# AREVA Enrichment Services, Inc.

# Report

Summary of Hydrogeologic Field Studies From April Through July 2008

MWH

**September 25, 2008**

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# TABLE OF CONTENTS


| Section No. | | Page No. |
|---|---|---|
| 1.0 | INTRODUCTION | 1 |
| 2.0 | CORE DRILLING | 1 |
| 3.0 | GEOPHYSICAL TESTING | 2 |
| 4.0 | PACKER TESTING | 2 |
| 5.0 | ROTARY DRILLING | 3 |
| 6.0 | GROUNDWATER SAMPLING | 4 |
| 7.0 | AQUIFER TESTING | 5 |
| 8.0 | WATER LEVEL MONITORING | 5 |
| 9.0 | REFERENCES | 5 |


## LIST OF FIGURES


| Figure | Name |
|---|---|
| 1 | Existing Agricultural and Newly Installed Monitoring Wells |


## LIST OF TABLES


| Figure | Name |
|---|---|
| 1 | Groundwater Levels at the Proposed EREF Site |


## LIST OF APPENDICES


| Appendix | Description |
|---|---|
| A | Well Completion Diagrams |

## 1.0 INTRODUCTION

This memorandum is to summarize hydrogeologic field studies conducted between April and July 2008 at the proposed Eagle Rock Enrichment Facility (EREF) site located about 32 km (20 mi) west of Idaho Falls in Bonneville County, Idaho. The hydrogeologic field studies were designed and conducted to obtain site-specific hydrologic and geologic information to support AREVA's Environmental Report for the EREF. The site-specific information supplements regional and long-term trend data. Field activities included: (1) collection of a continuous core between the ground surface and approximately 12.2 m (40 ft) below the static water table at the location of monitoring well GW-1; (2) installation of five deep monitoring wells GW-1 -2, -3, -4, and -5 to intercept the regional groundwater (Figure 1); (3) installation of one shallow monitoring well, GW-4S, to intercept potentially perched groundwater (Figure 1); (4) down-hole geophysical testing at two locations, GW-1 and GW-4; (5) hydrologic testing under both saturated and unsaturated conditions, and (6) groundwater sample collection and analyses. In addition, a detailed investigation was conducted on the surface geology of the proposed site. The field data for the surface geology investigation is provided in a separate report (MWH, 2008a).

## 2.0 CORE DRILLING

Core drilling was completed at the location of the to-be-installed well GW-1 by the subcontractor CRUX Subsurface, Inc. (CRUX), from Spokane, Washington (Figure 1). Core drilling occurred between 22 April 2008 and 29 April 2008. Groundwater was initially encountered during coring at 206 m (676 ft) below ground surface (bgs) on 28 April 2008. Coring was completed to 223 m (730.5 ft) bgs.

The core was collected using both diamond and carbide bits, depending on bedrock conditions. Both core bits were cooled using water pumped through the coring rod. Recirculation and recycling of the cooling water is typical in core drilling; however, this was impossible during coring at GW-1. Recirculation of water was prohibited by the fractured and porous nature of the basalt and thick unsaturated zone beneath the core hole. Water used during coring was transmitted into the unsaturated zone as recharge. It was estimated that 38,000 liters (10,000 gallons) of water was used per day for cooling during core drilling. This water requirement was not anticipated and alternate methods of water storage and transportation had to be arranged to complete drilling activities. Initially, an 11,400-liter (3,000 gallon) water truck was rented by CRUX to transport water pumped from the Spud Well. After drilling was delayed due to the limited water delivery and storage requirements, additional water storage tanks and a bladder were used to store water at GW-1. A 19,000-liter (5,000 gallon) water truck was provided by the property owner to store water onsite. In addition, a 19,000-liter (5,000 gallon) water truck was rented and used to transport water from a City of Idaho Falls hydrant approximately four times per day. These efforts alleviated the drilling delays caused by the unanticipated water demand.

Core was collected at approximately 1.5 m (5 ft) intervals or runs. The core was collected using HQ size core barrels, which are approximately 5.71 cm (2.25 in) in diameter. Bill Bragdon was the primary MWH geologist responsible for logging the core, with assistance from Ryan Jakubowski. The core was measured for rock quality designation (RQD), which is the sum of the lengths of core segments less than 10 cm (3.9 inches) in length divided by the total core length, and presented as a percentage. Core recovery was presented as a percentage of the amount recovered divided by the length of the core run.

As part of the lithologic description, the core was described by rock type, color (based on the Munsell Color Charts), fracture orientation, fracture thickness, voids (vugs) or vesicles, and other relevant parameters. Where soil was encountered, it was described by following the Unified Soil Classification System, and the color was described using the Munsell Color Charts. Other information including plasticity, density, and estimated moisture content was also recorded. After the core was logged, it was placed in labeled cardboard boxes for storage, with roughly 3 m (10 ft) length of segments per core box. The core logs were presented in a separate report (MWH, 2008b). A photographic log of the core (i.e., for each core box) was completed in the field and presented in a separate report (MWH, 2008c). All data collected in the field were obtained immediately following removal of the core from the borehole. Three pallets of core were secured and trucked to a separate facility approximately 10 km (6 mi) from the site for potential future testing and archival purposes.

## 3.0 GEOPHYSICAL TESTING

Following cessation of coring activities, two members from the CRUX drilling crew remained onsite for an additional day to assist with the geophysical investigation at GW-1. The open borehole was used for down-hole geophysical testing (video, gamma, caliper, and electricity logging), which was conducted on 1 May 2008 by Norcal Geophysical Consultants, Inc. (Cotati, California). A static water level at 207.1 m (679.5 ft) bgs was measured during the test. The geophysical data was summarized by Norcal in a report which was submitted to MWH (Norcal, 2008).

The partially completed borehole at GW-4 was also evaluated with geophysical testing (video, gamma, caliper, and electricity logging), which was conducted on 9 June 2008. At the time of geophysical testing, the open borehole was only partially completed due to complications encountered during drilling of the monitoring well, and data were only collected to 167.6 m (550 ft) bgs. The data was summarized by Norcal in a final report and submitted to MWH (Norcal, 2008).

## 4.0 PACKER TESTING

Following cessation of coring and geophysical activities, the CRUX drilling crew returned 5 May 2008 to conduct the packer tests at GW-1 under the direction of Ryan Jakubowski. Packer tests were conducted on 5 and 6 May 2008 to quantify the horizontal saturated hydraulic conductivity of selected test-zone intervals. The packer test methodology and

results were summarized in a technical memorandum (MWH, 2008c). After the packer tests were completed, CRUX secured the open borehole with proper guarding material, cleaned the site, and transported the core to storage.

## 5.0 ROTARY DRILLING

Rotary drilling with air and mud through a 20-cm (8-in) diameter borehole was completed for GW-1, GW-2, GW-3, GW-4, GW-4S, and GW-5 by a local drilling subcontractor, Andrew Well Drilling Services, Inc. (Idaho Falls, Idaho) and is summarized in a Driller's Report (Andrew, 2008). Rotary drilling and monitoring well completion activities occurred between 28 April and 2 July 2008 and were overseen by Ken Esposito. Due to difficult drilling conditions and equipment failure, the well drilling and completion took longer than expected. Limited subsurface information was obtained due to the following conditions: (1) only a small percentage of the finest grained cutting could be recovered (that is, most of the cuttings were lost to the highly fractured basalt bedrock), (2) cuttings were recoverable from only a depth of approximately 61 m (200 ft) bgs or less, and (3) the accuracy in determining the depth from which cuttings were derived was limited due to the total depth of drilling.

Wells were drilled to at least 9 m (30 ft) below the static water level in order to achieve a screened interval of 12 m (40 ft) [approximately 3 m (10 ft) above static water and 9 m (30 ft) below]. Drilling equipment was decontaminated with a pressurized steam cleaner between wells.

Well completion activities included installation of 10 cm (4-in) diameter schedule 40 PVC casing with a 12 m (40 ft) screen interval that consisting of 0.025 cm (0.010-in) slots. Filter sand (10-20 silica sand) was used to complete the interval from the bottom of the well to 4.5 m (15 ft) above the well screen. Above this level, for an additional 1.5 m (5 ft), finer grained filter sand (60 silica sand) was used to complete this zone. The remainder of the hole was filled with hydrated bentonite chips and the surface was sealed from 0 to 1 m (0 to 3 ft) bgs with cement. Three steel protective posts, a well head protection box, and concrete slab were installed around each well.

The wells were developed for at least 8 hours following well completion by pumping groundwater at a rate of approximately 23 liters per minute (lpm) [6 gallons per minute (gpm)]. Well development equipment was decontaminated between wells.

Drilling at GW-3 began on 28 April and was completed on 4 May after confirming that the hole was drilled to at least 9 m (30 ft) below the static water level, with a total depth of 218 m (716 ft) bgs. Static water was encountered at 207.2 m (679.8 ft) bgs. The well was screened from 204 to 216 m (670 to 710 ft) bgs with a filter pack from 196 to 218 m (644 to 715 ft) bgs. During drilling GW-3, there were several days of down-time due to the drill stem being stuck down-hole.

Drilling at GW-5 began on 5 May and was completed on 13 May after confirming that the hole was drilled at least 9 m (30 ft) below the static water level, with a total depth of 228 m (748 ft) bgs. Static water was encountered at 218 m (715 ft) bgs. The well was screened from 215 to 227 m (706 to 746 ft) bgs with a filter pack from 209 to 228 m (685 to 748 ft) bgs. Due to equipment failure and difficult subsurface conditions, installation and completion of GW-5 was delayed several days.

Drilling at GW-4 began on 14 May. Difficult drilling conditions caused the drill stem to jam down-hole between 19 May and 18 June. Following several unsuccessful attempts to free the drill stem, the dill pipe was left in place and the rig was moved to GW-2. After GW-2 and GW-1 were drilled, as described below, the drill stem was freed and drilling resumed at GW-4 on 20 June and was completed 24 June to a total depth of 213 m (700 ft) bgs. Static water was encountered at 201 m (658 ft) bgs. The well was screened from 198 to 210 m (650 to 690 ft) bgs with a filter pack from 192 to 213 m (630 to 700 ft) bgs.

Drilling at GW-4S began on 24 June and was completed the same day to reach a total depth of 22 m (71 ft) bgs. The well was screened from 11 to 20 m (35 to 65 ft) bgs with a filter pack from 7 to 21 m (23 to 70 ft) bgs. This shallow well was completed directly above a clay horizon several feet thick (observed during the down-hole geophysical testing of the adjacent hole, GW-4). Although this clay layer could potentially serve as a confining layer (resulting in locally perched groundwater), GW-4 was dry when it was installed and has remained dry since its installation.

Drilling at GW-2 began on 4 June and was completed on 12 June after confirming that the hole was drilled to at least 9 m (30 ft) below the static water level, with a total depth of 214 m (702 ft) bgs. Static water was encountered at 202 m (662 ft) bgs. The well was screened from 198 to 214 m (650 to 690 ft) bgs with a filter pack from 192 to 214 m (630 to 702 ft) bgs.

Drilling at GW-1 began on 14 June and was completed on 18 June after confirming that the hole was drilled to at least 9 m (30 ft) below the static water level, with a total depth of 220 m (723 ft) bgs. Static water was encountered at 208 m (681 ft) bgs. The well was screened from 204 to 216 m (670 to 710 ft) bgs with a filter pack from 214 to 219 m (650 to 720 ft) bgs.

The well completion diagrams that have been filed with the Idaho Department of Water Resources are presented in Appendix A.

## 6.0 GROUNDWATER SAMPLING

Two baseline groundwater sampling events were completed at the existing agricultural wells on the proposed site: Lava Well-3 and Spud Well-1 were both sampled on 25 March and 18 June 2008. The monitoring wells were sampled as the wells were completed throughout the summer, with GW-3 sampled on 20 May; GW-5 on 18 June; GW-1 on 7 July; GW-4 on 9 July; and GW-2 on 10 July. Samples were collected by Ken

Esposito, Ryan Jakubowski, or Mike Witler of MWH. Field parameters of conductivity, pH, temperature, dissolved oxygen, and oxidation reduction potential (ORP) were measured prior to sample collection. Samples were labeled as primary (type 01), duplicate (type 02), blank (type 03), and rinsate (type 04). All samples were shipped to SVL Analytical Inc., Kellogg, Idaho, except for the radiochemistry samples, which were shipped to AREVA Environmental Laboratory, Westborough, Massachusetts.

## 7.0 AQUIFER TESTING

An aquifer test was conducted in Lava Well-3 and GW-5 during the week of 9 June 2008 by Ryan Jakubowski, Toby Leeson, and Mike Witler. The objective of the aquifer test was to estimate the storativity, transmissivity, and saturated horizontal hydraulic conductivity of the upper hydrostratigraphic unit within the Snake River basalts beneath the proposed Eagle Rock Enrichment Facility. Pre-test water levels and barometric pressure in GW-5 were measured from 8 June to 11 June. The 72-hour constant rate extraction aquifer test started on 11 June and ended on 14 June. Lava Well-3 served as the pumping well and GW-5 served as the observation well. Following the pumping, a 24-hour recovery test was conducted. The aquifer test methodology and results are summarized in a separate report (MWH, 2008e).

## 8.0 WATER LEVEL MONITORING

A program of weekly water level measurements was initiated on 27 June 2008 and will continue for a six month period. Groundwater levels are measured by Rocky Mountain Environmental Associates, Inc., who are based in Idaho Falls, ID. Table 1, Groundwater Levels at the Proposed EREF Site, summarizes the measured depth to groundwater in monitoring wells GW-1 through GW-5 reported by Rocky Mountain Environmental Associates, Inc. In addition, Table 1, Groundwater Levels at the Proposed EREF Site, provides the groundwater elevation above mean sea level.

## 9.0 REFERENCES

Andrew, 2008 Well Drillers Report.

MWH, 2008a. Surface Geology Mapping Summary and Field Notes. MWH Americas, Inc., Fort Collins, Colorado.

MWH, 2008b. Core Logs for Monitoring Well Location GW-1, July, 2008. MWH Americas, Inc., Fort Collins, Colorado, July 3, 2008.

MWH, 2008c. Core Photos for Monitoring Well Location GW-1, July, 2008. MWH Americas, Inc., Fort Collins, Colorado, July 3, 2008.

MWH, 2008d. Packer Testing Methodology and Results for GW-1, Eagle Rock Enrichment Plant. Memo from Ryan Jakubowski to Ken Esposito and Ted Eary, July 8, 2008.

MWH, 2008e. Aquifer Test Calculation Brief: Transmissivity and Storativity of Basalt Aquifer Beneath Proposed Eagle Rock Enrichment Plant. MWH Americas, Inc., Fort Collins, Colorado, July 3, 2008.

Norcal, 2008. Borehole Geophysical Logging, Borings GW-1 and GW-4, Idaho Falls, Idaho. Report by NORCAL Geophysical Consultants, Inc. sent to Ken Esposito, June 26, 2008.

# FIGURES

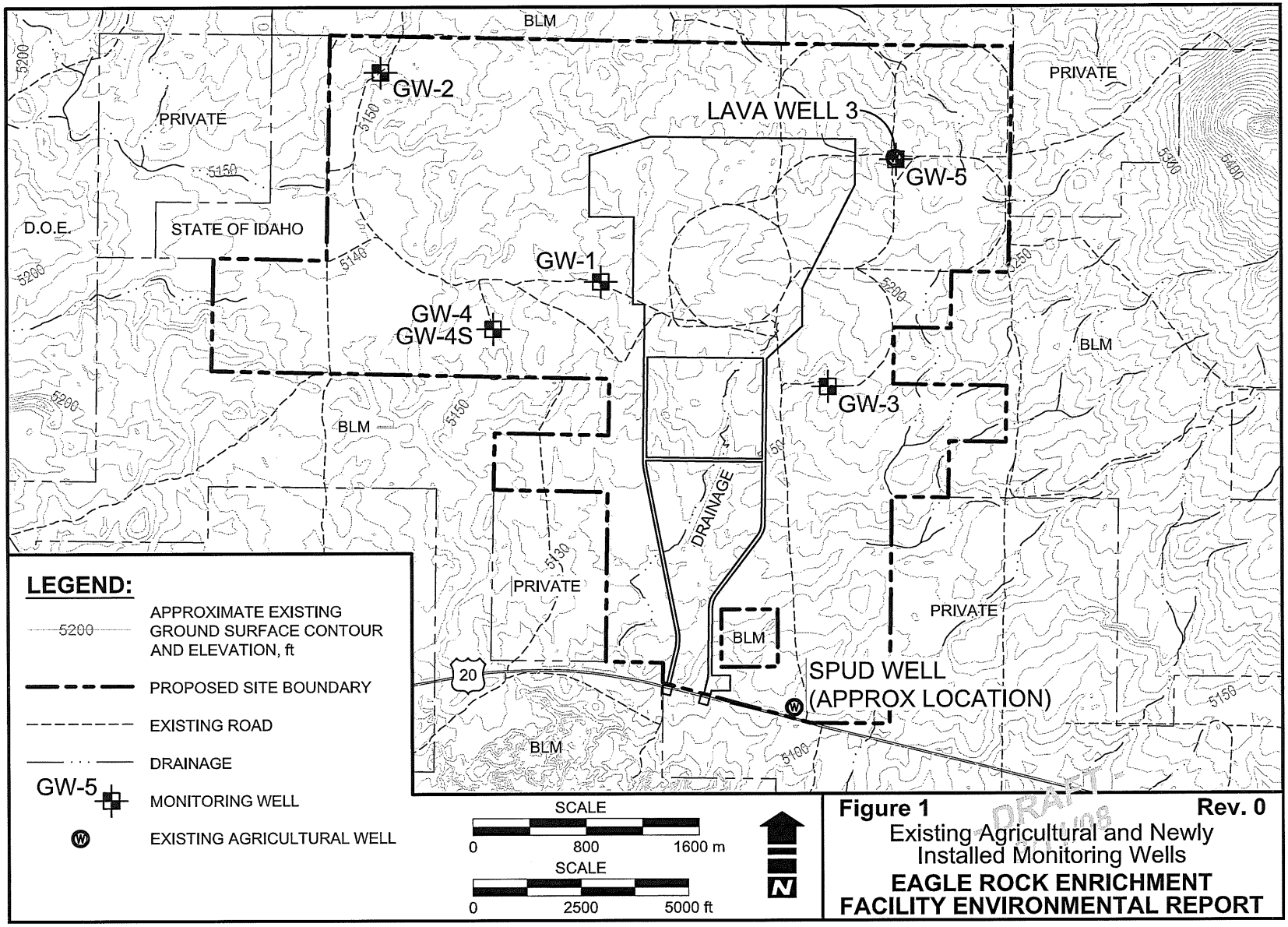



**Figure 1** **Rev. 0**

Existing Agricultural and Newly Installed Monitoring Wells

**EAGLE ROCK ENRICHMENT FACILITY ENVIRONMENTAL REPORT**

# TABLES

# Table 1. Groundwater Levels at the Proposed EREF Site.
Page 1 of 2

| GW-1 | | | | | GW-2 | | | |
|---|---|---|---|---|---|---|---|---|
| TOC PVC[1] m (in) | | 0.74 (29.00) | | | TOC PVC[1] m (in) | | 0.86 (34.00) | |
| TOC Steel m (in) | | 0.80 (31.5) | | | TOC Steel m (in) | | 0.97 (38.25) | |
| Ground Elevation m (ft) | | 1576.99 (5173.85) | | | Ground Elevation m (ft) | | 1570.96 (5154.06) | |
| Date | Depth to GW[2] (m) | Depth to GW[2] (ft) | GW Elevation[3] (m) | GW Elevation[3] (ft) | Depth to GW[2] (m) | Depth to GW[2] (ft) | GW Elevation[3] (m) | GW Elevation[3] (ft) |
| 6/27/2008 | NM | NM | | | NM | NM | | |
| 7/3/2008 | NM | NM | | | NM | NM | | |
| 7/10/2008 | 208.36 | 683.60 | 1369.36 | 4492.67 | NM | NM | | |
| 7/17/2008 | 208.51 | 684.10 | 1369.21 | 4492.17 | 202.75 | 665.18 | 1369.07 | 4491.71 |
| 7/22/2008 | 208.56 | 684.25 | 1369.17 | 4492.02 | 202.79 | 665.31 | 1369.03 | 4491.58 |
| 7/30/2008 | 208.64 | 684.52 | 1369.08 | 4491.75 | 202.88 | 665.63 | 1368.94 | 4491.26 |
| 8/8/2008 | 208.69 | 684.69 | 1369.03 | 4491.58 | 202.94 | 665.82 | 1368.88 | 4491.07 |
| 8/13/2008 | 208.70 | 684.72 | 1369.02 | 4491.55 | 202.98 | 665.94 | 1368.84 | 4490.95 |
| 8/21/2008 | 208.64 | 684.53 | 1369.08 | 4491.74 | 202.94 | 665.83 | 1368.88 | 4491.06 |
| 8/27/2008 | 208.63 | 684.49 | 1369.09 | 4491.78 | 202.95 | 665.85 | 1368.87 | 4491.04 |
| 9/4/2008 | 208.58 | 684.33 | 1369.14 | 4491.94 | 202.93 | 665.77 | 1368.89 | 4491.12 |
| 9/11/2008 | 208.54 | 684.20 | 1369.18 | 4492.07 | 202.90 | 665.68 | 1368.92 | 4491.21 |
| 9/18/2008 | 208.47 | 683.95 | 1369.26 | 4492.32 | 202.84 | 665.50 | 1368.98 | 4491.39 |

| GW-3 | | | | | GW-4 | | | |
|---|---|---|---|---|---|---|---|---|
| TOC PVC[1] m (in) | | 0.61 (24.00) | | | TOC PVC[1] m (in) | | 0.83 (32.50) | |
| TOC Steel m (in) | | 0.84 (33.25) | | | TOC Steel m (in) | | 0.95 (37.25) | |
| Ground Elevation m (ft) | | 1577.37 (5175.09) | | | Ground Elevation m (ft) | | 1569.54 (5149.40) | |
| Date | Depth to GW[2] (m) | Depth to GW[2] (ft) | GW Elevation[3] (m) | GW Elevation[3] (ft) | Depth to GW[2] (m) | Depth to GW[2] (ft) | GW Elevation[3] (m) | GW Elevation[3] (ft) |
| 6/27/2008 | 208.56 | 684.25 | 1369.42 | 4492.84 | NM | NM | | |
| 7/3/2008 | 208.66 | 684.59 | 1369.31 | 4492.50 | 201.24 | 660.24 | 1369.12 | 4491.87 |
| 7/10/2008 | 208.75 | 684.89 | 1369.22 | 4492.20 | 201.33 | 660.52 | 1369.04 | 4491.59 |
| 7/17/2008 | 208.89 | 685.33 | 1369.09 | 4491.76 | 201.47 | 660.99 | 1368.89 | 4491.12 |
| 7/22/2008 | 208.93 | 685.48 | 1369.04 | 4491.61 | 201.51 | 661.11 | 1368.86 | 4491.00 |
| 7/30/2008 | 209.02 | 685.76 | 1368.96 | 4491.33 | 201.59 | 661.39 | 1368.77 | 4490.72 |
| 8/8/2008 | 209.05 | 685.86 | 1368.93 | 4491.23 | 201.64 | 661.55 | 1368.72 | 4490.56 |
| 8/13/2008 | 209.05 | 685.87 | 1368.92 | 4491.22 | 201.65 | 661.57 | 1368.72 | 4490.54 |
| 8/21/2008 | 208.98 | 685.63 | 1369.00 | 4491.46 | 201.59 | 661.40 | 1368.77 | 4490.71 |
| 8/27/2008 | 208.96 | 685.57 | 1369.02 | 4491.52 | 201.58 | 661.36 | 1368.78 | 4490.75 |
| 9/4/2008 | 208.91 | 685.39 | 1369.07 | 4491.70 | 201.54 | 661.22 | 1368.82 | 4490.89 |
| 9/11/2008 | 208.87 | 685.26 | 1369.11 | 4491.83 | 201.51 | 661.11 | 1368.86 | 4491.00 |
| 9/18/2008 | 208.79 | 685.00 | 1369.19 | 4492.09 | 201.44 | 660.89 | 1368.92 | 4491.22 |

TOC: Top of casing is the height above ground surface
PVC: Schedule 40 polyvinyl chloride well casing
DRY: Depth to water greater than depth at well
NM: Not measured
[1] Height above ground surface to measuring point includes TOC PVC height
[2] Measured depth to groundwater includes PVC above ground
[3] Groundwater elevations are above mean sea level

# Table 1. Groundwater Levels at the Proposed EREF Site.
Page 2 of 2

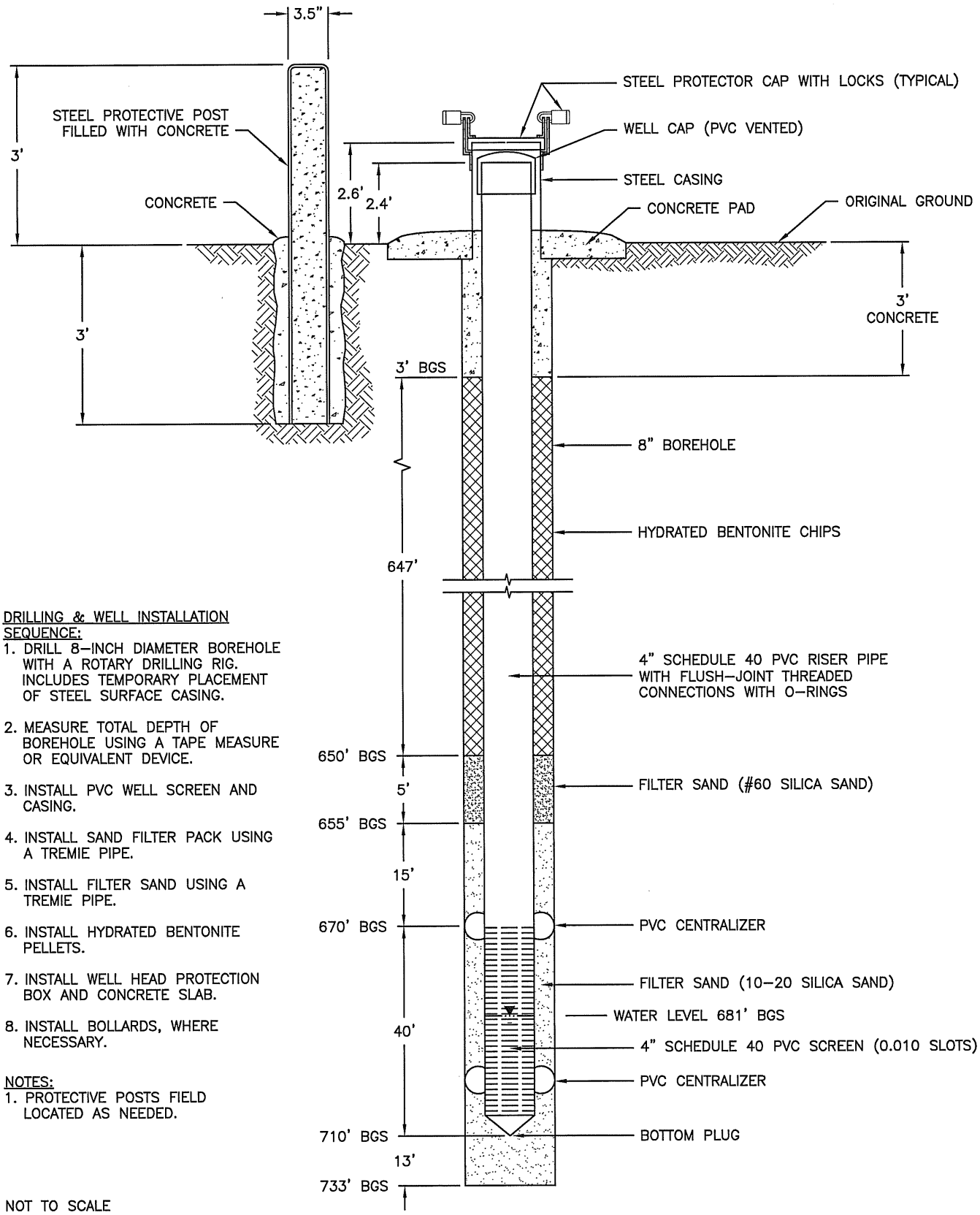
| GW-4S | | GW-5 | | | |
|---|---|---|---|---|---|
| TOC PVC[1] m (in) | 0.76 (30.00) | TOC PVC[1] m (in) | 0.84 (33.25) | | |
| TOC Steel m (in) | 0.00 (0.00) | TOC Steel m (in) | 0.91 (36.00) | | |
| Ground Elevation m (ft) | 1569.54 (5149.40) | Ground Elevation m (ft) | 1589.80 (5215.87) | | |
| Date | Depth to GW[2] (m) | Depth to GW[2] (m) | Depth to GW[2] (ft) | GW Elevation[3] (m) | GW Elevation[3] (ft) |
| 6/27/2008 | DRY | 219.75 | 720.97 | 4497.67 | 1370.89 |
| 7/3/2008 | DRY | 219.84 | 721.26 | 4497.38 | 1370.80 |
| 7/10/2008 | DRY | 220.26 | 722.65 | 4495.99 | 1370.38 |
| 7/17/2008 | DRY | 220.12 | 722.17 | 4496.47 | 1370.52 |
| 7/22/2008 | NM | 220.17 | 722.34 | 4496.30 | 1370.47 |
| 7/30/2008 | NM | 220.27 | 722.68 | 4495.96 | 1370.37 |
| 8/8/2008 | NM | 220.11 | 722.13 | 4496.51 | 1370.54 |
| 8/13/2008 | NM | 220.12 | 722.17 | 4496.47 | 1370.52 |
| 8/21/2008 | DRY | 220.04 | 721.92 | 4496.72 | 1370.60 |
| 8/27/2008 | DRY | 220.03 | 721.88 | 4496.76 | 1370.61 |
| 9/4/2008 | DRY | 219.97 | 721.68 | 4496.96 | 1370.67 |
| 9/11/2008 | DRY | 220.10 | 722.11 | 4496.53 | 1370.54 |
| 9/18/2008 | DRY | 219.83 | 721.22 | 4497.42 | 1370.81 |

TOC: Top of casing is the height above ground surface
PVC: Schedule 40 polyvinyl chloride well casing
DRY: Depth to water greater than depth at well
NM: Not measured
[1] Height above ground surface to measuring point includes TOC PVC height
[2] Measured depth to groundwater includes PVC above ground
[3] Groundwater elevations are above mean sea level

# APPENDIX A

## Well Completion Diagrams

# GW-1




DRILLING & WELL INSTALLATION SEQUENCE:

1. DRILL 8-INCH DIAMETER BOREHOLE WITH A ROTARY DRILLING RIG. INCLUDES TEMPORARY PLACEMENT OF STEEL SURFACE CASING.
2. MEASURE TOTAL DEPTH OF BOREHOLE USING A TAPE MEASURE OR EQUIVALENT DEVICE.
3. INSTALL PVC WELL SCREEN AND CASING.
4. INSTALL SAND FILTER PACK USING A TREMIE PIPE.
5. INSTALL FILTER SAND USING A TREMIE PIPE.
6. INSTALL HYDRATED BENTONITE PELLETS.
7. INSTALL WELL HEAD PROTECTION BOX AND CONCRETE SLAB.
8. INSTALL BOLLARDS, WHERE NECESSARY.

NOTES:

1. PROTECTIVE POSTS FIELD LOCATED AS NEEDED.

NOT TO SCALE

| | | |
|---|---|---|
| DESIGNED BY | | |
| DRAWN BY | DCM | 6-26-08 |
| CHECKED BY | | |
| APPROVED BY | | |
| PROJECT MANAGER | | |
| CLIENT APPROVAL | | |
| CLIENT REFERENCE NO | | |

PROJECT LOCATION: IDAHO FALLS, ID

PROJECT: EAGLE ROCK ENRICHMENT FACILITY ENVIRONMENTAL REPORT

TITLE: WELL CONSTRUCTION DIAGRAM MONITORING WELL GW-1

MWH

FIGURE

REVISION A

FILE NAME 1005746D071-A

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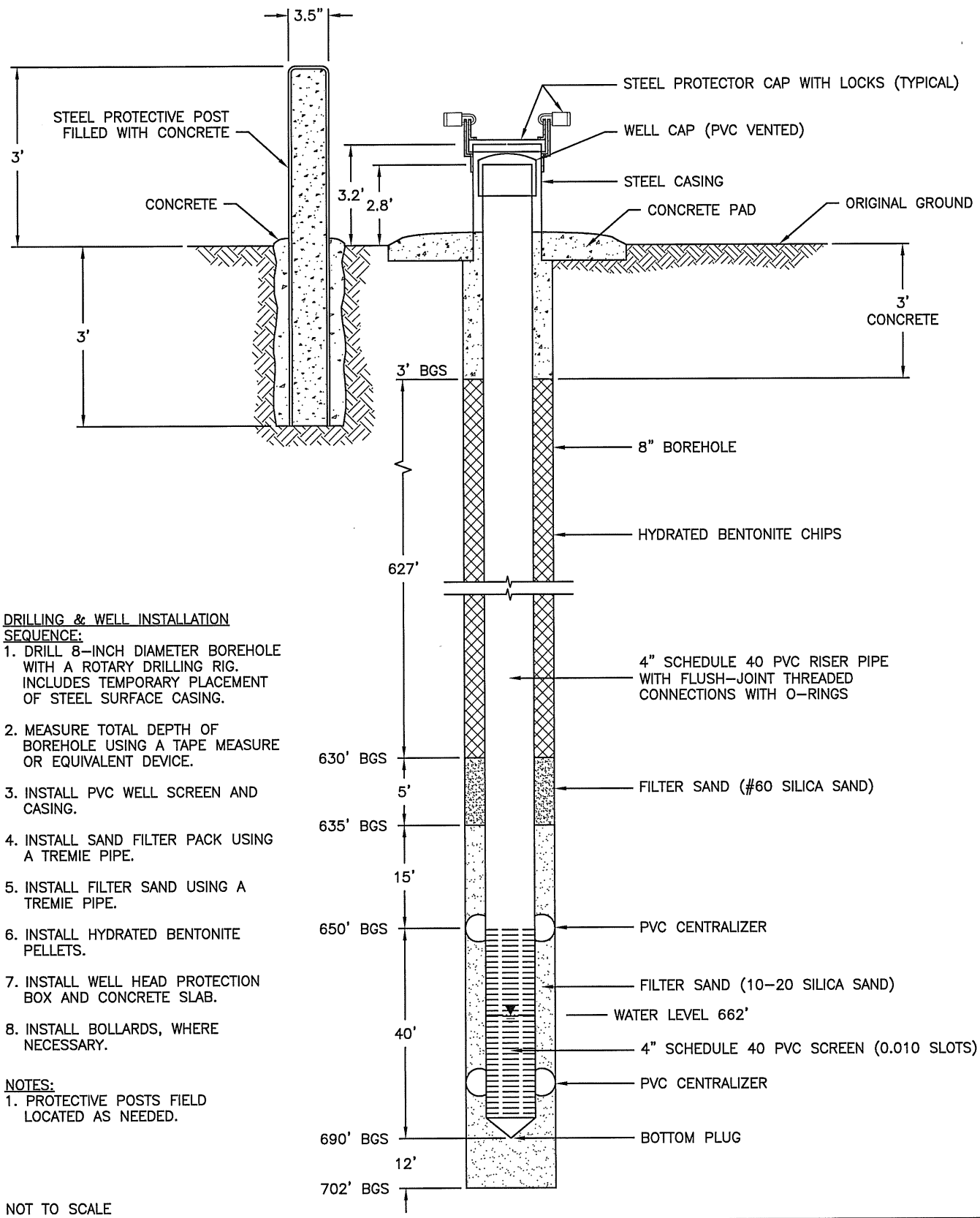
# GW-2




DRILLING & WELL INSTALLATION SEQUENCE:

1. DRILL 8-INCH DIAMETER BOREHOLE WITH A ROTARY DRILLING RIG. INCLUDES TEMPORARY PLACEMENT OF STEEL SURFACE CASING.
2. MEASURE TOTAL DEPTH OF BOREHOLE USING A TAPE MEASURE OR EQUIVALENT DEVICE.
3. INSTALL PVC WELL SCREEN AND CASING.
4. INSTALL SAND FILTER PACK USING A TREMIE PIPE.
5. INSTALL FILTER SAND USING A TREMIE PIPE.
6. INSTALL HYDRATED BENTONITE PELLETS.
7. INSTALL WELL HEAD PROTECTION BOX AND CONCRETE SLAB.
8. INSTALL BOLLARDS, WHERE NECESSARY.

NOTES:

1. PROTECTIVE POSTS FIELD LOCATED AS NEEDED.

NOT TO SCALE

| | | |
|---|---|---|
| DESIGNED BY | | |
| DRAWN BY | DCM | 6-26-08 |
| CHECKED BY | | |
| APPROVED BY | | |
| PROJECT MANAGER | | |
| CLIENT APPROVAL | | |
| CLIENT REFERENCE NO | | |

PROJECT LOCATION: IDAHO FALLS, ID

PROJECT: EAGLE ROCK ENRICHMENT FACILITY ENVIRONMENTAL REPORT

TITLE: WELL CONSTRUCTION DIAGRAM MONITORING WELL GW-2

MWH

FIGURE: REVISION A

FILE NAME: 1005746D072-A

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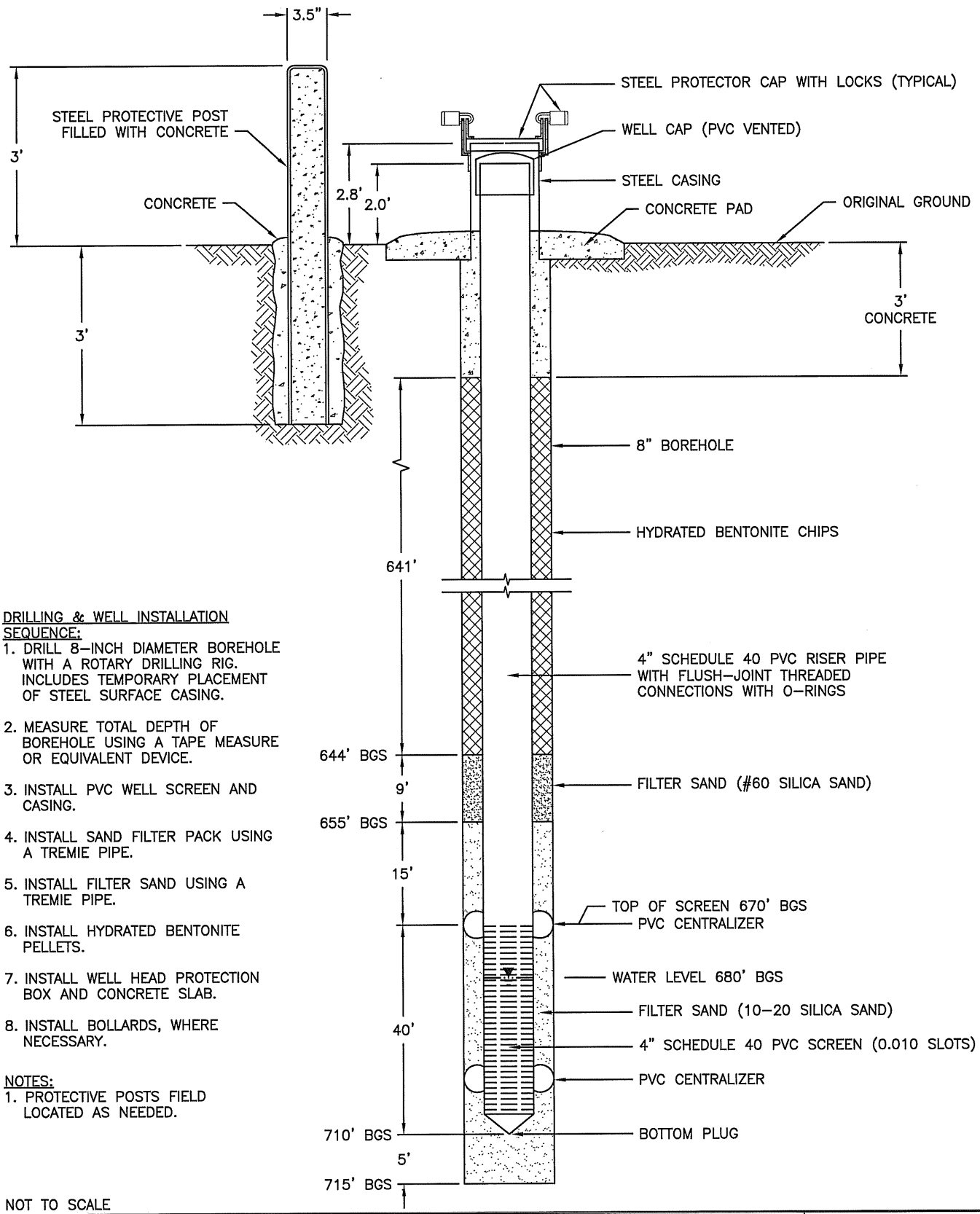
# GW-3




DRILLING & WELL INSTALLATION SEQUENCE:

1. DRILL 8-INCH DIAMETER BOREHOLE WITH A ROTARY DRILLING RIG. INCLUDES TEMPORARY PLACEMENT OF STEEL SURFACE CASING.
2. MEASURE TOTAL DEPTH OF BOREHOLE USING A TAPE MEASURE OR EQUIVALENT DEVICE.
3. INSTALL PVC WELL SCREEN AND CASING.
4. INSTALL SAND FILTER PACK USING A TREMIE PIPE.
5. INSTALL FILTER SAND USING A TREMIE PIPE.
6. INSTALL HYDRATED BENTONITE PELLETS.
7. INSTALL WELL HEAD PROTECTION BOX AND CONCRETE SLAB.
8. INSTALL BOLLARDS, WHERE NECESSARY.

NOTES:

1. PROTECTIVE POSTS FIELD LOCATED AS NEEDED.

NOT TO SCALE

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| DESIGNED BY | | |
| DRAWN BY | DCM | 6-26-08 |
| CHECKED BY | | |
| APPROVED BY | | |
| PROJECT MANAGER | | |
| CLIENT APPROVAL | | |
| CLIENT REFERENCE NO | | |

PROJECT LOCATION: IDAHO FALLS, ID

PROJECT: EAGLE ROCK ENRICHMENT FACILITY ENVIRONMENTAL REPORT

TITLE: WELL CONSTRUCTION DIAGRAM MONITORING WELL GW-3

MWH

FIGURE

REVISION: A

FILE NAME: 1005746D060-A

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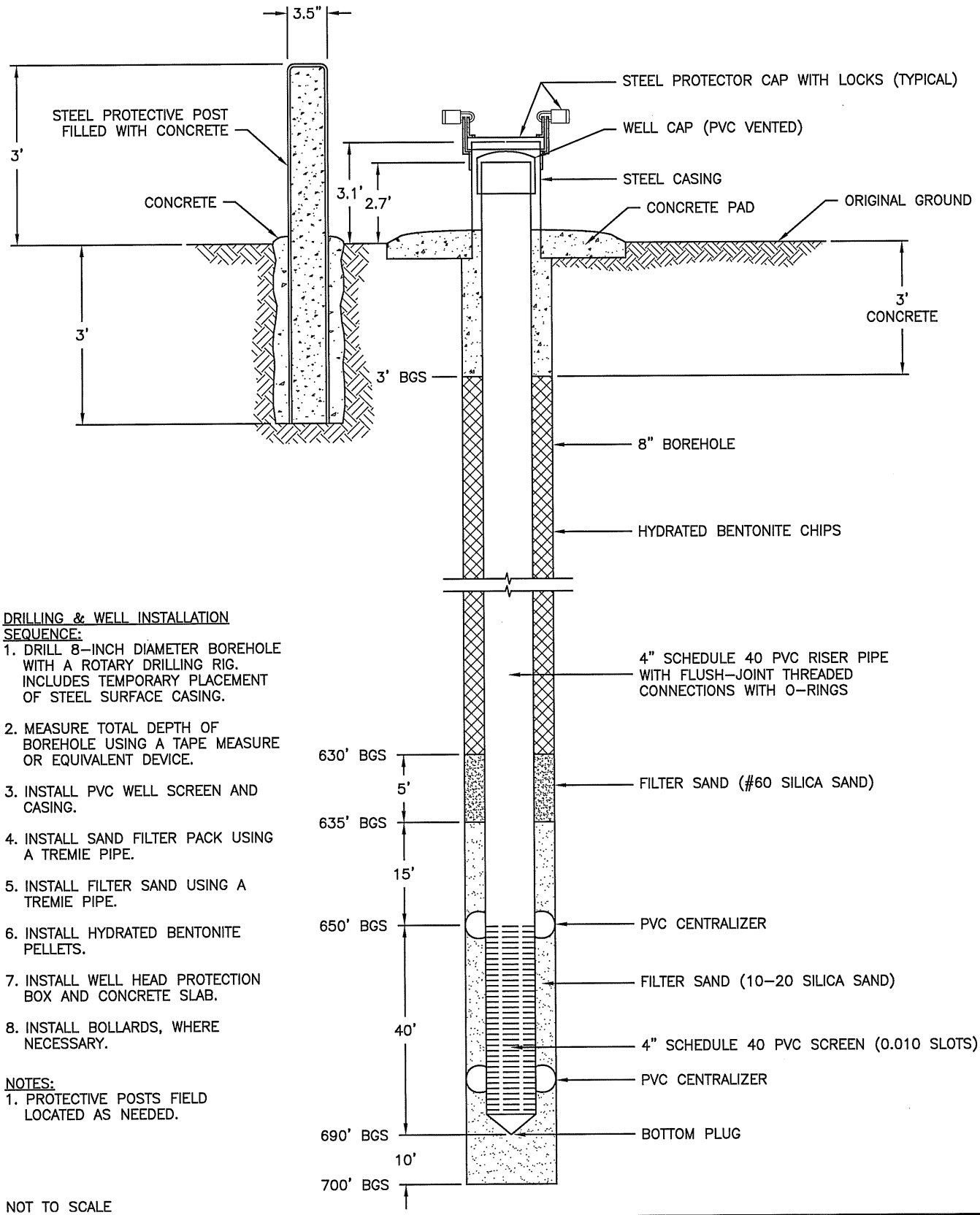
# GW-4




DRILLING & WELL INSTALLATION SEQUENCE:

1. DRILL 8-INCH DIAMETER BOREHOLE WITH A ROTARY DRILLING RIG. INCLUDES TEMPORARY PLACEMENT OF STEEL SURFACE CASING.
2. MEASURE TOTAL DEPTH OF BOREHOLE USING A TAPE MEASURE OR EQUIVALENT DEVICE.
3. INSTALL PVC WELL SCREEN AND CASING.
4. INSTALL SAND FILTER PACK USING A TREMIE PIPE.
5. INSTALL FILTER SAND USING A TREMIE PIPE.
6. INSTALL HYDRATED BENTONITE PELLETS.
7. INSTALL WELL HEAD PROTECTION BOX AND CONCRETE SLAB.
8. INSTALL BOLLARDS, WHERE NECESSARY.

NOTES:

1. PROTECTIVE POSTS FIELD LOCATED AS NEEDED.

NOT TO SCALE

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| CLIENT APPROVAL | | |
| CLIENT REFERENCE NO | | |

PROJECT LOCATION: IDAHO FALLS, ID

PROJECT: EAGLE ROCK ENRICHMENT FACILITY ENVIRONMENTAL REPORT

TITLE: WELL CONSTRUCTION DIAGRAM MONITORING WELL GW-4

MWH

FIGURE | REVISION: A

FILE NAME: 1005746D073-A

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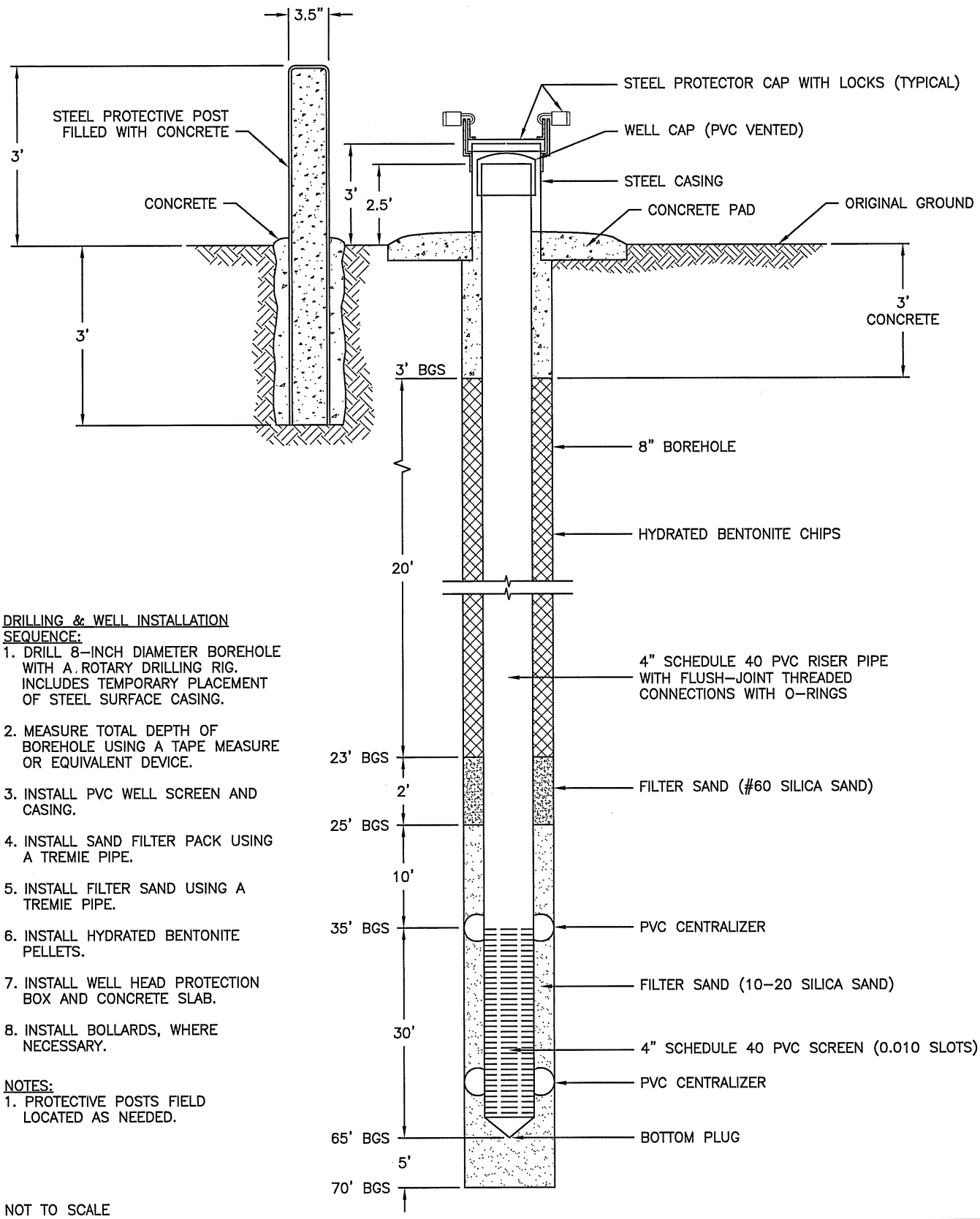
# GW-4S




DRILLING & WELL INSTALLATION SEQUENCE:

1. DRILL 8-INCH DIAMETER BOREHOLE WITH A ROTARY DRILLING RIG. INCLUDES TEMPORARY PLACEMENT OF STEEL SURFACE CASING.
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| CLIENT REFERENCE NO | | |

PROJECT LOCATION: IDAHO FALLS, ID

PROJECT: EAGLE ROCK ENRICHMENT FACILITY ENVIRONMENTAL REPORT

TITLE: WELL CONSTRUCTION DIAGRAM MONITORING WELL GW-4S

MWH

FIGURE: REVISION A

FILE NAME: 1005746D074-A

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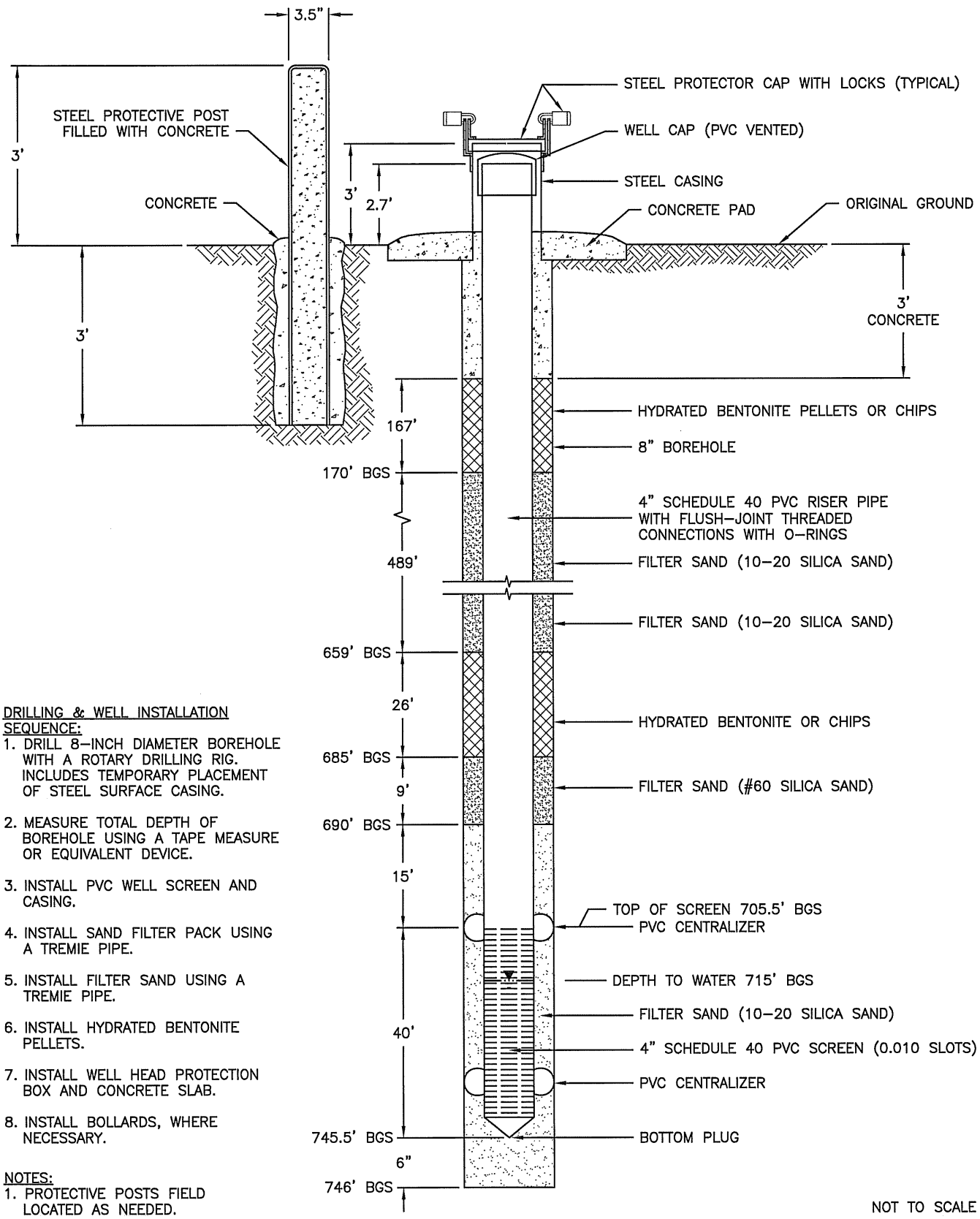
# GW-5




DRILLING & WELL INSTALLATION SEQUENCE:

1. DRILL 8-INCH DIAMETER BOREHOLE WITH A ROTARY DRILLING RIG. INCLUDES TEMPORARY PLACEMENT OF STEEL SURFACE CASING.
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PROJECT LOCATION: IDAHO FALLS, ID

PROJECT: EAGLE ROCK ENRICHMENT FACILITY ENVIRONMENTAL REPORT

TITLE: WELL CONSTRUCTION DIAGRAM MONITORING WELL GW-5

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FIGURE | REVISION A

FILE NAME 1005746D061-A

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