REPORT OF DRILLING, WELL ABANDONMENT AND INSTALLATION SERVICES

PROPOSED GYPSUM DISPOSAL AREA
TVA KINGSTON FOSSIL PLANT
KINGSTON, TENNESSEE

S&ME Project No. 1431-08-022

Prepared for:
Tennessee Valley Authority
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February 29, 2008

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February 29, 2008

Tennessee Valley Authority
1101 Market Street
Chattanooga, TN 37402

Attention: Mr. Lynn Petty

Reference: **Report of Drilling, Well Abandonment and Installation Services**
Proposed Gypsum Disposal Area
TVA Kingston Fossil Plant
Kingston, Tennessee
S&ME Project No. 1431-08-022
Release No. 21706-92

Dear Mr. Petty:

S&ME, Inc. has completed the proposed drilling, well abandonment and well installation services at the Tennessee Valley Authority's (TVA) Kingston Fossil Plant. This project was conducted in accordance with existing TVA Contract No. 21706, and as outlined in S&ME Proposal No. 3107949 Revision 1, dated December 20, 2007. We will be pleased to discuss the data with you and would welcome the opportunity to provide the engineering design and material testing services needed to successfully complete your project.

Respectfully submitted,

S&ME, Inc.

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1. INTRODUCTION

This report presents a summary of our field services that included monitoring well abandonment and installation activities at the proposed gypsum disposal facility located at TVA's Kingston Fossil Plant (see Figure 1, Site Location Map). Our services were authorized by Mr. Lynn Petty of TVA.

2. OBJECTIVES

The objectives of our scope of work were to abandon existing monitoring wells and piezometers located within the footprint of the proposed gypsum disposal facility, and to install new monitoring wells along the perimeter of the Phase I area of the proposed disposal facility. An assessment of site environmental conditions, or an assessment for the presence or absence of pollutants in the soil, bedrock, surface water, or groundwater of the site was beyond the proposed objectives of our scope of work.

3. SCOPE OF WORK

The scope of work was based on our proposal No. 3107949 Revision 1, dated December 20, 2007, as well as recommendations provided by TVA during project execution. It included the following:

- Reconnaissance of the site.
- Mobilization of one ATV-mounted drill rig and one subcontract truck-mounted air-rotary drill rig.
- Abandoning existing 2-inch diameter residuum wells (total of 11) and bedrock monitoring wells (a total of 5), as well as 1-inch diameter piezometers (a total of 5) located within the footprint of the proposed disposal area
- Drilling 5 geotechnical soil borings (B-1A, B-4A, B-6A, MW-3A, and MW-5A) to auger refusal depths in order to delineate subsurface conditions.
- The installation of 2 residuum monitoring wells (MW-3A and MW-5A) to bedrock refusal. The installation of 5 bedrock monitoring wells (MW-1B, MW-3B, MW-4B, MW-5B, and MW-6B) into the upper 28.5 to 81.4 feet of the bedrock.
- Above grade completion of all wells (except MW-1B) with an approximate 3 foot stickup, a vented PVC cap, and a lockable steel outer casing secured in a 4 foot by 4

foot concrete pad. Four (4-inch diameter by 5 foot length) steel bollards were installed to a 3-foot height at the four corners of the concrete pad.

- Installation of MW-1B as a double cased, open hole bedrock well (i.e., no PVC well screen or riser installed). A lockable aluminum cap was provided at the top of the well casing approximately 1 foot above ground surface.

- Perform well development at each of the installed wells. Procedures included surging, bailing, and pumping. Well development was performed at each well for approximately 2 hours.

- Prepare a report that contains the Well Abandonment Forms, Boring Logs, Monitoring Well Schematics, and a summary of the field procedures and activities.

4. ABANDONMENT OF EXISTING MONITORING WELLS AND PIEZOMETERS

A total of sixteen 2-inch monitoring wells and five 1-inch piezometers were abandoned as a part of the scope of work. See Figure 2 for the locations of the abandoned wells and piezometers. Abandonment activities included well material removal, overdrilling, and grouting. Well Plugging and Abandonment Forms for each abandoned well and piezometer can be found in Appendix I.

5. GEOTECHNICAL AND AIR-ROTARY BORINGS

Geotechnical (Soil Test) Borings

Subsurface conditions at the proposed well installation locations were explored with 5 soil test borings identified as B-1A, B-4A, B-6A, MW-3A, and MW-5A. The locations for all the borings and monitoring wells were proposed by TVA and established in the field by TVA and S&ME (see Figure 2).

Subsurface conditions encountered at each geotechnical boring location are shown on the Boring Logs in Appendix II. The Boring Logs represent our interpretation of the subsurface conditions, based on the visual examination of the samples by our on-site professional. The groundwater levels provided on the logs correspond to levels at the time of boring termination and after 24 hours. The lines designating the interfaces between various strata on the Boring Logs represent the approximate interface locations. The ground surface elevations listed on the Boring Logs were provided by TVA.

The test borings performed typically encountered residual soil. Residual soil is soil that has developed from the in-place weathering of the underlying parent bedrock. The residuum in the borings consisted of clay and silt with varying amounts of manganese nodules, chert fragments, and dolomite fragments. The SPT resistance N-values in the residuum ranged from 5 to over 50 blows per foot, indicating firm to very hard consistency. Auger refusal depths varied from 18.5 feet (B-4A) to 42.5 feet (B-1A).

Upon completion of drilling, test borings B-1A, B-4A, and B-6A were abandoned by backfilling the full depth with bentonite cement grout utilizing the tremie method. Residuum monitoring wells were installed at test boring locations MW-3A and MW-5A upon completion of drilling.

All geotechnical boring and sampling operations were conducted in general accordance with the American Society of Testing and Materials (ASTM), ASTM D 6151 – Practice for Using Hollow-Stem Augers for Geotechnical Exploration and Soil Sampling and ASTM D 1586 – Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils. The borings were advanced by mechanically rotating three and one-quarter (3 ¼) inch I.D. continuous steel hollow-stem auger flights into the ground. At regular intervals, soil samples were obtained with a standard 1.4-inch I.D., 2-inch O.D., split-tube sampler. The sampler was first seated six inches to penetrate any loose cuttings and then driven an additional foot with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler the final foot of penetration was recorded and is designated the "standard penetration test (SPT) resistance". Proper evaluation of the penetration resistance provides an index to the soil's consistency or relative density. The SPT samples were logged and labeled by S&ME's on-site professional and then transported to our laboratory.

Air-rotary Borings

Air-rotary borings MW-1B, MW-3B, MW-4B, MW-5B, and MW-6B were drilled at each of the proposed bedrock monitoring well locations in preparation for bedrock well installation and construction.

Subsurface conditions encountered at each air-rotary boring location are shown on the Boring Logs in Appendix II. The Boring Logs represent our interpretation of the subsurface conditions, based on the visual observation by our on-site professional of the drilling activities and soil/rock cuttings produced during drilling. The Boring Logs contain information on drill penetration rates, voids, cuttings return, etc. The groundwater levels provided on the logs correspond to levels at the time of well installation and at 24 hours after installation. The lines designating the interfaces between various strata on the Boring Logs represent the approximate interface locations. The ground surface elevations listed on the Boring Logs were provided by TVA.

The air-rotary borings encountered residual soil overlying bedrock. Bedrock, consisting mainly of dolomite with interbedded limestone and sandstone, was encountered at depths

varying from 14.0 feet (MW-4B) to 42.5 feet (MW-1B). The air-rotary borings were terminated at depths varying from 58.0 feet (MW-5B) to 152.0 feet (MW-1B).

Bedrock monitoring wells were installed at air-rotary boring locations MW-1B, MW-3B, MW-4B, MW-5B, and MW-6B upon completion of drilling activities.

All air-rotary boring operations were conducted in general accordance with ASTM D 5782 – Standard Guide for Use of Direct Air-Rotary Drilling for Geo-environmental Exploration and the Installation of Subsurface Water Quality Monitoring Devices. The borings were advanced using tri-cone rotary bits (which utilize rotation and down pressure) and hammer/bit combinations (which utilize rotation, down pressure, and percussion).

6. INSTALLATION OF NEW MONITORING WELLS

Residuum Monitoring Wells

Residuum monitoring wells were installed at locations MW-3A and MW-5A (see Figure 2). Detailed monitoring well schematics showing the well constructions are provided in Appendix III.

The wells consisted of 2-inch diameter, Schedule 40 PVC casing with double-density, slotted, 0.010-inch screen. Screen lengths were approximately 10 feet. The wells were set on a 0.5 foot thick footing of filter pack sand (20/40 grain size). A PVC V-wire pre-packed screen (20/40 size) was installed with the filter pack extending 0.5 feet above the screen. A minimum 3-foot thick bentonite seal was placed above the filter pack. The remaining annulus was filled with a cement-bentonite grout.

Above grade well completion consisted of an approximate 3 foot stickup with a lockable steel outer casing and a vented PVC cap secured in a 4 foot by 4 foot concrete pad. Four (4-inch diameter by 5 foot length) steel bollards were installed to a 3-foot height at the four corners of the concrete pad.

Bedrock Monitoring Wells

Bedrock monitoring wells were installed at locations MW-1B, MW-3B, MW-4B, MW-5B, and MW-6B (see Figure 2). Detailed monitoring well schematics showing the well constructions are provided in Appendix III.

During the installation of the bedrock wells a 10-inch diameter borehole was advanced through the residuum into the upper 2.0 to 5.5 feet of competent bedrock. An 8-inch diameter, steel surface casing was installed and grouted in place using a cement-bentonite grout, which was allowed to cure for 24 hours. A minimum 6-inch annular diameter was provided within the bedrock monitoring wells. Wells at locations MW-3B through MW-6B

consisted of 2-inch diameter, Schedule 40 PVC casing with double-density, slotted, 0.010-inch screen. Screen lengths were approximately 20 feet. A factory slotted pre-packed screen (20/40 size) was installed with the filter pack extending a minimum of 2.0 feet above the screen. A minimum 3-foot thick bentonite seal was placed above the filter pack. The remaining annulus was filled with a cement-bentonite grout.

Above grade completion of all wells (except MW-1B) consisted of an approximate 3 foot stickup with a lockable steel outer casing and a vented PVC cap secured in a 4 foot by 4 foot concrete pad. Four (4-inch diameter by 5 foot length) steel bollards were installed to a 3-foot height at the four corners of the concrete pad.

The well at location MW-1B consisted of a double cased, open hole bedrock well. An 8-inch diameter casing was installed from the ground surface to a depth of 48.0 feet, while 6-inch diameter casing was installed from the ground surface to a depth of 105.0 feet in order to case off an open void (encountered from 53.0 feet to 79.5 feet) as well as intermittent highly fractured zones within the bedrock. A rubber top cementing plug was installed to a depth of 124.0 feet to seal off a clay-filled void encountered from 125.0 feet to 152.0 feet. An approximate 1 foot thick layer of cement-bentonite grout was tremied overlying the rubber plug up to a depth of 123.0 feet to complete the open hole bedrock well.

7. GROUNDWATER CONDITIONS

In the geotechnical borings, groundwater levels were measured at the time of boring termination (i.e., at auger refusal depths) and at approximately 24 hours after termination of the borings. The groundwater levels obtained in the air-rotary borings were measured at the time of bedrock well installation and at approximately 24 hours after well installation. The recorded groundwater levels are presented in Table 1 (on the following page).

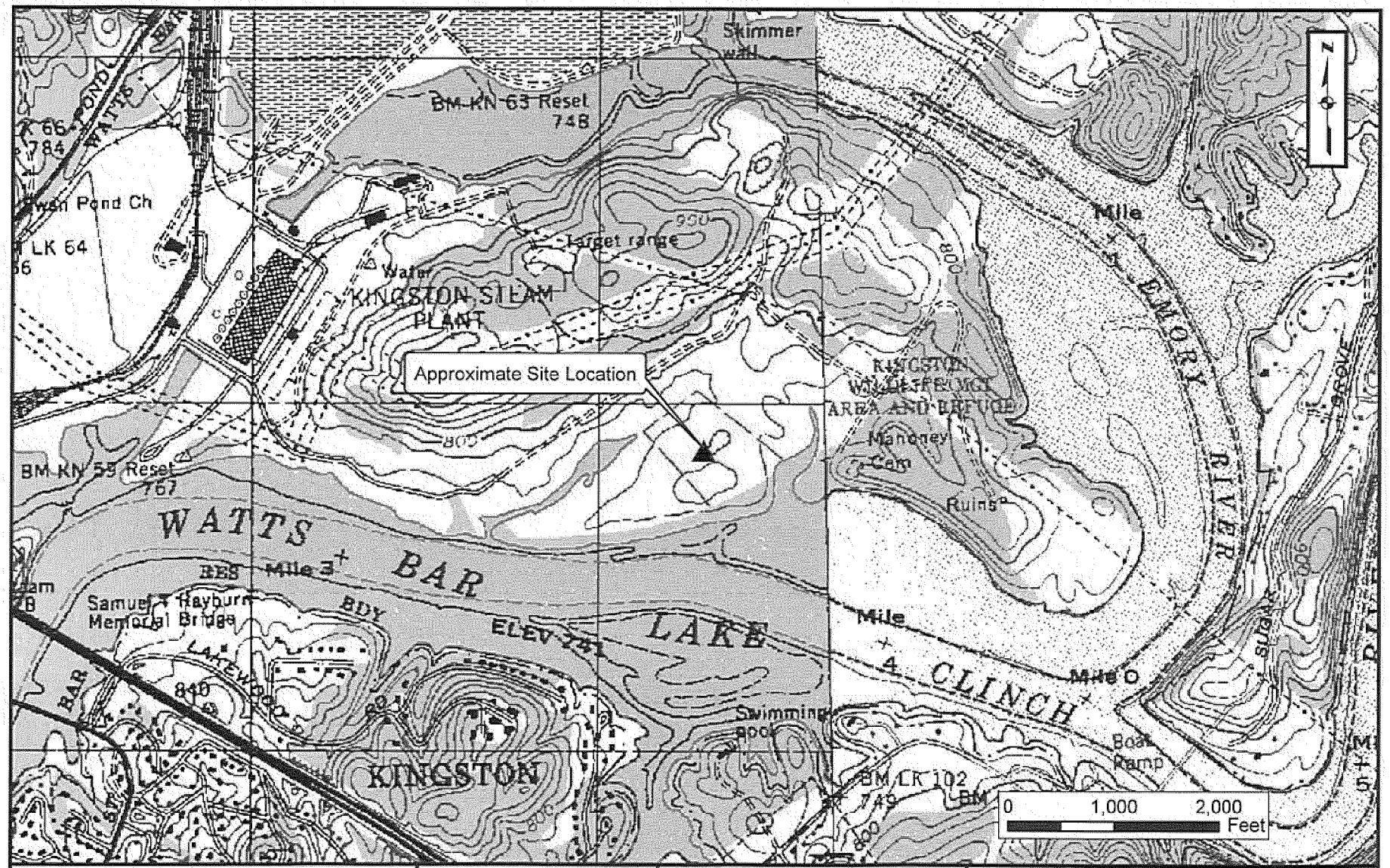
Fluctuations in the groundwater level occur because of variation in rainfall, evaporation, construction activity, surface run-off, and other site-specific factors such as fluctuation of water levels in the adjacent Watts Bar Lake.

Table 1
Ground-Water Data

Boring Number	Ground Surface Elevation (Feet msl)	Depth to Ground Water at Boring Termination (Feet)	Ground-Water Elevation at Boring Termination (Feet msl)	Depth to Ground Water After 24 Hours (Feet)	Ground-Water Elevation After 24 Hours (Feet msl)
B-1A	858.80	N.E.	-	N.E.	-
MW-3A	745.30	10.49	734.81	9.00	736.30
B-4A	767.20	N.E.	-	17.94	
MW-5A	757.90	20.11	737.79	19.96	737.94
B-6A	777.10	N.E.	-	N.E.	-
MW-1B	858.80	114.00	744.80	115.50	743.30
MW-3B	745.30	13.00	732.30	9.89	735.41
MW-4B	767.20	N.E.	-	32.70	734.50
MW-5B	757.90	19.02	738.88	19.65	738.25
MW-6B	777.10	33.00	744.10	33.70	743.40

Notes:
-Water levels in MW-1B through MW-6B are at time of well installation and 24 hrs after installation
-N.E. (Not Encountered)
-Ground surface elevations were provided by TVA

FIGURES



USGS Topographic Quadrangle Reference: Harriman Quad (West) Elverton Quad (East)	SCALE: AS SHOWN CHECKED: CTJ DRAWN: MDS DATE: 1/10/08

S&ME

Site Vicinity Map
TVA Kingston Gypsum Disposal Area
Kingston, Tennessee
Project No: 1431-08-022

FIGURE NO: **1**

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Boring and Monitoring Well Abandonment/Installation Location Plan

TVA Kingston Gypsum Disposal Area
Kingston, Tennessee

DRAWN BY:	BCW
APPROVED BY:	CTJ
SCALE:	1"=400'
PROJECT NO:	1431-08-022
DATE:	02-07-08

FIGURE 2