REPORT

Groundwater Monitoring Plan - Revision 2

Martin Lake Steam Electric Station - Ash Pond Area
Rusk County, Texas

Submitted to:

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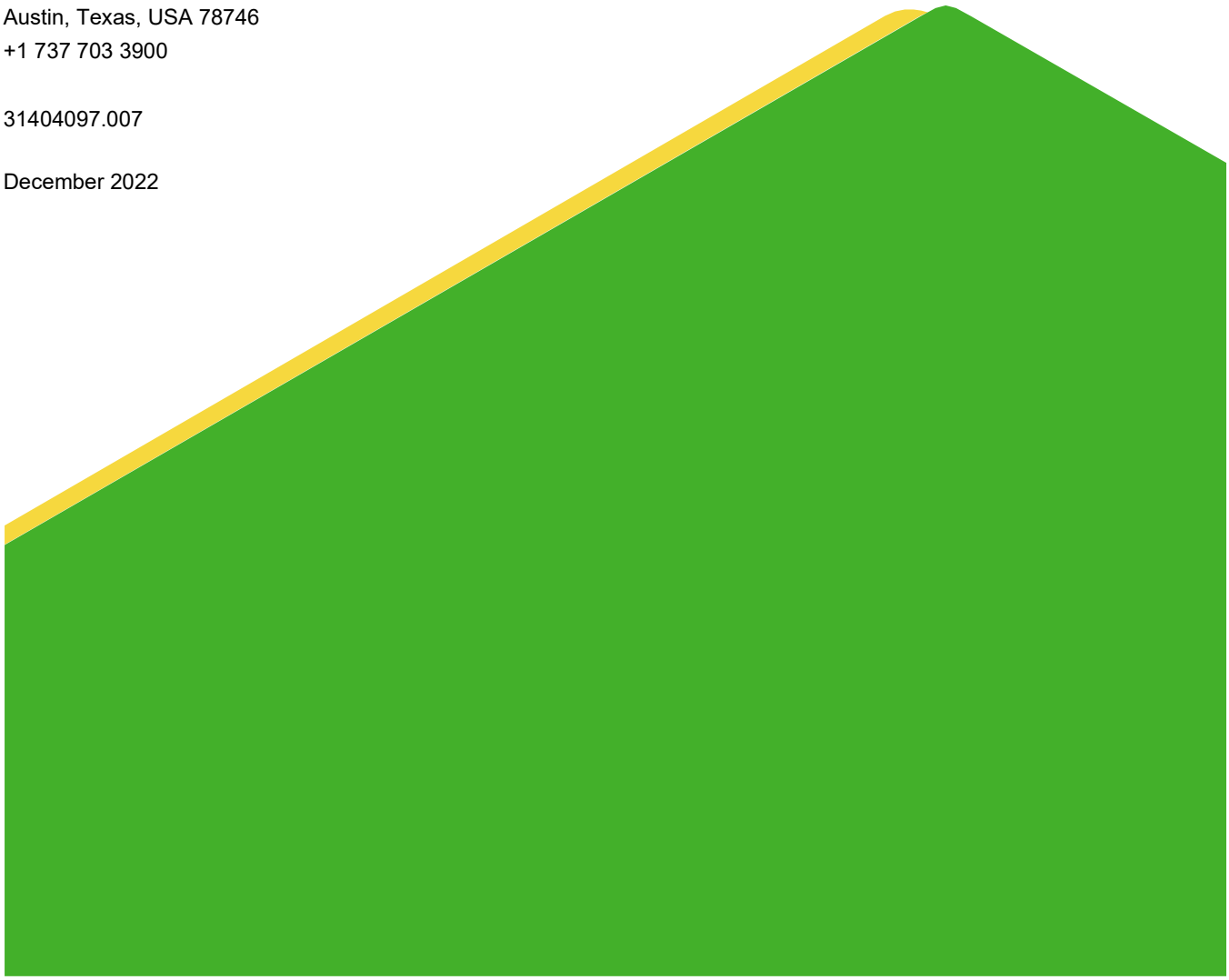

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DOCUMENT REVISION RECORD

Issue No.	Date	Details of Revisions
Revision 0	October 2017	Original Document
Revision 1	January 2022	Updated information on data evaluation procedures, updated well information
Revision 2	December 2022	Signed/sealed report and added professional geoscientist seal to figures where appropriate, addressed sample shipment and quality assurance/quality control procedures, specified that the rate and direction of groundwater flow will be determined each sampling event, provided additional information on the statistical methods used to develop background values and evaluate sample data, specified that Alternate Source Demonstrations must be certified by a professional engineer, and updated GWPS information for cobalt, lithium, molybdenum

1.0 INTRODUCTION

Luminant Power (Luminant) operates the Martin Lake Steam Electric Station (MLSES) located approximately 5 miles southeast of Tatum, Rusk County, Texas (Figure 1). The MLSES consists of three coal/lignite-fired power generation units. Coal Combustion Residuals (CCRs) including fly ash, bottom ash and gypsum are generated as part of the MLSES unit operations. Currently, CCRs generated at the MLSES are transported off-site for beneficial reuse by third-parties or are managed by Luminant in surface impoundments located on the MLSES property or the A1 Area Landfill located approximately 2.5 miles east of the MLSES. This report discusses the Ash Pond Area (the Site), which includes the West Ash Pond (WAP), East Ash Pond (EAP), and the New Scrubber Pond.

The CCR Rule (40 CFR 257 Subpart D - *Standards for the Receipt of Coal Combustion Residuals in Landfills and Surface Impoundments*) has been promulgated by the EPA to regulate the management and disposal of CCRs as solid waste under Resource Conservation and Recovery Act (RCRA) Subtitle D.

The CCR Rule establishes national minimum criteria for existing and new CCR landfills, existing and new CCR surface impoundments, and lateral expansions to landfills/impoundments. The Ash Ponds are considered “existing surface imoundments” under 40 C.F.R 257.53. A groundwater monitoring plan for the Site was developed for the Site in accordance with Sections 257.90 through 257.95 of the CCR Rule (PBW, 2017a). The CCR groundwater monitoring system at the Site was certified by a professional engineer in accordance with Section 257.91 of the CCR Rule as part of a separate report (PBW, 2017b). This revised groundwater monitoring plan updates and replaces the previous groundwater monitoring plan for the Site.

1.1 CCR Unit Groundwater Monitoring Applicability

Section 257.90 of the CCR Rule requires that existing CCR landfills and surface impoundments be in compliance with the following groundwater monitoring requirements no later than October 17, 2017:

- Install a groundwater monitoring system as required under Section 257.91;
- Develop a groundwater sampling and analysis program to include selection of the statistical procedures to be used for evaluating groundwater monitoring data as required under Section 257.93;
- Initiate a detection monitoring program to include obtaining a minimum of eight independent

samples for each background and downgradient monitoring well as required under Section 257.94; and

- Begin evaluating the groundwater monitoring data for statistically significant increases over background levels for the constituents listed in Appendix III of this part as required under Section 257.94.

Once a groundwater monitoring system and groundwater monitoring program has been established at the CCR unit, the owner or operator must conduct groundwater monitoring and, if necessary, corrective action throughout the active life and post-closure care period of the CCR unit. In the event of a release from a CCR unit, the owner or operator must take all necessary measures to control the source(s) of releases so as to reduce or eliminate, to the maximum extent feasible, further releases of contaminants into the environment.

For existing CCR landfills and surface impoundments, the owner or operator must prepare an annual groundwater monitoring and corrective action report to document the status of the groundwater monitoring and corrective action program for the CCR unit for the previous calendar year.

1.2 Groundwater Sampling and Analysis Requirements

The CCR Rule establishes groundwater sampling and analysis criteria that are designed to create consistency and ensure that monitoring results provide accurate representations of groundwater quality at the CCR groundwater monitoring wells. A sampling and analysis program must be developed for each unit that includes procedures and techniques for sample collection, sample preservation and shipment, analytical procedures, chain of custody control, and quality assurance and quality control. Depending on the constituents and concentrations detected, groundwater monitoring at each CCR unit may consist of detection monitoring (Section 257.94) only or a combination of detection monitoring and assessment monitoring (Section 257.95). Selected technical groundwater sampling and analysis criteria are described in detail below; however, the complete CCR Rule should be referenced for notification requirements and other criteria.

1.2.1 Groundwater Elevations

Groundwater elevations must be measured in each well immediately prior to purging, each time groundwater is sampled. Remove sentence about flow and flow directions

1.2.2 General Groundwater Analytical Requirements

The CCR groundwater monitoring program must include sampling and analytical methods that are appropriate for groundwater sampling and that accurately measure hazardous constituents and other monitoring parameters in groundwater samples. The EPA publication *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846)*, is EPA'S official compendium of analytical and sampling methods that have been evaluated and approved for use in complying with the RCRA regulations (EPA, 2015).

Groundwater monitoring under the CCR Rule includes analyses for inorganic parameters and metals. All metals analyses must be reported as "total recoverable metals" to capture both the particulate fraction and dissolved fraction of metals in the groundwater. The CCR Rule stipulates that groundwater samples cannot be field filtered prior to analysis.

1.2.3 Background Groundwater Quality Determination

Background groundwater quality must be established in a hydraulically upgradient or background well(s) for each of the groundwater constituents required in the detection monitoring or assessment monitoring program that applies to the CCR unit. Background groundwater quality may be established at wells that are not located hydraulically upgradient from the CCR unit if the samples accurately represent the quality of background groundwater that has not been affected by leakage from the CCR unit.

1.2.4 Detection Monitoring Requirements

Groundwater detection monitoring must be performed at each CCR unit (CCR Rule Section 257.94). The following constituents must be included in the detection monitoring program (from Appendix III to the CCR Rule):

- Boron
- Calcium
- Chloride
- Fluoride
- pH
- Sulfate
- Total Dissolved Solids (TDS)

The monitoring frequency for these constituents must be at least semi-annual during the active life of the CCR unit and post-closure period. The reported concentrations of the detection monitoring

constituents must be compared to the respective CCR unit background concentration developed for each constituent. If a statistically significant increase over background levels is determined for one or more of the constituents listed above at any monitoring well at the CCR unit waste boundary, within 90 days the owner or operator must:

- Establish an assessment monitoring program as described in Section 257.95 of the Rule, or
- Demonstrate that a source other than the CCR unit caused the statistically significant increase over background levels for a constituent or that the statistically significant increase resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. If a successful demonstration is completed within the 90-day period, the owner or operator of the CCR unit may continue with the detection monitoring program.

1.2.5 Assessment Monitoring Requirements

Assessment monitoring is required under the CCR Rule whenever a statistically significant increase over background levels has been detected for one or more of the detection monitoring constituents listed above (CCR Rule Section 257.95). The following constituents must be included in the assessment monitoring program (from Appendix IV to the CCR Rule):

- Antimony
- Arsenic
- Barium
- Beryllium
- Cadmium
- Chromium
- Cobalt
- Fluoride
- Lead
- Lithium
- Mercury
- Molybdenum
- Selenium
- Thallium
- Radium 226 and 228 combined

Within 90 days of triggering an assessment monitoring program, and annually thereafter, the owner or operator of the CCR unit must sample and analyze the groundwater for all assessment monitoring constituents (Appendix IV) listed above. At least one sample must be collected from each well associated with the CCR unit.

Within 90 days of obtaining the results from the initial assessment monitoring sampling event, the owner or operator of the CCR unit must resample all wells associated with the CCR unit, conduct analyses for all detection monitoring parameters (Appendix III) and for those assessment monitoring constituents (Appendix IV) that have been detected as part of assessment monitoring. At least one sample must be collected from each well associated with the CCR unit. This monitoring must be performed on at least a semi-annual basis thereafter. The owner or operator of a CCR unit may demonstrate the need for an alternative monitoring frequency for repeated sampling and analysis for these constituents during the active life and the post-closure care period based on the availability of groundwater. If there is not adequate groundwater flow to sample wells semi-annually, the alternative frequency shall be no less than annual.

Within 90 days of obtaining the results from the initial assessment monitoring sampling event, groundwater protection standards (GWPSs) must be established for all assessment monitoring constituents (Appendix IV) detected in the CCR unit monitoring wells. The GWPS shall be:

- For constituents for which a federal maximum contaminant level (MCL) has been established under 40 CFR 141.62 and 141.66, the MCL for that constituent; or
- For constituents for which an MCL has not been established, the background concentration for the constituent or approved regional screening level established in accordance with CCR Rule Section 257.91; or
- For constituents for which the background level is higher than the MCL, the background concentration.

Following are the GWPSs that have been established for the assessment monitoring constituents (Appendix IV) identified in the Rule:

Constituent	GWPS (mg/L)
Antimony	0.006
Arsenic	0.01
Barium	2.0
Beryllium	0.004
Cadmium	0.005
Chromium	0.1
Cobalt	0.0564

Constituent	GWPS (mg/L)
Fluoride	4.0
Lead	0.015
Lithium	0.177
Mercury	0.002
Molybdenum	0.1
Selenium	0.05
Thallium	0.002
Radium 226/228 Combined	5 pCi/L**

** pCi/L = picocuries per liter

If the concentrations of all detection monitoring constituents (Appendix III) and assessment monitoring constituents (Appendix IV) are shown to be statistically at or below background values for two consecutive sampling events, the owner or operator may return to performing only detection monitoring of the CCR unit. If the concentrations of any detection monitoring constituents (Appendix III) and assessment monitoring constituents (Appendix IV) are shown to be statistically above background values, but all concentrations are below their respective GWPSs, the owner or operator must continue assessment monitoring of the CCR Unit.

Within 90 days of finding that any of the assessment monitoring constituents (Appendix IV) have been detected at a statistically significant level exceeding their respective GWPSs, the owner or operator of the CCR unit must either:

- Initiate an assessment of corrective measures for the CCR unit (CCR Rule Section 257.96); or
- Demonstrate that a source other than the CCR unit caused the contamination, or that the statistically significant increase resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. If a successful demonstration is made, the owner or operator must continue assessment monitoring. If a successful demonstration has not been made at the end of the 90 day period, the owner or operator of the CCR unit must initiate an assessment of corrective measures for the CCR unit.

If one or more assessment monitoring constituents (Appendix IV) are detected at statistically significant levels above their respective GWPSs, the owner or operator of the CCR unit must characterize the nature and extent of the release. Characterization of the release includes the following minimum measures:

- Install additional monitoring wells necessary to define the contaminant plume(s);
- Collect data on the nature and estimated quantity of material released including specific information on the assessment monitoring constituents (Appendix IV) and the levels at which they are present in the material released;
- Install at least one additional monitoring well at the facility boundary in the direction of contaminant migration and sample this well for all detection monitoring parameters (Appendix III) and for those assessment monitoring constituents (Appendix IV) that have been detected as part of assessment monitoring. This monitoring must be performed on at least a semi-annual basis thereafter.
- Sample all CCR unit wells for all detection monitoring parameters (Appendix III) and for those assessment monitoring constituents (Appendix IV) that have been detected as part of assessment monitoring. This monitoring must be performed on at least a semi-annual basis thereafter.

If an assessment of corrective measures is required as a result of assessment monitoring, and if the CCR unit being monitored is considered an existing unlined CCR surface impoundment under the CCR Rule, then the CCR unit is required to retrofit or close in accordance with the applicable parts of the CCR Rule.

1.3 Groundwater Statistical Evaluation Procedures

Statistical analysis of the groundwater monitoring data is required as part of detection monitoring and assessment monitoring under the CCR Rule. One of the following statistical methods must be used to evaluate groundwater monitoring data for each monitored constituent:

- A parametric analysis of variance followed by multiple comparison procedures to identify statistically significant evidence of contamination. The method must include estimation and testing of the contrasts between each compliance well's mean and the background mean levels for each constituent; or
- An analysis of variance based on ranks followed by multiple comparison procedures to identify statistically significant evidence of contamination. The method must include estimation and testing of the contrasts between each compliance well's median and the background median levels for each constituent; or
- A tolerance or prediction interval procedure in which an interval for each constituent is established from the distribution of the background data. The level of each constituent in each compliance well is compared to the upper tolerance or prediction limit established from the background data; or

- A control chart approach that gives control limits for each constituent; or
- Another statistical test method that meets the performance standards.

Any statistical method chosen must comply with the following performance standards:

- The statistical method used to evaluate groundwater monitoring data shall be appropriate for the distribution of constituents. Probability distributions of data values shall use parametric methods, and non-probability distributions of data values shall use non-parametric methods. If the distribution of the constituents is shown to be inappropriate for a probability theory test, the data must be transformed or a distribution-free (non-parametric) theory test must be used. If the distributions for the constituents differ, more than one statistical method may be needed;
- If an individual well comparison procedure is used to compare an individual compliance well constituent concentration with background constituent concentrations or a GWPS, the test shall be done at a Type I error level no less than 0.01 for each testing period. If a multiple comparison procedure is used, the Type I experiment wise error rate for each testing period shall be no less than 0.05; however, the Type I error of no less than 0.01 for individual well comparison must be maintained. This performance standard does not apply to tolerance intervals, prediction intervals, or control charts;
- If a control chart approach is used to evaluate groundwater monitoring data, the specific type of chart and its associated parameter values shall be such that this approach is at least as effective as any other approach in this section for evaluating groundwater data. The parameter values shall be determined after considering the number of samples in the background database, the data distribution, and the range of the concentration values for each constituent of concern;
- If a tolerance interval or a prediction interval is used to evaluate groundwater monitoring data, the levels of confidence and, for tolerance intervals, the percentage of the population that the interval must contain, shall be such that this approach is at least as effective as any other approach in this section for evaluating groundwater data. These parameters shall be determined after considering the number of samples in the background database, the data distribution, and the range of the concentration values for each constituent of concern;
- The statistical method must account for data below the limit of detection with one or more statistical procedures that shall be at least as effective as any other approach in this section for evaluating groundwater data. Any practical quantitation limit that is used in the statistical method shall be the lowest concentration level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions that are available to the facility; and
- If necessary, the statistical method must include procedures to control or correct for seasonal and spatial variability as well as temporal correlation in the data.

The owner/operator of the CCR unit must determine if there has been a statistically significant increase over background (detection monitoring) or MCLs/background (assessment monitoring) for each

constituent required in the particular groundwater monitoring program that applies to the CCR unit. The determination of statistical increase over background/MCLs for each constituent at each monitoring well must be made within 90 days after completing sampling and analysis.

2.0 GROUNDWATER MONITORING PROCEDURES

This section describes groundwater sampling and analysis procedures for monitoring the CCR unit wells to comply with the requirements of 40 CFR 257.90 - 257.95 of the CCR Rule.

2.1 Ash Pond Area Groundwater Monitoring System

The CCR groundwater monitoring system at the Ash Pond Area consists of the following eight monitoring wells:

Upgradient Wells	Downgradient Wells
H-26	H-28
H-27	H-29
H-33	H-30
	H-31
	H-32

A detailed Site Plan showing the CCR monitoring well locations is presented on Figure 2. Well logs for the wells are reproduced in Appendix A. The CCR groundwater monitoring system was certified by a professional engineer in accordance with Section 257.91 of the CCR Rule as part of a separate report (PBW, 2017b).

2.2 Groundwater Sampling Procedures

2.2.1 Equipment Assembly and Preparation

Activities that occur during groundwater sampling are summarized as follows:

- pre-arrangement of sample analytical requests with analytical testing laboratory;
- assembly and preparation of sampling equipment and supplies;
- groundwater sampling;
- water-level measurements;
- well purging;
- field parameter measurements;
- sample collection;
- sample preservation;
- sample labeling;
- completion of sample records;
- completion of chain-of-custody records; and
- sample shipment.

Prior to each sampling event, equipment to be used is assembled, properly cleaned and its operating condition verified. In addition, all record-keeping materials are prepared. Sampling procedures are conducted in general accordance with EPA SW-846 methods.

Decontamination of all non-disposable or non-dedicated field measurement, purging, and sampling equipment are performed for each sampling event before any purging/sampling activities begin, after each well is sampled, and at the end of the sampling event. Decontamination procedures are summarized below:

(1) Wash equipment with low-residue soap and/or detergent solution.
(2) Rinse with distilled water; and
(3) Repeat steps (1) and (2) above, as necessary.

2.2.2 General Groundwater Sampling Procedures

Prior to collecting samples, each well is inspected for signs of damage to the well protective casing and well pad. Each field instrument is calibrated according to the manufacturer's instructions prior to use.

Special care should be exercised to prevent contamination of the groundwater and extracted samples during the sampling activities. The primary way in which such contamination can occur is contact with improperly cleaned equipment. To prevent such contamination, all non-dedicated sampling equipment is thoroughly cleaned before and between uses at different sampling locations. In addition to the use of properly cleaned equipment, a new pair of disposable latex (or similar) gloves is worn for each well.

2.2.3 Groundwater Level Measurements

Groundwater levels are measured prior to purging the wells. Using a pre-cleaned water level meter, the groundwater surface is measured from the casing datum to the nearest 0.01-foot. Total depth measurements are also collected on, at least, an annual basis. The rate and direction of groundwater flow should be determined for each groundwater monitoring event.

2.2.4 Well Purging and Sampling

Well purging and sampling is conducted using either a submersible pump or peristaltic pump in accordance with standard low flow sampling procedures. The sampler withdraws water in a manner that minimized stress (drawdown) to the system to the extent practicable. When the pump intake is located within the screened interval, the water pumped is drawn in directly from the formation with little mixing of casing water or disturbance to the sampling zone. Thus, sample results are more representative of the constituents present in the groundwater.

Purging rates during sample collection are generally performed at 0.5 liters per minute (L/min) or less. Field parameters (pH, temperature, conductivity and turbidity) are measured to evaluate when the well is adequately purged. Turbidity in the samples should be minimized as much as possible. By using minimal pumping rates, dedicated equipment whenever possible, and positioning the intake for the sample tubing or submersible pump off of the bottom of the well.

For groundwater samples, at least three field measurements should be taken during the course of purging the well. If the parameters have not stabilized at that time, field measurements and purging will continue until two consecutive readings have stabilized to within the following limits:

- Temperature: +/-1° C
- pH: +/-0.1 pH units
- Specific conductance: +/-10%
- Turbidity: +/- 10%

Sample extraction is accomplished by using the pump that was previously used to purge the well. The sample bottle is filled directly from the pump line. The pumping rate and parameter measurements are recorded on groundwater sampling forms in the field. If a well goes dry during purging, sampling is performed after the well has sufficiently recharged to allow sample collection.

Groundwater samples will not be filtered in the field prior to collection in accordance with Section 257.93(i) of the CCR Rule.

2.2.5 Container, Labels, and Shipment

Samples are collected in laboratory-supplied containers. The following information is legibly and indelibly written on the label:

- project identification;
- sample identification;
- name or initials of collector;
- date and time of collection;
- analysis requested; and
- sample preservative, if applicable.

After the samples are collected, the sample containers are placed in a cooler or similar container, preserved with ice, and shipped to the laboratory for analysis.

2.2.6 Chain-of-Custody Control

After samples are collected, chain-of-custody procedures are followed to establish a written record concerning sample movement between the sampling site and the testing laboratory. Each shipping container has a chain-of-custody form completed by the sampling personnel packing the samples. The chain-of-custody form for each container is completed and sealed in the shipping container.

2.3 Analytical Procedures

The laboratory analytical methods utilized for the analysis of detection monitoring and assessment monitoring programs are appropriate and commonly utilized EPA methodologies, or other similar standard methodologies. Typical methodologies used to analyze the detection and assessment program constituents are presented below:

Detection Monitoring Program (Appendix III Constituents)

- Boron and calcium by EPA Method SW6020;
- Chloride, fluoride, and sulfate by EPA Method E300;
- pH by Standard Method M4500-H + B (field measurement); and
- TDS by Standard Method M2540.

Assessment Monitoring Program (Appendix IV Constituents)

- Antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, lead, lithium, molybdenum, selenium, and thallium by EPA Method SW6020;
- Fluoride EPA Method E300;
- Mercury by EPA Method SW7470; and
- Radium 226 and 228 by EPA Methods 904.0/SW9320 Modified and 903.1 Modified.

All metals analyses shall be reported as “total recoverable metals” in accordance with Section 257.93(1) of the CCR Rule. Filtering of samples prior to analysis is not permitted.

2.3.1 Data Quality Assurance/Quality Control

A quality assurance/quality control (QA/QC) program will be implemented to confirm the validity of the analytical results. Laboratory QC samples will include method blanks, laboratory control samples, and matrix spike/matrix spike duplicates. Field QC samples will include one field duplicate per sampling event. The selected laboratory must have in place documented quality assurance protocols and quality control checks to demonstrate the laboratory’s procedures and practices are consistent with the National Environmental Laboratory Accreditation Conference (NELAC) standards. Potential issues regarding the quality of the data should be evaluated through the examination of:

- The project objectives;
- Laboratory review checklist and associated exceptions report;
- The reportable data; and
- The field notes and data associated with the sampling event(s).

In the case where quality control criteria are outside applicable limits, a summary must be presented that indicates the affected samples, the quality control parameter reviewed, the qualifiers and bias code(s) applied to the data point, and the determination made concerning the usability of data.

3.0 STATISTICAL EVALUATION PROCEDURES

The following statistical evaluation approaches were selected to demonstrate groundwater compliance for the Ash Pond Area under the CCR Rule:

- Use of upper prediction limits (UPLs) to develop site-specific background concentrations for all Appendix III and Appendix IV constituents. This approach is a common statistical method used to evaluate groundwater compliance for Subtitle D landfill facilities and is one of the approved options for groundwater quality data statistical evaluation under the CCR Rule.

- After every detection monitoring event, Appendix III constituent concentrations from each well are compared to background UPLs to ascertain if a statistically significant increase above background exists. Background UPLs are based on a 1-of-2 resampling approach, meaning that if zero or one concentration measurement from a series of two independent samples collected from a well do not exceed the appropriate UPL, then a statistically significant increase over background has not occurred at a CCR unit.

- If in assessment monitoring, the 95% lower confidence limit of the mean (LCL) is calculated after each assessment monitoring event for each Appendix IV constituent. The set of data used to calculate LCLs are based on current and historical constituent concentrations. A statistically significant increase over the GWPS has occurred at a CCR unit when the LCL for at least one assessment monitoring constituent at a well is greater than the appropriate GWPS.

The statistical evaluation procedures proposed for the Ash Pond Area groundwater data conforms with the Rule requirements shown above, as well as the Statistical Analysis Plan for the Site (Golder, 2022), EPA's *Unified Guidance: Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities* (EPA, 2009) and the American Society for Testing and Materials (ASTM) standard D6312-17, *Developing Appropriate Statistical Approaches for Groundwater Detection Monitoring Programs at waste Disposal Facilities* (ASTM, 2017).

Eight independent groundwater samples were evaluated for each Appendix III parameter at each well to statistically establish detection monitoring prediction limits.

Eight independent groundwater samples were also evaluated for each Appendix IV parameter at each well to establish assessment monitoring GWPSs. The GWPSs were developed using the following methodology:

- For constituents for which a federal maximum contaminant level (MCL) has been established, the MCL for that constituent; or

- For constituents for which an MCL has not been established, the background concentration (prediction limit) or approved regional screening level for the constituent; or

- For constituents for which the background level (prediction limit) is higher than the MCL, the

background concentration (prediction limit) for the constituent.

4.0 DETECTION MONITORING DATA EVALUATION

CCR groundwater detection monitoring will be performed on a semi-annual basis during the active life of the CCR units and during the post-closure period. Each CCR monitoring well will be sampled for the following Appendix III constituents as part of the detection monitoring program:

- Boron
- Calcium
- Chloride
- Fluoride
- pH
- Sulfate
- Total Dissolved Solids (TDS)

Sampling and analytical procedures will be as described in previous sections of this plan.

After each detection monitoring event, the reported concentrations of the detection monitoring constituents at each well will be compared to the background concentration prediction limits developed for each constituent as described in Section 3 of this plan to ascertain if a statistically significant increase above background concentrations does or no does not exist. Possible outcomes from comparing the detection monitoring constituent concentrations in each well to their respective background concentration prediction limits are as follows:

- All detection monitoring constituent concentrations in each well are less than or equal to their respective background concentration prediction limits in the well; or
- One or more detection monitoring constituent concentrations in each well are above their respective background concentration prediction limits in the well.

4.1 No Statistically Significant Increase Over Background Concentrations

The background concentration prediction limits were developed based on a one-of-two resampling approach, meaning that if concentrations in at least one sample in a series of two independent samples collected from a well do not exceed their prediction limits, then a statistically significant increase over background concentrations has not occurred. This conclusion will be reached if the data indicate either of the following:

- All detection monitoring constituent concentrations in each well are less than or equal to their respective background concentration prediction limits; or

- One or more detection monitoring constituent concentration in any well is above the respective background concentration prediction limits. If this occurs, the well or wells with concentrations above the prediction limits will be resampled and analyzed for the detection monitoring constituent or constituents that exceed the prediction limits. If the resample indicates that the target detection monitoring constituent concentrations in the well or wells are less than or equal to their respective background concentration prediction limits, then it can be concluded that a statistically significant increase over background concentrations for all detection monitoring constituents does not exist, since concentrations in one sample of the two independent samples do not exceed their prediction limits.

If the groundwater monitoring data indicate that a statistically significant increase over background does not exist at the CCR wells, detection monitoring at all CCR wells will continue on a semi-annual basis.

4.2 Statistically Significant Increase Over Background Concentrations

If one or more detection monitoring constituent concentrations in any well is above the respective background concentration prediction limit in both the original detection monitoring sample and the resample, then a statistically significant increase over background concentrations for the target detection monitoring constituents can be concluded. If a statistically significant increase is indicated, within 90 days the owner/operator must:

- Establish an assessment monitoring program as described in this plan, or
- Demonstrate that a source other than the CCR unit caused the statistically significant increase over background levels for a constituent, or that the statistically significant increase resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. The demonstration must be summarized in a report that is certified by a professional engineer. If a successful demonstration is completed within the 90-day period, the owner or operator of the CCR unit may continue with the detection monitoring program.

5.0 ASSESSMENT MONITORING DATA EVALUATION

CCR groundwater assessment monitoring will be performed at the Ash Pond Area groundwater monitoring system whenever a statistically significant increase over GWPSs has been confirmed for one or more of the detection monitoring constituents listed in this plan. Within 90 days of triggering the assessment monitoring program, and annually thereafter, each CCR monitoring well in the Ash Pond Area groundwater monitoring system will be sampled for the following Appendix IV parameters as part of the assessment monitoring program:

- Antimony
- Arsenic
- Barium
- Beryllium
- Cadmium
- Chromium
- Cobalt
- Fluoride
- Lead
- Lithium
- Mercury
- Molybdenum
- Selenium
- Thallium
- Radium 226 and 228 combined

Sampling and analytical procedures will be as described in previous sections of this plan.

Within 90 days of obtaining the results from the initial assessment monitoring sampling event, all wells in the groundwater monitoring system will be resampled and analyzed for:

- All Appendix III detection monitoring parameters; and
- The Appendix IV assessment monitoring parameters that were detected as part of the assessment monitoring event.

This monitoring will be performed on at least a semi-annual basis thereafter, unless the owner/operator can demonstrate the need for an alternative monitoring frequency for repeated sampling and analysis for these constituents during the active life and the post-closure care period based on the availability of groundwater. If there is not adequate groundwater flow to sample wells semi-annually, the alternative frequency shall be no less than annual.

Within 90 days of obtaining the results from the initial assessment monitoring sampling event, GWPSs will be established for all Appendix IV assessment monitoring constituents that were detected in the Ash Pond Area groundwater monitoring system wells as follows:

- For constituents for which a federal maximum contaminant level (MCL) has been established, the MCL for that constituent; or
- For constituents for which an MCL has not been established, the background concentration or approved regional screening level for the constituent; or
- For constituents for which the background level is higher than the MCL, the background concentration for the constituent.

The 95% LCL of each Appendix IV constituent concentration at each well will be compared to the GWPS established for each constituent to ascertain if a statistically significant increase above the GWPS does or does not exist.

5.1 No Statistically Significant Increase Over GWPSs

If the groundwater monitoring data indicate that a statistically significant increase over GWPSs does not exist at the CCR wells, all wells in the groundwater monitoring system will be sampled on a semi-annual basis and analyzed for:

- All Appendix III detection monitoring parameters; and
- The Appendix IV assessment monitoring parameters that were detected as part of the initial assessment monitoring event.

This monitoring will be performed on at least a semi-annual basis unless the owner/operator can demonstrate the need for an alternative monitoring frequency for repeated sampling and analysis for these constituents during the active life and the post-closure care period based on the availability of groundwater.

If the concentrations of all Appendix III detection monitoring constituents and Appendix IV assessment monitoring constituents are shown to be statistically at or below background values for two consecutive assessment monitoring sampling events, assessment monitoring will be terminated and detection monitoring as described in this plan will resume. If the concentrations of any Appendix III detection monitoring constituents and Appendix IV assessment monitoring constituents are shown to be

statistically above background values, but all concentrations are below their respective GWPSs, assessment monitoring will continue.

5.2 Statistically Significant Increase Over GWPSs

If a statistically significant increase over GWPSs for any Appendix IV assessment monitoring constituent is confirmed, within 90 days of the initial assessment monitoring event, the owner/operator will either:

- Initiate an assessment of corrective measures for the CCR unit in accordance with CCR Rule Section 257.96; or
- Demonstrate that a source other than the CCR unit caused the contamination, or that the statistically significant increase resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. The demonstration must be summarized in a report that is certified by a professional engineer. If a successful demonstration is made, the owner or operator must continue assessment monitoring. If a successful demonstration has not been made at the end of the 90 day period, the owner or operator of the CCR unit must initiate an assessment of corrective measures for the CCR unit.

If one or more Appendix IV assessment monitoring constituents are detected at statistically significant levels above their respective GWPSs in any sampling event, and if a source other than the CCR unit cannot be demonstrated to have caused the contamination, a release from the CCR unit is likely and the nature and extent of the release will be further characterized as follows:

- Install additional monitoring wells necessary to define the contaminant plume(s);
- Collect data on the nature and estimated quantity of material released including specific information on the Appendix IV assessment monitoring constituents and the levels at which they are present in the material released;
- Install at least one additional monitoring well at the facility boundary in the direction of contaminant migration and sample this well for all Appendix III detection monitoring parameters and for those Appendix IV assessment monitoring constituents that have been detected as part of assessment monitoring. This monitoring must be performed on at least a semi-annual basis thereafter.
- Sample all CCR unit wells for all Appendix III detection monitoring parameters and for those Appendix IV assessment monitoring constituents that have been detected as part of assessment monitoring. This monitoring must be performed on at least a semi-annual basis thereafter.

6.0 REPORTING REQUIREMENTS

The results of the CCR groundwater monitoring program will be reported each year in an Annual Groundwater Monitoring and Corrective Action Report. The annual report will document the status of the groundwater monitoring and corrective action program, summarize key actions completed, describe any problems encountered, discuss actions to resolve the problems, and project key activities for the upcoming year. At a minimum, the Annual Groundwater Monitoring and Corrective Action Report will contain the following information:

- A map, aerial image, or diagram showing the CCR unit and all background (or upgradient) and downgradient monitoring wells, to include the well identification numbers, that are part of the groundwater monitoring program for the CCR unit;
- Identification of any monitoring wells that were installed or decommissioned during the preceding year, along with a narrative description of why those actions were taken;
- In addition to all the monitoring data obtained under CCR Rule Sections 257.90 through 257.98, a summary including the number of groundwater samples that were collected for analysis for each background and downgradient well, the dates the samples were collected, and whether the sample was required by the detection monitoring or assessment monitoring programs;
- A narrative discussion of any transition between monitoring programs (e.g., the date and circumstances for transitioning from detection monitoring to assessment monitoring in addition to identifying the constituent(s) detected at a statistically significant increase over background levels); and
- Other information required to be included in the annual report as specified in CCR Rule Sections 257.90 through 257.98.

The Groundwater Monitoring and Corrective Action Reports must be placed in the facility operating record no later than January 31 of the year following completion of the groundwater monitoring program from the preceding calendar year.

7.0 REFERENCES

ASTM, 2017. Standard Guide for Developing Appropriate Statistical Approaches for Groundwater Detection Monitoring Programs at Waste Disposal Facilities - D6312-17.

EPA, 2015. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846). On-Line.

EPA, 2009. Unified Guidance Document: Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, EPA 530/R-09-007, March.

Golder Associates USA, Inc. (Golder), 2022. Statistical Analysis Plan, Revision No. 1, Ash Pond Area, Martin Lake Steam Electric Station. November.

PBW, 2017a. Groundwater Monitoring Plan – Martin Lake Steam Electric Station, Ash Pond Area, Rusk County, Texas, August.

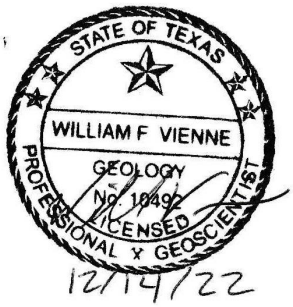
PBW, 2017b. CCR Groundwater Monitoring System Certification – Martin Lake Steam Electric Station, Ash Pond Area, Rusk County, Texas, August.

SIGNATURE PAGE

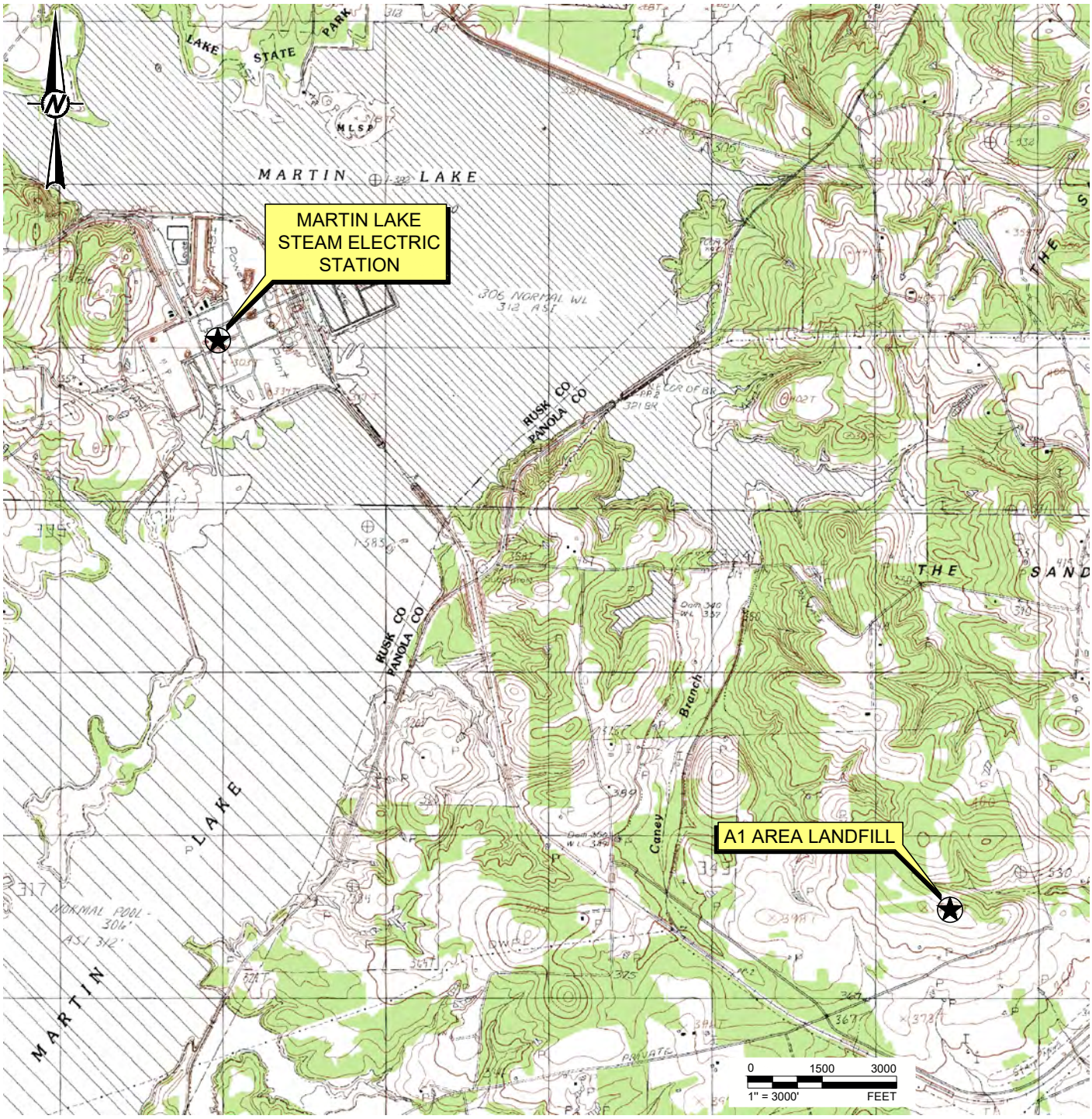
Golder Associates Inc., Member of WSP

Patrick J. Behling
Principal Engineer

William F. Vienne
Senior Hydrogeologist

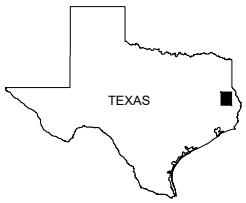


FIGURES



REFERENCE(S)

BASE MAP TAKEN FROM TNRIS.GOV, TATUM, TX 7.5 MIN. USGS QUADRANGLE DATED 1983.



QUADRANGLE LOCATION

CLIENT
LUMINANT GENERATION COMPANY, LLC

PROJECT
MARTIN LAKE STEAM ELECTRIC STATION
TATUM, TEXAS

TITLE
TOPOGRAPHIC MAP

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2021-12-13
DESIGNED	AJD
PREPARED	AJD
REVIEWED	WFV
APPROVED	WFV

PROJECT NO.

REV. 0

FIGURE 1

LEGEND

- DOWNGRADIENT CCR MONITORING WELL
- UPGRADIENT CCR MONITORING WELL

STATE OF TEXAS
WILLIAM F VIENNE
GEOLOGY
No. 10492
LICENSED
PROFESSIONAL GEOSCIENTIST
11/16/2022

REFERENCE(S)

BASE MAP TAKEN FROM GOOGLE EARTH, IMAGERY DATED 4/6/17.

CLIENT
LUMINANT

PROJECT
MARTIN LAKE STEAM ELECTRIC STATION
TATUM, TEXAS

TITLE
SITE PLAN

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2020-01-23
DESIGNED	AJD
PREPARED	AJD
REVIEWED	WFV
APPROVED	WFV

PROJECT NO. | REV. 0 | FIGURE 2

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A

1 in
0

APPENDIX A

CCR Monitoring Well Logs

Luminant

Log of Boring: H-26

Martin Lake Steam Electric Station
Tatum, TX

PBW Project No. 5164B

Completion Date:	9/14/2015	Drilling Method:	Sonic
Drilling Company:	Walker-Hill Environmental	Borehole Diameter (in.):	6.5
Driller:	Timmy Beach	Total Depth (ft):	50
Driller's License:	5814M	TOC Elevation (ft. AMSL):	
Logged By:	Ryan Francis	Northing:	
Sampling Method:	4"x10' Core barrel	Easting:	

Depth (ft)	Well Materials	Recovery (ft/ft)	USCS	Lithologic Description
0			ML	(0 - 3) Silty CLAY, dark brown, dry, soft to firm, weak cementation, flat, low plasticity
4		10.0/10.0	SC	(3 - 7) Sandy CLAY, red/orange with gray clay ribbons, dry, soft to firm, weak cementation, medium plasticity, minor rounded pebbles
8				(7 - 11) Silty SAND, gray, dry, soft, weak cementation, subrounded, sharp contact
12		10.0/10.0	ML	(11 - 30) Clayey silty SAND, tan with red and gray ribbons, moist to wet, soft, weak cementation, medium plasticity
16				
20		10.0/10.0		
24				
28				
32		10.0/10.0	SP	(30 - 40) SAND, tan and orange, fine grained, higher clay content (31'-34'), wet, very soft to soft, low to medium plasticity
36				
40		10.0/10.0	SW	(40 - 44) SAND, red, wet, soft to firm, moderate cementation, heavy iron content, iron concretions ("rocky" texture)
44			SP	(44 - 50) SAND, red and gray, wet, soft, fine grained, subrounded, gradual color change to dark brown/black (47'-50'), moisture content decreases with depth, hard sand (48'-50')
48				
52				

PBW

Pastor, Behling & Wheeler, LLC
2201 Double Creek Dr., Suite 4004
Round Rock, TX 78664
Tel (512) 671-3434 Fax (512) 671-3446

Notes:
1. This log should not be used separately from the report to which it is attached.

Well Materials
(0-35) Casing, 2" Sch 40 FJT PVC
(35-40) Screen, 2" Sch 40 FJT PVC, 0.010" slot

Annular Materials
(0'-31') Grout
(31'-33') Bentonite pellets
(33'-40') 20/40 sand

STATE OF TEXAS
WILLIAM F. VIENNE
GEOLOGY
No. 10492
LICENSED
PROFESSIONAL GEOSCIENTIST
11/16/2022

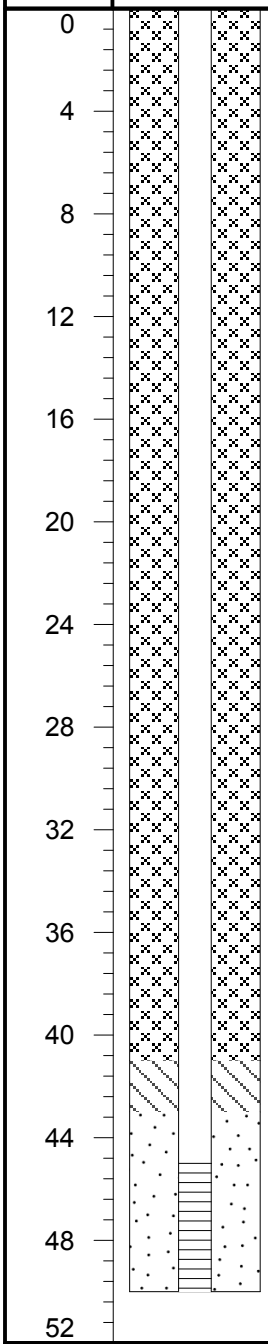
Luminant

Log of Boring: H-27

Martin Lake Steam Electric Station
Tatum, TX

PBW Project No. 5164B

Completion Date:	9/15/2015	Drilling Method:	Sonic
Drilling Company:	Walker-Hill Environmental	Borehole Diameter (in.):	6.5
Driller:	Timmy Beach	Total Depth (ft):	50
Driller's License:	5814M	TOC Elevation (ft. AMSL):	
Logged By:	Ryan Francis	Northing:	
Sampling Method:	4"x10' Core barrel	Easting:	



Lithologic Description
(0 - 20) CLAY, orange and brown mottling, minor black sreaking, blocky, moist, soft to hard, low to high plasticity, dry and variable sand content (5'-7'), wet at 20'
(20 - 21) SAND, gray, moist, soft, subrounded, sharp contact
(21 - 28) CLAY, gray and orange, blocky, moist, firm to hard, moderate cementation, low plasticity
(28 - 40) SAND, light gray to tan/orange, moist to wet, soft, none to low plasticity, minor clay content decreasing with depth
(40 - 44) Sandy CLAY, orange and gray, moist, firm, low to medium plasticity, flat, sharp contact, very hard and little to no sand at 43'
(44 - 50) Clayey SAND, orange and gray, wet, soft, low plasticity, fine grained, decreasing clay content with depth, sharp contact, color change to brown at 48'

PBW

Pastor, Behling & Wheeler, LLC
2201 Double Creek Dr., Suite 4004
Round Rock, TX 78664
Tel (512) 671-3434 Fax (512) 671-3446

Notes:
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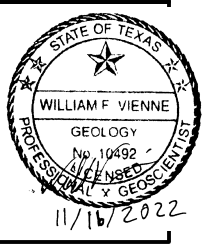
Well Materials
(0-45) Casing, 2" Sch 40 FJT PVC
(45-50) Screen, 2" Sch 40 FJT PVC, 0.010" slot

Annular Materials
(0'-41') Grout
(41'-43') Bentonite pellets
(43'-50') 20/40 sand



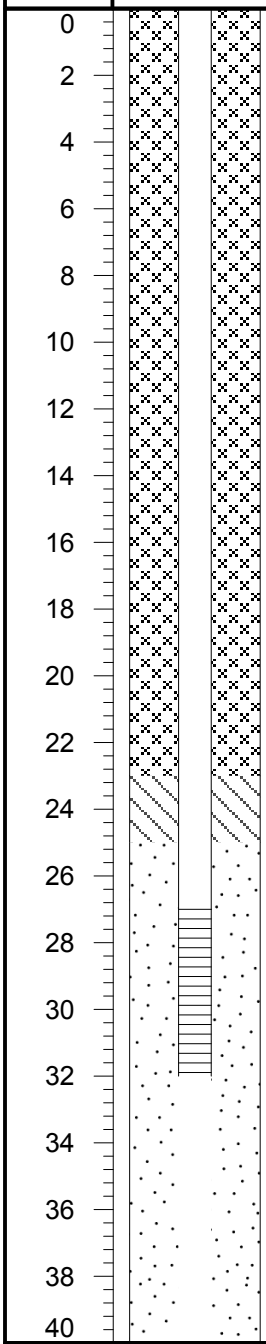
Luminant

Log of Boring: H-28

Martin Lake Steam Electric Station
Tatum, TX

PBW Project No. 5164B

Completion Date:	9/15/2015	Drilling Method:	Sonic
Drilling Company:	Walker-Hill Environmental	Borehole Diameter (in.):	6.5
Driller:	Timmy Beach	Total Depth (ft):	40
Driller's License:	5814M	TOC Elevation (ft. AMSL):	
Logged By:	Ryan Francis	Northing:	
Sampling Method:	4"x10' Core barrel	Easting:	



Depth (ft)	Recovery (ft/ft)	USCS	Lithologic Description
0 – 6	10.0/10.0	SP	(0 - 6) Soil with SAND, tan, dry, firm, moderate cementation, hard packed
6 – 20	10.0/10.0	SC	(6 - 21) Clayey SAND, moist, soft to firm, weak cementation, none to low plasticity, flat, 6" gray fine to very fine sand lense at 10', gray and orange mottling (11'-21'), fine grained
20 – 30	10.0/10.0	SP/SC	(21 - 30) Clayey SAND, tan and orange, wet, soft to firm, low plasticity, none to weak cementation, variation in clay content with depth, highest clay content at 21', more orange and less clay (29'-30')
30 – 32		SP	(30 - 33) SAND, orange and gray, fine grained, wet, soft, low plasticity, minor clay content, color change from tna to brown to dark gray
32 – 40	10.0/10.0	CL	(33 - 40) Silty CLAY, dark gray, moderate sand, dry, hard, weak cementation, flat

PBW

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Notes:
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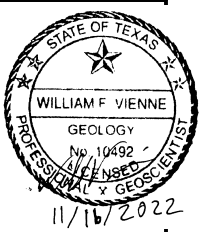
Well Materials
(0-27) Casing, 2" Sch 40 FJT PVC
(27-32) Screen, 2" Sch 40 FJT PVC, 0.010" slot

Annular Materials
(0'-23') Grout
(23'-25') Bentonite pellets
(25'-32') 20/40 sand



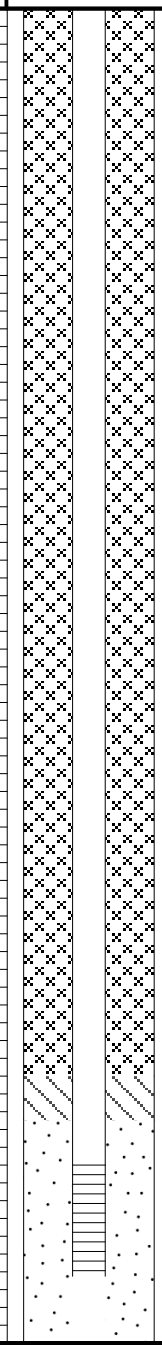
Luminant

Log of Boring: H-29

Martin Lake Steam Electric Station
Tatum, TX

PBW Project No. 5164B

Completion Date:	9/23/2015	Drilling Method:	Sonic
Drilling Company:	Walker-Hill Environmental	Borehole Diameter (in.):	6.5
Driller:	Timmy Beach	Total Depth (ft):	60
Driller's License:	5814M	TOC Elevation (ft. AMSL):	
Logged By:	Ryan Francis	Northing:	
Sampling Method:	4"x10' Core barrel	Easting:	



Depth (ft)	Recovery (ft/ft)	USCS	Lithologic Description
0		FILL	(0 - 2) Hard rock road bed, dry
4	10.0/10.0	SC	(2 - 18) Clayey SAND, orange and gray mottling, very fine grained, dry to moist, firm, weak cementation, low to medium plasticity, increasing clay content with depth
8			
12			
16	10.0/10.0		
20		CL	(18 - 30) CLAY, orange, moist, firm, low to medium plasticity, very little sand or silt, black striping at 22', increasing sand content with depth (28'-30')
24	10.0/10.0		
28			
32	10.0/10.0	CH	(30 - 36) CLAY, orange, moist, soft, friable, high plasticity, minor silt
36			
40		CL/SC	(36 - 45) Sandy CLAY/Clayey SAND, orange/gray/red mottling, friable, wet, soft to firm, low to medium plasticity, increasing clay content with depth
44	10.0/10.0		
48		CH	(45 - 48) CLAY with sand, orange and gray mottling, wet, soft, high plasticity
52	10.0/10.0	SP	(48 - 57) SAND, gray, wet, soft, one to low plasticity, some black roots/ organics, interspersed clay lenses
56			
60		CL	(57 - 60) Silty CLAY, gray/brown, dry, hard, weak cementation, sharp contact

PBW

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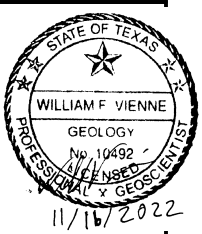
Round Rock, TX 78664
Tel (512) 671-3434 Fax (512) 671-3446

Notes:
1. This log should not be used separately from the report to which it is attached.

Well Materials
(0-52) Casing, 2" Sch 40 FJT PVC
(52-57) Screen, 2" Sch 40 FJT PVC, 0.010" slot

Annular Materials
(0'-48') Grout
(48'-50') Bentonite pellets
(50'-57') 20/40 sand



11/16/2022

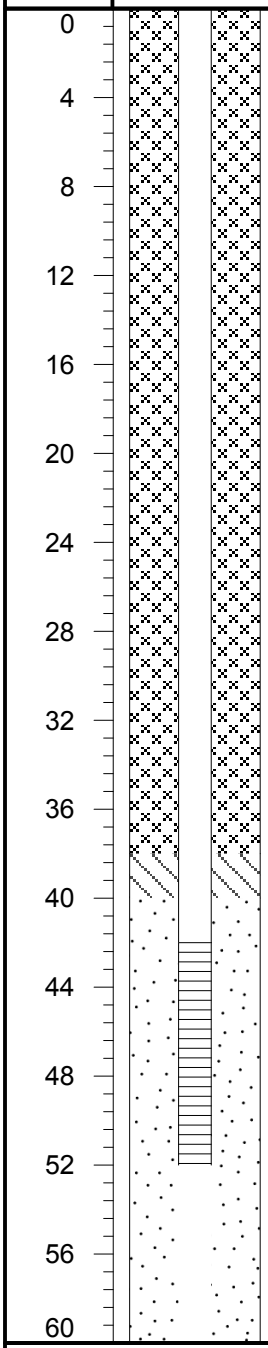
Luminant

Log of Boring: H-31

Martin Lake Steam Electric Station
Tatum, TX

PBW Project No. 5164B

Completion Date:	9/24/2015	Drilling Method:	Sonic
Drilling Company:	Walker-Hill Environmental	Borehole Diameter (in.):	6.5
Driller:	Timmy Beach	Total Depth (ft):	60
Driller's License:	5814M	TOC Elevation (ft. AMSL):	
Logged By:	Ryan Francis	Northing:	
Sampling Method:	4"x10' Core barrel	Easting:	



Depth (ft)	Recovery (ft/ft)	USCS	Lithologic Description
0		FILL	(0 - 1) Hard, packed gravel road bed, dry
4	10.0/10.0	SC	(1 - 12) Clayey SAND, orange, dry to moist, soft to firm, low plasticity, fine grained, increasing clay content with depth, gray clay ribbons at 10'
12	5.0/10.0	SP	(12 - 20) SAND, orange with red and gray mottling, dry to moist, soft, none to low plasticity, weak cementation, fine grained, very little clay
20	10.0/10.0	SC/CL	(20 - 30) Sandy CLAY, orange, dry to moist, firm, crumbly, color variation with depth, low plasticity, some gray sand lenses, very fine grained, color change to gray at 29'
32	10.0/10.0	CL/SC	(30 - 41) Sandy CLAY,/ Clayey SAND, gray and tan, moist, soft, fine grained, low plasticity, variations in clay content and firmness with depth, moisture content changes to wet at 35'
44	10.0/10.0	SP	(41 - 57) SAND, orange/tan, wet, very soft, fine grained, subrounded, increasing red color with depth starting at 52', hard iron concretion layer with some black staining at 55'
56	10.0/10.0	CL	(57 - 60) Sandy CLAY, gray, dry to moist, hard, fine grained, weak cementation, low plasticity, flat
60			

PBW

Pastor, Behling & Wheeler, LLC
2201 Double Creek Dr., Suite 4004
Round Rock, TX 78664
Tel (512) 671-3434 Fax (512) 671-3446

Notes:
1. This log should not be used separately from the report to which it is attached.

Well Materials
(0-42) Casing, 2" Sch 40 FJT PVC
(42-52) Screen, 2" Sch 40 FJT PVC, 0.010" slot

Annular Materials
(0'-38') Grout
(38'-40') Bentonite pellets
(40'-52') 20/40 sand

STATE OF TEXAS
WILLIAM F. VIENNE
GEOLOGY
No. 10492
LICENSED
PROFESSIONAL GEOSCIENTIST
11/16/2022

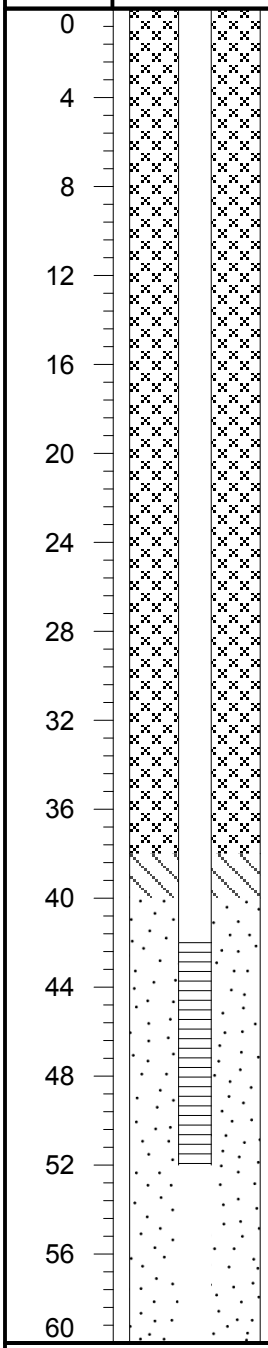
Luminant

Log of Boring: H-32

Martin Lake Steam Electric Station
Tatum, TX

PBW Project No. 5164B

Completion Date:	9/24/2015	Drilling Method:	Sonic
Drilling Company:	Walker-Hill Environmental	Borehole Diameter (in.):	6.5
Driller:	Timmy Beach	Total Depth (ft):	60
Driller's License:	5814M	TOC Elevation (ft. AMSL):	
Logged By:	Ryan Francis	Northing:	
Sampling Method:	4"x10' Core barrel	Easting:	



Depth (ft)	Recovery (ft/ft)	USCS	Lithologic Description
0		FILL	(0 - 1) Hard, packed gravel road bed, dry
4	10.0/10.0	SC/CL	(1 - 10) Sandy CLAY/Clayey SAND, orange/tan, dry, firm, fine grained, low plasticity, weak cementation
8			
12	10.0/10.0	CH	(10 - 21) CLAY with minor silt/sand, orange with some black streaks, moist, firm, high plasticity, gradual contact
16			
20		SP	(21 - 23.5) SAND, gray, dry, soft to firm, friable, fine grained
24	10.0/10.0	CH	(23.5 - 38) CLAY, orange/tan/gray, moist, soft to firm, unconsolidated, high plasticity, minor sand at 30', tan and gray with orange stripes (30'-38'), sharp contact
28			
32			
36	10.0/10.0		
40		SP	(38 - 57) SAND, orange/tan, moist to wet, very soft to soft, fine grained, subrounded, minor clay, low plasticity, no clay content at 42', gradual coarsening of sand grains (48'-55'), some gray streakings at 49', color change to reddish brown at 52'
44	10.0/10.0		
48			
52	10.0/10.0		
56			
60		CL	(57 - 60) Sandy CLAY, dark red and brown, wet, soft, low plasticity, layer of dark red concretions at 57', weak cementation, flat

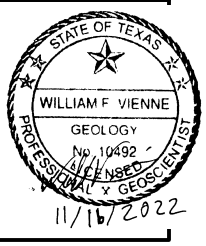
PBW

Pastor, Behling & Wheeler, LLC
2201 Double Creek Dr., Suite 4004
Round Rock, TX 78664
Tel (512) 671-3434 Fax (512) 671-3446

Notes:
1. This log should not be used separately from the report to which it is attached.

Well Materials
(0-42) Casing, 2" Sch 40 FJT PVC
(42-52) Screen, 2" Sch 40 FJT PVC, 0.010" slot

Annular Materials
(0'-38') Grout
(38'-40') Bentonite pellets
(40'-52') 20/40 sand



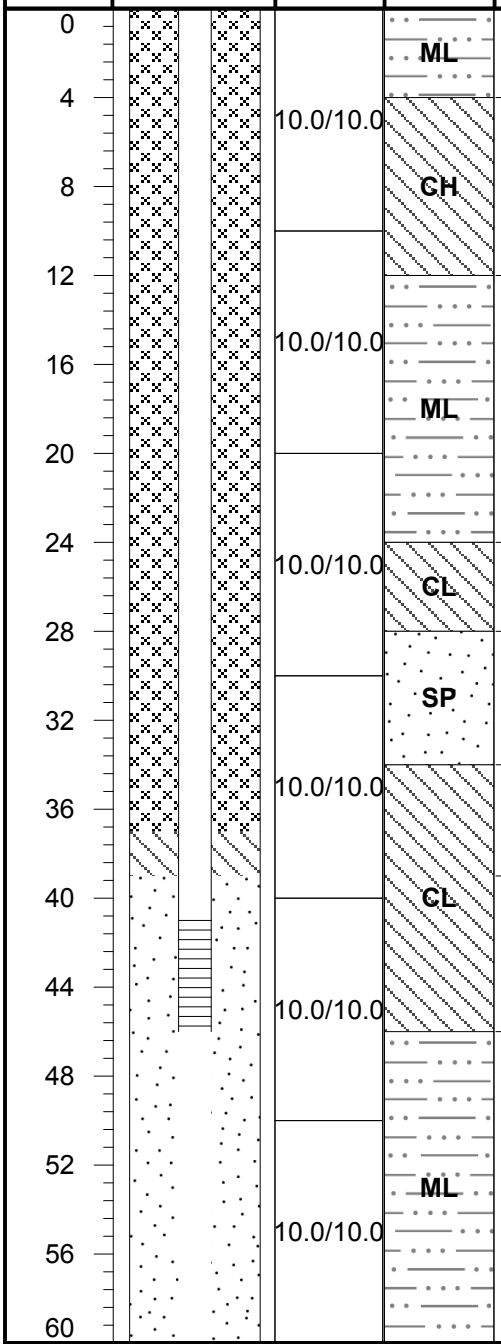
Luminant

Log of Boring: H-33

Martin Lake Steam Electric Station
Tatum, TX

PBW Project No. 5164B

Completion Date:	9/14/2015	Drilling Method:	Sonic
Drilling Company:	Walker-Hill Environmental	Borehole Diameter (in.):	6.5
Driller:	Timmy Beach	Total Depth (ft):	60
Driller's License:	5814M	TOC Elevation (ft. AMSL):	
Logged By:	Ryan Francis	Northing:	
Sampling Method:	4"x10' Core barrel	Easting:	



Lithologic Description

(0 - 4) Silty CLAY, minor sand, red and orange with gray ribbons, dry, soft to firm, low to medium plasticity, flat

(4 - 12) CLAY, red with gray concretions, moist, soft to firm, high plasticity, gradual contact

(12 - 24) Sandy SILT, gray and red, dry, soft, weak cementation, sharp contact, red and gray clay lense at 19'

(24 - 28) Clay, red, moist to wet, soft to firm, high plasticity, pebbles present

(28 - 34) SAND, gray, wet, soft to firm, minor clay, low to medium plasticity, subrounded, increasing clay content with depth, sharp contact

(34 - 39) CLAY, orange and gray mottling, dry, very hard, moderate cementation, low plasticity

(39 - 46) Sandy CLAY, orange and gray, moist to wet, firm, medium plasticity, weak cementation, increasing sand content with depth

(46 - 60) Sandy SILT, dark gray, dry, hard, flat

PBW

Pastor, Behling & Wheeler, LLC
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Round Rock, TX 78664
Tel (512) 671-3434 Fax (512) 671-3446

Notes:
1. This log should not be used separately from the report to which it is attached.

Well Materials
(0-41) Casing, 2" Sch 40 FJT PVC
(41-46) Screen, 2" Sch 40 FJT PVC, 0.010" slot

Annular Materials
(0'-37') Grout
(37'-39') Bentonite pellets
(39'-46') 20/40 sand