEVELOPMENT OBSERVED BY: David B. Wright

ONE WELL VOLUME: 28.6 GALLONS

TOTAL GALLONS PUMPED: 140 TOTAL WELL VOLUMES PUMPED: 3.0

INITIAL pH: 12.1 FINAL pH: 8.5

INITIAL DISSOLVED SOLIDS (µS): 2300 FINAL DISSOLVED SOLIDS (µS): 360

DESCRIPTION OF INITIAL TURBIDITY: Murky

DESCRIPTION OF FINAL TURBIDITY: Slight cloudy

FINAL MEASURED TURBIDITY: __________

WELL APPROVED BY: David B. Wright

ODOR OF WATER: No Odor

WATER DISCHARGED TO:

[ ] GROUND SURFACE [ ] STORM SEWERS [ ] STORAGE TANKS
[ ] DRUMS [ ] OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH: 81.4' from surface

DEVELOPMENT OBSERVATIONS

[Blank lines for observations]

[Signature and date]

Observer Signature/Date

PAGE 1 OF 1
Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Swab through 2 3/8" tubing

DEVELOPMENT BEGAN DATE: 1-26-90

DEVELOPMENT ENDING DATE: 1-31-90

DEVELOPMENT OBSERVED BY: Jeff Carter

ONE WELL VOLUME: 15 GALLONS

TOTAL GALLONS PUMPED: 82.12 TOTAL WELL VOLUMES PUMPED: 5.5

INITIAL pH: 9.7 FINAL pH: 9.6

INITIAL DISSOLVED SOLIDS (mg/L): 630 FINAL DISSOLVED SOLIDS (mg/L): 430

DESCRIPTION OF INITIAL TURBIDITY: very murky (reddish-tan)

DESCRIPTION OF FINAL TURBIDITY: slightly cloudy (tan)

FINAL MEASURED TURBIDITY: Not measured

WELL APPROVED BY: Jeff Carter

ODOR OF WATER: No Odor

WATER DISCHARGED TO: □ GROUND SURFACE □ TANK TRUCK
□ STORM SEWERS □ STORAGE TANKS
□ DRUMS □ OTHER Pre-dug pit

INITIAL PRE-DEVELOPMENT WATER DEPTH: 104.5 ft.

DEVELOPMENT OBSERVATIONS

As more water was removed the recovered water level rose. Final measured water level was at 95.3 ft.

Observer Signature/Date: Jeff R. Carter 2/2/90
Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Swab through 2 3/8" tubing

DEVELOPMENT BEGAN DATE: 11/3/89

DEVELOPMENT ENDING DATE: 11/8/89

DEVELOPMENT OBSERVED BY: David B. Wright

ONE WELL VOLUME: 196 GALLONS

TOTAL GALLONS PUMPED: 1060 TOTAL WELL VOLUMES PUMPED: 5.4

INITIAL pH: 9.4 FINAL pH: 9.1

INITIAL DISSOLVED SOLIDS (μS): 360 FINAL DISSOLVED SOLIDS (μS): 350

DESCRIPTION OF INITIAL TURBIDITY: Slightly cloudy

DESCRIPTION OF FINAL TURBIDITY: Clear

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: David B. Wright

ODOR OF WATER: No Odor

WATER DISCHARGED TO:
- GROUND SURFACE
- STORM SEWERS
- DRUMS
- TANK TRUCK
- STORAGE TANKS

INITIAL PRE-DEVELOPMENT WATER DEPTH: 126' from surface

DEVELOPMENT OBSERVATIONS

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OBSERVER SIGNATURE/DATE: David B. Wright
Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Swab through 2 3/8" tubing

DEVELOPMENT BEGAN DATE: 7/24/89

DEVELOPMENT ENDING DATE: 7/27/89

DEVELOPMENT OBSERVED BY: David B. Wright

ONE WELL VOLUME: 44 GALLONS

TOTAL GALLONS PUMPED: 295   TOTAL WELL VOLUMES PUMPED: 6.7

INITIAL pH: 7.9   FINAL pH: 7.5

INITIAL DISSOLVED SOLIDS (µS): 290   FINAL DISSOLVED SOLIDS (µS): 240

DESCRIPTION OF INITIAL TURBIDITY: Muddy

DESCRIPTION OF FINAL TURBIDITY: Slightly Cloudy

FINAL MEASURED TURBIDITY: ______________________

WELL APPROVED BY: David B. Wright

ODOR OF WATER: No Odor

WATER DISCHARGED TO:

☐ GROUND SURFACE   ☐ STORM SEWERS   ☐ TANK TRUCK
☐ DRUMS   ☐ STORAGE TANKS   ☐ OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH: 10.0' from ground surface

DEVELOPMENT OBSERVATIONS

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David B. Wright CPG TN: 0061

PAGE 1 OF 1
Y-12 MONITORING WELL DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Swabbing

DEVELOPMENT BEGAN DATE: 7/20/89

DEVELOPMENT ENDING DATE: 7/24/89

DEVELOPMENT OBSERVED BY: David B. Wright

ONE WELL VOLUME: 83.3 GALLONS

TOTAL GALLONS PUMPED: 450 TOTAL WELL VOLUMES PUMPED: 5.4

INITIAL pH: 8.7 FINAL pH: 7.9

INITIAL DISSOLVED SOLIDS (mg/L): 410 FINAL DISSOLVED SOLIDS (mg/L): 410

DESCRIPTION OF INITIAL TURBIDITY: Cloudy

DESCRIPTION OF FINAL TURBIDITY: Clear

FINAL MEASURED TURBIDITY: 

WELL APPROVED BY: David B. Wright

ODOR OF WATER: None

WATER DISCHARGED TO:

GROUND SURFACE
STORM SEWERS
DRUMS

TANK TRUCK
STORAGE TANKS
OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH: Ground surface

DEVELOPMENT OBSERVATIONS

.Observer Signature/Date: David B. Wright 7/24/89
Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Swab through 2 3/8" tubing

DEVELOPMENT BEGAN DATE: 2/20/90

DEVELOPMENT ENDING DATE: 2/26/90

DEVELOPMENT OBSERVED BY: David B. Wright

ONE WELL VOLUME: 200.4 GALLONS

TOTAL GALLONS PUMPED: 1110

TOTAL WELL VOLUMES PUMPED: 5.4

INITIAL pH: 6.5

FINAL pH: 6.2

INITIAL DISSOLVED SOLIDS (TSS): 2200

FINAL DISSOLVED SOLIDS (TSS): 2000

DESCRIPTION OF INITIAL TURBIDITY: slightly cloudy

DESCRIPTION OF FINAL TURBIDITY: clear

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: David B. Wright

ODOR OF WATER: No odor

WATER DISCHARGED TO:

GROUND SURFACE
STORM SEwers
DRUMS
TANK TRUCK
STORAGE TANKS
OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH: 128' from surface

DEVELOPMENT OBSERVATIONS

Observer Signature/Date: David B. Wright 2/26/90
Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Swab through 2 3/8" tubing

DEVELOPMENT BEGAN DATE: 3/16/90

DEVELOPMENT ENDING DATE: 3/23/90

DEVELOPMENT OBSERVED BY: David B. Wright

ONE WELL VOLUME: 232.7 GALLONS

TOTAL GALLONS PUMPED: 1290  TOTAL WELL VOLUMES PUMPED: 5.5

INITIAL pH: 10.2  FINAL pH: 9.7

INITIAL DISSOLVED SOLIDS (μS): 2350  FINAL DISSOLVED SOLIDS (μS): 2000

DESCRIPTION OF INITIAL TURBIDITY: Cloudy

DESCRIPTION OF FINAL TURBIDITY: Clear

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: David B. Wright

ODOR OF WATER: No Odor

WATER DISCHARGED TO:

- Ground Surface
- Storm Sewers
- Drums

INITIAL PRE-DEVELOPMENT WATER DEPTH: 129' from surface

DEVELOPMENT OBSERVATIONS

Observer Signature/Date: David B. Wright 3/23/90
Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Swab through 2 3/8" tubing

DEVELOPMENT BEGAN DATE: 4/4/90

DEVELOPMENT ENDING DATE: 4/10/90

DEVELOPMENT OBSERVED BY: David B. Wright

ONE WELL VOLUME: 10.7 GALLONS

TOTAL GALLONS PUMPED: 54 TOTAL WELL VOLUMES PUMPED: 5.0

INITIAL pH: 7.4 FINAL pH: 7.3

INITIAL DISSOLVED SOLIDS (Mg): 230 FINAL DISSOLVED SOLIDS (Mg): 110

DESCRIPTION OF INITIAL TURBIDITY: Murky

DESCRIPTION OF FINAL TURBIDITY: Cloudy

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: David B. Wright

ODOR OF WATER: No Odor

WATER DISCHARGED TO:

- GROUND SURFACE
- TANK TRUCK
- STORM SEWERS
- STORAGE TANKS
- DRUMS
- OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH: 6' from surface

DEVELOPMENT OBSERVATIONS

[Blank lines]

OBSERVER SIGNATURE/DATE: David B. Wright 4/11/90
Y-12 MONITORING WELL DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Swab through 2 3/8" tubing

DEVELOPMENT BEGAN DATE: 3/26/90

DEVELOPMENT ENDING DATE: 3/30/90

DEVELOPMENT OBSERVED BY: David B. Wright

ONE WELL VOLUME: 24.3 GALLONS

TOTAL GALLONS PUMPED: 230 TOTAL WELL VOLUMES PUMPED: 9.5

INITIAL pH: 7.9 FINAL pH: 7.1

INITIAL DISSOLVED SOLIDS (US): 990 FINAL DISSOLVED SOLIDS (US): 400

DESCRIPTION OF INITIAL TURBIDITY: Cloudy

DESCRIPTION OF FINAL TURBIDITY: Slightly Cloudy

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: David B. Wright

ODOR OF WATER: No Odor

WATER DISCHARGED TO: ☐ GROUND SURFACE ☐ STORM SEWERS ☐ TANK TRUCK

INITIAL PRE-DEVELOPMENT WATER DEPTH: 7' from surface

DEVELOPMENT OBSERVATIONS

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[Signature]

Observer Signature/Date

David B. Wright 3/30/90
Y-12 MONITORING WELL DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Swab through 2 3/8" tubing
DEVELOPMENT BEG A N DATE: 4/10/90
DEVELOPMENT ENDING DATE: 4/17/90
DEVELOPMENT OBSERVED BY: David B. Wright

ONE WELL VOLUME: 30.2 GALLONS
TOTAL GALLONS PUMPED: 235 TOTAL WELL VOLUMES PUMPED: 7.8
INITIAL pH: 10.1 FINAL pH: 9.2
INITIAL DISSOLVED SOLIDS (μS): 150 FINAL DISSOLVED SOLIDS (μS): 110
DESCRIPTION OF INITIAL TURBIDITY: Muddy
DESCRIPTION OF FINAL TURBIDITY: Cloudy
FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: David B. Wright

ODOR OF WATER: No Odor
WATER DISCHARGED TO:
GROUND SURFACE
STORM SEwerS
DRUMS
TANK TRUCK
STORAGE TANKS
OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH: 4' from surface

DEVELOPMENT OBSERVATIONS

[Blank lines]

OBSERVER SIGNATURE/DATE: David B. Wright 4/23/90
Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Swab through 2 3/8" tubing

DEVELOPMENT BEGANN DATE: 4/3/90

DEVELOPMENT ENDING DATE: 4/9/90

DEVELOPMENT OBSERVED BY: David B. Wright

ONE WELL VOLUME: 41.6 GALLONS

TOTAL GALLONS PUMPED: 215 TOTAL WELL VOLUMES PUMPED: 5.2

INITIAL pH: 10.2 FINAL pH: 8.6

INITIAL DISSOLVED SOLIDS (dS): 370 FINAL DISSOLVED SOLIDS (dS): 160

DESCRIPTION OF INITIAL TURBIDITY: Cloudy

DESCRIPTION OF FINAL TURBIDITY: Cloudy

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: David B. Wright

ODOR OF WATER: No Odor

WATER DISCHARGED TO:

- GROUND SURFACE
- TANK TRUCK
- STORM SEWERS
- STORAGE TANKS
- DRUMS
- OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH: 20.3' from surface

DEVELOPMENT OBSERVATIONS

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Observer Signature/Date: David B. Wright 4/9/90
Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Swab through 2 3/8" tubing

DEVELOPMENT BEGAN DATE: 9/20/89

DEVELOPMENT ENDING DATE:

DEVELOPMENT OBSERVED BY: David B. Wright

ONE WELL VOLUME: 23 GALLONS

TOTAL GALLONS PUMPED: 2240

TOTAL WELL VOLUMES PUMPED: 97.4

INITIAL pH: 8.4

FINAL pH: 8.2

INITIAL DISSOLVED SOLIDS (μS): 460

FINAL DISSOLVED SOLIDS (μS): 440

DESCRIPTION OF INITIAL TURBIDITY: Muddy

DESCRIPTION OF FINAL TURBIDITY: Muddy

FINAL MEASURED TURBIDITY:

WELL APPROVED BY: David B. Wright

ODOR OF WATER: No Odor

WATER DISCHARGED TO:

[ ] GROUND SURFACE [ ] TANK TRUCK

[ ] STORM SEWERS [ ] STORAGE TANKS

[ ] DRUMS [ ] OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH: 11.8' from surface

DEVELOPMENT OBSERVATIONS

[Blank lines]

OBSERVER SIGNATURE/DATE

David B. Wright, P.G. TN 0061
Y-12 MONITORING WELL DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Swabbed through 2 3/8" tubing

DEVELOPMENT BEGAN DATE: 12/11/89

DEVELOPMENT ENDING DATE: 12/15/89

DEVELOPMENT OBSERVED BY: David B. Wright

ONE WELL VOLUME: 11.2 GALLONS

TOTAL GALLONS PUMPED: 103 TOTAL WELL VOLUMES PUMPED: 9.2

INITIAL pH: 8.4 FINAL pH: 8.3

INITIAL DISSOLVED SOLIDS (μS): 370 FINAL DISSOLVED SOLIDS (μS): 370

DESCRIPTION OF INITIAL TURBIDITY: Muddy

DESCRIPTION OF FINAL TURBIDITY: Cloudy

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: David B. Wright

ODOR OF WATER: No Odor

WATER DISCHARGED TO: ☐ GROUND SURFACE ☐ TANK TRUCK

☐ STORM SEWERS ☐ STORAGE TANKS

☐ DRUMS ☐ OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH: 6.4' from surface

DEVELOPMENT OBSERVATIONS

OBSERVER SIGNATURE/DATE

David B. Wright 12/15/89
## Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

### WELL DEVELOPMENT SUMMARY

**WELL NO.** GW-623

<table>
<thead>
<tr>
<th>Method of Development:</th>
<th>Air Lifting and Surging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development Date:</td>
<td></td>
</tr>
<tr>
<td>Start: 8/24/90</td>
<td></td>
</tr>
<tr>
<td>Finish: 12/14/90</td>
<td></td>
</tr>
<tr>
<td>One Well Volume:</td>
<td>47.9 GALLONS</td>
</tr>
<tr>
<td>Total Gallons Pumped:</td>
<td>983</td>
</tr>
<tr>
<td>Total Well Volumes Pumped:</td>
<td>20.5</td>
</tr>
<tr>
<td>Initial pH:</td>
<td>12.2</td>
</tr>
<tr>
<td>Final pH:</td>
<td>9.5</td>
</tr>
<tr>
<td>Initial Specific Conductance:</td>
<td>5500</td>
</tr>
<tr>
<td>Final: 1100</td>
<td></td>
</tr>
<tr>
<td>Description of Initial Turbidity:</td>
<td>Clear</td>
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<tr>
<td>Description of Final Turbidity:</td>
<td>Slightly Cloudy</td>
</tr>
<tr>
<td>Final Measured Turbidity:</td>
<td>N/A</td>
</tr>
<tr>
<td>Well Approved By:</td>
<td>Bruce McMaster</td>
</tr>
<tr>
<td>Water Discharged To:</td>
<td>Ground Surface</td>
</tr>
<tr>
<td></td>
<td>Tank Truck</td>
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<tr>
<td></td>
<td>Storm Sewers</td>
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<td></td>
<td>Storage Tanks</td>
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<td></td>
<td>Drums</td>
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<tr>
<td></td>
<td>Other</td>
</tr>
<tr>
<td>Initial Pre-Development Water Depth:</td>
<td>4' below ground surface</td>
</tr>
</tbody>
</table>

### Development Observations
- Surged again from 12/4 to 12/6 and stopped because observed grout flakes in a sample. Air lifted 12/6 to 12/14. Very slight odor persisted from 11/26 thru 12/14 but not detectable with HNU; or less than 5 ppm.

**Observer Signature:** ____________________________

**Date:** ____________________________
Y-12 MONITORING WELL DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: SHAB through 2 3/8" Tubing

DEVELOPMENT BEGAN DATE: 2/6/90

DEVELOPMENT ENDING DATE: 2/9/90

DEVELOPMENT OBSERVED BY: David B. Wright

ONE WELL VOLUME: 20 GALLONS

TOTAL GALLONS PUMPED: 111

TOTAL WELL VOLUMES PUMPED: 3.6

INITIAL pH: 7.8

FINAL pH: 7.7

INITIAL DISSOLVED SOLIDS (μS): 380

FINAL DISSOLVED SOLIDS (μS): 350

DESCRIPTION OF INITIAL TURBIDITY: Muddy

DESCRIPTION OF FINAL TURBIDITY: Cloudy

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: David B. Wright

ODOR OF WATER: No Odor

WATER DISCHARGED TO:

GROUND SURFACE

STORM SEWERS

DRUMS

TANK TRUCK

STORAGE TANKS

OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH: 3' from surface

DEVELOPMENT OBSERVATIONS

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OBSERVER SIGNATURE/DATE

David B. Wright 2/12/90

PAGE 1 OF 1
Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Swab through 2 3/8" tubing

DEVELOPMENT BEGAN DATE: 1/2/90

DEVELOPMENT ENDING DATE: 1/9/90

DEVELOPMENT OBSERVED BY: David B. Wright, CRG TN 0061

ONE WELL VOLUME: 4,777 GALLONS

TOTAL GALLONS PUMPED: 232 TOTAL WELL VOLUMES PUMPED: 6.6

INITIAL pH: 9.1 FINAL pH: 9.5

INITIAL DISSOLVED SOLIDS (μS): 170 FINAL DISSOLVED SOLIDS (μS): 170

DESCRIPTION OF INITIAL TURBIDITY: Cloudy

DESCRIPTION OF FINAL TURBIDITY: Clear

FINAL MEASURED TURBIDITY: 

WELL APPROVED BY: David B. Wright

ODOR OF WATER: No Odor

WATER DISCHARGED TO:

GROUND SURFACE
STORM SEWERS
DRUMS

INITIAL PRE-DEVELOPMENT WATER DEPTH: 22.6' from ground surface

DEVELOPMENT OBSERVATIONS


OSERVER SIGNATURE/DATE
Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Swab through 1 3/8" tubing

DEVELOPMENT BEGAN DATE: 1/12/90

DEVELOPMENT ENDING DATE: 1/18/90

DEVELOPMENT OBSERVED BY: David B. Wright, CPG T: 0061

ONE WELL VOLUME: 407.3 GALLONS

TOTAL GALLONS PUMPED: 2040 TOTAL WELL VOLUMES PUMPED: 5

INITIAL pH: 8.5 FINAL pH: 8.5

INITIAL DISSOLVED SOLIDS (\(\mu\)g): 1290 FINAL DISSOLVED SOLIDS (\(\mu\)g): 1150

DESCRIPTION OF INITIAL TURBIDITY: Slightly cloudy

DESCRIPTION OF FINAL TURBIDITY: Clear

FINAL MEASURED TURBIDITY: __________

WELL APPROVED BY: David B. Wright

ODOR OF WATER: Very slight diesel odor

WATER DISCHARGED TO:

- [ ] GROUND SURFACE
- [ ] STORM SEWERS
- [ ] DRUMS
- [ ] TANK TRUCK
- [ ] STORAGE TANKS
- [ ] OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH: 23.8' from ground surface

DEVELOPMENT OBSERVATIONS

______________________________

OBSERVER SIGNATURE/DATE

David B. Wright

PAGE 1 OF
# Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

## WELL DEVELOPMENT SUMMARY

<table>
<thead>
<tr>
<th>Method of Development:</th>
<th>Steel swab with rubber cups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development Observed By:</td>
<td>Bruce McMaster</td>
</tr>
<tr>
<td>One Well Volume:</td>
<td>55 gallons</td>
</tr>
<tr>
<td>Total Gallons Pumped:</td>
<td>275</td>
</tr>
<tr>
<td>Initial pH:</td>
<td>8.8</td>
</tr>
<tr>
<td>Initial Specific Conductance:</td>
<td>800</td>
</tr>
<tr>
<td>Description of Initial Turbidity:</td>
<td>Slightly Cloudy</td>
</tr>
<tr>
<td>Description of Final Turbidity:</td>
<td>Slightly Cloudy</td>
</tr>
<tr>
<td>Final Measured Turbidity:</td>
<td>N/A</td>
</tr>
<tr>
<td>Well Approved By:</td>
<td>Bruce McMaster</td>
</tr>
<tr>
<td>Odor of Water:</td>
<td>None</td>
</tr>
<tr>
<td>Water Discharged To:</td>
<td>☑ Ground Surface</td>
</tr>
<tr>
<td>Initial Pre-Development Water Depth:</td>
<td>7' below ground surface</td>
</tr>
</tbody>
</table>

**Development Observations:**

Well developed using stainless steel swab with rubber cups in 2-1/8" diameter tubing.

Water has no odor; HNU meter shows less than 5 ppm volatiles with head space test.

**Observer Signature:** 

**Date:**
**Y-12 MONITORING WELL**

**DEVELOPMENT FORM**

**DEVELOPMENT DETAILS**

**METHOD OF DEVELOPMENT:** Swab through 2 3/8" tubing

**DEVELOPMENT BEGAN DATE:** 5/7/90

**DEVELOPMENT ENDING DATE:** 5/14/90

**DEVELOPMENT OBSERVED BY:** Bruce McMaster

**ONE WELL VOLUME:** 26.3 GALLONS

**TOTAL GALLONS PUMPED:** 123  **TOTAL WELL VOLUMES PUMPED:** 4.7

**INITIAL pH:** 8.6  **FINAL pH:** 8.4

**INITIAL DISSOLVED SOLIDS (dS):** 380  **FINAL DISSOLVED SOLIDS (dS):** 355

**DESCRIPTION OF INITIAL TURBIDITY:** Muddy

**DESCRIPTION OF FINAL TURBIDITY:** Cloudy

**FINAL MEASURED TURBIDITY:** N/A

**WELL APPROVED BY:** Bruce McMaster

**ODOR OF WATER:** None

**WATER DISCHARGED TO:**
- [ ] GROUND SURFACE
- [ ] STORM SEWERS
- [ ] DRUMS
- [ ] TANK TRUCK
- [ ] STORAGE TANKS
- [ ] OTHER

**INITIAL PRE-DEVELOPMENT WATER DEPTH:** 9.0' from ground surface

**DEVELOPMENT OBSERVATIONS**

**OBSERVER SIGNATURE/DATE**

Bruce McMaster  5/14/90
Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Workover Rig w/steel cable and swab.
DEVELOPMENT BEGAN DATE: 6/6/90
DEVELOPMENT ENDING DATE: 6/12/90
DEVELOPMENT OBSERVED BY: B. McMaster

ONE WELL VOLUME: 75 GALLONS
TOTAL GALLONS PUMPED: 375 TOTAL WELL VOLUMES PUMPED: 5
INITIAL pH: 10.1 FINAL pH: 9.3
INITIAL Specific conductance 450 FINAL Specific conductance 440
DESCRIPTION OF INITIAL TURBIDITY: slightly cloudy
DESCRIPTION OF FINAL TURBIDITY: clear
FINAL MEASURED TURBIDITY: 440

WELL APPROVED BY: Bruce McMaster

ODOR OF WATER: None
WATER DISCHARGED TO:
- GROUND SURFACE
- STORM SEWERS
- DRUMS
- OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH: well at ground surface

DEVELOPMENT OBSERVATIONS
Tested water using head space test w/OVA meter. No show of organics; No smells. Instructed to go ahead and dump barrels after filling.

OBSERVER SIGNATURE/DATE: Bruce McMaster 6/12/90
Y-12 MONITORING WELL DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Workover Rig w/steel cable and swab.

DEVELOPMENT BEGAN DATE: 6/13/90

DEVELOPMENT ENDING DATE: 6/19/90

DEVELOPMENT OBSERVED BY: B. McMaster

WELL VOLUME: 14.7 GALLONS

TOTAL GALLONS PUMPED: 77

TOTAL WELL VOLUMES PUMPED: 5

INITIAL pH: 9.4

FINAL pH: 8.4

INITIAL Specific Conductance: 390

FINAL Specific Conductance: 540

DESCRIPTION OF INITIAL TURBIDITY: cloudy - opaque

DESCRIPTION OF FINAL TURBIDITY: slightly cloudy

FINAL MEASURED TURBIDITY: 540

WELL APPROVED BY: Bruce McMaster

ODOR OF WATER: None

WATER DISCHARGED TO: GROUND SURFACE

TANK TRUCK

STORM SEWERS

DRUMS

OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH: 5.5' below land surface

DEVELOPMENT OBSERVATIONS

Tested water using Head Space test w/OVA meter. No show of organics; No smells. Instructed to go ahead and dump barrels after filling.

Observer Signature/Date: Bruce McMaster 6/19/90
Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Work over rig with steel cable and swab

DEVELOPMENT
BEGAN DATE: 6/20/90

DEVELOPMENT
ENDING DATE: 6/25/90

DEVELOPMENT
OBSERVED BY: Bruce McMaster

ONE WELL VOLUME: 6  GALLONS

TOTAL GALLONS PUMPED: 48  TOTAL WELL VOLUMES PUMPED: 8

INITIAL pH: 8.1  FINAL pH: 7.7

INITIAL CONDUCTANCE 940  FINAL CONDUCTANCE 985

DESCRIPTION OF INITIAL TURBIDITY: Cloudy

DESCRIPTION OF FINAL TURBIDITY: Cloudy

FINAL MEASURED TURBIDITY: 96

WELL APPROVED BY: Timothy A. Lee

LOCATION OF WATER: None

WATER DISCHARGED TO:

- GROUND SURFACE
- DRUMS
- TANK TRUCK
- STORAGE TANKS
- OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH: 4.6 feet below ground surface.

DEVELOPMENT OBSERVATIONS

---

Observer Signature/Date

Bruce McMaster  6/22/90
Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Work over rig with steel cable and saph

DEVELOPMENT BEGAN DATE: 6/21/90

DEVELOPMENT ENDING DATE: 6/26/90

DEVELOPMENT OBSERVED BY: Bruce McMaster

ONE WELL VOLUME: 80 GALLONS

TOTAL GALLONS PUMPED: 645

TOTAL WELL VOLUMES PUMPED: 8

INITIAL pH: 9.9

FINAL pH: 9.8

INITIAL CONDUCTANCE 90

FINAL CONDUCTANCE 403

DESCRIPTION OF INITIAL TURBIDITY: Slightly cloudy

DESCRIPTION OF FINAL TURBIDITY: Slightly cloudy

FINAL MEASURED TURBIDITY: 24

WELL APPROVED BY: Bruce McMaster

ODOR OF WATER: None

WATER DISCHARGED:  ☐ GROUND SURFACE ☐ TANK TRUCK

☐ STORM SEWERS ☐ STORAGE TANKS

☐ DRUMS ☐ OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH:

DEVELOPMENT OBSERVATIONS

Observer Signature/Date: Bruce McMaster 6/21/90
**Y-12 MONITORING WELL DEVELOPMENT FORM**

**DEVELOPMENT DETAILS**

**METHOD OF DEVELOPMENT:** Work over rig with steel cable and swab

**DEVELOPMENT BEGAN DATE:** 6/26/90

**DEVELOPMENT ENDING DATE:** 7/3/90

**DEVELOPMENT OBSERVED BY:** Tim A. Lee

**ONE WELL VOLUME:** 20.6 GALLONS

**TOTAL GALLONS PUMPED:** 170  **TOTAL WELL VOLUMES PUMPED:** 8.2

**INITIAL pH:** 8.1  **FINAL pH:** 8.0

**INITIAL DISSOLVED SOLIDS (μS):** 100  **FINAL DISSOLVED SOLIDS (μS):** 35

**DESCRIPTION OF INITIAL TURBIDITY:** cloudy

**DESCRIPTION OF FINAL TURBIDITY:** clear

**FINAL MEASURED TURBIDITY:**

---

**WELL APPROVED BY:** Timothy A. Lee

**ODOR OF WATER:** No odor detected

**WATER DISCHARGED TO:**

- □ GROUND SURFACE
- □ STORM SEWERS
- □ DRUMS
- □ TANK TRUCK
- □ STORAGE TANKS
- □ OTHER

**INITIAL PRE-DEVELOPMENT WATER DEPTH:** 21.2 feet below ground level

**DEVELOPMENT OBSERVATIONS**

---

**OBSERVER SIGNATURE/DATE**

---

Timothy A. Lee
**Y-12 MONITORING WELL**

**DEVELOPMENT FORM**

**DEVELOPMENT DETAILS**

**METHOD OF DEVELOPMENT:** Work over rig with steel cable and swab.

**DEVELOPMENT BEGAN DATE:** 7-03-90

**DEVELOPMENT ENDING DATE:** 7-11-90

**DEVELOPMENT OBSERVED BY:** Timothy A. Lee

**ONE WELL VOLUME:** 4.8 GALLONS

**TOTAL GALLONS PUMPED:** 75.0

**TOTAL WELL VOLUMES PUMPED:** 15.6

**INITIAL pH:** 8.0

**FINAL pH:** 7.4

**INITIAL DISSOLVED SOLIDS (mg):** 47

**FINAL DISSOLVED SOLIDS (mg):** 12

**DESCRIPTION OF INITIAL TURBIDITY:** Cloudy

**DESCRIPTION OF FINAL TURBIDITY:** Slightly Cloudy

**FINAL MEASURED TURBIDITY:**

**WELL APPROVED BY:** Timothy A. Lee

**LOCATION OF WATER:** None

**WATER DISCHARGED TO:**

- □ GROUND SURFACE
- □ STORM SEWERS
- □ DRUMS
- □ TANK TRUCK
- □ STORAGE TANKS
- □ OTHER

**INITIAL PRE-DEVELOPMENT WATER DEPTH:** 17.3' below ground surface.

**DEVELOPMENT OBSERVATIONS**

**OBSERVER SIGNATURE/DATE**

Timothy A. Lee
Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Work over rig with teflon coated cable and swab.

DEVELOPMENT BEGAN DATE: 6-29-90

DEVELOPMENT ENDING DATE: 7-10-90

DEVELOPMENT OBSERVED BY: Timothy A. Lee

ONE WELL VOLUME: 25 GALLONS

TOTAL GALLONS PUMPED: 120 TOTAL WELL VOLUMES Pumped: 4.8

INITIAL pH: 8.7 FINAL pH: 7.0

INITIAL DISSOLVED SOLIDS (US): 45 FINAL DISSOLVED SOLIDS (US): 26

DESCRIPTION OF INITIAL TURBIDITY: Cloudy

DESCRIPTION OF FINAL TURBIDITY: Slightly Cloudy

FINAL MEASURED TURBIDITY: Not Measured

WELL APPROVED BY: Timothy A. Lee

ODOR OF WATER: None

WATER DISCHARGED: □ GROUND SURFACE □ STORM SEWERS □ STORAGE TANKS

TO: □ DRUMS □ OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH: 18.2 feet below ground surface.

DEVELOPMENT OBSERVATIONS

Observer Signature/Date: Timothy A. Lee 7/10/90

PAGE ___ OF ___
Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Swabbing through 2 3/8" tubing.

DEVELOPMENT BEGAN DATE: 7/12/90

DEVELOPMENT ENDING DATE: 7/20/90

DEVELOPMENT OBSERVED BY: Michael L. Ebers

ONE WELL VOLUME: 31.4 GALLONS

TOTAL GALLONS PUMPED: 210

TOTAL WELL VOLUMES PUMPED: 6.7

INITIAL pH: 8.8

FINAL pH: 6.9

INITIAL DISSOLVED SOLIDS (μS): 500

FINAL DISSOLVED SOLIDS (μS): 310

DESCRIPTION OF INITIAL TURBIDITY: Muddy

DESCRIPTION OF FINAL TURBIDITY: Cloudy

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: Michael L. Ebers

ODOR OF WATER: None

WATER DISCHARGED TO:

GROUND SURFACE

STORM SEWERS

DRUMS

TANK TRUCK

STORAGE TANKS

OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH: 16.7 feet below ground surface.

DEVELOPMENT OBSERVATIONS

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[Blank lines]

[Blank lines]

[Blank lines]

OBSERVER SIGNATURE/DATE: Michael L. Ebers, CPGS, PG 7/20/90
Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Swab through 2 3/8" tubing.

DEVELOPMENT BEGAN DATE: 7-16-90

DEVELOPMENT ENDING DATE: 7-23-90

DEVELOPMENT OBSERVED BY: Michael L. Ebers

ONE WELL VOLUME: 19.8 GALLONS

TOTAL GALLONS PUMPED: 120

TOTAL WELL VOLUMES PUMPED: 6.1

INITIAL pH: 7.8

FINAL pH: 6.7

INITIAL DISSOLVED SOLIDS (mg/L): 450

FINAL DISSOLVED SOLIDS (mg/L): 270

DESCRIPTION OF INITIAL TURBIDITY: Muddy

DESCRIPTION OF FINAL TURBIDITY: Cloudy

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: Michael L. Ebers

ODOR OF WATER: None

WATER DISCHARGED TO:

- GROUND SURFACE
- STORM SEWERS
- DRUMS
- TANK TRUCK
- STORAGE TANKS
- OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH: 6.75 feet from ground surface.

DEVELOPMENT OBSERVATIONS

observer signature/date: Michael L. Ebers, PG

2-23-90
Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Swab with workover rig and steel swab.

DEVELOPMENT BEGAN DATE: 7-23-90

DEVELOPMENT ENDING DATE: 8-02-90

DEVELOPMENT OBSERVED BY: Mike Ebers and Timothy A. Lee

ONE WELL VOLUME: 11.5 GALLONS

TOTAL GALLONS PUMPED: 60 TOTAL WELL VOLUMES PUMPED: 5.2

INITIAL pH: 8.3 FINAL pH: 8.4

INITIAL DISSOLVED SOLIDS (μS): 510 FINAL DISSOLVED SOLIDS (μS): 490

DESCRIPTION OF INITIAL TURBIDITY: Cloudy

DESCRIPTION OF FINAL TURBIDITY: Slightly Cloudy

FINAL MEASURED TURBIDITY: --

WELL APPROVED BY: Timothy A. Lee

ODOR OF WATER: None

WATER DISCHARGED TO:

GROUND SURFACE

STORM SEWERS

DRUMS

TANK TRUCK

STORAGE TANKS

OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH: 75.7' below ground surface.

DEVELOPMENT OBSERVATIONS

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OBSERVER SIGNATURE/DATE: Timothy A. Lee

8-02-90
Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Workover Rig and Swab

DEVELOPMENT BEGAN DATE: 8/02/90

DEVELOPMENT ENDING DATE: 8/13/90

DEVELOPMENT OBSERVED BY: Timothy A. Lee

ONE WELL VOLUME: 37.0 GALLONS

TOTAL GALLONS PUMPED: 215 TOTAL WELL VOLUMES PUMPED: 5.8

INITIAL pH: 11.7 FINAL pH: 7.8

INITIAL DISSOLVED SOLIDS (mS): 2000 FINAL DISSOLVED SOLIDS (mS): 790

DESCRIPTION OF INITIAL TURBIDITY: Cloudy

DESCRIPTION OF FINAL TURBIDITY: Slightly cloudy

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: Timothy A. Lee

ODOR OF WATER: None

WATER DISCHARGED TO:
- GROUND SURFACE
- STORM SEWERS
- DRUMS
- TANK TRUCK
- STORAGE TANKS
- OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH: 37.5 Feet below ground surface.

DEVELOPMENT OBSERVATIONS

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observer signature/date: Timothy A. Lee  8/13/90
ERC / EDGE
Environmental
and Energy
Services Co.

WELLHt. GW-647
LOCAn_v..Y-12

Y- 72 MONITORlNO
WELL
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DEVEL OP,_EN T DETAILS
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A. Lee

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Timothy A. Lee
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Water

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level

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feet

below qround surface.


**Y-12 MONITORING WELL**

**DEVELOPMENT FORM**

**DEVELOPMENT DETAILS**

**METHOD OF DEVELOPMENT:** Stainless steel swab and cable with workover rig

**DEVELOPMENT BEGAIN DATE:** 9/20/90

**DEVELOPMENT ENDING DATE:** 10/05/90

**DEVELOPMENT OBSERVED BY:** B. McMaster

**ONE WELL VOLUME:** 317 GALLONS

**TOTAL GALLONS PUMPED:** 335

**TOTAL WELL VOLUMES PUMPED:** 10.6 Vols.

**INITIAL pH:** 8.2

**FINAL pH:** 7.2

**INITIAL DISSOLVED SOLIDS (US):** 490 us

**FINAL DISSOLVED SOLIDS (US):** 390 (K)

**DESCRIPTION OF INITIAL TURBIDITY:** Cloudy

**DESCRIPTION OF FINAL TURBIDITY:** Cloudy

**FINAL MEASURED TURBIDITY:** ----

**WELL APPROVED BY:** B. McMaster

**ODOR OF WATER:** None

**WATER DISCHARGED TO:**

- [ ] GROUND SURFACE
- [ ] STORM SEWERS
- [X] DRUMS
- [ ] TANK TRUCK
- [ ] STORAGE TANKS
- [ ] OTHER

**INITIAL PRE-DEVELOPMENT WATER DEPTH:** 45' below land surface

**DEVELOPMENT OBSERVATIONS**

Water never completely cleaned up.

**OBSERVER SIGNATURE/DATE:** B. McMaster 10/5/90
**Y-12 MONITORING WELL DEVELOPMENT FORM**

**DEVELOPMENT DETAILS**

<table>
<thead>
<tr>
<th>METHOD OF DEVELOPMENT:</th>
<th>Work over rig and swab.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEVELOPMENT BEGAN DATE:</td>
<td>8/03/90</td>
</tr>
<tr>
<td>DEVELOPMENT ENDING DATE:</td>
<td>8/10/90</td>
</tr>
<tr>
<td>DEVELOPMENT OBSERVED BY:</td>
<td>Timothy A. Lee</td>
</tr>
</tbody>
</table>

**ONE WELL VOLUME: 19.6 GALLONS**

<table>
<thead>
<tr>
<th>TOTAL GALLONS PUMPED:</th>
<th>150</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL WELL VOLUMES PUMPED:</td>
<td>7.6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INITIAL pH:</th>
<th>7.9</th>
<th>FINAL pH:</th>
<th>7.8</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>INITIAL DISSOLVED SOLIDS (μS):</th>
<th>340</th>
<th>FINAL DISSOLVED SOLIDS (μS):</th>
<th>250</th>
</tr>
</thead>
</table>

**DESCRIPTION OF INITIAL TURBIDITY:** Cloudy

**DESCRIPTION OF FINAL TURBIDITY:** Slightly Cloudy

**FINAL MEASURED TURBIDITY:** N/A

**WELL APPROVED BY:** Timothy A. Lee

**ODOR OF WATER:** None

**WATER DISCHARGED TO:**
- [ ] GROUND SURFACE
- [ ] TANK TRUCK
- [ ] STORM SEWERS
- [ ] STORAGE TANKS
- [ ] DRUMS
- [ ] OTHER

**INITIAL PRE-DEVELOPMENT WATERDEPTH:** 7.3 feet below ground surface.

**DEVELOPMENT OBSERVATIONS**

---

**OBSERVER SIGNATURE/DATE**

Timothy A. Lee 8/10/90
Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF
DEVELOPMENT: Work over rig and swab.

DEVELOPMENT
BEGAN DATE: 8-20-90

DEVELOPMENT
ENDING DATE: 8-30-90

DEVELOPMENT
OBSERVED BY: Timothy A. Lee

ONE WELL VOLUME: 35.2 GALLONS

TOTAL GALLONS PUMPED: 205 TOTAL WELL VOLUMES PUMPED: 5.8

INITIAL pH: 11.7 FINAL pH: 8.3

INITIAL DISSOLVED SOLIDS (mg/L): 1700 FINAL DISSOLVED SOLIDS (mg/L): 470

DESCRIPTION OF INITIAL TURBIDITY: Clear

DESCRIPTION OF FINAL TURBIDITY: Clear

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: Timothy A. Lee

ODOR
OF WATER: None

WATER
DISCHARGED TO:
- GROUND SURFACE
- STORM SEWERS
- DRUMS
- TANK TRUCK
- STORAGE TANKS
- OTHER

INITIAL PRE-DEVELOPMENT
WATER DEPTH: 3.7 feet below ground surface.

DEVELOPMENT OBSERVATIONS


|

OBSERVER SIGNATURE/DATE Timothy A. Lee 8-30-90
Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Workover rig and swab.

DEVELOPMENT BEGAN DATE: 8-10-90

DEVELOPMENT ENDING DATE: 8-20-90

DEVELOPMENT OBSERVED BY: Timothy A. Lee

ONE WELL VOLUME: 29.1 GALLONS

TOTAL GALLONS PUMPED: 150  TOTAL WELL VOLUMES PUMPED: 5.1

INITIAL pH: 8.4  FINAL pH: 7.7

INITIAL DISSOLVED SOLIDS (mS): 550  FINAL DISSOLVED SOLIDS (mS): 530

DESCRIPTION OF INITIAL TURBIDITY: Cloudy

DESCRIPTION OF FINAL TURBIDITY: Clear

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: Timothy A. Lee

ODOR OF WATER: None

WATER DISCHARGED TO:

<table>
<thead>
<tr>
<th></th>
<th>GROUND SURFACE</th>
<th>STORM SEWERS</th>
<th>TANK TRUCK</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>STORAGE TANKS</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>OTHER</td>
</tr>
</tbody>
</table>

INITIAL PRE-DEVELOPMENT WATER DEPTH: 4.2 feet below ground surface.

DEVELOPMENT OBSERVATIONS

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Observer Signature/Date: 8/20/90

Timothy A. Lee
Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Work over rig and swab.

DEVELOPMENT BEGAN DATE: 8-24-90

DEVELOPMENT ENDING DATE: 9-04-90

DEVELOPMENT OBSERVED BY: Timothy A. Lee

ONE WELL VOLUME: 21.4 GALLONS

TOTAL GALLONS PUMPED: 120 TOTAL WELL VOLUMES PUMPED: 5.6

INITIAL pH: 8.4 FINAL pH: 7.8

INITIAL DISSOLVED SOLIDS (mS): 150 FINAL DISSOLVED SOLIDS (mS): 90

DESCRIPTION OF INITIAL TURBIDITY: Slightly Cloudy

DESCRIPTION OF FINAL TURBIDITY: Clear

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: Timothy A. Lee

ODOR OF WATER: None

WATER DISCHARGED TO:

GROUND SURFACE
STORM SEWERS
DRUMS
TANK TRUCK
STORAGE TANKS
OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH: 18.3 feet below ground surface.

DEVELOPMENT OBSERVATIONS

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WELL NO. GW-653
LOCATION: Y-12

9/04/90

Timothy A. Lee
Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Workover rig and swab.

DEVELOPMENT BEGAN DATE: 8-14-90

DEVELOPMENT ENDING DATE: 8-24-90

DEVELOPMENT OBSERVED BY: Timothy A. Lee

ONE WELL VOLUME: 15.3 GALLONS

TOTAL GALLONS PUMPED: 145
TOTAL WELL VOLUMES PUMPED: 9.4

INITIAL pH: 7.6
FINAL pH: 7.6

INITIAL DISSOLVED SOLIDS (μS): 350
FINAL DISSOLVED SOLIDS (μS): 340

DESCRIPTION OF INITIAL TURBIDITY: Cloudy

DESCRIPTION OF FINAL TURBIDITY: Cloudy

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: Timothy A. Lee

ODOR OF WATER: None

WATER DISCHARGED TO:
- [ ] GROUND SURFACE
- [ ] STORM SEWERS
- [ ] DRUMS
- [ ] TANK TRUCK
- [ ] STORAGE TANKS
- [ ] OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH: 4.3 feet below ground surface.

DEVELOPMENT OBSERVATIONS

Observer Signature/Date: Timothy A. Lee 8-24-90
Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Work over rig and swab

DEVELOPMENT BEGAN DATE: 9-12-90

DEVELOPMENT ENDING DATE: 9-21-90

DEVELOPMENT OBSERVED BY: Timothy A. Lee

ONE WELL VOLUME: 33.4 GALLONS

TOTAL GALLONS PUMPED: 180

TOTAL WELL VOLUMES PUMPED: 5.4

INITIAL PH: 11.9

FINAL PH: 8.6

INITIAL DISSOLVED SOLIDS (µS): 1500

FINAL DISSOLVED SOLIDS (µS): 220

DESCRIPTION OF INITIAL TURBIDITY: Slightly Cloudy

DESCRIPTION OF FINAL TURBIDITY: Slightly Cloudy

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: Timothy A. Lee

ODOR OF WATER: None

WATER DISCHARGED TO:

☐ GROUND SURFACE

☐ STORM SEWERS

☐ DRUMS

☐ TANK TRUCK

☐ STORAGE TANKS

☐ OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH: Water level at 28.7 feet below ground surface.

DEVELOPMENT OBSERVATIONS

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observer signature/date ________________________________ 9/21/90

Timothy A. Lee
Y-12 MONITORING WELL
DEVELOPMENT FORM

DEVELOPMENT DETAILS

METHOD OF DEVELOPMENT: Air Lift

DEVELOPMENT BEGAN DATE: 9-19-90

DEVELOPMENT ENDING DATE: 9-21-90

DEVELOPMENT OBSERVED BY: Timothy A. Lee

ONE WELL VOLUME: 12.3 GALLONS

TOTAL GALLONS PUMPED: 54      TOTAL WELL VOLUMES PUMPED: 4.4

INITIAL pH: 8.3      FINAL pH: 8.0

INITIAL DISSOLVED SOLIDS (µS): 930      FINAL DISSOLVED SOLIDS (µS): 860

DESCRIPTION OF INITIAL TURBIDITY: Cloudy

DESCRIPTION OF FINAL TURBIDITY: Slightly Cloudy

FINAL MEASURED TURBIDITY: N/A

WELL APPROVED BY: Timothy A. Lee

ODOR OF WATER: Slight Petroleum Product

WATER DISCHARGED TO:

□ GROUND SURFACE □ STORM SEWERS □ TANK TRUCK
□ DRUMS □ STORAGE TANKS □ OTHER

INITIAL PRE-DEVELOPMENT WATER DEPTH: Water level at 10.2 feet below ground surface.

DEVELOPMENT OBSERVATIONS

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<table>
<thead>
<tr>
<th>METHOD OF DEVELOPMENT:</th>
<th>Air Lift</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEVELOPMENT OBSERVED BY:</td>
<td>B. McMaster/Mike Elliott</td>
</tr>
<tr>
<td>ONE WELL VOLUME:</td>
<td>6.2 gallons</td>
</tr>
<tr>
<td>TOTAL GALLONS PUMPED:</td>
<td>82</td>
</tr>
<tr>
<td>TOTAL WELL VOLUMES PUMPED:</td>
<td>13.2</td>
</tr>
<tr>
<td>INITIAL pH:</td>
<td>8.1</td>
</tr>
<tr>
<td>FINAL pH:</td>
<td>7.9</td>
</tr>
<tr>
<td>INITIAL SPECIFIC CONDUCTANCE:</td>
<td>500</td>
</tr>
<tr>
<td>FINAL:</td>
<td>560</td>
</tr>
<tr>
<td>DESCRIPTION OF INITIAL TURBIDITY:</td>
<td>Cloudy</td>
</tr>
<tr>
<td>DESCRIPTION OF FINAL TURBIDITY:</td>
<td>Slightly Cloudy</td>
</tr>
<tr>
<td>FINAL MEASURED TURBIDITY:</td>
<td></td>
</tr>
<tr>
<td>WELL APPROVED BY:</td>
<td>B. McMaster</td>
</tr>
<tr>
<td>ODOR OF WATER:</td>
<td>Strong sewage smell</td>
</tr>
<tr>
<td>WATER DISCHARGED TO:</td>
<td>☑ DRUMS</td>
</tr>
<tr>
<td>☐ GROUND SURFACE</td>
<td>☐ TANK TRUCK</td>
</tr>
<tr>
<td>☑ STORM SEWERS</td>
<td>☐ STORAGE TANKS</td>
</tr>
<tr>
<td>INITIAL PRE-DEVELOPMENT WATER DEPTH:</td>
<td>6.6'</td>
</tr>
<tr>
<td>DEVELOPMENT OBSERVATIONS:</td>
<td>Bailed well initially, could detect no odor or hydrocarbon sheen. When pumped well got strong sewage smell. Need to wear gloves when handling. Well makes 8-10 gallons/minute.</td>
</tr>
</tbody>
</table>

OBSERVER SIGNATURE: B. McMaster

DATE: 10/18/90
**Y-12 MONITORING WELL DEVELOPMENT FORM**

**DEVELOPMENT DETAILS**

**METHOD OF DEVELOPMENT:** Air Lifted

**DEVELOPMENT BEGAN DATE:** 9-07-90

**DEVELOPMENT ENDING DATE:** 9-14-90

**DEVELOPMENT OBSERVED BY:** Timothy A. Lee

**ONE WELL VOLUME:** 13.9 GALLONS

**TOTAL GALLONS PUMPED:** 61

**TOTAL WELL VOLUMES PUMPED:** 4.3

**INITIAL pH:** 8.0

**FINAL pH:** 7.9

**INITIAL DISSOLVED SOLIDS (μS):** 460

**FINAL DISSOLVED SOLIDS (μS):** 660

**DESCRIPTION OF INITIAL TURBIDITY:** Slightly Cloudy

**DESCRIPTION OF FINAL TURBIDITY:** Clear

**FINAL MEASURED TURBIDITY:** N/A

**WELL APPROVED BY:** Timothy A. Lee

**ODOR OF WATER:** Petroleum product odor

**WATER DISCHARGED TO:**

- **GROUND SURFACE**
- **STORM SEWERS**
- **DRUMS**
- **TANK TRUCK**
- **STORAGE TANKS**
- **OTHER**

**INITIAL PRE-DEVELOPMENT WATER DEPTH:** 8.9 feet below ground surface.

**DEVELOPMENT OBSERVATIONS**

Strong odor of petroleum encountered. Did not purge a full 5 well volumes due to the decrease in photovac readings and also the fact the pH and dissolved solids have leveled off.

**OBSERVER SIGNATURE/DATE:**

Timothy A. Lee 9-14-90
**Y-12 MONITORING WELL DEVELOPMENT FORM**

**DEVELOPMENT DETAILS**

**METHOD OF DEVELOPMENT:** Air lifted

**DEVELOPMENT BEGAN DATE:** 9-07-90

**DEVELOPMENT ENDING DATE:** 9-14-90

**DEVELOPMENT OBSERVED BY:** Timothy A. Lee

**ONE WELL VOLUME:** 10.7 GALLONS

**TOTAL GALLONS PUMPED:** 53

**TOTAL WELL VOLUMES PUMPED:** 4.9

**INITIAL pH:** 8.5

**FINAL pH:** 7.9

**INITIAL DISSOLVED SOLIDS (µS):** 500

**FINAL DISSOLVED SOLIDS (µS):** 690

**DESCRIPTION OF INITIAL TURBIDITY:** Cloudy

**DESCRIPTION OF FINAL TURBIDITY:** Slightly Cloudy

**FINAL MEASURED TURBIDITY:** N/A

**WELL APPROVED BY:** Timothy A. Lee

**ODOR OF WATER:** Petroleum product odor

**WATER DISCHARGED TO:**

- □ Ground Surface
- □ Storm Sewers
- □ Drums
- □ Tank Truck
- □ Storage Tanks
- □ Other

**INITIAL PRE-DEVELOPMENT WATER DEPTH:** 8.9 feet below ground surface.

**DEVELOPMENT OBSERVATIONS**

Strong odor of petroleum encountered. Did not purge a full 5 well volumes due to the decrease in photovac readings and also the fact the pH and dissolved solids have leveled off.

**OBSERVER SIGNATURE/DATE:** Timothy A. Lee 9-14-90
## Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

### WELL DEVELOPMENT SUMMARY

<table>
<thead>
<tr>
<th>Method of Development</th>
<th>Swab</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development Observed By</td>
<td>B. McMaster</td>
</tr>
<tr>
<td>One Well Volume</td>
<td>77 gallons</td>
</tr>
<tr>
<td>Total Gallons Pumped</td>
<td>780</td>
</tr>
<tr>
<td>Total Well Volumes Pumped</td>
<td>10.1</td>
</tr>
<tr>
<td>Initial pH</td>
<td>7.4</td>
</tr>
<tr>
<td>Final pH</td>
<td>6.8</td>
</tr>
<tr>
<td>Initial Specific Conductance</td>
<td>450</td>
</tr>
<tr>
<td>Final:</td>
<td>400</td>
</tr>
<tr>
<td>Description of Initial Turbidity</td>
<td>Muddy</td>
</tr>
<tr>
<td>Description of Final Turbidity</td>
<td>Cloudy</td>
</tr>
<tr>
<td>Final Measured Turbidity</td>
<td>N/A</td>
</tr>
<tr>
<td>Well Approved By</td>
<td>B. McMaster</td>
</tr>
<tr>
<td>Odor of Water</td>
<td>No Odor</td>
</tr>
<tr>
<td>Water Discharged To</td>
<td>Ground Surface</td>
</tr>
<tr>
<td></td>
<td>Tank Truck</td>
</tr>
<tr>
<td></td>
<td>Storm Sewers</td>
</tr>
<tr>
<td></td>
<td>Storage Tanks</td>
</tr>
<tr>
<td></td>
<td>Drums</td>
</tr>
<tr>
<td></td>
<td>Other</td>
</tr>
<tr>
<td>Initial Pre-Development</td>
<td>87' below ground surface</td>
</tr>
</tbody>
</table>

### Development Observations:

Developed using workover rig with stainless steel swab with rubber cups in 2-1/8" diameter tubing. Headspace test on water sample showed less than 5 ppm organics. No odor noticed. Water never completely cleaned up with swabbing.

### Observer Signature:

Date: ____________________
<table>
<thead>
<tr>
<th>Y-12 PLANT GROUNDWATER PROTECTION PROGRAM</th>
<th>WELL NO. GW-684</th>
</tr>
</thead>
<tbody>
<tr>
<td>WELL DEVELOPMENT SUMMARY</td>
<td></td>
</tr>
<tr>
<td>METHOD OF DEVELOPMENT: Stainless Steel Swab</td>
<td>DEVELOPMENT DATE:</td>
</tr>
<tr>
<td>DEVELOPMENT OBSERVED BY: B. McMaster</td>
<td>START: 11/6/90</td>
</tr>
<tr>
<td>ONE WELL VOLUME: 82 GALLONS</td>
<td>FINISH: 11/28/90</td>
</tr>
<tr>
<td>TOTAL GALLONS PUMPED: 700</td>
<td></td>
</tr>
<tr>
<td>TOTAL WELL VOLUMES PUMPED: 8.5</td>
<td></td>
</tr>
<tr>
<td>INITIAL pH: 10.2</td>
<td>FINAL pH: 8.5</td>
</tr>
<tr>
<td>INITIAL SPECIFIC CONDUCTANCE: 1120</td>
<td>FINAL: 510</td>
</tr>
<tr>
<td>DESCRIPTION OF INITIAL TURBIDITY: Muddy</td>
<td></td>
</tr>
<tr>
<td>DESCRIPTION OF FINAL TURBIDITY: Slightly Silty</td>
<td></td>
</tr>
<tr>
<td>FINAL MEASURED TURBIDITY: N/A</td>
<td></td>
</tr>
<tr>
<td>WELL APPROVED BY: B. McMaster</td>
<td></td>
</tr>
<tr>
<td>ODOR OF WATER: None</td>
<td></td>
</tr>
<tr>
<td>WATER DISCHARGED TO: □ GROUND SURFACE □ TANK TRUCK</td>
<td></td>
</tr>
<tr>
<td>□ STORM SEWERS □ STORAGE TANKS</td>
<td></td>
</tr>
<tr>
<td>□ DRUMS □ OTHER</td>
<td></td>
</tr>
<tr>
<td>INITIAL PRE-DEVELOPMENT WATER DEPTH: 14' below ground surface</td>
<td></td>
</tr>
</tbody>
</table>

DEVELOPMENT OBSERVATIONS: Head space test showed less than 5 ppm on HNU meter - No odors. pH went up on 4th day of development, not quite sure why. Recovered after several days of developing. All samples have what appears to be some organic material or fines.

| OBSERVER SIGNATURE: | DATE: |
## Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

### WELL DEVELOPMENT SUMMARY

<table>
<thead>
<tr>
<th>METHOD OF DEVELOPMENT:</th>
<th>Swab</th>
<th>DEVELOPMENT DATE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEVELOPMENT OBSERVED BY:</td>
<td>B. McMaster</td>
<td>START: 11/29/90</td>
</tr>
<tr>
<td>ONE WELL VOLUME:</td>
<td>260 GALLONS</td>
<td>FINISH: 12/28/90</td>
</tr>
<tr>
<td>TOTAL GALLONS PUMPED:</td>
<td>840</td>
<td>TOTAL WELL VOLUMES PUMPED:</td>
</tr>
<tr>
<td>INITIAL pH:</td>
<td>6.9</td>
<td>FINAL pH:</td>
</tr>
<tr>
<td>INITIAL SPECIFIC CONDUCTANCE:</td>
<td>550</td>
<td>FINAL:</td>
</tr>
<tr>
<td>DESCRIPTION OF INITIAL TURBIDITY:</td>
<td>Cloudy</td>
<td></td>
</tr>
<tr>
<td>DESCRIPTION OF FINAL TURBIDITY:</td>
<td>Slightly cloudy - minor iron precipitate</td>
<td></td>
</tr>
<tr>
<td>FINAL MEASURED TURBIDITY:</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>WELL APPROVED BY:</td>
<td>B. McMaster</td>
<td></td>
</tr>
<tr>
<td>ODOR OF WATER:</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>WATER DISCHARGED TO:</td>
<td>Ground Surface</td>
<td>Tank Truck</td>
</tr>
<tr>
<td></td>
<td>Storm Sewers</td>
<td>Storage Tanks</td>
</tr>
<tr>
<td></td>
<td>Drums</td>
<td>Other</td>
</tr>
<tr>
<td>INITIAL PRE-DEVELOPMENT WATER DEPTH:</td>
<td>5' below ground surface</td>
<td></td>
</tr>
<tr>
<td>DEVELOPMENT OBSERVATIONS:</td>
<td>Well is fairly slow to recover; makes approximately 55 gallons overnight.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Headspace test with HNU meter showed less than 5 ppm organics</td>
<td></td>
</tr>
</tbody>
</table>

## OBSERVER SIGNATURE: ______________________

## DATE: ______________________
## WELL DEVELOPMENT SUMMARY

**WELL NO.** GW-703

**METHOD OF DEVELOPMENT:** Steel swab with rubber cups

**DEVELOPMENT OBSERVED BY:** Bruce McMaster

**DEVELOPMENT DATE:**

<table>
<thead>
<tr>
<th>START</th>
<th>FINISH</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/10/91</td>
<td>1/18/91</td>
</tr>
</tbody>
</table>

**ONE WELL VOLUME:** 255 GALLONS

**TOTAL GALLONS PUMPED:** 1145

**TOTAL WELL VOLUMES PUMPED:** 4.5

**INITIAL pH:** 9.0

**FINAL pH:** 7.7

**INITIAL SPECIFIC CONDUCTANCE:** 420

**FINAL:** 230

**DESCRIPTION OF INITIAL TURBIDITY:** Slightly Cloudy

**DESCRIPTION OF FINAL TURBIDITY:** Slightly Silty

**FINAL MEASURED TURBIDITY:** N/A

**WELL APPROVED BY:** Bruce McMaster

**ODOR OF WATER:** None

**WATER DISCHARGED TO:**

- [x] GROUND SURFACE
- [ ] TANK TRUCK
- [ ] STORM SEWERS
- [ ] STORAGE TANKS
- [ ] DRUMS
- [ ] OTHER

**INITIAL PRE-DEVELOPMENT WATER DEPTH:** 35' below ground surface

**DEVELOPMENT OBSERVATIONS:**

- Developed using stainless steel swab with rubber cups in 2-1/8" diameter tubing.

- Water has no odor, HNU meter shows less than 5 ppm volatiles with head space test.

- Well is an open hole completion: 7" casing to 135'; 6½" open hole 135'-182'.

**OBSERVER SIGNATURE:**

**DATE:**
## Y-12 PLANT GROUNDWATER PROTECTION PROGRAM

### WELL DEVELOPMENT SUMMARY

<table>
<thead>
<tr>
<th>Method of Development:</th>
<th>Stainless steel swab with rubber cups</th>
<th>Development Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development Observed By:</td>
<td>Bruce McMaster</td>
<td>Start: 1/2/91</td>
</tr>
<tr>
<td>One Well Volume:</td>
<td>445 Gallons</td>
<td>Finish: 1/9/91</td>
</tr>
<tr>
<td>Total Gallons Pumped:</td>
<td>2320</td>
<td>Total Well Volumes Pumped: 5.6</td>
</tr>
<tr>
<td>Initial pH:</td>
<td>7.3</td>
<td>Final pH: 7.2</td>
</tr>
<tr>
<td>Initial Specific Conductance:</td>
<td>470</td>
<td>Final: 440</td>
</tr>
<tr>
<td>Description of Initial Turbidity:</td>
<td>Muddy</td>
<td></td>
</tr>
<tr>
<td>Description of Final Turbidity:</td>
<td>Cloudy</td>
<td></td>
</tr>
<tr>
<td>Final Measured Turbidity:</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Well Approved By:</td>
<td>Bruce McMaster</td>
<td></td>
</tr>
<tr>
<td>Odor of Water:</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Water Discharged To:</td>
<td>☐ Ground Surface</td>
<td>☐ Tank Truck</td>
</tr>
<tr>
<td></td>
<td>☐ Storm Sewers</td>
<td>☐ Storage Tanks</td>
</tr>
<tr>
<td></td>
<td>☐ Drums</td>
<td>☐ Other</td>
</tr>
</tbody>
</table>

### Initial Pre-Development

- Water Depth: 20' below ground surface

### Development Observations:

Well developed using stainless steel swab with rubber cups in 2-1/8" diameter tubing.

No odor to water, head space test with HNU meter showed less than 5 ppm volatiles.

Well is an open hole completion type, water never completely cleaned up during development.

Observer Signature: ____________________

Date: ____________________
**Y-12 PLANT GROUNDWATER PROTECTION PROGRAM**

**WELL DEVELOPMENT SUMMARY**

<table>
<thead>
<tr>
<th>METHOD OF DEVELOPMENT:</th>
<th>Air Lift</th>
<th>DEVELOPMENT DATE:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>START: 10/15/90</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FINISH: 10/23/90</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ONE WELL VOLUME:</th>
<th>7.3 GALLONS</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>TOTAL GALLONS PUMPED:</th>
<th>69</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL WELL VOLUMES PUMPED:</td>
<td>9.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INITIAL pH:</th>
<th>8.0</th>
<th>FINAL pH:</th>
<th>7.6</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>INITIAL SPECIFIC CONDUCTANCE:</th>
<th>440</th>
<th>FINAL:</th>
<th>570</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>DESCRIPTION OF INITIAL TURBIDITY:</th>
<th>Slightly Cloudy</th>
</tr>
</thead>
<tbody>
<tr>
<td>DESCRIPTION OF FINAL TURBIDITY:</td>
<td>Slightly Cloudy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FINAL MEASURED TURBIDITY:</th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>WELL APPROVED BY:</th>
<th>B. McMaster</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>ODOR OF WATER:</th>
<th>Slight sewage smell</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>WATER DISCHARGED TO:</th>
<th>GROUND SURFACE</th>
<th>TANK TRUCK</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>STORM SEwers</td>
<td>STORAGE TANKS</td>
</tr>
<tr>
<td></td>
<td>DRUMS</td>
<td>OTHER</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INITIAL PRE-DEVELOPMENT WATER DEPTH:</th>
<th>6.6'</th>
</tr>
</thead>
</table>

**DEVELOPMENT OBSERVATIONS:** Bailed well initially to check for free product, did not detect odor or hydrocarbon sheen. During pumping on 10/17, water began smelling like sewage.

<table>
<thead>
<tr>
<th>OBSERVER SIGNATURE:</th>
<th>B. McMaster</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATE:</td>
<td>10/23/90</td>
</tr>
</tbody>
</table>
**Y-12 PLANT GROUNDWATER PROTECTION PROGRAM**

**WELL DEVELOPMENT SUMMARY**

<table>
<thead>
<tr>
<th>METHOD OF DEVELOPMENT:</th>
<th>Air Lift</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEVELOPMENT OBSERVED BY:</td>
<td>B. McMaster/Mike Elliott</td>
</tr>
<tr>
<td>ONE WELL VOLUME:</td>
<td>6.0 GALLONS</td>
</tr>
<tr>
<td>TOTAL GALLONS PUMPED:</td>
<td>70</td>
</tr>
<tr>
<td>TOTAL WELL VOLUMES PUMPED:</td>
<td>11.7</td>
</tr>
<tr>
<td>INITIAL pH:</td>
<td>7.7</td>
</tr>
<tr>
<td>FINAL pH:</td>
<td>7.7</td>
</tr>
<tr>
<td>INITIAL SPECIFIC CONDUCTANCE:</td>
<td>550</td>
</tr>
<tr>
<td>FINAL:</td>
<td>560</td>
</tr>
<tr>
<td>DESCRIPTION OF INITIAL TURBIDITY:</td>
<td>Clear</td>
</tr>
<tr>
<td>DESCRIPTION OF FINAL TURBIDITY:</td>
<td>Slightly Cloudy</td>
</tr>
<tr>
<td>FINAL MEASURED TURBIDITY:</td>
<td></td>
</tr>
<tr>
<td>WELL APPROVED BY:</td>
<td>B. McMaster</td>
</tr>
<tr>
<td>ODOR OF WATER:</td>
<td>Gasoline - hydrocarbon smell</td>
</tr>
<tr>
<td>WATER DISCHARGED TO:</td>
<td>☐ GROUND SURFACE  ☐ TANK TRUCK</td>
</tr>
<tr>
<td>☐ STORM SEWERS</td>
<td>☐ STORAGE TANKS</td>
</tr>
<tr>
<td>☐ DRUMS</td>
<td>☐ OTHER</td>
</tr>
<tr>
<td>INITIAL PRE-DEVELOPMENT WATER DEPTH:</td>
<td>5.5'</td>
</tr>
<tr>
<td>DEVELOPMENT OBSERVATIONS:</td>
<td>Bailed well initially to check for free product. Can smell (like gasoline) but can see no hydrocarbon sheen. Well makes 8-10 gallons/minute.</td>
</tr>
</tbody>
</table>

**OBSERVER SIGNATURE:** B. McMaster  
**DATE:** 10/23/90
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W. C. Sidle

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