Sandy Creek Energy Station Coal Combustion Residual Waste Management Facility Registration Application TCEQ Registration No. _____ McLennan County, Texas

Volume 2 of 2

Prepared for
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SCS Project No. 162210590.00 | Revision 0 – January 2022

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Sandy Creek Energy Station

Coal Combustion Residual Waste Management Facility

Registration Application

TCEQ Registration No. _____

McLennan County, Texas

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SANDY CREEK ENERGY STATION
COAL COMBUSTION RESIDUAL WASTE MANAGEMENT FACILITY
REGISTRATION APPLICATION
TCEQ REGISTRATION NO. -----
McLENNAN COUNTY, TEXAS

PART V
SITE OPERATING PLAN

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SCS Engineers
TBPE Reg. # F-3407

LIST OF ACRONYMS

AASHTO - American Association of State Highway and Transportation Officials
ANSI - American National Standards Institute
ASTM - American Society for Testing and Materials
CCR - Coal Combustion Residuals
CDR - Chemical Data Reporting
CFR - Code of Federal Regulations
DOT - Department of Transportation
EPA - U.S. Environmental Protection Agency
FWS - U.S. Fish and Wildlife Service
GWSAP - Ground Sampling and Analysis Plan
HAP - Hazardous Air Pollutant
LCRS - leachate Collection and Removal System
Landfill – CCR Waste Management Facility MSDS - Material Safety Data Sheets
MSL - mean sea level
NIOSH - National Institute for Occupational Safety and Health
NOR - Notice of Registration
NRR - Noise Reduction Rating
Operator – Sandy Creek Services, LLCOwner – Sandy Creek Services, LLC
OSHA - Occupational Safety and Health Administration
PAC - Powdered Activated Carbon
Plant – Sandy Creek Energy Station
PRB - Powder River Basin
PSD - Prevention of Significant Deterioration
RCRA - Resource Conservation and Recovery Act
SCR - Selective Catalytic Reduction
SDA - Spray Dry Absorber
SDS - Safety Data Sheet
SHSP - Site Health and Safety Plan
SPCC - Spill Prevention, Control, and Countermeasure Plan
SOP - Site Operating Plan
SWPPP - Storm Water Pollution Prevention Plan
TAC - Texas Administrative Code
TCEQ - Texas Commission on Environmental Quality
TPDES - Texas Pollution Discharge Elimination System
TRI - Toxic Release Inventory
TSCA - Toxic Substances Control Act
TxDOT - Texas Department of Transportation
WWTP - Wastewater treatment plant

1 INTRODUCTION

This Site Operating Plan (SOP) has been prepared for the prepared for Sandy Creek Services, LLC (Owner and Operator) of the Sandy Creek Energy Station (Plant) Coal Combustion Residual Waste Management Facility (Landfill), located in McLennan County. The SOP has been prepared consistent with Title 30 of the Texas Administrative Code (30 TAC), Chapter 352, Subchapter G and relevant provisions of Title 40 of the Code of Federal Regulations (40 CFR), Part 257, Subpart D adopted by reference.

The purpose of this SOP is to provide general guidance to the Landfill Owner/Operator for the day-to-day operation of the Landfill . This document also provides an operating guide for the Landfill Owner/Operator to maintain the Landfill in compliance with the engineering design and applicable regulatory requirements of the Texas Commission on Environmental Quality (TCEQ). This document may also serves as a reference source and assist in personnel training. This SOP, the registration and Registration Application will be retained on site throughout the Landfill's operating life.

The Landfill and associated support facilities are located on the southwest corner of the Plant property boundary. As currently designed, the Landfill is one unit (Unit 002) that will ultimately occupy approximately 40.7 acres and consist of three cells referred to as Cells 1 to 3 (Drawing I.B-4). Cells 1 and 2 are existing active cells that were constructed in 2010 and 2014, respectively, with ongoing waste placement operations. A portion of Cell 3 (inclusive of Subcells 3A through 3D encompassing approximately 10.3 acres) was constructed in 2021 prior to and during the time of preparing this SOP. Future subcells within Cell 3 will be constructed and operated consistent with this SOP. The approximate areas of Cells 1, 2, and 3 are 8.1, 15.6, and 17.0 acres, respectively. Other facilities associated with the Landfill include a stormwater pond and associated ditches and culverts, a leachate evaporation pond and associated piping, and the Landfill equipment maintenance building.

The primary wastes disposed of in the Landfill are fly ash and bottom ash generated during the coal combustion process at the Plant. Additionally, other Class 2 and Class 3 waste generated at the facility are disposed of at the Landfill.

2 OPERATIONAL PROCEDURES

2.1 ACCESS CONTROL

Security measures in place at the Landfill are designed to prevent unauthorized persons from entering the site, to protect the Landfill and its equipment from possible damage caused by trespassers, and to prevent disruption of Landfill operations caused any unauthorized site entry. The Plant is secured by a chain-link fence along the perimeter. The Landfill is accessed from Farm-to-Market [FM] 1860 via Rattlesnake Road, through a gated entrance located west of the Plant (Drawing I.B-4). Entrance through this gate is restricted at the guardhouse, where a gate attendant controls access and monitors vehicles entering and exiting the site during regular business hours. After business hours, entrance through this gate is controlled by Plant personnel. A gate, located south of Cell 2, normally remains locked but may be utilized to access the Landfill, as needed, by the Landfill Owner/Operator, visitors and/or contractors authorized for entry by the Landfill Owner/Operator. Other gates may be installed in the future, which will be accessible to authorized persons only.

2.1.1 Traffic Control and Access Roads

The Landfill is accessed via a road from the Plant to the Landfill perimeter road (Drawing I.B-4). The perimeter Landfill road is an all-weather road that is capable of supporting loads from vehicles accessing the Landfill. Temporary haul roads may be constructed as needed to access the Landfill and active working face. The perimeter road and temporary internal haul roads may be constructed of crushed stone, concrete rubble, masonry demolition debris, gravel, caliche, concrete paving, asphalt paving, or other suitable material and provide access from the Plant to the active Landfill area(s). Temporary internal access roads within the Landfill disposal areas (lined areas) may be constructed of CCR waste materials or other all-weather materials described above.

Roads used to transport waste materials from the Plant to the Landfill will be inspected for waste spilled en route to the Landfill on a daily basis with any spillage and removed if discovered prior to the end of the operation day. The access roads extending from the asphalt surface roads at the Plant to the Landfill area and the access roads (perimeter and internal haul roads) within the Landfill Registration Boundary are maintained by the Landfill Owner/Operator. The perimeter road and interior haul roads are maintained in an all-weather condition to drain freely and kept free of excessive ruts and potholes, as described in Section 3 of this SOP. Access road maintenance includes adding gravel (or other acceptable road construction material), grading, cleaning, and other actions required to provide continuous access during wet and dry weather conditions. The frequency of road regrading is on an as-needed basis, and is dependent on the inspections and if depressions, ruts, potholes, or soft spots of sufficient severity are detected.

Landfill Owner/Operator will maintain a sign adjacent to the Landfill near the intersection of the access road from the main power plant area to the Landfill and the Landfill perimeter road. The sign will be readable from the access road and at a minimum, will state the following:

“COAL COMBUSTION RESIDUAL WASTE MANAGEMENT FACILITY
TCEQ REGISTRATION NO. 88448
APPROVED WASTES ONLY”

2.2 WASTE STREAMS ACCEPTED

The primary wastes streams disposed in the Landfill are fly ash and bottom ash generated during the coal combustion process at the Plant. Other Class 2 and Class 3 nonhazardous industrial waste generated at the Plant will be disposed of at the Landfill. As of the writing of this SOP, the following wastes may be disposed of in the Landfill:

- Fly ash (Texas waste code: 00713032);
- Bottom ash (Texas waste code: 00703032);
- Filter cake from the water treatment building (Texas waste code: 00093192);
- Spent SCR catalyst (Texas waste code: 00523932);
- Class 2 spent demineralizer resin (Texas waste code: 00564032);
- Cooling tower sediments and cooling water screenings (Texas waste code: 00731142);
- Spent resin (Texas waste code: 00574032);
- Ancillary wastes, including coal mill rejects, waste coal, cooling tower sediments, cooling water screenings, sump pit sediments, nonhazardous sand-blast media, fire brick and refractory materials, sediments from the dredging of Plant's stormwater ditches and Plant's TPDES units, and construction debris, as described in a January 29, 2004 notification letter from the Owner to the TCEQ.

The general process diagram for waste generation at the Plant is shown on Part I, Appendix I.B, Drawing I.B-5 The Landfill Owner/Operator will obtain waste classification (including description, character, waste code, and analytical testing) prior to disposal of waste within the Landfill and following a process change that results in the generation of waste that changes the waste classification.

Under Toxic Substances Control Act (TSCA), fly ash and bottom ash generated at the Plant are considered chemical byproducts of the coal combustion process. Fly ash and bottom ash may be beneficially used for commercial purposes and are subject to the Chemical Data Reporting (CDR) requirements of TSCA (40 CFR §711). The fly ash and bottom ash are not subject to the CDR requirements if it is used by public or private organizations for enriching soil (40 CFR §720.30 (g)). As part of the Owner's TSCA report, the Landfill Owner/Operator tracks the beneficial reuse of fly ash and bottom ash generated at the site. These records will be maintained in the Site Operating Record for the Landfill consistent with Section 4 of this SOP.

2.3 UNLOADING WASTES

Dump trucks (on or off-road), roll-off containers, or similar waste hauling equipment (referred herein as "Hauling Equipment") will be used to haul waste material from the Plant or other locations within the Plant property boundary to the Landfill for disposal. Dump trucks hauling ash from the Plant to the Landfill have tailgates to prevent spillage of waste along haul roads. Hauling Equipment will be loaded to prevent waste spills over the sidewalls of the equipment or in such a way that waste accumulates on the wheel wells or bumpers. If waste is too wet prior to placement, the Landfill Owner/Operator will spread it out at the working face to dry before incorporating into normal disposal operations. Compaction of incoming waste provides more efficient use of available space and reduces the amount of settling after disposal of waste in the Landfill. The incoming waste is spread in layers and compacted by a Landfill compactor or similar equipment. Adequate compaction is accomplished to minimize future consolidation and settlement and provide for a proper foundation for application of intermediate and final cover.

Dust control during waste placement within the Landfill will be conducted in accordance with Section 2.5 of this SOP.

Heavy Equipment will not be used on any portion of the liner or leachate collection and removal system (LCRS) until at least three (3) feet of soil or select waste (bottom ash) is placed between Hauling Equipment and LCRS piping or liner geosynthetics.

In accordance with the Plant's air permit (TCEQ Permit No. 70861, Special Condition 25), the maximum working face size (active area) will not exceed one (1) acre and the maximum area of exposed waste will not exceed five (5) acres total. Inactive areas will be covered with intermediate cover (12-inch soil layer or alternate intermediate cover) to limit dust emissions consistent with the Fugitive Dust Control Plan (see Part III).

2.4 LANDFILL OPERATION HOURS

The hours of operation for the Landfill typically conforms to waste production and other Landfill activities. Normal hours of operation are 7 AM to 4 PM, Monday through Friday. The Landfill Owner/Operator may perform Landfill operations 24 hours per day, 7 days per week, or as needed, to accommodate ash unloading from the Plant and waste disposal at the Landfill.

2.5 FUGITIVE DUST CONTROL

The Landfill and associated ancillary facilities will be operated under a Fugitive Dust Control Plan (see Part III) that complies with 40 CFR §257.80, 30 TAC §352.801, and the Plant's air permit (TCEQ Permit No. 70861, Special Condition 25). The purpose of the plan is to present measures to be implemented at the Landfill to effectively minimize waste from becoming airborne during waste management activities.

Fugitive dust will be controlled on the onsite access roads or exposed waste areas and during waste placement by the periodic spraying from a water truck or other appropriate equipment as-needed during periods of significantly dry weather. Dust controls will be implemented by the Landfill Owner/Operator, as needed, to prevent dust from becoming a nuisance to surrounding areas. Care will be taken to utilize only the minimum amount of water needed for dust suppression within the lined area of the Landfill to avoid saturating the waste.

Water for dust control within the active area of the Landfill (i.e., within the lined area without intermediate cover) is pumped by the Landfill Owner/Operator from the leachate evaporation pond as needed. If there is insufficient water available in the leachate evaporation pond, a water truck or other appropriate equipment may be filled with Plant service water, raw water, cooling tower blowdown, or onsite stormwater pond, and used for dust control within the active area of the Landfill.

Water for dust control for areas outside the lined area of the Landfill or areas of the Landfill within in-place intermediate cover will not be obtained from the leachate evaporation pond, but from the water service line located at the Landfill equipment maintenance building, cooling tower blowdown, or onsite stormwater pond.

2.6 SOIL MANAGEMENT: PLACEMENT OF INTERMEDIATE AND FINAL COVER

2.6.1 Intermediate Cover

To minimize the generation of contact water (water that has come in contact with waste or leachate), the Landfill Owner/Operator places intermediate cover (12-inch thick soil layer or approved alternate intermediate cover) over areas in the Landfill as needed to maintain compliance with the Plant's air permit and Fugitive Dust Control Plan. Consistent with the air permit, the exposed waste area will be limited to 5 acres or less to minimize the generation of contact water and leachate, and minimize discharge to the leachate evaporation pond during periods of wet weather. In the event areas with intermediate soil cover become active, the Landfill Owner/Operator may strip off the cover prior to placement of additional waste. The top 6 inches of intermediate soil cover will be capable of sustaining vegetation and will be seeded or sodded by the Landfill Owner/Operator following installation. Lime precipitate or lime grit generated at the Plant may be beneficially used as a soil amendment to promote vegetation growth on intermediate cover.

Inactive areas of the Landfill with intermediate cover are graded and maintained to prevent ponding consistent with Section 2.7 of this SOP. Runoff from areas that have intact intermediate cover are not considered as having come into contact with waste or leachate (i.e., considered non-contact water) and is directed to the stormwater pond.

Posi-shell (or similar material) may be used by the Landfill Owner/Operator as an alternative to the 12-inch thick intermediate cover soil layer. The Posi-shell will be applied with an initial thickness of 1/4-inch to 3/8-inch and touched up if waste/soil becomes visible during weekly inspections, consistent with the manufacturer's recommendations, to maintain compliance with the air permit and Fugitive Dust Control Plan, and to minimize contact water.

The Landfill Owner/Operator inspects soil intermediate cover, or approved alternative intermediate cover, weekly and annually for erosion, ponded water, seeps, protruding waste, or other detrimental conditions that may cause contaminated runoff as described in Section 3. Erosion gullies or washed-out areas are repaired as described in Section 2.6.3.

2.6.2 Final Cover

Consistent with the Final Closure and Post-Closure Care Plan, final cover will be placed in a manner compatible with ongoing fill activities and Landfill development. Surface water will be managed throughout the active life of the Landfill to minimize infiltration into the filled areas and to minimize contact with waste materials. Erosion of final cover will be repaired by restoring the cover material, grading, compacting, and seeding, as necessary. Monthly inspections and restorations will be implemented during the entire active and post-closure period. Post-closure care inspection procedures are outlined in the Final Closure and Post-Closure Care Plan and Section 3 of this SOP. Refer to Table 3.1 of this SOP for a site inspection and maintenance schedule.

Final cover placement over completed portions of the site will consist of the following steps:

- Survey controls will be implemented during waste placement to control the filling of waste to the bottom of intermediate cover layer elevations.

- No later than the date of closure initiation, a notice of intent to close the Landfill or portion thereof will be prepared, submitted to the TCEQ, and placed in the Site Operating Record. The notification will include a certification by a qualified professional engineer that the design of the final cover system meets the requirements of §257.102(d)(3).

- The final cover system layers will be constructed at the appropriate time following placement of the final lift of waste. Installation and testing of the various components of the final cover system will be performed in accordance with Section 3.3 of this Plan.

- A Final Cover System Evaluation Report (FCSER) will be prepared by an independent registered professional engineer, as described in Section 3.4, which will include a closure completion certification. This FCSER will be submitted for TCEQ approval, certifying that the final cover has been constructed in accordance with this Plan and requirements of §257.102(d).

- The FCSER, including closure completion certification, will be placed in the Site Operating Record, and the notification placed on the Landfill's publicly accessible website in accordance with Section 4 of the SOP, and the inspection checklist will be updated to reflect final cover placement.

- Prior to closure completion certification approval by the TCEQ, a financial assurance mechanism must be in place consistent with §352.1101(b).

- Following final closure of the Landfill, the following will be completed:

    - Equipment that has come in contact with CCR during active operations or closure activities will be cleaned prior to demobilizing the equipment from the Landfill or placing it into service for post-closure activities.

    - A notation will be recorded on the deed indicating that: (i) the property has been used for CCR disposal; and (ii) the use of the property is restricted under the post-closure care requirements of §257.104(d)(1)(iii). A notification stating that the notation has been recorded in the McLennan County Deed Records will be placed in the Site Operating Record and submitted to the TCEQ.

2.6.3 Erosion of Cover

Intermediate and final cover will be inspected for erosion on a weekly and monthly basis, respectively, and during the annual inspection. Erosion gullies or washed-out areas deep enough to impact the final or intermediate cover will be repaired following detection by restoring the cover material, grading, compacting, and/or seeding or sodding. An eroded area is considered to be deep enough to impact the final or intermediate cover if it exceeds 6 inches in depth as measured perpendicular to the slope.

The date of detection of erosion and date of completion of repairs will be documented in the inspection checklist. Cover inspections will be conducted throughout the operational life of the Landfill and post-closure care period.

2.7 PREVENTION OF PONDED WATER

The prevention of ponding water is necessary to control infiltration of water into the waste. Additionally, ponded water may be a breeding grounds for mosquitos. This ponding water prevention plan will be implemented at the Landfill, and includes, but is not limited to, the following procedures:

Preventative Actions:

- Inspections of the Landfill cover, consistent with Section 3 of this SOP, and following periods of wet weather, to identify potential ponding locations.
- Routine site grading and maintenance to provide drainage and minimize the ponding of water over areas containing waste.

Corrective Actions:

- Should ponding occur, the water will be removed and the depressions filled as needed.
- If the ponded water has come into contact with waste or contact water, it will be handled as contact water in accordance with Section 2.8 of this SOP.

2.8 STORMWATER AND CONTACT WATER MANAGEMENT

2.8.1 Stormwater Management

Surface water is managed in accordance with the Run-on and Run-off Control Plan (see Part IV, Appendix IV.C) throughout the active life of the Landfill to minimize the amount of contact water, which is the stormwater that comes into contact with waste. Surface water that does not come in contact with waste or contact water is managed separately from leachate and contact water. Cells 2 and 3 utilize subcell divider berms to minimize the amount of contact water generated during the operation of the Landfill. Stormwater collected in subcells that have not come in contact with the waste will be discharged as clean water into the stormwater pond.

The Landfill Owner/Operator conducts inspections of the stormwater management system in accordance with Section 3 of this SOP, which will include inspection of the diversion berms, downchutes, perimeter drainage channels, culverts, and stormwater pond. Based on the inspections, maintenance of the stormwater management system may include the following activities:

- Removing excessive sediments: sediments are not allowed to accumulate deeper than 2 ft in the stormwater pond; and

- Repairing eroded areas; gullies are not allowed to develop to a depth of more than 6 inches.

2.8.2 Leachate and Contact Water Management

The Landfill Owner/Operator limits the generation of contact water and leachate through Landfill operating practices. Specifics on the design and operation of the leachate management system are provided in Part IV, Appendix IV.A – Leachate Collection and Removal System Plan of this Registration Application. Leachate that is generated during operations is collected at the bottom of the Landfill and conveyed to the leachate evaporation pond as follows:

- Leachate from Cell 1 is directed to the leachate evaporation pond via a leachate gravity drain pipe;

- Leachate from Cell 2 is pumped from a leachate sump, located at the low end of the cell (Subcell 2A), to the leachate gravity drain pipe and directed to the leachate evaporation pond; and

- Leachate from Cell 3 is pumped from the leachate sump, located at the low end of the cell (Subcell 3A), to a leachate forcemain and directed to the leachate evaporation pond.

Contact water will be contained within the exposed waste areas, including working face, by using temporary containment berms and directed to the leachate collection and removal system, which discharges into the leachate evaporation pond. Site grading of the exposed waste areas will be regularly conducted to provide drainage, promote run-off, and minimize ponding of water over areas containing waste in accordance with the Site Operating Plan. Additionally, at no time will contact water be allowed to discharge into the stormwater management system, offsite into waters of the United States, or onto adjacent properties. Surface water that infiltrates into the underlying waste will be managed as leachate in accordance with Part IV, Appendix IV.A, related to the Leachate Collection and Removal System Plan and this Plan.

The leachate evaporation pond is designed with a maximum operating depth of 6 feet and maximum storage capacity of 6.2 million gallons. This pond is a no-discharge pond, and has a freeboard of 2 feet which will be maintained at all times. The liquid level indicator in the pond is placed in the southeast corner of the pond. If there is no available storage in the leachate evaporation pond, leachate will be used by the Landfill Owner/Operator for dust control within the Landfill consistent with Section 2.5 of this SOP. Otherwise, the excess leachate will be sent offsite by the Landfill Owner/Operator for disposal at a permitted wastewater treatment facility or other authorized disposal facility.

A groundwater underdrain system is located beneath the leachate pond liner. The underdrain discharges on the south side of the pond. The Landfill Owner/Operator shall keep the outlet clear of obstacles that could impede drainage. Drainage from perched groundwater in the clay soils beneath the pond is expected to be intermittent and minimal.

The Landfill Owner/Operator conducts inspections of the contact water management system, and maintenance activities in accordance with Section 3 of this SOP. Based on the inspections, maintenance of the leachate and contact water management system may include the following activities:

- Verifying that isolation valves in Cells 2 and 3 are open or closed as appropriate and, if closed, not leaking;
- Managing the Landfill in a manner such that 2 ft of freeboard is maintained in the leachate evaporation pond at all times; and
- Verifying that the underdrain outlet for the leachate evaporation pond is not blocked by sediments, vegetation, or debris.

2.9 GROUNDWATER MONITORING

Groundwater monitoring for the facility will be performed in accordance with the Groundwater Monitoring and Corrective Action Plan (see Part VI) and groundwater wells will be inspected in accordance with Section 3 of this SOP. Recordkeeping, notification, and posting of information to the internet for demonstrations, certifications, findings, monitoring, meetings, testing and analytical data related to groundwater monitoring, assessment monitoring, and corrective action will be completed in accordance with Section 4 of this SOP.

3 INSPECTION PROCEDURES

Plant personnel or other qualified person will perform weekly inspections of the Landfill area for appearances of actual or potential structural weakness and other conditions which are disrupting or have the potential to disrupt the operation or safety of the landfill. A weekly inspection checklist is provided in Appendix V.A of the SOP and summarized in Table IV.D of TCEQ Form 20870, which will be used to document weekly inspections of the Landfill. Following completion of weekly inspections, the completed checklist will be placed and maintained in the Site Operating Record in accordance with Section 4 of this SOP.

The Landfill will be inspected once per calendar year by a qualified professional engineer in the state of Texas, who will verify that the design, construction, operation, and maintenance of the Landfill is consistent with recognized and generally accepted good engineering standards. The inspection will include a review of available information regarding the status and condition of the Landfill, including files available in the Site Operating Record, and a visual inspection of the Landfill to identify signs of distress or malfunction of the Landfill. The professional engineer will prepare a report following each inspection that addresses changes in geometry of the structure since the previous annual inspection, the approximate volume of waste contained in the Landfill at the time of the inspection, any appearances of an actual or potential structural weakness of the Landfill, in additional to any existing conditions that are disrupting or have the potential to disrupt the operation and safety of the Landfill, and any other change(s) which may have affected the stability or operation of the Landfill since the previous annual inspection. An annual inspection checklist, is provided in Appendix V.B of the SOP and summarized in Table IV.D of TCEQ Form 20870, which will be used to document annual inspections of the Landfill. Following completion of annual inspection, the completed annual report and checklist will be placed and maintained in the Site Operating Record and Landfill's publicly accessible website in accordance with Section 4 of this SOP.

The checklists have been developed for the weekly and annual inspections required for an active Landfill, and may be revised as needed throughout the life of the Landfill. After final cover has been installed on the Landfill, a new inspection checklist will be developed for post-closure activities.

A site inspection and maintenance schedule is provided in Table 3.1 of this SOP.

Consistent with 30 TAC §352.841(b), the Landfill Owner/Operator will verbally notify the TCEQ within 24 hours and in writing within five (5) days if a deficiency is observed during a weekly or annual inspection that could result in harm to human health, the environment, or has resulted in a release. Additionally, the TCEQ will be notified in writing within 14 days of all other deficiencies following annual inspections that could have the potential to disrupt operation of the Landfill. If a waste release or deficiency is found, the Landfill Owner/Operator will prepare a written corrective action plan to remedy the release or deficiency as soon as feasible consistent with 40 CFR §257.84(b)(5). Notifications and correction action plans will be placed in the Site Operating Record and on the Landfill's publicly accessible website in accordance with Section 4 of this SOP.

Prior to placing waste in a lateral expansion of the Landfill, (1) a certification letter signed by the Responsible Official for the Plant and a licensed professional engineer in the state of Texas, stating that the expansion has been constructed in compliance with conditions of this registration, , will be submitted to the TCEQ. If within 15 days of submission of the certification letter to the TCEQ, the TCEQ has not notified the Landfill Owner/Operator of their intent to inspect, then it is understood that the TCEQ has waived the opportunity for this inspection and the Landfill Operator can commence disposal in the lateral expansion.

Table 3.1 Site Inspection and Maintenance Schedule

ITEM	TASK	SCHEDULE
Waste Spilled in route to Landfill	Inspect access roads used for waste delivery to the Landfill. Clean up prior to end of operation day.	Daily
Landfill Structure and Slope	Inspect for sloughing, slumping, sliding, surface cracking, sinkholes, excessive slope, toe of slope movement, and vehicle damage. Remedy deficiencies as needed and notify TCEQ as required in Section 3.	Weekly
Landfill Access Roads	Inspect Landfill access roads for damage from vehicle traffic and erosion. Repair onsite access roads, as needed, based on inspections.	Monthly
Intermediate Cover	Inspect for proper placement, thickness, erosion, vegetation, animal burrows, and for presence of waste or other contamination. Remedy deficiencies as needed.	Weekly
Final Cover	Inspect for proper placement, thickness, slope, settlement, vegetation, animal burrows, and erosion. Maintenance will be ongoing throughout post-closure care period. Remedy deficiencies as needed.	Monthly
Dust Emissions	Inspect for fugitive dust at the Landfill and ash silo, and from haul trucks. If found, remedy deficiencies as needed.	Daily
Erosion Control	Inspect the intermediate and final cover for signs of erosion. Damaged areas will be repaired by restoring cover material, grading, compaction, and/or seeding or sodding.	Weekly (Interim), Monthly (Final)
Ponding Water	Inspect Landfill cover for potential ponding water locations. Fill depressions and regrade potential areas as needed.	Weekly
Run-on and Run-off Control Systems (Uncontaminated and Contact Water)	Inspect diversion berms, downchutes, perimeter drainage channels, culverts, detention basin(s) for damage. Remedy deficiencies as needed.	Weekly

Table 3.1 (Continued)

Leachate Collection and Removal System	Inspect leachate riser pipes, sump pump/controls, evaporation pond for damage and height of freeboard in the pond. Inspection isolation valves, protective cover, exposed geosynthetics, and leachate evaporation pond underdrain system for damage or blockage, as applicable. Remedy deficiencies as needed.	Weekly Monthly
Groundwater Monitoring System	Inspect groundwater monitoring wells for damage, excess vegetation, and other deficiencies. Remedy deficiencies as needed.	Monthly

4 RECORDKEEPING, NOTIFICATION, AND POSTING OF INFORMATION TO THE INTERNET

4.1 RECORDKEEPING REQUIREMENTS (§352.1301)

The Landfill Owner/Operator will maintain a copy of the registration, approved Registration Application, and any other required plans or documents in the Site Operating Record. These plans and documents are considered a part of the Site Operating Record for the Landfill. The Site Operating Record for the Landfill is maintained onsite in either a hard copy format, within a digital storage system accessible by a computer, or a combination of both.

The Landfill Owner/Operator is responsible for recording and retaining within the Site Operating Record the information listed below:

- All location restriction demonstrations.
- Liner design and construction certifications.
- Fugitive dust control plan and annual reports.
- Initial and subsequent updates to Run-On And Run-Off Control System Plan.
- Weekly and annual inspection reports, and corrective action reports for deficiencies and releases.
- Demonstrations, certifications, findings, monitoring, public meetings, testing, and analytical data related to groundwater monitoring, assessment monitoring, and corrective action.
- Approximate volume of waste disposed in the Landfill for waste disposed onsite.
    - Current issued effective registration; all applications and revisions; registration public notice(s); TCEQ registration; TCEQ compliance summary; other documents regarding and/or summarizing the TCEQ's review of or initial decision on the Registration Application.
- Closure and Post-Closure Care Plan and modifications, closure time extension certification, intention to close and closure and post-closure completion notifications; and closure notation on the deed.
- Other documents as specified by the approved registration or by the TCEQ.

Table 4.1 summarizes the recordkeeping requirements, described above. Unless otherwise specified, the Landfill Owner/Operator will retain all information contained within the Site Operating Record of the Landfill and all plans required for the Landfill for at least five years following the date of each occurrence, measurement, maintenance, corrective action, report, record, or study. The Landfill Owner/Operator will maintain the Site Operating Record in an organized format, which allows the information to be easily located and retrieved, and upon request, will make the Site Operating Record available for TCEQ inspection.

4.2 NOTIFICATION REQUIREMENTS (§352.1311)

The Landfill Owner/Operator will provide notification to the TCEQ within 30 days, if not otherwise specified, of placing in the Site Operating Record the information detailed in this section and Table 4.1. If the 30-day deadline requirement falls on a weekend or federal holiday, the notification deadline is extended to the next business day.

The Landfill Owner/Operator is responsible for notifying the TCEQ that the information listed below has been placed in the Site Operating Record:

- All location restriction demonstrations.
- Liner design and construction certifications.
- Fugitive duct control plan and annual reports.
- Initial and run-on and run-off control system plan.
- Groundwater monitoring and corrective action report; monitoring system certification; selection of a statistical method certification; assessment monitoring programs, assessment monitoring program establishment, sampling and results, and returning to detection monitoring.
- New waste stream(s) accepted at the Landfill.
- Closure and Post-Closure Care Plan and modifications closure time extension certification, intention to close and closure completion notifications; and closure notation on the deed.
- Changes to the URL for the Landfill's publicly accessible website (notification to the US EPA).
- Notifications of deficiencies during inspections.
- Other documents as directed by the TCEQ.

Table 4.1 summarizes the notification requirements, described above.

4.3 PUBLICLY ACCESSIBLE INTERNET SITE REQUIREMENTS (§352.1321)

The Landfill Owner/Operator is responsible for maintaining a publicly accessible internet site and placing information detailed in this section and Table 4.1 on the website within 30 days, if not otherwise specified. The information on the website is and will be identifiable and can be immediately printed and downloaded by anyone accessing the site. If any changes are made to the URL, the Landfill Owner/Operator will notify the TCEQ and EPA within 14 days of the change.

The Landfill Owner/Operator is responsible for placing the same information identified in Section 4.2 on a publicly accessible internet site. Unless otherwise specified, the Landfill Owner/Operator retains all information contained within the Landfill's publicly accessible website for at least five (5) years following the date of each occurrence, measurement, maintenance, corrective action, report, record, or study.

Table 4.1 Recordkeeping, Notification, and Posting of Information to the Internet Requirements

Primary Citation	Description	Site Operating Record Deadline (§352.1301)	TCEQ Notification Deadline (§352.1311)	Publicly Accessible Website Deadline (§352.1321)
§257.60(a) and §352.601	Documentation of compliance with location restrictions: aquifer	Initial registration, and no later than date of initial receipt of waste in any lateral expansion (e.g. Cell 4)	Within 30 days of placing in SOR	Within 30 days of placing in SOR
§257.61(a) and §352.611	Documentation of compliance with location restrictions: wetland	Initial registration, and no later than date of initial receipt of waste in any lateral expansion (e.g. Cell 4)	Within 30 days of placing in SOR	Within 30 days of placing in SOR
§256.62(a) and §352.621	Documentation of compliance with location restrictions: damage zone near fault lines	Initial registration, and no later than date of initial receipt of waste in any lateral expansion (e.g. Cell 4)	Within 30 days of placing in SOR	Within 30 days of placing in SOR
§256.63(a) and §352.631	Documentation of compliance with location restrictions: damage seismic impact zone	Initial registration, and no later than date of initial receipt of waste in any lateral expansion (e.g. Cell 4)	Within 30 days of placing in SOR	Within 30 days of placing in SOR
§257.64(a) and §352.641	Documentation of compliance with location restrictions: unstable areas	Initial Registration	Within 30 days of placing in SOR	Within 30 days of placing in SOR
§257.70(e) and §352.701	Liner Design Certification	60 days prior to construction of any lateral expansion (e.g. Cell 4)	60 days prior to construction of any lateral expansion (e.g. Cell 4)	60 days prior to construction of any lateral expansion (e.g. Cell 4)
§257.70(f) and §352.701	Liner Construction Certification	No later than date of initial receipt of waste in any new waste unit	15 days prior to the initial receipt of waste in any new unit	No later than date of initial receipt of waste in any new waste unit
§257.80(b) and §352.801	Fugitive Dust Control Plan	Initial Registration and any subsequent amendment	Within 30 days of placing in SOR	Within 30 days of placing in SOR
§257.80(c) and §352.801	Fugitive Dust Control Plan Annual Report	Initial annual report is due no later than 14 months after placing the initial CCR fugitive dust control plan. Subsequent reports are due 1 year after previous report completion	Within 30 days of placing in SOR	Within 30 days of placing in SOR
§257.81(c) and §352.811	Initial and Periodic run-on and run-off control system plan	Initial Registration, and every 5 years after initial plan	Within 30 days of placing in SOR	Within 30 days of placing in SOR
§257.84(a) and §352.841	Weekly inspection reports	Weekly throughout the life of the Landfill	N/A	N/A
§257.84(b) and §352.841	Annual Inspections Report	Initial Registration and 1 year after previous report completion	Within 30 days of placing in SOR	Within 30 days of placing in SOR
§257.84(b)(5) and §352.841(b)	Documentation of corrective measures for deficiency or release (based on annual report)	As soon as feasible	Verbally within 24 hours and in writing within 5 days for deficiencies that could result in harm to human health, the environment, or has resulted in a release. 14 days for all other deficiencies.	Within 30 days of placing in SOR
§257.90(e) and §352.901	Annual groundwater monitoring and corrective action report	Initial Registration, and Annual Report due 1 year after previous report completion	Within 30 days of placing in SOR	Within 30 days of placing in SOR
§257.91(e)(1) and §352.911	Documentation of design, installation, development, and decommissioning of GW Wells	Initial Registration and any subsequent amendment	Within 30 days of placing in SOR	Within 30 days of placing in SOR
§257.91(f) and §352.911	Groundwater Monitoring System certification	Initial Registration and any subsequent amendment	Within 30 days of placing in SOR	Within 30 days of placing in SOR
§257.93(f) and §352.931	Certification of selected statistical method for evaluating GW monitoring data	Initial Registration and any subsequent amendment	Within 30 days of placing in SOR	Within 30 days of placing in SOR
§257.94(e)(3) and §352.941	GW Assessment Monitoring Program establishment notification	30 days after plan establishment	Within 30 days of placing in SOR	Within 30 days of placing in SOR
§257.95(d)(1) and §352.951	GW Assessment monitoring program sampling and results	90 days after results, and on at least semiannual basis thereafter	Within 30 days of placing in SOR	Within 30 days of placing in SOR

Table 4.1 (Continued)

Primary Citation	Description	Site Operating Record Deadline (§257.105 and §352.1301)	TCEQ Notification Deadline (§257.106 and §352.1311)	Publicly Accessible Website Deadline (§257.107 and §352.1321)
§257.95(g) and §352.951(e)	Notification of GW constituent(s) being above protection standards	30 days after detection	Within 30 days of placing in SOR	Within 30 days of placing in SOR
§257.96(d) and §352.961	Assessment of GW corrective measures	90 days after detection	Within 30 days of placing in SOR	Within 30 days of placing in SOR
§257.96(e) and §352.961(c)	Documentation recording public meeting for GW corrective measures assessment	After meeting	Within 30 days of placing in SOR	Within 30 days of placing in SOR
§257.97(a) and §352.971	Progress reports (Semiannually) for selecting and design remedy for GW corrective action	6 months after selection and design completion	Within 30 days of placing in SOR	Within 30 days of placing in SOR
§257.98(e) and §352.981	Notification and certification of GW remedy completion	30 days after of completion	Within 30 days of placing in SOR	Within 30 days of placing in SOR
§257.102(b) and §352.1221	Closure Plan	Initial Registration and any subsequent modification	Within 30 days of placing in SOR	Within 30 days of placing in SOR
§257.102(f)(2) and §352.1221	Closure time extension certification	After 30 days of certification	Within 30 days of placing in SOR	Within 30 days of placing in SOR
§257.102(g) and §352.1221	Initial of closure notification	After 30 days of notification	Within 30 days of placing in SOR	Within 30 days of placing in SOR
§257.102(h) and §352.1221	Closure completion notification	After 30 days of notification	Within 30 days of placing in SOR	Within 30 days of placing in SOR
§257.102(i) and §352.1221	Closure notation on the deed	After 30 days of completion	Within 30 days of placing in SOR	Within 30 days of placing in SOR
§257.104(d) and §352.1241	Post-Closure Plan	Initial Registration and any subsequent modification	Within 30 days of placing in SOR	Within 30 days of placing in SOR
§257.104(e) and §352.1241	Post-closure care completion notification	After 30 days of notification	Within 30 days of placing in SOR	Within 30 days of placing in SOR
§335.9(a)	Records of waste disposed onsite or sent offsite	Texas waste code will be recorded prior to disposal in the Landfill, volume of waste disposed in the Landfill will be conducted during the annual inspection in accordance with Section 3 of the SOP, and information for waste sent offsite will be recorded following removal from site.	Prior to disposal of new waste stream(s) in the Landfill	N/A
§257.105(h) and §352.1301(b)	Groundwater monitoring and associated groundwater surface elevations	30 days after of completion[1]	N/A	N/A
§352.1321(c)	Post issued effective registration; all applications and revisions; registration public notice(s); TCEQ draft registration; TCEQ compliance summary; other documents regarding and/or summarizing the TCEQ's review of or initial decision on the Registration Application on publicly accessible website	Initial Registration and any subsequent modification	Within 30 days of placing in SOR[1]	Within 30 days of placing in SOR
§257.95(g) and §352.951(e)	Notification of GW constituent(s) being above protection standards	30 days after detection	Within 30 days of placing in SOR	Within 30 days of placing in SOR
§257.96(d) and §352.961	Assessment of GW corrective measures	90 days after detection	Within 30 days of placing in SOR	Within 30 days of placing in SOR

Notes:

1. Document will be kept in the SOR for the life of site.

APPENDIX V.A

WEEKLY INSPECTION CHECKLIST

Sandy Creek Energy Station

Coal Combustion Residual Waste Management Facility Weekly Inspection Checklist

40 CFR §257.84(a) - Requires inspections once every 7 days by a qualified person.

Date and Time of Inspection: ____________________

Inspector's Name: ____________________

Weather Summary at time of Inspection: ____________________

____

Precipitation for the previous 7 days: ____________________

1. Landfill Structure and Slope

Sloughing, Slumping, Sliding		Surface Cracking		Excessively Steep Slope		Toe of Slope Moving		Inadequate Compaction	
Yes	No	Yes	No	Yes	No	Yes	No	Yes	No

Inappropriate Vegetative Growth		Animal Burrows		Erosion Damage		Vehicle Damage	
Yes	No	Yes	No	Yes	No	Yes	No

Additional Observations: ____________________

____

____

2. Landfill Cover

Qualifier	Intermediate Soil Cover		Final Soil Cover		Bottom Ash Cover		Alternative Cover	
	Yes	No	Yes	No	Yes	No	Yes	No
Installed								
Erosion								
Location								

Additional Observations: ____________________

____

3A. Run-on and Run-off Control System

Uncontaminated Surface Water Management System

Qualifier	Diversion Berms		Downchutes		Perimeter Drainage Channels		Culverts		Detention Basins	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Inspection										
Damage										
Type										
Location										

Additional Observations: ____________________

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____

3B. Run-on and Run-off Control System

Contact Water Management System

Qualifier	Diversion Berms		Drainage at Perimeter Berm		Drainage at Separation Berm		Culvert		Ponding of Contact Water		Release of Contact Water	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Inspection												
Damage												
Type												
Location												

Additional Observations: ______________________________

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____

4. Exposed Liner and Leachate Collection and Removal System

Qualifier	Intercell Berm Sacrificial Plastic		LCRS Riser Pipes		Leachate Sump Pump/Controls		Leachate Evaporation Pond		
	Yes	No	Yes	No	Yes	No	Yes	No	Freeboard (ft)
Inspection									
Damage									NA
Type									NA
Location									NA

5. Fugitive Dust

Landfill		Haul Trucks		Ash Silo	
Yes	No	Yes	No	Yes	No

Additional Observations: ______________________________

____

____

6. Exposed Liner, Leachate Collection and Removal System, and Access Roads (monthly)

Previous Inspection Date: ______________________________

Qualifier	LCRS Valves		Protective Cover		Exposed Geosynthetics		Access Roads	
	Yes	No	Yes	No	Yes	No	Yes	No
Inspection								
Damage								
Type								
Location								

Additional Observations: ______________________________

____

____

7. Leachate Evaporation Pond Underdrain System (monthly)

Previous Inspection Date: ____________________

Sediment		Vegetation		Debris		Water Flow	
Yes	No	Yes	No	Yes	No	Yes	No

Additional Observations: ____________________

____

____

8. Groundwater Monitoring System (monthly)

Previous Inspection Date: ____________________

Damage		Excess Vegetation		Lock Working		Housing Lid Functional		Insects in Housing		Housing Paint Peeling		Label Adequate	
Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No

Additional Observations: ____________________

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Additional Comments/Observations/Recommendations: ____________________

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Improvements completed since last weekly inspection: ____________________

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Improvements that still need to be completed: ____________________

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____

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____

____

____________________ **Inspector Signature**

____________________ **Date**

____________________ **Supervisor Signature**

____________________ **Date**

APPENDIX V.B

ANNUAL INSPECTION CHECKLIST

Sandy Creek Energy Station

Coal Combustion Residual Waste Management Facility Annual Inspection Checklist

40 CFR §257.84(b) - Requires inspections on an annual basis by a Qualified Professional Engineer

Date and Time of Inspection: ______________________________

Professional Engineer's Name: ______________________________

Weather Summary at time of Inspection: ______________________________

____

Precipitation for the previous 7 days: ______________________________

1. Landfill Structure and Slope

Sloughing, Slumping, Sliding		Surface Cracking		Excessive Slope		Toe of Slope Moving		Inadequate Compaction	
Yes	No	Yes	No	Yes	No	Yes	No	Yes	No

Inappropriate Vegetative Growth		Animal Burrows		Erosion Damage		Vehicle Damage	
Yes	No	Yes	No	Yes	No	Yes	No

Additional Observations: ______________________________

____

____

2. Landfill Cover

Qualifier	Intermediate Soil Cover		Final Soil Cover		Bottom Ash Cover		Alternative Cover	
	Yes	No	Yes	No	Yes	No	Yes	No
Installed								
Erosion								
Location								

Additional Observations: ______________________________

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3A. Run-on and Run-off Control System

Uncontaminated Surface Water Management System

Qualifier	Diversion Berms		Downchutes		Perimeter Drainage Channels		Culverts		Detention Basins	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Inspection										
Damage										
Type										
Location										

Additional Observations: ______________________________

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____

3B. Run-on and Run-off Control System

Contact Water Management System

Qualifier	Diversion Berms		Drainage at Perimeter Berm		Drainage at Separation Berm		Culvert		Ponding of Contact Water		Release of Contact Water	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Inspection												
Damage												
Type												
Location												

Additional Observations: ______

4. Exposed Liner and Leachate Collection and Removal System

Qualifier	Intercell Berm Sacrificial Plastic		LCRS Riser Pipes		Leachate Sump Pump/Controls		Leachate Evaporation Pond		
	Yes	No	Yes	No	Yes	No	Yes	No	Freeboard (ft)
Inspection									
Damage									
Type									
Location									

Qualifier	LCRS Ball Valve		Protective Cover		Exposed Geosynthetics	
	Yes	No	Yes	No	Yes	No
Inspection						
Damage						
Type						
Location						

Additional Observations: ______

5. Fugitive Dust

Landfill		Haul Trucks		Ash Silo	
Yes	No	Yes	No	Yes	No

Additional Observations: ______

6. Leachate Evaporation Pond Underdrain System

Sediment		Vegetation		Debris		Water Flow	
Yes	No	Yes	No	Yes	No	Yes	No

Additional Observations: ______________________________

____

____

7. Groundwater Monitoring System

Damage		Excess Vegetation		Lock Working		Housing Lid Functional		Insects in Housing		Housing Paint Peeling		Label Adequate	
Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No

Additional Observations: ______________________________

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8. Document Review

Description	**Yes**	**No**
Weekly Inspection Checklists Reviewed:		
All Weekly Inspections Completed:		
Site Operating Record Reviewed:		
All necessary documents maintained in Site Operating Record: (see attached Site Operating Record Checklist)		

Additional Observations: ______________________________

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Additional Comments/Observations/Recommendations: ______________________________

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Professional Engineer's Signature and Seal

Date

APPENDIX V.C

2020 ANNUAL INSPECTION REPORT

January 13, 2021
SCS Project No. 16220101.00

Mr. Darryl Sparks
Compliance Manager
NAES Corporation
2161 Rattlesnake Road
Riesel, Texas 76682

Sent via email

Subject: Sandy Creek Energy Station
Coal Combustion Residual (CCR) Landfill
2020 Annual Inspection Report per 40 CFR §257.84(b)(2)

Dear Mr. Sparks:

SCS Engineers (SCS) is pleased to provide this 2020 annual inspection report for compliance Title 40, Code of Federal Regulation (CFR) §257.84(b)(2), related to the annual inspection of a coal combustion residual (CCR) landfill by a qualified engineer. The CCR landfill is located on the Sandy Creek Energy Station (facility) property at 2161 Rattlesnake Road, Riesel, Texas 76682, and is registered with the Texas Commission on Environmental Quality (TCEQ) under Registration No. 88448.

BACKGROUND

The CCR landfill is classified as an existing landfill as defined under §257.53, which was constructed and commenced operation prior to October 14, 2015. The landfill is currently comprised of two CCR disposal cells, Cells 1 and 2, which commenced receiving waste in early 2013 and October 2014, respectively. The approximate area of Cells 1 and 2 are 10.0 and 14.3 acres, respectively.

The primary wastes disposed of in the landfill are dry scrubber ash and bottom ash generated during the facility's coal combustion process. Incidental waste generated during the facility's operation may also be disposed of in the landfill, as described in the initial registration notification to TCEQ and the most recent version of the facility's Operations Plan.

ANNUAL INSPECTION [§257.84(B)(1)]

An annual inspection of the landfill was performed on December 30, 2020, by Brett DeVries, Ph.D., P.E., a Professional Engineer registered in the State of Texas. An annual inspection checklist prepared during the inspection is attached to this report. At the time of the inspection, the facility was operational, and the landfill was receiving waste.

Although the items described below and on the attached checklist were observed during the inspection, there were no existing conditions or changes from the previous annual inspection that appeared to have the potential to disrupt the operation, safety, or stability of the landfill [§257.84(b)(2)(iv)]. Additionally, during the inspection, no appearance of actual or potential structural weakness was observed [§257.84(b)(2)(ii)].

During the inspection, as noted in the attached checklist, the following items were observed:

- One (center) of three culverts located at the west side entrance of the stormwater pond (i.e., discharge of perimeter channel into the pond) is blocked and unable to transmit uncontaminated surface water. Based on discussion with operation personnel, this does not result in the ponding of surface water, and it will continue to be monitored by operation personnel.

- Erosion rills were not observed on the intermediate cover of the internal and external slopes of the landfill. As a result, underlying CCR waste was not observed (or exposed) in any location as a result of erosion to intermediate cover. In addition, site personnel have installed temporary sideslope berms in potential high erosion areas in an effort to control erosion.

- Protective cover was removed and geosynthetic was exposed at a temporary downchute on the east slope of inactive Subcell 2E, and a portion of the protective cover on the northwest corner of Subcell 2D was damaged due to erosion, but the geosynthetic was not exposed. Based on discussion with operation personell, the temporary downchute in Subcell 2E and erosion damage in Subcell 2D was repaired shortly after the inspection.

- Minor erosion damage to the contact water diversion berm in Subcell 2D was observed; however, this minor damage was not enough to allow contact water release. Based on discussion with operation personell, the contact water diversion berm damage in Subcell 2D was repaired shortly after the inspection.

- Excessive dust emissions were not observed during the inspection. Leachate evaporation pond, leachate evaporation pond underdrain system, and groundwater monitoring systems were observed to be functioning as designed.

During the inspection, SCS also reviewed the weekly inspection reports prepared by a qualified person in accordance with §257.84(a). All required weekly inspections have been completed for calendar year 2020. Consistent with §257.84(b)(i), SCS reviewed the 2020 weekly inspections and the prior 2019 annual inspection. Items noted during the 2020 weekly inspections were similar to the items noted in this 2019 annual inspection, which were primarily related to ongoing challenges with erosion and stormwater (non-contaminated water) culverts. In addition, items observed during the 2020 annual inspection will be corrected by operation personnel in the near future (weather permitting). Based on a review of these inspections, operation personnel have routinely corrected or maintained the landfill facility, as weather allowed, for items identified in the inspections and during landfill operation.

Lastly, during the inspection, consistent with §257.84(b)(i), SCS also reviewed all other documents in the Site Operation Record. All documents required to be in the Site Operating Record in accordance with §257.105 were present during the inspection.

In summary, based on the above-described inspection and improvement plans (previously noted) and consistent with the previous annual inspection (dated 1/13/2020), in our opinion, the design, construction, operation, and maintenance of the landfill (inclusive of the items inspected in the attached checklist) is being performed consistent with recognized and generally accepted good engineering standards.

VOLUME OF IN-PLACE WASTE [§257.84(B)(2)(ii)]

The approximate volume of CCR contained in the landfill at the time of the inspection was estimated in accordance with §257.84(b)(2)(ii). The landfill has been operational since early 2013.

Ground surveys of the landfill have been developed since April 2013, with the most recent two surveys being performed on September 23, 2020 and December 14, 2020. The estimated airspace consumed between the two surveys is 28,400 cubic yards (CY) for a period of 82 days (provided by facility personnel). Therefore, the airspace consumed was converted to an average daily volume of approximately 346.3 cy/day. Based on a comparison of the as-built top of liner grades and existing grades at the time of the surveys, the landfill has approximately 1,123,128 cubic yards of CCR waste as of December 14, 2020 (provided by facility personnel). In addition, based on the average daily volume of 346.3 cy/day, it is estimated that an additional 5,540.8 cy of CCR waste was disposed of in the landfill between December 14, 2020 and December 30, 2020. **Therefore, as of the date of the annual inspection (December 30, 2020), it is estimated that the landfill contained approximately 1,128,669 cy of CCR waste.**

CLOSING

SCS appreciates the opportunity to perform the 2020 annual inspection of Sandy Creek Energy Station, CCR Landfill. Should you have any questions or require additional information on this inspection, please feel free to contact Brett DeVries, Ph.D., P.E. at 817-571-2288.

Sincerely,

STATE OF TEXAS
BRETT J. DeVRIES
128061
LICENSED
PROFESSIONAL ENGINEER

Brett DeVries, Ph.D., P.E.
Project Engineer
SCS ENGINEERS
TBPE Registration No. F-3407

Ryan Kuntz, P.E.
Vice President / Satellite Office Manager
SCS ENGINEERS

Attachment: Coal Combustion Residual Landfill Annual Inspection Checklist

Sandy Creek Energy Station

Coal Combustion Residual Landfill Annual Inspection Checklist

40 CFR §257.84(b) - Requires inspections on an annual basis by a Qualified Professional Engineer

Date and Time of Inspection: 12/30/2020 10:00 a.m.

Professional Engineer's Name: Brett DeVries, Ph.D., P.E.

Weather Summary at time of Inspection: 60°F, Rain

Precipitation for the previous 7 days: 0.1-inches

1. Landfill Structure and Slope

Sloughing, Slumping, Sliding		Surface Cracking		Excessive Slope		Toe of Slope Moving		Inadequate Compaction	
Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
	X		X		X		X		X

Inappropriate Vegetative Growth		Animal Burrows		Erosion Damage		Vehicle Damage	
Yes	No	Yes	No	Yes	No	Yes	No
	X		X		X		X

Additional Observations:

2. Landfill Cover

Qualifier	Intermediate Soil Cover		Final Soil Cover		Bottom Ash Cover		Alternative Cover	
	Yes	No	Yes	No	Yes	No	Yes	No
Installed	X		N/A		N/A		N/A	
Erosion		X						
Location								

Additional Observations:

3A. Run-on and Run-off Control System

Uncontaminated Surface Water Management System

Qualifier	Diversion Berms		Downchutes		Perimeter Drainage Channels		Culverts		Detention Basins	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Inspection	X		X		X		X		X	
Damage		X	X			X	X			X
Type			**See Note 1**				**Blockage (See Note 2)**			
Location			**Subcell 2E**				**Stormwater Pond Entrance**			

Additional Observations: [1] Located on east slope of Subcell 2E to control uncontaminated surface water.

[2] One (center) of three culverts located on the west side of the stormwater pond is blocked and unable to transmit uncontaminated water.

SCS ENGINEERS

\\bed-fs02\shares\Data\Projects\16220101.00\20210104 Sandy Creek 2020 Annual Inspection Checklist.xlsx

NAES

3B. Run-on and Run-off Control System

Contact Water Management System

Qualifier	Diversion Berms		Drainage at Perimeter Berm		Drainage at Separation Berm		Culvert		Ponding of Contact Water		Release of Contact Water	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Inspection	X		X		X		X		X		X	
Damage	X			X		X		X		X		X
Type	**See Note 1**											
Location	**Subcell 2D**											

Additional Observations: [1] Minor damage to contact water diversion berm in Subcell 2D. Not enough to allow contact water release.

4. Exposed Liner and Leachate Collection and Removal System

Qualifier	Intercell Berm Sacrificial Plastic		LCRS Riser Pipes		Leachate Sump Pump/Controls		Leachate Evaporation Pond		
	Yes	No	Yes	No	Yes	No	Yes	No	Freeboard (ft)
Inspection	X		X		X		X		**5**
Damage		X		X		X		X	**NA**
Type									**NA**
Location									**NA**

Qualifier	LCRS Ball Valve		Protective Cover		Exposed Geosynthetics	
	Yes	No	Yes	No	Yes	No
Inspection	X		X		X	
Damage		X	X		X	
Type	**See Note 2**		**See Notes 2 and 3**		**See Note 3**	
Location	**Subcell 2E**		**Subcell 2D**		**Subcell 2E**	

Additional Observations: [1] LCRS Ball Valves were covered by soil, but have not been damaged.

[2] Protective cover damaged on Northwest corner of subcell 2D, but geosynthetic was not exposed.

[3] Protective cover removed and geosynthetic exposed at temporary downchute on east slope of Subcell 2E.

5. Dust Emissions

Landfill		Haul Trucks		Ash Silo	
Yes	No	Yes	No	Yes	No
	X		X		X

Additional Observations:

6. Leachate Evaporation Pond Underdrain System

Sediment		Vegetation		Debris		Water Flow	
Yes	No	Yes	No	Yes	No	Yes	No
	X		X		X	X	

Additional Observations:

7. Groundwater Monitoring System

Damage		Excess Vegetation		Lock Working		Housing Lid Functional		Insects in Housing		Housing Paint Peeling		Label Adequate	
Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
	X		X	X		X			X		X	X	

Additional Observations: ______

8. Document Review

Description	Yes	No
Weekly Inspection Checklists Reviewed:	X	
All Weekly Inspections Completed:	X	
Site Operating Record Reviewed:	X	
All necessary documents maintained in Site Operating Record: (see attached Site Operating Record Checklist)	X	

Additional Observations: ______

Additional Comments/Observations/Recommendations: ______

Professional Engineer's Signature and Seal

12/30/2020

Date

SANDY CREEK ENERGY STATION
CCR LANDFILL ANNUAL SITE OPERATING RECORD REVIEW

					Maintained in Operating Record		
Primary Citation	**Description**	**Required**	**Deadline**	**Date Completed**	**Yes**	**No**	**NA**
§257.60(a)	Documentation of compliance with location restrictions: aquifer	Yes	No later than date of initial reciept of CCR in any lateral expansion (e.g. Cell 3)	NA			X
§257.61(a)	Documentation of compliance with location restrictions: wetland	Yes	No later than date of initial reciept of CCR in any lateral expansion (e.g. Cell 3)	NA			X
§256.62(a)	Documentation of compliance with location restrictions: seismic zone	Yes	No later than date of initial reciept of CCR in any lateral expansion (e.g. Cell 3)	NA			X
§256.63(a)	Documentation of compliance with location restrictions: damage zone near fault lines	Yes	No later than date of initial reciept of CCR in any lateral expansion (e.g. Cell 3)	NA			X
§257.64(a)	Documentation of compliance with location restrictions: unstable areas	Yes	10/17/2018	10/1/2018	X		
§257.70(e)	Liner Design Certification	No	NA	NA			X
§257.70(f)	Liner Construction Certification	No	NA	NA			X
§257.80(b)	Fugitive Dust Control Plan	Yes	10/19/2015	10/18/2015	X		
§257.80(c)	Fugitive Dust Control Plan Annual Report	Yes	1 year after previous report completion	12/16/16, 11/30/17, 12/18/18, 12/19	X		
§257.81(c)	Initial and Periodic run-on and run-off control system plan	Yes	10/17/2016, and every 5 years after initial plan	10/14/2016	X		
§257.84(a)	Weekly inspection reports	Yes	Weekly in 2016, 2017, 2018, 2019, and 2020	Weekly in 2016, 2017, 2018, 2019, and 2020	X		
§257.84(b)(2) and (3)	Annual Inspections	Yes	Due 1/19/2016 and 1 year after previous report completion	1/13/2016, 1/13/17, 1/13/18, 1/13/19	X		
§257.84(b)(5)	Documentation of corrective measures for deficiency or release (based on annual report)	Yes	As soon as feasible	NA			X
§257.90(e)	Annual groundwater monitoring and corrective action report	Yes	1/31/2018, and Annual Report due 1 year after previous report completion	1/30/18, 1/30/19, 1/30/20	X		
§257.91(e)(1)	Documentation of design, installation, development, and decommissioning of GW Wells	Yes	10/17/2017	3/11/2016	X		
§257.91(f)	Groundwater Monitoring System certification	Yes	10/17/2017	3/11/2016	X		
§257.93(f)	Certification of selected statistical method for evaluating GW monitoring data	Yes	10/17/2017	3/2/2016	X		
§257.94(e)(3)	GW Assessment Monitoring Program establishment notification	Yes	30 days after plan establishment	NA			X
§257.95(d)(1)	GW Assessment monitoring program sampling and results	Yes	90 days after results, and on at least semiannual basis thereafter	NA			X
§257.95(e)	Notification of resuming GW detection monitoring program	Yes	30 days after program establishment	NA			X
§257.95(g)	Notification of GW constituent(s) being above protection standards	Yes	30 days after detection	NA			X
§257.96(d)	Assessment of GW corrective measures	Yes	90 days after detection	NA			X
§257.96(e)	Documentation recording public meeting for GW corrective measures assessment	Yes	After meeting	NA			X
§257.97(a)	Progress reports (Semiannually) for selecting and design remedy for GW corrective action	Yes	6 months after selection and design completion	NA			X
§257.98(e)	Notification and certification of GW remedy completion	Yes	After 30 days of completion	NA			X
§257.102(b)	Closure Plan	Yes	10/17/2016	10/14/2016	X		
§257.104(d)	Post-Closure Care Plan	Yes	10/17/2016	10/14/2016	X		

\\bed-fs02\shares\Data\Projects\16220101.00\20210104 Sandy Creek 2020 Annual Inspection Checklist.xlsx

SANDY CREEK ENERGY STATION
COAL COMBUSTION RESIDUAL WASTE MANAGEMENT FACILITY
REGISTRATION APPLICATION
TCEQ REGISTRATION NO. ----

PART VI
GROUNDWATER MONITORING AND
CORRECTIVE ACTION PLAN

Prepared for:

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LICENSED
PROFESSIONAL ENGINEER
1/13/22

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Revision 0 – January 2022
SCS Project No. 16221059.00

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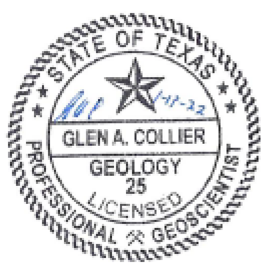
1 PE CERTIFICATION

I, Brett DeVries, Ph.D., P.E. and Glen Collier, P.G., hereby certify that the groundwater monitoring system Sandy Creek Energy Station Coal Combustion Residual Waste Management Facility meets the requirements in 30 TAC §352.911 (40 CFR §257.93). This certification is based on investigated available geologic and hydrogeologic information within the Landfill Registration Boundary. This Plan was prepared by or under my supervision. I am a duly licensed Professional Engineer or Professional Geologist under the laws of the State of Texas.

Brett DeVries, Ph.D., P.E.
(printed or typed name)

License number __128061____________________

My license renewal date is __9/30/2022______



Glen A. Collier, P.G.
(printed or typed name)

License number 25__________________

My license renewal date is 12/30/2021

2 INTRODUCTION

This document is the Groundwater Monitoring and Corrective Action Plan for the Registration Application for the Sandy Creek Energy Station (Plant) Coal Combustion Residual Waste Management Facility (Landfill) and has been prepared in accordance with 30 Texas Administrative Code (TAC) §352.241 and such provisions of Title 40 of the Code of Federal Regulations (40 CFR) Part 257, Subpart D, as are incorporated by reference. At the time of preparing this Groundwater and Corrective Action Plan (Plan), Cells 1 and 2 are existing active cells constructed in 2010 and 2014, respectively. A portion of Cell 3 (inclusive of Subcells 3A through 3D) was constructed in 2021 prior to and during the time of preparing this Plan..

Discussion related to locations restrictions for groundwater and geology, specifically placement above the uppermost aquifer (30 TAC §352.601 [40 CFR §257.60]), fault areas, and seismic impact zones (30 TAC 352.631 [40 CFR §257.63]) are provided in Part II – Location Restriction Demonstration of this Registration Application.

This Report summarizes available data related to regional and site-specific geologic and hydrogeologic conditions, as well as information pertinent to aquifers in the area of the Landfill. Information from the following sources was used where applicable.

- Groundwater Monitoring System Certification Report for Solid Waste Disposal Facility, Sandy Creek Energy Station, Riesel, McLennan County, Texas, Geosyntec Consultants, March 2016 (Geosyntec, 2016 – see Appendix VI.B).

- November 2020 Groundwater Monitor Well Install Report, Sandy Creek Energy Station, McLennan County, Texas, SCS Engineers, January 22, 2021 (SCS, 2020 – see Appendix VI.C).

- Cell 3 Compliance Demonstration, Sandy Creek Energy Station Solid Waste Disposal Facility, McLennan County, Texas, SCS Engineers, June 7, 2021 (SCS, 2021 – see Appendix II.A).

3 REGIONAL PHYSIOGRAPHY, TOPOGRAPHY AND CLIMATE

3.1 PHYSIOGRAPHY AND TOPOGRAPHY

The Landfill is in McLennan County, Texas and is located in the Blackland Prairies physiographic province of the Texas Gulf Coastal plains. The Blackland Prairies consist of chalks and marls that weather to deep, black clay soils (Physiographic Map of Texas 1996). The existing topography within the Landfill Registration Boundary had natural grades ranging from approximately 415 to 520 feet-mean sea level (MSL) [elevations across the Landfill ranged from 480 to 550 feet MSL] at the time of developing this Registration Application. Post-development, a number of natural drainage features within the Landfill Registration Boundary were filled with soil to create relatively flat areas for infrastructure construction. In the area of the Landfill, ground slopes to the southwest.

3.2 CLIMATE

The climate in the Waco area (within close proximity to the Landfill as depicted on Drawing I.B-1) is sub-humid, with area rainfall averaging approximately 34.7 inches per year (averaged between 1981 and 2010 at the Waco-McGregor Municipal Airport; source: www.usclimatedata.com). Figure VI-1 provides the average monthly rainfall in the Waco area over the 29 years.

4 GEOLOGY

4.1 GEOLOGIC SETTING

The Landfill is located northeast of the Central Texas uplift. The landscape is dominated by widespread outcrops of Upper Cretaceous rocks in various stages of weathering. To the east and across the Balcones and Mexia-Talco-Luling fault zones, Eocene strata are exposed at the surface. Lower Cretaceous stratigraphic units make up the extensive Edwards Plateau to the west and southwest.

The Lower Cretaceous Trinity Group hosts the uppermost aquifer beneath the Landfill Registration Boundary (George et al., 2011). The Trinity Group is overlain by, in ascending order, the Lower Cretaceous Fredericksburg and Washita groups. Overlying the Washita Group are rocks of the following Upper Cretaceous groups, in ascending order, Woodbine, Eagle Ford, and Austin (American Association of Petroleum Geologists [AAPG], 1979). Lithologies of these units include chalk, limestone, marl, clay, shale, and sandstone.

The integrated Lower Taylor Marl Formation (Ozan Formation) and the Wolfe City Formation, both of the Upper Cretaceous epoch, overlie the Austin Group and are exposed at the surface of the facility. The shallow subsurface stratigraphy within the Landfill Registration Boundary, as revealed by borings, consists predominantly of high plasticity yellow-brown clays, weathered clayshale, and marl units of fluvial and shallow marine origin (Geotechnical Design Report Revision 0, Sandy Creek Power Partners, Apr. 2009).

4.2 SITE STRATIGRAPHY

Site soil conditions within the vicinity of the Landfill Registration Boundary were investigated by the original Owner/Operator prior to Landfill Construction by borings within and adjacent to the Landfill footprint (Geosyntec, 2015 as provided in Appendix VI.B). Consistent with the above referenced reports, the soils in the vicinity of the Landfill Registration Boundary are comprised of three soil layers, identified in soil borings conducted to depths of up to 100 feet at the Landfill. These stratigraphic units are described in Section 4 of Part I.

The locations and logs of the borings drilled in since 2010 in the vicinity of the Landfill Registration Boundary are found in the various reports provided in Appendix VI.C. The results of geotechnical laboratory tests conducted on soil samples collected by Black and Veatch and Geosyntec Consultants during subsurface investigation activities are also included in Appendix VI.B.

Based on available information, including field investigations of the Landfill Registration Boundary , the geology of the Landfill is considered suitable for Landfill development.

5 HYDROGEOLOGY

5.1 REGIONAL HYDROGEOLOGY

The Trinity aquifer, a major aquifer in Texas, generally consists of sands, gravels, and conglomerates interbedded with limestone, shale, clay and marl. There are no other minor or major aquifers in the vicinity of the Landfill Registration Boundary (George et al., 2011). The Trinity aquifer is located more than 1,000 ft below the existing ground surface within the Landfill Registration Boundary , and has combined freshwater saturated thickness of approximately 1,000 ft (George et al., 2011). The overlying Cretaceous formations serve as confining units between the Landfill and the Trinity aquifer. Due to the low hydraulic conductivity and the significant thickness of these units, the potential for Landfill constituents to migrate from the Landfill to the Trinity aquifer during the active life and post-closure care period does not exist. Therefore groundwater monitoring of the Trinity aquifer beneath the Site is not warranted.

5.2 LOCAL HYDROGEOLOGY

While B&V (2009 – see Geosyntec, 2015) found groundwater in Stratum II at depths of 14 to 43 ft below ground surface in some of the borings and all of the piezometers in the northwest portion within the Plant Boundary, they did not encounter groundwater in borings drilled in the vicinity of the Landfill. B&V (2009 – see Geosyntec, 2015) concluded that water flowed in cracks and fissures in the clay. The majority of the fissures were in-filled with sand and gypsum, indicating secondary mineralization and water flow at certain depths, and some fissures were stained with iron oxide. In the northwest portion of the Plant Boundary, free water was commonly encountered within the sand layers found in Stratum II at depths greater than 20 feet. The groundwater encountered in Stratum II is considered transient and perched and is not expected to be found in significant quantities. Hydraulic conductivity tests were conducted on four undisturbed soil samples collected from Stratum II. Measured vertical hydraulic conductivities ranged from to 4.6×10^{-9} to 6.6×10^{-8} cm/sec. Slug tests were conducted by Geosyntec (2015) in three borings drilled in 2010 in the vicinity of the leachate evaporation pond. Estimated horizontal hydraulic conductivities for Stratum II ranged from 1.2×10^{-4} to 3.1×10^{-4} cm/s over saturated soil thicknesses of approximately 7.8 to 12.5 feet. Based on their hydrogeologic characteristics, Stratum I is generally an unsaturated zone, Stratum II is the uppermost water bearing zone beneath the Plant Boundary, and Stratum III is an aquitard or lower confining layer for Stratum II. The top of Stratum III generally follows topography and slopes to the southwest in the Landfill area. However, and as previously stated, the uppermost aquifer (Trinity aquifer) is estimated to be located approximately 1,000 feet below the existing ground surface.

6 GROUNDWATER INVESTIGATION REPORT

6.1 OVERVIEW

The previous groundwater investigation reports, included as Appendix VI.B, are sufficient to characterize the hydrogeological setting and to facilitate the design of the groundwater monitoring system to monitor the uppermost groundwater bearing unit as required by 30 TAC §352.911.

6.2 WELL INSTALLATION AND CONSTRUCTION

Existing well installation and construction details are found in Appendix VI.B reports. Should additional wells be needed or existing wells replaced, new wells will be constructed in accordance 16 TAC Chapter 76 and with the installation specifications described in the following paragraphs within this section and depicted on Drawing VI-1 in this Plan.

A qualified Texas-licensed driller will drill and install monitoring wells using equipment and methods that are appropriate for the conditions within the Landfill Registration Boundary . A licensed professional geoscientist or engineer who is familiar with the geology of the area will supervise drilling, develop a detailed lithologic description of the boring, monitor well installation, and oversee well development. The boring will be at least 4 inches larger than the outer diameter of the well casing and screen. If water is used in drilling, it will be from a potable source, and a current chemical analysis will be provided with the monitoring well installation report. A licensed professional geoscientist or engineer who is familiar with the geology of the area will supervise or make a boring log for each monitoring well and shall seal, sign, and date the boring log.

After a monitoring well is installed, it will be developed until excessive turbidity due to drilling/installation has been removed and field measurements of pH, specific conductance, and temperature have stabilized. Development may be accomplished through the use of pumping and/or bailing. Upon completion of well installation activities, a registered professional surveyor will survey the locations with vertical measurements to the nearest 0.01-foot and referenced to mean sea level (with year of the sea-level datum shown). Survey points for each well will include the top of PVC casing (with referenced point marked), top of protective cap, and ground surface adjacent to the well pad. Horizontal locations will be determined to the nearest tenth of a second for latitude and longitude or accurately located relative to the Site grid system. Within 60 days of well completion, well installation and construction information will be submitted to the TCEQ on current forms. The report will include a detailed geologic log, any test results, a description of development procedures, and a site map (to scale) showing the location of all monitoring wells and the point of compliance. Any monitoring well that is damaged to the extent that it is no longer suitable for sampling will be reported to the TCEQ with a recommendation to repair or replace the well. Any monitoring well that is no longer used shall be properly abandoned and plugged in accordance with 16 TAC §76.702 and §76.1004 with prior authorization in writing from the TCEQ.

The wells will be operated and maintained so that they will yield representative groundwater samples for the appropriate hydrogeologic unit throughout the life of the groundwater monitoring program. Groundwater monitoring will be conducted throughout the active life and the closure and post-closure care period of the Landfill.

6.3 SLUG TESTING

In September 2010, Geosyntec performed falling head permeability tests in piezometers GB-2 and GB-4 and well MW-3 (Geosyntec, 2015). The tests were performed using a solid "slug" to generate water level changes and a pressure transducer/data logger set up to monitor the water level response in the piezometers and well over time. Estimated horizontal hydraulic conductivities for Stratum II ranged from 1.2×10^{-4} to 3.1×10^{-4} cm/sec (0.34 to 0.88 feet/day) over saturated soil thicknesses of approximately 7.8 to 12.5 feet. The calculated geometric mean hydraulic conductivity is 2.0×10^{-4} cm/sec (0.55 feet/day). Estimated transmissivities ranged from 2.9 to 10.9 feet/day.

6.4 GROUNDWATER ELEVATIONS AND FLOW CALCULATIONS (30 TAC §352.911 [40 CFR §257.93(C)])

In accordance with 40 CFR Part §257.93(c), the groundwater flow rate and direction in the uppermost water bearing zone in the area of the existing groundwater monitoring wells were calculated.

Flow Rate Calculation:

$$Va = \frac{KI}{7.5N}$$ (Driscoll, 1986, Groundwater and Wells)

Where:

Va = Actual Velocity of Groundwater Flow (feet/day)

K = Hydraulic Conductivity (gpd/ft^2)

I = Hydraulic Gradient (feet/feet)

N = Effective Porosity (%)

Then:

K = 2.0×10^{-4} cm/sec (geometric mean hydraulic conductivity obtained from slug tests performed by Geosyntec in 2010)

Find K equivalent in units of gpd/feet^2:

(1 cm/sec = 21,200 gallons/day/ft2)

2.0×10^{-4} cm/sec x 21,200 gallons/day/ft2 = 4.24 gpd/ft^2

Find I: BW-1 elevation – MW-3 elevation: 468.37 feet – 421.46 feet = 0.0199 feet/feet distance between wells: 2,350 ft

I = 0.0199 feet/feet (ave. gradient across the site, from June 2021 water levels)

N = 6% (representative effective porosity for clay from Morris and Johnson, 1967)

Therefore:

$$Va = \frac{4.24 \text{ gpd/feet}^2 \times (0.0199 \text{ feet/feet})}{7.5\ (0.06)} = 0.187 \text{ feet/day}$$

(0.187 feet/day)(365 days/year) = 68 feet/year

Conclusion:

The calculated June 2021 site groundwater flow rate is **68 ft/year**. The gradient was measured using BW-1 and MW-3. The June 2021 groundwater flow direction is to the south-southwest. The calculated groundwater flow rate and direction are consistent with conditions previously observed at the site. See Drawing VI-2 for details, provided in accordance with 40 CFR part §257.93(c).

7 GROUNDWATER QUALITY CHARACTERIZATION

7.1 OVERVIEW OF THE EXISTING GROUNDWATER MONITORING SYSTEM

The current groundwater monitoring system at the Landfill consists of six wells (see Table 8-1). One (BW-1) is upgradient and five (MW-1, -2, -3, -4, & -5) are downgradient. Drawing II.B-1 and Drawing VI-2 shows the groundwater monitoring system at the Landfill.

Table 7-1 Sandy Creek Energy Station Groundwater Monitoring System

Well ID (U-upgradient; D-downgradient)	Status	Top of Casing Elevation (ft MSL)	Well Depth (ft, bgs)	Screen Interval (ft, bgs)	Water Level Elevation (ft MSL On 6/22/2021)[1]
BW-1 (U)	Detection	485.57	38.63	28.30-38.30	468.37
MW-1 (D)	Detection	465.87	34.23	23.90-33.90	455.29
MW-2 (D)	Detection	442.15	19.63	9.30-19.30	431.88
MW-3 (D)	Detection	430.06	16.23	5.98-15.98	421.46
MW-4 (D)	Background	436.91	30.3	20.00-30.00	427.52
MW-5 (D)	Background	454.52	35.3	25.00-35.00	432.29

1. June 22, 2021 is the latest groundwater water level measurements conducted at the Landfill at the time of developing this Registration Application.

The potential pathways for contaminant movement from the Landfill is expected to be lateral [horizontal] via bedding planes and along shale fractures that develop primarily horizontally as the overlying sediments unload over geologic time due to erosion. The locations and depths of the monitoring wells are designed to determine the quality of groundwater passing the point of compliance and to detect groundwater impact from the Landfill.

7.2 GROUNDWATER MONITORING DATA

Sampling of groundwater monitoring wells is conducted in accordance with 40 CFR §257.93 and the Groundwater Monitoring Sampling and Analysis Program (GWSAP) as provided in Appendix VI.A. Groundwater monitoring of six wells will be performed (BW-1, MW-1, MW-2, MW-3, MW-4, MW-5; as depicted on Drawing II.B-1 and VI-2). In accordance with 40 CFR §257.94(b), quarterly background monitoring will be performed for each well for eight consecutive quarters (i.e., eight independent samples collected for each well). The Appendix III and IV constituents monitored during the first eight quarters and the first semiannual detection monitoring event include 18 inorganic compounds, total dissolved solids, radium-226, and radium-228. The constituents monitored in subsequent events and during the June 2021 semiannual detection monitoring event include Appendix III constituents only. Initial background monitoring for monitoring wells MW-1, MW-2, MW-3, and BW-1 commenced in December 2015 and was completed in August 2017. The subsequent Background Evaluation Report is included as Appendix III. MW-1, MW-2, MW-3, and BW-1 are currently in detection monitoring. Monitoring wells MW-4 and MW-5 are currently in background monitoring. None of the wells are in assessment monitoring at the time of developing this Registration Application.

The First Semiannual Groundwater Monitoring Report for 2020 is included as Appendix VI.C. Historical groundwater sampling results for all six wells are also provided in Appendix VI.C.

7.3 GROUNDWATER MONITORING SYSTEM (30 TAC §352.911 [40 CFR §257.91])

As required by 40 CFR §257.91, the groundwater monitoring system will consist of a sufficient number of appropriately located wells to yield groundwater samples from the uppermost aquifer that represent the quality of background groundwater and the quality of groundwater passing the point of compliance.

Previously described Stratum II is the uppermost water bearing zone beneath the Landfill Registration Boundary. Based on the boring logs for the monitoring wells, the thickness of the water bearing zone within Stratum II (i.e., the zone with sand or gypsum lenses or iron oxide staining) ranges from eight to 18 feet thick beneath the facility.

Water levels measured periodically from 2010 to the present indicate a general south-southwesterly direction to groundwater movement in Stratum II. The velocity of groundwater moving through Stratum II has been calculated to range from 67 to 86 feet per year.

Based on the thickness of the uppermost water-bearing zone, groundwater flow direction, and groundwater velocity, the groundwater monitoring system consists of a sufficient number of appropriately located wells to yield representative samples of groundwater passing beneath the Landfill.

7.4 ASSESSMENT OF CORRECTIVE MEASURES (30 TAC §352.961 [40 CFR §257.96])

Within 90 days of finding that any of the Appendix IV constituents have been detected at a statistically significant level above a Groundwater Protection Standards (GWPS), Landfill Owner/Operator (Sandy Creek Services, LLC) will initiate an assessment of corrective measures. This assessment will be completed within 90 days of initiating the assessment and may be extended for no longer than 60 days. The assessment will be included in the annual groundwater monitoring and corrective action report required by 40 CFR §257.90(e), in addition to the certification by a qualified professional engineer.

Unless preceded by an Alternative Source Demonstration showing that the statistically significant increase (SSI) is not attributable to the Landfill, the assessment will analyze the effectiveness of potential corrective measures, including performance, reliability, ease of implementation, and potential impacts. The assessment will also discuss the control of exposure to residual contamination, time required to begin and complete the remedy, costs of remedy implementation, and any institutional requirements that may substantially affect implementation of the remedy or remedies.

At least 30 days prior to selecting a remedy, Landfill Owner/Operator will discuss the results of the assessment of corrective measures in a public meeting with interested and affected parties. The Landfill Owner/Operator of the Landfill must comply with the recordkeeping requirements specified in 40 CFR §257.105(h), the notification requirements specified in 40 CFR §257.106(h), and the Internet requirements specified in 40 CFR §257.107(h).

Within 30 days of completing the assessment of corrective measures required by this section, and before implementation of the remedy, Landfill Owner/Operator will submit an amendment application, on forms prescribed by the Executive Director, in accordance with §352.131. Landfill Owner/Operator will provide any additional information as the Executive Director may require that compliance with §352.131 be demonstrated. The application will include, at a minimum:

- Documentation that characterizes the nature and extent of the release, both vertically and horizontally, and meets the applicable requirements of §352.951,
- The completed assessment of corrective measures,
- The proposed selection of remedy required by §352.971,
- A comparison of the Appendix III constituents with a statistically significant increase over the background value, and the corresponding background value at each monitoring well,
- A comparison of the Appendix IV constituents and the corresponding groundwater protection standard meeting the requirements of §352.951(b) at each monitoring well,
- A proposed timeline for the submission of the corrective action effectiveness report required by §352.991, and
- A signed affidavit certifying that the owner or operator has complied with the applicable notification requirements of §352.951.

7.5 SELECTION OF REMEDY (30 TAC §352.971 [40 CFR §257.97])

Based on the results of the corrective measures assessment, Landfill Owner/Operator must as soon as feasible, select a remedy that, at a minimum, meets the remedy standards in 40 CFR §257.97(b). Landfill Owner/Operator will prepare a semiannual report describing the progress in selecting and designing the remedy. Upon selection of a remedy, Landfill Owner/Operator must prepare a final report describing the selected remedy and how it meets the standards specified in 40 CFR

§257.97(b). The final remedy selection will be achieved through issuance of the registration amendment required under §352.961.

7.6 IMPLEMENTATION OF THE CORRECTIVE ACTION PROGRAM (30 TAC §352.981 [40 CFR §257.98])

The Landfill Owner/Operator will implement a corrective action groundwater monitoring program following the schedule specified for the selected remedy. The corrective action is considered complete when the concentrations of all constituents are shown to be at or below GWPSs for a period of three consecutive years. Landfill Owner/Operator will also take any interim measures necessary to ensure the protection of human health and the environment. Interim measures will, to the greatest extent practicable, be consistent with the objectives of and contribute to the performance of the approved remedy.

Prior to returning to detection monitoring or assessment monitoring, Landfill Owner/Operator will submit documentation that demonstrates that the requirements of this section have been fulfilled, and the remedy has been achieved for the impacted property. The documentation submitted will include at a minimum:

- All analytical data prepared and presented in accordance with §352.931 that demonstrates achievement of the remedy,
- A narrative discussion of how the requirements of this section have been fulfilled for the impacted property, and
- A description of the volume and final disposal location, and a copy of any waste manifests or other documentation of disposition, for waste or environmental media which were removed from the impacted property.

The Landfill Owner/Operator may return to either detection monitoring or assessment monitoring only after satisfying the conditions of this section, and after obtaining written approval from the Executive Director. All coal combustion residuals managed under a remedy required under §352.971, or an interim measure required under this section, will be managed in a manner that complies with all applicable United States Resource Conservation and Recovery Act and state requirements.

7.7 CORRECTIVE ACTION EFFECTIVENESS REPORT (30 TAC §352.991)

If the Landfill is performing corrective action, a corrective action effectiveness report will be submitted to the TCEQ following each reporting period.

8 RECORDKEEPING, NOTIFICATION, AND POSTING OF INFORMATION TO THE INTERNET

The Landfill Owner/Operator will maintain a copy of this Plan in the Site Operating Record and on the Landfill's publicly accessible website consistent with §352.902, §257.105(g), and §257.107(g) as specified in Section 4 of the SOP.

Notification, submittal, posting, and public meeting requirements stated in §35.911, §352.931, §352.941, §352.951, §352.961, §352.991, §257.90(f), §257.91(g), §257.93(j), §257.94(f), and §257.95(i) will be completed by the Landfill Owner/Operator.

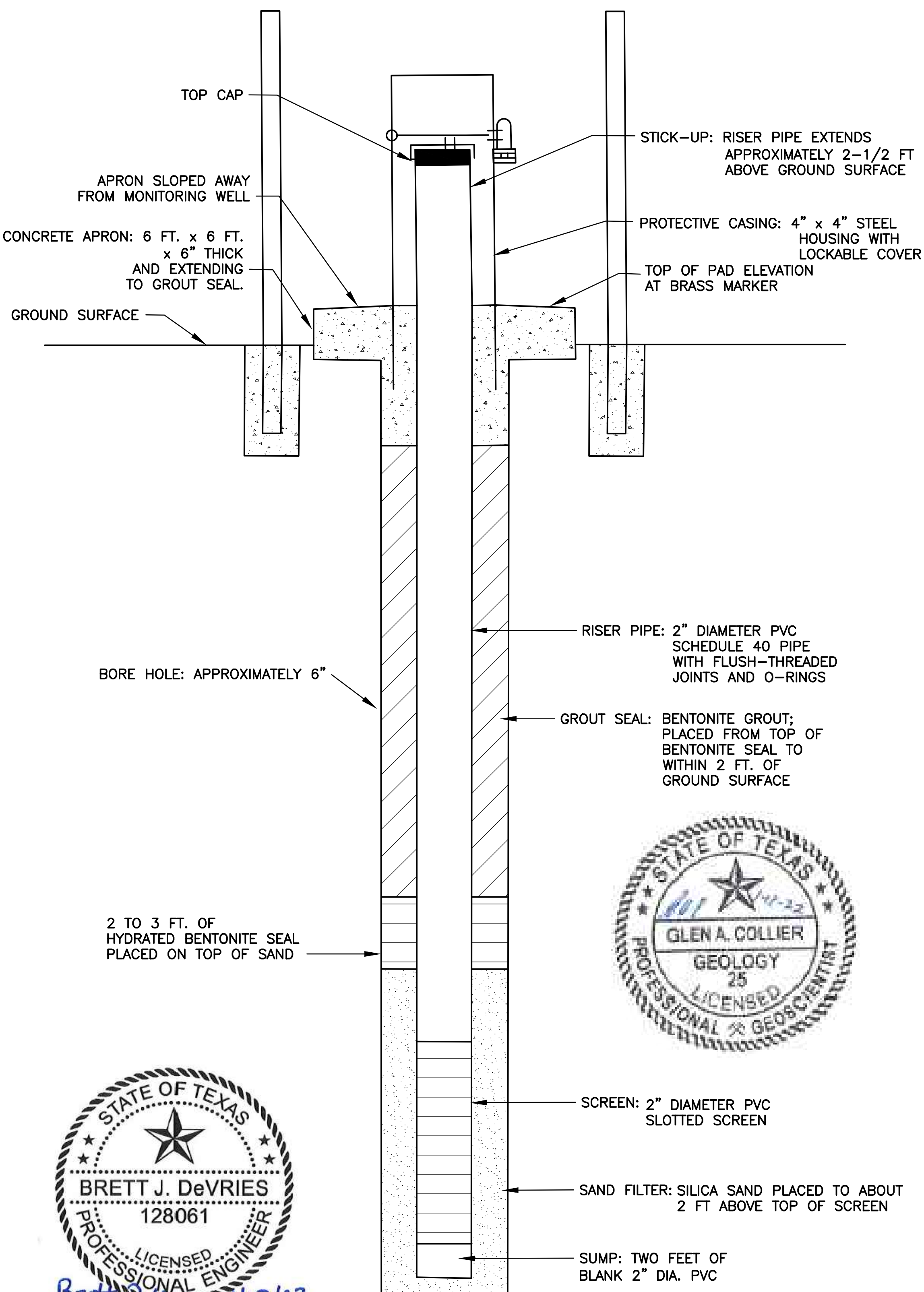
In accordance with 30 TAC §352.911(c), any changes to this Plan will be approved by the TCEQ in accordance with §352.931.

DRAWINGS

Drawing VI-1: Typical Monitoring Well Detail

Drawing VI-2: Groundwater Monitoring System and Groundwater Contour Map

TYPICAL MONITORING WELL DETAIL



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Brett DeVries 1/13/22

1/17/2022 11:30 AM G:\SANDY CREEK\16221059.00 TCEQ Registration\DWG\4.20 - monitor well dtl

FOR REGISTRATION PURPOSES ONLY

REV	DATE	DESCRIPTION	BY
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TEXAS BOARD OF PROFESSIONAL ENGINEERS REG. NO. F-3407

DRAWING TITLE
TYPICAL MONITORING WELL DETAIL

PROJECT TITLE
SANDY CREEK ENERGY STATION
CCR WASTE MANAGEMENT FACILITY
TCEQ REGISTRATION APPLICATION

CLIENT
SANDY CREEK SERVICES, LLC
2161 RATTLESNAKE ROAD
RIESEL, TEXAS 76682

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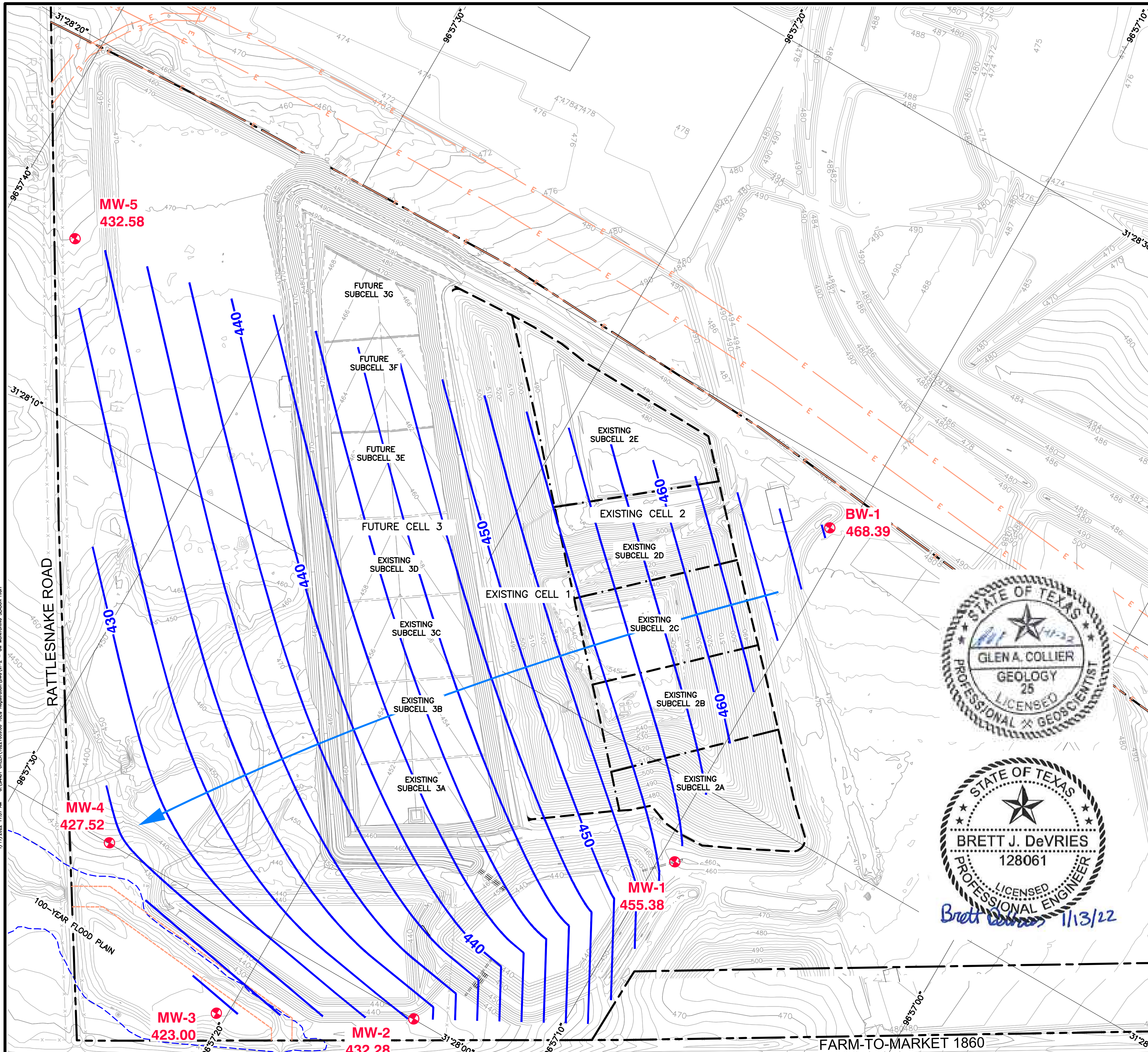
PROJ. NO. 16216088.00	DWN. BY: JLJ/NR	Q/A RVW BY: RRK
DSN. BY: AB/JL	CHK. BY: BJD/AB	APP. BY: JL

CADD FILE: 4.20 – MONITOR WELL DTL

DATE: 11/2021

SCALE: AS SHOWN

FIGURE: **VI-1**



0 150 300
SCALE IN FEET

LEGEND

450	EXISTING/PROPOSED CONTOURS
	PLANT PROPERTY BOUNDARY
	LANDFILL REGISTRATION BOUNDARY
	REGISTERED LIMITS OF WASTE
	EXISTING CELL BOUNDARY
	FUTURE CELL BOUNDARY
96°57'10"	LATITUDE/LONGITUDE LINES
	100-YEAR FLOOD PLAIN
MW-1	EXISTING MONITORING WELL
450	GROUNDWATER CONTOUR
450	PROPOSED/EXISTING EXCAVATION CONTOURS (SEE NOTE 3)

NOTES:

1. THE EXISTING CONTOUR MAP SHOWN ON THIS DRAWING WAS COMPILED FROM AN AERIAL SURVEY CONDUCTED BY DALLAS AERIAL SURVEY, INC. IN NOVEMBER, 2020 AND EXISTING TOPOGRAPHY BY BLACK & VEATCH CORPORATION DATED APRIL 2006. STATE PLANE COORDINATE GRID CORRESPONDS TO TEXAS STATE PLAN COORDINATE SYSTEM, TEXAS CENTRAL ZONE (4203), NORTH AMERICAN DATUM 83 (NAD83) 1983.

2. ELEVATION ARE IN FEET ABOVE MEAN SEA LEVEL (FT, MSL) AS DEFINED BY THE USGS NATIONAL GEODETIC VERTICAL DATUM (NGVD) OF 1988. STATE PLANE COORDINATE GRID CORRESPONDS TO TEXAS STATE COORDINATE SYSTEM, TEXAS CENTRAL ZONE (4203), NORTH AMERICAN DATUM OF 1983 (NAD-83).

5. EXISTING FEATURES IN SUBCELLS 3A THROUGH 3D ARE EXISTING AND SUBCELLS 3E THROUGH 3G ARE PROPOSED AT THE TIME OF THIS REGISTRATION APPLICATION DEVELOPMENT.

SEASONAL HIGH GROUNDWATER

MONITORING WELL	SAMPLE DATE	GW ELEVATION
BW-1	11/10/2020	468.39
MW-1	06/24/2019	455.38
MW-2	06/24/2019	432.28
MW-3	06/24/2019	423.00
MW-4	06/22/2021	427.52
MW-5	03/24/2021	432.58

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REV	DATE	DESCRIPTION	BY

TEXAS BOARD OF PROFESSIONAL ENGINEERS REG. NO. F-3407

DRAWING TITLE
GROUNDWATER MONITORING SYSTEM AND SEASONAL HIGH GROUNDWATER CONTOUR MAP

PROJECT TITLE
SANDY CREEK ENERGY STATION
CCR WASTE MANAGEMENT FACILITY
TCEQ REGISTRATION APPLICATION

CLIENT
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PROJ. NO. 16221059.00 | DWN. BY: ORA | Q/A RVW BY: BJD
DSN. BY: BJD | CHK. BY: BJD | APP. BY: BJD

CADD FILE: VI-2 - GW MONITORING SEASON HIGH

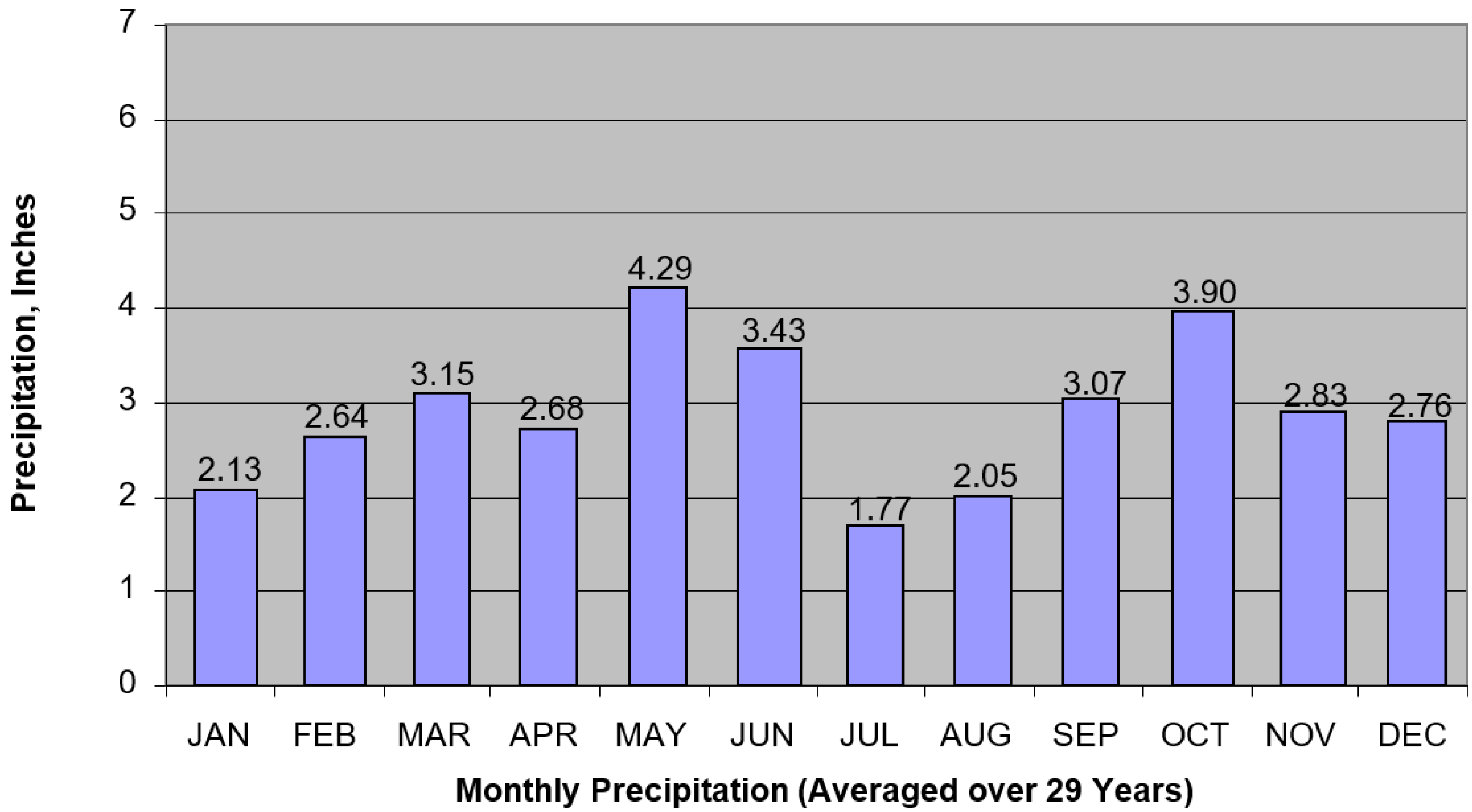
DATE: 11/2021

SCALE: AS SHOWN

DRAWING NO.
VI-2

FIGURES

Figure VI-I: Waco Average Monthly Rainfall



(Averaged between 1981 and 2010 at the Waco-Mcgregor Municipal Airport; source: www.usclimate.com).

Figure VI-1 - Waco Average Monthly Rainfall

APPENDIX VI.A

GROUNDWATER MONITORING SAMPLING AND ANALYSIS PROGRAM

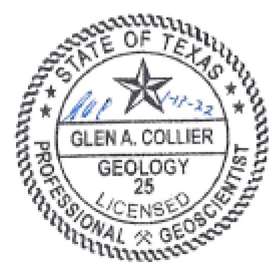
SANDY CREEK ENERGY STATION
COAL COMBUSTION RESIDUAL WASTE MANAGEMENT FACILITY
REGISTRATION APPLICATION
TCEQ REGISTRATION NO. -----
McLENNAN COUNTY, TEXAS

APPENDIX VI.A
GROUNDWATER SAMPLING AND ANALYSIS PLAN

Prepared for:

SANDY CREEK SERVICES, LLC
2161 Rattlesnake Road
Riesel, TX 76682

Prepared by:



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Revision 0 – January 2022
SCS Project No. 16221059.00

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TBPE Reg. # F-3407

1 PE CERTIFICATION

STATE OF TEXAS
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PROFESSIONAL ENGINEER

Brett DeVries 1/13/22

I, Brett DeVries, Ph.D., P.E. and Glen Collier, P.G, hereby certify that the statistical method, as described in this Plan, is appropriate for evaluating the groundwater monitoring data for the Sandy Creek Energy Station Coal Combustion Residual Waste Management Facility. This Plan was prepared by or under my supervision. I am a duly licensed Professional Engineer or Professional Geologist under the laws of the State of Texas.

Brett DeVries, Ph.D., P.E.
(printed or typed name)

License number 128061

My license renewal date is 9/30/2022

STATE OF TEXAS
GLEN A. COLLIER
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Glen A. Collier, P.G.
(printed or typed name)

License number 25

My license renewal date is 12/30/2021

2 INTRODUCTION

This Groundwater Sampling and Analysis Plan (GWSAP) has been prepared for Sandy Creek Services, LLC (Owner and Operator) of the Sandy Creek Energy Station (Plant) Coal Combustion Residual (CCR) Waste Management Facility (Landfill), located in McLennan County. It has been developed in accordance with Title 30 of the Texas Administrative Code (30 TAC) §352.931 and Title 40 of the Code of Federal Regulations (40 CFR) §257.93, and following TCEQ's Coal Combustion Residuals Groundwater Monitoring and Corrective Action Draft Technical Guideline No. 32. This GWSAP provides procedures and techniques for groundwater monitoring for consistency and to maintain data quality throughout the life of the program.

Six wells (BW-1, MW-1, MW-2, MW-3, MW-4, and MW-5) comprise the groundwater monitoring system of the Landfill. Background monitoring for wells MW-1, MW-2, MW-3, and BW-1 commenced in December 2015 and was completed in August 2017. The wells are currently in detection monitoring. Monitoring wells MW-4 and MW-5 are currently in background monitoring.

3 GROUNDWATER SAMPLING PROCEDURES

The following sampling procedures are designed to aid in obtaining representative groundwater samples at each well. These or equivalent procedures are to be followed by all personnel conducting groundwater monitoring well sampling (sampler).

3.1 GENERAL FIELD PROCEDURES

The sampler will refrain from using organic sprays or other potential contaminants to remove any insects found on or in the casing, or organic lubricants on well components such as hinges and locks. Topical skin care products may also contain organic compounds and will not be allowed to contaminate the area or the sample.

Sampling equipment will include a container for measuring bailed or purged well fluids and a container for measuring temperature, specific conductance, and pH. Field instruments for measuring pH and specific conductance will be calibrated following manufacturer's instructions prior to the sampling event.

Decontamination equipment will include suitable materials such as spray bottles with appropriate phosphate-free detergent and/or clean water, and additional rinse water bottles as needed.

3.2 WELL INSPECTION

The components of the well and its surroundings will be verified to be in good condition, and the well will be clearly identified. The casing, concrete pad, protective collar, and protective barriers will be checked for damage or deterioration. The sampler will check that the lid of the protective collar has a lock, that the lock is functional, and that the lid was locked when the sampler visited the well. The condition of the well cap will be noted. Also, the sampler will note the proximity of the well to potential sources of contamination, including facility roads.

The wells will also be inspected for damage, excessive vegetation, and other deficiencies by Plant Personnel or qualified person on a monthly basis and on an annual basis by a qualified professional engineer as outlined in Section 3 of Part III – Site Operating Plan.

3.3 MEASUREMENT OF GROUNDWATER ELEVATIONS

Before purging a well, the sampler will measure and record the depth to water at every event. The sampler also will measure and record the depth to the bottom of the well at least once every other calendar year. All depth measurements will be taken from a permanent, clearly marked and identifiable reference point, or datum. The datum is typically a notch or a point marked with permanent marker at the top of the well casing, and will be documented on the Well Data Sheet for each well. The water level indicator probe will be decontaminated before use in each well. The sampler will include in the field log any indication of organic compounds that have formed a liquid separate from the groundwater. The sampler will calculate the elevation of the water level with respect to mean sea level and record it to the nearest hundredth of a foot.

Water level measurements will be collected from the highest water elevation to the lowest water elevation wells (based on previous event results) unless any constituents are detected at concentrations of concern. If the constituents are detected at concentrations of concern, then water level measurements will be collected from the least to greatest impacted well.

3.4 WELL PURGING

Each well will be purged prior to sampling. Purging will remove stagnant water in the well casing and allow formation water to enter the well for sampling. Based on well construction, depth to water, recharge rate, and analytical results to date, purging with a bailer is the primary purging method. Acceptable alternative methods include purging with a pump and low-flow purging and sampling.

The order of well purging will be from the highest water elevation to the lowest water elevation wells (based on water level measurements obtained immediately prior to the event), unless non-naturally occurring impacts are confirmed. In the event that non-naturally occurring impacts are confirmed, purging will be conducted from the least-impacted to the most impacted well.

During the purging operations, a field log or equivalent, will be maintained that will record pertinent data and noteworthy observations. The information will include the following:

- Sampler's name.
- Date and time.
- Outdoor temperature and weather conditions.
- Initial depth to water, well depth, and calculated height and volume of the water column.
- Desired well volume to purge (for example, three casing volumes).
- Purge-discharge rate, if known, and purge duration (elapsed time).
- Volume of water actually purged from a well.
- Low-flow parameter readings, if a low-flow method is used.
- Well inspection results.
- Any other pertinent information.

Water purged from each well, along with unused water obtained during sampling and water used for decontamination, is to be collected and disposed as follows: purge and decontamination water will be collected in drums and stored for subsequent disposal in an approved manner. Analytical data will be reviewed prior to disposal of the water.

3.4.1 PURGING WITH BAILER

When purging with a bailer, the sampler will take extra care to avoid introducing contaminants to the water in the well, and use disposable gloves, a new pair for each well, to avoid cross-contamination. Bailers will have a bottom emptying device that allows the bailer to be emptied slowly with minimum aeration of the sample.

Each monitoring well will be purged immediately prior to sample collection with a dedicated bailer. Purge water can be measured in a known volume container such as a 5-gallon bucket. Purged water from the monitoring wells will be discharged into drums. Each well will be purged until three well volumes are removed or until dry. If a well goes dry during the purging process, it is deemed sufficiently purged.

The volume of water to be purged will be calculated as follows:

The depth of water in the well column is calculated by subtracting the depth to the water surface from the total depth of the well casing. The volume per foot of 2-inch diameter, schedule 40 PVC well casing is 0.163 gallons. The amount of water present in the well casing can be calculated by multiplying the depth of water by the value above for the proper casing diameter. The volume to be purged is three times the well casing volume.

Example:

Total depth of well casing (feet)	20.00
Depth to groundwater (feet)	- 9.50
Depth of water column (feet)	10.50
Gallons per foot of 2-inch casing	x 0.163
Amount of water in casing (gallons)	1.71
Three well volumes	x 3
Total volume to be purged (gallons)	5.13

3.4.2 LOW-FLOW PURGING

Low flow purging is a widely used method of well purging which involves removal of well water in a manner that minimizes drawdown, turbidity, and disturbances to the groundwater. The sampler will place the pump intake in the middle of the screened interval to avoid mixing formation water with sediments in the well bottom or overlying stagnant water within the well casing, unless water levels within the screen are low enough to warrant a lower pump intake placement. A dedicated purging and sampling device will be used, but if non-dedicated equipment is used, it will be decontaminated between wells to prevent cross-contamination.

Water levels will be measured and recorded before pumping. After purging is initiated, the flow rate will be adjusted to maintain a minimal drawdown. The minimum well-purge volume will be at least two pump and tubing volumes.

Field parameters will be continuously monitored during purging, preferably with a flow-through cell. Stabilization of parameters such as pH, specific conductance, dissolved oxygen (DO), oxidation-reduction potential (ORP), temperature, and turbidity will be used to determine when stagnant casing water has been purged and formation water is available for sampling. A minimum subset will include pH, specific conductance, and temperature.

Measurements will be recorded every three to five minutes. Stabilization is considered achieved when the parameters are within tolerances listed below for three successive readings.

- ±0.1 units for pH;
- ±3% for specific conductance;
- ±10 millivolts for ORP; and
- ±10% for turbidity and DO.

3.4.3 PURGING WITH A PUMP

Purging with electric, or air-operated pumps at higher speeds than low-flow rates is acceptable. Generally a peristaltic pump is used but a submersible or pneumatic pump may be used, depending on the amount of lift required. Pumps and tubing will be limited to those made of stainless steel, Teflon®, or other resistant materials. Care should be taken to prevent air from contacting the water and to minimize aeration in the well.

The following procedures should be implemented when purging by a non-low-flow method:

- For each well, the pump and tubing will be clean to minimize cross-contamination between wells.
- The volume of water in each well will be calculated using the method described under Section 3.4.1 of this Plan.
- To avoid stirring up accumulated sediments at the bottom of the well, the pump level will be at least three to five feet from the bottom of the well, if possible.
- The volume of water purged will be measured using a flow meter or by discharging in a graduated container.
- The well should be purged at a rate low enough to prevent groundwater that is recharging the well from cascading down the sides of the well, if possible.

- Continue purging until the desired volume, as calculated in Section 3.4.1, has been purged, unless the well goes dry before the purging process is completed.

3.5 SAMPLE COLLECTION (30 TAC §352.931 [40 CFR §257.93(a)(1)])

Using the bailer sampling method, groundwater samples will be collected with a disposable PVC bailer utilizing a bottom emptying device to reduce aeration and turbulence. A new disposable bailer will be used for each well. All samples will be placed directly into the appropriate sample vessel without the use of transfer containers, taking care not to allow the sampling device to touch the sample container.

The order of well sampling will be from the highest water elevation to the lowest water elevation wells (based on water level measurements obtained immediately prior to the sampling), unless non-naturally occurring impacts are confirmed. In the event that non-naturally occurring impacts are confirmed, sampling will be conducted from the least-impacted to the most impacted well.

The elapsed time between purging and sample collection will be as short as practical, to avoid temporal variations in water levels and water chemistry. Preferably, sampling will be done within 24 hours of purging. The sampler will measure the water level in each well again before sampling to determine whether there is enough water for sampling, especially if the well went dry during purging. Where practicable, the water level in a well will be allowed to recover to 90 percent of the level that existed prior to purging, before collecting a sample. To allow wells that were purged dry to recover sufficiently to sample, or suspended sediments to settle, the sampler may have to wait several hours or several days between purging and sampling.

The sampler may allow up to seven days recovery time after purging a well before determining that the well is dry or has not recharged sufficiently to sample. If after seven days a slowly recharging well has not recovered sufficiently for a complete set of samples, the sampler will collect a partial set of samples in the order specified in this GWSAP, or in another order if warranted by conditions and data needs, until no more samples for the well can be collected. If non-naturally occurring impacts are known to be present in one or more wells at the Landfill, the sampler will begin the sampling at the well that is known to be the least impacted and end with the most impacted well. Where no non-naturally-occurring impacts are known, the order will generally be from the well with the highest water-level elevation to the one with the lowest elevation (that is, from upgradient to downgradient) for wells screened in the same water-bearing unit.

Disposable gloves (non-powder latex, nitrile, or equivalent) will be worn during all sample collection procedures. Soiled equipment such as sample bottles, gloves, bailers or bottom emptying devices will not be reused until decontaminated. Water removed during sampling that is not placed in sample bottles will be handled in a manner similar for purged water.

For low-flow purging and sampling, samples will be collected following removal of the calculated purge volume and stabilization of field parameters. For sampling with non-low flow procedures, sampling will be collected following removal of the calculated purge volume and field parameter stabilization, and after sufficient recharge has occurred.

3.6 SAMPLE CONTAINERS AND LABELS

Water samples collected are to be placed into laboratory-cleaned bottles of the appropriate size and construction for the chemical constituents to be analyzed. Sample containers will be marked as described below.

Sample labels will be affixed to each sample container and will contain the following information in waterproof ink:

- Project name (includes site name);
- Sample and well number;
- Date and time of sample collection; and
- Special handling instructions.

Quality Assurance and Quality Control (QA/QC) samples will be labeled accordingly. Duplicate samples will be labeled in a manner to prevent the laboratory from knowing which well produced the duplicate.

3.7 SAMPLE PRESERVATION AND SHIPMENT (30 TAC §352.931 [40 CFR §257.93(a)(2)])

No samples will be filtered in the field before shipping. Filtering is allowed by the laboratory only if required to protect sensitive analytical equipment.

Samples to be shipped will be packed in a hard-sided, insulated, shipping container pre-cooled with water ice. The sample containers will be packed to prevent breakage. Water ice used to pre-cool the shipping container will be discarded and adequate ice added to maintain the temperature at about 4°C during shipment. Dry ice will not be used for chilling.

3.8 QUALITY ASSURANCE AND QUALITY CONTROL (30 TAC §352.931 [40 CFR §257.93(a)(5)])

To document that sample collection and handling procedures used in the field have not affected the quality of groundwater samples, blanks are to be prepared and analyzed. These blanks consist of one duplicate sample per sampling event. Equipment blanks will not be required due to the use of disposable equipment. Field blanks will not be required because no volatile constituents will be analyzed.

Duplicate samples will be analyzed for the detection monitoring constituents listed in Table 5-1.

3.9 CHAIN-OF-CUSTODY DOCUMENTATION (30 TAC §352.931 [40 CFR §257.93(a)(4)])

A chain-of-custody (COC) form will be maintained in order to track possession and handling of samples from field collection through laboratory testing in accordance with 40 CFR §257.93(a)(4). COC records show the custody of samples at all times. Samples are considered in the custody of an individual when they are either in the individual's sight or securely under the individual's control.

COC documentation will be maintained on a chain-of-custody record form. Each sample will be logged onto the COC record form as it is collected. Information on the COC record form typically includes the following, as appropriate:

- Project name (includes site name);
- Site location;
- Sample number;
- Sample date and time;
- Sample type;
- Number and type of sample containers;
- Analyses required;
- Sample preservative;
- Lab destination;
- Carrier/shipping number;
- Special instructions; and
- Spaces for signatures of sampler(s) and everyone assuming sample custody.

The COC record will contain the signatures of anyone assuming custody of the samples. Each time custody changes hands, the party releasing the samples signs under "Relinquished By" and records the date and time. The party receiving the samples signs under the heading "Received By" and records the date and time. The COC form is typically provided by the analytical laboratory. When the sample container(s) are relinquished for shipping, the shipping paperwork constitutes the COC for that period when the sample(s) are in the custody of the shipper.

3.10 EQUIPMENT DECONTAMINATION

Reusable sampling equipment and measurement instruments coming in contact with the groundwater in wells or in samples are to be decontaminated before use at each well location. Standards or equivalent procedures for decontamination of well purging and sampling equipment consist of washing the equipment with a nonphosphate detergent and rinsing with deionized water. Waste decontamination water and cleaning agents will be placed in drums that are used to contain well purge water.

3.11 FIELD DOCUMENTATION

Field activities will be thoroughly documented in the field log, forms, or equivalent. Below is an outline of the information that is documented during field activities, as appropriate for the conditions.

- Project name;
- Date and time of all activities;
- Sampler;
- Field instrument calibration methods and remarks;
- Well identification number;
- Well description, including casing size;
- Description of well condition;
- Initial water-level measurement with point of reference (top of casing) and time of measurement;
- Well volume calculations;
- Presence and thicknesses of immiscible layers, if present;
- Physical description of groundwater (color, odor, turbidity);
- Temperature, conductivity, and pH measurements;
- Sample time, date and description; and
- Samples collected (number of bottles).

4 LABORATORY QUALITY ASSURANCE AND QUALITY CONTROL

All analytical data submitted will be examined so that the data quality objectives are considered and met prior to submittal. The quality assurance and quality control (QA/QC) results, supporting data, and data review by the laboratory will be included. Any potential impacts will be reported such as the bias on the quality of the data, footnotes in the report, and anything of concern that was identified in the laboratory case narrative summary.

The laboratory will document and report all problems and observed anomalies associated with the analysis. If analysis of the data indicates that the data fails to meet the quality control goals for the laboratory's analytical data analysis program, the Landfill Owner/Operator in consultation with the laboratory and consultant will determine if the data is usable. If the evaluation determines the analytical data may be utilized, the problems and corrective action that the laboratory identified during the analysis will be included in a Laboratory Case Narrative (LCN).

A LCN report for problems and anomalies observed will be included with the report. The LCN will report the following information:

- The exact number of samples, testing parameters and sample matrix.
- The name of the laboratory involved in the analysis. If more than one laboratory is used, all laboratories will be identified in the case narrative.
- The test objective regarding samples.
- Explanation of each failed precision and accuracy measurement determined to be outside of the laboratory and/or method control limits.
- Explanation if the effect of the failed precision and accuracy measurements on the results induces a positive or negative bias.
- Identification and explanation of problems associated with the sample results, along with the limitations these problems have on data usability.
- A statement on the estimated uncertainty of analytical results of the samples when appropriate and/or requested.
- A statement of compliance and/or noncompliance with the requirements and specifications. Exceedance of holding times and identification of matrix interferences will be identified. Dilutions will be identified and if dilutions are necessary, they will be done to the smallest dilution possible to effectively minimize matrix interferences and bring the sample into control for analysis.
- Identification of any and all applicable quality assurance and quality control samples that will require special attention by the reviewer.

- A statement on the quality control of the analytical method of the permit and the analytical recoveries information will be provided when appropriate and/or when requested.

In addition to the LCN, the following information will be submitted for all analytical data:

- A table identifying the field sample name with the sample identification in the laboratory report.

- Chain of custody.

- An analytical report that documents the results and methods for each sample and analyses to be included for every analytical testing event. These test reports will document the reporting limit/method detection limit the laboratory used.

5 GROUNDWATER MONITORING REQUIREMENTS

Groundwater monitoring is to follow the requirements for detection, assessment, and corrective action monitoring as outlined in applicable parts of 30 TAC §352.931 and 40 CFR §257.93.

5.1 GROUNDWATER MONITORING PARAMETERS AND ANALYTICAL METHODS (30 TAC §352.931 [40 CFR §257.93(a)(3)])

The Landfill will establish background limits for the constituents listed in Appendix III and Appendix IV of 40 CFR Part 257, adopted by reference in 30 TAC §352.1421 and §352.1431, and listed in Table 5-1.

Table 5-1 Constituents to be Tested

Part 257 Appendix	Constituent	Method Number
III	Boron	6010B
III	Calcium	6010B
III	Chloride	9056
III	Fluoride	9056
III	pH	9040C
III	Sulfate	9056
III	Total Dissolved Solids	160.1
Part 257 Appendix	**Constituent**	**Method Number**
IV	Antimony	6010B
IV	Arsenic	6010B
IV	Barium	6010B
IV	Beryllium	6010B
IV	Cadmium	6010B
IV	Chromium	6010B
IV	Cobalt	6010B
IV	Fluoride*	9056
IV	Lead	6010B
IV	Lithium	6010B
IV	Mercury	7470A
IV	Molybdenum	6010B
IV	Selenium	6010B
IV	Thallium	6010B
IV	Radium 226/228	903.1/904.0

*Fluoride is listed twice in Table 5-1 because Part 257 includes it in both Appendices III and IV

Approved analytical methods to be used for testing are listed for each constituent in Table 5-1; equivalent or better methods may be substituted.

5.2 MONITORING FREQUENCY

Eight (8) background samples will be obtained quarterly. This interval is estimated to be sufficient to obtain "statistically independent" samples and allow for seasonal variation.

After the completion of background monitoring, the monitoring wells will be sampled twice a year at roughly 6-month intervals for the constituents listed in Appendix III. An effort will be made to perform the semiannual sampling consistently in the same (2) months each year.

Monitoring wells BW-1, MW-1, MW-2, and MW-3 completed the eight (8) background samples in August 2017; and at the time of developing this Registration Application, MW-4 and 5 have completed three of the background samples.

5.3 STATISTICAL METHODS (30 TAC §352.931 [40 CFR §257.93(g)])

Once background sampling is completed, statistical evaluation of Appendix III detection groundwater-monitoring constituents is required. The statistical analysis will meet the standards described in 40 CFR 257.93(g), and will include use of time series charts, Shewhart-CUSUM control charts for normally-distributed data, and prediction intervals for data that could not be normalized. Intra-well statistical methods are appropriate in most cases. In some circumstances, such as significant concentrations of constituents in upgradient wells, inter-well methods may be the most appropriate. As the database increases over time, different statistical methods may be required.

Statistical analysis will be performed on each of the Appendix III constituents that are detected in downgradient wells, using methods cited above that are appropriate for the distribution of the concentration values of the constituents. Statistical analysis will commence upon completion of the first detection monitoring event for each downgradient well.

A Statistically Significant Increase (SSI) will be determined using procedures as described above and outlined in §257.93(g) and (h). The analysis will be aided by an electronic database used in conjunction with software suited to statistical analysis of groundwater monitoring data. An unconfirmed SSI can be verified by resampling within sixty (60) days of determining the unconfirmed SSI.

If there is a reasonable cause to think that a source other than the Landfill caused the SSI or that the SSI resulted from error in sampling, analysis, or statistical evaluation, or from natural variation in groundwater quality, then a report demonstrating the alternate source may be issued. In accordance with TAC §352.951(d), to pursue an Alternate Source Demonstration (ASD), the intention for must be made in writing to the executive director of the TCEQ within 14 days of determining an SSI over background limit. The ASD will be submitted within 90 days of determining an SSI.

Unless an ASD is completed in accordance with §257.94(e)(2), assessment monitoring will be implemented in accordance with §257.93(h) and §257.95 whenever a SSI has been confirmed for one or more of the Appendix III constituents. In accordance with §257.95(b), within ninety (90) days of confirming an SSI, and annually thereafter, each well will be sampled for all Appendix IV constituents, in addition to the routinely sampled Appendix III constituents. Any constituent(s) detected as a result of the Appendix IV analysis will continue to be analyzed during subsequent semiannual events in accordance with §257.95(d)(1). Eight (8) semiannual samples from each well will be collected and analyzed for the detected Appendix IV constituents to establish background levels for the additional Appendix IV constituent(s). In accordance with §257.95(e), if all of the Appendix III and IV constituents fall below statistical background levels for two (2) consecutive events, normal detection monitoring of Appendix III constituents will resume. If concentrations of any constituents remain above background levels, assessment monitoring will continue in accordance with §257.95(f).

If one or more of the Appendix III or IV constituents exceeds the background statistical level established by eight (8) events, one of following two (2) procedures will be implemented:

(1) Procedures listed in §257.95(g) will be followed, including implement Assessment of Corrective Measures as detailed in §257.96 and subsequent actions detailed in §257.97 and §257.98. The nature and extent of any release will be characterized. At least one (1) additional monitoring well will be installed between the monitoring well with the SSI and the Landfill Registration Boundary.

(2) Demonstrate a source other than the Landfill is the cause of the SSI in accordance with §257.97 257.95(g)(3)(ii).

6 RECORDKEEPING, NOTIFICATION, AND POSTING OF INFORMATION TO THE INTERNET ((30 TAC §352.931 [40 CFR §257.93 (J)])

The Landfill Owner/Operator will maintain a copy of this Plan in the Site Operating Record and on the Landfill's publicly accessible website consistent with 40 CFR §257.105(f), §257.106(f), §257.107(f), and Section 4 of the SOP (Part V).

All reports will be prepared under the supervision of and certified by a registered professional engineer in the State of Texas. Recordkeeping, reporting, and public notification will be implemented in accordance with §257.105 through §257.107. An annual groundwater monitoring report will be prepared in accordance with §257.105(h), placed in the Site Operating Record, and posted in the Landfill's publicly accessible website consistent with §257.107. Quarterly and semiannual reports will be prepared in accordance with §257.105(h)(6), placed in the Site Operating Record, and posted in the Landfill's publicly accessible website consistent with §257.107.

If one or more constituents in Appendix IV are detected at statistically significant levels above the groundwater protection standard established for the Landfill, the Landfill Owner/Operator will notify the TCEQ and any local pollution agency with jurisdiction that has requested to be notified, in writing within 14 days of the determination in accordance with §352.951(d). If one or more constituents in Appendix IV are detected at statistically significant levels above the groundwater protection standard established for the groundwater protection standard established for the Landfill, the Landfill Owner/Operator may submit an alternative source demonstration in accordance with §257.95(g)(3) to the TCEQ for review. This demonstration will be submitted to the TCEQ and any local pollution agency with jurisdiction within 90 days of detection and will be certified in accordance with §352.4.

In accordance with 30 TAC §352.931(b), any changes to this GWSAP will be approved by the TCEQ in accordance with §352.131.

APPENDIX VI.B

GEOLOGY AND GROUNDWATER SUPPLEMENTAL INFORMATION

GROUNDWATER MONITORING SYSTEM CERTIFICATION REPORT FOR SOLID WASTE DISPOSAL FACILITY, SANDY CREEK ENERGY STATION, RIESEL, MCLENNAN COUNTY, TEXAS, GEOSYNTEC CONSULTANTS, MARCH 2016.

GROUNDWATER MONITORING SYSTEM CERTIFICATION REPORT FOR SOLID WASTE DISPOSAL FACILITY

Sandy Creek Energy Station
Riesel, McLennan County, Texas

Submitted to

NAES

NAES Corporation Sandy Creek Energy Station
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March 2016

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SECTION 1

INTRODUCTION

1.1 Purpose

The purpose of this report is to present the groundwater monitoring system for the Solid Waste Disposal Facility (SWDF) at the Sandy Creek Energy Station (Site) in Riesel, McLennan County, Texas and to demonstrate it complies with the United States Environmental Protection Agency's (EPA's) groundwater monitoring system requirements of the new Coal Combustion Residuals (CCR) Rule (40 CFR § 257.91).

This report was prepared by Mr. Alexander Brewster and Ms. Lindsay O'Leary, P.E. of Geosyntec Consulants (Geosyntec) and reviewed by Dr. Beth Gross, P.E., also of Geosyntec, in accordance with the senior review policies of the firm.

1.2 Report Organization

This report is organized as follows:

- Section 2, Background Information, describes the Site location, the SWDF layout and design, and the regional and site settings with respect to geology and hydrogeology;

- Section 3, Piezometers and Monitoring Wells, describes piezometer and well design, installation, construction, development, slug tests, and survey;

- Section 4, Considerations for Groundwater Monitoring System Design, describes the uppermost water bearing zone beneath the Site, observed groundwater elevations and flow directions, average flow rate, and SWDF features considered during design of the groundwater monitoring system;

- Section 5, Certification, provides certification of the groundwater monitoring system by qualified professional engineers; and

- Section 6, References, lists references that were used in development of this Report.

Appendices A to D, respectively, contain boring logs, monitoring well and piezometer data, State of Texas well reports, and survey data. Appendix E contains supplemental documentation on the geotechnical investigations that have been conducted at the Site.

SECTION 2

BACKGROUND INFORMATION

2.1 Site Location

The 698-acre Sandy Creek Energy Station is located in southeast McLennan County approximately 17 miles southeast of Waco, Texas, west of the City of Riesel. It is bounded on the south by FM 1860 and on the west and north by Rattlesnake Road (Drawing 1).

2.2 Description of SWDF

The SWDF is a CCR landfill located on the southwest corner of the Site (Drawing 1). It is operated under Texas Commission on Environmental Quality (TCEQ) Registration No. 88448 and used for disposal of CCR and incidental waste generated during coal combustion at the Site.

The SWDF will ultimately occupy approximately 65 acres and will consist of four cells, referred to as Cells 1 to 4 (Drawing 1). The base of Cell 1 was constructed approximately at grade, while the based of Cell 2 was constructed up to about 15 feet (ft) below grade. Subgrade elevations for the cells range from approximately 449 to 495 ft-mean sea level (ft-msl). Waste placement in the SWDF began in Cell 1 after start up of the Sandy Creek Energy Station in October 2011. Because the start up period took an extended period of time, only a small amount of waste was placed during the first year of landfill operation. Cell 2 was constructed in early 2014. As of November 2015, Cell 1 had been filled to its initial waste grades, and waste placement was occurring in the south end of Cell 2. Waste had not been placed on the north side of Cell 2. Based on the current waste generation rates, it is anticipated that Cell 3 will not be operational until 2022. The approximate design life of the SWDF is 35 years.

The liner system for the SWDF is designed to convey leachate to the south side of the landfill for removal. The liner system for Cell 1 consists of a 3-ft thick compacted clay liner (with hydraulic conductivity no greater than 1×10^{-7} centimeter/second [cm/s]) overlain by a 6-in. thick protective soil layer and then a leachate collection piping system with pipes at 50-ft spacings. The liner system for Cell 2 consists of, from bottom to top: a 3-ft thick compacted clay liner (with hydraulic conductivity no greater than 1×10^{-7} cm/s), double-sided geocomposite drainage layer for leachate collection, and 1-ft thick protective cover.

Leachate from the SWDF is piped to a leachate evaporation pond located southwest of Cell 2 (Figure 1). The pond has a composite liner consisting of a 2-ft thick compacted clay liner (with hydraulic conductivity no greater than 1×10^{-7} cm/s) overlain by a 60-mil thick high density polyethylene (HDPE) geomembrane.

2.3 Regional Setting

2.3.1 Physiography

As described by Black and Veatch Corporation (B&V) (2009), the Site lies in the Blackland Prairies province of the Gulf Coastal Plains. This province is located northeast of the Central Texas uplift and consists of chalks and marls that weather to clay soils.

2.3.2 Geology and Hydrogeology

Two integrated geologic formations of the Taylor Group from the Upper Cretaceous period lie below the site. The uppermost is the Wolfe City Formation, which consists of marl, sand, sandstone, and clay interbedded with thin sandstone and sand lenses and was estimated by B&V (2009) to be approximately 150 ft thick at the Site. The Ozan Formation, primarily clay, grades upward into the Wolfe City and is reported to be 500 to 775 ft thick in the Waco area (Proctor et al., 1970).

Below the Taylor are three addition groups of the Upper Cretaceous period (Austin, Eagle Ford, and Woodbine) and two groups of the Lower Cretaceous period (Washita and Fredericksburg), which consist primarily of chalk, limestone, marl, clay, and shale and overlie the Trinity Group (American Association of Petroleum Geologists [AAPG], 1979). The Trinity Group includes, from top to bottom, the Paluxy, Glen Rose, and Travis Peak/Twin Mountains Formations, which compose the uppermost aquifer beneath the Site (George et al., 2011). The Trinity Aquifer, a major aquifer in Texas, generally consists of sands, gravels, and conglomerates interbedded with limestone, shale, clay and marl. There are no other minor or major aquifers in the vicinity of the Site (George et al., 2011). The Trinity Aquifer is located more than 1,000 ft below ground surface at the Site and has combined freshwater saturated thickness of approximately 1,000 ft (George et al., 2011). The overlying Cretaceous formations serve as confining units between the SWDF and the Trinity Aquifer. Due to the significant thickness of these units, the potential for landfill constituents to migrate from the SWDF to the Trinity Aquifer during the active life and post-closure care period does not exist. Therefore groundwater monitoring of the Trinity Aquifer beneath the Site is not warranted.

2.4 Site Setting

2.4.1 Topography

Natural grades at the Site range from approximately 415 to 520 ft-msl (Drawing 1 and Appendix E). With development, a number of the natural drainage features at the Site were filled with soil to create relatively flat areas for infrastructure construction. In the area of the SDWF, ground slopes to the southwest (Figure 1).

2.4.2 Stratigraphy

Three stratigraphic units were identified in soil borings conducted to depths of up to 100 ft at the Site (B&V, 2009, 2010; Geosyntec, 2010, 2015). From top to bottom, these strata generally consist of:

- Stratum I: 1 to 12-ft thick (typical), dry to moist, soft to firm, high plasticity, brown clay with trace amounts of rounded sand and gravel;

- Stratum II: within 10 to 45-ft below ground surface (typical), dry to moist, firm to stiff, high plasticity yellow-brown clay grading to gray with depth, with trace amounts of subrounded sand and gravel, occasional horizontal seams of fine sand in the upper portions of the stratum, and horizontal and vertical deposits of gypsum throughout the layer; and

- Stratum III: dry to moist, hard, high plasticity, fissile, gray clayshale with infrequent fine sand layers and very infrequent fissures and joints, typically found below depths of 50 ft in uplands and 25 ft in bottom valleys.

The locations and logs of the borings drilled in the vicinity of the SWDF and discussed in the B&V (2010) report are provided in Appendix E. The geologic cross section for the SWDF area developed by B&V (2010) is also included in Appendix E. In addition to Strata I to III, Geosyntec also encountered soil fill when drilling. The locations and logs of the borings drilled in 2010 and 2015 in the vicinity of the SWDF under the direction of Geosyntec are provided in Appendices A and E. The results of geotechnical laboratory tests conducted on soil samples collected by B&V and Geosyntec during subsurface investigation activities are also included in Appendix E.

Cells 1 and 2 of the SWDF as well as the leachate evaporation pond extend into Strata I and II clayey soils.

2.4.3 Hydrostratigraphy

While B&V (2009) found groundwater in Stratum II at depths of 14 to 43 ft below ground surface in some of the borings and all of the piezometers in the northwest portion of the Site, they did not encounter groundwater in borings drilled in the vicinity of the SWDF. B&V (2009) concluded that water flowed in cracks and fissures in the clay. The majority of the fissures were in-filled with sand and gypsum, indicating secondary mineralization and water flow at certain depths, and some fissures were stained with iron oxide. In the northwest portion of the Site free water was commonly encountered within the sand layers found in Stratum II at depths greater than 20 ft. The groundwater encountered in Stratum II is considered transient and perched and is not expected to be found in significant quantities. Hydraulic conductivity tests were conducted on four undisturbed soil samples collected from Stratum II. Measured vertical hydraulic conductivities ranged from to 4.6×10^{-9} to 6.6×10^{-8} cm/s (Appendix E). Slug tests were conducted by Geosyntec in three borings drilled in 2010 in the vicinity of the leachate evaporation pond. Estimated horizontal hydraulic conductivities for Stratum II ranged from 1.2×10^{-4} to 3.1×10^{-4} cm/s over saturated soil thicknesses of approximately 7.8 to 12.5 ft.

Based their hydrogeologic characteristics, Stratum I is generally an unsaturated zone, Stratum II is the uppermost water bearing zone beneath the Site, and Stratum III is an aquitard or lower confining layer for Stratum II. The top of Stratum III generally follows topography and slopes to the southwest in the SWDF area.

EPA's new CCR Rule requires monitoring of groundwater in the uppermost aquifer beneath an active CCR landfill. As defined by 40 CFR §257.53, "*Aquifer* means a geologic formation, group of formations, or portion of a formation capable of yielding usable quantities of groundwater to wells or springs." The uppermost aquifer, the Trinity Aquifer, is located more than 1,000 ft below ground surface and is isolated from the Site by thick Cretaceous confining units. With this significant hydraulic isolation, there is no need to monitor the Trinity. As is standard practice in Texas and other states for landfills sited over clay formations, the uppermost water bearing zone is often considered an "aquifer" for groundwater monitoring purposes. Although Stratum II is not an aquifer and does not yield useable quantities of water for water supply, it is anticipated to yield sufficient groundwater for a groundwater monitoring program.

SECTION 3

PIEZOMETERS AND MONITORING WELLS

3.1 Overview

In August and September 2010, Geosyntec directed the drilling of five soil borings (GB-1 to GB-5) in the vicinity of the current leachate evaporation pond to collect geotechnical data and evaluate groundwater levels in the pond area as part of the pond design. The subsurface investigation program was completed under the direction of Edward B. Dolan, P.G., a licensed geoscientist in the State of Texas. Boring locations are shown on Figure 1. Piezometers were constructed in borings GB-1 to GB-4 and screened in Stratum II above the Stratum II/Stratum III interface. While water levels were recorded in Piezometers GB-2 to GB-4, Piezometer GB-1 remained dry. Slug tests were conducted in Piezometers GB-2 to GB-4. Piezometers GB-1 and GB-4 were decommissioned prior to pond construction.

In September 2015, Geosyntec directed the drilling of five additional borings (GB-6, GB-7, BW-1, MW-1, and MW-2) in the SWDF area as part of the development of the proposed groundwater monitoring system. The subsurface investigation program was completed under the direction of Lindsay A. O'Leary, P.E., a licensed professional engineer in the State of Texas. Boring locations are shown on Figure 1. Borings GB-6 and GB-7 were dry and were plugged and abandoned; piezometers were installed in BW-1, MW-1, and MW-2 and screened in Stratum II above the Stratum II/Stratum III interface.

Based on the location of the piezometers relative to SWDF, four piezometers are proposed to be used as wells in the groundwater monitoring system. Well BW-1 will serve as the background well, and Wells MW-1, MW-2, and MW-3 (former GB-3) will serve as downgradient wells. Piezometer GB-2 will be retained for water level measurements to provide more control for evaluating groundwater flow directions and gradients.

Boring logs are provided in Appendices A and E. Well and piezometer construction logs are included in Appendices B and E. State of Texas well reports are provided in Appendices C and E. Piezometer and well survey information is presented in Appendix D. The remainder of this section primarily describes the design, installation, construction, and development of Piezometer GB-2 and Wells BW-1, MW-1, MW-2, and MW-3.

3.2 Piezometer and Well Design and Installation

A Geosyntec engineer provided oversight of piezometer installation in 2010 and groundwater monitoring well installation in 2015. Prior to conducting field work at the Site, Geosyntec prepared a Site-specific Health and Safety Plan (HASP) and a Task Hazard Analysis (THA), contacted the Texas utility notification services and NAES regarding underground utilities and other subsurface lines, and attended a Site-specific health and safety orientation. During field work at the Site, Geosyntec conducted daily safety briefings and utilized the appropriate professional protective equipment (PPE) prescribed in the HASP.

Drilling performed in 2010 used both rotary wash and hollow stem auger; in 2015, the hollow stem auger method was used. Soil cores were collected continuously using a five-foot long CME core barrel, and the core lithology was logged by a Geosyntec engineer in general accordance with American Society for Testing and Materials (ASTM) D 2487. Thin-walled tube samples were also collected at select locations for geotechnical laboratory testing. Drilling equipment was cleaned prior to use at the Site and after completing work at each borehole location. Soil cores and drill cuttings were distributed to the land surface in the vicinity of each borehole. Cleaning water and development water were placed in 55-gallon steel drums with lids, labeled with non-hazardous waste identification decals, and staged on wooden pallets for subsequent management by NAES.

During the 2010 field activities, five borings (GB-1 to GB-5) were drilled 17 to 32 ft below ground surface by Total Support Services of Austin, Texas, a Texas licensed water well driller. Four of the five borings (GB-1 to GB-4) were completed as piezometers; GB-5 was plugged with a cement-bentonite grout mixture. In general, piezometers were installed though Strata I and II and approximately 1-ft into Stratum III and were screened 10 ft from the Stratum II/Stratum III interface upward. Piezometers GB-2 to GB-4 subsequently yielded water; Piezometer GB-1 remained dry. Slug tests were subsequently conducted in Piezometers GB-2 to GB-4. Piezometers GB-1 and GB-4 were plugged and abandoned on 12 April 2011, prior to the construction of the leachate evaporation pond (Fugro Consultants, Inc., 2011).

During the 2015 field activities, five borings (GB-6, GB-7, BW-1, MW-1, and MW-2) were drilled 25 to 50 ft below ground surface by Best Drilling Services, Inc. (Best) of Friendswood, Texas, a Texas licensed water well driller. Groundwater was observed in borings BW-1 and MW-1 after the boreholes were left open overnight. Boring MW-2 was initially observed to be dry, but groundwater was observed five days after well development. These three borings (BW-1, MW-1, and MW-2) were completed as piezometers with a similar design to those installed in 2010. Two borings (GB-6 and GB-7) were observed to be dry boreholes with little evidence of water transmission (sand seams, iron oxide staining, gypsum seams). These borings were plugged with a cement-bentonite grout mixture. Geosyntec also observed groundwater in previously-installed Piezometers GB-2 and GB-3.

Based on the observation of groundwater in Piezometer GB-3 in September 2015 and the geographical location of the piezometer relative to the SWDF and leachate evaporation pond, Piezometer GB-3 was redesignated as Well MW-3 and incorporated into the groundwater monitoring network. Although groundwater was also observed in Piezometer GB-2, the piezometer was not considered for use as a well because it is located approximately 40 ft south of the proposed limit of waste (i.e., SWDF footprint) (Figure 1) and will ultimately be overlain by approximately 25 ft of structural fill placed during construction of the southwest portion of the SWDF perimeter berm.

3.3 Piezometer and Well Construction

The Geosyntec engineer logging the borings determined where to set the piezometer and well screens based on the observations of the geologic strata encountered. Boring logs included in Appendix A contain details on the materials accounted and groundwater levels observed at the time of drilling. Details on the piezometer and well construction materials, dimensions, elevations, and locations are included in Appendix B.

The piezometer and wells were constructed with new 2-in. diameter polyvinyl chloride (PVC) casings, screens, and bottom caps supplied in clean plastic bags. All PVC joints were flush threaded. Screens had 0.01-inch slots, which are compatible with the gradation of the sand pack used to fill the annulus between the borehole and the well casing. As described below, all piezometers and wells were cased in a manner that maintains the integrity of the borehole.

The piezometer or well, consisting of a solid casing and slotted screen, was set at the elevation determined by the Geosyntec engineer. The sand pack was then installed by slowly pouring the sand material into the borehole, around the piezometer or well, to approximately 1 to 2 ft above the piezometer or well screen. Then, a 2-ft thick (minimum) bentonite seal was constructed above the sand pack. For BW-1, MW-1, and MW-2, after the bentonite was hydrated, a cement/bentonite grout was gravity fed into the borehole from the top of the bentonite seal to approximately 2 ft below ground surface. For GB-2 and MW-3, due to the proximity of the sand pack to the ground surface, hydrated bentonite chips were placed in the borehole between the top of the sand pack and the concrete pad. The above-ground (i.e., stick-up) piezometer or well was completed by filling the remainder of the borehole with concrete and constructing a concrete pad around it. The stick-up portion of the piezometer or well extended through the concrete pad and was housed in a locking aluminum well casing (i.e., protective outer casing). Concrete bollards (i.e., protection posts) were installed at each corner of the concrete pad. State of Texas well reports documenting the piezometer or well construction were submitted by the drillers to the Texas Water Development Board. Copies of the reports are provided in Appendix C.

3.4 Piezometer and Well Development

Geosyntec developed Piezometer GB-2 and Well MW-3 in 2010 using a surging and purging technique with a surge block and submersible pump. Best developed Wells BW-1, MW-1, and MW-2 and purged Well MW-3 in September 2015 using a submersible pump to surge and purge. The following details the development activities.

Each piezometer and well was first gauged using an electronic water level indicator to obtain the depth to water. For Piezometer GB-2 and Well MW-3, a surge block was used to suspend sediments in water and facilitate sediment removal. A submergible pump was then used to remove the water and sediment. The pump was periodically raised and lowered along the piezometer or well screen (i.e., surged) in order to induce flow out through the screen and thereby flush the fine sediments from the filter pack. After Piezometer GB-2 and Well MW-3 were pumped dry, pumping ceased. Development was resumed six days later after allowing natural recharge to occur. Water quality parameters were measured during well development and used, along with water clarity, to evaluate when development was complete (i.e., water quality parameters had stabilized and the purged water was clear). The water quality parameters and volumes of water removed from the wells were recorded.

For BW-1, MW-1, and MW-2, a submersible pump was used to surge and purge the wells until they were pumped dry. Then potable water was added through the PVC casing and pumping was resumed. This process continued until the water remained visibly clear, at which time the well was pumped dry once more (i.e., removing added potable water). Approximately 80 to 100 gallons of water was added to and pumped from each well. The water quality parameters and volumes of water removed from the wells were measured and recorded.

MW-3 was originally developed in 2010 and subsequently purged in 2015. Best intermittently pumped five gallons of water from MW-3 and then pumped the well dry. MW-3 was allowed to recharge and then pumped intermittently at approximately 5-minute intervals until approximately 10 gallons of water was removed. MW-3 produced visibly clear water throughout purging. The water quality parameters and volumes of water removed were measured and recorded during the process.

Field equipment used for well development was cleaned prior to use between wells, and new tubing was used in each well.

3.5 Slug Testing

In September 2010, Geosyntec performed falling head permeability tests in Piezometers GB-2 and GB-4 and Well MW-3. The tests were performed using a solid "slug" to generate water level changes and a pressure transducer/data logger set up to monitor the water level response in the piezometers and well over time. Estimated horizontal hydraulic conductivities for Stratum II ranged from 1.2×10^{-4} to 3.1×10^{-4} cm/s (0.34 to 0.88 ft/day) over saturated soil thicknesses of approximately 7.8 to 12.5 ft. The calculated geometric mean hydraulic conductivity is 2.0×10^{-4} cm/s (0.55 ft/day). Estimated transmissitivies ranged from 2.9 to 10.9 ft^2/day.

3.6 Piezometer and Well Survey

The physical locations, ground surface elevations (at the edge of concrete pads), and top of the inner PVC casing elevations were surveyed by Walker Partners of Waco, Texas. The survey data are provided in Appendix D.

SECTION 4

CONSIDERATIONS FOR GROUNDWATER MONITORING SYSTEM DESIGN

4.1 Overview

As required by 40 CFR § 257.91, a groundwater monitoring system for a CCR unit, such as the SWDF, must consist of a sufficient number of appropriately located wells to yield groundwater samples from the uppermost aquifer that represent the quality of background groundwater and the quality of groundwater passing the waste boundary of the CCR. Although the rule requires a minimum of one upgradient and three downgradient monitoring wells, the number, spacing and depths of the monitoring wells must be determined based on hydrogeology of the site including aquifer thickness, groundwater flow rates, and direction.

4.2 Thickness of Uppermost Water Bearing Zone

As described in Section 2.4.3, Stratum II is the uppermost water bearing zone beneath the Site and is considered the “uppermost aquifer” for the groundwater monitoring purposes. Based on the boring logs for the monitoring wells, the thickness of the water bearing zone within Stratum II (i.e., the zone with sand or gypsum lenses or iron oxide staining) is on the order of 8 ft in the vicinity of Well BW-1 and 10 to 18-ft thick along the southern boundary of the SWDF.

4.3 Groundwater Elevations and Flow Directions

Groundwater levels in piezometers and wells installed in 2010 and 2015 have been periodically recorded since they were installed and developed. Following stabilization of groundwater levels in the wells recently installed in September 2015, NAES personnel have been recording depth to water (DTW) measurements for Wells BW-1 and MW-1 through MW-3 and Piezometer GB-2 on a monthly basis (Table 1). Groundwater elevations were then calculated by subtracting the DTW measurements from the surveyed elevations of the tops of casings. The top of casing elevations and calculated monthly groundwater elevations are presented in Table 1. Based on the available groundwater data, groundwater elevations on the southern boundary of the SWDF in late 2010 and early 2011 are similar to groundwater elevations in late 2015 and early 2016. It is recommended that groundwater level data continue to be collected and evaluated to further assess the seasonal and temporal fluctuations in the groundwater table and, thus, groundwater flow.

Groundwater elevations observed in October, November, and December 2015 were plotted on a Site map, and potentiometric surfaces for each of these dates were contoured (Figures 2 through 4). Groundwater elevations for January 2016 were not plotted. Observed groundwater elevations, potentiometric surface maps, and the boring logs show that groundwater elevations in Stratum II generally mimics the natural ground surface topography at the site (Drawing 1) as well as the elevation changes of the top of Stratum III. Based on these features, groundwater flow is expected to flow to the southwest. The potentiometric surfaces in Figures 2 to 4 are consistent with this Site conceptual model. The Site conceptual model is consistent with those for other Texas Sites located in similar hydrogeologic settings.

Based on the potentiometric surfaces, natural ground surface topography, top of Stratum III elevations, and locations of the SWDF and leachate evaporation pond, Well BW-1 is considered an upgradient or background well for the SWDF, and Wells MW-1 to MW-3 are considered downgradient wells. Given that only Cells 1 and 2 of the SWDF have been constructed and that these cells have only been fully operational for a relatively short period, it may also be appropriate to use groundwater samples from Wells MW-1 to MW-3 along with those from Well BW-1 to establish background conditions for the SWDF.

4.4 <u>Average Groundwater Flow Velocity</u>

The average velocity of groundwater moving through Stratum II was calculated using Darcy's equation:

$$v = ki/n_e$$

where v = average groundwater velocity (ft/day), k = average hydraulic conductivity (ft/day), i = average hydraulic gradient (ft/ft), and n_e = effective porosity (dimensionless).

Using a geometric mean horizontal hydraulic conductivity estimated from slug tests of 0.55 ft/day, an assumed effective porosity for the clay of 0.05 (i.e., five percent of the soil matrix volume is composed of connected voids), and an average hydraulic gradient of 0.021 ft/ft, the calculated average horizontal groundwater flow rate is 0.24 ft/day (86 ft/yr).

4.5 <u>SWDF Features</u>

4.5.1 Landfill Liner Grades and Sumps

The liner system for Cells 1 and 2 is designed with a compacted clay liner and leachate collection system graded to convey leachate to the southwest corner of the cells. Leachate heads in the cells are anticipated to be highest at these locations and, therefore, the potential for leachate migration into the compacted clay liner is greater at these locations than elsewhere in the cells. Monitoring well MW-1 is located downgradient of the Cell 2 sump, and Monitoring Well MW-2 is located downgradient of the Cell 1 sump and the leachate evaporation pond. Based on the available groundwater data, Monitoring Well MW-3 is located downgradient of the sump of future Cell 3 and the leachate evaporation pond, and an additional well may be required in the future to monitor Cell 4.

4.5.2 Leachate Evaporation Pond

The existing leachate evaporation pond was constructed with a geomembrane/compacted clay composite liner. While small in footprint area compared to the SWDF, the leachate evaporation pond is operated with a higher hydraulic head than that anticipated for the SWDF. In consideration of the leachate evaporation pond, groundwater monitoring wells MW-2 and MW-3 are located hydraulically down-gradient of the pond and the SWDF.

4.5.3 Stormwater Pond and Swales

The existing stormwater pond and the drainage channel located along the eastern and southern perimeter of the SWDF (Figure 1) represents locations where accumulated surface water could potentially influence the groundwater flow direction by providing a source of additional recharge to Stratum II. However, these features were designed to drain rather than retain flow. The stormwater pond was constructed with a bleed pipe to drain the stormwater pond to approximately 1 ft deep within three days of the design storm. The drainage channels along the eastern and southern perimeter of the SWDF are designed to drain storm water offsite or to the stormwater pond.

4.6 Conclusions

Based on the thickness of the uppermost water bearing zone, groundwater flow direction and velocity, and SWDF features, including liner system grades and sumps, the groundwater monitoring system described in this report consists of a sufficient number of appropriately located wells to yield samples of groundwater representative of background conditions and conditions downgradient of the SWDF.

SECTION 5

CERTIFICATION

We hereby certify as a qualified professional engineers that based on the information presented in this Groundwater Monitoring System Certification Report, the groundwater monitoring system for the SWDF has been designed and constructed to meet the requirements of 40 CFR §257.91.

L. O'Leary 3/11/2016
Lindsay A. O'Leary, P.E.
Texas Number 110164

Beth Ann Gross 3/11/2016
Beth Ann Gross, Ph.D., P.E.
Texas Number 79864

SECTION 6

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TABLE

Table 1
Monitoring Well and Piezometer Construction Details and Groundwater Elevations
SWDF Groundwater Monitoring Network, Sandy Creek Energy Station, Reisel, Texas

ID	Top of Casing Elevation (ft msl)	Well Depth (ft BTOC)	Casing Height (ft)	Screen Length (ft)	Screen Interval (ft bgs)	Well Diameter (inches)	06-Oct-15		04-Nov-15		02-Dec-15		19-Jan-16	
							Depth to Water (ft BTOC)	Groundwater Elevation (ft msl)	Depth to Water (ft BTOC)	Groundwater Elevation (ft msl)	Depth to Water (ft BTOC)	Groundwater Elevation (ft msl)	Depth to Water (ft BTOC)	Groundwater Elevation (ft msl)
Monitoring Wells														
BW-1	485.57	41.50	2.87	10.0	28.30 - 38.30	2	20.80	464.77	17.60	467.97	20.10	465.47	20.20	465.37
MW-1	465.87	37.25	3.02	10.0	23.90 - 33.90	2	13.60	452.27	13.40	452.47	12.50	453.37	12.40	453.47
MW-2	442.15	22.60	2.97	10.0	9.30 - 19.30	2	13.95	428.20	12.40	429.75	12.10	430.05	13.50	428.65
MW-3	430.06	19.95	2.97	10.0	5.98 - 15.98	2	12.60	417.46	8.60	421.46	7.70	422.36	8.40	421.66
Piezometer														
GB-2	447.45	22.10	2.83	10.0	9.02 - 19.02	2	13.20	434.25	13.40	434.05	11.80	435.65	11.10	436.35

Notes:
1. ft msl indicates feet above mean sea level, ft bgs indicates feet below ground surface, and ft BTOC indicates ft below top of casing.
2. Top of casing elevations are taken from the survey data provided in Appendix D.
3. Monitoring well construction details are taken from the well construction logs provided in Appendix B.
4. Groundwater elevation is calculated by subtracting the recorded depth to water (ft BTOC) from the surveyed top of casing elevation (ft msl).
5. The groundwater elevation in MW-3 (GB-3) was measured by Geosyntec on 28 September 2010 (421.38 ft msl) and 26 April 2011 (419.48 ft msl).
6. The groundwater elevation in GB-2 was measured by Geosyntec on 28 September 2010 (436.08 ft msl) and 26 April 2011 (434.25 ft msl).
7. The groundwater elevation in former GB-4, located near current MW-2 was measured by Geosyntec on 28 September 2010 (430.42 ft msl).

FIGURES

P:\CADD\PROJECTS\S\SANDY CREEK PP\ENG DESIGN\CCR RULE COMPLIANCE (TXL0526.01)\GROUNDWATER REPORT (TXL0526.02)\TXL052602F01

NOTES:

1. THE EXISTING CONTOUR MAP SHOWN ON THIS DRAWING WAS COMPILED USING EXISTING TOPOGRAPHY DATED APRIL 2006 AND DESIGN GRADES DATED OCTOBER 2007 FROM BLACK & VEATCH CORPORATION; DESIGN GRADES DEVELOPED BY GEOSYNTEC CONSULTANTS, INC. FOR THE LEACHATE EVAPORATION POND AND CELL 2 DATED APRIL 2011 AND APRIL 2014, RESPECTIVELY; AND AREA 59 EXISTING TOPOGRAPHY SURVEY CONDUCTED BY WALKER PARTNERS DATED 9 MAY 2013.

2. ELEVATIONS ARE IN FEET ABOVE MEAN SEA LEVEL (FT, MSL) AS DEFINED BY THE USGS NATIONAL GEODETIC VERTICAL DATUM (NGVD) OF 1988 (NAD-88). STATE PLANE COORDINATE GRID CORRESPONDS TO TEXAS STATE PLANE COORDINATE SYSTEM, TEXAS CENTRAL ZONE (4203), NORTH AMERICAN DATUM OF 1983 (NAD-83).

3. MONITORING WELL LOCATIONS BASED ON SURVEY PERFORMED IN SEPTEMBER 2015 BY WALKER PARTNERS.

LEGEND

- EXISTING CONTOUR (FT,MSL) (NOTES 1, 2)
- PROPERTY BOUNDARY
- PROPOSED LIMIT OF WASTE (CCR LANDFILL FOOTPRINT)
- MONITORING WELL
- DRY BOREHOLE (PLUGGED)
- HISTORIC PIEZOMETER (PLUGGED AND ABANDONED)
- EXISTING PIEZOMETER

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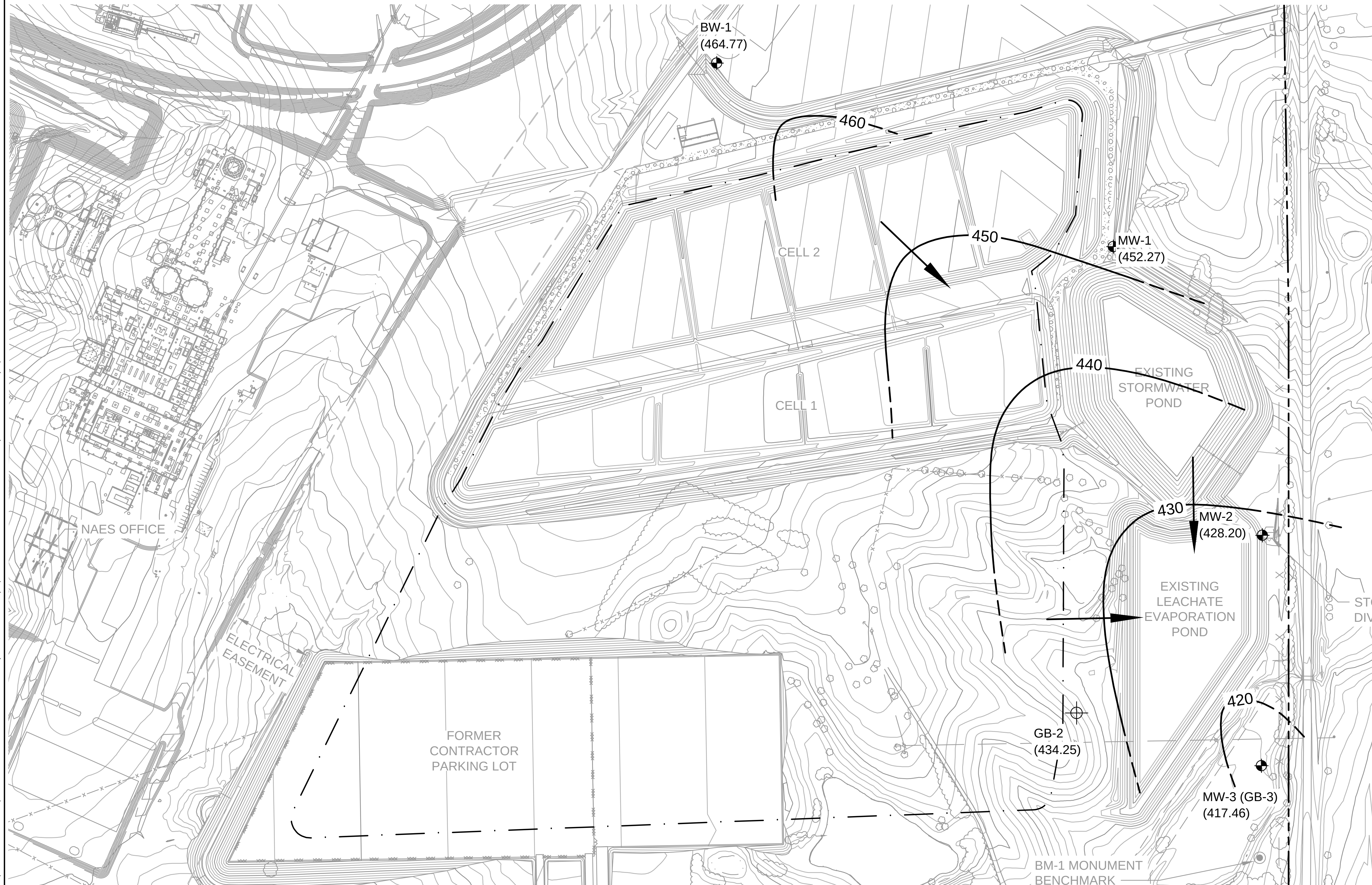
L. O'Leary

3/11/2016

MONITORING WELL LOCATION MAP

Geosyntec consultants
TX ENG. FIRM REGISTRATION NO. 1182

PROJECT NO: TXL0526	MARCH 2016	FIGURE 1



N

LEGEND

EXISTING CONTOUR (FT, MSL) (NOTES 1, 2)

PROPERTY BOUNDARY

MW-1 (452.27) — MONITORING WELL [WATER LEVEL ELEVATION (FT, MSL)]

GB-2 (434.25) — EXISTING PIEZOMETER [WATER LEVEL ELEVATION (FT, MSL)]

INFERRED GROUNDWATER EQUIPOTENTIAL LINE

450 — GROUNDWATER EQUIPOTENTIAL LINE

DIRECTION OF GROUNDWATER FLOW

PROPOSED LIMIT OF WASTE (CCR LANDFILL FOOTPRINT)

0 300'

SCALE IN FEET

NOTES:

1. THE EXISTING CONTOUR MAP SHOWN ON THIS DRAWING WAS COMPILED USING EXISTING TOPOGRAPHY DATED APRIL 2006 AND DESIGN GRADES DATED OCTOBER 2007 FROM BLACK & VEATCH CORPORATION; DESIGN GRADES DEVELOPED BY GEOSYNTEC CONSULTANTS, INC. FOR THE LEACHATE EVAPORATION POND AND CELL 2 DATED APRIL 2011 AND APRIL 2014, RESPECTIVELY; AND AREA 59 EXISTING TOPOGRAPHY SURVEY CONDUCTED BY WALKER PARTNERS DATED 9 MAY 2013.

2. ELEVATIONS ARE IN FEET ABOVE MEAN SEA LEVEL (FT, MSL) AS DEFINED BY THE USGS NATIONAL GEODETIC VERTICAL DATUM (NGVD) OF 1988 (NAD-88). STATE PLANE COORDINATE GRID CORRESPONDS TO TEXAS STATE PLANE COORDINATE SYSTEM, TEXAS CENTRAL ZONE (4203), NORTH AMERICAN DATUM OF 1983 (NAD-83).

3. MONITORING WELL LOCATIONS BASED ON SURVEY PERFORMED IN SEPTEMBER 2015 BY WALKER PARTNERS. WATER LEVELS WERE MEASURED ON 6 OCTOBER 2015 BY NAES PERSONNEL.

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3/11/2016

POTENTIOMETRIC SURFACE MAP
(OCTOBER 2015)

Geosyntec consultants
TX ENG. FIRM REGISTRATION NO. 1182

PROJECT NO: TXL0526 | MARCH 2016

FIGURE 2

P:\CADD\PROJECTS\S\SANDY CREEK PP\ENG DESIGN\CCR RULE COMPLIANCE (TXL0526.01)\GROUNDWATER REPORT (TXL0526.02)\TXL052602F02

LEGEND

Symbol	Description
(thin line)	EXISTING CONTOUR (FT, MSL) (NOTES 1, 2)
(long dash-dot line)	PROPERTY BOUNDARY
MW-1 (452.47)	MONITORING WELL [WATER LEVEL ELEVATION (FT, MSL)]
GB-2 (434.05)	EXISTING PIEZOMETER [WATER LEVEL ELEVATION (FT, MSL)]
(dashed line)	INFERRED GROUNDWATER EQUIPOTENTIAL LINE
450	GROUNDWATER EQUIPOTENTIAL LINE
(arrow)	DIRECTION OF GROUNDWATER FLOW
(dash-dot line)	PROPOSED LIMIT OF WASTE (CCR LANDFILL FOOTPRINT)

0 300'

SCALE IN FEET

NOTES:

1. THE EXISTING CONTOUR MAP SHOWN ON THIS DRAWING WAS COMPILED USING EXISTING TOPOGRAPHY DATED APRIL 2006 AND DESIGN GRADES DATED OCTOBER 2007 FROM BLACK & VEATCH CORPORATION; DESIGN GRADES DEVELOPED BY GEOSYNTEC CONSULTANTS, INC. FOR THE LEACHATE EVAPORATION POND AND CELL 2 DATED APRIL 2011 AND APRIL 2014, RESPECTIVELY; AND AREA 59 EXISTING TOPOGRAPHY SURVEY CONDUCTED BY WALKER PARTNERS DATED 9 MAY 2013.

2. ELEVATIONS ARE IN FEET ABOVE MEAN SEA LEVEL (FT, MSL) AS DEFINED BY THE USGS NATIONAL GEODETIC VERTICAL DATUM (NGVD) OF 1988 (NAD-88). STATE PLANE COORDINATE GRID CORRESPONDS TO TEXAS STATE PLANE COORDINATE SYSTEM, TEXAS CENTRAL ZONE (4203), NORTH AMERICAN DATUM OF 1983 (NAD-83).

3. MONITORING WELL LOCATIONS BASED ON SURVEY PERFORMED IN SEPTEMBER 2015 BY WALKER PARTNERS. WATER LEVELS WERE MEASURED ON 4 NOVEMBER 2015 BY NAES PERSONNEL.

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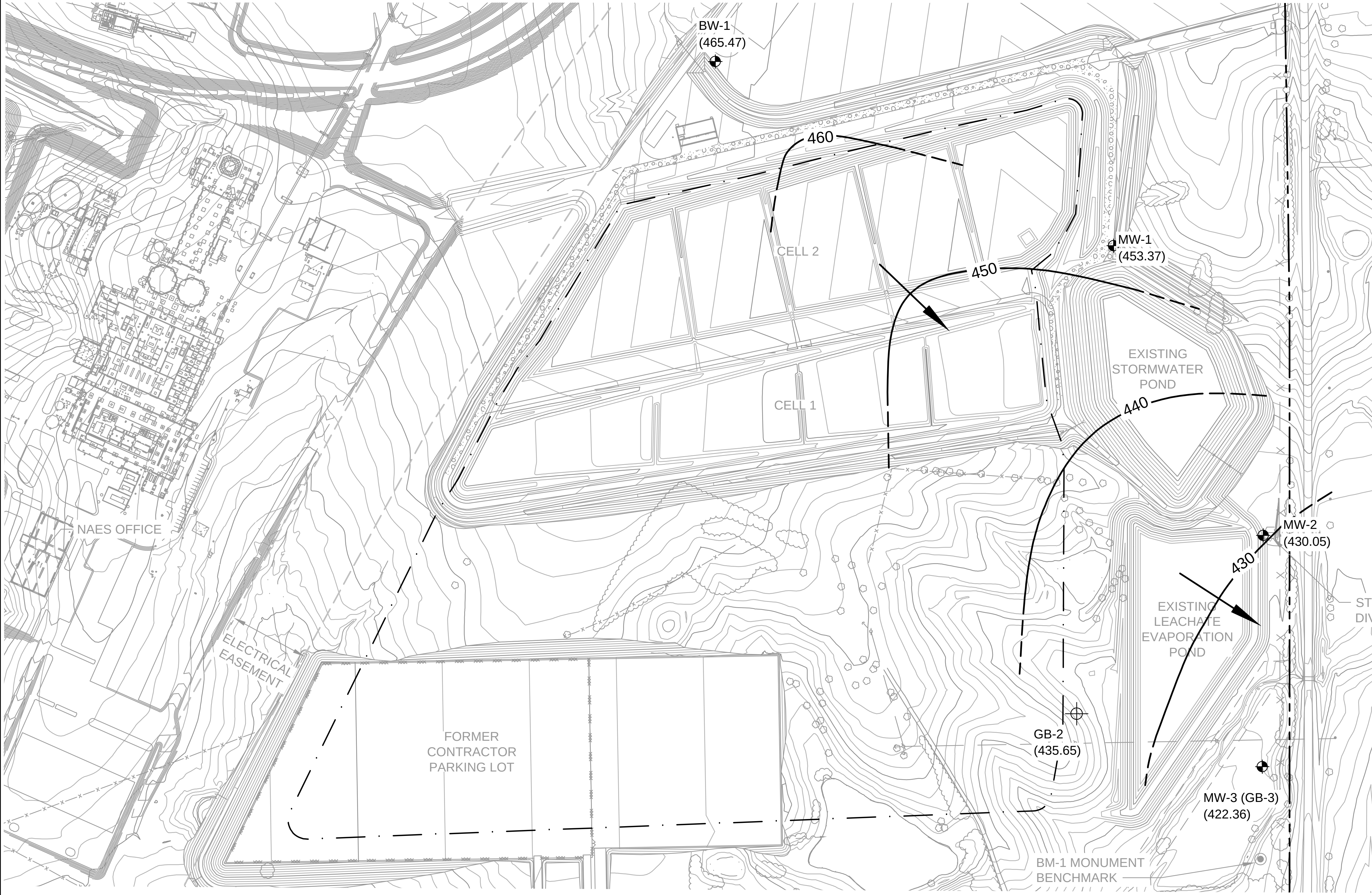
POTENTIOMETRIC SURFACE MAP
(NOVEMBER 2015)

Geosyntec consultants
TX ENG. FIRM REGISTRATION NO. 1182

PROJECT NO: TXL0526 | MARCH 2016 | FIGURE 3

P:\CADD\PROJECTS\S\SANDY CREEK PP\ENG DESIGN\CCR RULE COMPLIANCE (TXL0526.01)\GROUNDWATER REPORT (TXL0526.02)\TXL052602F03



N

LEGEND

Symbol	Description
	EXISTING CONTOUR (FT, MSL) (NOTES 1, 2)
	PROPERTY BOUNDARY
MW-1 (453.37)	MONITORING WELL [WATER LEVEL ELEVATION (FT, MSL)]
GB-2 (435.65)	EXISTING PIEZOMETER [WATER LEVEL ELEVATION (FT, MSL)]
	INFERRED GROUNDWATER EQUIPOTENTIAL LINE
450	GROUNDWATER EQUIPOTENTIAL LINE
	DIRECTION OF GROUNDWATER FLOW
	PROPOSED LIMIT OF WASTE (CCR LANDFILL FOOTPRINT)

0 300'

SCALE IN FEET

NOTES:

1. THE EXISTING CONTOUR MAP SHOWN ON THIS DRAWING WAS COMPILED USING EXISTING TOPOGRAPHY DATED APRIL 2006 AND DESIGN GRADES DATED OCTOBER 2007 FROM BLACK & VEATCH CORPORATION; DESIGN GRADES DEVELOPED BY GEOSYNTEC CONSULTANTS, INC. FOR THE LEACHATE EVAPORATION POND AND CELL 2 DATED APRIL 2011 AND APRIL 2014, RESPECTIVELY; AND AREA 59 EXISTING TOPOGRAPHY SURVEY CONDUCTED BY WALKER PARTNERS DATED 9 MAY 2013.

2. ELEVATIONS ARE IN FEET ABOVE MEAN SEA LEVEL (FT, MSL) AS DEFINED BY THE USGS NATIONAL GEODETIC VERTICAL DATUM (NGVD) OF 1988 (NAD-88). STATE PLANE COORDINATE GRID CORRESPONDS TO TEXAS STATE PLANE COORDINATE SYSTEM, TEXAS CENTRAL ZONE (4203), NORTH AMERICAN DATUM OF 1983 (NAD-83).

3. MONITORING WELL LOCATIONS BASED ON SURVEY PERFORMED IN SEPTEMBER 2015 BY WALKER PARTNERS. WATER LEVELS WERE MEASURED ON 2 DECEMBER 2015 BY NAES PERSONNEL.

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3/11/2016

POTENTIOMETRIC SURFACE MAP
(DECEMBER 2015)

Geosyntec
consultants
TX ENG. FIRM REGISTRATION NO. 1182

PROJECT NO: TXL0526 | MARCH 2016

FIGURE
4

P:\CADD\PROJECTS\S\SANDY CREEK PP\ENG DESIGN\CCR RULE COMPLIANCE (TXL0526.01)\GROUNDWATER REPORT (TXL0526.02)\TXL052602F04

DRAWINGS

LEGEND

500	EXISTING GROUND ELEVATION (FT, MSL) (NOTES 1, 2)
	EXISTING SURFACE WATER LINE
x x x	EXISTING SITE FENCE
	EXISTING TREE LINE
	EXISTING ROAD
	EXISTING BUILDING
	PROPERTY BOUNDARY
	DEED RECORDED LIMITS OF WASTE
	CELL BOUNDARY
N 10514500 E 3349500	STATE PLANE COORDINATES
GB-3	EXISTING PIEZOMETER
	SWDF OPERATIONS ACCESS ROAD

0 250' 500'
SCALE IN FEET

NOTES:

1. THE EXISTING CONTOUR MAP SHOWN ON THIS DRAWING WAS COMPILED USING EXISTING TOPOGRAPHY DATED APRIL 2006 AND DESIGN GRADES DATED OCTOBER 2007 FROM BLACK & VEATCH CORPORATION; DESIGN GRADES DEVELOPED BY GEOSYNTEC CONSULTANTS, INC. FOR THE LEACHATE EVAPORATION POND AND CELL 2 DATED APRIL 2011 AND APRIL 2014, RESPECTIVELY; AND AREA 59 EXISTING TOPOGRAPHY SURVEY CONDUCTED BY WALKER PARTNERS DATED 9 MAY 2013.
2. ELEVATIONS ARE IN FEET ABOVE MEAN SEA LEVEL (FT, MSL) AS DEFINED BY THE USGS NATIONAL GEODETIC VERTICAL DATUM (NGVD) OF 1988. STATE PLANE COORDINATE GRID CORRESPONDS TO TEXAS STATE PLANE COORDINATE SYSTEM, TEXAS CENTRAL ZONE (4203), NORTH AMERICAN DATUM OF 1983 (NAD-83).

REV	DATE	DESCRIPTION	DRN	APP
1	9/24/2014	ADDED DRAINAGE EASEMENT AND SCRUBBER ASH SILO REFERENCE	JJV	MZI
0	6/10/2014	ISSUE FOR CONSTRUCTION	JJV	MZI

NAES CORPORATION
2161 RATTLESNAKE ROAD
RIESEL, TEXAS 76682
PHONE: 254-896-4314

Geosyntec consultants
GEOSYNTEC CONSULTANTS, INC.
TEXAS ENG. FIRM REGISTRATION NO. 1182
8217 SHOAL CREEK BLVD., SUITE 200
AUSTIN, TEXAS 78757
PHONE: 512.451.4003

TITLE: SITE LAYOUT

PROJECT: OPERATIONS PLAN – SOLID WASTE DISPOSAL FACILITY (CELL 2)

SITE: SANDY CREEK ENERGY STATION

THIS DRAWING MAY NOT BE ISSUED FOR PROJECT TENDER OR CONSTRUCTION, UNLESS SEALED.

SIGNATURE
6/10/2014
DATE

STATE OF TEXAS
M. ZAHIRUL ISLAM
109989
LICENSED PROFESSIONAL ENGINEER

DESIGN BY:	MZI	DATE:	JUNE 2014
DRAWN BY:	JJV/KH	PROJECT NO.:	TXL0208.07.01
CHECKED BY:	MZI	FILE:	TXL020807-OP-00
REVIEWED BY:	BG	DRAWING NO.:	1 OF 16
APPROVED BY:	MZI		

OPERATIONS DRAWING

APPENDIX A

BORING LOGS FOR GROUNDWATER MONITORING WELLS (BW-1 and MW-1 to MW-3) AND PIEZOMETER (GB-2)

Project: **Sandy Creek Energy Station** Project Location: **2161 Rattlesnake Road Riesel, TX 76682** Project Number: **TXL0526 / 02**	Key to Log of Boring **Sheet 1 of 1**

Elevation (feet, MSL)	Depth (feet)	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Well Log
1	2	3	4	5	6

COLUMN DESCRIPTIONS

1 Elevation (feet, MSL): Elevation (feet, MSL)
2 Depth (feet): Depth in feet below the ground surface.
3 USCS Symbol: Type of material encountered.
4 Graphic Log: Graphic depiction of the subsurface material encountered.
5 MATERIAL DESCRIPTION: Description of material encountered. May include consistency, moisture, color, and other descriptive text.
6 Well Log: Graphical representation of well installed upon completion of drilling and sampling.

FIELD AND LABORATORY TEST ABBREVIATIONS

CHEM: Chemical tests to assess corrosivity
COMP: Compaction test
CONS: One-dimensional consolidation test
LL: Liquid Limit, percent
PI: Plasticity Index, percent
SA: Sieve analysis (percent passing No. 200 Sieve)
UC: Unconfined compressive strength test, Qu, in ksf
WA: Wash sieve (percent passing No. 200 Sieve)

MATERIAL GRAPHIC SYMBOLS

Bentonite plug
Fat CLAY, CLAY w/SAND, SANDY CLAY (CH)
Claystone
Portland Cement Concrete
Gravel
Grout
Poorly graded SAND (SP)

TYPICAL SAMPLER GRAPHIC SYMBOLS

Auger sampler
Bulk Sample
3-inch-OD California w/ brass rings
CME Sampler
Grab Sample
2.5-inch-OD Modified California w/ brass liners
Pitcher Sample
2-inch-OD unlined split spoon (SPT)
Shelby Tube (Thin-walled, fixed head)

OTHER GRAPHIC SYMBOLS

Water level (at time of drilling, ATD)
Water level (after waiting)
Minor change in material properties within a stratum
Inferred/gradational contact between strata
? Queried contact between strata

GENERAL NOTES

1: Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive, and actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
2: Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

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Figure A-1

Project: **Sandy Creek Energy Station**	**Log of Boring BW-1**
Project Location: **2161 Rattlesnake Road Riesel, TX 76682**	**Sheet 1 of 2**
Project Number: **TXL0526 / 02**	

Date(s) Drilled: **9/21/2015 and 9/22/2015**	Logged By: **Alexander Brewster**	Checked By: **Lindsay O'Leary, P.E.**
Drilling Method: **Hollow Stem Auger**	Drill Bit Size/Type: **5" and 8.25" HSA (Note 1)**	Total Depth of Borehole: **50 ft**
Drill Rig Type: **Truck-Mounted CME**	Drilling Contractor: **Best Drilling Services, Inc.**	Approximate Surface Elevation: **482.70 (ft, MSL)**
Groundwater Level and Date Measured: **464.52 (ft, MSL) (9/28/2015)**	Sampling Method(s): **Core Barrel**	Hammer Data: **N/A**
Borehole Backfill: **Well Completion**	Location: **UTM: N 10515061.29', E 3350322.30'. N-NE of Landfill Cell 2; between the warehouse and laydown yard; near the eastern corner of a stormwater swale.**	

Elevation (feet, MSL)	Depth (feet)	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Well Log
482.7	0			Fill; gravel	
		CH		Fill; light brown CLAY; slightly moist; some localized gypsum crystals and sand pockets	
477.7	5	CH		Fill; light brown CLAY with occasional thin strata of dark brown CLAY; slightly moist; bigger localized gypsum crystals;	
472.7	10	CH		Light brown CLAY with thin strata of dark brown CLAY containing organic fines; moist; low recovery	
467.7	15	CH		Dark brown CLAY with organic fines; moist	
				some gravel pieces	(9/28/2015)
462.7	20	CH		Light brown / tan CLAY; moist	
457.7	25	CH		Brown CLAY; moist	
				Heavily crystallized calcite pockets; small gypsum / sand seams	
452.7	30				

Project: **Sandy Creek Energy Station**	Log of Boring BW-1
Project Location: **2161 Rattlesnake Road Riesel, TX 76682**	**Sheet 2 of 2**
Project Number: **TXL0526 / 02**	

Elevation (feet, MSL)	Depth (feet)	USCS Symbol	MATERIAL DESCRIPTION
452.7	30	CH	Light brown CLAY interbedded with brown CLAY; moist; pronounced gypsum / sand seams
447.7	35	Claystone	Dark grey CLAYSTONE; slightly moist; hard
		CH	Light brown CLAY interbedded with brown CLAY; slightly moist
442.7	40	Claystone	Dark gray CLAYSTONE; slightly moist; hard
437.7	45		
432.7	50		End of drilling at 50 ft; no initial groundwater encountered.
427.7	55		Note 1: A 5" borehole was drilled on 9/21/2015 for geotechnical logging purposes. On 9/22/2015, an 8.25" auger was used to expand the borehole for well installation purposes.
422.7	60		
417.7	65		

Graphic Log

Well Log

Project: **Sandy Creek Energy Station**	# Log of Boring MW-1
Project Location: **2161 Rattlesnake Road Riesel, TX 76682**	**Sheet 1 of 2**
Project Number: **TXL0526 / 02**	

Date(s) Drilled **9/21/2015**	Logged By **Alexander Brewster**	Checked By **Lindsay O'Leary, P.E.**
Drilling Method **Hollow Stem Auger**	Drill Bit Size/Type **8.25" HSA**	Total Depth of Borehole **45 ft**
Drill Rig Type **Truck-Mounted CME**	Drilling Contractor **Best Drilling Services, Inc.**	Approximate Surface Elevation **462.85 (ft, MSL)**
Groundwater Level and Date Measured **452.52 (ft, MSL) (9/28/2015)**	Sampling Method(s) **Core Barrel**	Hammer Data **N/A**
Borehole Backfill **Well Completion**	Location **UTM: N 10513907.71', E 3350439.78'. S of Landfill Cell 2; near northeastern edge of stormwater pond.**	

Elevation (feet, MSL)	Depth (feet)	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Well Log
462.85	0	CH		Fill; light brown CLAY with gravel; dry	
		CH		Fill; light brown CLAY with some gravel; dry; some dessication	
457.85	5	CH		Light brown CLAY with occasional thin strata of dark brown CLAY containing organic fines; dry; slight dessication	
452.85	10			(9/28/2015) ▼	
		CH		Light brown CLAY; dry; thin sandy gypsum seams and crystals	
447.85	15				
442.85	20				
437.85	25			Low recovery	
432.85	30				

Log of Boring MW-1

Elevation (feet, MSL)	Depth (feet)	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Well Log
432.85	30			Low recovery	
		Claystone		Dark gray CLAYSTONE with thin strata of light brown CLAY; dry	
427.85	35	Claystone		Dark gray CLAYSTONE; dry; low recovery	
422.85	40	Claystone		Dark gray CLAYSTONE; moist	
417.85	45			End of drilling at 45 ft; initial groundwater encountered at 45 ft.	
412.85	50				
407.85	55				
402.85	60				
397.85	65				

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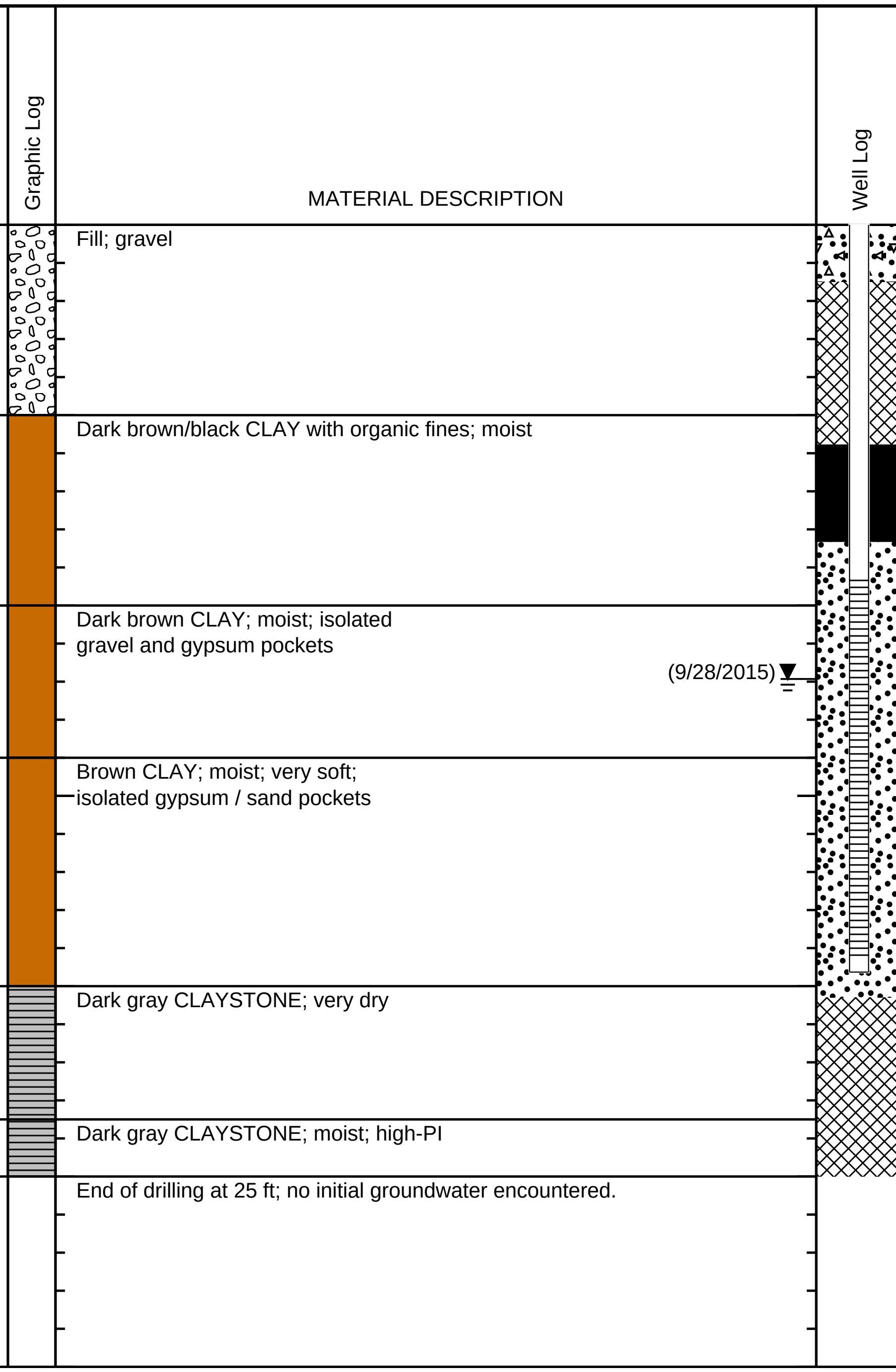
Project: **Sandy Creek Energy Station**	Log of Boring MW-2
Project Location: **2161 Rattlesnake Road Riesel, TX 76682**	**Sheet 1 of 1**
Project Number: **TXL0526 / 02**	

Date(s) Drilled **9/23/2015**	Logged By **Alexander Brewster**	Checked By **Lindsay O'Leary, P.E.**
Drilling Method **Hollow Stem Auger**	Drill Bit Size/Type **8.25" HSA**	Total Depth of Borehole **25 ft**
Drill Rig Type **Truck-Mounted CME**	Drilling Contractor **Best Drilling Services, Inc.**	Approximate Surface Elevation **439.18 (ft, MSL)**
Groundwater Level and Date Measured **427.25 (ft, MSL) (9/28/2015)**	Sampling Method(s) **Core Barrel**	Hammer Data **N/A**
Borehole Backfill **Well Completion**	Location **UTM: N 10513176.91', E 3349982.33'. SE of leachate evaporation pond.**	

Elevation (feet, MSL)	Depth (feet)	USCS Symbol	MATERIAL DESCRIPTION
439.18	0		Fill; gravel
434.18	5	CH	Dark brown/black CLAY with organic fines; moist
429.18	10	CH	Dark brown CLAY; moist; isolated gravel and gypsum pockets
			(9/28/2015) ▼
		CH	Brown CLAY; moist; very soft; isolated gypsum / sand pockets
424.18	15		
419.18	20	Claystone	Dark gray CLAYSTONE; very dry
		Claystone	Dark gray CLAYSTONE; moist; high-PI
414.18	25		End of drilling at 25 ft; no initial groundwater encountered.
409.18	30		



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Project: **Sandy Creek Energy Station**	# Log of Boring MW-3 (GB-3)
Project Location: **2161 Rattlesnake Road Riesel, TX 76682**	**Sheet 1 of 1**
Project Number: **TXL0084 / 03**	

Date(s) Drilled **9/1/2010**	Logged By **M. Zahirul Islam**	Checked By **Lindsay O'Leary, P.E.**
Drilling Method **Hollow Stem Auger**	Drill Bit Size/Type **8.25" HSA**	Total Depth of Borehole **22 ft**
Drill Rig Type **Truck-Mounted CME**	Drilling Contractor **Total Support Services, Inc.**	Approximate Surface Elevation **427.09 (ft, MSL) (based on Oct 2015 survey)**
Groundwater Level and Date Measured **420.99 (ft, MSL) (9/28/2010)**	Sampling Method(s) **Core Barrel**	Hammer Data **N/A**
Borehole Backfill **Cement Bentonite Grout**	Location **UTM: N 10512867.54', E 3349455.27' (based on Oct 2015 survey). SW of leachate evaporation pond.**	

Elevation (feet, MSL)	Depth (feet)	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Well Log
427.09	0	CH		Light brown CLAY with some gravel; dry; trace amounts of sand	
		CH		Tan / light grey CLAY with some gravelly fill; moist; trace amounts of sand	
422.09	5	CH		Grades to brown CLAY; moist; occasional calcite seams; trace amounts of sand (9/28/2010)	
417.09	10	CH		Brown CLAY; moist; localized pieces of gravel; trace amounts of sand and silt	
412.09	15	CH		Grades to dark grey	
		Claystone		Dark grey CLAYSTONE; moist; localized pieces of gravel	
407.09	20				
				End of drilling at 22 ft	
402.09	25				
397.09	30				

Project: **Sandy Creek Energy Station** Project Location: **2161 Rattlesnake Road Riesel, TX 76682** Project Number: **TXL0084 / 03**	# Log of Boring GB-2 **Sheet 1 of 1**

Date(s) Drilled **8/31/2010 and 9/1/2010**	Logged By **M. Zahirul Islam**	Checked By **Lindsay O'Leary, P.E.**
Drilling Method **Hollow Stem Auger**	Drill Bit Size/Type **8.25" HSA**	Total Depth of Borehole **25 ft**
Drill Rig Type **Truck-Mounted CME**	Drilling Contractor **Total Support Services, Inc.**	Approximate Surface Elevation **444.62 (ft, MSL) (based on Oct 2015 survey)**
Groundwater Level and Date Measured **437.12 (ft, MSL) (9/22/2010)**	Sampling Method(s) **Core Barrel**	Hammer Data **N/A**
Borehole Backfill **Well Completion**	Location **UTM: N 10513360.72', E 33494325.82' (based on Oct 2015 survey). Approximately 65 ft N of western corner of leachate evaporation pond.**	

Elevation (feet, MSL)	Depth (feet)	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Well Log
444.62	0	CH		Tan / light grey CLAY with some gravel; moist	
		CH		Brown CLAY; moist; occasional calcite seams; small amounts of sand and trace amounts of silt	
439.62	5	CH		Brown CLAY with some gravel; occasional calcite seams; trace amounts of silt and sand	
				(9/28/2010) ▼	
434.62	10				
429.62	15	CH		Grades to grey	
		CH		Dark gray CLAY intermixed with light brown CLAY	
		Claystone		Dark grey CLAYSTONE; dry	
424.62	20				
419.62	25			End of drilling at 25 ft	
414.62	30				

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APPENDIX B

MONITORING WELL AND PIEZOMETER DATA

- Well and Piezometer Construction Logs
- Water Level Measurements

WELL CONSTRUCTION DIAGRAM - EPA TYPE II WELL (STICK-UP)

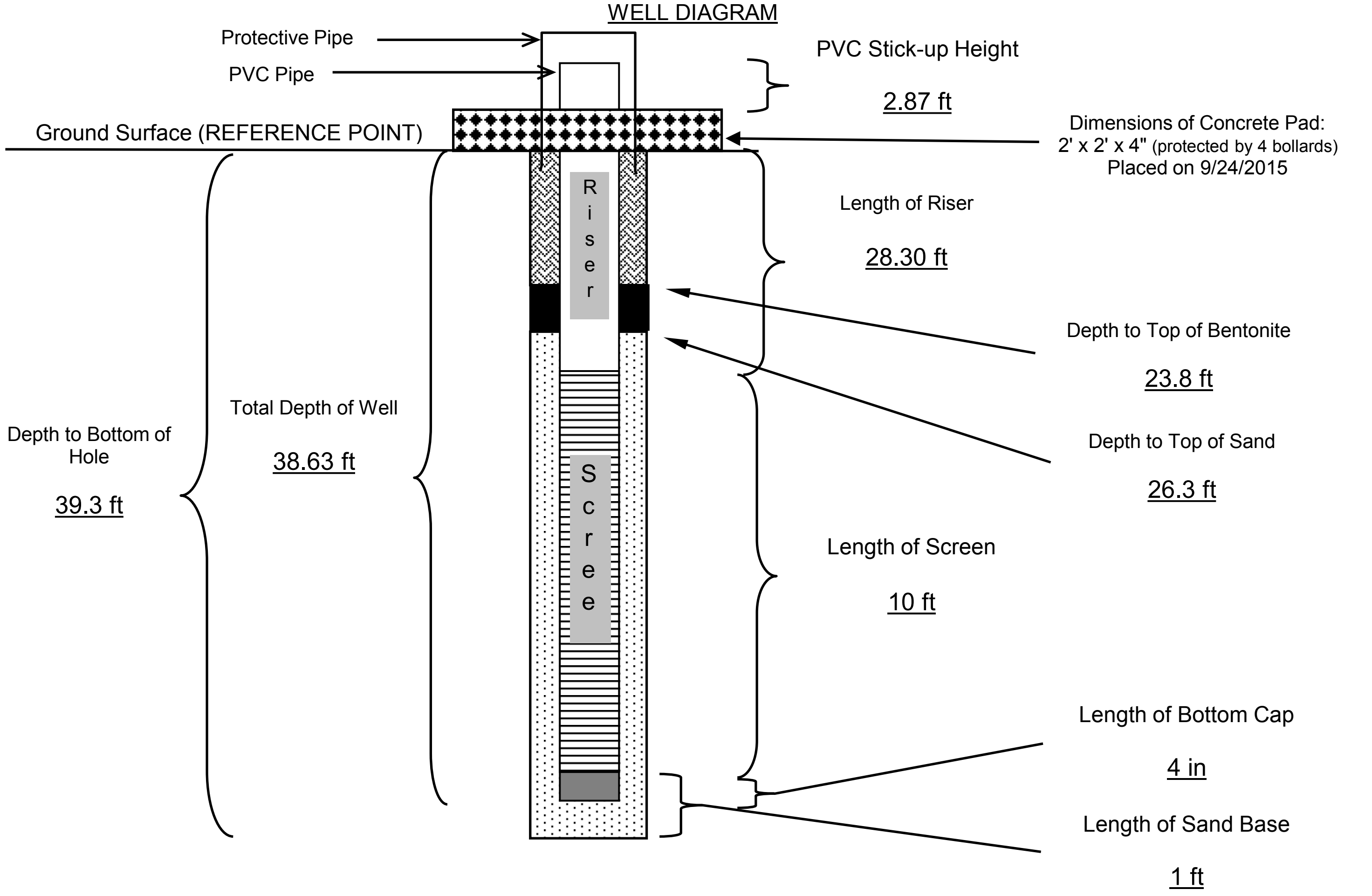
Geosyntec consultants

JOB NAME:	NAES Sandy Creek
JOB NO.:	TXL0526 / 02
DATE/TIME:	9/22/2015 0830
WELL LOCATION:	N NE of Cell 2
WELL NO.:	BW-1
FIELD REP:	Lindsay O'Leary

GROUND SURFACE ELEVATION:	482.70 (ft, msl)
TOP OF SCREEN ELEVATION:	454.40 (ft, msl)
BOTTOM OF WELL ELEVATION:	444.07 (ft, msl)
TOP OF PVC RISER ELEVATION (TOC):	485.57 (ft, msl)
NORTHING:	10515061.29
EASTING:	3350322.30
SCREEN MATERIAL:	SCH 40 PVC
RISER MATERIAL:	SCH 40 PVC
RISER MANUFACTURER:	N/A
RISER DIAMETER:	2 (in) Length: 31.17 (ft)
SCREEN DIAMETER:	2 (in) Length: 10 (ft)
BOREHOLE DIAMETER:	8.25 (in)
DRILLING TECHNIQUE:	HSA Size: 8.25 (in)

BENTONITE TYPE:	Enviroplug Med. (for plug); High Yield Bentonite Gel (for CB grout)
MANUFACTURER:	Wyo-Ben (for plug); N/A (for CB grout)
CEMENT TYPE:	Quikrete Portland Cement Type I/II
CEMENT MANUFACTURER:	Quikrete
SAND PACK TYPE AND SIZE:	20/40 Silica
SAND MANUFACTURER:	Unimin
DRILLING CONTRACTOR:	Best Drilling Services, Inc. (Friendswood, TX)
AMOUNT BENTONITE USED IN PLUG:	0.5 bags 50 lbs
AMOUNT BENTONITE USED IN BACKFILL GROUT:	0.5 bags 50 lbs
AMOUNT CEMENT USED:	1.5 bags 50 lbs
AMOUNT SAND USED:	10 bags 50 lbs
STATIC WATER:	21.05 (9/28/2015) ft below TOC
ENCOUNTERED WATER:	45 (See Boring Log) depth from ground (ft)

WELL DIAGRAM



Legend: Cement/Bentonite Grout | Sand Pack | Neat Concrete | Bentonite | Bottom Cap

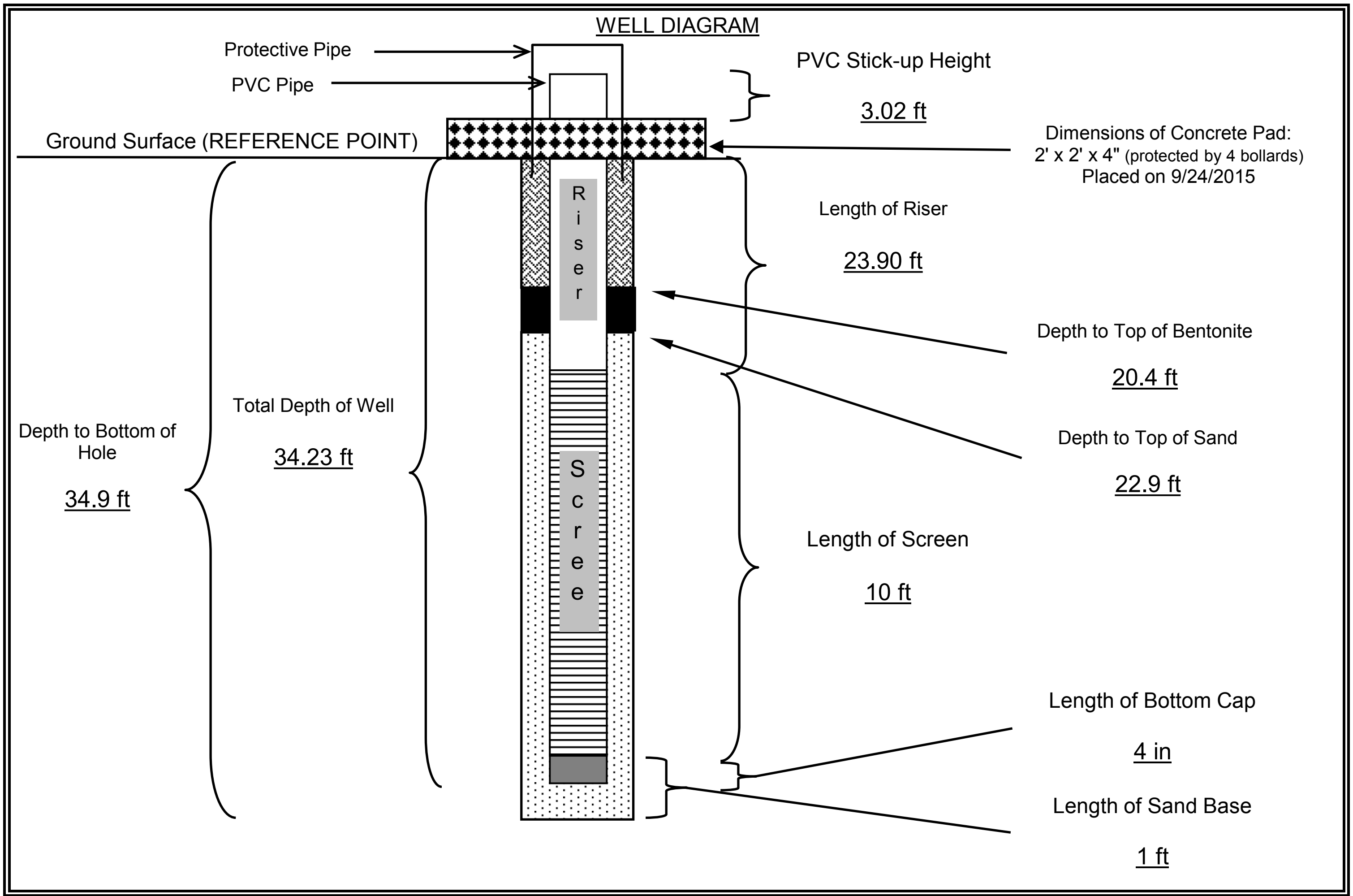
QA/QC INSTALLED BY:	Best Drilling Services, Inc. (Lawrence Tobola)	OBSERVED BY:	Lindsay O'Leary, PE
DATE:	9/22/2015	CHECKED BY: Alex Brewster	DATE: 10/9/2015

WELL CONSTRUCTION DIAGRAM - EPA TYPE II WELL (STICK-UP)

Geosyntec consultants

JOB NAME:	NAES Sandy Creek
JOB NO.:	TXL0526 / 02
DATE/TIME:	9/21/2015 1355
WELL NO.:	MW-1
WELL LOCATION:	South of Cell 2
FIELD REP:	Lindsay O'Leary

GROUND SURFACE ELEVATION:	462.85 (ft, msl)		BENTONITE TYPE:	Enviroplug Med. (for plug); High Yield Bentonite Gel (for CB grout)
TOP OF SCREEN ELEVATION:	438.95 (ft, msl)		MANUFACTURER:	Wyo-Ben (for plug); N/A (for CB grout)
BOTTOM OF WELL ELEVATION:	428.62 (ft, msl)		CEMENT TYPE:	Quikrete Portland Cement Type I/II
TOP OF PVC RISER ELEVATION (TOC):	465.87 (ft, msl)		CEMENT MANUFACTURER:	Quikrete
NORTHING:	10513907.71	EASTING: 3350439.78	SAND PACK TYPE AND SIZE:	20/40 Silica
SCREEN MATERIAL:	SCH 40 PVC		SAND MANUFACTURER:	Unimin
RISER MATERIAL:	SCH 40 PVC		DRILLING CONTRACTOR:	Best Drilling Services, Inc. (Friendswood, TX)
RISER MANUFACTURER:	N/A		AMOUNT BENTONITE USED IN PLUG:	0.5 bags 50 lbs
RISER DIAMETER:	2 (in)	Length: 26.92 (ft)	AMOUNT BENTONITE USED IN BACKFILL GROUT:	0.3 bags 50 lbs
SCREEN DIAMETER:	2 (in)	Length: 10 (ft)	AMOUNT CEMENT USED:	1.0 bags 50 lbs
BOREHOLE DIAMETER:	8.25 (in)		AMOUNT SAND USED:	7 bags 50 lbs
DRILLING TECHNIQUE:	HSA	Size: 8.25 (in)	STATIC WATER:	13.35 (9/28/2015) ft below TOC
			ENCOUNTERED WATER:	40 (See Boring Log) depth from ground (ft)



Cement/Bentonite Grout | Sand Pack | Neat Concrete | Bentonite | Bottom Cap

QA/QC	INSTALLED BY:	Best Drilling Services, Inc. (Lawrence Tobola)	OBSERVED BY:	Lindsay O'Leary, P.E.
	DATE:	9/21/2015	CHECKED BY:	Alex Brewster DATE: 10/9/2015

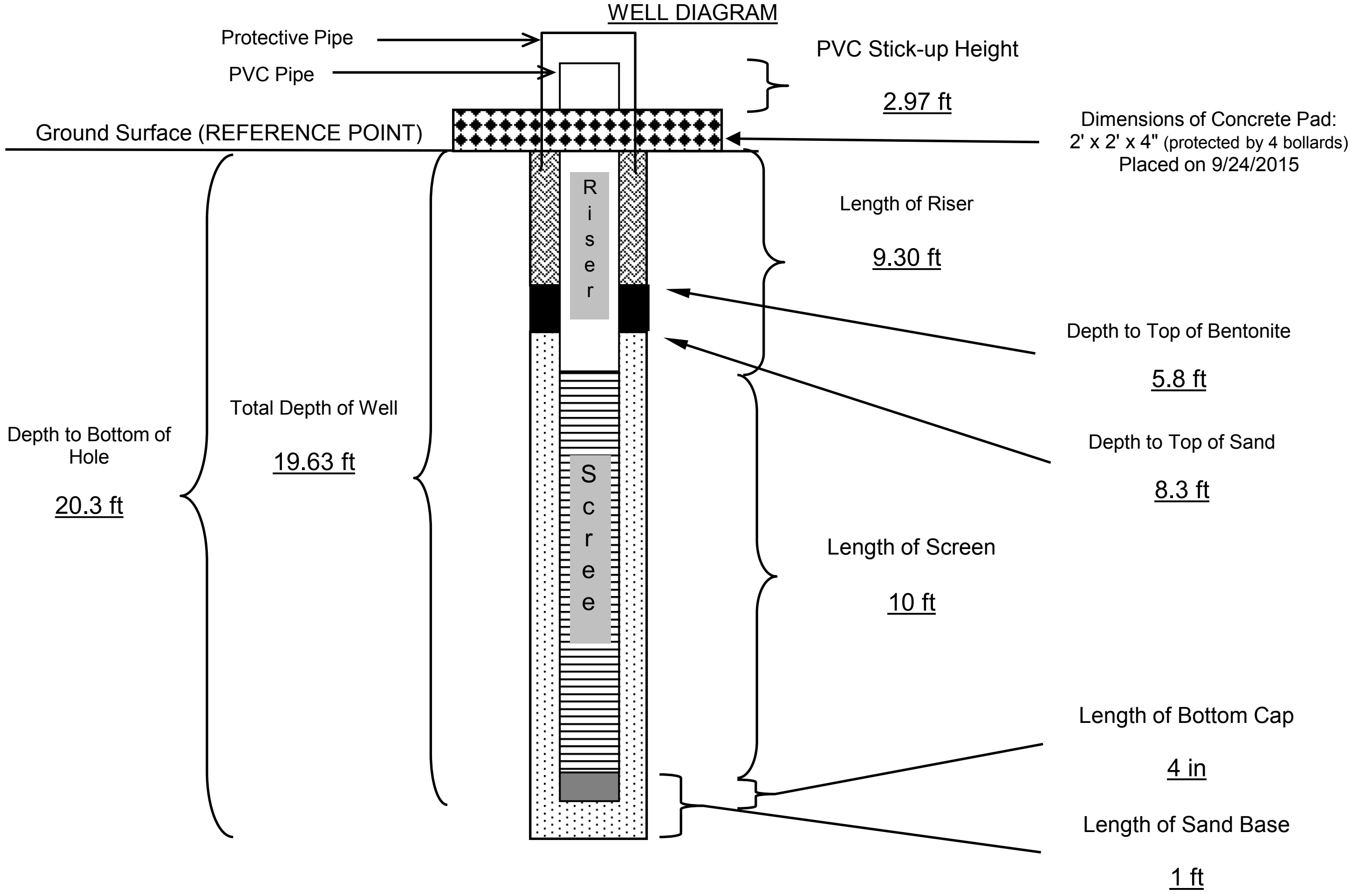
WELL CONSTRUCTION DIAGRAM - EPA TYPE II WELL (STICK-UP)

Geosyntec consultants

JOB NAME: NAES Sandy Creek
JOB NO.: TXL0526 / 02
DATE/TIME: 9/23/2015 1700
WELL NO.: MW-2
WELL LOCATION: SE of leachate pond
FIELD REP: Lindsay O'Leary

GROUND SURFACE ELEVATION: 439.18 (ft, msl)	BENTONITE TYPE: Enviroplug Med. (for plug); High Yield Bentonite Gel (for CB grout)
TOP OF SCREEN ELEVATION: 429.88 (ft, msl)	MANUFACTURER: Wyo-Ben (for plug); N/A (for CB grout)
BOTTOM OF WELL ELEVATION: 419.55 (ft, msl)	CEMENT TYPE: Quikrete Portland Cement Type I/II
TOP OF PVC RISER ELEVATION (TOC): 442.15 (ft, msl)	CEMENT MANUFACTURER: Quikrete
NORTHING: 10513176.91 EASTING: 3349982.33	SAND PACK TYPE AND SIZE: 20/40 Silica
SCREEN MATERIAL: SCH 40 PVC	SAND MANUFACTURER: Unimin
RISER MATERIAL: SCH 40 PVC	DRILLING CONTRACTOR: Best Drilling Services, Inc, (Friendswood, TX)
RISER MANUFACTURER: N/A	AMOUNT BENTONITE USED IN PLUG: 0.5 bags 50 lbs
RISER DIAMETER: 2 (in) Length: 12.27 (ft)	AMOUNT BENTONITE USED IN BACKFILL GROUT: 0.5 bags 50 lbs
SCREEN DIAMETER: 2 (in) Length: 10 (ft)	AMOUNT CEMENT USED: 1.5 bags 50 lbs
BOREHOLE DIAMETER: 8.25 (in)	AMOUNT SAND USED: 8 bags 50 lbs
DRILLING TECHNIQUE: HSA Size: 8.25 (in)	STATIC WATER: 14.90 (9/28/2015) ft below TOC
	ENCOUNTERED WATER: N/A depth from ground (ft)

WELL DIAGRAM



Cement/Bentonite Grout | Sand Pack | Neat Concrete | Bentonite | Bottom Cap

QA/QC INSTALLED BY:	Best Drilling Services, Inc. (Lawrence Tobola)	OBSERVED BY:	Lindsay O'Leary, P.E.
DATE:	9/23/2015	CHECKED BY: Lindsay O'Leary	DATE: 10/9/2015

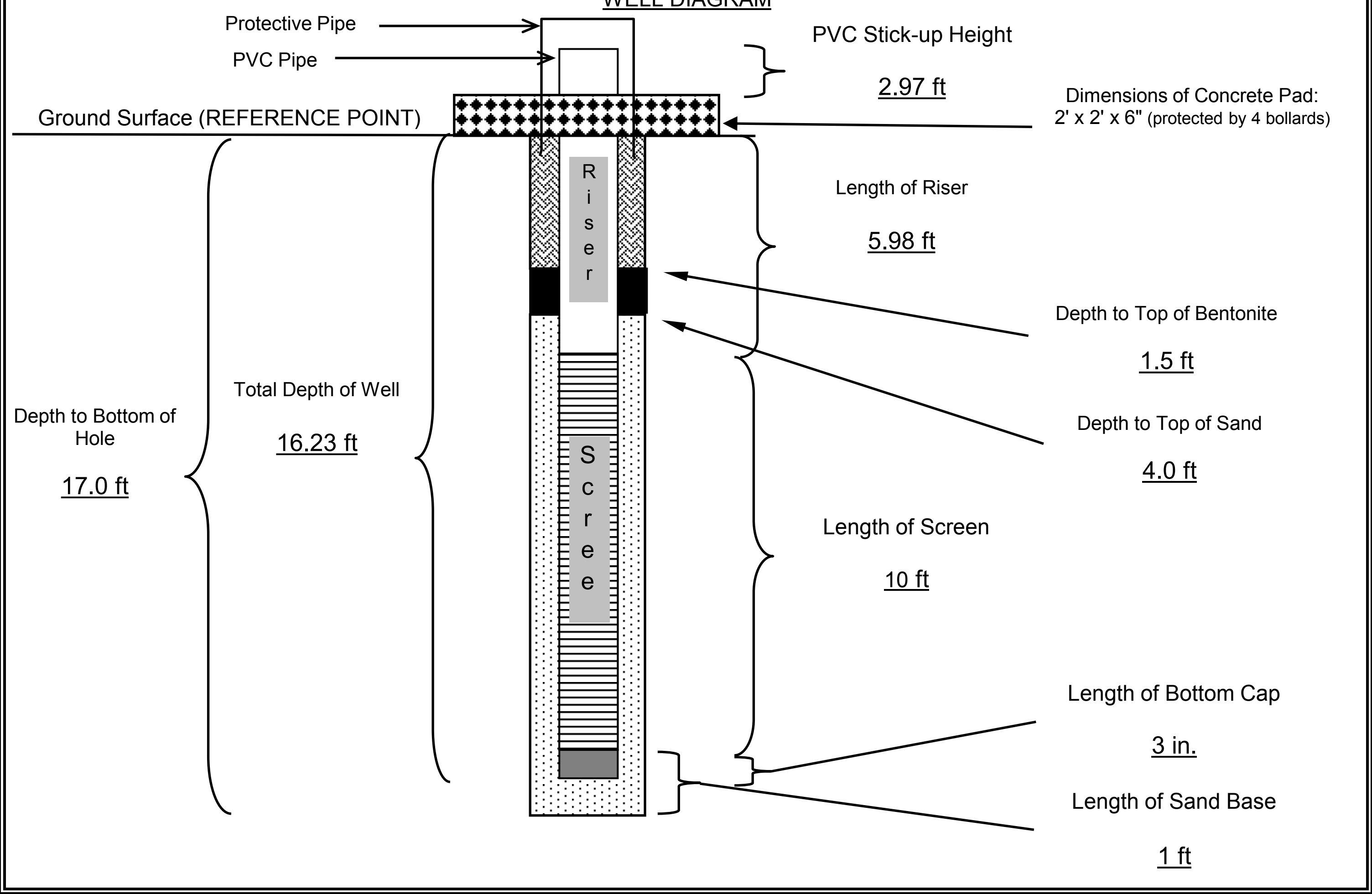
WELL CONSTRUCTION DIAGRAM - EPA TYPE II WELL (STICK-UP)

Geosyntec consultants

JOB NAME: Leachate Evaporation Pond Design
JOB NO.: TXL0084-03
DATE/TIME: 9/1/2010
WELL LOCATION:
WELL NO.: MW-3 (GB-3)
FIELD REP: Zahirul Islam

GROUND SURFACE ELEVATION:	427.09 (ft, msl)	BENTONITE TYPE:	Western Bentonite
TOP OF SCREEN ELEVATION:	421.11 (ft, msl)	MANUFACTURER:	PDS
BOTTOM OF WELL ELEVATION:	410.11 (ft, msl)	CEMENT TYPE:	Not used, sealed with hydrated bentonite chips
TOP OF PVC RISER ELEVATION:	430.06 (ft, msl)	CEMENT MANUFACTURER:	N/A
NORTHING: 10512867.42	EASTING: 3349455.27	SAND PACK TYPE AND SIZE:	Silica 20/40
SCREEN MATERIAL:	PVC - Schedule 40	SAND MANUFACTURER:	Unimin
RISER MATERIAL:	PVC - Schedule 40	DRILLING CONTRACTOR:	Total Support Services, Inc.
RISER MANUFACTURER:		AMOUNT BENTONITE USED:	3 bags 40 lbs
RISER DIAMETER:	2 (in) Length: 8.95 (ft)	AMOUNT CEMENT USED:	N/A bags lbs
SCREEN DIAMETER:	2 (in) Length: 10 (ft)	AMOUNT SAND USED:	7 bags 50 lbs
BOREHOLE DIAMETER:	8.25 (in)	STATIC WATER:	6.08 ft (9/28/2010) depth from ground
DRILLING TECHNIQUE:	Hollow stem Size: 8.25 (in)	ENCOUNTERED WATER:	Not Encountered depth from ground

WELL DIAGRAM



Cement/Bentonite Grout | Sand Pack | Neat Concrete | Bentonite | Bottom Cap

QA/QC
INSTALLED BY: Total Support Services, Inc. OBSERVED BY: Zahirul Islam
DATE: 9/1/2010 CHECKED BY: Ed Dolan, P.G. DATE: 10/14/2010

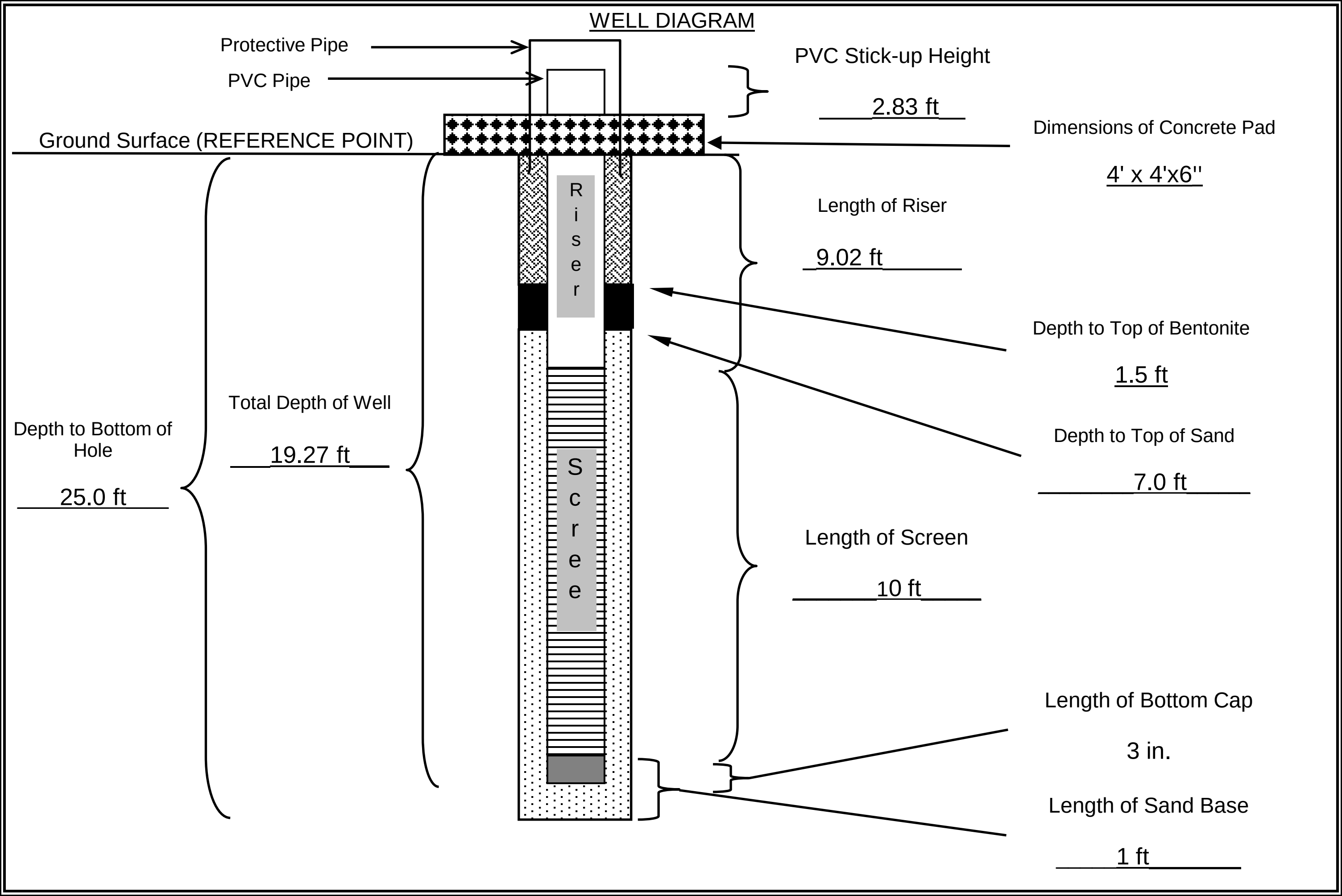
WELL CONSTRUCTION DIAGRAM - EPA TYPE II WELL (STICK-UP)

Geosyntec consultants

JOB NAME:	Leachate Evaporation Pond Design		GB-2
JOB NO.:	TXL0084-03		
DATE/TIME:	8/31/2010 & 9/1/2010	WELL NO.:	
WELL LOCATION:		FIELD REP:	Zahirul Islam

GROUND SURFACE ELEVATION:	444.62 (ft, msl)	BENTONITE TYPE:	Western Bentonite
TOP OF SCREEN ELEVATION:	435.60 (ft, msl)	MANUFACTURER:	PDS
BOTTOM OF WELL ELEVATION:	425.60 (ft, msl)	CEMENT TYPE:	Not used, sealed with hydrated bentonite chips
TOP OF PVC RISER ELEVATION:	447.45 (ft, msl)	CEMENT MANUFACTURER:	N/A
NORTHING:	10513360.72 EASTING: 3349325.82	SAND PACK TYPE AND SIZE:	Silica 20/40
SCREEN MATERIAL:	PVC - Schedule 40	SAND MANUFACTURER:	Unimin
RISER MATERIAL:	PVC - Schedule 40	DRILLING CONTRACTOR:	Total Support Services, Inc.
RISER MANUFACTURER:		AMOUNT BENTONITE USED:	4 bags 40 lbs
RISER DIAMETER:	2 (in) Length: 11.85 (ft)	AMOUNT CEMENT USED:	N/A bags lbs
SCREEN DIAMETER:	2 (in) Length: 10 (ft)	AMOUNT SAND USED:	7 bags 50 lbs
BOREHOLE DIAMETER:	8.25 (in)	STATIC WATER:	7.50 ft (9/22/2010) depth from ground
DRILLING TECHNIQUE:	Hollow stem Size: 8.25 (in)	ENCOUNTERED WATER:	Not Encountered depth from ground

WELL DIAGRAM



Cement/Bentonite Grout | Sand Pack | Neat Concrete | Bentonite | Bottom Cap

QA/QC INSTALLED BY:	Total Support Services, Inc.	OBSERVED BY:	Zahirul Islam
DATE:	8/31/2010 & 9/1/2010	CHECKED BY:	Ed Dolan, P.G. DATE: 10/14/2010

WATER LEVEL MEASUREMENTS

Site Name:	Sandy Creek Energy Station	Sampling Personnel:	Darryl Sparks and Ty Brown
Location:	2161 Rattlesnake Rd, Riesel, TX	Field Conditions:	Varies

ID	Date	Time	TOC Elevation (ft msl)	Depth to Water (ft BTOC)	GW Elevation (ft msl)	Field Observations
BW-1	10/6/2015	13:32	485.57	20.80	464.77	N/A
MW-1	10/6/2015	13:22	465.87	13.60	452.27	N/A
MW-2	10/6/2015	13:17	442.15	13.95	428.20	N/A
MW-3	10/6/2015	13:58	430.06	12.60	417.46	N/A
GB-2	10/6/2015	13:12	447.45	13.20	434.25	N/A
BW-1	11/4/2015	13:20	485.57	17.60	467.97	Rain Event 10/23-24/15; Lock installed
MW-1	11/4/2015	13:43	465.87	13.40	452.47	Rain Event 10/23-24/15; Lock installed
MW-2	11/4/2015	13:48	442.15	12.40	429.75	Rain Event 10/23-24/15; Lock installed
MW-3	11/4/2015	13:53	430.06	8.60	421.46	Rain Event 10/23-24/15; Lock installed
GB-2	11/4/2015	13:50	447.45	13.40	434.05	Rain Event 10/23-24/15; Lock installed
BW-1	12/2/2015	N/A	485.57	20.10	465.47	Rain preceding weekend (Approx. 1.5" total)
MW-1	12/2/2015	N/A	465.87	12.50	453.37	Rain preceding weekend (Approx. 1.5" total)
MW-2	12/2/2015	N/A	442.15	12.10	430.05	Rain preceding weekend (Approx. 1.5" total)
MW-3	12/2/2015	N/A	430.06	7.70	422.36	Rain preceding weekend (Approx. 1.5" total)
GB-2	12/2/2015	N/A	447.45	11.80	435.65	Rain preceding weekend (Approx. 1.5" total)
BW-1	1/19/2016	N/A	485.57	20.20	465.37	N/A
MW-1	1/19/2016	N/A	465.87	12.40	453.47	N/A
MW-2	1/19/2016	N/A	442.15	13.50	428.65	N/A
MW-3	1/19/2016	N/A	430.06	8.40	421.66	N/A
GB-2	1/19/2016	N/A	447.45	11.10	436.35	N/A

Notes:
1. ft msl indicates feet above mean sea level and ft BTOC indicates ft below top of casing*.
2. *Depth is measured from the top of the inner well casing.
3. Monitoring well MW-3 was formerly labeled as piezometer GB-3.

Geosyntec Project No.: TXL0526

APPENDIX C

STATE OF TEXAS WELL REPORTS FOR GROUNDWATER MONITORING WELLS AND PIEZOMETER

STATE OF TEXAS WELL REPORT for Tracking #408218

Owner:	**Sandy Creek Services, LLC**	Owner Well #:	**BW-1**
Address:	**P.O. Box 370 Riesel, TX 76682**	Grid #:	**39-33-2**
Well Location:	**2161 Rattlesnake Rd. Riesel, TX 76682**	Latitude:	**31° 28' 18.65" N**
		Longitude:	**096° 57' 10" W**
Well County:	**McLennan**	Elevation:	**483 ft. above sea level**
Type of Work:	**New Well**	Proposed Use:	**Monitor**

Drilling Start Date: **9/22/2015** Drilling End Date: **9/22/2015**

Borehole:

Diameter (in.)	Top Depth (ft.)	Bottom Depth (ft.)
8.25	**0**	**50**

Drilling Method: **Hollow Stem Auger**

Borehole Completion: **Filter Packed**

Filter Pack Intervals:

Top Depth (ft.)	Bottom Depth (ft.)	Filter Material	Size
27.5	**39.5**	**Sand**	**20/40**

Annular Seal Data:

Top Depth (ft.)	Bottom Depth (ft.)	Description (number of sacks & material)
0	**24**	**Cement 1.5 Bags/Sacks**
24	**26.5**	**Bentonite 0.5 Bags/Sacks**
26.5	**39.5**	**Sand 10 Bags/Sacks**

Seal Method: **Tremie**

Sealed By: **Driller**

Distance to Property Line (ft.): **No Data**

Distance to Septic Field or other concentrated contamination (ft.): **No Data**

Distance to Septic Tank (ft.): **No Data**

Method of Verification: **No Data**

Surface Completion: **Surface Slab Installed** **Surface Completion by Driller**

Water Level: **20.5 ft.** below land surface on **2015-10-13**

Packers: **No Data**

Type of Pump: **No Data**

Well Tests: **No Test Data Specified**

Water Quality:	Strata Depth (ft.)	Water Type
	No Data	**No Data**

Chemical Analysis Made: **No**

Did the driller knowingly penetrate any strata which contained injurious constituents?: **No**

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the report(s) being returned for completion and resubmittal.

Company Information: **BEST DRILLING SERVICES, INC.**

P.O. BOX 845
FRIENDSWOOD, TX 77549

Driller Name: **Lawrence Tobola** License Number: **3026**

Comments: **N-NE of Landfill Cell 2**

Lithology:
DESCRIPTION & COLOR OF FORMATION MATERIAL

Top (ft.)	*Bottom (ft.)*	*Description*
0	**1**	**NO RECOVERY**
1	**5**	**CLAY, lt. brown**
5	**15**	**CLAY, lt. brown**
15	**20**	**CLAY, drk. brown**
20	**35**	**CLAY, lt. brown**
35	**37.5**	**CLAYSTONE, drk. gray**
37.5	**40**	**CLAY, lt. brown**
40	**50**	**CLAYEYSTONE, drk. gray**

Casing:
BLANK PIPE & WELL SCREEN DATA

DIa (in.)	*Type*	*Material*	*Sch./Gage*	*Top (ft.)*	*Bottom (ft.)*
2	**Riser**	**New Plastic (PVC)**	**40**	**0**	**28.5**
2	**Screen**	**New Plastic (PVC)**	**40 0.01**	**28.5**	**38.5**
2	**Bottom Cap**	**New Plastic (PVC)**		**38.5**	**39**

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

TEX. OCC. CODE Title 12, Chapter 1901.251, authorizes the owner (owner or the person for whom the well was drilled) to keep information in Well Reports confidential. The Department shall hold the contents of the well log confidential and not a matter of public record if it receives, by certified mail, a written request to do so from the owner.

Please include the report's Tracking Number on your written request.

Texas Department of Licensing and Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

STATE OF TEXAS WELL REPORT for Tracking #408201

Owner:	**Sandy Creek Services, LLC**	Owner Well #:	**MW-1**
Address:	**P.O. Box 370** **Riesel, TX 76682**	Grid #:	**39-33-2**
Well Location:	**2161 Rattlesnake Rd.** **Riesel, TX 76682**	Latitude:	**31° 28' 07.21" N**
		Longitude:	**096° 57' 09.04" W**
Well County:	**McLennan**	Elevation:	**463 ft. above sea level**

Type of Work: **New Well** Proposed Use: **Monitor**

Drilling Start Date: **9/21/2015** Drilling End Date: **9/21/2015**

Borehole:

Diameter (in.)	*Top Depth (ft.)*	*Bottom Depth (ft.)*
8.25	**0**	**45**

Drilling Method: **Hollow Stem Auger**

Borehole Completion: **Filter Packed**

Filter Pack Intervals:

Top Depth (ft.)	*Bottom Depth (ft.)*	*Filter Material*	*Size*
23	**35**	**Sand**	**20/40**

Annular Seal Data:

Top Depth (ft.)	*Bottom Depth (ft.)*	*Description (number of sacks & material)*
0	**20.5**	**Cement 1 Bags/Sacks**
20.5	**23**	**Bentonite 0.5 Bags/Sacks**
23	**35**	**Sand 7 Bags/Sacks**

Seal Method: **Tremie**

Sealed By: **Driller**

Distance to Property Line (ft.): **No Data**

Distance to Septic Field or other concentrated contamination (ft.): **No Data**

Distance to Septic Tank (ft.): **No Data**

Method of Verification: **No Data**

Surface Completion: **Surface Slab Installed** **Surface Completion by Driller**

Water Level: **14 ft.** below land surface on **2015-10-03**

Packers: **No Data**

Type of Pump: **No Data**

Well Tests: **No Test Data Specified**

	Strata Depth (ft.)	Water Type
Water Quality:	**No Data**	**No Data**

Chemical Analysis Made: **No**

Did the driller knowingly penetrate any strata which contained injurious constituents?: **No**

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the report(s) being returned for completion and resubmittal.

Company Information: **BEST DRILLING SERVICES, INC.**

P.O. BOX 845
FRIENDSWOOD, TX 77549

Driller Name: **Lawrence Tobola** License Number: **3026**

Comments: **South of Landfill Cell 2**

Lithology:
DESCRIPTION & COLOR OF FORMATION MATERIAL

Top (ft.)	Bottom (ft.)	Description
0	**1**	**CLAY, lt. brown with gravelly fill**
1	**5**	**CLAY, lt. brown with some gravelly fill**
5	**13**	**CLAY, lt. brown to drk. brown**
13	**31**	**CLAY, lt. brown**
31	**35**	**CLAYSTONE with thin strata of lt. brown CLAY**
35	**45**	**CLAYSTONE, drk. gray**

Casing:
BLANK PIPE & WELL SCREEN DATA

DIa (in.)	Type	Material	Sch./Gage	Top (ft.)	Bottom (ft.)
2	**Riser**	**New Plastic (PVC)**	**40**	**-3**	**24**
2	**Screen**	**New Plastic (PVC)**	**40 0.01**	**24**	**34**
2	**Bottom Cap**	**New Plastic (PVC)**		**34**	**34.5**

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Texas Department of Licensing and Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

STATE OF TEXAS WELL REPORT for Tracking #408213

Owner:	**Sandy Creek Services, LLC**	Owner Well #:	**MW-2**
Address:	**P.O. Box 370 Riesel, TX 76682**	Grid #:	**39-33-2**
Well Location:	**2161 Rattlesnake Rd Riesel, TX 76682**	Latitude:	**31° 28' 00.11" N**
		Longitude:	**096° 57' 14.58" W**
Well County:	**McLennan**	Elevation:	**439 ft. above sea level**

Type of Work: **New Well** Proposed Use: **Monitor**

Drilling Start Date: **9/23/2015** Drilling End Date: **9/23/2015**

Borehole:

Diameter (in.)	Top Depth (ft.)	Bottom Depth (ft.)
8.25	**0**	**25**

Drilling Method: **Hollow Stem Auger**

Borehole Completion: **Filter Packed**

Filter Pack Intervals:

Top Depth (ft.)	Bottom Depth (ft.)	Filter Material	Size
8	**20.5**	**Sand**	**20/40**

Annular Seal Data:

Top Depth (ft.)	Bottom Depth (ft.)	Description (number of sacks & material)
0	**6**	**Cement 1.5 Bags/Sacks**
6	**8.5**	**Bentonite 0.6 Bags/Sacks**
8.5	**20.5**	**Sand 8 Bags/Sacks**

Seal Method: **Tremie**

Sealed By: **Driller**

Distance to Property Line (ft.): **No Data**

Distance to Septic Field or other concentrated contamination (ft.): **No Data**

Distance to Septic Tank (ft.): **No Data**

Method of Verification: **No Data**

Surface Completion: **Surface Slab Installed** **Surface Completion by Driller**

Water Level: **13.5 ft.** below land surface on **2015-10-13**

Packers: **No Data**

Type of Pump: **No Data**

Well Tests: **No Test Data Specified**

Water Quality:

Strata Depth (ft.)	Water Type
No Data	**No Data**

Chemical Analysis Made: **No**

Did the driller knowingly penetrate any strata which contained injurious constituents?: **No**

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the report(s) being returned for completion and resubmittal.

Company Information: **BEST DRILLING SERVICES, INC.**

P.O. BOX 845
FRIENDSWOOD, TX 77549

Driller Name: **Lawrence Tobola**

License Number: **3026**

Comments: **Southeast of existing Leachate Collection Pond**

Lithology:
DESCRIPTION & COLOR OF FORMATION MATERIAL

Top (ft.)	Bottom (ft.)	Description
0	**5**	**Gravely fill**
5	**10**	**CLAY, drk. brown/black**
10	**14**	**CLAY, drk. brown**
14	**20**	**CLAY, brown**
20	**23.5**	**CLAYSTONE, drk. gray**
23.5	**25**	**CLAYSTONE, drk. gray**

Casing:
BLANK PIPE & WELL SCREEN DATA

DIa (in.)	Type	Material	Sch./Gage	Top (ft.)	Bottom (ft.)
2	**Riser**	**New Plastic (PVC)**	**40**	**0.3**	**9.5**
2	**Screen**	**New Plastic (PVC)**	**40 0.01**	**9.5**	**19.5**
2	**Bottom Cap**	**New Plastic (PVC)**		**19.5**	**20**

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P.O. Box 12157
Austin, TX 78711
(512) 463-7880

STATE OF TEXAS WELL REPORT for Tracking #231669

Owner:	**SCPP**	Owner Well #:	**GB3** (MW-3)
Address:	**2161 Rattlesnake Rd.** **Riesel , TX**	Grid #:	**39-33-2**
Well Location:	**Same** **Riesel , TX**	Latitude:	**31° 27' 57" N**
Well County:	**McLennan**	Longitude:	**096° 57' 20" W**
Elevation:	**No Data**	GPS Brand Used:	**No Data**
Type of Work:	**New Well**	Proposed Use:	**Monitor**

Drilling Date:	Started: **8/30/2010** Completed: **9/3/2010**
Diameter of Hole:	Diameter: **8.25 in From Surface To 17 ft**
Drilling Method:	**Hollow Stem Auger**
Borehole Completion:	Other: **20/40 Silica Sand**
Annular Seal Data:	1st Interval: **From 0 ft to 2 ft with Concrete (#sacks and material)** 2nd Interval: **From 2 ft to 4 ft with Bentonite (#sacks and material)** 3rd Interval: **No Data** Method Used: **Gravity** Cemented By: **Crew** Distance to Septic Field or other Concentrated Contamination: **No Data** Distance to Property Line: **No Data** Method of Verification: **No Data** Approved by Variance: **No Data**
Surface Completion:	**Surface Sleeve Installed**
Water Level:	Static level: **No Data** Artesian flow: **No Data**
Packers:	**No Data**
Plugging Info:	Casing or Cement/Bentonite left in well: **No Data**
Type Of Pump:	**No Data**
Well Tests:	**No Data**
Water Quality:	Type of Water: **No Data** Depth of Strata: **No Data** Chemical Analysis Made: **No Data** Did the driller knowingly penetrate any strata which contained undesirable constituents: **No Data**
Certification Data:	The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.
Company Information:	**Total Support Services** **P.O. Box 81621**

	Austin , TX 78708
Driller License Number:	**54611**
Licensed Well Driller Signature:	**Brian Kern**
Registered Driller Apprentice Signature:	**No Data**
Apprentice Registration Number:	**No Data**
Comments:	**No Data**

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

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Please include the report's Tracking number (Tracking **#231669**) on your written request.

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P.O. Box 12157
Austin, TX 78711
(512) 463-7880

DESC. & COLOR OF FORMATION MATERIAL

From (ft) To (ft) Description
0 to 16 Tan and Gray Clay
16 to 17 Gray Shale

CASING, BLANK PIPE & WELL SCREEN DATA

Dia. New/Used Type Setting From/To
2 New PVC Riser 0/6 Sched. 40
2 New PVC Screen 6/16 0.010 Slotted

STATE OF TEXAS WELL REPORT for Tracking #231667

Owner:	**SCPP**	Owner Well #:	**GB2**
Address:	**2161 Rattlesnake Rd. Riesel , TX**	Grid #:	**39-33-2**
Well Location:	**Same Riesel , TX**	Latitude:	**31° 28' 01" N**
Well County:	**McLennan**	Longitude:	**096° 57' 22" W**
Elevation:	**No Data**	GPS Brand Used:	**No Data**
Type of Work:	**New Well**	Proposed Use:	**Monitor**

Drilling Date:	Started: **8/30/2010** Completed: **9/3/2010**
Diameter of Hole:	Diameter: **8.25 in From Surface To 20 ft**
Drilling Method:	**Hollow Stem Auger**
Borehole Completion:	Other: **20/40 Silica Sand**
Annular Seal Data:	1st Interval: **From 0 ft to 2 ft with Concrete (#sacks and material)** 2nd Interval: **From 2 ft to 7 ft with Bentonite (#sacks and material)** 3rd Interval: **No Data** Method Used: **Gravity** Cemented By: **Crew** Distance to Septic Field or other Concentrated Contamination: **No Data** Distance to Property Line: **No Data** Method of Verification: **No Data** Approved by Variance: **No Data**
Surface Completion:	**Surface Sleeve Installed**

Water Level:	Static level: **No Data** Artesian flow: **No Data**
Packers:	**No Data**
Plugging Info:	Casing or Cement/Bentonite left in well: **No Data**
Type Of Pump:	**No Data**
Well Tests:	**No Data**

Water Quality:	Type of Water: **No Data** Depth of Strata: **No Data** Chemical Analysis Made: **No Data** Did the driller knowingly penetrate any strata which contained undesirable constituents: **No Data**
Certification Data:	The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.
Company Information:	**Total Support Services** **P.O. Box 81621**

	Austin , TX 78708
Driller License Number:	**54611**
Licensed Well Driller Signature:	**Brian Kern**
Registered Driller Apprentice Signature:	**No Data**
Apprentice Registration Number:	**No Data**
Comments:	**No Data**

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Please include the report's Tracking number (Tracking **#231667**) on your written request.

Texas Department of Licensing & Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

DESC. & COLOR OF FORMATION MATERIAL

From (ft) To (ft) Description
0 to 19 Tan and Gray Clay
19 to 20 Gray Shale

CASING, BLANK PIPE & WELL SCREEN DATA

Dia. New/Used Type Setting From/To
2 New PVC Riser 0/9 Sched. 40
2 New PVC Screen 9/19 0.010 Slotted

APPENDIX D

SURVEY DATA

OCTOBER 13, 2015

GEOSYNTEC CONSULTANTS, INC.
8217 SHOAL CREEK BLVD., SUITE 200
AUSTIN, TEXAS 78757

RE: SANDY CREEK ENERGY STATION WELL CONSTRUCTION DIAGRAMS

TO WHOM IT MAY CONCERN:

I HEREBY CERTIFY THE COORDINATES AND ELEVATIONS SHOWN IN THE TABLE BELOW ARE BASED UPON STATE PLANE COORDINATE SYSTEM, NAD 83, TEXAS CENTRAL ZONE, NAVD 88 AND REFERENCED TO BM-1 MONUMENT (NORTHING=10512746.62, EASTING 3349242.64, ELEV.=426.81) AS SHOWN ON THE PLANS PROVIDED BY GEOSYNTEC CONSULTANTS, INC., DATED DECEMBER 9, 2013, FOR THE SANDY CREEK ENERGY STATION.

Monitoring Well	Ground Surface Elevation	Top of PVC Riser Elevation	Northing	Easting
BW-1	482.70	485.57	10515061.29	3350322.30
MW-1	462.85	465.87	10513907.71	3350439.78
MW-2	439.18	442.15	10513176.91	3349982.33
GB-2	444.62	447.45	10513360.72	3349325.82
MW-3/GB-3	427.09	430.06	10512867.54	3349455.27
GB-6	453.39	N/A	10513492.63	3349684.20
GB-7	440.87	N/A	10513175.55	3349950.07

SINCERELY,

Marty Paul Polk

MARTY PAUL POLK, R.P.L.S. 6031

STATE OF TEXAS REGISTERED MARTY PAUL POLK 6031 PROFESSIONAL LAND SURVEYOR

PROJ NO. 1-02580
REVISED: DECEMBER 3, 2015

600 AUSTIN AVENUE, SUITE 20 • WACO, TEXAS • 76701
PHONE: 254-714-1402 • FAX: 254-714-0402
T.B.P.L.S. REGISTRATION NO. 10032500

APPENDIX E

SUPPLEMENTAL DOCUMENTATION

- Geotechnical Design Report (B&V, 2009)
  - Section 4.0: Subsurface Investigation
  - Section 5.0: Subsurface Conditions
  - Figure 6-2: Atterberg Limit Data vs. Depth, All Data
  - Figure 6-3: Atterberg Limit Classification, All Data

- Engineering Report (B&V, 2010)
  - Section 3.0: Site Geology and Hydrogeology
  - Figure 3-1: Subsurface Investigation – Boring Location and Insitu Test Plan
  - Figure 5-1: Solid Waste Disposal Facility (SWDF) Area Cross Section
  - Appendix A: Boring, Piezometer, and Test Pit Logs
    - BV-101 thru BV-111; PZ-107; and TP-4
  - Appendix C: Laboratory Test Results
    - Hydraulic conductivity test for BV-102

- Geosyntec Boring Logs
  - GB-1 and GB-4 to GB-7

- Geotechnical Laboratory Test Data for Geosyntec Borings

Sandy Creek Energy Station
Riesel, Texas

Geotechnical Design Report
Revision 0

SCPP Project 149060
SCPP File No. 52.0106

April 2009

SCPP
Sandy Creek Power Partners

Contents

Tables

Figures

4.0 Subsurface Investigation

The subsurface investigation was performed to determine the site stratigraphy and geotechnical engineering parameters of the soils that underlie the proposed site area. The subsurface investigation was developed to gather detailed design information for use with data obtained from a previous geotechnical investigation.

The subsurface investigation was contracted to Professional Service Industries, Inc. (PSI) of Houston, Texas, under the geotechnical engineering direction of Sandy Creek Power Partners (SCPP). The exploration work consisted of soil borings with minimal rock coring, piezometer installations and test pits. Additional field work included pressuremeter testing, soil electrical resistivity field testing, double ring infiltrometer testing, in-situ shear vane testing, dynamic cone penetrometer testing, and crosshole seismic testing.

The initial subsurface location plan with the preliminary site layout is presented on Figures 4-1 and 4-2. The updated site and plant layout is shown in Figure 4-3, which includes movement of the cooling tower, removal of retaining ponds, and an updated arrangement of the rail line, among other minor changes. Planning, field supervision, and subsurface logging were performed by an SCPP geotechnical engineer. Fieldwork was completed in September 2007.

4.1 Field Testing Program

The subsurface investigation included 51 soil borings to depths of up to 100 feet, 4 test pits to 16 feet, 4 double-ring infiltrometer (DRI) tests, 4 piezometers to depths of 29.5to 49.0 feet, and 40 electrical resistivity tests. Pressuremeter and shear vane tests were performed in situ during drilling. Two crosshole seismic tests were performed at locations of rotating-mass equipment.

The investigation was performed through July, August, and September of 2007. PSI was contracted to perform all drilling, sampling, and testing of soil and rock obtained during the investigation.

Initial surveying and staking of points was performed by Sherwood Surveying, LLC of Spring Branch, Texas. Coordinates were transformed from state plane to latitude and longitude for use with global positioning system (GPS) location equipment. Mean Sea Level (MSL) elevations were used for the investigation. Table 4-1 lists the coordinates, ground surface elevations, and depths for the soil borings, test pits, and piezometer locations, along with remarks identifying the particular field testing conducted within the boring as listed in Figure 4-3. Table 4-2 lists the coordinates and elevations for the soil electrical resistivity tests as listed in Figure 4-2.

Table 4-1
Subsurface Investigation Locations

Location Number	Plant Grid (feet)		State Plane (feet)		Depth (feet)	Remarks
BV-1	5372.69	9138.98	10516296.99	3348576.40	41	PMT
BV-2	5302.16	9402.55	10516252.73	3348801.76	75	PMT
BV-3	5258.34	9704.39	10516244.84	3349106.65	46	VST
BV-4	5247.51	9930.16	10516260.72	3349332.13	46	PMT
BV-5	5210.50	9085.63	10516124.33	3348497.86	8	DCP
BV-6	5153.86	9495.83	10516116.47	3348911.88	73	THERM
BV-7	5123.01	9879.53	10516131.11	3349296.54	48	PIEZ
BV-8	5122.58	9207.76	10516051.43	3348629.51	68	VST
BV-9	5010.34	9654.83	10515969.98	3348895.34	50	VST
BV-10	5047.43	9815.58	10516029.54	3349082.33	63	VST
BV-11	5004.06	9940.97	10516005.45	3349247.07	85	PMT
BV-12	5066.09	9998.74	10516081.83	3349364.26	48	ERS
BV-13	5020.13	9998.74	10516043.01	3349427.06	46	VST
BV-14	4982.05	9228.74	10516005.20	3349431.55	83	PMT
BV-15 A,B,C	4989.27	9228.63	10515921.52	3348665.96	108	CST
BV-16	4967.44	9653.13	10515949.92	3349090.07	52	PMT
BV-17 A,B,C	4934.12	9937.68	10515950.40	3349376.57	99	CST
BV-18	4941.61	9057.00	10515853.94	3348501.16	48	PMT
BV-19	4882.26	9372.41	10515832.21	3348821.37	68	VST
BV-20	4882.26	9524.72	10515850.18	3348972.62	78	THERM
BV-21	4838.92	9223.59	10515771.61	3348678.70	78	ERS / PIEZ
BV-22	4751.65	9954.93	10515771.24	3349415.22	8	DCP
BV-23	5570.30	8223.48	10516379.91	3347599.29	38	
BV-24	6061.39	9280.50	10516992.27	3348590.98	78	PMT
BV-25	5046.39	8790.72	10515926.57	3348224.38	8	DCP
BV-26	5741.22	9237.12	10516669.21	3348585.69	37	VST
BV-27	5788.27	9772.89	10516779.15	3349112.17	48	
BV-28	5781.05	9971.82	10516795.44	3349310.56	38	
BV-29	5968.82	10854.20	10517086.00	3350164.62	33	PIEZ
BV-30	6207.80	11475.28	10517396.58	3350753.17	8	DCP
BV-31	5400.92	9503.72	10516362.74	3348890.57	77	PMT
BV-32	5517.78	9763.70	10516509.46	3349134.95	43	
BV-33	5512.53	9967.23	10516528.26	3349337.67	48	
BV-34	5331.33	10191.76	10516374.81	3349582.02	79	ERS
BV-35	5507.28	10741.94	10516614.44	3350107.59	45	PMT
BV-36	4875.69	10816.78	10515996.09	3350256.42	45	VST
BV-37	4244.12	11462.80	10515445.14	3350972.45	8	DCP
BV-38	4580.25	13097.57	10515971.80	3352556.14	8	
BV-39	6025.94	16242.36	10516038.78	3355508.42	8	DCP

Table 4-1
Subsurface Investigation Locations

Location Number	Plant Grid (feet)		State Plane (feet)		Depth (feet)	Remarks
BV-101	4026.14	8999.50	10514938.08	3348552.06	43	PIEZ
BV-102	3335.46	9470.07	10514307.74	3349100.83	48	
BV-103	4055.68	10248.88	10515114.81	3349789.23	50	
BV-104	3609.90	9868.75	10514627.29	3349464.35	73	
BV-105	3689.96	10523.55	10514784.05	3350105.13	50	
BV-106	2448.49	9621.23	10513444.80	3349355.58	43	
BV-107	3101.00	10663.00	10514216.41	3350313.15	28	PIEZ
BV-108	2345.42	10497.71	10513445.85	3350238.09	37	
BV-109	2338.85	10190.45	10513403.08	3349933.75	50	
BV-110	2550.91	10393.32	10513637.59	3350110.19	38	
BV-111	2739.34	10464.88	10513833.14	3350159.02	50	
TP-1	5625.45	8352.16	10516449.85	3347720.56	13	TEST PIT
TP-2	5642.52	9813.60	10516639.22	3349169.78	15	TEST PIT
TP-3	5913.13	10663.96	10517008.25	3349982.28	15	TEST PIT
TP-4	2344.08	10330.80	10513424.83	3350072.50	14	TEST PIT

Abbreviations:

PMT= Pressuremeter Test

VST= In-situ Shear Vane Test

DCP= Dynamic Cone Penetrometer Test

ERS= Electrical Soil Resistivity Samples

PIEZ= Piezometer Installation

THERM= Thermal Resistivity Samples

CST= Crosshole Seismic Test

Table 4-2
Electrical Resistivity Locations

Location Number	Plant Grid (ft)		State Plane (ft)	
	North	East	North	East
TSR1	8497	1827	10517084.64	3348669.69
TSR2	8085	1364	10516492.21	3348487.08
TSR3	7670	1010	10515953.85	3348399.41
TSR4	7587	677	10515710.31	3348157.58
TSR5	7453	1041	10515784.10	3348538.16
TSR6	7006	1292	10515531.89	3348984.52
TSR7	7119	1680	10515829.57	3349257.86
TSR8	7461	1740	10516153.00	3349132.26
TSR9	7663	2319	10516625.80	3349523.28
TSR10	7100	2178	10516070.79	3349693.67
TSR11	5861	1926	10514880.77	3350120.15
TSR12	6597	2494	10515804.44	3350225.15
TSR13	7519	3019	10516865.23	3350196.03
TSR14	7160	4167	10517152.97	3351363.42
TSR15	6014	4686	10516441.52	3352401.37
TSR16	5749	3341	10515517.74	3351388.68
TSR17	4520	2285	10513919.80	3351121.83
TSR18	8017	-25	10515713.31	3347333.81
MSR1	7831	1532	10516291.45	3348816.19
MSR2	6897	2812	10516243.94	3350164.22

4.1.1 Soil Test Borings

Fifty one borings were performed using a combination of rotary wash and solid and hollow stem auger. Borings BV-1 through BV-22 were located within the power block and tank areas. BV-23, 27, 28, 29, 32, and 33, were located within the storm water, wastewater, and coal pile ponds on the northern portion of the site. BV-5, 25, 30, 37, 38, and 39 were performed along the rail loop to the east of the power block area. BV-24 and 26 were located along the cooling tower alignment. BV-34, 35, and 36 were drilled in the coal handling and storage pile vicinity. Borings BV-101 through BV-111 were located in the proposed landfill and leachate pond areas. A test pit was performed in each of the four pond locations around the site, in accordance with TCEQ regulations

Borings were advanced with either a 4-1/2 inch solid stem auger, 8 inch outside diameter hollow stem auger, or 3-7/8 inch step bit using a bentonite slurry as drilling fluid. Borings were advanced to depths of 30 to 100 feet. The hollow stem auger was used in Borings BV-3, 8, 9, 10, 13, 19, 26, and 36 for in situ shear vane testing and Central Mine Equipment Company (CME) continuous barrel sampling. The 4-1/2 inch flighted auger was used for Borings BV-25, 30, 37, 38, and 39 because of ease of mobilization and shallow sampling depth. The remaining borings were performed with rotary wash techniques, including borings in which pressuremeter testing was included. Dual Shelby tube samplings were often used to create cavities for the wash bit that was brought on site to perform the pressuremeter tests. A 2-7/8 inch downward flow pressuremeter testing cavity was created in clays that refused a Shelby tube sampler.

Sampling of the in situ materials included the standard penetration test (SPT) that utilized a standard 2.0 inch outside diameter split spoon sampler, driven with a CME auto hammer and thin-walled Shelby tubes advanced with hydraulic down pressure from the rig. Continuous barrel sampling was also performed during hollow stem drilling, replacing the center bit.

Rotary-wash drilling was used for the majority of the borings, each piezometer, and for advancement of the pressuremeter. Hollow stem augers were used for identifying groundwater bearing seams and performing shear vane testing. Continuous sampling was utilized in the borings for the shear vane testing by pushing a CME barrel sampler ahead of the augers.

Borings were backfilled with bentonite chips through the open hole. An SCPP geotechnical engineer logged the borings and provided field classification of samples during the drilling work. The boring logs are presented in Appendix A.

4.1.2 Rock Coring

Five feet of rock coring was performed in BV-11, from 80 to 85 feet in the marl formation. An 1-7/8 inch core size, 5 foot long, NQ core barrel was used to cut and retrieve the sample, with thin bentonite mud as drilling fluid. Rock coring was not utilized at any other location during the investigation, as samples were obtainable with SPTs or tubes.

4.1.3 Piezometers

Four piezometers were installed in borings BV-7, 23, 21, and 107 to depths of 49.5, 39.0, 52.5, and 29.5 feet, respectively. The locations covered the landfill pond, power block, northern pond, and cooling tower area. As noted in Section 4.1, the piezometers were constructed in holes drilled by rotary wash methods and bentonite mud as fluid. Each borehole was flushed with 500 gallons of clear water prior to piezometer construction. Each piezometer was constructed with 10 foot sections of 2 inch diameter polyvinyl chloride (PVC) riser pipe and a 10 foot screen pipe with 0.010 inch slots, set to the bottom of the drilled hole. The interface of the yellow-brown clay with the hard gray clay was monitored, with water likely seeping in the sand-filled clay fissures located above and below the interface. Filter material consisting of medium to fine silica sand was installed along the screen and above to ensure adequate monitoring of the sand seams. The riser pipe was extended to 3 feet above the ground surface. The piezometer was developed by first surging, then bailing the well nearly dry with a manual bailer. Expelled water was initially dark and full of suspended solids, but became relatively clear as the hole was bailed to within 4 feet of the bottom. A dry hole was not immediately obtainable because of the inflow of water, but the water clarity became stable as the hole was emptied. Piezometer logs are included in Appendix B.

4.1.4 Test Pits

Four test pits were excavated within the site and were located in the proposed storm pond, wastewater pond, coal runoff pond, and landfill runoff pond, as preliminarily located in June 2007. The pits were excavated by Brazos Valley Excavating, Inc., (subcontracted by PSI) with a CAT 325 hydraulic trackhoe. Pits were dug to between 13 and 16 feet and logged by a SCPP engineer/geologist. Bag samples were obtained from each test pit. Each pit was subsequently backfilled and hoe-tamped to protect the livestock in the area. Additionally, shallow (1.5 to 3.0 foot deep) pits were dug to prepare a bed for DRI testing, which was required to provide a suitable test platform without large surficial cracks. Test pit logs are included in Appendix C.

4.1.5 Geophysical Exploration

Two seismic crosshole tests were performed at opposite ends of the power block, near Borings BV-15 and BV-17. The tests were performed on three 100 foot cased borings spaced at 15 feet. The initial intent was to use 10 foot spacings for the borings, but it was determined during sampling that the anticipated shear wave velocity of the clay necessitated the use of greater spacings. Five foot vertical testing intervals were utilized to sample each soil layer, to a maximum depth of 100 feet. Verticality of each casing was determined with a 2DVA-1000 deviation probe.

During testing, limited grading and grubbing activities occurred with a D-6 dozer, which induced some vibrations into the test. Overhead transmission lines are located approximately 200 yards from the site, which also added minor irregularity into the test. The high swelling nature of the clay made for difficulties in properly grouting the casings.

A refraction microtremor (ReMi) test was performed at the contractor’s choice as a check between the two test locations. All testing was performed by PSI geoscientists. The geophysical report is included in Appendix D.

4.1.6 Pressuremeter Testing

Pressuremeter tests were performed in Borings BV-1, 2, 4, 11, 14, 16, 18, 24, 31, and 35 to determine in situ deformation properties of the soil strata. Pressuremeter testing was performed by sampling between SPT samples and Shelby tube samples at 5 foot intervals. Tests were conduced in the holes created by two Shelby tube samples where feasible in clay material. Tests were conducted in the clayshale layer by using rotary wash techniques and a downward flow bit, with bentonite slurry as drilling fluid to produce a smooth-walled hole. In several instances, the hole drilled for the probe was either too small or too large in diameter and was rejected for testing. Pressuremeter test results are provided in Appendix E

4.1.7 Soil Electrical Resistivity Tests

Soil electrical resistivity testing was performed over the property in strategic locations to efficiently model the site for grounding design. Twenty-six topsoil resistivity arrays were completed, along with four mid-soil resistivity arrays. Arrays were performed over the power block area, coal and cooling tower sites, and proposed railroad loop area. MSR-2 was offset 200 feet south to avoid deep ravines and inaccessible areas of the site. Electrical resistivity test results are provided in Appendix E.

Additional field test results are provided in Appendix E. Those included in Appendix E are Pressuremeter Tests, Electrical Resistivity Tests, Summary of Vane Shear Tests, Dynamic Cone Penetrometer Tests, and the Double Ring Infiltrometer Test.

4.2 Laboratory Testing Program

Numerous laboratory tests were assigned for the samples collected. A laboratory testing program was performed to classify and characterize the soils encountered during the investigation and to estimate relevant engineering properties of the soils. Triaxial tests included unconsolidated-undrained and consolidated-undrained. Remolded and recompacted soil was mixed with calculated amounts of cement or lime and used with unconsolidated-undrained testing.

The laboratory testing program was developed by B&V and performed by PSI and subcontractors. The laboratory tests included the following:

- Moisture Content--To determine the in situ water content of soil samples.
- Atterberg Limits--To determine the relative plasticity of the soil samples and to assist in classifying the fine-grained portion of the sample.
- California Bearing Ratio (CBR)--To determine suitability of a subgrade for use under a foundation or roadway.
- Clay Fraction--To determine the percentage of clay within a sample.
- Consolidation--To determine the compressibility of cohesive deposits.
- CU-Bar (Consolidated-Undrained with Pore Pressure Measurements) Triaxial Compression--To determine total and effective stress strength parameters.
- Grain Size Analyses--To determine the relative proportions of fine-grained soil particles and sand gradation found in the soil samples.
- Falling Head Permeability--To determine permeability of landfill and pond liner material.
- Lime Percentage--To determine the optimum amount of lime for soil modification.
- UU (Unconsolidated-Unconfined) Triaxial Compression--To determine representative undrained shear strengths of clay deposits under in situ confining stresses.
- UNC (Unconfined) Compression--To determine representative undrained compressive strengths of clay with no confining stress.
- Standard Proctor Tests--To determine the maximum dry density and optimum moisture contents of fill material.
- Soil Box Electrical Resistivity--To determine the resistivity of borrow sources.

- Swell Test--To determine free swell percentages and maximum swell pressures.
- Chemical Analysis--To determine the corrosive potential of foundation soils by measuring the pH, chloride, and sulfate content of foundation soils.

All laboratory testing was performed in general accordance with established American Society for Testing and Materials (ASTM) procedures. Results from the laboratory testing program are included in Appendix F.

4.3 Previous Investigation

A previous investigation was performed by Morris-Flood and Associates in 2006 (Reference 5). During the investigation, eight soil borings were completed, along with a limited array of laboratory testing. Five borings were performed in the proposed power block area, two in the pond and landfill location, and one in the proposed railroad alignment. Borings were terminated at depths ranging from 30 to 60 feet. The boring logs indicated materials encountered as firm to hard, high plasticity clay. The SPT N values (and consistency) of the clay increased with depth, to over 50 blows per foot. A layer of Marl was identified under several of the deeper borings, past depths of 50 feet. The majority of deep clay samples were reported as sampled by thin-walled tube pushes, which was not reproduced by the sampling methods used for this investigation.

5.0 Subsurface Conditions

5.1 Regional Geology

The project site lies in the Blackland Prairies province of the Texas Gulf Coastal plains. They are the most inland Gulf Coast plains, located northeast of the Central Texas uplift, and consist of chalks and marls that weather to deep, black clay soils (Physiographic Map of Texas 1996).

Two integrated geologic formations of the Upper Cretaceous period lie below the site. The Lower Taylor Marl Formation (Ozan) grades upward to the Wolfe City Formation, of which both were sampled during the investigations. The Wolfe City formation is historically known to reach thicknesses of 300 feet, but based on its exposed width at the surface, a rough estimate of its thickness at the site would be 150 feet. The Wolfe City Formation consists of marl, sand, sandstone, and clay interbedded with thin sandstone and un-cemented sand lenses, and containing glauconite, phosphate and hematite nodules. It is generally dark gray to light gray and brown. (Geologic Atlas of Texas, Waco Sheet, Texas Bureau of Economic Geology, 1970.).

The geology of the Gulf Coastal Plains is complex due to cyclic deposition of sedimentary facies. Sediments were deposited under a fluvial-deltaic to shallow marine environments during the Miocene to the Pleistocene periods. Repeated sea-level changes and natural basin subsidence produced discontinuous beds of sand, silt, clay, and gravel (Chowdhury and Turco, 2005).

The formations directly underlying the site are considered to be a confining unit of the local aquifer. A local recharge zone of sandy deposits is located just northwest of the site running northeast to southwest. The most shallow principal aquifer beneath the site is the Trinity Aquifer, which would likely be encountered at least 1,000 feet below the ground surface. (*Groundwater Atlas of the United States*, USGS, Reston, VA, 1996.)

5.2 Site-Specific Geology

Three distinct soil layers are found within the site. A high plasticity, overconsolidated, firm, brown clay with fluvial gravel and cobble is underlain by a stiff, high plasticity, overconsolidated, yellow-brown clay. The yellow-brown clay grades to a hard, high plasticity, gray clayshale deposit. The clayshale layer is a completely weathered-decomposed layer of shale. Also encountered was a clayey rock locally termed marl, consisting of highly cemented plant and bone fragments with frequent sandstone, limestone, and gypsum nodules. The marl was encountered in only one boring, and no limits or extent of the material could be determined.

An approximate 6 inch topsoil layer overlies the site and contains organics. The yellow-brown clay ranges in thickness from 5 feet to 40 feet, and the gray clayshale has been measured in thickness from 20 to 40 feet. Frequent secondary mineralization and deposits of gypsum and fine sand are apparent to depths of up to 40 feet. Overconsolidation of the clays found onsite is from variations in historical water levels, sediment deposits over geologic history, and desiccation.

5.3 Geological Hazards

Liquefaction is not a concern at the site because of low seismic potential and no loose granular materials found onsite.

The majority of clays found in the upper 35 feet have a high potential for swelling. Seasonal shrink-swell patterns commonly leave 1.5 inch wide fissures in the upper 5 to 10 feet of soil. Swelling of the clays under lightly loaded structures built on shallow foundations and paved roads will have to be mitigated by techniques detailed in Section 7.2.

Land subsidence is not a concern at the site. Sinkholes are not common to the area, as the underlying rock is not prone to dissolution by surface water infiltration.

The majority of clay in the upper 35 feet is lightly to moderately overconsolidated. Below 35 feet, to the top of rock, the majority of clay sampled was highly overconsolidated. There is no risk of soil collapse caused by under consolidated deposits.

The nearest Cretaceous-aged fault is located more than 15 miles from the project area. There have been no recent geologic data that indicated any seismic-related ground surface movement in recent geologic history.

The average proposed elevation of the power block area is 480 feet (MSL). The lowest proposed plant elevation is 445 feet at the storm water retention pond berm. The Federal Emergency Management Agency (FEMA) 100 year flood elevation is approximately 425 feet. The site is not prone to flooding.

The risk of landslides is minimal at the current site. Some moderately steep hills exist, but consist of stiff clay that is sufficiently strong to withstand any driving forces from the natural slopes. Proposed earthwork plans indicate the removal of most steep valleys and hills, which would further eliminate any landslide or slope failure risk.

5.4 Seismicity

Seismic activity is generally not considered a hazard in the site area. The maximum peak ground acceleration for a 50 year event is 6.0 percent gravity (0.06g).

5.4.1 Probabilistic Seismicity

The site area has a low potential for seismic activity. The soil is classified as Site Class C based on the average soil properties for the upper 100 feet of the soil profile, as defined by the requirements in the 2003 International Building Code (IBC). Seismic design parameters are as follows (IBC 2003):

- Mapped spectral acceleration for 0.2 second short period (S_S) = 10.1 percent, based on Site Class C.
- Mapped spectral acceleration for 1 second period (S_1) = 4.3 percent, based on Site Class C.
- Seismic Importance Factor (IE) = 1.25.
- Structure Category = Category III.
- Seismic Use Group = Group II.
- Design spectral acceleration for 0.2 second short period (S_{DS}) = 8.1 percent.
- Design spectral acceleration for 1.0 second short period (S_{D1}) = 5.6 percent.

5.4.2 Deterministic Seismicity

Geologic evidence indicates very low risk for seismic movement or hazards. The United States Geological Survey (USGS, 2007) states, "The gulf-margin normal faults in Texas are assigned as Class B structures because of their low seismicity and because they may be decoupled from underlying crust, making it unclear if they can generate significant seismic ruptures that could cause damaging ground motion."

Few earthquakes are recorded in southern Texas history, with even fewer creating much damage. The latest recorded significant earthquakes to impact the region are listed in Table 5-1 (USGS, 2007).

Table 5-1
Regional Latest Recorded Significant Earthquakes (USGS, 2007)

Occurrence Date	Modified Mercalli Magnitude	Location
09/15/2007	2.7	100 miles NE of Austin
11/02/1981	3.2	90 miles NE of Austin
2/15/1974	4.5	Texas Panhandle
5/12/1969	3.3/3.4	El Paso
06/20/1966	4.8	Texas Panhandle

5.5 Site-Specific Ground Conditions

5.5.1 Site Stratigraphy

Three major layers have been identified under the site. Cross sections for the Power Block, Cooling Tower, and Coal Handling areas are shown in Figures 5-1, 5-2, and 5-3, respectively. Not all of the soil borings are included in the cross sections.

Layer 1: Brown Clay

Layer 1 is a high plasticity, soft-to-firm clay with trace amounts of rounded sand and gravel of fluvial deposits. It contains organics in the top 6 inches and sustains wild plant growth. This layer is typically 1 to 12 feet thick and is found in every boring sampled onsite. Thinner deposits are found on the top and sides of hills, with thicker deposits up to 12 feet thick located in bottom valley areas. The upper 8 feet (where deposited) is highly desiccated from seasonal drying and exhibits vertical cracking up to 2 inches wide and 6 feet deep in the dry season. This layer is prone to substantial swelling. Average SPT N values were 5 blows per foot (bpf), with an average shear strength of 1.5 ksf. The average moisture content, liquid limit, and plastic limit were 30, 70, and 28 percent, respectively. The overconsolidation ratio ranged from 1.5 to 4.0.

Layer 2: Yellow-Brown Clay

Layer 2 is a high plasticity, firm-to-stiff clay with trace amounts of subrounded sand and gravel. This layer ranges in depth from 10 feet to 45 feet and is found in every boring sampled onsite. The SPT N values ranged from 15 to 45, and increased linearly with depth. Shear strengths increased from 2.5 ksf at shallow depths to 4 ksf near the interface with clayshale. Occasional horizontal seams of fine gray sand were common in the upper elevations, while horizontal and vertical deposits of gypsum were identified within this layer. Free water was commonly encountered within the sand layers at depths greater than 20 feet. This layer is prone to swelling when exposed to excess water. At lower elevations, this layer grades to gray with no change in strength properties. Three sublayers were created for analysis to accurately capture the increasing strength of the deposit. The average moisture content, liquid limit, and plastic limits are 25, 68, and 25 percent, respectively. The overconsolidation ratio ranged from 2.0 to 4.0.

Layer 3: Clayshale

Layer 3 is a moist-to-dry, high plasticity, hard, residual intermediate geomaterial typically found below depths of 50 feet in the upper hills and 25 feet in the bottom valleys. It was classified as a a decomposed residual shale that had been weathered to a clay material. It is characterized as having a distinct horizontal fabric structure (fissile).

Fine sand layers were found infrequently, and typically were observed with iron oxide staining. Very infrequently fissures and joints were found with angles of 45 to 60 degrees. Average SPT N values were over 50 bpf, with occasional refusal on unweathered nodules. The average shear strength from unconfined compression and unconsolidated undrained triaxial tests was 7 ksf. The average moisture content, liquid limit, and plastic limits are 20, 67, and 25 percent, respectively. The overconsolidation ratio was estimated at over 6, due to a lack of quality undisturbed samples recovered.

Marl

Clayey limestone (Marl) was identified in one deep boring, BV-11 at a depth of 78.0 feet (elevation 404 feet). It was characterized as a soft rock with clay origins and random cemented inclusions with less than 10 percent gypsum content. The layer was identified by SPT refusal and required coring equipment for sampling. The average unconfined compressive strength was 40 ksf (280 pounds per square inch, psi) from rock core samples.

5.5.2 Groundwater Conditions

Groundwater was encountered in all eight borings advanced with hollow stem augers, and in all piezometers installed onsite. Water strikes were encountered from 22 to 43 feet below ground surface (elevation 454 feet and 442 feet, respectively) in the power block area (Borings BV-7 and BV-11), and 14 feet below ground surface (elevation 411 feet) near the storm runoff pond (Boring BV-23). It was determined that the water flowed from cracks and fissures in the stiff clay. The majority of the fissures were in-filled with sand and gypsum, indicating secondary mineralization and water flow at certain depths. Iron oxide staining and secondary mineralization in near-surface soil indicates vertical water movement in recent history.

The water encountered is considered transient or perched, is not connected to the local aquifer, and is not expected to be found in large quantities. The nearest freshwater aquifer is located at a depth of over 1,000 feet below ground surface.

The permeability and infiltration rate of clays onsite were determined by both laboratory and in situ tests. Falling head permeability tests and DRI testing resulted in close agreement of the hydraulic properties. The infiltration rates during the DRI tests indicate the swelling nature of the high plasticity clay, with the initial inflow rates as much as 10 times those at the end of the test. This indicates that the system either became saturated or swelled and fissures closed during testing, with the latter verified by visual inspection. All soil encountered onsite was mostly clay with high plasticity. The natural permeability of these soils is generally very low ($k < 10^{-8}$ centimeters per second).

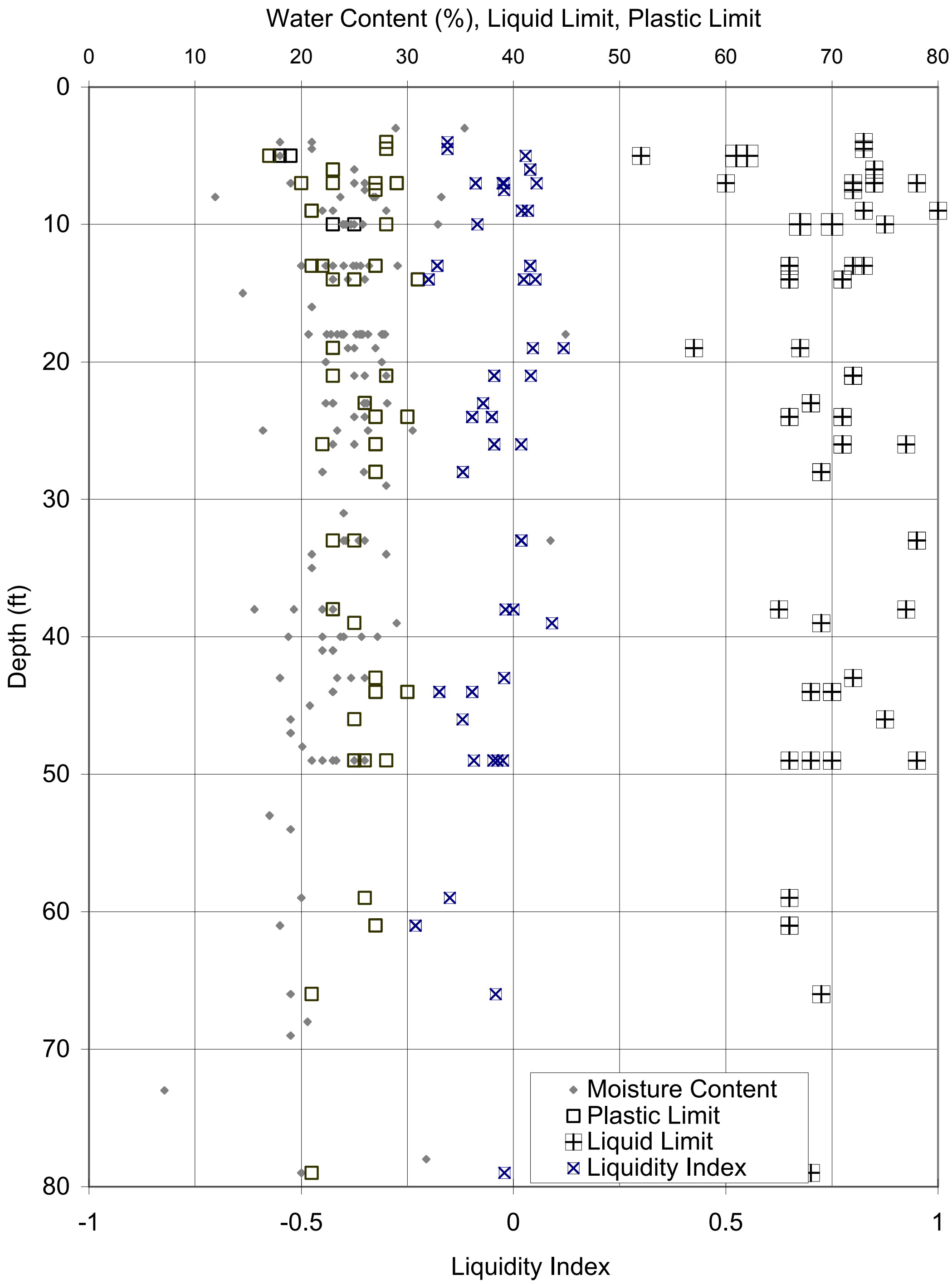

Figure 6-2
Atterberg Limit Data vs. Depth, All Data

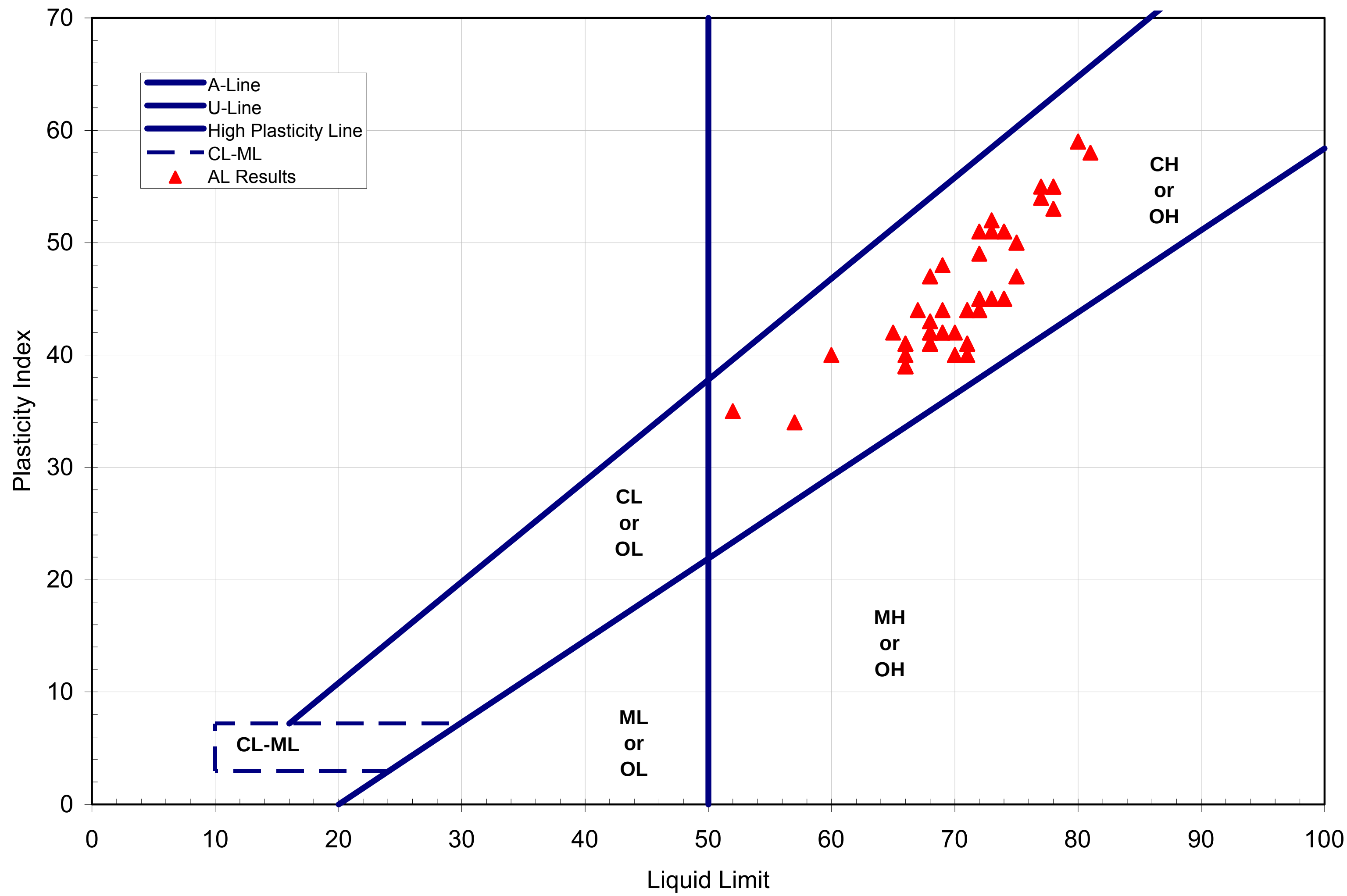

Figure 6-3
Atterberg Limit Classification, All Data

Sandy Creek Services, LLC

Sandy Creek Energy Station
Solid Waste Disposal Facility

Engineering Report

Revision 1

SCPP Project No. 149060
SCPP File No. 52.0206

October 18, 2010

SCPP
Sandy Creek Power Partners

Sandy Creek Power Partners, L.P.

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Drawings

As listed in Table 2-1 - Solid Waste Disposal Facility Drawings

3.0 Site Geology and Hydrogeology

3.1 Regional Geology

The project site lies in the Blackland Prairies province of the Texas Gulf Coastal plains. They are the most inland Gulf Coast plains, located northeast of the Central Texas uplift, and consist of chalks and marls that weather to deep, black clay soils (Physiographic Map of Texas 1996).

Two integrated geologic formations of the Upper Cretaceous period lie below the site. The Lower Taylor Marl Formation (Ozan) grades upward to the Wolfe City Formation, of which both were sampled during the investigations. The Wolfe City formation is historically known to reach thicknesses of 300 feet, but based on its exposed width at the surface, a rough estimate of its thickness at the site would be 150 feet. The Wolfe City Formation consists of marl, sand, sandstone, and clay interbedded with thin sandstone and un-cemented sand lenses, and containing glauconite, phosphate and hematite nodules. It is generally dark gray to light gray and brown. (Geologic Atlas of Texas, Waco Sheet, Texas Bureau of Economic Geology, 1970.).

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The formations directly underlying the site are considered to be a confining unit of the local aquifer. A local recharge zone of sandy deposits is located just northwest of the site running northeast to southwest. The most shallow principal aquifer beneath the site is the Trinity Aquifer, which would likely be encountered at least 1,000 feet below the ground surface. (Groundwater Atlas of the United States, USGS, Reston, VA, 1996.)

3.2 Site-Specific Geology

Three distinct soil layers are found within the site. A high plasticity, overconsolidated, firm, brown clay with fluvial gravel and cobble is underlain by a stiff, high plasticity, overconsolidated, yellow-brown clay. The yellow-brown clay grades to a hard, high plasticity, gray clayshale deposit. The clayshale layer is a completely weathered-decomposed layer of shale. Also encountered was a clayey rock locally termed marl, consisting of highly cemented plant and bone fragments with frequent sandstone, limestone, and gypsum nodules. The marl was encountered in only one boring, and no limits or extent of the material could be determined.

An approximate 6 inch topsoil layer overlies the site and contains organics. The yellow-brown clay ranges in thickness from 5 feet to 40 feet, and the gray clayshale has been measured in thickness from 20 to 40 feet. Frequent secondary mineralization and deposits of gypsum and fine sand are apparent to depths of up to 40 feet. Overconsolidation of the clays found onsite is from variations in historical water levels, sediment deposits over geologic history, and desiccation.

3.3 Subsurface Investigation

The subsurface investigation was performed to determine the site stratigraphy and geotechnical engineering parameters of the soils that underlie the proposed site area. The subsurface investigation was developed to gather detailed design information for use with data obtained from a previous geotechnical investigation.

The subsurface investigation was contracted to Professional Service Industries, Inc. (PSI) of Houston, Texas, under the geotechnical engineering direction of SCPP. The exploration work within the storage area footprint consisted of soil borings, piezometer installations, and test pits.

3.3.1 Field Testing Program

The field investigation consisted of a total of eleven (11) soil borings, of which a piezometer was set in one (1) of the borings located on the southeast corners of the solid waste disposal facility site. The borings were 28 to 73 feet deep with most of the borings terminating in the clayshale layer. One (1) test pit was excavated to a depth of 16 feet in the stormwater runoff pond area. Field tests within the SWDF and stormwater runoff pond area are discussed in the following subsections.

The subsurface investigation locations are provided on Figure 3-1 (SCPP Drawing 149060-DS-0001, Revision C). Initial surveying and staking of points was performed by Sherwood Surveying, LLC of Spring Branch, Texas. Coordinates were transformed from state plane to latitude and longitude for use with global positioning system (GPS) location equipment. Mean Sea Level (MSL) elevations were used for the investigation. Table 3-1 lists the coordinates, ground surface elevations, and depths for the soil borings, test pits, and piezometer locations, along with remarks identifying the particular field testing conducted within the boring as listed in Figure 3-1.

Table 3-1
Subsurface Investigation Locations

Location Number	Plant Grid (feet)		State Plane (feet)		Depth (feet)	Elevation (feet)	Remarks
BV-101	4026.14	8999.50	10514938.08	3348552.06	43	473.2	
BV-102	3335.46	9470.07	10514307.74	3349100.83	48		
BV-103	4055.68	10248.88	10515114.81	3349789.23	50	493.2	
BV-104	3609.90	9868.75	10514627.29	3349464.35	73	490.3	
BV-105	3689.96	10523.55	10514784.05	3350105.13	50	464.0	
BV-106	2448.49	9621.23	10513444.80	3349355.58	43		

Table 3-1
Subsurface Investigation Locations

Location Number	Plant Grid (feet)		State Plane (feet)		Depth (feet)	Elevation (feet)	Remarks
BV-107	3101.00	10663.00	10514216.41	3350313.15	28		PIEZ
BV-108	2345.42	10497.71	10513445.85	3350238.09	37	443.7	
BV-109	2338.85	10190.45	10513403.08	3349933.75	50	441.6	
BV-110	2550.91	10393.32	10513637.59	3350110.19	38	439.6	
BV-111	2739.34	10464.88	10513833.14	3350159.02	50	446.0	
TP-4	2344.08	10330.80	10513424.83	3350072.50	14	438.0	TEST PIT

Abbreviations:
PIEZ= Piezometer Installation

3.3.1.1 Soil Test Borings

Eleven soil borings were performed using rotary wash technique. Borings BV-101 through BV-107 were located within the SWDF areas. Borings BV-108 through BV-111 and test pit TP-4, were located within the stormwater runoff pond area.

Borings were advanced with 3-7/8 inch step bit using bentonite slurry as drilling fluid. Sampling of the in situ materials included the standard penetration test (SPT) that utilized a standard 2.0 inch outside diameter split spoon sampler, driven with a CME auto hammer and thin-walled Shelby tubes advanced with hydraulic down pressure from the rig. Borings, with the exception of piezometer borings, were backfilled with bentonite chips through the open hole. An SCPP geotechnical engineer logged the borings and provided field classification of samples during the drilling work. The boring logs are presented in Appendix A.

3.3.1.2 Piezometers

One piezometer was installed in boring BV-107 at a depth of 19.0 feet, with a 10 foot screen. As noted in Section 3.3.1.1, the piezometer was constructed in borehole drilled by rotary wash methods and bentonite mud as fluid. The borehole was flushed with 500 gallons of clear water prior to piezometer construction. Each piezometer was constructed with 10 foot sections of 2 inch diameter polyvinyl chloride (PVC) riser pipe and a 10 foot screen pipe with 0.010 inch slots, set to the bottom of the drilled hole. The interface of the yellow-brown clay with the hard gray clay was monitored, with water likely seeping in the sand-filled clay fissures located above and below the interface. Filter material consisting of medium to fine silica sand was installed along the screen and above to ensure adequate monitoring of the sand seams. The riser pipe was extended to 3 feet above the ground surface. The piezometer was developed by first surging, then bailing the well nearly dry with a manual bailer. Expelled water was initially dark and full of suspended solids, but became relatively clear as the hole was bailed to within 4 feet of the bottom. A dry hole was not immediately obtainable because of the inflow of water, but the water clarity became stable as the hole was emptied. Piezometer log is included in Appendix A.

3.3.1.3 Field Permeability Tests

The permeability and infiltration rate of clays onsite were determined by compacting the in situ material to the clay liner specifications in 3 lifts. Falling head permeability tests on samples from each lift and double ring infiltrometer (DRI) testing resulted in close agreement of the hydraulic properties. The infiltration rates during the DRI tests indicate the swelling nature of the high plasticity clay, with the initial inflow rates as much as 10 times those at the end of the test. This indicates that the system either became saturated or swelled and fissures closed during testing, with the latter verified by visual inspection. All soil encountered onsite was mostly clay with high plasticity. The natural permeability of these soils is generally very low (k < 10 -8 centimeters per second). Field permeability tests data and interpretation is provided in Appendix B.

3.3.1.4 Test Pits

One test pit was excavated within the stormwater runoff pond area. The pits were excavated by Brazos Valley Excavating, Inc., (subcontracted by PSI) with a CAT 325 hydraulic trackhoe. The test pit was dug to a depth of 13 feet and logged by a SCPP engineer/geologist. Bag samples were obtained from the test pit. The pit was subsequently backfilled and hoe-tamped to protect the livestock in the area. Test pit logs are included in Appendix A.

3.3.2 Laboratory Testing Program

Numerous laboratory tests were assigned for the samples collected. A laboratory testing program was performed to classify and characterize the soils encountered during the investigation and to estimate relevant engineering properties of the soils. Triaxial tests included unconsolidated-undrained and consolidated-undrained. Remolded and recompacted soil was mixed with calculated amounts of cement or lime and used with unconsolidated-undrained testing.

The laboratory testing program was developed by SCPP and performed by PSI and subcontractors. The laboratory tests included the following:

- Moisture Content--To determine the in situ water content of soil samples.
- Atterberg Limits--To determine the relative plasticity of the soil samples and to assist in classifying the fine-grained portion of the sample.
- California Bearing Ratio (CBR)--To determine suitability of a subgrade for use under a foundation or roadway.
- Clay Fraction--To determine the percentage of clay within a sample.
- CU-Bar (Consolidated-Undrained with Pore Pressure Measurements) Triaxial Compression--To determine total and effective stress strength parameters.
- Grain Size Analyses--To determine the relative proportions of fine-grained soil particles and sand gradation found in the soil samples.
- Variable Head Permeability--To determine permeability of landfill and pond liner material.
- UU (Unconsolidated-Unconfined) Triaxial Compression--To determine representative undrained shear strengths of clay deposits under in situ confining stresses.

- Standard Proctor Tests--To determine the maximum dry density and optimum moisture contents of fill material.

All laboratory testing was performed in general accordance with established American Society for Testing and Materials (ASTM) procedures. Results from the laboratory testing program are included in Appendix C.

3.3.3 Previous Investigations

A previous investigation was performed by Morris-Flood and Associates in 2006 . During the investigation, eight soil borings were completed, along with a limited array of laboratory testing. Two of the borings were performed in the proposed SWDF area. Borings were terminated at depths ranging from 30 to 60 feet. The boring logs indicated materials encountered as firm to hard, high plasticity clay. The SPT N values (and consistency) of the clay increased with depth, to over 50 blows per foot. A layer of Marl was identified under several of the deeper borings, past depths of 50 feet. The majority of deep clay samples were reported as sampled by thin-walled tube pushes, which were not reproduced by the sampling methods used by SCPP for this investigation.

3.4 Site-Specific Ground Conditions

3.4.1 Site Stratigraphy

Three major layers have been identified under the site.

3.4.1.1 Brown Clay

Layer 1 is a high plasticity, soft-to-firm clay with trace amounts of rounded sand and gravel of fluvial deposits. It contains organics in the top 6 inches and sustains wild plant growth. This layer is typically 1 to 12 feet thick and is found in every boring sampled onsite. Thinner deposits are found on the top and sides of hills, with thicker deposits up to 12 feet thick located in bottom valley areas. The upper 8 feet (where deposited) is highly desiccated from seasonal drying and exhibits vertical cracking up to 2 inches wide and 6 feet deep in the dry season. This layer is prone to substantial swelling. Average SPT N values were 5 blows per foot (bpf), with an average shear strength of 1.5 ksf. The average moisture content, liquid limit, and plastic limit were 30, 70, and 28 percent, respectively. The overconsolidation ratio ranged from 1.5 to 4.0.

3.4.1.2 Yellow-Brown Clay

Layer 2 is a high plasticity, firm-to-stiff clay with trace amounts of subrounded sand and gravel. This layer ranges in depth from 10 feet to 45 feet and is found in every boring sampled onsite. The SPT N values ranged from 15 to 45, and increased linearly with depth. Shear strengths increased from 2.5 ksf at shallow depths to 4 ksf near the interface with clayshale. Occasional horizontal seams of fine gray sand were common in the upper elevations, while horizontal and vertical deposits of gypsum were identified within this layer. Free water was commonly encountered within the sand layers at depths greater than 20 feet. This layer is prone to swelling when exposed to excess water. At lower elevations, this layer grades to gray with no change in strength properties. Three sublayers were created for analysis to accurately capture the increasing strength of the deposit. The average moisture content, liquid limit, and plastic limits are 25, 68, and 25 percent, respectively. The overconsolidation ratio ranged from 2.0 to 4.0.

3.4.1.3 Clayshale

Layer 3 is a moist-to-dry, high plasticity, hard, residual intermediate geomaterial typically found below depths of 50 feet in the upper hills and 25 feet in the bottom valleys. It was classified as decomposed residual shale that had been weathered to a clay material. It is characterized as having a distinct horizontal fabric structure (fissile). Fine sand layers were found infrequently, and typically were observed with iron oxide staining. Very infrequently fissures and joints were found with angles of 45 to 60 degrees. Average SPT N values were over 50 bpf, with occasional refusal on unweathered nodules. The average shear strength from unconfined compression and unconsolidated undrained triaxial tests was 7 ksf. The average moisture content, liquid limit, and plastic limits are 20, 67, and 25 percent, respectively. The overconsolidation ratio was estimated at over 6, due to a lack of quality undisturbed samples recovered.

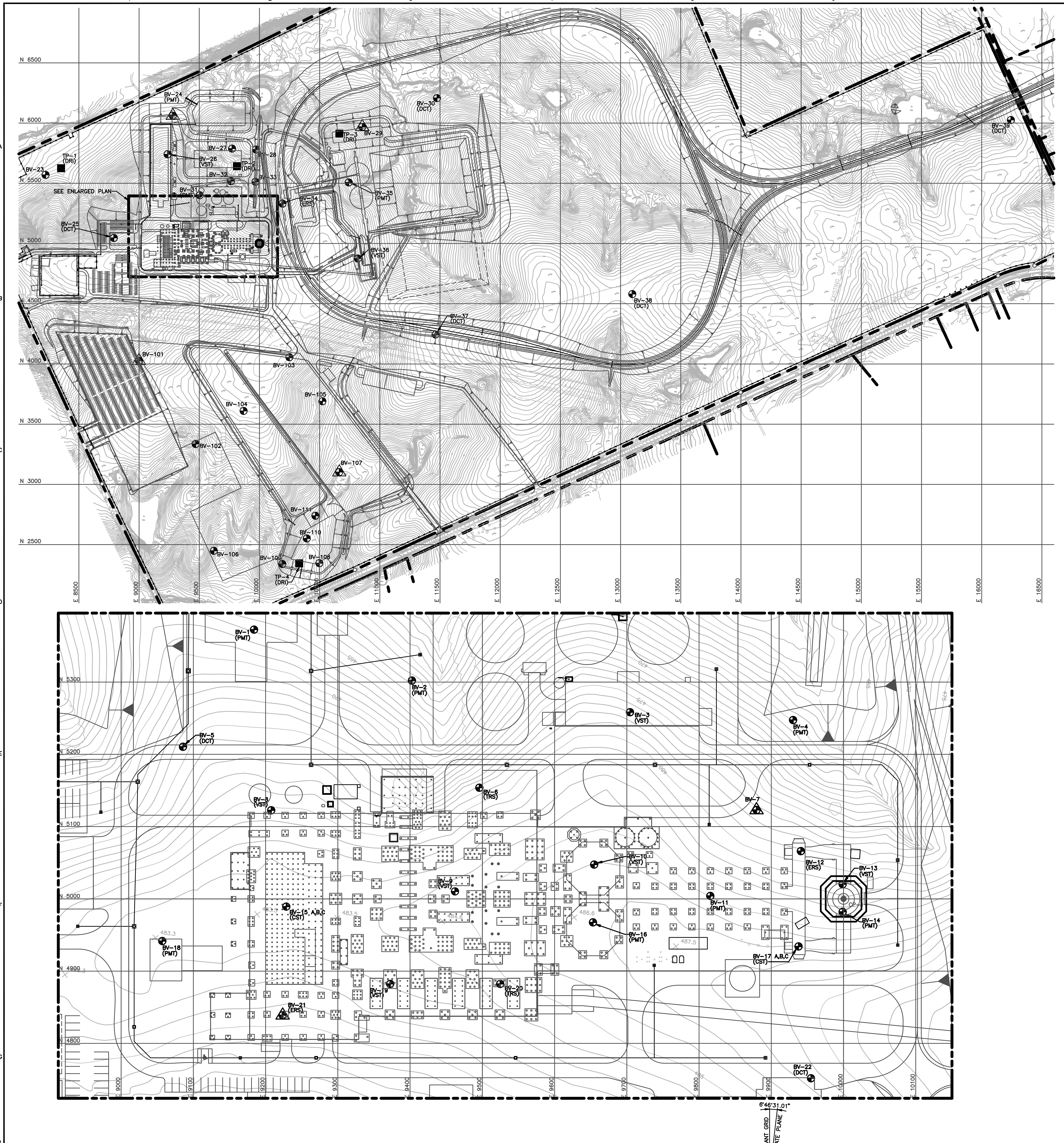
3.4.1.4 Marl

Clayey limestone (Marl) layer was not identified in SWDF borings to the depths explored. Based on the extent of this layer elsewhere in the power block area, the layer was characterized as a soft rock with clay origins and random cemented inclusions with less than 10 percent gypsum content. The layer was identified by SPT refusal and required coring equipment for sampling. The average unconfined compressive strength was 40 ksf (280 pounds per square inch, psi) from rock core samples.

3.5 Groundwater Conditions

Groundwater was not encountered in the SWDF area borings. In the power block area, groundwater was encountered in eight borings advanced with hollow stem augers, and in all piezometers installed onsite. Water strikes were encountered from 22 to 43 feet below ground surface (elevation 454 feet and 442 feet, respectively) in the power block area (Borings BV-7 and BV-11), and 14 feet below ground surface (elevation 411 feet) near the stormwater runoff pond (Boring BV-23). It was determined that the water flowed from cracks and fissures in the stiff clay. The majority of the fissures were in-filled with sand and gypsum, indicating secondary mineralization and water flow at certain depths. Iron oxide staining and secondary mineralization in near-surface soil indicates vertical water movement in recent history.

The water encountered is considered transient or perched, is not connected to the local aquifer, and is not expected to be found in large quantities. The nearest freshwater aquifer is located at a depth of over 1,000 feet below ground surface.



BORING LOCATIONS

LOCATION NO.	PLANT GRID NORTHING	PLANT GRID EASTING	STATE PLANE NORTHING	STATE PLANE EASTING	SOIL DRILLING (FT)	ROCK/MARL DRILLING (FT)	REMARKS
BV-1	5372.69	9183.98	10516296.99	3348576.40	50	TOP	PRESSUREMETER TESTING
BV-2	5302.16	9402.55	10516252.73	3348801.76	50	30	PRESSUREMETER TESTING
BV-3	5258.34	9704.39	10516244.84	3349106.65	50	TOP	VANE SHEAR TEST
BV-4	5247.51	9930.16	10516260.72	3349332.13	50	TOP	PRESSUREMETER TESTING
BV-5	5210.50	9085.63	10516124.33	3348497.86	10	–	DYNAMIC CONE TEST
BV-6	5153.86	9495.83	10516116.47	3348911.88	50	30	THERMAL RESISITIVITY SAMPLE
BV-7	5123.01	9879.53	10516131.11	3349296.54	50	TOP	PIEZOMETER
BV-8	5122.58	9207.76	10516051.43	3348629.51	50	30	VANE SHEAR TEST
BV-9	5010.34	9462.12	10515969.98	3348895.34	50	30	VANE SHEAR TEST
BV-10	5047.43	9654.83	10516029.54	3349082.33	50	30	VANE SHEAR TEST
BV-11	5004.06	9815.58	10516005.45	3349247.07	50	30	PRESSURE METER TEST
BV-12	5066.09	9940.97	10516081.83	3349364.26	50	TOP	ELECTRICAL RESISTIVITY SAMPLE
BV-13	5020.13	9998.74	10516043.01	3349427.06	50	TOP	VANE SHEAR TEST
BV-14	4982.05	9998.74	10516005.20	3349431.55	50	30	PRESSUREMETER TESTING
BV-15 A,B,C	4989.27	9228.63	10515921.52	3348665.96	50	50	CROSSHOLE SEISMIC TEST; SAMPLE BORING "A"
BV-16	4967.44	9653.13	10515949.92	3349090.07	50	TOP	PRESSUREMETER TESTING
BV-17 A,B,C	4934.12	9937.68	10515950.40	3349376.57	50	50	CROSSHOLE SEISMIC TEST; SAMPLE BORING "A"
BV-18	4941.61	9057.00	10515853.94	3348501.16	50	TOP	PRESSUREMETER TESTING
BV-19	4882.26	9372.41	10515832.21	3348821.37	50	TOP	VANE SHEART TEST
BV-20	4882.26	9524.72	10515850.18	3348972.62	50	30	THERMAL RESISTIVITY SAMPLE
BV-21	4838.92	9223.59	10515771.61	3348678.70	50	30	ELECTRICAL RESISTIVITY SAMPLE
BV-22	4751.65	9954.93	10515771.24	3349415.22	10	–	DYNAMIC CONE TEST
BV-23	5570.30	8223.48	10516379.91	3347599.29	60	TOP	
BV-24	6061.39	9280.50	10516992.27	3348590.98	50	30	PRESSUREMETER TESTING; PIEZOMETER
BV-25	5046.39	8790.72	10515926.57	3348224.38	10	–	DYNAMIC CONE TEST
BV-26	5741.22	9237.12	10516669.21	3348585.69	50	TOP	VANE SHEAR TEST
BV-27	5788.27	9772.89	10516779.15	3349112.17	50	TOP	
BV-28	5781.05	9971.82	10516795.44	3349310.56	50	TOP	
BV-29	5968.82	10854.20	10517086.00	3350164.62	50	TOP	PIEZOMETER
BV-30	6207.80	11475.28	10517396.58	3350753.17	10	–	DYNAMIC CONE TEST
BV-31	5400.92	9503.72	10516362.74	3348890.57	50	30	PRESSUREMETER TESTING
BV-32	5517.78	9763.70	10516509.46	3349134.95	50	TOP	
BV-33	5512.53	9967.23	10516528.26	3349337.67	50	TOP	
BV-34	5331.33	10191.76	10516374.81	3349582.02	50	30	ELECTRICAL RESISTIVITY SAMPLE
BV-35	5507.28	10741.94	10516614.44	3350107.59	50	TOP	PRESSUREMETER TESTING
BV-36	4875.69	10816.78	10515996.09	3350256.42	50	30	VANE SHEAR TEST
BV-37	4244.12	11462.80	10515445.14	3350972.45	10	–	DYNAMIC CONE TEST
BV-38	4580.25	13097.57	10515971.80	3352556.14	10	–	DYNAMIC CONE TEST
BV-39	6025.94	16242.36	10517778.39	3355508.42	10	–	DYNAMIC CONE TEST
BV-101	4026.14	8999.50	10514938.08	3348552.06	50	TOP	PIEZOMETER
BV-102	3335.46	9470.07	10514307.74	3349100.83	50	TOP	
BV-103	4055.68	10248.88	10515114.81	3349789.23	50	TOP	
BV-104	3609.90	9868.75	10514627.29	3349464.35	50	TOP	
BV-105	3689.96	10523.55	10514784.05	3350105.13	50	TOP	
BV-106	2448.49	9621.23	10513444.80	3349355.58	50	TOP	
BV-107	3101.00	10663.15	10514216.41	3350313.15	50	TOP	PIEZOMETER
BV-108	2345.42	10497.71	10513445.85	3350238.09	50	TOP	
BV-109	2338.85	10190.45	10513403.08	3349933.75	50	TOP	
BV-110	2550.91	10393.32	10513637.59	3350110.19	50	TOP	
BV-111	2739.34	10464.88	10513833.14	3350159.02	50	TOP	
TP-1	5625.45	8352.16	10516449.85	3347720.56	15	–	
TP-2	5642.52	9813.60	10516639.22	3349169.78	15	–	
TP-3	5913.13	10663.96	10517008.25	3349982.28	15	–	
TP-4	2344.08	10330.80	10513424.83	3350072.50	15	–	

LEGEND

- BV-1 BORING LOCATION
- BV-1 BORING WITH PIEZOMETER LOCATION
- TP-1 TEST PIT LOCATION
- (PMT) PRESSUREMETER TESTING
- (VST) VANE SHEAR TEST
- (CST) CROSSHOLE SEISMIC TEXT, SAMPLE BORING "A"
- (DCT) DYNAMIC CONE TEST
- (TRS) THERMAL RESISITIVITY SAMPLE
- (ERS) ELECTRICAL RESISTIVITY SAMPLE
- (DRI) DOUBLE RING INFILTROMETER

NOTES

1. ELECTRICAL RESISTIVITY SAMPLE TO BE TAKEN AT DESIGNATED LOCATIONS AT APPROXIMATE DEPTHS OF 2', 4', 10', 15', 20', 30', AND BOTTOM OF BORING.
2. CROSSHOLE SEISMIC TEST REQUIRES 3-100' CASED HOLES LOCATED IN A LINE AT 10' SPACING.
3. THERMAL RESISTIVITY SAMPLE TO BE TAKEN AT DESIGNATED LOCATIONS AT DEPTHS INDICATED BY PURCHASER. SAMPLE TO BE PLACED IN SEALED 5 GALLON BUCKET.

FOR ENGINEERING REPORT
FIGURE 3-1
BORING LOCATION AND INSITU TEST PLAN

NOT TO BE USED
FOR CONSTRUCTION

NO	DATE	REVISIONS AND RECORD OF ISSUE	DRN	DES	CHK	PDE	APP
C	04/11/2008	GENERAL REVISIONS	BEZ	JJD			
B	07/27/2007	REVISED TABLE	SLS	JJD			
A	07/20/2007	ISSUED FOR CONTRACT	SLS	JJD			

VI.B-88

300' 150' 0 300' 600'
1"=300'
50' 25' 0 50' 100'
1"=50'

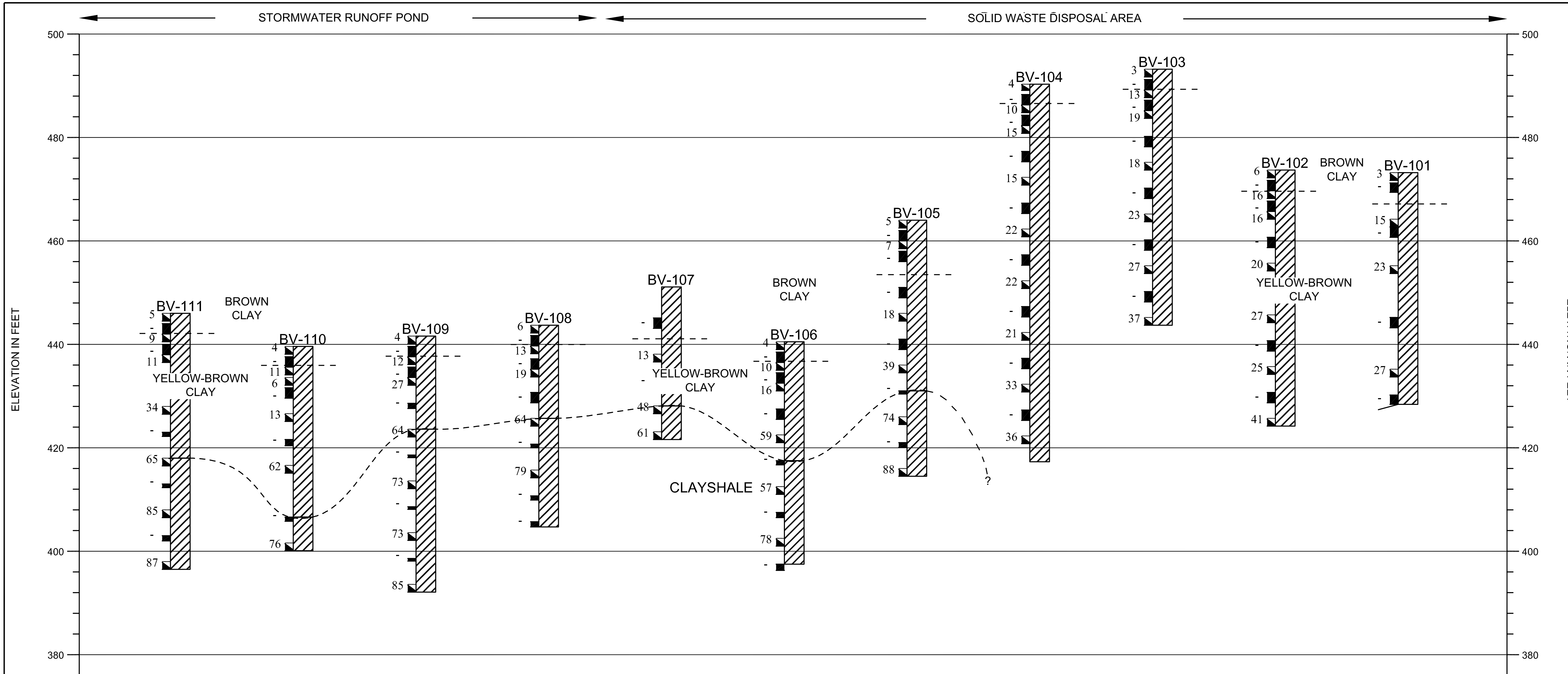
I HEREBY CERTIFY THAT THIS DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF TEXAS
SIGNED
DATE REG NO.

BLACK & VEATCH CORPORATION SCPP SANDY CREEK ENERGY STATION

ENGINEER JCB DRAWN SLS
CHECKED DATE

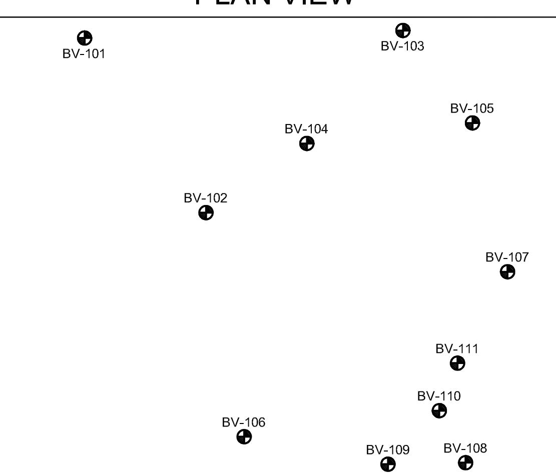
SANDY CREEK ENERGY STATION
UNIT 1
SUBSURFACE INVESTIGATION
BORING LOCATION AND ISITU TEST PLAN

PROJECT DRAWING NUMBER 149060-DS-0001 REV C
CODE
AREA



This cross section is included as part of the report and is based on interpretations of the soil borings presented in the report. Actual subsurface conditions may vary from those in this cross section due to conditions not detected during the subsurface investigation. Groundwater levels were generally not measured due to the use of rotary wash drilling.

PLAN VIEW



LEGEND

- CLAY/CLAYSHALE
- Standard penetration test
- Undisturbed thin wall Shelby tube
- 1 — N-VALUE
- NR — N-VALUE NOT RECORDED
- 80 — RQD Value
- - - - INDICATES AN APPROXIMATE OR GRADUAL CHANGE

Horizontal	Vertical
Scale: 1"=(proportional)'	Scale: 1"=20'

PROJECT	LOCATION
Sandy Creek Energy Station	Reisel, Texas
CLIENT	
Sandy Creek Energy Associates	
PROJECT NO	
149060	

FOR ENGINEERING REPORT
FIGURE 5-1
SOLID WASTE DISPOSAL FACILITY (SWDF)
AREA CROSS SECION

Appendix A

Boring and Piezometer Logs

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BORING LOG

BORING NO. BV-101
SHEET 1 OF 2

CLIENT	PROJECT	PROJECT NO.
Sandy Creek Energy Associates	Sandy Creek Energy Station	149060

PROJECT LOCATION	COORDINATES		GROUND ELEVATION (DATUM)	TOTAL DEPTH
Reisel, Texas	N 4026.0'	E 8990.0'	473.2 ft (MSL)	44.8 (feet)

SURFACE CONDITIONS	COORDINATE SYSTEM	DATE START	DATE FINISHED
Side of hill; weed cover	PLANT	08/08/2007	08/08/2007

LOGGED BY	CHECKED BY	APPROVED BY
JJ Deeken	V Bhadriraju	BL Christensen

SOIL SAMPLING: SAMPLE TYPE, SAMPLE NUMBER, SET 6 INCHES, 2ND 6 INCHES, 3RD 6 INCHES, N VALUE, SAMPLE RECOVERY
ROCK CORING: CORE SIZE, RUN NUMBER, RUN LENGTH, RUN RECOVERY, RQD RECOVERY, PERCENT RECOVERY, RQD

SAMPLE TYPE	SAMPLE NUMBER	SET 6 INCHES	2ND 6 INCHES	3RD 6 INCHES	N VALUE	SAMPLE RECOVERY	DEPTH (FEET)	ELEVATION (FEET)	CLASSIFICATION OF MATERIALS	REMARKS
SPT	1	2	1	2	3	0.2	0	472	CLAY; brown; soft; moist; low plasticity; w/some sand & gravel (6" Topsoil)	Boring advanced w/rotary wash using 3-7/8" step bit & bentonite mud as drilling fluid. SPT performed w/ autohammer. @4' PP=4.5 tsf
TW	2	1.8	-	-	-	1.5	2	470	grading yellow-brown; stiff; w/some gypsum seams; trace cemented clay seams	
							4–8	468, 466		
SPT	3	6	7	8	15	1.5	10	464	grading w/1/4" cemented clay nodules	
									cemented clay nodules grades out	PP=4.25 tsf
TW	4	2.0	-	-	-	2.0	12	462		
							14–16	460, 458, 456		
SPT	5	7	11	12	23	1.5	18	454	grading w/some cementation	
							20–26	452, 450, 448, 446		
TW	6	2.0	-	-	-	1.4	28	444	grading mottled gray	

4/11/2008 1:21 PM SCEA - Sandy Creek Energy Station

BLACK & VEATCH

BORING LOG

CLIENT	PROJECT	PROJECT NO.
Sandy Creek Energy Associates	Sandy Creek Energy Station	149060

PROJECT LOCATION	COORDINATES		GROUND ELEVATION (DATUM)	TOTAL DEPTH
Reisel, Texas	N 4026.0'	E 8990.0'	473.2 ft (MSL)	44.8 (feet)

SURFACE CONDITIONS	COORDINATE SYSTEM	DATE START	DATE FINISHED
Side of hill; weed cover	PLANT	08/08/2007	08/08/2007

LOGGED BY	CHECKED BY	APPROVED BY
JJ Deeken	V Bhadriraju	BL Christensen

SOIL SAMPLING: SAMPLE TYPE, SAMPLE NUMBER, SET 6 INCHES, 2ND 6 INCHES, 3RD 6 INCHES, N VALUE, SAMPLE RECOVERY

ROCK CORING: CORE SIZE, RUN NUMBER, RUN LENGTH, RUN RECOVERY, RQD RECOVERY, PERCENT RECOVERY, RQD

SAMPLE TYPE / CORE SIZE	SAMPLE NUMBER / RUN NUMBER	SET 6 INCHES / RUN LENGTH	2ND 6 INCHES / RUN RECOVERY	3RD 6 INCHES / RQD RECOVERY	N VALUE / PERCENT RECOVERY	SAMPLE RECOVERY / RQD	DEPTH (FEET)	ELEVATION (FEET)	CLASSIFICATION OF MATERIALS	REMARKS
							30	442		
							32	440		
							34	438		
							36	436		
SPT	7	10	13	14	27	1.5	38	434	grading very stiff	
							40	432		
TW	8	1.8	-	-	-	1.8	42–44	430	grading dark gray; fissile	
							46	428		Bottom of boring @ 44.8'. Water level not recorded. Boring backfilled w/ bentonite chips.
							48	426		
							50	424		
							52	422		
							54	420		
							56	418		
							58	416		
								414		

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BORING LOG

BORING NO. BV-102

CLIENT	PROJECT	PROJECT NO.
Sandy Creek Energy Associates	Sandy Creek Energy Station	149060

PROJECT LOCATION	COORDINATES		GROUND ELEVATION (DATUM)	TOTAL DEPTH
Reisel, Texas	N 3335.0'	E 9470.0'		49.5 (feet)

SURFACE CONDITIONS	COORDINATE SYSTEM	DATE START	DATE FINISHED
High weeds; boring offset 150' east	Plant	8/3/07	8/3/07

LOGGED BY	CHECKED BY	APPROVED BY
JJ Deeken	V Bhadriraju	BL Christensen

SAMPLE TYPE / CORE SIZE	SAMPLE NUMBER / RUN NUMBER	SET 6 INCHES / RUN LENGTH	2ND 6 INCHES / RUN RECOVERY	3RD 6 INCHES / RQD RECOVERY	N VALUE / PERCENT RECOVERY	SAMPLE RECOVERY / RQD	DEPTH (FEET)	ELEVATION (FEET)	CLASSIFICATION OF MATERIALS	REMARKS
SPT	1	3	3	3	6	0.9	0		CLAY: brown; firm; moist; high plasticity (6" Topsoil)	Boring advanced w/rotary wash using 3-7/8" step bit & bentonite mud as drilling fluid. SPT performed w/ autohammer. @4' PP>4.5 tsf
							2	472		
TW	2	2.0	-	-	-	2.0			@ 3.0' grading gray-brown; very stiff; w/some sand & 1" subrounded gravel	
							4	470		
SPT	3	7	8	8	16	1.5			sand grades out	
							6	468		
TW	4	2.0	-	-	-	2.0				
							8	466		
SPT	5	7	8	8	16	1.3				
							10	464		
							12	462		
TW	6	2.0	-	-	-	2.0	14	460		
							16	458		
							18	456	grading mottled yellow-brown-gray	
SPT	7	7	9	11	20	1.5				
							20	454		
							22	452		
TW	8	2.0	-	-	-	2.0	24	450		
							26	448		
							28	446	grading w/occasional white cemented clay seams	
SPT	9	10	12	15	27	1.5		444		

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BORING LOG

BORING NO. BV-102

CLIENT	PROJECT	PROJECT NO.
Sandy Creek Energy Associates	Sandy Creek Energy Station	149060

PROJECT LOCATION	COORDINATES		GROUND ELEVATION (DATUM)	TOTAL DEPTH
Reisel, Texas	N 3335.0'	E 9470.0'		49.5 (feet)

SURFACE CONDITIONS	COORDINATE SYSTEM	DATE START	DATE FINISHED
High weeds; boring offset 150' east	Plant	8/3/07	8/3/07

LOGGED BY	CHECKED BY	APPROVED BY
JJ Deeken	V Bhadriraju	BL Christensen

SOIL SAMPLING: SAMPLE TYPE / ROCK CORING: CORE SIZE	SAMPLE NUMBER / RUN NUMBER	SET 6 INCHES / RUN LENGTH	2ND 6 INCHES / RUN RECOVERY	3RD 6 INCHES / RQD RECOVERY	N VALUE / PERCENT RECOVERY	SAMPLE RECOVERY / RQD	DEPTH (FEET)	ELEVATION (FEET)	CLASSIFICATION OF MATERIALS	REMARKS
TW	10	2.0	-	-	-	2.0	34			
SPT	11	9	11	14	25	1.5	38–39.5			
TW	12	2.0	-	-	-	2.0	44			
SPT	13	15	18	23	41	1.5	48–49.5		grading hard	
							49.5			Bottom of boring at 49.5'. Water level not recorded. Boring backfilled w/ bentonite chips.

Depth scale (feet): 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58

Elevation scale (feet): 442, 440, 438, 436, 434, 432, 430, 428, 426, 424, 422, 420, 418, 416, 414

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BORING LOG

BORING NO. BV-103

CLIENT	PROJECT	PROJECT NO.
Sandy Creek Energy Associates	Sandy Creek Energy Station	149060

PROJECT LOCATION	COORDINATES		GROUND ELEVATION (DATUM)	TOTAL DEPTH
Reisel, Texas	N 4056.0'	E 10249.0'	493.2 ft (MSL)	49.5 (feet)

SURFACE CONDITIONS	COORDINATE SYSTEM	DATE START	DATE FINISHED
Rolling hills, tall weeds	Plant	8/1/07	8/1/07

LOGGED BY	CHECKED BY	APPROVED BY
JJ Deeken	JJ Deeken	BL Christensen

SOIL SAMPLING / **ROCK CORING**

SAMPLE TYPE (CORE SIZE)	SAMPLE NUMBER (RUN NUMBER)	SET 6 INCHES (RUN LENGTH)	2ND 6 INCHES (RUN RECOVERY)	3RD 6 INCHES (RQD RECOVERY)	N VALUE (PERCENT RECOVERY)	SAMPLE RECOVERY (RQD)
SPT	1	2	2	1	3	0.8
TW	2	2.0	-	-	-	2.0
SPT	3	2	5	8	13	1.5
TW	4	2.0	-	-	-	1.6
SPT	5	5	8	11	19	1.5
TW	6	2.0	-	-	-	2.0
SPT	7	6	8	10	18	1.5
TW	8	2.0	-	-	-	2.0
SPT	9	7	11	12	23	1.5

DEPTH (FEET): 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28

ELEVATION (FEET): 492, 490, 488, 486, 484, 482, 480, 478, 476, 474, 472, 470, 468, 466, 464

SAMPLE TYPE | GRAPHIC LOG

CLASSIFICATION OF MATERIALS	REMARKS
CLAY: brown; soft; moist; high plasticity (6" Topsoil)	Boring advanced w/rotary wash using 3-7/8" step bit & bentonite mud as drilling fluid. SPT performed w/ autohammer.
grading stiff	@2' PP=2.0 tsf
grading yellow-brown & gray seams	@4' PP=2.5 tsf
	@6' PP=4.5 tsf
grading very stiff	Reacts w/HCL
	PP=4.5 tsf
grading w/quartz seams	

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BORING LOG

BORING NO. BV-103

CLIENT	PROJECT	PROJECT NO.
Sandy Creek Energy Associates	Sandy Creek Energy Station	149060

PROJECT LOCATION	COORDINATES		GROUND ELEVATION (DATUM)	TOTAL DEPTH
Reisel, Texas	N 4056.0'	E 10249.0'	493.2 ft (MSL)	49.5 (feet)

SURFACE CONDITIONS	COORDINATE SYSTEM	DATE START	DATE FINISHED
Rolling hills, tall weeds	Plant	8/1/07	8/1/07

LOGGED BY	CHECKED BY	APPROVED BY
JJ Deeken	JJ Deeken	BL Christensen

SOIL SAMPLING: SAMPLE TYPE / SAMPLE NUMBER / SET 6 INCHES / 2ND 6 INCHES / 3RD 6 INCHES / N VALUE / SAMPLE RECOVERY

ROCK CORING: CORE SIZE / RUN NUMBER / RUN LENGTH / RUN RECOVERY / RQD RECOVERY / PERCENT RECOVERY / RQD

SAMPLE TYPE	SAMPLE NUMBER	SET 6 INCHES	2ND 6 INCHES	3RD 6 INCHES	N VALUE	SAMPLE RECOVERY	DEPTH (FEET)	ELEVATION (FEET)	CLASSIFICATION OF MATERIALS	REMARKS
							33.0	460	grading iron oxide staining	PP=4.5 tsf
TW	10	2.0	-	-	-	2.0	34			
							36.0		@ 36.0' quartz seams grades out	
SPT	11	7	12	15	27	1.5	38.5			
							43.0	450	grading blue-gray	PP=4.5 tsf
TW	12	2.0	-	-	-	2.0	44			
							48		grading hard	
SPT	13	11	17	20	37	1.5	48.5			
							49.5			Bottom of boring at 49.5'. Water level not recorded. Boring backfilled with bentonite chips.

Depth scale: 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58

Elevation scale: 462, 460, 458, 456, 454, 452, 450, 448, 446, 444, 442, 440, 438, 436, 434

BLACK & VEATCH

BORING LOG

CLIENT	PROJECT	PROJECT NO.
Sandy Creek Energy Associates	Sandy Creek Energy Station	149060

PROJECT LOCATION	COORDINATES		GROUND ELEVATION (DATUM)	TOTAL DEPTH
Reisel, Texas	N 3609.0'	E 9869.0'	490.3 ft (MSL)	73.0 (feet)

SURFACE CONDITIONS	COORDINATE SYSTEM	DATE START	DATE FINISHED
Top of hill, tall weeds	Plant	8/1/07	8/1/07

LOGGED BY	CHECKED BY	APPROVED BY
JJ Deeken	V Bhadriraju	BL Christensen

SOIL SAMPLING: SAMPLE TYPE, SAMPLE NUMBER, SET 6 INCHES, 2ND 6 INCHES, 3RD 6 INCHES, N VALUE, SAMPLE RECOVERY
ROCK CORING: CORE SIZE, RUN NUMBER, RUN LENGTH, RUN RECOVERY, RQD RECOVERY, PERCENT RECOVERY, RQD

SAMPLE TYPE	SAMPLE NUMBER	SET 6 INCHES	2ND 6 INCHES	3RD 6 INCHES	N VALUE	SAMPLE RECOVERY	DEPTH (FEET)	ELEVATION (FEET)	CLASSIFICATION OF MATERIALS	REMARKS
SPT	1	2	2	2	4	1.2	0	490	CLAY: brown; soft; moist; high plasticity (6" Topsoil)	Boring advanced w/rotary wash using 3-7/8" step bit & bentonite mud as drilling fluid. SPT performed w/ autohammer.
							2	488	grading stiff	@2' PP=1.75 tsf
TW	2	2.0	-	-	-	1.7				
SPT	3	2	4	6	10	1.5	4	486		@4' PP=2.0 tsf
							5		grading yellow-brown & occasional gray clay seams	
TW	4	2.0	-	-	-	2.0	6	484		
SPT	5	5	6	9	15	1.5	8	482		PP>4.5 tsf
							10	480		
							12	478		
TW	6	2.0	-	-	-	2.0	14	476		
							16	474		
SPT	7	6	6	9	15	1.5	18	472		
							20	470		
							22	468	grading fissile	
TW	8	2.0	-	-	-	2.0	24	466		
							26	464		
SPT	9	7	10	12	22	1.5	28	462	grading very stiff; w/1/4" quartz seams	

BLACK & VEATCH

BORING LOG

BORING NO. BV-104

CLIENT	PROJECT	PROJECT NO.
Sandy Creek Energy Associates	Sandy Creek Energy Station	149060

PROJECT LOCATION	COORDINATES		GROUND ELEVATION (DATUM)	TOTAL DEPTH
Reisel, Texas	N 3609.0'	E 9869.0'	490.3 ft (MSL)	73.0 (feet)

SURFACE CONDITIONS	COORDINATE SYSTEM	DATE START	DATE FINISHED
Top of hill, tall weeds	Plant	8/1/07	8/1/07

LOGGED BY	CHECKED BY	APPROVED BY
JJ Deeken	V Bhadriraju	BL Christensen

SOIL SAMPLING: SAMPLE TYPE, SAMPLE NUMBER, SET 6 INCHES, 2ND 6 INCHES, 3RD 6 INCHES, N VALUE, SAMPLE RECOVERY

ROCK CORING: CORE SIZE, RUN NUMBER, RUN LENGTH, RUN RECOVERY, RQD RECOVERY, PERCENT RECOVERY, RQD

SAMPLE TYPE / CORE SIZE	SAMPLE NUMBER / RUN NUMBER	SET 6 INCHES / RUN LENGTH	2ND 6 INCHES / RUN RECOVERY	3RD 6 INCHES / RQD RECOVERY	N VALUE / PERCENT RECOVERY	SAMPLE RECOVERY / RQD	DEPTH (FEET)	ELEVATION (FEET)	CLASSIFICATION OF MATERIALS	REMARKS
							30	460		
							32	458		
									grading w/some 1/8" quartz grains	PP>4.5 tsf
TW	10	2.0	-	-	-	2.0	34	456		
							36	454		
							38	452	grading iron oxide staining	
SPT	11	7	10	12	22	1.5				
							40	450		
							42	448		
										PP>4.5 tsf
TW	12	2.0	-	-	-	2.0	44	446		
							46	444		
							48	442		
SPT	13	8	9	12	21	1.5				
							50	440		
							52	438		
TW	14	2.0	-	-	-	2.0	54	436		
							56	434		
							58	432	grading hard; w/occasional quartz seams	
SPT	15	10	14	19	33	1.5				

BORING LOG

BLACK & VEATCH

CLIENT	PROJECT	PROJECT NO.
Sandy Creek Energy Associates	Sandy Creek Energy Station	149060

PROJECT LOCATION	COORDINATES		GROUND ELEVATION (DATUM)	TOTAL DEPTH
Reisel, Texas	N 3609.0'	E 9869.0'	490.3 ft (MSL)	73.0 (feet)

SURFACE CONDITIONS	COORDINATE SYSTEM	DATE START	DATE FINISHED
Top of hill, tall weeds	Plant	8/1/07	8/1/07

LOGGED BY	CHECKED BY	APPROVED BY
JJ Deeken	V Bhadriraju	BL Christensen

SAMPLE TYPE / CORE SIZE	SAMPLE NUMBER / RUN NUMBER	SET 6 INCHES / RUN LENGTH	2ND 6 INCHES / RUN RECOVERY	3RD 6 INCHES / RQD RECOVERY	N VALUE / PERCENT RECOVERY	SAMPLE RECOVERY / RQD	DEPTH (FEET)	ELEVATION (FEET)	CLASSIFICATION OF MATERIALS	REMARKS
							60	430		
							62	428		
TW	16	2.0	-	-	-	2.0	64	426	grading blue-gray & yellow-brown seams; quartz seams grades out	PP>4.5 tsf
							66	424		
SPT	17	14	16	20	36	1.5	68	422		
							70	420		
							72	418		
							74	416		Bottom of boring at 73.0'. Water level not recorded. Boring backfilled w/ bentonite chips.
							76	414		
							78	412		
							80	410		
							82	408		
							84	406		
							86	404		
							88	402		

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BORING LOG

BLACK & VEATCH

BORING NO. BV-105

CLIENT	PROJECT	PROJECT NO.
Sandy Creek Energy Associates	Sandy Creek Energy Station	149060

PROJECT LOCATION	COORDINATES		GROUND ELEVATION (DATUM)	TOTAL DEPTH
Reisel, Texas	N 3690.0'	E 10524.0'	464.0 ft (MSL)	49.5 (feet)

SURFACE CONDITIONS	COORDINATE SYSTEM	DATE START	DATE FINISHED
Side hill, tall weeds	Plant	8/1/07	8/1/07

LOGGED BY	CHECKED BY	APPROVED BY
JJ Deeken	V Bhadriraju	BL Christensen

SOIL SAMPLING: SAMPLE TYPE, SAMPLE NUMBER, SET 6 INCHES, 2ND 6 INCHES, 3RD 6 INCHES, N VALUE, SAMPLE RECOVERY

ROCK CORING: CORE SIZE, RUN NUMBER, RUN LENGTH, RUN RECOVERY, RQD RECOVERY, PERCENT RECOVERY, RQD

SAMPLE TYPE	SAMPLE NUMBER	SET 6 INCHES	2ND 6 INCHES	3RD 6 INCHES	N VALUE	SAMPLE RECOVERY	DEPTH (FEET)	ELEVATION (FEET)	CLASSIFICATION OF MATERIALS	REMARKS
SPT	1	2	2	3	5	0.8	0	464	CLAY: brown; firm; moist; high plasticity (6" Topsoil)	Boring advanced w/rotary wash using 3-7/8" step bit & bentonite mud as drilling fluid. SPT performed w/ autohammer. @2' PP=2.0 tsf @3.5' PP=2.0 tsf @6' PP=2.8 tsf
TW	2	2.0	-	-	-	1.5	2	462	grading stiff	
SPT	3	3	3	4	7	1.5	4	460	grading firm	
TW	4	2.0	-	-	-	1.7	6	458	grading yellow-brown & gray seams; very stiff	
							8	456		
							10	454		
							12	452		
TW	5	2.0	-	-	-	2.0	14	450	grading fissile	PP>4.5 tsf
							16	448		
SPT	6	6	8	10	18	1.5	18	446		PP>4.5 tsf
							20	444		
							22	442		
TW	7	2.0	-	-	-	1.8	24	440	grading w/occasional cemented quartz seams	PP>4.5 tsf
							26	438		
SPT	8	12	15	24	39	1.5	28	436	grading blue-gray; hard; gray seams grades out	PP>4.5 tsf

SAMPLE TYPE | GRAPHIC LOG

BLACK & VEATCH

BORING LOG

CLIENT	PROJECT	PROJECT NO.
Sandy Creek Energy Associates	Sandy Creek Energy Station	149060

PROJECT LOCATION	COORDINATES		GROUND ELEVATION (DATUM)	TOTAL DEPTH
Reisel, Texas	N 3690.0'	E 10524.0'	464.0 ft (MSL)	49.5 (feet)

SURFACE CONDITIONS	COORDINATE SYSTEM	DATE START	DATE FINISHED
Side hill, tall weeds	Plant	8/1/07	8/1/07

LOGGED BY	CHECKED BY	APPROVED BY
JJ Deeken	V Bhadriraju	BL Christensen

SAMPLE TYPE / CORE SIZE	SAMPLE NUMBER / RUN NUMBER	SET 6 INCHES / RUN LENGTH	2ND 6 INCHES / RUN RECOVERY	3RD 6 INCHES / RQD RECOVERY	N VALUE / PERCENT RECOVERY	SAMPLE RECOVERY / RQD	DEPTH (FEET)	ELEVATION (FEET)	CLASSIFICATION OF MATERIALS	REMARKS
							30	434		
							32	432		
							33.0		CLAYSHALE; gray; hard; moist; high plasticity; fissile	
TW	9	0.6	-	-	-	0.6				TW refusal
							34	430		
							36	428		
							38	426	grading w/frequent cemetations	
SPT	10	21	32	42	74	1.5				
							40	424		
							42	422		
TW	11	0.9	-	-	-	0.9				Thick walled tube driven 100 blows
							44	420		
							46	418		
							48	416		
SPT	12	32	42	46	88	1.5				
							49.5			Bottom of boring at 49.5'. Water level not recorded. Boring backfilled w/ bentonite chips.
							50	414		
							52	412		
							54	410		
							56	408		
							58	406		

BORING LOG

BLACK & VEATCH

BORING NO. BV-106

CLIENT	PROJECT	PROJECT NO.
Sandy Creek Energy Associates	Sandy Creek Energy Station	149060

PROJECT LOCATION	COORDINATES		GROUND ELEVATION (DATUM)	TOTAL DEPTH
Reisel, Texas	N 2448.0'	E 9621.0'		44.2 (feet)

SURFACE CONDITIONS	COORDINATE SYSTEM	DATE START	DATE FINISHED
Valley, tall weeds	Plant	8/3/07	8/3/07

LOGGED BY	CHECKED BY	APPROVED BY
JJ Deeken	V Bhadriraju	BL Christensen

SOIL SAMPLING: SAMPLE TYPE, SAMPLE NUMBER, SET 6 INCHES, 2ND 6 INCHES, 3RD 6 INCHES, N VALUE, SAMPLE RECOVERY
ROCK CORING: CORE SIZE, RUN NUMBER, RUN LENGTH, RUN RECOVERY, RQD RECOVERY, PERCENT RECOVERY, RQD

SAMPLE TYPE	SAMPLE NUMBER	SET 6 INCHES	2ND 6 INCHES	3RD 6 INCHES	N VALUE	SAMPLE RECOVERY
SPT	1	2	2	2	4	1.0
TW	2	2.0	-	-	-	1.1
SPT	3	2	5	5	10	0.1
TW	4	2.0	-	-	-	2.0
SPT	5	4	6	10	16	0.1
TW	6	2.0	-	-	-	1.8
SPT	7	14	26	33	59	1.5
TW	8	0.8	-	-	-	0.8
SPT	9	20	25	32	57	1.5

DEPTH (FEET): 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28

ELEVATION (FEET): 440, 438, 436, 434, 432, 430, 428, 426, 424, 422, 420, 418, 416, 414, 412

SAMPLE TYPE, GRAPHIC LOG

CLASSIFICATION OF MATERIALS

Depth	CLASSIFICATION OF MATERIALS	REMARKS
0	CLAY; brown; soft; moist; high plasticity; w/trace coarse sand & 1" gravel (6" Topsoil)	Boring advanced w/rotary wash using 3-7/8" step bit & bentonite mud as drilling fluid. SPT performed w/ autohammer.
2	grading stiff	
4		@4' PP=2.2 tsf Gravel in SPT3
6	grading dark gray; w/some gravel	
8	grading very stiff	Gravel in SPT5
13		PP>4.5 tsf
18	grading hard; w/frequent light gray partings; occasional cemented clay seams; gravel grades out	
23.0	CLAYSHALE; gray; hard; moist; high plasticity; fissile	

BLACK & VEATCH

BORING LOG

BORING NO. BV-106

CLIENT	PROJECT	PROJECT NO.
Sandy Creek Energy Associates	Sandy Creek Energy Station	149060

PROJECT LOCATION	COORDINATES	GROUND ELEVATION (DATUM)	TOTAL DEPTH
Reisel, Texas	N 2448.0' E 9621.0'		44.2 (feet)

SURFACE CONDITIONS	COORDINATE SYSTEM	DATE START	DATE FINISHED
Valley, tall weeds	Plant	8/3/07	8/3/07

LOGGED BY	CHECKED BY	APPROVED BY
JJ Deeken	V Bhadriraju	BL Christensen

SOIL SAMPLING: SAMPLE TYPE, SAMPLE NUMBER, SET 6 INCHES, 2ND 6 INCHES, 3RD 6 INCHES, N VALUE, SAMPLE RECOVERY

ROCK CORING: CORE SIZE, RUN NUMBER, RUN LENGTH, RUN RECOVERY, RQD RECOVERY, PERCENT RECOVERY, RQD

SAMPLE TYPE / CORE SIZE	SAMPLE NUMBER / RUN NUMBER	SET 6 INCHES / RUN LENGTH	2ND 6 INCHES / RUN RECOVERY	3RD 6 INCHES / RQD RECOVERY	N VALUE / PERCENT RECOVERY	SAMPLE RECOVERY / RQD	DEPTH (FEET)	CLASSIFICATION OF MATERIALS	REMARKS
TW	10	1.0	-	-	-	1.0	33–34		Thick walled tube pushed 8", then driven 2".
SPT	11	26	35	43	78	1.5	38–39.5		
TW	12	1.2	-	-	-	1.2	43–44.2		Thick walled tube pushed 4", then driven 10".
							44.2		Bottom of boring at 44.2' Water level not recorded. Boring backfilled w/ bentonite chips.

DEPTH (FEET): 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58

ELEVATION (FEET): 410, 408, 406, 404, 402, 400, 398, 396, 394, 392, 390, 388, 386, 384, 382

SAMPLE TYPE / GRAPHIC LOG

BLACK & VEATCH

BORING LOG

BORING NO. BV-107

SHEET 1 OF 1

CLIENT	PROJECT	PROJECT NO.
Sandy Creek Energy Associates	Sandy Creek Energy Station	149060

PROJECT LOCATION	COORDINATES		GROUND ELEVATION (DATUM)	TOTAL DEPTH
Reisel, Texas	N 3101.0'	E 10663.0'		29.5 (feet)

SURFACE CONDITIONS	COORDINATE SYSTEM	DATE START	DATE FINISHED
Natural drainage path, brush cover	Plant	08/09/2007	08/09/2007

LOGGED BY	CHECKED BY	APPROVED BY
JJ Deeken	V Bhadriraju	BL Christensen

SOIL SAMPLING: SAMPLE TYPE / SAMPLE NUMBER / SET 6 INCHES / 2ND 6 INCHES / 3RD 6 INCHES / N VALUE / SAMPLE RECOVERY

ROCK CORING: CORE SIZE / RUN NUMBER / RUN LENGTH / RUN RECOVERY / RQD RECOVERY / PERCENT RECOVERY / RQD

SAMPLE TYPE	SAMPLE NUMBER	SET 6 INCHES	2ND 6 INCHES	3RD 6 INCHES	N VALUE	SAMPLE RECOVERY	DEPTH (FEET)	ELEVATION (FEET)	CLASSIFICATION OF MATERIALS	REMARKS
							0		CLAY; brown; moist; high plasticity; w/some gravel; trace sand (6" Topsoil)	Boring advanced w/rotary wash using 3-7/8" step bit & bentonite mud as drilling fluid. SPT performed w/ autohammer.
TW	1	2.0	-	-	-	1.2	6		grading very stiff	PP=2.5 tsf
SPT	2	4	6	7	13	1.5	13		grading mottled yellow-brown-gray; stiff	
TW	3	1.2	-	-	-	1.2	18		grading dark gray; moist; slightly fissile; w/some cemented clay seams & gravel	TW refusal @ 19.2'
SPT	4	16	20	28	48	1.5	23.0		CLAYSHALE; gray; hard; moist; high plasticity; fissile; w/some gravel	Harder drilling
SPT	5	19	25	36	61	1.5	28			Bottom of boring at 29.5'. Water level not recorded. Piezometer installed on 08/09/07.

Depth scale (feet): 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28

Elevation scale (feet): 450, 448, 446, 444, 442, 440, 438, 436, 434, 432, 430, 428, 426, 424, 422

BLACK & VEATCH

BORING LOG

BORING NO. BV-108

CLIENT	PROJECT	PROJECT NO.
Sandy Creek Energy Associates	Sandy Creek Energy Station	149060

PROJECT LOCATION	COORDINATES		GROUND ELEVATION (DATUM)	TOTAL DEPTH
Reisel, Texas	N 2345.0'	E 10497.0'	443.7 ft (MSL)	39.0 (feet)

SURFACE CONDITIONS	COORDINATE SYSTEM	DATE START	DATE FINISHED
Hill; weeds	Plant	08/02/2007	08/02/2007

LOGGED BY	CHECKED BY	APPROVED BY
JJ Deeken	V Bhadriraju	BL Christensen

SOIL SAMPLING: SAMPLE TYPE, SAMPLE NUMBER, SET 6 INCHES, 2ND 6 INCHES, 3RD 6 INCHES, N VALUE, SAMPLE RECOVERY

ROCK CORING: CORE SIZE, RUN NUMBER, RUN LENGTH, RUN RECOVERY, RQD RECOVERY, PERCENT RECOVERY, RQD

SAMPLE TYPE	SAMPLE NUMBER	SET 6 INCHES	2ND 6 INCHES	3RD 6 INCHES	N VALUE	SAMPLE RECOVERY	DEPTH (FEET)	ELEVATION (FEET)	CLASSIFICATION OF MATERIALS	REMARKS
SPT	1	3	3	3	6	1.2	0		CLAY; brown; firm; moist; high plasticity; w/some sand & 1" gravel (6" Topsoil)	Boring advanced w/rotary wash using 3-7/8" step bit & bentonite mud as drilling fluid. SPT performed w/ autohammer. TW-2 disturbed
							2	442		
TW	2	2.0	-	-	-	2.0			grading yellow-brown	@2' PP=3.2 tsf
							4	440		@4' PP=3.2 tsf
SPT	3	3	6	7	13	1.5			grading stiff	
							6	438		TW4 PP=4.0 tsf
TW	4	2.0	-	-	-	2.0	8	436		
SPT	5	7	9	10	19	1.5			grading very stiff; w/some quartz sand	
							10	434		
							12	432		
								430	grading mottled dark gray	PP>4.5 tsf
TW	6	2.0	-	-	-	2.0	14			
							16	428		
							18	426	18.0	
SPT	7	16	26	38	64	1.5			CLAYSHALE; gray; hard; moist; high plasticity; fissile; w/occasional cementation @ 19.5' grading dark gray	PP>4.5 tsf
							20	424		
							22	422		
TW	8	0.7	-	-	-	0.7				PP>4.5 tsf
							24	420		
							26	418		
							28	416		PP>4.5 tsf
SPT	9	20	33	46	79	1.5		414		

BLACK & VEATCH

BORING LOG

CLIENT	PROJECT	PROJECT NO.
Sandy Creek Energy Associates	Sandy Creek Energy Station	149060

PROJECT LOCATION	COORDINATES		GROUND ELEVATION (DATUM)	TOTAL DEPTH
Reisel, Texas	N 2345.0'	E 10497.0'	443.7 ft (MSL)	39.0 (feet)

SURFACE CONDITIONS	COORDINATE SYSTEM	DATE START	DATE FINISHED
Hill; weeds	Plant	08/02/2007	08/02/2007

LOGGED BY	CHECKED BY	APPROVED BY
JJ Deeken	V Bhadriraju	BL Christensen

SOIL SAMPLING: SAMPLE TYPE / ROCK CORING: CORE SIZE	SAMPLE NUMBER / RUN NUMBER	SET 6 INCHES / RUN LENGTH	2ND 6 INCHES / RUN RECOVERY	3RD 6 INCHES / RQD RECOVERY	N VALUE / PERCENT RECOVERY	SAMPLE RECOVERY / RQD	DEPTH (FEET)	ELEVATION (FEET)	CLASSIFICATION OF MATERIALS	REMARKS
							30			
							32	412		
TW	10	0.8	-	-	-	0.8	34	410		
							36	408		
TW	11	1.0	-	-	-	1.0	38	406		
							40	404		Bottom of boring @ 39.0'. Water level not recorded. Boring backfilled w/ bentonite chips.
							42	402		
							44	400		
							46	398		
							48	396		
							50	394		
							52	392		
							54	390		
							56	388		
							58	386		
								384		

BLACK & VEATCH

BORING LOG

CLIENT	PROJECT	PROJECT NO.
Sandy Creek Energy Associates	Sandy Creek Energy Station	149060

PROJECT LOCATION	COORDINATES		GROUND ELEVATION (DATUM)	TOTAL DEPTH
Reisel, Texas	N 2339.0'	E 10190.0'	441.6 ft (MSL)	49.5 (feet)

SURFACE CONDITIONS	COORDINATE SYSTEM	DATE START	DATE FINISHED
Valley; tall weeds	Plant	08/02/2007	08/02/2007

LOGGED BY	CHECKED BY	APPROVED BY
JJ Deeken	V Bhadriraju	BL Christensen

SOIL SAMPLING: SAMPLE TYPE / SAMPLE NUMBER / SET 6 INCHES / 2ND 6 INCHES / 3RD 6 INCHES / N VALUE / SAMPLE RECOVERY

ROCK CORING: CORE SIZE / RUN NUMBER / RUN LENGTH / RUN RECOVERY / RQD RECOVERY / PERCENT RECOVERY / RQD

SAMPLE TYPE	SAMPLE NUMBER	SET 6 INCHES	2ND 6 INCHES	3RD 6 INCHES	N VALUE	SAMPLE RECOVERY	DEPTH (FEET)	CLASSIFICATION OF MATERIALS	REMARKS
SPT	1	3	2	2	4	1.1	0	CLAY; brown; soft; moist; high plasticity (6" Topsoil)	Boring advanced w/rotary wash using 3-7/8" step bit & bentonite mud as drilling fluid. SPT performed w/ autohammer.
TW	2	2.0	-	-	-	1.0	2	grading yellow-brown	
SPT	3	3	6	6	12	1.4	4	grading stiff	
TW	4	2.0	-	-	-	2.0	6		PP=2.0 tsf
SPT	5	8	12	15	27	1.5	8	grading very stiff	
TW	6	1.0	-	-	-	1.0	13	grading dark gray	
SPT	7	17	27	37	64	1.5	18.0	CLAYSHALE; gray; hard; moist; high plasticity; fissile; w/frequent cemented clay seams	
TW	8	0.5	-	-	-	0.5	23		
SPT	9	21	32	41	73	1.5	28.5		

ELEVATION (FEET): 440, 438, 436, 434, 432, 430, 428, 426, 424, 422, 420, 418, 416, 414, 412

BLACK & VEATCH

BORING LOG

BORING NO. BV-109

CLIENT	PROJECT	PROJECT NO.
Sandy Creek Energy Associates	Sandy Creek Energy Station	149060

PROJECT LOCATION	COORDINATES		GROUND ELEVATION (DATUM)	TOTAL DEPTH
Reisel, Texas	N 2339.0'	E 10190.0'	441.6 ft (MSL)	49.5 (feet)

SURFACE CONDITIONS	COORDINATE SYSTEM	DATE START	DATE FINISHED
Valley; tall weeds	Plant	08/02/2007	08/02/2007

LOGGED BY	CHECKED BY	APPROVED BY
JJ Deeken	V Bhadriraju	BL Christensen

SOIL SAMPLING: SAMPLE TYPE, SAMPLE NUMBER, SET 6 INCHES, 2ND 6 INCHES, 3RD 6 INCHES, N VALUE, SAMPLE RECOVERY

ROCK CORING: CORE SIZE, RUN NUMBER, RUN LENGTH, RUN RECOVERY, RQD RECOVERY, PERCENT RECOVERY, RQD

SAMPLE TYPE	SAMPLE NUMBER	SET 6 INCHES	2ND 6 INCHES	3RD 6 INCHES	N VALUE	SAMPLE RECOVERY	DEPTH (FEET)	CLASSIFICATION OF MATERIALS	REMARKS
TW	10	0.5	-	-	-	0.5	33		Tube end crushed.
SPT	11	22	32	41	73	1.5	38		
TW	12	0.5	-	-	-	0.5	43		
SPT	13	27	39	46	85	1.5	48		
							49.5		Bottom of boring @ 49.5'. Water level not recorded. Boring backfilled w/ bentonite chips.

DEPTH (FEET): 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58

ELEVATION (FEET): 410, 408, 406, 404, 402, 400, 398, 396, 394, 392, 390, 388, 386, 384, 382

BLACK & VEATCH

BORING LOG

BORING NO. BV-110

CLIENT	PROJECT	PROJECT NO.
Sandy Creek Energy Associates	Sandy Creek Energy Station	149060

PROJECT LOCATION	COORDINATES		GROUND ELEVATION (DATUM)	TOTAL DEPTH
Reisel, Texas	N 2551.0'	E 10393.0'	439.6 ft (MSL)	39.5 (feet)

SURFACE CONDITIONS	COORDINATE SYSTEM	DATE START	DATE FINISHED
Valley/tall weeds	Plant	8/3/07	8/4/07

LOGGED BY	CHECKED BY	APPROVED BY
DE Campbell	V Bhadriraju	BL Christensen

SOIL SAMPLING: SAMPLE TYPE, SAMPLE NUMBER, SET 6 INCHES, 2ND 6 INCHES, 3RD 6 INCHES, N VALUE, SAMPLE RECOVERY

ROCK CORING: CORE SIZE, RUN NUMBER, RUN LENGTH, RUN RECOVERY, RQD RECOVERY, PERCENT RECOVERY, RQD

SAMPLE TYPE	SAMPLE NUMBER	SET 6 INCHES	2ND 6 INCHES	3RD 6 INCHES	N VALUE	SAMPLE RECOVERY	DEPTH (FEET)	ELEVATION (FEET)	CLASSIFICATION OF MATERIALS	REMARKS
SPT	1	WOH	2	2	4	1.2	0		CLAY: brown; soft; moist; high plasticity; w/trace subrounded red fine gravel (6" Topsoil)	Boring advanced w/rotary wash using 3-7/8" step bit & bentonite mud as drilling fluid. SPT performed w/ autohammer.
TW	2	2.0	-	-	-	1.1	2	438		@2' PP=1.5 tsf
SPT	3	3	4	7	11	1.0	4	436	grading stiff	
SPT	4	3	3	3	6	1.3	6	434	grading yellow-brown; firm	
TW	5	2.0	-	-	-	2.0	8	432		
							10	430	@ 10.0' grading mottled gray	PP=2.25 tsf
							12	428		
SPT	6	3	5	8	13	1.3	14	426	grading w/trace cementation; gravel grades out	
							16	424		
TW	7	1.2	-	-	-	1.2	18	422	grading gray	
							20	420		
							22	418		
SPT	8	18	26	36	62	1.5	24	416	grading hard; w/occasional cemented clay seams	
							26	414		
							28	412		
								410		

SAMPLE TYPE | GRAPHIC LOG

CLIENT	PROJECT	PROJECT NO.
Sandy Creek Energy Associates	Sandy Creek Energy Station	149060

PROJECT LOCATION	COORDINATES		GROUND ELEVATION (DATUM)	TOTAL DEPTH
Reisel, Texas	N 2551.0'	E 10393.0'	439.6 ft (MSL)	39.5 (feet)

SURFACE CONDITIONS	COORDINATE SYSTEM	DATE START	DATE FINISHED
Valley/tall weeds	Plant	8/3/07	8/4/07

LOGGED BY	CHECKED BY	APPROVED BY
DE Campbell	V Bhadriraju	BL Christensen

SOIL SAMPLING: SAMPLE TYPE, SAMPLE NUMBER, SET 6 INCHES, 2ND 6 INCHES, 3RD 6 INCHES, N VALUE, SAMPLE RECOVERY
ROCK CORING: CORE SIZE, RUN NUMBER, RUN LENGTH, RUN RECOVERY, RQD RECOVERY, PERCENT RECOVERY, RQD

SAMPLE TYPE	SAMPLE NUMBER	SET 6 INCHES	2ND 6 INCHES	3RD 6 INCHES	N VALUE	SAMPLE RECOVERY	DEPTH (FEET)	CLASSIFICATION OF MATERIALS	REMARKS
TW	9	0.8	-	-	-	0.8	33.0	CLAYSHALE: gray; hard; moist; high plasticity; fissile; w/trace cementation	Tube end crushed.
SPT	10	22	34	43	76	1.5			
							39.5		Bottom of boring @ 39.5'. Water level not recorded. Boring backfilled w/ bentonite chips.

DEPTH (FEET): 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58
ELEVATION (FEET): 408, 406, 404, 402, 400, 398, 396, 394, 392, 390, 388, 386, 384, 382, 380

BLACK & VEATCH

BORING LOG

CLIENT	PROJECT	PROJECT NO.
Sandy Creek Energy Associates	Sandy Creek Energy Station	149060

PROJECT LOCATION	COORDINATES		GROUND ELEVATION (DATUM)	TOTAL DEPTH
Reisel, Texas	N 2739.0'	E 10465.0'	446.0 ft (MSL)	49.5 (feet)

SURFACE CONDITIONS	COORDINATE SYSTEM	DATE START	DATE FINISHED
tall weeds in valley, heavy rain	Plant	08/02/2007	08/02/2007

LOGGED BY	CHECKED BY	APPROVED BY
JJ Deeken	V Bhadriraju	BL Christensen

SOIL SAMPLING

SAMPLE TYPE	SAMPLE NUMBER	SET 6 INCHES	2ND 6 INCHES	3RD 6 INCHES	N VALUE	SAMPLE RECOVERY
SPT	1	2	2	3	5	1.2
TW	2	2.0	-	-	-	1.5
SPT	3	2	4	5	9	1.4
TW	4	2.0	-	-	-	1.8
SPT	5	2	4	7	11	1.5
TW	6	2.0	-	-	-	2.0
SPT	7	10	15	19	34	1.5
TW	8	0.8	-	-	-	0.8
SPT	9	20	27	38	65	1.5

ROCK CORING: CORE SIZE | RUN NUMBER | RUN LENGTH | RUN RECOVERY | RQD RECOVERY | PERCENT RECOVERY | RQD

DEPTH (FEET)	ELEVATION (FEET)	CLASSIFICATION OF MATERIALS	REMARKS
0	446	CLAY; brown; firm; moist; high plasticity (6" Topsoil)	Boring advanced w/rotary wash using 3-7/8" step bit & bentonite mud as drilling fluid. SPT performed w/ autohammer.
2	444		
4	442	grading stiff	
6	440	grading yellow; w/trace sand	@6' PP=1.5 tsf
8	438		@8' PP=3.5 tsf
		@ 9.0' grading yellow-brown	
10	436		
12	434		
			PP>4.5 tsf
14	432		
16	430		
18	428	grading hard; w/some sand @ 18.5' grading w/1" gravel	PP>4.5 tsf
		@ 19.5' grading gray-brown	
20	426		
22	424		
		grading w/occasiional quartz seams	
24	422		
26	420		
28	418	28.0	
		CLAYSHALE; gray; hard; moist; high plasticity; fissile; w/trace cementation	

BORING LOG

CLIENT	PROJECT	PROJECT NO.
Sandy Creek Energy Associates	Sandy Creek Energy Station	149060

PROJECT LOCATION	COORDINATES		GROUND ELEVATION (DATUM)	TOTAL DEPTH
Reisel, Texas	N 2739.0'	E 10465.0'	446.0 ft (MSL)	49.5 (feet)

SURFACE CONDITIONS	COORDINATE SYSTEM	DATE START	DATE FINISHED
tall weeds in valley, heavy rain	Plant	08/02/2007	08/02/2007

LOGGED BY	CHECKED BY	APPROVED BY
JJ Deeken	V Bhadriraju	BL Christensen

SOIL SAMPLING: SAMPLE TYPE, SAMPLE NUMBER, SET 6 INCHES, 2ND 6 INCHES, 3RD 6 INCHES, N VALUE, SAMPLE RECOVERY
ROCK CORING: CORE SIZE, RUN NUMBER, RUN LENGTH, RUN RECOVERY, RQD RECOVERY, PERCENT RECOVERY, RQD

SAMPLE TYPE	SAMPLE NUMBER	SET 6 INCHES	2ND 6 INCHES	3RD 6 INCHES	N VALUE	SAMPLE RECOVERY	DEPTH (FEET)	ELEVATION (FEET)	CLASSIFICATION OF MATERIALS	REMARKS
							30	416		
							32	414		
TW	10	0.7	-	-	-	0.7				Thick walled tube driven.
							34	412		
							36	410		
							38	408	grading dry to moist	
SPT	11	23	44	41	85	1.5				
							40	406		
							42	404		
TW	12	1.0	-	-	-	1.0				Thick walled tube driven.
							44	402		
							46	400		
							48	398		
SPT	13	30	40	47	87	1.5				
										Bottom of boring @ 49.5'. Water level not recorded. Boring backfilled w/ bentonite chips.
							50	396		
							52	394		
							54	392		
							56	390		
							58	388		

BLACK & VEATCH

Piezometer NO. PZ-107

Piezometer Log

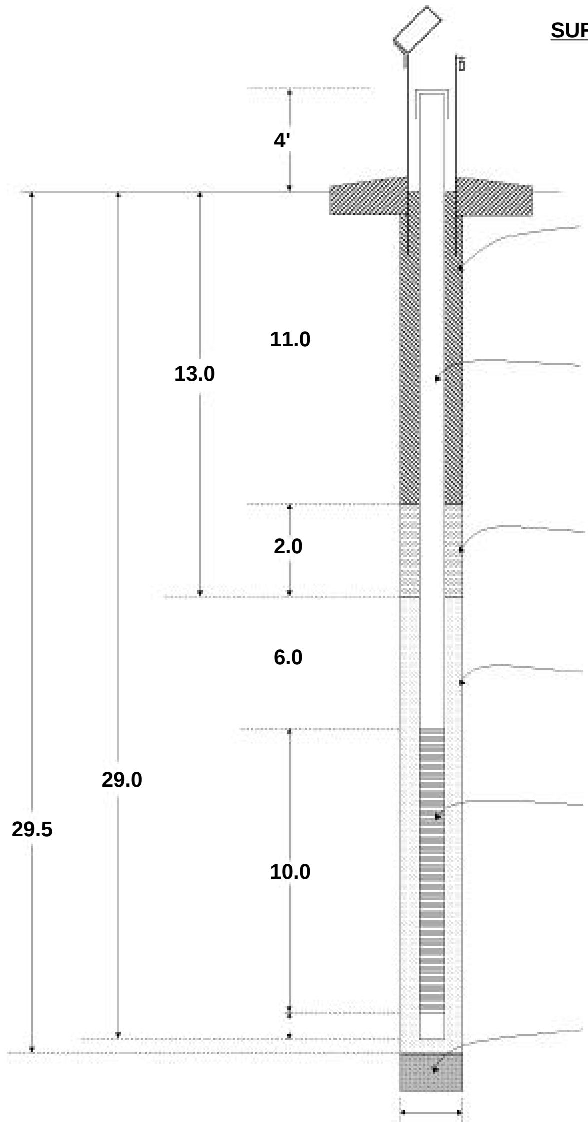
SHEET 1 OF 1

CLIENT	PROJECT	PROJECT NO.
Sandy Creek Energy Associates	Sandy Creek Energy Station	149060

PROJECT LOCATION	COORDINATES	GROUND ELEVATION (DATUM)	DATE
Reisel, Texas	N 3101.0' E 10650.0'	451.0 ft (MSL)	8/9/07

STRATUM MONITORED
Interface of yellow-brown and gray clay, w/sand seams

INSPECTOR	CHECKED BY	APPROVED BY
JJ Deeken	JJ Deeken	BL Christensen



SURFACE PROTECTION

Type: 4" square steel w/lock bolt
Casing Stick-Up: 4' feet
Top of Casing: 454.0 (ft) (MSL)

SURFACE SEAL

Type: Cement-bentonite grout
Thickness: 11 feet

RISER PIPE

Type: Flush thread NSF certified PVC
Inner Diameter: 2"

PRIMARY SEAL

Type: Hydrated bentonite chips
Thickness: 2' feet

FILTER MATERIAL

Type: ANSI/NSF 61 bag sand

SCREEN

Type: Pre-slotted NWWA screen
Slot dimensions: 0.010"
Diameter: 2"
Screen Length: 10' feet

LOWER SEAL

Type: none

BORING DIAMETER

DIAMETER: 3 7/8"
*Note-Diagram not shown to scale

Installation Method: Boring drilled to completion depth of 29.5' using rotary wash techniques & flushed until clear. Screen & riser pipe set on 6" sand base, primary filter set & primary seal set, then surged. Boring grouted to ground surface & surface protection placed.

Notes: 08/10/07 water level 6.0' below ground surface.
08/30/07 water level 8.2' below ground surface.

BLACK & VEATCH

TEST PIT LOG

TEST-PIT NO. TP-4

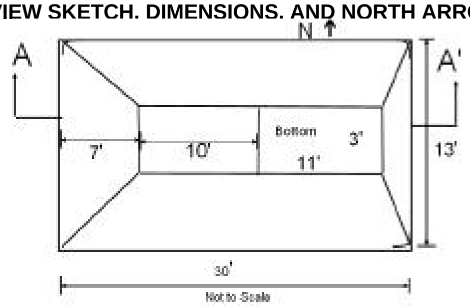
CLIENT - PROJECT			PROJECT NO.
Sandy Creek Energy Associates - Sandy Creek Energy Station			149060
PROJECT LOCATION	**COORDINATES**	**GROUND ELEVATION (DATUM)**	**DATE**
Reisel, Texas	N 2344.1' E 10330.8'	438 ft (MSL)	8/21/07

SURFACE CONDITIONS
Valley, ground wet; short weeds

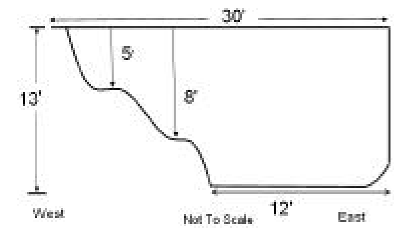
EXCAVATION METHOD
CAT 334 Trackhoe

INSPECTOR	CHECKED BY	APPROVED BY
JJ Deeken	JJ Deeken	BL Christensen

PLAN VIEW SKETCH. DIMENSIONS. AND NORTH ARROW



PROFILE VIEW SKETCH AND DIMENSIONS



SAMPLE NUMBER & TYPE	DEPTH (FEET)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (HORIZONTAL SCALE IN FEET) 0 – 6 – 12 – 18 – 24 – 30
	0	CLAY; dark brown; moist; high plasticity; w/some gravel; trace sand seams (6" Topsoil) @ 1.5' grading brown; w/some 3" gravel
	4	@ 4.5' grading w/trace gypsum crystalization @ 5.0' grading gray @ 7.5' sand & gravel grades out
	8	@ 9.0' grading w/light gray very fine sand in vertical fissures @ 11.0' grading slightly fissile
	12	
	16	

REMARKS

Appendix C

Laboratory Test Results

FALLING HEAD / RISING TAIL HYDRAULIC CONDUCTIVITY TEST
(ASTM D-5084-90)

Project No:	286-75083	Sample Identification:	BV-102, TW-4, 6-8 FEET
Technician:	AG/KMV	Sample Description:	Light Gray and Brown Fat Clay

Project : Sandy Creek Energy Station

INITIAL CONDITIONS				FINAL CONDITIONS			
WATER CONTENT		SPECIMEN DATA		WATER CONTENT		SPECIMEN DATA	
Tare No.:	w	Length, in:	5.120	Tare No.:	d-1	Length, in:	5.370
Wet+Tare, gms:	110.04	Diameter, in:	2.870	Wet+Tare, gms:	242.3	Diameter, in:	2.890
Dry+Tare, gms:	95.59	Wet mass, gms:	1127.8	Dry+Tare, gms:	208.4	Wet mass, gms:	1181.8
Tare Weight, gms:	21.37	Area, sq.cm.:	41.74	Tare Weight, gms:	85.1	Area, sq.cm.:	42.32
Moisture, %	19.5	Volume, cc:	542.8	Moisture, %	27.4	Volume, cc:	577.2
		Unit wet wt, pcf:	129.7			Unit wet wt, pcf:	127.8
Specific Gravity:	2.70	Unit dry wt, pcf:	108.5	Specific Gravity:	2.70	Unit dry wt, pcf:	100.2
Saturation, %:	95.2	Void Ratio:	0.552	Saturation, %:	108.8	Void Ratio:	0.681
Perm. Cell No.:	7	Burret diam, cm:	1.123	Burret area,sq.cm.:	0.991	Burret factor,cm/cc:	1.009
Cell Pressure, psi:	30.0	Head Pressure, psi:	30.0	Tail Pressure, psi:	28.0	Remarks:	

PERMEABILITY MEASUREMENTS

Date	Time	Elapsed Time (sec)	Temp (C)	Pressure Diff. (psi)	Head Rdg (cc)	Tail Rdg (cc)	Head Change (cm)	Tail Change (cm)	Total Head (cm)	Permeability Kt (cm/sec)	Permeability K_{20} (cm/sec)
1/3/2008	9:33:00 AM	0	24.0	2.0	0.2	24.2	0.000	0.000	164.82	0.00E+00	0.00E+00
1/4/2008	3:31:00 PM	1798	24.0	2.0	0.9	23.4	0.706	0.807	163.30	8.19E-07	7.43E-07
1/5/2008	9:25:00 AM	2872	24.0	2.0	1.2	23.0	0.303	0.404	162.60	2.41E-07	2.18E-07
1/7/2008	3:06:00 PM	6093	24.0	2.0	2.1	21.9	0.908	1.110	160.58	3.27E-07	2.97E-07
1/8/2008	8:15:00 AM	7122	24.0	2.0	2.4	21.6	0.303	0.303	159.97	8.47E-08	7.68E-08
1/9/2008	7:40:00 AM	8527	24.0	2.0	2.7	21.3	0.303	0.303	159.37	7.10E-08	6.44E-08
1/10/2008	7:30:00 AM	9957	25.0	2.0	3.1	21.0	0.404	0.303	158.66	7.12E-08	6.28E-08
1/11/2008	7:30:00 AM	11397	24.0	2.0	3.5	20.8	0.404	0.202	158.06	5.36E-08	4.86E-08
1/14/2008	7:30:00 AM	15717	24.0	2.0	4.4	20.2	0.908	0.605	156.54	9.78E-08	8.86E-08

Coefficient of Permeability, k = **6.61E-08** cm/sec (See Note)
(k should be the average of the last 4 readings)

Computed By: KMV Date: 01/08/08 Checked By: KMV Date: 01/08/08

psi

Project: Leachate Evaporation Pond Design
Project Location: 2161 Rattlesnake Road, Riesel, TX 76682
Project Number: TXL0084-03

Key to Log of Boring

Sheet 1 of 1

Elevation, feet	Depth, feet	Sample Type	Sample	Relative Consistency	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Well Log	REMARKS AND OTHER TESTS
1	2	3	4	5	6	7	8	9	10

COLUMN DESCRIPTIONS

1 **Elevation, feet:** Elevation (MSL, feet)

2 **Depth, feet:** Depth in feet below the ground surface.

3 **Sample Type:** Type of soil sample collected at the depth interval shown.

4 **Sample:** Type of soil sample collected at the depth interval shown.

5 **Relative Consistency:** Relative consistency of the subsurface material.

6 **USCS Symbol:** USCS symbol of the subsurface material.

7 **Graphic Log:** Graphic depiction of the subsurface material encountered.

8 **MATERIAL DESCRIPTION:** Description of material encountered. May include consistency, moisture, color, and other descriptive text.

9 **Well Log:** Graphical representation of well installed upon completion of drilling and sampling.

10 **REMARKS AND OTHER TESTS:** Comments and observations regarding drilling or sampling made by driller or field personnel.

FIELD AND LABORATORY TEST ABBREVIATIONS

CHEM: Chemical tests to assess corrosivity
COMP: Compaction test
CONS: One-dimensional consolidation test
LL: Liquid Limit, percent
PI: Plasticity Index, percent

SA: Sieve analysis (percent passing No. 200 Sieve)
UC: Unconfined compressive strength test, Qu, in ksf
WA: Wash sieve (percent passing No. 200 Sieve)

TYPICAL MATERIAL GRAPHIC SYMBOLS

Well graded GRAVEL (GW)
Poorly graded GRAVEL (GP)
Well graded GRAVEL with Silt (GW-GM)
Well graded GRAVEL with Clay (GW-GC)
Poorly graded GRAVEL with Silt (GP-GM)
Poorly graded GRAVEL with Clay (GP-GC)
Silty GRAVEL (GM)
Clayey GRAVEL (GC)
Well graded SAND (SW)
Poorly graded SAND (SP)
Well graded SAND with Silt (SW-SM)

Well graded SAND with Clay (SW-SC)
Poorly graded SAND with Silt (SP-SM)
Poorly graded SAND with Clay (SP-SC)
Silty SAND (SM)
Clayey SAND (SC)
SILT, SILT w/SAND, SANDY SILT (ML)
Lean CLAY, CLAY w/SAND, SANDY CLAY (CL)
SILT, SILT w/SAND, SANDY SILT (MH)
Fat CLAY, CLAY w/SAND, SANDY CLAY (CH)
SILT, SILT with SAND, SANDY SILT (ML-MH)
Lean-Fat CLAY, CLAY w/SAND, SANDY CLAY (CL-CH)

SILTY CLAY (CL-ML)
Lean CLAY/PEAT (CL-OL)
Fat CLAY/SILT (CH-MH)
Fat CLAY/PEAT (CH-OH)
Silty SAND to Sandy SILT (SM-ML)
Silty SAND to Sandy SILT (SM-MH)
Clayey SAND to Sandy CLAY (SC-CL)
Clayey SAND to Sandy CLAY (SC-CH)
SILT to CLAY (CL/ML)
Silty to Clayey SAND (SM-SC)

TYPICAL SAMPLER GRAPHIC SYMBOLS

2-inch-OD unlined split spoon (SPT)
2.5-inch-OD Modified California w/ brass liners
3-inch-OD California w/ brass rings
Shelby Tube (Thin-walled, fixed head)
Grab Sample
Bulk Sample
Pitcher Sample
Other sampler

OTHER GRAPHIC SYMBOLS

Water level (at time of drilling, ATD)
Water level (after waiting a given time)
Minor change in material properties within a stratum
Inferred or gradational contact between strata
? Queried contact between strata

GENERAL NOTES

1. Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive, and actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
2. Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

P:\Projects\Sandy Creek PP\Phase 3 Work_Leachate Pond Design\Boring Logs\SCS Boring Logs_Final - 6-15-2011.bgs [Boring GB1.tpl]

Project: Leachate Evaporation Pond Design Project Location: 2161 Rattlesnake Road, Riesel, TX 76682 Project Number: TXL0084-03	Log of Boring GB-1 Sheet 1 of 2

Date(s) Drilled 08/30/2010	Logged By M. Zahirul Islam	Checked By Edward B. Dolan, P.G.
Drilling Method Hollow Stem Auger	Drill Bit Size/Type 8.2 inch HSA	Total Depth of Borehole 32 feet bgs
Drill Rig Type Mobile B 59	Drilling Contractor Total Support Services, Inc.	Approximate Surface Elevation 456.12 feet MSL
Groundwater Level and Date Measured Not Encountered	Sampling Method(s) Core	Hammer Data N/A
Borehole Backfill Well Completion	Location N 10513523.31, E 3349864.44	

Elevation, feet	Depth, feet	Sample	Relative Consistency	USCS Symbol	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
456.1	0	Core	Stiff	CH	Drill cuttings appear to be light brown CLAY, dry, some gravel.	No sample recovered.
		Shelby Tube	Medium stiff	CH	Brown dry CLAY, some gravel, trace silt and sand.	
451.1	5	Core	Stiff	CH	Brown dry CLAY, occassional calcite seam, some gravel.	
446.1	10	Shelby Tube	Stiff	CH	Brown CLAY, moist, calcite seam, occassional gravel, trace sand and silt.	
		Core				
441.1	15	Shelby Tube	Stiff	CH	Same as above.	
		Core				
436.1	20	Shelby Tube	Very stiff	CH	Brown CLAY, occassional calcite seam, dry, a 6 in. grey clay layer at 22 ft bgs.	
		Core				
431.1	25		Hard	CH	Grading grey.	
		Core	Hard	Claystone	Dark grey CLAYSTONE, dry, trace silt, drilling very slowly.	
426.1	30					

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Project: Leachate Evaporation Pond Design
Project Location: 2161 Rattlesnake Road, Riesel, TX 76682
Project Number: TXL0084-03

Log of Boring GB-1

Elevation, feet	Depth, feet	Sample Type	Sample	Relative Consistency	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Well Log	REMARKS AND OTHER TESTS
426.1	30		Core		Claystone		Same as above.		
							Bottom of Boring at 32 feet bgs.		
421.1	35								
416.1	40								
411.1	45								
406.1	50								
401.1	55								
396.1	60								
391.1	65								

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Project: Leachate Evaporation Pond Design
Project Location: 2161 Rattlesnake Road, Riesel, TX 76682
Project Number: TXL0084-03

Log of Boring GB-4

Sheet 1 of 1

Date(s) Drilled **08/30/2010 and 08/31/2010**	Logged By **M. Zahirul Islam**	Checked By **Edward B. Dolan, P.G.**
Drilling Method **Hollow Stem Auger**	Drill Bit Size/Type **8.2 inch HSA**	Total Depth of Borehole **17 feet bgs**
Drill Rig Type **Mobile B 59**	Drilling Contractor **Total Support Services, Inc.**	Approximate Surface Elevation **433.75 feet MSL**
Groundwater Level and Date Measured **3.17 feet measured on 9/22/2010**	Sampling Method(s) **Core**	Hammer Data **N/A**
Borehole Backfill **Well Completion**	Location **N 10513167.81, E 3349948.58**	

Elevation, feet	Depth, feet	Sample Type	Sample	Relative Consistency	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Well Log	REMARKS AND OTHER TESTS
433.8	0		Core	Medium stiff	CH		Moist grey CLAY with some gravel. a 2 in. gravel encountered at about 2 ft bgs, roots (top 6 in.).	9/22/2010	3.5 ft sample recovered
428.8	5		Core	Medium stiff	CH		Grading brown, moist, calcite seam, occassional gravel, trace silt.		
				Medium stiff	CH		Brown CLAY, moist, calcite seam, occassional gravel.		
423.8	10		Shelby Tube	Stiff	CH		Grading grey, moist, trace silt.		
			Core	Hard	Claystone		Grey CLAYSTONE, trace silt, dry.		
418.8	15		Core	Hard	Claystone		Hard, dark grey CLAYSTONE, dry.		
							Bottom of Boring at 17 feet bgs.		
413.8	20								
408.8	25								
403.8	30								

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Project: Leachate Evaporation Pond Design	Log of Boring GB-5
Project Location: 2161 Rattlesnake Road, Riesel, TX 76682	Sheet 1 of 1
Project Number: TXL0084-03	

Date(s) Drilled **09/01/2010**	Logged By **M. Zahirul Islam**	Checked By **Edward B. Dolan, P.G.**
Drilling Method **Hollow Stem Auger**	Drill Bit Size/Type **8.2 inch HSA**	Total Depth of Borehole **20 feet bgs**
Drill Rig Type **Mobile B 59**	Drilling Contractor **Total Support Services, Inc.**	Approximate Surface Elevation **440.64 feet MSL**
Groundwater Level and Date Measured **Not Measured**	Sampling Method(s) **Core**	Hammer Data **N/A**
Borehole Backfill **Well Completion**	Location **N 10513245.68, E 3349741.37**	

Elevation, feet	Depth, feet	Sample Type	Sample	Relative Consistency	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Well Log	REMARKS AND OTHER TESTS
440.6	0		Core	Stiff	CH		Light grey CLAY, dry, some gravel.		
				Stiff	CH		Grading brown, occassional calcite seam.		
435.6	5		Shelby Tube	Medium stiff	CH		Brown CLAY, calcite seam, moist, occassional gravel, trace sand and silt.		
			Core						
430.6	10		Shelby Tube	Medium stiff	CH		Grading grey, moist, occassional gravel, trace sand and silt.		
			Core						
425.6	15		Shelby Tube	Stiff	CH		Mixture of light brown and grey CLAY, occassional gravel, dry.		
			Core	Hard	Claystone		Hard, dark grey CLAYSTONE, trace silt, a 6 in. vertical fracture with iron stain at 19 ft bgs, dry.		
420.6	20						Bottom of Boring at 20 feet bgs.		
415.6	25								
410.6	30								

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Elevation (feet, MSL)	Depth (feet)	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Well Log
1	2	3	4	5	6

COLUMN DESCRIPTIONS

1 Elevation (feet, MSL): Elevation (feet, MSL)
2 Depth (feet): Depth in feet below the ground surface.
3 USCS Symbol: Type of material encountered.
4 Graphic Log: Graphic depiction of the subsurface material encountered.
5 MATERIAL DESCRIPTION: Description of material encountered. May include consistency, moisture, color, and other descriptive text.
6 Well Log: Graphical representation of well installed upon completion of drilling and sampling.

FIELD AND LABORATORY TEST ABBREVIATIONS

CHEM: Chemical tests to assess corrosivity
COMP: Compaction test
CONS: One-dimensional consolidation test
LL: Liquid Limit, percent
PI: Plasticity Index, percent
SA: Sieve analysis (percent passing No. 200 Sieve)
UC: Unconfined compressive strength test, Qu, in ksf
WA: Wash sieve (percent passing No. 200 Sieve)

MATERIAL GRAPHIC SYMBOLS

Bentonite plug
Fat CLAY, CLAY w/SAND, SANDY CLAY (CH)
Claystone
Portland Cement Concrete
Gravel
Grout
Poorly graded SAND (SP)

TYPICAL SAMPLER GRAPHIC SYMBOLS

Auger sampler
Bulk Sample
3-inch-OD California w/ brass rings
CME Sampler
Grab Sample
2.5-inch-OD Modified California w/ brass liners
Pitcher Sample
2-inch-OD unlined split spoon (SPT)
Shelby Tube (Thin-walled, fixed head)

OTHER GRAPHIC SYMBOLS

Water level (at time of drilling, ATD)
Water level (after waiting)
Minor change in material properties within a stratum
Inferred/gradational contact between strata
? Queried contact between strata

GENERAL NOTES

1: Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive, and actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
2: Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

P:\Projects\NAES\CCR Rule Compliance 2015-2016\Field Forms\Consolidated Boring Logs.bg4[GeosyntecTemplate.tpl]

Project: **Sandy Creek Energy Station**	Log of Boring GB-6
Project Location: **2161 Rattlesnake Road Riesel, TX 76682**	**Sheet 1 of 1**
Project Number: **TXL0526 / 02**	

Date(s) Drilled **9/22/2015**	Logged By **Alexander Brewster**	Checked By **Lindsay O'Leary, P.E.**
Drilling Method **Hollow Stem Auger**	Drill Bit Size/Type **5" HSA**	Total Depth of Borehole **30 ft**
Drill Rig Type **Truck-Mounted CME**	Drilling Contractor **Best Drilling Services, Inc.**	Approximate Surface Elevation **453.39 (ft, MSL)**
Groundwater Level and Date Measured **Not encountered**	Sampling Method(s) **Core Barrel**	Hammer Data **N/A**
Borehole Backfill **Cement Bentonite Grout**	Location **UTM: N 10513492.63', E 3349684.20'. SE of northern corner of existing leachate evaporation pond.**	

Elevation (feet, MSL)	Depth (feet)	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Well Log
453.39	0			No Recovery	
		CH		Light brown / brown CLAY; dry; low recovery - collapsable	
448.39	5				
443.39	10	CH		Brown / light brown CLAY; moist	
438.39	15	CH		Light brown / brown CLAY; slightly moist; localized gypsum / sand deposits	
433.39	20			Mottled with gray and orange	
		Claystone		Dark gray CLAYSTONE interbedded with brown CLAY; slightly moist	
428.39	25	Claystone		Dark gray CLAYSTONE; slightly moist	
423.39	30			End of drilling at 30 ft; no groundwater encountered; no well developed;	

P:\Projects\NAES\CCR Rule Compliance 2015-2016\Field Forms\Consolidated Boring Logs.bg4[GeosyntecTemplate.tpl]

Project: **Sandy Creek Energy Station** Project Location: **2161 Rattlesnake Road Riesel, TX 76682** Project Number: **TXL0526 / 02**	Log of Boring GB-7 **Sheet 1 of 1**

Date(s) Drilled **9/23/2015**	Logged By **Alexander Brewster**	Checked By **Lindsay O'Leary, P.E.**
Drilling Method **Hollow Stem Auger**	Drill Bit Size/Type **8.25" HSA**	Total Depth of Borehole **25 ft**
Drill Rig Type **Truck-Mounted CME**	Drilling Contractor **Best Drilling Services, Inc.**	Approximate Surface Elevation **440.87 (ft, MSL)**
Groundwater Level and Date Measured **Not encountered**	Sampling Method(s) **Core Barrel**	Hammer Data **N/A**
Borehole Backfill **Cement Bentonite Grout**	Location **UTM: N 10513175.55', E 3349950.07'. Approximately 65 ft W and 10 ft N of MW-2.**	

Elevation (feet, MSL)	Depth (feet)	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Well Log
440.87	0			Gravely fill	
		CH		Light brown / brown CLAY; slightly moist; localized gypsum crystals and pieces of gravel	
435.87	5				
				Low recovery	
		CH		Dark brown CLAY with fine organic material; slightly moist; localized gypsum crystals and pieces of gravel	
430.87	10				
		CH		Brown CLAY; moist	
425.87	15				
				Low recovery	
		Claystone		dark gray CLAYSTONE; slightly moist	
420.87	20				
415.87	25			End of drilling at 25 ft; no groundwater encountered; no well developed; borehole backfilled with cement bentonite grout.	
410.87	30				

STATE OF TEXAS WELL REPORT for Tracking #231664

Owner:	**SCPP**	Owner Well #:	**GB1**
Address:	**2161 Rattlesnake Rd. Riesel , TX**	Grid #:	**39-33-2**
Well Location:	**Same Riesel , TX**	Latitude:	**31° 28' 02" N**
Well County:	**McLennan**	Longitude:	**096° 57' 15" W**
Elevation:	**No Data**	GPS Brand Used:	**No Data**
Type of Work:	**New Well**	Proposed Use:	**Monitor**

Drilling Date: Started: **8/30/2010**
Completed: **9/3/2010**

Diameter of Hole: Diameter: **8.25 in From Surface To 27 ft**

Drilling Method: **Hollow Stem Auger**

Borehole Completion: Other: **20/40 Silica Sand**

Annular Seal Data: 1st Interval: **From 0 ft to 2 ft with Concrete (#sacks and material)**
2nd Interval: **From 2 ft to 14 ft with Bentonite (#sacks and material)**
3rd Interval: **No Data**
Method Used: **Gravity**
Cemented By: **Crew**
Distance to Septic Field or other Concentrated Contamination: **No Data**
Distance to Property Line: **No Data**
Method of Verification: **No Data**
Approved by Variance: **No Data**

Surface Completion: **Surface Sleeve Installed**

Water Level: Static level: **No Data**
Artesian flow: **No Data**

Packers: **No Data**

Plugging Info: Casing or Cement/Bentonite left in well: **No Data**

Type Of Pump: **No Data**

Well Tests: **No Data**

Water Quality: Type of Water: **No Data**
Depth of Strata: **No Data**
Chemical Analysis Made: **No Data**
Did the driller knowingly penetrate any strata which contained undesirable constituents: **No Data**

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.

Company Information: **Total Support Services**
P.O. Box 81621

	Austin , TX 78708
Driller License Number:	**54611**
Licensed Well Driller Signature:	**Brian Kern**
Registered Driller Apprentice Signature:	**No Data**
Apprentice Registration Number:	**No Data**
Comments:	**No Data**

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

TEX. OCC. CODE Title 12, Chapter 1901.251, authorizes the owner (owner or the person for whom the well was drilled) to keep information in Well Reports confidential. The Department shall hold the contents of the well log confidential and not a matter of public record if it receives, by certified mail, a written request to do so from the owner.

Please include the report's Tracking number (Tracking **#231664**) on your written request.

Texas Department of Licensing & Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

DESC. & COLOR OF FORMATION MATERIAL

From (ft) To (ft) Description
0 to 3 Brown Gravel Sand and Clay
3 to 26 Tan and Gray Clay
26 to 27 Gray Shale

CASING, BLANK PIPE & WELL SCREEN DATA

Dia. New/Used Type Setting From/To
2 New PVC Riser 0/16 Sched. 40
2 New PVC Screen 16/26 0.010 Slotted

STATE OF TEXAS WELL REPORT for Tracking #231665

Owner:	**SCPP**	Owner Well #:	**GB4**
Address:	**2161 Rattlesnake Rd.** **Riesel , TX**	Grid #:	**39-33-2**
Well Location:	**Same** **Riesel , TX**	Latitude:	**31° 27' 59" N**
Well County:	**McLennan**	Longitude:	**096° 57' 19" W**
Elevation:	**No Data**	GPS Brand Used:	**No Data**
Type of Work:	**New Well**	Proposed Use:	**Monitor**

Drilling Date: Started: **8/30/2010**
Completed: **9/3/2010**

Diameter of Hole: Diameter: **8.25 in From Surface To 16 ft**

Drilling Method: **Hollow Stem Auger**

Borehole Completion: Other: **20/40 Silica Sand**

Annular Seal Data: 1st Interval: **From 0 ft to 1 ft with Concrete (#sacks and material)**
2nd Interval: **From 1 ft to 3 ft with Bentonite (#sacks and material)**
3rd Interval: **No Data**
Method Used: **Gravity**
Cemented By: **Crew**
Distance to Septic Field or other Concentrated Contamination: **No Data**
Distance to Property Line: **No Data**
Method of Verification: **No Data**
Approved by Variance: **No Data**

Surface Completion: **Surface Sleeve Installed**

Water Level: Static level: **No Data**
Artesian flow: **No Data**

Packers: **No Data**

Plugging Info: Casing or Cement/Bentonite left in well: **No Data**

Type Of Pump: **No Data**

Well Tests: **No Data**

Water Quality: Type of Water: **No Data**
Depth of Strata: **No Data**
Chemical Analysis Made: **No Data**
Did the driller knowingly penetrate any strata which contained undesirable constituents: **No Data**

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.

Company Information: **Total Support Services**
P.O. Box 81621

	Austin , TX 78708
Driller License Number:	**54611**
Licensed Well Driller Signature:	**Brian Kern**
Registered Driller Apprentice Signature:	**No Data**
Apprentice Registration Number:	**No Data**
Comments:	**No Data**

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

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Texas Department of Licensing & Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

DESC. & COLOR OF FORMATION MATERIAL

From (ft) To (ft) Description
0 to 11 Tan and Gray Clay
11 to 16 Gray Shale

CASING, BLANK PIPE & WELL SCREEN DATA

Dia. New/Used Type Setting From/To
2 New PVC Riser 0/5 Sched. 40
2 New PVC Screen 5/15 0.010 Slotted

STATE OF TEXAS WELL REPORT for Tracking #231670

Owner:	**SCPP**	Owner Well #:	**GB5**
Address:	**2161 Rattlesnake Rd. Riesel , TX**	Grid #:	**39-33-2**
Well Location:	**Same Riesel , TX**	Latitude:	**31° 28' 01" N**
Well County:	**McLennan**	Longitude:	**096° 57' 20" W**
Elevation:	**No Data**	GPS Brand Used:	**No Data**
Type of Work:	**New Well**	Proposed Use:	**Environmental Soil Boring**

Drilling Date:	Started: **8/30/2010** Completed: **9/3/2010**
Diameter of Hole:	Diameter: **8.25 in From Surface To 20 ft**
Drilling Method:	**Hollow Stem Auger**
Borehole Completion:	**Open Hole**
Annular Seal Data:	1st Interval: **From 0 ft to 2 ft with Concrete (#sacks and material)** 2nd Interval: **From 2 ft to 20 ft with Bentonite (#sacks and material)** 3rd Interval: **No Data** Method Used: **Gravity** Cemented By: **Crew** Distance to Septic Field or other Concentrated Contamination: **No Data** Distance to Property Line: **No Data** Method of Verification: **No Data** Approved by Variance: **No Data**
Surface Completion:	**No Data**
Water Level:	Static level: **No Data** Artesian flow: **No Data**
Packers:	**No Data**
Plugging Info:	The well **was** plugged within 48 hours. Casing or Cement/Bentonite left in well: **No Data**
Type Of Pump:	**No Data**
Well Tests:	**No Data**
Water Quality:	Type of Water: **No Data** Depth of Strata: **No Data** Chemical Analysis Made: **No Data** Did the driller knowingly penetrate any strata which contained undesirable constituents: **No Data**
Certification Data:	The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.

Company Information:	**Total Support Services** **P.O. Box 81621** **Austin , TX 78708**
Driller License Number:	**54611**
Licensed Well Driller Signature:	**Brian Kern**
Registered Driller Apprentice Signature:	**No Data**
Apprentice Registration Number:	**No Data**
Comments:	**No Data**

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

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Please include the report's Tracking number (Tracking **#231670**) on your written request.

Texas Department of Licensing & Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

DESC. & COLOR OF FORMATION MATERIAL

From (ft) To (ft) Description
0 to 19 Tan and Gray Clay
19 to 20 Gray Shale

CASING, BLANK PIPE & WELL SCREEN DATA

No Data

STATE OF TEXAS WELL REPORT for Tracking #408222

Owner:	**Sandy Creek Services, LLC**	Owner Well #:	**Location 3 (GB-6)**
Address:	**P.O. Box 370** **Riesel, TX 76682**	Grid #:	**39-33-2**
Well Location:	**2161 Rattlesnake Rd** **Riesel, TX 76682**	Latitude:	**31° 28' 03.33" N**
		Longitude:	**096° 57' 17.91" W**
Well County:	**McLennan**	Elevation:	**453 ft. above sea level**

Type of Work: **New Well** Proposed Use: **Environmental Soil Boring**

Drilling Start Date: **9/23/2015** Drilling End Date: **9/23/2015**

Borehole:

Diameter (in.)	*Top Depth (ft.)*	*Bottom Depth (ft.)*
8.15	**0**	**25**

Drilling Method: **Hollow Stem Auger**

Borehole Completion: **Plugged**

Annular Seal Data:

Top Depth (ft.)	*Bottom Depth (ft.)*	*Description (number of sacks & material)*
0	**25**	**CEMENT BENTONITE GROUT**

Seal Method: **Tremie**

Sealed By: **Driller**

Distance to Property Line (ft.): **No Data**

Distance to Septic Field or other concentrated contamination (ft.): **No Data**

Distance to Septic Tank (ft.): **No Data**

Method of Verification: **No Data**

Surface Completion: **No Data** **Surface Completion by Driller**

Water Level: **No Data**

Packers: **No Data**

Type of Pump: **No Data**

Well Tests: **No Test Data Specified**

Water Quality:	Strata Depth (ft.)	Water Type
	No Data	**No Data**

Chemical Analysis Made: **No**

Did the driller knowingly penetrate any strata which contained injurious constituents?: **No**

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the report(s) being returned for completion and resubmittal.

Company Information: **BEST DRILLING SERVICES, INC.**

P.O. BOX 845
FRIENDSWOOD, TX 77549

Driller Name: **Lawrence Tobola** License Number: **3026**

Comments: **No Data**

Lithology:
DESCRIPTION & COLOR OF FORMATION MATERIAL

Top (ft.)	*Bottom (ft.)*	*Description*
0	**5**	**Gravely fill**
5	**10**	**CLAY, drk. brown/black**
10	**14**	**CLAY, drk. brown**
14	**23**	**CLAY, brown**
23	**25**	**CLAYSTONE, drk. gray**

Casing:
BLANK PIPE & WELL SCREEN DATA

Dia. (in.)	*New/Used*	*Type*	*Setting From/To (ft.)*
No Data			

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Texas Department of Licensing and Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

STATE OF TEXAS WELL REPORT for Tracking #408220

Owner:	**Sandy Creek Services, LLC**	Owner Well #:	**Location 5 (GB-7)**
Address:	**P.O. Box 370 Riesel, TX 76682**	Grid #:	**39-33-2**
Well Location:	**2161 Rattlesnake Rd. Riesel, TX 76682**	Latitude:	**31° 28' 00.11" N**
		Longitude:	**096° 57' 14.95" W**
Well County:	**McLennan**	Elevation:	**441 ft. above sea level**

Type of Work: **New Well** Proposed Use: **Monitor**

Drilling Start Date: **9/23/2015** Drilling End Date: **9/23/2015**

Borehole:

Diameter (in.)	*Top Depth (ft.)*	*Bottom Depth (ft.)*
8.25	**0**	**25**

Drilling Method: **Hollow Stem Auger**

Borehole Completion: **Plugged**

Annular Seal Data:

Top Depth (ft.)	*Bottom Depth (ft.)*	*Description (number of sacks & material)*
0	**25**	**CEMENT BENTONITE GROUT**

Seal Method: **Tremie**

Sealed By: **Driller**

Distance to Property Line (ft.): **No Data**

Distance to Septic Field or other concentrated contamination (ft.): **No Data**

Distance to Septic Tank (ft.): **No Data**

Method of Verification: **No Data**

Surface Completion: **No Data** **Surface Completion by Driller**

Water Level: **No Data**

Packers: **No Data**

Type of Pump: **No Data**

Well Tests: **No Test Data Specified**

Plug Information:

Description (number of sacks & material)	*Top Depth (ft.)*	*Bottom Depth (ft.)*
CEMENT BENTONITE GROUT	**0**	**25**

Water Quality:

Strata Depth (ft.)	Water Type
No Data	**No Data**

Chemical Analysis Made: **No**

Did the driller knowingly penetrate any strata which contained injurious constituents?: **No**

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the report(s) being returned for completion and resubmittal.

Company Information: **BEST DRILLING SERVICES, INC.**

P.O. BOX 845
FRIENDSWOOD, TX 77549

Driller Name: **Lawrence Tobola** License Number: **3026**

Comments: **30 ft west and 10 ft North of MW-2**

Lithology:
DESCRIPTION & COLOR OF FORMATION MATERIAL

Top (ft.)	Bottom (ft.)	Description
0	**3**	**Gravelly fill**
3	**9**	**CLAY, lt. brown/brown**
9	**13**	**CLAY, drk. brown**
13	**19**	**CLAY, brown**
19	**25**	**CLAYEYSTONE, drk. gray**

Casing:
BLANK PIPE & WELL SCREEN DATA

Dia. (in.)	New/Used	Type	Setting From/To (ft.)
No Data			

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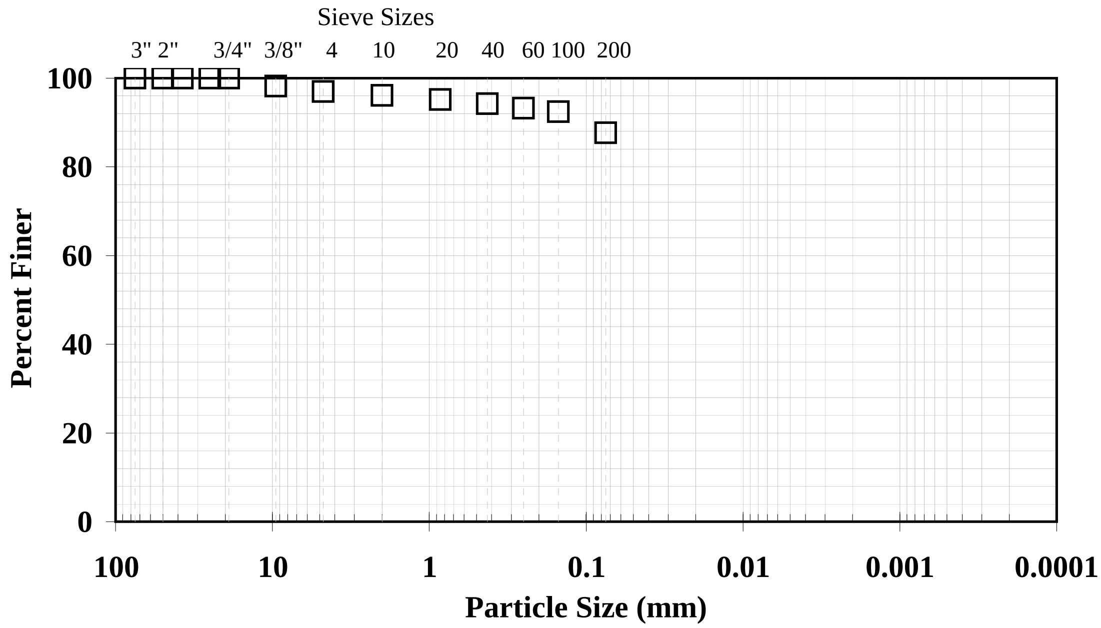
Texas Department of Licensing and Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

Particle Size Analysis for Soils

Client:	Geosyntec Consultants	TRI Log#:	E2347-08-03
Project:	TXL0084-03 Sandy Creek Services (SCS) Leachate Evaporation Pond Design	Test Method:	ASTM D 422
Sample:	GB-1 (5-6 ft)	Test Date:	09/13/10



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	98.2
No. 4 (4.75 mm)	97.0
No. 10 (2.00 mm)	96.1
No. 20 (850 µm)	95.1
No. 40 (425 µm)	94.2
No. 60 (250 µm)	93.2
No. 100 (150 µm)	92.4
No. 200 (75 µm)	87.7

Notes: Soil classifies as a fat clay (CH) in accordance with ASTM D 2487.

The as received moisture content was 20.46 % as determined by ASTM D 2216.

Plastic Index (ASTM D 4318) Results	
Liquid Limit	64
Plastic Limit	19
Plastic Index	45
Notes: Specimen was air dried, 3 point Liquid Limit procedure was used.	

Cheng-Wei Chen, 09/14/10
Quality Review/Date
Tested by: Adam Lewis & Olga Vasquez

TRI/ENVIRONMENTAL, INC.

A Texas Research International Company

Particle Size Analysis for Soils

Client: Geosyntec Consultants

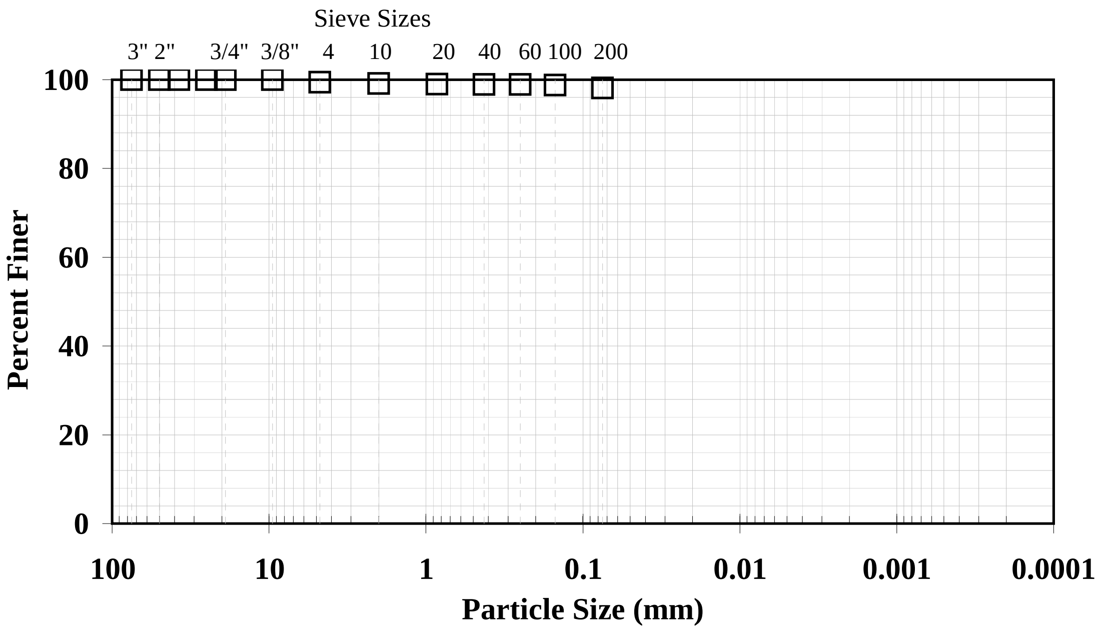
Project: TXL0084-03 Sandy Creek Services (SCS) Leachate Evaporation Pond Design

Sample: GB-1 (9-10 ft)

TRI Log#: E2347-08-03

Test Method: ASTM D 422

Test Date: 09/13/10



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	99.4
No. 10 (2.00 mm)	99.2
No. 20 (850 µm)	99.0
No. 40 (425 µm)	98.9
No. 60 (250 µm)	98.9
No. 100 (150 µm)	98.7
No. 200 (75 µm)	98.1

Notes: Soil classifies as a fat clay (CH) in accordance with ASTM D 2487.

The as received moisture content was 22.31 % as determined by ASTM D 2216.

Plastic Index (ASTM D 4318) Results	
Liquid Limit	67
Plastic Limit	20
Plastic Index	47
Notes: Specimen was air dried, 3 point Liquid Limit procedure was used.	

Cheng-Wei Chen, 09/14/10

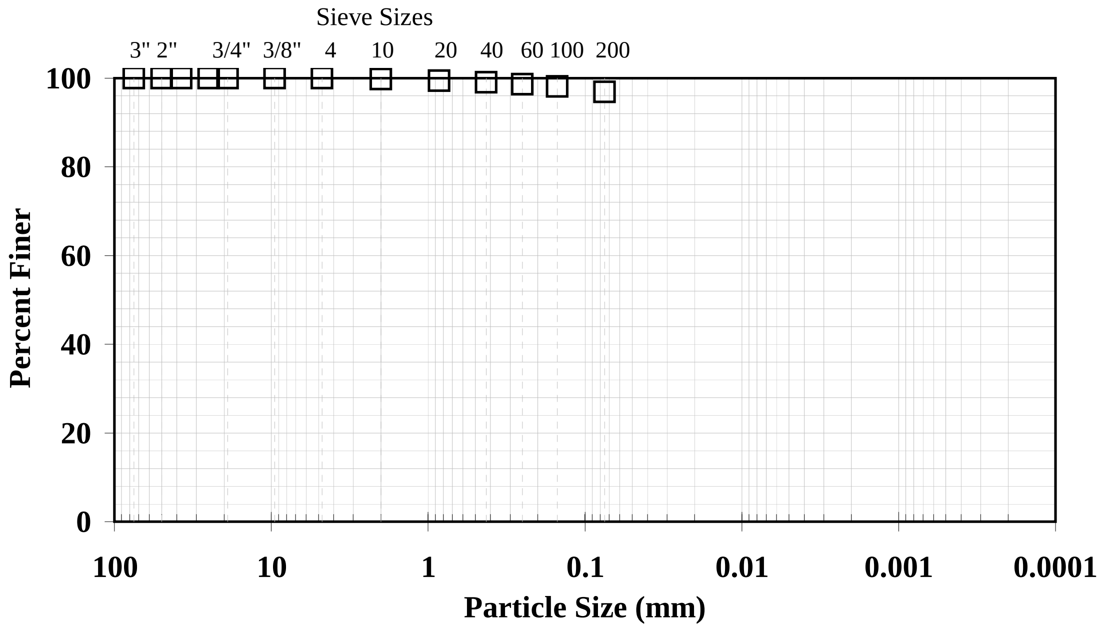
Quality Review/Date

Tested by: Adam Lewis & Olga Vasquez

TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

Particle Size Analysis for Soils

Client:	Geosyntec Consultants	TRI Log#:	E2347-08-03
Project:	TXL0084-03 Sandy Creek Services (SCS) Leachate Evaporation Pond Design	Test Method:	ASTM D 422
		Test Date:	09/13/10
Sample:	GB-1 (24-25 ft)		



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	100.0
No. 10 (2.00 mm)	99.8
No. 20 (850 µm)	99.4
No. 40 (425 µm)	99.1
No. 60 (250 µm)	98.6
No. 100 (150 µm)	98.1
No. 200 (75 µm)	96.9

Notes: Soil classifies as a fat clay (CH) in accordance with ASTM D 2487.

Plastic Index (ASTM D 4318) Results	
Liquid Limit	64
Plastic Limit	22
Plastic Index	42
Notes: Specimen was air dried, 3 point Liquid Limit procedure was used.	

Cheng-Wei Chen, 09/14/10
Quality Review/Date
Tested by: Adam Lewis & Olga Vasquez

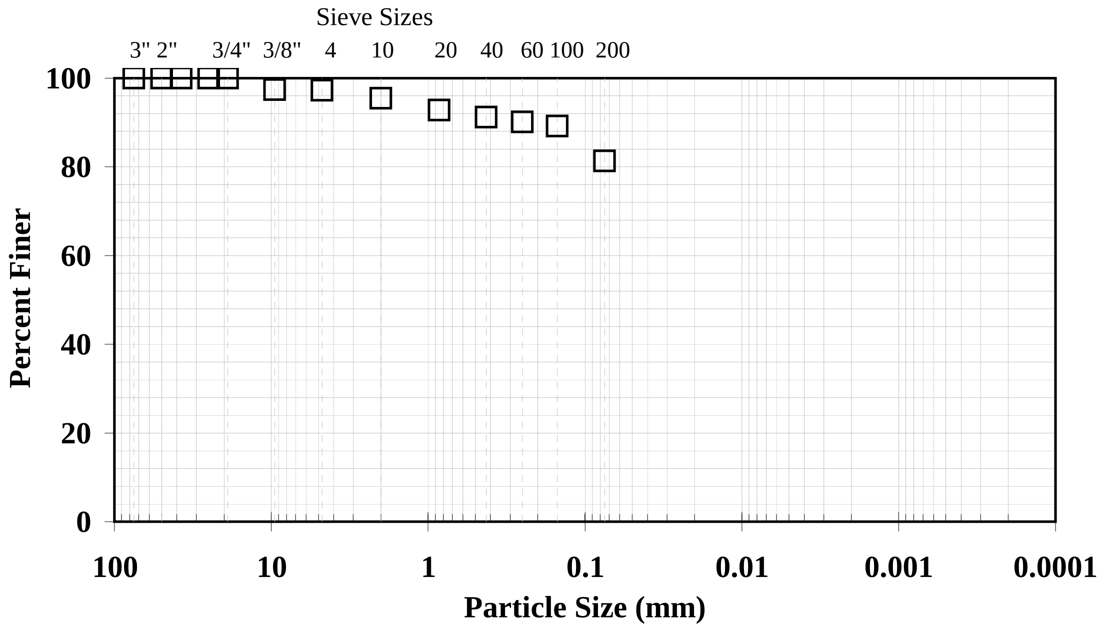
9063 Bee Caves Road □ Austin, TX 78733-6201 □ (512) 263-2101 □ (512) 263-2558 □ 1-800-880-TEST

TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

Particle Size Analysis for Soils

Client: Geosyntec Consultants
Project: TXL0084-03 Sandy Creek Services (SCS) Leachate Evaporation Pond Design
Sample: GB-2 (4-5 ft)

TRI Log#: E2347-08-03
Test Method: ASTM D 422
Test Date: 09/13/10



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	97.4
No. 4 (4.75 mm)	97.3
No. 10 (2.00 mm)	95.5
No. 20 (850 µm)	92.8
No. 40 (425 µm)	91.2
No. 60 (250 µm)	90.2
No. 100 (150 µm)	89.2
No. 200 (75 µm)	81.3

Notes: Soil classifies as a fat clay with sand (CH) in accordance with ASTM D 2487.

The as received moisture content was 17.44 % as determined by ASTM D 2216.

Plastic Index (ASTM D 4318) Results	
Liquid Limit	57
Plastic Limit	22
Plastic Index	35
Notes: Specimen was air dried, 3 point Liquid Limit procedure was used.	

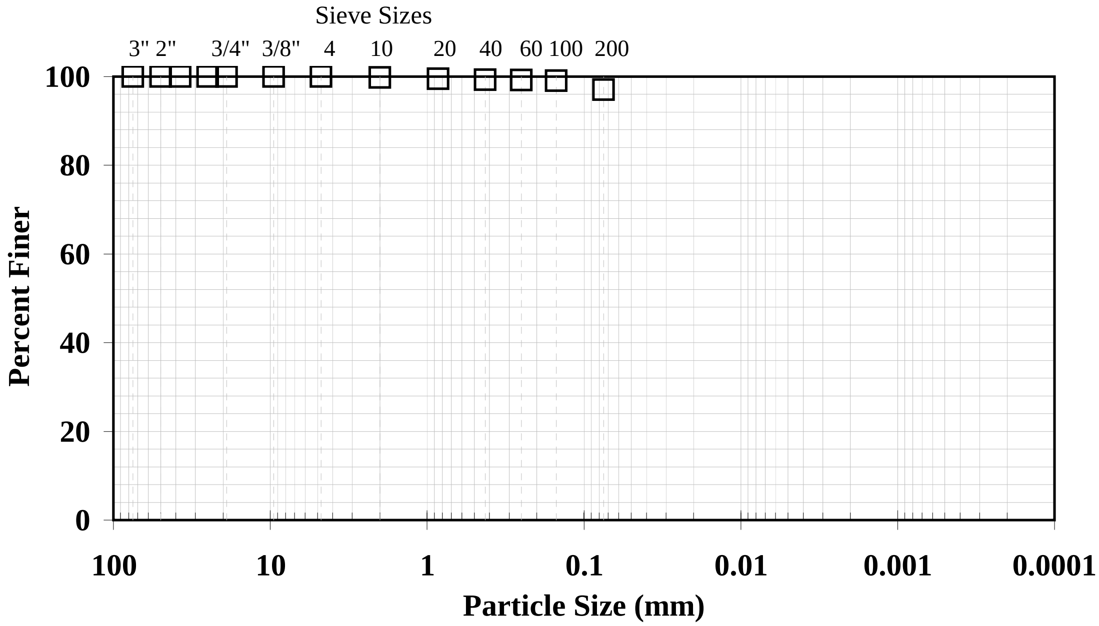
Cheng-Wei Chen, 09/14/10
Quality Review/Date
Tested by: Adam Lewis & Olga Vasquez

9063 Bee Caves Road □ Austin, TX 78733-6201 □ (512) 263-2101 □ (512) 263-2558 □ 1-800-880-TEST

Particle Size Analysis for Soils

Client: Geosyntec Consultants
Project: TXL0084-03 Sandy Creek Services (SCS) Leachate Evaporation Pond Design
Sample: GB-2 (10-11.5 ft)

TRI Log#: E2347-08-03
Test Method: ASTM D 422
Test Date: 09/13/10



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	100.0
No. 10 (2.00 mm)	99.8
No. 20 (850 µm)	99.5
No. 40 (425 µm)	99.3
No. 60 (250 µm)	99.2
No. 100 (150 µm)	99.1
No. 200 (75 µm)	97.0

Notes: Soil classifies as a fat clay (CH) in accordance with ASTM D 2487.

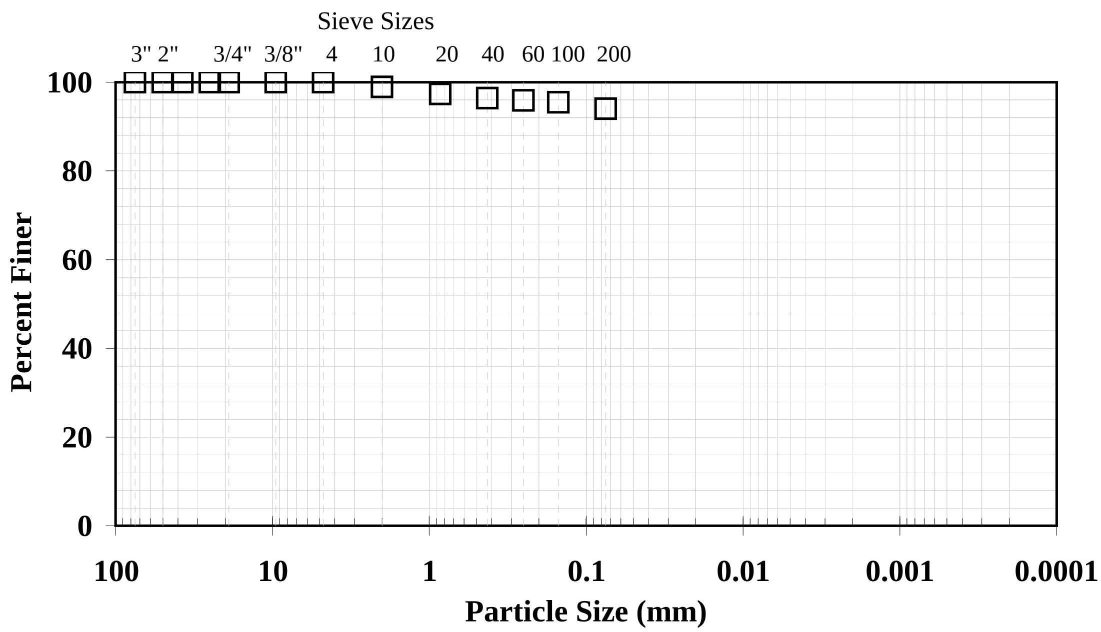
Plastic Index (ASTM D 4318) Results	
Liquid Limit	53
Plastic Limit	24
Plastic Index	29
Notes: Specimen was air dried, 3 point Liquid Limit procedure was used.	

Cheng-Wei Chen, 09/20/10
Quality Review/Date
Tested by: Adam Lewis & Olga Vasquez

Particle Size Analysis for Soils

Client: Geosyntec Consultants
Project: TXL0084-03 Sandy Creek Services (SCS) Leachate Evaporation Pond Design
Sample: GB-2 (15-16.5 ft)

TRI Log#: E2347-08-03
Test Method: ASTM D 422
Test Date: 09/13/10



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	100.0
No. 10 (2.00 mm)	98.9
No. 20 (850 µm)	97.3
No. 40 (425 µm)	96.4
No. 60 (250 µm)	95.9
No. 100 (150 µm)	95.5
No. 200 (75 µm)	94.0

Notes: Soil classifies as a fat clay (CH) in accordance with ASTM D 2487.

Plastic Index (ASTM D 4318) Results	
Liquid Limit	66
Plastic Limit	24
Plastic Index	42
Notes: Specimen was air dried, 3 point Liquid Limit procedure was used.	

Cheng-Wei Chen, 09/20/10
Quality Review/Date
Tested by: Adam Lewis & Olga Vasquez

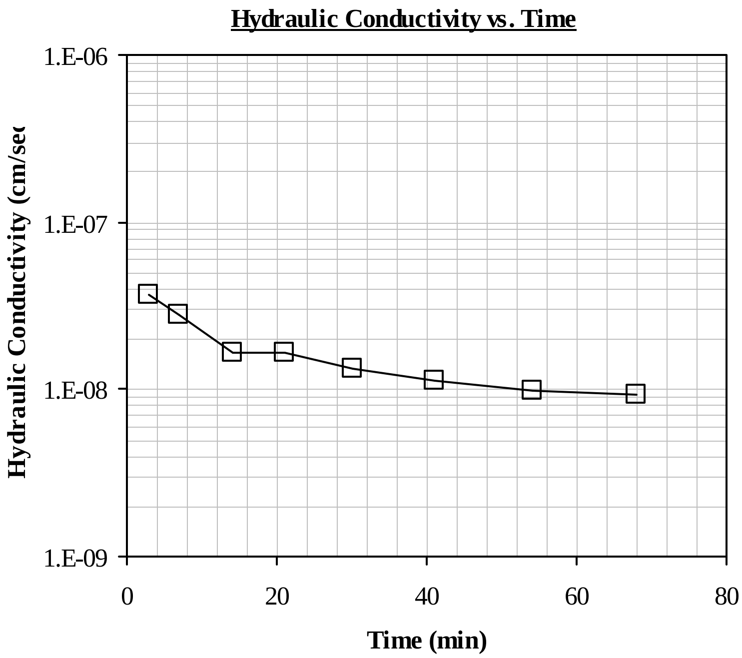
TRI/ENVIRONMENTAL, INC.

A Texas Research International Company

Hydraulic Conductivity

Client: Geosyntec Consultants
Project: TXL0084-03 Sandy Creek Services (SCS)
Leachate Evaporation Pond Design
Sample: GB-2 (15-16.5 ft)

TRI Log#: E2347-08-03
Test Method: ASTM D 5084, Method F
Test Date: 09/15/10



INITIAL VALUES	
Avg. Sample Height (in)	2.02
Avg. Sample Diameter (in)	2.85
Wet Weight (g)	403.0
Area (in^2)	6.38
Volume (cc)	210.7
Initial Water Content (%)	23.6
Total Density (pcf)	119.4
Dry Density (pcf)	96.6
G_s (assumed)	2.65
Degree of Saturation (%)	87.9
Void Ratio	0.71
Porosity	0.42
1 Pore Volume (cc)	87.6

Hydraulic Conductivity

Time (min)	k at 20 deg C (cm/sec)
3	3.65E-08
7	2.80E-08
14	1.64E-08
21	1.68E-08
30	1.33E-08
41	1.12E-08
54	9.70E-09
68	9.25E-09

Average[1]: **1.1E-08**

Note: A B-value of 0.96 was achieved for the undisturbed specimen. Permeation measurements were made with a mercury U-tube. The effective confining pressure was 5 psi per test request.

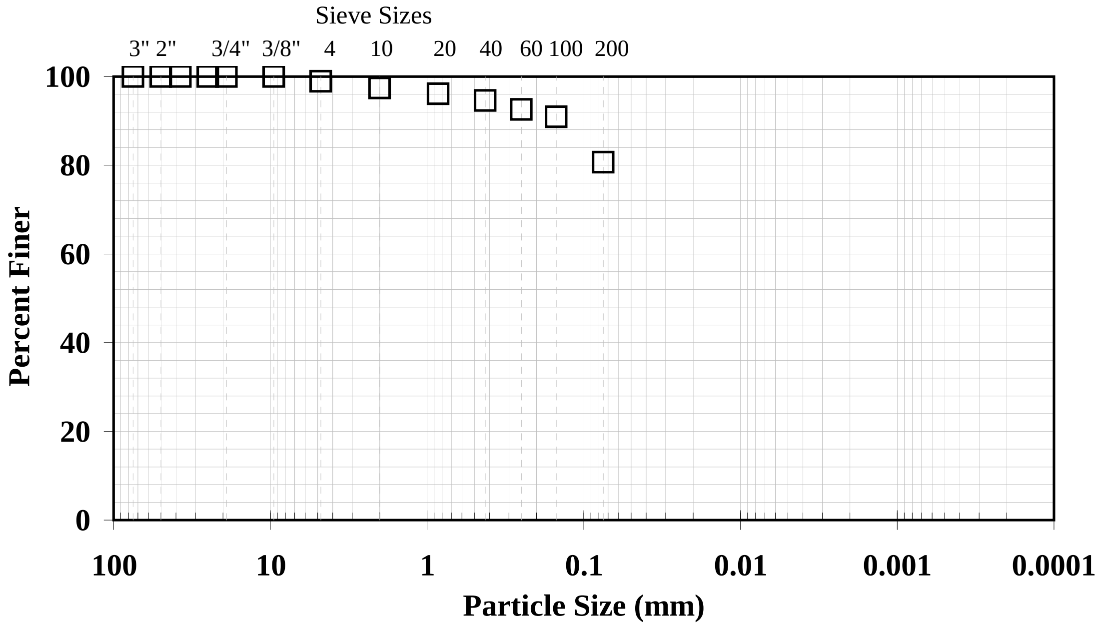
1: Average corrected hydraulic conductivity (k_{20}) is obtained from the last 4 average readings.

Cheng-Wei Chen, 09/20/10
Analysis & Quality Review/Date
Tested by: David Gonzales

TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

Particle Size Analysis for Soils

Client:	Geosyntec Consultants	TRI Log#:	E2347-08-03
Project:	TXL0084-03 Sandy Creek Services (SCS) Leachate Evaporation Pond Design	Test Method:	ASTM D 422
		Test Date:	09/13/10
Sample:	GB-3 (1-2 ft)		



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	98.9
No. 10 (2.00 mm)	97.4
No. 20 (850 µm)	96.1
No. 40 (425 µm)	94.6
No. 60 (250 µm)	92.6
No. 100 (150 µm)	90.9
No. 200 (75 µm)	80.7

Notes: Soil classifies as a fat clay with sand (CH) in accordance with ASTM D 2487.

The as received moisture content was 13.56 % as determined by ASTM D 2216.

Plastic Index (ASTM D 4318) Results	
Liquid Limit	51
Plastic Limit	20
Plastic Index	31
Notes: Specimen was air dried, 3 point Liquid Limit procedure was used.	

Cheng-Wei Chen, 09/14/10
Quality Review/Date
Tested by: Adam Lewis & Olga Vasquez

TRI/ENVIRONMENTAL, INC.
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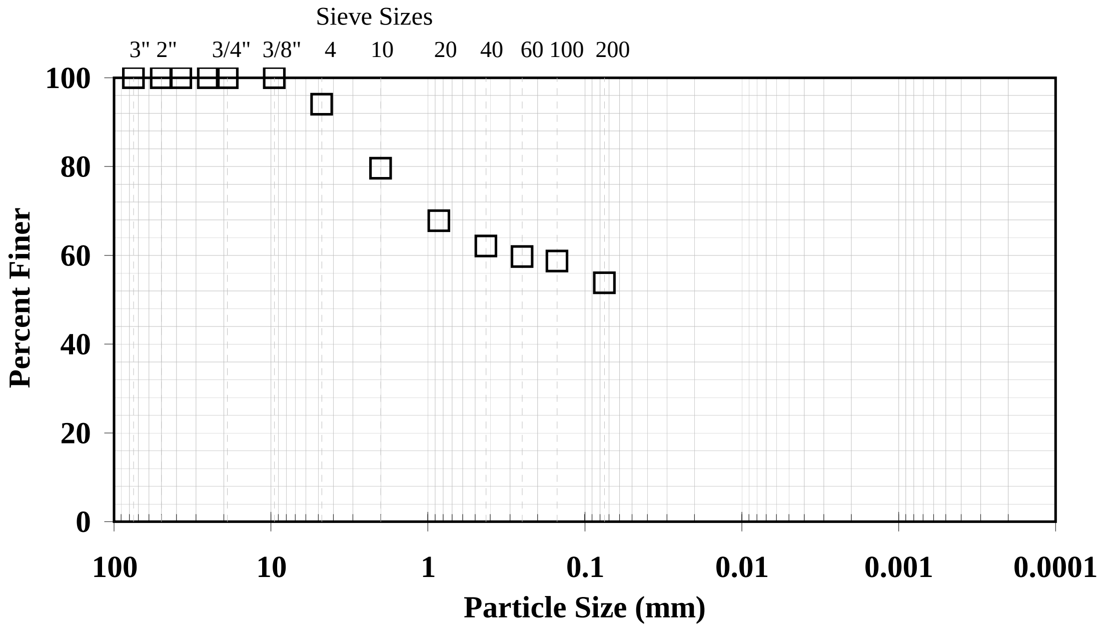
Particle Size Analysis for Soils

Client:	Geosyntec Consultants	TRI Log#:	E2347-08-03
Project:	TXL0084-03 Sandy Creek Services (SCS) Leachate Evaporation Pond Design	Test Method:	ASTM D 422
		Test Date:	09/13/10
Sample:	GB-3 (9-10 ft)		



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	94.0
No. 10 (2.00 mm)	79.6
No. 20 (850 µm)	67.8
No. 40 (425 µm)	62.1
No. 60 (250 µm)	59.7
No. 100 (150 µm)	58.7
No. 200 (75 µm)	53.8

Notes: Soil classifies as a sandy fat clay (CH) in accordance with ASTM D 2487.

The as received moisture content was 18.39 % as determined by ASTM D 2216.

Plastic Index (ASTM D 4318) Results	
Liquid Limit	58
Plastic Limit	17
Plastic Index	41
Notes: Specimen was air dried, 3 point Liquid Limit procedure was used.	

Cheng-Wei Chen, 09/14/10

Quality Review/Date

Tested by: Adam Lewis & Olga Vasquez

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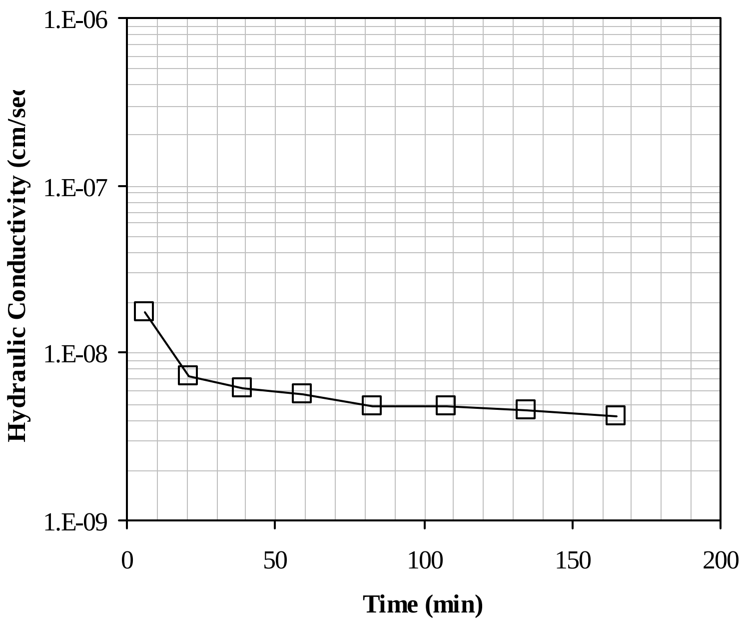
Hydraulic Conductivity

Client:	Geosyntec Consultants	TRI Log#:	E2347-08-03
Project:	TXL0084-03 Sandy Creek Services (SCS) Leachate Evaporation Pond Design	Test Method:	ASTM D 5084, Method F
Sample:	GB-3 (10-11.5 ft)	Test Date:	09/15/10

Hydraulic Conductivity vs. Time



INITIAL VALUES	
Avg. Sample Height (in)	1.97
Avg. Sample Diameter (in)	2.87
Wet Weight (g)	426.2
Area (in^2)	6.46
Volume (cc)	208.2
Initial Water Content (%)	19.7
Total Density (pcf)	127.8
Dry Density (pcf)	106.8
G_s (assumed)	2.65
Degree of Saturation (%)	95.0
Void Ratio	0.55
Porosity	0.35
1 Pore Volume (cc)	73.8

Hydraulic Conductivity

Time (min)	k at 20 deg C (cm/sec)
6	1.76E-08
21	7.19E-09
39	6.13E-09
59	5.64E-09
83	4.82E-09
108	4.74E-09
135	4.50E-09
165	4.15E-09

Average[1]: **4.6E-09**

Note: A B-value of 0.95 was achieved for the undisturbed specimen. Permeation measurements were made with a mercury U-tube. The effective confining pressure was 5 psi per test request.

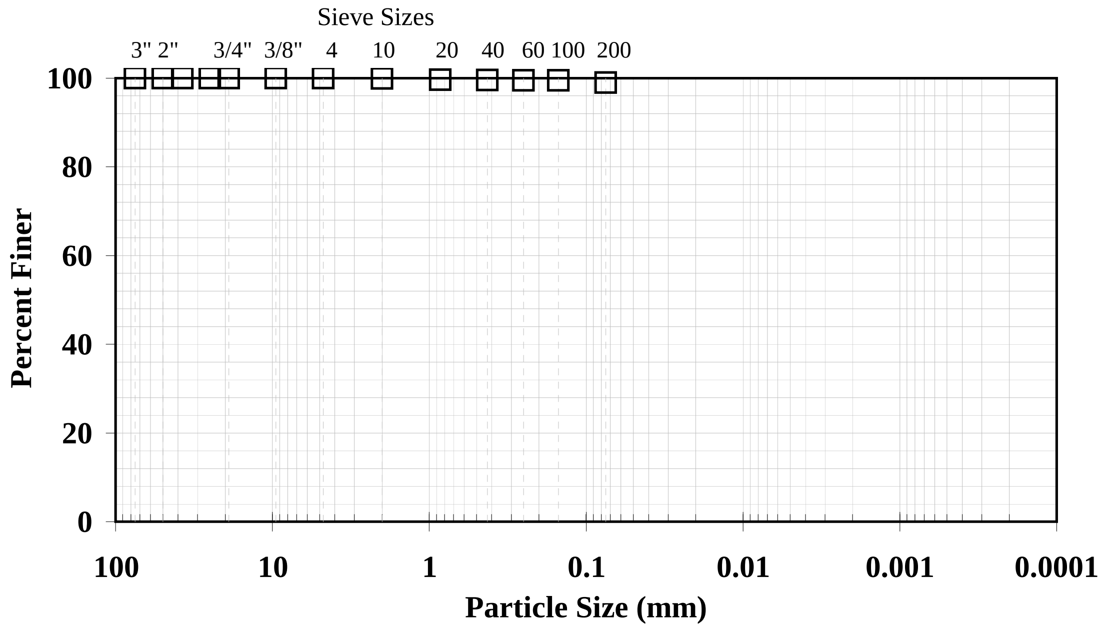
1: Average corrected hydraulic conductivity (k_{20}) is obtained from the last 4 average readings.

Cheng-Wei Chen, 09/20/10
Analysis & Quality Review/Date
Tested by: David Gonzales

TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

Particle Size Analysis for Soils

Client:	Geosyntec Consultants	TRI Log#:	E2347-08-03
Project:	TXL0084-03 Sandy Creek Services (SCS) Leachate Evaporation Pond Design	Test Method:	ASTM D 422
		Test Date:	09/13/10
Sample:	GB-3 (21-22 ft)		



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	100.0
No. 10 (2.00 mm)	99.9
No. 20 (850 µm)	99.6
No. 40 (425 µm)	99.5
No. 60 (250 µm)	99.5
No. 100 (150 µm)	99.5
No. 200 (75 µm)	99.0

Notes: Soil classifies as a fat clay (CH) in accordance with ASTM D 2487.

Plastic Index (ASTM D 4318) Results	
Liquid Limit	56
Plastic Limit	24
Plastic Index	32
Notes: Specimen was air dried, 3 point Liquid Limit procedure was used.	

Cheng-Wei Chen, 09/14/10

Quality Review/Date

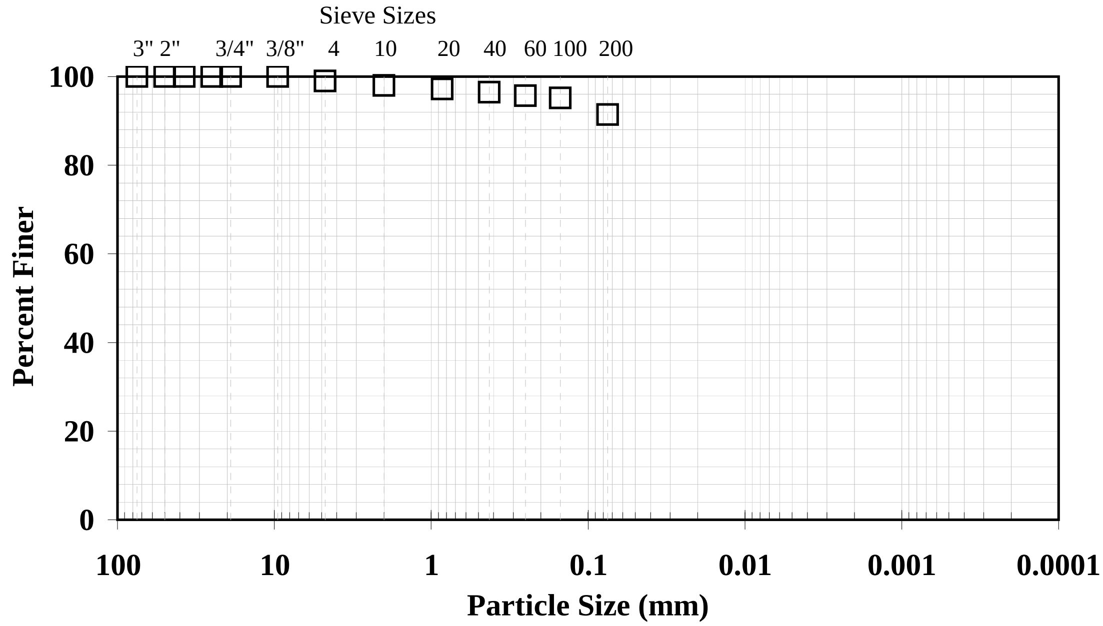
Tested by: Adam Lewis & Olga Vasquez

TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

Particle Size Analysis for Soils

Client: Geosyntec Consultants
Project: TXL0084-03 Sandy Creek Services (SCS) Leachate Evaporation Pond Design
Sample: GB-4 (4-5 ft)

TRI Log#: E2347-08-03
Test Method: ASTM D 422
Test Date: 09/13/10



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	99.0
No. 10 (2.00 mm)	98.0
No. 20 (850 µm)	97.2
No. 40 (425 µm)	96.4
No. 60 (250 µm)	95.7
No. 100 (150 µm)	95.2
No. 200 (75 µm)	91.4

Notes: Soil classifies as a fat clay (CH) in accordance with ASTM D 2487.

The as received moisture content was 25.08 % as determined by ASTM D 2216.

Plastic Index (ASTM D 4318) Results	
Liquid Limit	68
Plastic Limit	23
Plastic Index	45
Notes: Specimen was air dried, 3 point Liquid Limit procedure was used.	

Cheng-Wei Chen, 09/14/10
Quality Review/Date
Tested by: Adam Lewis & Olga Vasquez

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TRI/ENVIRONMENTAL, INC.
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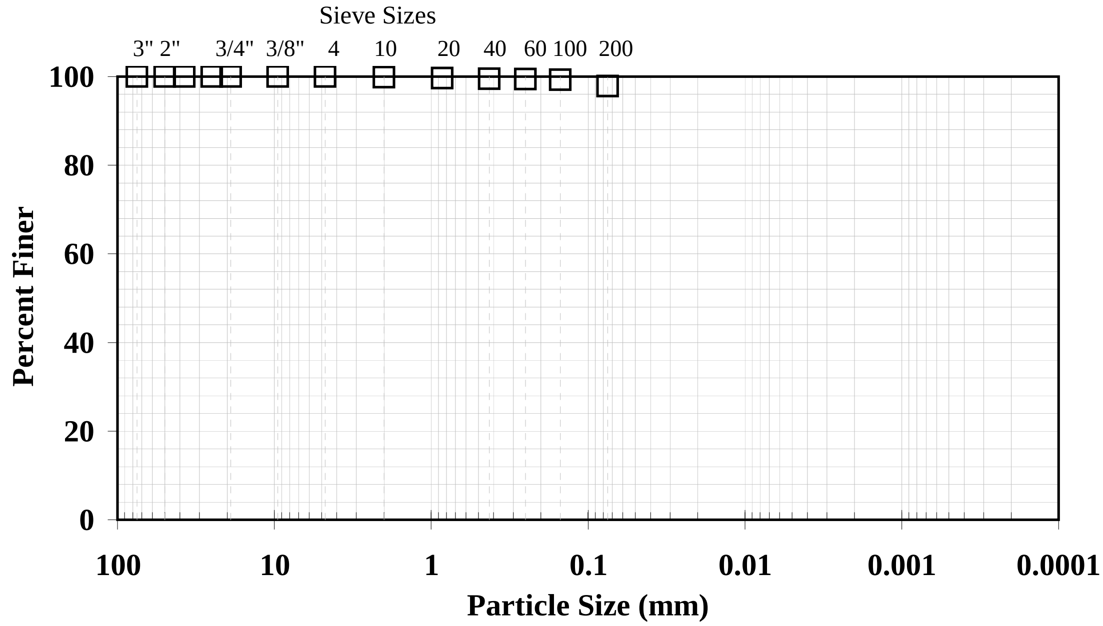
Particle Size Analysis for Soils

Client: Geosyntec Consultants
Project: TXL0084-03 Sandy Creek Services (SCS) Leachate Evaporation Pond Design
Sample: GB-4 (10-11.5 ft)

TRI Log#: E2347-08-03
Test Method: ASTM D 422
Test Date: 09/13/10



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	100.0
No. 10 (2.00 mm)	99.8
No. 20 (850 µm)	99.6
No. 40 (425 µm)	99.5
No. 60 (250 µm)	99.4
No. 100 (150 µm)	99.3
No. 200 (75 µm)	97.8

Notes: Soil classifies as a fat clay (CH) in accordance with ASTM D 2487.

Plastic Index (ASTM D 4318) Results	
Liquid Limit	61
Plastic Limit	25
Plastic Index	36
Notes: Specimen was air dried, 3 point Liquid Limit procedure was used.	

Cheng-Wei Chen, 09/27/10
Quality Review/Date
Tested by: Adam Lewis & Olga Vasquez

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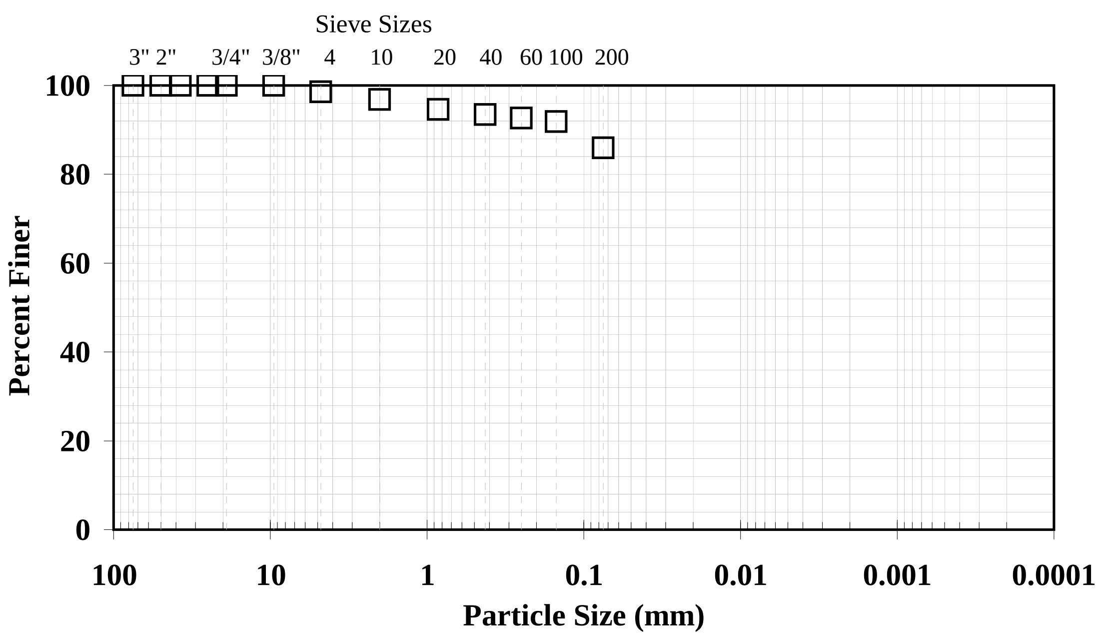
A Texas Research International Company

Particle Size Analysis for Soils

Client: Geosyntec Consultants
Project: TXL0084-03 Sandy Creek Services (SCS) Leachate Evaporation Pond Design
Sample: GB-5 (2-5 ft)

TRI Log#: E2347-08-03
Test Method: ASTM D 422
Test Date: 09/13/10



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	98.6
No. 10 (2.00 mm)	96.8
No. 20 (850 μm)	94.6
No. 40 (425 μm)	93.4
No. 60 (250 μm)	92.6
No. 100 (150 μm)	91.8
No. 200 (75 μm)	85.9

Notes: Soil classifies as a fat clay (CH) in accordance with ASTM D 2487.

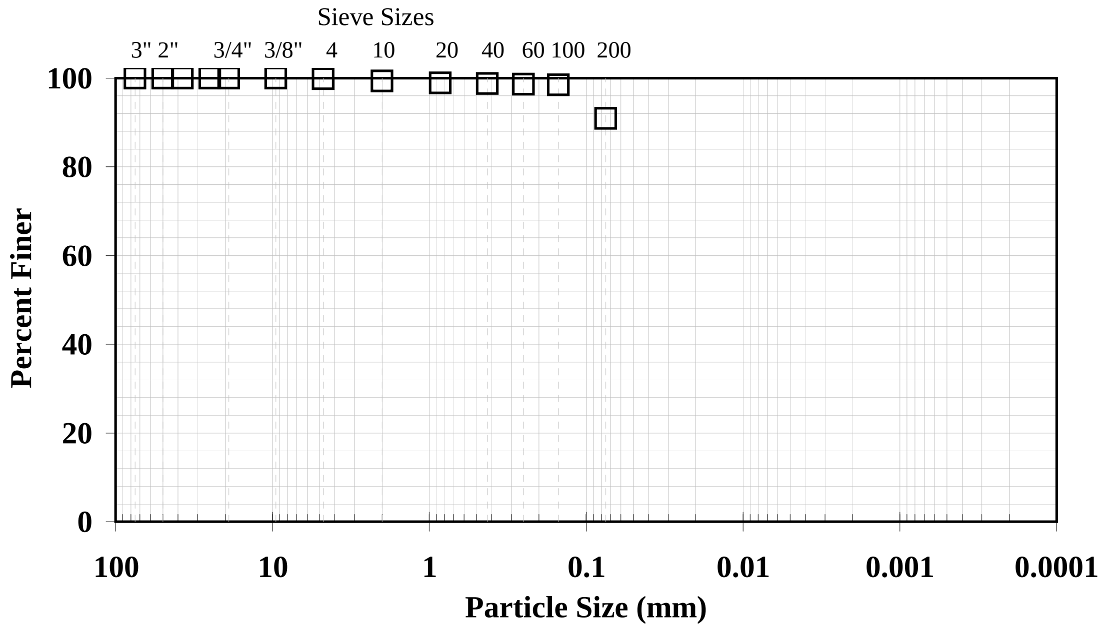
Plastic Index (ASTM D 4318) Results	
Liquid Limit	62
Plastic Limit	21
Plastic Index	41
Notes: Specimen was air dried, 3 point Liquid Limit procedure was used.	

Cheng-Wei Chen, 09/20/10
Quality Review/Date
Tested by: Adam Lewis & Olga Vasquez

Particle Size Analysis for Soils

Client: Geosyntec Consultants
Project: TXL0084-03 Sandy Creek Services (SCS) Leachate Evaporation Pond Design
Sample: GB-5 (5-6.5 ft)

TRI Log#: E2347-08-03
Test Method: ASTM D 422
Test Date: 09/23/10



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	99.8
No. 10 (2.00 mm)	99.4
No. 20 (850 µm)	98.9
No. 40 (425 µm)	98.8
No. 60 (250 µm)	98.7
No. 100 (150 µm)	98.5
No. 200 (75 µm)	90.9

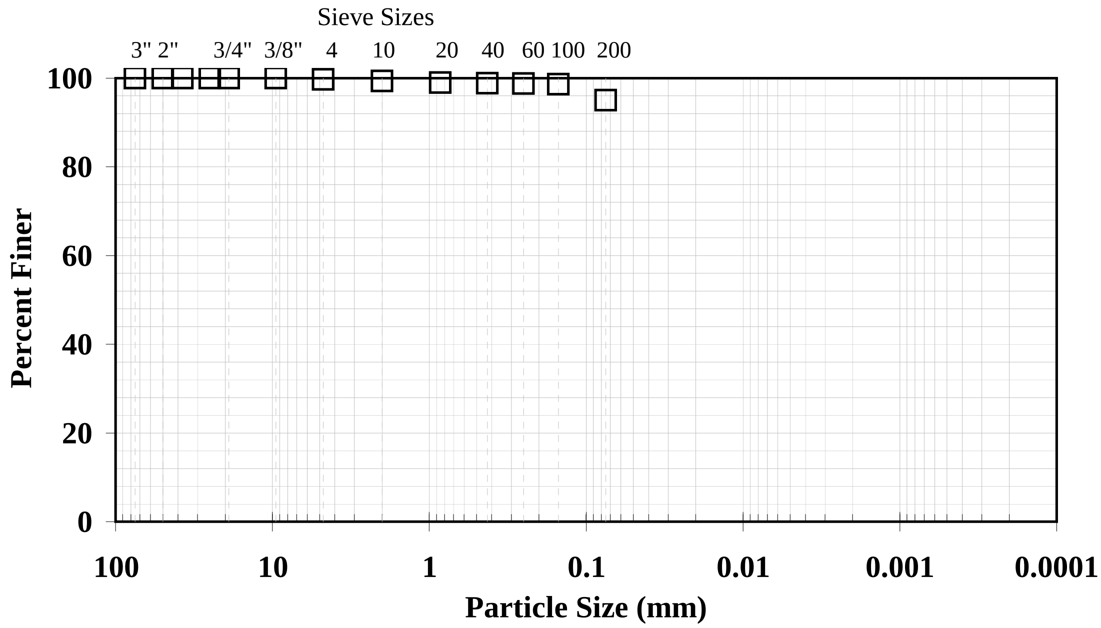
Notes: Soil classifies as a fat clay (CH) in accordance with ASTM D 2487.

Plastic Index (ASTM D 4318) Results	
Liquid Limit	55
Plastic Limit	28
Plastic Index	27
Notes: Specimen was air dried, 3 point Liquid Limit procedure was used.	

Cheng-Wei Chen, 09/26/10
Quality Review/Date
Tested by: Roderick Thomas & Olga Vasquez

Particle Size Analysis for Soils

Client:	Geosyntec Consultants	TRI Log#:	E2347-08-03
Project:	TXL0084-03 Sandy Creek Services (SCS) Leachate Evaporation Pond Design	Test Method:	ASTM D 422
Sample:	GB-5 (10-11.5 ft)	Test Date:	09/23/10



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	99.7
No. 10 (2.00 mm)	99.4
No. 20 (850 µm)	99.0
No. 40 (425 µm)	98.9
No. 60 (250 µm)	98.8
No. 100 (150 µm)	98.6
No. 200 (75 µm)	95.0

Notes: Soil classifies as a fat clay (CH) in accordance with ASTM D 2487.

Plastic Index (ASTM D 4318) Results	
Liquid Limit	58
Plastic Limit	26
Plastic Index	32
Notes: Specimen was air dried, 3 point Liquid Limit procedure was used.	

Cheng-Wei Chen, 09/26/10
Quality Review/Date
Tested by: Roderick Thomas & Olga Vasquez

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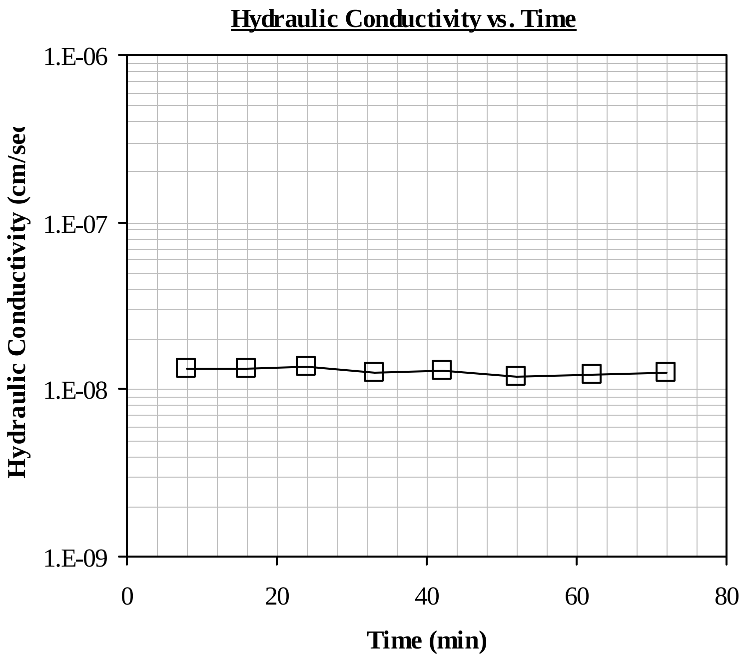
Hydraulic Conductivity

Client:	Geosyntec Consultants
Project:	TXL0084-03 Sandy Creek Services (SCS) Leachate Evaporation Pond Design
Sample:	GB-5 (10-11.5 ft)
TRI Log#:	E2347-08-03
Test Method:	ASTM D 5084, Method F
Test Date:	09/22/10

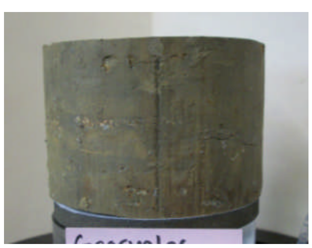


INITIAL VALUES	
Avg. Sample Height (in)	2.04
Avg. Sample Diameter (in)	2.93
Wet Weight (g)	420.2
Area (in^2)	6.72
Volume (cc)	224.8
Initial Water Content (%)	21.1
Total Density (pcf)	116.7
Dry Density (pcf)	96.3
G_s (assumed)	2.65
Degree of Saturation (%)	78.2
Void Ratio	0.72
Porosity	0.42
1 Pore Volume (cc)	93.9

Hydraulic Conductivity

Time (min)	k at 20 deg C (cm/sec)
8	1.32E-08
16	1.35E-08
24	1.38E-08
33	1.25E-08
42	1.28E-08
52	1.18E-08
62	1.21E-08
72	1.24E-08

Average[1]: **1.2E-08**



Note: A B-value of 0.95 was achieved for the undisturbed specimen. Permeation measurements were made with a mercury U-tube. The effective confining pressure was 5 psi per test request.

1: Average corrected hydraulic conductivity (k_{20}) is obtained from the last 4 average readings.

Cheng-Wei Chen, 09/27/10

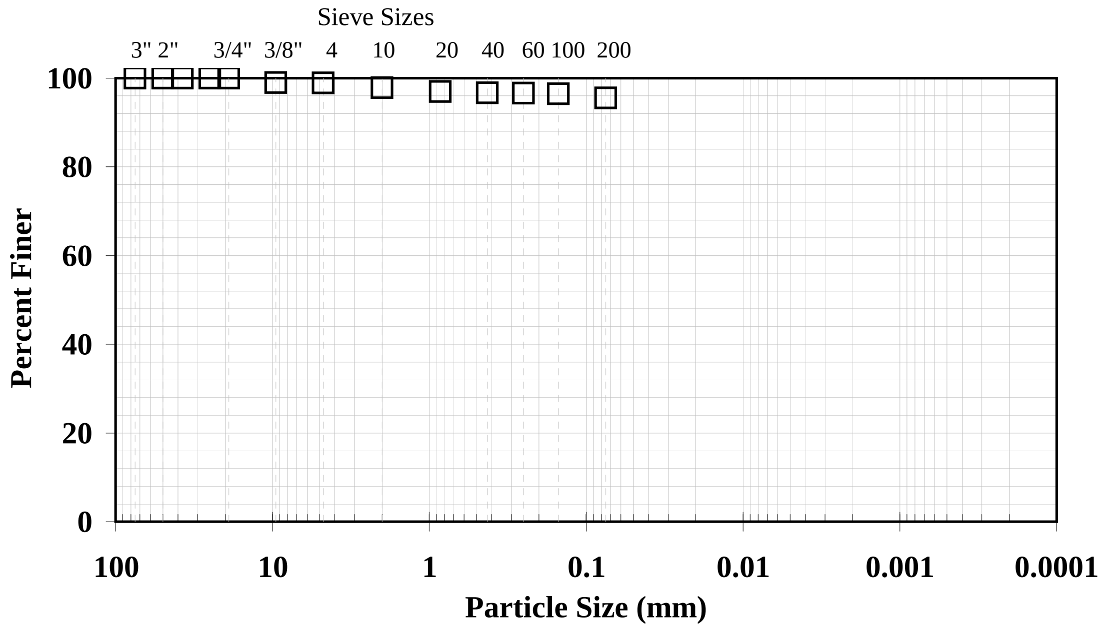
Analysis & Quality Review/Date

Tested by: David Gonzales

TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

Particle Size Analysis for Soils

Client:	Geosyntec Consultants	TRI Log#:	E2347-08-03
Project:	TXL0084-03 Sandy Creek Services (SCS) Leachate Evaporation Pond Design	Test Method:	ASTM D 422
		Test Date:	09/23/10
Sample:	GB-5 (15-16ft)		



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	99.0
No. 4 (4.75 mm)	98.9
No. 10 (2.00 mm)	97.9
No. 20 (850 µm)	97.0
No. 40 (425 µm)	96.7
No. 60 (250 µm)	96.6
No. 100 (150 µm)	96.5
No. 200 (75 µm)	95.5

Notes: Soil classifies as a fat clay (CH) in accordance with ASTM D 2487.

Plastic Index (ASTM D 4318) Results	
Liquid Limit	57
Plastic Limit	28
Plastic Index	29
Notes: Specimen was air dried, 3 point Liquid Limit procedure was used.	

Cheng-Wei Chen, 09/26/10
Quality Review/Date
Tested by: Roderick Thomas & Olga Vasquez

TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

Particle Size Analysis and Atterberg Limits for Soil

Client: Geosyntec Consultants
Project: TXL0084-03 Sandy Creek Services (SCS)
Leachate Evaporation Pond Design

TRI Log No.: E2347-08-03
Test Method: ASTM D 2216

Cheng-Wei Chen, 09/28/10
Quality Review/Date

Tested by: Olga Vasquez

Boring	Depth (ft)	w (%)	γ total (pcf)	γ dry (pcf)	% Fines	Liquid Limit	Plastic Limit	Plastic Index	USCS
GB-5	19-20	18.41	- -	- -	- -	- -	- -	- -	- -

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NOVEMBER 2020 GROUNDWATER MONITOR WELL INSTALL REPORT, SANDY CREEK ENERGY STATION, MCLENNAN COUNTY, TEXAS, SCS ENGINEERS, JANUARY 22, 2021.

November 2020 Groundwater Monitoring Well Install Report

Sandy Creek Energy Station
McLennan County, Texas

Prepared For:

Sandy Creek Energy Station
2161 Rattlesnake Road
Riesel, Texas 76682

STATE OF TEXAS
James Lawrence
Discipline
License #
541
LICENSED
PROFESSIONAL GEOSCIENTIST

1/22/2021

SCS ENGINEERS

SCS Project 16220089.00 | January 22, 2021

1901 Central Drive, Suite 550
Bedford, TX 76021
817-571-2288

January 22, 2021
SCS Project No. 16220089.00

Ms. Dana Perry
Sandy Creek Services, LLC
2161 Rattlesnake Road
Riesel, Texas 76682

Subject: Sandy Creek Energy Station
November 2020 Groundwater Monitoring Well Install Report

Dear Ms. Perry:

SCS Engineers (SCS) is herein submitting this Groundwater Monitoring Well Installation Report for the Sandy Creek Energy Station (SCES). This report describes the installation of two new monitoring wells (MW-4 and MW-5). This report should be placed in the site operating record.

Monitoring wells MW-4 and MW-5 were installed on November 2, 2020. The wells were installed using hollow stem auger methods by a licensed water well driller (West Drilling), and the project was supervised by a Professional Geologist licensed in the state of Texas (Jim Lawrence). Geologic and groundwater conditions encountered were consistent with site characterization prepared by Geosyntec Consultants (October 18, 2010). Monitoring wells MW-4 and MW-5 were developed (sediment was removed) on December 3, 2020, using a combination of surging and bailing. All work was conducted in general accordance with 40 CFR 257.91 and 30 TAC 330.421.

Monitoring well depths and elevations relative are tabulated below.

MW-ID	Northing	Easting	Well Elevation (ft msl, toc)	Well Depth (ft, b.g.s)
MW-4	10513171.76	3348968.18	436.91	30.3
MW-5	10514652.86	3348001.46	454.52	35.3

The boring logs, well location map, monitoring well data sheets, well development sheets, State of Texas Well Reports, and surveyor's report are attached.

Please contact Jim Lawrence at (817) 358-6106 if you have comments or require additional information.

Sincerely,

Asher Boudreaux
Associate Staff Professional
SCS ENGINEERS
TBPE Registration No. F-3407

Brett DeVries, Ph.D., P.E.
Project Engineer
SCS ENGINEERS

James Lawrence, P.G.
Project Director
SCS ENGINEERS

Attachments: Boring Logs
Monitoring Well Location Map
Monitor Well Completion Data
Monitor Well Development Data
State of Texas Well Reports
Surveyors Report
Groundwater Monitoring System Certification

1/22/2021

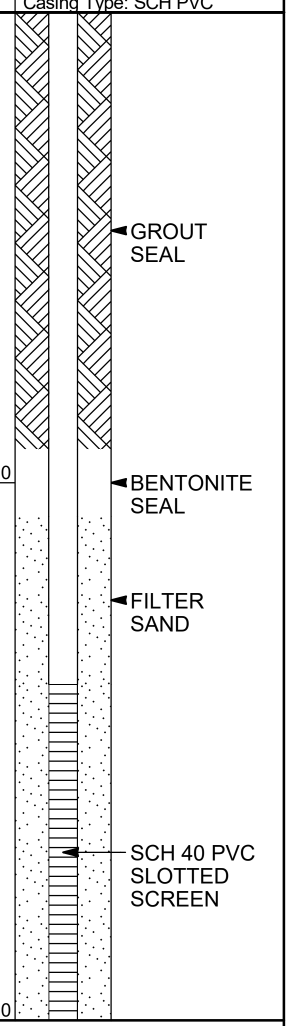
SCS ENGINEERS

SCS Engineers
1901 Central Drive, Ste. 550
Bedford, Texas
Telephone: 817-571-2288

WELL NUMBER MW-4

CLIENT SCES
PROJECT NAME Sandy Creek
PROJECT NUMBER 16220089.00 T80
PROJECT LOCATION 2161 Rattlesnake Rd., Riesel, TX 76682
DATE STARTED 11/2/20 **COMPLETED** 11/2/20
GROUND ELEVATION 433.73 ft **HOLE SIZE** 8.25 inches
DRILLING CONTRACTOR West Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY AB **CHECKED BY** JL
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0			CLAY (CH): Dark brown, moist.	Casing Top Elev: 0 (ft) Casing Type: SCH PVC
			light brown/tan to 14 feet, some gravel	
5			some gypsum seams, some sand	GROUT SEAL
10			hard sand lenses with increasing depth	
		14.0		-14.0
15			CLAYSTONE: Dark gray, slightly moist, some crystallized gypsum. dry	BENTONITE SEAL FILTER SAND
20			becomes harder with increased depth, some sand lenses	
25				SCH 40 PVC SLOTTED SCREEN
30		30.0		-30.0



Bottom of borehole at 30.0 feet.

STATE OF TEXAS
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1/22/2021

SCS ENGINEERS

SCS Engineers
1901 Central Drive, Ste. 550
Bedford, Texas
Telephone: 817-571-2288

WELL NUMBER MW-5

CLIENT SCES

PROJECT NAME Sandy Creek

PROJECT NUMBER 16220089.00 T80

PROJECT LOCATION 2161 Rattlesnake Rd., Riesel, TX 76682

DATE STARTED 11/2/20 **COMPLETED** 11/2/20

GROUND ELEVATION 451.70 ft **HOLE SIZE** 8.25 inches

DRILLING CONTRACTOR West Drilling

GROUND WATER LEVELS:

DRILLING METHOD Hollow Stem Auger

AT TIME OF DRILLING ---

LOGGED BY AB **CHECKED BY** JL

AT END OF DRILLING ---

NOTES

AFTER DRILLING ---

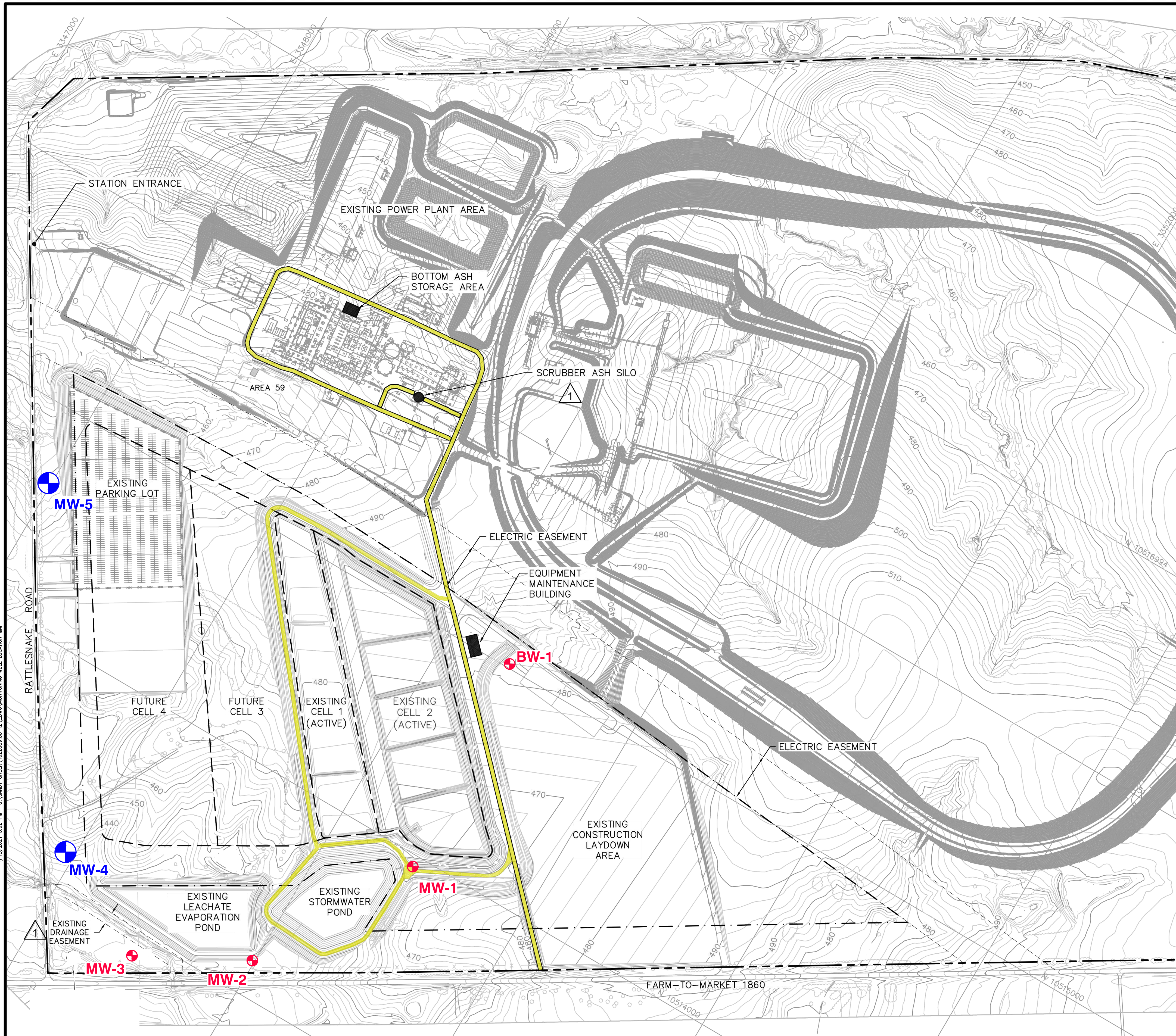
STATE OF TEXAS
James Lawrence
Discipline
License # 541
PROFESSIONAL GEOSCIENTIST
LICENSED

1/22/2021

DEPTH (ft)	NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION		WELL DIAGRAM
0				CLAY (CH): Brown, moist, some gravel.		Casing Top Elev: 0 (ft) Casing Type: SCH PVC
5				light brown/tan, some sand pockets, occasional gypsum pockets, low recovery.		GROUT SEAL
10						BENTONITE SEAL
15				light brown to gray, some sand, some gypsum seams, orange staining, slightly moist		
20				brown, slightly harder, pockets of gypsum, slightly moist		FILTER SAND
25			25.0		-25.0	
			26.0	CLAYSTONE: Dark gray, dry.	-26.0	
		CH	27.0	(CH) CLAY (CH): brown, gypsum seams.	-27.0	
30				CLAYSTONE: Gray, slightly moist, interbedded with gypsum and silt seams, increase in hardness.		SLOTTED SCH 40 PVC SCREEN
			32.5		-32.5	
		CH	33.0	(CH) CLAY (CH): brown, moist.	-33.0	
35			35.0	CLAYSTONE: gray, dry, gypsum seams and interbedded silt.	-35.0	

Bottom of borehole at 35.0 feet.

GENERAL BH / TP / WELL - GINT STD US LAB.GDT - 11/9/20 11:17 - M:\PROJECTS\16220089.00\DELIVERABLES\SANDY CREEK BORING LOGS 11.09.20.GPJ



LEGEND

- 500 — EXISTING GROUND ELEVATION (FT, MSL) (NOTES 1, 2)
- EXISTING SURFACE WATER LINE
- EXISTING SITE FENCE
- EXISTING TREE LINE
- MW-1 — EXISTING MONITORING WELL
- EXISTING BUILDING
- PROPERTY BOUNDARY
- DEED RECORDED LIMITS OF WASTE
- CELL BOUNDARY
- N 10514500 E 3349500 — STATE PLANE COORDINATES
- SWDF OPERATIONS ACCESS ROAD
- MW-4 — MONITORING WELL INSTALLED FOR 2020

0 250' 500'
SCALE IN FEET

NOTES:

1. THE EXISTING CONTOUR MAP SHOWN ON THIS DRAWING WAS COMPILED USING EXISTING TOPOGRAPHY DATED APRIL 2006 AND DESIGN GRADES DATED OCTOBER 2007 FROM BLACK & VEATCH CORPORATION; DESIGN GRADES DEVELOPED BY GEOSYNTEC CONSULTANTS, INC. FOR THE LEACHATE EVAPORATION POND AND CELL 2 DATED APRIL 2011 AND APRIL 2014, RESPECTIVELY; AND AREA 59 EXISTING TOPOGRAPHY SURVEY CONDUCTED BY WALKER PARTNERS DATED 9 MAY 2013.

2. ELEVATIONS ARE IN FEET ABOVE MEAN SEA LEVEL (FT, MSL) AS DEFINED BY THE USGS NATIONAL GEODETIC VERTICAL DATUM (NGVD) OF 1988. STATE PLANE COORDINATE GRID CORRESPONDS TO TEXAS STATE PLANE COORDINATE SYSTEM, TEXAS CENTRAL ZONE (4203), NORTH AMERICAN DATUM OF 1983 (NAD-83).

STATE OF TEXAS
James Lawrence
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License #
541
LICENSED
PROFESSIONAL GEOSCIENTIST

1/22/2021

REV | DATE | DESCRIPTION | BY

TEXAS BOARD OF PROFESSIONAL ENGINEERS REG. NO. F-3407

DRAWING TITLE: MONITORING WELL LOCATION MAP

PROJECT TITLE: SANDY CREEK NOVEMBER 2020 GROUNDWATER MONITORING WELL INSTALLATION

CLIENT: SANDY CREEK SERVICES, LLC
2161 RATTLESNAKE ROAD
RIESEL, TEXAS 76682

SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT CONSULTING ENGINEERS
1901 CENTRAL DRIVE, SUITE 550, BEDFORD, TX 76021
PH (817) 571-2288 FAX NO. (817) 571-2188

PROJ. NO. 16220098.00 | DSN. BY: AB | DWN. BY: JL | CHK. BY: AB | Q/A RVW BY: JL | APP. BY: JL

CADD FILE: MONITORING WELL LOCATION MAP

DATE: 11/2020

SCALE: AS SHOWN

FIGURE: 1

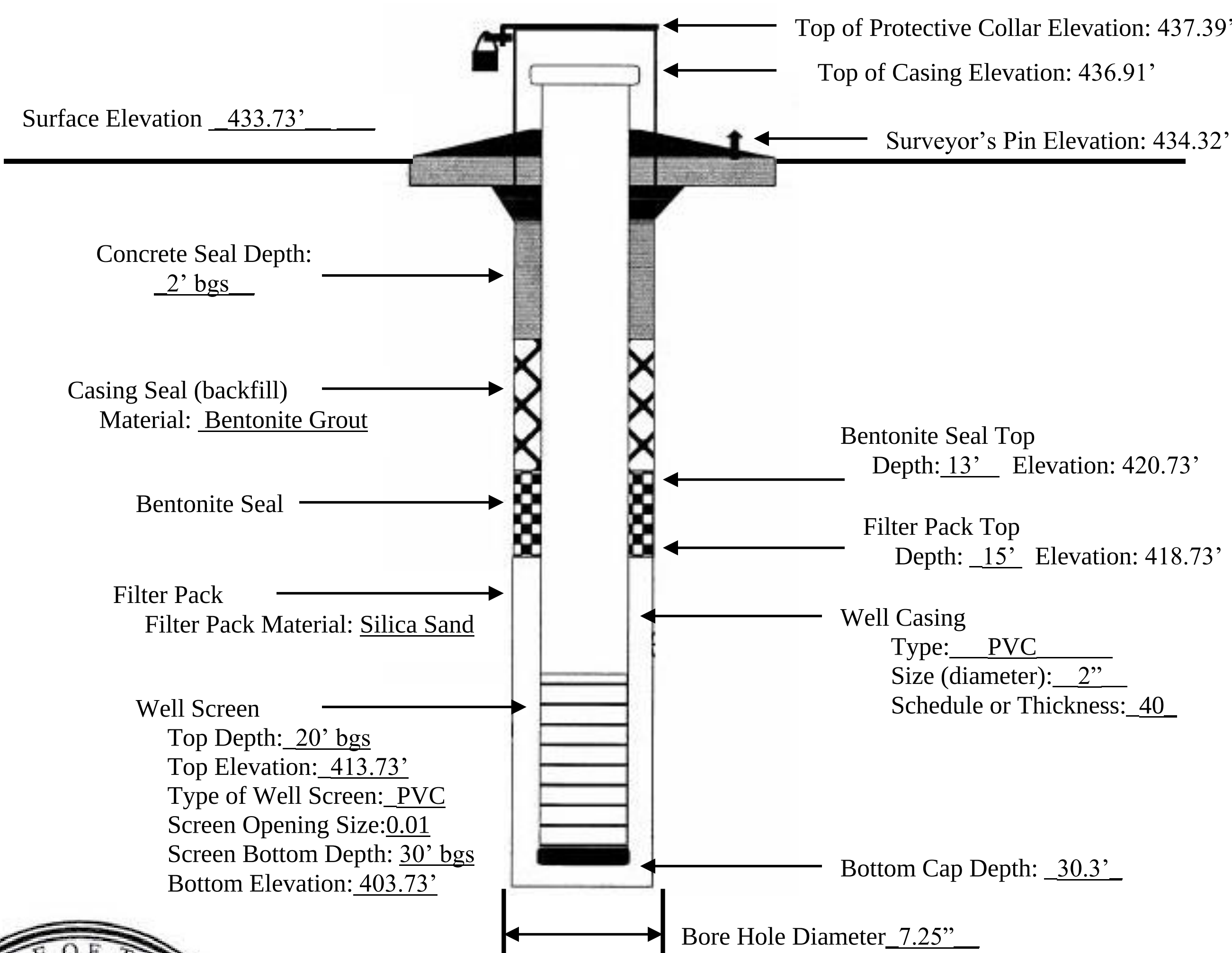
SOURCE: BACKGROUND INFORMATION FOR THIS DRAWING IS FROM A DRAWING NAMED SITE LAYOUT BY GEOSYNTEC CONSULTANTS, DATED JUNE 2014.

Monitor Well Data Sheet

Site Name: Sandy Creek Energy Station
County: McLennan Well I.D. No.: MW-4
Date of Installation: 11/2/2020 Date of Development: 12/3/2020
Northing: 10513171.76 Easting: 3348968.18
Well Driller Name and License Number: Ricardo Garcia 54637
Method of well development: Surge and Bail

SCS Field Staff Supervising Installation: Asher Boudreaux
Static Water Level after Well Development: Dry
Name of Geologic Formation(s) in which Well is completed: Wolfe City Fm.

Type of Locking Device: Pad Lock Type of Case Protection: Steel
Concrete Surface Pad (with steel reinforcement) Dimensions: 4'X4'



SCS ENGINEERS

STATE OF TEXAS
James Lawrence
Discipline
License # 541
LICENSED PROFESSIONAL GEOSCIENTIST

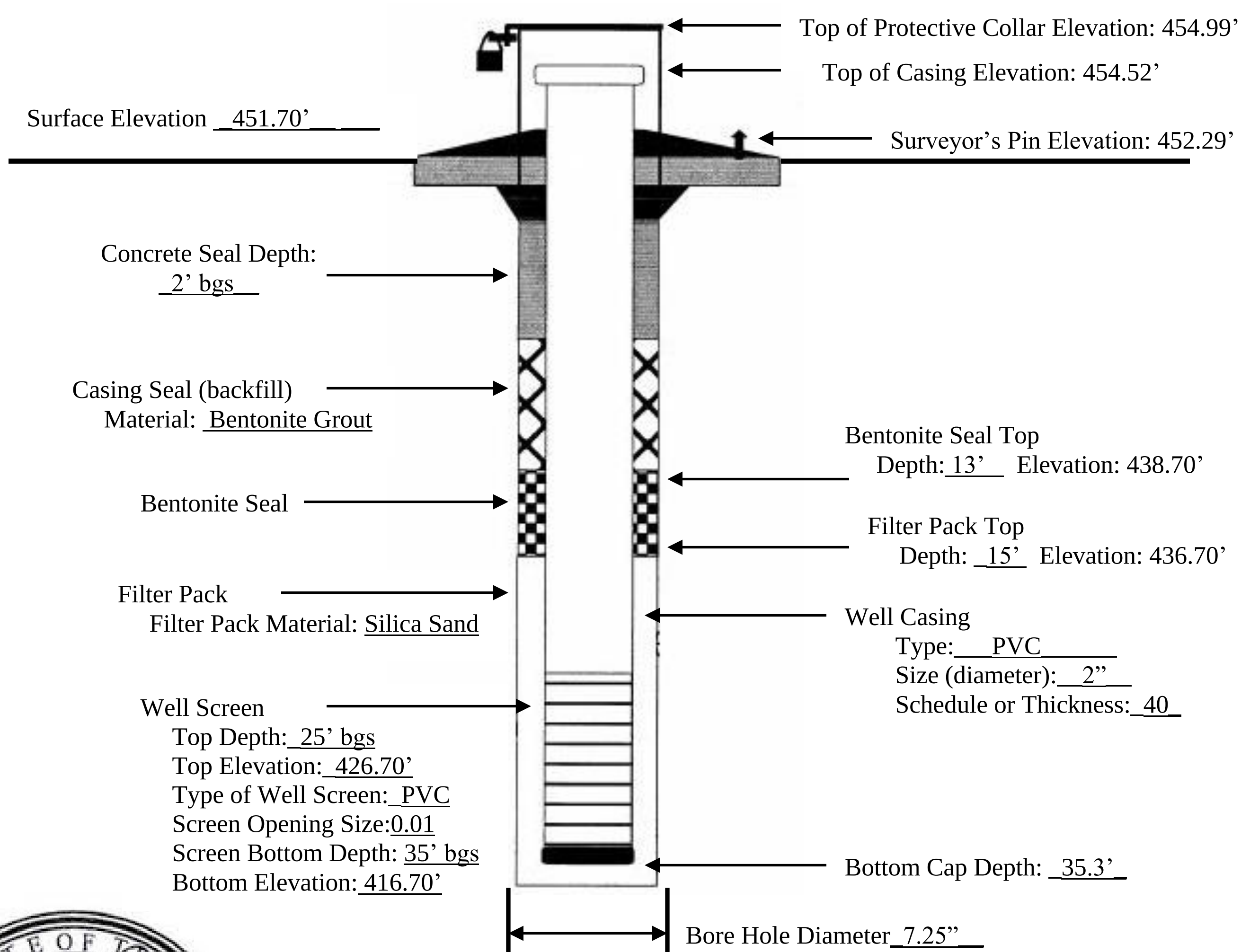
1/22/2021

Monitor Well Data Sheet

Site Name: Sandy Creek Energy Station______
County:__McLennan______________________ Well I.D. No.:_MW-5____
Date of Installation:11/2/2020 Date of Development:12/3/2020_____
Northing:10514652.86___ Easting:3348001.46___
Well Driller Name and License Number: Ricardo Garcia 54637
Method of well development:__Surge and Bail_________

SCS Field Staff Supervising Installation:__Asher Boudreaux_________
Static Water Level after Well Development:___Dry_____
Name of Geologic Formation(s) in which Well is completed:___Wolfe City Fm.____

Type of Locking Device:_____Pad Lock_______ Type of Case Protection:___Steel___
Concrete Surface Pad (with steel reinforcement) Dimensions:__4'X4'______________



SCS ENGINEERS

STATE OF TEXAS
James Lawrence
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541
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1/22/2021

Monitoring Well Development Data Sheet

Client: Sandy Creek Energy Station
Location: Riesel, Texas
Field Technician: Asher Boudreaux

Date: 12/3/2020
Monitoring Well Number: MW-4
Method of Well Development: Surge and Bail
Total Well Depth (ft below T.O.C.): 33.48'
Well Factor: 0.16
Depth to Water before Development: 12.16' **Height of Water Column:** 21.32'
Depth to Water after Development: Dry **One Well Volume:** 3.4 gallons

(Time)	(Gallons)	(Temperature °C)	(Ph)	(Conductivity)	Turbidity (NTU)
13:08	1	21.57	7.02	8.56	0
13:12	1	22.05	7.01	8.31	0
13:16	1	21.81	7.08	8.30	0
13:20	1	21.98	7.13	8.34	0
13:23	1	22.14	7.16	8.44	0
13:27	1	21.85	7.22	8.46	0
13:32	1.5	22.03	7.29	8.49	0
14:26	1	20.96	7.41	8.09	0
	Total: 8.5				

Comments: Dry at 13:37 after purging 7.5 gallons
Returned at 14:20, depth to water was 29.71'
Purged 1 gallon, well went dry at 14:26

Monitoring Well Development Data Sheet

Client: Sandy Creek Energy Station
Location: Riesel, Texas
Field Technician: Asher Boudreaux

Date: 12/3/2020
Monitoring Well Number: MW-5
Method of Well Development: Surge and Bail
Total Well Depth (ft below T.O.C.): 38.12’
Well Factor: 0.16
Depth to Water before Development: 23.81’ **Height of Water Column:** 14.31’
Depth to Water after Development: Dry **One Well Volume:** 2.29 gallons

(Time)	(Gallons)	(Temperature °C)	(Ph)	(Conductivity)	Turbidity (NTU)
12:10	1	19.31	7.22	9.08	0
12:14	1	20.38	7.18	9.21	0
12:18	1	20.87	7.12	9.77	0
12:22	1	21.27	7.12	10.2	0
12:26	1	21.50	7.11	10.6	0
12:30	1.5	21.57	7.08	11.5	0
14:02	1	21.55	7.09	10.4	0
	Total: 7.5				

Comments: Dry at 12:32 after purging 6.5 gallons
Returned at 13:51, depth to water was 35.18’
Purged 1 gallon, well went dry at 14:02

STATE OF TEXAS WELL REPORT for Tracking #560141

Owner:	**Sandy Creek Electric Station**	Owner Well #:	**MW-4**
Address:	**2161 Rattlesnake Road Riesel, TX 76682**	Grid #:	**39-33-1**
Well Location:	**2161 Rattlesnake Road Riesel, TX 76682**	Latitude:	**31° 28' 08" N**
		Longitude:	**096° 57' 32" W**
Well County:	**McLennan**	Elevation:	**No Data**
Type of Work:	**New Well**	Proposed Use:	**Monitor**

Drilling Start Date: **11/2/2020** Drilling End Date: **11/2/2020**

Borehole:

Diameter (in.)	Top Depth (ft.)	Bottom Depth (ft.)
7.25	0	30

Drilling Method: **Hollow Stem Auger**

Borehole Completion: **Filter Packed**

Filter Pack Intervals:

Top Depth (ft.)	Bottom Depth (ft.)	Filter Material	Size
15	30	Sand	

Annular Seal Data:

Top Depth (ft.)	Bottom Depth (ft.)	Description (number of sacks & material)
0	2	Concrete
2	15	Bentonite

Seal Method: **Gravity**

Sealed By: **Driller**

Distance to Property Line (ft.): **No Data**

Distance to Septic Field or other concentrated contamination (ft.): **No Data**

Distance to Septic Tank (ft.): **No Data**

Method of Verification: **No Data**

Surface Completion: **Surface Slab Installed** **Surface Completion by Driller**

Water Level: **No Data**

Packers: **No Data**

Type of Pump: **No Data**

Well Tests: **No Test Data Specified**

Water Quality:

Strata Depth (ft.)	Water Type
No Data	**No Data**

Chemical Analysis Made: **No**

Did the driller knowingly penetrate any strata which contained injurious constituents?: **No**

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the report(s) being returned for completion and resubmittal.

Company Information: **WEST Drilling**

101 Industrial Drive
Waxahachie, TX 75165

Driller Name: **Ricardo Garcia** License Number: **54637**

Comments: **No Data**

Lithology:
DESCRIPTION & COLOR OF FORMATION MATERIAL

Top (ft.)	Bottom (ft.)	Description
0	**14**	**dark brown and light brown clay**
14	**30**	**gray shale**

Casing:
BLANK PIPE & WELL SCREEN DATA

Dia (in.)	Type	Material	Sch./Gage	Top (ft.)	Bottom (ft.)
2	**Riser**	**New Plastic (PVC)**	**40**	**0**	**20**
2	**Screen**	**New Plastic (PVC)**	**40 0.010**	**20**	**30**

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

TEX. OCC. CODE Title 12, Chapter 1901.251, authorizes the owner (owner or the person for whom the well was drilled) to keep information in Well Reports confidential. The Department shall hold the contents of the well log confidential and not a matter of public record if it receives, by certified mail, a written request to do so from the owner.

Please include the report's Tracking Number on your written request.

Texas Department of Licensing and Regulation
P.O. Box 12157
Austin, TX 78711
(512) 334-5540

STATE OF TEXAS WELL REPORT for Tracking #560143

Owner:	**Sandy Creek Electric Station**	Owner Well #:	**MW-5**
Address:	**2161 Rattlesnake Road Riesel, TX 76682**	Grid #:	**39-33-1**
Well Location:	**2161 Rattlesnake Road Riesel, TX 76682**	Latitude:	**31° 28' 08" N**
		Longitude:	**096° 57' 32" W**
Well County:	**McLennan**	Elevation:	**No Data**
Type of Work:	**New Well**	Proposed Use:	**Monitor**

Drilling Start Date: **11/2/2020** Drilling End Date: **11/2/2020**

Borehole:

Diameter (in.)	*Top Depth (ft.)*	*Bottom Depth (ft.)*
7.25	**0**	**35**

Drilling Method: **Hollow Stem Auger**

Borehole Completion: **Filter Packed**

Filter Pack Intervals:

Top Depth (ft.)	*Bottom Depth (ft.)*	*Filter Material*	*Size*
15	**35**	**Sand**	

Annular Seal Data:

Top Depth (ft.)	*Bottom Depth (ft.)*	*Description (number of sacks & material)*
0	**2**	**Concrete**
2	**15**	**Bentonite**

Seal Method: **Gravity**

Sealed By: **Driller**

Distance to Property Line (ft.): **No Data**

Distance to Septic Field or other concentrated contamination (ft.): **No Data**

Distance to Septic Tank (ft.): **No Data**

Method of Verification: **No Data**

Surface Completion: **Surface Slab Installed** **Surface Completion by Driller**

Water Level: **No Data**

Packers: **No Data**

Type of Pump: **No Data**

Well Tests: **No Test Data Specified**

Water Quality:

Strata Depth (ft.)	Water Type
No Data	**No Data**

Chemical Analysis Made: **No**

Did the driller knowingly penetrate any strata which contained injurious constituents?: **No**

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the report(s) being returned for completion and resubmittal.

Company Information: **WEST Drilling**

101 Industrial Drive
Waxahachie, TX 75165

Driller Name: **Ricardo Garcia** License Number: **54637**

Comments: **No Data**

Lithology:
DESCRIPTION & COLOR OF FORMATION MATERIAL

Top (ft.)	Bottom (ft.)	Description
0	**25**	**dark brown, light brown and gray clay**
25	**35**	**gray shale, with brown clay lenses (at 26-27 ft and 32.5-33 ft)**

Casing:
BLANK PIPE & WELL SCREEN DATA

Dia (in.)	Type	Material	Sch./Gage	Top (ft.)	Bottom (ft.)
2	**Riser**	**New Plastic (PVC)**	**40**	**0**	**25**
2	**Screen**	**New Plastic (PVC)**	**40 0.010**	**25**	**35**

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

TEX. OCC. CODE Title 12, Chapter 1901.251, authorizes the owner (owner or the person for whom the well was drilled) to keep information in Well Reports confidential. The Department shall hold the contents of the well log confidential and not a matter of public record if it receives, by certified mail, a written request to do so from the owner.

Please include the report's Tracking Number on your written request.

Texas Department of Licensing and Regulation
P.O. Box 12157
Austin, TX 78711
(512) 334-5540

PIEZOMETER WELLS FOR SANDY CREEK ENERGY STATION

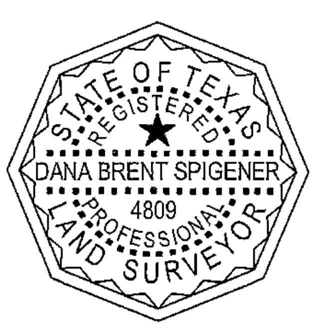
PIEZOMETER	1. TOP OF CASING	2. TOP OF PVC PIPE	3. CONCRETE SLAB	4. GROUND SURFACE	NORTHING	EASTING
4	437.39	436.91	434.32	433.73	10513171.76	3348968.18
5	454.99	454.52	452.29	451.70	10514652.86	3348001.46

SURVEY DATE: NOVEMBER 9, 2020
RELEASE DATE: NOVEMBER 16, 2020

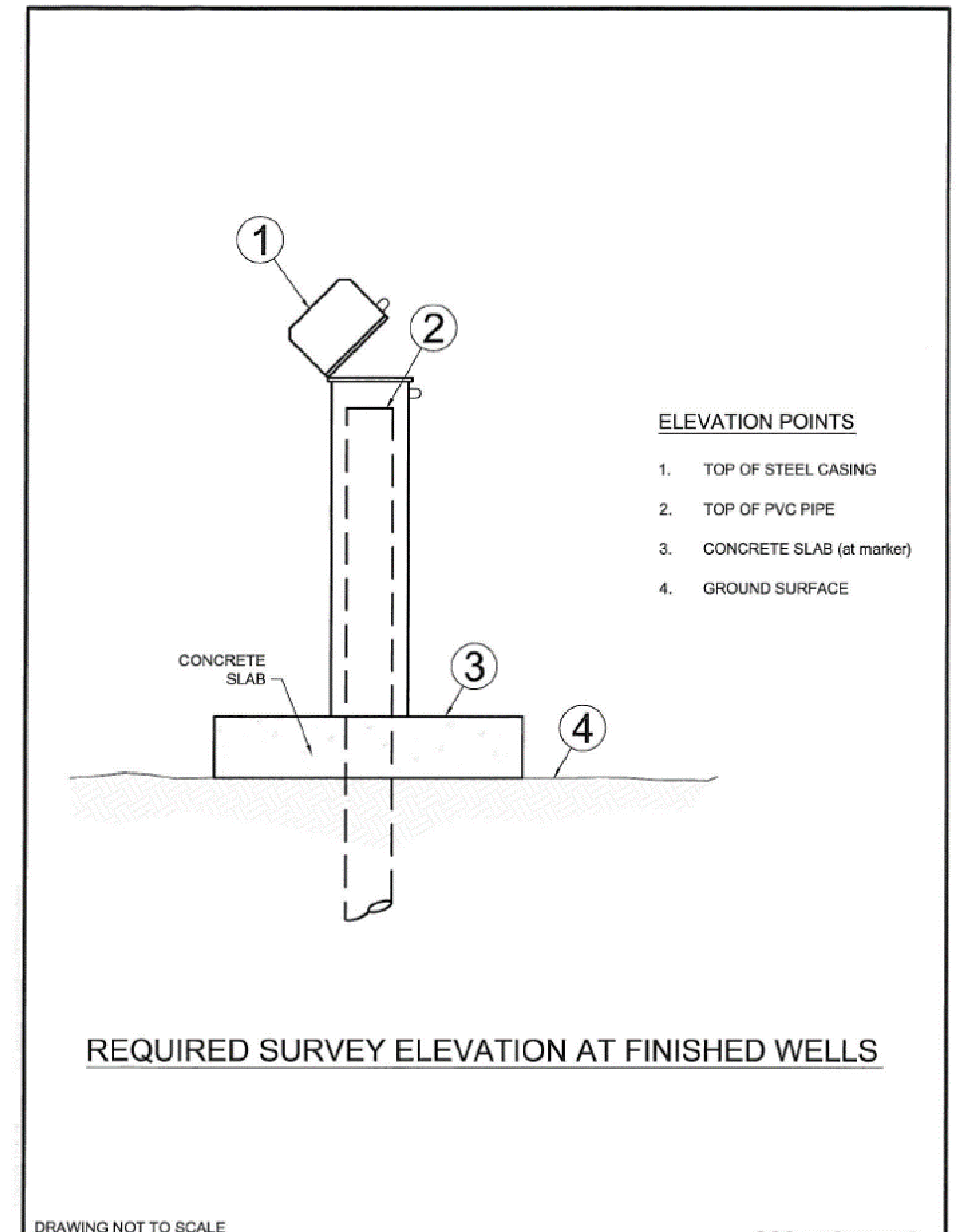
SURVEYOR'S NOTES:

THE COORDINATES AND ELEVATIONS SHOWN HEREON ARE BASED UPON SANDY CREEK ENERGY STATION PUBLISHED SITE CONTROL.
"BM 1" NORTHING: 10512746.63, EASTING: 3349242.64, ELEVATION: 426.62

Walker Partners
engineers ★ surveyors



Dana B. Spigener



GROUNDWATER MONITORING SYSTEM CERTIFICATION

General Site Information

Site:	Sandy Creek Energy Station
Site Location:	Riesel, Texas

Qualified Groundwater Scientist Statement

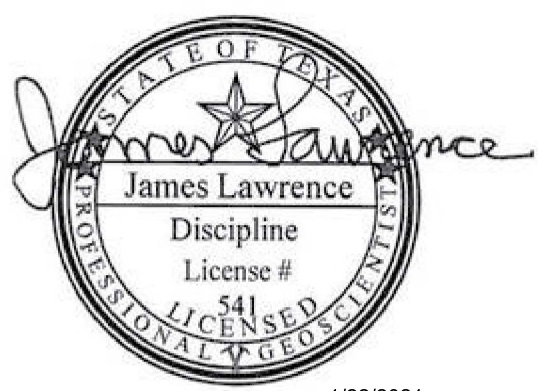
I, James Lawrence, P.G., have reviewed the groundwater monitoring system design for the subject site and the supporting data. In my professional opinion, the groundwater monitoring system has been designed in accordance with the groundwater monitoring requirements specified in 40 CFR 257.91. The new monitoring wells (MW-4 and MW-5) were installed in general accordance with the 40 CFR 257.91 and 30 TAC 330.421.

I am a qualified groundwater scientist as defined in 30 TAC 330.3. The only warranty made by me is that I have used that degree of care and skill ordinarily exercised under similar conditions by reputable members of my profession, practicing in the same or similar locality. No other warranty, expressed or implied, is intended.

Firm and Address: SCS Engineers
1901 Central Drive, Suite 550
Bedford, Texas 76021

Signature: James Lawrence

Date: 1/22/2021



1/22/2021

APPENDIX VI.C

HISTORICAL GROUNDWATER REPORTS AND DATA

2017 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT

January 30, 2018
SCS Project 16215106.00

Mr. Darryl Sparks
Compliance Manager
NAES Corporation
2161 Rattlesnake Road
Riesel, Texas 76682

Subject: Sandy Creek Energy Station
McLennan County, Texas
2017 Annual Groundwater Monitoring and Corrective Action Report Submittal

Dear Mr. Sparks:

SCS Engineers (SCS) is pleased to submit the 2017 Annual Groundwater Monitoring and Corrective Action Report to the Sandy Creek Energy Station (SCES), in accordance with Coal Combustion Residual Rule (CCR) 40 CFR Part §257.94, and the site Groundwater Sampling and Analysis Plan (GWSAP), prepared by SCS, dated March 2, 2016.

Please contact James Lawrence at (817) 358-6106 if you have comments or require additional information.

Sincerely,

Douglas P Steen Brett DeVries James Lawrence

Doug Steen
Associate Professional
SCS ENGINEERS
TBPE Registration No. F-3407

Brett DeVries, Ph.D., P.E.
Project Engineer
SCS ENGINEERS

James Lawrence, P.G.
Project Director
SCS ENGINEERS

Attachment: 2017 Annual Groundwater Monitoring and Corrective Action Report

cc: Paulette Heuer at PHeuer@lspower.com
Alan Riddle at ariddle@sandycreekservices.com

SCS ENGINEERS

2017 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT

SANDY CREEK ENERGY STATION
RIESEL, TEXAS

Prepared for:

SANDY CREEK ENERGY STATION
2161 Rattlesnake Road
Riesel, Texas 76682

Prepared by:

SCS ENGINEERS
Dallas/Fort Worth Office
1901 Central Drive, Suite 550
Bedford, Texas 76021
817-571-2288

January 2018
File No. 16215106.00

Offices Nationwide
www.scsengineers.com

TABLE OF CONTENTS

STATE OF TEXAS
BRETT J. DeVRIES
128061
LICENSED
PROFESSIONAL ENGINEER
1/30/18

STATE OF TEXAS
James Lawrence
Discipline
License #
541
LICENSED
PROFESSIONAL GEOSCIENTIST
1-30-2018

SECTION 1.0

INTRODUCTION AND BACKGROUND

SCS Engineers (SCS) is submitting the 2017 Annual Groundwater Monitoring and Corrective Action Report for the Sandy Creek Energy Station (SCES), in accordance with Coal Combustion Residual Rule (CCR) 40 CFR §257.90(e), and site Groundwater Sampling and Analysis Plan (GWSAP) prepared by SCS, dated March 2, 2016. This report includes results for the first semiannual detection monitoring event at SCES, conducted in December 2017.

SCES is a pulverized coal-fired electric generation facility which operates a landfill for disposal of dry scrubber ash and bottom ash generated during the coal combustion process at the facility. Incidental wastes generated during the operation of the facility may also be disposed in the landfill, as described in the initial registration notification to TCEQ and the most recent version of the Operations Plan for the facility. The landfill is currently comprised of two CCR disposal cells, Cells 1 and 2, which commenced receiving waste in early 2013 and October 2014, respectively. The approximate area of Cells 1 and 2 are 10.0 and 14.3 acres, respectively.

Sampling of groundwater monitoring wells is conducted in accordance with 40 CFR §257.93 and the GWSAP. Background monitoring of four wells (MW-1, MW-2, MW-3, and BW-1; as depicted on Figure 1) was performed for eight consecutive quarters in accordance with 40 CFR §257.94(b) (i.e., eight independent samples were collected for each well). The background monitoring described above commenced in December 2015 and was completed in August 2017. In accordance with 40 CFR §257 Appendix III and IV, the constituents monitored during the first eight quarters and the first semiannual detection monitoring event included 18 inorganic compounds, total dissolved solids, radium-226, and radium-228.

SECTION 2.0

GROUNDWATER MONITORING SUMMARY

Groundwater Monitoring System

The current groundwater monitoring system at the SCES landfill consists of four wells (see Table 1 below). One (BW-1) is upgradient and three (MW-1, -2, & -3) are downgradient. All four wells are currently in detection monitoring. Figure 1 shows monitoring well locations at SCES.

Table 1 - Sandy Creek Energy Station Groundwater Monitoring System

Well Name (U/D)[1]	Completion Date	Status	Top of Casing Elevation (ft msl)[2]	Well Depth (ft bgs)[2]	Screen Interval (ft bgs)[2]	Water Level Elevation (ft msl on 12/20/2017)
MW-1 (D)	9/21/2015	Detection	465.87	37.25	23.90 - 33.90	454.22
MW-2 (D)	9/23/2015	Detection	442.15	22.60	9.30 - 19.30	429.47
MW-3 (D)	9/1/2010	Detection	430.06	19.95	5.98 - 15.98	421.08
BW-1 (U)	9/22/2015	Detection	485.57	41.50	28.30 - 38.30	466.51

[1] (U) = upgradient; (D) = downgradient
[2] Top of Casing Elevation, Well Depth, and Screen Interval information obtained from Table 1 – Monitoring Well and Piezometer Construction Details and Groundwater Elevations prepared by Geosyntec Consultants, dated March 11, 2016
ft msl = feet above mean sea level
ft bgs = feet below ground surface

Summary of Groundwater Monitoring Events

All sampling events followed the groundwater sampling and laboratory analysis procedures outlined in the GWSAP. A duplicate sample was collected from one well during each event for Quality Assurance & Quality Control (QA/QC) purposes. All monitoring wells were sampled and analyzed for 40 CFR 257 Appendix III & IV constituents, in accordance with 40 CFR §257.94(b).

December 2015 – First Quarterly Monitoring Event

All four wells (MW-1, MW-2, MW-3, and BW-1) were purged and sampled on December 14, 2015 using the conventional purge and sampling method with disposable PVC bailers. The results of the sampling were provided to SCES in a report prepared by SCS, dated March 2, 2016.

Exceedances of EPA drinking water primary maximum contaminant levels (MCLs) during this event included selenium (MW-1) (see Table 2 below).

February 2016 – Second Quarterly Monitoring Event

All four wells (MW-1, MW-2, MW-3, and BW-1) were purged and sampled on February 25, 2016 using the conventional purge and sampling method with disposable PVC bailers. The results of the sampling were provided to SCES in a report prepared by SCS, dated April 22, 2016.

Exceedances of EPA primary drinking water MCLs during this event included arsenic (MW-2, BW-1) and selenium (MW-1) (see Table 2 below).

May 2016 – Third Quarterly Monitoring Event

All four wells (MW-1, MW-2, MW-3, and BW-1) were purged and sampled on May 11, 2016 using the conventional purge and sampling method with disposable PVC bailers. The results of the sampling were provided to SCES in a report prepared by SCS, dated July 8, 2016.

Exceedances of EPA primary drinking water MCLs during this event included arsenic (MW-1), beryllium (MW-1), chromium (MW-1), lead (MW-1), and combined radium (MW-1, BW-1) (see Table 2 below).

August 2016 – Fourth Quarterly Monitoring Event

All four wells (MW-1, MW-2, MW-3, and BW-1) were purged and sampled on August 16, 2016 using the conventional purge and sampling method with disposable PVC bailers. The results of the sampling were provided to SCES in a report prepared by SCS, dated October 17, 2016.

Exceedances of EPA primary drinking water MCLs during this event included selenium (MW-1) and combined radium (MW-3) (see Table 2 below).

November 2016 – Fifth Quarterly Monitoring Event

All four wells (MW-1, MW-2, MW-3, and BW-1) were purged and sampled on November 17, 2016 using the conventional purge and sampling method with disposable PVC bailers. The results of the sampling were provided to SCES in a report prepared by SCS, dated January 23, 2017.

Exceedances of EPA primary drinking water MCLs during this event included selenium (MW-1) and combined radium (MW-3) (see Table 2 below).

February 2017 – Sixth Quarterly Monitoring Event

All four wells (MW-1, MW-2, MW-3, and BW-1) were purged and sampled on February 23, 2017 using the conventional purge and sampling method with disposable PVC bailers. The results of the sampling were provided to the SCES in a report prepared by SCS, dated April 24, 2017.

Exceedances of EPA primary drinking water MCLs during this event included selenium (MW-1) and combined radium (MW-2) (see Table 2 below).

June 2017 – Seventh Quarterly Monitoring Event

All four wells (MW-1, MW-2, MW-3, and BW-1) were purged and sampled on June 7, 2017 using the conventional purge and sampling method with disposable PVC bailers. The results of the sampling were provided to the SCES in a report prepared by SCS, dated August 9, 2017.

Exceedances of EPA primary drinking water MCLs during this event included selenium (MW-1) (see Table 2 below).

August 2017 – Eighth Quarterly Monitoring Event

All four wells (MW-1, MW-2, MW-3, and BW-1) were purged and sampled on August 24, 2017 using the conventional purge and sampling method with disposable PVC bailers. The results of the sampling were provided to SCES in a report prepared by SCS, dated September 26, 2017.

Exceedances of EPA drinking water MCLs during this event included selenium (MW-1) and combined radium (MW-3) (see Table 2 below).

December 2017 – Semiannual Detection Monitoring Event

All four wells (MW-1, MW-2, MW-3, and BW-1) were purged and sampled on December 20, 2017 using the conventional purge and sampling method with disposable PVC bailers. This sampling event marks the first semiannual detection monitoring event following the collection of eight independent quarterly samples, in accordance with 40 CFR §257.94(b). Though 40 CFR §257.94(b) states that only Appendix III constituents must be monitored during semiannual detection monitoring events, wells were also monitored for 40 CFR §257 Appendix IV constituents due to multiple EPA primary MCL exceedances of Appendix IV constituents during quarterly monitoring (see Appendix C). Field forms and laboratory results for this event are provided in Appendices A & B, respectively.

Exceedances of federally-promulgated primary MCLs during this event included selenium (MW-1) and combined radium (MW-2).

The analysis of Appendix IV constituents during the December 2017 monitoring event does not represent a decision to initiate an assessment monitoring program. The facility remains in a detection monitoring program, in accordance with 40 CFR §257.94.

Table 2 – Sandy Creek Energy Station MCL Exceedances

Constituent	Well Name	Date	Concentration (mg/L)	MCL (mg/L)
Arsenic	MW-1	5/11/2016	0.12	0.01
	MW-2	2/25/2016	0.014	
	BW-1	2/25/2016	0.015	
Beryllium	MW-1	5/11/2016	0.029	0.004
Chromium	MW-1	5/11/2016	0.69	0.1
Lead	MW-1	5/11/2016	0.21	0.015
Selenium	MW-1	12/14/2015	0.16	0.05
		2/25/2016	0.2	
		8/16/2016	0.13	
		11/17/2016	0.16	
		2/23/2017	0.066	
		6/7/2017	0.15	
		8/24/2017	0.17	
		12/20/2017	0.18	
Combined Radium	MW-1	5/11/2016	12.33	5
	MW-2	2/23/2017	5.79	
		12/20/2017	5.015	
	MW-3	8/16/2016	5.991	
		11/17/2016	6.102	
		8/24/2017	5.67	
	BW-1	5/11/2016	5.20	

SECTION 3.0

RESULTS AND STATISTICAL ANALYSIS

A summary of December 2017 laboratory results and statistical limits in each well – constituent pair is provided in Appendix D. Statistical limits were determined accordance with 40 CFR §257.93(f-g) and the GWSAP using the software program Sanitas ®. Limits are presented using Shewhart-CUSUM control charts, non-parametric prediction limits, or parametric prediction limits as deemed appropriate by background data distributions. EPA primary drinking water MCLs are also presented for comparison to current data.

Unconfirmed statistically significant increases (SSIs) were indicated for fluoride at MW-1 and boron in MW-3 (see Appendix D). In accordance with 40 CFR §257.94(e)(2), two alternate source demonstrations (ASDs) are provided in Appendix F to demonstrate that these unconfirmed SSIs likely result from natural variation in groundwater quality at the site, and are not indicative of impacts from the SCES landfill.

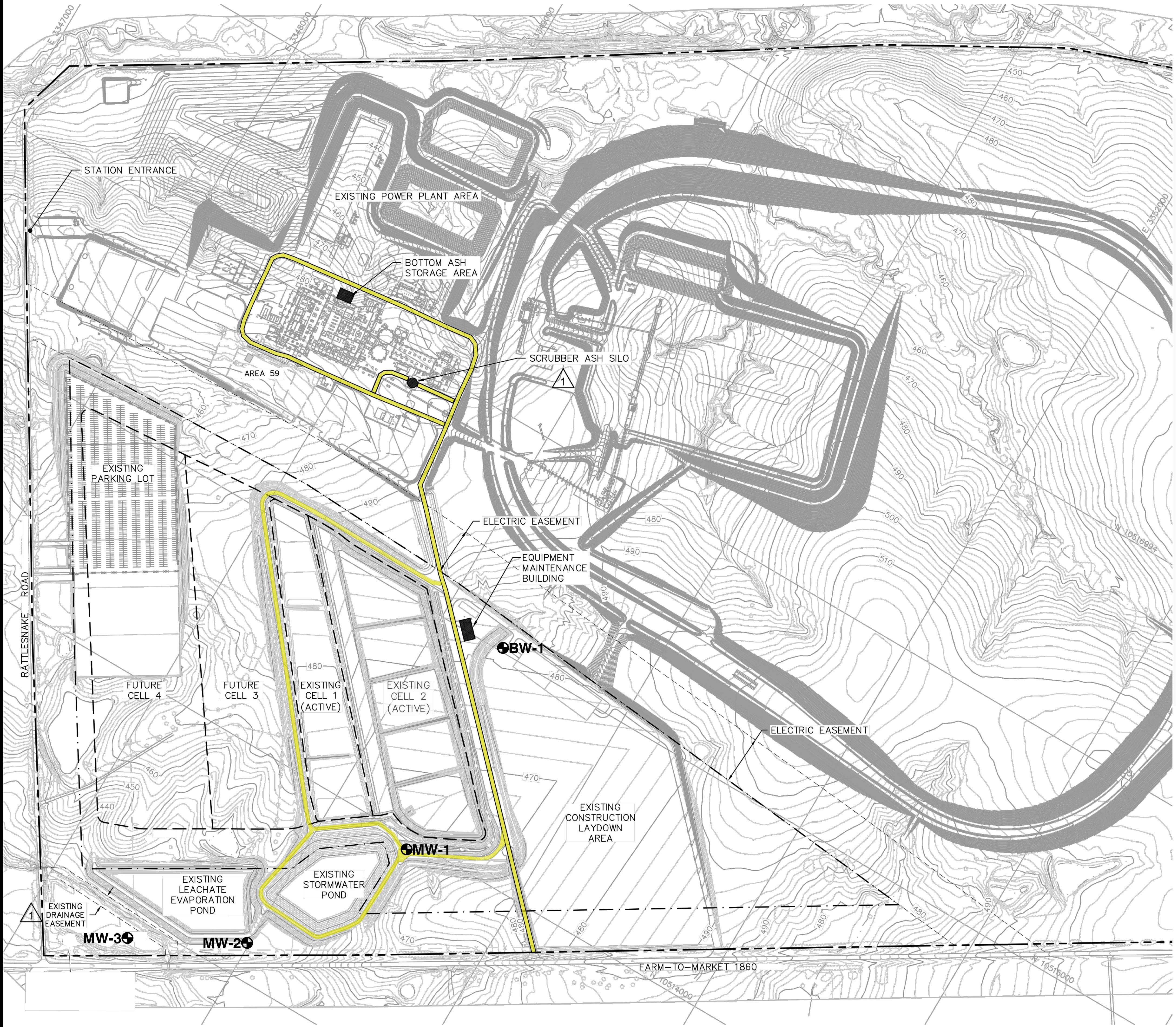
SECTION 4.0

RECOMMENDATIONS

No confirmed SSIs were indicated for any wells during the December 2017 detection monitoring event at the SCES, as outlined in the attached ASDs for fluoride in MW-1 and boron in MW-3 (see Appendix F). These ASDs should be filed with the annual groundwater monitoring and corrective action report, in accordance with the recordkeeping requirements specified in 40 CFR §257.105(f), notification requirements specified in 40 CFR §257.106(h), and internet requirements specified in 40 CFR §257.107(h). SCS recommends that the facility remain in semiannual detection monitoring, in accordance with 40 CFR §257.94.

Due to the lack of confirmed SSIs for Appendix III and IV constituents during the December 2017 detection monitoring event, the facility will continue monitoring for all constituents listed in 40 CFR §257 Appendix III during semiannual groundwater monitoring events, in accordance with 40 CFR §257.94(a). The Appendix IV constituent list will be analyzed if any confirmed statistical exceedances of the Appendix III list are indicated in future events. The next planned groundwater monitoring event is a semiannual detection monitoring event scheduled for June 2018.

FIGURE 1: MONITORING WELL LOCATION MAP



LEGEND

500	EXISTING GROUND ELEVATION (FT, MSL) (NOTES 1, 2)
	EXISTING SURFACE WATER LINE
— x — x —	EXISTING SITE FENCE
	EXISTING TREE LINE
MW-1	EXISTING MONITORING WELL
	EXISTING BUILDING
	PROPERTY BOUNDARY
	DEED RECORDED LIMITS OF WASTE
	CELL BOUNDARY
N 10514500 E 3349500	STATE PLANE COORDINATES
	SWDF OPERATIONS ACCESS ROAD

0 250' 500'
SCALE IN FEET

NOTES:

1. THE EXISTING CONTOUR MAP SHOWN ON THIS DRAWING WAS COMPILED USING EXISTING TOPOGRAPHY DATED APRIL 2006 AND DESIGN GRADES DATED OCTOBER 2007 FROM BLACK & VEATCH CORPORATION; DESIGN GRADES DEVELOPED BY GEOSYNTEC CONSULTANTS, INC. FOR THE LEACHATE EVAPORATION POND AND CELL 2 DATED APRIL 2011 AND APRIL 2014, RESPECTIVELY; AND AREA 59 EXISTING TOPOGRAPHY SURVEY CONDUCTED BY WALKER PARTNERS DATED 9 MAY 2013.

2. ELEVATIONS ARE IN FEET ABOVE MEAN SEA LEVEL (FT, MSL) AS DEFINED BY THE USGS NATIONAL GEODETIC VERTICAL DATUM (NGVD) OF 1988. STATE PLANE COORDINATE GRID CORRESPONDS TO TEXAS STATE PLANE COORDINATE SYSTEM, TEXAS CENTRAL ZONE (4203), NORTH AMERICAN DATUM OF 1983 (NAD-83).

SOURCE: BACKGROUND INFORMATION FOR THIS DRAWING IS FROM A DRAWING NAMED SITE LAYOUT BY GEOSYNTEC CONSULTANTS, DATED JUNE 2014.

REV | DATE | DESCRIPTION | BY

TEXAS BOARD OF PROFESSIONAL ENGINEERS REG. NO. F-3407

DRAWING TITLE: MONITORING WELL LOCATION MAP

PROJECT TITLE: SANDY CREEK ENERGY STATION GROUNDWATER MONITORING

CLIENT: NAES CORPORATION
2161 RATTLESNAKE ROAD
RIESEL, TEXAS 76682

SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT CONSULTING ENGINEERS
1901 CENTRAL DRIVE, SUITE 550, BEDFORD, TX 76021
PH (817) 571-2288 FAX NO. (817) 571-2188

PROJ. NO. 16215134.00 | DSN. BY: RD | DWN. BY: BPB | CHK. BY: JL | Q/A RVW BY: JL | APP. BY: JL

CADD FILE: 2017 MONITORING WELL SITE MAP

DATE: 01/2018

SCALE: AS SHOWN

DRAWING NO. 1

1/19/2017 9:48 AM G:\SANDY CREEK\2017 MONITORING WELL SITE MAP

APPENDIX A
DECEMBER 2017 GROUNDWATER MONITORING FIELD FORMS

Groundwater Monitoring Form

Facility name: Sandy Creek Energy Station
Permittee: Sandy Creek Energy Associates, L.P.
County: McLennan

1. Facility Type: Power Station
2. Monitor well no.: MW-1
3. Date of sampling: 12/20/2017

Name of sampler: Doug Steen
Affiliation of sampler: SCS Engineers
If split sampled, with whom? N/A
Integrity of well: GOOD
Installation date: 9/21/2015

Most recent previous sampling: 8/24/2017
Date of water level measurements: 12/20/2017
Datum reference point: Top of Casing
Datum elevation*: 465.87
Depth to water(below datum)*: 11.65
4. Water level elevation*: 454.22

5. Purging/Sampling method: Bailer (Enter bailer or pump)
   Were low-flow methods used? ☐ yes ■ no (check one)
   If yes, what volume was purged? N/A gal.
6. Well volumes purged: 2.0
7. Was the well dry before purging? ☐ yes ■ no (check one)
8. Was the well dry after purging? ■ yes ☐ no (check one)
9. How long before sampling? 2.0
10. Unit of measure? hours (Enter value as days, hours, or mins.)

11. Sample event: Detection
   - Background - Corrective Action
   - Detection - Other
   - Assessment
12. Sample schedule: Semi-Annual
   - Quarterly - Fourth Year
   - Semi-Annual - Other
   - Annual
13. Sample type: Regular
   - Regular - Split
   - Duplicate - Other
   - Resample

Field Measurements:

14. pH 5.86
15. Spec. cond. 4,287
16. ■ umho/cm or ☐ mmho/cm (check one)
17. Temp. 21.41
18. ☐ F or ■ C (check one)
19. Turbidity 66.2
20. ■ NTU

Laboratory:

21. Name Pace Analytical Services, Inc.
Phone: (817) 335-1186
Address: 2657 Gravel Drive, Fort Worth, TX 76118

* Report depth to water and elevations to nearest 0.01 foot relative to mean sea level (msl).

Groundwater Monitoring Form

Facility name: Sandy Creek Energy Station
Permittee: Sandy Creek Energy Associates, L.P.
County: McLennan

1. Facility Type: Power Station
2. Monitor well no.: MW-2
3. Date of sampling: 12/20/2017

Name of sampler: Doug Steen
Affiliation of sampler: SCS Engineers
If split sampled, with whom? N/A
Integrity of well: GOOD
Installation date: 9/23/2015

Most recent previous sampling: 8/24/2017
Date of water level measurements: 12/20/2017
Datum reference point: Top of Casing
Datum elevation*: 442.15
Depth to water(below datum)*: 12.68
4. Water level elevation*: 429.47

5. Purging/Sampling method: Bailer (Enter bailer or pump)
   Were low-flow methods used? ☐ yes ■ no (check one)
   If yes, what volume was purged? N/A gal.
6. Well volumes purged: 2.5
7. Was the well dry before purging? ☐ yes ■ no (check one)
8. Was the well dry after purging? ■ yes ☐ no (check one)
9. How long before sampling? 2.0
10. Unit of measure? hours (Enter value as days, hours, or mins.)

11. Sample event: Detection
   - Background - Corrective Action
   - Detection - Other
   - Assessment
12. Sample schedule: Semi-Annual
   - Quarterly - Fourth Year
   - Semi-Annual - Other
   - Annual
13. Sample type: Regular
   - Regular - Split
   - Duplicate - Other
   - Resample

Field Measurements:

14. pH 5.39
15. Spec. cond. 6,198
16. ■ umho/cm or ☐ mmho/cm (check one)
17. Temp. 20.23
18. ☐ F or ■ C (check one)
19. Turbidity 37.7
20. ■ NTU

Laboratory:

21. Name Pace Analytical Services, Inc.
Phone: (817) 335-1186
Address: 2657 Gravel Drive, Fort Worth, TX 76118

* Report depth to water and elevations to nearest 0.01 foot relative to mean sea level (msl).

Groundwater Monitoring Form

Facility name: Sandy Creek Energy Station
Permittee: Sandy Creek Energy Associates, L.P.
County: McLennan

1. Facility Type: Power Station
2. Monitor well no.: MW-3
3. Date of sampling: 12/20/2017

Name of sampler: Doug Steen
Affiliation of sampler: SCS Engineers
If split sampled, with whom? N/A
Integrity of well: GOOD
Installation date: 9/1/2010

Most recent previous sampling: 8/24/2017
Date of water level measurements: 12/20/2017
Datum reference point: Top of Casing
Datum elevation*: 430.06
Depth to water(below datum)*: 8.98
4. Water level elevation*: 421.08

5. Purging/Sampling method: Bailer (Enter bailer or pump)
   Were low-flow methods used? ☐ yes ■ no (check one)
   If yes, what volume was purged? N/A gal.
6. Well volumes purged: 3.1
7. Was the well dry before purging? ☐ yes ■ no (check one)
8. Was the well dry after purging? ☐ yes ■ no (check one)
9. How long before sampling? 2.0
10. Unit of measure? hours (Enter value as days, hours, or mins.)

11. Sample event: Detection
- Background
- Corrective Action
- Detection
- Other
- Assessment

12. Sample schedule: Semi-Annual
- Quarterly
- Fourth Year
- Semi-Annual
- Other
- Annual

13. Sample type: Regular
- Regular
- Split
- Duplicate
- Other
- Resample

Field Measurements:

14. pH 5.58
15. Spec. cond. 6,459 — 16. ■ umho/cm or ☐ mmho/cm (check one)
17. Temp. 21.52 — 18. ☐ F or ■ C (check one)
19. Turbidity 22.4 — 20. ■ NTU

Laboratory:

21. Name: Pace Analytical Services, Inc. Phone: (817) 335-1186
Address: 2657 Gravel Drive, Fort Worth, TX 76118

* Report depth to water and elevations to nearest 0.01 foot relative to mean sea level (msl).

Groundwater Monitoring Form

Facility name: Sandy Creek Energy Station
Permittee: Sandy Creek Energy Associates, L.P.
County: McLennan

1. Facility Type: Power Station
2. Monitor well no.: BW-1
3. Date of sampling: 12/20/2017

Name of sampler: Doug Steen
Affiliation of sampler: SCS Engineers
If split sampled, with whom? N/A
Integrity of well: GOOD
Installation date: 9/22/2015

Most recent previous sampling: 8/24/2017
Date of water level measurements: 12/20/2017
Datum reference point: Top of Casing
Datum elevation*: 485.57
Depth to water(below datum)*: 19.06
4. Water level elevation*: 466.51

5. Purging/Sampling method: Bailer (Enter bailer or pump)
   Were low-flow methods used? ☐ yes ■ no (check one)
   If yes, what volume was purged? N/A gal.
6. Well volumes purged: 3.1
7. Was the well dry before purging? ☐ yes ■ no (check one)
8. Was the well dry after purging? ☐ yes ■ no (check one)
9. How long before sampling? 2.0
10. Unit of measure? hours (Enter value as days, hours, or mins.)

11. Sample event: Detection
- Background - Corrective Action
- Detection - Other
- Assessment

12. Sample schedule: Semi-Annual
- Quarterly - Fourth Year
- Semi-Annual - Other
- Annual

13. Sample type: Regular
- Regular - Split
- Duplicate - Other
- Resample

Field Measurements:

14. pH 7.14
15. Spec. cond. 7,063 — 16. ■ umho/cm or ☐ mmho/cm (check one)
17. Temp. 20.33 — 18. ☐ F or ■ C (check one)
19. Turbidity 180 — 20. ■ NTU

Laboratory:

21. Name: Pace Analytical Services, Inc. Phone: (817) 335-1186
Address: 2657 Gravel Drive, Fort Worth, TX 76118

* Report depth to water and elevations to nearest 0.01 foot relative to mean sea level (msl).

Groundwater Monitoring Form

Facility name: Sandy Creek Energy Station
Permittee: Sandy Creek Energy Associates, L.P.
County: McLennan

1. Facility Type: Power Station
2. Monitor well no.: DUP
3. Date of sampling: 12/20/2017

Name of sampler: Doug Steen
Affiliation of sampler: SCS Engineers
If split sampled, with whom? N/A
Integrity of well: N/A
Installation date: N/A

Most recent previous sampling: N/A
Date of water level measurements: N/A
Datum reference point: Top of Casing
Datum elevation*: N/A
Depth to water(below datum)*: N/A
4. Water level elevation*: N/A

5. Purging/Sampling method: N/A (Enter bailer or pump)
   Were low-flow methods used? ☐ yes ☐ no (check one)
   If yes, what volume was purged? N/A gal.
6. Well volumes purged: N/A
7. Was the well dry before purging? ☐ yes ☐ no (check one)
8. Was the well dry after purging? ☐ yes ☐ no (check one)
9. How long before sampling? N/A
10. Unit of measure? N/A (Enter value as days, hours, or mins.)

11. Sample event: Detection
   - Background - Corrective Action
   - Detection - Other
   - Assessment
12. Sample schedule: Semi-Annual
   - Quarterly - Fourth Year
   - Semi-Annual - Other
   - Annual
13. Sample type: Duplicate
   - Regular - Split
   - Duplicate - Other
   - Resample

Field Measurements:

14. pH N/A
15. Spec. cond. N/A
16. ☐ umho/cm or ☐ mmho/cm (check one)
17. Temp. N/A
18. ☐ F or ☐ C (check one)
19. Turbidity N/A
20. ☐ NTU

Laboratory:

21. Name Pace Analytical Services, Inc. Phone: (817) 335-1186
   Address: 2657 Gravel Drive, Fort Worth, TX 76118

* Report depth to water and elevations to nearest 0.01 foot relative to mean sea level (msl).

APPENDIX B
DECEMBER 2017 LABORATORY REPORT WITH CHAIN OF CUSTODY

Pace Analytical Services, LLC
400 West Bethany Drive - Suite 190
Allen, TX 75013
(972)727-1123

January 29, 2018

Jim Lawrence
SCS Engineers
1901 Central Dr.
Suite 550
Bedford, TX 76021

RE: Project: 16215106.00/Sandy Creek
Pace Project No.: 7579575

Dear Jim Lawrence:

Enclosed are the analytical results for sample(s) received by the laboratory on December 22, 2017. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

Report revised 1/29/18 to include calcium results.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Vince Egyed
vince.egyed@pacelabs.com
(817) 335-1186
Project Manager

Enclosures

cc: Tyson Milbrand, SCS Engineers
Madison Rosene, SCS Engineers
Doug Steen, SCS Engineers
Valerie Wooters, SCS Engineers

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
400 West Bethany Drive - Suite 190
Allen, TX 75013
(972)727-1123

CERTIFICATIONS

Project: 16215106.00/Sandy Creek
Pace Project No.: 7579575

New Orleans Certification IDs

California Env. Lab Accreditation Program Branch: 11277CA
Florida Department of Health (NELAC): E87595
Illinois Environmental Protection Agency: 0025721
Kansas Department of Health and Environment (NELAC): E-10266
Louisiana Dept. of Environmental Quality (NELAC/LELAP): 02006
Pennsylviania Dept. of Env Protection (NELAC): 68-04202
Texas Commission on Env. Quality (NELAC): T104704405-09-TX
U.S. Dept. of Agriculture Foreign Soil Import: P330-10-00119
Commonwealth of Virginia (TNI): 480246

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
L-A-B DOD-ELAP Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification
Connecticut Certification #: PH-0694
Delaware Certification
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: 90133
Louisiana DHH/TNI Certification #: LA140008
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: PA00091
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification
Missouri Certification #: 235
Montana Certification #: Cert 0082
Nebraska Certification #: NE-05-29-14
Nevada Certification #: PA014572015-1
New Hampshire/TNI Certification #: 2976
New Jersey/TNI Certification #: PA 051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Oregon/TNI Certification #: PA200002
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: TN2867
Texas/TNI Certification #: T104704188-14-8
Utah/TNI Certification #: PA014572015-5
USDA Soil Permit #: P330-14-00213
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 460198
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Certification
Wyoming Certification #: 8TMS-L

Dallas Certification IDs:

400 West Bethany Dr Suite 190, Allen, TX 75013
EPA# TX00074
Florida Certification #: E871118
Texas Certification #: T104704232
Kansas Certification #: E-10388
Arkansas Certification #: 88-0647
Oklahoma Certification #: 8727
Louisiana Certification #: 30686
Iowa Certification #: 408
Florida Certification #: E871118
Nevada Certification #: TX00074

Pace Analytical Services, LLC
400 West Bethany Drive - Suite 190
Allen, TX 75013
(972)727-1123

SAMPLE SUMMARY

Project: 16215106.00/Sandy Creek
Pace Project No.: 7579575

Lab ID	Sample ID	Matrix	Date Collected	Date Received
7579575001	**MW-1**	Water	12/20/17 12:55	12/22/17 07:21
7579575002	**MW-2**	Water	12/20/17 13:25	12/22/17 07:21
7579575003	**MW-3**	Water	12/20/17 13:55	12/22/17 07:21
7579575004	**BW-1**	Water	12/20/17 12:10	12/22/17 07:21
7579575005	**DUP**	Water		12/22/17 07:21

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SAMPLE ANALYTE COUNT

Project: 16215106.00/Sandy Creek
Pace Project No.: 7579575

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
7579575001	**MW-1**	EPA 6010	DT1	11	PASI-D
		EPA 6010	KJR	1	PASI-N
		EPA 6020	KJR	2	PASI-N
		EPA 7470	IZC	1	PASI-D
		EPA 903.1	KAC	1	PASI-PA
		EPA 904.0	JLW	1	PASI-PA
		SM 2540C	NT	1	PASI-D
		EPA 9040	TMS	1	PASI-D
		EPA 9056A	LNF	3	PASI-D
7579575002	**MW-2**	EPA 6010	DT1, SPS	11	PASI-D
		EPA 6010	KJR	1	PASI-N
		EPA 6020	KJR	2	PASI-N
		EPA 7470	IZC	1	PASI-D
		EPA 903.1	KAC	1	PASI-PA
		EPA 904.0	JLW	1	PASI-PA
		SM 2540C	NT	1	PASI-D
		EPA 9040	TMS	1	PASI-D
		EPA 9056A	LNF	3	PASI-D
7579575003	**MW-3**	EPA 6010	DT1	11	PASI-D
		EPA 6010	KJR	1	PASI-N
		EPA 6020	KJR	2	PASI-N
		EPA 7470	IZC	1	PASI-D
		EPA 903.1	KAC	1	PASI-PA
		EPA 904.0	JLW	1	PASI-PA
		SM 2540C	NT	1	PASI-D
		EPA 9040	TMS	1	PASI-D
		EPA 9056A	LNF	3	PASI-D
7579575004	**BW-1**	EPA 6010	DT1	11	PASI-D
		EPA 6010	KJR	1	PASI-N
		EPA 6020	KJR	2	PASI-N
		EPA 7470	IZC	1	PASI-D
		EPA 903.1	KAC	1	PASI-PA
		EPA 904.0	JLW	1	PASI-PA
		SM 2540C	NT	1	PASI-D
		EPA 9040	TMS	1	PASI-D
		EPA 9056A	LNF	3	PASI-D
7579575005	**DUP**	EPA 6010	DT1	11	PASI-D

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SAMPLE ANALYTE COUNT

Project: 16215106.00/Sandy Creek
Pace Project No.: 7579575

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
		EPA 6010	KJR	1	PASI-N
		EPA 6020	KJR	2	PASI-N
		EPA 7470	IZC	1	PASI-D
		EPA 903.1	KAC	1	PASI-PA
		EPA 904.0	JLW	1	PASI-PA
		SM 2540C	NT	1	PASI-D
		EPA 9040	TMS	1	PASI-D
		EPA 9056A	LNF	3	PASI-D

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ANALYTICAL RESULTS

Project: 16215106.00/Sandy Creek
Pace Project No.: 7579575

Sample: MW-1 | **Lab ID: 7579575001** | Collected: 12/20/17 12:55 | Received: 12/22/17 07:21 | Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010 Metals, Total	Analytical Method: EPA 6010 Preparation Method: EPA 3010								
Lithium	**0.38**	mg/L	0.050	0.012	1	12/28/17 07:50	12/29/17 13:53	7439-93-2	
Arsenic	ND	mg/L	0.0060	0.0037	1	12/26/17 06:05	12/27/17 15:31	7440-38-2	
Barium	**0.017**	mg/L	0.010	0.0033	1	12/26/17 06:05	12/27/17 15:31	7440-39-3	
Beryllium	ND	mg/L	0.0010	0.00017	1	12/26/17 06:05	12/27/17 15:31	7440-41-7	
Boron	**1.3**	mg/L	0.10	0.018	1	12/26/17 06:05	12/27/17 15:31	7440-42-8	
Cadmium	ND	mg/L	0.0050	0.00061	1	12/26/17 06:05	12/27/17 15:31	7440-43-9	
Calcium	**548**	mg/L	1.0	0.33	1	12/26/17 06:05	12/27/17 15:31	7440-70-2	
Chromium	ND	mg/L	0.0070	0.0021	1	12/26/17 06:05	12/27/17 15:31	7440-47-3	
Cobalt	ND	mg/L	0.0025	0.00049	1	12/26/17 06:05	12/27/17 15:31	7440-48-4	
Lead	ND	mg/L	0.010	0.0017	1	12/26/17 06:05	12/27/17 15:31	7439-92-1	
Molybdenum	ND	mg/L	0.030	0.0097	1	12/26/17 06:05	12/27/17 15:31	7439-98-7	
Selenium	**0.18**	mg/L	0.020	0.0042	1	12/26/17 06:05	12/27/17 15:31	7782-49-2	
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	ND	mg/L	0.0010	0.00025	1	01/02/18 07:46	01/02/18 12:16	7440-36-0	
Thallium	ND	mg/L	0.00050	0.00012	1	01/02/18 07:46	01/02/18 12:16	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470								
Mercury	ND	mg/L	0.00020	0.000070	1	12/27/17 07:02	12/27/17 13:58	7439-97-6	
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**4250**	mg/L	62.5	62.5	1		12/22/17 22:56		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.4**	Std. Units	0.10	0.10	1		12/26/17 12:24		H6
9056 IC Anions	Analytical Method: EPA 9056A								
Chloride	**248**	mg/L	80.0	35.8	100		01/11/18 17:12	16887-00-6	
Fluoride	**1.1**	mg/L	0.50	0.18	1		01/11/18 14:14	16984-48-8	
Sulfate	**2340**	mg/L	700	393	1000		01/12/18 14:22	14808-79-8	

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ANALYTICAL RESULTS

Project: 16215106.00/Sandy Creek
Pace Project No.: 7579575

Sample: MW-2 | **Lab ID: 7579575002** | Collected: 12/20/17 13:25 | Received: 12/22/17 07:21 | Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010 Metals, Total	Analytical Method: EPA 6010 Preparation Method: EPA 3010								
Arsenic	ND	mg/L	0.012	0.0074	2	12/26/17 06:05	12/28/17 14:50	7440-38-2	D3
Lithium	**0.74**	mg/L	0.050	0.012	1	12/28/17 07:50	12/29/17 14:17	7439-93-2	
Barium	**0.022**	mg/L	0.010	0.0033	1	12/26/17 06:05	12/27/17 15:38	7440-39-3	
Beryllium	ND	mg/L	0.0010	0.00017	1	12/26/17 06:05	12/27/17 15:38	7440-41-7	
Boron	**2.2**	mg/L	0.10	0.018	1	12/26/17 06:05	12/27/17 15:38	7440-42-8	
Cadmium	ND	mg/L	0.010	0.0012	2	12/26/17 06:05	12/28/17 14:50	7440-43-9	D3
Calcium	**716**	mg/L	1.0	0.33	1	12/26/17 06:05	12/27/17 15:38	7440-70-2	
Chromium	ND	mg/L	0.014	0.0042	2	12/26/17 06:05	12/28/17 14:50	7440-47-3	D3
Cobalt	**0.0072**	mg/L	0.0050	0.00098	2	12/26/17 06:05	12/28/17 14:50	7440-48-4	D3
Lead	ND	mg/L	0.020	0.0033	2	12/26/17 06:05	12/28/17 14:50	7439-92-1	D3
Molybdenum	ND	mg/L	0.030	0.0097	1	12/26/17 06:05	12/27/17 15:38	7439-98-7	
Selenium	ND	mg/L	0.040	0.0084	2	12/26/17 06:05	12/28/17 14:50	7782-49-2	D3
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	ND	mg/L	0.0010	0.00025	1	01/02/18 07:46	01/02/18 12:20	7440-36-0	
Thallium	ND	mg/L	0.00050	0.00012	1	01/02/18 07:46	01/02/18 12:20	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470								
Mercury	ND	mg/L	0.00020	0.000070	1	12/27/17 07:02	12/27/17 14:00	7439-97-6	
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**9600**	mg/L	500	500	1		12/27/17 17:51		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.2**	Std. Units	0.10	0.10	1		12/26/17 12:33		H6
9056 IC Anions	Analytical Method: EPA 9056A								
Chloride	**2590**	mg/L	800	358	1000		01/12/18 14:40	16887-00-6	
Fluoride	ND	mg/L	0.50	0.18	1		01/11/18 14:31	16984-48-8	
Sulfate	**3100**	mg/L	700	393	1000		01/12/18 14:40	14808-79-8	

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ANALYTICAL RESULTS

Project: 16215106.00/Sandy Creek
Pace Project No.: 7579575

Sample: MW-3 **Lab ID: 7579575003** Collected: 12/20/17 13:55 Received: 12/22/17 07:21 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010 Metals, Total	Analytical Method: EPA 6010 Preparation Method: EPA 3010								
Lithium	**0.92**	mg/L	0.050	0.012	1	12/28/17 07:50	12/29/17 14:21	7439-93-2	
Arsenic	ND	mg/L	0.0060	0.0037	1	12/26/17 06:05	12/27/17 15:45	7440-38-2	
Barium	**0.034**	mg/L	0.010	0.0033	1	12/26/17 06:05	12/27/17 15:45	7440-39-3	
Beryllium	ND	mg/L	0.0010	0.00017	1	12/26/17 06:05	12/27/17 15:45	7440-41-7	
Boron	**1.3**	mg/L	0.10	0.018	1	12/26/17 06:05	12/27/17 15:45	7440-42-8	
Cadmium	ND	mg/L	0.0050	0.00061	1	12/26/17 06:05	12/27/17 15:45	7440-43-9	
Calcium	**563**	mg/L	1.0	0.33	1	12/26/17 06:05	12/27/17 15:45	7440-70-2	
Chromium	ND	mg/L	0.0070	0.0021	1	12/26/17 06:05	12/27/17 15:45	7440-47-3	
Cobalt	**0.0086**	mg/L	0.0025	0.00049	1	12/26/17 06:05	12/27/17 15:45	7440-48-4	
Lead	ND	mg/L	0.010	0.0017	1	12/26/17 06:05	12/27/17 15:45	7439-92-1	
Molybdenum	ND	mg/L	0.030	0.0097	1	12/26/17 06:05	12/27/17 15:45	7439-98-7	
Selenium	ND	mg/L	0.020	0.0042	1	12/26/17 06:05	12/27/17 15:45	7782-49-2	
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	ND	mg/L	0.0010	0.00025	1	01/02/18 07:46	01/02/18 12:31	7440-36-0	
Thallium	ND	mg/L	0.00050	0.00012	1	01/02/18 07:46	01/02/18 12:31	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470								
Mercury	ND	mg/L	0.00020	0.000070	1	12/27/17 07:02	12/27/17 14:02	7439-97-6	
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**5790**	mg/L	83.3	83.3	1		12/27/17 17:49		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**6.8**	Std. Units	0.10	0.10	1		12/26/17 12:47		H6
9056 IC Anions	Analytical Method: EPA 9056A								
Chloride	**380**	mg/L	80.0	35.8	100		01/11/18 17:48	16887-00-6	
Fluoride	**0.61**	mg/L	0.50	0.18	1		01/11/18 14:49	16984-48-8	
Sulfate	**2830**	mg/L	700	393	1000		01/12/18 14:58	14808-79-8	

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ANALYTICAL RESULTS

Project: 16215106.00/Sandy Creek

Pace Project No.: 7579575

Sample: BW-1 **Lab ID: 7579575004** Collected: 12/20/17 12:10 Received: 12/22/17 07:21 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010 Metals, Total	Analytical Method: EPA 6010 Preparation Method: EPA 3010								
Arsenic	ND	mg/L	0.0060	0.0037	1	12/26/17 06:05	12/27/17 15:51	7440-38-2	
Lithium	**0.73**	mg/L	0.050	0.012	1	12/28/17 07:50	12/29/17 14:25	7439-93-2	
Barium	**0.044**	mg/L	0.010	0.0033	1	12/26/17 06:05	12/27/17 15:51	7440-39-3	
Beryllium	ND	mg/L	0.0010	0.00017	1	12/26/17 06:05	12/27/17 15:51	7440-41-7	
Boron	**3.5**	mg/L	0.10	0.018	1	12/26/17 06:05	12/27/17 15:51	7440-42-8	
Cadmium	ND	mg/L	0.0050	0.00061	1	12/26/17 06:05	12/27/17 15:51	7440-43-9	
Calcium	**658**	mg/L	1.0	0.33	1	12/26/17 06:05	12/27/17 15:51	7440-70-2	
Chromium	ND	mg/L	0.0070	0.0021	1	12/26/17 06:05	12/27/17 15:51	7440-47-3	
Cobalt	**0.0034**	mg/L	0.0025	0.00049	1	12/26/17 06:05	12/27/17 15:51	7440-48-4	
Lead	ND	mg/L	0.010	0.0017	1	12/26/17 06:05	12/27/17 15:51	7439-92-1	
Molybdenum	ND	mg/L	0.030	0.0097	1	12/26/17 06:05	12/27/17 15:51	7439-98-7	
Selenium	ND	mg/L	0.020	0.0042	1	12/26/17 06:05	12/27/17 15:51	7782-49-2	
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	ND	mg/L	0.0010	0.00025	1	01/02/18 07:46	01/02/18 12:35	7440-36-0	
Thallium	ND	mg/L	0.00050	0.00012	1	01/02/18 07:46	01/02/18 12:35	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470								
Mercury	ND	mg/L	0.00020	0.000070	1	12/27/17 07:02	12/27/17 14:03	7439-97-6	
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**6140**	mg/L	83.3	83.3	1		12/27/17 17:50		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.2**	Std. Units	0.10	0.10	1		12/26/17 12:21		H6
9056 IC Anions	Analytical Method: EPA 9056A								
Chloride	**1030**	mg/L	80.0	35.8	100		01/11/18 18:06	16887-00-6	
Fluoride	ND	mg/L	0.50	0.18	1		01/11/18 15:07	16984-48-8	
Sulfate	**2620**	mg/L	700	393	1000		01/12/18 15:16	14808-79-8	

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ANALYTICAL RESULTS

Project: 16215106.00/Sandy Creek
Pace Project No.: 7579575

Sample: DUP **Lab ID: 7579575005** Collected: Received: 12/22/17 07:21 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010 Metals, Total	Analytical Method: EPA 6010 Preparation Method: EPA 3010								
Lithium	**0.71**	mg/L	0.050	0.012	1	12/28/17 07:50	12/29/17 14:30	7439-93-2	
Arsenic	ND	mg/L	0.0060	0.0037	1	12/26/17 06:05	12/27/17 15:58	7440-38-2	
Barium	**0.044**	mg/L	0.010	0.0033	1	12/26/17 06:05	12/27/17 15:58	7440-39-3	
Beryllium	ND	mg/L	0.0010	0.00017	1	12/26/17 06:05	12/27/17 15:58	7440-41-7	
Boron	**3.3**	mg/L	0.10	0.018	1	12/26/17 06:05	12/27/17 15:58	7440-42-8	
Cadmium	ND	mg/L	0.0050	0.00061	1	12/26/17 06:05	12/27/17 15:58	7440-43-9	
Calcium	**630**	mg/L	1.0	0.33	1	12/26/17 06:05	12/27/17 15:58	7440-70-2	
Chromium	ND	mg/L	0.0070	0.0021	1	12/26/17 06:05	12/27/17 15:58	7440-47-3	
Cobalt	**0.0031**	mg/L	0.0025	0.00049	1	12/26/17 06:05	12/27/17 15:58	7440-48-4	
Lead	ND	mg/L	0.010	0.0017	1	12/26/17 06:05	12/27/17 15:58	7439-92-1	
Molybdenum	ND	mg/L	0.030	0.0097	1	12/26/17 06:05	12/27/17 15:58	7439-98-7	
Selenium	ND	mg/L	0.020	0.0042	1	12/26/17 06:05	12/27/17 15:58	7782-49-2	
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	ND	mg/L	0.0010	0.00025	1	01/02/18 07:46	01/02/18 12:39	7440-36-0	
Thallium	ND	mg/L	0.00050	0.00012	1	01/02/18 07:46	01/02/18 12:39	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470								
Mercury	ND	mg/L	0.00020	0.000070	1	12/27/17 07:02	12/27/17 14:05	7439-97-6	
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**6100**	mg/L	83.3	83.3	1		12/27/17 17:50		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.4**	Std. Units	0.10	0.10	1		12/26/17 12:52		H6
9056 IC Anions	Analytical Method: EPA 9056A								
Chloride	**1080**	mg/L	80.0	35.8	100		01/11/18 18:24	16887-00-6	
Fluoride	ND	mg/L	0.50	0.18	1		01/11/18 15:25	16984-48-8	
Sulfate	**2870**	mg/L	700	393	1000		01/12/18 15:33	14808-79-8	

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QUALITY CONTROL DATA

Project: 16215106.00/Sandy Creek
Pace Project No.: 7579575

QC Batch: 89710 Analysis Method: EPA 7470
QC Batch Method: EPA 7470 Analysis Description: 7470 Mercury
Associated Lab Samples: 7579575001, 7579575002, 7579575003, 7579575004, 7579575005

METHOD BLANK: 397217 Matrix: Water
Associated Lab Samples: 7579575001, 7579575002, 7579575003, 7579575004, 7579575005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Mercury	mg/L	ND	0.00020	0.000070	12/27/17 13:51	

LABORATORY CONTROL SAMPLE: 397218

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	mg/L	.0025	0.0028	112	83-117	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 397219 397220

Parameter	Units	7579575001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	mg/L	ND	.0025	.0025	0.0032	0.0028	127	112	37-137	13	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

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QUALITY CONTROL DATA

Project: 16215106.00/Sandy Creek
Pace Project No.: 7579575

QC Batch: 89626 Analysis Method: EPA 6010
QC Batch Method: EPA 3010 Analysis Description: 6010 MET
Associated Lab Samples: 7579575001, 7579575002, 7579575003, 7579575004, 7579575005

METHOD BLANK: 396893 Matrix: Water
Associated Lab Samples: 7579575001, 7579575002, 7579575003, 7579575004, 7579575005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Arsenic	mg/L	ND	0.0060	0.0037	12/26/17 13:33	
Barium	mg/L	ND	0.010	0.0033	12/26/17 13:33	
Beryllium	mg/L	ND	0.0010	0.00017	12/26/17 13:33	
Boron	mg/L	ND	0.10	0.018	12/26/17 13:33	
Cadmium	mg/L	ND	0.0050	0.00061	12/26/17 13:33	
Calcium	mg/L	ND	1.0	0.33	12/26/17 13:33	
Chromium	mg/L	ND	0.0070	0.0021	12/26/17 13:33	
Cobalt	mg/L	ND	0.0025	0.00049	12/26/17 13:33	
Lead	mg/L	ND	0.010	0.0017	12/26/17 13:33	
Molybdenum	mg/L	ND	0.030	0.0097	12/27/17 15:00	
Selenium	mg/L	ND	0.020	0.0042	12/26/17 13:33	

LABORATORY CONTROL SAMPLE: 396894

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic	mg/L	1	1.1	106	83-111	
Barium	mg/L	1	1.1	106	87-116	
Beryllium	mg/L	1	1.1	108	86-113	
Boron	mg/L	1	1.1	109	80-120	
Cadmium	mg/L	1	1.1	108	86-113	
Calcium	mg/L	10	10.6	106	85-114	
Chromium	mg/L	1	1.0	104	89-114	
Cobalt	mg/L	1	1.1	112	90-117	
Lead	mg/L	1	1.1	112	90-117	
Molybdenum	mg/L	1	1.1	106	80-120	
Selenium	mg/L	1	1.1	112	83-121	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 396895 396896

Parameter	Units	7579488001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic	mg/L	ND	1	1	1.1	1.1	110	110	71-126	1	20	
Barium	mg/L	90.8 ug/L	1	1	1.2	1.2	108	108	66-124	0	20	
Beryllium	mg/L	ND	1	1	1.1	1.1	110	110	67-123	0	20	
Boron	mg/L	ND	1	1	1.1	1.1	110	111	76-126	1	20	
Cadmium	mg/L	ND	1	1	1.1	1.1	111	111	70-130	0	20	
Calcium	mg/L	103000 ug/L	10	10	111	109	78	54	10-200	2	20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 16215106.00/Sandy Creek
Pace Project No.: 7579575

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 396895 396896

Parameter	Units	7579488001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chromium	mg/L	ND	1	1	1.0	1.0	103	103	68-123	0	20	
Cobalt	mg/L	ND	1	1	1.1	1.1	111	111	52-134	0	20	
Lead	mg/L	ND	1	1	1.1	1.1	111	111	56-130	0	20	
Molybdenum	mg/L	ND	1	1	1.1	1.1	107	107	75-125	0	20	
Selenium	mg/L	ND	1	1	1.2	1.2	115	115	70-139	0	20	

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QUALITY CONTROL DATA

Project: 16215106.00/Sandy Creek
Pace Project No.: 7579575

QC Batch: 97879 | Analysis Method: EPA 6010
QC Batch Method: EPA 3010 | Analysis Description: 6010 MET
Associated Lab Samples: 7579575001, 7579575002, 7579575003, 7579575004, 7579575005

METHOD BLANK: 421455 | Matrix: Water
Associated Lab Samples: 7579575001, 7579575002, 7579575003, 7579575004, 7579575005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Lithium	mg/L	ND	0.050	0.012	12/29/17 13:45	

LABORATORY CONTROL SAMPLE: 421456

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Lithium	mg/L	1	0.98	98	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 421457 421458

Parameter	Units	7579575001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Lithium	mg/L	0.38	1	1	1.4	1.3	97	94	80-120	3	20	

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QUALITY CONTROL DATA

Project: 16215106.00/Sandy Creek
Pace Project No.: 7579575

QC Batch: 98006 Analysis Method: EPA 6020
QC Batch Method: EPA 3010 Analysis Description: 6020 MET
Associated Lab Samples: 7579575001, 7579575002, 7579575003, 7579575004, 7579575005

METHOD BLANK: 422024 Matrix: Water
Associated Lab Samples: 7579575001, 7579575002, 7579575003, 7579575004, 7579575005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Antimony	mg/L	ND	0.0010	0.00025	01/02/18 11:53	
Thallium	mg/L	ND	0.00050	0.00012	01/02/18 11:53	

LABORATORY CONTROL SAMPLE: 422025

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	mg/L	.02	0.018	92	85-115	
Thallium	mg/L	.02	0.018	90	82-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 422026 422027

Parameter	Units	2067709002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony	mg/L	ND	.02	.02	0.0085	0.0084	42	41	80-120	2	20	M1
Thallium	mg/L	ND	.02	.02	0.019	0.019	96	95	80-120	1	20	

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REPORT OF LABORATORY ANALYSIS

QUALITY CONTROL DATA

Project: 16215106.00/Sandy Creek
Pace Project No.: 7579575

QC Batch: 89659 | Analysis Method: SM 2540C
QC Batch Method: SM 2540C | Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 7579575001

METHOD BLANK: 397058 | Matrix: Water
Associated Lab Samples: 7579575001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	ND	25.0	25.0	12/22/17 22:42	

LABORATORY CONTROL SAMPLE: 397059

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	250	258	103	85-115	

SAMPLE DUPLICATE: 397060

Parameter	Units	7579517001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	616	615	0	5	

SAMPLE DUPLICATE: 397061

Parameter	Units	7579575001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	4250	4250	0	5	

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QUALITY CONTROL DATA

Project: 16215106.00/Sandy Creek
Pace Project No.: 7579575

QC Batch: 89790 Analysis Method: SM 2540C
QC Batch Method: SM 2540C Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 7579575002, 7579575003, 7579575004, 7579575005

METHOD BLANK: 397449 Matrix: Water
Associated Lab Samples: 7579575002, 7579575003, 7579575004, 7579575005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	ND	25.0	25.0	12/27/17 17:46	

LABORATORY CONTROL SAMPLE: 397450

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	250	241	96	85-115	

SAMPLE DUPLICATE: 397537

Parameter	Units	7579600013 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	70300	70400	0	5	

SAMPLE DUPLICATE: 397538

Parameter	Units	7579600014 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	54700	53700	2	5	

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QUALITY CONTROL DATA

Project: 16215106.00/Sandy Creek
Pace Project No.: 7579575

QC Batch: 89684 Analysis Method: EPA 9040
QC Batch Method: EPA 9040 Analysis Description: 9040 pH
Associated Lab Samples: 7579575001, 7579575002, 7579575003, 7579575004, 7579575005

LABORATORY CONTROL SAMPLE: 397144

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
pH at 25 Degrees C	Std. Units	6	6.0	100	99-101	H6

SAMPLE DUPLICATE: 397145

Parameter	Units	7579315001 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	6.8	6.8	0	20	H6

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QUALITY CONTROL DATA

Project: 16215106.00/Sandy Creek
Pace Project No.: 7579575

QC Batch: 90492 Analysis Method: EPA 9056A
QC Batch Method: EPA 9056A Analysis Description: 9056 IC Anions
Associated Lab Samples: 7579575001, 7579575002, 7579575003, 7579575004, 7579575005

METHOD BLANK: 401010 Matrix: Water
Associated Lab Samples: 7579575001, 7579575002, 7579575003, 7579575004, 7579575005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	ND	0.80	0.36	01/11/18 12:44	
Fluoride	mg/L	ND	0.50	0.18	01/11/18 12:44	
Sulfate	mg/L	ND	0.70	0.39	01/11/18 12:44	

LABORATORY CONTROL SAMPLE: 401011

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	5.0	101	90-110	
Fluoride	mg/L	5	5.0	100	90-110	
Sulfate	mg/L	5	5.1	102	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 401012 401013

Parameter	Units	7579315001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	6.9	5.6	5.6	13.6	13.7	121	122	80-120	1	15	M1
Fluoride	mg/L	0.24J	5.6	5.6	4.5	4.5	76	78	80-120	2	15	M1
Sulfate	mg/L	23.8	50	50	77.9	78.4	108	109	80-120	1	15	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 16215106.00/Sandy Creek
Pace Project No.: 7579575

Sample: MW-1 **Lab ID: 7579575001** Collected: 12/20/17 12:55 Received: 12/22/17 07:21 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**1.26 ± 0.680 (0.686)** **C:NA T:86%**	pCi/L	01/12/18 17:39	13982-63-3	
Radium-228	EPA 904.0	**2.46 ± 0.888 (1.38)** **C:75% T:61%**	pCi/L	01/11/18 12:48	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 16215106.00/Sandy Creek
Pace Project No.: 7579575

Sample: MW-2 **Lab ID: 7579575002** Collected: 12/20/17 13:25 Received: 12/22/17 07:21 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.945 ± 0.578 (0.709)** **C:NA T:100%**	pCi/L	01/12/18 17:54	13982-63-3	
Radium-228	EPA 904.0	**4.07 ± 0.940 (0.702)** **C:80% T:84%**	pCi/L	01/11/18 12:48	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 16215106.00/Sandy Creek
Pace Project No.: 7579575

Sample: MW-3 **Lab ID: 7579575003** Collected: 12/20/17 13:55 Received: 12/22/17 07:21 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.626 ± 0.567 (0.835)** **C:NA T:95%**	pCi/L	01/12/18 17:54	13982-63-3	
Radium-228	EPA 904.0	**2.77 ± 0.728 (0.734)** **C:78% T:84%**	pCi/L	01/11/18 12:48	15262-20-1	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 16215106.00/Sandy Creek
Pace Project No.: 7579575

Sample: BW-1 **Lab ID: 7579575004** Collected: 12/20/17 12:10 Received: 12/22/17 07:21 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**1.07 ± 0.681 (0.878)** **C:NA T:92%**	pCi/L	01/12/18 17:54	13982-63-3	
Radium-228	EPA 904.0	**3.13 ± 0.788 (0.742)** **C:76% T:85%**	pCi/L	01/11/18 12:48	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 16215106.00/Sandy Creek
Pace Project No.: 7579575

Sample: DUP | **Lab ID: 7579575005** | Collected: | Received: 12/22/17 07:21 | Matrix: Water
PWS: | Site ID: | Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**1.54 ± 0.774 (0.877) C:NA T:90%**	pCi/L	01/12/18 17:54	13982-63-3	
Radium-228	EPA 904.0	**2.78 ± 0.712 (0.650) C:81% T:80%**	pCi/L	01/11/18 12:49	15262-20-1	

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QUALITY CONTROL - RADIOCHEMISTRY

Project: 16215106.00/Sandy Creek
Pace Project No.: 7579575

QC Batch: 283643 Analysis Method: EPA 903.1
QC Batch Method: EPA 903.1 Analysis Description: 903.1 Radium-226
Associated Lab Samples: 7579575001, 7579575002, 7579575003, 7579575004, 7579575005

METHOD BLANK: 1392418 Matrix: Water
Associated Lab Samples: 7579575001, 7579575002, 7579575003, 7579575004, 7579575005

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-226	0.506 ± 0.433 (0.587) C:NA T:96%	pCi/L	01/12/18 17:39	

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QUALITY CONTROL - RADIOCHEMISTRY

Project: 16215106.00/Sandy Creek
Pace Project No.: 7579575

QC Batch: 283773 — Analysis Method: EPA 904.0
QC Batch Method: EPA 904.0 — Analysis Description: 904.0 Radium 228
Associated Lab Samples: 7579575001, 7579575002, 7579575003, 7579575004, 7579575005

METHOD BLANK: 1392877 — Matrix: Water
Associated Lab Samples: 7579575001, 7579575002, 7579575003, 7579575004, 7579575005

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	0.202 ± 0.329 (0.715) C:79% T:82%	pCi/L	01/11/18 12:47	

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REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: 16215106.00/Sandy Creek
Pace Project No.: 7579575

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Act - Activity

Unc - Uncertainty: SDWA = 1.96 sigma count uncertainty, all other matrices = Expanded Uncertainty (95% confidence interval).
Gamma Spec = Expanded Uncertainty (95.4% Confidence Interval)

(MDC) - Minimum Detectable Concentration

Trac - Tracer Recovery (%)

Carr - Carrier Recovery (%)

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TNI - The Nelac Institute

LABORATORIES

PASI-D	Pace Analytical Services - Dallas
PASI-N	Pace Analytical Services - New Orleans
PASI-PA	Pace Analytical Services - Greensburg

ANALYTE QUALIFIERS

D3	Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
H6	Analysis initiated outside of the 15 minute EPA required holding time.
M1	Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 16215106.00/Sandy Creek
Pace Project No.: 7579575

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
7579575001	**MW-1**	EPA 3010	89626	EPA 6010	89702
7579575001	**MW-1**	EPA 3010	97879	EPA 6010	97949
7579575002	**MW-2**	EPA 3010	89626	EPA 6010	89702
7579575002	**MW-2**	EPA 3010	97879	EPA 6010	97949
7579575003	**MW-3**	EPA 3010	89626	EPA 6010	89702
7579575003	**MW-3**	EPA 3010	97879	EPA 6010	97949
7579575004	**BW-1**	EPA 3010	89626	EPA 6010	89702
7579575004	**BW-1**	EPA 3010	97879	EPA 6010	97949
7579575005	**DUP**	EPA 3010	89626	EPA 6010	89702
7579575005	**DUP**	EPA 3010	97879	EPA 6010	97949
7579575001	**MW-1**	EPA 3010	98006	EPA 6020	98126
7579575002	**MW-2**	EPA 3010	98006	EPA 6020	98126
7579575003	**MW-3**	EPA 3010	98006	EPA 6020	98126
7579575004	**BW-1**	EPA 3010	98006	EPA 6020	98126
7579575005	**DUP**	EPA 3010	98006	EPA 6020	98126
7579575001	**MW-1**	EPA 7470	89710	EPA 7470	89738
7579575002	**MW-2**	EPA 7470	89710	EPA 7470	89738
7579575003	**MW-3**	EPA 7470	89710	EPA 7470	89738
7579575004	**BW-1**	EPA 7470	89710	EPA 7470	89738
7579575005	**DUP**	EPA 7470	89710	EPA 7470	89738
7579575001	**MW-1**	EPA 903.1	283643		
7579575002	**MW-2**	EPA 903.1	283643		
7579575003	**MW-3**	EPA 903.1	283643		
7579575004	**BW-1**	EPA 903.1	283643		
7579575005	**DUP**	EPA 903.1	283643		
7579575001	**MW-1**	EPA 904.0	283773		
7579575002	**MW-2**	EPA 904.0	283773		
7579575003	**MW-3**	EPA 904.0	283773		
7579575004	**BW-1**	EPA 904.0	283773		
7579575005	**DUP**	EPA 904.0	283773		
7579575001	**MW-1**	SM 2540C	89659		
7579575002	**MW-2**	SM 2540C	89790		
7579575003	**MW-3**	SM 2540C	89790		
7579575004	**BW-1**	SM 2540C	89790		
7579575005	**DUP**	SM 2540C	89790		
7579575001	**MW-1**	EPA 9040	89684		
7579575002	**MW-2**	EPA 9040	89684		
7579575003	**MW-3**	EPA 9040	89684		
7579575004	**BW-1**	EPA 9040	89684		
7579575005	**DUP**	EPA 9040	89684		

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 16215106.00/Sandy Creek
Pace Project No.: 7579575

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
7579575001	**MW-1**	EPA 9056A	90492		
7579575002	**MW-2**	EPA 9056A	90492		
7579575003	**MW-3**	EPA 9056A	90492		
7579575004	**BW-1**	EPA 9056A	90492		
7579575005	**DUP**	EPA 9056A	90492		

Pace Analytical®	Document Name: Sample Condition Upon Receipt	Document Revised: 09-26-17 Page 1 of 1
	Document No.: F-DAL-C-001-rev.07	Issuing Authority: Pace Dallas Quality Office

Sample Condition Upon Receipt

☒Dallas ☐Ft Worth

WO# : 7579575

7579575

Client Name: SCS Engineers Project Work order:

Courier: FedEx ☐ UPS ☐ USPS ☐ Client ☐ LSO ☐ PACE ☒ Other: ______

Tracking #: ______

Custody Seal on Cooler/Box: Yes ☐ No ☒ Seals Intact: Yes ☐ No ☐ NA ☒

Packing Material: Bubble Wrap ☐ Bubble Bags ☒ Foam ☒ None ☐ Other ☒

Thermometer Used: IR C5#4 Type of Ice: Wet ☒ Blue ☐ None ☐ Sample Received on ice, cooling process has begun ☒

Cooler Temp °C: 8.8 (Recorded) -0.5 (Correction Factor) 8.3 (Actual) ☐ (Thermal preservation not required)

Temp should be above freezing to 6°C

Chain of Custody Present	Yes ☒ No ☐ NA ☐	1
Chain of Custody filled out	Yes ☒ No ☐ NA ☐	2
Chain of Custody relinquished	Yes ☒ No ☐ NA ☐	3
Sampler name & signature on COC	Yes ☐ No ☒ NA ☐	4
Sample received within HT DCP 12/22/17	~~Yes ☒~~ No ☒ NA ☐	5 pH out of Hold
Short HT analyses (<72 hrs)	Yes ☒ No ☐ NA ☐	6
Rush TAT requested	Yes ☐ No ☒ NA ☐	7
Sufficient Volume received	Yes ☒ No ☐ NA ☐	8
Correct Container used Pace Container used	Yes ☒ No ☐ NA ☐ Yes ☒ No ☐ NA ☐	9
Container Intact	Yes ☒ No ☐ NA ☐	10
Unpreserved 5035A soil frozen within 48 hrs	Yes ☐ No ☐ NA ☒	11
Filtered volume received for Dissolved tests	Yes ☐ No ☐ NA ☒	12
Sample labels match COC Include date/time/ID/analyses Matrix: Water	Yes ☒ No ☐ NA ☐	13
All containers needing preservation have been checked and found to be in Compliance with EPA recommendation (includes residual chlorine checks) Exception: VOA, coliform, O&G	Yes ☒ No ☐ NA ☐ Yes ☐ No ☒	14a. pH Strip Lot #: 6705201 Original pH: pH<2 ☒ pH>9 ☐ pH>12 ☐ Neutral ☒ Lot# of Iodine strip: ______ Lot# of Lead Acetate strip: ______
Do containers require preservation at the lab Added 1.0/1.5mL HNO3 to sample (002,003)(RAD) respectively 12/22/17 DCP	Yes ☒ No ☐ NA ☐	14b. Preservation: HNO3 | Lot# and adjusted pH: 99448 pH<2 ☒ pH>9 ☐ pH>12
Are soil samples (volatiles) received in	Bulk ☐ Terracore ☐ EnCore ☐ NA ☒	15.
Trip Blank present Trip Blank Custody Seals Intact Pace Trip Blank Lot# (if purchased):	Yes ☐ No ☐ NA ☒ Yes ☐ No ☐ NA ☒	16.
Headspace in VOA (>6mm)	Yes ☐ No ☐ NA ☒	17.
Project sampled in USDA Regulated Area:	Yes ☒ No ☐	18. List State TX

Triage Person: BB Date: 12/22/17 Login Person: DCP Date: 12/22/17 Labeling Person: DCP Date: 12/22/17

Client Notification/Resolution/Comments:

Person Contacted: ______ Date: ______

Comments/Resolution: ______

Project Manager Review: [signature]

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

PaceAnalytical

Page : 1 Of 1

Section A — Required Client Information:

Company:	SCS Engineers
Address:	1901 Central Dr.
	Bedford, TX 76021
Email:	dsteen@scsengineers.com
Phone:	NONE
Fax:	
Requested Due Date:	

Section B — Required Project Information:

Report To:	Doug Steen
Copy To:	Jim Lawrence JLawrence@SCSEngineers.com
Purchase Order #:	20171220SAN
Project Name:	Sandy Creek
Project #:	16215106.00

Section C — Invoice Information:

Attention:	Krystal Kuntz KKuntz@scsengineers.com
Company Name:	SCS Engineers
Address:	1901 Central Dr. Ste 550 Bedford, TX 7602[illegible]
Pace Quote:	
Pace Project Manager:	vince.egyed@pacelabs.com,
Pace Profile #:	5660

Regulatory Agency	
State / Location	TX

MATRIX / CODE: Drinking Water DW; Water WT; Waste Water WW; Product P; Soil/Solid SL; Oil OL; Wipe WP; Air AR; Other OT; Tissue TS

SAMPLE ID — One Character per box. (A-Z, 0-9 / , -) Sample Ids must be unique

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED START DATE	START TIME	END DATE	END TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other	Analyses Test Y/N	Cl, F, SO4, TDS, pH	6010, 6020 metals, 7470 Hg	Radium 228	Radium 226	Residual Chlorine (Y/N)	7579575
1	MW-1	WT		12/20/17	12:55	—	—		5	1		4							X	X	X	X		EPA 9056,6010, 7470,EPA 7470A,EPA 903.1,EPA 904.0 001
2	MW-2	WT		12/20/17	13:25	—	—		5	1		4							X	X	X	X		EPA 9056,6010, 7470,EPA 7470A,EPA 903.1,EPA 904.0 002
3	MW-3	WT		12/20/17	13:55	—	—		5	1		4							X	X	X	X		EPA 9056,6010, 7470,EPA 7470A,EPA 903.1,EPA 904.0 003
4	BW-1	WT		12/20/17	12:10	—	—		5	1		4							X	X	X	X		EPA 9056,6010, 7470,EPA 7470A,EPA 903.1,EPA 904.0 004
5	DUP	WT		—	—	—	—		5	1		4							X	X	X	X		EPA 9056,6010, 7470,EPA 7470A,EPA 903.1,EPA 904.0 005
6																								
7																								
8																								
9																								
10																								
11																								
12																								

VTC-52

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
6010-As, Ba, Be, B, Cd, Cr, Co, Pb, Li, Mo, Se	Doug Steen [signature] /SCS	12-20-17	16:15	FedEx			
6020-Sb, Tl	FedEx	12/21/17	12:15	[signature] Pace	12/21/17	12:15	
	[signature] Pace	12/22/17	06:39	[signature] Pace	12/22/17	06:39	
	[signature] Pace	12/22/17	07:21	[signature] Pace	12/22/17	07:21	

APPENDIX C
HISTORICAL GROUNDWATER ANALYTICAL DATA

APPENDIX C - GROUNDWATER ANALYTICAL DATA

2017 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT

SANDY CREEK ENERGY STATION

2161 RATTLESNAKE ROAD

RIESEL, TX 76682

	Boron	Calcium	Chloride	pH at 25°C	Sulfate	Total Dissolved Solids	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium	Radium-226	Radium-228	Combined Radium	Fluoride
Units	mg/L	mg/L	mg/L	Std. Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pCi/L	pCi/L	pCi/L	mg/L
MW-1																							
12/14/2015	1.2	454	253	7.6	2090	4090	<0.0010	<0.0050	0.044	<0.0010	<0.0010	0.0073	<0.0025	<0.0050	0.43	<0.00020	<0.010	0.16	<0.00050	1.04 ± 0.838	1.09 ± 0.523	2.13	<0.30
2/25/2016	1.4	520	236	7.5	2190	4060	<0.0010	<0.0050	0.033	<0.0010	<0.0010	0.0074	<0.0025	0.0084	0.39	<0.00020	<0.010	0.2	<0.00050	0.922 ± 0.720	1.46 ± 0.496	2.382	<0.30
5/11/2016	2.6	1030	402	7.2	2580	5260	<0.0010	0.12	1	0.029	<0.0020	0.69	0.087	0.21	0.78	<0.00020	<0.020	0.039	0.00089	3.94 ± 1.31	8.39 ± 1.74	12.33	<0.30
8/16/2016	1.3	535	239	6.8	2300	3880	<0.0010	<0.0050	0.022	<0.0010	<0.0010	<0.0050	<0.0025	<0.0050	0.41	<0.00020	<0.010	0.13	<0.00050	0.593 ± 0.620	3.29 ± 0.828	3.883	0.35
11/17/2016	1.2	542	216	7	2130	3720	<0.0010	<0.0050	0.018	<0.0010	<0.0010	<0.0050	<0.0025	<0.0050	0.37	<0.00020	<0.020	0.16	<0.00050	0.338 ± 0.339	2.49 ± 0.783	2.828	<0.30
2/23/2017	1.3	531	223	7	2350	3980	<0.0010	<0.010	<0.20	<0.0050	<0.0050	<0.010	<0.010	<0.0050	0.44	<0.00020	<0.010	0.066	<0.00050	-0.207 ± 0.945	3.13 ± 0.908	2.923	<0.30
6/7/2017	1.2	530	203	7.5	2010	3680	<0.0010	<0.0050	0.019	<0.0010	<0.0010	<0.0050	<0.0025	<0.0050	0.36	<0.00020	<0.020	0.15	<0.00050	0.000 ± 0.449	1.30 ± 0.518	1.3	<0.30
8/24/2017	1.2	518	241	7.1	2620	4550	<0.0010	<0.0050	0.02	<0.0010	<0.0010	<0.0050	<0.0025	<0.0050	0.395	<0.00020	<0.020	0.17	<0.00050	0.577 ± 0.429	1.69 ± 0.634	2.267	0.4
12/20/2017	1.3	548	248	7.4	2340	4250	<0.0010	<0.0060	0.017	<0.0010	<0.0050	<0.0070	<0.0025	<0.010	0.38	<0.00020	<0.030	0.18	<0.00050	1.26 ± 0.680	2.46 ± 0.888	3.72	1.1
MW-2																							
12/14/2015	1.9	569	1890	6.7	2810	8520	<0.0010	<0.0050	0.031	<0.0010	<0.0010	<0.0050	0.0061	<0.0050	0.69	<0.00020	<0.010	<0.010	<0.00050	1.41 ± 0.938	2.76 ± 0.771	4.17	0.98
2/25/2016	2.4	697	2080	7.3	2890	8070	<0.0010	0.014	0.038	<0.0010	<0.0010	<0.0050	<0.011	<0.0050	0.74	<0.00020	<0.010	<0.010	<0.00050	0.857 ± 0.590	2.57 ± 0.665	3.427	<0.30
5/11/2016	2.2	613	2340	6.7	3010	9930	<0.0010	0.0059	0.027	<0.0010	<0.0010	<0.0050	0.0079	<0.0050	0.87	<0.00020	<0.010	<0.010	<0.00050	0.859 ± 0.561	3.13 ± 0.822	3.989	<0.30
8/16/2016	2.1	680	2440	6.7	3080	7870	<0.0020	<0.0050	0.021	<0.0010	<0.0010	<0.0050	0.0084	<0.0050	0.84	<0.00020	<0.010	<0.010	<0.0010	0.237 ± 0.329	3.28 ± 0.775	3.517	0.64
11/17/2016	1.9	701	2140	6.7	2770	9680	<0.0010	0.0059	0.024	<0.0010	<0.0010	<0.0050	0.0064	<0.0050	0.82	<0.00020	0.024	<0.010	<0.00050	0.923 ± 0.594	3.16 ± 0.826	4.083	0.35
2/23/2017	1.9	646	2320	6.9	3110	9630	<0.0010	<0.010	<0.20	<0.0050	<0.0050	<0.010	<0.010	<0.0050	0.8	<0.00020	<0.010	<0.020	<0.00050	1.52 ± 1.50	4.27 ± 1.07	5.79	0.46
6/7/2017	1.9	640	2420	7.5	2970	14200	<0.0010	<0.0050	0.016	<0.0010	<0.0010	<0.0050	0.0051	<0.0050	0.75	<0.00020	<0.020	<0.010	<0.00050	0.344 ± 0.415	3.82 ± 0.931	4.164	1.3
8/24/2017	1.9	664	2520	6.8	3710	9600	<0.0010	<0.010	0.017	<0.0010	<0.0020	<0.0050	0.0065	<0.010	0.729	<0.00020	<0.020	0.026	<0.00050	1.12 ± 0.610	3.78 ± 0.960	4.9	0.32
12/20/2017	2.2	716	2590	7.2	3100	9600	<0.0010	<0.012	0.022	<0.0010	<0.010	<0.014	0.0072	<0.020	0.74	<0.00020	<0.030	<0.040	<0.00050	0.945 ± 0.578	4.07 ± 0.940	5.015	<0.50
MW-3																							
12/14/2015	0.35	67.6	12.3	7.2	135	586	<0.0010	<0.0050	0.021	<0.0010	<0.0010	<0.0050	<0.0025	<0.0050	<0.050	<0.00020	<0.010	<0.010	<0.00050	0.997 ± 0.813	0.736 ± 0.505	1.733	0.62
2/25/2016	1.2	479	347	7	2430	5400	<0.0010	0.0061	0.052	<0.0010	<0.0010	<0.0050	0.0098	<0.0050	0.85	<0.00020	<0.010	<0.010	<0.00050	1.26 ± 0.762	3.02 ± 0.791	4.28	0.9
5/11/2016	1.1	465	349	6.5	2330	5440	<0.0010	<0.0050	0.024	<0.0010	<0.0010	<0.0050	0.0059	<0.0050	0.65	<0.00020	<0.010	<0.010	<0.00050	1.54 ± 0.797	1.62 ± 0.547	3.16	<0.30
8/16/2016	1.2	505	381	7.3	2950	5680	<0.0010	<0.0050	0.018	<0.0010	<0.0010	<0.0050	0.006	<0.0050	0.98	<0.00020	<0.010	<0.010	<0.00050	0.891 ± 0.626	5.10 ± 1.13	5.991	<0.30
11/17/2016	1.1	494	322	6.6	2420	5420	<0.0010	<0.0050	0.028	<0.0010	<0.0010	<0.0050	0.0068	<0.0050	0.94	<0.00020	<0.020	<0.010	<0.00050	0.872 ± .0579	5.23 ± 1.30	6.102	<0.30
2/23/2017	1.1	389	202	7	1450	2900	<0.0010	<0.010	<0.20	<0.0050	<0.0050	<0.010	<0.010	<0.0050	0.7	<0.00020	<0.010	<0.020	<0.00050	-0.239 ± 1.09	4.07 ± 1.03	3.831	0.45
6/7/2017	1.2	486	327	7.1	2260	4740	<0.0010	<0.0050	0.015	<0.0010	<0.0010	<0.0050	0.0058	<0.0050	0.62	<0.00020	<0.020	<0.010	<0.00050	0.941 ± 0.658	2.76 ± 0.765	3.701	0.57
8/24/2017	1.1	519	401	6.5	2890	6160	<0.0010	<0.010	0.014	<0.0010	<0.0020	<0.0050	0.0084	<0.010	1.03	<0.00020	<0.020	<0.020	<0.00050	1.26 ± 0.600	4.41 ± 1.07	5.67	<0.30
12/20/2017	1.3	563	380	6.8	2830	5790	<0.0010	<0.0060	0.034	<0.0010	<0.0050	<0.0070	0.0086	<0.010	0.92	<0.00020	<0.030	<0.020	<0.00050	0.626 ± 0.567	2.77 ± 0.728	3.396	0.61
BW-1																							
12/14/2015	1.8	465	727	9.5	2130	4900	<0.0010	<0.0050	0.17	<0.0010	<0.0010	0.015	0.0026	<0.0050	0.7	<0.00020	<0.010	<0.010	0.00073	0.900 ± 0.728	1.13 ± 0.513	2.03	<0.30
2/25/2016	3.5	586	1050	7.4	2690	6420	<0.0010	0.015	0.055	<0.0010	<0.0010	0.0053	0.0035	0.0069	0.71	<0.00020	<0.010	<0.010	<0.00050	0.887 ± 0.697	1.82 ± 0.541	2.707	0.67
5/11/2016	4	566	1120	7	2610	6360	<0.0010	0.0084	0.04	<0.0010	<0.0010	0.011	0.0035	0.0091	0.79	<0.00020	<0.010	<0.010	<0.00050	2.40 ± 0.944	2.80 ± 0.710	5.2	0.32
8/16/2016	3.7	566	1130	7.2	2720	6280	<0.0010	0.0064	0.04	<0.0010	<0.0010	0.0073	0.0029	<0.0050	0.78	<0.00020	<0.010	<0.010	<0.00050	0.610 ± 0.483	3.42 ± 0.777	4.03	0.94
11/17/2016	2.8	548	991	6.8	2590	6400	<0.0010	0.0066	0.023	<0.0010	<0.0010	<0.0050	<0.0025	<0.0050	0.74	<0.00020	0.022	<0.010	<0.00050	0.605 ± 0.548	2.94 ± 0.799	3.545	0.85
2/23/2017	3.1	532	1080	7.2	2760	6280	<0.0010	<0.010	<0.20	<0.0050	<0.0050	<0.010	<0.010	<0.0050	0.73	<0.00020	<0.010	<0.020	<0.00050	0.816 ± .0983	4.07 ± 1.08	4.886	<0.30
6/7/2017	3.8	539	1020	7.7	2220	7320	<0.0010	<0.0050	0.026	<0.0010	<0.0010	<0.0050	<0.0025	<0.0050	0.79	<0.00020	<0.020	<0.010	<0.00050	1.36 ± 0.685	3.13 ± 0.783	4.49	<0.30
8/24/2017	3.4	531	1160	7.1	2870	7260	<0.0010	<0.010	0.037	<0.0010	<0.0020	<0.0050	<0.0050	<0.010	0.738	<0.00020	<0.020	<0.020	<0.00050	1.58 ± 0.602	2.80 ± 0.759	4.38	0.37
12/20/2017	3.5	658	1030	7.2	2620	6140	<0.0010	<0.0060	0.044	<0.0010	<0.0050	<0.0070	0.0034	<0.010	0.73	<0.00020	<0.030	<0.020	<0.00050	1.07 ± 0.681	3.13 ± 0.788	4.2	<0.50
MCL	n/a	n/a	n/a	n/a	n/a	n/a	0.006	0.01	2	0.004	0.005	0.1	n/a	0.015	n/a	0.002	n/a	0.05	0.002	n/a	n/a	5	4

MCL - EPA Primary Drinking Water Maximum Contaminant Level

0.015 Exceedance of EPA Primary MCL

40 CFR 257 Appendix III Constituent

40 CFR 257 Appendix IV Constituent

40 CFR 257 Appendix III & IV Constituent

"<" - Indicates analyte was not detected above the laboratory reporting limit

"n/a" - Indicates constituent has no EPA Primary MCL

APPENDIX D
DECEMBER 2017 RESULTS AND STATISTICAL LIMITS

Appendix D – December 2017 Results and Statistical Limits - MW-1						
MW-ID	CFR 257 Appendix	Constituent	Lab Result	MCL	Statistical Limit	Statistical Method
MW-1	III	Boron (mg/L)	1.3	n/a	2.6	Non-Parametric Prediction Limit
		Calcium (mg/L)	548	n/a	1030	Non-Parametric Prediction Limit
		Chloride (mg/L)	248	n/a	402	Non-Parametric Prediction Limit
		pH at 25˚C	7.4	n/a	6.136 - 8.289	Parametric Prediction Limit
		Sulfate (mg/L)	2340	n/a	3402	Shewhart-Cusum Control Chart
		TDS (mg/L)	4250	n/a	6765	Shewhart-Cusum Control Chart
		Fluoride (mg/L)	**1.1**	**4**	**0.4**	**Non-Parametric Prediction Limit**
	IV	Antimony (mg/L)	<0.0010	0.006	0.001	Non-Parametric Prediction Limit
		Arsenic (mg/L)	<0.0060	0.01	0.12	Non-Parametric Prediction Limit
		Barium (mg/L)	0.017	2	1	Non-Parametric Prediction Limit
		Beryllium (mg/L)	<0.0010	0.004	0.029	Non-Parametric Prediction Limit
		Cadmium (mg/L)	<0.0050	0.005	0.001	Non-Parametric Prediction Limit
		Chromium (mg/L)	<0.0070	0.1	0.69	Non-Parametric Prediction Limit
		Cobalt (mg/L)	<0.0025	n/a	0.087	Non-Parametric Prediction Limit
		Lead (mg/L)	<0.010	0.015	0.21	Non-Parametric Prediction Limit
		Lithium (mg/L)	0.38	n/a	0.78	Non-Parametric Prediction Limit
		Mercury (mg/L)	<0.00020	0.002	0.0002	Non-Parametric Prediction Limit
		Molybdenum (mg/L)	<0.030	n/a	0.02	Non-Parametric Prediction Limit
		Selenium (mg/L)	0.18	0.05	0.2535	Shewhart-Cusum Control Chart
		Thallium (mg/L)	<0.00050	0.002	0.00089	Non-Parametric Prediction Limit
		Radium - 226 (pCi/L)	1.26 ± 0.680	n/a	n/a	n/a
		Radium - 228 (pCi/L)	2.46 ± 0.888	n/a	n/a	n/a
		Combined Radium (pCi/L)	3.72	5	12.33	Non-Parametric Prediction Limit
		Fluoride (mg/L)	**1.1**	**4**	**0.4**	**Non-Parametric Prediction Limit**

Bolded value indicates that consituent exceeded intrawell statistical limit

Appendix D – December 2017 Results and Statistical Limits - MW-2						
MW-ID	**CFR 257 Appendix**	**Constituent**	**Lab Result**	**MCL**	**Statistical Limit**	**Statistical Method**
MW-2	**III**	Boron (mg/L)	2.2	n/a	2.4	Non-Parametric Prediction Limit
		Calcium (mg/L)	716	n/a	874.4	Shewhart-Cusum Control Chart
		Chloride (mg/L)	2590	n/a	3336	Shewhart-Cusum Control Chart
		pH at 25˚C	7.2	n/a	6.7 - 7.5	Non-Parametric Prediction Limit
		Sulfate (mg/L)	3100	n/a	4635	Shewhart-Cusum Control Chart
		TDS (mg/L)	9600	n/a	23969	Shewhart-Cusum Control Chart
		Fluoride* (mg/L)	<0.50	4	2.831	Shewhart-Cusum Control Chart
	IV	Antimony (mg/L)	<0.0010	0.006	0.001	Non-Parametric Prediction Limit
		Arsenic (mg/L)	<0.012	0.01	0.014	Non-Parametric Prediction Limit
		Barium (mg/L)	0.022	2	0.5299	Shewhart-Cusum Control Chart
		Beryllium (mg/L)	<0.0010	0.004	0.001	Non-Parametric Prediction Limit
		Cadmium (mg/L)*	<0.010	0.005	0.002	Non-Parametric Prediction Limit
		Chromium (mg/L)*	<0.014	0.1	0.005	Non-Parametric Prediction Limit
		Cobalt (mg/L)	0.0072	n/a	0.02189	Shewhart-Cusum Control Chart
		Lead (mg/L)	<0.020	0.015	0.01	Non-Parametric Prediction Limit
		Lithium (mg/L)	0.74	n/a	1.09	Shewhart-Cusum Control Chart
		Mercury (mg/L)	<0.00020	0.002	0.0002	Non-Parametric Prediction Limit
		Molybdenum (mg/L)	<0.030	n/a	0.024	Non-Parametric Prediction Limit
		Selenium (mg/L)	<0.040	0.05	0.026	Non-Parametric Prediction Limit
		Thallium (mg/L)	<0.00050	0.002	0.0005	Non-Parametric Prediction Limit
		Radium - 226 (pCi/L)	0.945 ± 0.578	n/a	n/a	n/a
		Radium - 228 (pCi/L)	4.07 ± 0.940	n/a	n/a	n/a
		Combined Radium (pCi/L)	5.015	5	8.09	Shewhart-Cusum Control Chart
		Fluoride (mg/L)	<0.50	4	2.831	Shewhart-Cusum Control Chart

Bolded value indicates that consituent exceeded intrawell statistical limit

Appendix D – December 2017 Results and Statistical Limits - MW-3						
MW-ID	**CFR 257 Appendix**	**Constituent**	**Lab Result**	**MCL**	**Statistical Limit**	**Statistical Method**
MW-3	III	**Boron (mg/L)**	**1.3**	**n/a**	**1.2**	**Non-Parametric Prediction Limit**
		Calcium (mg/L)	563	n/a	688.1	Shewhart-Cusum Control Chart
		Chloride (mg/L)	380	n/a	606.9	Shewhart-Cusum Control Chart
		pH at 25˚C	6.8	n/a	8.09 - 5.71	Parametric Prediction Limit
		Sulfate (mg/L)	2830	n/a	4447	Shewhart-Cusum Control Chart
		TDS (mg/L)	5790	n/a	9375	Shewhart-Cusum Control Chart
		Fluoride* (mg/L)	0.61	4	2.201	Shewhart-Cusum Control Chart
	IV	Antimony (mg/L)	<0.0010	0.006	0.001	Non-Parametric Prediction Limit
		Arsenic (mg/L)	<0.0060	0.01	0.0061	Non-Parametric Prediction Limit
		Barium (mg/L)	0.034	2	0.3241	Shewhart-Cusum Control Chart
		Beryllium (mg/L)	<0.0010	0.004	0.001	Non-Parametric Prediction Limit
		Cadmium (mg/L)	<0.0050	0.005	0.002	Non-Parametric Prediction Limit
		Chromium (mg/L)	<0.0070	0.1	0.005	Non-Parametric Prediction Limit
		Cobalt (mg/L)	0.0086	n/a	0.02018	Shewhart-Cusum Control Chart
		Lead (mg/L)	<0.010	0.015	0.01	Non-Parametric Prediction Limit
		Lithium (mg/L)	0.92	n/a	2.336	Shewhart-Cusum Control Chart
		Mercury (mg/L)	<0.00020	0.002	0.0002	Non-Parametric Prediction Limit
		Molybdenum (mg/L)	<0.030	n/a	0.02	Non-Parametric Prediction Limit
		Selenium (mg/L)	<0.020	0.05	0.02	Non-Parametric Prediction Limit
		Thallium (mg/L)	<0.00050	0.002	0.0005	Non-Parametric Prediction Limit
		Radium - 226 (pCi/L)	0.626 ± 0.567	n/a	n/a	n/a
		Radium - 228 (pCi/L)	2.77 ± 0.728	n/a	n/a	n/a
		Combined Radium (pCi/L)	3.396	5	11.97	Shewhart-Cusum Control Chart
		Fluoride (mg/L)	0.61	4	2.201	Shewhart-Cusum Control Chart

Bolded value indicates that consituent exceeded intrawell statistical limit

Appendix D – December 2017 Results and Statistical Limits - BW-1						
MW-ID	**CFR 257 Appendix**	**Constituent**	**Lab Result**	**MCL**	**Statistical Limit**	**Statistical Method**
BW-1	III	Boron (mg/L)	3.5	n/a	6.787	Shewhart-Cusum Control Chart
		Calcium (mg/L)	658	n/a	723.7	Shewhart-Cusum Control Chart
		Chloride (mg/L)	1030	n/a	1540	Shewhart-Cusum Control Chart
		pH at 25˚C	7.2	n/a	6.8 - 9.5	Non-Parametric Prediction Limit
		Sulfate (mg/L)	2620	n/a	3884	Shewhart-Cusum Control Chart
		TDS (mg/L)	6140	n/a	10119	Shewhart-Cusum Control Chart
		Fluoride* (mg/L)	<0.50	4	2.356	Shewhart-Cusum Control Chart
	IV	Antimony (mg/L)	<0.0010	0.006	0.001	Non-Parametric Prediction Limit
		Arsenic (mg/L)	<0.0060	0.01	0.02645	Shewhart-Cusum Control Chart
		Barium (mg/L)	0.044	2	0.4562	Shewhart-Cusum Control Chart
		Beryllium (mg/L)	<0.0010	0.004	0.001	Non-Parametric Prediction Limit
		Cadmium (mg/L)	<0.0050	0.005	0.002	Non-Parametric Prediction Limit
		Chromium (mg/L)	<0.0070	0.1	0.02912	Shewhart-Cusum Control Chart
		Cobalt (mg/L)	0.0034	n/a	0.04052	Shewhart-Cusum Control Chart
		Lead (mg/L)	<0.010	0.015	0.0091	Non-Parametric Prediction Limit
		Lithium (mg/L)	0.73	n/a	0.9244	Shewhart-Cusum Control Chart
		Mercury (mg/L)	<0.00020	0.002	0.0002	Non-Parametric Prediction Limit
		Molybdenum (mg/L)	<0.030	n/a	0.022	Non-Parametric Prediction Limit
		Selenium (mg/L)	<0.020	0.05	0.02	Non-Parametric Prediction Limit
		Thallium (mg/L)	<0.00050	0.002	0.00073	Non-Parametric Prediction Limit
		Radium - 226 (pCi/L)	1.07 ± 0.681	n/a	n/a	n/a
		Radium - 228 (pCi/L)	3.13 ± 0.788	n/a	n/a	n/a
		Combined Radium (pCi/L)	4.2	5	9.354	Shewhart-Cusum Control Chart
		Fluoride (mg/L)	<0.50	4	2.356	Shewhart-Cusum Control Chart

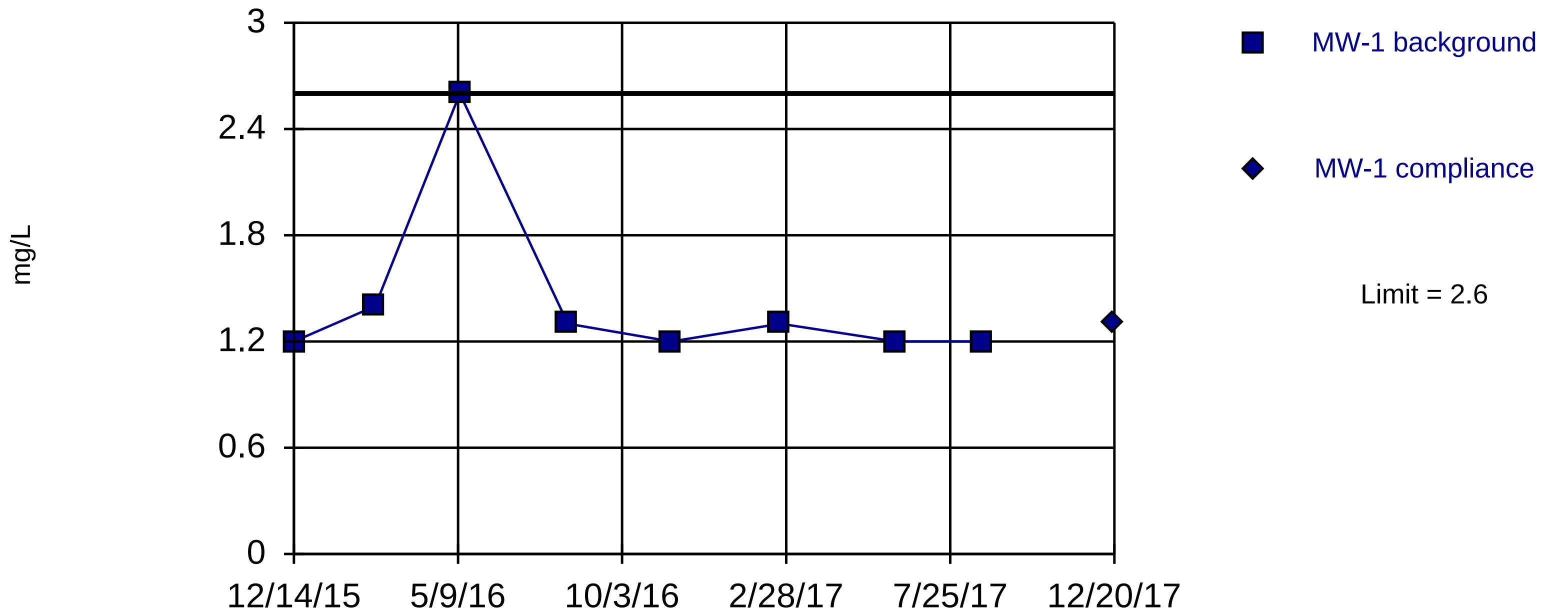
Bolded value indicates that consituent exceeded intrawell statistical limit

APPENDIX E
STATISTICAL ANALYSIS GRAPHS

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because the Shapiro Wilk normality test showed the data to be non-normal at the 0.05 alpha level. Limit is highest of 8 background values. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Boron   Analysis Run 1/25/2018 11:37 AM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Boron (mg/L) Analysis Run 1/25/2018 11:38 AM

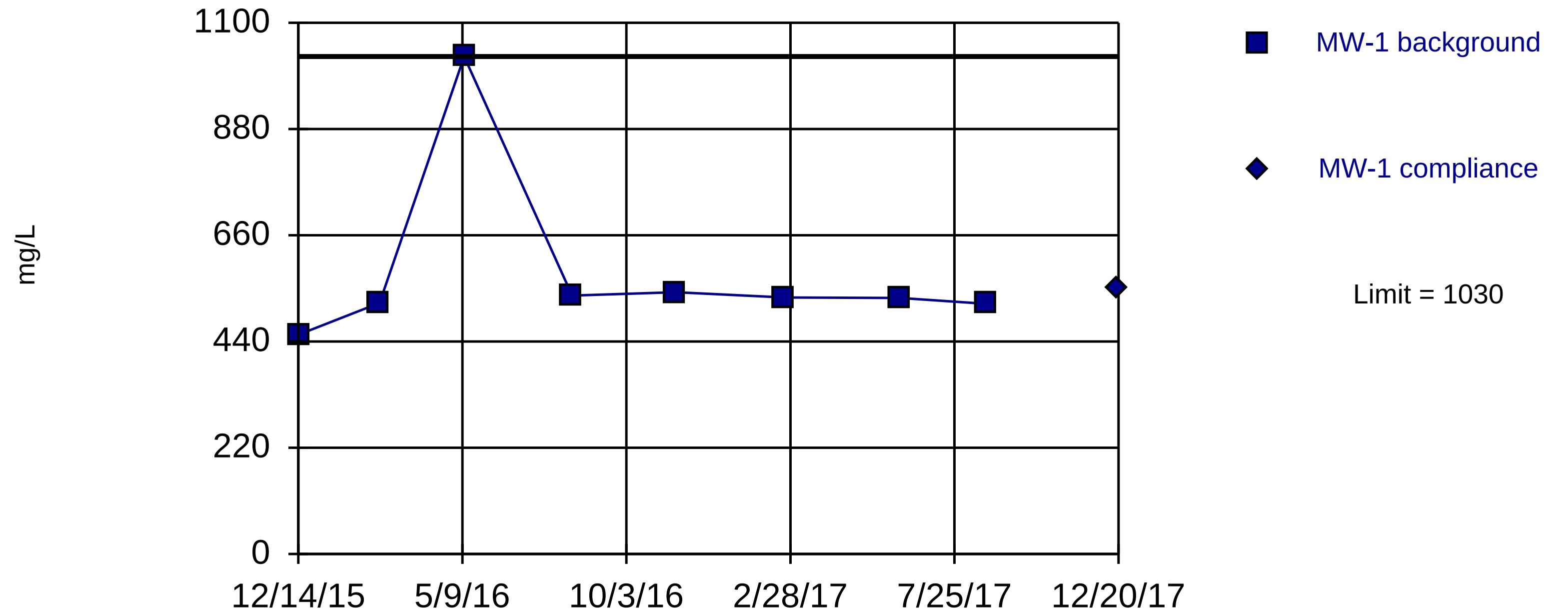
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-1	MW-1
12/14/2015	1.2	
2/25/2016	1.4	
5/11/2016	2.6	
8/16/2016	1.3	
11/17/2016	1.2	
2/23/2017	1.3	
6/7/2017	1.2	
8/24/2017	1.2	
12/20/2017		1.3

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because the Shapiro Wilk normality test showed the data to be non-normal at the 0.05 alpha level. Limit is highest of 8 background values. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Calcium   Analysis Run 1/26/2018 10:15 AM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Calcium (mg/L) Analysis Run 1/26/2018 10:16 AM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-1	MW-1
12/14/2015	454	
2/25/2016	520	
5/11/2016	1030	
8/16/2016	535	
11/17/2016	542	
2/23/2017	531	
6/7/2017	530	
8/24/2017	518	
12/20/2017		548

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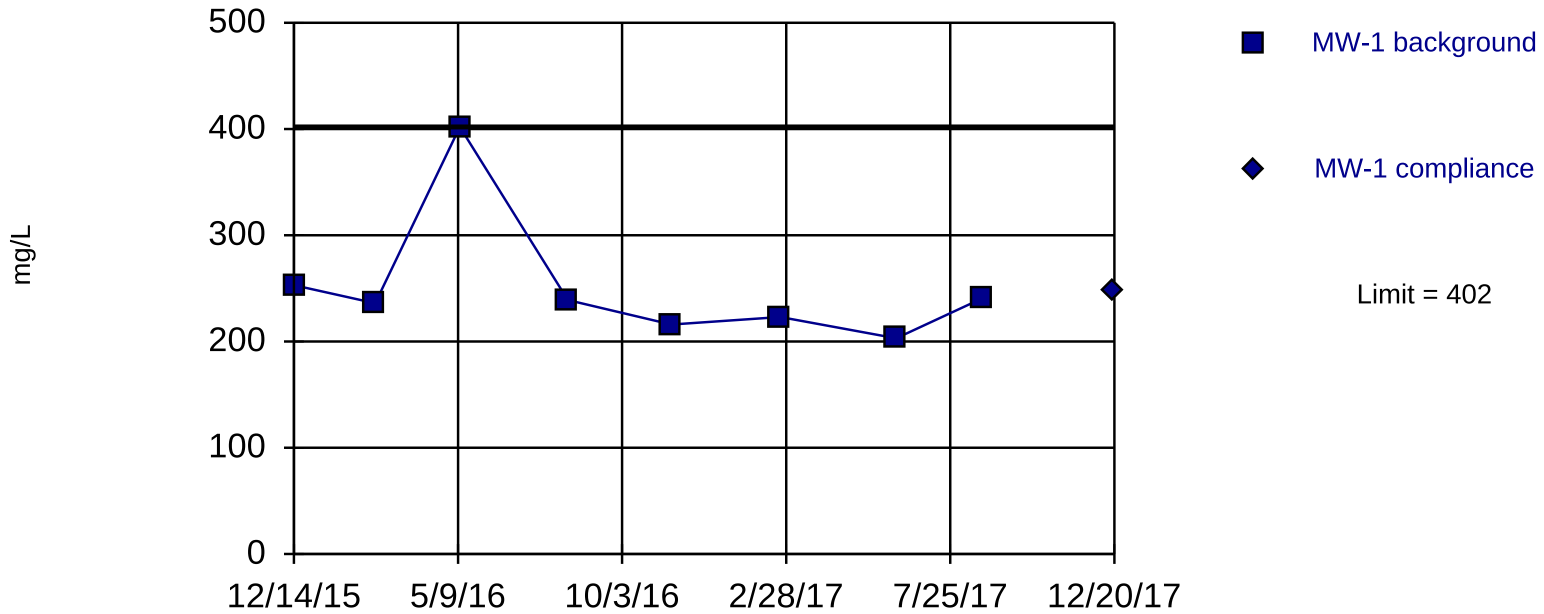
Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because the Shapiro Wilk normality test showed the data to be non-normal at the 0.05 alpha level. Limit is highest of 8 background values. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Chloride   Analysis Run 1/25/2018 11:37 AM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Chloride (mg/L)   Analysis Run 1/25/2018 11:38 AM

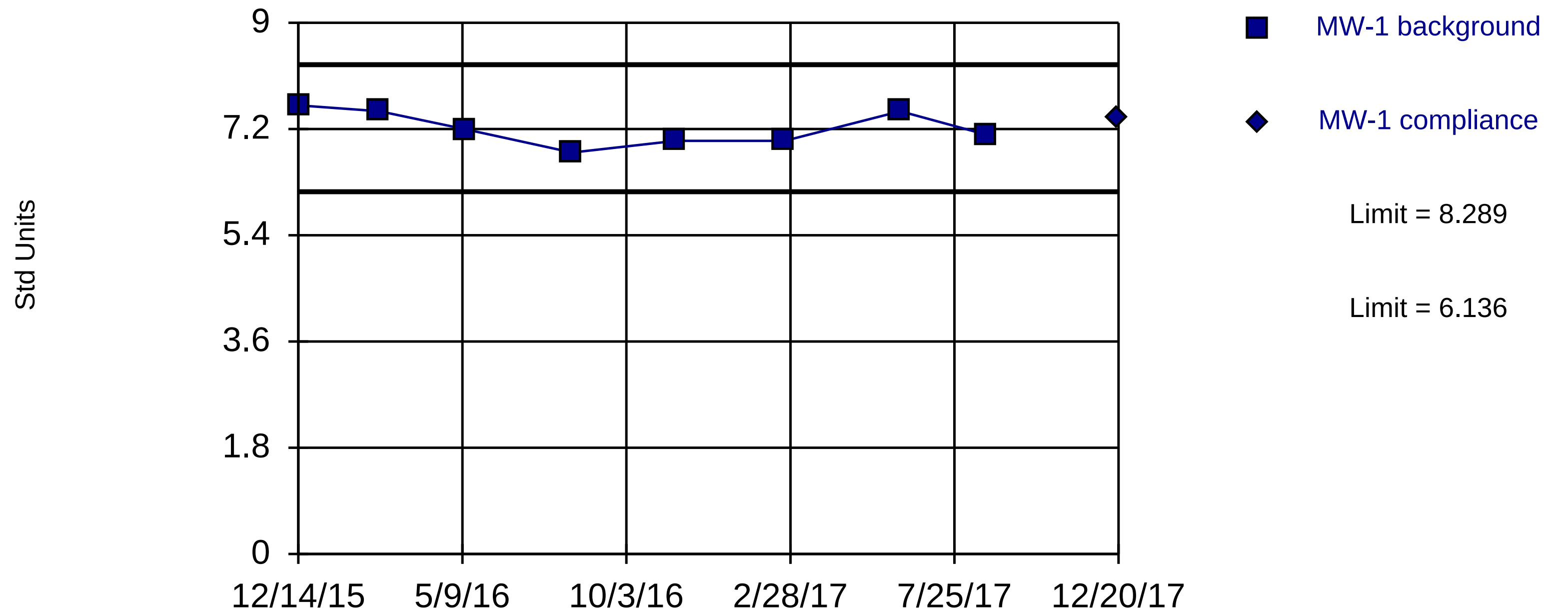
Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-1	MW-1
12/14/2015	253	
2/25/2016	236	
5/11/2016	402	
8/16/2016	239	
11/17/2016	216	
2/23/2017	223	
6/7/2017	203	
8/24/2017	241	
12/20/2017		248

Within Limits

Prediction Limit

Intrawell Parametric



Background Data Summary: Mean=7.213, Std. Dev.=0.29, n=8. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9179, critical = 0.818. Report alpha = 0.01. Most recent point compared to limit.

Constituent: pH Analysis Run 1/25/2018 11:42 AM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

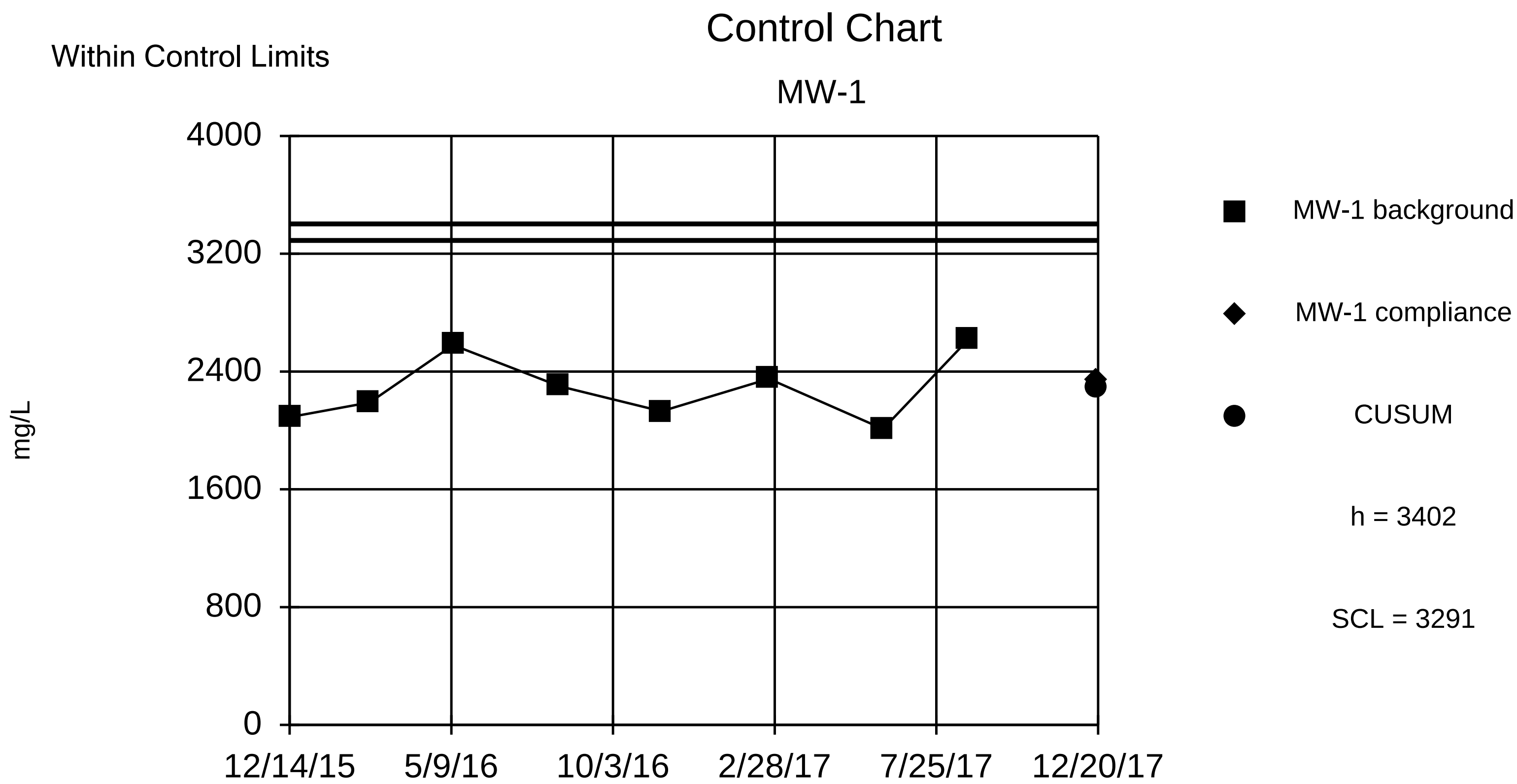
Prediction Limit

Constituent: pH (Std Units)   Analysis Run 1/25/2018 11:43 AM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-1	MW-1
12/14/2015	7.6	
2/25/2016	7.5	
5/11/2016	7.2	
8/16/2016	6.8	
11/17/2016	7	
2/23/2017	7	
6/7/2017	7.5	
8/24/2017	7.1	
12/20/2017		7.4

Within Control Limits



Background Data Summary: Mean=2284, Std. Dev.=223.7, n=8. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9231, critical = 0.818. Report alpha = 0.00205. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Sulfate   Analysis Run 1/25/2018 11:37 AM

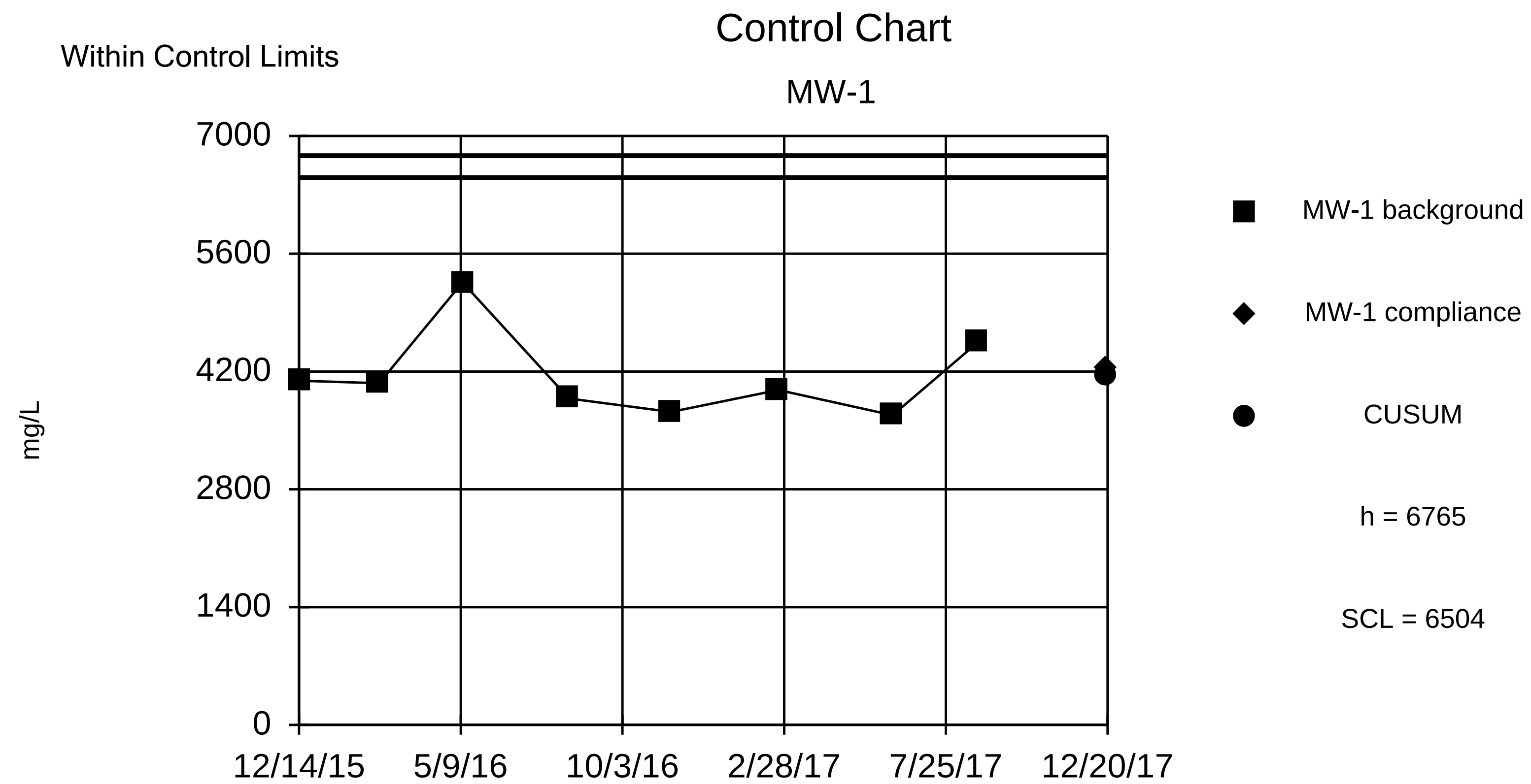
Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart

Constituent: Sulfate (mg/L)   Analysis Run 1/25/2018 11:38 AM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-1	MW-1	Std. Mean	CUSUM
12/14/2015	2090			
2/25/2016	2190			
5/11/2016	2580			
8/16/2016	2300			
11/17/2016	2130			
2/23/2017	2350			
6/7/2017	2010			
8/24/2017	2620			
12/20/2017		2340	0.2514	2284



Background Data Summary: Mean=4153, Std. Dev.=522.5, n=8. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8305, critical = 0.818. Report alpha = 0.00205. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Total Dissolved Solids Analysis Run 1/25/2018 11:37 AM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart

Constituent: Total Dissolved Solids (mg/L)   Analysis Run 1/25/2018 11:38 AM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-1	MW-1	Std. Mean	CUSUM
12/14/2015	4090			
2/25/2016	4060			
5/11/2016	5260			
8/16/2016	3880			
11/17/2016	3720			
2/23/2017	3980			
6/7/2017	3680			
8/24/2017	4550			
12/20/2017		4250	0.1866	4153

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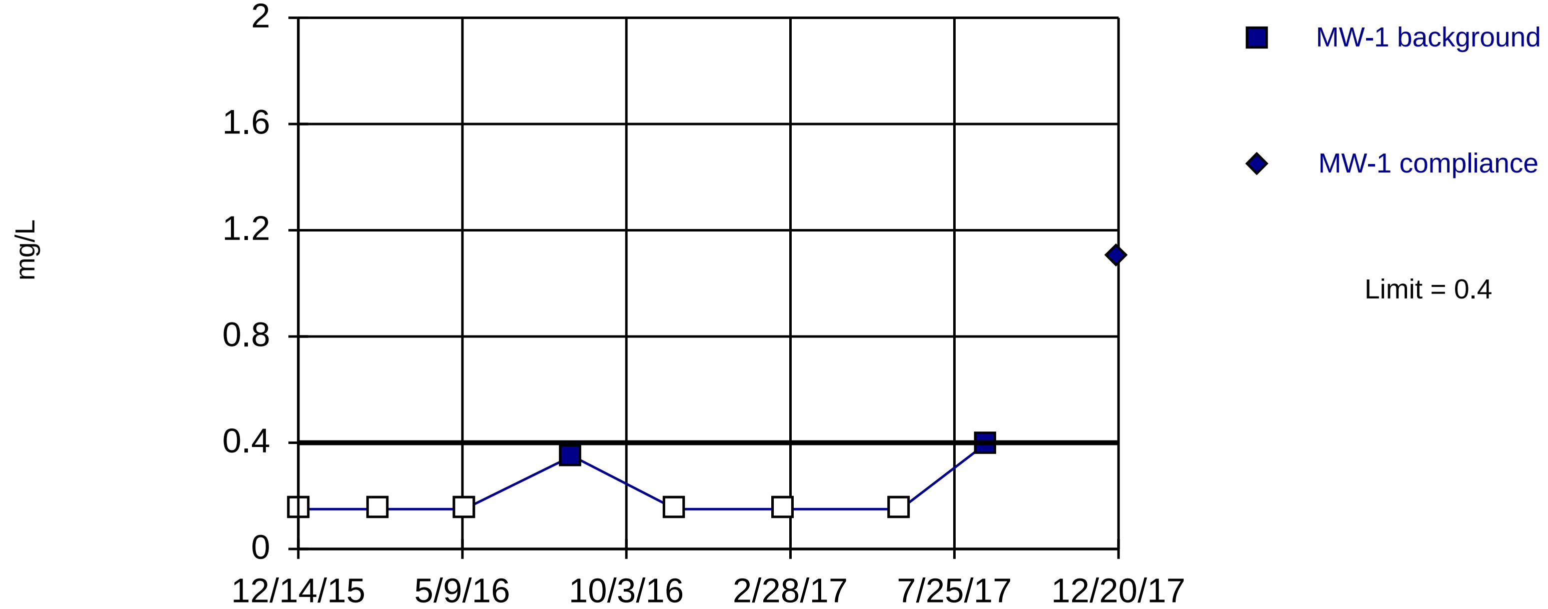
Hollow symbols indicate censored values.

Exceeds Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. Limit is highest of 8 background values. 75% NDs. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Fluoride Analysis Run 1/25/2018 11:37 AM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Fluoride (mg/L)   Analysis Run 1/25/2018 11:38 AM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-1	MW-1
12/14/2015	<0.3	
2/25/2016	<0.3	
5/11/2016	<0.3	
8/16/2016	0.35	
11/17/2016	<0.3	
2/23/2017	<0.3	
6/7/2017	<0.3	
8/24/2017	0.4	
12/20/2017		1.1

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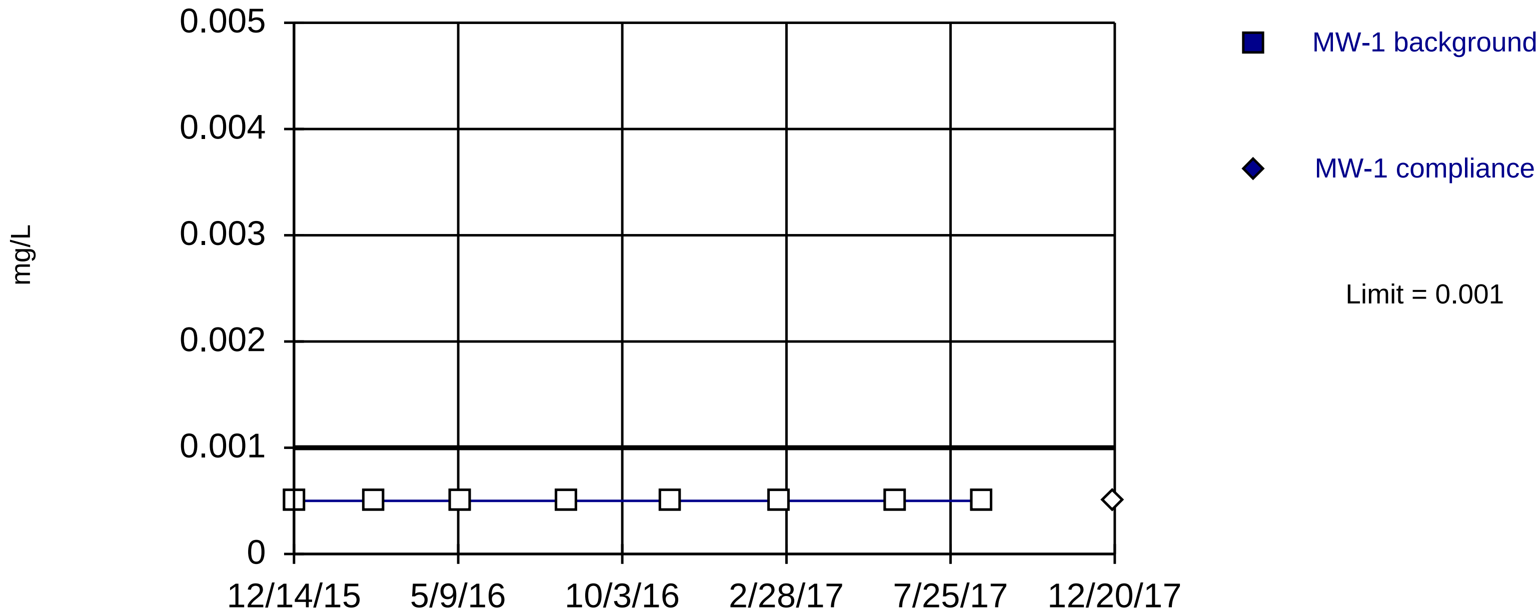
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. All background values (n = 8) were censored; limit is most recent reporting limit. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Antimony Analysis Run 1/25/2018 11:58 AM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Antimony (mg/L)   Analysis Run 1/25/2018 12:04 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-1	MW-1
12/14/2015	<0.001	
2/25/2016	<0.001	
5/11/2016	<0.001	
8/16/2016	<0.001	
11/17/2016	<0.001	
2/23/2017	<0.001	
6/7/2017	<0.001	
8/24/2017	<0.001	
12/20/2017		<0.001

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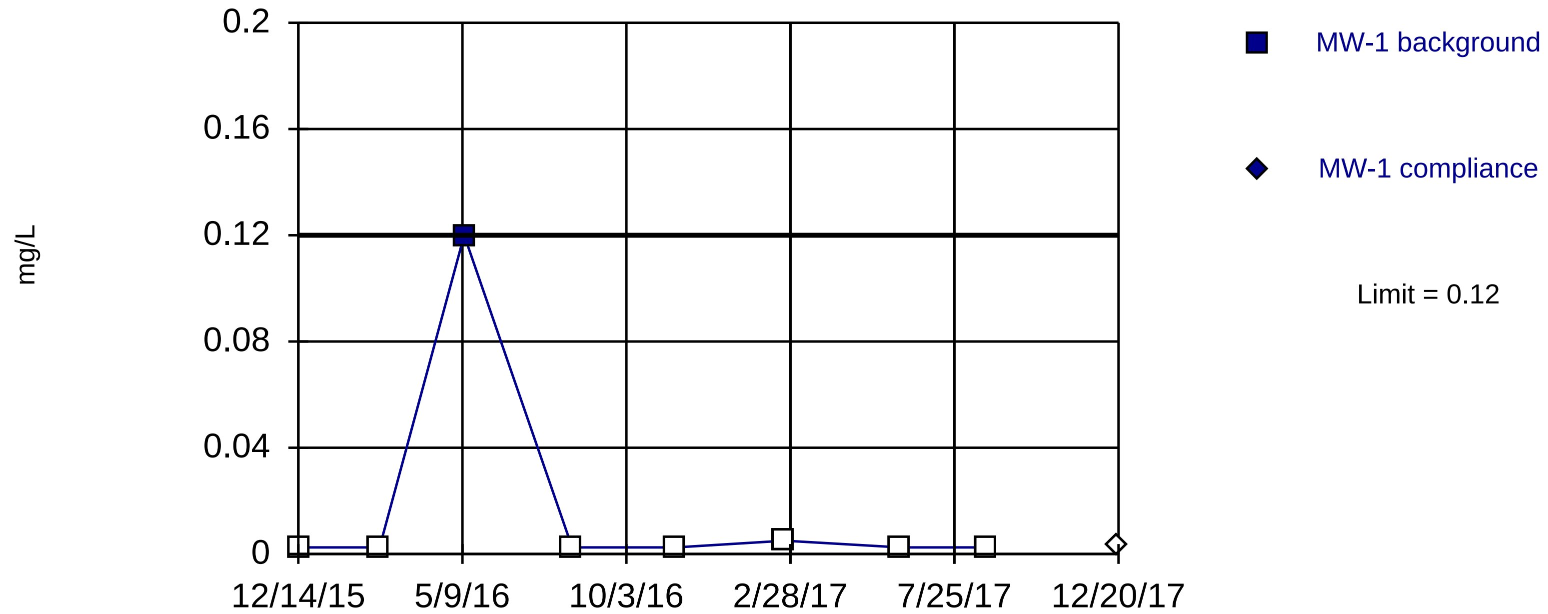
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. Limit is highest of 8 background values. 87.5% NDs. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Arsenic   Analysis Run 1/25/2018 11:58 AM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Arsenic (mg/L)   Analysis Run 1/25/2018 12:04 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-1	MW-1
12/14/2015	<0.005	
2/25/2016	<0.005	
5/11/2016	0.12	
8/16/2016	<0.005	
11/17/2016	<0.005	
2/23/2017	<0.01	
6/7/2017	<0.005	
8/24/2017	<0.005	
12/20/2017		<0.006

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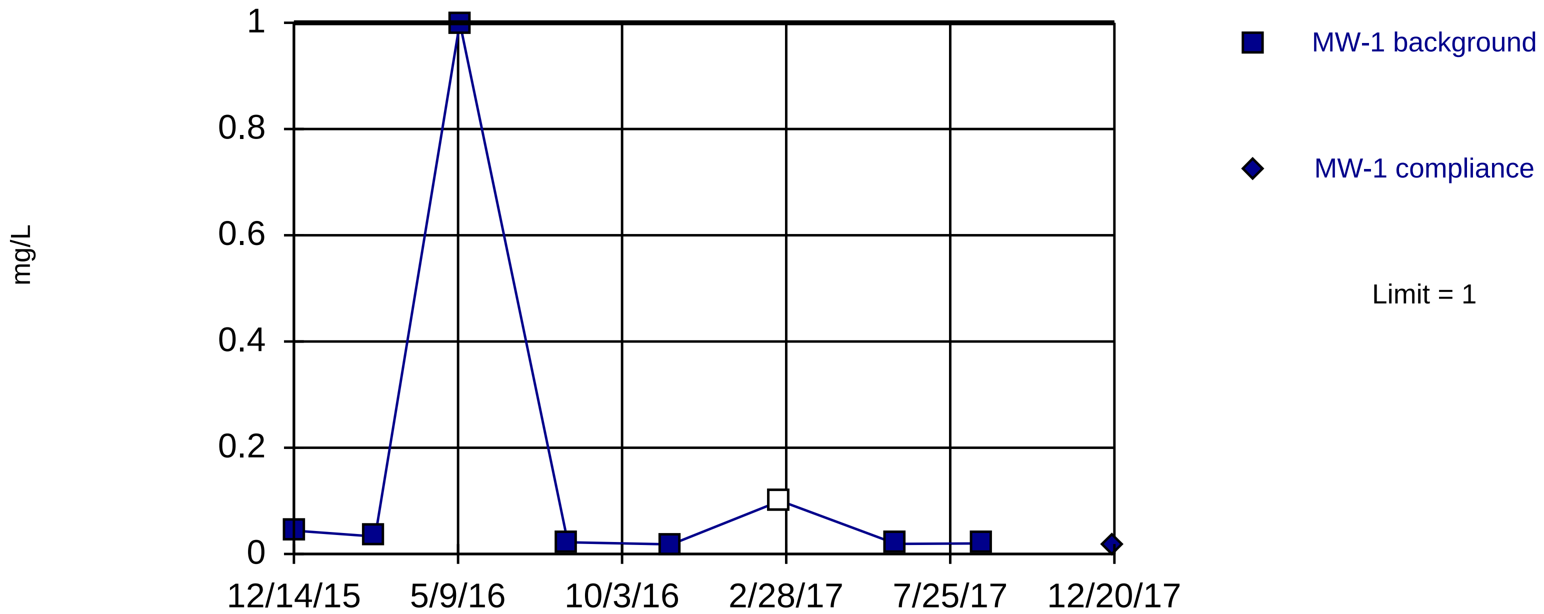
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because the Shapiro Wilk normality test showed the data to be non-normal at the 0.05 alpha level. Limit is highest of 8 background values. 12.5% NDs. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Barium   Analysis Run 1/25/2018 11:58 AM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Barium (mg/L)   Analysis Run 1/25/2018 12:04 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-1	MW-1
12/14/2015	0.044	
2/25/2016	0.033	
5/11/2016	1	
8/16/2016	0.022	
11/17/2016	0.018	
2/23/2017	<0.2	
6/7/2017	0.019	
8/24/2017	0.02	
12/20/2017		0.017

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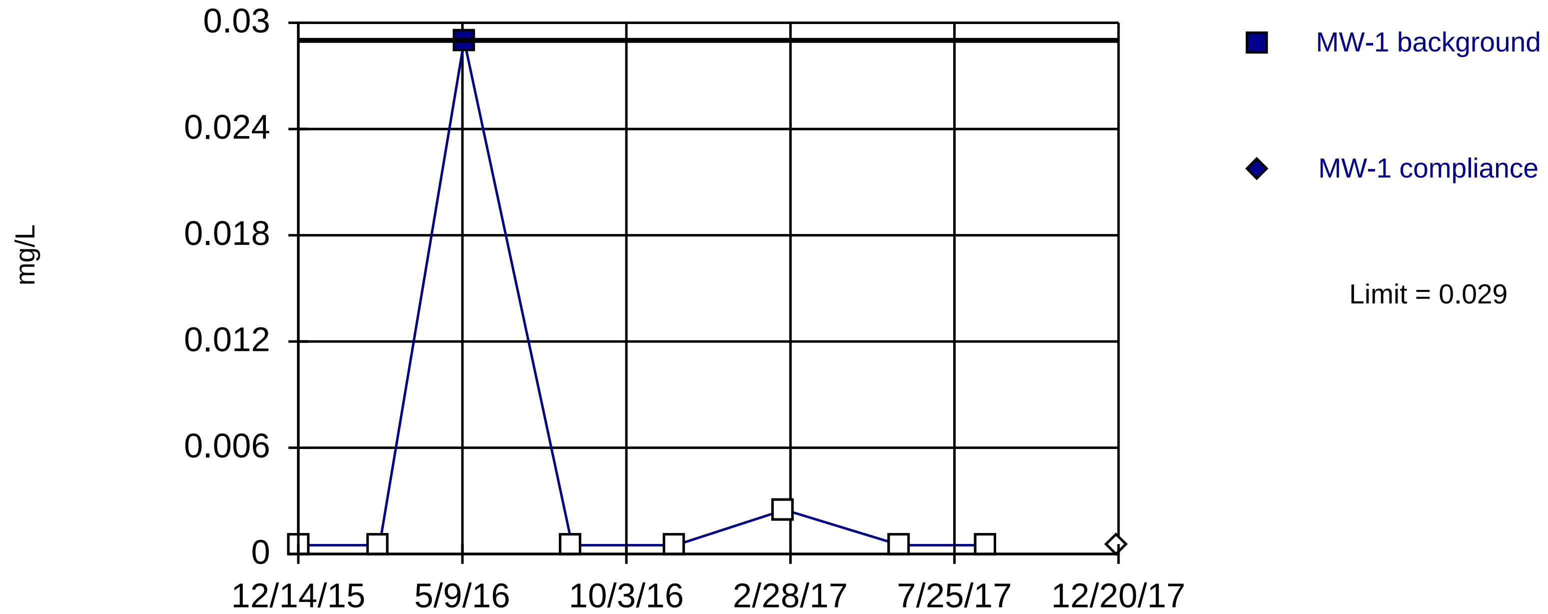
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. Limit is highest of 8 background values. 87.5% NDs. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Beryllium Analysis Run 1/25/2018 11:58 AM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Beryllium (mg/L)   Analysis Run 1/25/2018 12:04 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-1	MW-1
12/14/2015	<0.001	
2/25/2016	<0.001	
5/11/2016	0.029	
8/16/2016	<0.001	
11/17/2016	<0.001	
2/23/2017	<0.005	
6/7/2017	<0.001	
8/24/2017	<0.001	
12/20/2017		<0.001

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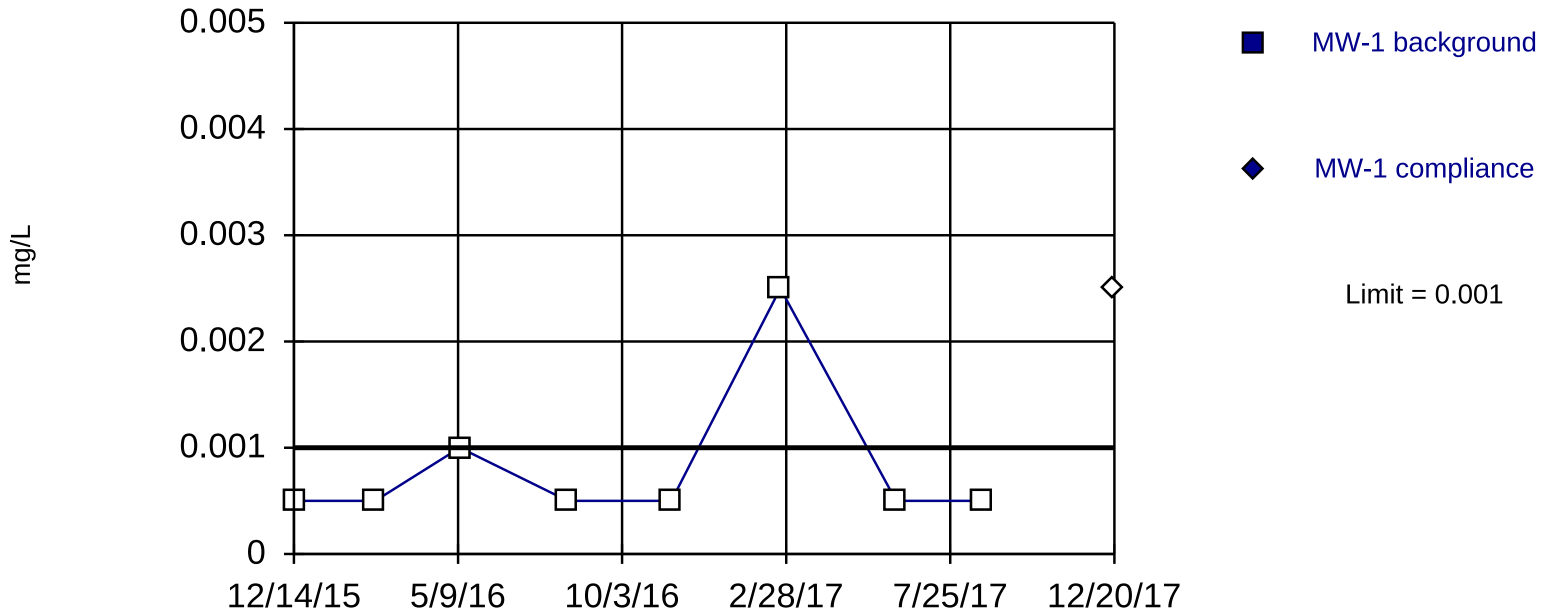
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. All background values (n = 8) were censored; limit is most recent reporting limit. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Cadmium Analysis Run 1/25/2018 11:58 AM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Cadmium (mg/L) Analysis Run 1/25/2018 12:04 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-1	MW-1
12/14/2015	<0.001	
2/25/2016	<0.001	
5/11/2016	<0.002	
8/16/2016	<0.001	
11/17/2016	<0.001	
2/23/2017	<0.005	
6/7/2017	<0.001	
8/24/2017	<0.001	
12/20/2017		<0.005

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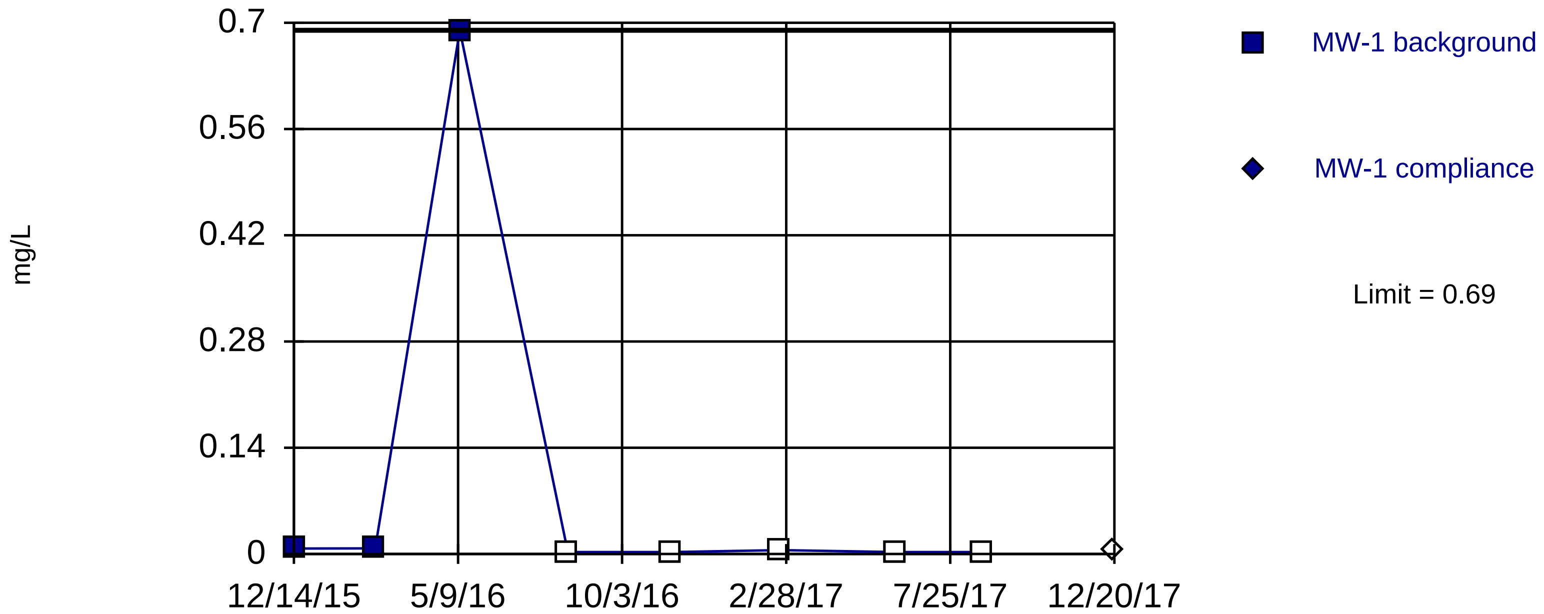
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. Limit is highest of 8 background values. 62.5% NDs. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Chromium Analysis Run 1/25/2018 11:58 AM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Chromium (mg/L) Analysis Run 1/25/2018 12:04 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-1	MW-1
12/14/2015	0.0073	
2/25/2016	0.0074	
5/11/2016	0.69	
8/16/2016	<0.005	
11/17/2016	<0.005	
2/23/2017	<0.01	
6/7/2017	<0.005	
8/24/2017	<0.005	
12/20/2017		<0.007

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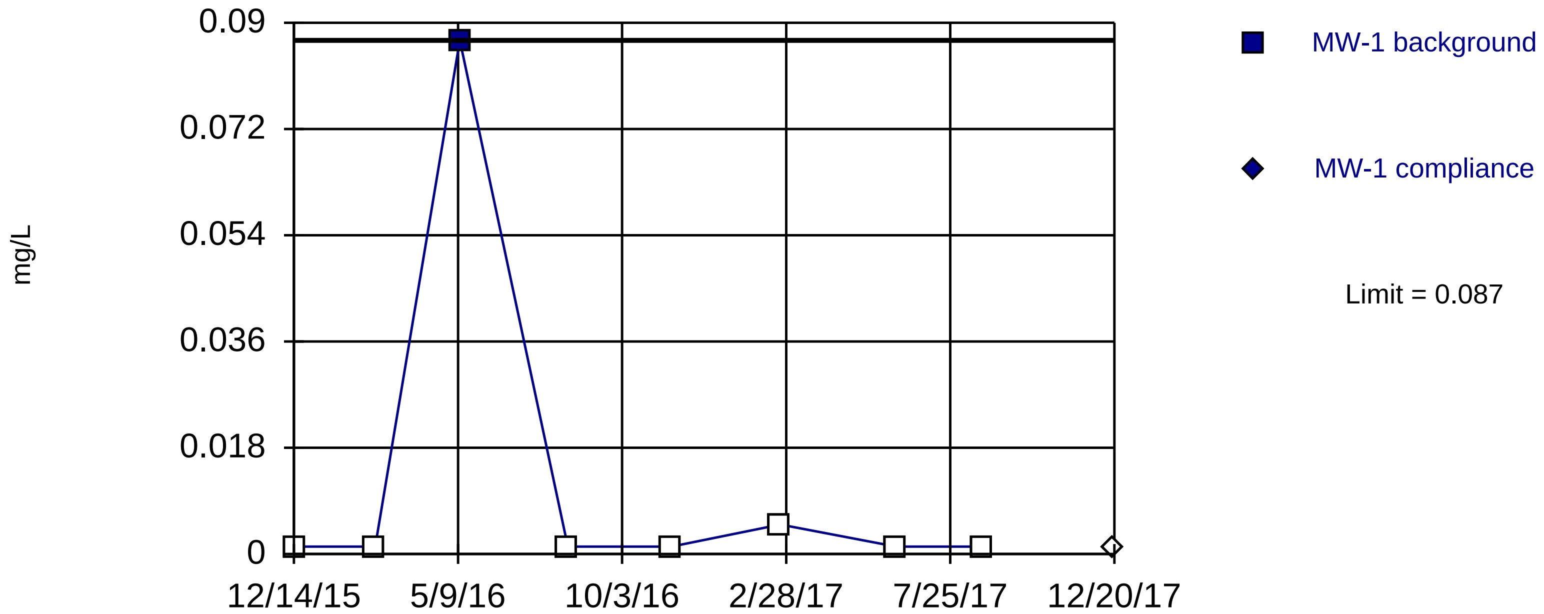
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. Limit is highest of 8 background values. 87.5% NDs. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Cobalt Analysis Run 1/25/2018 11:58 AM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Cobalt (mg/L)   Analysis Run 1/25/2018 12:04 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-1	MW-1
12/14/2015	<0.0025	
2/25/2016	<0.0025	
5/11/2016	0.087	
8/16/2016	<0.0025	
11/17/2016	<0.0025	
2/23/2017	<0.01	
6/7/2017	<0.0025	
8/24/2017	<0.0025	
12/20/2017		<0.0025

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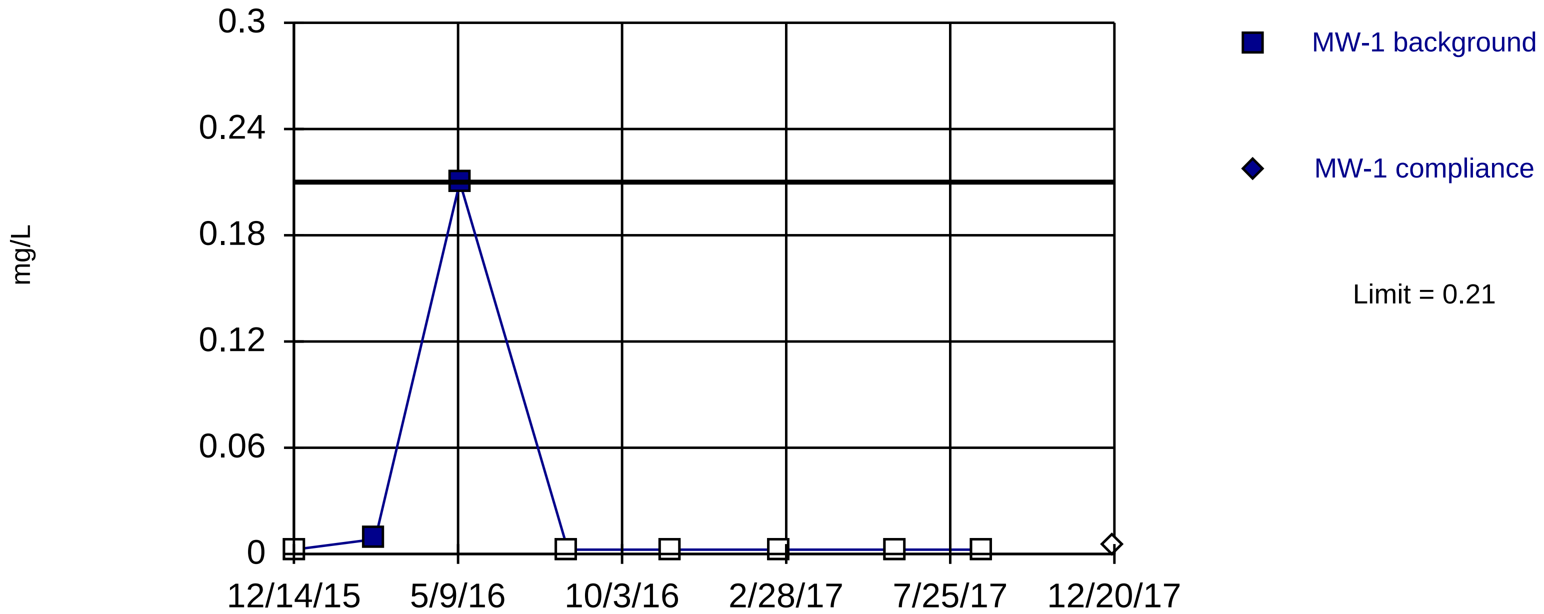
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. Limit is highest of 8 background values. 75% NDs. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Lead   Analysis Run 1/25/2018 11:58 AM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Lead (mg/L) Analysis Run 1/25/2018 12:04 PM

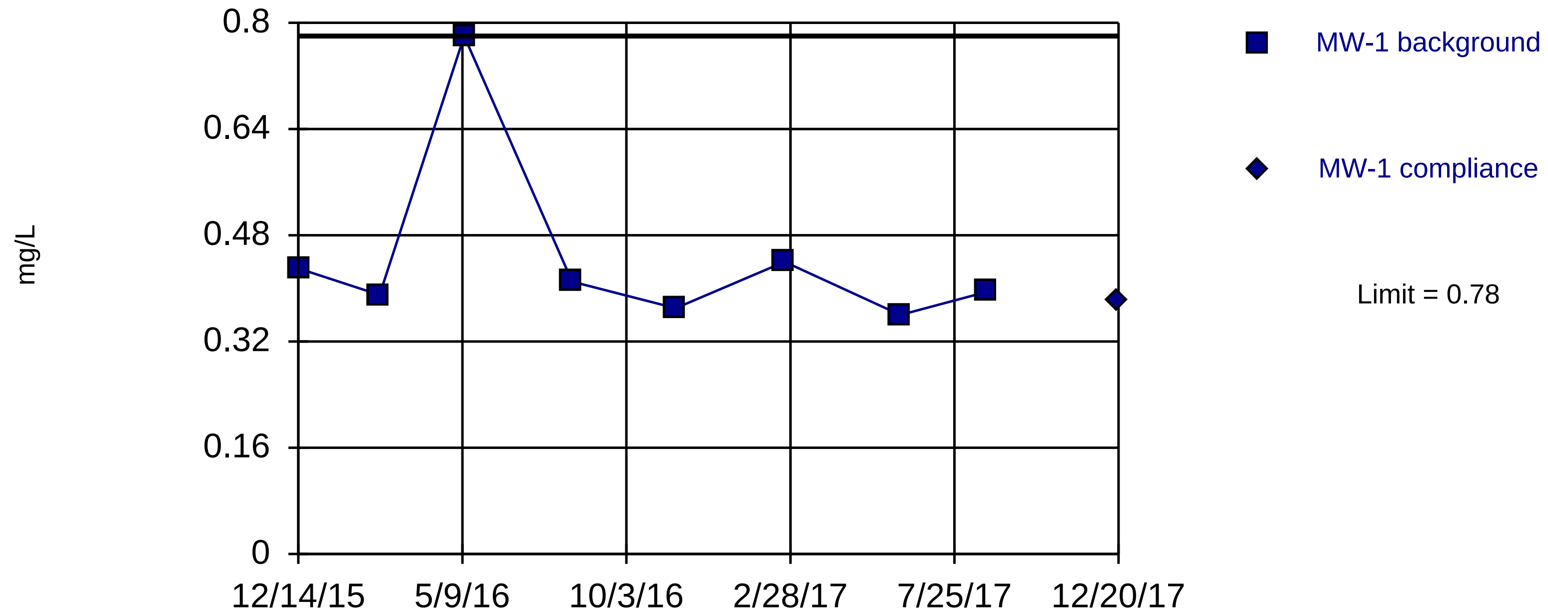
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-1	MW-1
12/14/2015	<0.005	
2/25/2016	0.0084	
5/11/2016	0.21	
8/16/2016	<0.005	
11/17/2016	<0.005	
2/23/2017	<0.005	
6/7/2017	<0.005	
8/24/2017	<0.005	
12/20/2017		<0.01

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because the Shapiro Wilk normality test showed the data to be non-normal at the 0.05 alpha level. Limit is highest of 8 background values. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Lithium Analysis Run 1/25/2018 11:58 AM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Lithium (mg/L) Analysis Run 1/25/2018 12:04 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-1	MW-1
12/14/2015	0.43	
2/25/2016	0.39	
5/11/2016	0.78	
8/16/2016	0.41	
11/17/2016	0.37	
2/23/2017	0.44	
6/7/2017	0.36	
8/24/2017	0.395	
12/20/2017		0.38

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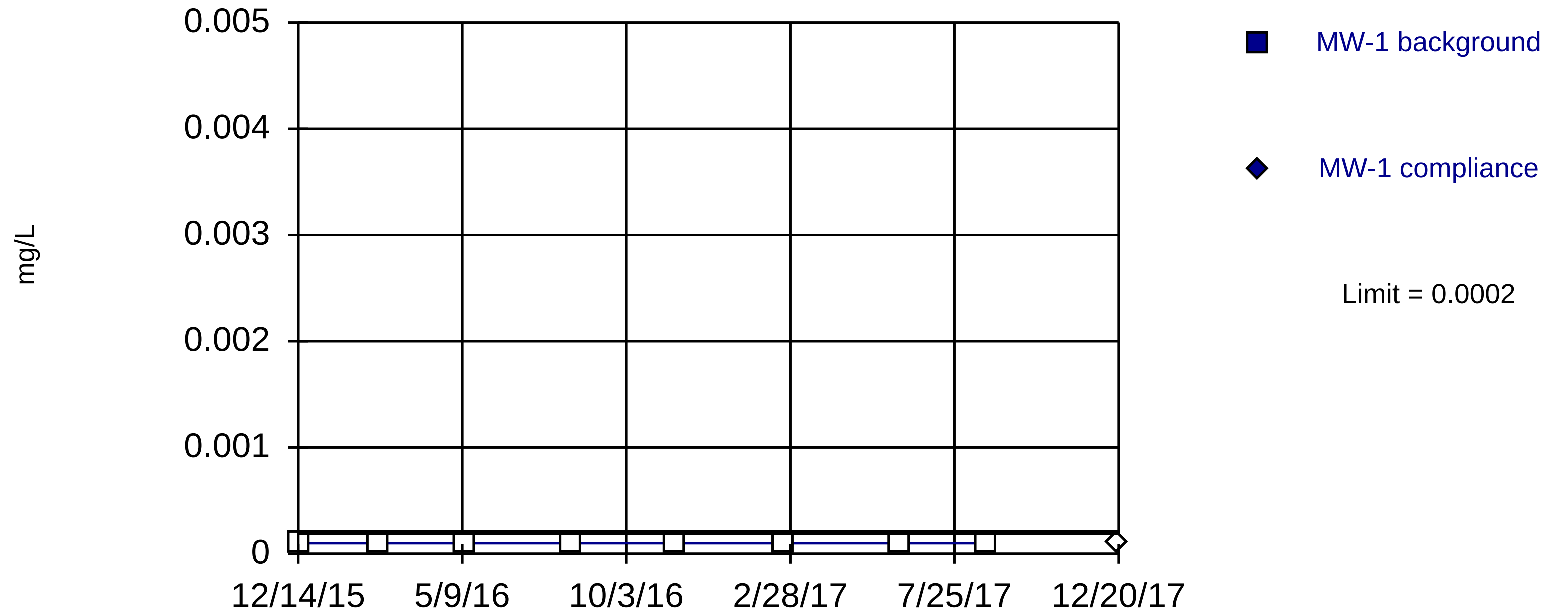
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. All background values (n = 8) were censored; limit is most recent reporting limit. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Mercury   Analysis Run 1/25/2018 11:58 AM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Mercury (mg/L)   Analysis Run 1/25/2018 12:04 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-1	MW-1
12/14/2015	<0.0002	
2/25/2016	<0.0002	
5/11/2016	<0.0002	
8/16/2016	<0.0002	
11/17/2016	<0.0002	
2/23/2017	<0.0002	
6/7/2017	<0.0002	
8/24/2017	<0.0002	
12/20/2017		<0.0002

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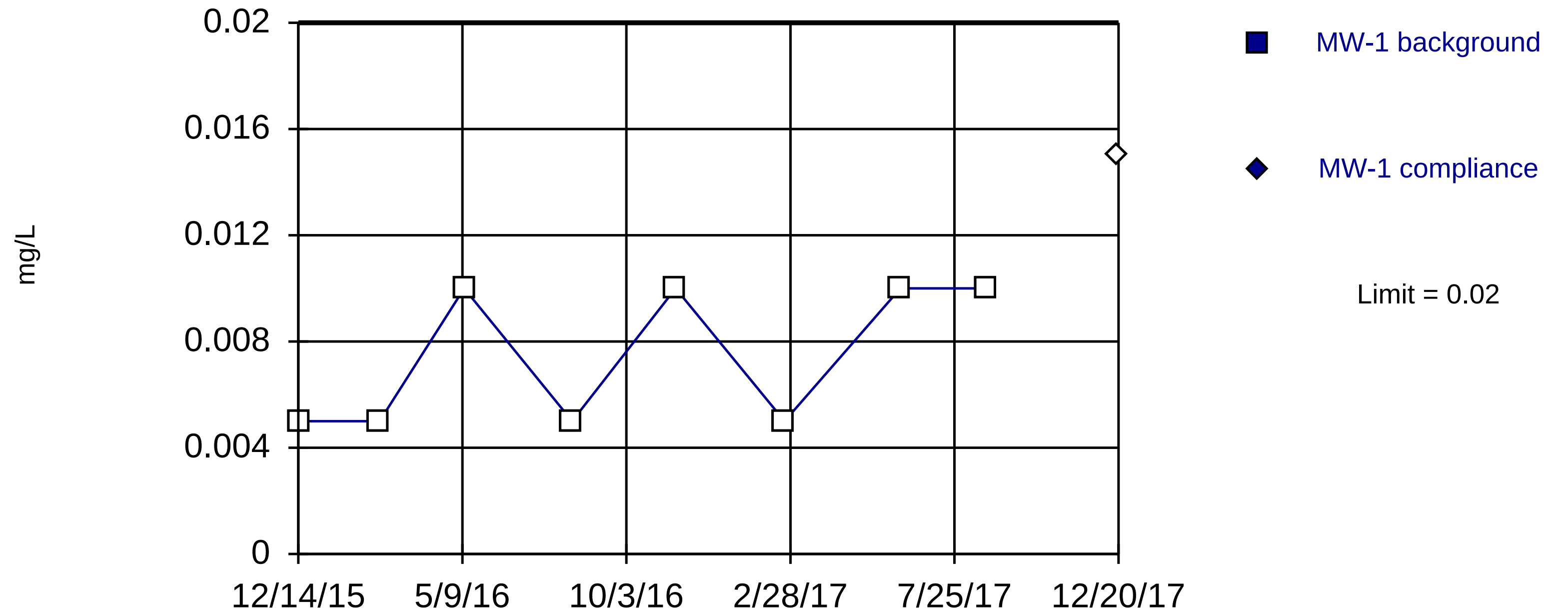
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. All background values (n = 8) were censored; limit is most recent reporting limit. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Molybdenum Analysis Run 1/25/2018 11:58 AM

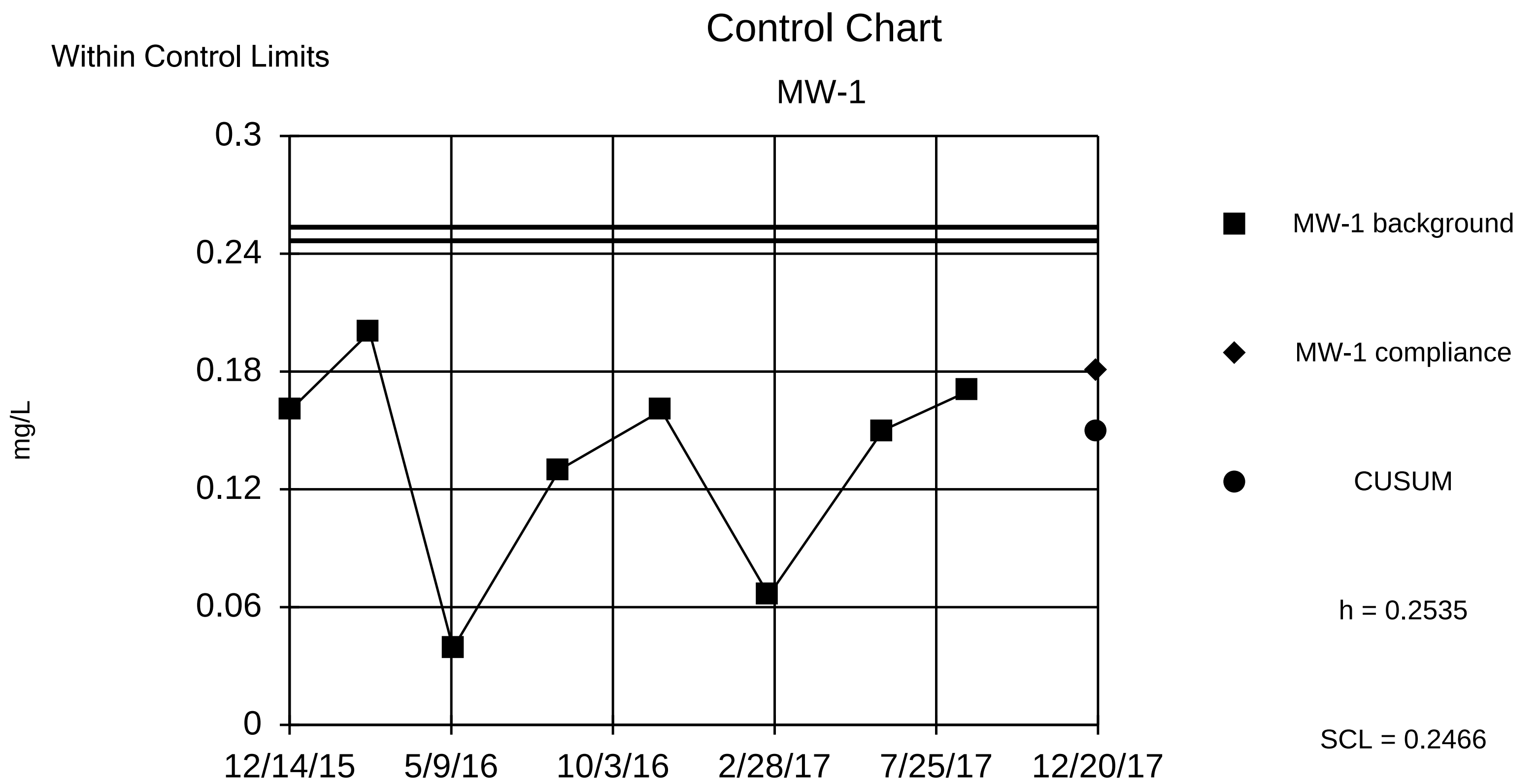
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Molybdenum (mg/L)   Analysis Run 1/25/2018 12:04 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-1	MW-1
12/14/2015	<0.01	
2/25/2016	<0.01	
5/11/2016	<0.02	
8/16/2016	<0.01	
11/17/2016	<0.02	
2/23/2017	<0.01	
6/7/2017	<0.02	
8/24/2017	<0.02	
12/20/2017		<0.03



Background Data Summary (based on cube transformation): Mean=0.003378, Std. Dev.=0.002583, n=8. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9441, critical = 0.818. Report alpha = 0.00205. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Selenium Analysis Run 1/25/2018 11:58 AM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart

Constituent: Selenium (mg/L)   Analysis Run 1/25/2018 12:04 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-1	MW-1	Cube	Std. Mean	CUSUM
12/14/2015	0.16		0.004096		
2/25/2016	0.2		0.008		
5/11/2016	0.039		5.9319E-05		
8/16/2016	0.13		0.002197		
11/17/2016	0.16		0.004096		
2/23/2017	0.066		0.000287496		
6/7/2017	0.15		0.003375		
8/24/2017	0.17		0.004913		
12/20/2017		0.18	0.005832	0.95	0.15

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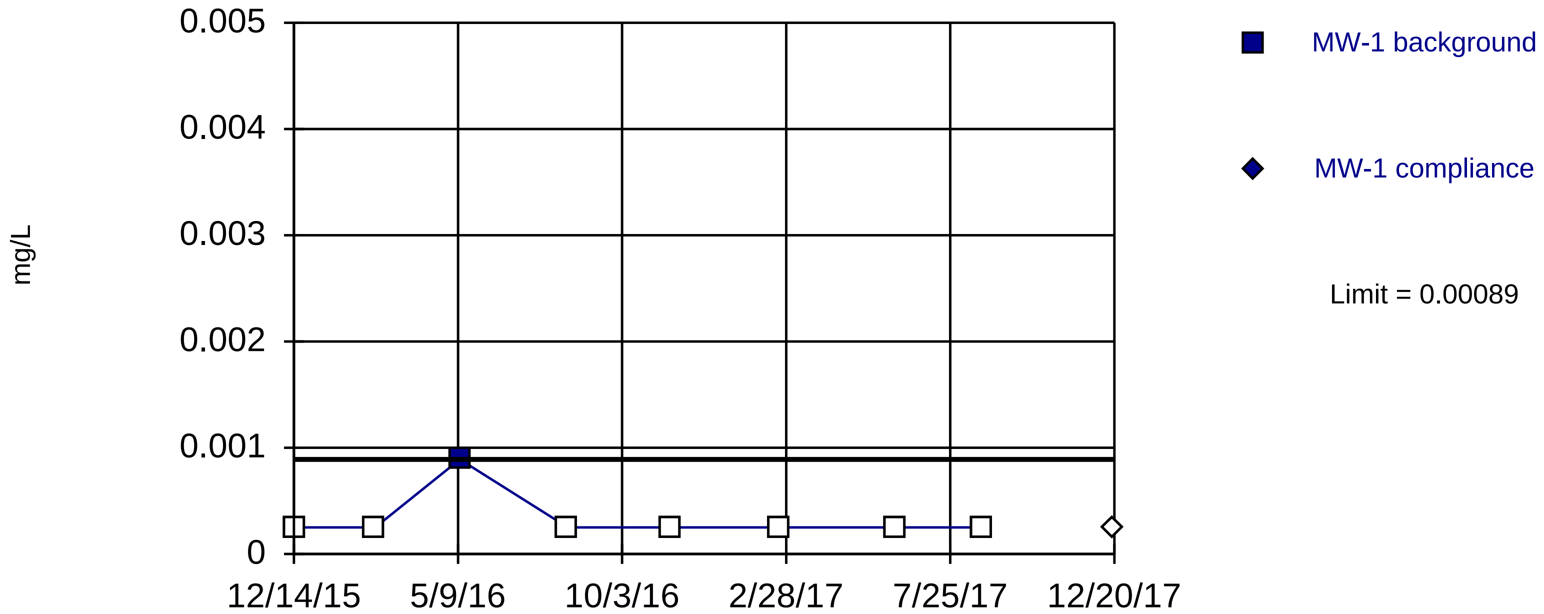
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. Limit is highest of 8 background values. 87.5% NDs. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Thallium Analysis Run 1/25/2018 11:58 AM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Thallium (mg/L)   Analysis Run 1/25/2018 12:04 PM

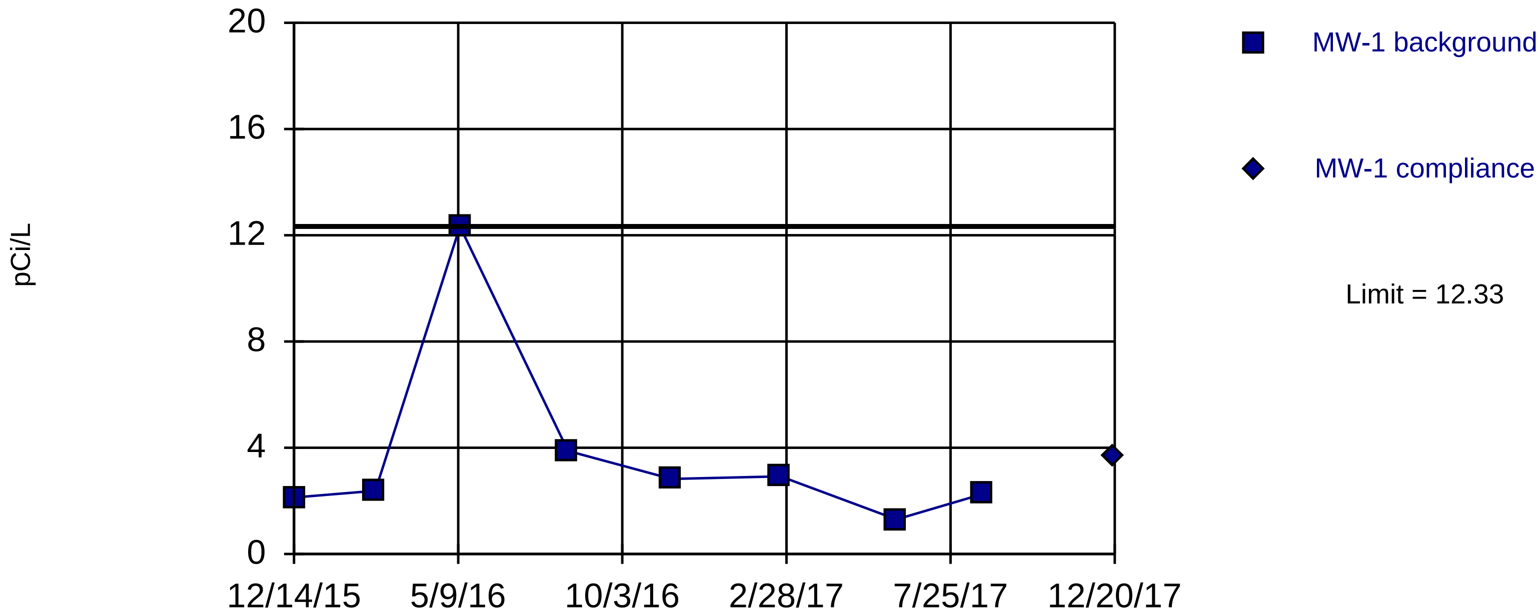
Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-1	MW-1
12/14/2015	<0.0005	
2/25/2016	<0.0005	
5/11/2016	0.00089	
8/16/2016	<0.0005	
11/17/2016	<0.0005	
2/23/2017	<0.0005	
6/7/2017	<0.0005	
8/24/2017	<0.0005	
12/20/2017		<0.0005

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because the Shapiro Wilk normality test showed the data to be non-normal at the 0.05 alpha level. Limit is highest of 8 background values. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Combined Radium   Analysis Run 1/25/2018 12:05 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Combined Radium (pCi/L)   Analysis Run 1/25/2018 12:05 PM

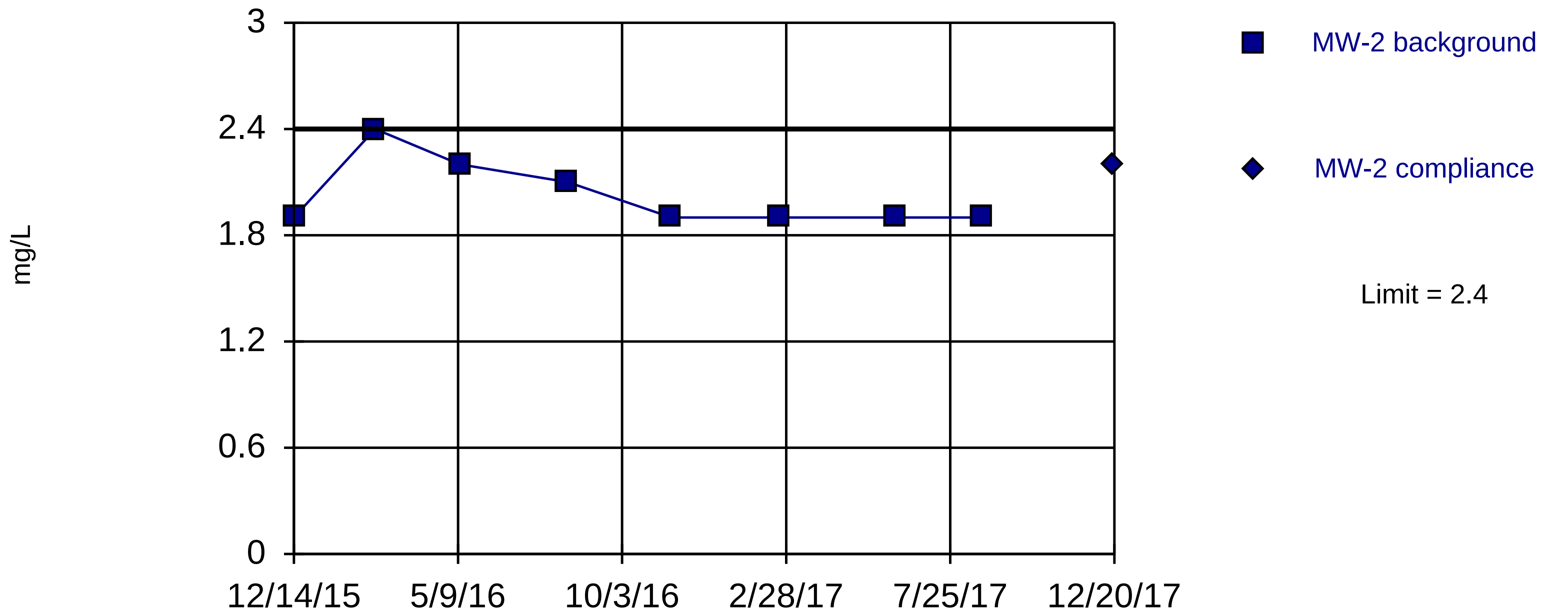
Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-1	MW-1
12/14/2015	2.13	
2/25/2016	2.382	
5/11/2016	12.33	
8/16/2016	3.883	
11/17/2016	2.828	
2/23/2017	2.923	
6/7/2017	1.3	
8/24/2017	2.267	
12/20/2017		3.72

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because the Shapiro Wilk normality test showed the data to be non-normal at the 0.05 alpha level. Limit is highest of 8 background values. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Boron Analysis Run 1/25/2018 12:10 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

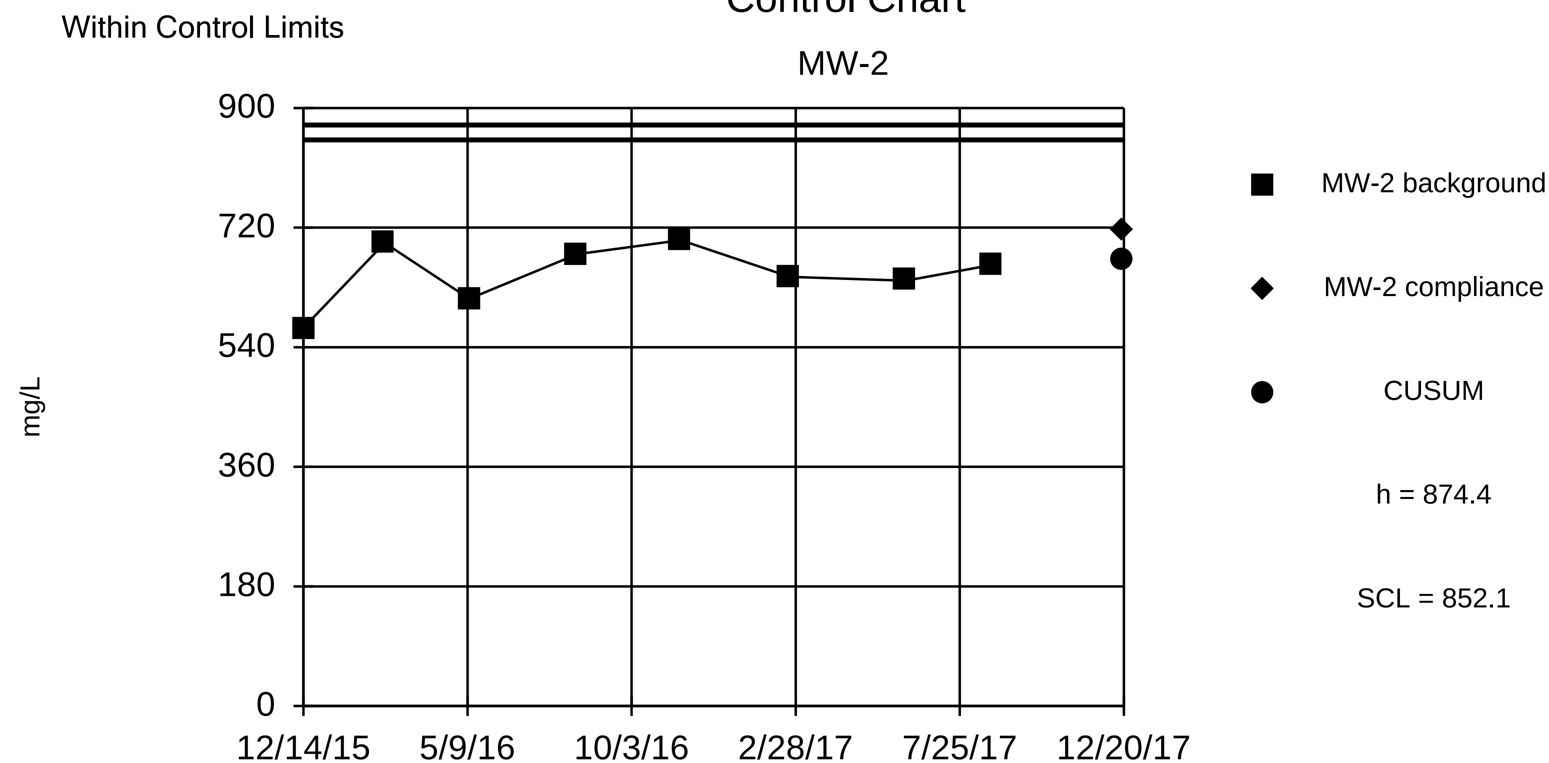
Control Chart Alternate

Constituent: Boron (mg/L)   Analysis Run 1/25/2018 12:12 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-2	MW-2
12/14/2015	1.9	
2/25/2016	2.4	
5/11/2016	2.2	
8/16/2016	2.1	
11/17/2016	1.9	
2/23/2017	1.9	
6/7/2017	1.9	
8/24/2017	1.9	
12/20/2017		2.2

Control Chart



Background Data Summary: Mean=651.3, Std. Dev.=44.62, n=8. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9396, critical = 0.818. Report alpha = 0.001952. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Calcium   Analysis Run 1/26/2018 10:16 AM

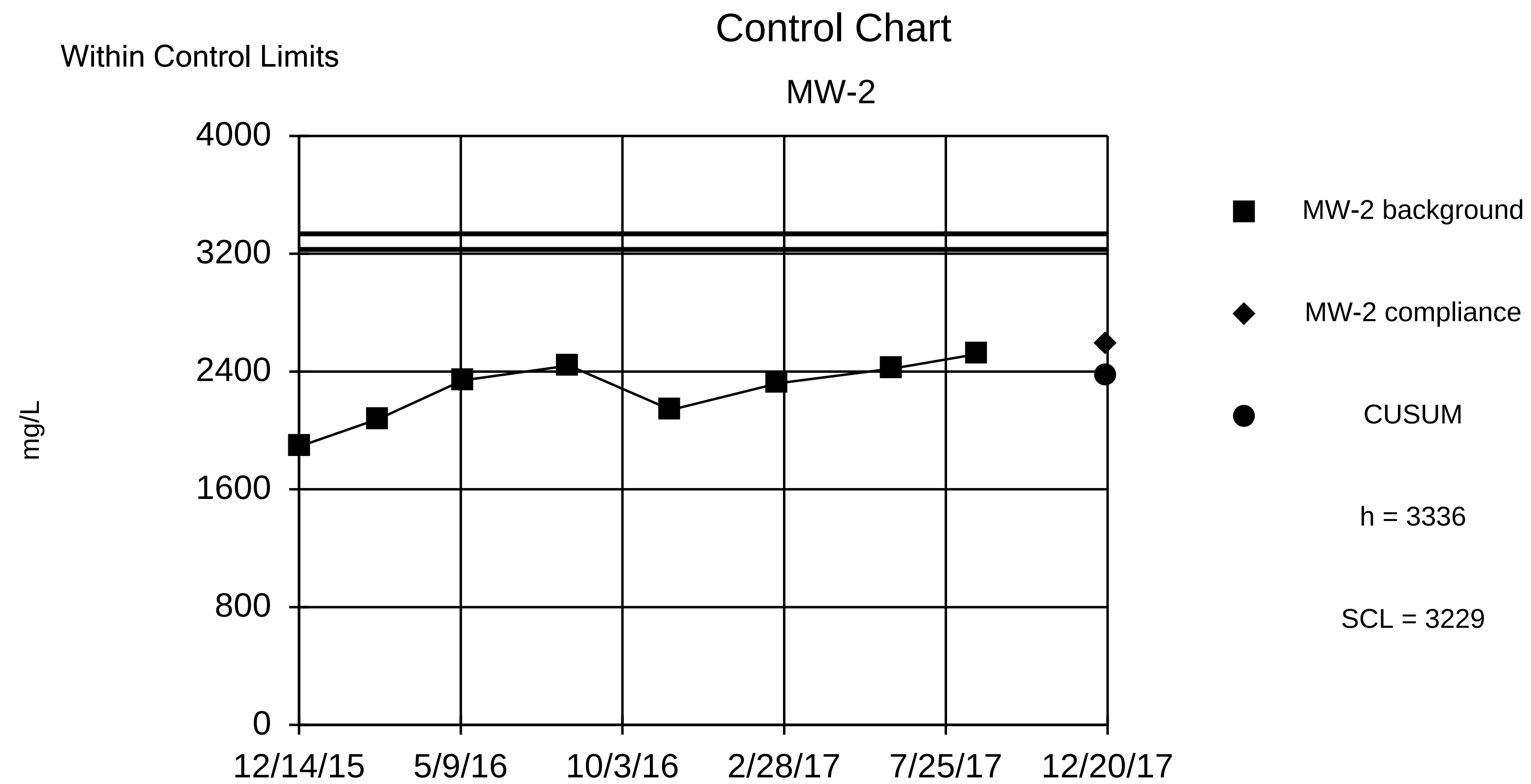
Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart

Constituent: Calcium (mg/L)   Analysis Run 1/26/2018 10:16 AM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-2	MW-2	Std. Mean	CUSUM
12/14/2015	569			
2/25/2016	697			
5/11/2016	613			
8/16/2016	680			
11/17/2016	701			
2/23/2017	646			
6/7/2017	640			
8/24/2017	664			
12/20/2017		716	1.451	671.4



Background Data Summary: Mean=2269, Std. Dev.=213.4, n=8. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9324, critical = 0.818. Report alpha = 0.00205. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Chloride Analysis Run 1/25/2018 12:10 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart

Constituent: Chloride (mg/L) Analysis Run 1/25/2018 12:12 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-2	MW-2	Std. Mean	CUSUM
12/14/2015	1890			
2/25/2016	2080			
5/11/2016	2340			
8/16/2016	2440			
11/17/2016	2140			
2/23/2017	2320			
6/7/2017	2420			
8/24/2017	2520			
12/20/2017		2590	1.506	2377

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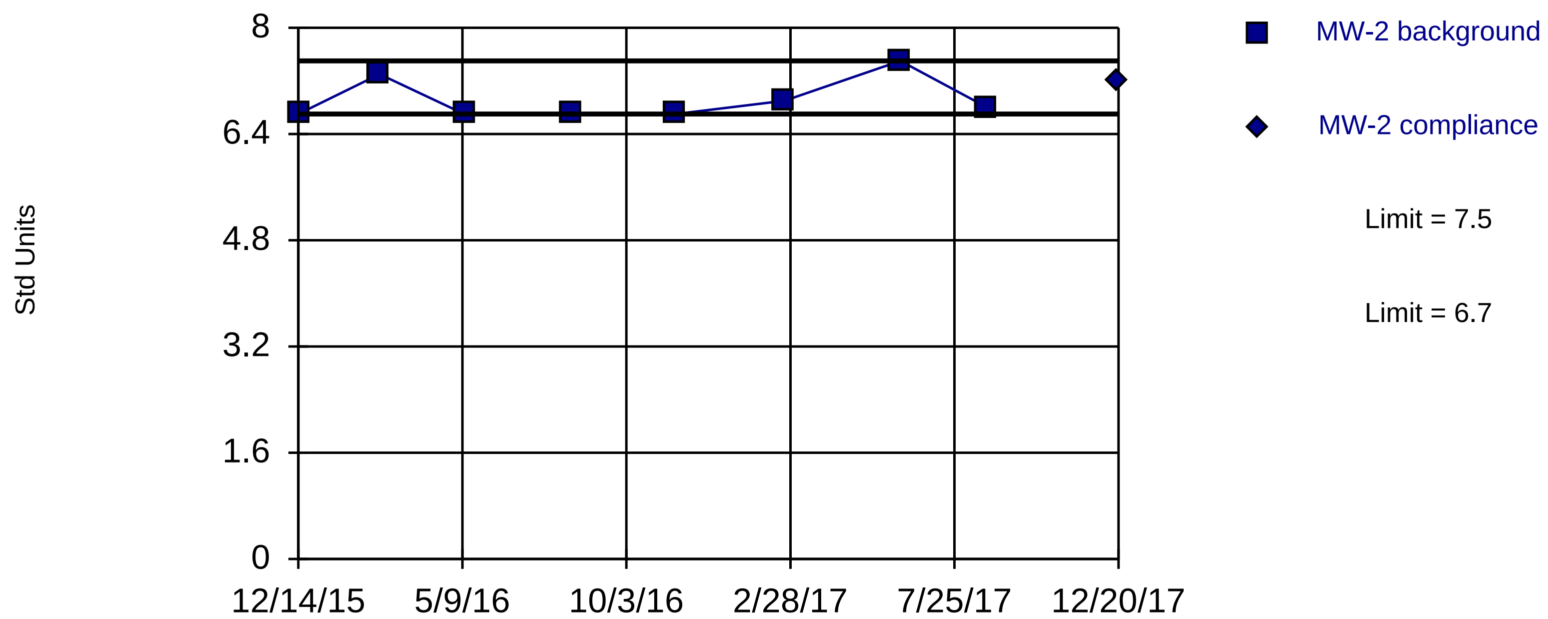
Within Limits

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.05 alpha level. Limits are highest and lowest of 8 background values. Report alpha = 0.2222. Most recent point compared to limit.

Constituent: pH   Analysis Run 1/25/2018 12:06 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

Prediction Limit

Constituent: pH (Std Units) Analysis Run 1/25/2018 12:07 PM

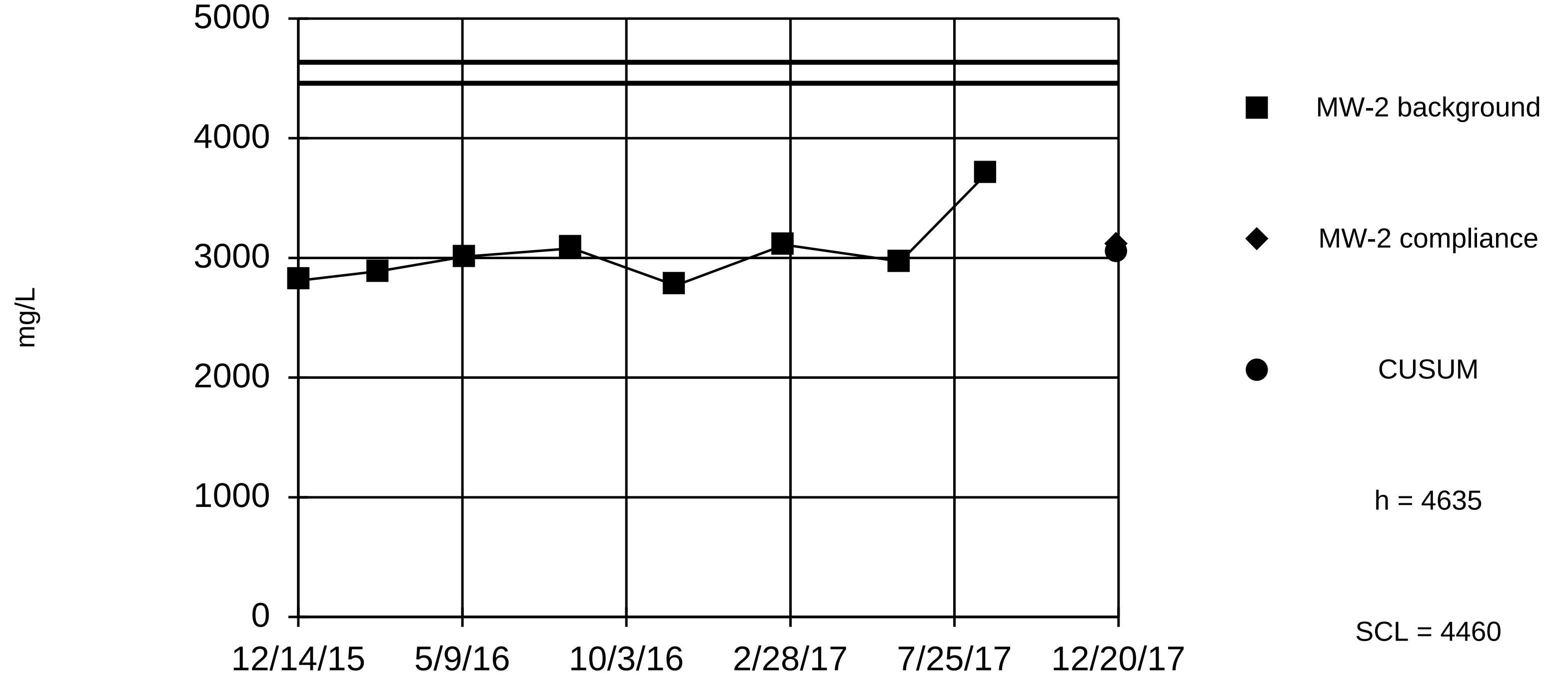
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-2	MW-2
12/14/2015	6.7	
2/25/2016	7.3	
5/11/2016	6.7	
8/16/2016	6.7	
11/17/2016	6.7	
2/23/2017	6.9	
6/7/2017	7.5	
8/24/2017	6.8	
12/20/2017		7.2

Control Chart

Within Control Limits

MW-2



Background Data Summary (based on square root transformation): Mean=55.12, Std. Dev.=2.592, n=8. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8189, critical = 0.818. Report alpha = 0.00205. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Sulfate Analysis Run 1/25/2018 12:10 PM

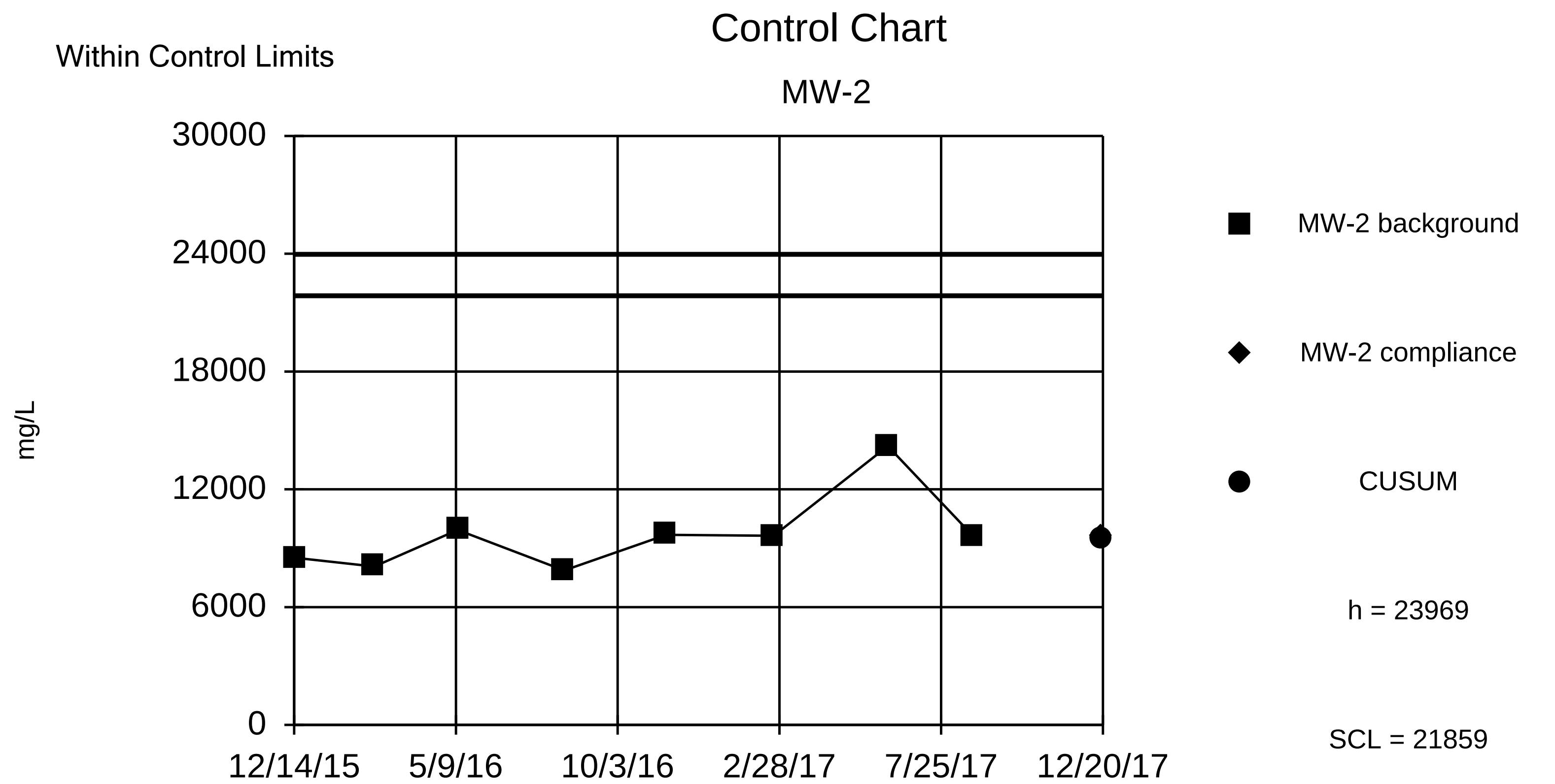
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart

Constituent: Sulfate (mg/L)   Analysis Run 1/25/2018 12:12 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-2	MW-2	Square Root	Std. Mean	CUSUM
12/14/2015	2810		53.01		
2/25/2016	2890		53.76		
5/11/2016	3010		54.86		
8/16/2016	3080		55.5		
11/17/2016	2770		52.63		
2/23/2017	3110		55.77		
6/7/2017	2970		54.5		
8/24/2017	3710		60.91		
12/20/2017		3100	55.68	0.2163	3038



Background Data Summary (based on natural log transformation): Mean=9.163, Std. Dev.=0.1844, n=8. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.833, critical = 0.818. Report alpha = 0.00205. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Total Dissolved Solids Analysis Run 1/25/2018 12:11 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart

Constituent: Total Dissolved Solids (mg/L)   Analysis Run 1/25/2018 12:12 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-2	MW-2	Natural Log	Std. Mean	CUSUM
12/14/2015	8520		9.05		
2/25/2016	8070		8.996		
5/11/2016	9930		9.203		
8/16/2016	7870		8.971		
11/17/2016	9680		9.178		
2/23/2017	9630		9.173		
6/7/2017	14200		9.561		
8/24/2017	9600		9.17		
12/20/2017		9600	9.17	0.03726	9538

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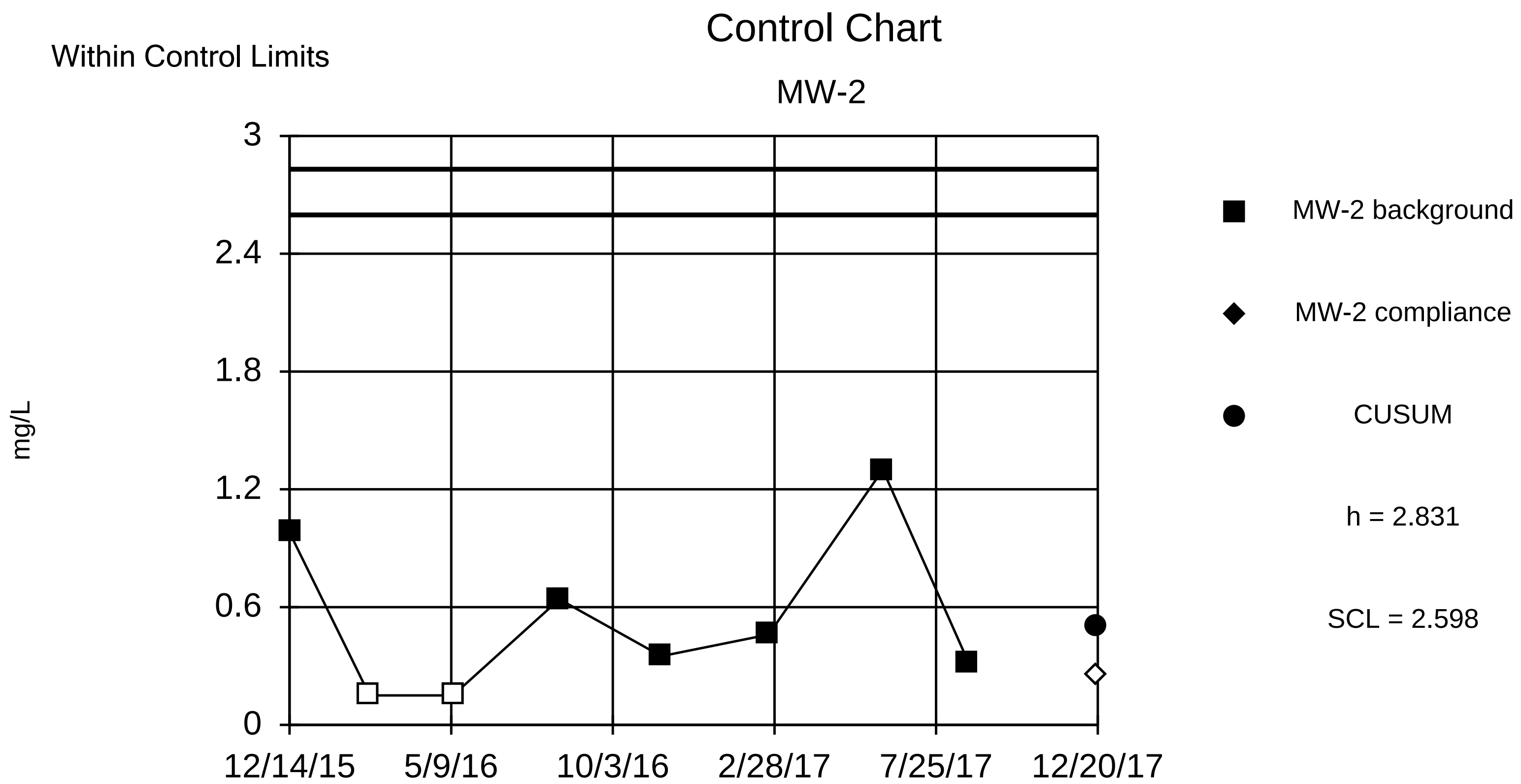
Hollow symbols indicate censored values.



Background Data Summary (after Cohen`s Adjustment): Mean=0.5048, Std. Dev.=0.4652, n=8, 25% NDs. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8855, critical = 0.818. Report alpha = 0.00205. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Fluoride Analysis Run 1/25/2018 12:10 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart

Constituent: Fluoride (mg/L)   Analysis Run 1/25/2018 12:12 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-2	MW-2	Std. Mean	CUSUM
12/14/2015	0.98			
2/25/2016	<0.3			
5/11/2016	<0.3			
8/16/2016	0.64			
11/17/2016	0.35			
2/23/2017	0.46			
6/7/2017	1.3			
8/24/2017	0.32			
12/20/2017		<0.5	-0.5478	0.5048

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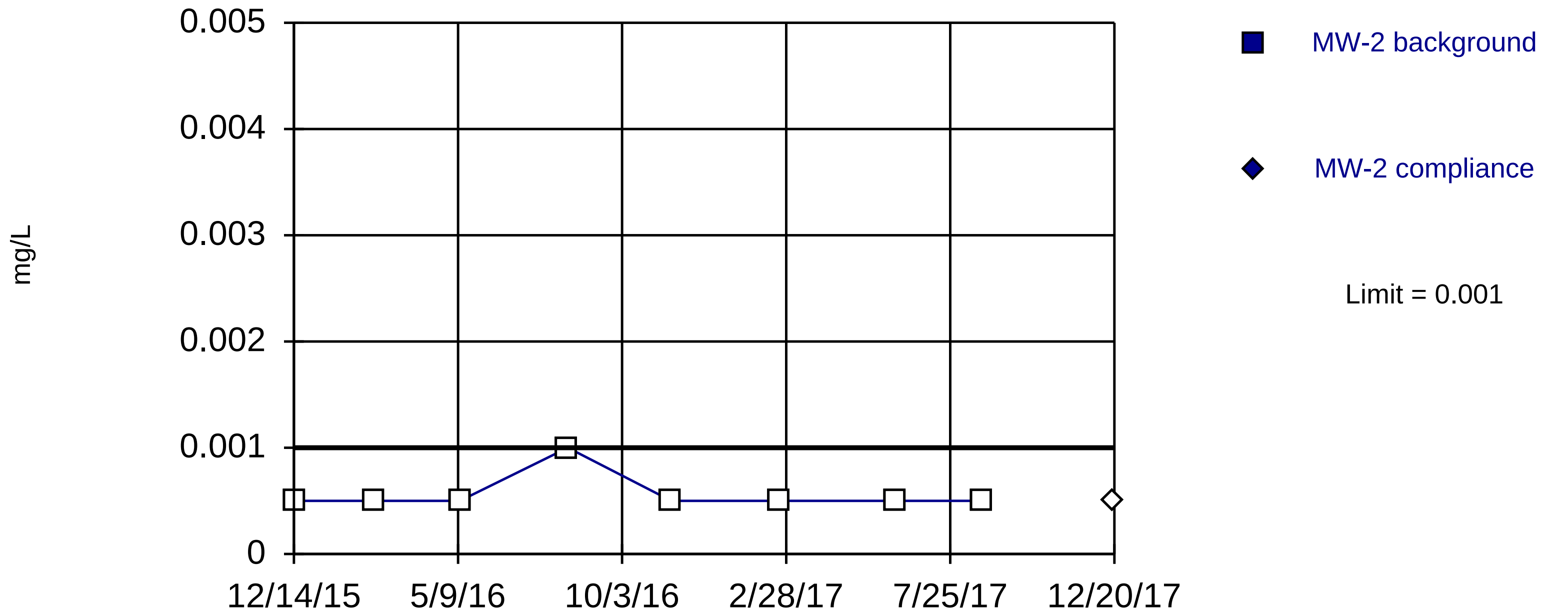
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. All background values (n = 8) were censored; limit is most recent reporting limit. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Antimony Analysis Run 1/25/2018 12:13 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Antimony (mg/L)   Analysis Run 1/25/2018 12:21 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-2	MW-2
12/14/2015	<0.001	
2/25/2016	<0.001	
5/11/2016	<0.001	
8/16/2016	<0.002	
11/17/2016	<0.001	
2/23/2017	<0.001	
6/7/2017	<0.001	
8/24/2017	<0.001	
12/20/2017		<0.001

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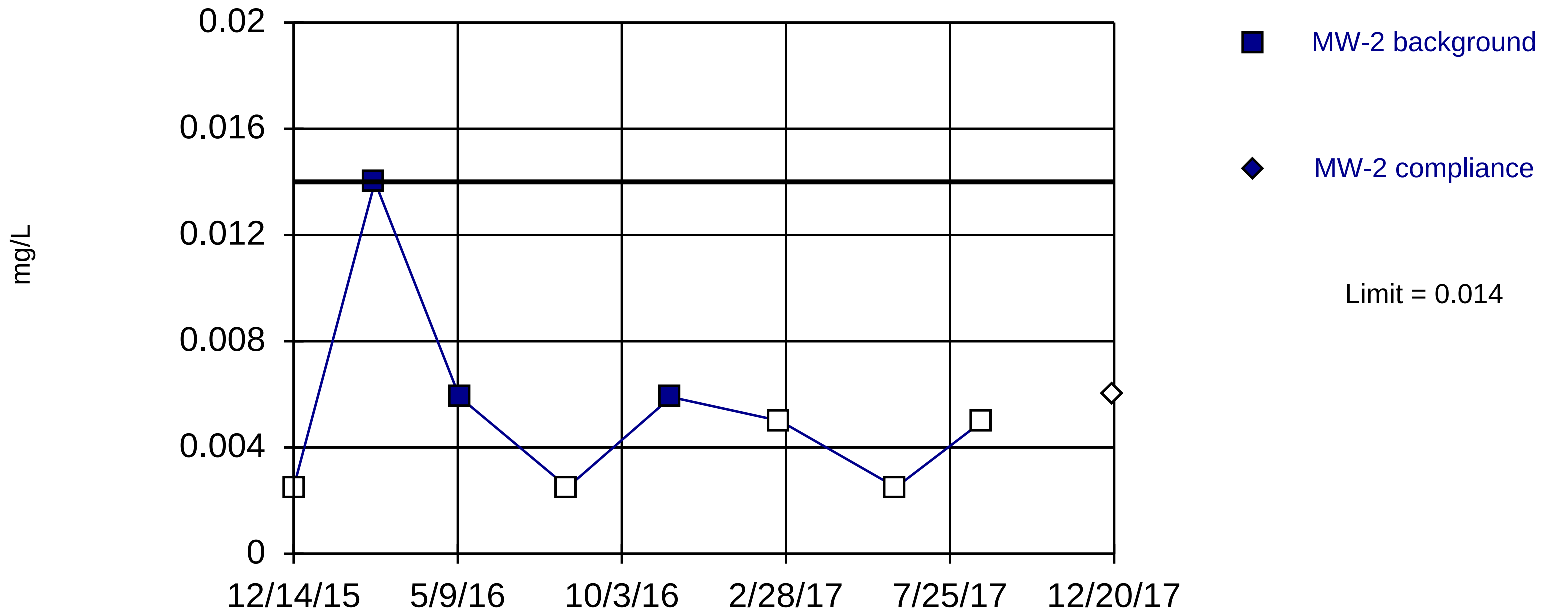
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. Limit is highest of 8 background values. 62.5% NDs. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Arsenic Analysis Run 1/25/2018 12:13 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Arsenic (mg/L)   Analysis Run 1/25/2018 12:21 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-2	MW-2
12/14/2015	<0.005	
2/25/2016	0.014	
5/11/2016	0.0059	
8/16/2016	<0.005	
11/17/2016	0.0059	
2/23/2017	<0.01	
6/7/2017	<0.005	
8/24/2017	<0.01	
12/20/2017		<0.012

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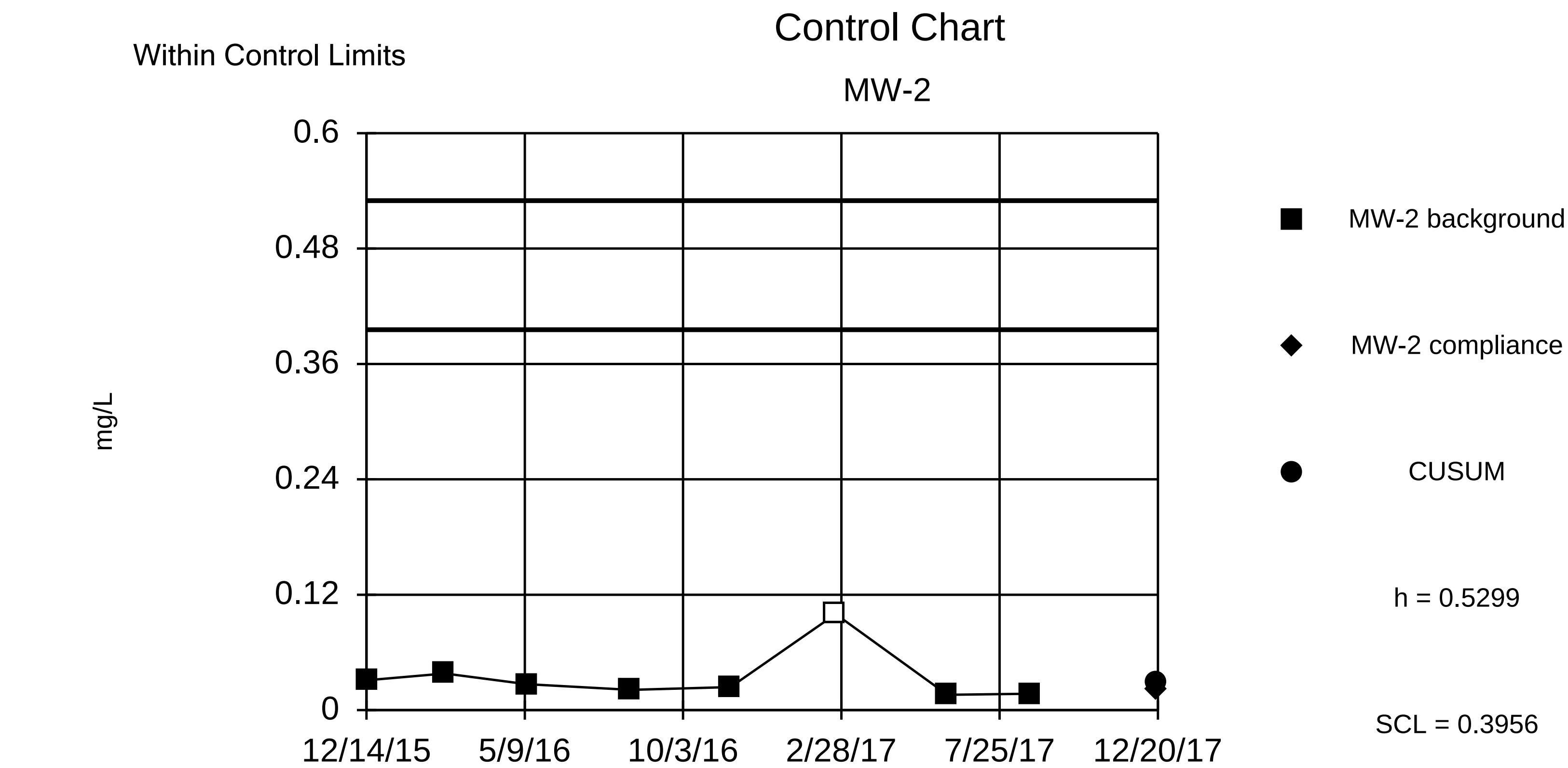
Hollow symbols indicate censored values.



Background Data Summary (based on natural log transformation): Mean=-3.558, Std. Dev.=0.5845, n=8, 12.5% NDs. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8648, critical = 0.818. Report alpha = 0.00205. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Barium Analysis Run 1/25/2018 12:13 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart

Constituent: Barium (mg/L)   Analysis Run 1/25/2018 12:21 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-2	MW-2	Natural Log	Std. Mean	CUSUM
12/14/2015	0.031		-3.474		
2/25/2016	0.038		-3.27		
5/11/2016	0.027		-3.612		
8/16/2016	0.021		-3.863		
11/17/2016	0.024		-3.73		
2/23/2017	<0.2		-2.303		
6/7/2017	0.016		-4.135		
8/24/2017	0.017		-4.075		
12/20/2017		0.022	-3.817	-0.4432	0.0285

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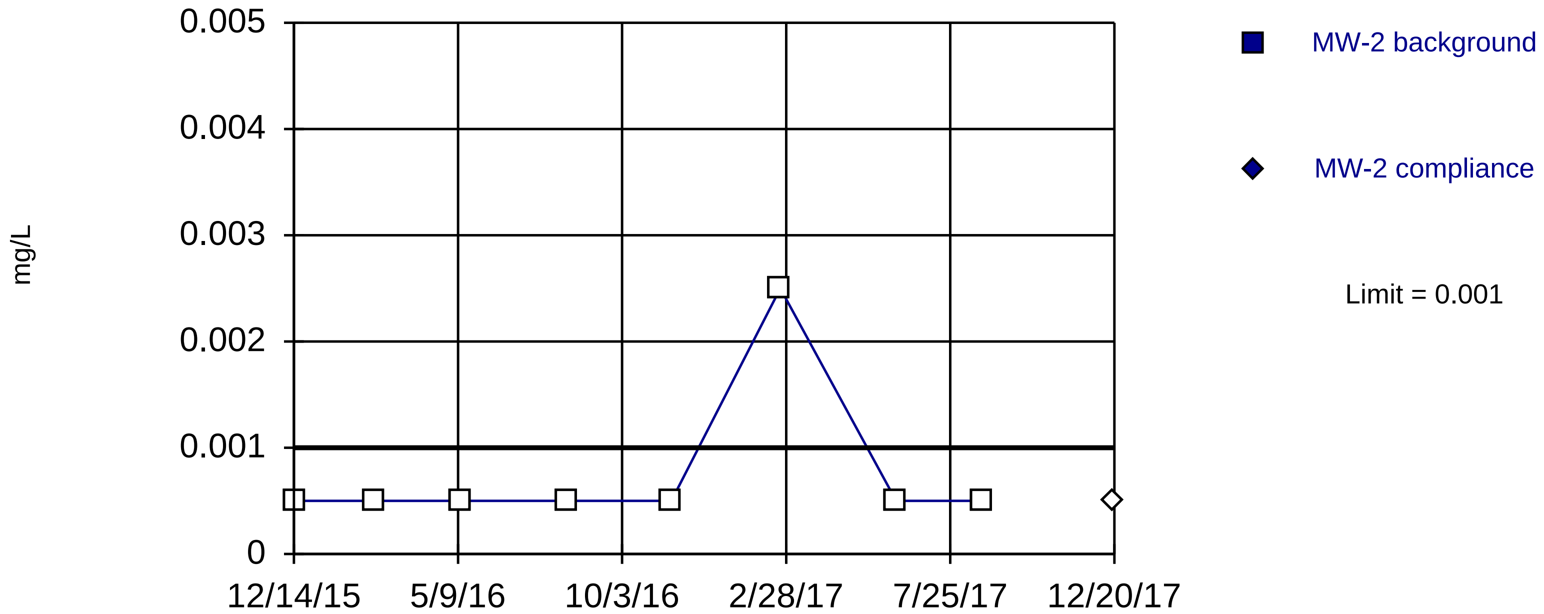
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. All background values (n = 8) were censored; limit is most recent reporting limit. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Beryllium   Analysis Run 1/25/2018 12:13 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Beryllium (mg/L)   Analysis Run 1/25/2018 12:21 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-2	MW-2
12/14/2015	<0.001	
2/25/2016	<0.001	
5/11/2016	<0.001	
8/16/2016	<0.001	
11/17/2016	<0.001	
2/23/2017	<0.005	
6/7/2017	<0.001	
8/24/2017	<0.001	
12/20/2017		<0.001

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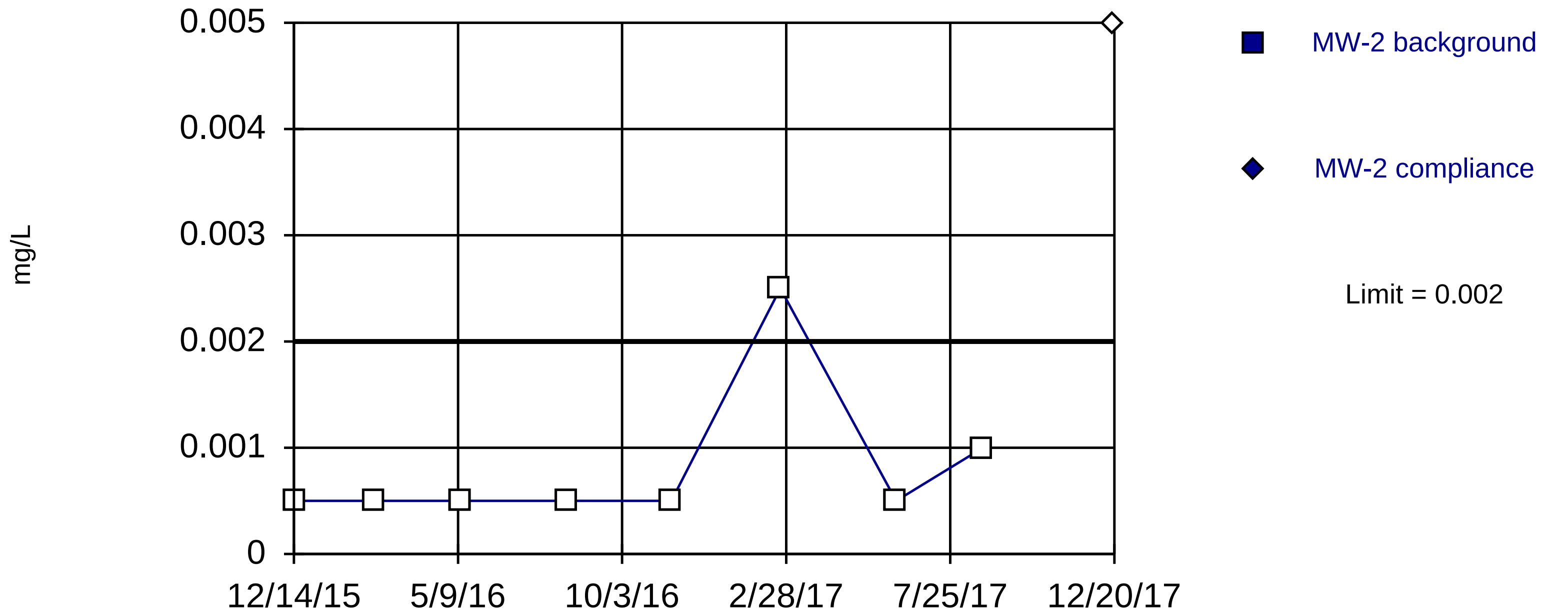
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. All background values (n = 8) were censored; limit is most recent reporting limit. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Cadmium Analysis Run 1/25/2018 12:13 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Cadmium (mg/L)   Analysis Run 1/25/2018 12:21 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-2	MW-2
12/14/2015	<0.001	
2/25/2016	<0.001	
5/11/2016	<0.001	
8/16/2016	<0.001	
11/17/2016	<0.001	
2/23/2017	<0.005	
6/7/2017	<0.001	
8/24/2017	<0.002	
12/20/2017		<0.01

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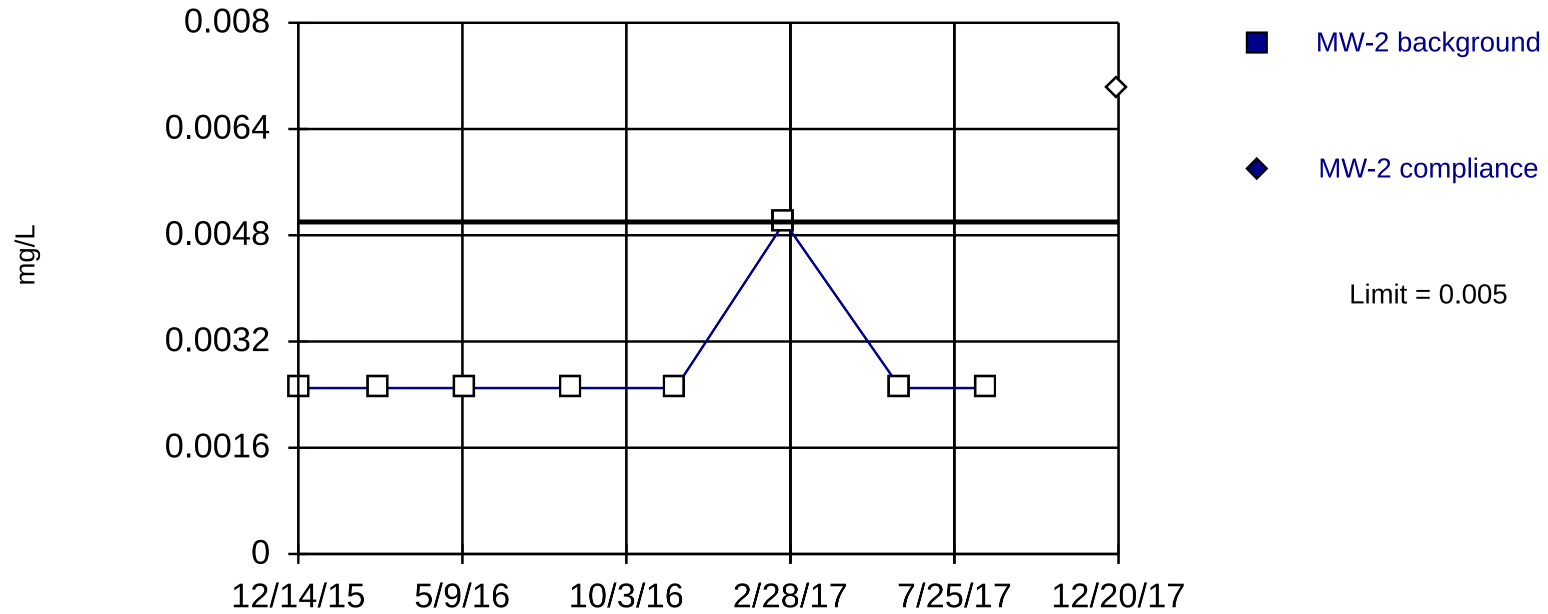
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. All background values (n = 8) were censored; limit is most recent reporting limit. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Chromium Analysis Run 1/25/2018 12:13 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Chromium (mg/L)   Analysis Run 1/25/2018 12:21 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-2	MW-2
12/14/2015	<0.005	
2/25/2016	<0.005	
5/11/2016	<0.005	
8/16/2016	<0.005	
11/17/2016	<0.005	
2/23/2017	<0.01	
6/7/2017	<0.005	
8/24/2017	<0.005	
12/20/2017		<0.014

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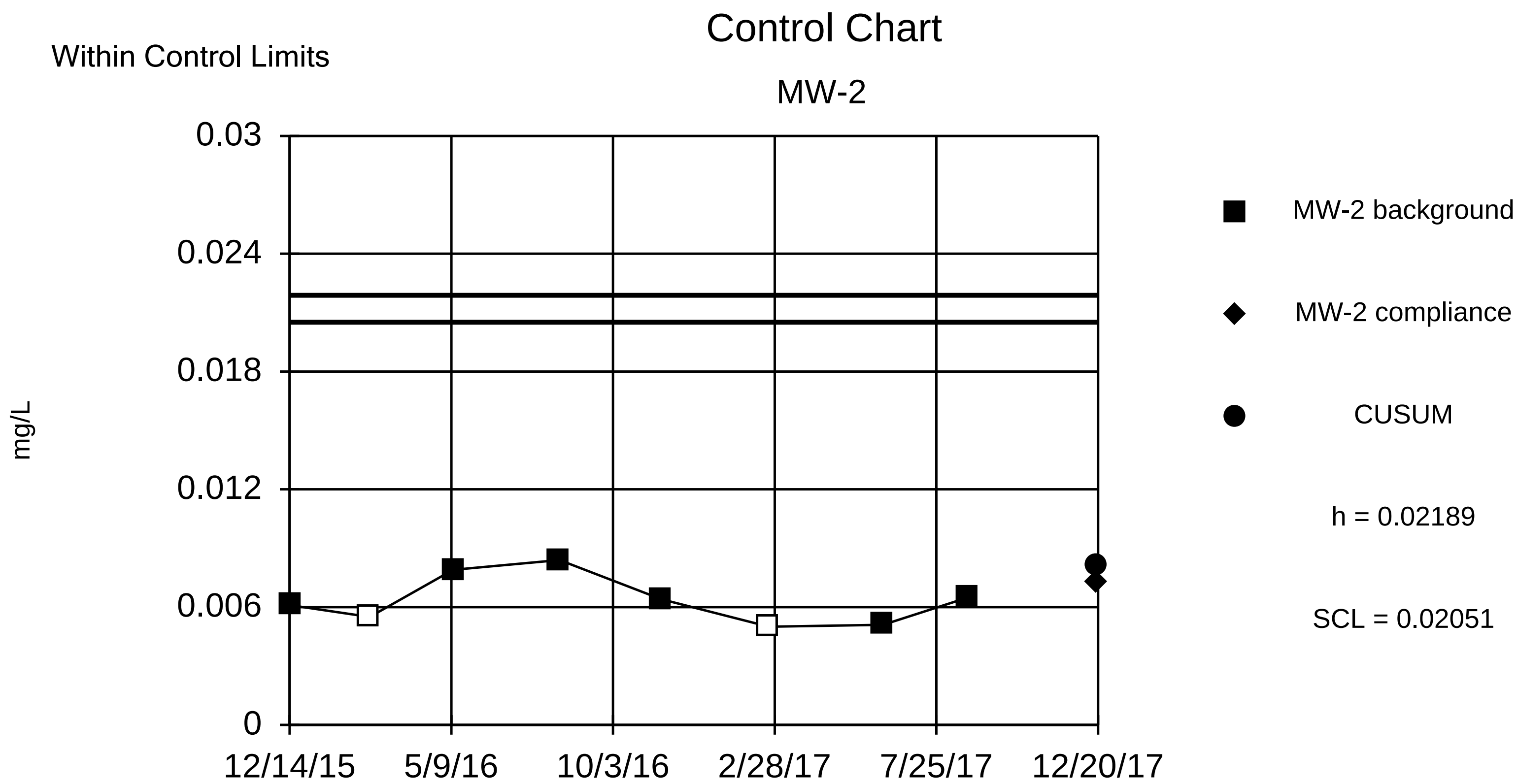
Hollow symbols indicate censored values.



Background Data Summary (after Cohen`s Adjustment): Mean=0.008155, Std. Dev.=0.002746, n=8, 25% NDs.
Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.91, critical = 0.818. Report alpha = 0.00205. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Cobalt Analysis Run 1/25/2018 12:13 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart

Constituent: Cobalt (mg/L)   Analysis Run 1/25/2018 12:21 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-2	MW-2	Std. Mean	CUSUM
12/14/2015	0.0061			
2/25/2016	<0.011			
5/11/2016	0.0079			
8/16/2016	0.0084			
11/17/2016	0.0064			
2/23/2017	<0.01			
6/7/2017	0.0051			
8/24/2017	0.0065			
12/20/2017		0.0072	-0.3479	0.008155

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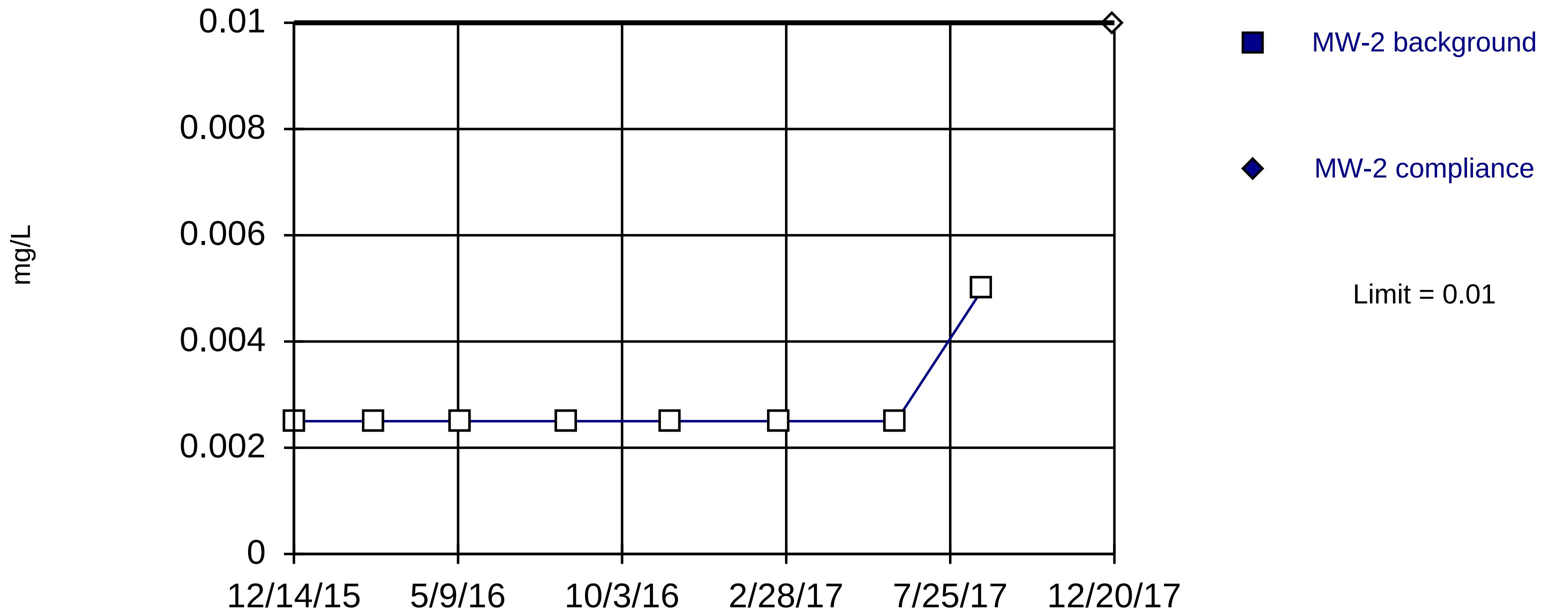
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. All background values (n = 8) were censored; limit is most recent reporting limit. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Lead   Analysis Run 1/25/2018 12:13 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

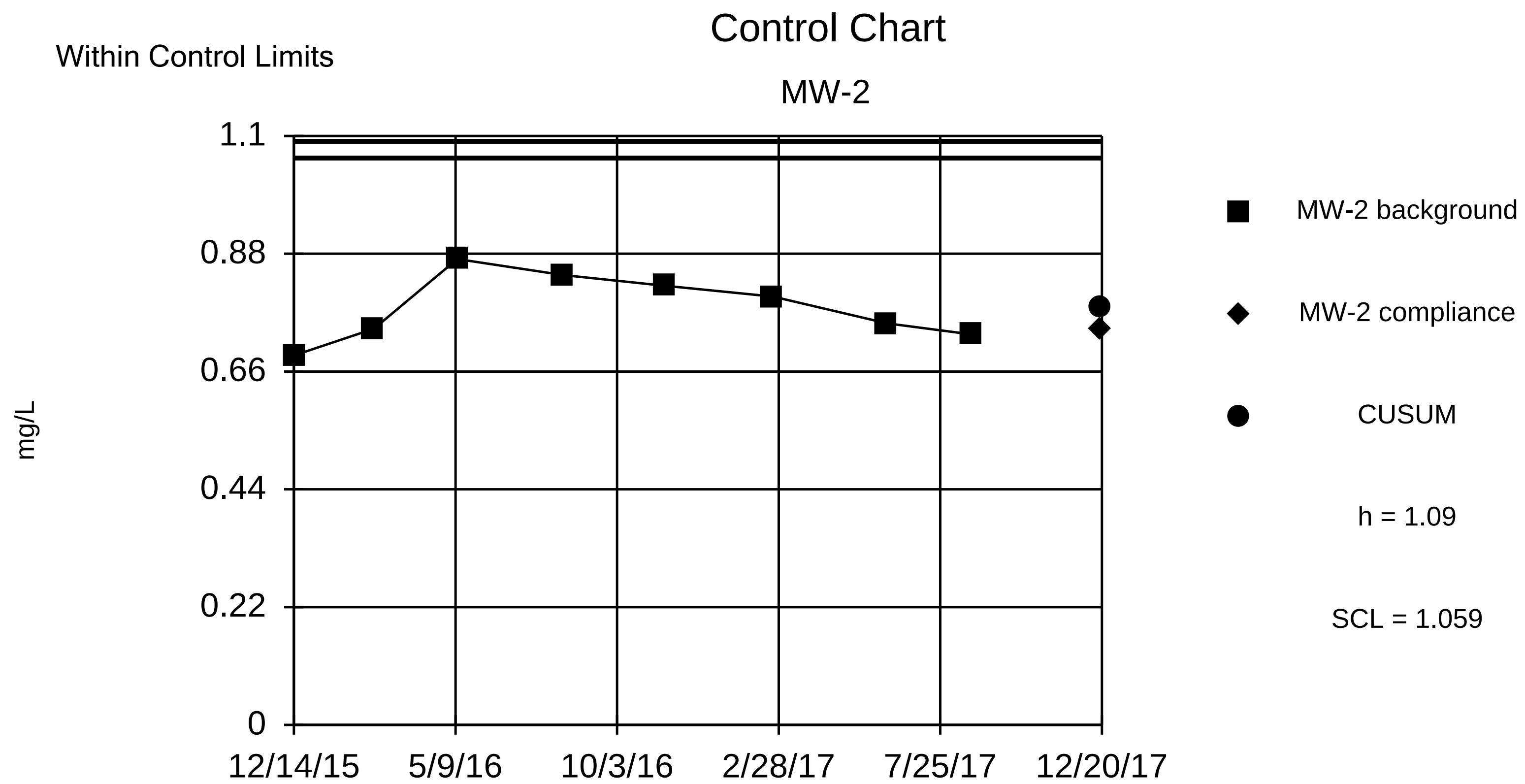
Control Chart Alternate

Constituent: Lead (mg/L)   Analysis Run 1/25/2018 12:21 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-2	MW-2
12/14/2015	<0.005	
2/25/2016	<0.005	
5/11/2016	<0.005	
8/16/2016	<0.005	
11/17/2016	<0.005	
2/23/2017	<0.005	
6/7/2017	<0.005	
8/24/2017	<0.01	
12/20/2017		<0.02

Within Control Limits



Background Data Summary: Mean=0.7799, Std. Dev.=0.06199, n=8. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9612, critical = 0.818. Report alpha = 0.00205. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Lithium   Analysis Run 1/25/2018 12:13 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart

Constituent: Lithium (mg/L) Analysis Run 1/25/2018 12:21 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-2	MW-2	Std. Mean	CUSUM
12/14/2015	0.69			
2/25/2016	0.74			
5/11/2016	0.87			
8/16/2016	0.84			
11/17/2016	0.82			
2/23/2017	0.8			
6/7/2017	0.75			
8/24/2017	0.729			
12/20/2017		0.74	-0.6432	0.7799

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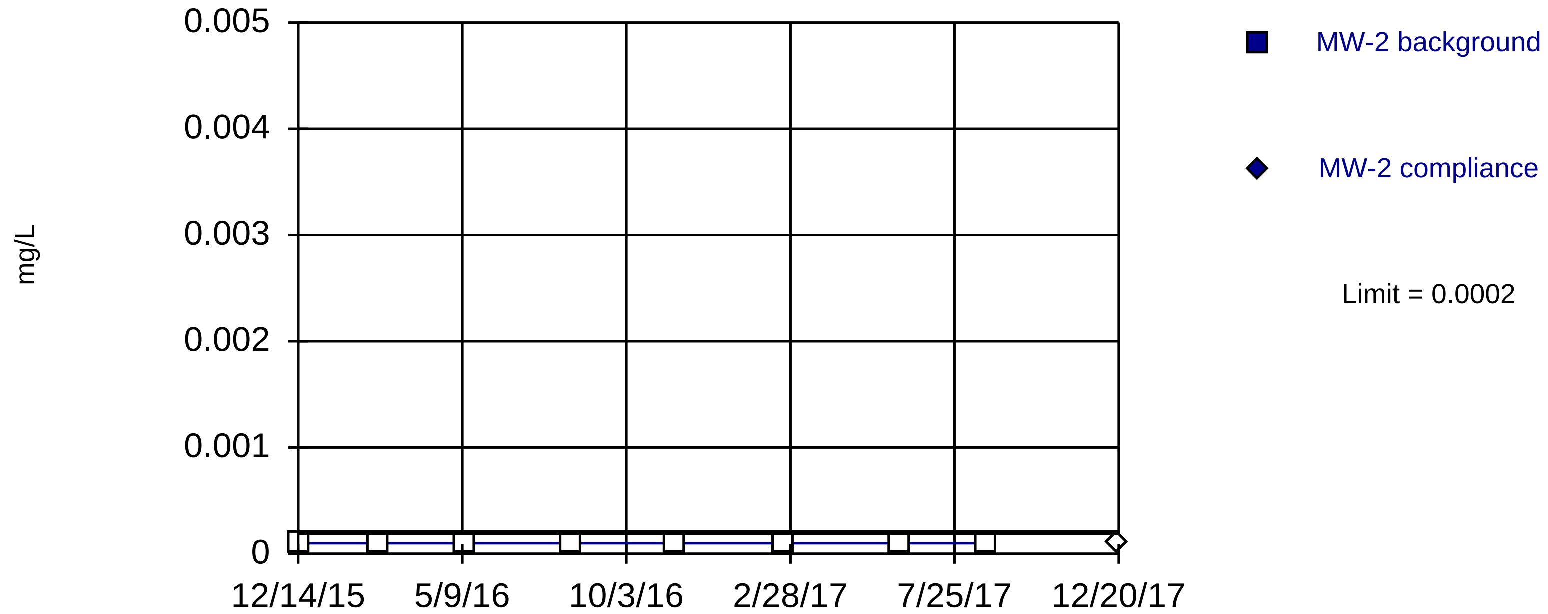
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. All background values (n = 8) were censored; limit is most recent reporting limit. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Mercury Analysis Run 1/25/2018 12:13 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Mercury (mg/L) Analysis Run 1/25/2018 12:21 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-2	MW-2
12/14/2015	<0.0002	
2/25/2016	<0.0002	
5/11/2016	<0.0002	
8/16/2016	<0.0002	
11/17/2016	<0.0002	
2/23/2017	<0.0002	
6/7/2017	<0.0002	
8/24/2017	<0.0002	
12/20/2017		<0.0002

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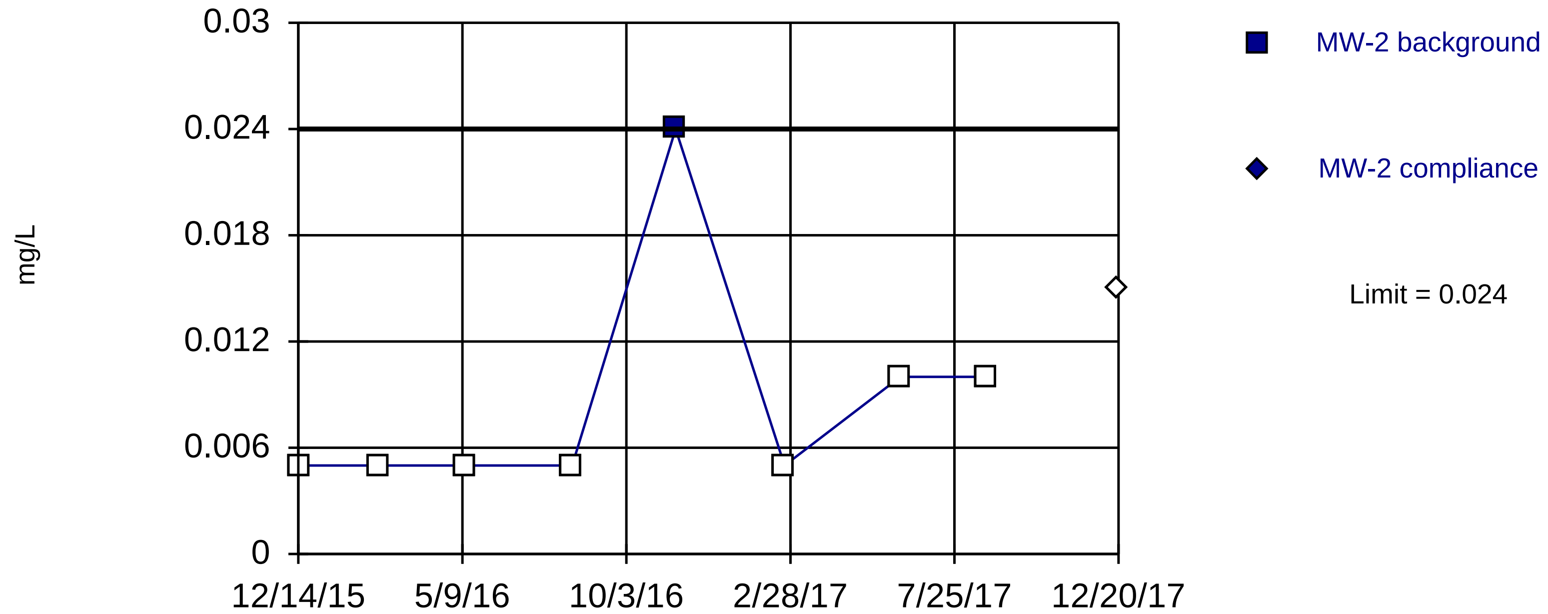
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. Limit is highest of 8 background values. 87.5% NDs. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Molybdenum   Analysis Run 1/25/2018 12:13 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Molybdenum (mg/L)   Analysis Run 1/25/2018 12:21 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-2	MW-2
12/14/2015	<0.01	
2/25/2016	<0.01	
5/11/2016	<0.01	
8/16/2016	<0.01	
11/17/2016	0.024	
2/23/2017	<0.01	
6/7/2017	<0.02	
8/24/2017	<0.02	
12/20/2017		<0.03

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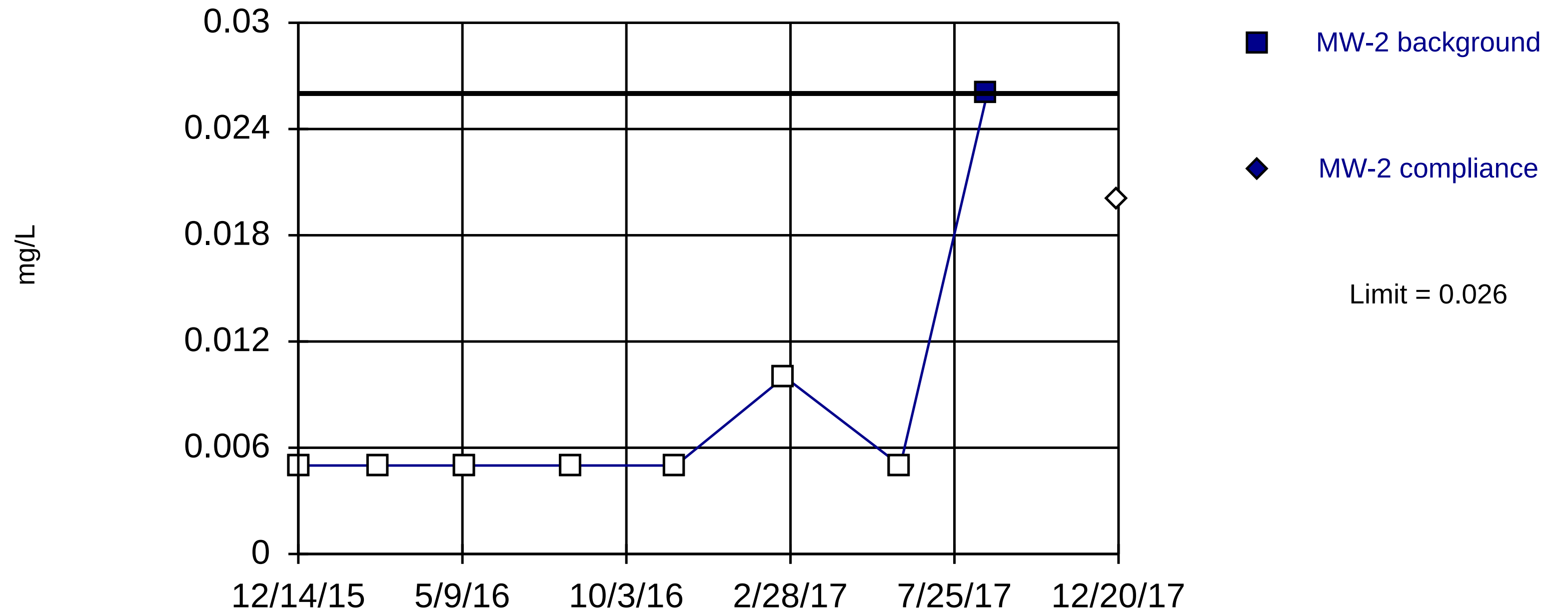
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. Limit is highest of 8 background values. 87.5% NDs. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Selenium Analysis Run 1/25/2018 12:13 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Selenium (mg/L)   Analysis Run 1/25/2018 12:21 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-2	MW-2
12/14/2015	<0.01	
2/25/2016	<0.01	
5/11/2016	<0.01	
8/16/2016	<0.01	
11/17/2016	<0.01	
2/23/2017	<0.02	
6/7/2017	<0.01	
8/24/2017	0.026	
12/20/2017		<0.04

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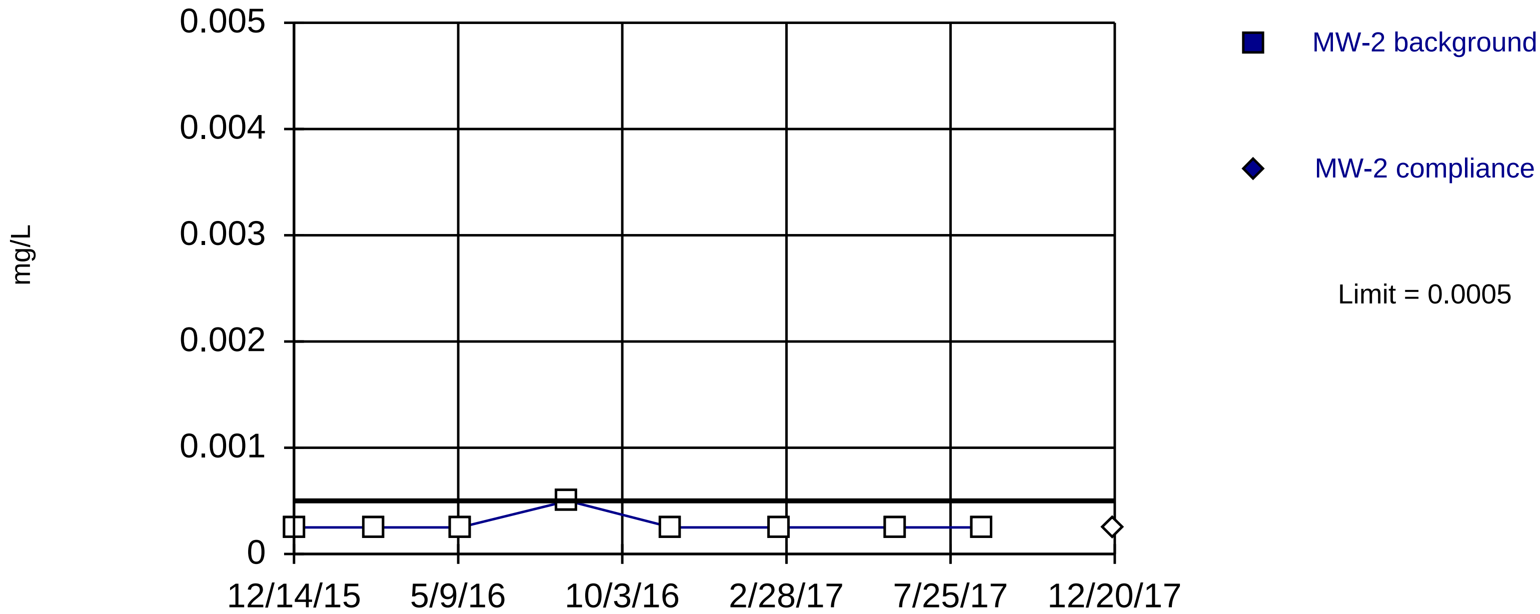
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. All background values (n = 8) were censored; limit is most recent reporting limit. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Thallium   Analysis Run 1/25/2018 12:13 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

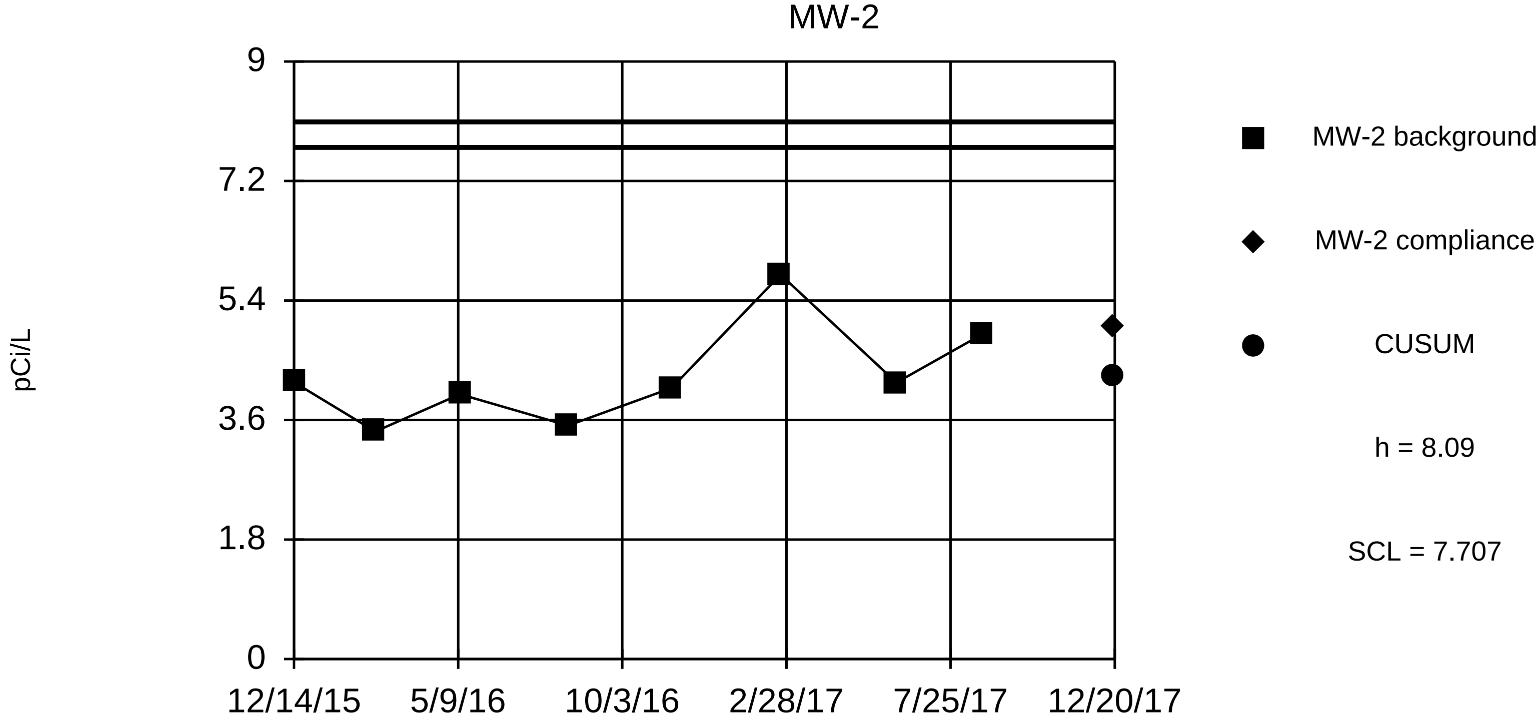
Constituent: Thallium (mg/L) Analysis Run 1/25/2018 12:21 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-2	MW-2
12/14/2015	<0.0005	
2/25/2016	<0.0005	
5/11/2016	<0.0005	
8/16/2016	<0.001	
11/17/2016	<0.0005	
2/23/2017	<0.0005	
6/7/2017	<0.0005	
8/24/2017	<0.0005	
12/20/2017		<0.0005

Control Chart

Within Control Limits



Background Data Summary: Mean=4.255, Std. Dev.=0.767, n=8. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.88, critical = 0.818. Report alpha = 0.001916. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Combined Radium   Analysis Run 1/25/2018 2:47 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart

Constituent: Combined Radium (pCi/L) Analysis Run 1/25/2018 2:47 PM

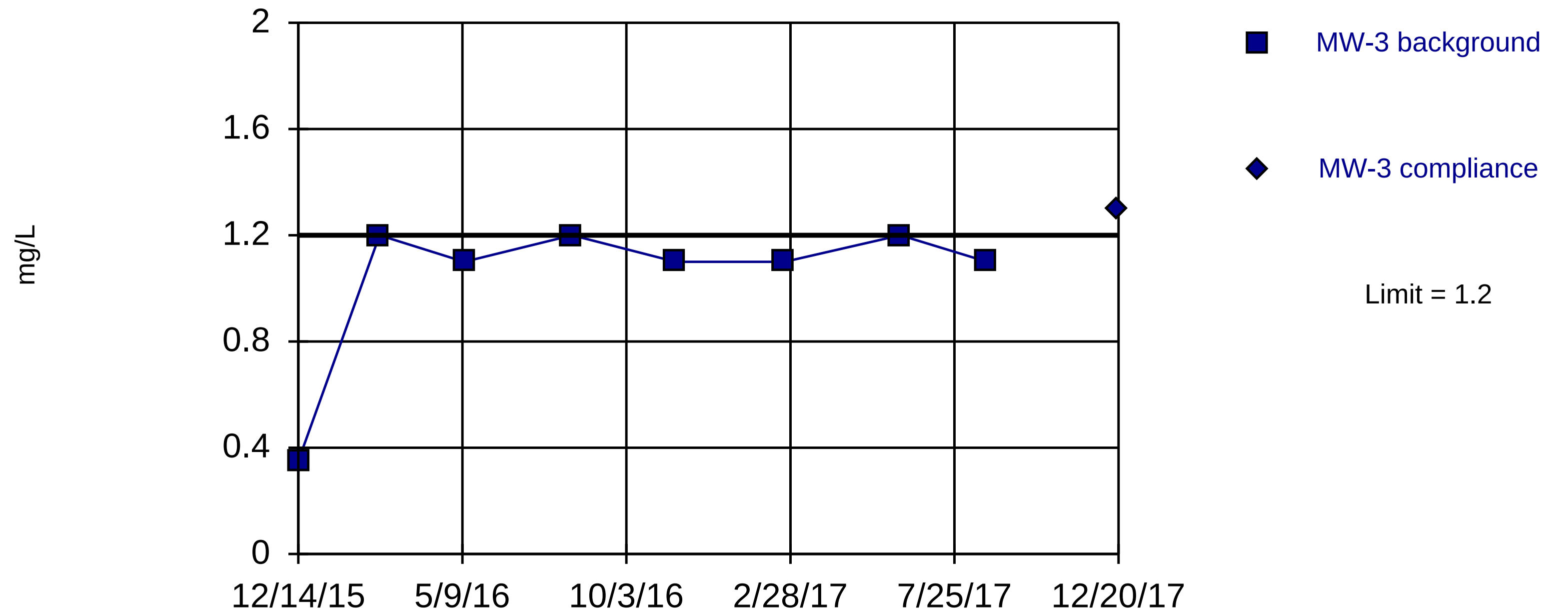
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-2	MW-2	Std. Mean	CUSUM
12/14/2015	4.17			
2/25/2016	3.427			
5/11/2016	3.989			
8/16/2016	3.517			
11/17/2016	4.083			
2/23/2017	5.79			
6/7/2017	4.164			
8/24/2017	4.9			
12/20/2017		5.015	0.9908	4.255

Exceeds Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because the Shapiro Wilk normality test showed the data to be non-normal at the 0.05 alpha level. Limit is highest of 8 background values. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Boron   Analysis Run 1/25/2018 12:25 PM

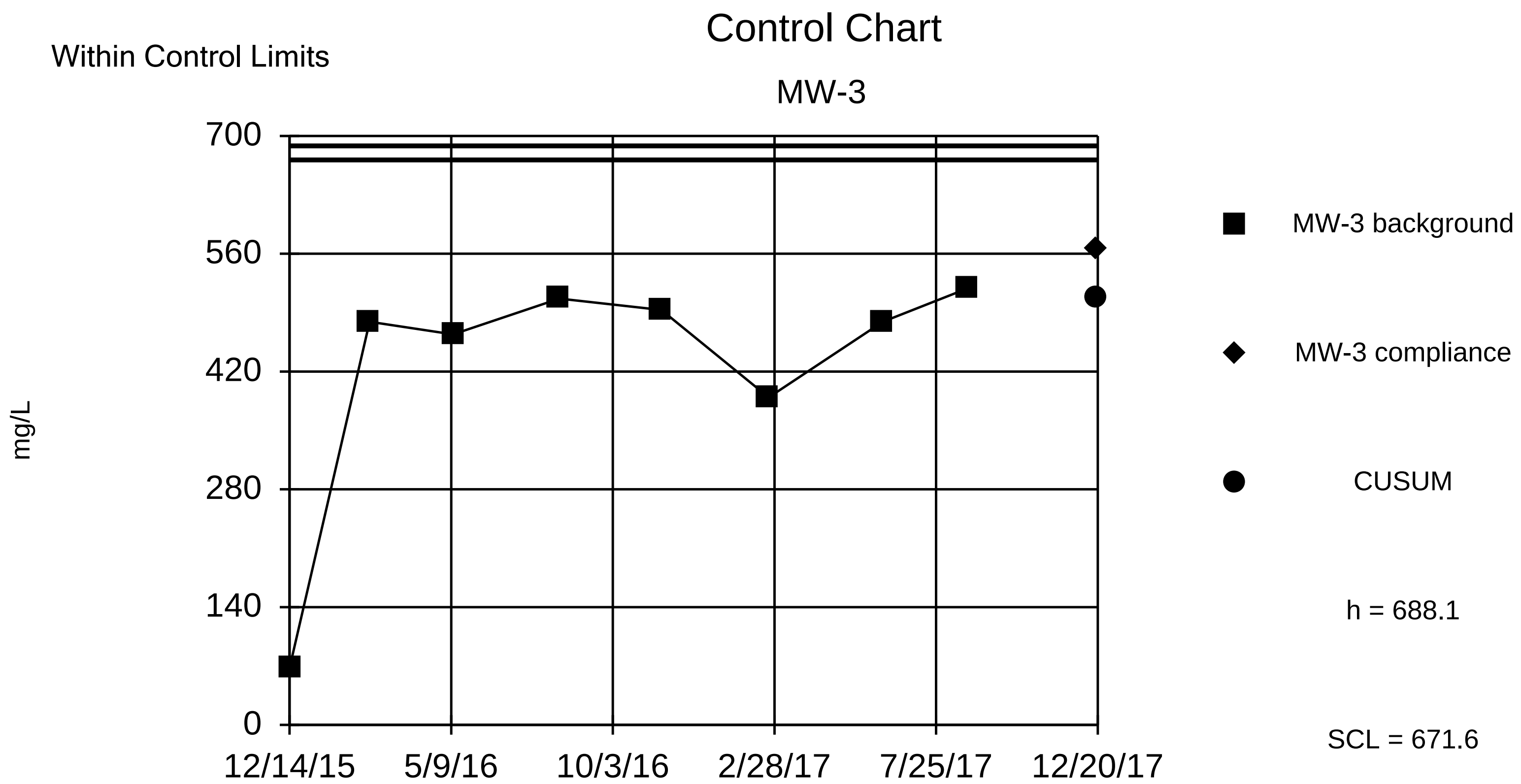
Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Boron (mg/L) Analysis Run 1/25/2018 12:27 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-3	MW-3
12/14/2015	0.35	
2/25/2016	1.2	
5/11/2016	1.1	
8/16/2016	1.2	
11/17/2016	1.1	
2/23/2017	1.1	
6/7/2017	1.2	
8/24/2017	1.1	
12/20/2017		1.3



Background Data Summary (based on cube transformation): Mean=9.7e7, Std. Dev.=4.6e7, n=8. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.828, critical = 0.818. Report alpha = 0.001952. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Calcium   Analysis Run 1/26/2018 10:17 AM

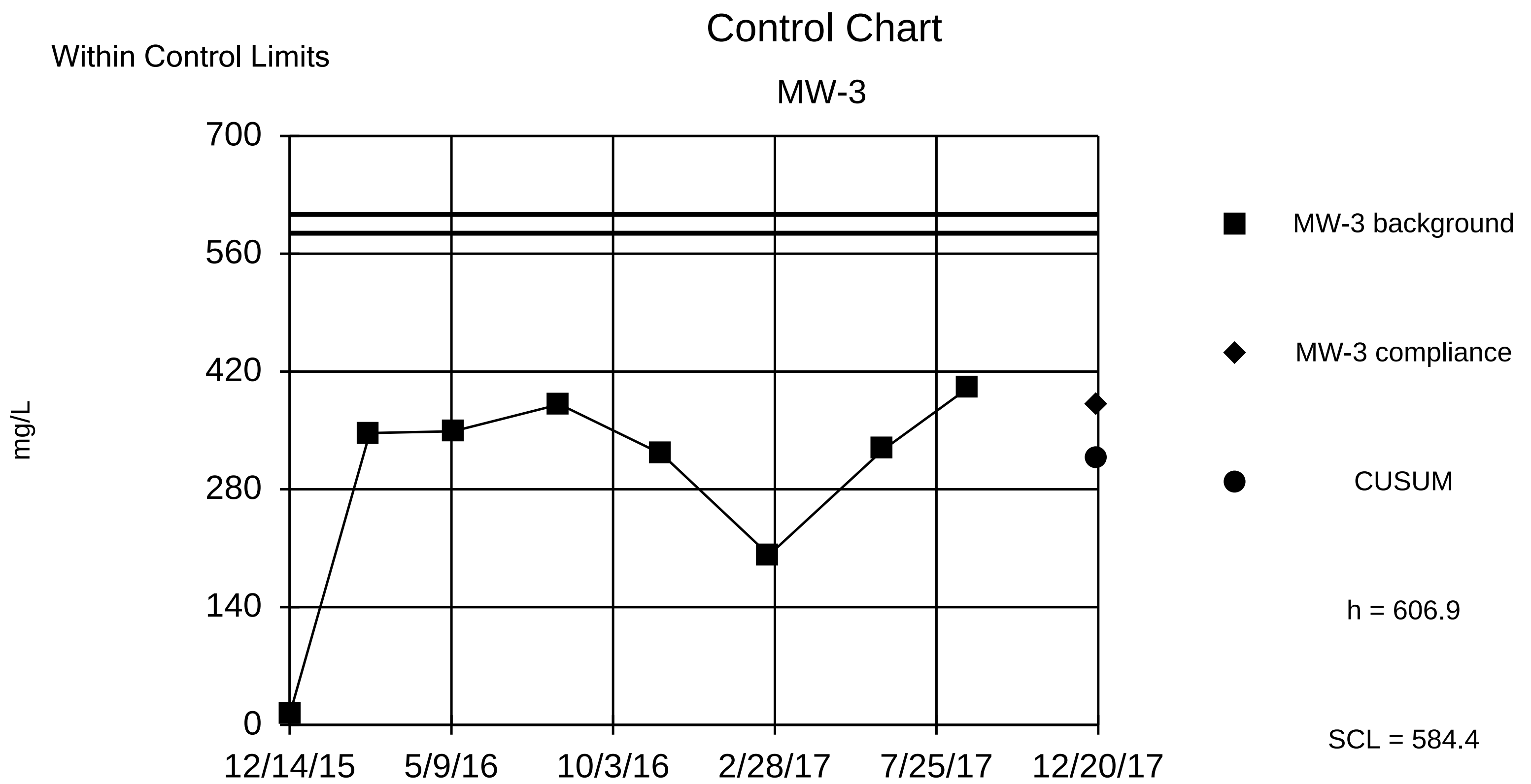
Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart

Constituent: Calcium (mg/L)   Analysis Run 1/26/2018 10:17 AM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-3	MW-3	Cube	Std. Mean	CUSUM
12/14/2015	67.6		308915.776		
2/25/2016	479		109902239		
5/11/2016	465		100544625		
8/16/2016	505		128787625		
11/17/2016	494		120553784		
2/23/2017	389		58863869		
6/7/2017	486		114791256		
8/24/2017	519		139798359		
12/20/2017		563	178453547	1.784	506.6



Background Data Summary (based on square transformation): Mean=99968, Std. Dev.=53670, n=8. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8926, critical = 0.818. Report alpha = 0.00205. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Chloride Analysis Run 1/25/2018 12:25 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart

Constituent: Chloride (mg/L)   Analysis Run 1/25/2018 12:27 PM

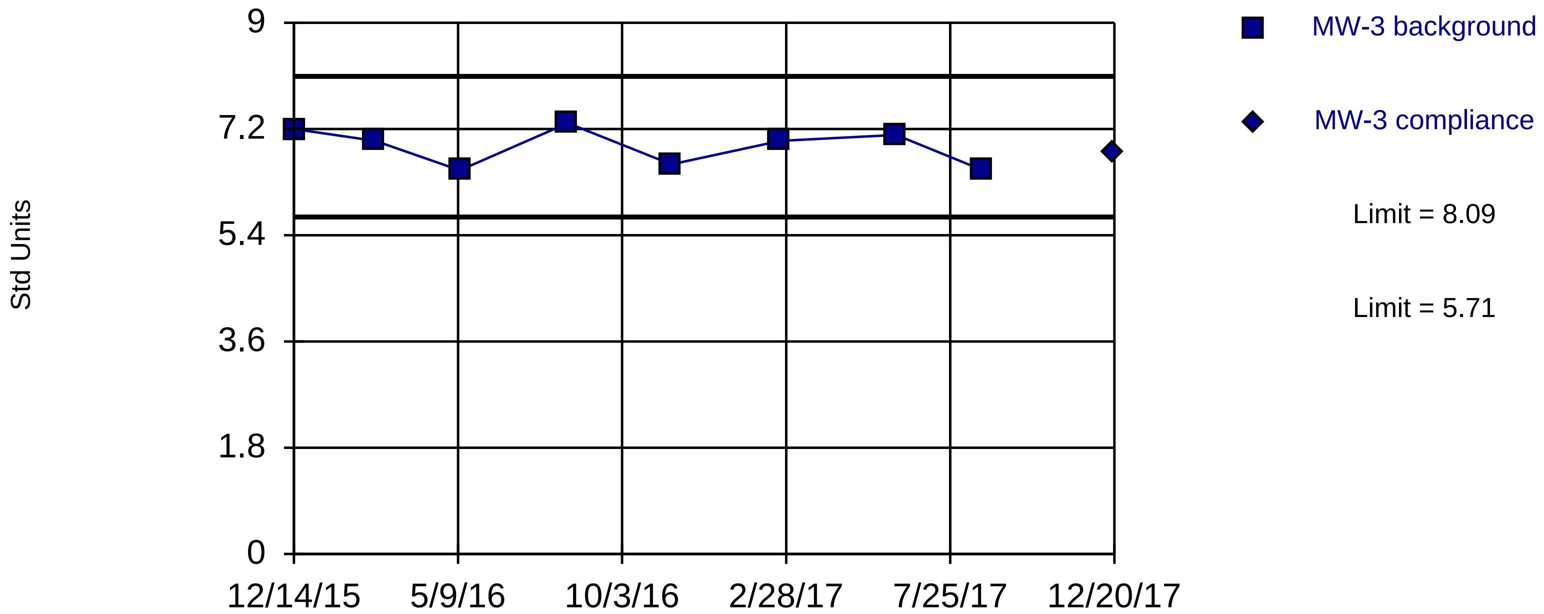
Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-3	MW-3	Square	Std. Mean	CUSUM
12/14/2015	12.3		151.29		
2/25/2016	347		120409		
5/11/2016	349		121801		
8/16/2016	381		145161		
11/17/2016	322		103684		
2/23/2017	202		40804		
6/7/2017	327		106929		
8/24/2017	401		160801		
12/20/2017		380	144400	0.8279	316.2

Within Limits

Prediction Limit

Intrawell Parametric



Background Data Summary: Mean=6.9, Std. Dev.=0.3207, n=8. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8729, critical = 0.818. Report alpha = 0.01. Most recent point compared to limit.

Constituent: pH Analysis Run 1/25/2018 12:23 PM

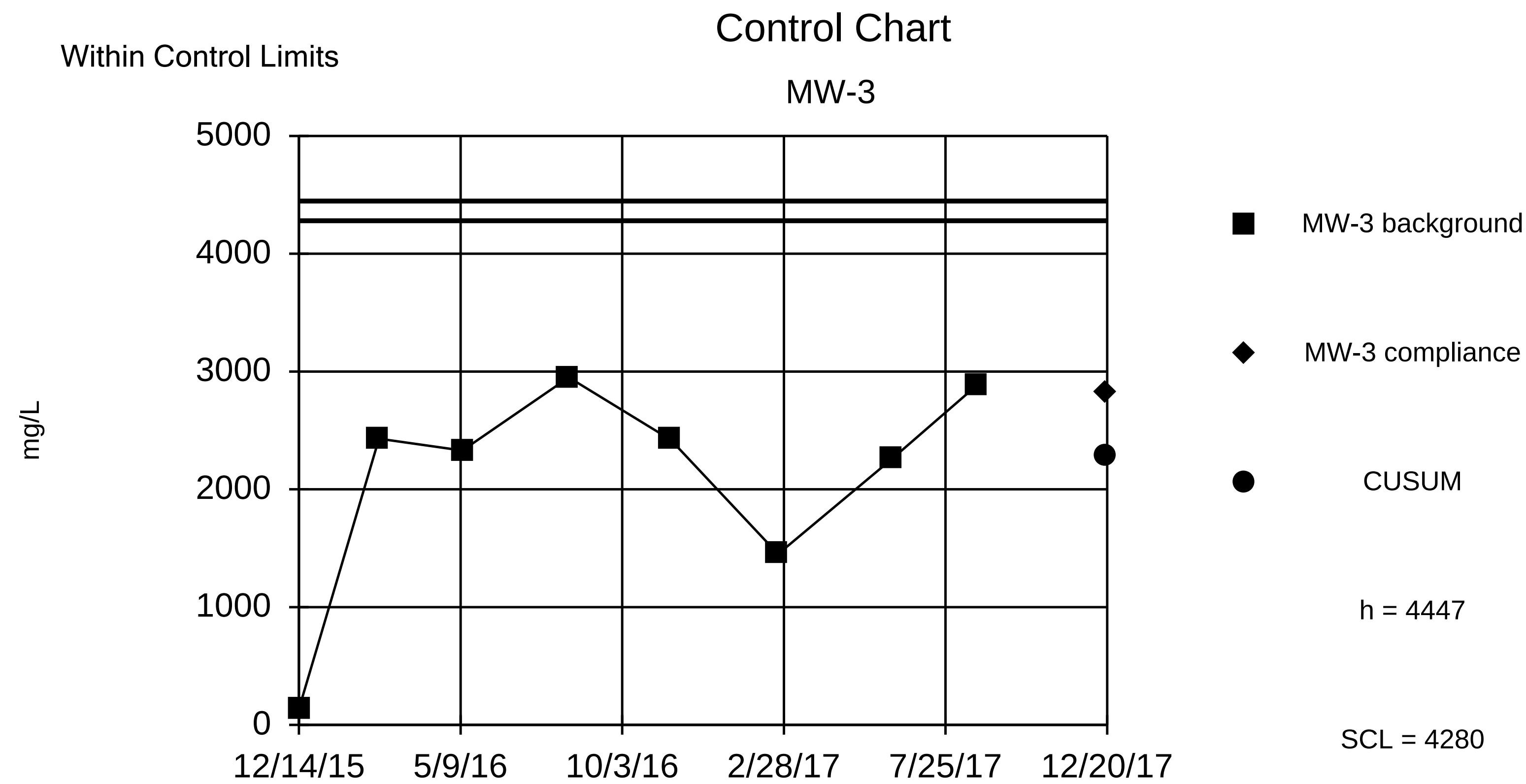
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Prediction Limit

Constituent: pH (Std Units) Analysis Run 1/25/2018 12:24 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-3	MW-3
12/14/2015	7.2	
2/25/2016	7	
5/11/2016	6.5	
8/16/2016	7.3	
11/17/2016	6.6	
2/23/2017	7	
6/7/2017	7.1	
8/24/2017	6.5	
12/20/2017		6.8



Background Data Summary (based on square transformation): Mean=5184141, Std. Dev.=2918787, n=8. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9173, critical = 0.818. Report alpha = 0.00205. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Sulfate   Analysis Run 1/25/2018 12:25 PM

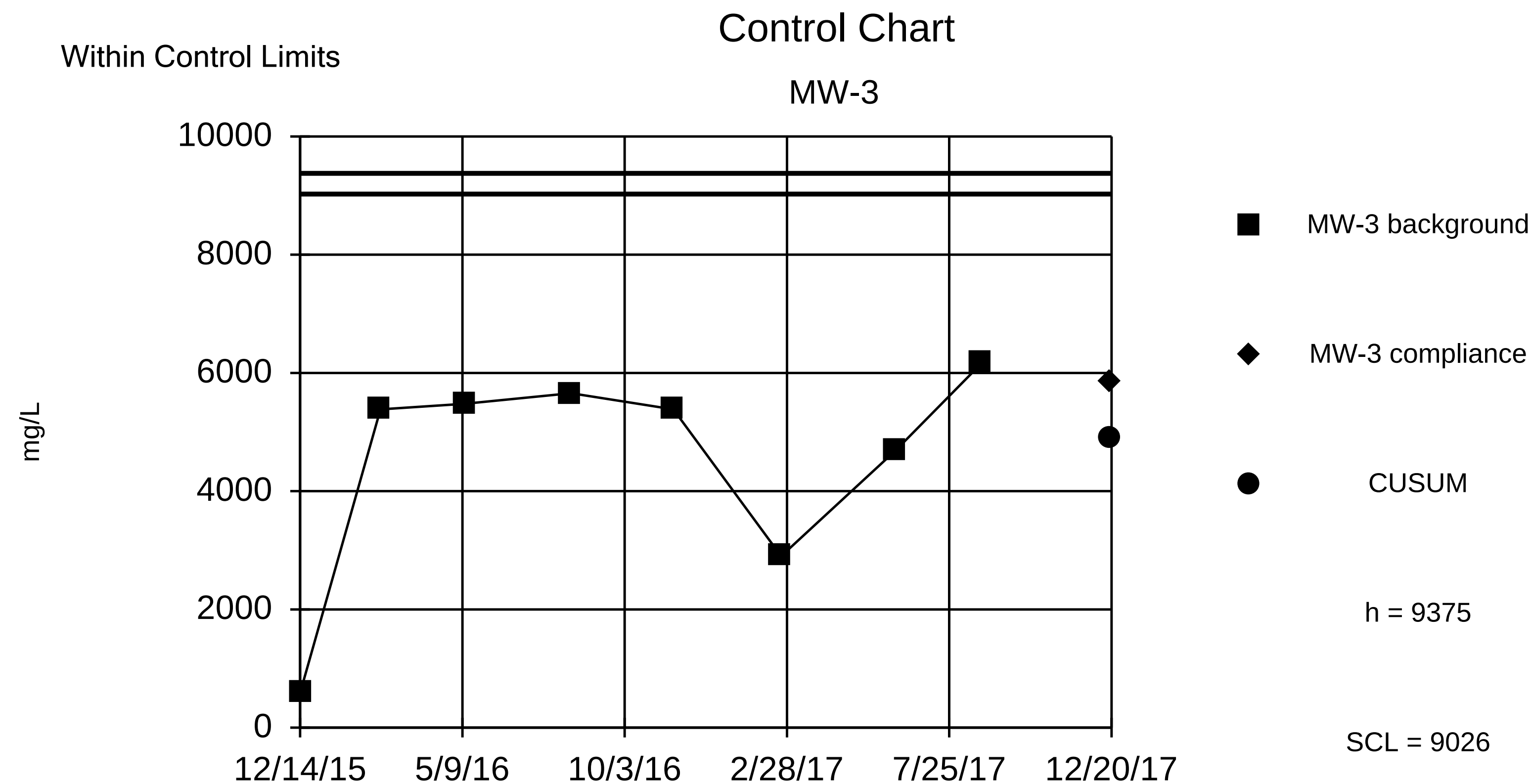
Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart

Constituent: Sulfate (mg/L)   Analysis Run 1/25/2018 12:27 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-3	MW-3	Square	Std. Mean	CUSUM
12/14/2015	135		18225		
2/25/2016	2430		5904900		
5/11/2016	2330		5428900		
8/16/2016	2950		8702500		
11/17/2016	2420		5856400		
2/23/2017	1450		2102500		
6/7/2017	2260		5107600		
8/24/2017	2890		8352100		
12/20/2017		2830	8008900	0.9678	2277



Background Data Summary (based on square transformation): Mean=2.4e7, Std. Dev.=1.3e7, n=8. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8631, critical = 0.818. Report alpha = 0.00205. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Total Dissolved Solids   Analysis Run 1/25/2018 12:25 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart

Constituent: Total Dissolved Solids (mg/L)   Analysis Run 1/25/2018 12:27 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-3	MW-3	Square	Std. Mean	CUSUM
12/14/2015	586		343396		
2/25/2016	5400		29160000		
5/11/2016	5440		29593600		
8/16/2016	5680		32262400		
11/17/2016	5420		29376400		
2/23/2017	2900		8410000		
6/7/2017	4740		22467600		
8/24/2017	6160		37945600		
12/20/2017		5790	33524100	0.7656	4899

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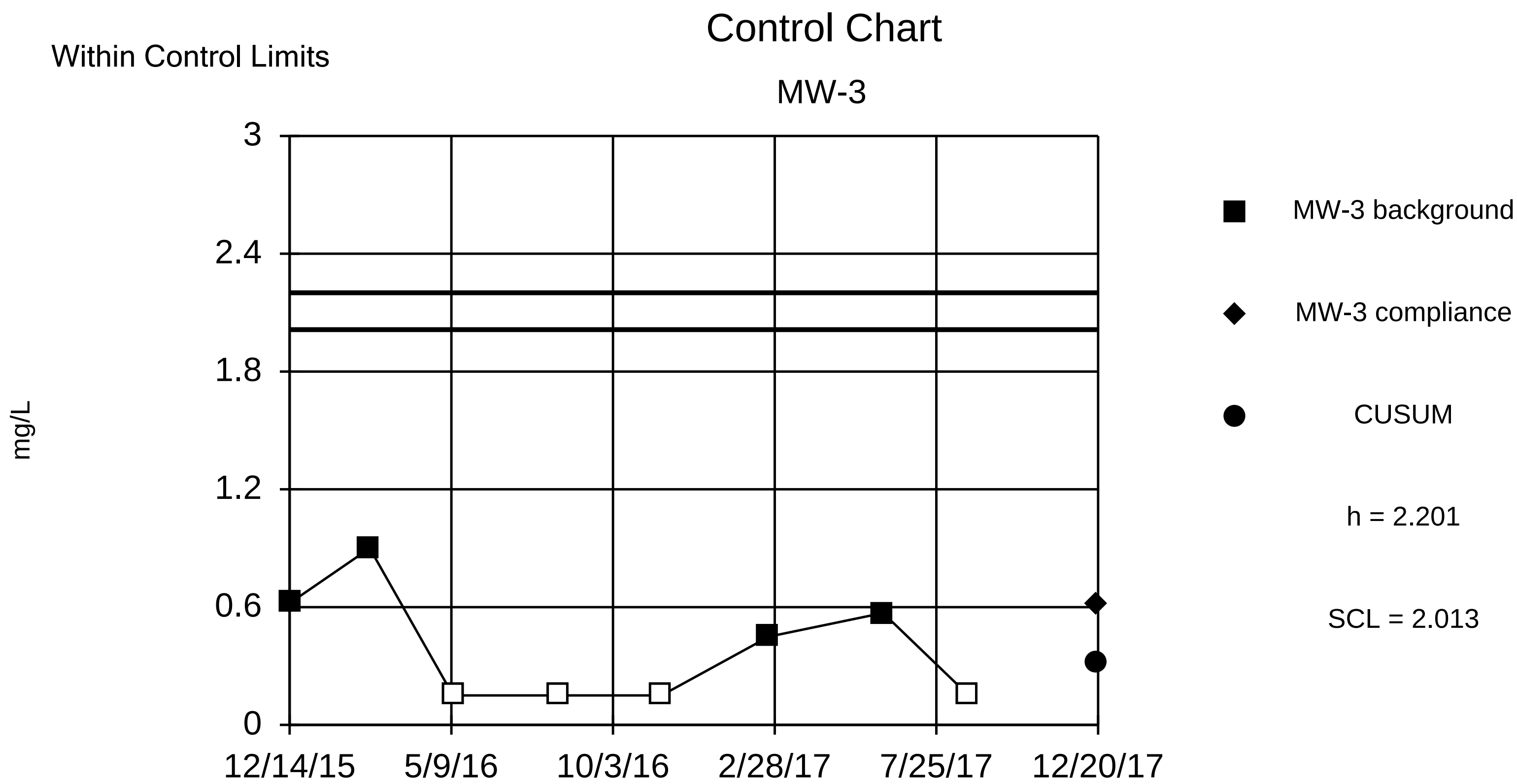
Hollow symbols indicate censored values.



Background Data Summary (after Cohen`s Adjustment): Mean=0.3213, Std. Dev.=0.376, n=8, 50% NDs. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8281, critical = 0.818. Report alpha = 0.00205. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Fluoride Analysis Run 1/25/2018 12:25 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart

Constituent: Fluoride (mg/L)   Analysis Run 1/25/2018 12:27 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-3	MW-3	Std. Mean	CUSUM
12/14/2015	0.62			
2/25/2016	0.9			
5/11/2016	<0.3			
8/16/2016	<0.3			
11/17/2016	<0.3			
2/23/2017	0.45			
6/7/2017	0.57			
8/24/2017	<0.3			
12/20/2017		0.61	0.7678	0.3213

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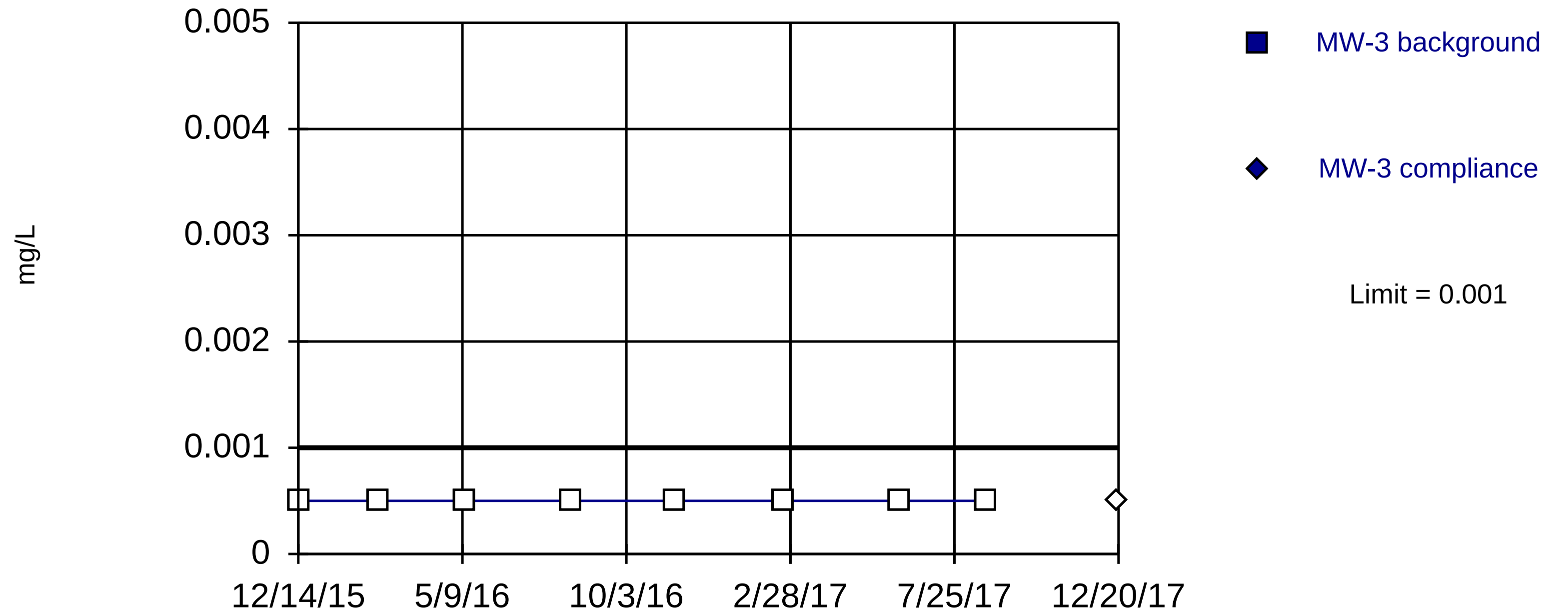
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. All background values (n = 8) were censored; limit is most recent reporting limit. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Antimony   Analysis Run 1/25/2018 12:31 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Antimony (mg/L) Analysis Run 1/25/2018 12:36 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

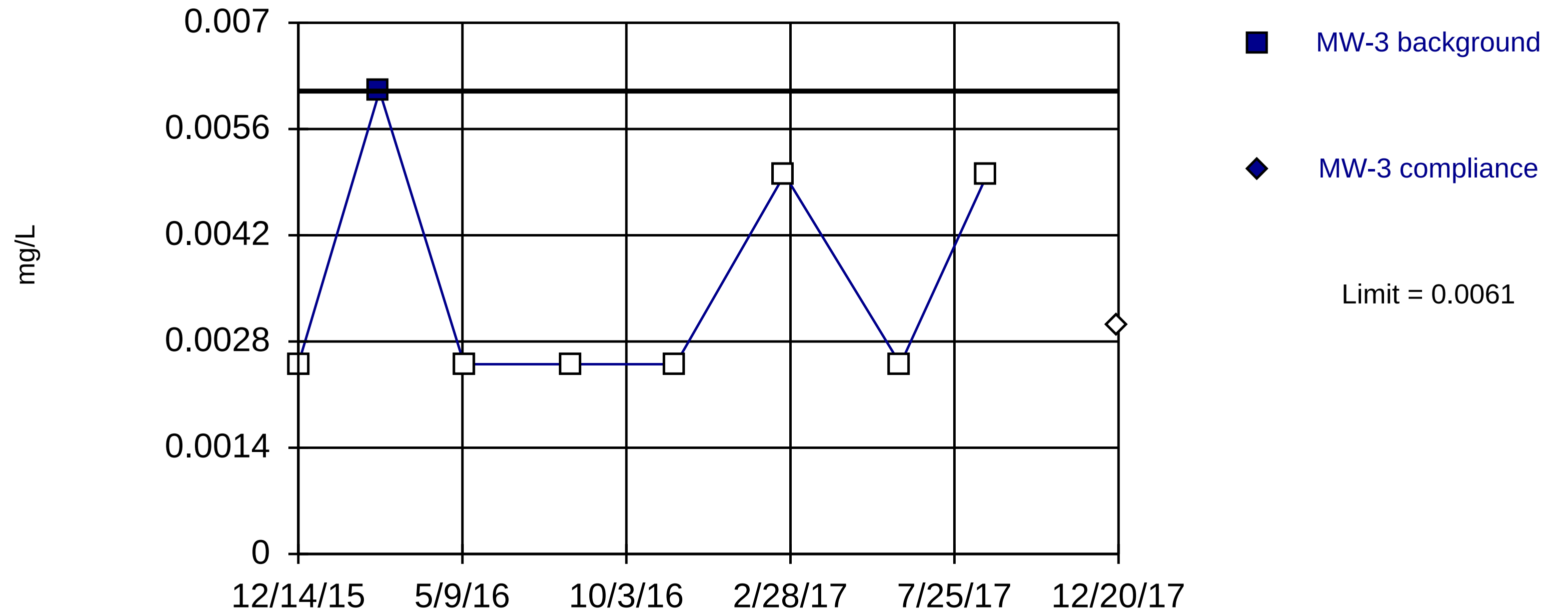
	MW-3	MW-3
12/14/2015	<0.001	
2/25/2016	<0.001	
5/11/2016	<0.001	
8/16/2016	<0.001	
11/17/2016	<0.001	
2/23/2017	<0.001	
6/7/2017	<0.001	
8/24/2017	<0.001	
12/20/2017		<0.001

Sanitas™ v.9.5.27 Software licensed to SCS Engineers. EPA
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. Limit is highest of 8 background values. 87.5% NDs. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Arsenic   Analysis Run 1/25/2018 12:31 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Arsenic (mg/L)   Analysis Run 1/25/2018 12:36 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-3	MW-3
12/14/2015	<0.005	
2/25/2016	0.0061	
5/11/2016	<0.005	
8/16/2016	<0.005	
11/17/2016	<0.005	
2/23/2017	<0.01	
6/7/2017	<0.005	
8/24/2017	<0.01	
12/20/2017		<0.006

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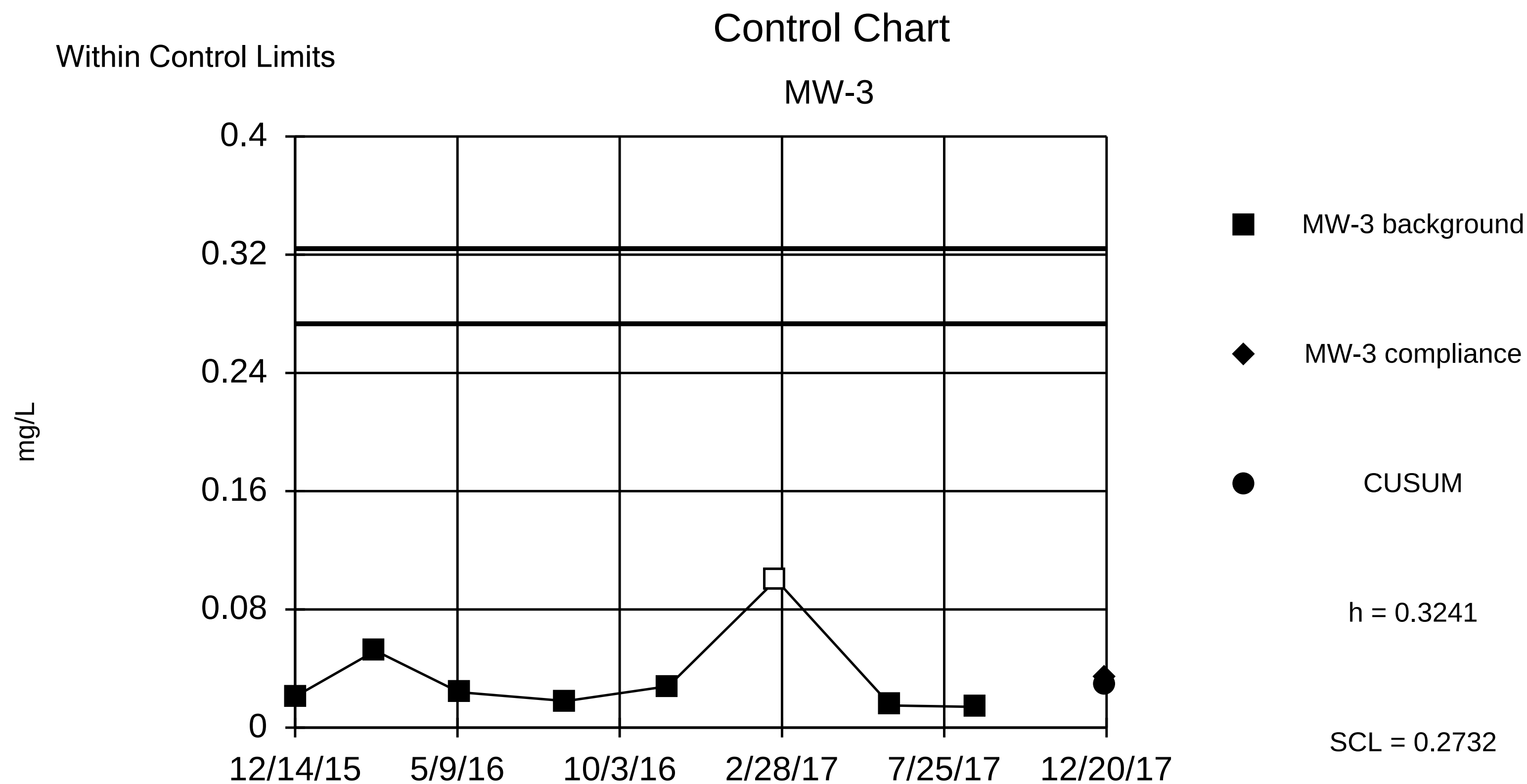
Hollow symbols indicate censored values.



Background Data Summary (based on cube root transformation): Mean=0.3069, Std. Dev.=0.076, n=8, 12.5% NDs. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8289, critical = 0.818. Report alpha = 0.00205. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Barium Analysis Run 1/25/2018 12:31 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart

Constituent: Barium (mg/L)   Analysis Run 1/25/2018 12:36 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-3	MW-3	Cube Root	Std. Mean	CUSUM
12/14/2015	0.021		0.2759		
2/25/2016	0.052		0.3733		
5/11/2016	0.024		0.2884		
8/16/2016	0.018		0.2621		
11/17/2016	0.028		0.3037		
2/23/2017	<0.2		0.4642		
6/7/2017	0.015		0.2466		
8/24/2017	0.014		0.241		
12/20/2017		0.034	0.324	0.2246	0.02891

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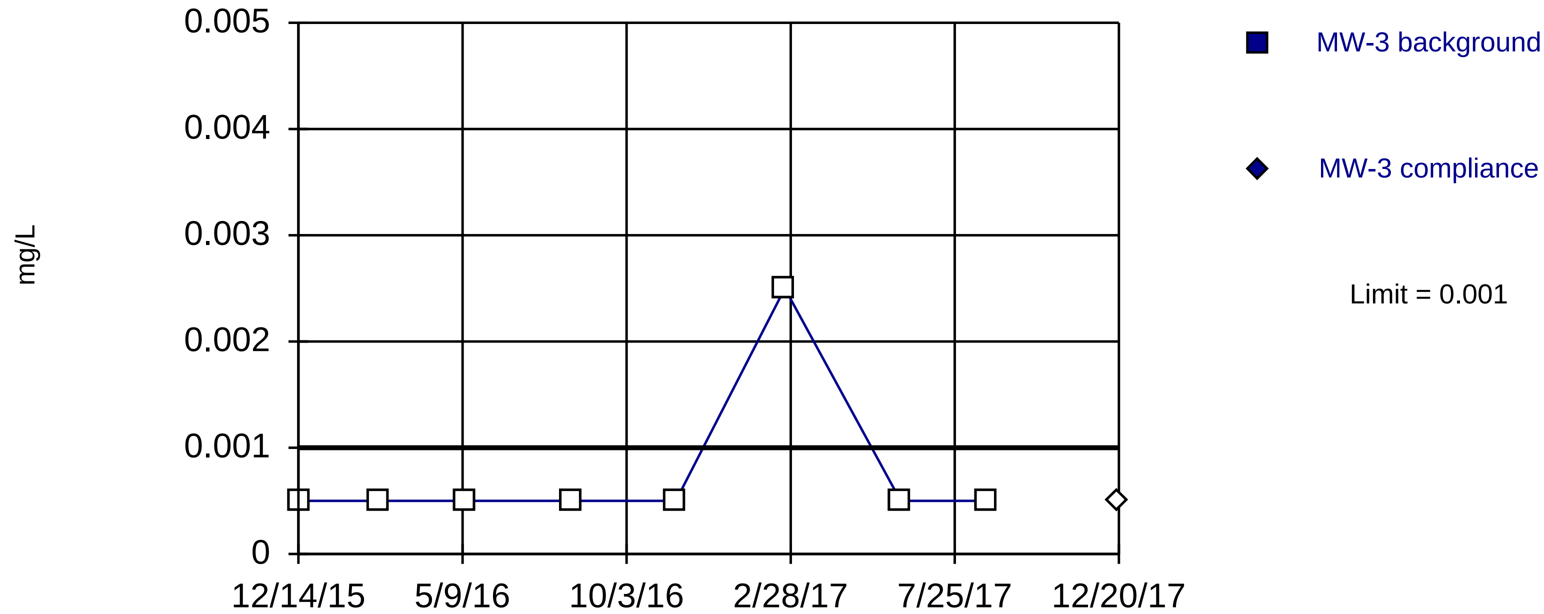
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. All background values (n = 8) were censored; limit is most recent reporting limit. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Beryllium Analysis Run 1/25/2018 12:31 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Beryllium (mg/L)   Analysis Run 1/25/2018 12:36 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-3	MW-3
12/14/2015	<0.001	
2/25/2016	<0.001	
5/11/2016	<0.001	
8/16/2016	<0.001	
11/17/2016	<0.001	
2/23/2017	<0.005	
6/7/2017	<0.001	
8/24/2017	<0.001	
12/20/2017		<0.001

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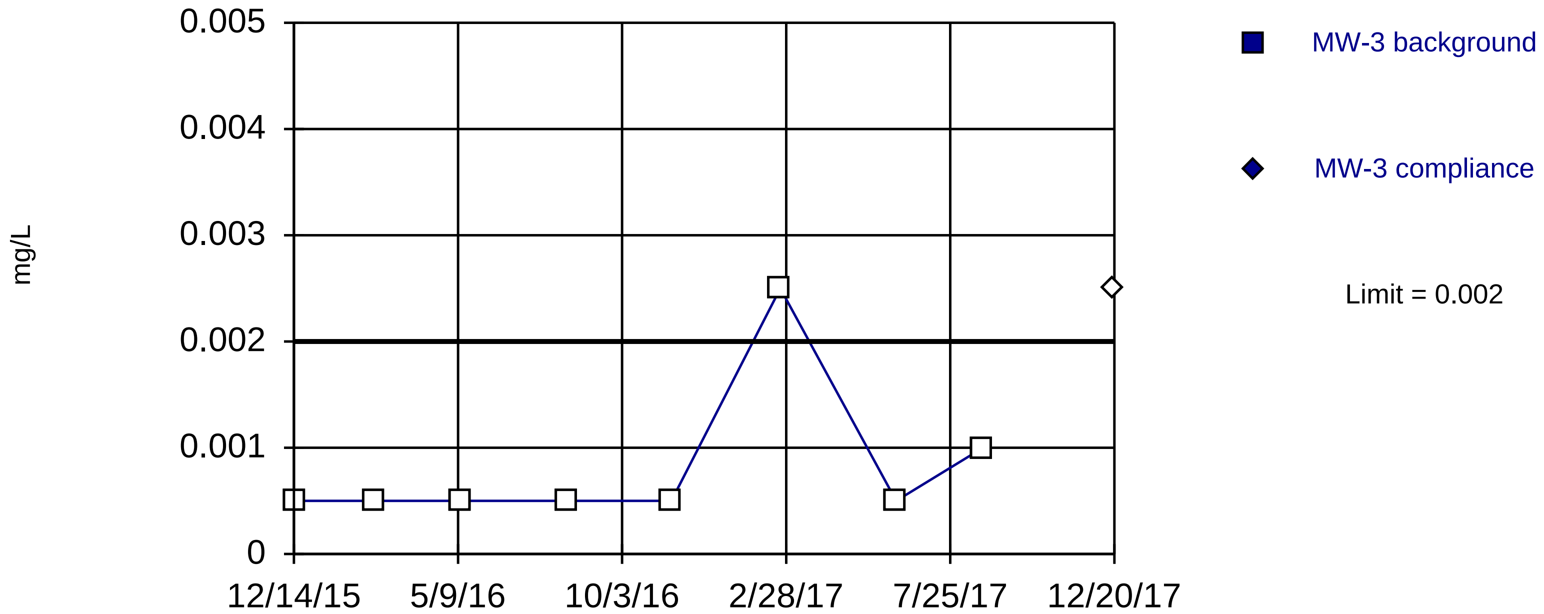
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. All background values (n = 8) were censored; limit is most recent reporting limit. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Cadmium Analysis Run 1/25/2018 12:31 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Cadmium (mg/L)   Analysis Run 1/25/2018 12:36 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-3	MW-3
12/14/2015	<0.001	
2/25/2016	<0.001	
5/11/2016	<0.001	
8/16/2016	<0.001	
11/17/2016	<0.001	
2/23/2017	<0.005	
6/7/2017	<0.001	
8/24/2017	<0.002	
12/20/2017		<0.005

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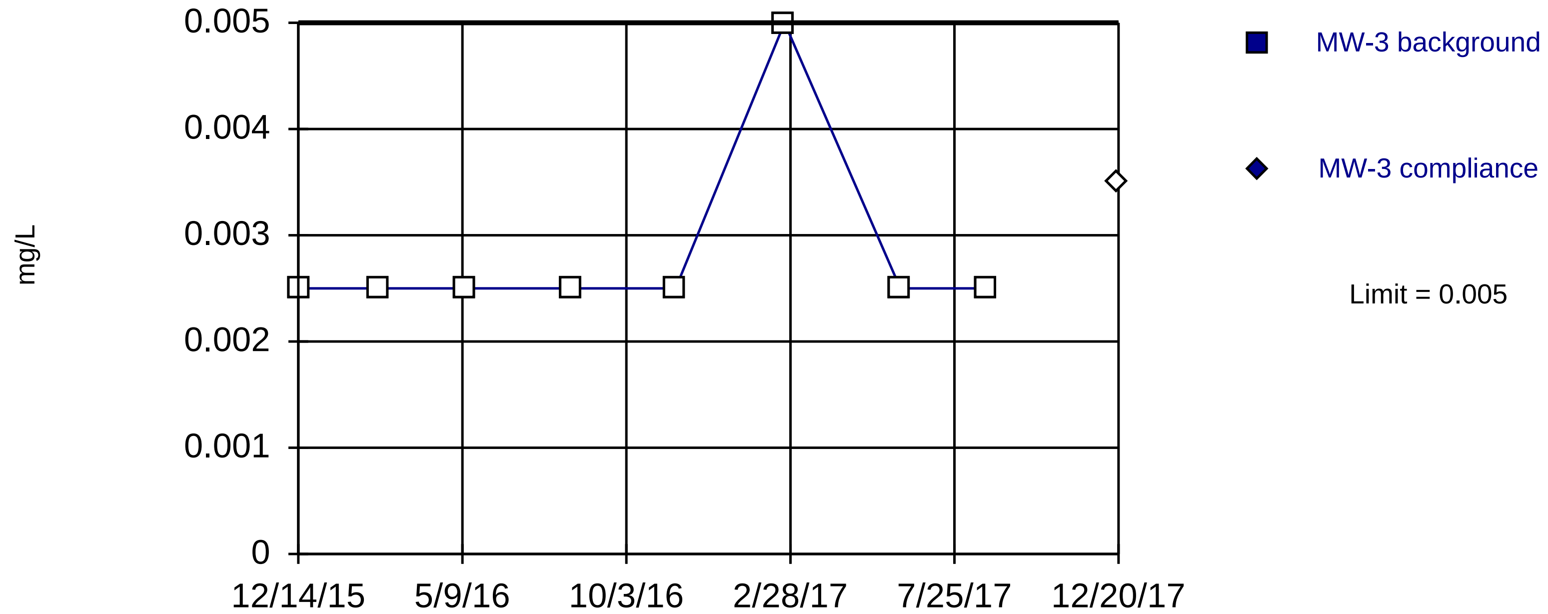
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. All background values (n = 8) were censored; limit is most recent reporting limit. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Chromium   Analysis Run 1/25/2018 12:31 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Chromium (mg/L)   Analysis Run 1/25/2018 12:36 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-3	MW-3
12/14/2015	<0.005	
2/25/2016	<0.005	
5/11/2016	<0.005	
8/16/2016	<0.005	
11/17/2016	<0.005	
2/23/2017	<0.01	
6/7/2017	<0.005	
8/24/2017	<0.005	
12/20/2017		<0.007

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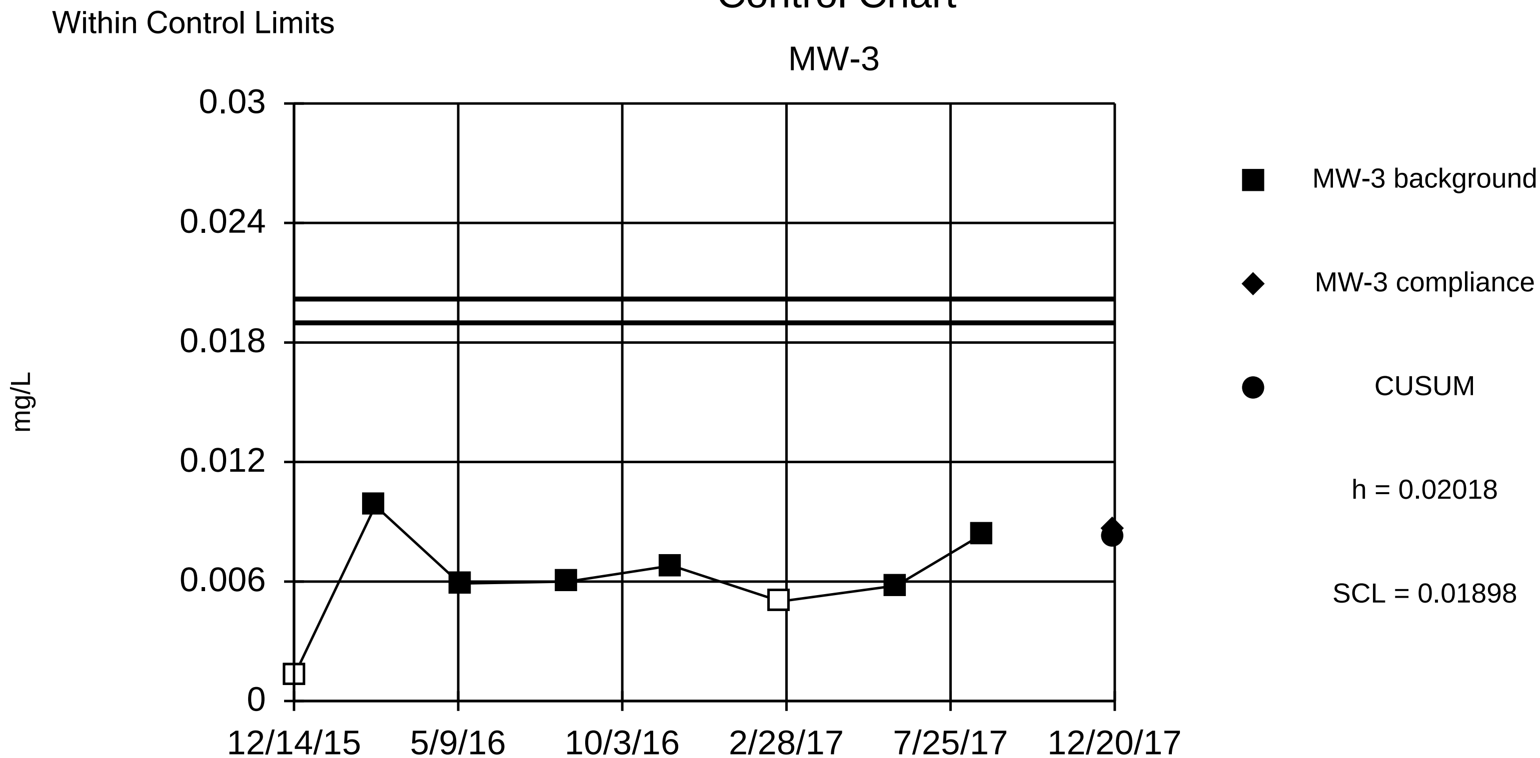
Hollow symbols indicate censored values.

Control Chart



Background Data Summary (after Cohen`s Adjustment): Mean=0.008184, Std. Dev.=0.0024, n=8, 25% NDs. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9325, critical = 0.818. Report alpha = 0.00205. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Cobalt   Analysis Run 1/25/2018 12:31 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart

Constituent: Cobalt (mg/L)   Analysis Run 1/25/2018 12:36 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-3	MW-3	Std. Mean	CUSUM
12/14/2015	<0.0025			
2/25/2016	0.0098			
5/11/2016	0.0059			
8/16/2016	0.006			
11/17/2016	0.0068			
2/23/2017	<0.01			
6/7/2017	0.0058			
8/24/2017	0.0084			
12/20/2017		0.0086	0.1735	0.008184

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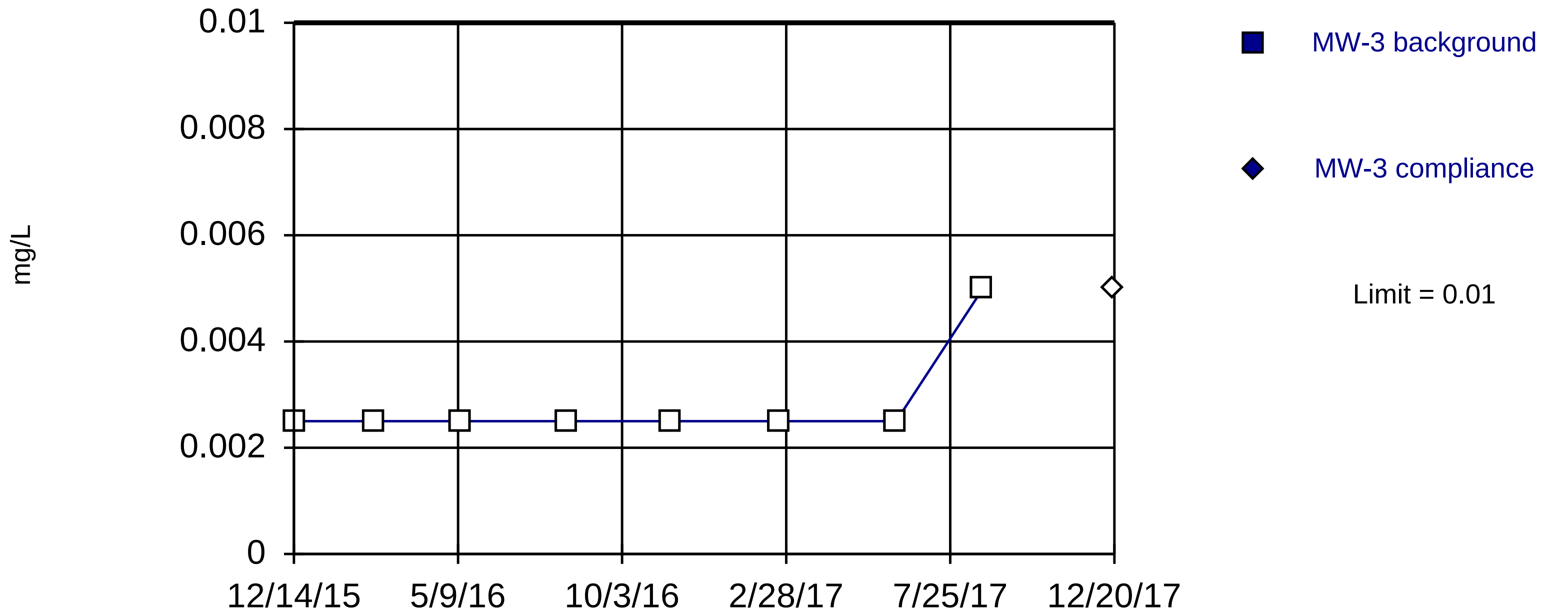
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. All background values (n = 8) were censored; limit is most recent reporting limit. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Lead   Analysis Run 1/25/2018 12:31 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Lead (mg/L) Analysis Run 1/25/2018 12:36 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-3	MW-3
12/14/2015	<0.005	
2/25/2016	<0.005	
5/11/2016	<0.005	
8/16/2016	<0.005	
11/17/2016	<0.005	
2/23/2017	<0.005	
6/7/2017	<0.005	
8/24/2017	<0.01	
12/20/2017		<0.01

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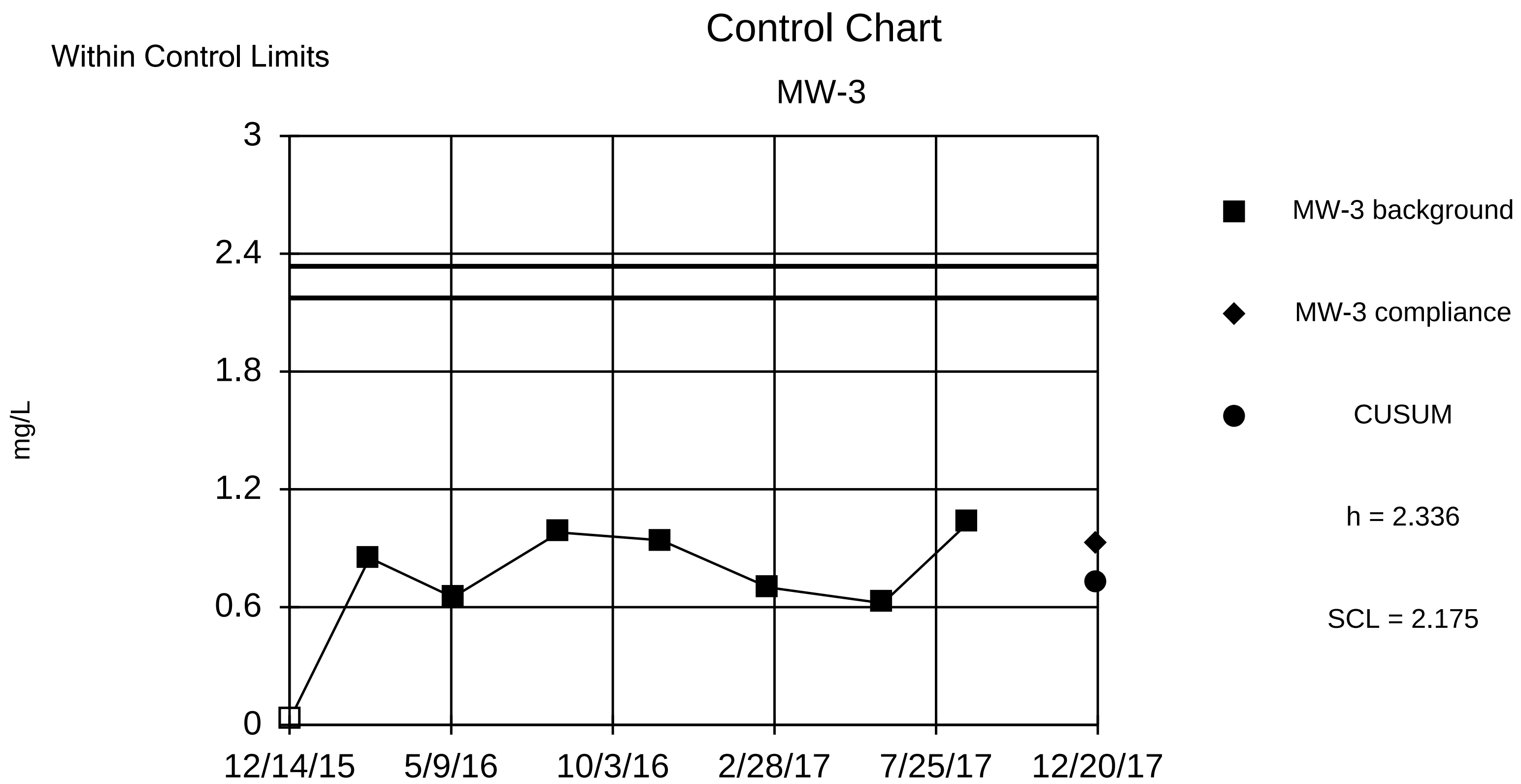
Hollow symbols indicate censored values.



Background Data Summary: Mean=0.7244, Std. Dev.=0.3223, n=8, 12.5% NDs. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.839, critical = 0.818. Report alpha = 0.00205. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Lithium   Analysis Run 1/25/2018 12:31 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart

Constituent: Lithium (mg/L) Analysis Run 1/25/2018 12:36 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-3	MW-3	Std. Mean	CUSUM
12/14/2015	<0.05			
2/25/2016	0.85			
5/11/2016	0.65			
8/16/2016	0.98			
11/17/2016	0.94			
2/23/2017	0.7			
6/7/2017	0.62			
8/24/2017	1.03			
12/20/2017		0.92	0.607	0.7244

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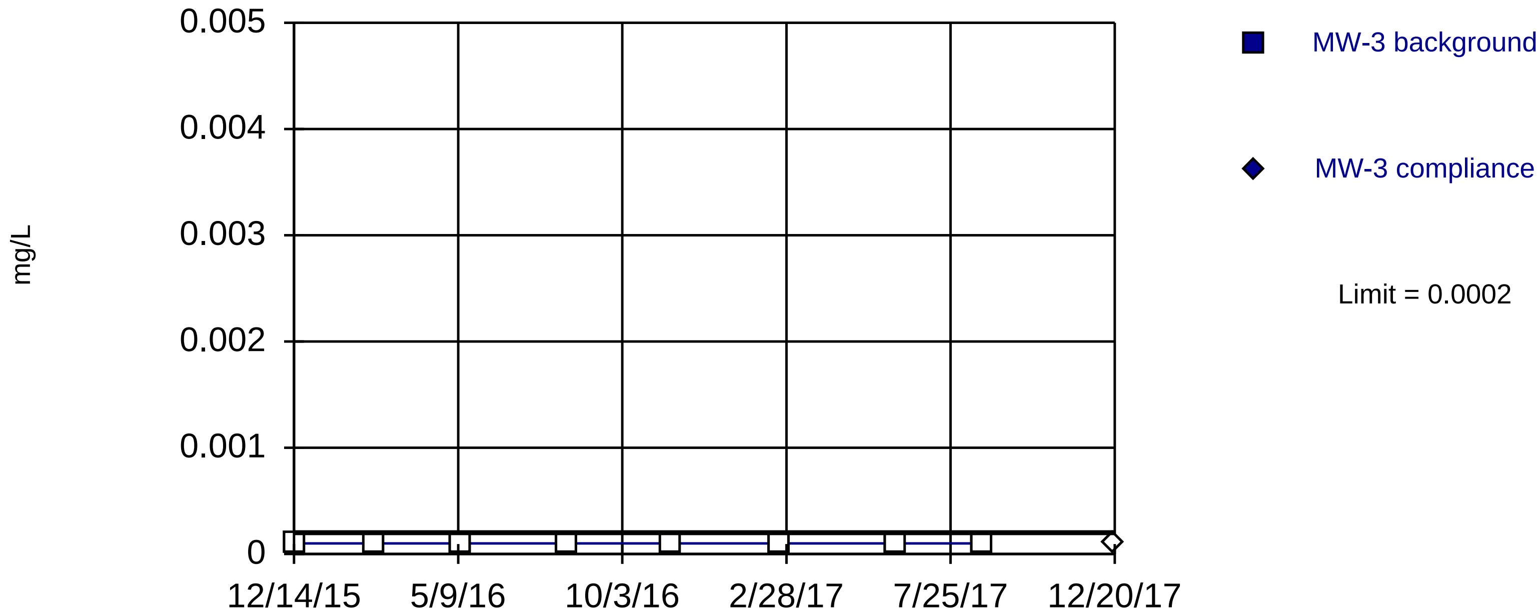
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. All background values (n = 8) were censored; limit is most recent reporting limit. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Mercury   Analysis Run 1/25/2018 12:31 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Mercury (mg/L) Analysis Run 1/25/2018 12:36 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-3	MW-3
12/14/2015	<0.0002	
2/25/2016	<0.0002	
5/11/2016	<0.0002	
8/16/2016	<0.0002	
11/17/2016	<0.0002	
2/23/2017	<0.0002	
6/7/2017	<0.0002	
8/24/2017	<0.0002	
12/20/2017		<0.0002

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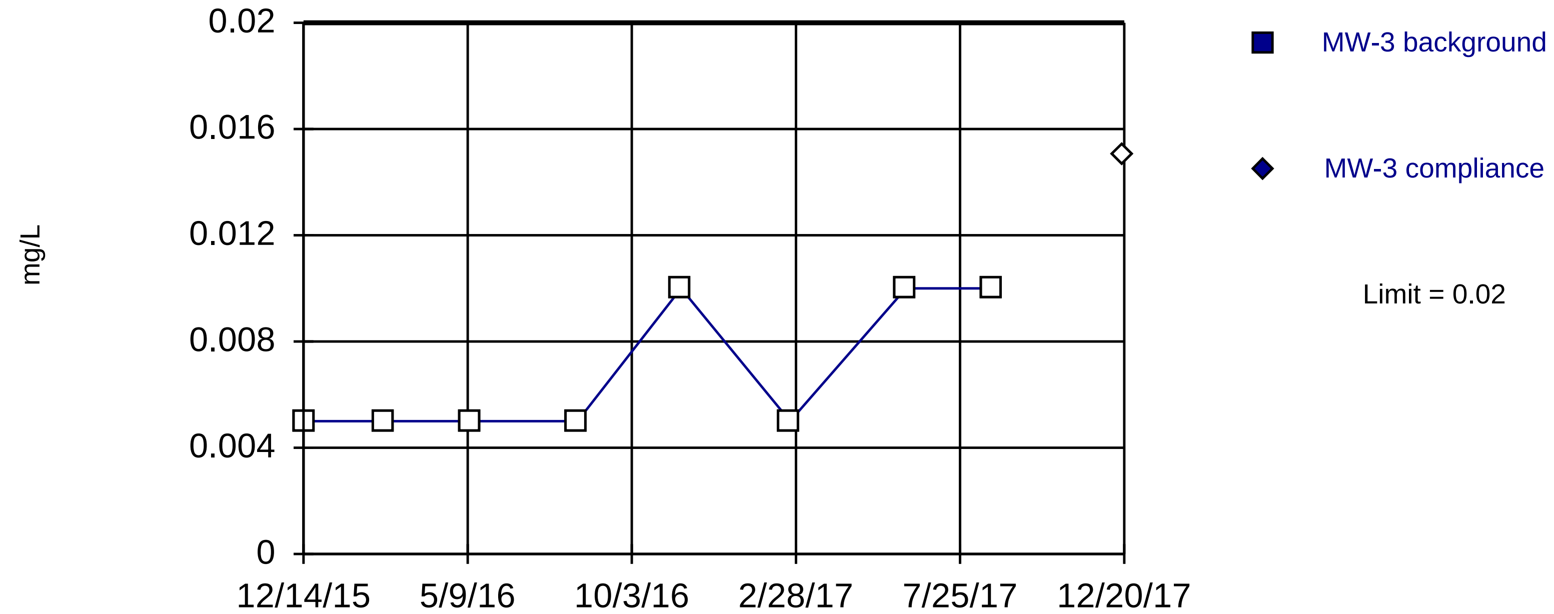
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. All background values (n = 8) were censored; limit is most recent reporting limit. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Molybdenum   Analysis Run 1/25/2018 12:31 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Molybdenum (mg/L)   Analysis Run 1/25/2018 12:36 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-3	MW-3
12/14/2015	<0.01	
2/25/2016	<0.01	
5/11/2016	<0.01	
8/16/2016	<0.01	
11/17/2016	<0.02	
2/23/2017	<0.01	
6/7/2017	<0.02	
8/24/2017	<0.02	
12/20/2017		<0.03

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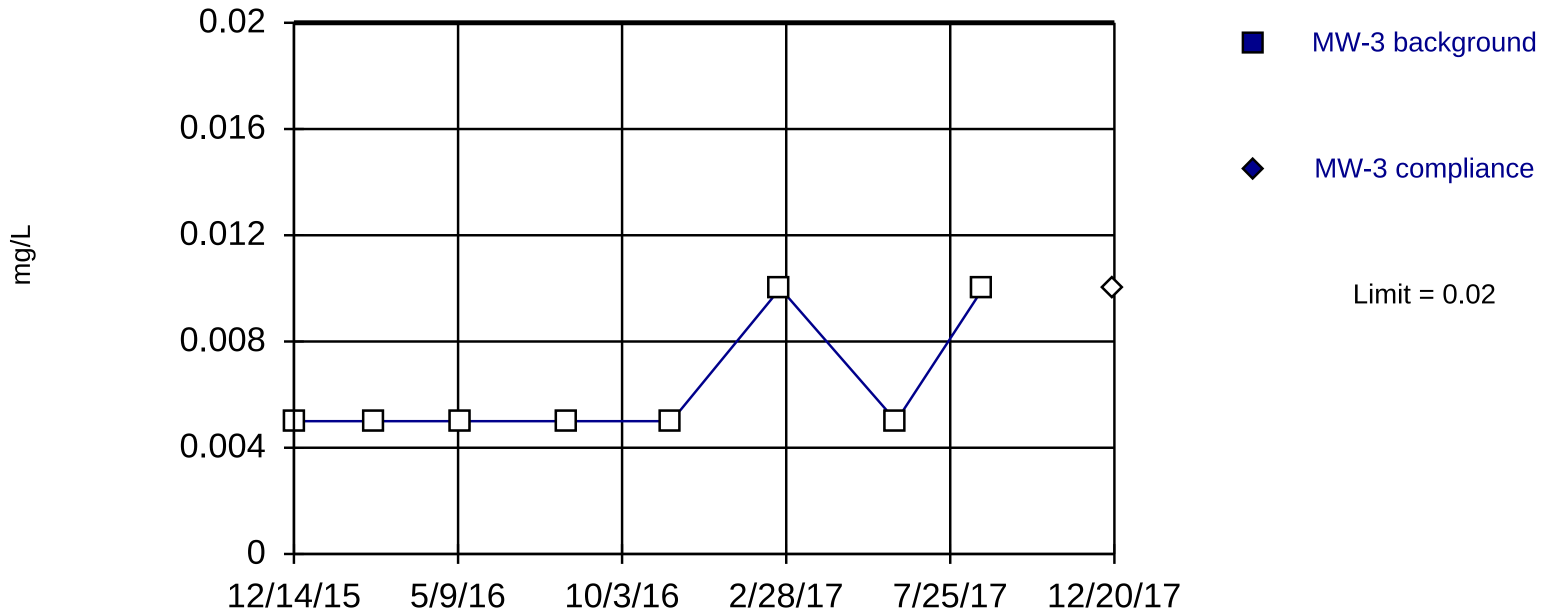
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. All background values (n = 8) were censored; limit is most recent reporting limit. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Selenium Analysis Run 1/25/2018 12:31 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Selenium (mg/L)   Analysis Run 1/25/2018 12:36 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-3	MW-3
12/14/2015	<0.01	
2/25/2016	<0.01	
5/11/2016	<0.01	
8/16/2016	<0.01	
11/17/2016	<0.01	
2/23/2017	<0.02	
6/7/2017	<0.01	
8/24/2017	<0.02	
12/20/2017		<0.02

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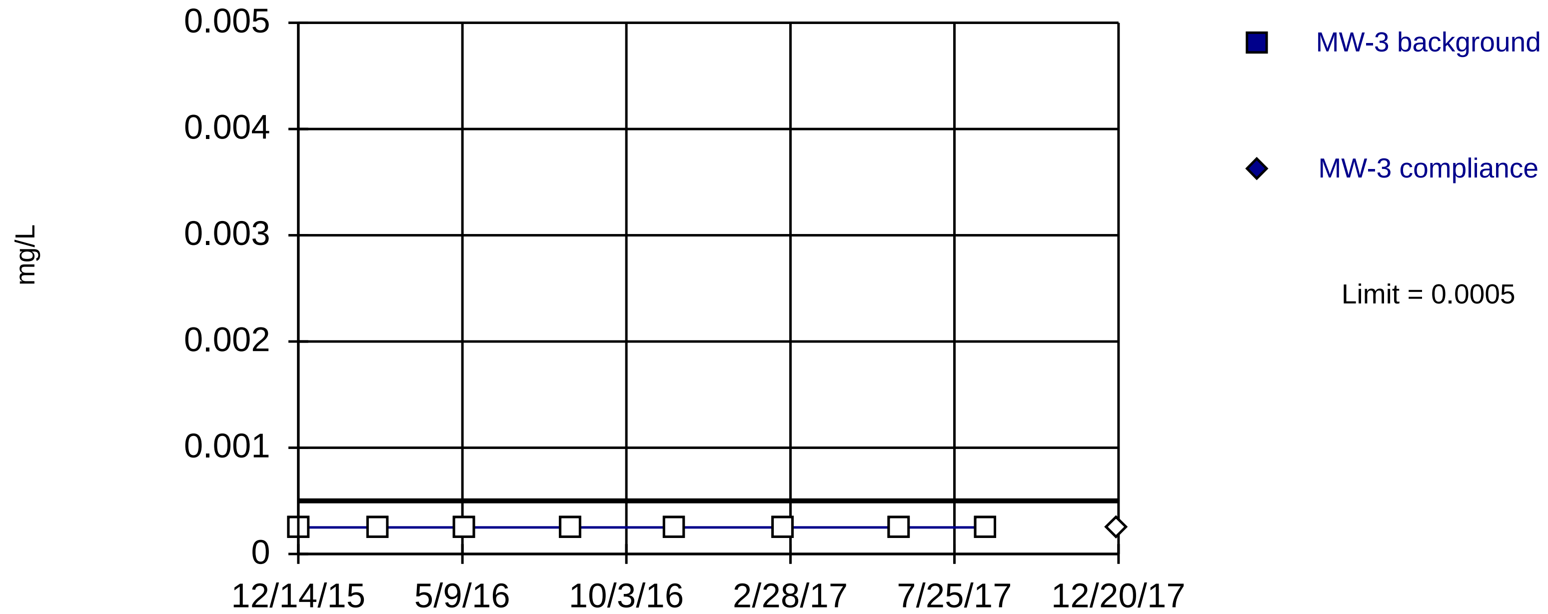
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. All background values (n = 8) were censored; limit is most recent reporting limit. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Thallium Analysis Run 1/25/2018 12:31 PM

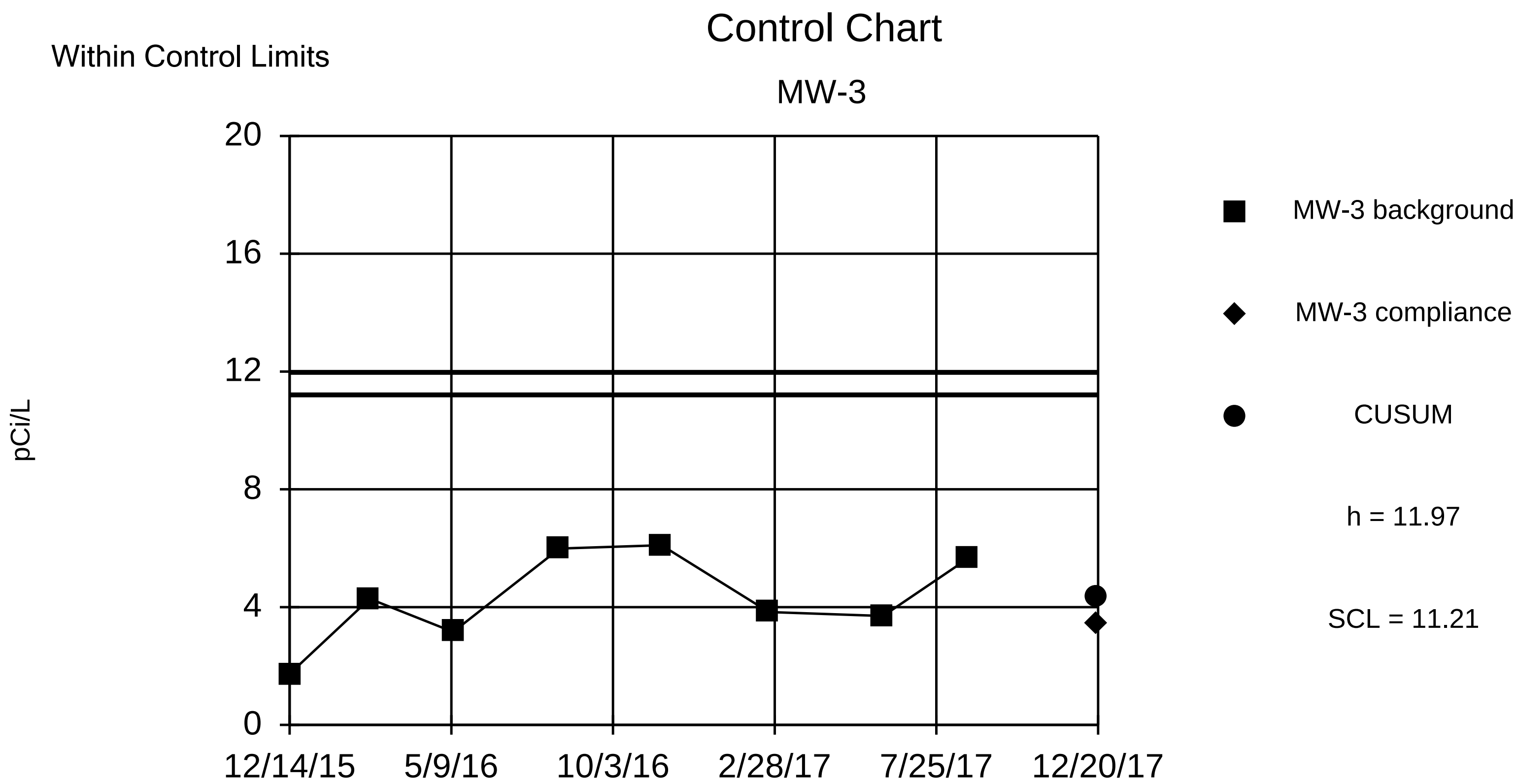
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Thallium (mg/L) Analysis Run 1/25/2018 12:36 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-3	MW-3
12/14/2015	<0.0005	
2/25/2016	<0.0005	
5/11/2016	<0.0005	
8/16/2016	<0.0005	
11/17/2016	<0.0005	
2/23/2017	<0.0005	
6/7/2017	<0.0005	
8/24/2017	<0.0005	
12/20/2017		<0.0005



Background Data Summary: Mean=4.309, Std. Dev.=1.533, n=8. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9285, critical = 0.818. Report alpha = 0.00205. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Combined Radium   Analysis Run 1/25/2018 12:38 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

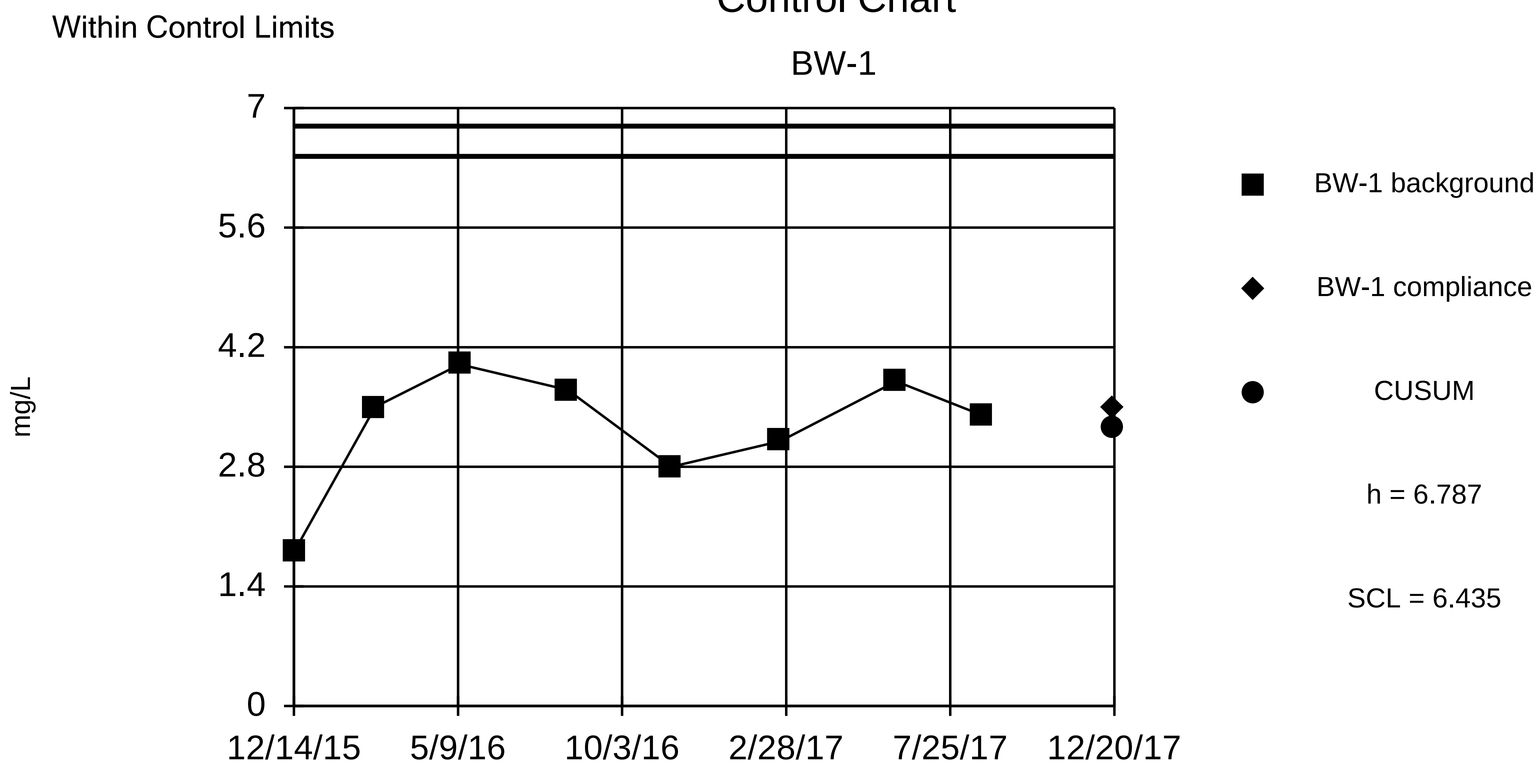
Control Chart

Constituent: Combined Radium (pCi/L)   Analysis Run 1/25/2018 12:39 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	MW-3	MW-3	Std. Mean	CUSUM
12/14/2015	1.733			
2/25/2016	4.28			
5/11/2016	3.16			
8/16/2016	5.991			
11/17/2016	6.102			
2/23/2017	3.831			
6/7/2017	3.701			
8/24/2017	5.67			
12/20/2017		3.396	-0.5952	4.309

Control Chart



Background Data Summary: Mean=3.263, Std. Dev.=0.705, n=8. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8884, critical = 0.818. Report alpha = 0.00205. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Boron Analysis Run 1/25/2018 12:41 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

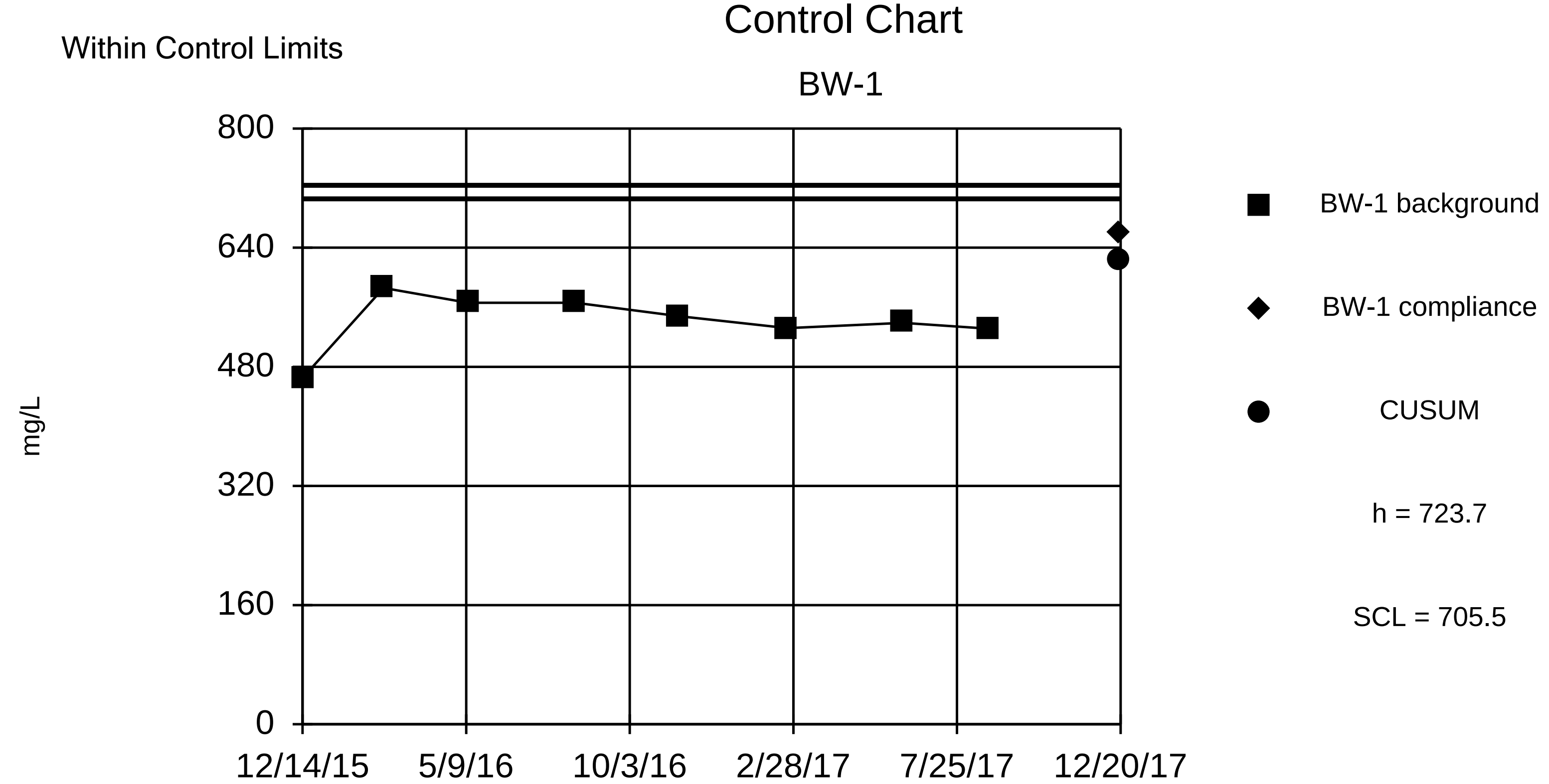
Control Chart

Constituent: Boron (mg/L)   Analysis Run 1/25/2018 12:43 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	BW-1	BW-1	Std. Mean	CUSUM
12/14/2015	1.8			
2/25/2016	3.5			
5/11/2016	4			
8/16/2016	3.7			
11/17/2016	2.8			
2/23/2017	3.1			
6/7/2017	3.8			
8/24/2017	3.4			
12/20/2017		3.5	0.3369	3.263

Control Chart



Background Data Summary: Mean=541.6, Std. Dev.=36.41, n=8. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.887, critical = 0.818. Report alpha = 0.001952. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Calcium   Analysis Run 1/26/2018 10:17 AM

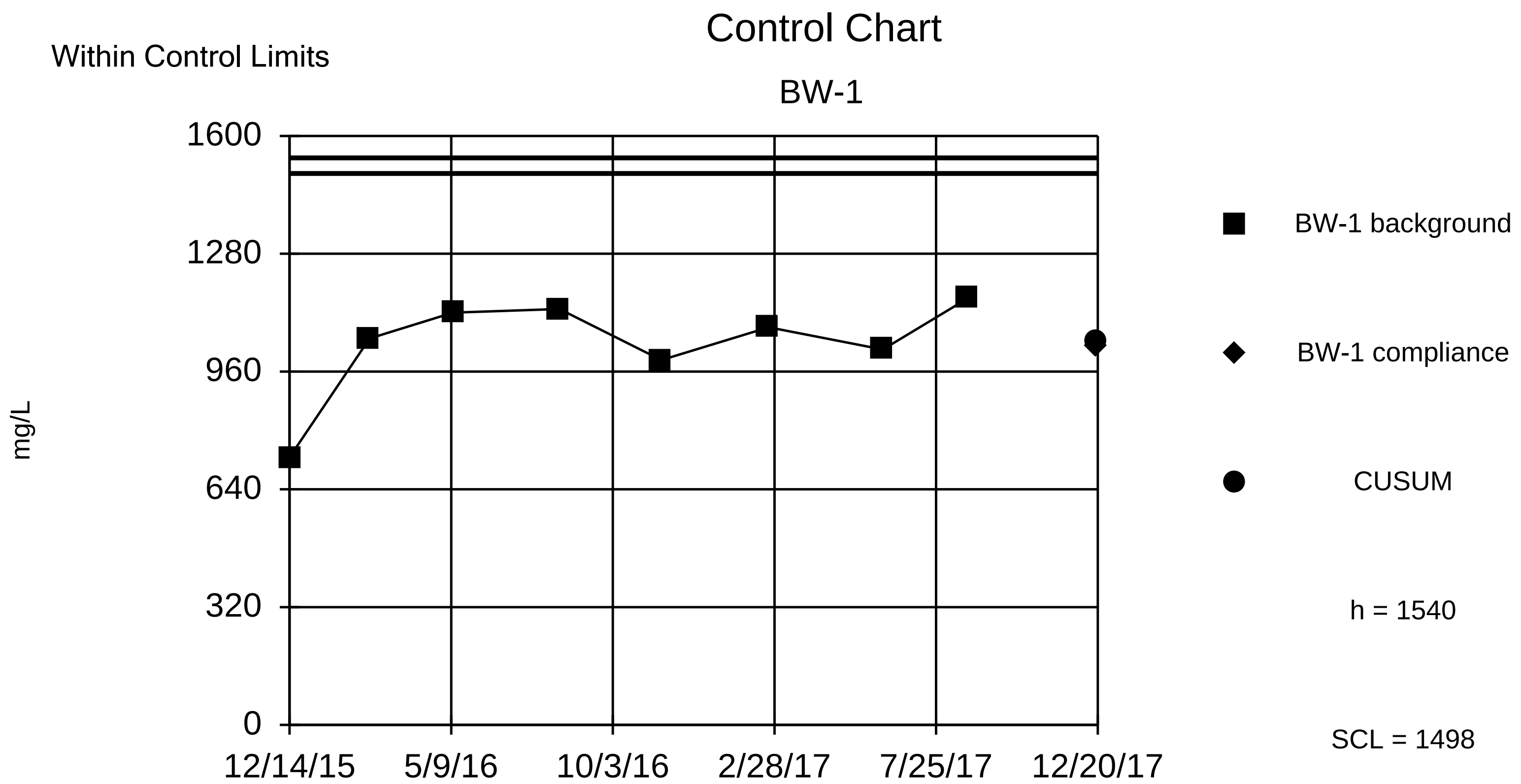
Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart

Constituent: Calcium (mg/L) Analysis Run 1/26/2018 10:18 AM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

	BW-1	BW-1	Std. Mean	CUSUM
12/14/2015	465			
2/25/2016	586			
5/11/2016	566			
8/16/2016	566			
11/17/2016	548			
2/23/2017	532			
6/7/2017	539			
8/24/2017	531			
12/20/2017		658	3.196	621.6



Background Data Summary (based on square transformation): Mean=1087101, Std. Dev.=257064, n=8. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8544, critical = 0.818. Report alpha = 0.00205. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Chloride Analysis Run 1/25/2018 12:41 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart

Constituent: Chloride (mg/L)   Analysis Run 1/25/2018 12:43 PM

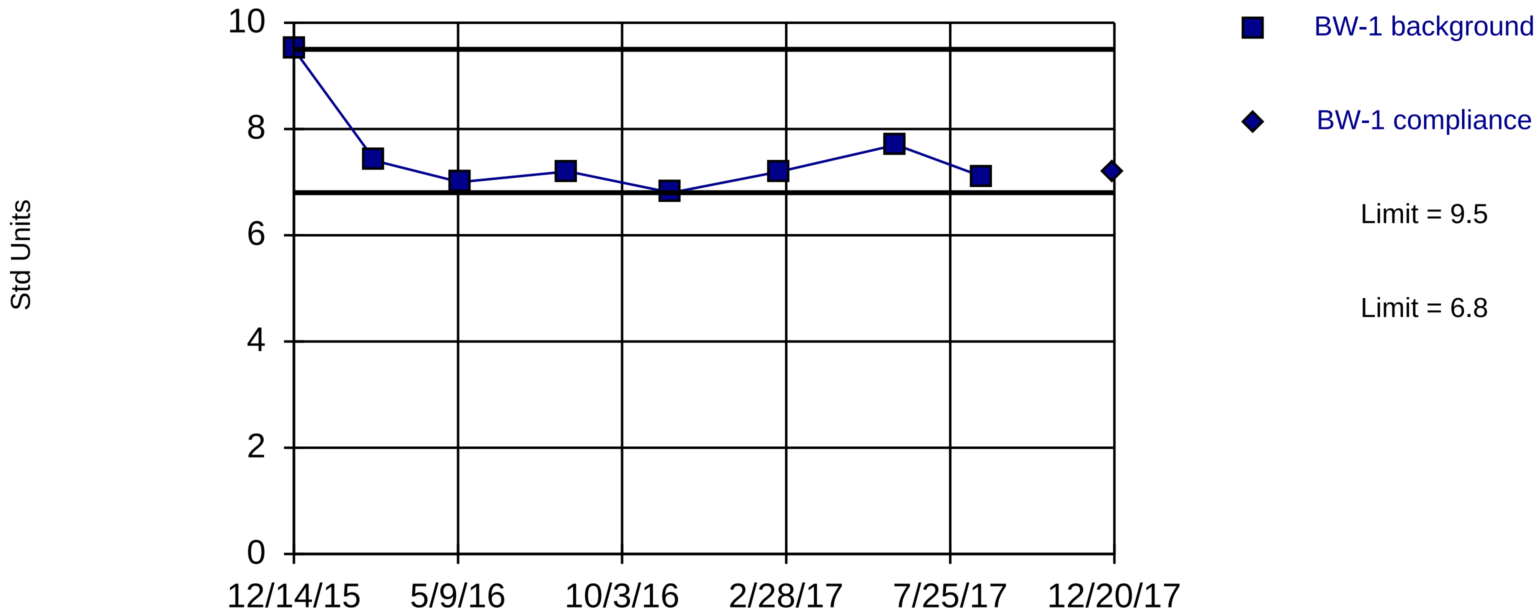
Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	BW-1	BW-1	Square	Std. Mean	CUSUM
12/14/2015	727		528529		
2/25/2016	1050		1102500		
5/11/2016	1120		1254400		
8/16/2016	1130		1276900		
11/17/2016	991		982081		
2/23/2017	1080		1166400		
6/7/2017	1020		1040400		
8/24/2017	1160		1345600		
12/20/2017		1030	1060900	-0.1019	1043

Within Limits

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.05 alpha level. Limits are highest and lowest of 8 background values. Report alpha = 0.2222. Most recent point compared to limit.

Constituent: pH Analysis Run 1/25/2018 12:40 PM

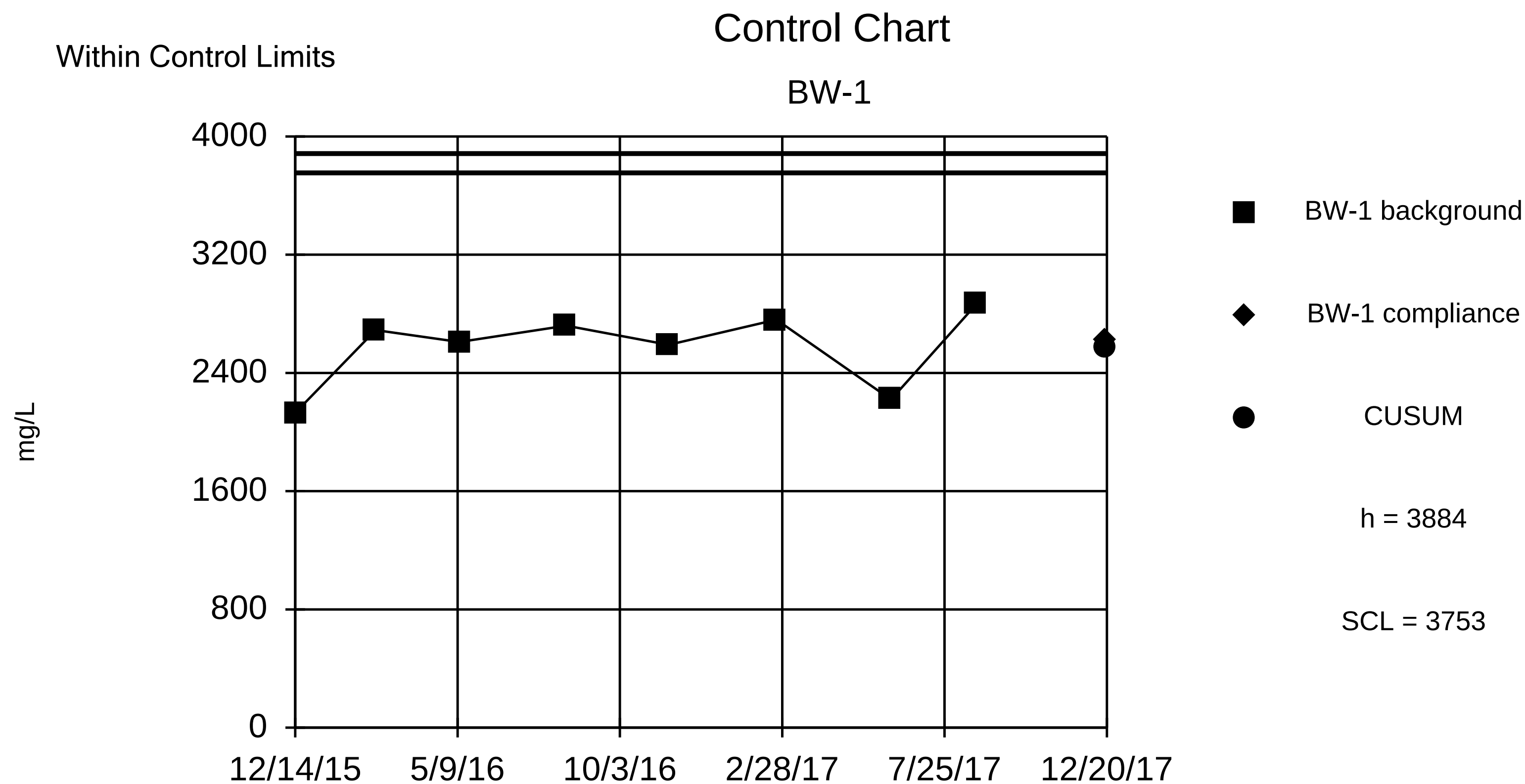
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Prediction Limit

Constituent: pH (Std Units) Analysis Run 1/25/2018 12:41 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

	BW-1	BW-1
12/14/2015	9.5	
2/25/2016	7.4	
5/11/2016	7	
8/16/2016	7.2	
11/17/2016	6.8	
2/23/2017	7.2	
6/7/2017	7.7	
8/24/2017	7.1	
12/20/2017		7.2



Background Data Summary: Mean=2574, Std. Dev.=262.1, n=8. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8672, critical = 0.818. Report alpha = 0.00205. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Sulfate   Analysis Run 1/25/2018 12:41 PM

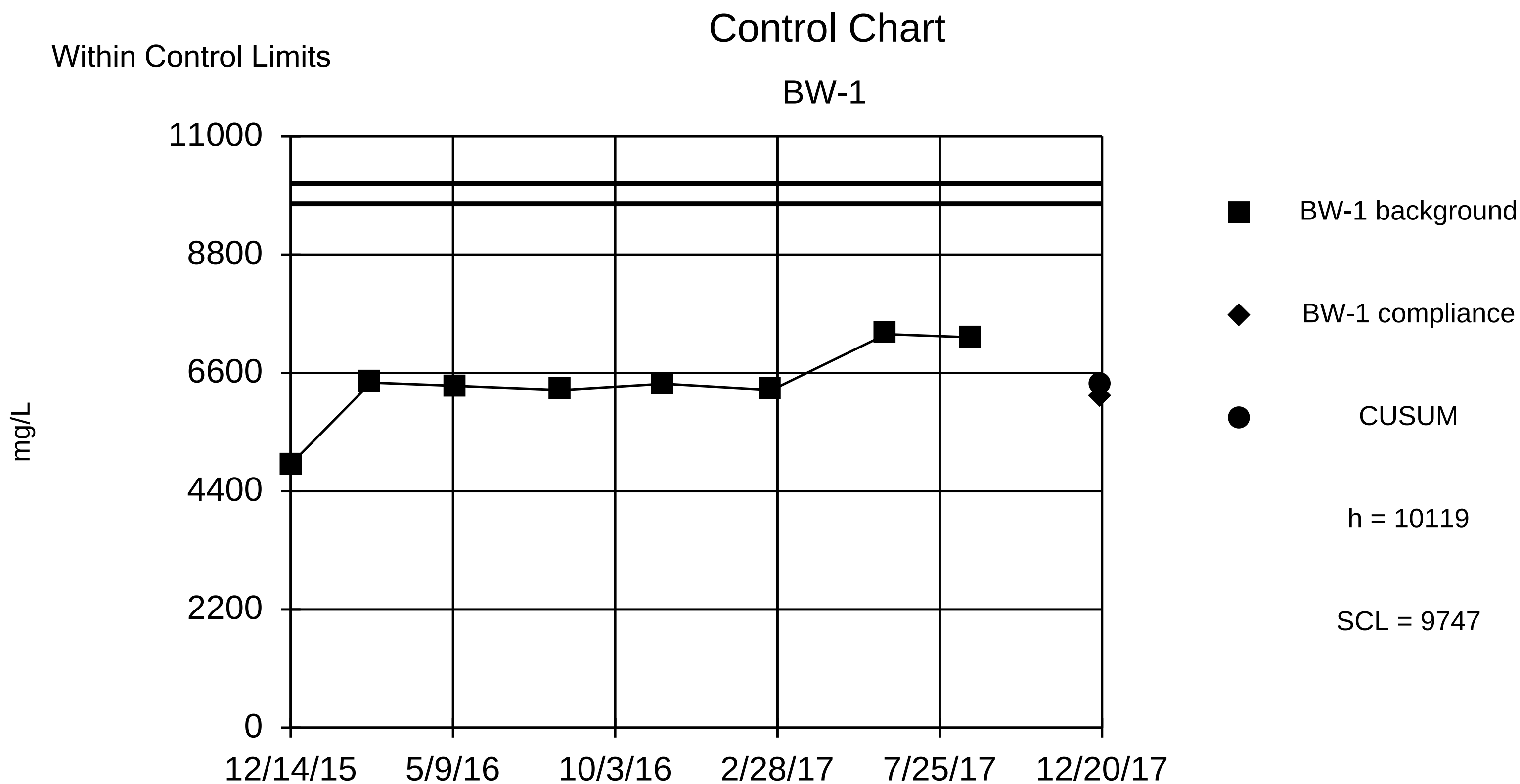
Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart

Constituent: Sulfate (mg/L)   Analysis Run 1/25/2018 12:43 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	BW-1	BW-1	Std. Mean	CUSUM
12/14/2015	2130			
2/25/2016	2690			
5/11/2016	2610			
8/16/2016	2720			
11/17/2016	2590			
2/23/2017	2760			
6/7/2017	2220			
8/24/2017	2870			
12/20/2017		2620	0.1764	2574



Background Data Summary: Mean=6403, Std. Dev.=743.2, n=8. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8391, critical = 0.818. Report alpha = 0.00205. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Total Dissolved Solids   Analysis Run 1/25/2018 12:41 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart

Constituent: Total Dissolved Solids (mg/L)   Analysis Run 1/25/2018 12:43 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	BW-1	BW-1	Std. Mean	CUSUM
12/14/2015	4900			
2/25/2016	6420			
5/11/2016	6360			
8/16/2016	6280			
11/17/2016	6400			
2/23/2017	6280			
6/7/2017	7320			
8/24/2017	7260			
12/20/2017		6140	-0.3532	6403

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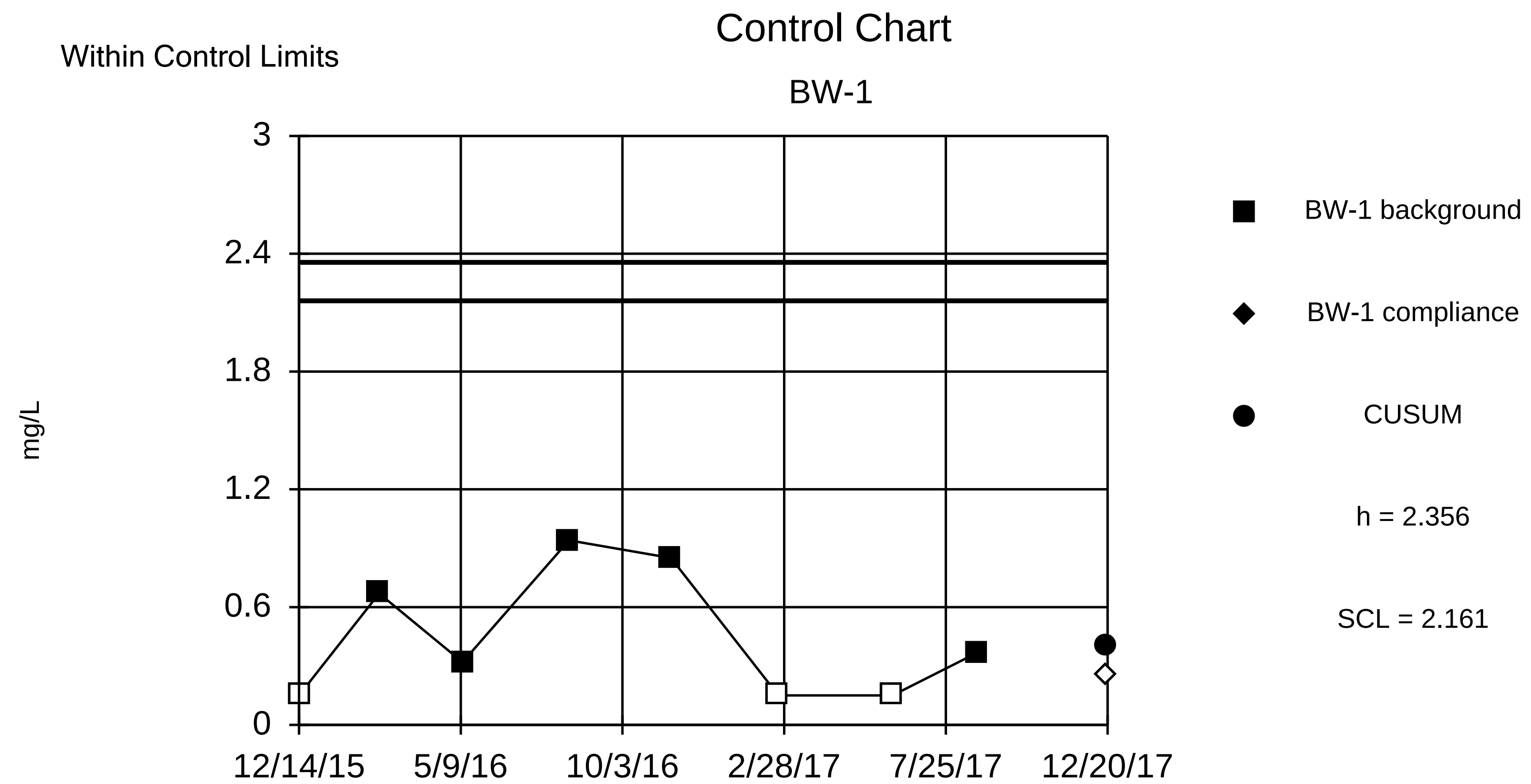
Hollow symbols indicate censored values.



Background Data Summary (after Cohen`s Adjustment): Mean=0.4018, Std. Dev.=0.3908, n=8, 37.5% NDs. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8478, critical = 0.818. Report alpha = 0.00205. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Fluoride Analysis Run 1/25/2018 12:41 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart

Constituent: Fluoride (mg/L) Analysis Run 1/25/2018 12:43 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

	BW-1	BW-1	Std. Mean	CUSUM
12/14/2015	<0.3			
2/25/2016	0.67			
5/11/2016	0.32			
8/16/2016	0.94			
11/17/2016	0.85			
2/23/2017	<0.3			
6/7/2017	<0.3			
8/24/2017	0.37			
12/20/2017		<0.5	-0.3884	0.4018

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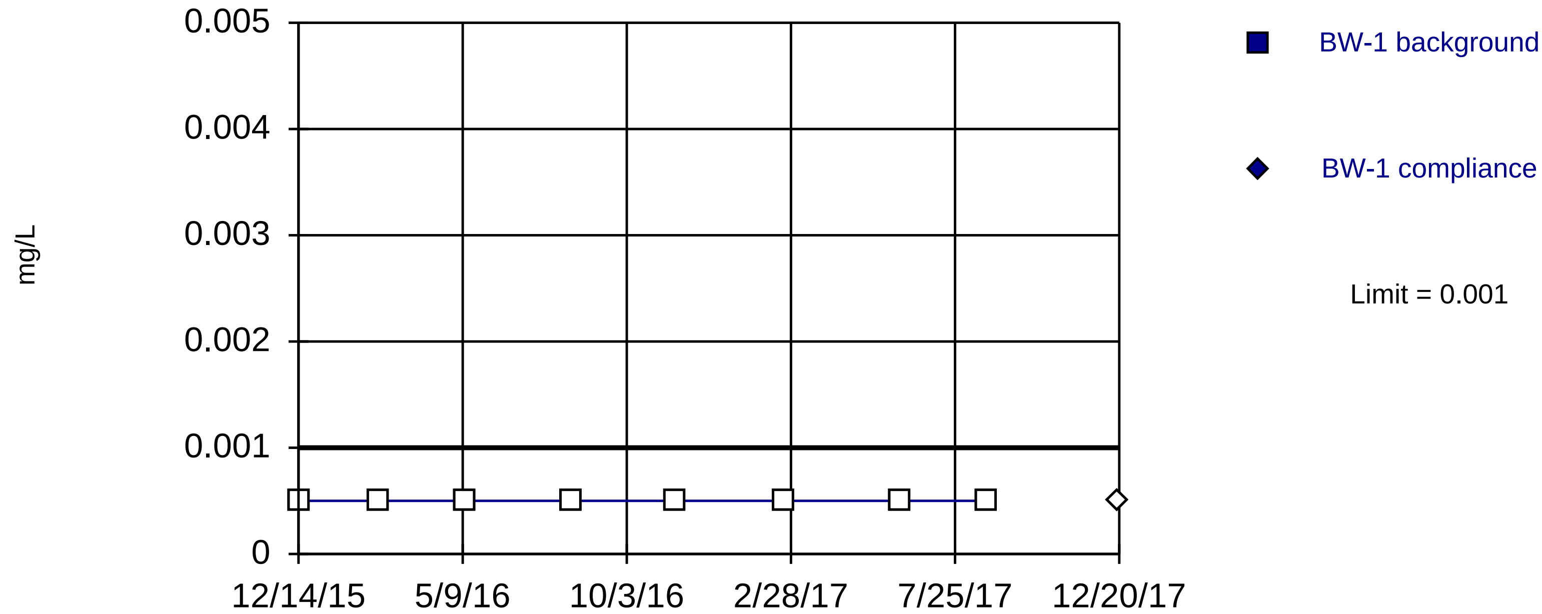
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. All background values (n = 8) were censored; limit is most recent reporting limit. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Antimony   Analysis Run 1/25/2018 12:45 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Antimony (mg/L)   Analysis Run 1/25/2018 12:51 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	BW-1	BW-1
12/14/2015	<0.001	
2/25/2016	<0.001	
5/11/2016	<0.001	
8/16/2016	<0.001	
11/17/2016	<0.001	
2/23/2017	<0.001	
6/7/2017	<0.001	
8/24/2017	<0.001	
12/20/2017		<0.001

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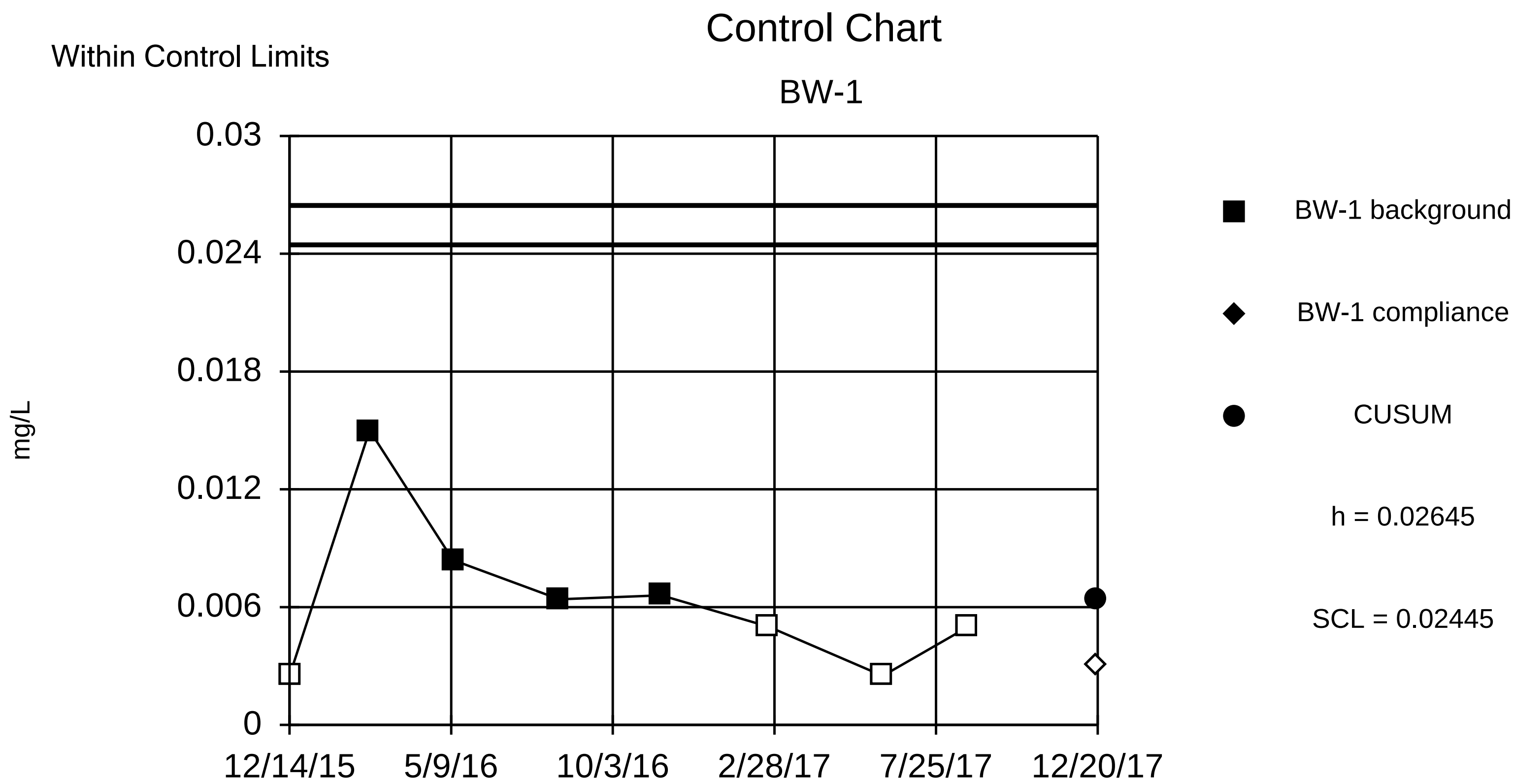
Hollow symbols indicate censored values.



Background Data Summary: Mean=0.006425, Std. Dev.=0.004006, n=8, 50% NDs. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8531, critical = 0.818. Report alpha = 0.00205. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Arsenic Analysis Run 1/25/2018 12:45 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

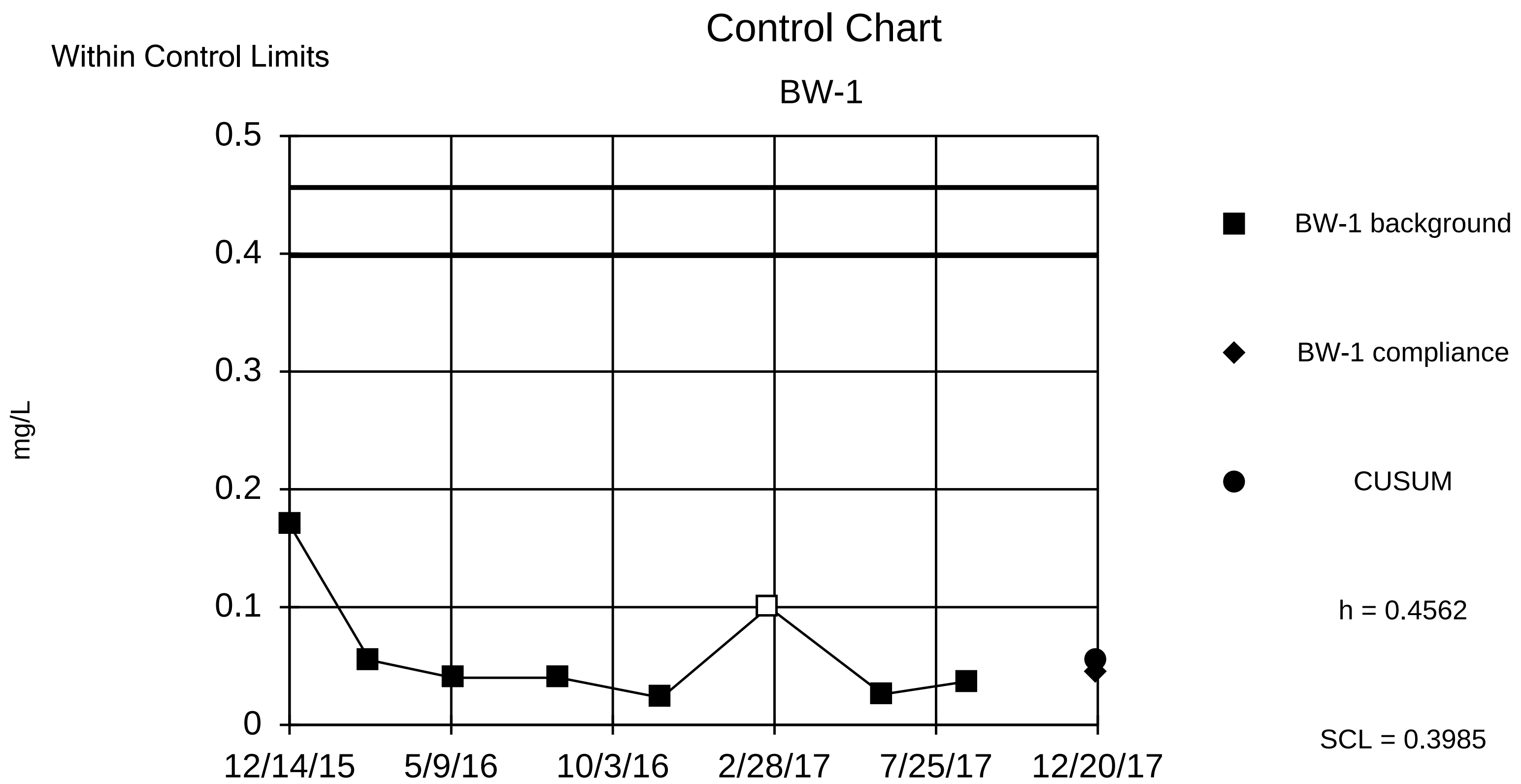
Control Chart

Constituent: Arsenic (mg/L)   Analysis Run 1/25/2018 12:51 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	BW-1	BW-1	Std. Mean	CUSUM
12/14/2015	<0.005			
2/25/2016	0.015			
5/11/2016	0.0084			
8/16/2016	0.0064			
11/17/2016	0.0066			
2/23/2017	<0.01			
6/7/2017	<0.005			
8/24/2017	<0.01			
12/20/2017		<0.006	-0.855	0.006425

Sanitas™ v.9.5.27 Software licensed to SCS Engineers. EPA
Hollow symbols indicate censored values.



Background Data Summary (based on square root transformation): Mean=0.2335, Std. Dev.=0.08838, n=8, 12.5% NDs. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8387, critical = 0.818. Report alpha = 0.00205. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Barium   Analysis Run 1/25/2018 12:45 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart

Constituent: Barium (mg/L)   Analysis Run 1/25/2018 12:51 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	BW-1	BW-1	Square Root	Std. Mean	CUSUM
12/14/2015	0.17		0.4123		
2/25/2016	0.055		0.2345		
5/11/2016	0.04		0.2		
8/16/2016	0.04		0.2		
11/17/2016	0.023		0.1517		
2/23/2017	<0.2		0.3162		
6/7/2017	0.026		0.1612		
8/24/2017	0.037		0.1924		
12/20/2017		0.044	0.2098	-0.269	0.05452

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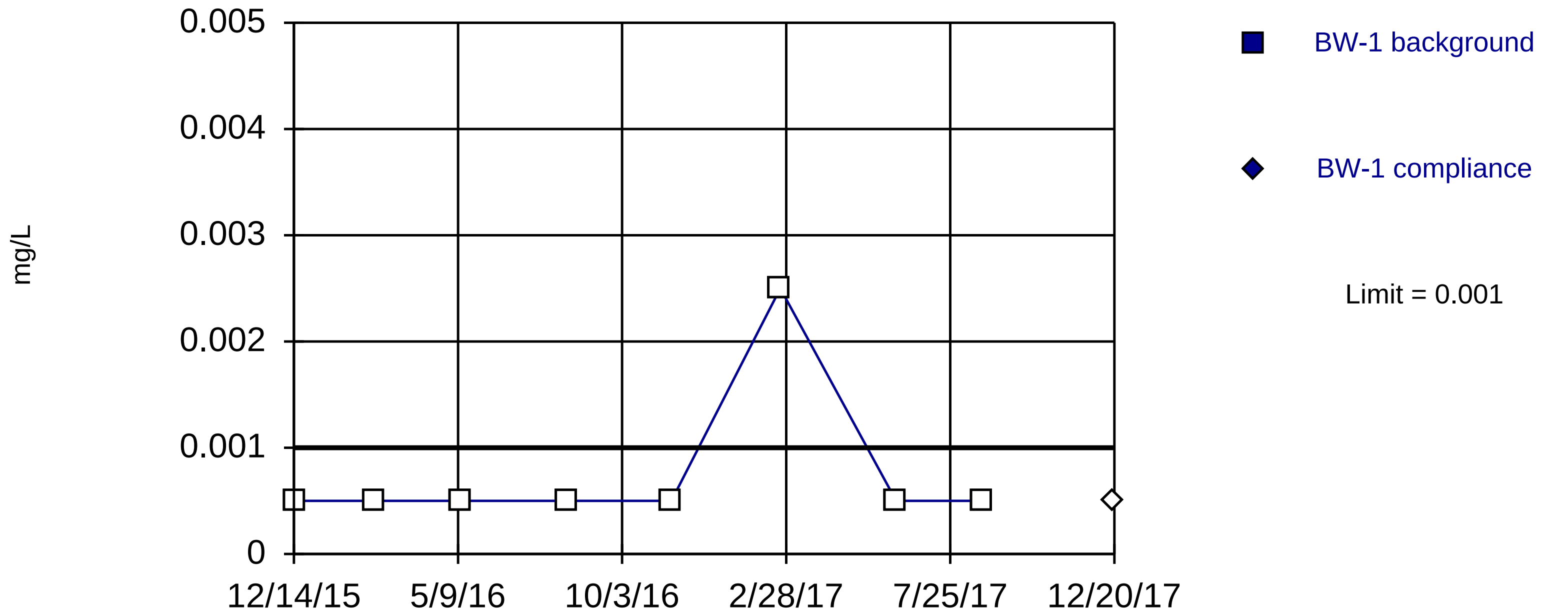
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. All background values (n = 8) were censored; limit is most recent reporting limit. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Beryllium   Analysis Run 1/25/2018 12:45 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Beryllium (mg/L) Analysis Run 1/25/2018 12:51 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

	BW-1	BW-1
12/14/2015	<0.001	
2/25/2016	<0.001	
5/11/2016	<0.001	
8/16/2016	<0.001	
11/17/2016	<0.001	
2/23/2017	<0.005	
6/7/2017	<0.001	
8/24/2017	<0.001	
12/20/2017		<0.001

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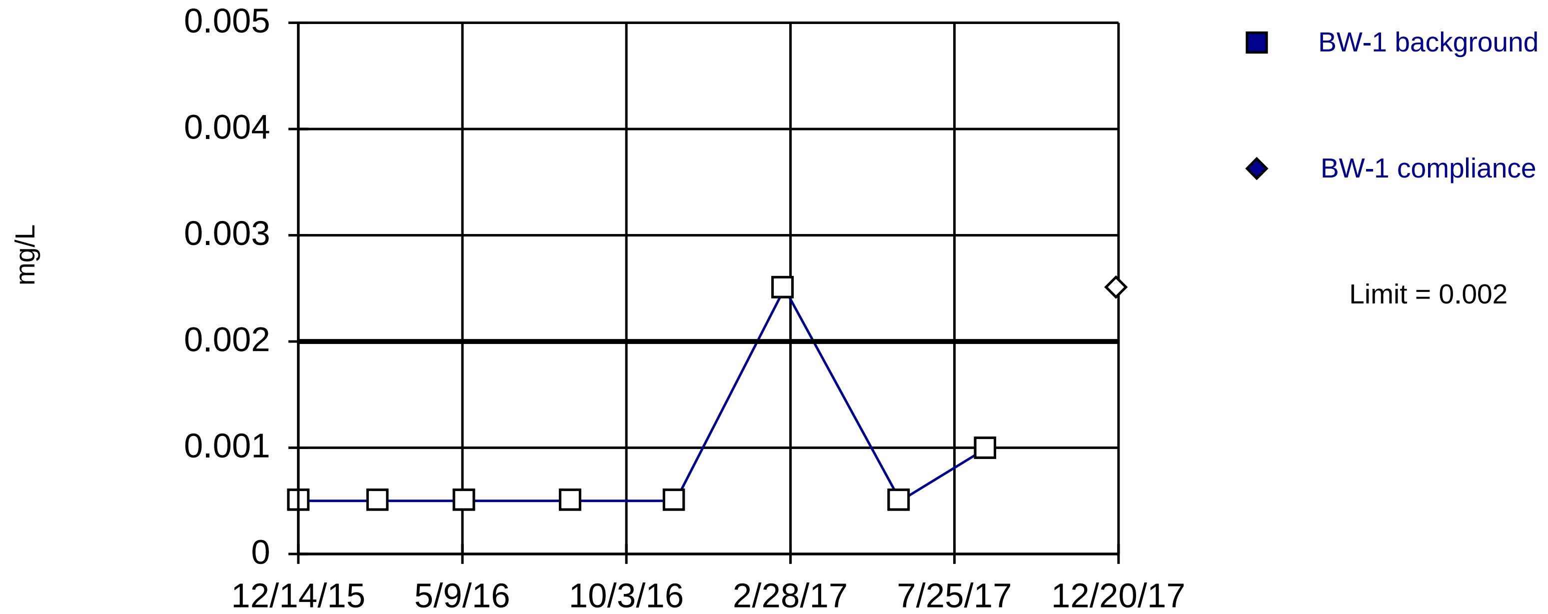
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. All background values (n = 8) were censored; limit is most recent reporting limit. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Cadmium   Analysis Run 1/25/2018 12:45 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Cadmium (mg/L)   Analysis Run 1/25/2018 12:51 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	BW-1	BW-1
12/14/2015	<0.001	
2/25/2016	<0.001	
5/11/2016	<0.001	
8/16/2016	<0.001	
11/17/2016	<0.001	
2/23/2017	<0.005	
6/7/2017	<0.001	
8/24/2017	<0.002	
12/20/2017		<0.005

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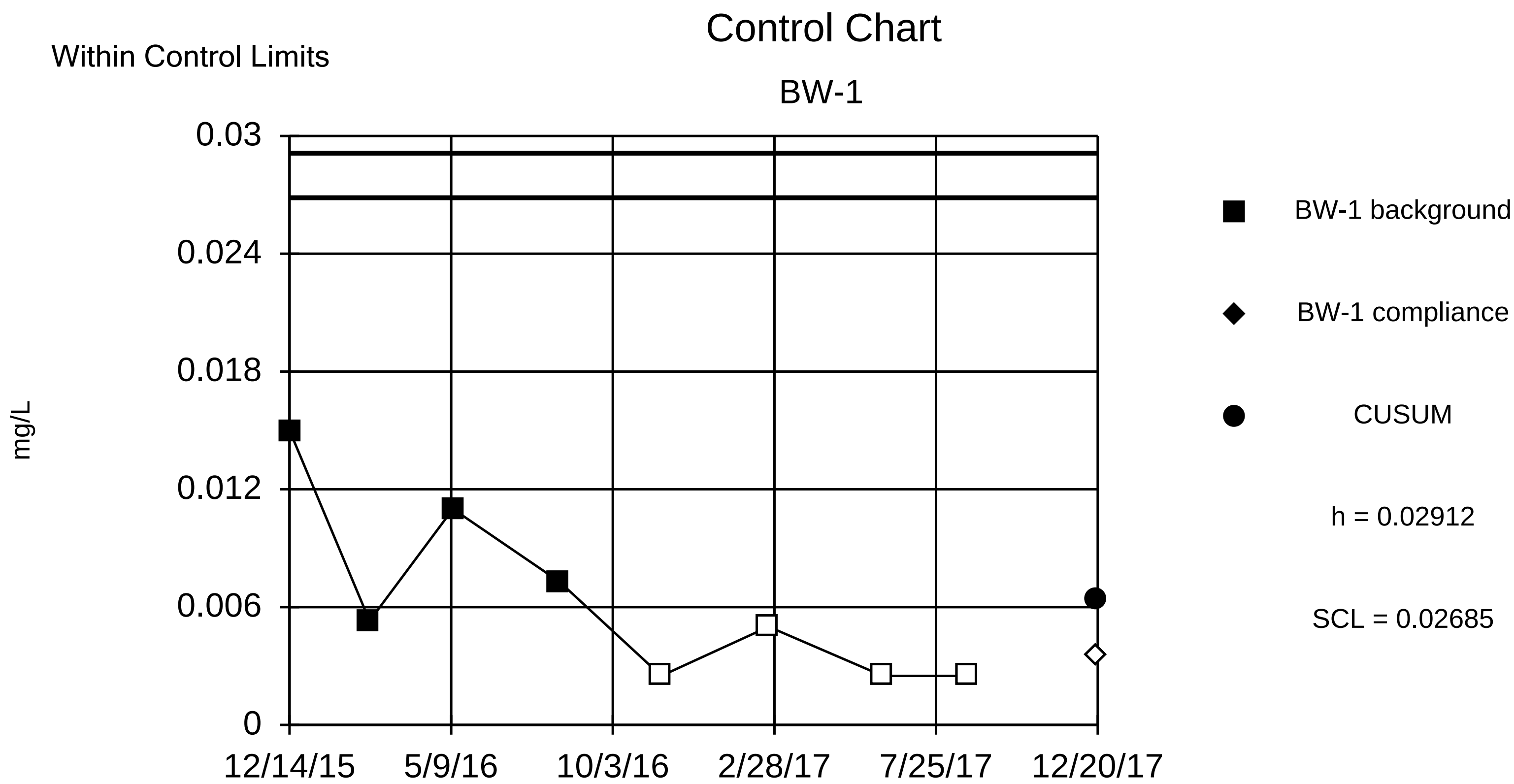
Hollow symbols indicate censored values.



Background Data Summary: Mean=0.006387, Std. Dev.=0.004547, n=8, 50% NDs. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8525, critical = 0.818. Report alpha = 0.00205. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Chromium Analysis Run 1/25/2018 12:45 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart

Constituent: Chromium (mg/L)   Analysis Run 1/25/2018 12:51 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	BW-1	BW-1	Std. Mean	CUSUM
12/14/2015	0.015			
2/25/2016	0.0053			
5/11/2016	0.011			
8/16/2016	0.0073			
11/17/2016	<0.005			
2/23/2017	<0.01			
6/7/2017	<0.005			
8/24/2017	<0.005			
12/20/2017		<0.007	-0.635	0.006387

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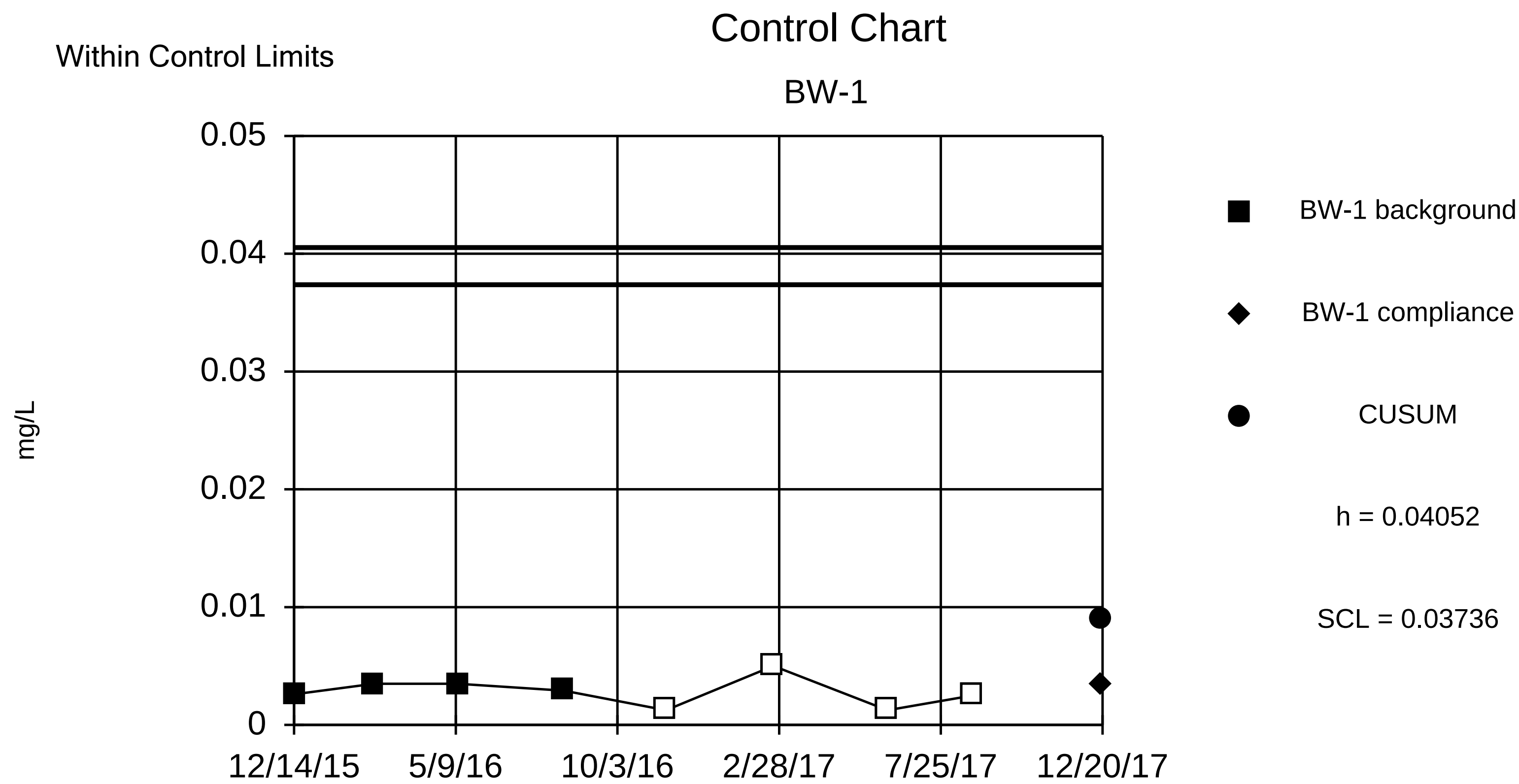
Hollow symbols indicate censored values.



Background Data Summary (after Cohen`s Adjustment): Mean=0.00891, Std. Dev.=0.006323, n=8, 50% NDs. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9351, critical = 0.818. Report alpha = 0.00205. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Cobalt Analysis Run 1/25/2018 12:45 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart

Constituent: Cobalt (mg/L)   Analysis Run 1/25/2018 12:51 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	BW-1	BW-1	Std. Mean	CUSUM
12/14/2015	0.0026			
2/25/2016	0.0035			
5/11/2016	0.0035			
8/16/2016	0.0029			
11/17/2016	<0.0025			
2/23/2017	<0.01			
6/7/2017	<0.0025			
8/24/2017	<0.005			
12/20/2017		0.0034	-0.8715	0.00891

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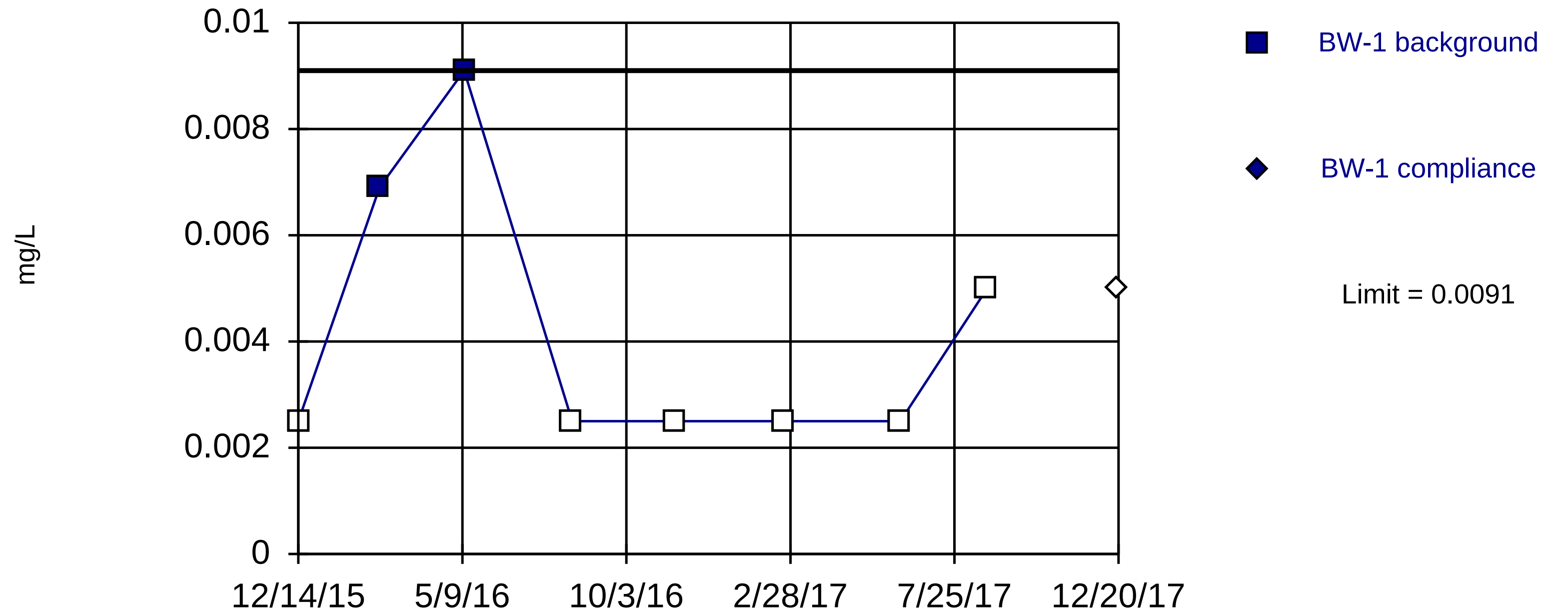
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. Limit is highest of 8 background values. 75% NDs. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Lead Analysis Run 1/25/2018 12:45 PM

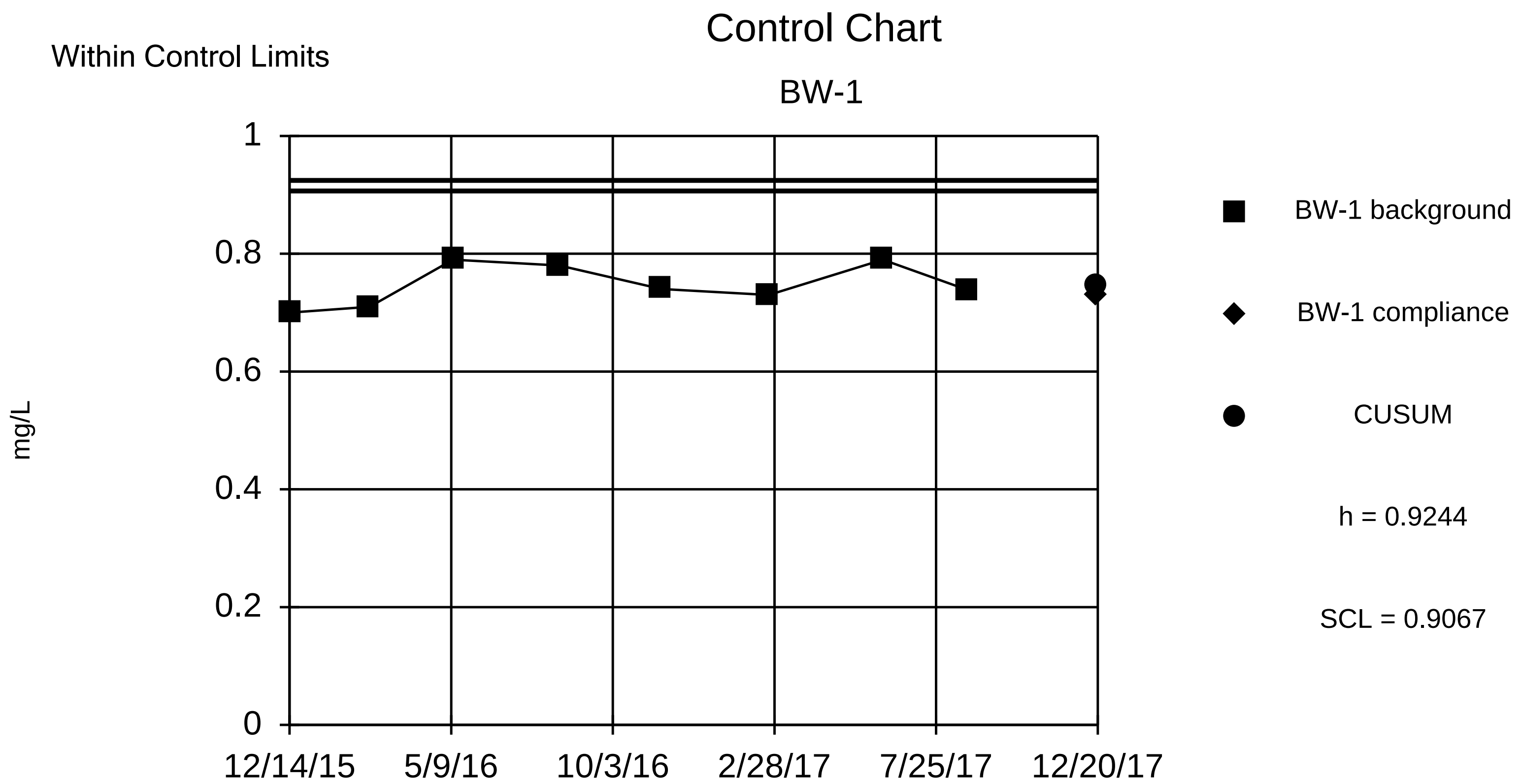
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Lead (mg/L) Analysis Run 1/25/2018 12:51 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

	BW-1	BW-1
12/14/2015	<0.005	
2/25/2016	0.0069	
5/11/2016	0.0091	
8/16/2016	<0.005	
11/17/2016	<0.005	
2/23/2017	<0.005	
6/7/2017	<0.005	
8/24/2017	<0.01	
12/20/2017		<0.01



Background Data Summary: Mean=0.7473, Std. Dev.=0.03542, n=8. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8939, critical = 0.818. Report alpha = 0.00205. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Lithium Analysis Run 1/25/2018 12:45 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart

Constituent: Lithium (mg/L)   Analysis Run 1/25/2018 12:51 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	BW-1	BW-1	Std. Mean	CUSUM
12/14/2015	0.7			
2/25/2016	0.71			
5/11/2016	0.79			
8/16/2016	0.78			
11/17/2016	0.74			
2/23/2017	0.73			
6/7/2017	0.79			
8/24/2017	0.738			
12/20/2017		0.73	-0.487	0.7473

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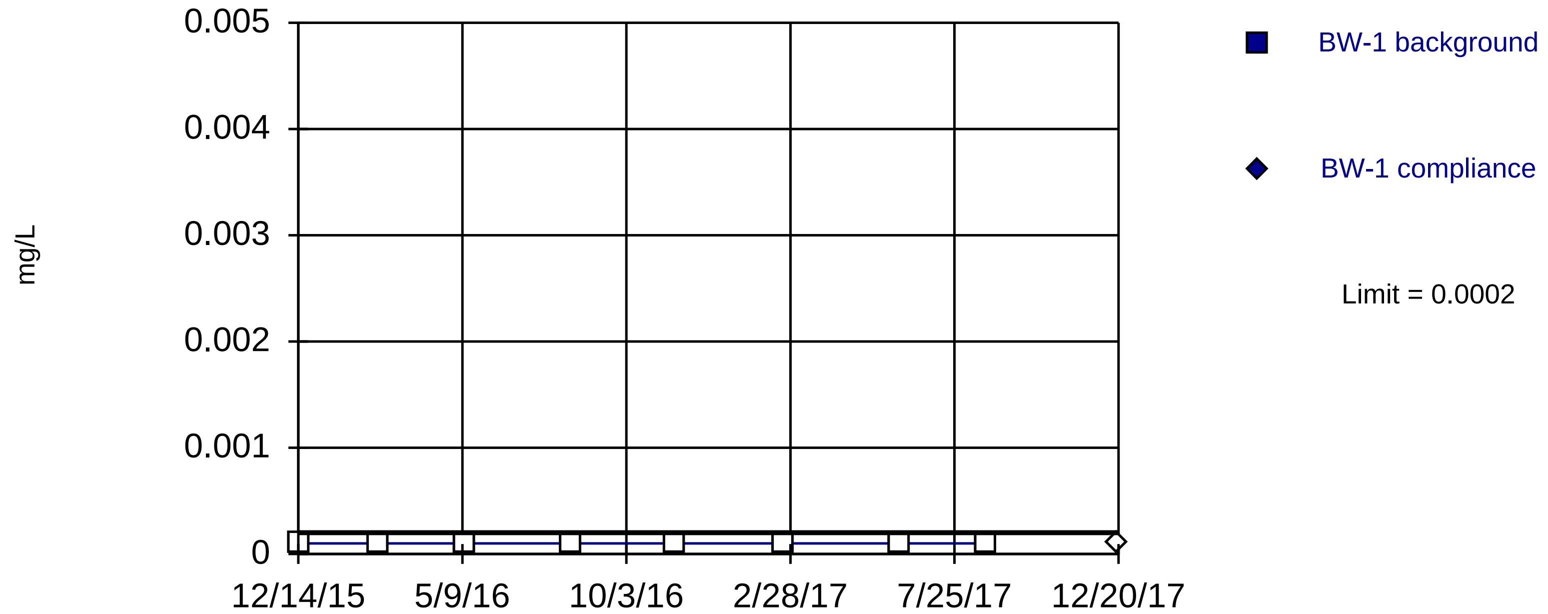
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. All background values (n = 8) were censored; limit is most recent reporting limit. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Mercury   Analysis Run 1/25/2018 12:45 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Mercury (mg/L)   Analysis Run 1/25/2018 12:51 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	BW-1	BW-1
12/14/2015	<0.0002	
2/25/2016	<0.0002	
5/11/2016	<0.0002	
8/16/2016	<0.0002	
11/17/2016	<0.0002	
2/23/2017	<0.0002	
6/7/2017	<0.0002	
8/24/2017	<0.0002	
12/20/2017		<0.0002

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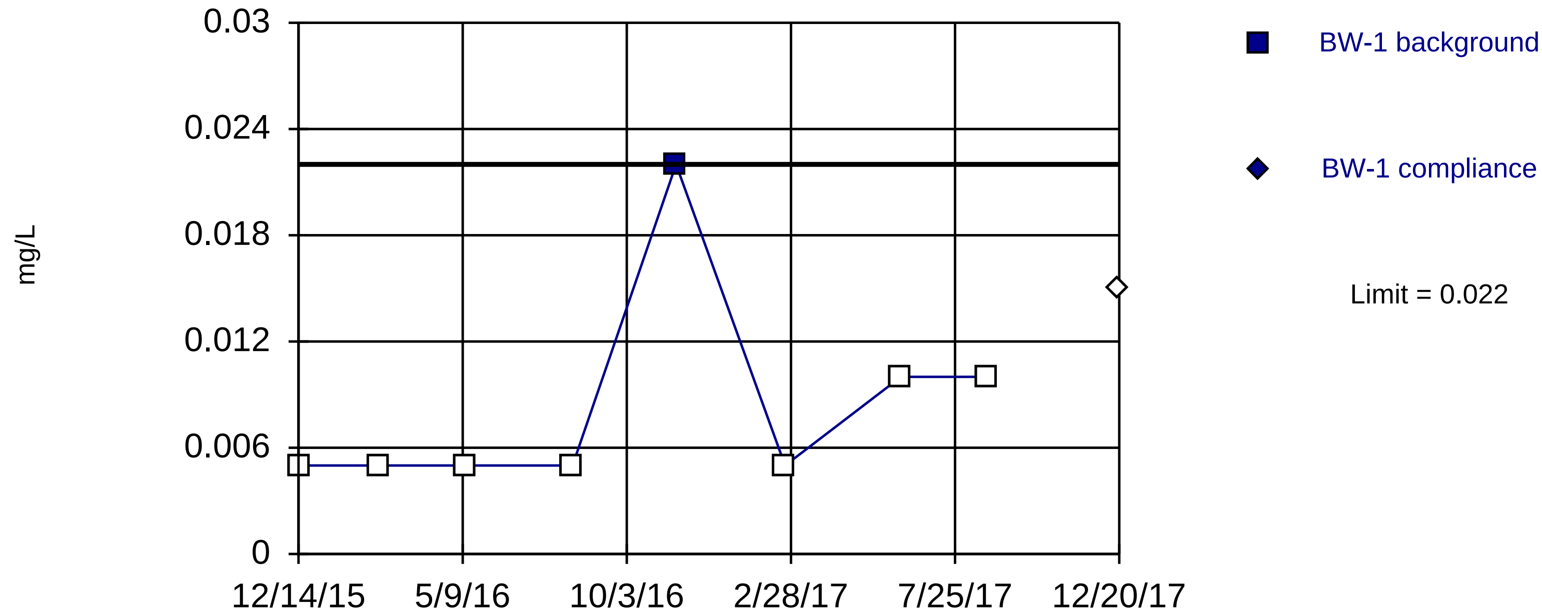
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. Limit is highest of 8 background values. 87.5% NDs. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Molybdenum Analysis Run 1/25/2018 12:45 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Molybdenum (mg/L)   Analysis Run 1/25/2018 12:51 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	BW-1	BW-1
12/14/2015	<0.01	
2/25/2016	<0.01	
5/11/2016	<0.01	
8/16/2016	<0.01	
11/17/2016	0.022	
2/23/2017	<0.01	
6/7/2017	<0.02	
8/24/2017	<0.02	
12/20/2017		<0.03

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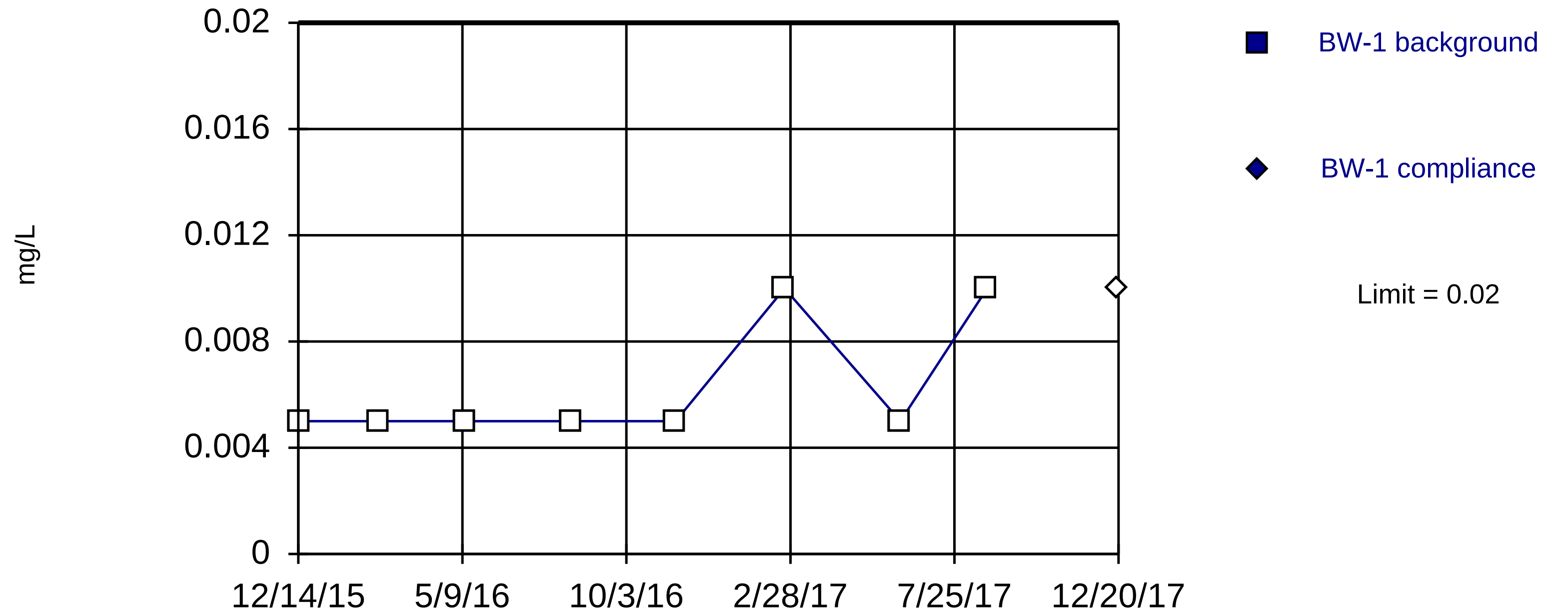
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. All background values (n = 8) were censored; limit is most recent reporting limit. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Selenium Analysis Run 1/25/2018 12:45 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart Alternate

Constituent: Selenium (mg/L)   Analysis Run 1/25/2018 12:51 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

	BW-1	BW-1
12/14/2015	<0.01	
2/25/2016	<0.01	
5/11/2016	<0.01	
8/16/2016	<0.01	
11/17/2016	<0.01	
2/23/2017	<0.02	
6/7/2017	<0.01	
8/24/2017	<0.02	
12/20/2017		<0.02

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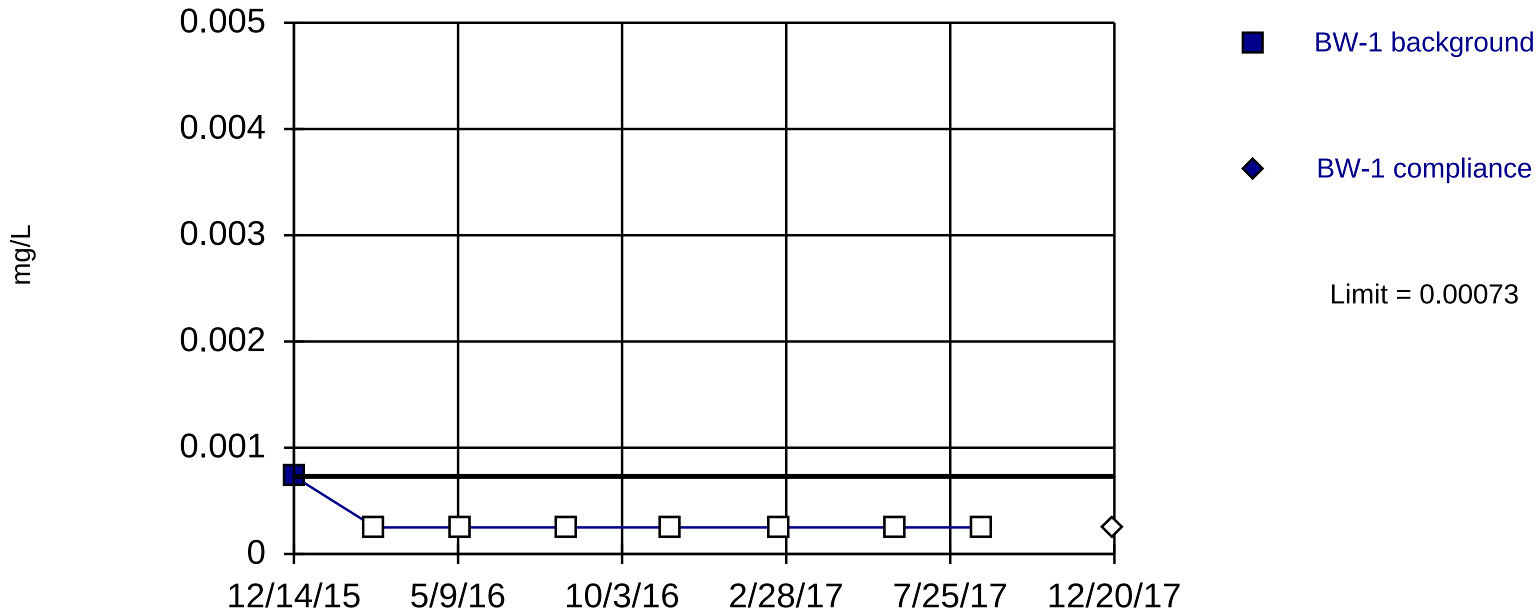
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of control chart because non-detects exceed user-adjustable maximum of 50%. Limit is highest of 8 background values. 87.5% NDs. Report alpha = 0.1111. Most recent point compared to limit.

Constituent: Thallium   Analysis Run 1/25/2018 12:45 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

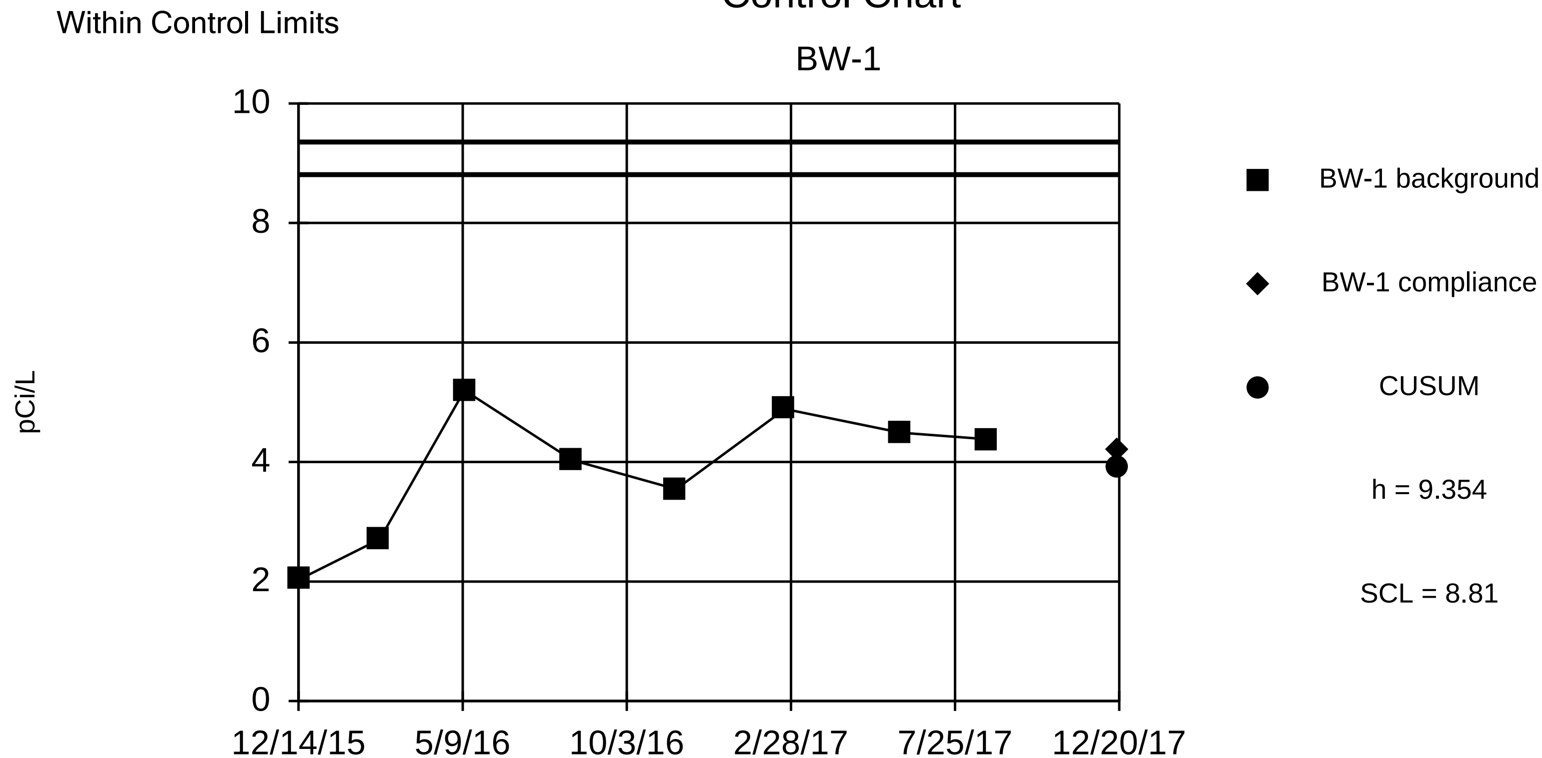
Control Chart Alternate

Constituent: Thallium (mg/L) Analysis Run 1/25/2018 12:51 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

	BW-1	BW-1
12/14/2015	0.00073	
2/25/2016	<0.0005	
5/11/2016	<0.0005	
8/16/2016	<0.0005	
11/17/2016	<0.0005	
2/23/2017	<0.0005	
6/7/2017	<0.0005	
8/24/2017	<0.0005	
12/20/2017		<0.0005

Control Chart



Background Data Summary: Mean=3.909, Std. Dev.=1.089, n=8. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.939, critical = 0.818. Report alpha = 0.00205. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Combined Radium Analysis Run 1/25/2018 12:43 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Control Chart

Constituent: Combined Radium (pCi/L) Analysis Run 1/25/2018 12:44 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

	BW-1	BW-1	Std. Mean	CUSUM
12/14/2015	2.03			
2/25/2016	2.707			
5/11/2016	5.2			
8/16/2016	4.03			
11/17/2016	3.545			
2/23/2017	4.886			
6/7/2017	4.49			
8/24/2017	4.38			
12/20/2017		4.2	0.2676	3.909

APPENDIX F
DECEMBER 2017 ALTERNATE SOURCE DEMONSTRATIONS:
1: FLUORIDE IN MW-1
2: BORON IN MW-3

Solid Waste Management Consultants
Offices Nationwide

Dallas / Fort Worth Office
1901 Central Drive
Suite 550
Bedford, Texas 76021

817-571-2288 Main
800-579-6671
817-571-2188 FAX

SCS ENGINEERS

January 30, 2018
SCS Project 16215106.00

Mr. Darryl Sparks
Compliance Manager
NAES Corporation
2161 Rattlesnake Road
Riesel, Texas 76682

Subject: Sandy Creek Energy Station
McLennan County, Texas
2017 Annual Groundwater Monitoring and Corrective Action Report
Alternate Source Demonstration for Fluoride in MW-1

Dear Mr. Sparks:

On behalf of the Sandy Creek Energy Station (SCES), SCS Engineers (SCS) is submitting this Alternate Source Demonstration (ASD) in accordance with the site Groundwater Sampling and Analysis Plan (GWSAP) prepared by SCS, dated March 2, 2016, and Coal Combustion Residual Rule (CCR) 40 CFR §257.94(e)(2) for a fluoride detection in groundwater monitoring well MW-1. Fluoride was detected in MW-1 at a concentration of 1.1 mg/L during the December 2017 groundwater monitoring event. This ASD is being submitted to demonstrate that the fluoride detection is caused by a source other than the SCES landfill. In accordance with 40 CFR §257.94(e)(2), this ASD is being submitted within 90 days of detecting a statistically significant increase (SSI) above background values.

Project Background

SCES is a pulverized coal-fired electric generation facility which operates a landfill for disposal of dry scrubber ash and bottom ash generated during the coal combustion process at the facility. Incidental wastes generated during the operation of the facility may also be disposed in the landfill, as described in the initial registration notification to TCEQ and the most recent version of the Operations Plan for the facility. The landfill is currently comprised of two CCR disposal cells, Cells 1 and 2, which commenced receiving waste in early 2013 and October 2014, respectively. The approximate area of Cells 1 and 2 are 10.0 and 14.3 acres, respectively.

In accordance with 40 CFR §257 Appendix III and IV, the list of constituents for monitoring at SCES includes 18 inorganic compounds, total dissolved solids, radium-226, and radium-228.

Fluoride Detection at MW-1

Fluoride was detected in MW-1 during the December 2017 groundwater monitoring event at 1.1 mg/L. This laboratory result exceeded the intrawell statistical limit for fluoride at MW-1 (0.4 mg/L). Initial statistical analysis of fluoride in MW-1 included the use of a non-parametric prediction limit using background fluoride data collected from only MW-1. This test is appropriate because the background data for fluoride in MW-1 are non-normally distributed. This intrawell statistical limit is represented as the highest of the eight fluoride background values from MW-1.

The Texas Commission on Environmental Quality (TCEQ) Texas-Specific Soil Background Concentration (TSBC) for fluoride is 190 mg/kg (equivalent mg/L) in soil (see attached TCEQ TSBC guidance). Note that this naturally-occurring median fluoride concentration in soil is multiple orders of magnitude greater than the 1.1 mg/L concentration in water that was detected on December 20, 2017. Therefore, the fluoride detection in MW-1 is most likely a naturally-derived component of the site geology, which can result in a natural variation in groundwater quality.

Closing

SCS recommends that the facility remain in detection monitoring, in accordance with 40 CFR §257.94, as this ASD satisfies the 90-day demonstration period requirement outlined in 40 CFR §257.94(e)(2). Please contact Jim Lawrence at (817) 358-6106 if you have comments or require additional information.

Sincerely,

Doug Steen
Associate Professional
SCS ENGINEERS
TBPE Registration No. F-3407

Brett DeVries, Ph.D., P.E.
Project Engineer
SCS ENGINEERS

James Lawrence, P.G.
Project Director
SCS ENGINEERS

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PROFESSIONAL ENGINEER
1/30/18

STATE OF TEXAS
James Lawrence
Discipline
License #
541
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PROFESSIONAL GEOSCIENTIST
1-30-2018

Attachment: TCEQ Texas-Specific Soil Background Concentrations Guidance

Texas-Specific Soil Background Concentrations milligrams per kilogram (mg/kg)[1]	
Metal	Median Background Concentration (mg/kg)
Aluminum	30,000
Antimony	1
Arsenic	5.9
Barium	300
Beryllium	1.5
Boron	30
Total Chromium	30
Cobalt	7
Copper	15
Fluoride	190
Iron	15,000
Lead	15
Manganese	300
Mercury	0.04
Nickel	10
Selenium	0.3
Strontium	100
Tin	0.9
Titanium	2,000
Thorium	9.3
Vanadium	50
Zinc	30

[1] Source: "Background Geochemistry of Some Rocks, Soils, Plants, and Vegetables in the Conterminous United States", by Jon J. Connor, Hansford T. Shacklette, et al., Geological Survey Professional Paper 574-F, US Geological Survey.

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SCS ENGINEERS

January 30, 2018
SCS Project 16215106.00

Mr. Darryl Sparks
Compliance Manager
NAES Corporation
2161 Rattlesnake Road
Riesel, Texas 76682

Subject: Sandy Creek Energy Station
McLennan County, Texas
2017 Annual Groundwater Monitoring and Corrective Action Report
Alternate Source Demonstration for Boron in MW-3

Dear Mr. Sparks:

On behalf of the Sandy Creek Energy Station (SCES), SCS Engineers (SCS) is submitting this Alternate Source Demonstration (ASD) in accordance with the site Groundwater Sampling and Analysis Plan (GWSAP) prepared by SCS, dated March 2, 2016, and Coal Combustion Residual Rule (CCR) 40 CFR Part §257.94(e)(2) for a boron detection in groundwater monitoring well MW-3. Boron was detected in MW-3 at 1.3 mg/L during the December 2017 groundwater monitoring event. This ASD is being submitted to demonstrate that the boron detection is caused by a source other than the SCES landfill. In accordance with 40 CFR §257.94(e)(2), this ASD is being submitted within 90 days of detecting a statistically significant increase (SSI) above background values.

Project Background

SCES is a pulverized coal-fired electric generation facility which operates a landfill for disposal of dry scrubber ash and bottom ash generated during the coal combustion process at the facility. Incidental wastes generated during the operation of the facility may also be disposed in the landfill, as described in the initial registration notification to TCEQ and the most recent version of the Operations Plan for the facility. The landfill is currently comprised of two CCR disposal cells, Cells 1 and 2, which commenced receiving waste in early 2013 and October 2014, respectively. The approximate area of Cells 1 and 2 are 10.0 and 14.3 acres, respectively.

In accordance with 40 CFR §257 Appendix III and IV, the list of constituents for monitoring at SCES includes 18 inorganic compounds, total dissolved solids, radium-226, and radium-228.

Boron Detection at MW-3

Boron was detected in MW-3 during the December 2017 groundwater monitoring event at 1.3 mg/L. The Texas Commission on Environmental Quality (TCEQ) Texas-Specific Soil Background Concentration (TSBC) for boron is 30 mg/kg (equivalent mg/L) in soil (see attached

TCEQ TSBC guidance). Note that this naturally-occurring median boron concentration in soil is an order of magnitude greater than the 1.3 mg/L concentration in water that was detected on December 20, 2017.

Statistical Analysis

Initial statistical analysis of boron in MW-3 included the use of a non-parametric prediction limit using background boron data collected from only MW-3. This test is appropriate because the background data for boron in MW-3 are non-normally distributed. This intrawell statistical limit is represented as the highest of the eight background values from MW-3 (see "Intrawell Limit" in Table 1 below).

Since the December 2017 laboratory result for boron in MW-3 exceeded its intrawell limit, additional statistical evaluation was performed in accordance with 40 CFR §257.94(e)(2). This additional analysis consisted of an interwell parametric prediction limit (see "Interwell Limit" in Table 1 below). This test is commonly used to provide a comparison between a detection in a downgradient monitoring well and a statistical limit derived from background data from one or more upgradient monitoring wells. If the detection falls below the interwell statistical limit, it can be inferred that the detection likely resulted from natural variations in groundwater quality at the site.

Table 1 – December 2017 Unconfirmed SSIs (mg/L)

MW- ID	Constituent	Lab Result	Intrawell Limit	Interwell Limit
MW-3	Boron	1.3	1.2	4.591

As a result of this analysis comparing upgradient to downgradient data, the statistical limit was raised above the December 2017 laboratory result for boron in MW-3. The boron appears to be coming from a non-landfill, upgradient source, so no further action is recommended. The boron detection in MW-1 is most likely a naturally-derived component of the site geology, which can result in a natural variation in groundwater quality.

Closing

Attached are the interwell statistical graphs and data, as well as the ANOVA calculations demonstrating a lack of significant spatial variation of the constituents between wells.

SCS recommends that the facility remain in detection monitoring, in accordance with 40 CFR §257.94, as this ASD satisfies the 90-day demonstration period requirement outlined in 40 CFR §257.94(e)(2). Please contact Jim Lawrence at (817) 358-6106 if you have comments or require additional information.

Sincerely,

Doug Steen
Associate Professional
SCS ENGINEERS
TBPE Registration No. F-3407

Brett DeVries, Ph.D., P.E.
Project Engineer
SCS ENGINEERS

James Lawrence, P.G.
Project Director
SCS ENGINEERS

STATE OF TEXAS
BRETT J. DeVRIES
128061
LICENSED
PROFESSIONAL ENGINEER
1/30/18

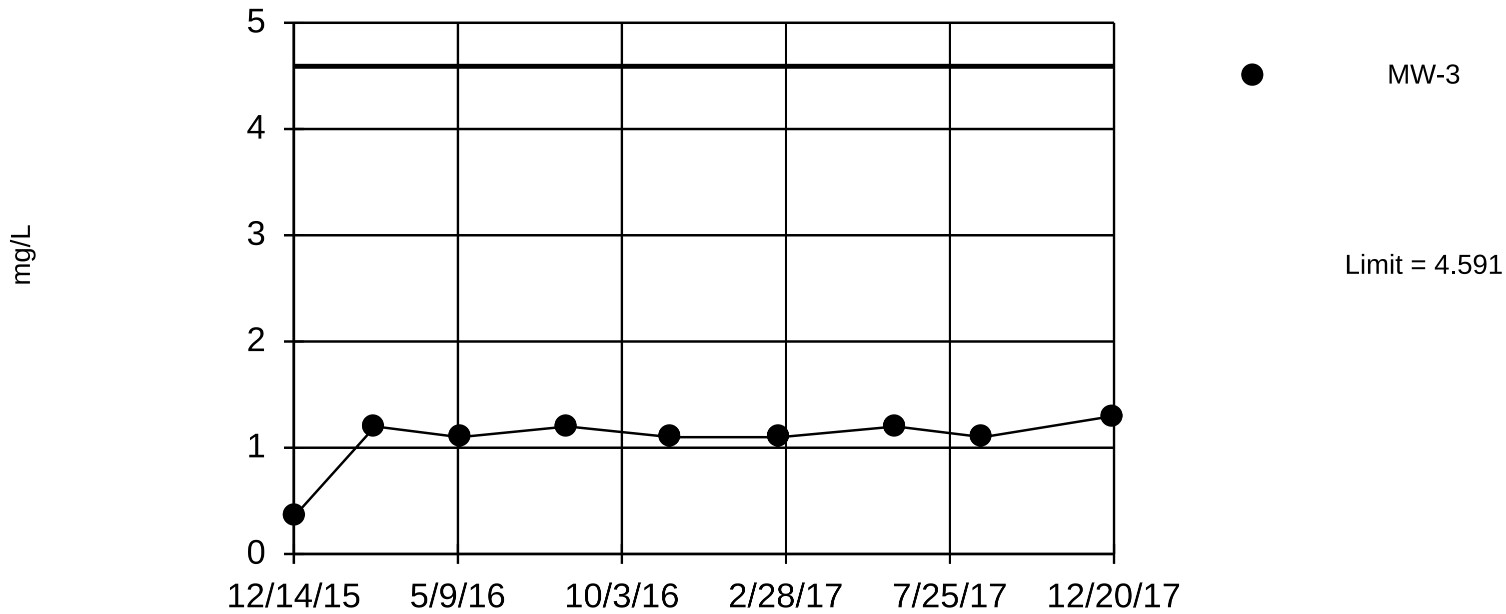
STATE OF TEXAS
James Lawrence
Discipline
License #
541
LICENSED
PROFESSIONAL GEOSCIENTIST
1-30-2018

Attachments: Interwell Statistical Graphs and Data
ANOVA Calculations and Data
TCEQ Texas-Specific Soil Background Concentrations Guidance

Within Limit

Prediction Limit

Interwell Parametric



Background Data Summary: Mean=3.289, Std. Dev.=0.6642, n=9. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8656, critical = 0.829. Report alpha = 0.05. Most recent point compared to limit.

Constituent: Boron Analysis Run 1/25/2018 3:25 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

Prediction Limit

Constituent: Boron (mg/L) Analysis Run 1/25/2018 3:31 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

	BW-1 (bg)	MW-3
12/14/2015	1.8	0.35
2/25/2016	3.5	1.2
5/11/2016	4	1.1
8/16/2016	3.7	1.2
11/17/2016	2.8	1.1
2/23/2017	3.1	1.1
6/7/2017	3.8	1.2
8/24/2017	3.4	1.1
12/20/2017	3.5	1.3

Non-Parametric ANOVA

Constituent: Boron   Analysis Run 1/25/2018 3:32 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.22.18

For observations made between 12/14/2015 and 12/20/2017, the non-parametric analysis of variance test indicates a DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 12.99

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 3 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 12.79
Adjusted Kruskal-Wallis statistic (H') = 12.99

The contrast test was performed to determine if any compliance group concentration was significantly higher than the background concentration. The contrast test indicates statistical significance in none of the compliance wells.

Contrast table:

Well	Difference	Contrast	Significant?
MW-3	-9	4.138	No

The critical (contrast) value was computed with 1 degree of freedom and a 5% error level for each well comparison. (Note: In this case, with Anova indicating differences that are not reflected in the contrast test, it should be concluded that it is the median of the Background data which is significantly higher.)

Non-parametric test used in lieu of parametric anova because the Shapiro Wilk normality test showed the residuals to be non-normal at the 0.05 alpha level.

Non-Parametric ANOVA

Constituent: Boron (mg/L) Analysis Run 1/25/2018 3:32 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.22.18

	BW-1 (bg)	MW-3
12/14/2015	1.8	0.35
2/25/2016	3.5	1.2
5/11/2016	4	1.1
8/16/2016	3.7	1.2
11/17/2016	2.8	1.1
2/23/2017	3.1	1.1
6/7/2017	3.8	1.2
8/24/2017	3.4	1.1
12/20/2017	3.5	1.3

Texas-Specific Soil Background Concentrations milligrams per kilogram (mg/kg)[1]	
Metal	Median Background Concentration (mg/kg)
Aluminum	30,000
Antimony	1
Arsenic	5.9
Barium	300
Beryllium	1.5
Boron	30
Total Chromium	30
Cobalt	7
Copper	15
Fluoride	190
Iron	15,000
Lead	15
Manganese	300
Mercury	0.04
Nickel	10
Selenium	0.3
Strontium	100
Tin	0.9
Titanium	2,000
Thorium	9.3
Vanadium	50
Zinc	30

[1] Source: "Background Geochemistry of Some Rocks, Soils, Plants, and Vegetables in the Conterminous United States", by Jon J. Connor, Hansford T. Shacklette, et al., Geological Survey Professional Paper 574-F, US Geological Survey.

2018 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT

January 31, 2019
SCS Project 16215106.00

Mr. Darryl Sparks
Compliance Manager
NAES Corporation
2161 Rattlesnake Road
Riesel, Texas 76682

Subject: 2018 Annual Groundwater Monitoring and Corrective Action Report Submittal
Sandy Creek Energy Station, McLennan County, Texas

Dear Mr. Sparks:

SCS Engineers (SCS) is pleased to submit the 2018 Annual Groundwater Monitoring and Corrective Action Report to the Sandy Creek Energy Station (SCES), in accordance with Coal Combustion Residual Rule (CCR) 40 CFR Part §257.94, and the site Groundwater Sampling and Analysis Plan (GWSAP), prepared by SCS, dated March 2, 2016.

Please contact James Lawrence at (817) 358-6106 if you have comments or require additional information.

Sincerely,

Doug Steen
Staff Professional
SCS ENGINEERS
TBPE Registration No. F-3407

Brett DeVries, Ph.D., P.E.
Project Engineer
SCS ENGINEERS

James Lawrence, P.G.
Project Director
SCS ENGINEERS

Attachments: 2018 Annual Groundwater Monitoring and Corrective Action Report

cc: Paulette Heuer at PHeuer@lspower.com
Alan Riddle at ariddle@sandycreekservices.com

2018 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT

SANDY CREEK ENERGY STATION
RIESEL, TEXAS

Prepared for:

Sandy Creek Energy Station
2161 Rattlesnake Road
Riesel, Texas 76682

SCS ENGINEERS

Project No. 16215106.00 | January 31, 2018

1901 Central Drive, Suite 550
Bedford, TX 76021
817-571-2288

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Figures

Appendices

STATE OF TEXAS
James Lawrence
Discipline
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PROFESSIONAL GEOSCIENTIST

1-31-2019

1.0 INTRODUCTION AND PROJECT BACKGROUND

SCS Engineers (SCS) is submitting the 2018 Annual Groundwater Monitoring and Corrective Action Report for the Sandy Creek Energy Station (SCES), in accordance with Coal Combustion Residual Rule (CCR) 40 CFR §257.93, and the site Groundwater Sampling and Analysis Plan (GWSAP). This report includes results for two semiannual detection monitoring events, conducted in June 2018 and December 2018.

SCES is a pulverized coal-fired electric generation facility which operates a landfill for disposal of dry scrubber ash and bottom ash generated during the coal combustion process at the facility. Incidental wastes generated during the operation of the facility may also be disposed in the landfill, as described in the initial registration notification to TCEQ and the most recent version of the Operations Plan for the facility. The landfill is currently comprised of two CCR disposal cells, Cells 1 and 2, which commenced receiving waste in early 2013 and October 2014, respectively. The approximate area of Cells 1 and 2 are 10.0 and 14.3 acres, respectively.

Sampling of monitoring wells is conducted in accordance with 40 CFR §257.93 and the GWSAP. Background monitoring of four wells (MW-1, MW-2, MW-3, and BW-1, as depicted in **Figure 1**) was performed for eight consecutive quarters in accordance with 40 CFR §257.94(b) (i.e., eight independent samples were collected for each well). The background monitoring described above commenced in December 2015 and was completed in August 2017. This report is for two semiannual detection monitoring events conducted at SCES. In accordance with 40 CFR §257 Appendix III and IV, the constituents for monitoring at SCES includes 18 inorganic compounds, total dissolved solids, radium-226, and radium-228. Currently, all monitoring wells are sampled and analyzed for 40 CFR §257 Appendix III constituents, in accordance with 40 CFR §257.94(a).

2.0 GROUNDWATER MONITORING SUMMARY

2.1 GROUNDWATER MONITORING SYSTEM

The current groundwater monitoring system at the SCES landfill consists of four wells (see Table 1 below). One is upgradient (BW-1) and three are downgradient (MW-1, MW-2, and MW-3). All four wells are currently in detection monitoring. Figure 1 shows monitoring well locations at the SCES.

Table 1 - Sandy Creek Energy Station Groundwater Monitoring System

Well Name (U/D)[1]	Completion Date	Status	Top of Casing (TOC) Elevation (ft msl)[2]	Well Depth (ft below TOC)[2]	Screen Interval (ft bgs)[2]	Water Level Elevation (ft msl on 12/13/2018)
MW-1 (D)	9/21/2015	Detection	465.87	37.25	23.90 - 33.90	454.86
MW-2 (D)	9/23/2015	Detection	442.15	22.60	9.30 - 19.30	430.72
MW-3 (D)	9/1/2010	Detection	430.06	19.95	5.98 - 15.98	422.36
BW-1 (U)	9/22/2015	Detection	485.57	41.50	28.30 - 38.30	467.24

[1] (U) = upgradient; (D) = downgradient
[2] Top of Casing Elevation, Well Depth, and Screen Interval information obtained from Table 1 – Monitoring Well and Piezometer Construction Details and Groundwater Elevations prepared by Geosyntec Consultants, dated March 11, 2016
ft msl = feet above mean sea level
ft bgs = feet below ground surface

2.2 SUMMARY OF 2018 SAMPLING EVENTS

All sampling events followed the groundwater sampling and laboratory analysis procedures outlined in the GWSAP. A duplicate sample was collected from one well during each event for Quality Assurance & Quality Control (QA/QC) purposes. All monitoring wells were sampled and analyzed for 40 CFR §257 Appendix III constituents, in accordance with 40 CFR §257.94(a).

June 2018 – Semiannual Detection Monitoring Event

All four wells (MW-1, MW-2, MW-3, and BW-1) were purged and sampled on June 21, 2018 using the conventional purge and sampling method with disposable PVC bailers. The results of the sampling were provided to the SCES in a report dated August 20, 2018. Field forms and laboratory results are provided in **Appendices A** & **B**, respectively.

December 2018 – Semiannual Detection Monitoring Event

All four wells (MW-1, MW-2, MW-3, and BW-1) were purged and sampled on December 13, 2018 using the conventional purge and sampling method with disposable PVC bailers. Field forms and laboratory results are provided in **Appendices A** & **B**, respectively.

3.0 RESULTS AND STATISTICAL ANALYSIS

A summary of June 2018 and December 2018 laboratory results and statistical limits for each well – constituent pair is provided below in **Appendix D.** Statistical limits were determined in accordance with 40 CFR §257.93(g) using the software program Sanitas®. Limits are presented using Shewhart-CUSUM control charts, non-parametric prediction limits, or parametric prediction limits as deemed appropriate by background data distributions. EPA MCLs are also presented for comparison to current data. Statistical limits for all constituents were calculated using eight quarterly background events from December 2015 to August 2017; these limits were originally presented in the 2017 Annual Groundwater Monitoring and Corrective Action Report, dated January 30, 2018.

Unconfirmed statistically significant exceedances (SSIs) were determined for fluoride at MW-1 and boron in MW-2 (see **Appendix D**). In accordance with 40 CFR §257.94(e), two alternate source demonstrations (ASDs) are provided in **Appendix F** to demonstrate that these unconfirmed SSIs likely result from natural variation in groundwater quality at the site, and are not indicative of impacts from the SCES landfill.

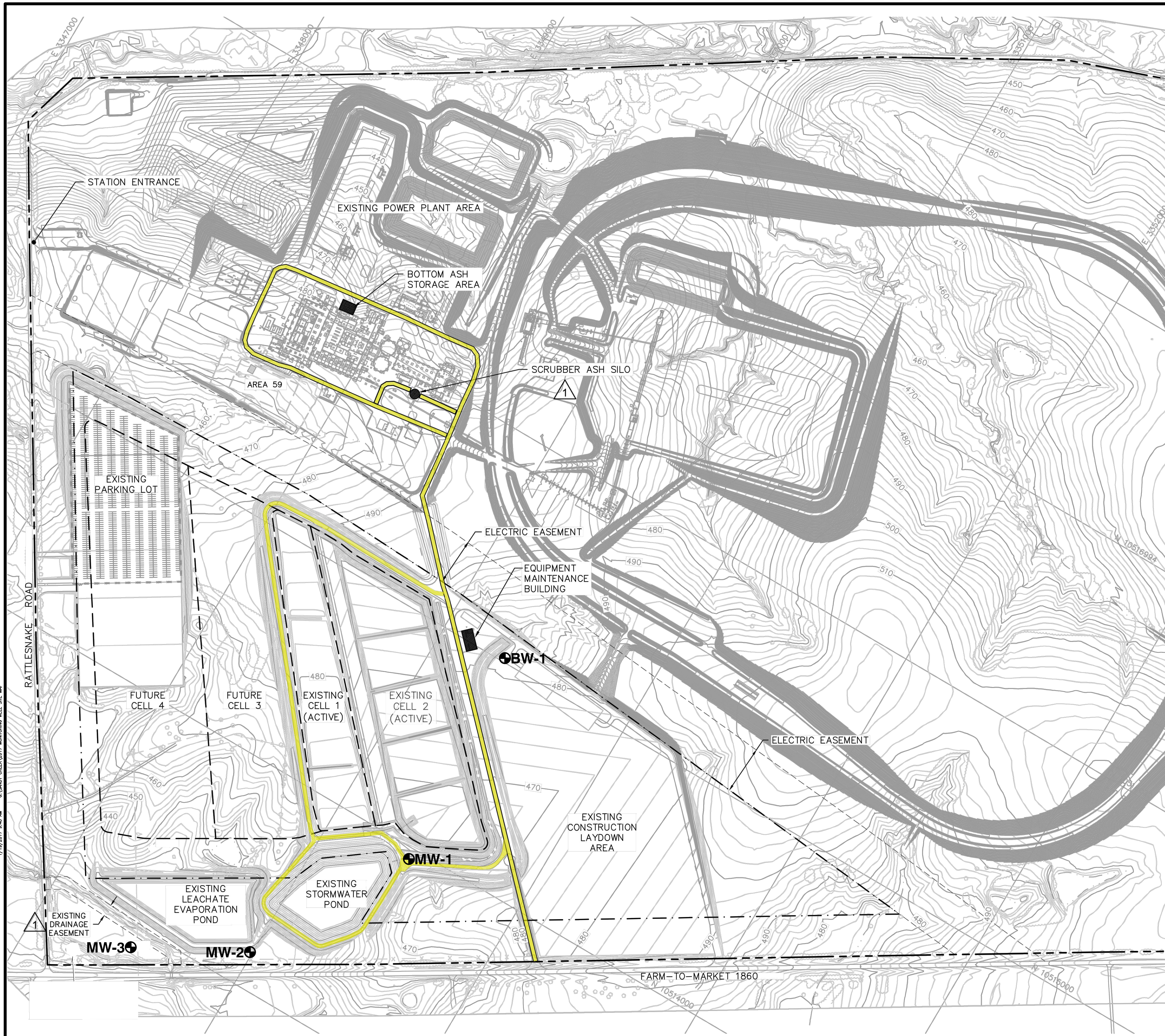
4.0 RECOMMENDATIONS

As outlined in the attached ASDs for fluoride in MW-1 and boron in MW-2, no confirmed SSIs were identified for any wells during the June 2018 and December 2018 semiannual detection monitoring events at the SCES. SCS therefore recommends that the facility remain in detection monitoring, in accordance with 40 CFR §257.94.

Due to the lack of confirmed SSIs for 40 CFR §257 Appendix III constituents during the June 2018 and December 2018 detection monitoring events, the facility will continue monitoring for all constituents listed in 40 CFR §257 Appendix III, in accordance with 40 CFR §257.94(a). The Appendix IV constituent list will be analyzed if any confirmed SSIs of the Appendix III list are indicated in future events. The next groundwater monitoring event is a semiannual detection monitoring event scheduled for June 2019.

FIGURE 1

MONITORING WELL LOCATION MAP



LEGEND

500	EXISTING GROUND ELEVATION (FT, MSL) (NOTES 1, 2)
	EXISTING SURFACE WATER LINE
x x x	EXISTING SITE FENCE
	EXISTING TREE LINE
MW-1	EXISTING MONITORING WELL
	EXISTING BUILDING
	PROPERTY BOUNDARY
	DEED RECORDED LIMITS OF WASTE
	CELL BOUNDARY
N 10514500 E 3349500	STATE PLANE COORDINATES
	SWDF OPERATIONS ACCESS ROAD

0 250' 500'
SCALE IN FEET

NOTES:

1. THE EXISTING CONTOUR MAP SHOWN ON THIS DRAWING WAS COMPILED USING EXISTING TOPOGRAPHY DATED APRIL 2006 AND DESIGN GRADES DATED OCTOBER 2007 FROM BLACK & VEATCH CORPORATION; DESIGN GRADES DEVELOPED BY GEOSYNTEC CONSULTANTS, INC. FOR THE LEACHATE EVAPORATION POND AND CELL 2 DATED APRIL 2011 AND APRIL 2014, RESPECTIVELY; AND AREA 59 EXISTING TOPOGRAPHY SURVEY CONDUCTED BY WALKER PARTNERS DATED 9 MAY 2013.
2. ELEVATIONS ARE IN FEET ABOVE MEAN SEA LEVEL (FT, MSL) AS DEFINED BY THE USGS NATIONAL GEODETIC VERTICAL DATUM (NGVD) OF 1988. STATE PLANE COORDINATE GRID CORRESPONDS TO TEXAS STATE PLANE COORDINATE SYSTEM, TEXAS CENTRAL ZONE (4203), NORTH AMERICAN DATUM OF 1983 (NAD-83).

SOURCE: BACKGROUND INFORMATION FOR THIS DRAWING IS FROM A DRAWING NAMED SITE LAYOUT BY GEOSYNTEC CONSULTANTS, DATED JUNE 2014.

1/19/2017 9:48 AM G:\SANDY CREEK\2017 MONITORING WELL SITE MAP

REV | DATE | DESCRIPTION | BY

TEXAS BOARD OF PROFESSIONAL ENGINEERS REG. NO. F-3407

DRAWING TITLE: MONITORING WELL LOCATION MAP

PROJECT TITLE: SANDY CREEK ENERGY STATION GROUNDWATER MONITORING

CLIENT: NAES CORPORATION 2161 RATTLESNAKE ROAD RIESEL, TEXAS 76682

SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT CONSULTING ENGINEERS
1901 CENTRAL DRIVE, SUITE 550, BEDFORD, TX 76021
PH (817) 571-2288 FAX NO. (817) 571-2188

PROJ. NO. 16215134.00 | DSN. BY: RD | DWN. BY: BPB | CHK. BY: JL | Q/A RVW BY: JL | APP. BY: JL

CADD FILE: 2017 MONITORING WELL SITE MAP

DATE: 01/2018

SCALE: AS SHOWN

DRAWING NO. 1

APPENDIX A

2018 GROUNDWATER MONITORING FIELD FORMS

Groundwater Monitoring Form

Facility name: Sandy Creek Energy Station
Permittee: Sandy Creek Energy Associates, L.P.
County: McLennan

1. Facility Type: Power Station
2. Monitor well no.: MW-1
3. Date of sampling: 6/21/2018

Name of sampler: Doug Steen
Affiliation of sampler: SCS Engineers
If split sampled, with whom? N/A
Integrity of well: GOOD
Installation date: 9/21/2015

Most recent previous sampling: 12/20/2017
Date of water level measurements: 6/21/2018
Datum reference point: Top of Casing
Datum elevation*: 465.87
Depth to water(below datum)*: 12.02
4. Water level elevation*: 453.85

5. Purging/Sampling method: Bailer (Enter bailer or pump)
   Were low-flow methods used? ☐ yes ■ no (check one)
   If yes, what volume was purged? N/A gal.
6. Well volumes purged: 2.1
7. Was the well dry before purging? ☐ yes ■ no (check one)
8. Was the well dry after purging? ■ yes ☐ no (check one)
9. How long before sampling? 1.5
10. Unit of measure? hours (Enter value as days, hours, or mins.)

11. Sample event: Detection
   - Background - Corrective Action
   - Detection - Other
   - Assessment
12. Sample schedule: Semi-Annual
   - Quarterly - Fourth Year
   - Semi-Annual - Other
   - Annual
13. Sample type: Regular
   - Regular - Split
   - Duplicate - Other
   - Resample

Field Measurements:

14. pH 7.05
15. Spec. cond. 4,670
16. ■ umho/cm or ☐ mmho/cm (check one)
17. Temp. 26.38
18. ☐ F or ■ C (check one)
19. Turbidity 681
20. ■ NTU

Laboratory:

21. Name ALS
Phone: (904) 739-2277
Address: 9143 Phillips Highway, Jacksonville, FL 32256

* Report depth to water and elevations to nearest 0.01 foot relative to mean sea level (msl).

Groundwater Monitoring Form

Facility name: Sandy Creek Energy Station
Permittee: Sandy Creek Energy Associates, L.P.
County: McLennan

1. Facility Type: Power Station
2. Monitor well no.: MW-2
3. Date of sampling: 6/21/2018

Name of sampler: Doug Steen
Affiliation of sampler: SCS Engineers
If split sampled, with whom? N/A
Integrity of well: GOOD
Installation date: 9/23/2015

Most recent previous sampling: 12/20/2017
Date of water level measurements: 6/21/2018
Datum reference point: Top of Casing
Datum elevation*: 442.15
Depth to water(below datum)*: 12.13
4. Water level elevation*: 430.02

5. Purging/Sampling method: Bailer (Enter bailer or pump)
   Were low-flow methods used? ☐ yes ■ no (check one)
   If yes, what volume was purged? N/A gal.
6. Well volumes purged: 2.7
7. Was the well dry before purging? ☐ yes ■ no (check one)
8. Was the well dry after purging? ■ yes ☐ no (check one)
9. How long before sampling? 1.5
10. Unit of measure? hours (Enter value as days, hours, or mins.)

11. Sample event: Detection
    - Background - Corrective Action
    - Detection - Other
    - Assessment
12. Sample schedule: Semi-Annual
    - Quarterly - Fourth Year
    - Semi-Annual - Other
    - Annual
13. Sample type: Regular
    - Regular - Split
    - Duplicate - Other
    - Resample

Field Measurements:

14. pH 6.80
15. Spec. cond. 12,660
16. ■ umho/cm or ☐ mmho/cm (check one)
17. Temp. 25.17
18. ☐ F or ■ C (check one)
19. Turbidity 4.42
20. ■ NTU

Laboratory:

21. Name ALS
    Phone: (904) 739-2277
    Address: 9143 Phillips Highway, Jacksonville, FL 32256

* Report depth to water and elevations to nearest 0.01 foot relative to mean sea level (msl).

Groundwater Monitoring Form

Facility name: Sandy Creek Energy Station
Permittee: Sandy Creek Energy Associates, L.P.
County: McLennan

1. Facility Type: Power Station
2. Monitor well no.: MW-3
3. Date of sampling: 6/21/2018

Name of sampler: Doug Steen
Affiliation of sampler: SCS Engineers
If split sampled, with whom? N/A
Integrity of well: GOOD
Installation date: 9/1/2010

Most recent previous sampling: 12/20/2017
Date of water level measurements: 6/21/2018
Datum reference point: Top of Casing
Datum elevation*: 430.06
Depth to water(below datum)*: 11.38
4. Water level elevation*: 418.68

5. Purging/Sampling method: Bailer (Enter bailer or pump)
   Were low-flow methods used? ☐ yes ■ no (check one)
   If yes, what volume was purged? N/A gal.
6. Well volumes purged: 2.9
7. Was the well dry before purging? ☐ yes ■ no (check one)
8. Was the well dry after purging? ☐ yes ■ no (check one)
9. How long before sampling? 1.5
10. Unit of measure? hours (Enter value as days, hours, or mins.)

11. Sample event: Detection
   - Background - Corrective Action
   - Detection - Other
   - Assessment
12. Sample schedule: Semi-Annual
   - Quarterly - Fourth Year
   - Semi-Annual - Other
   - Annual
13. Sample type: Regular
   - Regular - Split
   - Duplicate - Other
   - Resample

Field Measurements:

14. pH 6.46
15. Spec. cond. 6,633
17. Temp. 23.59
19. Turbidity 51.1

16. ■ umho/cm or ☐ mmho/cm (check one)
18. ☐ F or ■ C (check one)
20. ■ NTU

Laboratory:

21. Name ALS
Address: 9143 Phillips Highway, Jacksonville, FL 32256
Phone: (904) 739-2277

* Report depth to water and elevations to nearest 0.01 foot relative to mean sea level (msl).

Groundwater Monitoring Form

Facility name: Sandy Creek Energy Station
Permittee: Sandy Creek Energy Associates, L.P.
County: McLennan

1. Facility Type: Power Station
2. Monitor well no.: BW-1
3. Date of sampling: 6/21/2018

Name of sampler: Doug Steen
Affiliation of sampler: SCS Engineers
If split sampled, with whom? N/A
Integrity of well: GOOD
Installation date: 9/22/2015

Most recent previous sampling: 12/20/2017
Date of water level measurements: 6/21/2018
Datum reference point: Top of Casing
Datum elevation*: 485.57
Depth to water(below datum)*: 19.44
4. Water level elevation*: 466.13

5. Purging/Sampling method: Bailer (Enter bailer or pump)
   Were low-flow methods used? ☐ yes ■ no (check one)
   If yes, what volume was purged? N/A gal.
6. Well volumes purged: 3.1
7. Was the well dry before purging? ☐ yes ■ no (check one)
8. Was the well dry after purging? ☐ yes ■ no (check one)
9. How long before sampling? 1.5
10. Unit of measure? hours (Enter value as days, hours, or mins.)

11. Sample event: Detection
   - Background - Corrective Action
   - Detection - Other
   - Assessment
12. Sample schedule: Semi-Annual
   - Quarterly - Fourth Year
   - Semi-Annual - Other
   - Annual
13. Sample type: Regular
   - Regular - Split
   - Duplicate - Other
   - Resample

Field Measurements:

14. pH 6.75
15. Spec. cond. 7,755
16. ■ umho/cm or ☐ mmho/cm (check one)
17. Temp. 24.79
18. ☐ F or ■ C (check one)
19. Turbidity 39.3
20. ■ NTU

Laboratory:

21. Name ALS
Phone: (904) 739-2277
Address: 9143 Phillips Highway, Jacksonville, FL 32256

* Report depth to water and elevations to nearest 0.01 foot relative to mean sea level (msl).

Groundwater Monitoring Form

Facility name: Sandy Creek Energy Station
Permittee: Sandy Creek Energy Associates, L.P.
County: McLennan

1. Facility Type: Power Station
2. Monitor well no.: DUP
3. Date of sampling: 6/21/2018

Name of sampler: Doug Steen
Affiliation of sampler: SCS Engineers
If split sampled, with whom? N/A
Integrity of well: N/A
Installation date: N/A

Most recent previous sampling: N/A
Date of water level measurements: N/A
Datum reference point: Top of Casing
Datum elevation*: N/A
Depth to water(below datum)*: N/A
4. Water level elevation*: N/A

5. Purging/Sampling method: N/A (Enter bailer or pump)
   Were low-flow methods used? ☐ yes ☐ no (check one)
   If yes, what volume was purged? N/A gal.
6. Well volumes purged: N/A
7. Was the well dry before purging? ☐ yes ☐ no (check one)
8. Was the well dry after purging? ☐ yes ☐ no (check one)
9. How long before sampling? N/A
10. Unit of measure? N/A (Enter value as days, hours, or mins.)

11. Sample event: Detection
    - Background - Corrective Action
    - Detection - Other
    - Assessment
12. Sample schedule: Semi-Annual
    - Quarterly - Fourth Year
    - Semi-Annual - Other
    - Annual
13. Sample type: Duplicate
    - Regular - Split
    - Duplicate - Other
    - Resample

Field Measurements:

14. pH N/A
15. Spec. cond. N/A
17. Temp. N/A
19. Turbidity N/A

16. ☐ umho/cm or ☐ mmho/cm (check one)
18. ☐ F or ☐ C (check one)
20. ☐ NTU

Laboratory:

21. Name ALS
Phone: (904) 739-2277
Address: 9143 Phillips Highway, Jacksonville, FL 32256

* Report depth to water and elevations to nearest 0.01 foot relative to mean sea level (msl).

Groundwater Monitoring Form

Facility name: Sandy Creek Energy Station
Permittee: Sandy Creek Energy Associates, L.P.
County: McLennan

1. Facility Type: Power Station
2. Monitor well no.: MW-1
3. Date of sampling: 12/13/2018

Name of sampler: Doug Steen & Tyson Milbrand
Affiliation of sampler: SCS Engineers
If split sampled, with whom? N/A
Integrity of well: Good
Installation date: 9/21/2015

Most recent previous sampling: 6/21/2018
Date of water level measurements: 12/13/2018
Datum reference point: Top of Casing
Datum elevation*: 465.87
Depth to water(below datum)*: 11.01
4. Water level elevation*: 454.86

5. Purging/Sampling method: Bailer (Enter bailer or pump)
   Were low-flow methods used? ☐ yes ■ no (check one)
   If yes, what volume was purged? N/A gal.
6. Well volumes purged: 2.1
7. Was the well dry before purging? ☐ yes ■ no (check one)
8. Was the well dry after purging? ■ yes ☐ no (check one)
9. How long before sampling? 1
10. Unit of measure? hours (Enter value as days, hours, or mins.)

11. Sample event: Detection
- Background - Corrective Action
- Detection - Other
- Assessment

12. Sample schedule: Semi-Annual
- Quarterly - Fourth Year
- Semi-Annual - Other
- Annual

13. Sample type: Regular
- Regular - Split
- Duplicate - Other
- Resample

Field Measurements:

14. pH 7.00
15. Spec. cond. 4.369
17. Temp. 21.68
19. Turbidity 30

16. ■ mS/cm
18. ☐ F or ■ C (check one)
20. ■ NTU

Laboratory:

21. Name ALS
Phone: (281) 530-5656
Address: 10450 Stancliff Rd., Suite 210, Houston, Texas 77099

* Report depth to water and elevations to nearest 0.01 foot relative to mean sea level (msl).

Groundwater Monitoring Form

Facility name: Sandy Creek Energy Station
Permittee: Sandy Creek Energy Associates, L.P.
County: McLennan

1. Facility Type: Power Station
2. Monitor well no.: MW-2
3. Date of sampling: 12/13/2018

Name of sampler: Doug Steen & Tyson Milbrand
Affiliation of sampler: SCS Engineers
If split sampled, with whom? N/A
Integrity of well: Good
Installation date: 9/23/2015

Most recent previous sampling: 6/21/2018
Date of water level measurements: 12/13/2018
Datum reference point: Top of Casing
Datum elevation*: 442.15
Depth to water(below datum)*: 11.43
4. Water level elevation*: 430.72

5. Purging/Sampling method: Bailer (Enter bailer or pump)
   Were low-flow methods used? ☐ yes ■ no (check one)
   If yes, what volume was purged? N/A gal.
6. Well volumes purged: 3.1
7. Was the well dry before purging? ☐ yes ■ no (check one)
8. Was the well dry after purging? ☐ yes ■ no (check one)
9. How long before sampling? 1
10. Unit of measure? hours (Enter value as days, hours, or mins.)

11. Sample event: Detection
- Background - Corrective Action
- Detection - Other
- Assessment

12. Sample schedule: Semi-Annual
- Quarterly - Fourth Year
- Semi-Annual - Other
- Annual

13. Sample type: Regular
- Regular - Split
- Duplicate - Other
- Resample

Field Measurements:

14. pH 6.68
15. Spec. cond. 11.89 — 16. ■ mS/cm
17. Temp. 22.19 — 18. ☐ F or ■ C (check one)
19. Turbidity 15.1 — 20. ■ NTU

Laboratory:

21. Name: ALS — Phone: (281) 530-5656
Address: 10450 Stancliff Rd., Suite 210, Houston, Texas 77099

* Report depth to water and elevations to nearest 0.01 foot relative to mean sea level (msl).

Groundwater Monitoring Form

Facility name:	Sandy Creek Energy Station	1. Facility Type:	Power Station
Permittee:	Sandy Creek Energy Associates, L.P.	2. Monitor well no.:	MW-3
County:	McLennan	3. Date of sampling:	12/13/2018

Name of sampler:	Doug Steen & Tyson Milbrand	Most recent previous sampling:	6/21/2018
Affiliation of sampler:	SCS Engineers	Date of water level measurements:	12/13/2018
If split sampled, with whom?	N/A	Datum reference point:	Top of Casing
Integrity of well:	Good	Datum elevation*:	430.06
Installation date:	9/1/2010	Depth to water(below datum)*:	7.70
		4. Water level elevation*:	422.36

5. Purging/Sampling method: Bailer (Enter bailer or pump)
   Were low-flow methods used? ☐ yes ■ no (check one)
   If yes, what volume was purged? N/A gal.
6. Well volumes purged: 3.1
7. Was the well dry before purging? ☐ yes ■ no (check one)
8. Was the well dry after purging? ☐ yes ■ no (check one)
9. How long before sampling? 1
10. Unit of measure? hours (Enter value as days, hours, or mins.)

11. Sample event: Detection
- Background - Corrective Action
- Detection - Other
- Assessment

12. Sample schedule: Semi-Annual
- Quarterly - Fourth Year
- Semi-Annual - Other
- Annual

13. Sample type: Regular
- Regular - Split
- Duplicate - Other
- Resample

Field Measurements:

14. pH	6.51	
15. Spec. cond.	4.47	16. ■ mS/cm
17. Temp.	21.60	18. ☐ F or ■ C (check one)
19. Turbidity	10.6	20. ■ NTU

Laboratory:

21. Name: ALS Phone: (281) 530-5656
Address: 10450 Stancliff Rd., Suite 210, Houston, Texas 77099

* Report depth to water and elevations to nearest 0.01 foot relative to mean sea level (msl).

Groundwater Monitoring Form

Facility name: Sandy Creek Energy Station
Permittee: Sandy Creek Energy Associates, L.P.
County: McLennan

1. Facility Type: Power Station
2. Monitor well no.: BW-1
3. Date of sampling: 12/13/2018

Name of sampler: Doug Steen & Tyson Milbrand
Affiliation of sampler: SCS Engineers
If split sampled, with whom? N/A
Integrity of well: Good
Installation date: 9/22/2015

Most recent previous sampling: 6/21/2018
Date of water level measurements: 12/13/2018
Datum reference point: Top of Casing
Datum elevation*: 485.57
Depth to water(below datum)*: 18.33
4. Water level elevation*: 467.24

5. Purging/Sampling method: Bailer (Enter bailer or pump)
   Were low-flow methods used? ☐ yes ■ no (check one)
   If yes, what volume was purged? N/A gal.
6. Well volumes purged: 3.1
7. Was the well dry before purging? ☐ yes ■ no (check one)
8. Was the well dry after purging? ☐ yes ■ no (check one)
9. How long before sampling? 1
10. Unit of measure? hours (Enter value as days, hours, or mins.)

11. Sample event: Detection
- Background
- Detection
- Assessment
- Corrective Action
- Other

12. Sample schedule: Semi-Annual
- Quarterly
- Semi-Annual
- Annual
- Fourth Year
- Other

13. Sample type: Regular
- Regular
- Duplicate
- Resample
- Split
- Other

Field Measurements:

14. pH 6.85
15. Spec. cond. 7.159 — 16. ■ mS/cm
17. Temp. 21.28 — 18. ☐ F or ■ C (check one)
19. Turbidity 81.8 — 20. ■ NTU

Laboratory:

21. Name: ALS — Phone: (281) 530-5656
Address: 10450 Stancliff Rd., Suite 210, Houston, Texas 77099

* Report depth to water and elevations to nearest 0.01 foot relative to mean sea level (msl).

Groundwater Monitoring Form

Facility name: Sandy Creek Energy Station
Permittee: Sandy Creek Energy Associates, L.P.
County: McLennan

1. Facility Type: Power Station
2. Monitor well no.: DUP
3. Date of sampling: 12/13/2018

Name of sampler: Doug Steen & Tyson Milbrand
Affiliation of sampler: SCS Engineers
If split sampled, with whom? N/A
Integrity of well: N/A
Installation date: N/A

Most recent previous sampling: N/A
Date of water level measurements: N/A
Datum reference point: Top of Casing
Datum elevation*: N/A
Depth to water(below datum)*: N/A
4. Water level elevation*: N/A

5. Purging/Sampling method: N/A (Enter bailer or pump)
   Were low-flow methods used? ☐ yes ☐ no (check one)
   If yes, what volume was purged? N/A gal.
6. Well volumes purged: N/A
7. Was the well dry before purging? ☐ yes ☐ no (check one)
8. Was the well dry after purging? ☐ yes ☐ no (check one)
9. How long before sampling? N/A
10. Unit of measure? N/A (Enter value as days, hours, or mins.)

11. Sample event: Detection
   - Background - Corrective Action
   - Detection - Other
   - Assessment
12. Sample schedule: Semi-Annual
   - Quarterly - Fourth Year
   - Semi-Annual - Other
   - Annual
13. Sample type: Duplicate
   - Regular - Split
   - Duplicate - Other
   - Resample

Field Measurements:

14. pH N/A
15. Spec. cond. N/A — 16. ☐ mS/cm
17. Temp. N/A — 18. ☐ F or ☐ C (check one)
19. Turbidity N/A — 20. ☐ NTU

Laboratory:

21. Name: ALS — Phone: (281) 530-5656
Address: 10450 Stancliff Rd., Suite 210, Houston, Texas 77099

* Report depth to water and elevations to nearest 0.01 foot relative to mean sea level (msl).

APPENDIX B

2018 LABORATORY REPORTS WITH CHAIN OF CUSTODY FORMS

August 20, 2018 Service Request No:J1804531

Mr. Jim Lawrence
SCS Engineers
1901 Central Drive
Suite 550
Bedford, TX 76021

Laboratory Results for: Sandy Creek Groundwater

Dear Mr.Lawrence,

Enclosed are the results of the sample(s) submitted to our laboratory June 22, 2018
For your reference, these analyses have been assigned our service request number **J1804531.**

All analyses were performed according to our laboratory's quality assurance program. The test results meet requirements of the NELAP standards except as noted in the case narrative report. All results are intended to be considered in their entirety, and ALS Environmental is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report. In accordance to the NELAC 2003 Standard, a statement on the estimated uncertainty of measurement of any quantitative analysis will be supplied upon request.

Please contact me if you have any questions. My extension is 4410. You may also contact me via email at Jerry.Allen@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Jerry Allen
Project Manager

ADDRESS 9143 Philips Highway, Suite 200, Jacksonville, FL 32256
PHONE +1 904 739 2277 | FAX +1 904 739 2011
ALS Group USA, Corp.
dba ALS Environmental

Narrative Documents

ALS Environmental—Jacksonville Laboratory
9143 Philips Highway, Suite 200, Jacksonville, FL 32256
Phone (904) 739-2277 Fax (904) 739-2011
www.alsglobal.com

ALS Environmental

Client: SCS Engineers **Service Request:** J1804531
Project: Sandy Creek Groundwater/16215106.00 T131 **Date Received:** 6/22/18
Sample Matrix: Water

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier II data deliverables, including results of QC samples analyzed from this delivery group. When appropriate to the procedure, method blank results have been reported with each analytical test. Analytical procedures performed by the lab are validated in accordance with NELAC standards. Parameters that are included in the NELAC Fields of Testing but are not included in the lab's NELAC accreditation are identified in the discussion of each analytical procedure.

Sample Receipt

5 water samples were received for analysis at ALS Environmental on 6/22/18. The samples were received in good condition and consistent with the accompanying chain of custody form. Samples are refrigerated at ≤6°C upon receipt at the lab except for aqueous samples designated for metals analyses, which are stored at room temperature.

Metals Analyses:

No significant data anomalies were noted with this analysis.

General Chemistry Analyses:

Method 300.0/9056: The reporting limit is elevated for analyte(s) analyzed by IC in J1804531. These sample(s) had high conductivity which precludes their analysis without prior dilution via this technique.

Revision Notes:

This analytical report is a revision of the original report generated on 06/29/2018. The following specific changes were made to the report: samples reported to MDL.

Approved by ______________ Date 8/20/2018

SAMPLE DETECTION SUMMARY

CLIENT ID: BW-1	Lab ID: J1804531-001					
Analyte	Results	Flag	MDL	MRL	Units	Method
Solids, Total Dissolved	6640		100	100	mg/L	SM 2540 C
Chloride	1200		3	20	mg/L	9056
pH	7.22				pH Units	9040C
Sulfate	3030		2	20	mg/L	9056
Boron, Total	3.31		0.025	0.050	mg/L	6010D
Calcium, Total	610		0.08	0.20	mg/L	6010D

CLIENT ID: MW-1	Lab ID: J1804531-002					
Analyte	Results	Flag	MDL	MRL	Units	Method
Solids, Total Dissolved	4270		40	40	mg/L	SM 2540 C
Chloride	247		2	10	mg/L	9056
Fluoride	0.3	J	0.2	1.0	mg/L	9056
pH	7.38				pH Units	9040C
Sulfate	2530		0.9	10	mg/L	9056
Boron, Total	1.25		0.025	0.050	mg/L	6010D
Calcium, Total	587		0.08	0.20	mg/L	6010D

CLIENT ID: MW-2	Lab ID: J1804531-003					
Analyte	Results	Flag	MDL	MRL	Units	Method
Solids, Total Dissolved	10200		200	200	mg/L	SM 2540 C
Chloride	2840		6	50	mg/L	9056
pH	7.09				pH Units	9040C
Sulfate	3400		5	50	mg/L	9056
Boron, Total	1.90		0.025	0.050	mg/L	6010D
Calcium, Total	706		0.08	0.20	mg/L	6010D

CLIENT ID: MW-3	Lab ID: J1804531-004					
Analyte	Results	Flag	MDL	MRL	Units	Method
Solids, Total Dissolved	6090		100	100	mg/L	SM 2540 C
Chloride	396		3	20	mg/L	9056
pH	6.76				pH Units	9040C
Sulfate	3160		2	20	mg/L	9056
Boron, Total	1.13		0.025	0.050	mg/L	6010D
Calcium, Total	526		0.08	0.20	mg/L	6010D

CLIENT ID: DUP	Lab ID: J1804531-005					
Analyte	Results	Flag	MDL	MRL	Units	Method
Solids, Total Dissolved	6690		100	100	mg/L	SM 2540 C
Chloride	1210		3	20	mg/L	9056
pH	7.30				pH Units	9040C
Sulfate	3040		2	20	mg/L	9056
Boron, Total	3.30		0.025	0.050	mg/L	6010D
Calcium, Total	609		0.08	0.20	mg/L	6010D

Sample Receipt Information

ALS Environmental—Jacksonville Laboratory
9143 Philips Highway, Suite 200, Jacksonville, FL 32256
Phone (904) 739-2277 Fax (904) 739-2011
www.alsglobal.com

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
J1804531-001	BW-1	6/21/2018	1140
J1804531-002	MW-1	6/21/2018	1205
J1804531-003	MW-2	6/21/2018	1220
J1804531-004	MW-3	6/21/2018	1245
J1804531-005	DUP	6/21/2018	0000

ALS Environmental

Cooler Receipt Form

Client: SCS ENGINEERS   Service Request #: J1804531

Project: SANDY CREEK GROUNDWATER   Shipping paid by ALS?

Cooler received on 6.22.18 and opened on 6.22.18 by KB   Yes **No** N/A

COURIER: ALS UPS **FEDEX** DHL Client Other ______ Airbill # 8106 4509 4980

1	Were custody seals on outside of cooler?	**Yes**	No		
	If yes, how many and where?	#: 1 on lid		other	
2	Were seals intact and signature and date correct?	**Yes**	No	N/A	
3	Were custody papers properly filled out?	Yes	No	N/A	
4	Temperature of cooler(s) upon receipt (Should be 0°C and ≤ 6°C)	0.6 °C			
5	Thermometer ID	T/38			
6	Temperature Blank Present?	**Yes**	No		
7	Were Ice or Ice Packs present	**Ice**	Ice Packs	No	
8	Did all bottles arrive in good condition (unbroken, etc....)?	**Yes**	No	N/A	
9	Type of packing material present	Netting	Vial Holder	Bubble Wrap	
		Paper	Styrofoam	Other	**N/A**
10	Were all bottle labels complete (sample ID, preservation, etc....)?	**Yes**	No	N/A	
11	Did all bottle labels and tags agree with custody papers?	**Yes**	No	N/A	
12	Were the correct bottles used for the tests indicated?	**Yes**	No	N/A	
13	Were ~~all of the~~ preserved bottles received with the appropriate preservative?	**Yes**	No	N/A	
	HNO3 pH<2 H2SO4 pH<2 ZnAc2/NaOH pH>9 NaOH pH>12 HCl pH<2 — Preservative additions noted below				
14	Were all samples received within analysis holding times?	**Yes**	No	N/A	
15	Were VOA vials free of air bubbles greater than 6mm? If present, note below	Yes	No	**N/A**	
16	Where did the bottles originate?	**ALS**	Client		

Sample ID	Reagent	Lot #	ml added	Initials Date/Time

Additional comments and/or explanation of all discrepancies noted above:

Client approval to run samples if discrepancies noted: VI.C-269   Date:

ALS Environmental

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

9143 Philips Highway, Ste 200 • Jacksonville, FL 32256 (904) 739-2277 • 800-695-7222 x06 • FAX (904) 739-2011 PAGE 1 OF 1

SR# J1804531
CAS Contract

Project Name: Sandy Creek Groundwater
Project Number: 16215106.00 T131
Project Manager: Jim Lawrence
Email Address: JLawrence@scsengineers.com
Company/Address: SCS Engineers, 1901 Central Dr. Ste 550, Bedford TX 76021
Phone #: 817-358-6106
FAX #:
Sampler's Signature: [signature]
Sampler's Printed Name: Doug Steen

ANALYSIS REQUESTED (Include Method Number and Container Preservative)

J1804531 5
SCS Engineers
Sandy Creek Groundwater

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other ______

CLIENT SAMPLE ID	LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	9040C/pH	SM2540C/TDS	9056/Chloride	9056/Fluoride	9056/SO4	6010D Metals (B, Ca)	REMARKS/ ALTERNATE DESCRIPTION
BW-1		6/21/18	11:40	H_2O	2	X	X	X	X	X	X	
MW-1		↓	12:05	↓	2	X	X	X	X	X	X	
MW-2		↓	12:20	↓	2	X	X	X	X	X	X	
MW-3		↓	12:45	↓	2	X	X	X	X	X	X	
DUP		↓	—	↓	2	X	X	X	X	X	X	

SPECIAL INSTRUCTIONS/COMMENTS

6010D Metals- Boron + Calcium only

See QAPP ☐

TURNAROUND REQUIREMENTS
____ RUSH (SURCHARGES APPLY)
X STANDARD
REQUESTED FAX DATE ______
REQUESTED REPORT DATE ______

REPORT REQUIREMENTS
____ I. Results Only
____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
____ III. Results + QC and Calibration Summaries
____ IV. Data Validation Report with Raw Data
____ V. Specialized Forms / Custom Report
Edata ____ Yes ____ No

INVOICE INFORMATION
PO #
BILL TO:

SAMPLE RECEIPT: CONDITION/COOLER TEMP: 0.6°C CUSTODY SEALS: Y N

	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature	[signature]	[signature]				
Printed Name	Doug Steen	Shannon Stalncker				
Firm	SCS	ALS				
Date/Time	6/21/18 15:15	6/22/18 0915				

Distribution: White - Return to Originator; Yellow - Retained by Client

Miscellaneous Forms

ALS Environmental—Jacksonville Laboratory
9143 Philips Highway, Suite 200, Jacksonville, FL 32256
Phone (904) 739-2277 Fax (904) 739-2011
www.alsglobal.com

REPORT QUALIFIERS AND DEFINITIONS

INORGANIC DATA

* The result is an outlier. See case narrative.
\# The control limit criteria are not applicable. See case narrative.
B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
E The result is an estimated amount because the value exceeded the instrument calibration range.
J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
Z Too many colonies were present (TNTC). The numeric value represents the filtration volume.
i The MRL/MDL has been elevated due to matrix interference.
X See case narrative.

METALS DATA

* The result is an outlier. See case narrative.
\# The control limit criteria are not applicable. See case narrative.
J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
E The reported value is estimated because of the presence of matrix interference.
M The duplicate injection precision was not met.
N The Matrix Spike sample recovery is not within control limits. See case narrative.
S The result was determined by Method of Standard Additions (MSA).
U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i The MRL/MDL has been elevated due to matrix interference.
X See case narrative.
\+ The correlation coefficient for the MSA is less than 0.995.

ORGANIC DATA

* The result is an outlier. See case narrative.
\# The control limit criteria are not applicable. See case narrative.
A The tentatively identified compound is a suspected aldol-condensation product.
B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D The reported result is from a dilution.
E The result is an estimated amount because the value exceeded the instrument calibration range.
J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P The GC or HPLC confirmation criteria were exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides)
U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i The MRL/MDL has been elevated due to a chromatographic interference.
X See case narrative.

PETROLEUM HYDROCARBON SPECIFIC

F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.

Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.

Z The chromatographic fingerprint does not resemble a petroleum product.

Jacksonville Lab ID # for State Certifications[1]

Agency	Number	Expiration Date
Department of Defense	66206	6/30/2020
Florida Department of Health	E82502	6/30/2019
Georgia Department of Natural Resources	958	6/30/2019
Kentucky Division of Waste Management	123042	6/30/2019
Louisiana Department of Environmental Quality	02086	6/30/2019
Maine Department of Health and Human Services	2017003	2/3/2019
North Carolina Department of Environment and Natural Resources	527	12/31/2018
Pennsylvania Department of Environmental Protection	68-04835	8/31/2018
South Carolina Department of Health and Environmental Control	96021001	6/30/2018
Texas Commission on Environmental Quality	T104704197-18-10	5/31/2019
Virginia Environmental Accreditation Program	460191	12/14/2018

[1] Analyses were performed according to our laboratory's NELAP-approved quality assurance program and any applicable state or agency requirements. The test results meet requirements of the current NELAP/TNI standards or state or agency requirements, where applicable, except as noted in the laboratory case narrative provided. For a specific list of accredited analytes, refer to http://www.alsglobal.com/en/Our-Services/Life-Sciences/Environmental/Downloads/North-America-Downloads

ACRONYMS

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Analyst Summary report

Client:	SCS Engineers	**Service Request:**	J1804531
Project:	Sandy Creek Groundwater/16215106.00 T131		

Sample Name:	BW-1	**Date Collected:**	06/21/18
Lab Code:	J1804531-001	**Date Received:**	06/22/18
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
6010D	EGARDNER	EGARDNER
9040C		HHERNANDEZ
9056		HHERNANDEZ
SM 2540 C		ALANE

Sample Name:	MW-1	**Date Collected:**	06/21/18
Lab Code:	J1804531-002	**Date Received:**	06/22/18
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
6010D	EGARDNER	EGARDNER
9040C		HHERNANDEZ
9056		HHERNANDEZ
SM 2540 C		ALANE

Sample Name:	MW-2	**Date Collected:**	06/21/18
Lab Code:	J1804531-003	**Date Received:**	06/22/18
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
6010D	EGARDNER	EGARDNER
9040C		HHERNANDEZ
9056		HHERNANDEZ
SM 2540 C		ALANE

Sample Name:	MW-3	**Date Collected:**	06/21/18
Lab Code:	J1804531-004	**Date Received:**	06/22/18
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
6010D	EGARDNER	EGARDNER

Analyst Summary report

Client:	SCS Engineers	**Service Request:**	J1804531
Project:	Sandy Creek Groundwater/16215106.00 T131		

Sample Name:	MW-3	**Date Collected:**	06/21/18
Lab Code:	J1804531-004	**Date Received:**	06/22/18
Sample Matrix:	Water		

Analysis Method	**Extracted/Digested By**	**Analyzed By**
9040C		HHERNANDEZ
9056		HHERNANDEZ
SM 2540 C		ALANE

Sample Name:	DUP	**Date Collected:**	06/21/18
Lab Code:	J1804531-005	**Date Received:**	06/22/18
Sample Matrix:	Water		

Analysis Method	**Extracted/Digested By**	**Analyzed By**
6010D	EGARDNER	EGARDNER
9040C		HHERNANDEZ
9056		HHERNANDEZ
SM 2540 C		ALANE

Sample Results

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Metals

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Analytical Report

Client:	SCS Engineers	**Service Request:**	J1804531
Project:	Sandy Creek Groundwater/16215106.00 T131	**Date Collected:**	06/21/18 11:40
Sample Matrix:	Water	**Date Received:**	06/22/18 09:15
Sample Name:	BW-1	**Basis:**	NA
Lab Code:	J1804531-001		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	PQL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Boron, Total	6010D	**3.31**	mg/L	0.050	0.025	1	06/22/18 23:06	06/22/18	
Calcium, Total	6010D	**610**	mg/L	0.20	0.08	2	06/25/18 18:09	06/22/18	

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Analytical Report

Client:	SCS Engineers	**Service Request:**	J1804531
Project:	Sandy Creek Groundwater/16215106.00 T131	**Date Collected:**	06/21/18 12:05
Sample Matrix:	Water	**Date Received:**	06/22/18 09:15
Sample Name:	MW-1	**Basis:**	NA
Lab Code:	J1804531-002		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	PQL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Boron, Total	6010D	**1.25**	mg/L	0.050	0.025	1	06/22/18 23:17	06/22/18	
Calcium, Total	6010D	**587**	mg/L	0.20	0.08	2	06/25/18 18:14	06/22/18	

Analytical Report

Client:	SCS Engineers	**Service Request:**	J1804531
Project:	Sandy Creek Groundwater/16215106.00 T131	**Date Collected:**	06/21/18 12:20
Sample Matrix:	Water	**Date Received:**	06/22/18 09:15
Sample Name:	MW-2	**Basis:**	NA
Lab Code:	J1804531-003		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	PQL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Boron, Total	6010D	**1.90**	mg/L	0.050	0.025	1	06/22/18 23:28	06/22/18	
Calcium, Total	6010D	**706**	mg/L	0.20	0.08	2	06/25/18 18:19	06/22/18	

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Analytical Report

Client:	SCS Engineers	**Service Request:**	J1804531
Project:	Sandy Creek Groundwater/16215106.00 T131	**Date Collected:**	06/21/18 12:45
Sample Matrix:	Water	**Date Received:**	06/22/18 09:15
Sample Name:	MW-3	**Basis:**	NA
Lab Code:	J1804531-004		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	PQL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Boron, Total	6010D	**1.13**	mg/L	0.050	0.025	1	06/22/18 23:39	06/22/18	
Calcium, Total	6010D	**526**	mg/L	0.20	0.08	2	06/25/18 18:24	06/22/18	

Client: SCS Engineers
Project: Sandy Creek Groundwater/16215106.00 T131
Sample Matrix: Water
Service Request: J1804531
Date Collected: 06/21/18 00:00
Date Received: 06/22/18 09:15

Sample Name: DUP
Lab Code: J1804531-005
Basis: NA

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	PQL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Boron, Total	6010D	**3.30**	mg/L	0.050	0.025	1	06/23/18 00:05	06/22/18	
Calcium, Total	6010D	**609**	mg/L	0.20	0.08	2	06/25/18 18:29	06/22/18	

General Chemistry

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Client:	SCS Engineers	**Service Request:**	J1804531
Project:	Sandy Creek Groundwater/16215106.00 T131	**Date Collected:**	06/21/18 11:40
Sample Matrix:	Water	**Date Received:**	06/22/18 09:15
Sample Name:	BW-1	**Basis:**	NA
Lab Code:	J1804531-001		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	PQL	MDL	Dil.	Date Analyzed	Q
Chloride	9056	**1200**	mg/L	20	3	20	06/22/18 13:38	
Fluoride	9056	0.3 U	mg/L	2.0	0.3	20	06/22/18 13:38	
pH	9040C	**7.22**	pH Units	-	-	1	06/22/18 15:10	H
Solids, Total Dissolved	SM 2540 C	**6640**	mg/L	100	100	10	06/25/18 17:18	
Sulfate	9056	**3030**	mg/L	20	2	20	06/22/18 13:38	

Client:	SCS Engineers	**Service Request:**	J1804531
Project:	Sandy Creek Groundwater/16215106.00 T131	**Date Collected:**	06/21/18 12:05
Sample Matrix:	Water	**Date Received:**	06/22/18 09:15
Sample Name:	MW-1	**Basis:**	NA
Lab Code:	J1804531-002		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	PQL	MDL	Dil.	Date Analyzed	Q
Chloride	9056	**247**	mg/L	10	2	10	06/22/18 14:44	
Fluoride	9056	**0.3 J**	mg/L	1.0	0.2	10	06/22/18 14:44	
pH	9040C	**7.38**	pH Units	-	-	1	06/22/18 15:12	H
Solids, Total Dissolved	SM 2540 C	**4270**	mg/L	40	40	4	06/25/18 17:18	
Sulfate	9056	**2530**	mg/L	10	0.9	10	06/22/18 14:44	

Analytical Report

Client:	SCS Engineers	**Service Request:**	J1804531
Project:	Sandy Creek Groundwater/16215106.00 T131	**Date Collected:**	06/21/18 12:20
Sample Matrix:	Water	**Date Received:**	06/22/18 09:15
Sample Name:	MW-2	**Basis:**	NA
Lab Code:	J1804531-003		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	PQL	MDL	Dil.	Date Analyzed	Q
Chloride	9056	**2840**	mg/L	50	6	50	06/22/18 15:06	
Fluoride	9056	0.6 U	mg/L	5.0	0.6	50	06/22/18 15:06	
pH	9040C	**7.09**	pH Units	-	-	1	06/22/18 15:14	H
Solids, Total Dissolved	SM 2540 C	**10200**	mg/L	200	200	20	06/25/18 17:18	
Sulfate	9056	**3400**	mg/L	50	5	50	06/22/18 15:06	

Client:	SCS Engineers	**Service Request:**	J1804531
Project:	Sandy Creek Groundwater/16215106.00 T131	**Date Collected:**	06/21/18 12:45
Sample Matrix:	Water	**Date Received:**	06/22/18 09:15
Sample Name:	MW-3	**Basis:**	NA
Lab Code:	J1804531-004		

General Chemistry Parameters

Analyte Name	Analysis Method	Result		Units	PQL	MDL	Dil.	Date Analyzed	Q
Chloride	9056	**396**		mg/L	20	3	20	06/22/18 15:28	
Fluoride	9056	0.3	U	mg/L	2.0	0.3	20	06/22/18 15:28	
pH	9040C	**6.76**		pH Units	-	-	1	06/22/18 15:15	H
Solids, Total Dissolved	SM 2540 C	**6090**		mg/L	100	100	10	06/25/18 17:18	
Sulfate	9056	**3160**		mg/L	20	2	20	06/22/18 15:28	

Client:	SCS Engineers	**Service Request:**	J1804531
Project:	Sandy Creek Groundwater/16215106.00 T131	**Date Collected:**	06/21/18 00:00
Sample Matrix:	Water	**Date Received:**	06/22/18 09:15
Sample Name:	DUP	**Basis:**	NA
Lab Code:	J1804531-005		

General Chemistry Parameters

Analyte Name	Analysis Method	Result		Units	PQL	MDL	Dil.	Date Analyzed	Q
Chloride	9056	**1210**		mg/L	20	3	20	06/22/18 17:39	
Fluoride	9056	0.3	U	mg/L	2.0	0.3	20	06/22/18 17:39	
pH	9040C	**7.30**		pH Units	-	-	1	06/22/18 15:20	H
Solids, Total Dissolved	SM 2540 C	**6690**		mg/L	100	100	10	06/25/18 17:18	
Sulfate	9056	**3040**		mg/L	20	2	20	06/22/18 17:39	

QC Summary Forms

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Metals

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Analytical Report

Client:	SCS Engineers	**Service Request:**	J1804531
Project:	Sandy Creek Groundwater/16215106.00 T131	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	J1804531-MB		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	PQL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Boron, Total	6010D	0.025 U	mg/L	0.050	0.025	1	06/22/18 20:41	06/22/18	
Calcium, Total	6010D	0.04 U	mg/L	0.10	0.04	1	06/22/18 20:40	06/22/18	

Client:	SCS Engineers	**Service Request:**	J1804531
Project:	Sandy Creek Groundwater/16215106.00 T131	**Date Analyzed:**	06/22/18
Sample Matrix:	Water	**Date Extracted:**	06/22/18

Lab Control Sample Summary
Inorganic Parameters

Analysis Method:	6010D	**Units:**	mg/L
Prep Method:	EPA 3005A	**Basis:**	NA
		Analysis Lot:	595951

Lab Control Sample
J1804531-LCS

Analyte Name	Result	Spike Amount	% Rec	% Rec Limits
Boron, Total	2.53	2.50	101	80-120
Calcium, Total	5.15	5.00	103	80-120

General Chemistry

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Client:	SCS Engineers	**Service Request:**	J1804531
Project:	Sandy Creek Groundwater/16215106.00 T131	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	J1804531-MB		

General Chemistry Parameters

Analyte Name	Analysis Method	Result		Units	PQL	MDL	Dil.	Date Analyzed	Q
Chloride	9056	0.2	U	mg/L	1.0	0.2	1	06/22/18 12:11	
Fluoride	9056	0.02	U	mg/L	0.10	0.02	1	06/22/18 12:11	
Solids, Total Dissolved	SM 2540 C	10	U	mg/L	10	10	1	06/25/18 17:18	
Sulfate	9056	0.09	U	mg/L	1.0	0.09	1	06/22/18 12:11	

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QA/QC Report

Client:	SCS Engineers	**Service Request:** J1804531
Project:	Sandy Creek Groundwater/16215106.00 T131	**Date Collected:** 06/21/18
Sample Matrix:	Water	**Date Received:** 06/22/18
		Date Analyzed: 6/22/18

Matrix Spike Summary
General Chemistry Parameters

Sample Name:	BW-1	**Units:** mg/L
Lab Code:	J1804531-001	**Basis:** NA

Matrix Spike
J1804531-001MS

Analyte Name	Method	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Chloride	9056	1200	2170	1000	97	90-110
Fluoride	9056	0.3 U	105	100	105	90-110
Sulfate	9056	3030	3890	1000	86 *	90-110

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	SCS Engineers	**Service Request:**	J1804531
Project	Sandy Creek Groundwater/16215106.00 T131	**Date Collected:**	06/21/18
Sample Matrix:	Water	**Date Received:**	06/22/18
		Date Analyzed:	06/22/18 - 06/25/18

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	BW-1	**Units:**	mg/L
Lab Code:	J1804531-001	**Basis:**	NA

Analyte Name	Analysis Method	PQL	MDL	Sample Result	Duplicate Sample J1804531-001DUP Result	Average	RPD	RPD Limit
Chloride	9056	20	3	1200	1200	1200	<1	20
Fluoride	9056	2.0	0.3	0.3 U	0.3 U	NC	NC	20
Solids, Total Dissolved	SM 2540 C	100	100	6640	6700	6670	<1	10
Sulfate	9056	20	2	3030	3000	3020	1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	SCS Engineers	**Service Request:**	J1804531
Project:	Sandy Creek Groundwater/16215106.00 T131	**Date Analyzed:**	06/22/18 - 06/25/18
Sample Matrix:	Water		

Lab Control Sample Summary
General Chemistry Parameters

Units: mg/L
Basis: NA

Lab Control Sample
J1804531-LCS

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Chloride	9056	50.7	50.0	101	90-110
Fluoride	9056	5.24	5.00	105	90-110
Solids, Total Dissolved	SM 2540 C	275	300	92	85-115
Sulfate	9056	51.4	50.0	103	90-110

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January 04, 2019

Jim Lawrence
SCS Engineers
1901 Central Drive
Suite 550
Bedford, TX 76021

Work Order: **HS18120889**

Laboratory Results for: **Sandy Creek Groundwater 16215106**

Dear Jim,

ALS Environmental received 5 sample(s) on Dec 14, 2018 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: DAYNA.FISHER

Dane J. Wacasey

Client: SCS Engineers
Project: Sandy Creek Groundwater 16215106
Work Order: HS18120889

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18120889-01	BW-1	Groundwater		13-Dec-2018 11:45	14-Dec-2018 10:00	☐
HS18120889-02	MW-1	Groundwater		13-Dec-2018 11:55	14-Dec-2018 10:00	☐
HS18120889-03	MW-2	Groundwater		13-Dec-2018 12:05	14-Dec-2018 10:00	☐
HS18120889-04	MW-3	Groundwater		13-Dec-2018 12:20	14-Dec-2018 10:00	☐
HS18120889-05	DUP	Groundwater		13-Dec-2018 00:00	14-Dec-2018 10:00	☐

Client: SCS Engineers
Project: Sandy Creek Groundwater 16215106
Work Order: HS18120889

CASE NARRATIVE

Work Order Comments

- Sample received outside method holding time for pH. pH is an immediate test. Sample results are flagged with an "H" qualifier.

  The temperature at the time of pH is reported. Please note that all pH results are already normalized to a temperature of 25 °C.

Metals by Method SW6020

Batch ID: 135989

Sample ID: HS18120868-06MS

- MS is for an unrelated sample

WetChemistry by Method SW9056

Batch ID: R330328

Sample ID: CCB

- All reported samples bracketed by this CCB are 10 times greater than the Sulfate content in the associated CCBs.

Sample ID: HS18121459-04MS

- MS and MSD are for an unrelated sample (Chloride,Sulfate)

Batch ID: R330228

Sample ID: MW-3 (HS18120889-04MSD)

- The MS and/or MSD recovery was outside of the control limits; however, the result in the parent sample is greater than 4x the spike amount. (Sulfate)

WetChemistry by Method SW9040

Batch ID: R329934

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M2540C

Batch ID: R329753

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Client:	SCS Engineers		**ANALYTICAL REPORT**
Project:	Sandy Creek Groundwater 16215106		WorkOrder:HS18120889
Sample ID:	BW-1		Lab ID:HS18120889-01
Collection Date:	13-Dec-2018 11:45		Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ICP-MS METALS BY SW6020A		**Method:SW6020**			Prep:SW3010A / 24-Dec-2018		Analyst: JHD
Boron	**3,250**		**220**	**400**	**ug/L**	20	03-Jan-2019 13:46
Calcium	**637,000**		**680**	**10000**	**ug/L**	20	03-Jan-2019 13:46
TOTAL DISSOLVED SOLIDS BY SM2540C		**Method:M2540C**					Analyst: KAH
Total Dissolved Solids (Residue, Filterable)	**6,400**		**5.00**	**10.0**	**mg/L**	1	20-Dec-2018 17:20
PH BY SW9040C		**Method:SW9040**					Analyst: MZD
pH	**7.10**	H	**0.100**	**0.100**	**pH Units**	1	26-Dec-2018 11:50
Temp Deg C @pH	**21.0**	H	**0**	**0**	**DEG C**	1	26-Dec-2018 11:50
ANIONS BY SW9056A		**Method:SW9056**					Analyst: KMU
Chloride	**1,120**		**20.0**	**50.0**	**mg/L**	100	28-Dec-2018 23:57
Fluoride	**0.586**		**0.250**	**0.500**	**mg/L**	5	31-Dec-2018 15:00
Sulfate	**2,780**		**20.0**	**50.0**	**mg/L**	100	28-Dec-2018 23:57

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client:	SCS Engineers		**ANALYTICAL REPORT**
Project:	Sandy Creek Groundwater 16215106		WorkOrder:HS18120889
Sample ID:	MW-1		Lab ID:HS18120889-02
Collection Date:	13-Dec-2018 11:55		Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ICP-MS METALS BY SW6020A		**Method:SW6020**			Prep:SW3010A / 24-Dec-2018		Analyst: JHD
Boron	**1,350**		**220**	**400**	**ug/L**	20	03-Jan-2019 13:49
Calcium	**515,000**		**680**	**10000**	**ug/L**	20	03-Jan-2019 13:49
TOTAL DISSOLVED SOLIDS BY SM2540C		**Method:M2540C**					Analyst: KAH
Total Dissolved Solids (Residue, Filterable)	**4,100**		**5.00**	**10.0**	**mg/L**	1	20-Dec-2018 17:20
PH BY SW9040C		**Method:SW9040**					Analyst: MZD
pH	**7.52**	H	**0.100**	**0.100**	**pH Units**	1	26-Dec-2018 11:50
Temp Deg C @pH	**21.6**	H	**0**	**0**	**DEG C**	1	26-Dec-2018 11:50
ANIONS BY SW9056A		**Method:SW9056**					Analyst: KMU
Chloride	**241**		**2.00**	**5.00**	**mg/L**	10	29-Dec-2018 01:53
Fluoride	**0.585**		**0.250**	**0.500**	**mg/L**	5	31-Dec-2018 15:22
Sulfate	**2,570**		**20.0**	**50.0**	**mg/L**	100	31-Dec-2018 12:59

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client:	SCS Engineers	**ANALYTICAL REPORT**
Project:	Sandy Creek Groundwater 16215106	WorkOrder:HS18120889
Sample ID:	MW-2	Lab ID:HS18120889-03
Collection Date:	13-Dec-2018 12:05	Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ICP-MS METALS BY SW6020A		**Method:SW6020**			Prep:SW3010A / 24-Dec-2018		Analyst: JHD
Boron	**2,580**		**550**	**1000**	**ug/L**	50	03-Jan-2019 13:51
Calcium	**690,000**		**1700**	**25000**	**ug/L**	50	03-Jan-2019 13:51
TOTAL DISSOLVED SOLIDS BY SM2540C		**Method:M2540C**					Analyst: KAH
Total Dissolved Solids (Residue, Filterable)	**10,500**		**5.00**	**10.0**	**mg/L**	1	20-Dec-2018 17:20
PH BY SW9040C		**Method:SW9040**					Analyst: MZD
pH	**6.71**	H	**0.100**	**0.100**	**pH Units**	1	26-Dec-2018 11:50
Temp Deg C @pH	**21.8**	H	**0**	**0**	**DEG C**	1	26-Dec-2018 11:50
ANIONS BY SW9056A		**Method:SW9056**					Analyst: KMU
Chloride	**2,740**		**20.0**	**50.0**	**mg/L**	100	29-Dec-2018 00:26
Fluoride	**0.618**		**0.250**	**0.500**	**mg/L**	5	31-Dec-2018 15:43
Sulfate	**3,220**		**20.0**	**50.0**	**mg/L**	100	29-Dec-2018 00:26

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client:	SCS Engineers		**ANALYTICAL REPORT**
Project:	Sandy Creek Groundwater 16215106		WorkOrder:HS18120889
Sample ID:	MW-3		Lab ID:HS18120889-04
Collection Date:	13-Dec-2018 12:20		Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ICP-MS METALS BY SW6020A		**Method:SW6020**			Prep:SW3010A / 24-Dec-2018		Analyst: JHD
Boron	**1,080**		**110**	**200**	**ug/L**	10	03-Jan-2019 16:10
Calcium	**327,000**		**1700**	**25000**	**ug/L**	50	03-Jan-2019 13:53
TOTAL DISSOLVED SOLIDS BY SM2540C		**Method:M2540C**					Analyst: KAH
Total Dissolved Solids (Residue, Filterable)	**3,520**		**5.00**	**10.0**	**mg/L**	1	20-Dec-2018 17:20
PH BY SW9040C		**Method:SW9040**					Analyst: MZD
pH	**6.61**	H	**0.100**	**0.100**	**pH Units**	1	26-Dec-2018 11:50
Temp Deg C @pH	**21.7**	H	**0**	**0**	**DEG C**	1	26-Dec-2018 11:50
ANIONS BY SW9056A		**Method:SW9056**					Analyst: KMU
Chloride	**206**		**2.00**	**5.00**	**mg/L**	10	29-Dec-2018 00:41
Fluoride	**0.662**		**0.250**	**0.500**	**mg/L**	5	31-Dec-2018 19:41
Sulfate	**1,790**		**20.0**	**50.0**	**mg/L**	100	31-Dec-2018 13:20

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client:	SCS Engineers		**ANALYTICAL REPORT**
Project:	Sandy Creek Groundwater 16215106		WorkOrder:HS18120889
Sample ID:	DUP		Lab ID:HS18120889-05
Collection Date:	13-Dec-2018 00:00		Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ICP-MS METALS BY SW6020A		**Method:SW6020**			Prep:SW3010A / 24-Dec-2018		Analyst: JHD
Boron	**3,730**		**550**	**1000**	**ug/L**	50	03-Jan-2019 14:55
Calcium	**614,000**		**1700**	**25000**	**ug/L**	50	03-Jan-2019 14:55
TOTAL DISSOLVED SOLIDS BY SM2540C		**Method:M2540C**					Analyst: KAH
Total Dissolved Solids (Residue, Filterable)	**6,300**		**5.00**	**10.0**	**mg/L**	1	20-Dec-2018 17:20
PH BY SW9040C		**Method:SW9040**					Analyst: MZD
pH	**6.93**	H	**0.100**	**0.100**	**pH Units**	1	26-Dec-2018 11:50
Temp Deg C @pH	**21.5**	H	**0**	**0**	**DEG C**	1	26-Dec-2018 11:50
ANIONS BY SW9056A		**Method:SW9056**					Analyst: KMU
Chloride	**1,160**		**20.0**	**50.0**	**mg/L**	100	29-Dec-2018 02:22
Fluoride	**0.589**		**0.250**	**0.500**	**mg/L**	5	31-Dec-2018 20:02
Sulfate	**2,930**		**20.0**	**50.0**	**mg/L**	100	29-Dec-2018 02:22

Note: See Qualifiers Page for a list of qualifiers and their explanation.

WEIGHT LOG

Client: SCS Engineers
Project: Sandy Creek Groundwater 16215106
WorkOrder: HS18120889

Batch ID: 135989 **Method:** ICP-MS METALS BY SW6020A **Prep:** 3010A

SampID	Container	Sample Wt/Vol	Final Volume	Prep Factor
HS18120889-01	1	10	10 (mL)	1
HS18120889-02	1	10	10 (mL)	1
HS18120889-03	1	10	10 (mL)	1
HS18120889-04	1	10	10 (mL)	1
HS18120889-05	1	10	10 (mL)	1

Client: SCS Engineers
Project: Sandy Creek Groundwater 16215106
WorkOrder: HS18120889

DATES REPORT

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
Batch ID 135989	**Test Name :** ICP-MS METALS BY SW6020A			**Matrix:** Groundwater		
HS18120889-01	BW-1	13 Dec 2018 11:45		24 Dec 2018 13:00	03 Jan 2019 13:46	20
HS18120889-02	MW-1	13 Dec 2018 11:55		24 Dec 2018 13:00	03 Jan 2019 13:49	20
HS18120889-03	MW-2	13 Dec 2018 12:05		24 Dec 2018 13:00	03 Jan 2019 13:51	50
HS18120889-04	MW-3	13 Dec 2018 12:20		24 Dec 2018 13:00	03 Jan 2019 16:10	10
HS18120889-04	MW-3	13 Dec 2018 12:20		24 Dec 2018 13:00	03 Jan 2019 13:53	50
HS18120889-05	DUP	13 Dec 2018 00:00		24 Dec 2018 13:00	03 Jan 2019 14:55	50
Batch ID R329753	**Test Name :** TOTAL DISSOLVED SOLIDS BY SM2540C			**Matrix:** Groundwater		
HS18120889-01	BW-1	13 Dec 2018 11:45			20 Dec 2018 17:20	1
HS18120889-02	MW-1	13 Dec 2018 11:55			20 Dec 2018 17:20	1
HS18120889-03	MW-2	13 Dec 2018 12:05			20 Dec 2018 17:20	1
HS18120889-04	MW-3	13 Dec 2018 12:20			20 Dec 2018 17:20	1
HS18120889-05	DUP	13 Dec 2018 00:00			20 Dec 2018 17:20	1
Batch ID R329934	**Test Name :** PH BY SW9040C			**Matrix:** Groundwater		
HS18120889-01	BW-1	13 Dec 2018 11:45			26 Dec 2018 11:50	1
HS18120889-02	MW-1	13 Dec 2018 11:55			26 Dec 2018 11:50	1
HS18120889-03	MW-2	13 Dec 2018 12:05			26 Dec 2018 11:50	1
HS18120889-04	MW-3	13 Dec 2018 12:20			26 Dec 2018 11:50	1
HS18120889-05	DUP	13 Dec 2018 00:00			26 Dec 2018 11:50	1
Batch ID R330228	**Test Name :** ANIONS BY SW9056A			**Matrix:** Groundwater		
HS18120889-01	BW-1	13 Dec 2018 11:45			28 Dec 2018 23:57	100
HS18120889-02	MW-1	13 Dec 2018 11:55			29 Dec 2018 01:53	10
HS18120889-03	MW-2	13 Dec 2018 12:05			29 Dec 2018 00:26	100
HS18120889-04	MW-3	13 Dec 2018 12:20			29 Dec 2018 00:41	10
HS18120889-05	DUP	13 Dec 2018 00:00			29 Dec 2018 02:22	100
Batch ID R330328	**Test Name :** ANIONS BY SW9056A			**Matrix:** Groundwater		
HS18120889-01	BW-1	13 Dec 2018 11:45			31 Dec 2018 15:00	5
HS18120889-02	MW-1	13 Dec 2018 11:55			31 Dec 2018 15:22	5
HS18120889-02	MW-1	13 Dec 2018 11:55			31 Dec 2018 12:59	100
HS18120889-03	MW-2	13 Dec 2018 12:05			31 Dec 2018 15:43	5
HS18120889-04	MW-3	13 Dec 2018 12:20			31 Dec 2018 19:41	5
HS18120889-04	MW-3	13 Dec 2018 12:20			31 Dec 2018 13:20	100
HS18120889-05	DUP	13 Dec 2018 00:00			31 Dec 2018 20:02	5

Client: SCS Engineers
Project: Sandy Creek Groundwater 16215106
WorkOrder: HS18120889

QC BATCH REPORT

Batch ID: 135989 **Instrument: ICPMS04** **Method: SW6020**

MBLK Sample ID: **MBLK-135989** Units: **mg/L** Analysis Date: **03-Jan-2019 12:50**
Client ID: Run ID: **ICPMS04_330403** SeqNo: **4892971** PrepDate: **24-Dec-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Boron	< 0.0110	0.0200								

MBLK Sample ID: **MBLK-135989** Units: **mg/L** Analysis Date: **02-Jan-2019 15:57**
Client ID: Run ID: **ICPMS04_330335** SeqNo: **4891329** PrepDate: **24-Dec-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Calcium	< 0.0340	0.500								

LCS Sample ID: **LCS-135989** Units: **mg/L** Analysis Date: **03-Jan-2019 12:52**
Client ID: Run ID: **ICPMS04_330403** SeqNo: **4892972** PrepDate: **24-Dec-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Boron	0.5688	0.0200	0.5	0	114	80 - 120				

LCS Sample ID: **LCS-135989** Units: **mg/L** Analysis Date: **02-Jan-2019 15:59**
Client ID: Run ID: **ICPMS04_330335** SeqNo: **4891330** PrepDate: **24-Dec-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Calcium	5.079	0.500	5	0	102	80 - 120				

MS Sample ID: **HS18120868-06MS** Units: **mg/L** Analysis Date: **03-Jan-2019 12:59**
Client ID: Run ID: **ICPMS04_330403** SeqNo: **4892976** PrepDate: **24-Dec-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Boron	1.007	0.0200	0.5	0.4898	103	80 - 120				

MS Sample ID: **HS18120868-06MS** Units: **mg/L** Analysis Date: **02-Jan-2019 16:06**
Client ID: Run ID: **ICPMS04_330335** SeqNo: **4891333** PrepDate: **24-Dec-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Calcium	116.5	0.500	5	108.1	169	80 - 120				SO

Client: SCS Engineers
Project: Sandy Creek Groundwater 16215106
WorkOrder: HS18120889

QC BATCH REPORT

Batch ID: 135989 **Instrument:** ICPMS04 **Method:** SW6020

MSD Sample ID: **HS18120868-06MSD** Units: **mg/L** Analysis Date: **03-Jan-2019 13:01**
Client ID: Run ID: **ICPMS04_330403** SeqNo: **4892977** PrepDate: **24-Dec-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Boron	1.013	0.0200	0.5	0.4898	105	80 - 120	1.007	0.622	20	

MSD Sample ID: **HS18120868-06MSD** Units: **mg/L** Analysis Date: **02-Jan-2019 16:08**
Client ID: Run ID: **ICPMS04_330335** SeqNo: **4891334** PrepDate: **24-Dec-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Calcium	112.6	0.500	5	108.1	89.3	80 - 120	116.5	3.48	20	O

PDS Sample ID: **HS18120868-06PDS** Units: **mg/L** Analysis Date: **03-Jan-2019 13:03**
Client ID: Run ID: **ICPMS04_330403** SeqNo: **4892978** PrepDate: **24-Dec-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Boron	1.481	0.0200	1	0.4898	99.1	75 - 125				

PDS Sample ID: **HS18120868-06PDS** Units: **mg/L** Analysis Date: **02-Jan-2019 16:11**
Client ID: Run ID: **ICPMS04_330335** SeqNo: **4891335** PrepDate: **24-Dec-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Calcium	115.9	0.500	10	108.1	78.5	75 - 125				O

SD Sample ID: **HS18120868-06SD** Units: **mg/L** Analysis Date: **02-Jan-2019 16:04**
Client ID: Run ID: **ICPMS04_330335** SeqNo: **4891332** PrepDate: **24-Dec-2018** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Calcium	109.7	2.50					108.1	1.46	10	

The following samples were analyzed in this batch:

HS18120889-01	HS18120889-02	HS18120889-03	HS18120889-04
HS18120889-05			

Client: SCS Engineers
Project: Sandy Creek Groundwater 16215106
WorkOrder: HS18120889

QC BATCH REPORT

Batch ID: R329753 **Instrument:** Balance1 **Method:** M2540C

MBLK Sample ID: **WBLK-122018** Units: **mg/L** Analysis Date: **20-Dec-2018 17:20**
Client ID: Run ID: **Balance1_329753** SeqNo: **4877884** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	< 5.00	10.0								

LCS Sample ID: **WLCS-122018** Units: **mg/L** Analysis Date: **20-Dec-2018 17:20**
Client ID: Run ID: **Balance1_329753** SeqNo: **4877885** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	1026	10.0	1000	0	103	85 - 115				

DUP Sample ID: **HS18120988-01DUP** Units: **mg/L** Analysis Date: **20-Dec-2018 17:20**
Client ID: Run ID: **Balance1_329753** SeqNo: **4877883** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	< 5.00	10.0					2	0	5	

DUP Sample ID: **HS18120768-01DUP** Units: **mg/L** Analysis Date: **20-Dec-2018 17:20**
Client ID: Run ID: **Balance1_329753** SeqNo: **4877863** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	1132	10.0					1174	3.64	5	

The following samples were analyzed in this batch: HS18120889-01 HS18120889-02 HS18120889-03 HS18120889-04 HS18120889-05

Client: SCS Engineers
Project: Sandy Creek Groundwater 16215106
WorkOrder: HS18120889

QC BATCH REPORT

Batch ID: **R329934** **Instrument:** **WetChem_HS** **Method:** **SW9040**

DUP Sample ID: **HS18120889-05DUP** Units: **pH Units** Analysis Date: **26-Dec-2018 11:50**

Client ID: **DUP** Run ID: **WetChem_HS_329934** SeqNo: **4882100** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH	6.99	0.100					6.93	0.862	10	
Temp Deg C @pH	21.6	0					21.5	0.464	10	

The following samples were analyzed in this batch:

HS18120889-01	HS18120889-02	HS18120889-03	HS18120889-04
HS18120889-05			

Client: SCS Engineers
Project: Sandy Creek Groundwater 16215106
WorkOrder: HS18120889

QC BATCH REPORT

Batch ID: R330228 **Instrument:** ICS2100 **Method:** SW9056

MBLK Sample ID: **WBLKW1-122818** Units: **mg/L** Analysis Date: **28-Dec-2018 17:04**
Client ID: Run ID: **ICS2100_330228** SeqNo: **4888425** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	< 0.200	0.500								
Sulfate	< 0.200	0.500								

LCS Sample ID: **WLCSW1-122818** Units: **mg/L** Analysis Date: **28-Dec-2018 17:19**
Client ID: Run ID: **ICS2100_330228** SeqNo: **4888426** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	20.32	0.500	20	0	102	80 - 120				
Sulfate	20.21	0.500	20	0	101	80 - 120				

LCSD Sample ID: **WLCSDW1-122818** Units: **mg/L** Analysis Date: **28-Dec-2018 17:33**
Client ID: Run ID: **ICS2100_330228** SeqNo: **4888427** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	19.82	0.500	20	0	99.1	80 - 120	20.32	2.49	20	
Sulfate	19.79	0.500	20	0	99.0	80 - 120	20.21	2.09	20	

MS Sample ID: **HS18120889-04MS** Units: **mg/L** Analysis Date: **29-Dec-2018 00:55**
Client ID: **MW-3** Run ID: **ICS2100_330228** SeqNo: **4888437** PrepDate: DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	310	5.00	100	206.2	104	80 - 120				
Sulfate	1753	5.00	100	1638	116	80 - 120				EO

MSD Sample ID: **HS18120889-04MSD** Units: **mg/L** Analysis Date: **29-Dec-2018 01:10**
Client ID: **MW-3** Run ID: **ICS2100_330228** SeqNo: **4888438** PrepDate: DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	295.9	5.00	100	206.2	89.7	80 - 120	310	4.67	20	
Sulfate	1663	5.00	100	1638	25.4	80 - 120	1753	5.29	20	SEO

The following samples were analyzed in this batch:

HS18120889-01	HS18120889-02	HS18120889-03	HS18120889-04
HS18120889-05			

Client: SCS Engineers
Project: Sandy Creek Groundwater 16215106
WorkOrder: HS18120889

QC BATCH REPORT

Batch ID: R330328 **Instrument:** ICS3K2 **Method:** SW9056

MBLK Sample ID: **WBLKW1-123118** Units: **mg/L** Analysis Date: **31-Dec-2018 18:36**
Client ID: Run ID: **ICS3K2_330328** SeqNo: **4890588** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	< 0.0500	0.100								
Sulfate	< 0.200	0.500								

LCS Sample ID: **WLCSW1-123118** Units: **mg/L** Analysis Date: **31-Dec-2018 18:58**
Client ID: Run ID: **ICS3K2_330328** SeqNo: **4890589** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	4.102	0.100	4	0	103	80 - 120				
Sulfate	19.27	0.500	20	0	96.3	80 - 120				

LCSD Sample ID: **WLCSDW1-123118** Units: **mg/L** Analysis Date: **31-Dec-2018 19:19**
Client ID: Run ID: **ICS3K2_330328** SeqNo: **4890590** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	4.064	0.100	4	0	102	80 - 120	4.102	0.931	20	
Sulfate	19.36	0.500	20	0	96.8	80 - 120	19.27	0.482	20	

MS Sample ID: **HS18121459-04MS** Units: **mg/L** Analysis Date: **01-Jan-2019 10:04**
Client ID: Run ID: **ICS3K2_330328** SeqNo: **4890631** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	2.52	0.100	2	0.464	103	80 - 120				
Sulfate	223	0.500	10	216.3	66.2	80 - 120				SEO

MS Sample ID: **HS18121454-06MS** Units: **mg/L** Analysis Date: **01-Jan-2019 03:35**
Client ID: Run ID: **ICS3K2_330328** SeqNo: **4890613** PrepDate: DF: **500**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	983.5	50.0	1000	0	98.4	80 - 120				
Sulfate	9634	250	5000	4636	100.0	80 - 120				

Client: SCS Engineers
Project: Sandy Creek Groundwater 16215106
WorkOrder: HS18120889

QC BATCH REPORT

Batch ID: R330328 **Instrument:** ICS3K2 **Method:** SW9056

MSD Sample ID: **HS18121459-04MSD** Units: **mg/L** Analysis Date: **01-Jan-2019 10:25**
Client ID: Run ID: **ICS3K2_330328** SeqNo: **4890632** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	2.546	0.100	2	0.464	104	80 - 120	2.52	1.03	20	
Sulfate	224.5	0.500	10	216.3	82.0	80 - 120	223	0.704	20	EO

MSD Sample ID: **HS18121454-06MSD** Units: **mg/L** Analysis Date: **01-Jan-2019 03:57**
Client ID: Run ID: **ICS3K2_330328** SeqNo: **4890614** PrepDate: DF: **500**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluoride	990.5	50.0	1000	0	99.0	80 - 120	983.5	0.704	20	
Sulfate	9670	250	5000	4636	101	80 - 120	9634	0.37	20	

The following samples were analyzed in this batch:

HS18120889-01	HS18120889-02	HS18120889-03	HS18120889-04
HS18120889-05			

Client:	SCS Engineers	**QUALIFIERS, ACRONYMS, UNITS**
Project:	Sandy Creek Groundwater 16215106	
WorkOrder:	**HS18120889**	

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
µg/L	Micrograms per Liter

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	88-0356	27-Mar-2019
Texas	T10470231-18-21	30-Apr-2019
North Dakota	R193 2018-2019	30-Apr-2019
Illinois	004438	29-Jun-2019
Louisiana	03087	30-Jun-2019
Kentucky	123043 - 2018	30-Apr-2019
Kansas	E-10352 2018-2019	31-Jul-2019
Oklahoma	2018-156	31-Aug-2019

Sample Receipt Checklist

Client Name:	SCS ENGINEERS - Bedford TX	Date/Time Received:	**14-Dec-2018 10:00**
Work Order:	HS18120889	Received by:	**JRM**

Checklist completed by:	*Paresh M. Giga* (eSignature)	15-Dec-2018 (Date)	Reviewed by:	*Corey Grandits* (eSignature)	19-Dec-2018 (Date)

Matrices: **Groundwater** Carrier name: **FedEx**

Question	Yes	No	Other
Shipping container/cooler in good condition?	☑	☐	Not Present ☐
Custody seals intact on shipping container/cooler?	☑	☐	Not Present ☐
Custody seals intact on sample bottles?	☐	☐	Not Present ☑
Chain of custody present?	☑	☐	
Chain of custody signed when relinquished and received?	☑	☐	
Chain of custody agrees with sample labels?	☑	☐	
Samples in proper container/bottle?	☑	☐	
Sample containers intact?	☑	☐	
TX1005 solids received in hermetically sealed vials?	☐	☐	N/A ☑
Sufficient sample volume for indicated test?	☑	☐	
All samples received within holding time?	☑	☐	
Container/Temp Blank temperature in compliance?	☑	☐	
Temperature(s)/Thermometer(s):	.1c/2.5c U/c		IR11
Cooler(s)/Kit(s):	25696		
Date/Time sample(s) sent to storage:	12/14/18 20:00		
Water - VOA vials have zero headspace?	☐	☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	☑	☐	N/A ☐
pH adjusted?	☐	☑	N/A ☐
pH adjusted by:			

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

ALS

Cincinnati, OH +1 513 733 5336
Everett, WA +1 425 356 2600
Fort Collins, CO +1 970 490 1511
Holland, MI +1 616 399 6070

Chain of Custody Form

Page 1 of 1

COC ID: 193058

HS18120889 WV

SCS Engineers
Sandy Creek Groundwater 16215106

ALS Project Manager:

Customer Information		Project Information			
Purchase Order	16215106.00T132	Project Name	Sandy Creek Groundwater 16215106	A	pH_W_9040C (9040 pH)
Work Order		Project Number	16215106.00T132	B	9056_anions_W (9056 Cl, F, SO4)
Company Name	SCS Engineers	Bill To Company	SCS Engineers	C	TDS_W 2540C (2540C TDS)
Send Report To	Jim Lawrence	Invoice Attn	Krystal Kuntz - A/P	D	ICP_TW (6020 Boron, Calcium)
Address	1901 Central Drive Suite 550	Address	1901 Central Drive Suite 550	E / F	
City/State/Zip	Bedford, TX 76021	City/State/Zip	Bedford TX 76021	G	
Phone	(817) 571-2288	Phone	(817) 571-2288	H	
Fax		Fax		I	
e-Mail Address	JLawrence@scsengineers.com	e-Mail Address	kkuntz@scsengineers.com	J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	BW-1	12/13/18	11:45	Groundwa	2,8	2	X	X	X	X							
2	MW-1		11:55	Groundwa	2,8	2	X	X	X	X							
3	MW-2		12:05	Groundwa	2,8	2	X	X	X	X							
4	MW-3		12:20	Groundwa	2,8	2	X	X	X	X							
5	DUP		—	Groundwa	2,8	2	X	X	X	X							
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign: DOUG STEEN [signature]

Shipment Method:

Required Turnaround Time: (Check Box) [X] STD 10 Wk Days [ ] 5 Wk Days [ ] 2 Wk Days [ ] 24 Hour [ ] Other ________

Results Due Date:

Relinquished by:	Date:	Time:	Received by:
DOUG STEEN	12/13/18	13:15	

Relinquished by:	Date:	Time:	Received by (Laboratory):
	12/14/18	10:00	J. Malван

Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Notes: Sandy Creek GW

Cooler ID	Cooler Temp.
	UC
25696	2.1
	1n11
	CF 0.4

QC Package: (Check One Box Below)
[X] Level II Std QC
[ ] Level III Std QC/Raw Data
[ ] Level IV SW846/CLP
[ ] Other ________
[ ] TRRP Checklist
[ ] TRRP Level IV

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

ALS
10450 Stancliff Rd., Suite 210
Houston, Texas 77099
Tel. +1 281 530 5656
Fax. +1 281 530 5887

25696

CUSTODY SEAL

Date: 12/13/18 Time: 13:15
Name: DOUG STEEN
Company: SCS ENGINEERS

Seal Broken By: [signature]
Date: 12/14/18

25696 DEC 1 4 2018

Must Deliver Next Business Day
Time and Tempature Sensitive!

25696

ALS

Part # 159450-434 RIT2 EXP 05/19

ORIGIN ID:SGRA (817) 571-2288
DOUG STEEN
SCS ENGINEERS
1901 CENTRAL DRIVE
SUITE 550
BEDFORD, TX 76021
UNITED STATES US

SHIP DATE: 10DEC18
ACTWGT: 1.00 LB MAN
CAD: 300130/CAFE3211
DIMS: 14x11x10 IN

TO CLIENT SERVICES
ALS LABORATORY GROUP
10450 STANCLIFF ROAD
SUITE 210
HOUSTON TX 77099
(281) 530-5656
REF: SANDY CREEK GW-DW

551C1/F1FE/104C

RMA:

FedEx
Express

E

J181118090501uv

FedEx
TRK# 0221 4380 9535 4367

FRI - 14 DEC 10:30A
PRIORITY OVERNIGHT

77099
TX-US
IAH

43 SGRA

FID 671320 13DEC18 ACTA 553C1/F1FE/0C8A

APPENDIX C

HISTORICAL GROUNDWATER ANALYTICAL DATA

APPENDIX C - GROUNDWATER ANALYTICAL DATA
2018 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION
SANDY CREEK ENERGY STATION
2161 RATTLESNAKE ROAD
RIESEL, TX 76682

	Water Level	Conductiviy	Turbidity	Boron	Calcium	Chloride	pH at 25°C	Sulfate	Total Dissolved Solids	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium	Radium-226	Radium-228	Combined Radium	Fluoride
Units	**ft msl**	**mS/cm**	**NTU**	**mg/L**	**mg/L**	**mg/L**	**Std. Units**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**pCi/L**	**pCi/L**	**pCi/L**	**mg/L**
MW-1																										
12/14/2015	453.53	4.51	25.2	1.2	454	253	7.6	2090	4090	<0.0010	<0.0050	0.044	<0.0010	<0.0010	0.0073	<0.0025	<0.0050	0.43	<0.00020	<0.010	0.16	<0.00050	1.04 ± 0.838	1.09 ± 0.523	2.13	<0.30
2/25/2016	453.38	4.98	>800	1.4	520	236	7.5	2190	4060	<0.0010	<0.0050	0.033	<0.0010	<0.0010	0.0074	<0.0025	0.0084	0.39	<0.00020	<0.010	0.2	<0.00050	0.922 ± 0.720	1.46 ± 0.496	2.382	<0.30
5/11/2016	454.14	4.83	>800	2.6	1030	402	7.2	2580	5260	<0.0010	0.12	1	0.029	<0.0020	0.69	0.087	0.21	0.78	<0.00020	<0.020	0.039	0.00089	3.94 ± 1.31	8.39 ± 1.74	12.33	<0.30
8/16/2016	453.67	4.47	800	1.3	535	239	6.8	2300	3880	<0.0010	<0.0050	0.022	<0.0010	<0.0010	<0.0050	<0.0025	<0.0050	0.41	<0.00020	<0.010	0.13	<0.00050	0.593 ± 0.620	3.29 ± 0.828	3.883	0.35
11/17/2016	454.43	4.45	17.7	1.2	542	216	7	2130	3720	<0.0010	<0.0050	0.018	<0.0010	<0.0010	<0.0050	<0.0025	<0.0050	0.37	<0.00020	<0.020	0.16	<0.00050	0.338 ± 0.339	2.49 ± 0.783	2.828	<0.30
2/23/2017	454.72	5.08	452	1.3	531	223	7	2350	3980	<0.0010	<0.010	<0.20	<0.0050	<0.0050	<0.010	<0.010	<0.0050	0.44	<0.00020	<0.010	0.066	<0.00050	-0.207 ± 0.945	3.13 ± 0.908	2.923	<0.30
6/7/2017	454.42	4.77	500	1.2	530	203	7.5	2010	3680	<0.0010	<0.0050	0.019	<0.0010	<0.0010	<0.0050	<0.0025	<0.0050	0.36	<0.00020	<0.020	0.15	<0.00050	0.000 ± 0.449	1.30 ± 0.518	1.3	<0.30
8/24/2017	454.69	4.58	223	1.2	518	241	7.1	2620	4550	<0.0010	<0.0050	0.02	<0.0010	<0.0010	<0.0050	<0.0025	<0.0050	0.395	<0.00020	<0.020	0.17	<0.00050	0.577 ± 0.429	1.69 ± 0.634	2.267	0.4
12/20/2017	454.22	4.287	66.2	1.3	548	248	7.4	2340	4250	<0.0010	<0.0060	0.017	<0.0010	<0.0050	<0.0070	<0.0025	<0.010	0.38	<0.00020	<0.030	0.18	<0.00050	1.26 ± 0.680	2.46 ± 0.888	3.72	1.1
6/21/2018	453.85	4.67	681	1.25	587	247	7.38	2530	4270	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.3 J
12/13/2018	454.86	4.369	30	1.35	515	241	7.52	2570	4100	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.585
MW-2																										
12/14/2015	424.11	10.6	2.8	1.9	569	1890	6.7	2810	8520	<0.0010	<0.0050	0.031	<0.0010	<0.0010	<0.0050	0.0061	<0.0050	0.69	<0.00020	<0.010	<0.010	<0.00050	1.41 ± 0.938	2.76 ± 0.771	4.17	0.98
2/25/2016	429.50	11.3	52.2	2.4	697	2080	7.3	2890	8070	<0.0010	0.014	0.038	<0.0010	<0.0010	<0.0050	<0.011	<0.0050	0.74	<0.00020	<0.010	<0.010	<0.00050	0.857 ± 0.590	2.57 ± 0.665	3.427	<0.30
5/11/2016	430.72	10.8	23.7	2.2	613	2340	6.7	3010	9930	<0.0010	0.0059	0.027	<0.0010	<0.0010	<0.0050	0.0079	<0.0050	0.87	<0.00020	<0.010	<0.010	<0.00050	0.859 ± 0.561	3.13 ± 0.822	3.989	<0.30
8/16/2016	430.78	11.9	5.5	2.1	680	2440	6.7	3080	7870	<0.0020	<0.0050	0.021	<0.0010	<0.0010	<0.0050	0.0084	<0.0050	0.84	<0.00020	<0.010	<0.010	<0.0010	0.237 ± 0.329	3.28 ± 0.775	3.517	0.64
11/17/2016	430.80	10.7	0.4	1.9	701	2140	6.7	2770	9680	<0.0010	0.0059	0.024	<0.0010	<0.0010	<0.0050	0.0064	<0.0050	0.82	<0.00020	0.024	<0.010	<0.00050	0.923 ± 0.594	3.16 ± 0.826	4.083	0.35
2/23/2017	430.85	13.7	6.2	1.9	646	2320	6.9	3110	9630	<0.0010	<0.010	<0.20	<0.0050	<0.0050	<0.010	<0.010	<0.0050	0.8	<0.00020	<0.010	<0.020	<0.00050	1.52 ± 1.50	4.27 ± 1.07	5.79	0.46
6/7/2017	431.12	11	30.5	1.9	640	2420	7.5	2970	14200	<0.0010	<0.0050	0.016	<0.0010	<0.0010	<0.0050	0.0051	<0.0050	0.75	<0.00020	<0.020	<0.010	<0.00050	0.344 ± 0.415	3.82 ± 0.931	4.164	1.3
8/24/2017	431.20	11.4	8.1	1.9	664	2520	6.8	3710	9600	<0.0010	<0.010	0.017	<0.0010	<0.0020	<0.0050	0.0065	<0.010	0.729	<0.00020	<0.020	0.026	<0.00050	1.12 ± 0.610	3.78 ± 0.960	4.9	0.32
12/20/2017	429.47	6.198	37.7	2.2	716	2590	7.2	3100	9600	<0.0010	<0.012	0.022	<0.0010	<0.010	<0.014	0.0072	<0.020	0.74	<0.00020	<0.030	<0.040	<0.00050	0.945 ± 0.578	4.07 ± 0.940	5.015	<0.50
6/21/2018	430.02	12.66	4.42	1.9	706	2840	7.09	3400	10200	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.6
12/13/2018	430.72	11.89	15.1	2.58	690	2740	6.71	3220	10500	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.618
MW-3																										
12/14/2015	421.77	1.17	11.9	0.35	67.6	12.3	7.2	135	586	<0.0010	<0.0050	0.021	<0.0010	<0.0010	<0.0050	<0.0025	<0.0050	<0.050	<0.00020	<0.010	<0.010	<0.00050	0.997 ± 0.813	0.736 ± 0.505	1.733	0.62
2/25/2016	421.66	6.04	93.3	1.2	479	347	7	2430	5400	<0.0010	0.0061	0.052	<0.0010	<0.0010	<0.0050	0.0098	<0.0050	0.85	<0.00020	<0.010	<0.010	<0.00050	1.26 ± 0.762	3.02 ± 0.791	4.28	0.9
5/11/2016	421.94	3.82	197	1.1	465	349	6.5	2330	5440	<0.0010	<0.0050	0.024	<0.0010	<0.0010	<0.0050	0.0059	<0.0050	0.65	<0.00020	<0.010	<0.010	<0.00050	1.54 ± 0.797	1.62 ± 0.547	3.16	<0.30
8/16/2016	420.42	6.01	101	1.2	505	381	7.3	2950	5680	<0.0010	<0.0050	0.018	<0.0010	<0.0010	<0.0050	0.006	<0.0050	0.98	<0.00020	<0.010	<0.010	<0.00050	0.891 ± 0.626	5.10 ± 1.13	5.991	<0.30
11/17/2016	421.03	5.43	87	1.1	494	322	6.6	2420	5420	<0.0010	<0.0050	0.028	<0.0010	<0.0010	<0.0050	0.0068	<0.0050	0.94	<0.00020	<0.020	<0.010	<0.00050	0.872 ± .0579	5.23 ± 1.30	6.102	<0.30
2/23/2017	422.58	6.79	82	1.1	389	202	7	1450	2900	<0.0010	<0.010	<0.20	<0.0050	<0.0050	<0.010	<0.010	<0.0050	0.7	<0.00020	<0.010	<0.020	<0.00050	-0.239 ± 1.09	4.07 ± 1.03	3.831	0.45
6/7/2017	422.23	3.68	145	1.2	486	327	7.1	2260	4740	<0.0010	<0.0050	0.015	<0.0010	<0.0010	<0.0050	0.0058	<0.0050	0.62	<0.00020	<0.020	<0.010	<0.00050	0.941 ± 0.658	2.76 ± 0.765	3.701	0.57
8/24/2017	419.66	6.55	82.6	1.1	519	401	6.5	2890	6160	<0.0010	<0.010	0.014	<0.0010	<0.0020	<0.0050	0.0084	<0.010	1.03	<0.00020	<0.020	<0.020	<0.00050	1.26 ± 0.600	4.41 ± 1.07	5.67	<0.30
12/20/2017	421.08	6.459	22.4	1.3	563	380	6.8	2830	5790	<0.0010	<0.0060	0.034	<0.0010	<0.0050	<0.0070	0.0086	<0.010	0.92	<0.00020	<0.030	<0.020	<0.00050	0.626 ± 0.567	2.77 ± 0.728	3.396	0.61
6/21/2018	418.68	6.633	51.1	1.13	526	396	6.76	3160	6090	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.3
12/13/2018	422.36	4.47	10.6	1.08	327	206	6.61	1790	3520	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.662
BW-1																										
12/14/2015	465.60	5.35	155	1.8	465	727	9.5	2130	4900	<0.0010	<0.0050	0.17	<0.0010	<0.0010	0.015	0.0026	<0.0050	0.7	<0.00020	<0.010	<0.010	0.00073	0.900 ± 0.728	1.13 ± 0.513	2.03	<0.30
2/25/2016	465.44	5.8	307	3.5	586	1050	7.4	2690	6420	<0.0010	0.015	0.055	<0.0010	<0.0010	0.0053	0.0035	0.0069	0.71	<0.00020	<0.010	<0.010	<0.00050	0.887 ± 0.697	1.82 ± 0.541	2.707	0.67
5/11/2016	465.56	7.5	866	4	566	1120	7	2610	6360	<0.0010	0.0084	0.04	<0.0010	<0.0010	0.011	0.0035	0.0091	0.79	<0.00020	<0.010	<0.010	<0.00050	2.40 ± 0.944	2.80 ± 0.710	5.2	0.32
8/16/2016	465.71	7.52	56	3.7	566	1130	7.2	2720	6280	<0.0010	0.0064	0.04	<0.0010	<0.0010	0.0073	0.0029	<0.0050	0.78	<0.00020	<0.010	<0.010	<0.00050	0.610 ± 0.483	3.42 ± 0.777	4.03	0.94
11/17/2016	466.12	7.36	8.1	2.8	548	991	6.8	2590	6400	<0.0010	0.0066	0.023	<0.0010	<0.0010	<0.0050	<0.0025	<0.0050	0.74	<0.00020	0.022	<0.010	<0.00050	0.605 ± 0.548	2.94 ± 0.799	3.545	0.85
2/23/2017	466.57	7.17	245	3.1	532	1080	7.2	2760	6280	<0.0010	<0.010	<0.20	<0.0050	<0.0050	<0.010	<0.010	<0.0050	0.73	<0.00020	<0.010	<0.020	<0.00050	0.816 ± .0983	4.07 ± 1.08	4.886	<0.30
6/7/2017	466.17	7.58	852	3.8	539	1020	7.7	2220	7320	<0.0010	<0.0050	0.026	<0.0010	<0.0010	<0.0050	<0.0025	<0.0050	0.79	<0.00020	<0.020	<0.010	<0.00050	1.36 ± 0.685	3.13 ± 0.783	4.49	<0.30
8/24/2017	466.38	7.81	162	3.4	531	1160	7.1	2870	7260	<0.0010	<0.010	0.037	<0.0010	<0.0020	<0.0050	<0.0050	<0.010	0.738	<0.00020	<0.020	<0.020	<0.00050	1.58 ± 0.602	2.80 ± 0.759	4.38	0.37
12/20/2017	466.51	7.063	180	3.5	658	1030	7.2	2620	6140	<0.0010	<0.0060	0.044	<0.0010	<0.0050	<0.0070	0.0034	<0.010	0.73	<0.00020	<0.030	<0.020	<0.00050	1.07 ± 0.681	3.13 ± 0.788	4.2	<0.50
6/21/2018	466.13	7.755	39.3	3.31	610	1200	7.22	3030	6640	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.3
12/13/2018	467.24	7.159	81.8	3.25	637	1120	7.1	2780	6400	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.586
MCL				n/a	n/a	n/a	n/a	n/a	n/a	0.006	0.01	2	0.004	0.005	0.1	n/a	0.015	n/a	0.002	n/a	0.05	0.002	n/a	n/a	5	4

MCL - EPA Primary Drinking Water Maximum Contaminant Level
0.015 Exceedance of EPA Primary MCL
40 CFR 257 Appendix III Constituent
40 CFR 257 Appendix IV Constituent
40 CFR 257 Appendix III & IV Constituent
"<" - Indicates analyte was not detected above the laboratory reporting limit
"n/a" - Indicates constituent has no EPA Primary MCL

APPENDIX D

2018 RESULTS AND STATISTICAL LIMITS

Appendix D – 2018 Results and Statistical Limits - MW-1							
MW-ID	**CFR 257 Appendix**	**Constituent**	**June 2018 Lab Result**	**December 2018 Lab Result**	**MCL**	**Statistical Limit**	**Statistical Method**
MW-1	III	Boron (mg/L)	1.25	1.35	n/a	2.6	Non-Parametric Prediction Limit
		Calcium (mg/L)	587	515	n/a	1030	Non-Parametric Prediction Limit
		Chloride (mg/L)	247	241	n/a	402	Non-Parametric Prediction Limit
		pH at 25˚C	7.38	7.52	n/a	6.136 - 8.289	Parametric Prediction Limit
		Sulfate (mg/L)	2530	2570	n/a	3402	Shewhart-Cusum Control Chart
		TDS (mg/L)	4270	4100	n/a	6765	Shewhart-Cusum Control Chart
		Fluoride (mg/L)	0.3 J	**0.585**	**4**	**0.4**	**Non-Parametric Prediction Limit**
	IV	Antimony (mg/L)	n/a	n/a	0.006	0.001	Non-Parametric Prediction Limit
		Arsenic (mg/L)	n/a	n/a	0.01	0.12	Non-Parametric Prediction Limit
		Barium (mg/L)	n/a	n/a	2	1	Non-Parametric Prediction Limit
		Beryllium (mg/L)	n/a	n/a	0.004	0.029	Non-Parametric Prediction Limit
		Cadmium (mg/L)	n/a	n/a	0.005	0.001	Non-Parametric Prediction Limit
		Chromium (mg/L)	n/a	n/a	0.1	0.69	Non-Parametric Prediction Limit
		Cobalt (mg/L)	n/a	n/a	n/a	0.087	Non-Parametric Prediction Limit
		Lead (mg/L)	n/a	n/a	0.015	0.21	Non-Parametric Prediction Limit
		Lithium (mg/L)	n/a	n/a	n/a	0.78	Non-Parametric Prediction Limit
		Mercury (mg/L)	n/a	n/a	0.002	0.0002	Non-Parametric Prediction Limit
		Molybdenum (mg/L)	n/a	n/a	n/a	0.02	Non-Parametric Prediction Limit
		Selenium (mg/L)	n/a	n/a	0.05	0.2535	Shewhart-Cusum Control Chart
		Thallium (mg/L)	n/a	n/a	0.002	0.00089	Non-Parametric Prediction Limit
		Radium - 226 (pCi/L)	n/a	n/a	n/a	n/a	n/a
		Radium - 228 (pCi/L)	n/a	n/a	n/a	n/a	n/a
		Combined Radium (pCi/L)	n/a	n/a	5	12.33	Non-Parametric Prediction Limit
		Fluoride (mg/L)	0.3 J	**0.585**	**4**	**0.4**	**Non-Parametric Prediction Limit**

Bolded value indicates that consituent exceeded intrawell statistical limit

Appendix D – 2018 Results and Statistical Limits - MW-2							
MW-ID	**CFR 257 Appendix**	**Constituent**	**June 2018 Lab Result**	**December 2018 Lab Result**	**MCL**	**Statistical Limit**	**Statistical Method**
MW-2	III	**Boron (mg/L)**	1.9	**2.58**	**n/a**	**2.4**	**Non-Parametric Prediction Limit**
		Calcium (mg/L)	706	690	n/a	874.4	Shewhart-Cusum Control Chart
		Chloride (mg/L)	2840	2740	n/a	3336	Shewhart-Cusum Control Chart
		pH at 25˚C	7.09	6.71	n/a	6.7 - 7.5	Non-Parametric Prediction Limit
		Sulfate (mg/L)	3400	3220	n/a	4635	Shewhart-Cusum Control Chart
		TDS (mg/L)	10200	10500	n/a	23969	Shewhart-Cusum Control Chart
		Fluoride* (mg/L)	<0.6	0.618	4	2.831	Shewhart-Cusum Control Chart
	IV	Antimony (mg/L)	n/a	n/a	0.006	0.001	Non-Parametric Prediction Limit
		Arsenic (mg/L)	n/a	n/a	0.01	0.014	Non-Parametric Prediction Limit
		Barium (mg/L)	n/a	n/a	2	0.5299	Shewhart-Cusum Control Chart
		Beryllium (mg/L)	n/a	n/a	0.004	0.001	Non-Parametric Prediction Limit
		Cadmium (mg/L)*	n/a	n/a	0.005	0.002	Non-Parametric Prediction Limit
		Chromium (mg/L)*	n/a	n/a	0.1	0.005	Non-Parametric Prediction Limit
		Cobalt (mg/L)	n/a	n/a	n/a	0.02189	Shewhart-Cusum Control Chart
		Lead (mg/L)	n/a	n/a	0.015	0.01	Non-Parametric Prediction Limit
		Lithium (mg/L)	n/a	n/a	n/a	1.09	Shewhart-Cusum Control Chart
		Mercury (mg/L)	n/a	n/a	0.002	0.0002	Non-Parametric Prediction Limit
		Molybdenum (mg/L)	n/a	n/a	n/a	0.024	Non-Parametric Prediction Limit
		Selenium (mg/L)	n/a	n/a	0.05	0.026	Non-Parametric Prediction Limit
		Thallium (mg/L)	n/a	n/a	0.002	0.0005	Non-Parametric Prediction Limit
		Radium - 226 (pCi/L)	n/a	n/a	n/a	n/a	n/a
		Radium - 228 (pCi/L)	n/a	n/a	n/a	n/a	n/a
		Combined Radium (pCi/L)	n/a	n/a	5	8.09	Shewhart-Cusum Control Chart
		Fluoride* (mg/L)	<0.6	0.618	4	2.831	Shewhart-Cusum Control Chart

Bolded value indicates that consituent exceeded intrawell statistical limit

Appendix D – 2018 Results and Statistical Limits - MW-3							
MW-ID	**CFR 257 Appendix**	**Constituent**	**June 2018 Lab Result**	**December 2018 Lab Result**	**MCL**	**Statistical Limit**	**Statistical Method**
MW-3	**III**	Boron (mg/L)	1.13	1.08	n/a	1.2	Non-Parametric Prediction Limit
		Calcium (mg/L)	526	327	n/a	688.1	Shewhart-Cusum Control Chart
		Chloride (mg/L)	396	206	n/a	606.9	Shewhart-Cusum Control Chart
		pH at 25˚C	6.76	6.61	n/a	5.71 - 8.09	Parametric Prediction Limit
		Sulfate (mg/L)	3160	1790	n/a	4447	Shewhart-Cusum Control Chart
		TDS (mg/L)	6090	6300	n/a	9375	Shewhart-Cusum Control Chart
		Fluoride* (mg/L)	<0.3	0.662	4	2.201	Shewhart-Cusum Control Chart
	IV	Antimony (mg/L)	n/a	n/a	0.006	0.001	Non-Parametric Prediction Limit
		Arsenic (mg/L)	n/a	n/a	0.01	0.0061	Non-Parametric Prediction Limit
		Barium (mg/L)	n/a	n/a	2	0.3241	Shewhart-Cusum Control Chart
		Beryllium (mg/L)	n/a	n/a	0.004	0.001	Non-Parametric Prediction Limit
		Cadmium (mg/L)	n/a	n/a	0.005	0.002	Non-Parametric Prediction Limit
		Chromium (mg/L)	n/a	n/a	0.1	0.005	Non-Parametric Prediction Limit
		Cobalt (mg/L)	n/a	n/a	n/a	0.02018	Shewhart-Cusum Control Chart
		Lead (mg/L)	n/a	n/a	0.015	0.01	Non-Parametric Prediction Limit
		Lithium (mg/L)	n/a	n/a	n/a	2.336	Shewhart-Cusum Control Chart
		Mercury (mg/L)	n/a	n/a	0.002	0.0002	Non-Parametric Prediction Limit
		Molybdenum (mg/L)	n/a	n/a	n/a	0.02	Non-Parametric Prediction Limit
		Selenium (mg/L)	n/a	n/a	0.05	0.02	Non-Parametric Prediction Limit
		Thallium (mg/L)	n/a	n/a	0.002	0.0005	Non-Parametric Prediction Limit
		Radium - 226 (pCi/L)	n/a	n/a	n/a	n/a	n/a
		Radium - 228 (pCi/L)	n/a	n/a	n/a	n/a	n/a
		Combined Radium (pCi/L)	n/a	n/a	5	11.97	Shewhart-Cusum Control Chart
		Fluoride* (mg/L)	<0.3	0.662	4	2.201	Shewhart-Cusum Control Chart

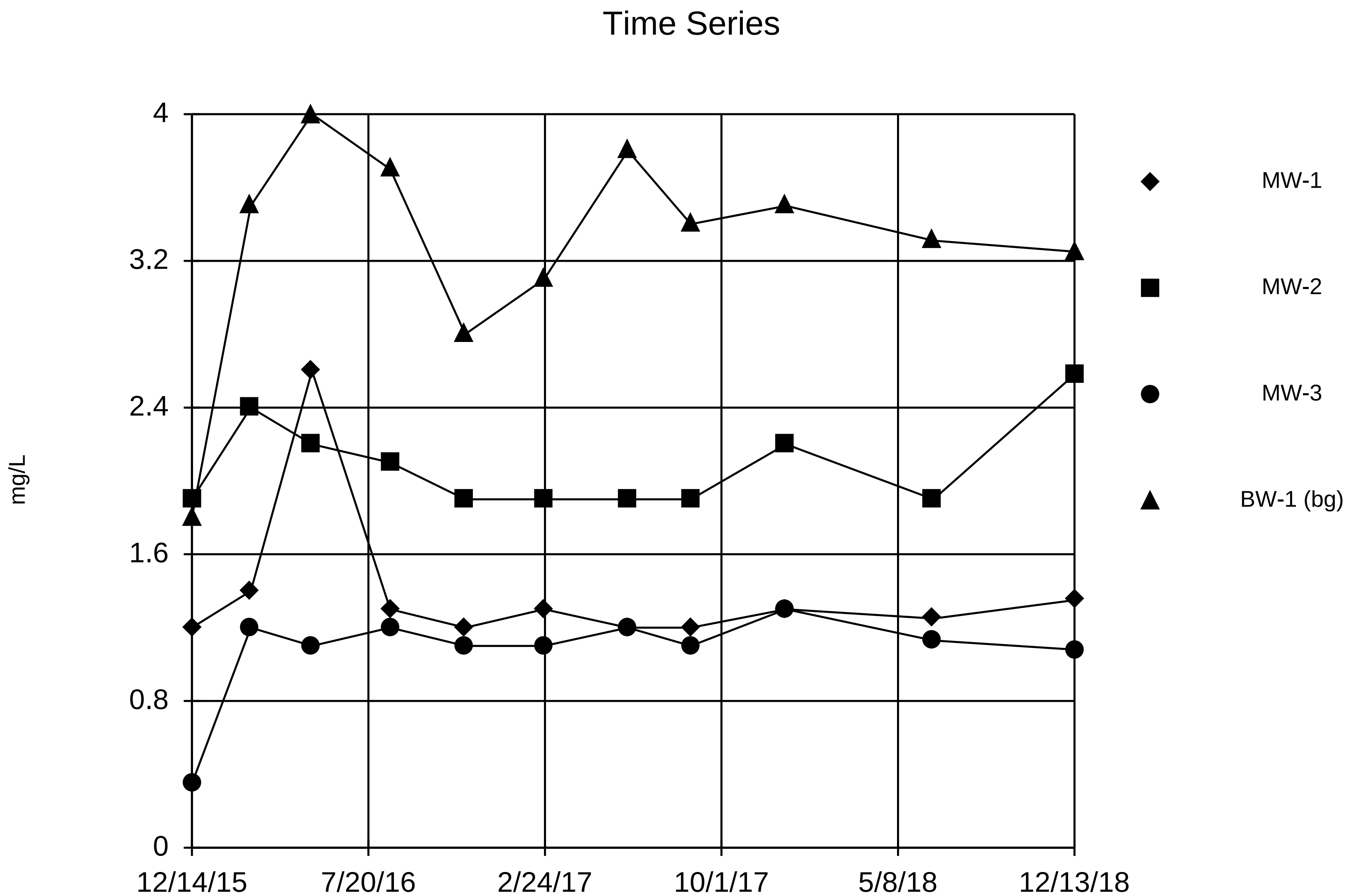
Bolded value indicates that consituent exceeded intrawell statistical limit

Appendix D –2018 Results and Statistical Limits - BW-1							
MW-ID	**CFR 257 Appendix**	**Constituent**	**June 2018 Lab Result**	**December 2018 Lab Result**	**MCL**	**Statistical Limit**	**Statistical Method**
BW-1	**III**	Boron (mg/L)	3.31	3.25	n/a	6.787	Shewhart-Cusum Control Chart
		Calcium (mg/L)	610	637	n/a	723.7	Shewhart-Cusum Control Chart
		Chloride (mg/L)	1200	1120	n/a	1540	Shewhart-Cusum Control Chart
		pH at 25˚C	7.22	7.1	n/a	6.8 - 9.5	Non-Parametric Prediction Limit
		Sulfate (mg/L)	3030	2780	n/a	3884	Shewhart-Cusum Control Chart
		TDS (mg/L)	6640	6400	n/a	10119	Shewhart-Cusum Control Chart
		Fluoride* (mg/L)	<0.3	0.586	4	2.356	Shewhart-Cusum Control Chart
	IV	Antimony (mg/L)	n/a	n/a	0.006	0.001	Non-Parametric Prediction Limit
		Arsenic (mg/L)	n/a	n/a	0.01	0.02645	Shewhart-Cusum Control Chart
		Barium (mg/L)	n/a	n/a	2	0.4562	Shewhart-Cusum Control Chart
		Beryllium (mg/L)	n/a	n/a	0.004	0.001	Non-Parametric Prediction Limit
		Cadmium (mg/L)	n/a	n/a	0.005	0.002	Non-Parametric Prediction Limit
		Chromium (mg/L)	n/a	n/a	0.1	0.02912	Shewhart-Cusum Control Chart
		Cobalt (mg/L)	n/a	n/a	n/a	0.04052	Shewhart-Cusum Control Chart
		Lead (mg/L)	n/a	n/a	0.015	0.0091	Non-Parametric Prediction Limit
		Lithium (mg/L)	n/a	n/a	n/a	0.9244	Shewhart-Cusum Control Chart
		Mercury (mg/L)	n/a	n/a	0.002	0.0002	Non-Parametric Prediction Limit
		Molybdenum (mg/L)	n/a	n/a	n/a	0.022	Non-Parametric Prediction Limit
		Selenium (mg/L)	n/a	n/a	0.05	0.02	Non-Parametric Prediction Limit
		Thallium (mg/L)	n/a	n/a	0.002	0.00073	Non-Parametric Prediction Limit
		Radium - 226 (pCi/L)	n/a	n/a	n/a	n/a	n/a
		Radium - 228 (pCi/L)	n/a	n/a	n/a	n/a	n/a
		Combined Radium (pCi/L)	n/a	n/a	5	9.354	Shewhart-Cusum Control Chart
		Fluoride* (mg/L)	<0.3	0.586	4	2.356	Shewhart-Cusum Control Chart

Bolded value indicates that consituent exceeded intrawell statistical limit

APPENDIX E

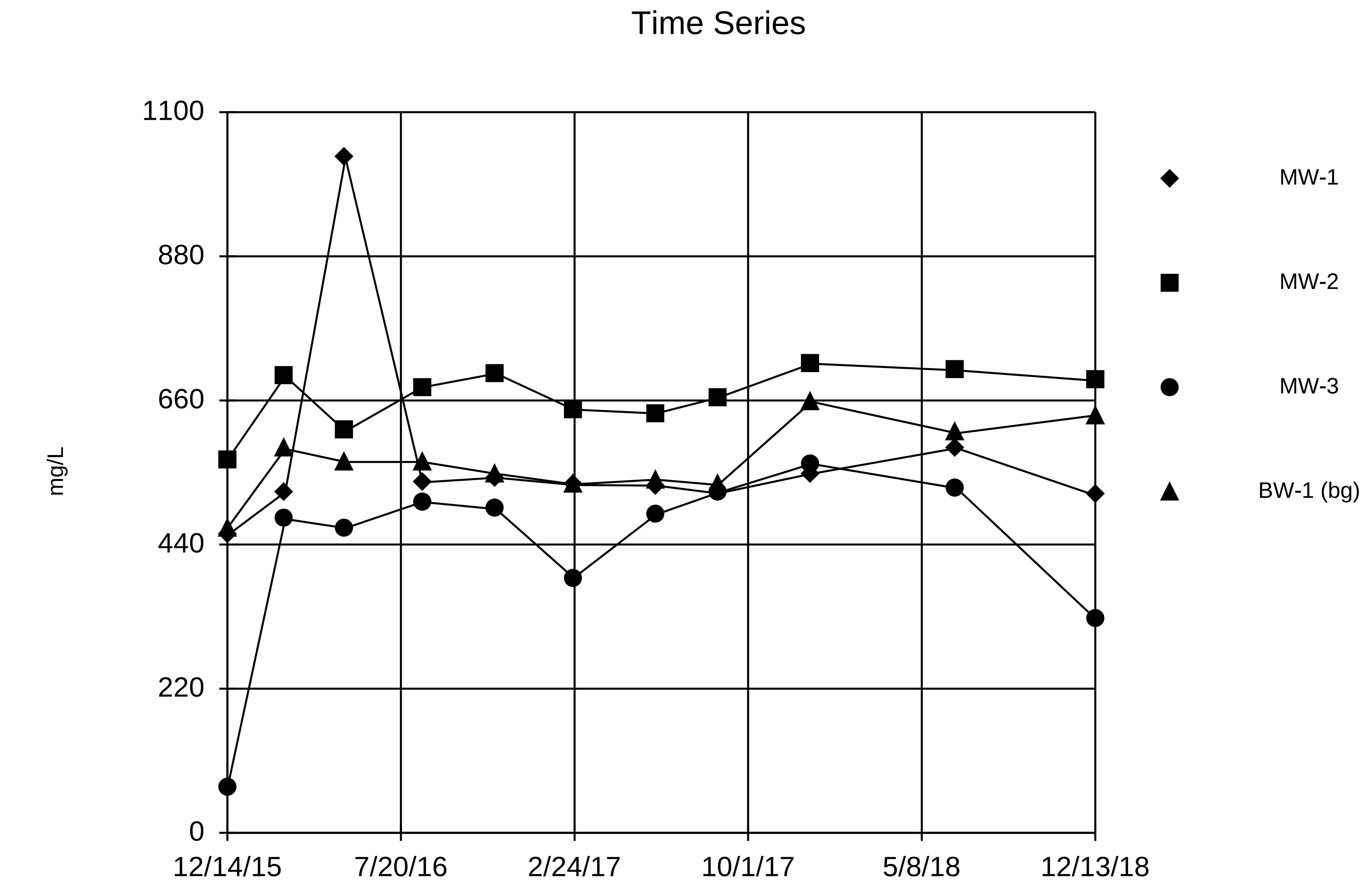
2018 STATISTICAL ANALYSIS GRAPHS



Constituent: Boron   Analysis Run 1/4/2019 11:03 AM

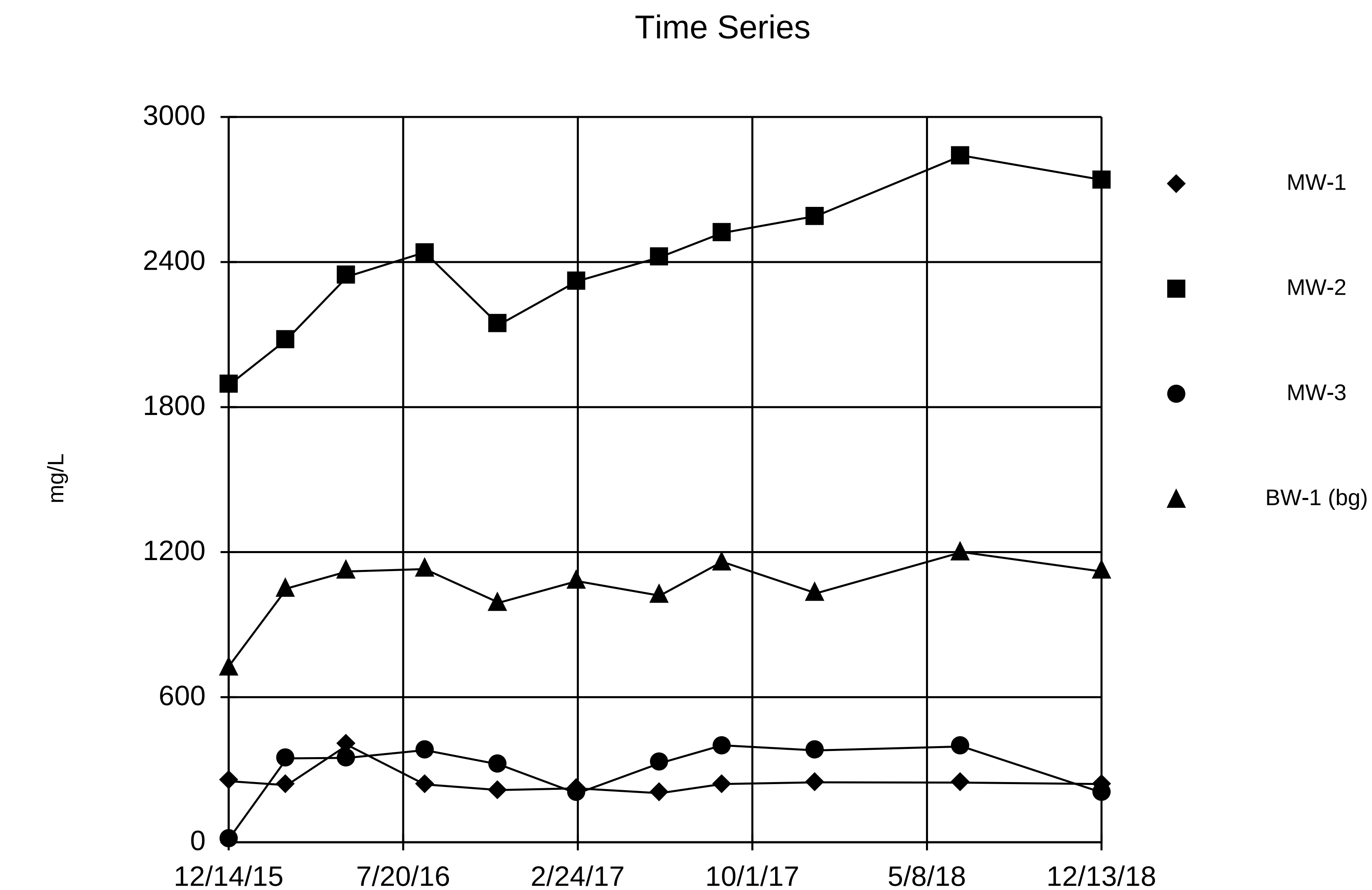
Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.4.2019

Sanitas™ v.9.5.32 Software licensed to SCS Engineers. UG



Constituent: Calcium   Analysis Run 1/4/2019 11:03 AM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.4.2019

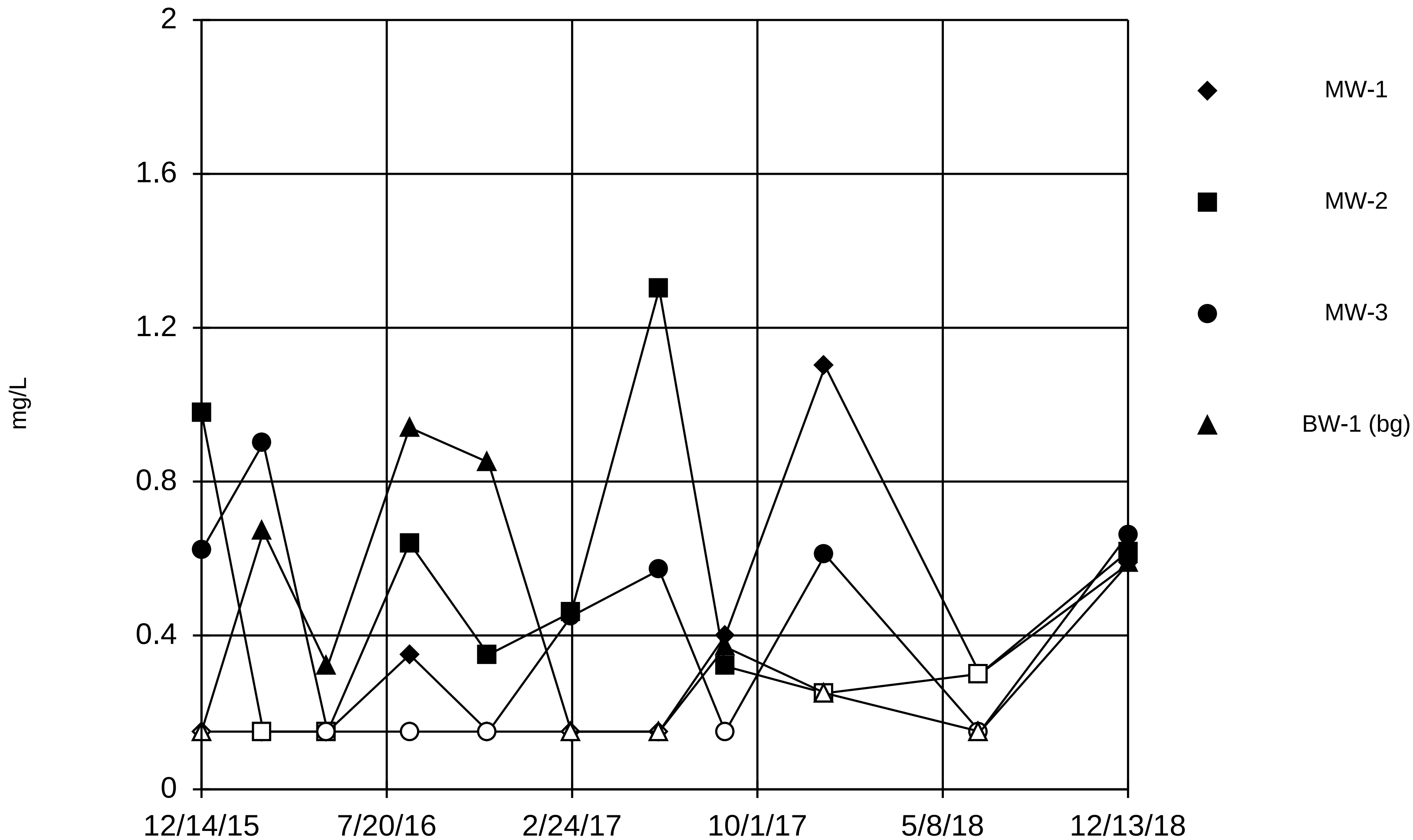


Constituent: Chloride   Analysis Run 1/4/2019 11:03 AM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.4.2019

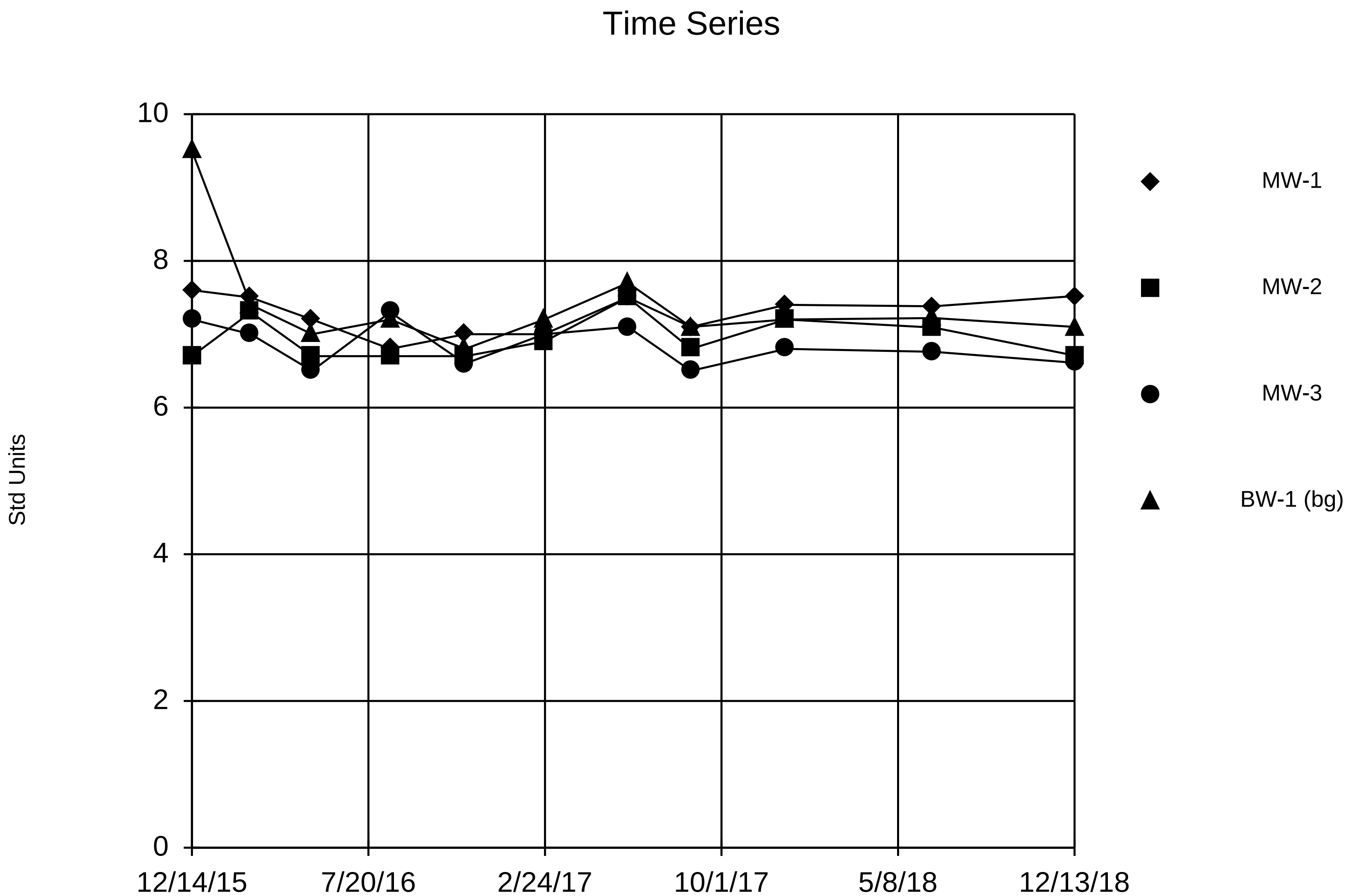
Sanitas™ v.9.5.32 Software licensed to SCS Engineers. UG
Hollow symbols indicate censored values.

Time Series



Constituent: Fluoride Analysis Run 1/4/2019 11:03 AM

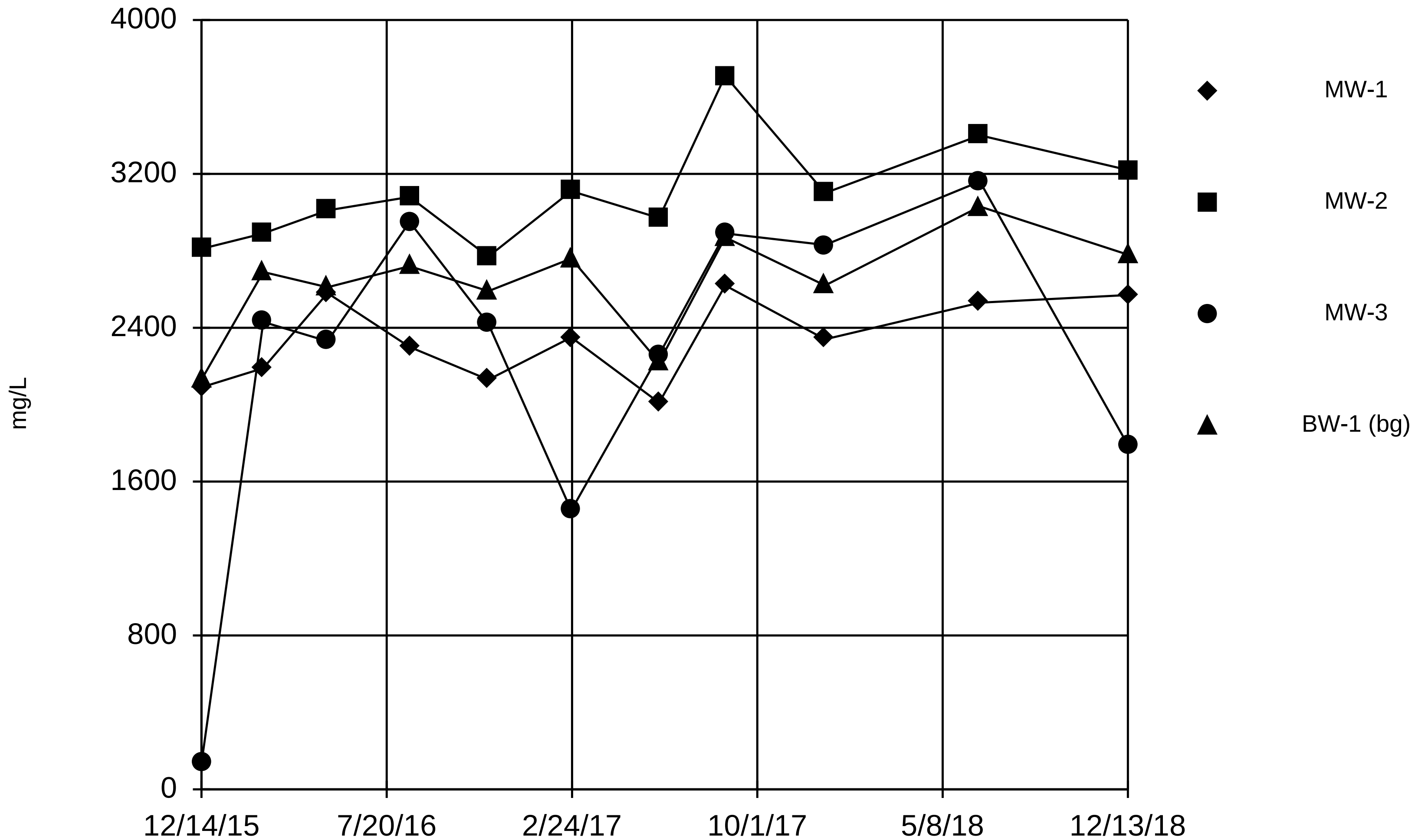
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.4.2019



Constituent: pH   Analysis Run 1/4/2019 11:03 AM

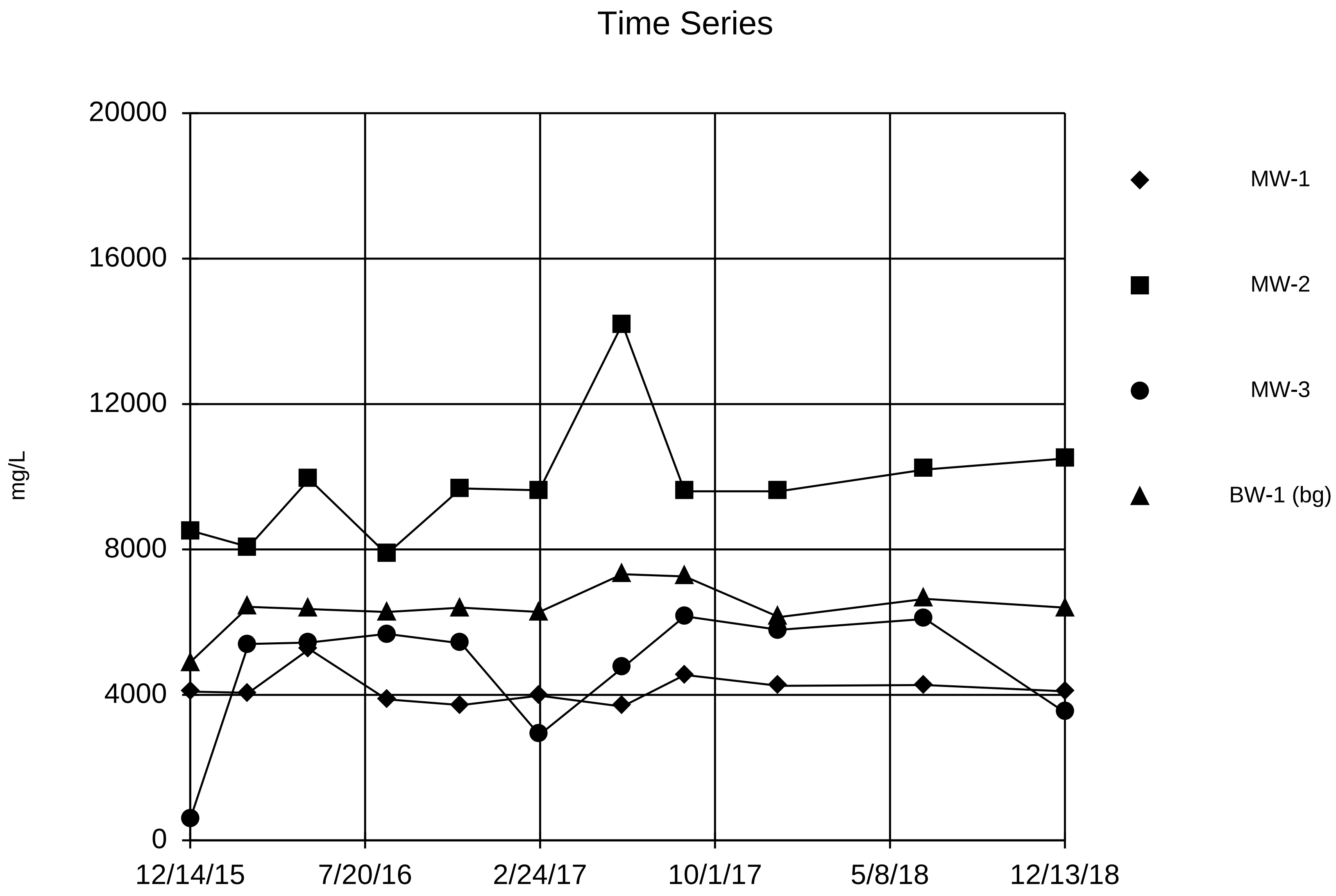
Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.4.2019

Time Series



Constituent: Sulfate Analysis Run 1/4/2019 11:03 AM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.4.2019



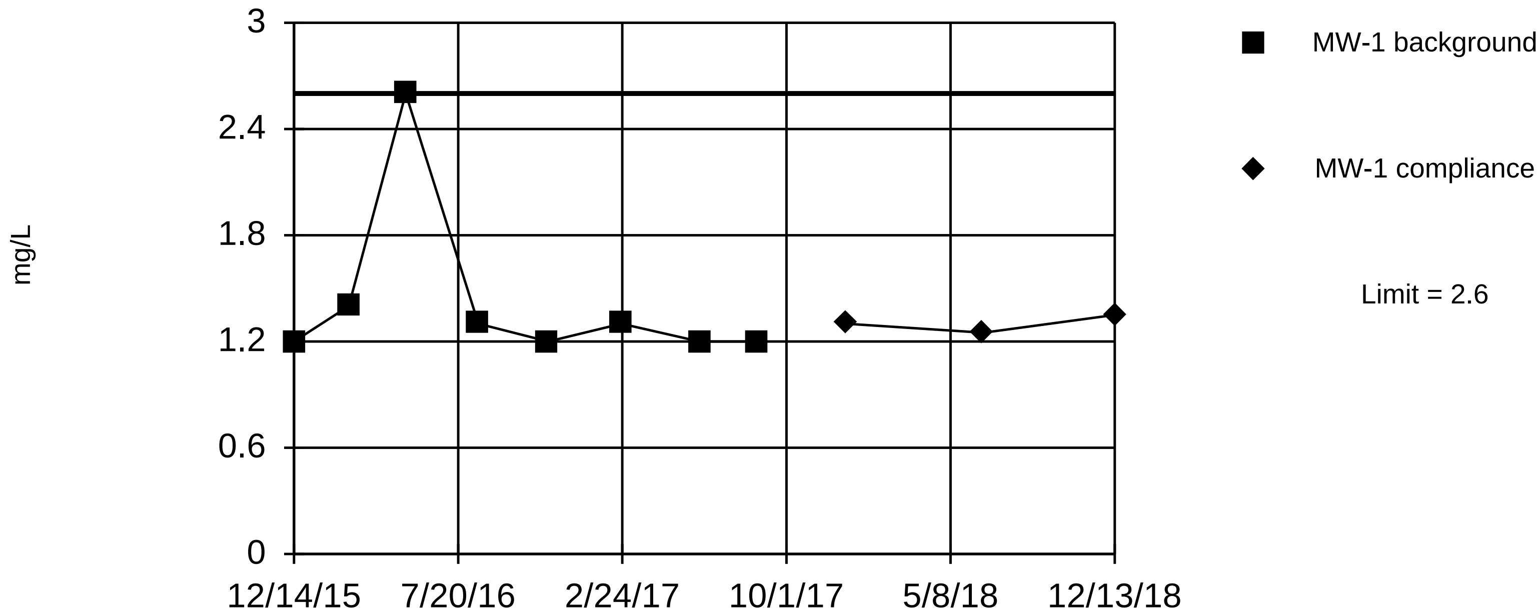
Constituent: Total Dissolved Solids Analysis Run 1/4/2019 11:03 AM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.4.2019

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.05 alpha level. Limit is highest of 8 background values. Report alpha = 0.1111. Most recent point compared to limit. Insufficient data to test for seasonality: data were not deseasonalized.

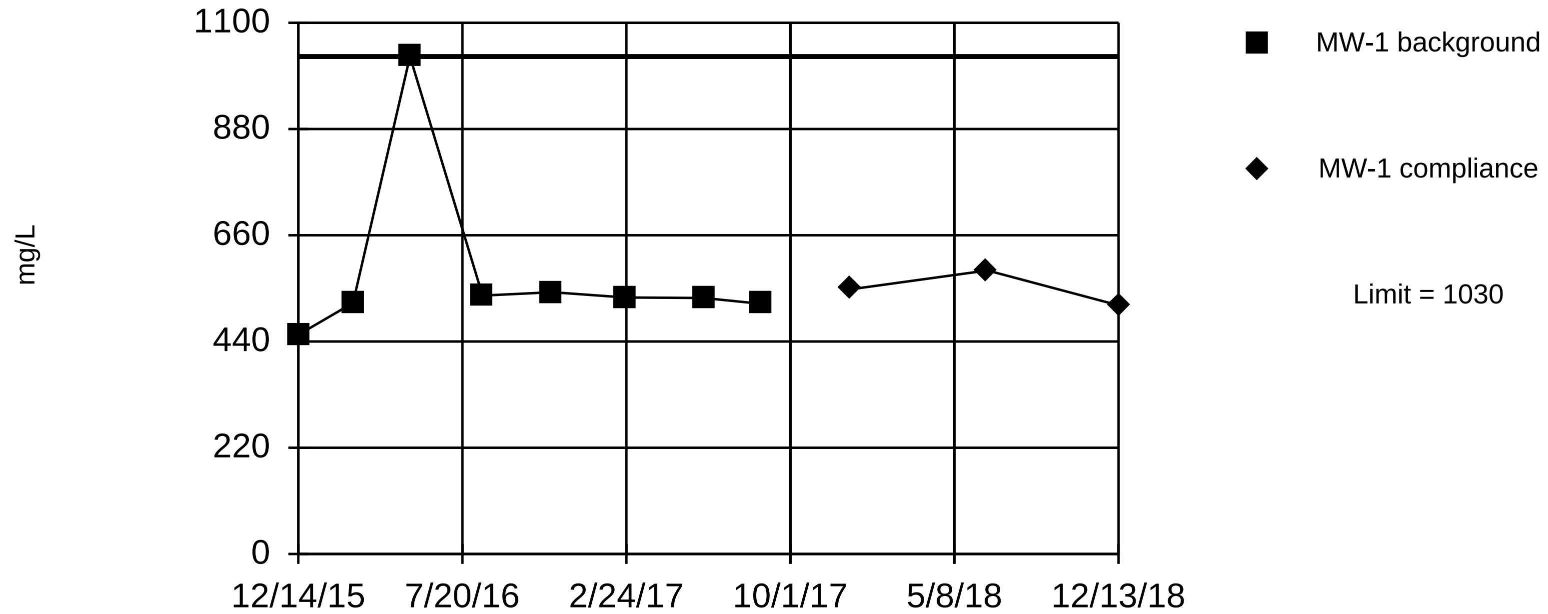
Constituent: Boron Analysis Run 1/4/2019 11:10 AM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.4.2019

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.05 alpha level. Limit is highest of 8 background values. Report alpha = 0.1111. Most recent point compared to limit. Insufficient data to test for seasonality: data were not deseasonalized.

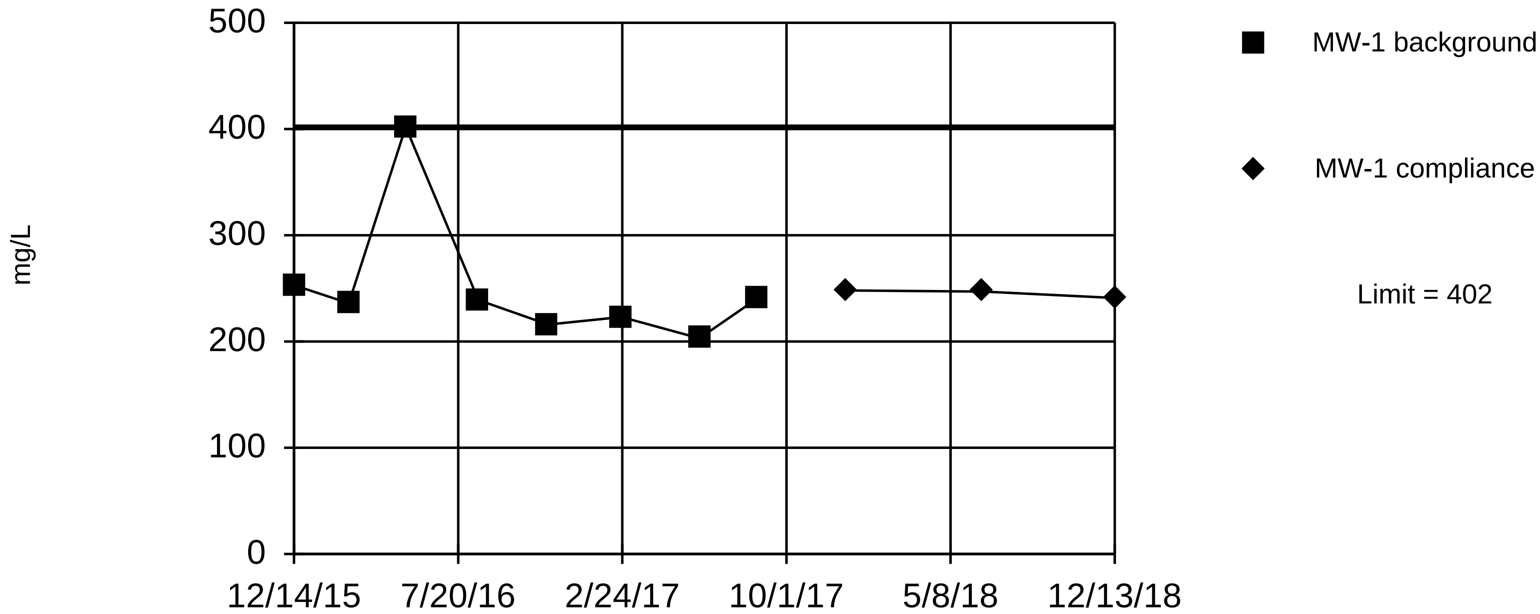
Constituent: Calcium   Analysis Run 1/4/2019 11:10 AM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.4.2019

Within Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.05 alpha level. Limit is highest of 8 background values. Report alpha = 0.1111. Most recent point compared to limit. Insufficient data to test for seasonality: data were not deseasonalized.

Constituent: Chloride Analysis Run 1/4/2019 11:11 AM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.4.2019

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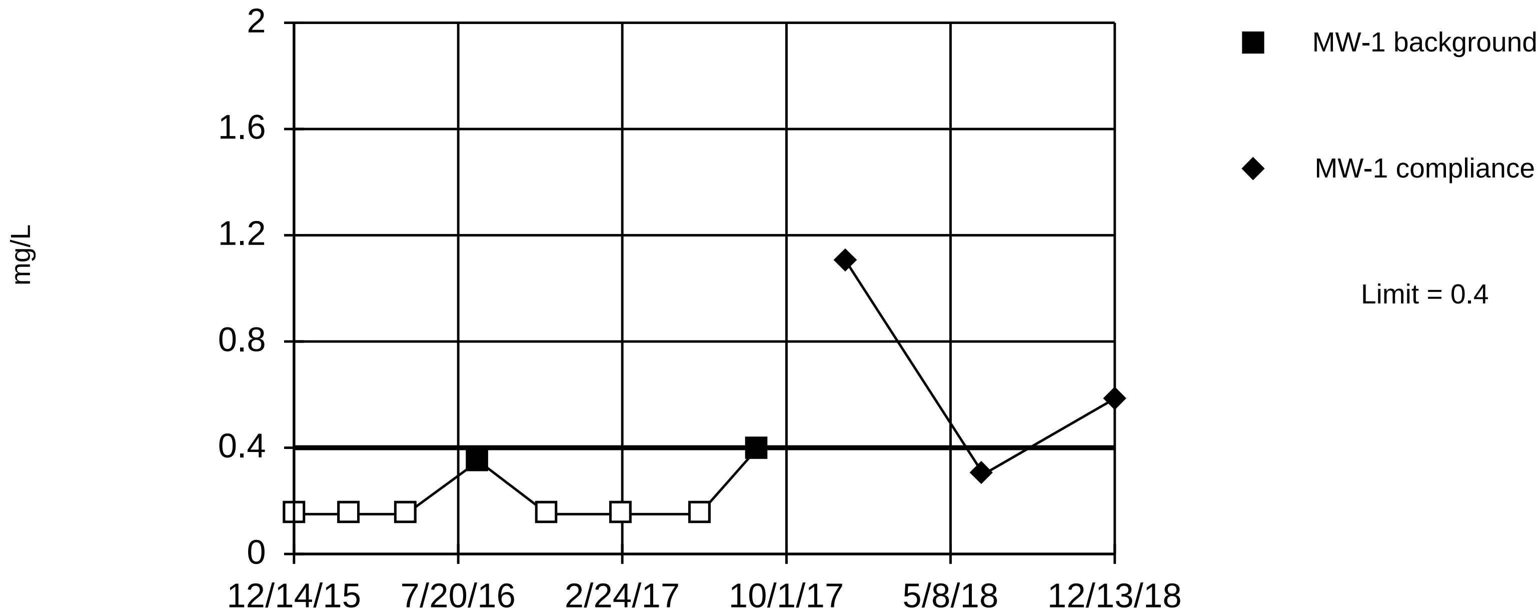
Hollow symbols indicate censored values.

Exceeds Limit

Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 8 background values. 75% NDs. Report alpha = 0.1111. Most recent point compared to limit. Insufficient data to test for seasonality: data were not deseasonalized.

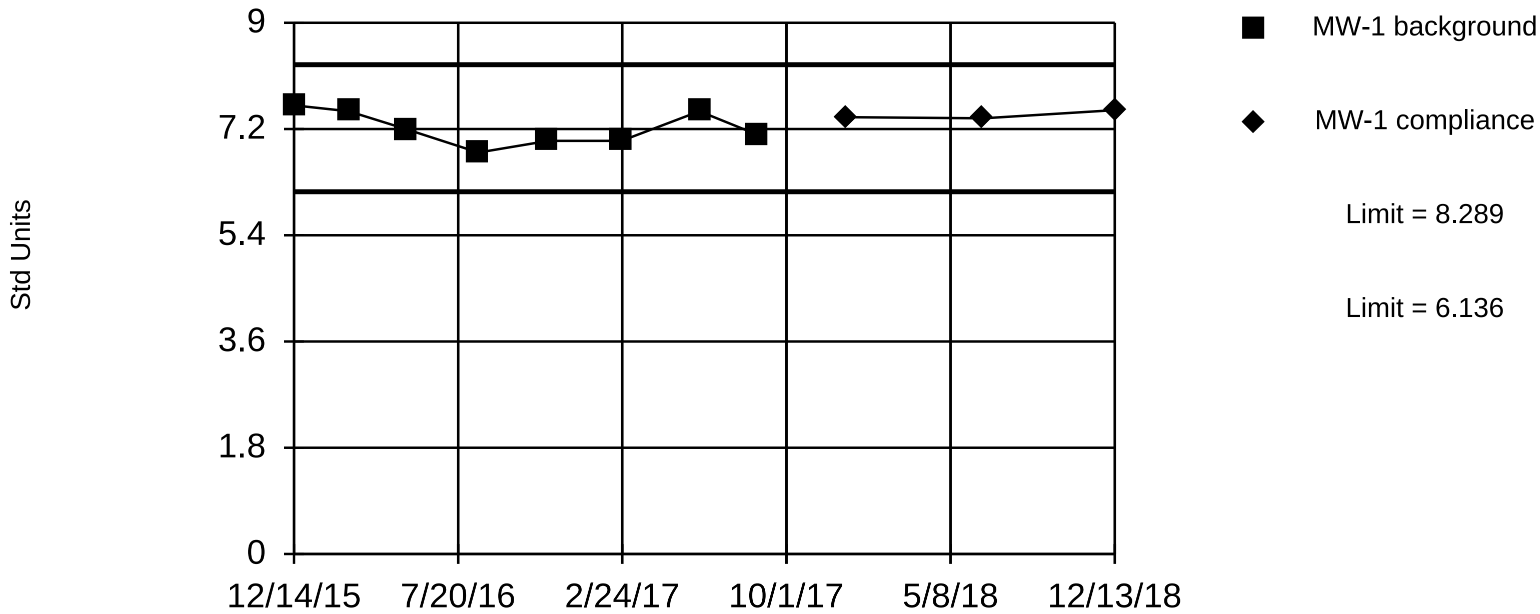
Constituent: Fluoride   Analysis Run 1/4/2019 11:14 AM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.4.2019

Within Limits

Prediction Limit

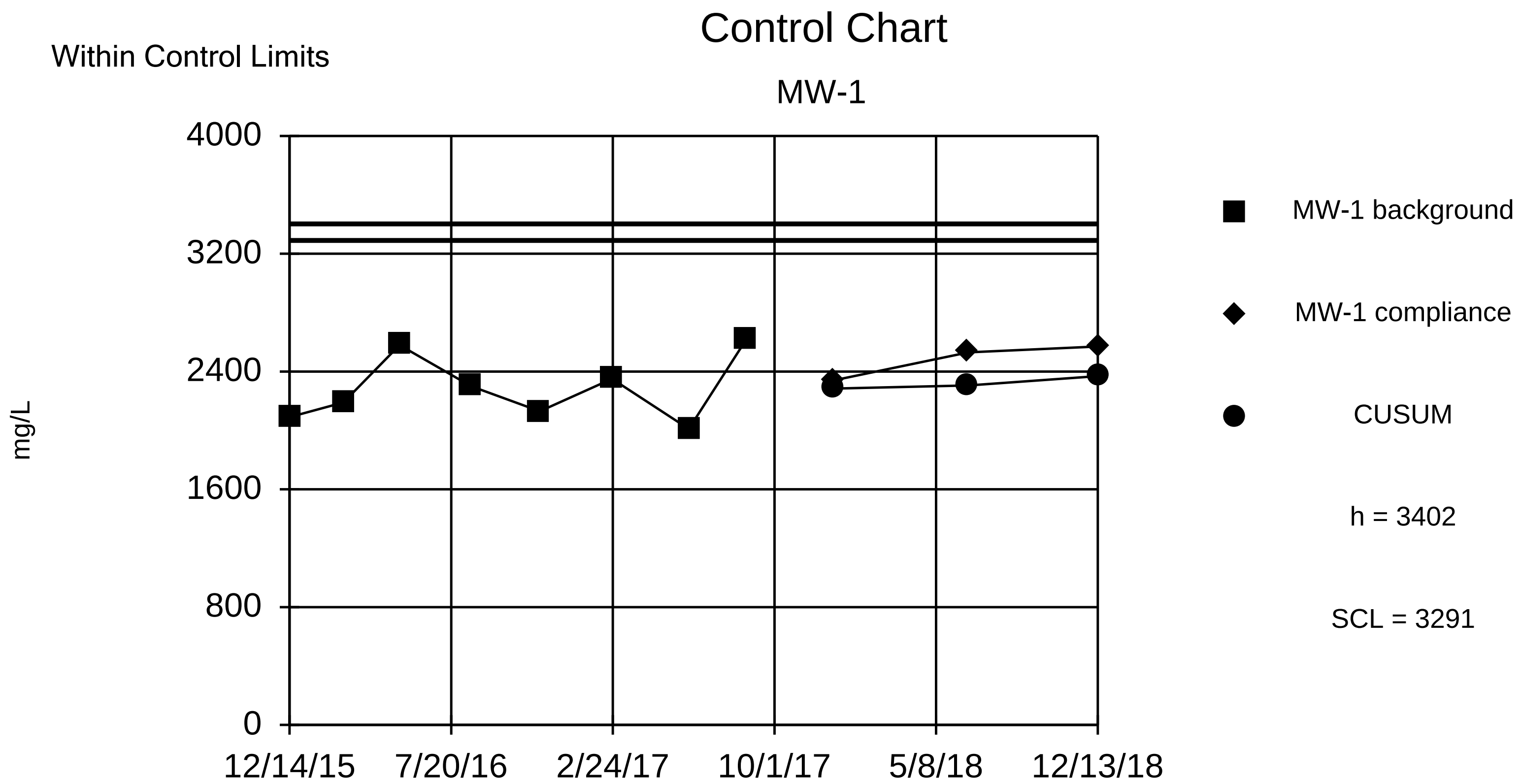
Intrawell Parametric



Background Data Summary: Mean=7.213, Std. Dev.=0.29, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9179, critical = 0.818. Report alpha = 0.01. Most recent point compared to limit.

Constituent: pH Analysis Run 1/4/2019 11:12 AM

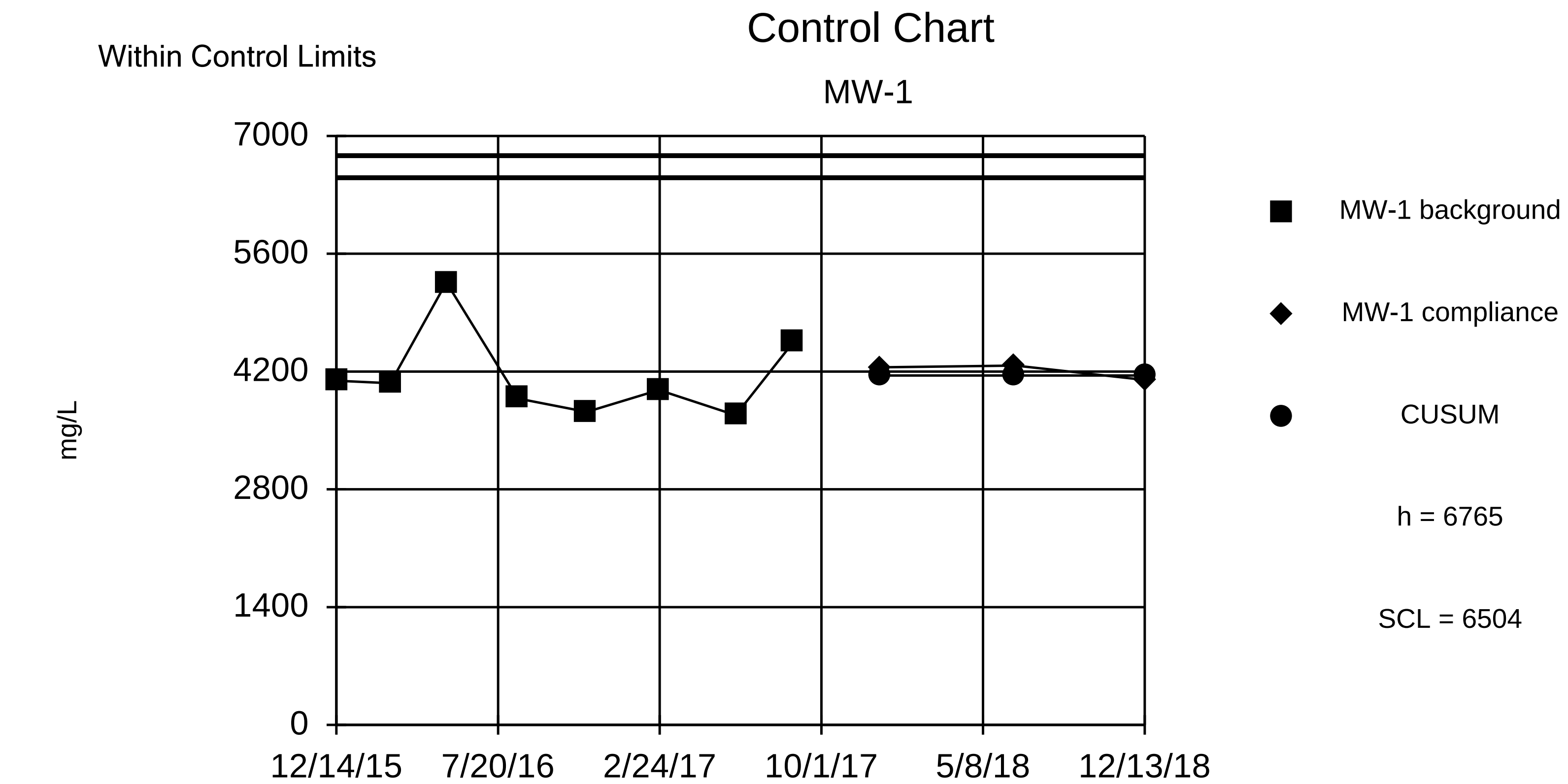
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.4.2019



Background Data Summary: Mean=2284, Std. Dev.=223.7, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9231, critical = 0.818. Report alpha = 0.006982. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Sulfate Analysis Run 1/4/2019 11:13 AM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.4.2019



Background Data Summary: Mean=4153, Std. Dev.=522.5, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8305, critical = 0.818. Report alpha = 0.006982. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

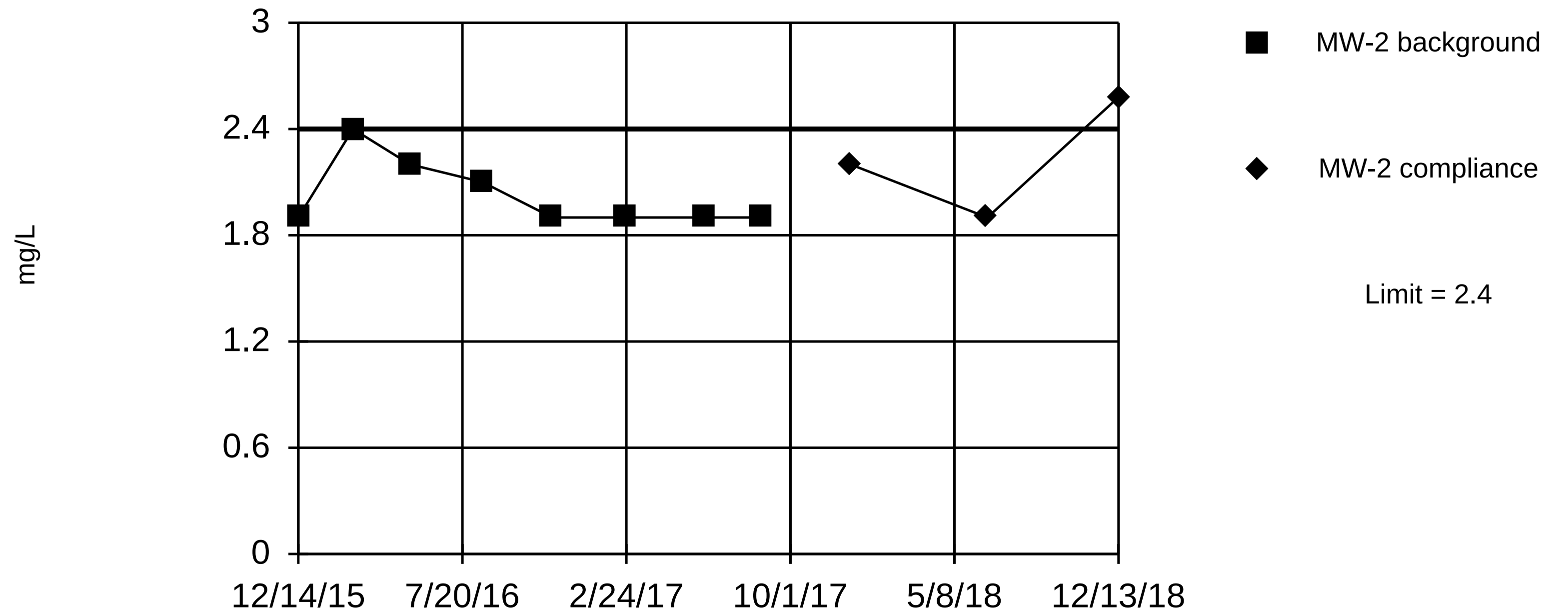
Constituent: Total Dissolved Solids   Analysis Run 1/4/2019 11:13 AM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.4.2019

Exceeds Limit

Prediction Limit

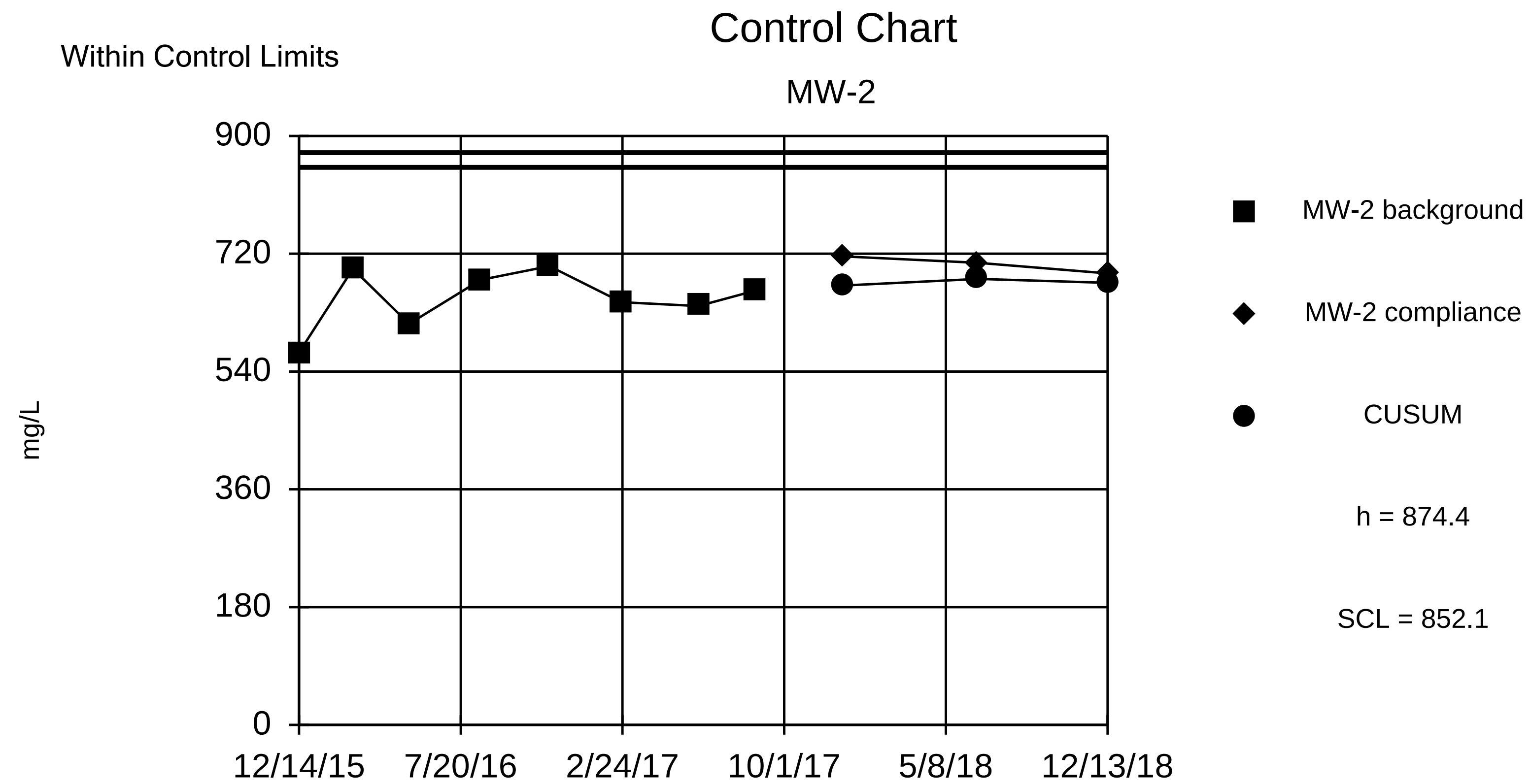
Intrawell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.05 alpha level. Limit is highest of 8 background values. Report alpha = 0.1111. Most recent point compared to limit. Insufficient data to test for seasonality: data were not deseasonalized.

Constituent: Boron Analysis Run 1/4/2019 11:17 AM

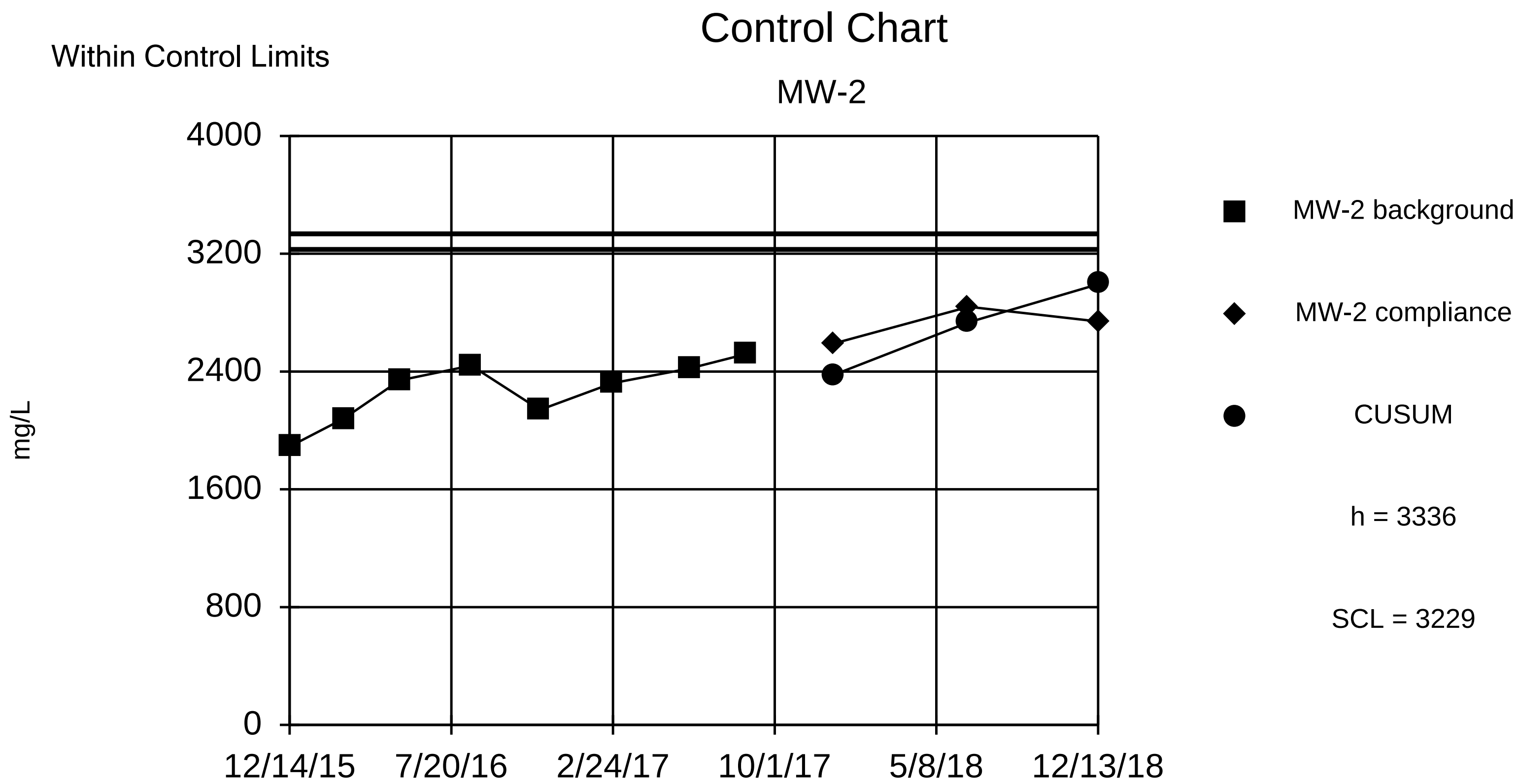
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.4.2019



Background Data Summary: Mean=651.3, Std. Dev.=44.62, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9396, critical = 0.818. Report alpha = 0.006982. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Calcium Analysis Run 1/4/2019 11:18 AM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.4.2019



Background Data Summary: Mean=2269, Std. Dev.=213.4, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9324, critical = 0.818. Report alpha = 0.006982. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Chloride Analysis Run 1/4/2019 11:19 AM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.4.2019

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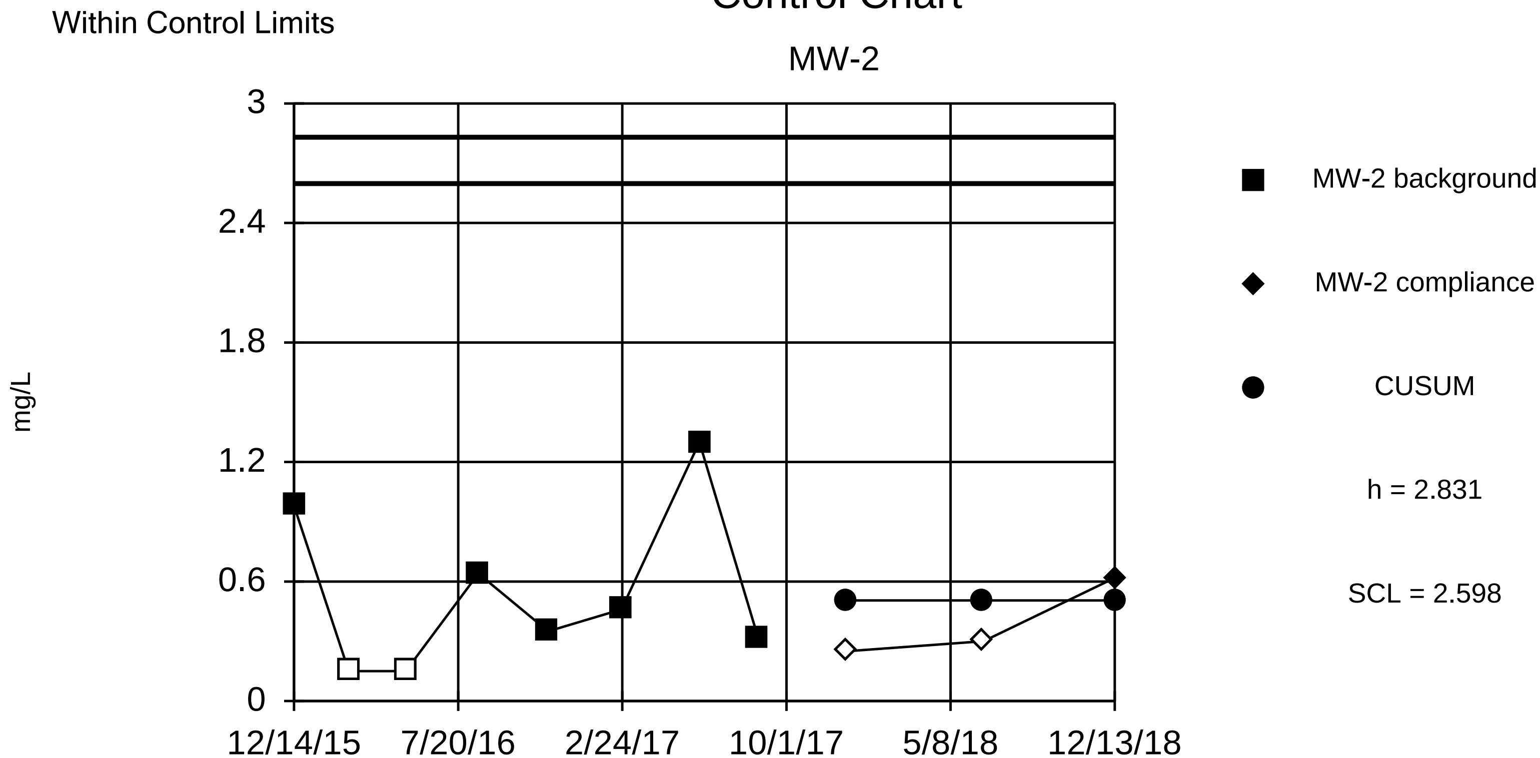
Hollow symbols indicate censored values.

Control Chart



Background Data Summary (after Cohen`s Adjustment): Mean=0.5048, Std. Dev.=0.4652, n=8, 25% NDs. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8855, critical = 0.818. Report alpha = 0.006982. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

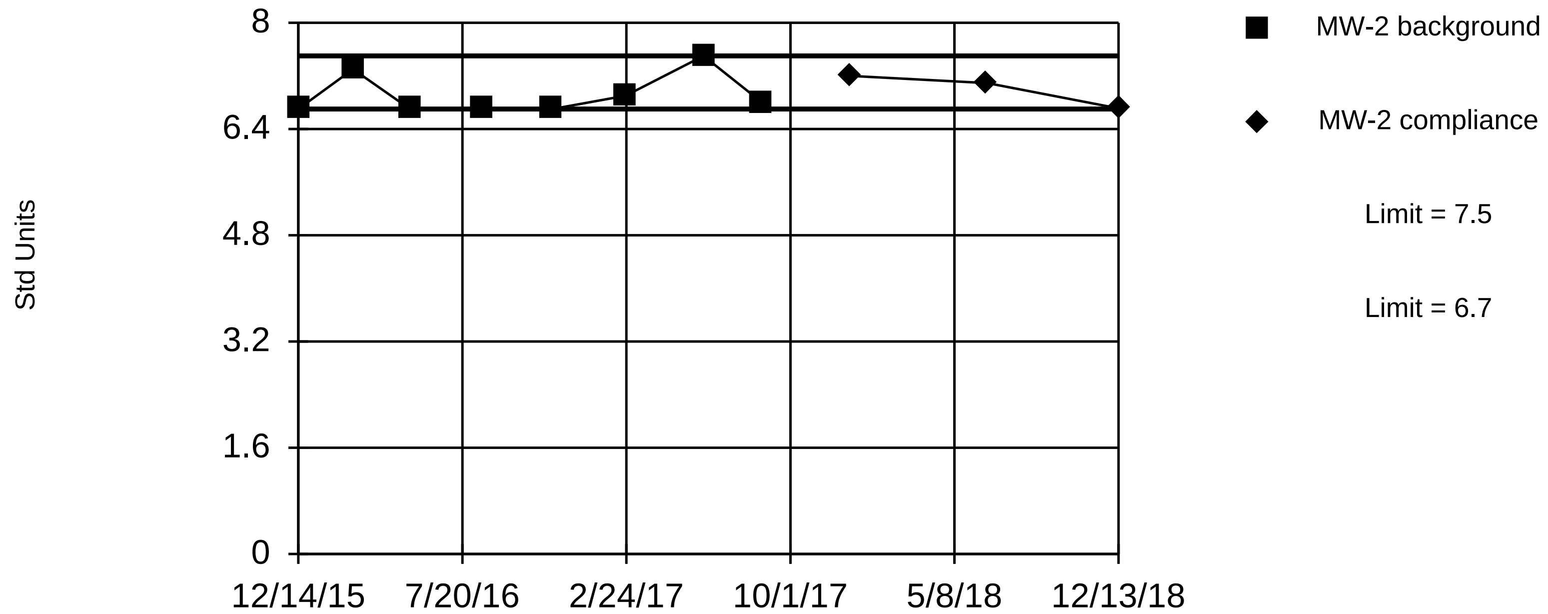
Constituent: Fluoride Analysis Run 1/4/2019 11:21 AM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.4.2019

Within Limits

Prediction Limit

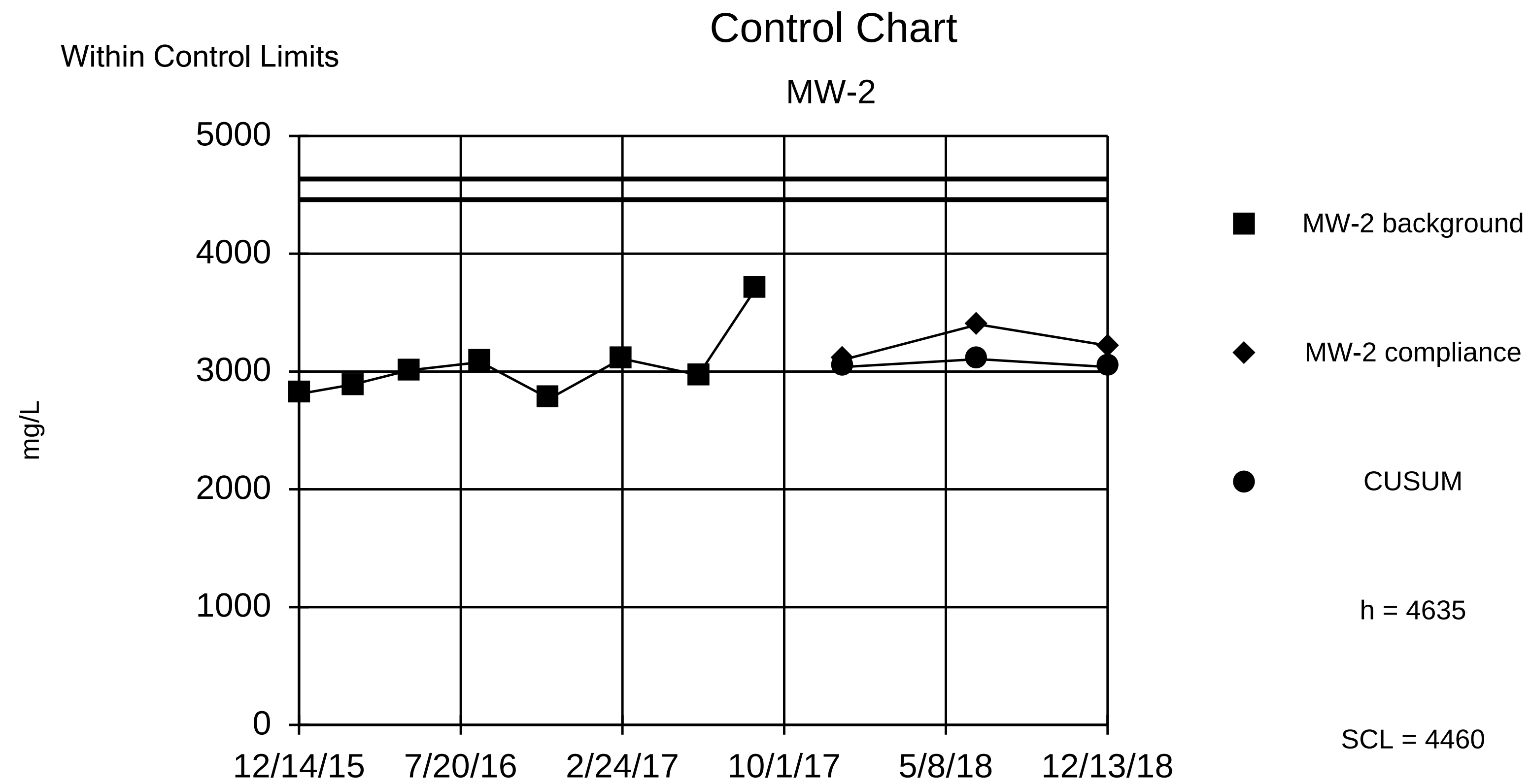
Intrawell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.05 alpha level. Limits are highest and lowest of 8 background values. Report alpha = 0.2222. Most recent point compared to limit. Insufficient data to test for seasonality: data were not deseasonalized.

Constituent: pH Analysis Run 1/4/2019 11:20 AM

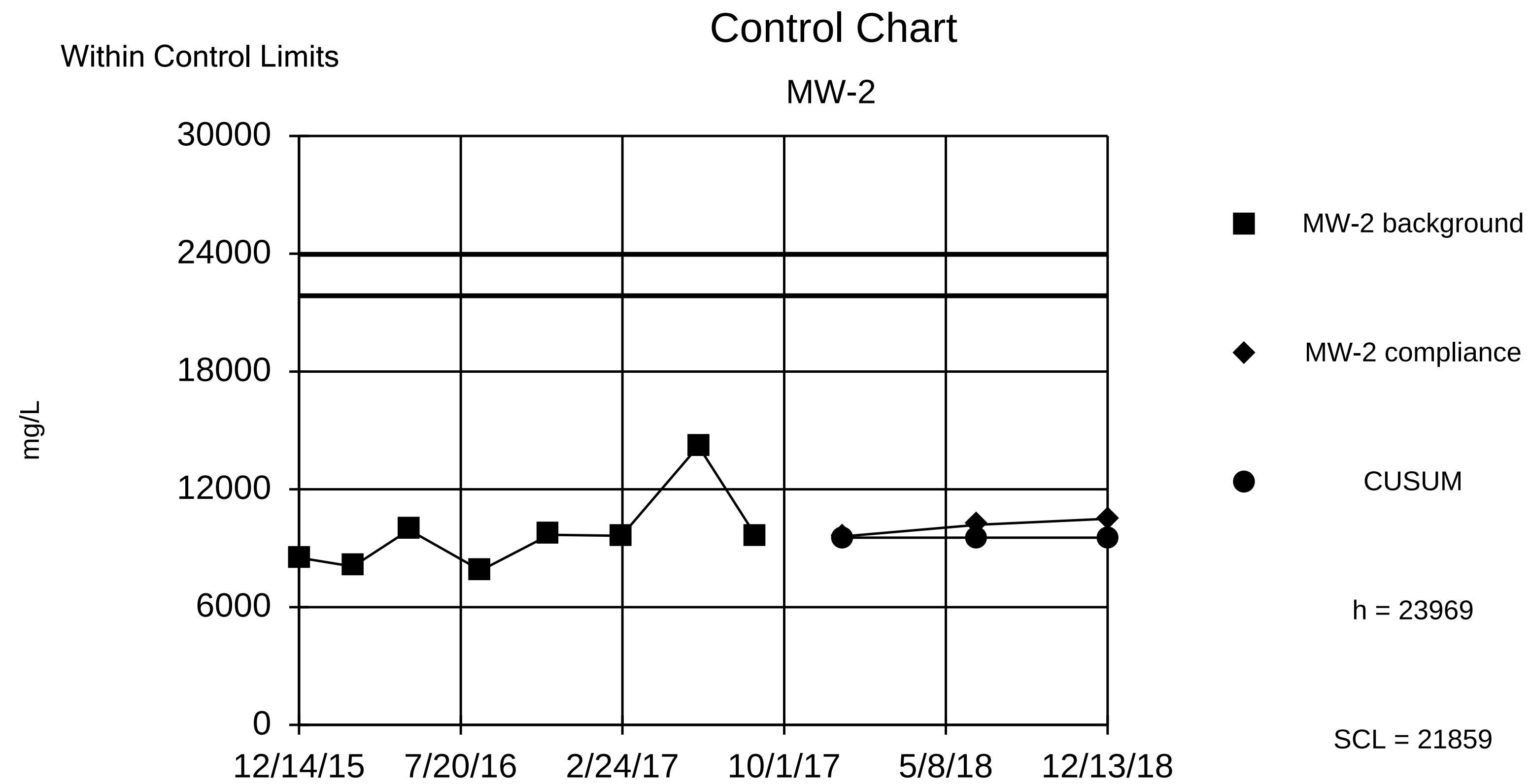
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.4.2019



Background Data Summary (based on square root transformation): Mean=55.12, Std. Dev.=2.592, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8189, critical = 0.818. Report alpha = 0.006982. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Sulfate Analysis Run 1/4/2019 11:20 AM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.4.2019



Background Data Summary (based on natural log transformation): Mean=9.163, Std. Dev.=0.1844, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.833, critical = 0.818. Report alpha = 0.006982. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

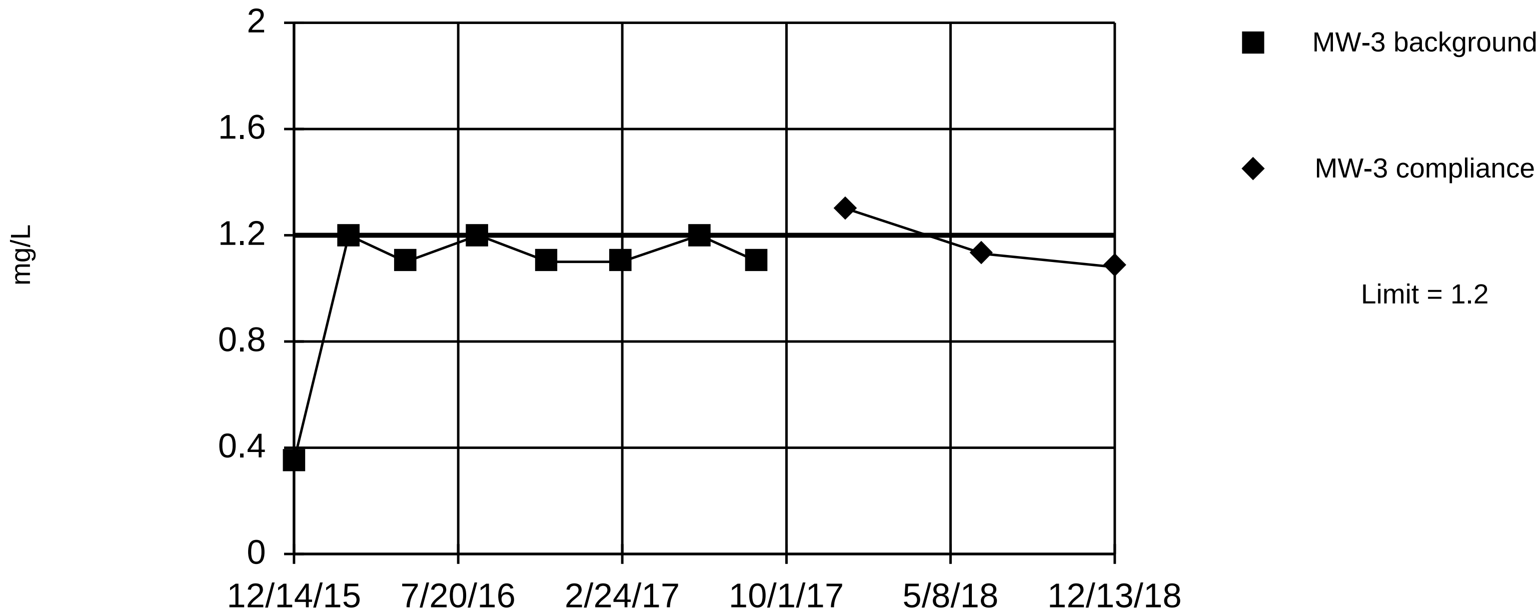
Constituent: Total Dissolved Solids Analysis Run 1/4/2019 11:21 AM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.4.2019

Within Limit

Prediction Limit

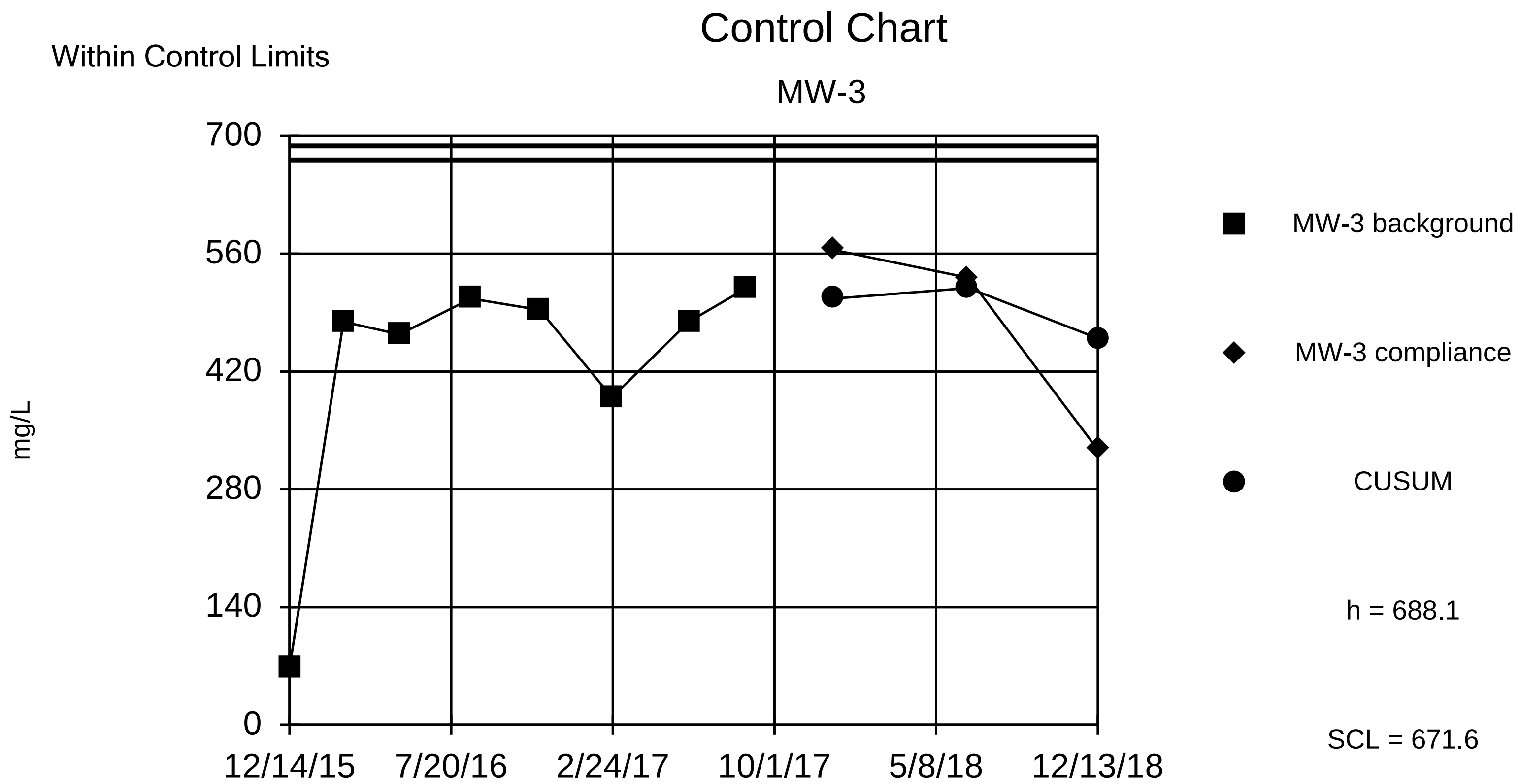
Intrawell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.05 alpha level. Limit is highest of 8 background values. Report alpha = 0.1111. Most recent point compared to limit. Insufficient data to test for seasonality: data were not deseasonalized.

Constituent: Boron Analysis Run 1/4/2019 11:24 AM

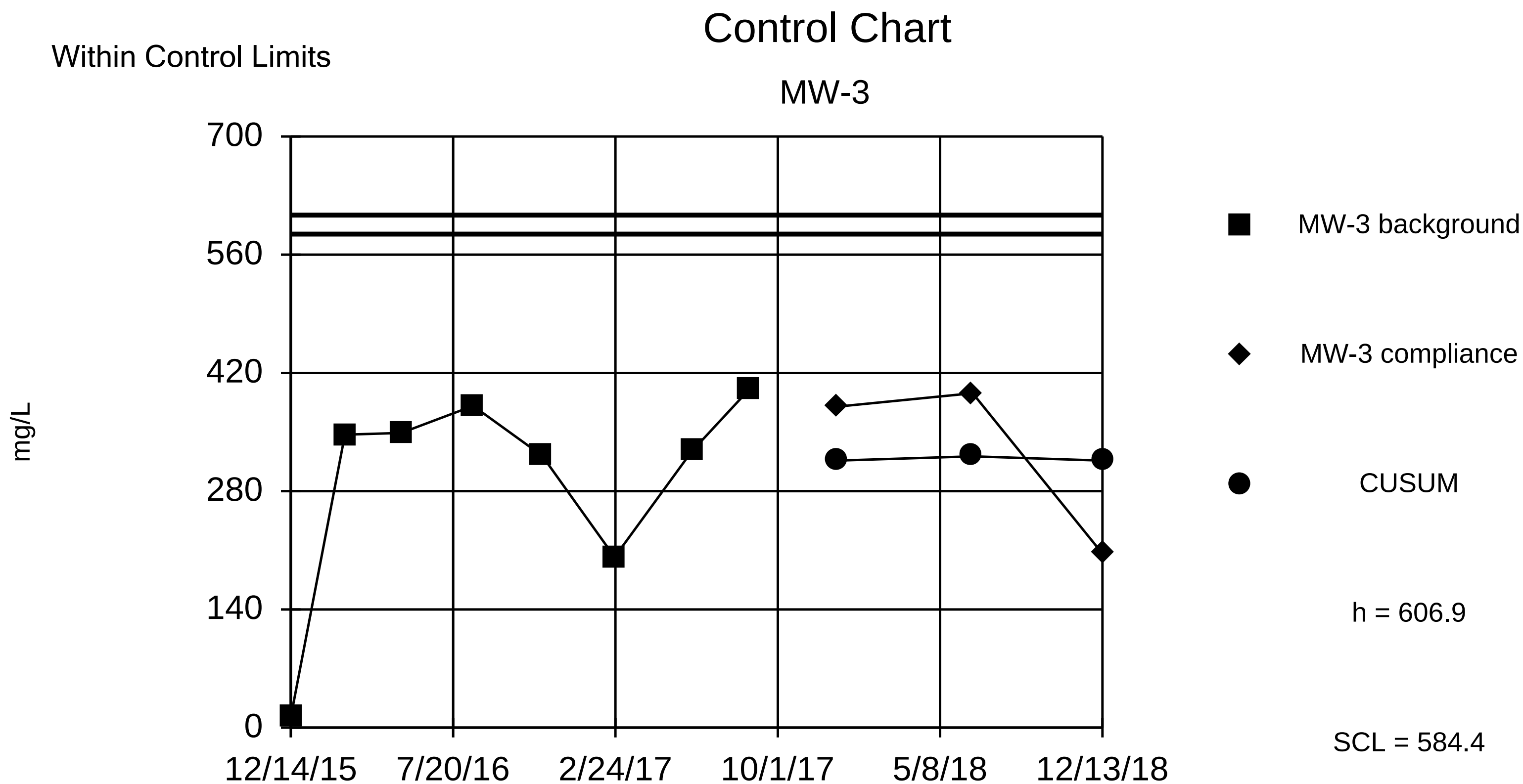
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.4.2019



Background Data Summary (based on cube transformation): Mean=9.7e7, Std. Dev.=4.6e7, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.828, critical = 0.818. Report alpha = 0.006982. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Calcium Analysis Run 1/4/2019 11:25 AM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.4.2019



Background Data Summary (based on square transformation): Mean=99968, Std. Dev.=53670, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8926, critical = 0.818. Report alpha = 0.006982. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Chloride   Analysis Run 1/4/2019 11:27 AM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.4.2019

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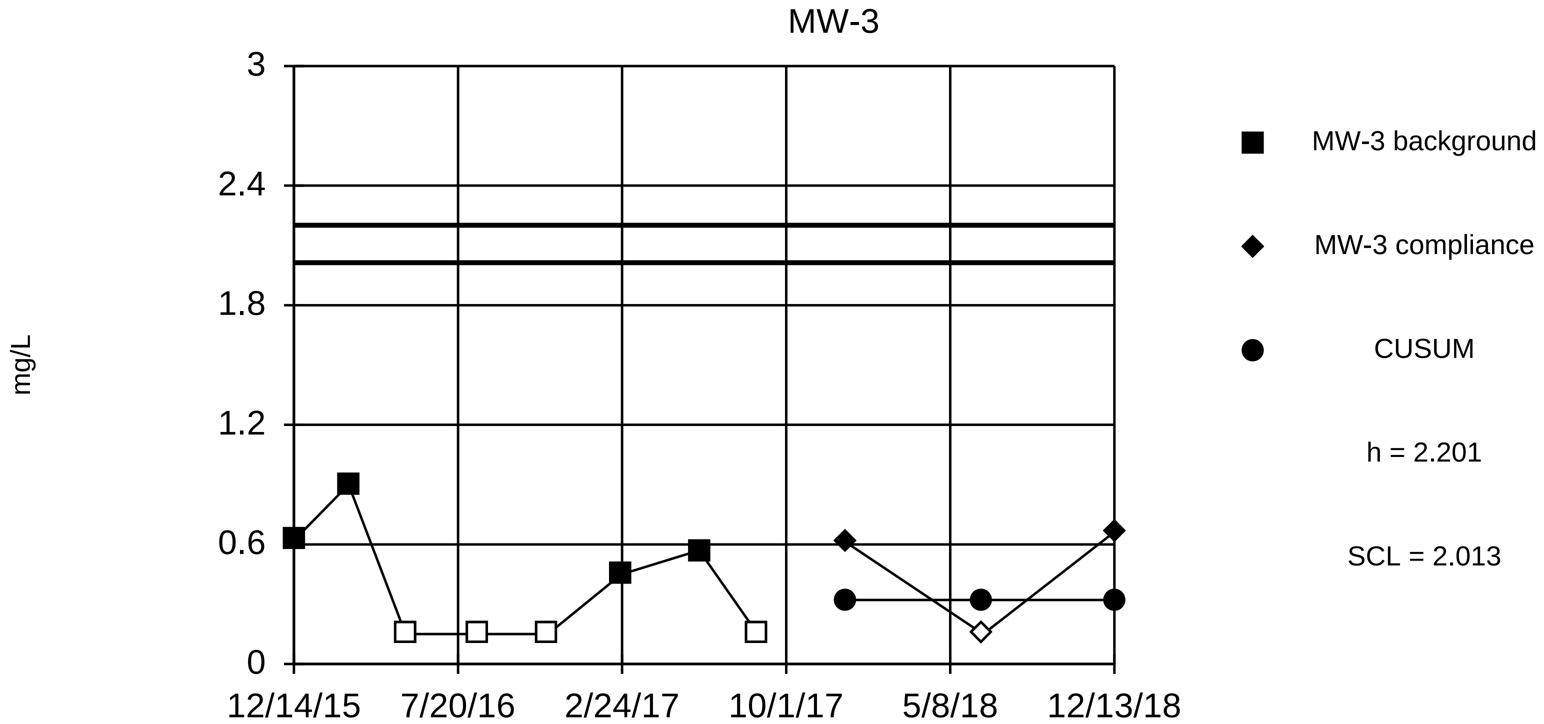
Hollow symbols indicate censored values.

Control Chart

Within Control Limits



Background Data Summary (after Cohen`s Adjustment): Mean=0.3213, Std. Dev.=0.376, n=8, 50% NDs. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8281, critical = 0.818. Report alpha = 0.006982. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

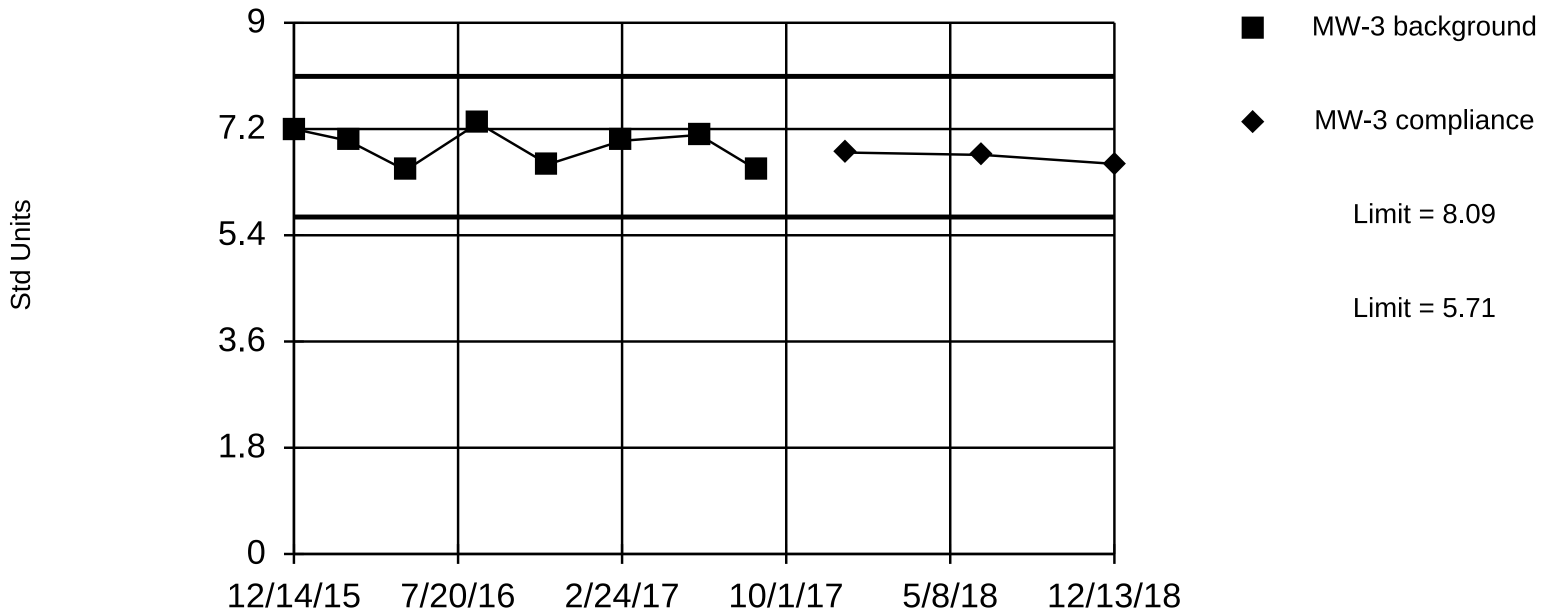
Constituent: Fluoride   Analysis Run 1/4/2019 11:37 AM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.4.2019

Within Limits

Prediction Limit

Intrawell Parametric

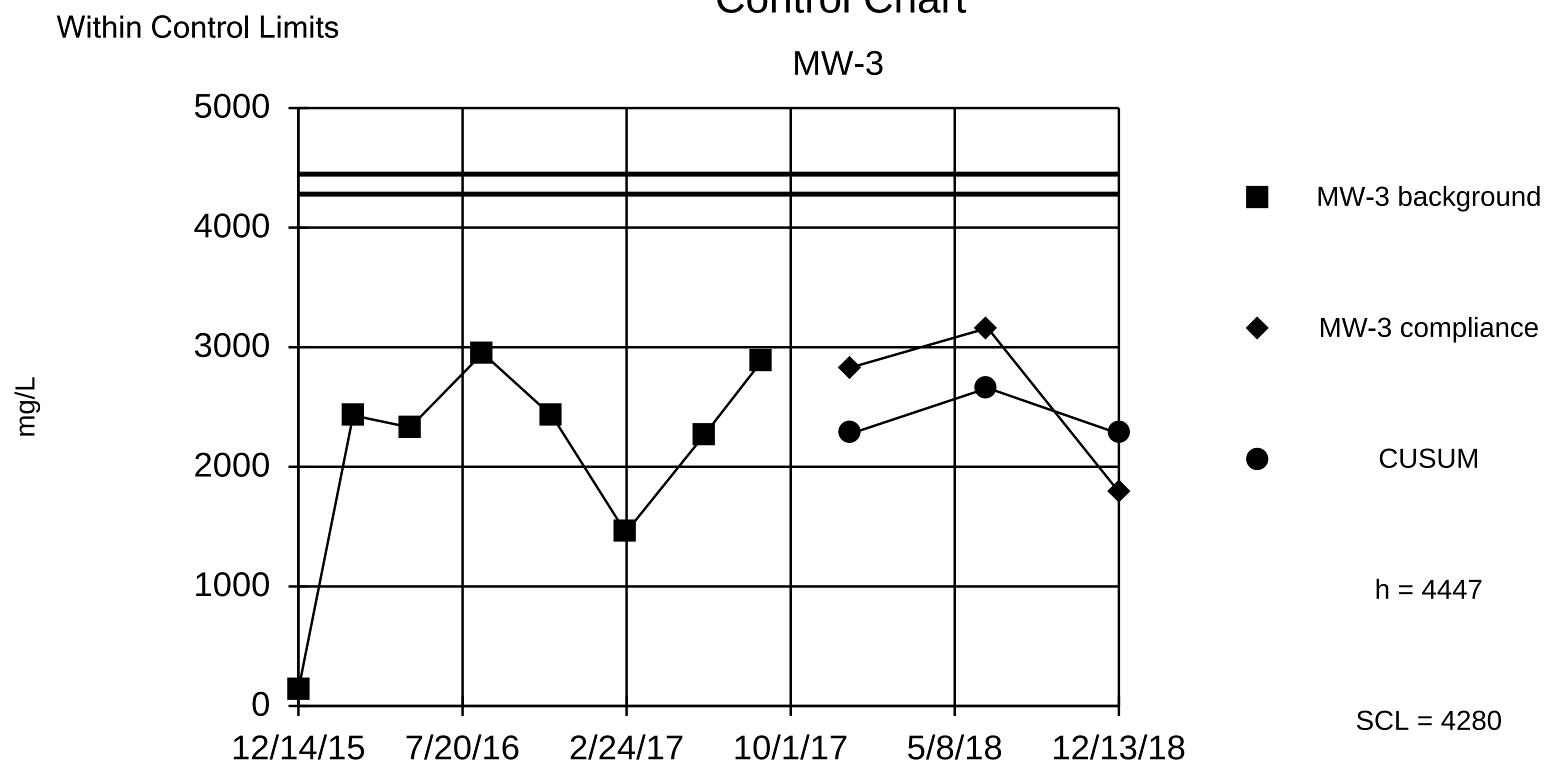


Background Data Summary: Mean=6.9, Std. Dev.=0.3207, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8729, critical = 0.818. Report alpha = 0.01. Most recent point compared to limit.

Constituent: pH Analysis Run 1/4/2019 11:27 AM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.4.2019

Control Chart



Background Data Summary (based on square transformation): Mean=5184141, Std. Dev.=2918787, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9173, critical = 0.818. Report alpha = 0.006982. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

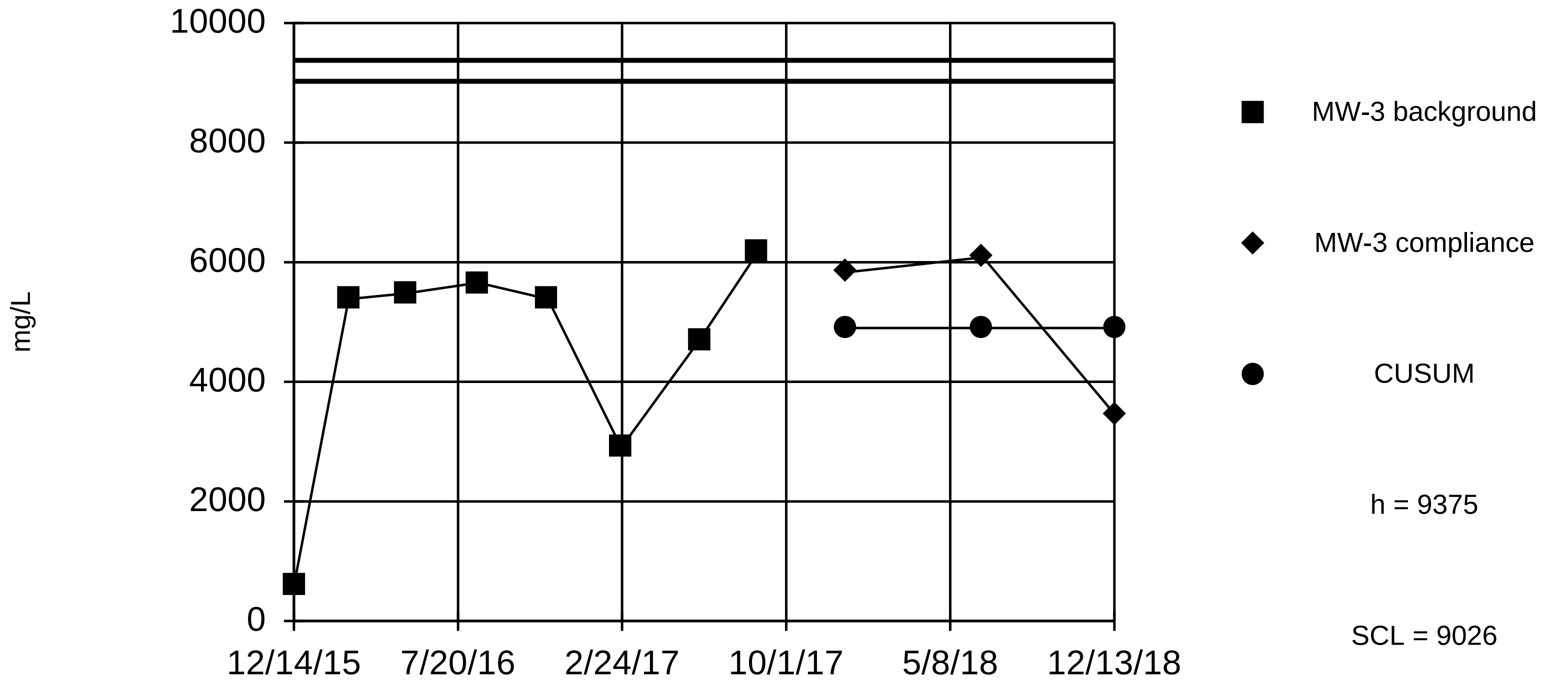
Constituent: Sulfate   Analysis Run 1/4/2019 11:32 AM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.4.2019

Within Control Limits

Control Chart

MW-3

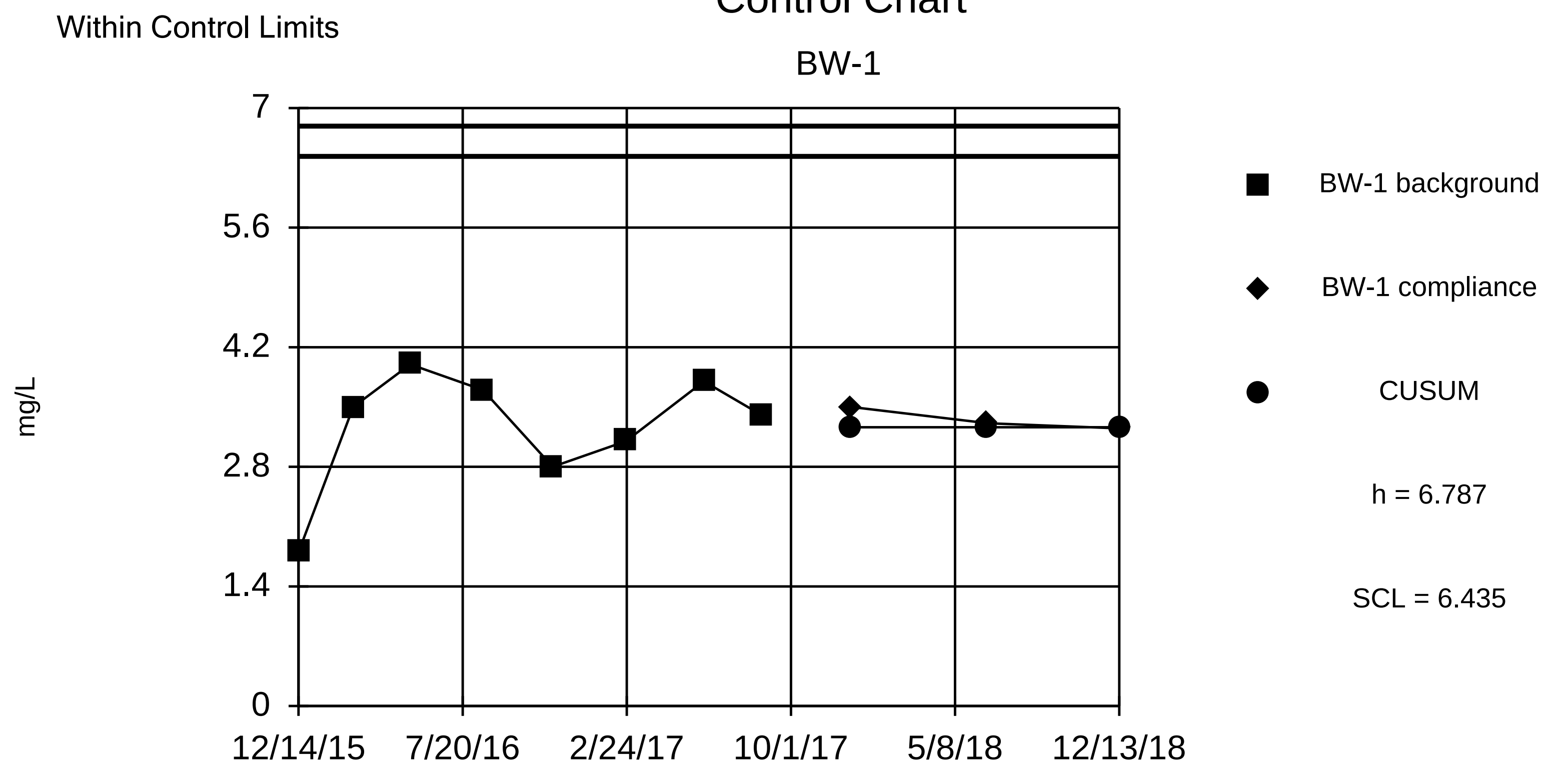


Background Data Summary (based on square transformation): Mean=2.4e7, Std. Dev.=1.3e7, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8631, critical = 0.818. Report alpha = 0.006982. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Total Dissolved Solids Analysis Run 1/4/2019 11:35 AM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.4.2019

Control Chart

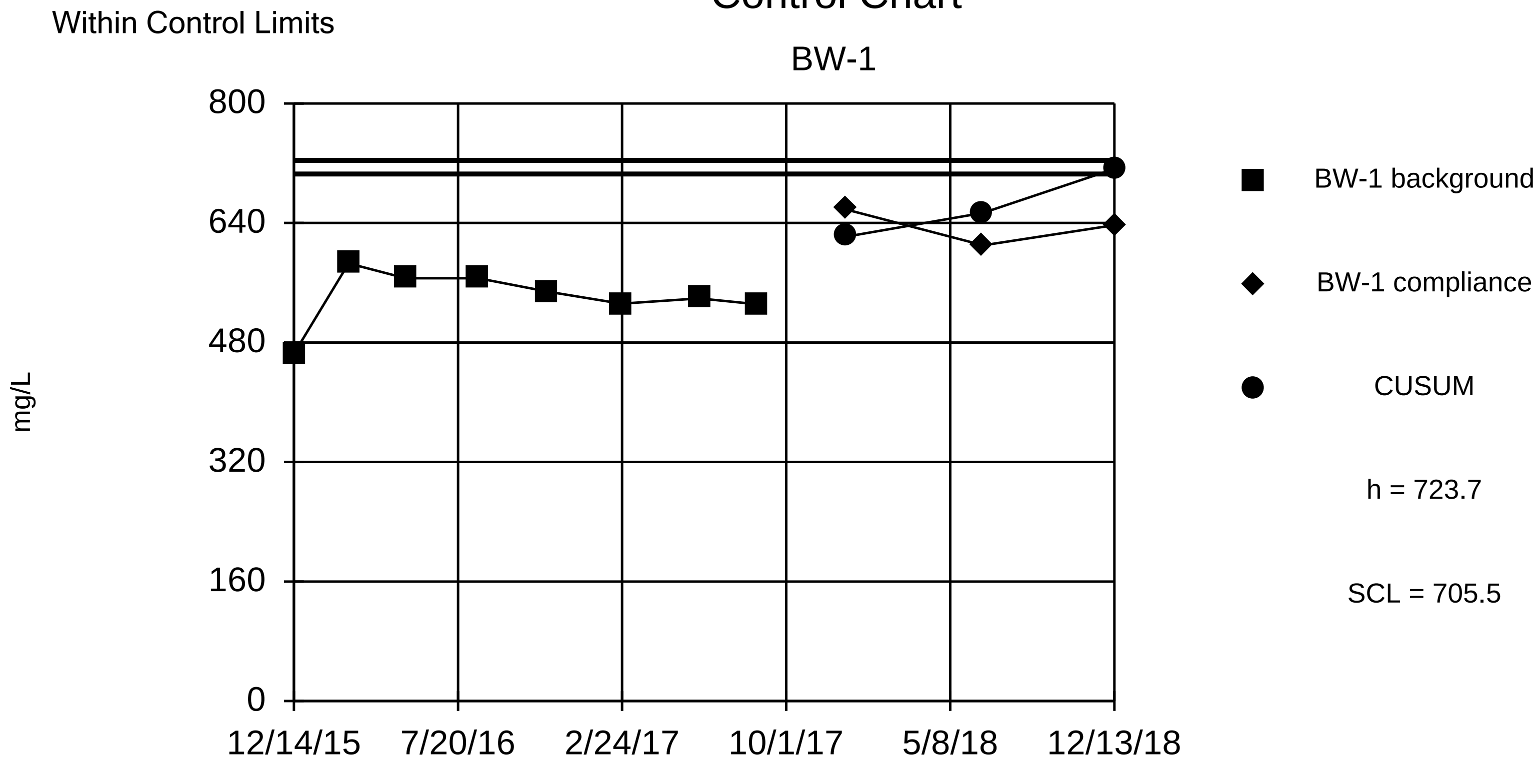


Background Data Summary: Mean=3.263, Std. Dev.=0.705, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8884, critical = 0.818. Report alpha = 0.006982. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Boron Analysis Run 1/4/2019 11:39 AM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.4.2019

Control Chart



Background Data Summary: Mean=541.6, Std. Dev.=36.41, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.887, critical = 0.818. Report alpha = 0.006982. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Calcium   Analysis Run 1/4/2019 11:41 AM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.4.2019

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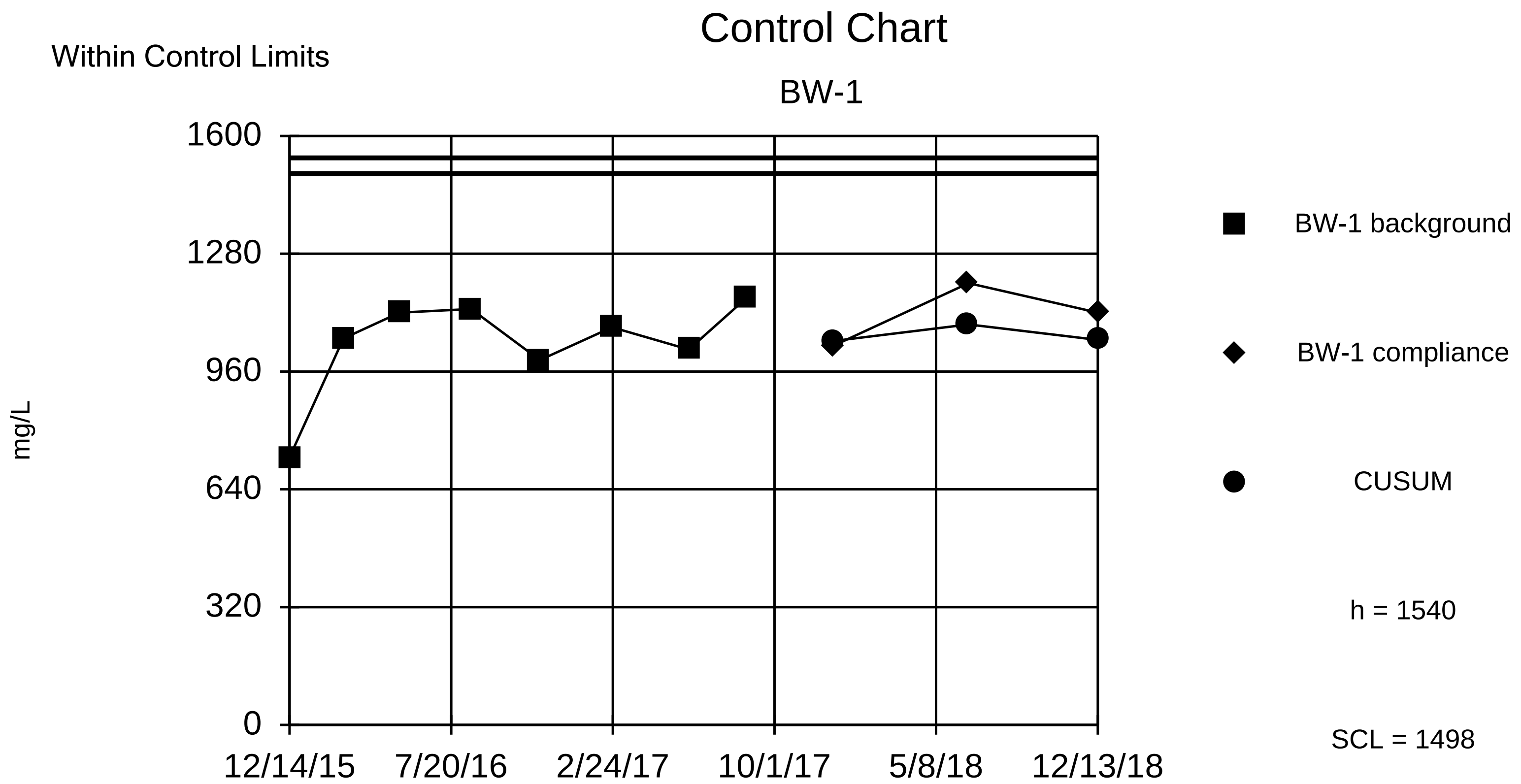

Background Data Summary (based on square transformation): Mean=1087101, Std. Dev.=257064, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8544, critical = 0.818. Report alpha = 0.006982. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Chloride Analysis Run 1/4/2019 11:42 AM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.4.2019

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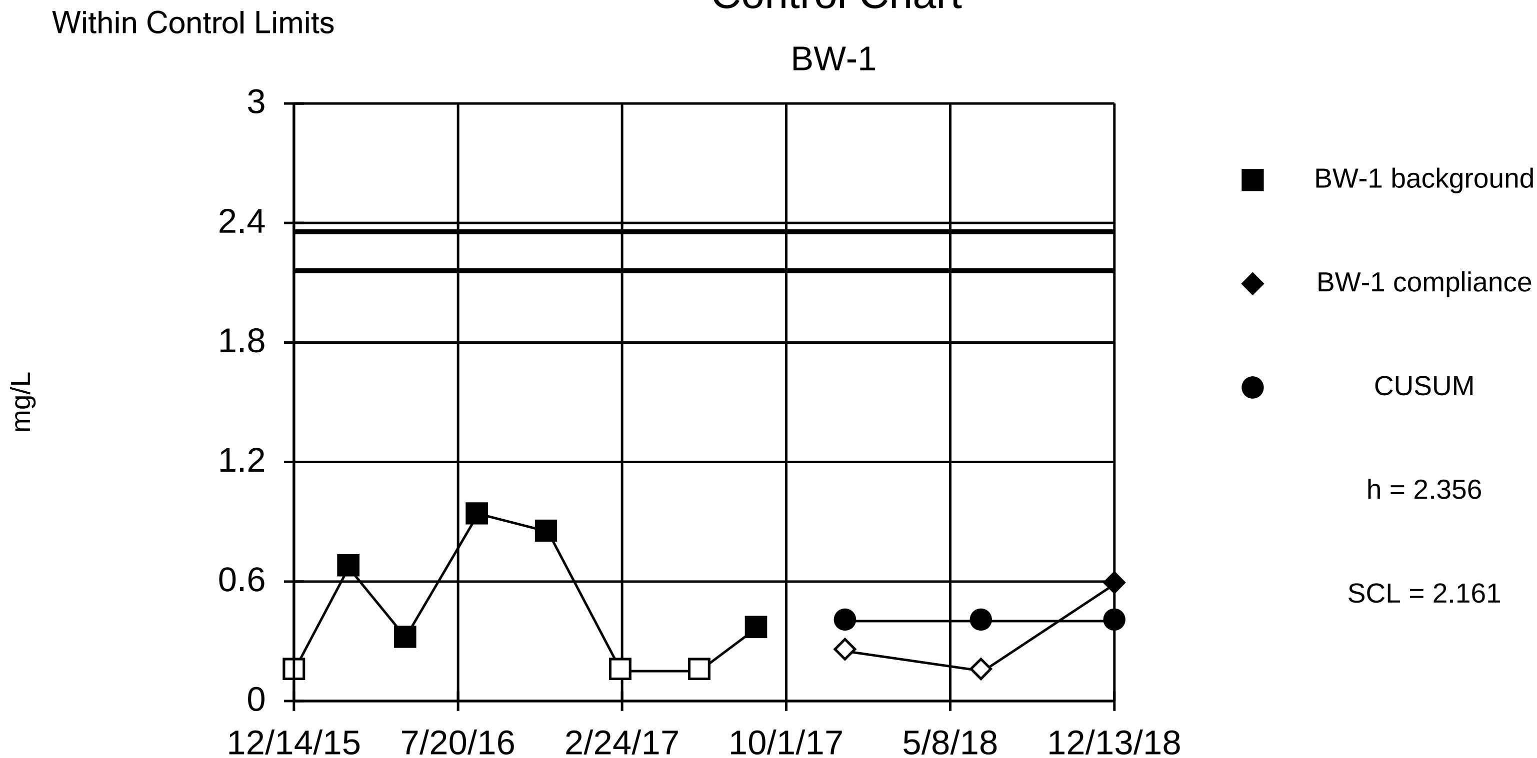
Hollow symbols indicate censored values.

Control Chart



Background Data Summary (after Cohen`s Adjustment): Mean=0.4018, Std. Dev.=0.3908, n=8, 37.5% NDs. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8478, critical = 0.818. Report alpha = 0.006982. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

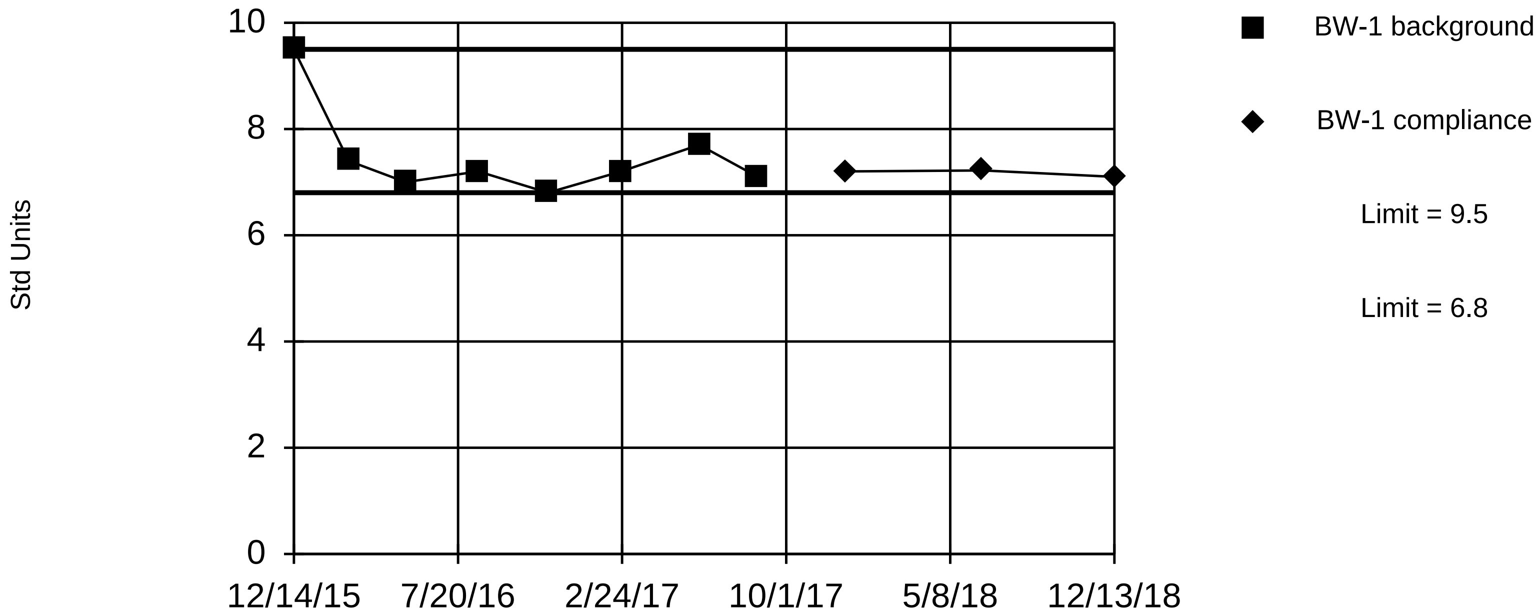
Constituent: Fluoride   Analysis Run 1/4/2019 11:45 AM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.4.2019

Within Limits

Prediction Limit

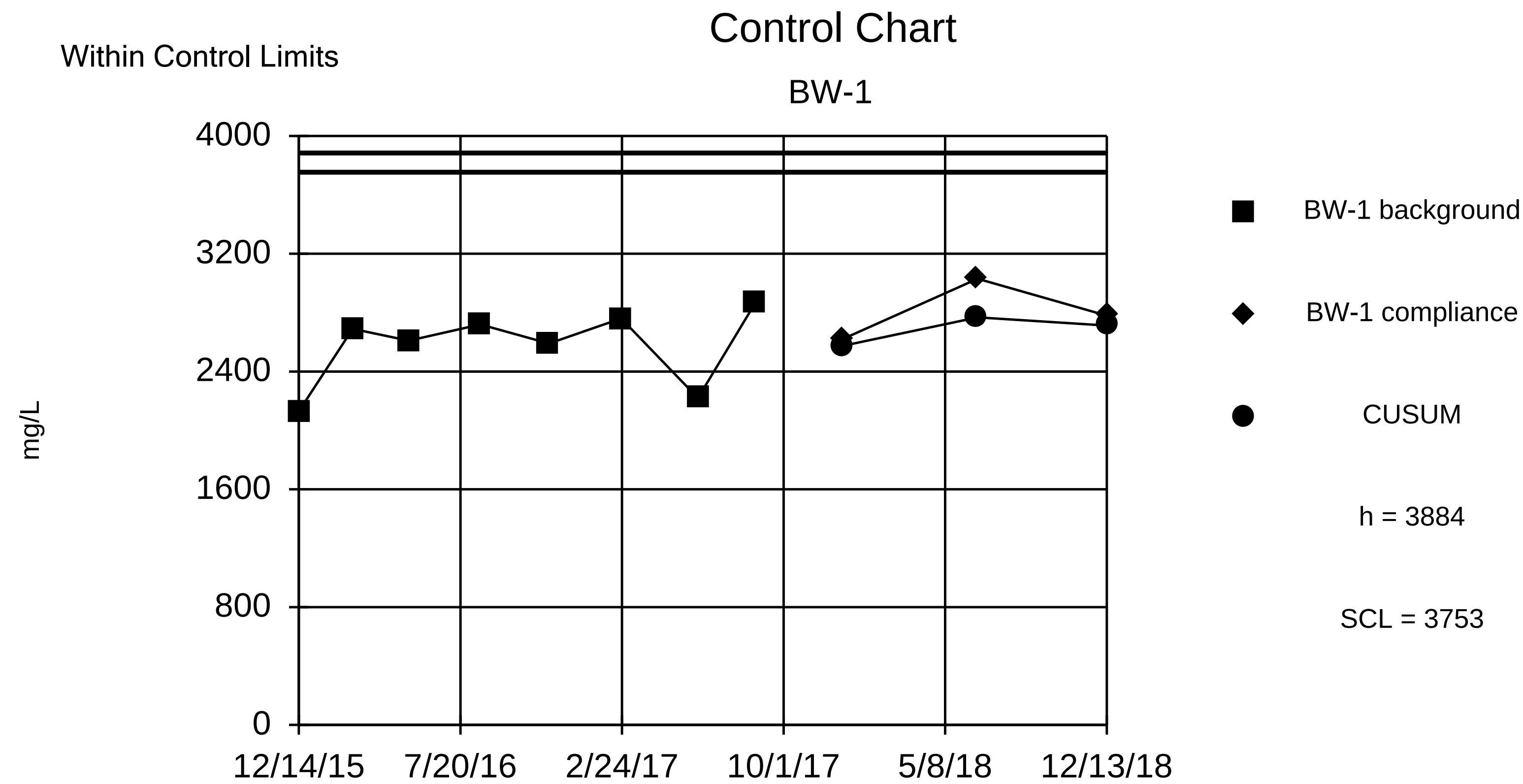
Intrawell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.05 alpha level. Limits are highest and lowest of 8 background values. Report alpha = 0.2222. Most recent point compared to limit. Insufficient data to test for seasonality: data were not deseasonalized.

Constituent: pH   Analysis Run 1/4/2019 11:43 AM

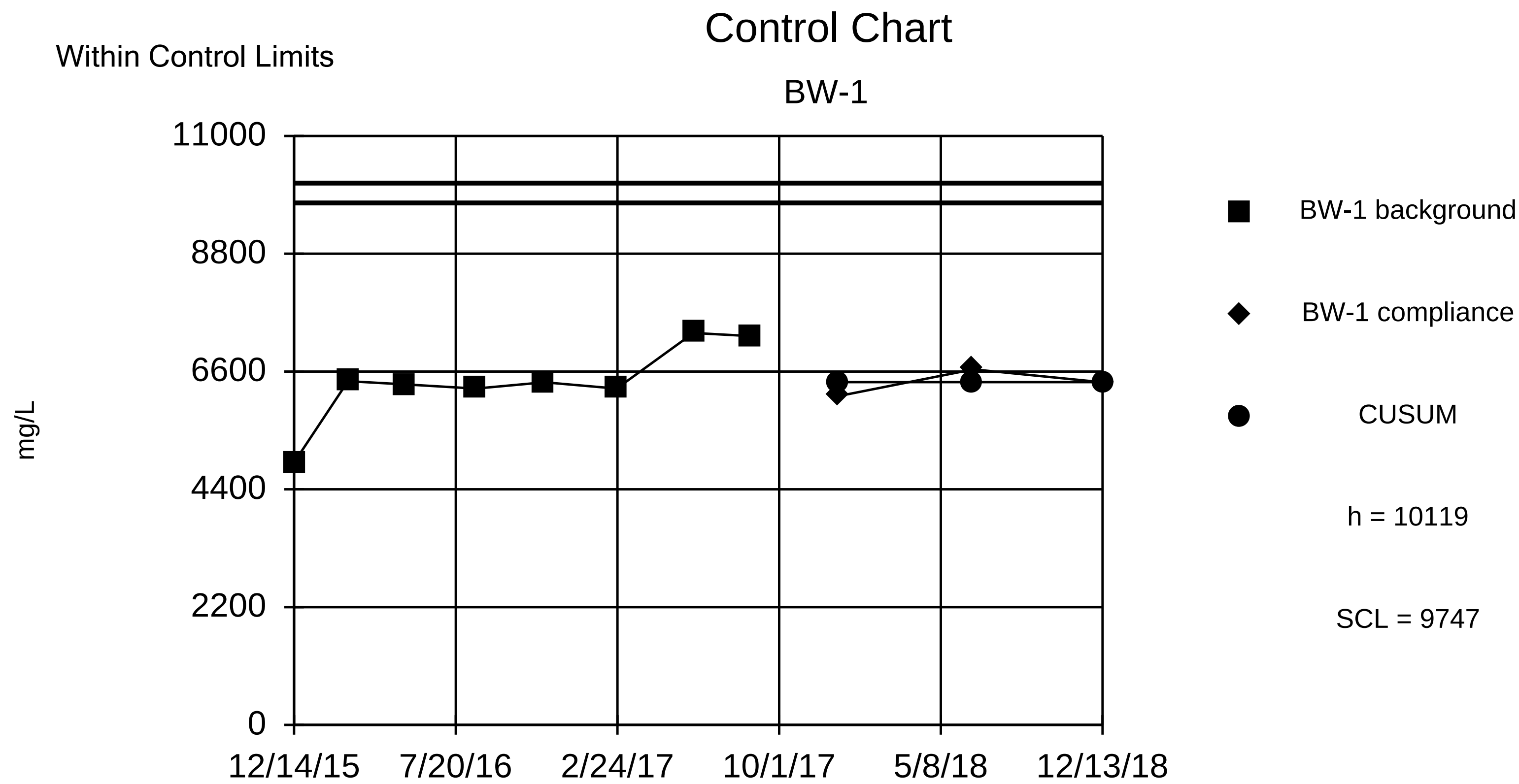
Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.4.2019



Background Data Summary: Mean=2574, Std. Dev.=262.1, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8672, critical = 0.818. Report alpha = 0.006982. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Sulfate Analysis Run 1/4/2019 11:44 AM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.4.2019



Background Data Summary: Mean=6403, Std. Dev.=743.2, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8391, critical = 0.818. Report alpha = 0.006982. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Total Dissolved Solids   Analysis Run 1/4/2019 11:45 AM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.4.2019

APPENDIX F

DECEMBER 2018 ALTERNATE SOURCE DEMONSTRATIONS:

FLUORIDE IN MW-1

BORON IN MW-2

January 31, 2019
SCS Project 16215106.00

Mr. Darryl Sparks
Compliance Manager
NAES Corporation
2161 Rattlesnake Road
Riesel, Texas 76682

Subject: Alternate Source Demonstration for Fluoride in MW-1 and Boron in MW-2
2018 Annual Groundwater Monitoring and Corrective Action Report
Sandy Creek Energy Station
McLennan County, Texas

Dear Mr. Sparks:

On behalf of the Sandy Creek Energy Station (SCES), SCS Engineers (SCS) is submitting this Alternate Source Demonstration (ASD) in accordance with the site Groundwater Sampling and Analysis Plan (GWSAP) prepared by SCS, dated March 2, 2016, and Coal Combustion Residual Rule (CCR) 40 CFR §257.94(e)(2) for fluoride and boron detections in groundwater monitoring wells MW-1 and MW-2, respectively. During the December 2018 groundwater monitoring event, fluoride was detected in MW-1 at 0.585 mg/L, and boron was detected in MW-2 at 2.58 mg/L. These ASDs are being submitted to demonstrate that the fluoride and boron detections likely result from natural variation in groundwater quality at the site, and are not indicative of impacts from the SCES landfill. In accordance with 40 CFR §257.94(e)(2), these ASDs are being submitted within 90 days of detecting an unconfirmed statistically significant increase (SSI) above background values.

Project Background

SCES is a pulverized coal-fired electric generation facility which operates a landfill for disposal of dry scrubber ash and bottom ash generated during the coal combustion process at the facility. Incidental wastes generated during the operation of the facility may also be disposed in the landfill, as described in the initial registration notification to TCEQ and the most recent version of the Operations Plan for the facility. The landfill is currently comprised of two CCR disposal cells, Cells 1 and 2, which commenced receiving waste in early 2013 and October 2014, respectively. The approximate area of Cells 1 and 2 are 10.0 and 14.3 acres, respectively.

In accordance with 40 CFR §257 Appendix III and IV, the list of constituents for monitoring at SCES includes 18 inorganic compounds, total dissolved solids, radium-226, and radium-228. Currently, all monitoring wells are sampled and analyzed for 40 CFR §257 Appendix III constituents, in accordance with 40 CFR §257.94(a).

December 2018 Fluoride and Boron Detections

Fluoride (0.585 mg/L) and boron (2.58 mg/L) were detected in MW-1 and MW-2, respectively, during the December 2018 semiannual groundwater monitoring event.

Naturally Occurring Fluoride and Boron in Texas Soils

The Texas Commission on Environmental Quality (TCEQ) Texas-Specific Soil Background Concentration (TSBC) for boron is 30 mg/kg (equivalent mg/L) in soil (see attached TCEQ TSBC guidance). The TCEQ TSBC for fluoride is 190 mg/kg. We note that these naturally-occurring median boron and fluoride concentrations expected in Texas soils are more than an order of magnitude greater than the concentrations that are the subject of this ASD, detected in groundwater on December 13, 2018.

Statistical Analysis

Initial statistical analysis of fluoride in MW-1 and boron in MW-2 included the use of non-parametric prediction limits, using background data collected from only each respective monitoring well. This test is appropriate because the background data pools for fluoride in MW-1 boron in MW-2 are each non-normally distributed. Therefore, the intrawell statistical limit for each constituent-well pair is represented as the highest of the eight background values from fluoride in MW-1 and boron in MW-2 (see “Intrawell Limit” in Table 1).

Since the December 2018 laboratory results for fluoride in MW-1 and boron in MW-2 exceeded their respective intrawell limits, additional statistical evaluation was performed in accordance with 40 CFR §257.94(e)(2). This additional analysis consisted of calculating interwell parametric prediction limits (see “Interwell Limit” in Table 1 and attachments). This test is commonly used to provide a comparison between a detection in a downgradient monitoring well and a statistical limit derived from background data from one or more upgradient monitoring wells. If the detection falls below the interwell statistical limit, it can be inferred that the detection likely resulted from natural variations in groundwater quality at the site.

Table 1 – December 2018 Unconfirmed SSIs (mg/L)

MW- ID	Constituent	Lab Result	Intrawell Limit	Interwell Limit
MW-1	Fluoride	0.585	0.4	1.187
MW-2	Boron	2.58	2.4	4.679

Conclusion

As a result of this analysis comparing upgradient to downgradient data, the interwell statistical limits were raised above the December 2018 laboratory results for fluoride in MW-1 and boron in MW-2, respectively. The constituents appear to be coming from a non-landfill, upgradient source, so no further action is recommended. The detections are most likely a naturally-derived component of the site geology, which can result in a natural variation in groundwater quality.

Closing

Attached are the interwell statistical graphs and data, as well as the ANOVA calculations demonstrating a lack of significant spatial variation of the constituents between upgradient and downgradient wells.

SCS recommends that the facility remain in detection monitoring, in accordance with 40 CFR §257.94, as these ASDs satisfy the 90-day demonstration period requirement outlined in 40 CFR §257.94(e)(2). Please contact Jim Lawrence at (817) 358-6106 if you have comments or require additional information.

Sincerely,

Doug Steen
Staff Professional
SCS ENGINEERS
TBPE Registration No. F-3407

Brett DeVries, Ph.D., P.E.
Project Engineer
SCS ENGINEERS

James Lawrence, P.G.
Project Director
SCS ENGINEERS

Attachments: Interwell Statistical Graphs and Data
ANOVA Calculations and Data
TCEQ Texas-Specific Soil Background Concentrations Guidance

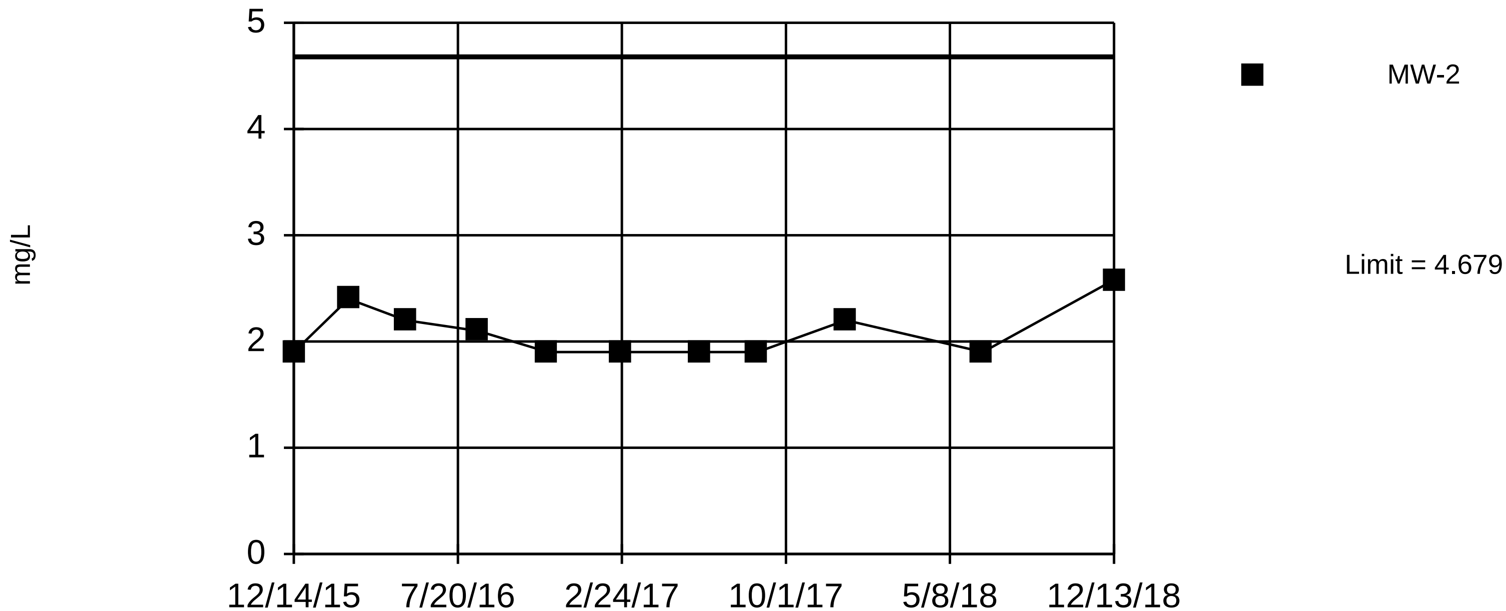
STATE OF TEXAS
James Lawrence
Discipline
License #
541
LICENSED
PROFESSIONAL GEOSCIENTIST

1-31-2019

Within Limit

Prediction Limit

Interwell Parametric



Background Data Summary: Mean=3.263, Std. Dev.=0.705, n=8. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8884, critical = 0.818. Report alpha = 0.05. Most recent point compared to limit.

Constituent: Boron Analysis Run 1/4/2019 3:23 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.4.2019

Prediction Limit

Constituent: Boron (mg/L) Analysis Run 1/4/2019 3:23 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.4.2019

	MW-2	BW-1 (bg)
12/14/2015	1.9	1.8
2/25/2016	2.4	3.5
5/11/2016	2.2	4
8/16/2016	2.1	3.7
11/17/2016	1.9	2.8
2/23/2017	1.9	3.1
6/7/2017	1.9	3.8
8/24/2017	1.9	3.4
12/20/2017	2.2	
6/21/2018	1.9	
12/13/2018	2.58	

Non-Parametric ANOVA

Constituent: Boron   Analysis Run 1/4/2019 3:22 PM
Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.4.2019

For observations made between 12/14/2015 and 12/13/2018, the non-parametric analysis of variance test indicates a DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 7.667

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 2 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 7.425
Adjusted Kruskal-Wallis statistic (H') = 7.667

The contrast test was performed to determine if any compliance group concentration was significantly higher than the background concentration. The contrast test indicates statistical significance in none of the compliance wells.

Contrast table:

Well	Difference	Contrast	Significant?
MW-2	-7.125	4.299	No

The critical (contrast) value was computed with 1 degree of freedom and a 5% error level for each well comparison. (Note: In this case, with Anova indicating differences that are not reflected in the contrast test, it should be concluded that it is the median of the Background data which is significantly higher.)

Non-parametric test used in lieu of parametric anova because Levene's Equality of Variance test failed at the 0.05 alpha level.

Non-Parametric ANOVA

Constituent: Boron (mg/L) Analysis Run 1/4/2019 3:22 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.4.2019

	BW-1 (bg)	MW-2
12/14/2015	1.8	1.9
2/25/2016	3.5	2.4
5/11/2016	4	2.2
8/16/2016	3.7	2.1
11/17/2016	2.8	1.9
2/23/2017	3.1	1.9
6/7/2017	3.8	1.9
8/24/2017	3.4	1.9
12/20/2017		2.2
6/21/2018		1.9
12/13/2018		2.58

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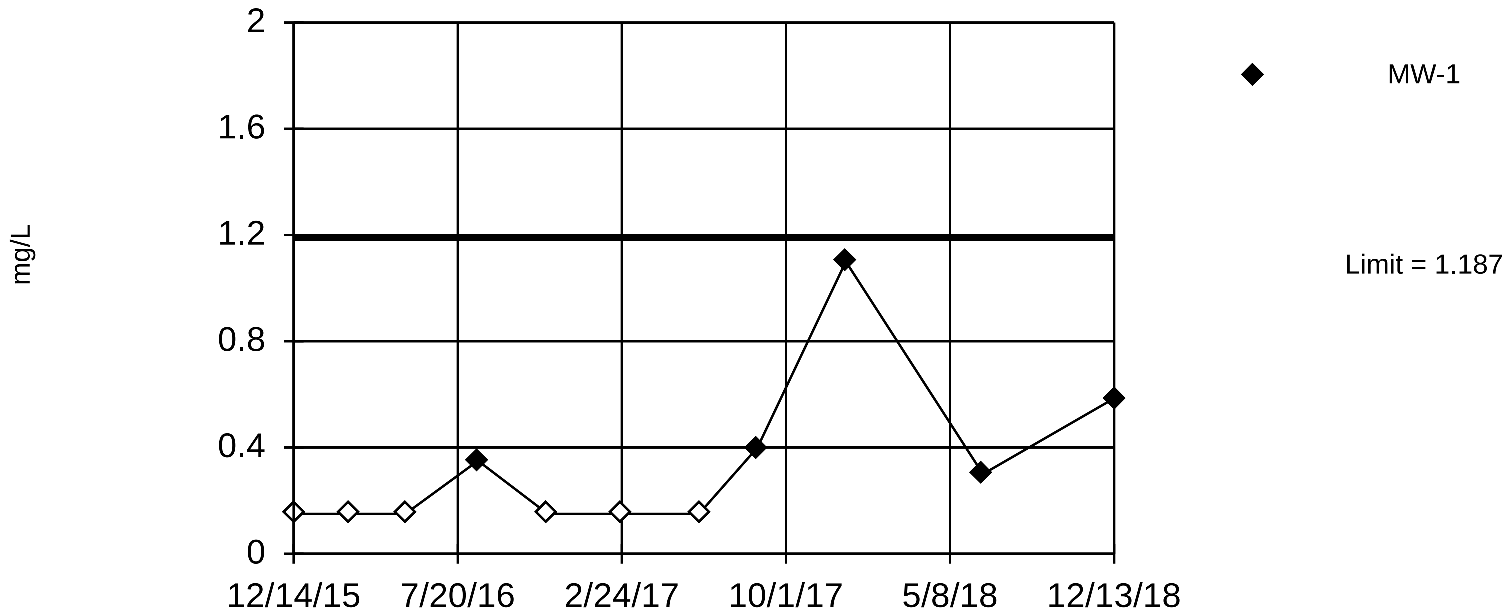
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Interwell Parametric



Background Data Summary (after Cohen`s Adjustment): Mean=0.4018, Std. Dev.=0.3908, n=8, 37.5% NDs. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8478, critical = 0.818. Report alpha = 0.05. Most recent point compared to limit.

Constituent: Fluoride   Analysis Run 1/4/2019 3:20 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.4.2019

Prediction Limit

Constituent: Fluoride (mg/L)   Analysis Run 1/4/2019 3:20 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.4.2019

	MW-1	BW-1 (bg)
12/14/2015	<0.3	<0.3
2/25/2016	<0.3	0.67
5/11/2016	<0.3	0.32
8/16/2016	0.35	0.94
11/17/2016	<0.3	0.85
2/23/2017	<0.3	<0.3
6/7/2017	<0.3	<0.3
8/24/2017	0.4	0.37
12/20/2017	1.1	
6/21/2018	0.3	
12/13/2018	0.585	

Parametric ANOVA

Constituent: Fluoride   Analysis Run 1/4/2019 3:21 PM

Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_1.4.2019

For observations made between 12/14/2015 and 12/13/2018 the parametric analysis of variance test (after natural log transformation) indicates NO VARIATION at the 5% significance level. Because the calculated F statistic is less than or equal to the tabulated F statistic, the hypothesis of a single homogeneous population is accepted.

Calculated F statistic = 0.8061

Tabulated F statistic = 4.45 with 1 and 17 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	0.436	1	0.436	0.8061
Error Within Groups	9.195	17	0.5409	
Total	9.631	18		

The Bonferroni t-Test indicates that NO compliance well mean is significantly higher than the background (see Contrasts Table below). The critical t (contrast) value is 1.74 with 17 degrees of freedom, 1 compliance wells and a 5% error level for each well comparison.

Contrast table:

Well	Difference	Di	Significant
MW-1	-0.3068	0.5945	No

Where the difference of a Well is greater than the critical (Di) value the hypothesis of a single population should be rejected.

The Shapiro Wilk normality test on the residuals passed after natural log transformation. Alpha = 0.05, calculated = 0.9036, critical = 0.901. Levene's Equality of Variance test passed. Calculated = 0.1807, tabulated = 4.45.

Parametric ANOVA

Constituent: Fluoride (mg/L) Analysis Run 1/4/2019 3:21 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.4.2019

	MW-1	BW-1 (bg)
12/14/2015	<0.3	<0.3
2/25/2016	<0.3	0.67
5/11/2016	<0.3	0.32
8/16/2016	0.35	0.94
11/17/2016	<0.3	0.85
2/23/2017	<0.3	<0.3
6/7/2017	<0.3	<0.3
8/24/2017	0.4	0.37
12/20/2017	1.1	
6/21/2018	0.3	
12/13/2018	0.585	

Texas-Specific Soil Background Concentrations milligrams per kilogram (mg/kg)[1]	
Metal	Median Background Concentration (mg/kg)
Aluminum	30,000
Antimony	1
Arsenic	5.9
Barium	300
Beryllium	1.5
Boron	30
Total Chromium	30
Cobalt	7
Copper	15
Fluoride	190
Iron	15,000
Lead	15
Manganese	300
Mercury	0.04
Nickel	10
Selenium	0.3
Strontium	100
Tin	0.9
Titanium	2,000
Thorium	9.3
Vanadium	50
Zinc	30

[1] Source: “Background Geochemistry of Some Rocks, Soils, Plants, and Vegetables in the Conterminous United States”, by Jon J. Connor, Hansford T. Shacklette, et al., Geological Survey Professional Paper 574-F, US Geological Survey.

2019 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT

SCS ENGINEERS Environmental Consulting & Contracting

January 31, 2020
SCS Project No. 16218157.00

Mr. Darryl Sparks
Compliance Manager
NAES Corporation
2161 Rattlesnake Road
Riesel, Texas 76682

Subject: Sandy Creek Energy Station
McLennan County, Texas
2019 Annual Groundwater Monitoring and Corrective Actions Report Submittal

Dear Mr. Sparks:

SCS Engineers (SCS) is pleased to submit the December 2019 Annual Groundwater Monitoring and Corrective Actions Report to the Sandy Creek Energy Station (SCES), in accordance with Title 40, Code of Federal Regulation (CFR) Part §257.105(h)(6), and the site Groundwater Sampling and Analysis Plan (GWSAP), prepared by SCS, dated March 2, 2016.

Please contact James Lawrence at (817) 358-6106 if you have comments or require additional information.

Sincerely,

Tyson Milbrand	Brett DeVries, Ph.D., P.E.	James Lawrence, P.G.
Staff Professional	Project Professional	Project Director
SCS ENGINEERS	**SCS ENGINEERS**	**SCS ENGINEERS**
TBPE Registration No. F-3407		

Attachment: 2019 Annual Groundwater Monitoring and Corrective Actions Report

STATE OF TEXAS
BRETT J. DeVRIES
128061
LICENSED PROFESSIONAL ENGINEER

1/30/2020

STATE OF TEXAS
James Lawrence
Discipline
License #
541
LICENSED PROFESSIONAL GEOSCIENTIST

1.31.2020

2019 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT

Sandy Creek Energy Station
McLennan County, Texas

Prepared For:

Sandy Creek Energy Station
2161 Rattlesnake Road
Riesel, Texas 76682

SCS ENGINEERS

SCS Project 16218157.00 | **January 31, 2020**

1901 Central Drive, Suite 550
Bedford, TX 76021
817-571-2288

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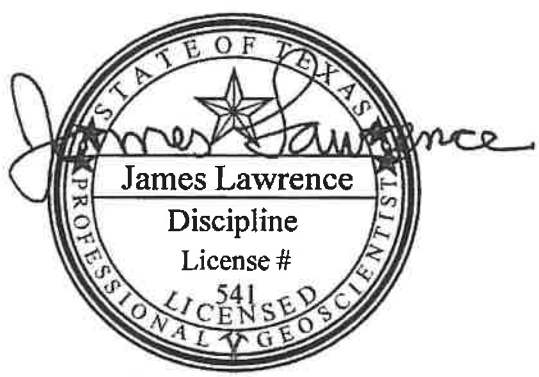

1. 31. 2020

1.0 INTRODUCTION AND BACKGROUND

SCS Engineers (SCS) is submitting this 2019 Annual Groundwater Monitoring and Corrective Action Report for the Sandy Creek Energy Station (SCES). This report is submitted in accordance with Coal Combustion Residual Rule (CCR) 40 CFR §257.105(h)(6) and the site Groundwater Sampling and Analysis Plan (GWSAP) prepared by SCS, dated March 2, 2016. This report includes results for two semiannual detection monitoring events, conducted in June 2019 and December 2019.

SCES is a pulverized coal-fired electric generation facility which operates a landfill for disposal of dry scrubber ash and bottom ash generated during the coal combustion process at the facility. Incidental wastes generated during the operation of the facility may also be disposed in the landfill, as described in the initial registration notification to TCEQ and the most recent version of the Operations Plan for the facility. The landfill is currently comprised of two CCR disposal cells, Cells 1 and 2, which commenced receiving waste in early 2013 and October 2014, respectively. The approximate area of Cells 1 and 2 are 10.0 and 14.3 acres, respectively.

Sampling of groundwater monitoring wells is conducted in accordance with 40 CFR §257.93 and the GWSAP. Initial monitoring of four wells (MW-1, MW-2, MW-3, and BW-1; as depicted on **Figure 1**) was performed for eight consecutive quarters in accordance with 40 CFR §257.94(b) (i.e., eight independent samples were collected for each well). The initial monitoring described above commenced in December 2015 and was completed in August 2017. The constituents monitored during the required background monitoring period and the first semiannual detection monitoring event included 18 inorganic compounds, total dissolved solids, radium-226, and radium-228, while the constituents monitored in subsequent events and during the December 2019 semiannual detection monitoring event included Appendix III constituents only, in accordance with 40 CFR §257.

2.0 GROUNDWATER MONITORING SUMMARY

2.1 GROUNDWATER MONITORING SYSTEM

The current groundwater monitoring system at the SCES landfill consists of four wells (see **Table 1** below). One upgradient (BW-1) and three downgradient (MW-1, MW-2, & MW-3). All four wells are currently in detection monitoring. **Figure 1** shows monitoring well locations at SCES.

Table 1. Sandy Creek Energy Station Groundwater Monitoring System

Well Name (U/D)[1]	Completion Date	Status	Top of Casing Elevation (ft msl)[2]	Well Depth (ft bgs)[2]	Screen Interval (ft bgs)[2]	Water Level Elevation (ft msl on 12/10/2019)
MW-1 (D)	9/21/2015	Detection	465.87	34.23	23.90 - 33.90	453.99
MW-2 (D)	9/23/2015	Detection	442.15	19.63	9.30 - 19.30	430.19
MW-3 (D)	9/1/2010	Detection	430.06	16.23	5.98 - 15.98	419.87
BW-1 (U)	9/22/2015	Detection	485.57	38.63	28.30 - 38.30	467.39

[1] (U) = upgradient, (D) = downgradient; [2] Top of Casing Elevation, Well Depth, and Screen Interval information obtained from Table 1 – Monitoring Well and Piezometer Construction Details and Groundwater Elevations prepared by Geosyntec Consultants, dated March 11, 2016; **ft msl** = feet above mean sea level; **ft bgs** = feet below ground surface

2.2 SUMMARY OF 2019 SAMPLING EVENTS

All sampling events followed the groundwater sampling and laboratory analysis procedures outlined in the GWSAP. A duplicate sample was collected from one well during each event for Quality Assurance & Quality Control (QA/QC) purposes. All monitoring wells were sampled and analyzed for 40 CFR §257 Appendix III constituents, in accordance with 40 CFR §257.94(a).

June 2019 – Semiannual Detection Monitoring Event

All four wells (MW-1, MW-2, MW-3, and BW-1) were purged and sampled on June 24, 2019 using the conventional purge and sampling method with disposable PVC bailers. The results of the sampling were provided to the SCES in a report dated September 6, 2019. Field forms and laboratory results are provided in **Appendices A** & **B**, respectively, and summarized in **Table 2.**

December 2019 – Semiannual Detection Monitoring Event

All four wells (MW-1, MW-2, MW-3, and BW-1) were purged and sampled on December 10, 2019 using the conventional purge and sampling method with disposable PVC bailers. Field forms and laboratory results are provided in **Appendices A** & **B**, respectively, and summarized in **Table 2.**

3.0 RESULTS AND STATISTICAL ANALYSIS

A summary of June 2019 and December 2019 laboratory results and statistical limits in each well-constituent pair is provided in **Table 2**. Time series graphs of Appendix III constituent concentrations are provided in **Appendix D**. Statistical limits were determined in accordance with 40 CFR §257.93(f-g) and the GWSAP using the software program Sanitas®. Statistical limits were determined in the 2017 Annual Groundwater Monitoring and Corrective Action report, and were presented using Shewhart-CUSUM control charts, non-parametric prediction limits, or parametric prediction limits as deemed appropriate by background data distributions. EPA primary drinking water Maximum Contaminant Levels (MCLs) are also presented in **Table 2** for comparison to current data.

Table 2. Sandy Creek Energy Station 2019 Sampling Results and Statistical Limits

MW-ID	Constituent	Lab Results June 2019	Lab Results Dec 2019	MCL	Statistical Limit*
MW-1	Boron (mg/L)	1.1	1.10	n/a	2.6
	Calcium (mg/L)	492	534	n/a	1030
	Chloride (mg/L)	169	192	n/a	402
	pH at 25˚C	7.2	7.43	n/a	6.136 - 8.289
	Sulfate (mg/L)	2430	2420	n/a	3402
	TDS (mg/L)	4030	3720	n/a	6765
	Fluoride (mg/L)	**0.73**	0.236	4	0.4
MW-2	Boron (mg/L)	1.7	1.48	n/a	2.4
	Calcium (mg/L)	656	660	n/a	874.4
	Chloride (mg/L)	2420	2180	n/a	3336
	pH at 25˚C	7.0	6.93	n/a	6.7 - 7.5
	Sulfate (mg/L)	3480	2620	n/a	4635
	TDS (mg/L)	9560	8120	n/a	23969
	Fluoride (mg/L)	<0.18	0.229	4	2.831
MW-3	Boron (mg/L)	0.99	**1.26**	**n/a**	**1.2**
	Calcium (mg/L)	452	572	n/a	688.1
	Chloride (mg/L)	306	345	n/a	606.9
	pH at 25˚C	6.6	6.67	n/a	5.71 - 8.09
	Sulfate (mg/L)	3130	3140	n/a	4447
	TDS (mg/L)	5740	5830	n/a	9375
	Fluoride (mg/L)	<0.18	0.137	4	2.201

Table 2. Sandy Creek Energy Station 2019 Sampling Results and Statistical Limits

MW-ID	Constituent	Lab Results June 2019	Lab Results Dec 2019	MCL	Statistical Limit*
BW-1	Boron (mg/L)	3.1	2.98	n/a	6.787
	Calcium (mg/L)	564	591	n/a	723.7
	Chloride (mg/L)	1160	1150	n/a	1540
	pH at 25˚C	7.1	7.11	n/a	6.8 - 9.5
	Sulfate (mg/L)	2930	2830	n/a	3884
	TDS (mg/L)	6380	6300	n/a	10119
	Fluoride (mg/L)	0.90	0.390	4	2.356

* Calculated in 2017 Annual Report

No constituents were detected in any wells or Quality Assurance/Quality Control (QA/QC) samples at concentrations exceeding federally-promulgated maximum concentration limits (MCLs) in 2019. Unconfirmed statistically significant increases (SSI) were determined for fluoride in MW-1 (June 2019) and boron in MW-3 (December 2019). In accordance with 40 CFR §257.94(e), alternate source demonstrations (ASDs) are provided in **Appendix E.**

4.0 GROUNDWATER FLOW RATE AND DIRECTION CALCULATIONS

In accordance with 40 CFR Part §257.93(c), the groundwater flow rate and direction in the uppermost aquifer in the area of the existing groundwater monitoring wells were calculated.

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1.31.2020

Flow Rate Calculation Using December 2019 Data

$$Va = \frac{KI}{7.5N}$$ (Driscoll, 1986, Groundwater and Wells)

Where:

Va	= Actual Velocity of Groundwater Flow (ft/day)
K	= Hydraulic Conductivity (gpd/ft^2)
I	= Hydraulic Gradient (ft/ft)
N	= Effective Porosity (%)

Then:

K = 2.0×10^{-4} cm/sec (geometric mean hydraulic conductivity obtained from slug tests performed by Geosyntec in 2010)

Find K equivalent in units of gpd/ft^2:

(1 cm/sec = 21,200 gallons/day/ft^2)

2.0×10^{-4} cm/sec x 21,200 gallons/day/ft^2 = 4.24 gpd/ft^2

Find I: $\dfrac{\text{BW-1 elevation} - \text{MW-3 elevation}}{\text{distance between wells}}$: $\dfrac{467.39\text{ ft} - 419.87\text{ ft}}{2{,}350\text{ ft}}$ = 0.0202 ft/ft

I = 0.0202 ft/ft (ave. gradient across the site, from December 2019 water levels)

N = 6% (representative effective porosity for clay from Morris and Johnson, 1967)

Therefore:

$$Va = \frac{4.24\text{ gpd/ft}^2 \times (0.0202\text{ ft/ft})}{7.5\,(0.06)} = 0.191\text{ ft/day}$$

(0.191 ft/day)(365 days/year) = **69 ft/year**

Conclusion

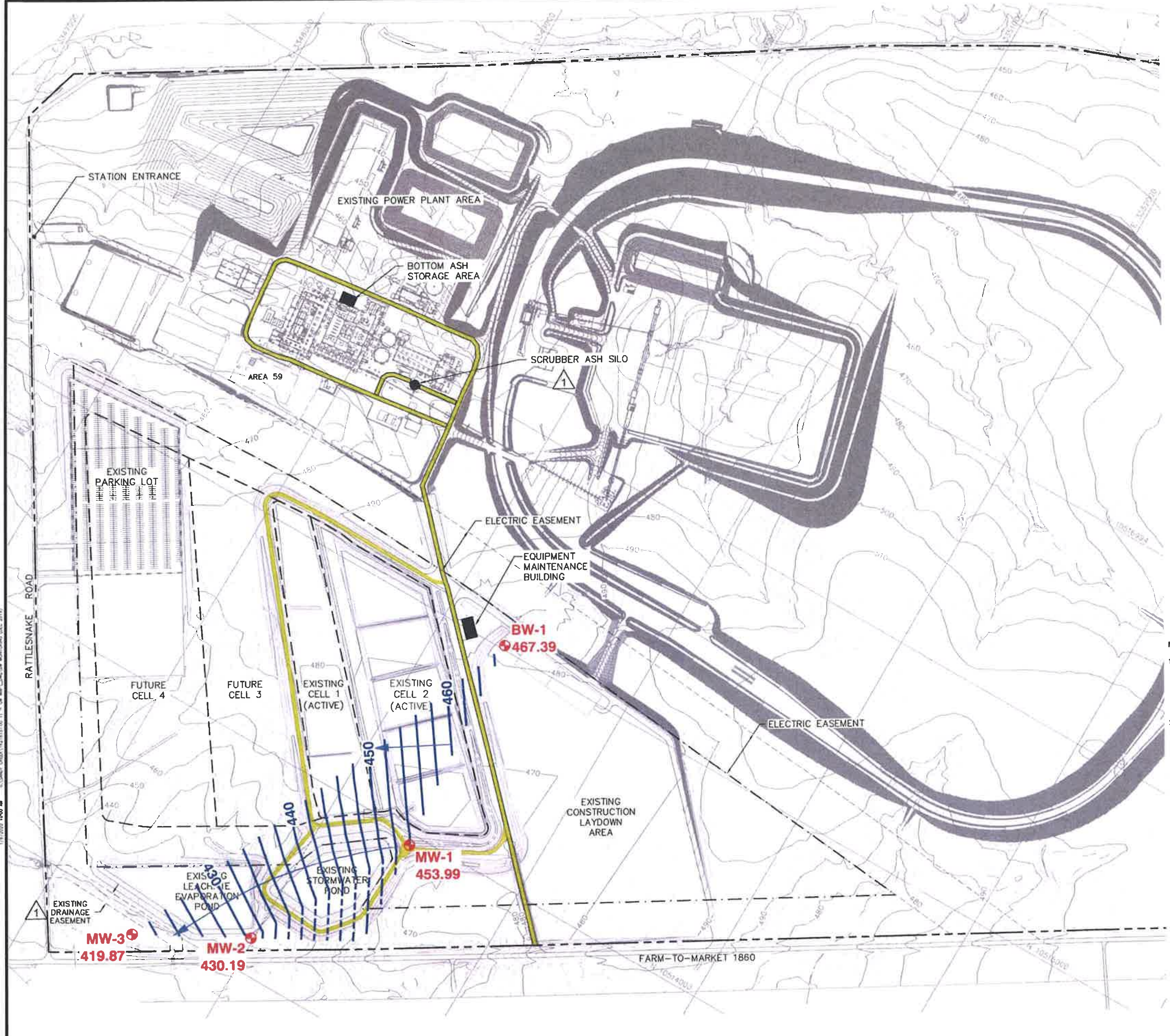
The December 2019 site groundwater flow rate is **69 ft/year.** The gradient was measured using BW-1 and MW-3. The December 2019 groundwater flow direction is to the west-southwest. The groundwater flow rate and direction are consistent with conditions previously observed at the site. See the attached groundwater gradient map for details, provided in accordance with 40 CFR Part §257.93(c).

5.0 RECOMMENDATIONS

As outlined in the attached ASDs for fluoride in MW-1 and boron in MW-3, no confirmed SSIs were identified for any Appendix III constituents during 2019 detection monitoring at the SCES. SCS recommends that the facility remain in semiannual detection monitoring, in accordance with 40 CFR §257.94.

Due to the lack of confirmed SSIs for Appendix III constituents during 2019 detection monitoring, the facility will continue monitoring for all constituents listed in 40 CFR §257 Appendix III during semiannual groundwater monitoring events, in accordance with 40 CFR §257.94(a). The Appendix IV constituent list will be analyzed if any confirmed statistical exceedances of the Appendix III list are indicated in future events. The next planned groundwater monitoring event is a semiannual detection monitoring event scheduled for June 2020.

Figure 1. Monitoring Well Location Map



LEGEND

- EXISTING GROUND ELEVATION (FT. MSL) (NOTES 1, 2)
- EXISTING SURFACE WATER LINE
- EXISTING SITE FENCE
- EXISTING TREE LINE
- MW-1 EXISTING MONITORING WELL
- EXISTING BUILDING
- PROPERTY BOUNDARY
- DEED RECORDED LIMITS OF WASTE
- CELL BOUNDARY
- STATE PLANE COORDINATES
- SWDF OPERATIONS ACCESS ROAD
- 450 GROUNDWATER CONTOUR
- GROUNDWATER CONTOURS (INFERRED)
- GROUNDWATER FLOW

0 250' 500'
SCALE IN FEET

NOTES:

1. THE EXISTING CONTOUR MAP SHOWN ON THIS DRAWING WAS COMPILED USING EXISTING TOPOGRAPHY DATED APRIL 2006 AND DESIGN GRADES DATED OCTOBER 2007 FROM BLACK & VEATCH CORPORATION; DESIGN GRADES DEVELOPED BY GEOSYNTEC CONSULTANTS, INC. FOR THE LEACHATE EVAPORATION POND AND CELL 2 DATED APRIL 2011 AND APRIL 2014, RESPECTIVELY; AND AREA 59 EXISTING TOPOGRAPHY SURVEY CONDUCTED BY WALKER PARTNERS DATED 9 MAY 2013.
2. ELEVATIONS ARE IN FEET ABOVE MEAN SEA LEVEL (FT, MSL) AS DEFINED BY THE USGS NATIONAL GEODETIC VERTICAL DATUM (NGVD) OF 1988. STATE PLANE COORDINATE GRID CORRESPONDS TO TEXAS STATE PLANE COORDINATE SYSTEM, TEXAS CENTRAL ZONE (4203), NORTH AMERICAN DATUM OF 1983 (NAD-83).
3. DATE OF WATER LEVELS: DECEMBER 10, 2019

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James Lawrence
1.31.2020

REV	DATE	DESCRIPTION	BY

TEXAS BOARD OF PROFESSIONAL ENGINEERS REG. NO. F-3407

DRAWING TITLE
GROUNDWATER GRADIENT MAP

PROJECT TITLE
SANDY CREEK DECEMBER 2019 GROUNDWATER MONITORING REPORT MONITORING

CLIENT
NAES CORPORATION
2161 RATTLESNAKE ROAD
RIESEL, TEXAS 76682

SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT
CONSULTING ENGINEERS
1901 CENTRAL DRIVE, SUITE 550, BEDFORD, TX 76021
PH (817) 571-2288 FAX NO. (817) 571-2188

PROJ. NO. 16218157.00 | DSN BY: DS | DWN BY: JJ | CHK BY: DS | Q/A RVW BY: JL | APP. BY: JL

CADD FILE: GW MONITORING (DEC 2019)

DATE: 01/2020

SCALE: AS SHOWN

DRAWING NO
FIGURE 1

SOURCE: BACKGROUND INFORMATION FOR THIS DRAWING IS FROM A DRAWING NAMED SITE LAYOUT BY GEOSYNTEC CONSULTANTS, DATED JUNE 2014.

Appendix A

2019 Groundwater Monitoring Field Forms

Groundwater Monitoring Form

Facility name: Sandy Creek Energy Station
Permittee: Sandy Creek Energy Associates, L.P.
County: McLennan

1. Facility Type: Power Station
2. Monitor well no.: MW-1
3. Date of sampling: 6/24/2019

Name of sampler: Doug Steen
Affiliation of sampler: SCS Engineers
If split sampled, with whom? N/A
Integrity of well: Good
Installation date: 9/21/2015

Most recent previous sampling: 12/13/2018
Date of water level measurements: 6/24/2019
Datum reference point: Top of Casing
Datum elevation*: 465.87
Depth to water(below datum)*: 10.49
4. Water level elevation*: 455.38

5. Purging/Sampling method: Bailer (Enter bailer or pump)
   Were low-flow methods used? ☐ yes ■ no (check one)
   If yes, what volume was purged? N/A gal.
6. Well volumes purged: 2.0
7. Was the well dry before purging? ☐ yes ■ no (check one)
8. Was the well dry after purging? ■ yes ☐ no (check one)
9. How long before sampling? 2
10. Unit of measure? hours (Enter value as days, hours, or mins.)

11. Sample event: Detection
   - Background - Corrective Action
   - Detection - Other
   - Assessment
12. Sample schedule: Semi-Annual
   - Quarterly - Fourth Year
   - Semi-Annual - Other
   - Annual
13. Sample type: Regular
   - Regular - Split
   - Duplicate - Other
   - Resample

Field Measurements:

14. pH 7.22
15. Spec. cond. 4.142 16. ■ mS/cm
17. Temp. 22.90 18. ☐ F or ■ C (check one)
19. Turbidity 21.58 20. ■ NTU

Laboratory:

21. Name: Pace Analytical Services, Inc. Phone: (972) 727-1123
Address: 400 W. Bethany Drive, Suite 190, Allen, TX 75013

* Report depth to water and elevations to nearest 0.01 foot relative to mean sea level (msl).

Groundwater Monitoring Form

Facility name: Sandy Creek Energy Station
Permittee: Sandy Creek Energy Associates, L.P.
County: McLennan

1. Facility Type: Power Station
2. Monitor well no.: MW-2
3. Date of sampling: 6/24/2019

Name of sampler: Doug Steen
Affiliation of sampler: SCS Engineers
If split sampled, with whom? N/A
Integrity of well: Good
Installation date: 9/23/2015

Most recent previous sampling: 12/13/2018
Date of water level measurements: 6/24/2019
Datum reference point: Top of Casing
Datum elevation*: 442.15
Depth to water(below datum)*: 9.87
4. Water level elevation*: 432.28

5. Purging/Sampling method: Bailer (Enter bailer or pump)
   Were low-flow methods used? ☐ yes ■ no (check one)
   If yes, what volume was purged? N/A gal.
6. Well volumes purged: 2.7
7. Was the well dry before purging? ☐ yes ■ no (check one)
8. Was the well dry after purging? ■ yes ☐ no (check one)
9. How long before sampling? 2
10. Unit of measure? hours (Enter value as days, hours, or mins.)

11. Sample event: Detection
   - Background - Corrective Action
   - Detection - Other
   - Assessment
12. Sample schedule: Semi-Annual
   - Quarterly - Fourth Year
   - Semi-Annual - Other
   - Annual
13. Sample type: Regular
   - Regular - Split
   - Duplicate - Other
   - Resample

Field Measurements:

14. pH 6.87
15. Spec. cond. 10.77 — 16. ■ mS/cm
17. Temp. 21.05 — 18. ☐ F or ■ C (check one)
19. Turbidity 9.87 — 20. ■ NTU

Laboratory:

21. Name: Pace Analytical Services, Inc. Phone: (972) 727-1123
Address: 400 W. Bethany Drive, Suite 190, Allen, TX 75013

* Report depth to water and elevations to nearest 0.01 foot relative to mean sea level (msl).

Groundwater Monitoring Form

Facility name: Sandy Creek Energy Station
Permittee: Sandy Creek Energy Associates, L.P.
County: McLennan

1. Facility Type: Power Station
2. Monitor well no.: MW-3
3. Date of sampling: 6/24/2019

Name of sampler: Doug Steen
Affiliation of sampler: SCS Engineers
If split sampled, with whom? N/A
Integrity of well: Good
Installation date: 9/1/2010

Most recent previous sampling: 12/13/2018
Date of water level measurements: 6/24/2019
Datum reference point: Top of Casing
Datum elevation*: 430.06
Depth to water(below datum)*: 7.06
4. Water level elevation*: 423.00

5. Purging/Sampling method: Bailer (Enter bailer or pump)
   Were low-flow methods used? ☐ yes ■ no (check one)
   If yes, what volume was purged? N/A gal.
6. Well volumes purged: 3.2
7. Was the well dry before purging? ☐ yes ■ no (check one)
8. Was the well dry after purging? ☐ yes ■ no (check one)
9. How long before sampling? 2
10. Unit of measure? hours (Enter value as days, hours, or mins.)

11. Sample event: Detection
    - Background - Corrective Action
    - Detection - Other
    - Assessment
12. Sample schedule: Semi-Annual
    - Quarterly - Fourth Year
    - Semi-Annual - Other
    - Annual
13. Sample type: Regular
    - Regular - Split
    - Duplicate - Other
    - Resample

Field Measurements:

14. pH 6.70
15. Spec. cond. 5.659 — 16. ■ mS/cm
17. Temp. 20.89 — 18. ☐ F or ■ C (check one)
19. Turbidity 10.3 — 20. ■ NTU

Laboratory:

21. Name: Pace Analytical Services, Inc. Phone: (972) 727-1123
Address: 400 W. Bethany Drive, Suite 190, Allen, TX 75013

* Report depth to water and elevations to nearest 0.01 foot relative to mean sea level (msl).

Groundwater Monitoring Form

Facility name: Sandy Creek Energy Station
Permittee: Sandy Creek Energy Associates, L.P.
County: McLennan

1. Facility Type: Power Station
2. Monitor well no.: BW-1
3. Date of sampling: 6/24/2019

Name of sampler: Doug Steen
Affiliation of sampler: SCS Engineers
If split sampled, with whom? N/A
Integrity of well: Good
Installation date: 9/22/2015

Most recent previous sampling: 12/13/2018
Date of water level measurements: 6/24/2019
Datum reference point: Top of Casing
Datum elevation*: 485.57
Depth to water(below datum)*: 18.20
4. Water level elevation*: 467.37

5. Purging/Sampling method: Bailer (Enter bailer or pump)
   Were low-flow methods used? ☐ yes ■ no (check one)
   If yes, what volume was purged? N/A gal.
6. Well volumes purged: 3.2
7. Was the well dry before purging? ☐ yes ■ no (check one)
8. Was the well dry after purging? ☐ yes ■ no (check one)
9. How long before sampling? 2
10. Unit of measure? hours (Enter value as days, hours, or mins.)

11. Sample event: Detection
   - Background - Corrective Action
   - Detection - Other
   - Assessment
12. Sample schedule: Semi-Annual
   - Quarterly - Fourth Year
   - Semi-Annual - Other
   - Annual
13. Sample type: Regular
   - Regular - Split
   - Duplicate - Other
   - Resample

Field Measurements:

14. pH 7.21
15. Spec. cond. 7.319 — 16. ■ mS/cm
17. Temp. 22.10 — 18. ☐ F or ■ C (check one)
19. Turbidity 157 — 20. ■ NTU

Laboratory:

21. Name: Pace Analytical Services, Inc. Phone: (972) 727-1123
Address: 400 W. Bethany Drive, Suite 190, Allen, TX 75013

* Report depth to water and elevations to nearest 0.01 foot relative to mean sea level (msl).

Groundwater Monitoring Form

Facility name: Sandy Creek Energy Station
Permittee: Sandy Creek Energy Associates, L.P.
County: McLennan

1. Facility Type: Power Station
2. Monitor well no.: DUP
3. Date of sampling: 6/24/2019

Name of sampler: Doug Steen
Affiliation of sampler: SCS Engineers
If split sampled, with whom? N/A
Integrity of well: N/A
Installation date: N/A

Most recent previous sampling: N/A
Date of water level measurements: N/A
Datum reference point: Top of Casing
Datum elevation*: N/A
Depth to water(below datum)*: N/A
4. Water level elevation*: N/A

5. Purging/Sampling method: N/A (Enter bailer or pump)
   Were low-flow methods used? ☐ yes ☐ no (check one)
   If yes, what volume was purged? N/A gal.
6. Well volumes purged: N/A
7. Was the well dry before purging? ☐ yes ☐ no (check one)
8. Was the well dry after purging? ☐ yes ☐ no (check one)
9. How long before sampling? N/A
10. Unit of measure? N/A (Enter value as days, hours, or mins.)

11. Sample event: Detection
    - Background - Corrective Action
    - Detection - Other
    - Assessment
12. Sample schedule: Semi-Annual
    - Quarterly - Fourth Year
    - Semi-Annual - Other
    - Annual
13. Sample type: Duplicate
    - Regular - Split
    - Duplicate - Other
    - Resample

Field Measurements:

14. pH N/A
15. Spec. cond. N/A — 16. ☐ mS/cm
17. Temp. N/A — 18. ☐ F or ☐ C (check one)
19. Turbidity N/A — 20. ☐ NTU

Laboratory:

21. Name: Pace Analytical Services, Inc. Phone: (972) 727-1123
    Address: 400 W. Bethany Drive, Suite 190, Allen, TX 75013

* Report depth to water and elevations to nearest 0.01 foot relative to mean sea level (msl).

Groundwater Monitoring Form

Facility name: Sandy Creek Energy Station
Permittee: Sandy Creek Energy Associates, L.P.
County: McLennan

1. Facility Type: Power Station
2. Monitor well no.: MW-1
3. Date of sampling: 12/10/2019

Name of sampler: Tyson Milbrand
Affiliation of sampler: SCS Engineers
If split sampled, with whom? N/A
Integrity of well: Good
Installation date: 9/21/2015

Most recent previous sampling: 6/24/2019
Date of water level measurements: 12/10/2019
Datum reference point: Top of Casing
Datum elevation*: 465.87
Depth to water(below datum)*: 11.88
4. Water level elevation*: 453.99

5. Purging/Sampling method: Bailer (Enter bailer or pump)
   Were low-flow methods used? ☐ yes ■ no (check one)
   If yes, what volume was purged? N/A gal.
6. Well volumes purged: 2.0
7. Was the well dry before purging? ☐ yes ■ no (check one)
8. Was the well dry after purging? ■ yes ☐ no (check one)
9. How long before sampling? 1
10. Unit of measure? hours (Enter value as days, hours, or mins.)

11. Sample event: Detection
   - Background - Corrective Action
   - Detection - Other
   - Assessment
12. Sample schedule: Annual
   - Quarterly - Fourth Year
   - Semi-Annual - Other
   - Annual
13. Sample type: Regular
   - Regular - Split
   - Duplicate - Other
   - Resample

Field Measurements:

14. pH 8.46
15. Spec. cond. 4.278
16. ■ mS/cm
17. Temp. 19.27
18. ☐ F or ■ C (check one)
19. Turbidity 64
20. ■ NTU

Laboratory:

21. Name: ALS Houston
Address: 10450 Stancliff Rd #210, Houston, TX 77099
Phone: (281) 530-5656

* Report depth to water and elevations to nearest 0.01 foot relative to mean sea level (msl).

Groundwater Monitoring Form

Facility name: Sandy Creek Energy Station
Permittee: Sandy Creek Energy Associates, L.P.
County: McLennan

1. Facility Type: Power Station
2. Monitor well no.: MW-2
3. Date of sampling: 12/10/2019

Name of sampler: Tyson Milbrand
Affiliation of sampler: SCS Engineers
If split sampled, with whom? N/A
Integrity of well: Good
Installation date: 9/23/2015

Most recent previous sampling: 6/24/2019
Date of water level measurements: 12/10/2019
Datum reference point: Top of Casing
Datum elevation*: 442.15
Depth to water(below datum)*: 11.96
4. Water level elevation*: 430.19

5. Purging/Sampling method: Bailer (Enter bailer or pump)
   Were low-flow methods used? ☐ yes ■ no (check one)
   If yes, what volume was purged? N/A gal.
6. Well volumes purged: 2.7
7. Was the well dry before purging? ☐ yes ■ no (check one)
8. Was the well dry after purging? ■ yes ☐ no (check one)
9. How long before sampling? 1
10. Unit of measure? hours (Enter value as days, hours, or mins.)

11. Sample event: Detection
   - Background - Corrective Action
   - Detection - Other
   - Assessment
12. Sample schedule: Annual
   - Quarterly - Fourth Year
   - Semi-Annual - Other
   - Annual
13. Sample type: Regular
   - Regular - Split
   - Duplicate - Other
   - Resample

Field Measurements:

14. pH 7.84
15. Spec. cond. 8.676
17. Temp. 18.56
19. Turbidity 19.1

16. ■ mS/cm
18. ☐ F or ■ C (check one)
20. ■ NTU

Laboratory:

21. Name ALS Houston
Address: 10450 Stancliff Rd #210, Houston, TX 77099
Phone: (281) 530-5656

* Report depth to water and elevations to nearest 0.01 foot relative to mean sea level (msl).

Groundwater Monitoring Form

Facility name: Sandy Creek Energy Station
Permittee: Sandy Creek Energy Associates, L.P.
County: McLennan

1. Facility Type: Power Station
2. Monitor well no.: MW-3
3. Date of sampling: 12/10/2019

Name of sampler: Tyson Milbrand
Affiliation of sampler: SCS Engineers
If split sampled, with whom? N/A
Integrity of well: Good
Installation date: 9/1/2010

Most recent previous sampling: 6/24/2019
Date of water level measurements: 12/10/2019
Datum reference point: Top of Casing
Datum elevation*: 430.06
Depth to water(below datum)*: 10.19
4. Water level elevation*: 419.87

5. Purging/Sampling method: Bailer (Enter bailer or pump)
   Were low-flow methods used? ☐ yes ■ no (check one)
   If yes, what volume was purged? N/A gal.
6. Well volumes purged: 2.5
7. Was the well dry before purging? ☐ yes ■ no (check one)
8. Was the well dry after purging? ☐ yes ■ no (check one)
9. How long before sampling? 1
10. Unit of measure? hours (Enter value as days, hours, or mins.)

11. Sample event: Detection
   - Background - Corrective Action
   - Detection - Other
   - Assessment
12. Sample schedule: Annual
   - Quarterly - Fourth Year
   - Semi-Annual - Other
   - Annual
13. Sample type: Regular
   - Regular - Split
   - Duplicate - Other
   - Resample

Field Measurements:

14. pH 7.93
15. Spec. cond. 6.189 — 16. ■ mS/cm
17. Temp. 17.24 — 18. ☐ F or ■ C (check one)
19. Turbidity 34.3 — 20. ■ NTU

Laboratory:

21. Name: ALS Houston — Phone: (281) 530-5656
Address: 10450 Stancliff Rd #210, Houston, TX 77099

* Report depth to water and elevations to nearest 0.01 foot relative to mean sea level (msl).

Groundwater Monitoring Form

Facility name: Sandy Creek Energy Station
Permittee: Sandy Creek Energy Associates, L.P.
County: McLennan

1. Facility Type: Power Station
2. Monitor well no.: BW-1
3. Date of sampling: 12/10/2019

Name of sampler: Tyson Milbrand
Affiliation of sampler: SCS Engineers
If split sampled, with whom? N/A
Integrity of well: Good
Installation date: 9/22/2015

Most recent previous sampling: 6/24/2019
Date of water level measurements: 12/10/2019
Datum reference point: Top of Casing
Datum elevation*: 485.57
Depth to water(below datum)*: 18.18
4. Water level elevation*: 467.39

5. Purging/Sampling method: Bailer (Enter bailer or pump)
   Were low-flow methods used? ☐ yes ■ no (check one)
   If yes, what volume was purged? N/A gal.
6. Well volumes purged: 3.0
7. Was the well dry before purging? ☐ yes ■ no (check one)
8. Was the well dry after purging? ☐ yes ■ no (check one)
9. How long before sampling? 1
10. Unit of measure? hours (Enter value as days, hours, or mins.)

11. Sample event: Detection
   - Background - Corrective Action
   - Detection - Other
   - Assessment
12. Sample schedule: Annual
   - Quarterly - Fourth Year
   - Semi-Annual - Other
   - Annual
13. Sample type: Regular
   - Regular - Split
   - Duplicate - Other
   - Resample

Field Measurements:

14. pH 7.95
15. Spec. cond. 6.612 — 16. ■ mS/cm
17. Temp. 17.90 — 18. ☐ F or ■ C (check one)
19. Turbidity 214 — 20. ■ NTU

Laboratory:

21. Name: ALS Houston — Phone: (281) 530-5656
    Address: 10450 Stancliff Rd #210, Houston, TX 77099

* Report depth to water and elevations to nearest 0.01 foot relative to mean sea level (msl).

Groundwater Monitoring Form

Facility name: Sandy Creek Energy Station
Permittee: Sandy Creek Energy Associates, L.P.
County: McLennan

1. Facility Type: Power Station
2. Monitor well no.: DUP
3. Date of sampling: 12/10/2019

Name of sampler: Tyson Milbrand
Affiliation of sampler: SCS Engineers
If split sampled, with whom? N/A
Integrity of well: N/A
Installation date: N/A

Most recent previous sampling: N/A
Date of water level measurements: N/A
Datum reference point: Top of Casing
Datum elevation*: N/A
Depth to water(below datum)*: N/A
4. Water level elevation*: N/A

5. Purging/Sampling method: N/A (Enter bailer or pump)
   Were low-flow methods used? ☐ yes ☐ no (check one)
   If yes, what volume was purged? N/A gal.
6. Well volumes purged: N/A
7. Was the well dry before purging? ☐ yes ☐ no (check one)
8. Was the well dry after purging? ☐ yes ☐ no (check one)
9. How long before sampling? N/A
10. Unit of measure? N/A (Enter value as days, hours, or mins.)

11. Sample event: Detection
   - Background - Corrective Action
   - Detection - Other
   - Assessment
12. Sample schedule: Semi-Annual
   - Quarterly - Fourth Year
   - Semi-Annual - Other
   - Annual
13. Sample type: Duplicate
   - Regular - Split
   - Duplicate - Other
   - Resample

Field Measurements:

14. pH N/A
15. Spec. cond. N/A
17. Temp. N/A
19. Turbidity N/A

16. ☐ mS/cm
18. ☐ F or ☐ C (check one)
20. ☐ NTU

Laboratory:

21. Name ALS Houston
Address: 10450 Stancliff Rd #210, Houston, TX 77099
Phone: (281) 530-5656

* Report depth to water and elevations to nearest 0.01 foot relative to mean sea level (msl).

Appendix B

2019 Laboratory Reports with Chain of Custody Forms

Pace Analytical Services, Inc.
400 W. Bethany Drive, Suite 190
Allen, TX 75013
(972) 727-1123

July 03, 2019

Jim Lawrence
SCS Engineers
1901 Central Dr.
Suite 550
Bedford, TX 76021

RE: Pace Project 75110801
Project ID: Sandy Creek GW

Dear Jim Lawrence:

Enclosed are the analytical results for sample(s) received by the laboratory on June 25, 2019. Results reported herin conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Leslie C R Underwood

Leslie Underwood
leslie.underwood@pacelabs.com
(972)727-1123

Laboratory Certifications

Pace Dallas: Texas T104704232-18-26
Pace Dallas: Texas Certification #: T104704232-18-26

REPORT OF LABORATORY ANALYSIS

Pace Analytical®

Sample Cross Reference

Pace Analytical Services, Inc.
400 W. Bethany Drive, Suite 190
Allen, TX 75013
(972) 727-1123

Pace Project 75110801

Client: SCS Engineers
Project ID: Sandy Creek GW

Client Sample ID	Lab ID	Matrix	Collection Date/Time	Received Date/Time
BW-1	75110801001	Water	06/24/2019 13:45	06/25/2019 08:10
MW-1	75110801002	Water	06/24/2019 14:15	06/25/2019 08:10
MW-2	75110801003	Water	06/24/2019 14:40	06/25/2019 08:10
MW-3	75110801004	Water	06/24/2019 15:10	06/25/2019 08:10
DUP	75110801005	Water	06/24/2019 15:10	06/25/2019 08:10

Pace Analytical Services, Inc.
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(972) 727-1123

Project Narrative

Pace Project 75110801

Holding Times:

These holding times were exceeded due to sample receipt or re-extraction after the holding time expired.

Sample 75110801001 analysis 9040 pH
Sample 75110801002 analysis 9040 pH
Sample 75110801003 analysis 9040 pH
Sample 75110801004 analysis 9040 pH
Sample 75110801005 analysis 9040 pH

Blanks:

All blank results were below reporting limits.

Laboratory Control Samples:

All LCS recoveries were within QC limits.

Matrix Spikes and Duplicates:

MS or MSD recoveries outside of QC limits are qualified in the Report of Quality Control section.

Surrogate:

All surrogate recoveries were within QC limits.

Appendix A
LABORATORY DATA PACKAGE COVER PAGE

This data package is for Job No. 75110801 and consists of:

This signature page, the laboratory review checklist, and the following reportable data:

X	R1 - Field chain-of-custody documentation;
X	R2 - Sample identification cross-reference;
X	R3 - Test reports (analytical data sheets) for each environmental sample that includes:

a. Items consistent with NELAC Chapter 5,
b. Dilution factors,
c. Preparation methods,
d. Cleanup methods, and
e. If required for the project, tentatively identified compounds (TICs).

X	R4 - Surrogate recovery data including:

a. Calculated recovery (%R), and
b. The laboratory's surrogate QC limits.

X	R5 - Test reports/summary forms for blank samples;
X	R6 - Test reports/summary forms for laboratory control samples (LCSs) including:

a. LCS spiking amounts,
b. Calculated %R for each analyte, and
c. The laboratory's LCS QC limits.

X	R7 - Test reports/summary forms for matrix spike/matrix spike duplicates (MS/MSDs) including:

a. Samples associated with the MS/MSD clearly identified,
b. MS/MSD spiking amounts,
c. Concentration of each MS/MSD analyte measured in the parent and spiked samples,
d. Calculated %Rs and relative percent differences, and
e. The laboratory's MS/MSD QC limits.

X	R8 - Laboratory analytical duplicate (if applicable) recovery and precision:

a. The amount of analyte measured in the duplicate,
b. The calculated RPD, and,
c. The laboratory's QC limits for analytical duplicated.

X	R9 - List of method quantitation limits (MQLs) and detectability check sample results for each analyte and
X	R10 - Other problems or anomalies.

The exception Report for each "No" or "Not Reviewed (NR) " item in the Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accredidation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: [ ] This laboratory meets an exception under 30 TAC §25.6 and was last inspected by [X] TCEQ on 05/02/2018

Any findings affecting the data in this laboratory data package are noted in the Exception Reports herin. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Name (Printed)	Signature	Official Title (Printed)	Date
Leslie Underwood		Project Manager	07/03/2019

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Sample Results

Pace Analytical Services, Inc.
400 W. Bethany Drive, Suite 190
Allen, TX 75013
(972) 727-1123

Client: SCS Engineers

Client ID: BW-1
Lab ID: 75110801001 **Moisture:** N/A
Collected: 06/24/2019 13:45 **Received** 06/25/2019 08:10

Project ID: Sandy Creek GW
Pace Project 75110801
Matrix: Water

Parameters	DF	Results	Qual	Units	MQL	SDL	Analysis Date	Prep Date	Batch	Instr.
6010 Metals, Total	Analytical Method: EPA 6010				Preparation Method: EPA 3010					
Boron	1	**3.1**		mg/L	0.10	0.017	07/02/2019 15:35	07/01/2019 08:20	120770	75ICP1
Calcium	1	**564**	M1	mg/L	1.0	0.093	07/02/2019 00:53	07/01/2019 08:20	120770	75ICP1
9040 pH	Analytical Method: EPA 9040									
pH at 25 Degrees C	1	**7.1**	H3,H6	Std. Units	0.10	0.10	07/01/2019 12:39		120808	75WETP
9056 IC Anions	Analytical Method: EPA 9056A									
Chloride	100	**1160**		mg/L	80.0	35.8	07/01/2019 14:48		120798	75WTA4
Fluoride	1	**0.90**		mg/L	0.50	0.18	07/01/2019 14:30		120798	75WTA4
Sulfate	1000	**2930**		mg/L	700	393	07/01/2019 15:06		120798	75WTA4
2540C Total Dissolved Solids	Analytical Method: SM 2540C									
Total Dissolved Solids	1	**6380**		mg/L	500	500	06/27/2019 10:41		120600	75BL17

Pace Analytical Services, Inc.
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(972) 727-1123

Sample Results

Client: SCS Engineers

Client ID: MW-1
Lab ID: 75110801002 **Moisture:** N/A
Collected: 06/24/2019 14:15 **Received** 06/25/2019 08:10

Project ID: Sandy Creek GW
Pace Project 75110801
Matrix: Water

Parameters	DF	Results	Qual	Units	MQL	SDL	Analysis Date	Prep Date	Batch	Instr.
6010 Metals, Total	Analytical Method: EPA 6010				Preparation Method: EPA 3010					
Boron	1	**1.1**		mg/L	0.10	0.017	07/02/2019 15:41	07/01/2019 08:20	120770	75ICP1
Calcium	1	**492**		mg/L	1.0	0.093	07/02/2019 00:58	07/01/2019 08:20	120770	75ICP1
9040 pH	Analytical Method: EPA 9040									
pH at 25 Degrees C	1	**7.2**	H3,H6	Std. Units	0.10	0.10	07/01/2019 12:41		120808	75WETP
9056 IC Anions	Analytical Method: EPA 9056A									
Chloride	100	**169**		mg/L	80.0	35.8	07/01/2019 16:53		120798	75WTA4
Fluoride	1	**0.73**		mg/L	0.50	0.18	07/01/2019 15:23		120798	75WTA4
Sulfate	1000	**2430**		mg/L	700	393	07/01/2019 17:46		120798	75WTA4
2540C Total Dissolved Solids	Analytical Method: SM 2540C									
Total Dissolved Solids	1	**4030**		mg/L	125	125	06/27/2019 10:41		120600	75BL17

Sample Results

Pace Analytical Services, Inc.
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Client: SCS Engineers

Client ID: MW-2
Lab ID: 75110801003 **Moisture:** N/A
Collected: 06/24/2019 14:40 **Received** 06/25/2019 08:10

Project ID: Sandy Creek GW
Pace Project 75110801
Matrix: Water

Parameters	DF	Results	Qual	Units	MQL	SDL	Analysis Date	Prep Date	Batch	Instr.
6010 Metals, Total	Analytical Method: EPA 6010				Preparation Method: EPA 3010					
Boron	1	**1.7**		mg/L	0.10	0.017	07/02/2019 15:46	07/01/2019 08:20	120770	75ICP1
Calcium	1	**656**		mg/L	1.0	0.093	07/02/2019 01:04	07/01/2019 08:20	120770	75ICP1
9040 pH	Analytical Method: EPA 9040									
pH at 25 Degrees C	1	**7.0**	H3,H6	Std. Units	0.10	0.10	07/01/2019 12:45		120808	75WETP
9056 IC Anions	Analytical Method: EPA 9056A									
Chloride	1000	**2420**		mg/L	800	358	07/01/2019 18:58		120798	75WTA4
Fluoride	1	< 0.18		mg/L	0.50	0.18	07/01/2019 18:40		120798	75WTA4
Sulfate	1000	**3480**		mg/L	700	393	07/01/2019 18:58		120798	75WTA4
2540C Total Dissolved Solids	Analytical Method: SM 2540C									
Total Dissolved Solids	1	**9560**		mg/L	500	500	06/27/2019 10:42		120600	75BL17

07/03/2019 16:47:21

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Sample Results

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Client: SCS Engineers

Client ID: MW-3
Lab ID: 75110801004 **Moisture:** N/A
Collected: 06/24/2019 15:10 **Received** 06/25/2019 08:10

Project ID: Sandy Creek GW
Pace Project 75110801
Matrix: Water

Parameters	DF	Results	Qual	Units	MQL	SDL	Analysis Date	Prep Date	Batch	Instr.
6010 Metals, Total	Analytical Method: EPA 6010				Preparation Method: EPA 3010					
Boron	1	**0.99**		mg/L	0.10	0.017	07/02/2019 15:52	07/01/2019 08:20	120770	75ICP1
Calcium	1	**452**		mg/L	1.0	0.093	07/02/2019 01:09	07/01/2019 08:20	120770	75ICP1
9040 pH	Analytical Method: EPA 9040									
pH at 25 Degrees C	1	**6.6**	H3,H6	Std. Units	0.10	0.10	07/01/2019 12:47		120808	75WETP
9056 IC Anions	Analytical Method: EPA 9056A									
Chloride	50	**306**	M6	mg/L	40.0	17.9	07/02/2019 19:25		120880	75WTA4
Fluoride	1	< 0.18		mg/L	0.50	0.18	07/02/2019 18:32		120880	75WTA4
Sulfate	500	**3130**		mg/L	350	196	07/02/2019 20:55		120880	75WTA4
2540C Total Dissolved Solids	Analytical Method: SM 2540C									
Total Dissolved Solids	1	**5740**		mg/L	250	250	06/27/2019 10:42		120600	75BL17

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Sample Results

Client: SCS Engineers

Client ID: DUP
Lab ID: 75110801005
Collected: 06/24/2019 15:10
Moisture: N/A
Received 06/25/2019 08:10
Project ID: Sandy Creek GW
Pace Project 75110801
Matrix: Water

Parameters	DF	Results	Qual	Units	MQL	SDL	Analysis Date	Prep Date	Batch	Instr.
6010 Metals, Total	Analytical Method: EPA 6010				Preparation Method: EPA 3010					
Boron	1	**3.0**		mg/L	0.10	0.017	07/02/2019 15:57	07/01/2019 08:20	120770	75ICP1
Calcium	1	**554**		mg/L	1.0	0.093	07/02/2019 01:15	07/01/2019 08:20	120770	75ICP1
9040 pH	Analytical Method: EPA 9040									
pH at 25 Degrees C	1	**7.1**	H3,H6	Std. Units	0.10	0.10	07/01/2019 12:49		120808	75WETP
9056 IC Anions	Analytical Method: EPA 9056A									
Chloride	100	**1100**		mg/L	80.0	35.8	07/02/2019 22:06		120880	75WTA4
Fluoride	1	**0.62**		mg/L	0.50	0.18	07/02/2019 21:48		120880	75WTA4
Sulfate	500	**2970**		mg/L	350	196	07/02/2019 22:24		120880	75WTA4
2540C Total Dissolved Solids	Analytical Method: SM 2540C									
Total Dissolved Solids	1	**6340**		mg/L	500	500	06/27/2019 10:42		120600	75BL17

Quality Control

Pace Analytical Services, Inc.
400 W. Bethany Drive, Suite 190
Allen, TX 75013
(972) 727-1123

Batch: 120770
Method: EPA 6010
Prep EPA 3010

Pace Project No.: 75110801
Instrument ID: 75ICP1

Blank: 544942

Parameters	Dilutio	Quals	Result	Units	MQL	SDL	Analysis Date	Prep Date
Boron	1	U	<0.017	mg/L	0.10	0.017	07/02/2019 14:12	07/01/2019 08:20
Calcium	1	U	<0.093	mg/L	1.0	0.093	07/02/2019 14:12	07/01/2019 08:20

Laboratory Control Sample: 544943

Parameters	Spk Amt	LCS Result	Units	LCS %Rec	% Rec Limits	LCS Quals
Boron	1	0.99	mg/L	99	88-111	
Calcium	10	9.4	mg/L	94	87-112	

Matrix Spike: 544944 **Matrix Spike Duplicate:** 544945

Original for Sample: Project sample BW-1

Parameters	Original Result	MS Spk	MSD Spk	MS Result	MSD Result	Units	MS %Rec	MSD %Rec	% Rec Limits	RPD	Max RPD	Quals
Boron	3.1	1	1	4.1	4.0	mg/L	104	91	84-113	3	20	
Calcium	564	10	10	558	556	mg/L	-59	-72	10-200	0	20	M1

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Quality Control

Batch: 120808
Method: EPA 9040

Pace Project No.: 75110801
Instrument ID: 75WETP

Laboratory Control Sample: 545057

Parameters	Spk Amt	LCS Result	Units	LCS %Rec	% Rec Limits	LCS Quals
pH at 25 Degrees C	6	6.0	Std. Units	100	99-101	H6

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Quality Control

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Batch: 120798
Method: EPA 9056A

Pace Project No.: 75110801
Instrument ID: 75WTA4

Blank: 545030

Parameters	Dilutio	Quals	Result	Units	MQL	SDL	Analysis Date	Prep Date
Chloride	1	U	<0.36	mg/L	0.80	0.36	07/01/2019 13:54	
Fluoride	1	U	<0.18	mg/L	0.50	0.18	07/01/2019 13:54	
Sulfate	1	U	<0.39	mg/L	0.70	0.39	07/01/2019 13:54	

Laboratory Control Sample: 545031

Parameters	Spk Amt	LCS Result	Units	LCS %Rec	% Rec Limits	LCS Quals
Chloride	5	4.8	mg/L	95	80-120	
Fluoride	5	5.2	mg/L	105	80-120	
Sulfate	5	5.1	mg/L	102	80-120	

Matrix Spike: 545053

Matrix Spike Duplicate: 545054

Original for Sample: Project sample MW-1

Parameters	Original Result	MS Spk	MSD Spk	MS Result	MSD Result	Units	MS %Rec	MSD %Rec	% Rec Limits	RPD	Max RPD	Quals
Chloride	169	500	500	674	673	mg/L	101	101	80-120	0	20	
Fluoride	0.73	5	5	5.8	5.7	mg/L	102	99	80-120	2	20	
Sulfate	2430	5000	5000	7760	7840	mg/L	107	108	80-120	1	20	

Pace Analytical Services, Inc.
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(972) 727-1123

Quality Control

Batch: 120880
Method: EPA 9056A

Pace Project No.: 75110801
Instrument ID: 75WTA4

Blank: 545336

Parameters	Dilutio	Quals	Result	Units	MQL	SDL	Analysis Date	Prep Date
Chloride	1	U	<0.36	mg/L	0.80	0.36	07/02/2019 17:56	
Fluoride	1	U	<0.18	mg/L	0.50	0.18	07/02/2019 17:56	
Sulfate	1	U	<0.39	mg/L	0.70	0.39	07/02/2019 17:56	

Laboratory Control Sample: 545337

Parameters	Spk Amt	LCS Result	Units	LCS %Rec	% Rec Limits	LCS Quals
Chloride	5	4.8	mg/L	96	80-120	
Fluoride	5	5.4	mg/L	107	80-120	
Sulfate	5	5.3	mg/L	105	80-120	

Matrix Spike: 545338

Matrix Spike Duplicate: 545339

Original for Sample: Project sample MW-3

Parameters	Original Result	MS Spk	MSD Spk	MS Result	MSD Result	Units	MS %Rec	MSD %Rec	% Rec Limits	RPD	Max RPD	Quals
Chloride	306	250	250	608	609	mg/L	121	121	80-120	0	20	M6
Fluoride	<0.18	5	5	5.0	5.0	mg/L	92	92	80-120	0	20	
Sulfate	3130	2500	2500	5930	5970	mg/L	112	114	80-120	1	20	

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Quality Control

Pace Analytical Services, Inc.
400 W. Bethany Drive, Suite 190
Allen, TX 75013
(972) 727-1123

Batch: 120600
Method: SM 2540C

Pace Project No.: 75110801
Instrument ID: 75BL17

Blank: 544068

Parameters	Dilutio	Quals	Result	Units	MQL	SDL	Analysis Date	Prep Date
Total Dissolved Solids	1	U	<25.0	mg/L	25.0	25.0	06/27/2019 10:41	

Laboratory Control Sample: 544069

Parameters	Spk Amt	LCS Result	Units	LCS %Rec	% Rec Limits	LCS Quals
Total Dissolved Solids	250	266	mg/L	106	85-115	

Pace Analytical Services, Inc.
400 W. Bethany Drive, Suite 190
Allen, TX 75013
(972) 727-1123

Unadjusted MQL

Pace Project 75110801

Analyte	Method	Unadjusted MQL	Reporting Units
Boron	EPA 6010	0.10	mg/L
Calcium	EPA 6010	1.0	mg/L
pH at 25 Degrees C	EPA 9040	0.10	Std. Units
Chloride	EPA 9056A	0.80	mg/L
Fluoride	EPA 9056A	0.50	mg/L
Sulfate	EPA 9056A	0.70	mg/L
Total Dissolved Solids	SM 2540C	25.0	mg/L

Pace Analytical Services, Inc.
400 W. Bethany Drive, Suite 190
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Pace Project 75110801

DEFINITIONS

DF	Dilution Factor
J	Estimated concentration above the adjusted method detection limit and below the adjusted reporting
U	Indicates the compound was analyzed for, but not detected.
SDL	Sample Detection Limit
MQL	Method Quantitation Limit
LCS(D)	Laboratory Control Sample (Duplicate)
MS(D)	Matrix Spike (Duplicate)
DUP	Sample Duplicate
RPD	Relative Percent Difference
TNI	The Nelac Institute

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

ANALYTE QUALIFIERS

H3	Sample was received or analysis requested beyond the recognized method holding time.
H6	Analysis initiated outside of the 15 minute EPA required holding time.
M1	Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.
M6	Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

Quality Control Data
Cross Reference Table

Pace Analytical Services, Inc.
400 W. Bethany Drive, Suite 190
Allen, TX 75013
(972) 727-1123

Pace Project 75110801

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical	Analytical
75110801001	BW-1	EPA 3010	120770	EPA 6010	120775
75110801002	MW-1	EPA 3010	120770	EPA 6010	120775
75110801003	MW-2	EPA 3010	120770	EPA 6010	120775
75110801004	MW-3	EPA 3010	120770	EPA 6010	120775
75110801005	DUP	EPA 3010	120770	EPA 6010	120775
75110801001	BW-1	SM 2540C	120600		
75110801002	MW-1	SM 2540C	120600		
75110801003	MW-2	SM 2540C	120600		
75110801004	MW-3	SM 2540C	120600		
75110801005	DUP	SM 2540C	120600		
75110801001	BW-1	EPA 9040	120808		
75110801002	MW-1	EPA 9040	120808		
75110801003	MW-2	EPA 9040	120808		
75110801004	MW-3	EPA 9040	120808		
75110801005	DUP	EPA 9040	120808		
75110801001	BW-1	EPA 9056A	120798		
75110801002	MW-1	EPA 9056A	120798		
75110801003	MW-2	EPA 9056A	120798		
75110801004	MW-3	EPA 9056A	120880		
75110801005	DUP	EPA 9056A	120880		

TRRP LABORATORY REVIEW CHECKLIST							
Laboratory	Pace Analytical Services, Inc.	LRC Date:	07/03/2019				
Project Name:	Sandy Creek GW	Laboratory Job	75110801				
Reviewer	Leslie Underwood	Prep Batch Number	See exception report.				

#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER #[5]
R1	OI	**Chain-of-custody (C-O-C)**					
		Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?		X			R1.1
		Were all departures from standard conditions described in an exception report?	X				
R2	OI	**Sample and quality control (QC) identification**					
		Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
		Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
R3	OI	**Test reports**					
		Were all samples prepared and analyzed within holding times?		X			R3.1
		Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
		Were calculations checked by a peer or supervisor?	X				
		Were all analyte identifications checked by a peer or supervisor?	X				
		Were sample detection limits reported for all analytes not detected?	X				
		Were all results for soil and sediment samples reported on a dry weight basis?			X		
		Were % moisture (or solids) reported for all soil and sediment samples?			X		
		Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
		If required for the project, are TICs reported?			X		
R4	O	**Surrogate recovery data**					
		Were surrogates added prior to extraction?			X		
		Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
R5	OI	**Test reports/summary forms for blank samples**					
		Were appropriate type(s) of blanks analyzed?	X				
		Were blanks analyzed at the appropriate frequency?	X				
		Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
		Were blank concentrations < MQL?	X				
R6	OI	**Laboratory control samples (LCS):**					
		Were all COCs included in the LCS?	X				
		Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
		Were LCSs analyzed at the required frequency?	X				
		Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
		Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
		Was the LCSD RPD within QC limits?			X		
R7	OI	**Matrix spike (MS) and matrix spike duplicate (MSD) data**					
		Were the project/method specified analytes included in the MS and MSD?	X				
		Were MS/MSD analyzed at the appropriate frequency?	X				
		Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?		X			R7.3
		Were MS/MSD RPDs within laboratory QC limits?	X				
R8	OI	**Analytical duplicate data**					
		Were appropriate analytical duplicates analyzed for each matrix?			X		
		Were analytical duplicates analyzed at the appropriate frequency?			X		
		Were RPDs or relative standard deviations within the laboratory QC limits?			X		
R9	OI	**Method quantitation limits (MQLs):**					
		Are the MQLs for each method analyte included in the laboratory data package?	X				
		Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
		Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
R10	OI	**Other problems/anomalies**					
		Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
		Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	X				
		Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices, and methods associated with this laboratory data package?	X				

TRRP LABORATORY REVIEW CHECKLIST			
Laboratory	Pace Analytical Services, Inc.	LRC Date:	07/03/2019
Project Name:	Sandy Creek GW	Laboratory Job	75110801
Reviewer	Leslie Underwood	Prep Batch Number	See exception report.

1. Items identified by the letter "R" must be included in the laboratory in the laboratory data package submitted in the TRRP-required reports(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period;
2. O = Organic analyses; I = inorganic analysises (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

TRRP LABORATORY REVIEW CHECKLIST

Laboratory	Pace Analytical Services, Inc.	LRC Date:	07/03/2019
Project Name:	Sandy Creek GW	Laboratory Job	75110801
Reviewer	Leslie Underwood	Prep Batch Number	See exception report.

#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER #[5]
S1	OI	**Initial calibration (ICAL)**					
		Were response factors and/or relative response factors for each analyte within QC limits?	X				
		Were percent RSDs or correlation coefficient criteria met?	X				
		Was the number of standards recommended in the method used for all analytes?	X				
		Were all points generated between the lowest and highest standard used to calculate the curve?	X				
		Are ICAL data available for all instruments used?	X				
		Has the initial calibration curve been verified using an appropriate second source standard?	X				
S2	OI	**Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):**					
		Was the CCV analyzed at the method-required frequency?	X				
		Were precent differences for each analyte within the method-required QC limits?	X				
		Was the ICAL curve verified for each analyte?	X				
		Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	X				
S3	O	**Mass spectral tuning**					
		Was the appropriate compound for the method used for tuning?			X		
		Were ion abundance data within the method-required QC limits?			X		
S4	O	**Internal standards (IS)**					
		Were IS area counts and retention times within the method-required QC limits?			X		
S5	OI	**Raw data (NELAC Section 5.5.10)**					
		Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
		Were data associated with manual integrations flagged on the raw data?	X				
S6	O	**Dual column confirmation**					
		Did dual column confirmation results meet the method-required QC?			X		
S7	O	**Tentatively identified compounds (TICs)**					
		If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
S8	I	**Interference Check Sample (ICS) results**					
		Were percent recoveries within method QC limits?	X				
S9	I	**Serial dilutions, post digestion spikes, and method of standard additions**					
		Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	X				
S10	OI	**Method detection limit (MDL) studies**					
		Was a MDL study performed for each reported analyte?	X				
		Is the MDL either adjusted or supported by the analysis of DCSs?	X				
S11	OI	**Proficiency test reports**					
		Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
S12	OI	**Standards documentation**					
		Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
S13	OI	**Compound/analyte identification procedures**					
		Are the procedures for compound/analyte identification documented?	X				
S14	OI	**Demonstration of analyst competency (DOC)**					
		Was DOC conducted consistent with NELAC Chapter 5?	X				
		Is documentation of the analyst's competency up-to-date and on file?	X				
S15	OI	**Verification/validation documentation for methods (NELAC Chapter 5)**					
		Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
S16	OI	**Laboratory standard operating procedures (SOPs)**					
		Are laboratory SOPs current and on file for each method performed?	X				

1. Items identified by the letter "R" must be included in the laboratory in the laboratory data package submitted in the TRRP-required reports(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period;
2. O = Organic analyses, I = inorganic analysises (and general chemistry, when applicable).
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

TRRP LABORATORY REVIEW CHECKLIST			
Laboratory	Pace Analytical Services, Inc.	**LRC Date:**	07/03/2019
Project Name:	Sandy Creek GW	**Laboratory Job**	75110801
Reviewer	Leslie Underwood	**Prep Batch Number**	120600,120770,120798,120808,120880

ER #[1]	Description
R1.1	Sample 545058, Method EPA 9040, pH at 25 Degrees C: H3 - Sample was received or analysis requested beyond the recognized method holding time.
R1.1	Sample 75110801001, Method EPA 9040, pH at 25 Degrees C: H3 - Sample was received or analysis requested beyond the recognized method holding time.
R1.1	Sample 75110801002, Method EPA 9040, pH at 25 Degrees C: H3 - Sample was received or analysis requested beyond the recognized method holding time.
R1.1	Sample 75110801003, Method EPA 9040, pH at 25 Degrees C: H3 - Sample was received or analysis requested beyond the recognized method holding time.
R1.1	Sample 75110801004, Method EPA 9040, pH at 25 Degrees C: H3 - Sample was received or analysis requested beyond the recognized method holding time.
R1.1	Sample 75110801005, Method EPA 9040, pH at 25 Degrees C: H3 - Sample was received or analysis requested beyond the recognized method holding time.
R3.1	Sample 75110801001, 9040 pH. Run on 07/01/19 12:39 is 6.9 days past hold. Sample received after hold date.
R3.1	Sample 75110801002, 9040 pH. Run on 07/01/19 12:41 is 6.9 days past hold. Sample received after hold date.
R3.1	Sample 75110801003, 9040 pH. Run on 07/01/19 12:45 is 6.9 days past hold. Sample received after hold date.
R3.1	Sample 75110801004, 9040 pH. Run on 07/01/19 12:47 is 6.9 days past hold. Sample received after hold date.
R3.1	Sample 75110801005, 9040 pH. Run on 07/01/19 12:49 is 6.9 days past hold. Sample received after hold date.
R7.3	MS Sample #544944: Calcium -59% spike recovery outside laboratory QC limit of 10-200%.
R7.3	MS Sample #545338: Chloride 121% spike recovery outside laboratory QC limit of 80-120%.
R7.3	MSD Sample #544945: Calcium -72% spike recovery outside laboratory QC limit of 10-200%.
R7.3	MSD Sample #545339: Chloride 121% spike recovery outside laboratory QC limit of 80-120%.

1. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

Pace Analytical	Document Name: Sample Condition Upon Receipt	Document Revised: 03-14-19 Page 1 of 1
	Document No.: F-DAL-C-001-rev.9	Issuing Authority: Pace Dallas Quality Office

Sample Condition Upon Receipt

☐Dallas ☑Ft Worth

WO# : 75110801

75110801

Client Name: SCS Engineers Project Work order: ____

Courier: FedEX ☐ UPS ☐ USPS ☐ Client ☑ LSO ☐ PACE ☐ Other: ____

Tracking #: ____

Custody Seal on Cooler/Box: Yes ☐ No ☑ Packing Material: Bubble Wrap/Bags ☐ Foam ☐ None ☑ Other ☐

Received on ice: Yes ☑ No ☐ Type of Ice: Wet ☑ Blue ☐

Thermometer Used: R12 Cooler Temp °C: 2.8 (Recorded) 0 (Correction Factor) 2.8 (Actual)

Temperature should be above freezing to 6°C

Chain of Custody relinquished	Yes ☑ No ☐
Sampler name & signature on COC	Yes ☑ No ☐
Short HT analyses (<72 hrs)	Yes ☐ No ☑
Sufficient Volume received	Yes ☑ No ☐
Correct Container used	Yes ☑ No ☐
Container Intact	Yes ☑ No ☐
Sample pH Acceptable pH Strips: 143849 Residual Chlorine Present Cl Strips: ____ Sulfide Present Lead Acetate Strips: ____	Yes ☑ No ☐ NA ☐ Yes ☐ No ☐ NA ☑ Yes ☐ No ☐ NA ☑
Are soil samples (volatiles, TPH) received in 5035A Kits	Yes ☐ No ☐ NA ☑
Unpreserved 5035A soil frozen within 48 hrs	Yes ☐ No ☐ NA ☑
Headspace in VOA (>6mm)	Yes ☐ No ☐ NA ☑
Project sampled in USDA Regulated Area: State Sampled: TX	Yes ☑ No ☐
Non-Conformance(s):	Yes ☐ No ☑

Pace Analytical

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page : 1 Of 1

Section A Required Client Information:	Section B Required Project Information:	Section C Invoice Information:
Company: SCS Engineers	Report To: Doug Steen	Attention:
Address: 1901 Central Dr.	Copy To:	Company Name:
Bedford, TX 76021		Address:
Email: dsteen@scsengineers.com	Purchase Order #:	Pace Quote:
Phone: NONE Fax	Project Name: Sandy Creek GW	Pace Project Manager: leslie.underwood@pacelabs.com,
Requested Due Date:	Project #:	Pace Profile #: 7268

Regulatory Agency:

State / Location: TX

MATRIX / CODE: Drinking Water DW; Water WT; Waste Water WW; Product P; Soil/Solid SL; Oil OL; Wipe WP; Air AR; Other OT; Tissue TS

SAMPLE ID — One Character per box. (A-Z, 0-9 / , -) Sample Ids must be unique

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED START DATE	START TIME	END DATE	END TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other	Analyses Test Y/N	pH by 9040	TDS	Chloride, Fluoride, Sulfate	6010 Metals (Ca and B)	Residual Chlorine (Y/N)	75110801
1	BW-1	WT		6/24/19	13:45	—	—		4	3		1							X	X	X	X		-001
2	MW-1	WT			14:15	—	—												X	X	X	X		-002
3	MW-2	WT			14:40	—	—												X	X	X	X		-003
4	MW-3	WT			15:10	—	—												X	X	X	X		-004
5	DUP	WT			—	—	—												X	X	X	X		-005
6																								
7																								
8																								
9																								
10																								
11																								
12																								

WO#: 75110801
PM: VPE Due Date: 07/02/19
CLIENT: SCS Engineer

Page 23 of 23

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
	Doug P Steen /SCS	6/25/19	8:10	chernandez / Pace	6.25.2019	0810	2.8 Y N Y
	chernandez / Pace	6.26.2019	0800	metcon	6.26.2019	0800	
	metcon	6.26.19	930	Meranda Gomez / Pace	6.26.19	930	2.9° Y Y Y

SAMPLER: DOUG STEEN Doug P Steen

10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

January 14, 2020

Jim Lawrence
SCS Engineers
1901 Central Drive
Suite 550
Bedford, TX 76021

Work Order: **HS19120609**

Laboratory Results for: **Sandy Creek**

Dear Jim,

ALS Environmental received 5 sample(s) on Dec 12, 2019 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: JUMOKE.LAWAL
Dane J. Wacasey

Client: SCS Engineers
Project: Sandy Creek
Work Order: HS19120609

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS19120609-01	BW-1	Groundwater		10-Dec-2019 14:30	12-Dec-2019 08:00	☐
HS19120609-02	MW-1	Groundwater		10-Dec-2019 14:50	12-Dec-2019 08:00	☐
HS19120609-03	MW-2	Groundwater		10-Dec-2019 15:03	12-Dec-2019 08:00	☐
HS19120609-04	MW-3	Groundwater		10-Dec-2019 15:30	12-Dec-2019 08:00	☐
HS19120609-05	DUP	Groundwater		10-Dec-2019 14:40	12-Dec-2019 08:00	☐

Client: SCS Engineers
Project: Sandy Creek
Work Order: HS19120609

CASE NARRATIVE

Work Order Comments

- Sample received outside method holding time for pH. pH is an immediate test. Sample results are flagged with an "H" qualifier. The temperature at the time of pH is reported. Please note that all pH results are already normalized to a temperature of 25 °C.

Metals by Method SW6020

Batch ID: 149347

Sample ID: BW-1 (HS19120609-01)

- Sample ran at 5x due to high concentration of Sodium.

Sample ID: DUP (HS19120609-05)

- Sample ran at 5x due to high concentration of Sodium.

Sample ID: HS19121499-01MS

- MS and MSD are for an unrelated sample

Sample ID: MW-2 (HS19120609-03)

- Sample ran at 5x due to high concentration of Sodium.

Sample ID: MW-3 (HS19120609-04)

- Sample ran at 5x due to high concentration of Sodium.

WetChemistry by Method SW9056

Batch ID: R354039

Sample ID: MW-3 (HS19120609-04MS)

- The MS and/or MSD recovery was outside of the control limits; however, the result in the parent sample is greater than 4x the spike amount. (Sulfate)

WetChemistry by Method SW9040C

Batch ID: R352956

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M2540C

Batch ID: R352817

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Client:	SCS Engineers		ANALYTICAL REPORT
Project:	Sandy Creek		WorkOrder:HS19120609
Sample ID:	BW-1		Lab ID:HS19120609-01
Collection Date:	10-Dec-2019 14:30		Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ICP-MS METALS BY SW6020A		**Method:SW6020**			Prep:SW3010A / 03-Jan-2020		Analyst: JHD
Arsenic	**0.00236**	J	**0.00200**	**0.0100**	**mg/L**	5	06-Jan-2020 23:09
Boron	**2.98**		**0.0550**	**0.100**	**mg/L**	5	06-Jan-2020 23:09
Calcium	**591**		**0.170**	**2.50**	**mg/L**	5	06-Jan-2020 23:09
Selenium	U		0.00550	0.0100	mg/L	5	06-Jan-2020 23:09
TOTAL DISSOLVED SOLIDS BY SM2540C		**Method:M2540C**					Analyst: KAH
Total Dissolved Solids (Residue, Filterable)	**6,300**		**5.00**	**10.0**	**mg/L**	1	17-Dec-2019 16:30
PH BY SW9040C		**Method:SW9040C**					Analyst: MWG
pH	**7.11**	H	**0.100**	**0.100**	**pH Units**	1	19-Dec-2019 16:00
Temp Deg C @pH	**22.4**	H	**0**	**0**	**DEG C**	1	19-Dec-2019 16:00
ANIONS BY SW9056A		**Method:SW9056**					Analyst: KMU
Chloride	**1,150**		**4.00**	**10.0**	**mg/L**	20	07-Jan-2020 12:02
Fluoride	**0.309**		**0.0500**	**0.100**	**mg/L**	1	07-Jan-2020 11:47
Sulfate	**2,830**		**20.0**	**50.0**	**mg/L**	100	07-Jan-2020 15:49

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client:	SCS Engineers
Project:	Sandy Creek
Sample ID:	MW-1
Collection Date:	10-Dec-2019 14:50

ANALYTICAL REPORT

WorkOrder:HS19120609

Lab ID:HS19120609-02

Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ICP-MS METALS BY SW6020A		**Method:SW6020**			Prep:SW3010A / 03-Jan-2020		Analyst: JHD
Arsenic	0.000667	J	0.000400	0.00200	mg/L	1	07-Jan-2020 14:24
Boron	1.10		0.0550	0.100	mg/L	5	06-Jan-2020 23:11
Calcium	534		0.170	2.50	mg/L	5	06-Jan-2020 23:11
Selenium	0.0809		0.00550	0.0100	mg/L	5	06-Jan-2020 23:11
TOTAL DISSOLVED SOLIDS BY SM2540C		**Method:M2540C**					Analyst: KAH
Total Dissolved Solids (Residue, Filterable)	3,720		5.00	10.0	mg/L	1	17-Dec-2019 16:30
PH BY SW9040C		**Method:SW9040C**					Analyst: MWG
pH	7.43	H	0.100	0.100	pH Units	1	19-Dec-2019 16:00
Temp Deg C @pH	22.4	H	0	0	DEG C	1	19-Dec-2019 16:00
ANIONS BY SW9056A		**Method:SW9056**					Analyst: KMU
Chloride	192		2.00	5.00	mg/L	10	07-Jan-2020 12:31
Fluoride	0.236		0.0500	0.100	mg/L	1	07-Jan-2020 12:16
Sulfate	2,420		20.0	50.0	mg/L	100	07-Jan-2020 16:04

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client:	SCS Engineers		**ANALYTICAL REPORT**
Project:	Sandy Creek		WorkOrder:HS19120609
Sample ID:	MW-2		Lab ID:HS19120609-03
Collection Date:	10-Dec-2019 15:03		Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ICP-MS METALS BY SW6020A		**Method:SW6020**			**Prep:SW3010A / 03-Jan-2020**		**Analyst: JHD**
Arsenic	**0.00219**	J	**0.00200**	**0.0100**	**mg/L**	5	06-Jan-2020 23:14
Boron	**1.48**		**0.0550**	**0.100**	**mg/L**	5	06-Jan-2020 23:14
Calcium	**660**		**0.170**	**2.50**	**mg/L**	5	06-Jan-2020 23:14
Selenium	U		0.00550	0.0100	mg/L	5	06-Jan-2020 23:14
TOTAL DISSOLVED SOLIDS BY SM2540C		**Method:M2540C**					**Analyst: KAH**
Total Dissolved Solids (Residue, Filterable)	**8,120**		**5.00**	**10.0**	**mg/L**	1	17-Dec-2019 16:30
PH BY SW9040C		**Method:SW9040C**					**Analyst: MWG**
pH	**6.93**	H	**0.100**	**0.100**	**pH Units**	1	19-Dec-2019 16:00
Temp Deg C @pH	**23.4**	H	**0**	**0**	**DEG C**	1	19-Dec-2019 16:00
ANIONS BY SW9056A		**Method:SW9056**					**Analyst: KMU**
Chloride	**2,180**		**10.0**	**25.0**	**mg/L**	50	07-Jan-2020 13:00
Fluoride	**0.229**		**0.100**	**0.200**	**mg/L**	2	07-Jan-2020 15:34
Sulfate	**2,620**		**10.0**	**25.0**	**mg/L**	50	07-Jan-2020 13:00

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client:	SCS Engineers	ANALYTICAL REPORT
Project:	Sandy Creek	WorkOrder:HS19120609
Sample ID:	MW-3	Lab ID:HS19120609-04
Collection Date:	10-Dec-2019 15:30	Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ICP-MS METALS BY SW6020A		**Method:SW6020**			Prep:SW3010A / 03-Jan-2020		Analyst: JHD
Arsenic	0.00240	J	0.00200	0.0100	mg/L	5	06-Jan-2020 23:16
Boron	1.26		0.0550	0.100	mg/L	5	06-Jan-2020 23:16
Calcium	572		0.170	2.50	mg/L	5	06-Jan-2020 23:16
Selenium	U		0.00550	0.0100	mg/L	5	06-Jan-2020 23:16
TOTAL DISSOLVED SOLIDS BY SM2540C		**Method:M2540C**					Analyst: KAH
Total Dissolved Solids (Residue, Filterable)	5,830		5.00	10.0	mg/L	1	17-Dec-2019 16:30
PH BY SW9040C		**Method:SW9040C**					Analyst: MWG
pH	6.67	H	0.100	0.100	pH Units	1	19-Dec-2019 16:00
Temp Deg C @pH	22.2	H	0	0	DEG C	1	19-Dec-2019 16:00
ANIONS BY SW9056A		**Method:SW9056**					Analyst: KMU
Chloride	345		2.00	5.00	mg/L	10	07-Jan-2020 14:06
Fluoride	0.137		0.0500	0.100	mg/L	1	07-Jan-2020 13:22
Sulfate	3,140		20.0	50.0	mg/L	100	07-Jan-2020 16:18

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client:	SCS Engineers	ANALYTICAL REPORT
Project:	Sandy Creek	WorkOrder:HS19120609
Sample ID:	DUP	Lab ID:HS19120609-05
Collection Date:	10-Dec-2019 14:40	Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ICP-MS METALS BY SW6020A		**Method:SW6020**			**Prep:SW3010A / 03-Jan-2020**		**Analyst: JHD**
Arsenic	0.00234	J	0.00200	0.0100	mg/L	5	06-Jan-2020 23:18
Boron	2.86		0.0550	0.100	mg/L	5	06-Jan-2020 23:18
Calcium	607		0.170	2.50	mg/L	5	06-Jan-2020 23:18
Selenium	U		0.00550	0.0100	mg/L	5	06-Jan-2020 23:18
TOTAL DISSOLVED SOLIDS BY SM2540C		**Method:M2540C**					**Analyst: KAH**
Total Dissolved Solids (Residue, Filterable)	6,370		5.00	10.0	mg/L	1	17-Dec-2019 16:30
PH BY SW9040C		**Method:SW9040C**					**Analyst: MWG**
pH	7.17	H	0.100	0.100	pH Units	1	19-Dec-2019 16:00
Temp Deg C @pH	21.8	H	0	0	DEG C	1	19-Dec-2019 16:00
ANIONS BY SW9056A		**Method:SW9056**					**Analyst: KMU**
Chloride	1,150		4.00	10.0	mg/L	20	07-Jan-2020 15:05
Fluoride	0.230		0.0500	0.100	mg/L	1	07-Jan-2020 14:50
Sulfate	2,890		40.0	100	mg/L	200	07-Jan-2020 15:20

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Weight / Prep Log

Client: SCS Engineers
Project: Sandy Creek
WorkOrder: HS19120609

Batch ID: 149347 **Start Date:** 03 Jan 2020 09:00 **End Date:** 03 Jan 2020 13:00
Method: WATER - SW3010A **Prep Code:** 3010A

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor
HS19120609-01		10 (mL)	10 (mL)	1
HS19120609-02		10 (mL)	10 (mL)	1
HS19120609-03		10 (mL)	10 (mL)	1
HS19120609-04		10 (mL)	10 (mL)	1
HS19120609-05		10 (mL)	10 (mL)	1

Client: SCS Engineers
Project: Sandy Creek
WorkOrder: HS19120609

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: 149347 (0)	**Test Name :** ICP-MS METALS BY SW6020A				**Matrix:** Groundwater	
HS19120609-01	BW-1	10 Dec 2019 14:30		03 Jan 2020 13:00	06 Jan 2020 23:09	5
HS19120609-02	MW-1	10 Dec 2019 14:50		03 Jan 2020 13:00	07 Jan 2020 14:24	1
HS19120609-02	MW-1	10 Dec 2019 14:50		03 Jan 2020 13:00	06 Jan 2020 23:11	5
HS19120609-03	MW-2	10 Dec 2019 15:03		03 Jan 2020 13:00	06 Jan 2020 23:14	5
HS19120609-04	MW-3	10 Dec 2019 15:30		03 Jan 2020 13:00	06 Jan 2020 23:16	5
HS19120609-05	DUP	10 Dec 2019 14:40		03 Jan 2020 13:00	06 Jan 2020 23:18	5
Batch ID: R352817 (0)	**Test Name :** TOTAL DISSOLVED SOLIDS BY SM2540C				**Matrix:** Groundwater	
HS19120609-01	BW-1	10 Dec 2019 14:30			17 Dec 2019 16:30	1
HS19120609-02	MW-1	10 Dec 2019 14:50			17 Dec 2019 16:30	1
HS19120609-03	MW-2	10 Dec 2019 15:03			17 Dec 2019 16:30	1
HS19120609-04	MW-3	10 Dec 2019 15:30			17 Dec 2019 16:30	1
HS19120609-05	DUP	10 Dec 2019 14:40			17 Dec 2019 16:30	1
Batch ID: R352956 (0)	**Test Name :** PH BY SW9040C				**Matrix:** Groundwater	
HS19120609-01	BW-1	10 Dec 2019 14:30			19 Dec 2019 16:00	1
HS19120609-02	MW-1	10 Dec 2019 14:50			19 Dec 2019 16:00	1
HS19120609-03	MW-2	10 Dec 2019 15:03			19 Dec 2019 16:00	1
HS19120609-04	MW-3	10 Dec 2019 15:30			19 Dec 2019 16:00	1
HS19120609-05	DUP	10 Dec 2019 14:40			19 Dec 2019 16:00	1
Batch ID: R354039 (0)	**Test Name :** ANIONS BY SW9056A				**Matrix:** Groundwater	
HS19120609-01	BW-1	10 Dec 2019 14:30			07 Jan 2020 15:49	100
HS19120609-01	BW-1	10 Dec 2019 14:30			07 Jan 2020 12:02	20
HS19120609-01	BW-1	10 Dec 2019 14:30			07 Jan 2020 11:47	1
HS19120609-02	MW-1	10 Dec 2019 14:50			07 Jan 2020 16:04	100
HS19120609-02	MW-1	10 Dec 2019 14:50			07 Jan 2020 12:31	10
HS19120609-02	MW-1	10 Dec 2019 14:50			07 Jan 2020 12:16	1
HS19120609-03	MW-2	10 Dec 2019 15:03			07 Jan 2020 15:34	2
HS19120609-03	MW-2	10 Dec 2019 15:03			07 Jan 2020 13:00	50
HS19120609-04	MW-3	10 Dec 2019 15:30			07 Jan 2020 16:18	100
HS19120609-04	MW-3	10 Dec 2019 15:30			07 Jan 2020 14:06	10
HS19120609-04	MW-3	10 Dec 2019 15:30			07 Jan 2020 13:22	1
HS19120609-05	DUP	10 Dec 2019 14:40			07 Jan 2020 15:20	200
HS19120609-05	DUP	10 Dec 2019 14:40			07 Jan 2020 15:05	20
HS19120609-05	DUP	10 Dec 2019 14:40			07 Jan 2020 14:50	1

Client: SCS Engineers
Project: Sandy Creek
WorkOrder: HS19120609

QC BATCH REPORT

Batch ID: 149347 (0) **Instrument:** ICPMS04 **Method:** ICP-MS METALS BY SW6020A

MBLK Sample ID: **MBLK-149347** Units: **mg/L** Analysis Date: **08-Jan-2020 15:21**
Client ID: Run ID: **ICPMS04_354019** SeqNo: **5429119** PrepDate: **03-Jan-2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	U	0.00200								
Boron	U	0.0200								
Calcium	U	0.500								
Selenium	U	0.00200								

LCS Sample ID: **LCS-149347** Units: **mg/L** Analysis Date: **06-Jan-2020 22:52**
Client ID: Run ID: **ICPMS05_353879** SeqNo: **5426277** PrepDate: **03-Jan-2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	0.04952	0.00200	0.05	0	99.0	80 - 120				
Boron	0.4411	0.0200	0.5	0	88.2	80 - 120				
Calcium	4.91	0.500	5	0	98.2	80 - 120				
Selenium	0.04954	0.00200	0.05	0	99.1	80 - 120				

MS Sample ID: **HS19121499-01MS** Units: **mg/L** Analysis Date: **06-Jan-2020 22:58**
Client ID: Run ID: **ICPMS05_353879** SeqNo: **5426280** PrepDate: **03-Jan-2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	0.05025	0.00200	0.05	0.000332	99.8	80 - 120				
Boron	0.5313	0.0200	0.5	0.04774	96.7	80 - 120				
Calcium	92.56	0.500	5	86.11	129	80 - 120				SO
Selenium	0.05255	0.00200	0.05	0.001974	101	80 - 120				

MSD Sample ID: **HS19121499-01MSD** Units: **mg/L** Analysis Date: **06-Jan-2020 23:00**
Client ID: Run ID: **ICPMS05_353879** SeqNo: **5426281** PrepDate: **03-Jan-2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	0.04878	0.00200	0.05	0.000332	96.9	80 - 120	0.05025	2.97	20	
Boron	0.4838	0.0200	0.5	0.04774	87.2	80 - 120	0.5313	9.37	20	
Calcium	88	0.500	5	86.11	37.8	80 - 120	92.56	5.06	20	SO
Selenium	0.05123	0.00200	0.05	0.001974	98.5	80 - 120	0.05255	2.55	20	

Client: SCS Engineers
Project: Sandy Creek
WorkOrder: HS19120609

QC BATCH REPORT

Batch ID: 149347 (0) **Instrument:** ICPMS04 **Method:** ICP-MS METALS BY SW6020A

PDS Sample ID: **HS19121499-01PDS** Units: **mg/L** Analysis Date: **06-Jan-2020 23:03**
Client ID: Run ID: **ICPMS05_353879** SeqNo: **5426282** PrepDate: **03-Jan-2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	0.1027	0.00200	0.1	0.000332	102	75 - 125				
Calcium	96.55	0.500	10	86.11	104	75 - 125				O
Selenium	0.1061	0.00200	0.1	0.001974	104	75 - 125				

SD Sample ID: **HS19121499-01SD** Units: **mg/L** Analysis Date: **06-Jan-2020 22:56**
Client ID: Run ID: **ICPMS05_353879** SeqNo: **5426279** PrepDate: **03-Jan-2020** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Arsenic	U	0.0100					0.000332	0	10	
Boron	0.07153	0.100					0.04774	0	10	J
Calcium	85.08	2.50					86.11	1.19	10	
Selenium	U	0.0100					0.001974	0	10	

The following samples were analyzed in this batch: HS19120609-01 HS19120609-02 HS19120609-03 HS19120609-04 HS19120609-05

Client: SCS Engineers
Project: Sandy Creek
WorkOrder: HS19120609

QC BATCH REPORT

Batch ID: R352817 (0) **Instrument:** Balance1 **Method:** TOTAL DISSOLVED SOLIDS BY SM2540C

MBLK Sample ID: **WBLK-121719** Units: **mg/L** Analysis Date: **17-Dec-2019 16:30**
Client ID: Run ID: **Balance1_352817** SeqNo: **5398043** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	U	10.0								

LCS Sample ID: **WLCS-121719** Units: **mg/L** Analysis Date: **17-Dec-2019 16:30**
Client ID: Run ID: **Balance1_352817** SeqNo: **5398044** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	1024	10.0	1000	0	102	85 - 115				

DUP Sample ID: **HS19120760-27DUP** Units: **mg/L** Analysis Date: **17-Dec-2019 16:30**
Client ID: Run ID: **Balance1_352817** SeqNo: **5398042** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	14520	10.0					14620	0.686	5	

DUP Sample ID: **HS19120466-02DUP** Units: **mg/L** Analysis Date: **17-Dec-2019 16:30**
Client ID: Run ID: **Balance1_352817** SeqNo: **5398022** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	1392	10.0					1382	0.721	5	

The following samples were analyzed in this batch:

HS19120609-01	HS19120609-02	HS19120609-03	HS19120609-04
HS19120609-05			

Client: SCS Engineers
Project: Sandy Creek
WorkOrder: HS19120609

QC BATCH REPORT

Batch ID: **R352956 (0)** **Instrument:** **WetChem_HS** **Method:** **PH BY SW9040C**

DUP Sample ID: **HS19120942-01DUP** Units: **pH Units** Analysis Date: **19-Dec-2019 16:00**
Client ID: Run ID: **WetChem_HS_352956** SeqNo: **5401708** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH	7.64	0.100					7.64	0	10	
Temp Deg C @pH	21.5	0					21.8	1.39	10	

The following samples were analyzed in this batch: HS19120609-01 HS19120609-02 HS19120609-03 HS19120609-04 HS19120609-05

Client: SCS Engineers
Project: Sandy Creek
WorkOrder: HS19120609

QC BATCH REPORT

Batch ID: R354039 (0) **Instrument:** ICS2100 **Method:** ANIONS BY SW9056A

MBLK Sample ID: WBLKW1-010720 Units: mg/L Analysis Date: 07-Jan-2020 11:03
Client ID: Run ID: ICS2100_354039 SeqNo: 5428725 PrepDate: DF: 1

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	U	0.500								
Fluoride	U	0.100								
Sulfate	U	0.500								

LCS Sample ID: WLCSW1-010720 Units: mg/L Analysis Date: 07-Jan-2020 11:18
Client ID: Run ID: ICS2100_354039 SeqNo: 5428726 PrepDate: DF: 1

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	19.35	0.500	20	0	96.8	80 - 120				
Fluoride	3.77	0.100	4	0	94.2	80 - 120				
Sulfate	19.32	0.500	20	0	96.6	80 - 120				

LCSD Sample ID: WLCSDW1-010720 Units: mg/L Analysis Date: 07-Jan-2020 11:32
Client ID: Run ID: ICS2100_354039 SeqNo: 5428727 PrepDate: DF: 1

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	19.09	0.500	20	0	95.4	80 - 120	19.35	1.38	20	
Fluoride	3.712	0.100	4	0	92.8	80 - 120	3.77	1.55	20	
Sulfate	19.19	0.500	20	0	96.0	80 - 120	19.32	0.665	20	

MS Sample ID: HS19120609-04MS Units: mg/L Analysis Date: 07-Jan-2020 14:21
Client ID: MW-3 Run ID: ICS2100_354039 SeqNo: 5428738 PrepDate: DF: 10

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	433.1	5.00	100	344.6	88.5	80 - 120				
Fluoride	18.02	1.00	20	0.165	89.3	80 - 120				
Sulfate	2981	5.00	100	2972	8.68	80 - 120				SEO

Client: SCS Engineers
Project: Sandy Creek
WorkOrder: HS19120609

QC BATCH REPORT

Batch ID: R354039 (0) **Instrument:** ICS2100 **Method:** ANIONS BY SW9056A

MSD Sample ID: **HS19120609-04MSD** Units: **mg/L** Analysis Date: **07-Jan-2020 14:36**

Client ID: **MW-3** Run ID: **ICS2100_354039** SeqNo: **5428739** PrepDate: DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	436.6	5.00	100	344.6	92.0	80 - 120	433.1	0.802	20	
Fluoride	19.02	1.00	20	0.165	94.3	80 - 120	18.02	5.38	20	
Sulfate	3004	5.00	100	2972	31.3	80 - 120	2981	0.757	20	SEO

The following samples were analyzed in this batch: HS19120609-01 HS19120609-02 HS19120609-03 HS19120609-04 HS19120609-05

Client: SCS Engineers
Project: Sandy Creek
WorkOrder: **HS19120609**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	19-028-0	27-Mar-2020
California	2919, 2019-2020	30-Apr-2020
Dept of Defense	ANAB L2231	20-Dec-2021
Florida	E87611-28	30-Jun-2020
Illinois	2000322019-2	09-May-2020
Kansas	E-10352 2019-2020	31-Jul-2020
Kentucky	123043, 2019-2020	30-Apr-2020
Louisiana	03087, 2019-2020	30-Jun-2020
Maryland	343, 2019-2020	30-Jun-2020
North Dakota	R-193 2019-2020	30-Apr-2020
Oklahoma	2019-067	31-Aug-2020
Texas	TX104704231-19-23	30-Apr-2020

Sample Receipt Checklist

Client Name:	SCS ENGINEERS - Bedford TX	Date/Time Received:	12-Dec-2019 08:00
Work Order:	HS19120609	Received by:	JRM

Checklist completed by:	*Raegen Giga* (eSignature)	12-Dec-2019 (Date)	Reviewed by:	*Dane J. Wacasey* (eSignature)	17-Dec-2019 (Date)
Matrices:	GW		Carrier name:	Greyhound	

Question	Yes	No	Not Present / Other
Shipping container/cooler in good condition?	☑	☐	Not Present ☐
Custody seals intact on shipping container/cooler?	☐	☐	Not Present ☑
Custody seals intact on sample bottles?	☐	☐	Not Present ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	☐	☐	Not Present ☑
Chain of custody present?	☑	☐	1 Page(s)
Chain of custody signed when relinquished and received?	☑	☐	COC IDs:212588
Samplers name present on COC?	☑	☐	
Chain of custody agrees with sample labels?	☑	☐	
Samples in proper container/bottle?	☑	☐	
Sample containers intact?	☑	☐	
Sufficient sample volume for indicated test?	☑	☐	
All samples received within holding time?	☑	☐	
Container/Temp Blank temperature in compliance?	☑	☐	

Temperature(s)/Thermometer(s):	1.2°C uc/c	IR 25
Cooler(s)/Kit(s):	45387	
Date/Time sample(s) sent to storage:	12/12/2019 16:50	

Question	Yes	No	Other
Water - VOA vials have zero headspace?	☐	☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	☑	☐	N/A ☐
pH adjusted?	☐	☑	N/A ☐

pH adjusted by:

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

Cincinnati, OH +1 513 733 5336
Everett, WA +1 425 356 2600
Fort Collins, CO +1 970 490 1511
Holland, MI +1 616 399 6070

Chain of Custody Form

Page 1 of 1

COC ID: 212588

HS19120609
SCS Engineers
Sandy Creek

ALS Project Manager:

Customer Information		Project Information	
Purchase Order	Sandy Creek	Project Name	Sandy Creek
Work Order		Project Number	
Company Name	SCS Engineers	Bill To Company	SCS Engineers
Send Report To	Jim Lawrence	Invoice Attn	Krystal Kuntz - A/P
Address	1901 Central Drive Suite 550	Address	1901 Central Drive Suite 550
City/State/Zip	Bedford, TX 76021	City/State/Zip	Bedford TX 76021
Phone	(817) 571-2288	Phone	(817) 571-2288
Fax		Fax	
e-Mail Address	JLawrence@scsengineers.com	e-Mail Address	kkuntz@scsengineers.com

	Analysis
A	pH_W_9040C (9040 pH)
B	9056_anions_W (9056 Cl, F, SO4)
C	TDS_W 2540C (2540C TDS)
D	ICP_TW (6020 As, B, Ca, Se)
E	
F	
G	
H	
I	
J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	BW-1	12/10/19	1430	Groundwa	2,8	4	X	X	X	X							
2	MW-1		1450	Groundwa	2,8	4	X	X	X	X							
3	MW-2		1503	Groundwa	2,8	4	X	X	X	X							
4	MW-3		1530	Groundwa	2,8	4	X	X	X	X							
5	DUP		1440	Groundwa	2,8	4	X	X	X	X							
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign: Tyson Milbrand

Shipment Method:

Required Turnaround Time: (Check Box) [ ] STD 10 Wk Days [ ] 5 Wk Days [ ] 2 Wk Days [ ] 24 Hour [X] 20

Results Due Date:

Relinquished by: Tyson Milbrand Date: 12/10/19 Time: 1128 Received by:

Relinquished by: Date: 12-11-19 Time: 1720 Received by (Laboratory): 12/12/19 0800

Logged by (Laboratory): Date: Time: Checked by (Laboratory):

Notes: SCS Sandy Creek

Cooler ID	Cooler Temp.
45387	1.2
	IR25
	CF0.0

QC Package: (Check One Box Below)
[X] Level II Std QC
[ ] Level III Std QC/Raw Data
[ ] Level IV SW846/CLP
[ ] Other
[ ] TRRP Checklist
[ ] TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

CUSTODY SEAL

Date: 12/11/19

Time: 1750

Name: M. Tilbe...

Company: SCS E&C

Seal Broken By:

Date: 12-11-19

ALS
10450 Stancliff Rd., Suite 210
Houston, Texas 77099
Tel. +1 281 530 5656
Fax. +1 281 530 5887

SCS

ALS
10450 Stancliff Rd., Suite 210
Houston, Texas 77099
Tel. +1 281 530 5656
Fax. +1 281 530 5887

u5387

CUSTODY SEAL	Seal Broken By:
Date: 12-11-19 Time: 1730	SM
Name: J Ward	Date:
Company: ALS	12/12/19

u5387 DEC 12 2019

11DEC19 21:02A ** LABEL **

Schd: GLI 7219

GLI 3087836015

HOUSTON, TX

ALS GLOBAL DALLAS
281-530-5656

u5387

JM 12/12/19
08:00

ALS GLOBAL DALLAS
10450 STANCLIFF RD

HOUSTON, TX 77099
Phone: 281-530-5656
GPX DIRECT (B)

Manual Wght:
180.0
Tariff Wght:
180.0

PO/Ref #:
553191

Agency Phone: (713)759-6550 WWW.SHIPGREYHOUND.COM

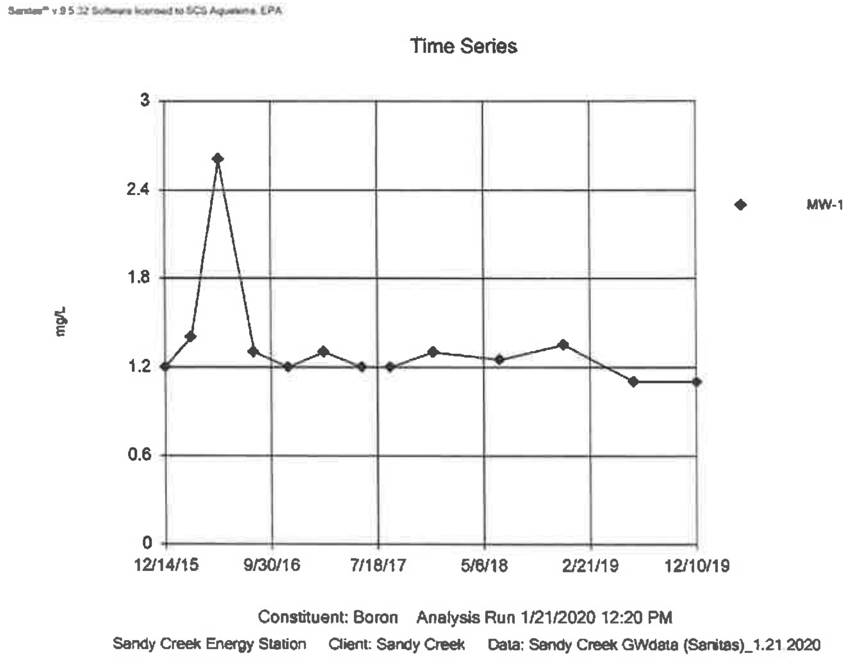
Appendix C
Historical Groundwater Analytical Data

APPENDIX C - GROUNDWATER ANALYTICAL DATA
2019 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION
SANDY CREEK ENERGY STATION
2161 RATTLESNAKE ROAD
RIESEL, TX 76682

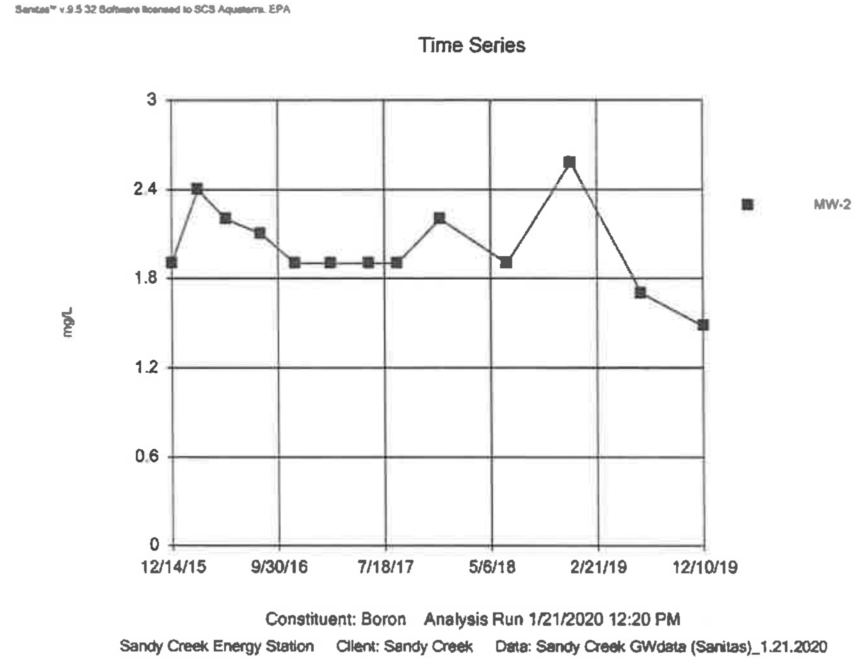
	Water Level	Conductiviy	Turbidity	Boron	Calcium	Chloride	pH at 25°C	Sulfate	Total Dissolved Solids	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium	Radium-226	Radium-228	Combined Radium	Fluoride
Units	ft msl	mS/cm	NTU	mg/L	mg/L	mg/L	Std. Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pCi/L	pCi/L	pCi/L	mg/L
MW-1																										
12/14/2015	453.53	4.51	25.2	1.2	454	253	7.6	2090	4090	<0.0010	<0.0050	0.044	<0.0010	<0.0010	0.0073	<0.0025	<0.0050	0.43	<0.00020	<0.010	0.16	<0.00050	1.04 ± 0.838	1.09 ± 0.523	2.13	<0.30
2/25/2016	453.38	4.98	>800	1.4	520	236	7.5	2190	4060	<0.0010	<0.0050	0.033	<0.0010	<0.0010	0.0074	<0.0025	0.0084	0.39	<0.00020	<0.010	0.2	<0.00050	0.922 ± 0.720	1.46 ± 0.496	2.382	<0.30
5/11/2016	454.14	4.83	>800	2.6	1030	402	7.2	2580	5260	<0.0010	0.12	1	0.029	<0.0020	0.69	0.087	0.21	0.78	<0.00020	<0.020	0.039	0.00089	3.94 ± 1.31	8.39 ± 1.74	12.33	<0.30
8/16/2016	453.67	4.47	800	1.3	535	239	6.8	2300	3880	<0.0010	<0.0050	0.022	<0.0010	<0.0010	<0.0050	<0.0025	<0.0050	0.41	<0.00020	<0.010	0.13	<0.00050	0.593 ± 0.620	3.29 ± 0.828	3.883	0.35
11/17/2016	454.43	4.45	17.7	1.2	542	216	7	2130	3720	<0.0010	<0.0050	0.018	<0.0010	<0.0010	<0.0050	<0.0025	<0.0050	0.37	<0.00020	<0.020	0.16	<0.00050	0.338 ± 0.339	2.49 ± 0.783	2.828	<0.30
2/23/2017	454.72	5.08	452	1.3	531	223	7	2350	3980	<0.0010	<0.010	<0.20	<0.0050	<0.0050	<0.010	<0.010	<0.0050	0.44	<0.00020	<0.010	0.066	<0.00050	-0.207 ± 0.945	3.13 ± 0.908	2.923	<0.30
6/7/2017	454.42	4.77	500	1.2	530	203	7.5	2010	3680	<0.0010	<0.0050	0.019	<0.0010	<0.0010	<0.0050	<0.0025	<0.0050	0.36	<0.00020	<0.020	0.15	<0.00050	0.000 ± 0.449	1.30 ± 0.518	1.3	<0.30
8/24/2017	454.69	4.58	223	1.2	518	241	7.1	2620	4550	<0.0010	<0.0050	0.02	<0.0010	<0.0010	<0.0050	<0.0025	<0.0050	0.395	<0.00020	<0.020	0.17	<0.00050	0.577 ± 0.429	1.69 ± 0.634	2.267	0.4
12/20/2017	454.22	4.287	66.2	1.3	548	248	7.4	2340	4250	<0.0010	<0.0060	0.017	<0.0010	<0.0050	<0.0070	<0.0025	<0.010	0.38	<0.00020	<0.030	0.18	<0.00050	1.26 ± 0.680	2.46 ± 0.888	3.72	1.1
6/21/2018	453.85	4.67	681	1.25	587	247	7.38	2530	4270	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.3 J
12/13/2018	454.86	4.369	30	1.35	515	241	7.52	2570	4100	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.585
6/24/2019	455.38	4.142	22.9	1.1	492	169	7.2	2430	4030	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.73
12/10/2019	453.99	4.278	64	1.1	534	192	7.43	2420	3720	n/a	0.000667	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0809	n/a	n/a	n/a	n/a	0.236
MW-2																										
12/14/2015	424.11	10.6	2.8	1.9	569	1890	6.7	2810	8520	<0.0010	<0.0050	0.031	<0.0010	<0.0010	<0.0050	0.0061	<0.0050	0.69	<0.00020	<0.010	<0.010	<0.00050	1.41 ± 0.938	2.76 ± 0.771	4.17	0.98
2/25/2016	429.50	11.3	52.2	2.4	697	2080	7.3	2890	8070	<0.0010	0.014	0.038	<0.0010	<0.0010	<0.0050	<0.011	<0.0050	0.74	<0.00020	<0.010	<0.010	<0.00050	0.857 ± 0.590	2.57 ± 0.665	3.427	<0.30
5/11/2016	430.72	10.8	23.7	2.2	613	2340	6.7	3010	9930	<0.0010	0.0059	0.027	<0.0010	<0.0010	<0.0050	0.0079	<0.0050	0.87	<0.00020	<0.010	<0.010	<0.00050	0.859 ± 0.561	3.13 ± 0.822	3.989	<0.30
8/16/2016	430.78	11.9	5.5	2.1	680	2440	6.7	3080	7870	<0.0020	<0.0050	0.021	<0.0010	<0.0010	<0.0050	0.0084	<0.0050	0.84	<0.00020	<0.010	<0.010	<0.0010	0.237 ± 0.329	3.28 ± 0.775	3.517	0.64
11/17/2016	430.80	10.7	0.4	1.9	701	2140	6.7	2770	9680	<0.0010	0.0059	0.024	<0.0010	<0.0010	<0.0050	0.0064	<0.0050	0.82	<0.00020	0.024	<0.010	<0.00050	0.923 ± 0.594	3.16 ± 0.826	4.083	0.35
2/23/2017	430.85	13.7	6.2	1.9	646	2320	6.9	3110	9630	<0.0010	<0.010	<0.20	<0.0050	<0.0050	<0.010	<0.010	<0.0050	0.8	<0.00020	<0.010	<0.020	<0.00050	1.52 ± 1.50	4.27 ± 1.07	5.79	0.46
6/7/2017	431.12	11	30.5	1.9	640	2420	7.5	2970	14200	<0.0010	<0.0050	0.016	<0.0010	<0.0010	<0.0050	0.0051	<0.0050	0.75	<0.00020	<0.020	<0.010	<0.00050	0.344 ± 0.415	3.82 ± 0.931	4.164	1.3
8/24/2017	431.20	11.4	8.1	1.9	664	2520	6.8	3710	9600	<0.0010	<0.010	0.017	<0.0010	<0.0020	<0.0050	0.0065	<0.010	0.729	<0.00020	<0.020	0.026	<0.00050	1.12 ± 0.610	3.78 ± 0.960	4.9	0.32
12/20/2017	429.47	6.198	37.7	2.2	716	2590	7.2	3100	9600	<0.0010	<0.012	0.022	<0.0010	<0.010	<0.014	0.0072	<0.020	0.74	<0.00020	<0.030	<0.040	<0.00050	0.945 ± 0.578	4.07 ± 0.940	5.015	<0.50
6/21/2018	430.02	12.66	4.42	1.9	706	2840	7.09	3400	10200	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.6
12/13/2018	430.72	11.89	15.1	2.58	690	2740	6.71	3220	10500	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.618
6/24/2019	432.28	10.77	9.87	1.7	656	2420	7.0	3480	9560	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.18
12/10/2019	430.19	8.676	19.1	1.48	660	2180	6.93	2620	8120	n/a	0.00219	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	n/a	n/a	n/a	n/a	0.229
MW-3																										
12/14/2015	421.77	1.17	11.9	0.35	67.6	12.3	7.2	135	586	<0.0010	<0.0050	0.021	<0.0010	<0.0010	<0.0050	<0.0025	<0.0050	<0.050	<0.00020	<0.010	<0.010	<0.00050	0.997 ± 0.813	0.736 ± 0.505	1.733	0.62
2/25/2016	421.66	6.04	93.3	1.2	479	347	7	2430	5400	<0.0010	0.0061	0.052	<0.0010	<0.0010	<0.0050	0.0098	<0.0050	0.85	<0.00020	<0.010	<0.010	<0.00050	1.26 ± 0.762	3.02 ± 0.791	4.28	0.9
5/11/2016	421.94	3.82	197	1.1	465	349	6.5	2330	5440	<0.0010	<0.0050	0.024	<0.0010	<0.0010	<0.0050	0.0059	<0.0050	0.65	<0.00020	<0.010	<0.010	<0.00050	1.54 ± 0.797	1.62 ± 0.547	3.16	<0.30
8/16/2016	420.42	6.01	101	1.2	505	381	7.3	2950	5680	<0.0010	<0.0050	0.018	<0.0010	<0.0010	<0.0050	0.006	<0.0050	0.98	<0.00020	<0.010	<0.010	<0.00050	0.891 ± 0.626	5.10 ± 1.13	5.991	<0.30
11/17/2016	421.03	5.43	87	1.1	494	322	6.6	2420	5420	<0.0010	<0.0050	0.028	<0.0010	<0.0010	<0.0050	0.0068	<0.0050	0.94	<0.00020	<0.020	<0.010	<0.00050	0.872 ± .0579	5.23 ± 1.30	6.102	<0.30
2/23/2017	422.58	6.79	82	1.1	389	202	7	1450	2900	<0.0010	<0.010	<0.20	<0.0050	<0.0050	<0.010	<0.010	<0.0050	0.7	<0.00020	<0.010	<0.020	<0.00050	-0.239 ± 1.09	4.07 ± 1.03	3.831	0.45
6/7/2017	422.23	3.68	145	1.2	486	327	7.1	2260	4740	<0.0010	<0.0050	0.015	<0.0010	<0.0010	<0.0050	0.0058	<0.0050	0.62	<0.00020	<0.020	<0.010	<0.00050	0.941 ± 0.658	2.76 ± 0.765	3.701	0.57
8/24/2017	419.66	6.55	82.6	1.1	519	401	6.5	2890	6160	<0.0010	<0.010	0.014	<0.0010	<0.0020	<0.0050	0.0084	<0.010	1.03	<0.00020	<0.020	<0.020	<0.00050	1.26 ± 0.600	4.41 ± 1.07	5.67	<0.30
12/20/2017	421.08	6.459	22.4	1.3	563	380	6.8	2830	5790	<0.0010	<0.0060	0.034	<0.0010	<0.0050	<0.0070	0.0086	<0.010	0.92	<0.00020	<0.030	<0.020	<0.00050	0.626 ± 0.567	2.77 ± 0.728	3.396	0.61
6/21/2018	418.68	6.633	51.1	1.13	526	396	6.76	3160	6090	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.3
12/13/2018	422.36	4.47	10.6	1.08	327	206	6.61	1790	3520	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.662
6/24/2019	423.00	5.659	10.3	0.99	452	306	6.6	3130	5740	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.18
12/10/2019	419.87	6.189	34.3	1.26	572	345	6.67	3140	5830	n/a	0.0024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	n/a	n/a	n/a	n/a	0.137
BW-1																										
12/14/2015	465.60	5.35	155	1.8	465	727	9.5	2130	4900	<0.0010	<0.0050	0.17	<0.0010	<0.0010	0.015	0.0026	<0.0050	0.7	<0.00020	<0.010	<0.010	0.00073	0.900 ± 0.728	1.13 ± 0.513	2.03	<0.30
2/25/2016	465.44	5.8	307	3.5	586	1050	7.4	2690	6420	<0.0010	0.015	0.055	<0.0010	<0.0010	0.0053	0.0035	0.0069	0.71	<0.00020	<0.010	<0.010	<0.00050	0.887 ± 0.697	1.82 ± 0.541	2.707	0.67
5/11/2016	465.56	7.5	866	4	566	1120	7	2610	6360	<0.0010	0.0084	0.04	<0.0010	<0.0010	0.011	0.0035	0.0091	0.79	<0.00020	<0.010	<0.010	<0.00050	2.40 ± 0.944	2.80 ± 0.710	5.2	0.32
8/16/2016	465.71	7.52	56	3.7	566	1130	7.2	2720	6280	<0.0010	0.0064	0.04	<0.0010	<0.0010	0.0073	0.0029	<0.0050	0.78	<0.00020	<0.010	<0.010	<0.00050	0.610 ± 0.483	3.42 ± 0.777	4.03	0.94
11/17/2016	466.12	7.36	8.1	2.8	548	991	6.8	2590	6400	<0.0010	0.0066	0.023	<0.0010	<0.0010	<0.0050	<0.0025	<0.0050	0.74	<0.00020	0.022	<0.010	<0.00050	0.605 ± 0.548	2.94 ± 0.799	3.545	0.85
2/23/2017	466.57	7.17	245	3.1	532	1080	7.2	2760	6280	<0.0010	<0.010	<0.20	<0.0050	<0.0050	<0.010	<0.010	<0.0050	0.73	<0.00020	<0.010	<0.020	<0.00050	0.816 ± .0983	4.07 ± 1.08	4.886	<0.30
6/7/2017	466.17	7.58	852	3.8	539	1020	7.7	2220	7320	<0.0010	<0.0050	0.026	<0.0010	<0.0010	<0.0050	<0.0025	<0.0050	0.79	<0.00020	<0.020	<0.010	<0.00050	1.36 ± 0.685	3.13 ± 0.783	4.49	<0.30
8/24/2017	466.38	7.81	162	3.4	531	1160	7.1	2870	7260	<0.0010	<0.010	0.037	<0.0010	<0.0020	<0.0050	<0.0050	<0.010	0.738	<0.00020	<0.020	<0.020	<0.00050	1.58 ± 0.602	2.80 ± 0.759	4.38	0.37
12/20/2017	466.51	7.063	180	3.5	658	1030	7.2	2620	6140	<0.0010	<0.0060	0.044	<0.0010	<0.0050	<0.0070	0.0034	<0.010	0.73	<0.00020	<0.030	<0.020	<0.00050	1.07 ± 0.681	3.13 ± 0.788	4.2	<0.50
6/21/2018	466.13	7.755	39.3	3.31	610	1200	7.22	3030	6640	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.3
12/13/2018	467.24	7.159	81.8	3.25	637	1120	7.1	2780	6400	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.586
6/24/2019	467.37	7.21	157	3.1	564	1160	7.1	2930	6380	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.9
12/10/2019	467.39	6.612	214	2.98	591	1150	7.11	2830	6300	n/a	0.00236	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	n/a	n/a	n/a	n/a	0.309
MCL				n/a	n/a	n/a	n/a	n/a	n/a	0.006	0.01	2	0.004	0.005	0.1	n/a	0.015	n/a	0.002	n/a	0.05	0.002	n/a	n/a	5	4

MCL - EPA Primary Drinking Water Maximum Contaminant Level
0.015 Exceedance of EPA Primary MCL
40 CFR 257 Appendix III Constituent
40 CFR 257 Appendix IV Constituent
40 CFR 257 Appendix III & IV Constituent
"<" - Indicates analyte was not detected above the laboratory reporting limit
"n/a" - Indicates constituent has no EPA Primary MCL

Appendix D
Time Series Graphs



Sanitas™ v.9.5.32 Software licensed to SCS Aquaterra. EPA
Time Series
mg/L
3
2.4
1.8
1.2
0.6
0
12/14/15
9/30/16
7/18/17
5/6/18
2/21/19
12/10/19
MW-1
Constituent: Boron Analysis Run 1/21/2020 12:20 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.21.2020



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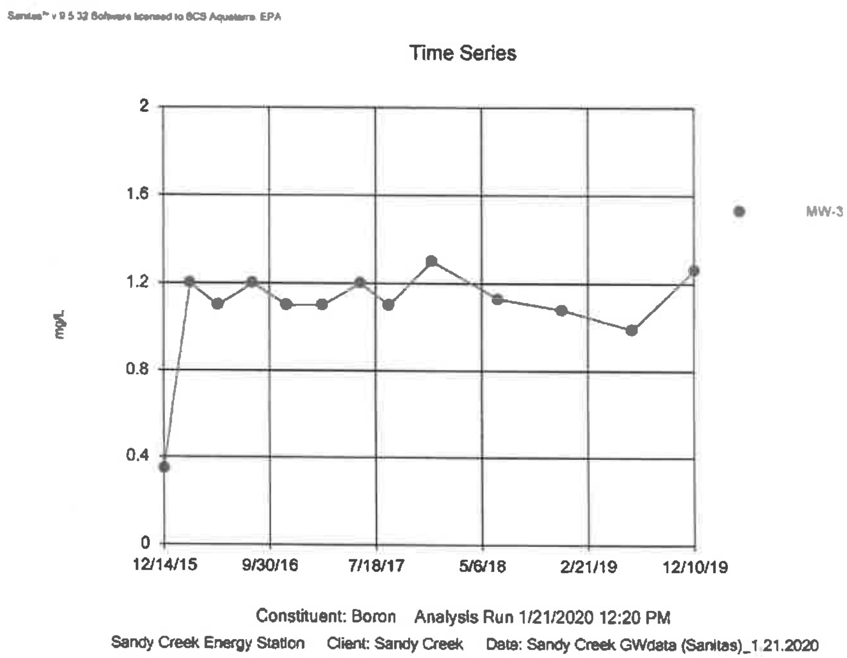
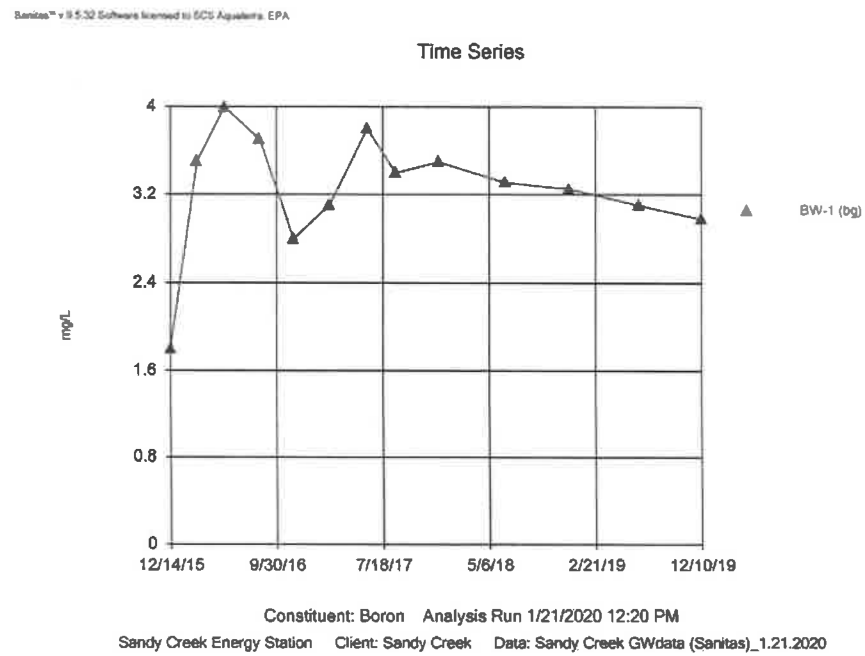
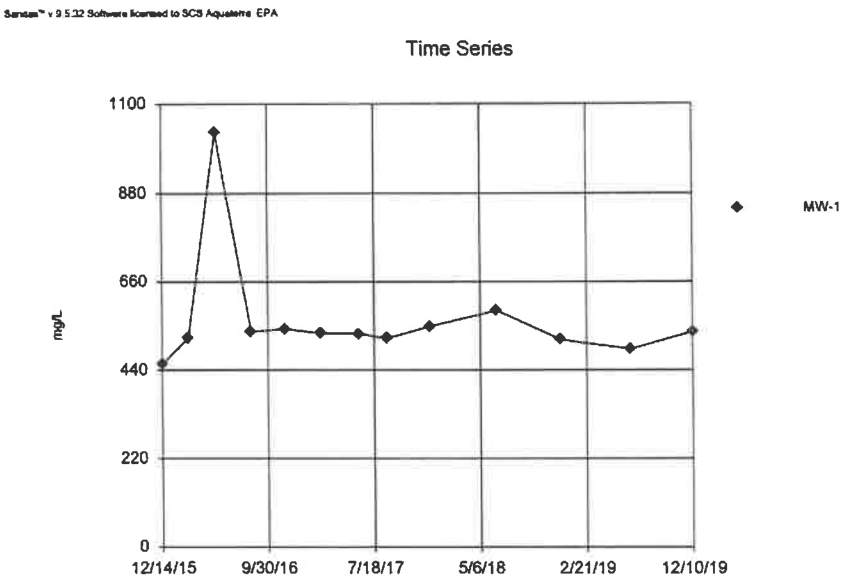
Time Series
mg/L
3
2.4
1.8
1.2
0.6
0
12/14/15
9/30/16
7/18/17
5/6/18
2/21/19
12/10/19
MW-2
Constituent: Boron Analysis Run 1/21/2020 12:20 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.21.2020



Sanitas™ v.9.5.32 Software licensed to SCS Aquaterra. EPA
Time Series
mg/L
2
1.6
1.2
0.8
0.4
0
12/14/15
9/30/16
7/18/17
5/6/18
2/21/19
12/10/19
MW-3
Constituent: Boron Analysis Run 1/21/2020 12:20 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.21.2020



Sanitas™ v.9.5.32 Software licensed to SCS Aquaterra. EPA
Time Series
mg/L
4
3.2
2.4
1.6
0.8
0
12/14/15
9/30/16
7/18/17
5/6/18
2/21/19
12/10/19
BW-1 (bg)
Constituent: Boron Analysis Run 1/21/2020 12:20 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.21.2020



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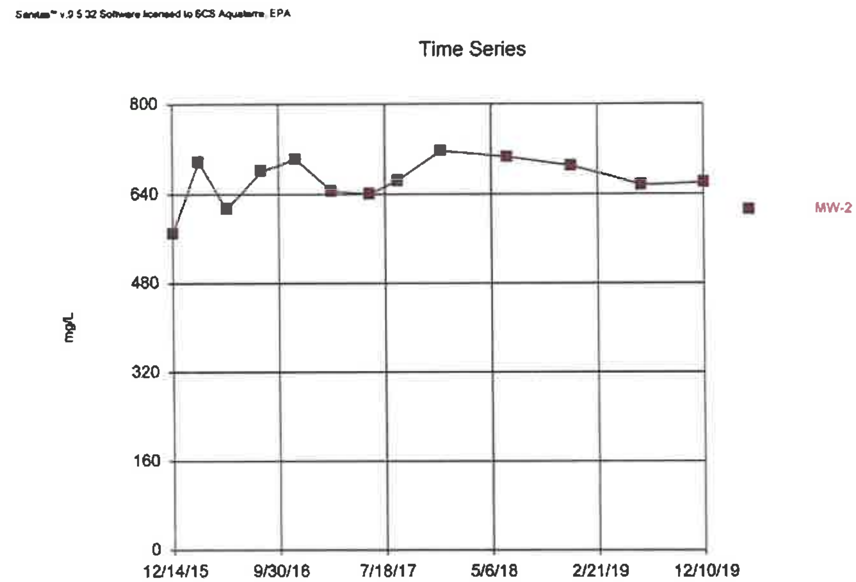

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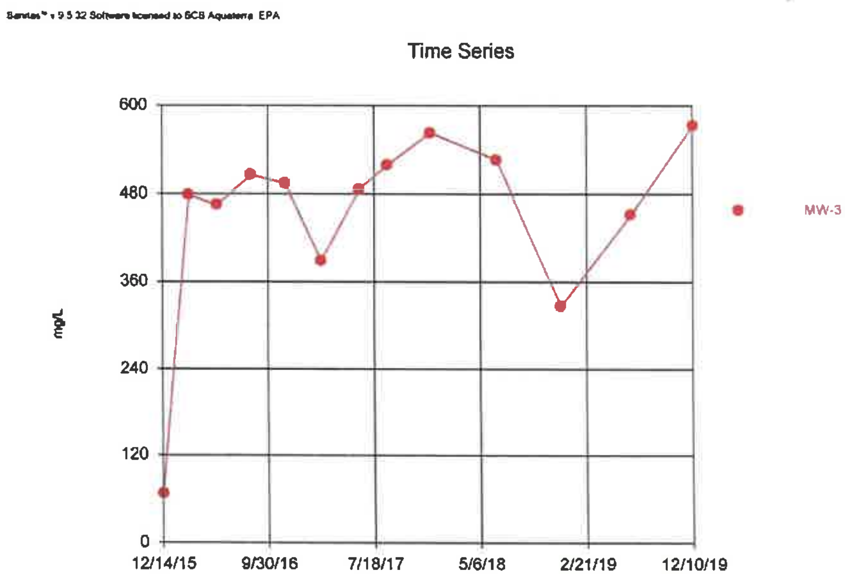

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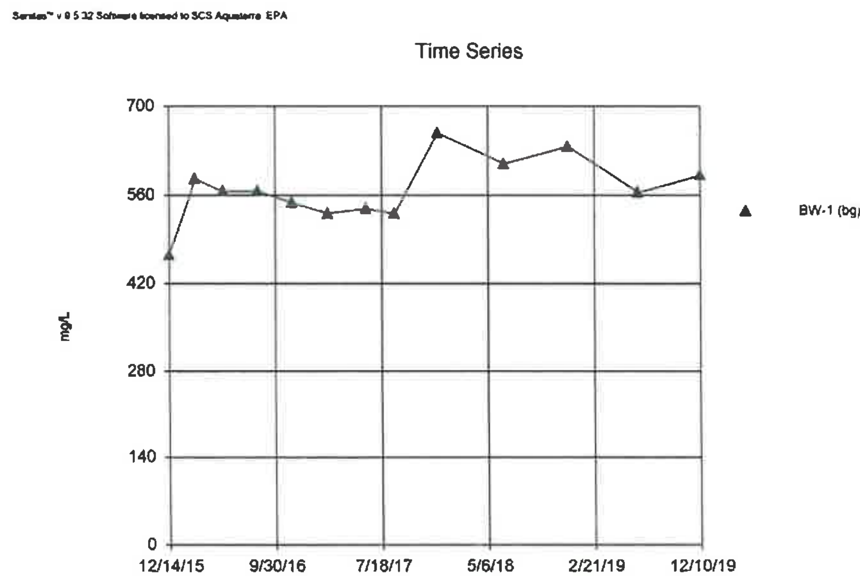
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.21.2020



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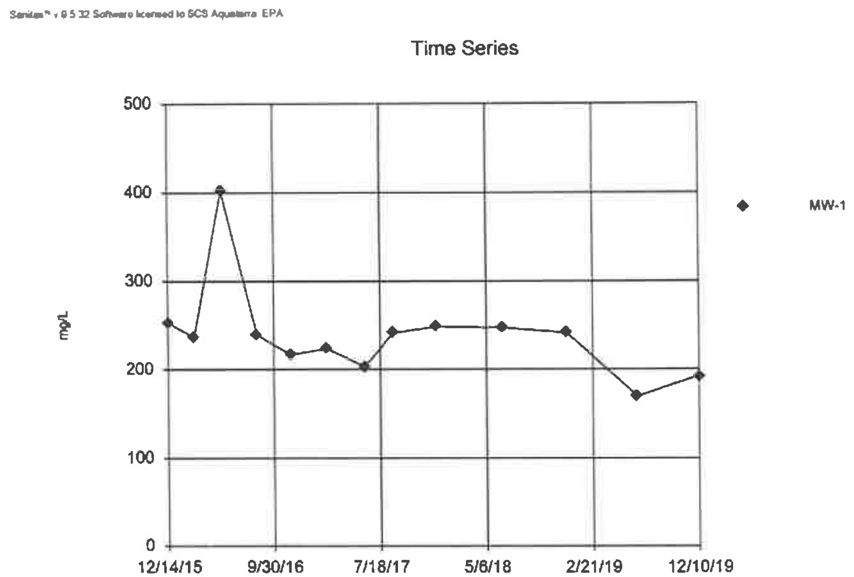

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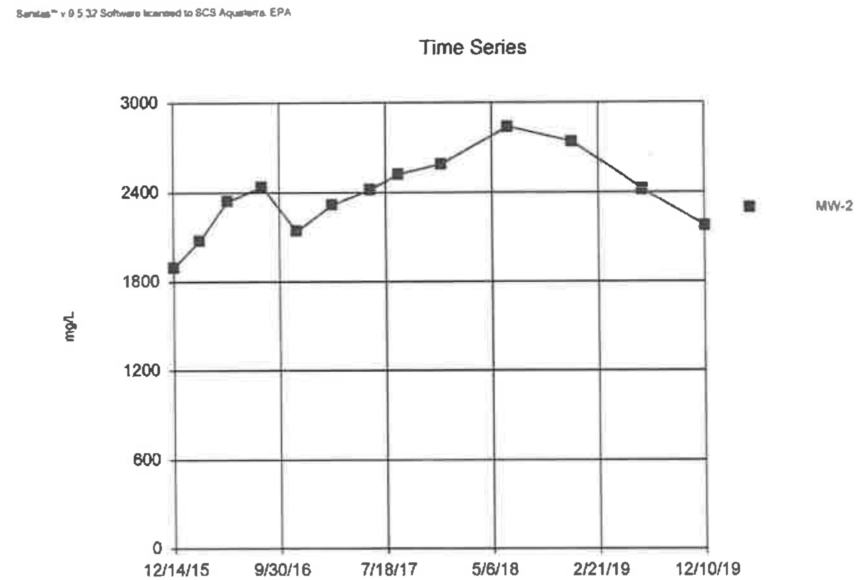
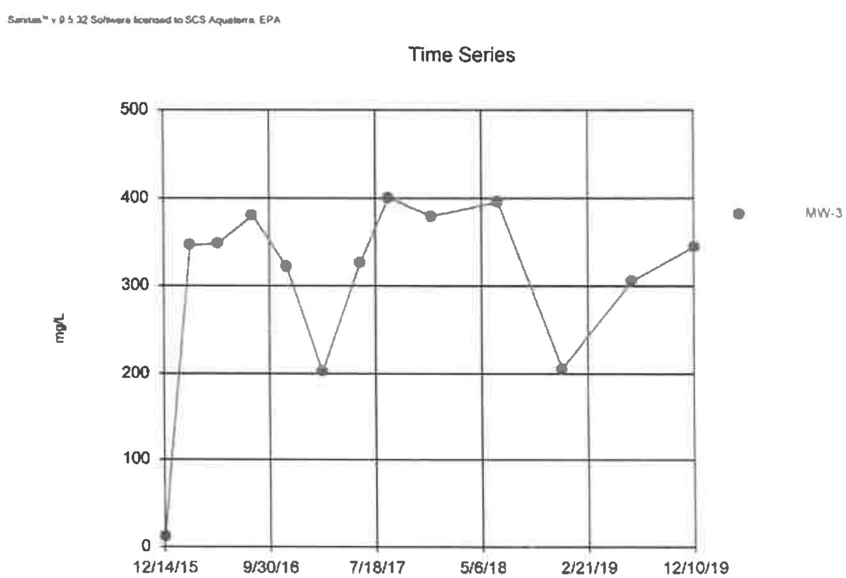


Constituent: Chloride Analysis Run 1/21/2020 12:20 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.21.2020



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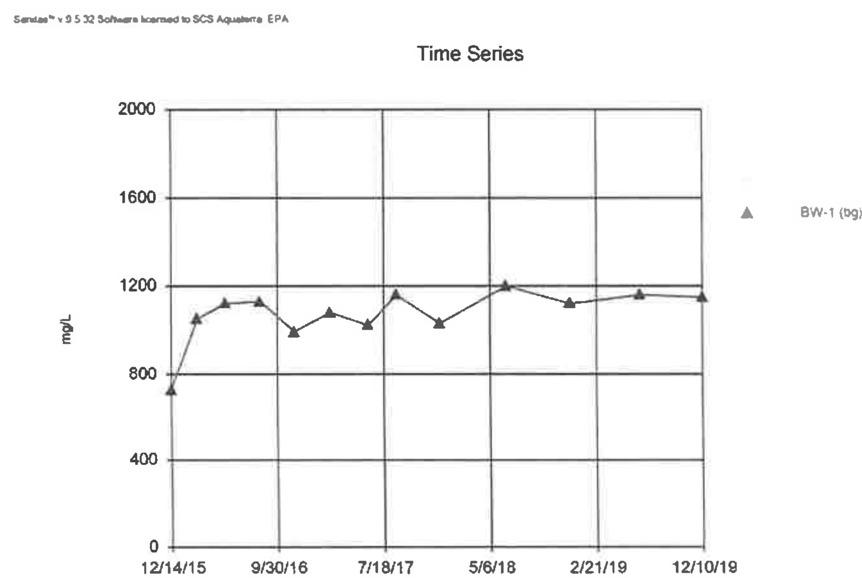
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.21.2020



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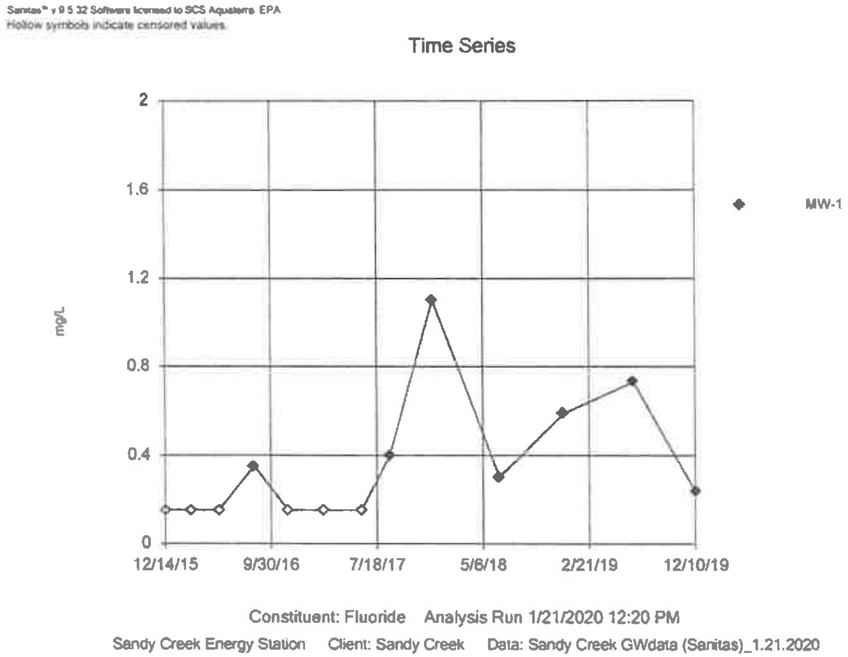
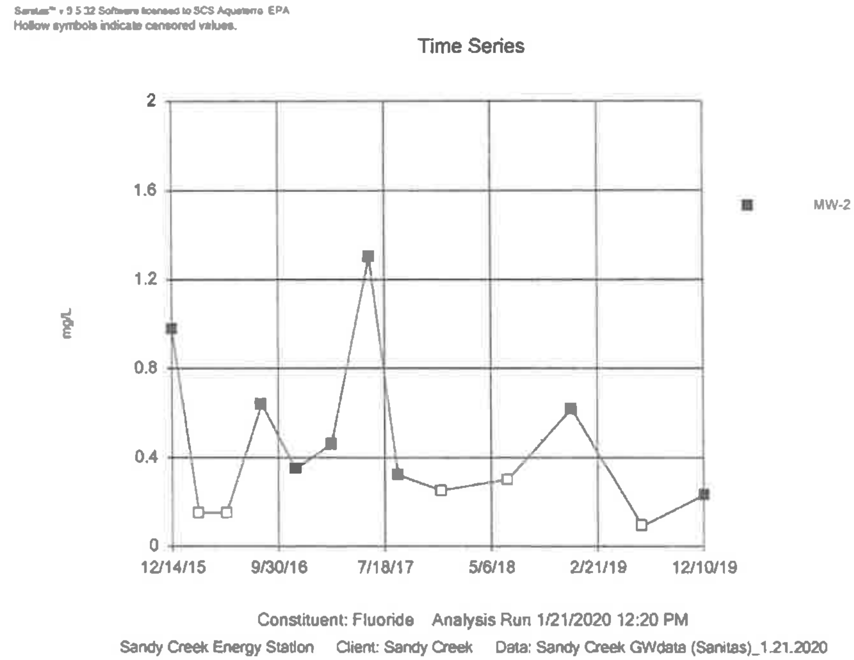
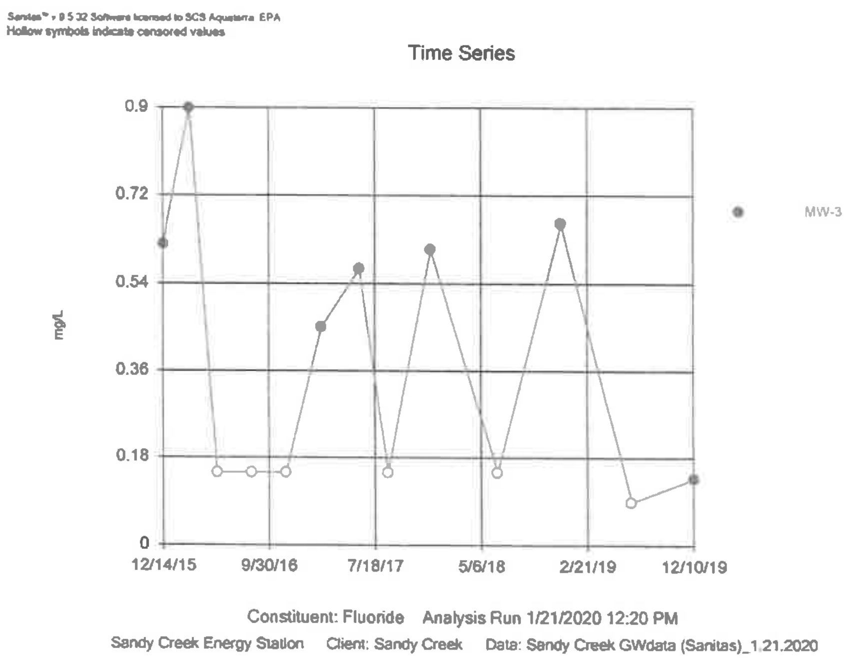
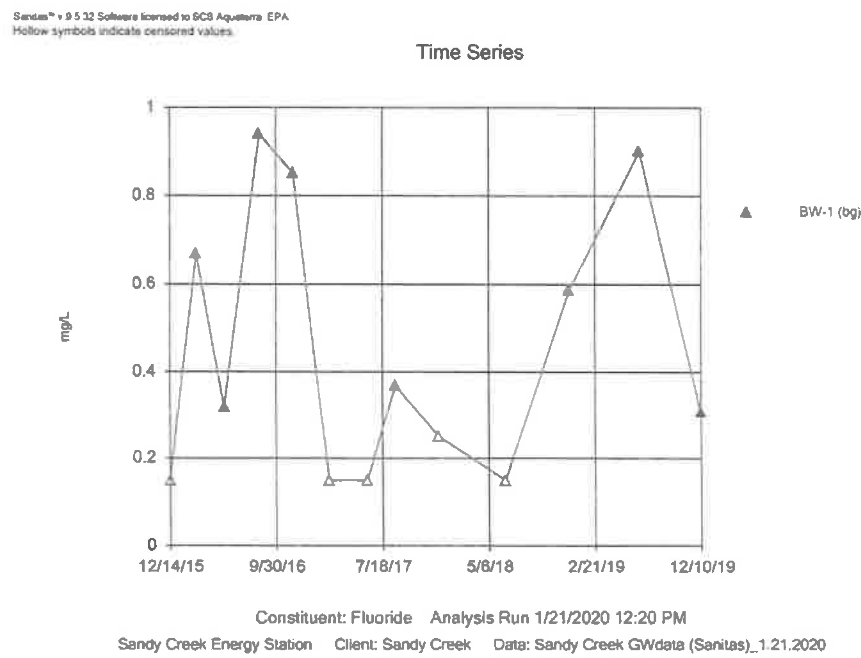
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.21.2020


Sanitas™ v.9.5.32 Software licensed to SCS Aquaterra. EPA
Hollow symbols indicate censored values.
Time Series
mg/L
2
1.6
1.2
0.8
0.4
0
12/14/15
9/30/16
7/18/17
5/6/18
2/21/19
12/10/19
MW-1
Constituent: Fluoride Analysis Run 1/21/2020 12:20 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.21.2020


Sanitas™ v.9.5.32 Software licensed to SCS Aquaterra. EPA
Hollow symbols indicate censored values.
Time Series
mg/L
2
1.6
1.2
0.8
0.4
0
12/14/15
9/30/16
7/18/17
5/6/18
2/21/19
12/10/19
MW-2
Constituent: Fluoride Analysis Run 1/21/2020 12:20 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.21.2020


Sanitas™ v.9.5.32 Software licensed to SCS Aquaterra. EPA
Hollow symbols indicate censored values
Time Series
mg/L
0.9
0.72
0.54
0.36
0.18
0
12/14/15
9/30/16
7/18/17
5/6/18
2/21/19
12/10/19
MW-3
Constituent: Fluoride Analysis Run 1/21/2020 12:20 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.21.2020


Sanitas™ v.9.5.32 Software licensed to SCS Aquaterra. EPA
Hollow symbols indicate censored values.
Time Series
mg/L
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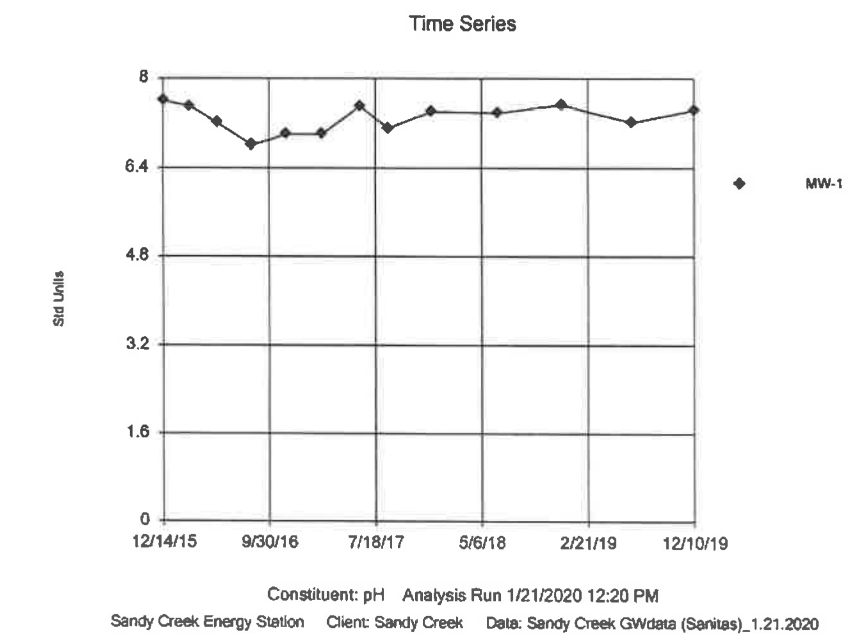
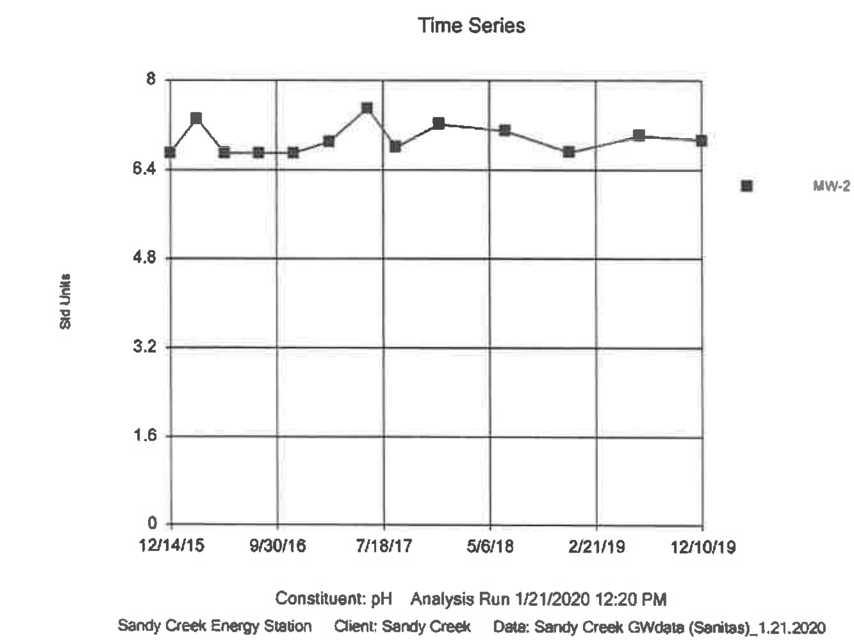
0.8
0.6
0.4
0.2
0
12/14/15
9/30/16
7/18/17
5/6/18
2/21/19
12/10/19
BW-1 (bg)
Constituent: Fluoride Analysis Run 1/21/2020 12:20 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.21.2020


Time Series
8
6.4
4.8
3.2
1.6
0
Std Units
12/14/15
9/30/16
7/18/17
5/6/18
2/21/19
12/10/19
MW-1
Constituent: pH Analysis Run 1/21/2020 12:20 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.21.2020


Time Series
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6.4
4.8
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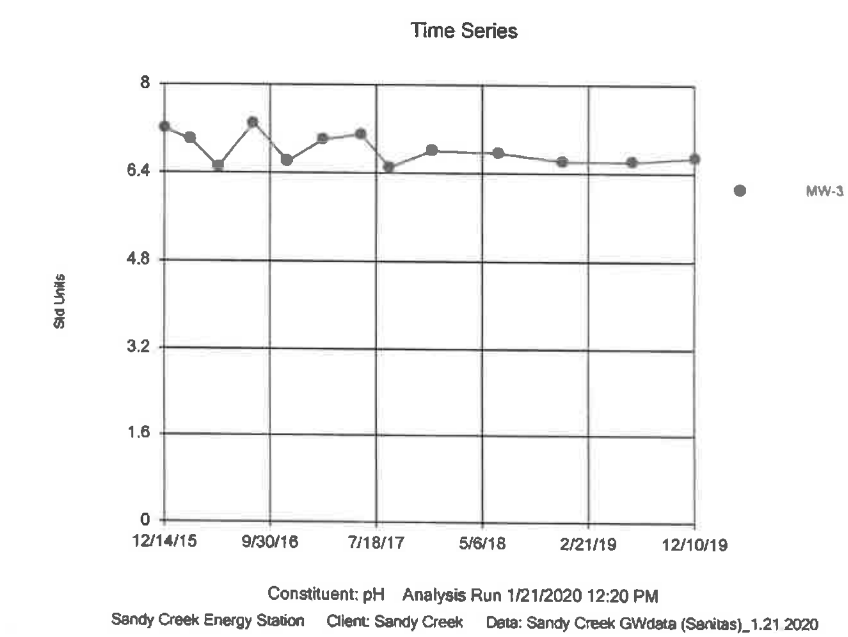
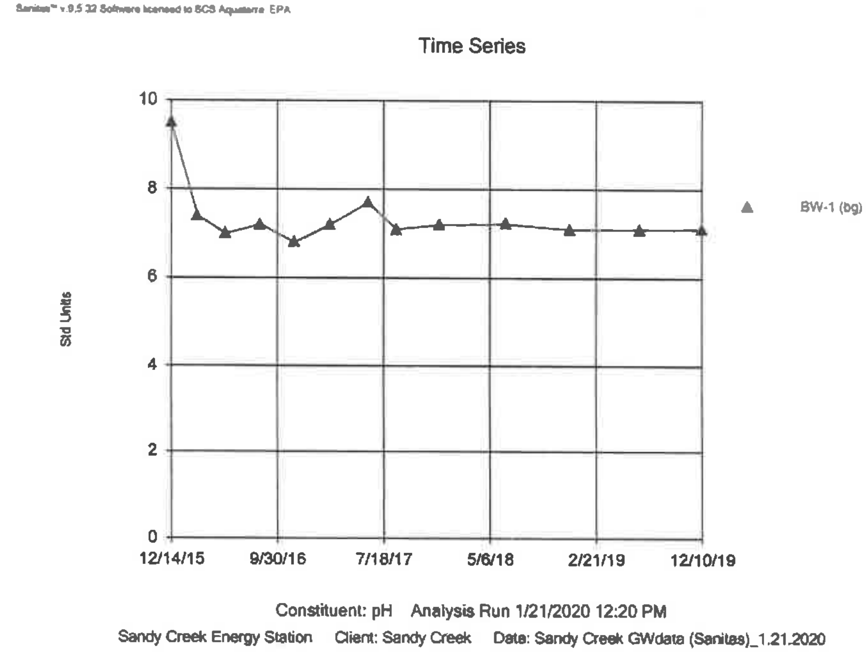
0
Std Units
12/14/15
9/30/16
7/18/17
5/6/18
2/21/19
12/10/19
MW-2
Constituent: pH Analysis Run 1/21/2020 12:20 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.21.2020


Time Series
8
6.4
4.8
3.2
1.6
0
Std Units
12/14/15
9/30/16
7/18/17
5/6/18
2/21/19
12/10/19
MW-3
Constituent: pH Analysis Run 1/21/2020 12:20 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.21.2020


Time Series
10
8
6
4
2
0
Std Units
12/14/15
9/30/16
7/18/17
5/6/18
2/21/19
12/10/19
BW-1 (bg)
Constituent: pH Analysis Run 1/21/2020 12:20 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.21.2020

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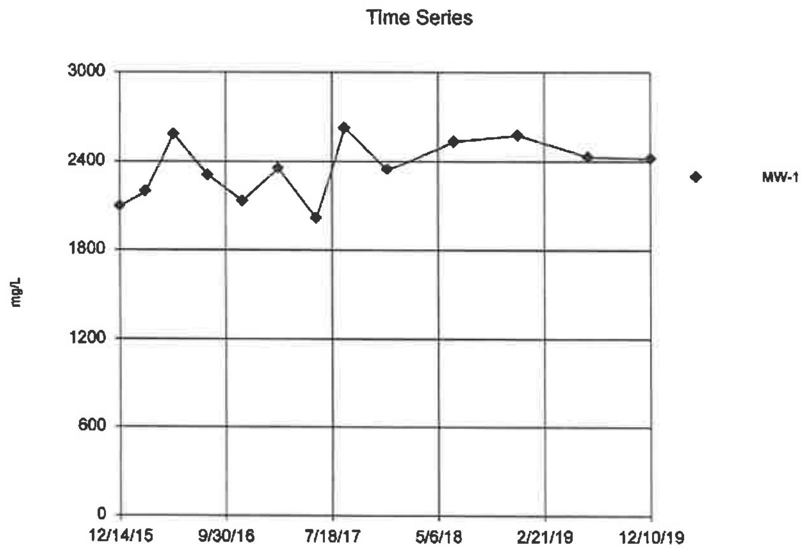
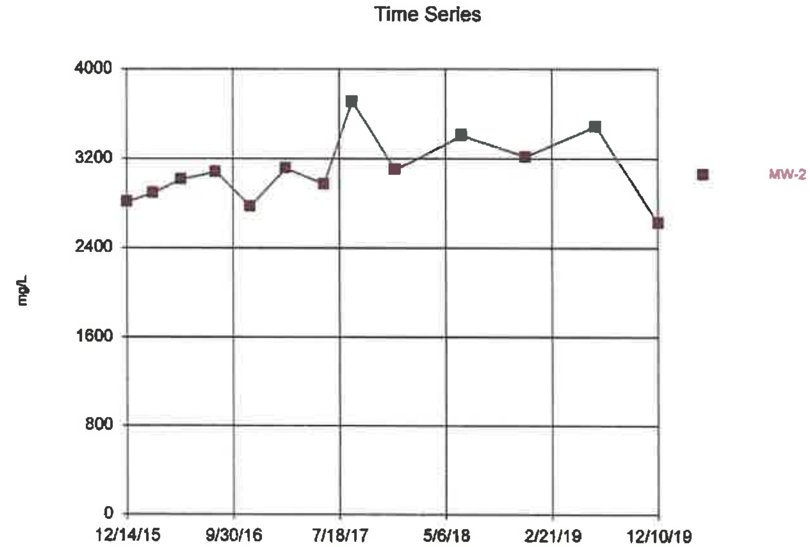


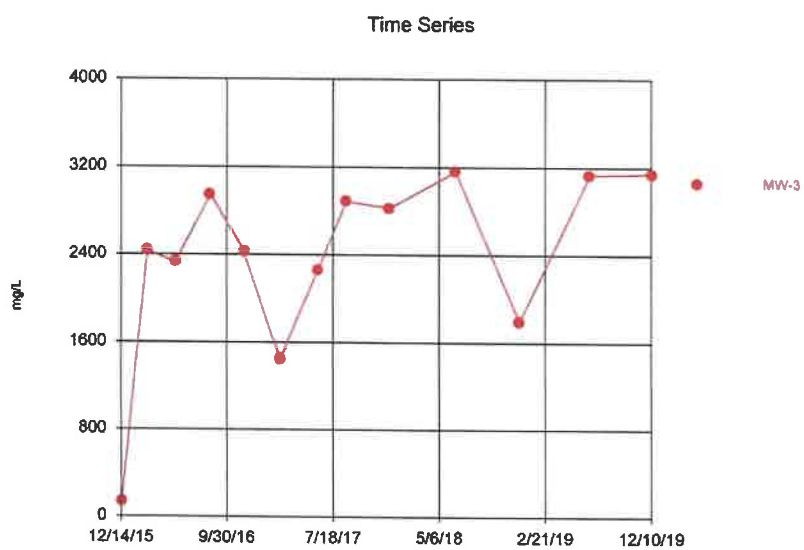
Constituent: Sulfate Analysis Run 1/21/2020 12:20 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.21.2020

Sanitas™ v.9.5.32 Software licensed to SCS Aquaterra. EPA



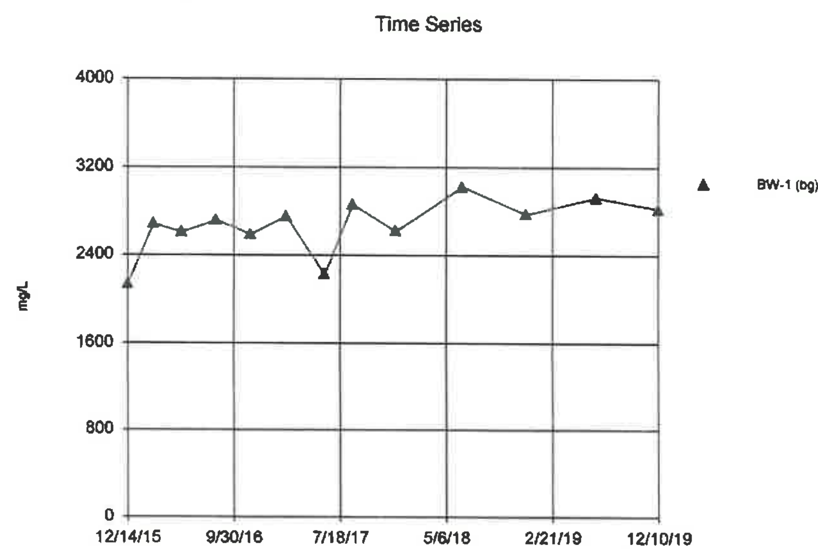
Constituent: Sulfate Analysis Run 1/21/2020 12:20 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.21.2020

Sanitas™ v.9.5.32 Software licensed to SCS Aquaterra. EPA



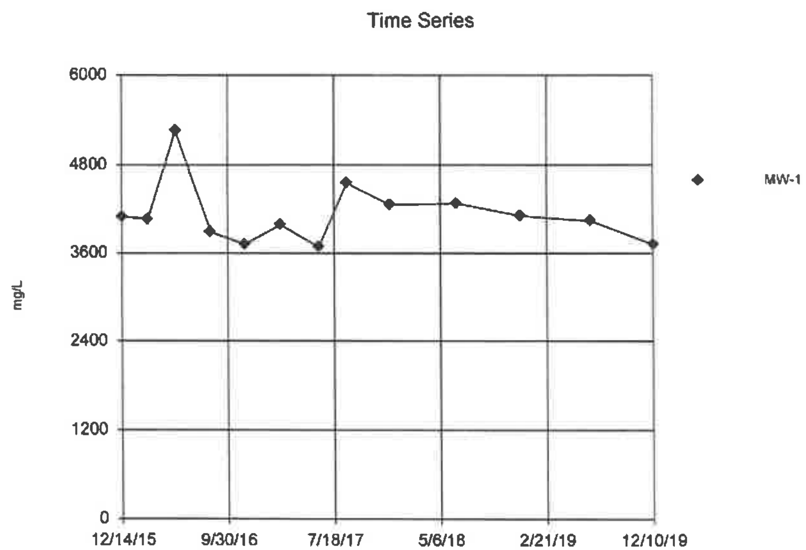
Constituent: Sulfate Analysis Run 1/21/2020 12:20 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.21.2020

Sanitas™ v.9.5.32 Software licensed to SCS Aquaterra. EPA



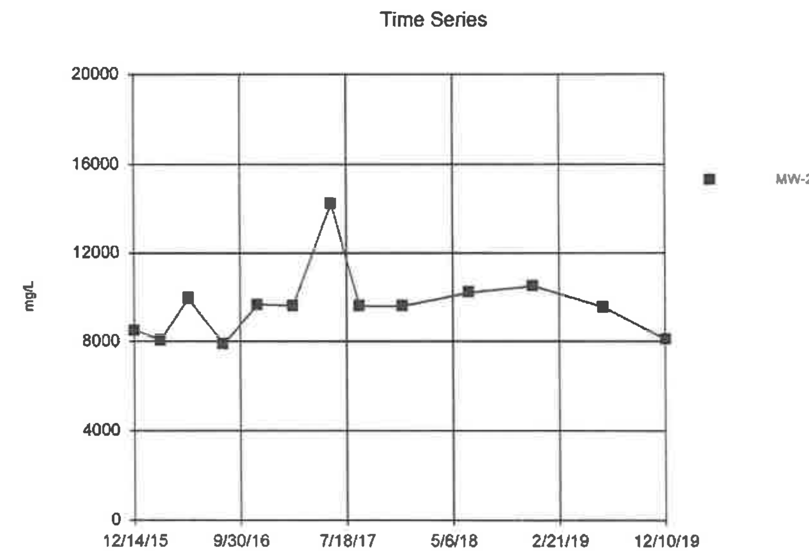
Constituent: Sulfate Analysis Run 1/21/2020 12:20 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.21.2020

Sanitas™ v.9.5.32 Software licensed to SCS Aquaterra. EPA



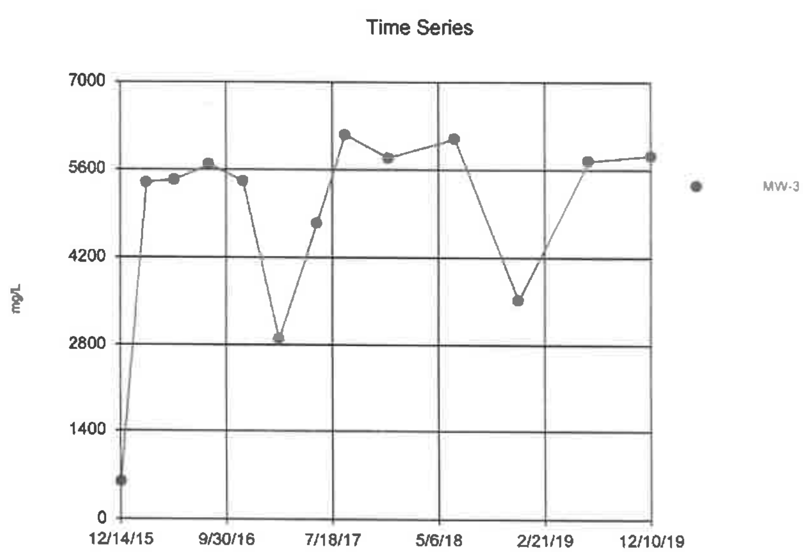
Constituent: Total Dissolved Solids Analysis Run 1/21/2020 12:20 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.21.2020

Sanitas™ v.9.5.32 Software licensed to SCS Aquaterra. EPA



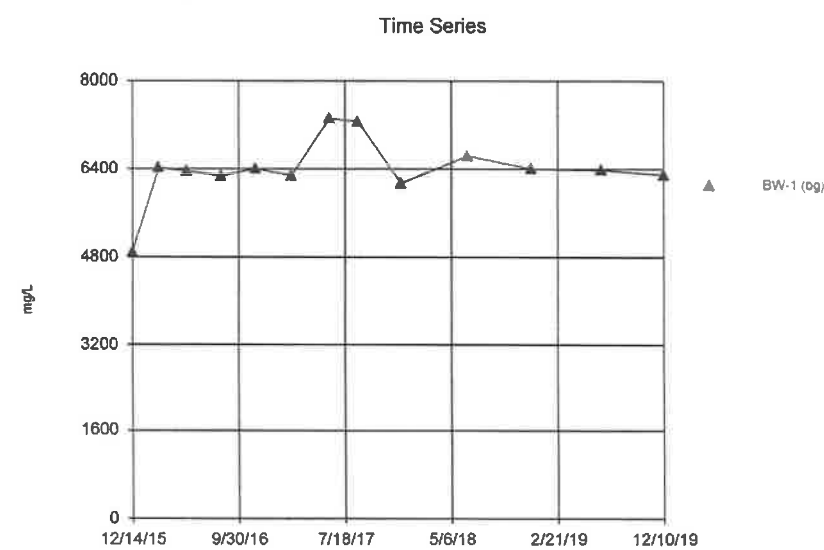
Constituent: Total Dissolved Solids Analysis Run 1/21/2020 12:21 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.21.2020

Sanitas™ v.9.5.32 Software licensed to SCS Aquaterra. EPA



Constituent: Total Dissolved Solids Analysis Run 1/21/2020 12:21 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.21.2020

Sanitas™ v.9.5.32 Software licensed to SCS Aquaterra. EPA



Constituent: Total Dissolved Solids Analysis Run 1/21/2020 12:21 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.21.2020

Appendix E
2019 Alternate Source Demonstrations

September 6, 2019
SCS Project 16218157.00

Mr. Darryl Sparks
Compliance Manager
NAES Corporation
2161 Rattlesnake Road
Riesel, Texas 76682

Subject: Alternate Source Demonstration for Fluoride in MW-1
June 2019 Semiannual Groundwater Monitoring Report
Sandy Creek Energy Station
McLennan County, Texas

Dear Mr. Sparks:

On behalf of the Sandy Creek Energy Station (SCES), SCS Engineers (SCS) is submitting this Alternate Source Demonstration (ASD) in accordance with the site Groundwater Sampling and Analysis Plan (GWSAP) prepared by SCS, dated March 2, 2016, and Coal Combustion Residual Rule (CCR) 40 CFR §257.94(e)(2) for a fluoride detection in groundwater monitoring well MW-1. During the June 2019 groundwater monitoring event, fluoride was detected in MW-1 at 0.73 mg/L, above the statistical limit of 0.4 mg/L. This ASD was conducted to investigate the likely source of the fluoride detection. In accordance with 40 CFR §257.94(e)(2), this ASD is being submitted within 90 days of detecting an unconfirmed statistically significant increase (SSI) above background values.

Project Background

SCES is a pulverized coal-fired electric generation facility which operates a landfill for disposal of dry scrubber ash and bottom ash generated during the coal combustion process at the facility. Incidental wastes generated during the operation of the facility may also be disposed in the landfill, as described in the initial registration notification to TCEQ and the most recent version of the Landfill Operations Plan for the facility. The landfill is currently comprised of two CCR disposal cells, Cells 1 and 2, which commenced receiving waste in early 2013 and October 2014, respectively. The approximate area of Cells 1 and 2 are 10.0 and 14.3 acres, respectively.

In accordance with 40 CFR §257 Appendix III and IV, the list of constituents for monitoring at SCES includes 18 inorganic compounds, total dissolved solids, radium-226, and radium-228. Currently, all monitoring wells are sampled and analyzed for 40 CFR §257 Appendix III constituents, in accordance with 40 CFR §257.94(a).

June 2019 Fluoride Detection

Fluoride was detected in MW-1 at a concentration of 0.73 mg/L during the June 2019 semiannual groundwater monitoring event.

Naturally Occurring Fluoride in Regional Groundwater

Median fluoride concentrations in groundwater samples from a regional major aquifer (Trinity) and a regional minor aquifer (Woodbine) are 0.7 mg/L (n=1,524) and 1.0 mg/L (n=179), respectively (Reedy et al., 2011). The June 2019 MW-1 fluoride detection of 0.73 mg/L in MW-1 is consistent with expected regional fluoride concentrations in groundwater. Fluoride concentrations in SCES upgradient well BW-1 range from <0.3 mg/L to 0.94 mg/L, indicating that SCES background groundwater fluoride concentrations are comparable to regional naturally-occurring concentrations.

Naturally Occurring Fluoride in Texas Soils

The Texas Commission on Environmental Quality (TCEQ) Texas-Specific Soil Background Concentration (TSBC) for fluoride is 190 mg/kg (equivalent mg/L) in soil (see attached TCEQ TSBC guidance). Note that the naturally-occurring median fluoride concentration expected in Texas soils is orders of magnitude greater than the concentration that is the subject of this ASD, detected in groundwater on June 24, 2019.

Statistical Analysis

Initial statistical analysis of fluoride in MW-1 included the use of a non-parametric prediction limit, using background data collected from MW-1. This test is appropriate because the background data pool for fluoride in MW-1 is non-normally distributed. Therefore, the intrawell statistical limit is represented as the highest of the eight background values from fluoride in MW-1 (see "Intrawell Limit" in Table 1).

Since the June 2019 laboratory result for fluoride in MW-1 exceeded its respective intrawell limit, additional statistical evaluation was performed in accordance with 40 CFR §257.94(e)(2). This additional analysis consisted of calculating an interwell parametric prediction limit (see "Interwell Limit" in Table 1 and attachments). This test is commonly used to provide a comparison between a detection in a downgradient monitoring well and a statistical limit derived from background data from one or more upgradient monitoring wells. If the detection falls below the interwell statistical limit, this is evidence that the detection is representative of background data.

Table 1 – June 2019 Unconfirmed SSIs (mg/L)

MW- ID	Constituent	Lab Result	Intrawell Limit	Interwell Limit
MW-1	Fluoride	0.73	0.4	1.187

Conclusion

As a result of this analysis comparing upgradient to downgradient data, the interwell statistical limit is higher than the June 2019 laboratory result for fluoride in MW-1. Attached are the interwell statistical graph and data, demonstrating the comparison between the upgradient and downgradient wells. The detection appears to be coming from a non-landfill, upgradient source, so no further action is recommended. The detection is most likely a naturally-derived component of the site geology, which can result in a natural variation in groundwater quality. The detected concentration is consistent with expected naturally-occurring fluoride concentrations in regional groundwater.

Closing

SCS recommends that the facility remain in detection monitoring, in accordance with 40 CFR §257.94, as these ASDs satisfy the 90-day demonstration period requirement outlined in 40 CFR §257.94(e)(2). Please contact Jim Lawrence at (817) 358-6106 if you have comments or require additional information.

Sincerely,

Doug Steen	James Lawrence, P.G.
Staff Professional	Project Director
SCS ENGINEERS	**SCS ENGINEERS**
TBPE Registration No. F-3407	

Attachments: Interwell Statistical Graph and Data
TCEQ Texas-Specific Soil Background Concentrations Guidance

References:

Reedy, R.C., B.R. Scanlon, S. Walden, and G. Strassberg (2011), Naturally Occurring Groundwater Contamination in Texas, *Bureau of Economic Geology, The University of Texas at Austin, TWDB Contract No. 1004831125, 203 p.*

STATE OF TEXAS
James Lawrence
Discipline
License #
541
LICENSED
PROFESSIONAL GEOSCIENTIST

9.6.2019

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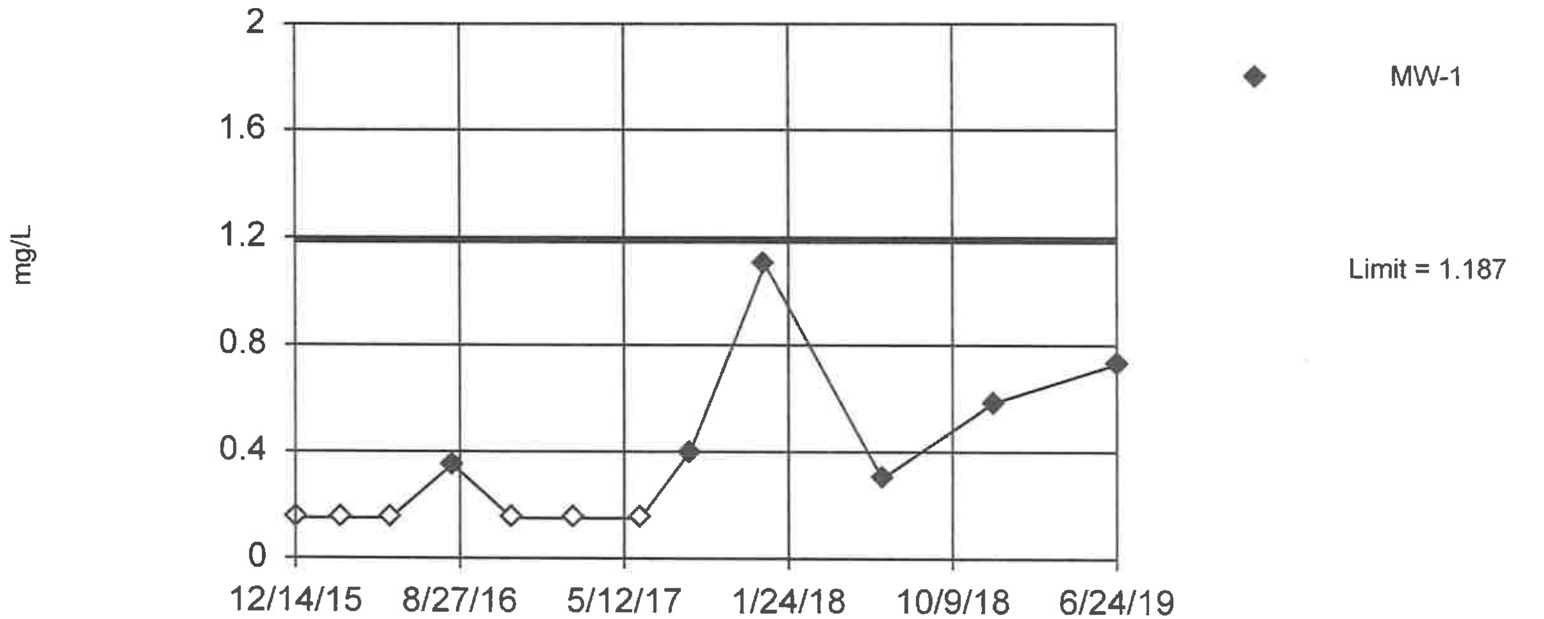
Hollow symbols indicate censored values.

Within Limit

Prediction Limit

Interwell Parametric



Background Data Summary (after Cohen`s Adjustment): Mean=0.4018, Std. Dev.=0.3908, n=8, 37.5% NDs. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8478, critical = 0.818. Report alpha = 0.05. Most recent point compared to limit.

Constituent: Fluoride Analysis Run 8/16/2019 9:19 AM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_7.31.2019

Prediction Limit

Constituent: Fluoride (mg/L) Analysis Run 8/16/2019 9:20 AM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_7.31.2019

	MW-1	BW-1 (bg)
12/14/2015	<0.3	<0.3
2/25/2016	<0.3	0.67
5/11/2016	<0.3	0.32
8/16/2016	0.35	0.94
11/17/2016	<0.3	0.85
2/23/2017	<0.3	<0.3
6/7/2017	<0.3	<0.3
8/24/2017	0.4	0.37
12/20/2017	1.1	
6/21/2018	0.3	
12/13/2018	0.585	
6/24/2019	0.73	

Texas-Specific Soil Background Concentrations milligrams per kilogram (mg/kg)[1]	
Metal	Median Background Concentration (mg/kg)
Aluminum	30,000
Antimony	1
Arsenic	5.9
Barium	300
Beryllium	1.5
Boron	30
Total Chromium	30
Cobalt	7
Copper	15
Fluoride	190
Iron	15,000
Lead	15
Manganese	300
Mercury	0.04
Nickel	10
Selenium	0.3
Strontium	100
Tin	0.9
Titanium	2,000
Thorium	9.3
Vanadium	50
Zinc	30

[1] Source: "Background Geochemistry of Some Rocks, Soils, Plants, and Vegetables in the Conterminous United States", by Jon J. Connor, Hansford T. Shacklette, et al., Geological Survey Professional Paper 574-F, US Geological Survey.

January 31, 2020
SCS Project 16218157.00

Mr. Darryl Sparks
Compliance Manager
NAES Corporation
2161 Rattlesnake Road
Riesel, Texas 76682

Subject: Alternate Source Demonstration for Boron in MW-3
2019 Annual Groundwater Monitoring and Corrective Action Report
Sandy Creek Energy Station
McLennan County, Texas

Dear Mr. Sparks:

On behalf of the Sandy Creek Energy Station (SCES), SCS Engineers (SCS) is submitting this Alternate Source Demonstration (ASD) in accordance with the site Groundwater Sampling and Analysis Plan (GWSAP) prepared by SCS, dated March 2, 2016, and Coal Combustion Residual Rule (CCR) 40 CFR §257.94(e)(2) for a boron detection in groundwater monitoring well MW-3. During the December 2019 groundwater monitoring event, boron was detected in MW-3 at 1.26 mg/L, above the statistical limit of 1.2 mg/L. This ASD was conducted to investigate the likely source of the boron detection. In accordance with 40 CFR §257.94(e)(2), this ASD is being submitted within 90 days of detecting an unconfirmed statistically significant increase (SSI) above background values.

Project Background

SCES is a pulverized coal-fired electric generation facility which operates a landfill for disposal of dry scrubber ash and bottom ash generated during the coal combustion process at the facility. Incidental wastes generated during the operation of the facility may also be disposed in the landfill, as described in the initial registration notification to TCEQ and the most recent version of the Landfill Operations Plan for the facility. The landfill is currently comprised of two CCR disposal cells, Cells 1 and 2, which commenced receiving waste in early 2013 and October 2014, respectively. The approximate area of Cells 1 and 2 are 10.0 and 14.3 acres, respectively.

In accordance with 40 CFR §257 Appendix III and IV, the list of constituents for monitoring at SCES includes 18 inorganic compounds, total dissolved solids, radium-226, and radium-228. Currently, all monitoring wells are sampled and analyzed for 40 CFR §257 Appendix III constituents, in accordance with 40 CFR §257.94(a).

December 2019 Boron Detection

Boron was detected in MW-3 at a concentration of 1.26 mg/L during the December 2019 semiannual groundwater monitoring event.

Naturally Occurring Boron in Texas Soils

The Texas Commission on Environmental Quality (TCEQ) Texas-Specific Soil Background Concentration (TSBC) for boron is 30 mg/kg (equivalent mg/L) in soil (see attached TCEQ TSBC guidance). Note that the naturally-occurring median boron concentration expected in Texas soils is much greater than the concentration that is the subject of this ASD, detected in groundwater on December 10, 2019.

Statistical Analysis

Initial statistical analysis of boron in MW-3 included the use of a non-parametric prediction limit, using background data collected from MW-3. This test is appropriate because the background data pool for boron in MW-3 is non-normally distributed. Therefore, the intrawell statistical limit is represented as the highest of the eight background values from boron in MW-3 (see "Intrawell Limit" in Table 1).

Since the December 2019 laboratory result for boron in MW-3 exceeded its respective intrawell limit, additional statistical evaluation was performed in accordance with 40 CFR §257.94(e)(2). This additional analysis consisted of calculating an interwell parametric prediction limit (see "Interwell Limit" in Table 1 and attachments). This test is commonly used to provide a comparison between a detection in a downgradient monitoring well and a statistical limit derived from background data from one or more upgradient monitoring wells. If the detection falls below the interwell statistical limit, this is evidence that the detection is representative of background data.

Table 1 – December 2019 Unconfirmed SSIs (mg/L)

MW- ID	Constituent	Lab Result	Intrawell Limit	Interwell Limit
MW-3	Boron	1.26	1.2	4.268

Conclusion

As a result of this analysis comparing upgradient to downgradient data, the interwell statistical limit is higher than the December 2019 laboratory result for boron in MW-3. Attached are the interwell statistical graph and data, demonstrating the comparison between the upgradient and downgradient wells. The detection appears to be coming from a non-landfill, upgradient source, so no further action is recommended. The detection is most likely a naturally-derived component of the site geology, which can result in a natural variation in groundwater quality. The detected concentration is consistent with expected naturally-occurring boron concentrations in regional groundwater.

Closing

SCS recommends that the facility remain in detection monitoring, in accordance with 40 CFR §257.94, as these ASDs satisfy the 90-day demonstration period requirement outlined in 40 CFR §257.94(e)(2). Please contact Jim Lawrence at (817) 358-6106 if you have comments or require additional information.

Sincerely,

Tyson Milbrand

James Lawrence

Tyson Milbrand
Staff Professional
SCS ENGINEERS
TBPE Registration No. F-3407

James Lawrence, P.G.
Project Director
SCS ENGINEERS

Attachments: Interwell Statistical Graph and Data
TCEQ Texas-Specific Soil Background Concentrations Guidance

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James Lawrence

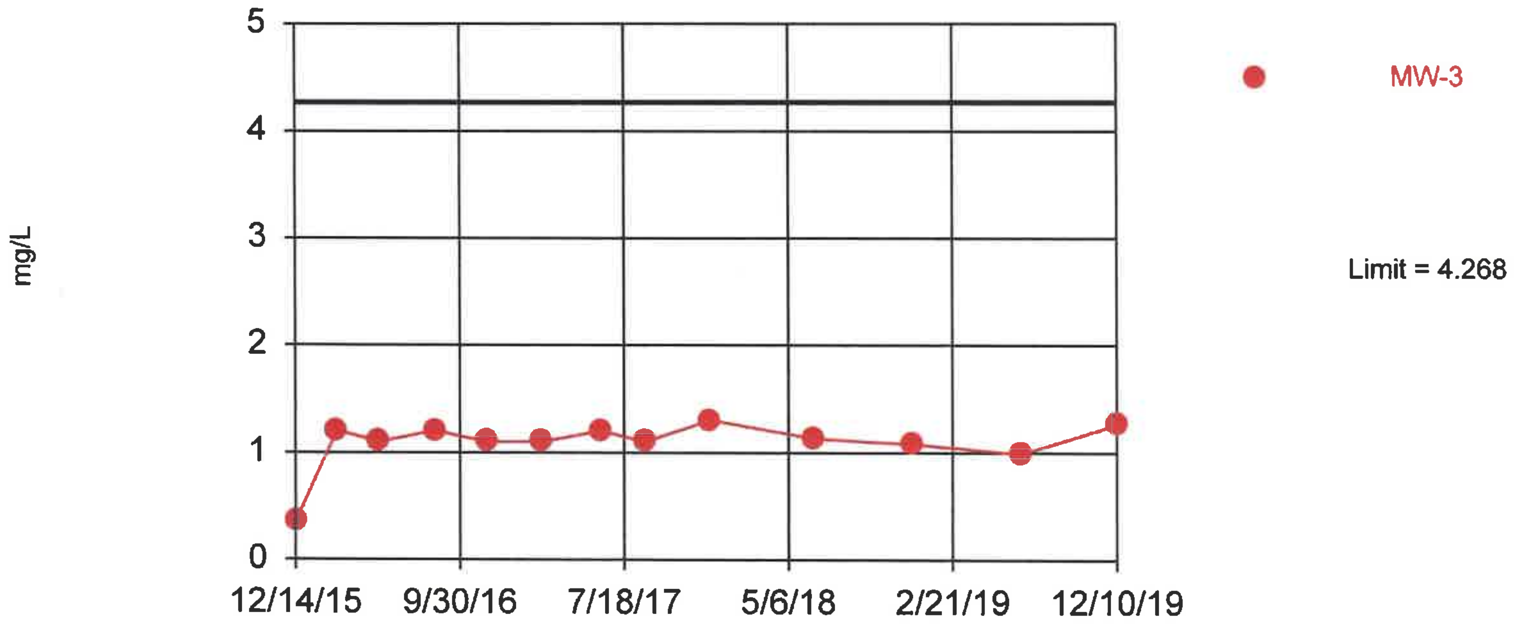
1.31.2020

Sanitas™ v.9.5.32 Software licensed to SCS Aquaterra. EPA

Within Limit

Prediction Limit

Interwell Parametric



Background Data Summary: Mean=3.249, Std. Dev.=0.5509, n=13. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8952, critical = 0.866. Report alpha = 0.05. Most recent point compared to limit.

Constituent: Boron Analysis Run 1/21/2020 12:23 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.21.2020

Prediction Limit

Constituent: Boron (mg/L) Analysis Run 1/21/2020 12:24 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.21.2020

	BW-1 (bg)	MW-3
12/14/2015	1.8	0.35
2/25/2016	3.5	1.2
5/11/2016	4	1.1
8/16/2016	3.7	1.2
11/17/2016	2.8	1.1
2/23/2017	3.1	1.1
6/7/2017	3.8	1.2
8/24/2017	3.4	1.1
12/20/2017	3.5	1.3
6/21/2018	3.31	1.13
12/13/2018	3.25	1.08
6/24/2019	3.1	0.99
12/10/2019	2.98	1.26

Non-Parametric ANOVA

Constituent: Boron Analysis Run 1/21/2020 12:23 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_1.21.2020

For observations made between 12/14/2015 and 12/10/2019, the non-parametric analysis of variance test indicates a DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 18.88

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 4 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 18.78
Adjusted Kruskal-Wallis statistic (H') = 18.88

The contrast test was performed to determine if any compliance group concentration was significantly higher than the background concentration. The contrast test indicates statistical significance in none of the compliance wells.

Contrast table:

Well	Difference	Contrast	Significant?
MW-3	-13	4.932	No

The critical (contrast) value was computed with 1 degree of freedom and a 5% error level for each well comparison. (Note: In this case, with Anova indicating differences that are not reflected in the contrast test, it should be concluded that it is the median of the Background data which is significantly higher.)

Non-parametric test used in lieu of parametric anova because the Shapiro Wilk normality test showed the residuals to be non-normal at the 0.01 alpha level.

Non-Parametric ANOVA

Constituent: Boron (mg/L) Analysis Run 1/21/2020 12:23 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas) 1.21.2020

	BW-1 (bg)	MW-3
12/14/2015	1.8	0.35
2/25/2016	3.5	1.2
5/11/2016	4	1.1
8/16/2016	3.7	1.2
11/17/2016	2.8	1.1
2/23/2017	3.1	1.1
6/7/2017	3.8	1.2
8/24/2017	3.4	1.1
12/20/2017	3.5	1.3
6/21/2018	3.31	1.13
12/13/2018	3.25	1.08
6/24/2019	3.1	0.99
12/10/2019	2.98	1.26

Texas-Specific Soil Background Concentrations milligrams per kilogram (mg/kg)[1]	
Metal	Median Background Concentration (mg/kg)
Aluminum	30,000
Antimony	1
Arsenic	5.9
Barium	300
Beryllium	1.5
Boron	30
Total Chromium	30
Cobalt	7
Copper	15
Fluoride	190
Iron	15,000
Lead	15
Manganese	300
Mercury	0.04
Nickel	10
Selenium	0.3
Strontium	100
Tin	0.9
Titanium	2,000
Thorium	9.3
Vanadium	50
Zinc	30

[1] Source: "Background Geochemistry of Some Rocks, Soils, Plants, and Vegetables in the Conterminous United States", by Jon J. Connor, Hansford T. Shacklette, et al., Geological Survey Professional Paper 574-F, US Geological Survey.

2020 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT

January 29, 2021
SCS Project No. 16220013.00

Mr. Darryl Sparks
Compliance Manager
NAES Corporation
2161 Rattlesnake Road
Riesel, Texas 76682

Subject: Sandy Creek Energy Station
McLennan County, Texas
2020 Annual Groundwater Monitoring and Corrective Action Report Submittal

Dear Mr. Sparks:

SCS Engineers (SCS) is pleased to submit the 2020 Annual Groundwater Monitoring and Corrective Action Report to the Sandy Creek Energy Station (SCES), in accordance with Coal Combustion Residual Rule (CCR) 40 CFR Part §257.105(h)(1), and the site Groundwater Sampling and Analysis Plan (GWSAP), prepared by SCS, dated March 2, 2016.

Please contact James Lawrence at (817) 358-6106 if you have comments or require additional information.

Sincerely,

STATE OF TEXAS
BRETT J. DeVRIES
128061
LICENSED
PROFESSIONAL ENGINEER

Asher Boudreaux
Associate Staff Professional
SCS ENGINEERS
TBPE Registration No. F-3407

Brett DeVries, Ph.D., P.E.
Project Engineer
SCS ENGINEERS

James Lawrence, P.G.
Project Director
SCS ENGINEERS

Attachment: 2020 Annual Groundwater Monitoring and Corrective Action Report

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1/29/2021

2020 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT

Sandy Creek Energy Station
McLennan County, Texas

Prepared For:

Sandy Creek Energy Station
2161 Rattlesnake Road
Riesel, Texas 76682

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1/29/2021

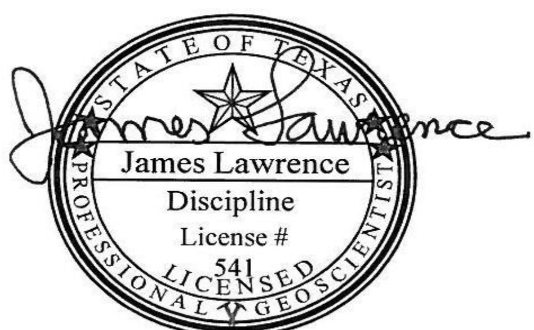
SCS ENGINEERS

SCS Project 16220013.00 | January 29, 2021

1901 Central Drive, Suite 550
Bedford, TX 76021
817-571-2288

Figures

Appendices



1/29/2021

1.0 INTRODUCTION AND BACKGROUND

SCS Engineers (SCS) is submitting this 2020 Annual Groundwater Monitoring and Corrective Action Report for the Sandy Creek Energy Station (SCES). This report is prepared in accordance with Coal Combustion Residual Rule (CCR) 40 CFR §257.105(h)(1) and the site Groundwater Sampling and Analysis Plan (GWSAP) prepared by SCS, dated March 2, 2016. This report includes results for two semiannual detection monitoring events, conducted in April 2020 and November 2020.

SCES is a pulverized coal-fired electric generation facility which operates a landfill for disposal of dry scrubber ash and bottom ash generated during the coal combustion process at the facility. Incidental wastes generated during the operation of the facility may also be disposed in the landfill, as described in the initial registration notification to TCEQ and the most recent version of the Operations Plan for the facility. The landfill is currently comprised of two CCR disposal cells, Cells 1 and 2, which commenced receiving waste in early 2013 and October 2014, respectively. The approximate area of Cells 1 and 2 are 10.0 and 14.3 acres, respectively.

Sampling of groundwater monitoring wells is conducted in accordance with 40 CFR §257.93 and the GWSAP. Initial monitoring of four wells (MW-1, MW-2, MW-3, and BW-1; as depicted on **Figure 1**) was performed for eight consecutive quarters in accordance with 40 CFR §257.94(b) (i.e., eight independent samples were collected for each well). The initial monitoring described above commenced in December 2015 and was completed in August 2017 in accordance with 40 CFR §257.94 (b). The constituents monitored during the required background monitoring period and the first semiannual detection monitoring event included 18 inorganic compounds, total dissolved solids, radium-226, and radium-228, while the constituents monitored in subsequent events and during the November 2020 semiannual detection monitoring event included Appendix III constituents only, in accordance with 40 CFR §257 Appendix III.

The site started 2020 in detection monitoring status. The observation of potential SSIs for boron and chloride were resolved through alternate source demonstrations (Appendix E). Accordingly, the site remains in its detection monitoring program.

2.0 GROUNDWATER MONITORING SUMMARY

2.1 GROUNDWATER MONITORING SYSTEM

The current groundwater monitoring system at the SCES landfill consists of four wells (see **Table 1** below). One upgradient (BW-1) and three downgradient (MW-1, MW-2, & MW-3). All four wells are currently in detection monitoring. **Figure 1** shows monitoring well locations at SCES.

Table 1. Sandy Creek Energy Station Groundwater Monitoring System

Well Name (U/D)[1]	Completion Date	Status	Top of Casing Elevation (ft msl)[2]	Well Depth (ft bgs)[2]	Screen Interval (ft bgs)[2]	Water Level Elevation (ft msl on 11/10/2020)
MW-1 (D)	9/21/2015	Detection	465.87	34.23	23.90 - 33.90	454.45
MW-2 (D)	9/23/2015	Detection	442.15	19.63	9.30 - 19.30	430.96
MW-3 (D)	9/1/2010	Detection	430.06	16.23	5.98 - 15.98	420.03
BW-1 (U)	9/22/2015	Detection	485.57	38.63	28.30 - 38.30	468.39

[1] (U) = upgradient, (D) = downgradient; [2] Top of Casing Elevation, Well Depth, and Screen Interval information obtained from Table 1 – Monitoring Well and Piezometer Construction Details and Groundwater Elevations prepared by Geosyntec Consultants, dated March 11, 2016; **ft msl** = feet above mean sea level; **ft bgs** = feet below ground surface

2.2 SUMMARY OF 2020 SAMPLING EVENTS

All sampling events followed the groundwater sampling and laboratory analysis procedures outlined in the GWSAP. A duplicate sample was collected from one well during each event for Quality Assurance & Quality Control (QA/QC) purposes. All monitoring wells were sampled and analyzed for 40 CFR §257 Appendix III constituents, in accordance with 40 CFR §257.94(a).

April 2020 – Semiannual Detection Monitoring Event

All four wells (MW-1, MW-2, MW-3, and BW-1) were purged and sampled on April 8, 2020 using the conventional purge and sampling method with disposable PVC bailers. The results of the sampling were provided to the SCES in a report dated June 18, 2020. Field forms and laboratory results are provided in **Appendices A** & **B**, respectively, and summarized in **Table 2.** The Laboratory Review Checklist was reviewed and the data were determined to conform to the most current National Environmental Laboratories Accreditation Conference (NELAC) standards.

November 2020 – Semiannual Detection Monitoring Event

All four wells (MW-1, MW-2, MW-3, and BW-1) were purged and sampled on November 10, 2020 using the conventional purge and sampling method with disposable PVC bailers. Field forms and laboratory results are provided in **Appendices A** & **B**, respectively, and summarized in **Table 2.** The Laboratory

Review Checklist was reviewed and the data were determined to conform to the most current NELAC standards.

3.0 RESULTS AND STATISTICAL ANALYSIS

A summary of April 2020 and November 2020 laboratory results and statistical limits in each well–constituent pair is provided in **Table 2.** Time series graphs of Appendix III constituent concentrations are provided in **Appendix D.** Statistical limits were determined in accordance with 40 CFR §257.93(f-g) and the GWSAP using the software program Sanitas®. Statistical limits were determined in the 2017 Annual Groundwater Monitoring and Corrective Action report, and were presented using Shewhart-CUSUM control charts, non-parametric prediction limits, or parametric prediction limits as deemed appropriate by background data distributions.

Table 2. Sandy Creek Energy Station 2020 Sampling Results and Statistical Limits

MW-ID	Constituent	Lab Results April 2020	Lab Results Nov 2020	Statistical Limit*
MW-1 (D)	Boron (mg/L)	1.3	1.18	2.6
	Calcium (mg/L)	524	539	1030
	Chloride (mg/L)	152	168	402
	pH at 25˚C	7.1	7.2	6.136 - 8.289
	Sulfate (mg/L)	2430	2350	3402
	TDS (mg/L)	4330	4060	6765
	Fluoride (mg/L)	<0.20	0.26 J	0.4
MW-2 (D)	Boron (mg/L)	1.9	2.13	2.4
	Calcium (mg/L)	650	715	874.4
	Chloride (mg/L)	2410	2350	3336
	pH at 25˚C	6.8	6.8	6.7 - 7.5
	Sulfate (mg/L)	3120	2830	4635
	TDS (mg/L)	9820	9670	23969
	Fluoride (mg/L)	<0.20	<0.20	2.831
MW-3 (D)	Boron (mg/L)	1.1	***3.07***	1.2
	Calcium (mg/L)	530	597	688.1
	Chloride (mg/L)	307	***1160***	606.9
	pH at 25˚C	6.5	7.1	5.71 - 8.09

MW-ID	Constituent	Lab Results April 2020	Lab Results Nov 2020	Statistical Limit*
MW-3 (D)	Sulfate (mg/L)	3020	2950	4447
	TDS (mg/L)	5980	6920	9375
	Fluoride (mg/L)	<0.20	<0.20	2.201
BW-1 (U)	Boron (mg/L)	3.7	3.14	6.787
	Calcium (mg/L)	545	612	723.7
	Chloride (mg/L)	1070	1170	1540
	pH at 25˚C	6.9	7.1	6.8 - 9.5
	Sulfate (mg/L)	2760	2710	3884
	TDS (mg/L)	6660	6000	10119
	Fluoride (mg/L)	<0.20	<0.20	2.356

*Calculated in 2017 Annual Report
(U) = upgradient, (D) = downgradient
Bolded italicized value indicates that constituent exceeded intrawell statistical limit
"J" Indicates value is above method detection limit (MDL) but below laboratory reporting limit

Unconfirmed statistically significant increases (SSI) were determined for boron and chloride in MW-3 (November 2020). In accordance with 40 CFR §257.94(e), alternate source demonstrations (ASDs) are provided in **Appendix E.**

4.0 GROUNDWATER FLOW RATE AND DIRECTION CALCULATIONS

In accordance with 40 CFR Part §257.93(c), the groundwater flow rate and direction in the uppermost aquifer in the area of the existing groundwater monitoring wells were calculated.

Flow Rate Calculation Using November 2020 Data

$Va = \frac{KI}{7.5N}$ (Driscoll, 1986, Groundwater and Wells)

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Where:

- Va = Actual Velocity of Groundwater Flow (ft/day)
- K = Hydraulic Conductivity (gpd/ft^2)
- I = Hydraulic Gradient (ft/ft)
- N = Effective Porosity (%)

Then:

K = 2.0×10^{-4} cm/sec (geometric mean hydraulic conductivity obtained from slug tests performed by Geosyntec in 2010)

Find K equivalent in units of gpd/ft^2:

(1 cm/sec = 21,200 gallons/day/ft^2)

2.0×10^{-4} cm/sec x 21,200 gallons/day/ft^2 = 4.24 gpd/ft^2

Find I: $\frac{\text{BW-1 elevation – MW-3 elevation}}{\text{distance between wells}}$: $\frac{468.39 \text{ ft} - 420.03 \text{ ft}}{2{,}350 \text{ ft}}$ = 0.0206 ft/ft

I = 0.0206 ft/ft
N = 6% (representative effective porosity for clay from Morris and Johnson, 1967)

Therefore:

$$Va = \frac{4.24 \text{ gpd/ft}^2 \times (0.0206 \text{ ft/ft})}{7.5\,(0.06)} = 0.194 \text{ ft/day}$$

(0.194 ft/day)(365 days/year) = **71 ft/year**

Conclusion

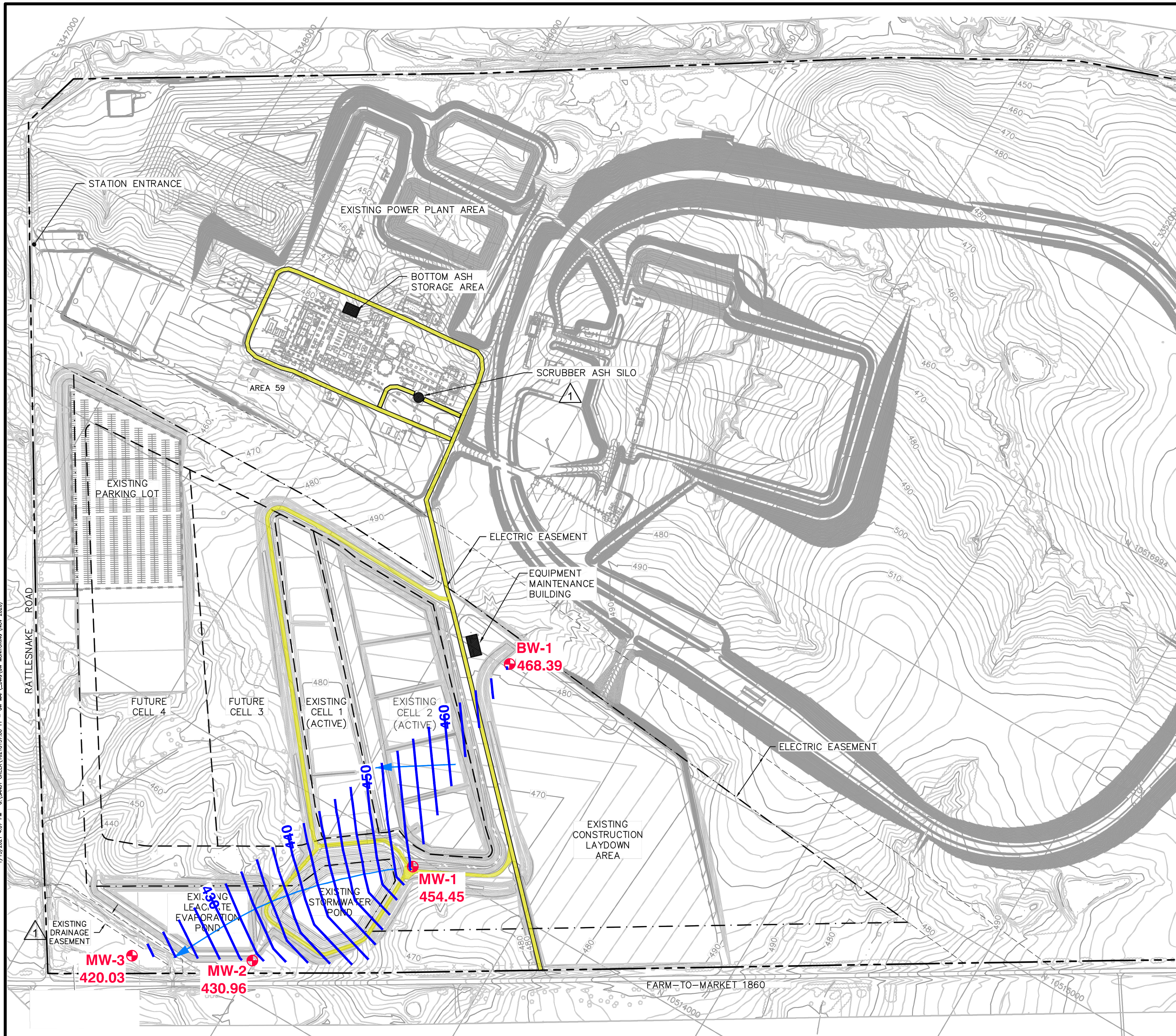
The November 2020 site groundwater flow rate is calculated to be **71 ft/year**. The gradient was measured using BW-1 and MW-3. The November 2020 groundwater flow direction is to the west-southwest. The calculated groundwater flow rate and direction are consistent with conditions previously observed at the site. See the attached groundwater gradient map for details, provided in accordance with 40 CFR Part §257.93(c).

5.0 RECOMMENDATIONS

As outlined in the attached ASDs for boron and chloride in MW-3, no confirmed SSIs were identified for any Appendix III constituents during 2020 detection monitoring at the SCES. SCS recommends that the facility remain in semiannual detection monitoring, in accordance with 40 CFR §257.94.

Due to the lack of confirmed SSIs for Appendix III constituents during 2020 detection monitoring, the facility will continue monitoring for all constituents listed in 40 CFR §257 Appendix III during semiannual groundwater monitoring events, in accordance with 40 CFR §257.94(a). The Appendix IV constituent list will be analyzed if any confirmed statistical exceedances of the Appendix III list are indicated in future events. The next planned groundwater monitoring event is a semiannual detection monitoring event scheduled for June 2021.

Figure 1. Monitoring Well Location Map



LEGEND

500	EXISTING GROUND ELEVATION (FT, MSL) (NOTES 1, 2)
	EXISTING SURFACE WATER LINE
x x x	EXISTING SITE FENCE
	EXISTING TREE LINE
MW-1	EXISTING MONITORING WELL
	EXISTING BUILDING
	PROPERTY BOUNDARY
	DEED RECORDED LIMITS OF WASTE
	CELL BOUNDARY
N 10514500 E 3349500	STATE PLANE COORDINATES
	SWDF OPERATIONS ACCESS ROAD
450	GROUNDWATER CONTOUR
	GROUNDWATER CONTOURS (INFERRED)
	GROUNDWATER FLOW

0 250' 500'
SCALE IN FEET

NOTES:

1. THE EXISTING CONTOUR MAP SHOWN ON THIS DRAWING WAS COMPILED USING EXISTING TOPOGRAPHY DATED APRIL 2006 AND DESIGN GRADES DATED OCTOBER 2007 FROM BLACK & VEATCH CORPORATION; DESIGN GRADES DEVELOPED BY GEOSYNTEC CONSULTANTS, INC. FOR THE LEACHATE EVAPORATION POND AND CELL 2 DATED APRIL 2011 AND APRIL 2014, RESPECTIVELY; AND AREA 59 EXISTING TOPOGRAPHY SURVEY CONDUCTED BY WALKER PARTNERS DATED 9 MAY 2013.
2. ELEVATIONS ARE IN FEET ABOVE MEAN SEA LEVEL (FT, MSL) AS DEFINED BY THE USGS NATIONAL GEODETIC VERTICAL DATUM (NGVD) OF 1988. STATE PLANE COORDINATE GRID CORRESPONDS TO TEXAS STATE PLANE COORDINATE SYSTEM, TEXAS CENTRAL ZONE (4203), NORTH AMERICAN DATUM OF 1983 (NAD-83).

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1/29/2021

DRAWING TITLE: GROUNDWATER GRADIENT MAP

PROJECT TITLE: SANDY CREEK NOVEMBER 2020 ANNUAL GROUNDWATER MONITORING REPORT

CLIENT: NAES CORPORATION
2161 RATTLESNAKE ROAD
RIESEL, TEXAS 76682

SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT CONSULTING ENGINEERS
1901 CENTRAL DRIVE, SUITE 550, BEDFORD, TX 76021
PH (817) 571-2288 FAX NO. (817) 571-2188
TEXAS BOARD OF PROFESSIONAL ENGINEERS REG. NO. F-3407

PROJ. NO.: 16218157.00
CADD FILE: GW MONITORING (NOV 2020)
DATE: 06/2020
SCALE: AS SHOWN
FIGURE: 1

SOURCE: BACKGROUND INFORMATION FOR THIS DRAWING IS FROM A DRAWING NAMED SITE LAYOUT BY GEOSYNTEC CONSULTANTS, DATED JUNE 2014.

Appendix A

2020 Groundwater Monitoring Field Forms

Groundwater Monitoring Form

Facility name: Sandy Creek Energy Station
Permittee: Sandy Creek Energy Associates, L.P.
County: McLennan

1. Facility Type: Power Station
2. Monitor well no.: MW-1
3. Date of sampling: 4/8/2020

Name of sampler: Asher Boudreaux
Affiliation of sampler: SCS Engineers
If split sampled, with whom? N/A
Integrity of well: Good
Installation date: 9/21/2015

Most recent previous sampling: 12/10/2019
Date of water level measurements: 4/8/2020
Datum reference point: Top of Casing
Datum elevation*: 465.87
Depth to water(below datum)*: 10.88
4. Water level elevation*: 454.99

5. Purging/Sampling method: Bailer (Enter bailer or pump)
   Were low-flow methods used? ☐ yes ■ no (check one)
   If yes, what volume was purged? N/A gal.
6. Well volumes purged: 2.4
7. Was the well dry before purging? ☐ yes ■ no (check one)
8. Was the well dry after purging? ■ yes ☐ no (check one)
9. How long before sampling? 1
10. Unit of measure? hours (Enter value as days, hours, or mins.)

11. Sample event: Detection
   - Background - Corrective Action
   - Detection - Other
   - Assessment
12. Sample schedule: Semi-Annual
   - Quarterly - Fourth Year
   - Semi-Annual - Other
   - Annual
13. Sample type: Regular
   - Regular - Split
   - Duplicate - Other
   - Resample

Field Measurements:

14. pH 7.22
15. Spec. cond. 4.66 — 16. ■ mS/cm
17. Temp. 25.70 — 18. ☐ F or ■ C (check one)
19. Turbidity 137 — 20. ■ NTU

Laboratory:

21. Name: Pace Analytical Allen Laboratory — Phone: (972)-727-1123
Address: 3714, 400 W Bethany Dr #190, Allen, TX 75013
Representative's signature: [signature]

Site operator's signature: ____________ Date: ____________

* Report depth to water and elevations to nearest 0.01 foot relative to mean sea level (msl).

Groundwater Monitoring Form

Facility name: Sandy Creek Energy Station
Permittee: Sandy Creek Energy Associates, L.P.
County: McLennan

1. Facility Type: Power Station
2. Monitor well no.: MW-2
3. Date of sampling: 4/8/2020

Name of sampler: Asher Boudreaux
Affiliation of sampler: SCS Engineers
If split sampled, with whom? N/A
Integrity of well: Good
Installation date: 9/23/2015

Most recent previous sampling: 12/10/2019
Date of water level measurements: 4/8/2020
Datum reference point: Top of Casing
Datum elevation*: 442.15
Depth to water(below datum)*: 12.08
4. Water level elevation*: 430.07

5. Purging/Sampling method: Bailer (Enter bailer or pump)
   Were low-flow methods used? ☐ yes ■ no (check one)
   If yes, what volume was purged? N/A gal.
6. Well volumes purged: 2.7
7. Was the well dry before purging? ☐ yes ■ no (check one)
8. Was the well dry after purging? ■ yes ☐ no (check one)
9. How long before sampling? 1
10. Unit of measure? hours (Enter value as days, hours, or mins.)

11. Sample event: Detection
- Background - Corrective Action
- Detection - Other
- Assessment

12. Sample schedule: Semi-Annual
- Quarterly - Fourth Year
- Semi-Annual - Other
- Annual

13. Sample type: Regular
- Regular - Split
- Duplicate - Other
- Resample

Field Measurements:

14. pH 6.70
15. Spec. cond. 13 — 16. ■ mS/cm
17. Temp. 23.90 — 18. ☐ F or ■ C (check one)
19. Turbidity 6.6 — 20. ■ NTU

Laboratory:

21. Name Pace Analytical Allen Laboratory — Phone: (972)-727-1123
Address: 3714, 400 W Bethany Dr #190, Allen, TX 75013
Representative's signature: [signature]

Site operator's signature: ______ Date: ______

* Report depth to water and elevations to nearest 0.01 foot relative to mean sea level (msl).

Groundwater Monitoring Form

Facility name: Sandy Creek Energy Station
Permittee: Sandy Creek Energy Associates, L.P.
County: McLennan

1. Facility Type: Power Station
2. Monitor well no.: MW-3
3. Date of sampling: 4/8/2020

Name of sampler: Asher Boudreaux
Affiliation of sampler: SCS Engineers
If split sampled, with whom? N/A
Integrity of well: Good
Installation date: 9/1/2010

Most recent previous sampling: 12/10/2019
Date of water level measurements: 4/8/2020
Datum reference point: Top of Casing
Datum elevation*: 430.06
Depth to water(below datum)*: 8.00
4. Water level elevation*: 422.06

5. Purging/Sampling method: Bailer (Enter bailer or pump)
   Were low-flow methods used? ☐ yes ■ no (check one)
   If yes, what volume was purged? N/A gal.
6. Well volumes purged: 3.0
7. Was the well dry before purging? ☐ yes ■ no (check one)
8. Was the well dry after purging? ☐ yes ■ no (check one)
9. How long before sampling? 1
10. Unit of measure? hours (Enter value as days, hours, or mins.)

11. Sample event: Detection
    - Background - Corrective Action
    - Detection - Other
    - Assessment
12. Sample schedule: Semi-Annual
    - Quarterly - Fourth Year
    - Semi-Annual - Other
    - Annual
13. Sample type: Regular
    - Regular - Split
    - Duplicate - Other
    - Resample

Field Measurements:

14. pH: 6.38
15. Spec. cond.: 6.46 — 16. ■ mS/cm
17. Temp.: 23.29 — 18. ☐ F or ■ C (check one)
19. Turbidity: 21.6 — 20. ■ NTU

Laboratory:

21. Name: Pace Analytical Allen Laboratory   Phone: (972)-727-1123
Address: 3714, 400 W Bethany Dr #190, Allen, TX 75013
Representative's signature: [signature]

Site operator's signature: ____________________   Date: ____________

* Report depth to water and elevations to nearest 0.01 foot relative to mean sea level (msl).

Groundwater Monitoring Form

Facility name: Sandy Creek Energy Station
Permittee: Sandy Creek Energy Associates, L.P.
County: McLennan

1. Facility Type: Power Station
2. Monitor well no.: BW-1
3. Date of sampling: 4/8/2020

Name of sampler: Asher Boudreaux
Affiliation of sampler: SCS Engineers
If split sampled, with whom? N/A
Integrity of well: Good
Installation date: 9/22/2015

Most recent previous sampling: 12/10/2019
Date of water level measurements: 4/8/2020
Datum reference point: Top of Casing
Datum elevation*: 485.57
Depth to water(below datum)*: 17.94
4. Water level elevation*: 467.63

5. Purging/Sampling method: Bailer (Enter bailer or pump)
   Were low-flow methods used? ☐ yes ■ no (check one)
   If yes, what volume was purged? N/A gal.
6. Well volumes purged: 2.8
7. Was the well dry before purging? ☐ yes ■ no (check one)
8. Was the well dry after purging? ■ yes ☐ no (check one)
9. How long before sampling? 1
10. Unit of measure? hours (Enter value as days, hours, or mins.)

11. Sample event: Detection
    - Background - Corrective Action
    - Detection - Other
    - Assessment
12. Sample schedule: Semi-Annual
    - Quarterly - Fourth Year
    - Semi-Annual - Other
    - Annual
13. Sample type: Regular
    - Regular - Split
    - Duplicate - Other
    - Resample

Field Measurements:

14. pH 7.05
15. Spec. cond. 8.15 — 16. ■ mS/cm
17. Temp. 27.37 — 18. ☐ F or ■ C (check one)
19. Turbidity 428 — 20. ■ NTU

Laboratory:

21. Name: Pace Analytical Allen Laboratory — Phone: (972)-727-1123
Address: 3714, 400 W Bethany Dr #190, Allen, TX 75013
Representative's signature: [signature]

Site operator's signature: ______________ Date: ______________

* Report depth to water and elevations to nearest 0.01 foot relative to mean sea level (msl).

Groundwater Monitoring Form

Facility name: Sandy Creek Energy Station
Permittee: Sandy Creek Energy Associates, L.P.
County: McLennan

1. Facility Type: Power Station
2. Monitor well no.: DUP
3. Date of sampling: 4/8/2020

Name of sampler: Asher Boudreaux
Affiliation of sampler: SCS Engineers
If split sampled, with whom? N/A
Integrity of well: N/A
Installation date: N/A

Most recent previous sampling: N/A
Date of water level measurements: N/A
Datum reference point: Top of Casing
Datum elevation*: N/A
Depth to water(below datum)*: N/A
4. Water level elevation*: N/A

5. Purging/Sampling method: N/A (Enter bailer or pump)
   Were low-flow methods used? ☐ yes ☐ no (check one)
   If yes, what volume was purged? N/A gal.
6. Well volumes purged: N/A
7. Was the well dry before purging? ☐ yes ☐ no (check one)
8. Was the well dry after purging? ☐ yes ☐ no (check one)
9. How long before sampling? N/A
10. Unit of measure? N/A (Enter value as days, hours, or mins.)

11. Sample event: Detection
    - Background - Corrective Action
    - Detection - Other
    - Assessment
12. Sample schedule: Semi-Annual
    - Quarterly - Fourth Year
    - Semi-Annual - Other
    - Annual
13. Sample type: Duplicate
    - Regular - Split
    - Duplicate - Other
    - Resample

Field Measurements:

14. pH N/A
15. Spec. cond. N/A — 16. ☐ mS/cm
17. Temp. N/A — 18. ☐ F or ☐ C (check one)
19. Turbidity N/A — 20. ☐ NTU

Laboratory:

21. Name: Pace Analytical Allen Laboratory — Phone: (972)-727-1123
Address: 3714, 400 W Bethany Dr #190, Allen, TX 75013
Representative's signature: [signature]

Site operator's signature: ____________________ Date: ____________

* Report depth to water and elevations to nearest 0.01 foot relative to mean sea level (msl).

Groundwater Monitoring Form

Facility name:	Sandy Creek Energy Station	1. Facility Type:	Power Station
Permittee:	Sandy Creek Energy Associates, L.P.	2. Monitor well no.:	MW-1
County:	McLennan	3. Date of sampling:	11/10/2020

Name of sampler:	Asher Boudreaux	Most recent previous sampling:	4/8/2020
Affiliation of sampler:	SCS Engineers	Date of water level measurements:	11/10/2020
If split sampled, with whom?	N/A	Datum reference point:	Top of Casing
Integrity of well:	Good	Datum elevation*:	465.87
Installation date:	9/21/2015	Depth to water(below datum)*:	11.42
		4. Water level elevation*:	454.45

5. Purging/Sampling method: Bailer (Enter bailer or pump)
   Were low-flow methods used? ☐ yes ■ no (check one)
   If yes, what volume was purged? N/A gal.
6. Well volumes purged: 2.1
7. Was the well dry before purging? ☐ yes ■ no (check one)
8. Was the well dry after purging? ■ yes ☐ no (check one)
9. How long before sampling? 2
10. Unit of measure? hours (Enter value as days, hours, or mins.)

11. Sample event: Detection
- Background - Corrective Action
- Detection - Other
- Assessment

12. Sample schedule: Semi-Annual
- Quarterly - Fourth Year
- Semi-Annual - Other
- Annual

13. Sample type: Regular
- Regular - Split
- Duplicate - Other
- Resample

Field Measurements:

14. pH	6.91		
15. Spec. cond.	4.73	16. ■ mS/cm	
17. Temp.	23.21	18. ☐ F or ■ C	(check one)
19. Turbidity	4.7	20. ■ NTU	

Laboratory:

21. Name: Pace Analytical Allen Laboratory — Phone: (972)-727-1123
Address: 3714, 400 W Bethany Dr #190, Allen, TX 75013

* Report depth to water and elevations to nearest 0.01 foot relative to mean sea level (msl).

Groundwater Monitoring Form

Facility name:	Sandy Creek Energy Station	1. Facility Type:	Power Station
Permittee:	Sandy Creek Energy Associates, L.P.	2. Monitor well no.:	MW-2
County:	McLennan	3. Date of sampling:	11/10/2020

Name of sampler:	Asher Boudreaux	Most recent previous sampling:	4/8/2020
Affiliation of sampler:	SCS Engineers	Date of water level measurements:	11/10/2020
If split sampled, with whom?	N/A	Datum reference point:	Top of Casing
Integrity of well:	Good	Datum elevation*:	442.15
Installation date:	9/23/2015	Depth to water(below datum)*:	11.19
		4. Water level elevation*:	430.96

5. Purging/Sampling method: Bailer (Enter bailer or pump)
   Were low-flow methods used? ☐ yes ■ no (check one)
   If yes, what volume was purged? N/A gal.
6. Well volumes purged: 2.5
7. Was the well dry before purging? ☐ yes ■ no (check one)
8. Was the well dry after purging? ■ yes ☐ no (check one)
9. How long before sampling? 2
10. Unit of measure? hours (Enter value as days, hours, or mins.)

11. Sample event: Detection
- Background - Corrective Action
- Detection - Other
- Assessment

12. Sample schedule: Semi-Annual
- Quarterly - Fourth Year
- Semi-Annual - Other
- Annual

13. Sample type: Regular
- Regular - Split
- Duplicate - Other
- Resample

Field Measurements:

14. pH	6.35		
15. Spec. cond.	13.7	16. ■ mS/cm	
17. Temp.	23.51	18. ☐ F or ■ C	(check one)
19. Turbidity	20.4	20. ■ NTU	

Laboratory:

21. Name: Pace Analytical Allen Laboratory   Phone: (972)-727-1123
Address: 3714, 400 W Bethany Dr #190, Allen, TX 75013

* Report depth to water and elevations to nearest 0.01 foot relative to mean sea level (msl).

Groundwater Monitoring Form

Facility name: Sandy Creek Energy Station
Permittee: Sandy Creek Energy Associates, L.P.
County: McLennan

1. Facility Type: Power Station
2. Monitor well no.: MW-3
3. Date of sampling: 11/10/2020

Name of sampler: Asher Boudreaux
Affiliation of sampler: SCS Engineers
If split sampled, with whom? N/A
Integrity of well: Good
Installation date: 9/1/2010

Most recent previous sampling: 4/8/2020
Date of water level measurements: 11/10/2020
Datum reference point: Top of Casing
Datum elevation*: 430.06
Depth to water(below datum)*: 10.03
4. Water level elevation*: 420.03

5. Purging/Sampling method: Bailer (Enter bailer or pump)
   Were low-flow methods used? ☐ yes ■ no (check one)
   If yes, what volume was purged? N/A gal.
6. Well volumes purged: 3.0
7. Was the well dry before purging? ☐ yes ■ no (check one)
8. Was the well dry after purging? ☐ yes ■ no (check one)
9. How long before sampling? 2
10. Unit of measure? hours (Enter value as days, hours, or mins.)

11. Sample event: Detection
   - Background - Corrective Action
   - Detection - Other
   - Assessment
12. Sample schedule: Semi-Annual
   - Quarterly - Fourth Year
   - Semi-Annual - Other
   - Annual
13. Sample type: Regular
   - Regular - Split
   - Duplicate - Other
   - Resample

Field Measurements:

14. pH 6.10
15. Spec. cond. 7.21 — 16. ■ mS/cm
17. Temp. 24.01 — 18. ☐ F or ■ C (check one)
19. Turbidity 18.9 — 20. ■ NTU

Laboratory:

21. Name Pace Analytical Allen Laboratory — Phone: (972)-727-1123
Address: 3714, 400 W Bethany Dr #190, Allen, TX 75013

* Report depth to water and elevations to nearest 0.01 foot relative to mean sea level (msl).

Groundwater Monitoring Form

Facility name: Sandy Creek Energy Station
Permittee: Sandy Creek Energy Associates, L.P.
County: McLennan

1. Facility Type: Power Station
2. Monitor well no.: BW-1
3. Date of sampling: 11/10/2020

Name of sampler: Asher Boudreaux
Affiliation of sampler: SCS Engineers
If split sampled, with whom? N/A
Integrity of well: Good
Installation date: 9/22/2015

Most recent previous sampling: 4/8/2020
Date of water level measurements: 11/10/2020
Datum reference point: Top of Casing
Datum elevation*: 485.57
Depth to water(below datum)*: 17.18
4. Water level elevation*: 468.39

5. Purging/Sampling method: Bailer (Enter bailer or pump)
   Were low-flow methods used? ☐ yes ■ no (check one)
   If yes, what volume was purged? N/A gal.
6. Well volumes purged: 3.0
7. Was the well dry before purging? ☐ yes ■ no (check one)
8. Was the well dry after purging? ☐ yes ■ no (check one)
9. How long before sampling? 2
10. Unit of measure? hours (Enter value as days, hours, or mins.)

11. Sample event: Detection
    - Background - Corrective Action
    - Detection - Other
    - Assessment
12. Sample schedule: Semi-Annual
    - Quarterly - Fourth Year
    - Semi-Annual - Other
    - Annual
13. Sample type: Regular
    - Regular - Split
    - Duplicate - Other
    - Resample

Field Measurements:

14. pH 6.68
15. Spec. cond. 8.28 — 16. ■ mS/cm
17. Temp. 23.53 — 18. ☐ F or ■ C (check one)
19. Turbidity 262 — 20. ■ NTU

Laboratory:

21. Name: Pace Analytical Allen Laboratory — Phone: (972)-727-1123
    Address: 3714, 400 W Bethany Dr #190, Allen, TX 75013

* Report depth to water and elevations to nearest 0.01 foot relative to mean sea level (msl).

Groundwater Monitoring Form

Facility name: Sandy Creek Energy Station
Permittee: Sandy Creek Energy Associates, L.P.
County: McLennan

1. Facility Type: Power Station
2. Monitor well no.: DUP
3. Date of sampling: 11/10/2020

Name of sampler: Asher Boudreaux
Affiliation of sampler: SCS Engineers
If split sampled, with whom? N/A
Integrity of well: N/A
Installation date: N/A

Most recent previous sampling: N/A
Date of water level measurements: N/A
Datum reference point: Top of Casing
Datum elevation*: N/A
Depth to water(below datum)*: N/A
4. Water level elevation*: N/A

5. Purging/Sampling method: N/A (Enter bailer or pump)
   Were low-flow methods used? ☐ yes ☐ no (check one)
   If yes, what volume was purged? N/A gal.
6. Well volumes purged: N/A
7. Was the well dry before purging? ☐ yes ☐ no (check one)
8. Was the well dry after purging? ☐ yes ☐ no (check one)
9. How long before sampling? N/A
10. Unit of measure? N/A (Enter value as days, hours, or mins.)

11. Sample event: Detection
    - Background - Corrective Action
    - Detection - Other
    - Assessment
12. Sample schedule: Semi-Annual
    - Quarterly - Fourth Year
    - Semi-Annual - Other
    - Annual
13. Sample type: Duplicate
    - Regular - Split
    - Duplicate - Other
    - Resample

Field Measurements:

14. pH N/A
15. Spec. cond. N/A
16. ☐ mS/cm
17. Temp. N/A
18. ☐ F or ☐ C (check one)
19. Turbidity N/A
20. ☐ NTU

Laboratory:

21. Name Pace Analytical Allen Laboratory
    Phone: (972)-727-1123
    Address: 3714, 400 W Bethany Dr #190, Allen, TX 75013

* Report depth to water and elevations to nearest 0.01 foot relative to mean sea level (msl).

Appendix B

2020 Laboratory Reports with Chain of Custody Forms

Pace Analytical Services, LLC
400 W. Bethany Drive, Suite 190
Allen, TX 75013
(972) 727-1123

November 18, 2020

Asher Boudreaux
SCS Engineering
1901 Central Drive, Ste 550
Bedford, TX 76021

RE: Pace Project 75144400
Project ID: Sandy Crreek 16220013.00 Task

Dear Asher Boudreaux:

Enclosed are the analytical results for sample(s) received by the laboratory on November 11, 2020.
Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Ricky Lopez
ricky.lopez@pacelabs.com
(972)727-1123

Laboratory Certifications

Pace Analytical Dallas : Texas Certification T104704232-20-32
Pace Analytical Dallas : EPA# TX00074

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
400 W. Bethany Drive, Suite 190
Allen, TX 75013
(972) 727-1123

Sample Cross Reference

Pace Project 75144400

Client: SCS Engineers
Project ID: Sandy Crreek 16220013.00 Task

Client Sample ID	Lab ID	Matrix	Collection Date/Time	Received Date/Time
BW1	75144400001	Water	11/10/2020 14:55	11/11/2020 12:24
MW1	75144400002	Water	11/10/2020 15:20	11/11/2020 12:24
MW2	75144400003	Water	11/10/2020 15:30	11/11/2020 12:24
MW3	75144400004	Water	11/10/2020 15:50	11/11/2020 12:24
DUP	75144400005	Water	11/10/2020 16:00	11/11/2020 12:24

Pace Analytical Services, LLC
400 W. Bethany Drive, Suite 190
Allen, TX 75013
(972) 727-1123

Project Narrative

Pace Project 75144400

Holding Times:

These holding times were exceeded due to sample receipt or re-extraction after the holding time expired.

Sample 75144400001 analysis 9040 pH
Sample 75144400002 analysis 9040 pH
Sample 75144400003 analysis 9040 pH
Sample 75144400004 analysis 9040 pH
Sample 75144400005 analysis 9040 pH

Blanks:

The following blank results were above method detection limits:
Batch 155471 sample 707456 Chloride

Laboratory Control Samples:

All LCS recoveries were within QC limits.

Matrix Spikes and Duplicates:

MS or MSD recoveries outside of QC limits are qualified in the Report of Quality Control section.

Surrogate:

All surrogate recoveries were within QC limits.

Appendix A
LABORATORY DATA PACKAGE COVER PAGE

This data package is for Job No. 75144400 and consists of:

This signature page, the laboratory review checklist, and the following reportable data:

X	R1 - Field chain-of-custody documentation;
X	R2 - Sample identification cross-reference;
X	R3 - Test reports (analytical data sheets) for each environmental sample that includes:

a. Items consistent with NELAC Chapter 5,
b. Dilution factors,
c. Preparation methods,
d. Cleanup methods, and
e. If required for the project, tentatively identified compounds (TICs).

X	R4 - Surrogate recovery data including:

a. Calculated recovery (%R), and
b. The laboratory's surrogate QC limits.

X	R5 - Test reports/summary forms for blank samples;
X	R6 - Test reports/summary forms for laboratory control samples (LCSs) including:

a. LCS spiking amounts,
b. Calculated %R for each analyte, and
c. The laboratory's LCS QC limits.

X	R7 - Test reports/summary forms for matrix spike/matrix spike duplicates (MS/MSDs) including:

a. Samples associated with the MS/MSD clearly identified,
b. MS/MSD spiking amounts,
c. Concentration of each MS/MSD analyte measured in the parent and spiked samples,
d. Calculated %Rs and relative percent differences, and
e. The laboratory's MS/MSD QC limits.

X	R8 - Laboratory analytical duplicate (if applicable) recovery and precision:

a. The amount of analyte measured in the duplicate,
b. The calculated RPD, and,
c. The laboratory's QC limits for analytical duplicated.

X	R9 - List of method quantitation limits (MQLs) and detectability check sample results for each analyte and
X	R10 - Other problems or anomalies.

The exception Report for each "No" or "Not Reviewed (NR) " item in the Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: [ ] This laboratory meets an exception under 30 TAC §25.6 and was last inspected by [X] TCEQ on 12/11/2019

Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Name (Printed)	Signature	Official Title (Printed)	Date
Ricky Lopez	Ricky Lopez	Project Manager	11/18/2020

Pace Analytical®

Sample Results

Pace Analytical Services, LLC
400 W. Bethany Drive, Suite 190
Allen, TX 75013
(972) 727-1123

Client: SCS Engineers

Client ID: BW1
Lab ID: 75144400001 **Moisture:** N/A
Collected: 11/10/2020 14:55 **Received** 11/11/2020 12:24

Project ID: Sandy Crreek 16220013.00
Pace Project 75144400
Matrix: Water

Parameters	DF	Results	Qual	Units	MQL	SDL	Analysis Date	Prep Date	Batch	Instr.
6010 Metals, Total	Analytical Method: EPA 6010				Preparation Method: EPA 3010					
Boron	1	**3140**		ug/L	100	17.4	11/18/2020 11:50	11/17/2020 11:30	155529	75ICP1
Calcium	1	**612000**		ug/L	1000	92.5	11/18/2020 11:50	11/17/2020 11:30	155529	75ICP1
9040 pH	Analytical Method: EPA 9040									
pH at 25 Degrees C	1	**7.1**	H3,H6	Std. Units	0.10	0.10	11/16/2020 13:27		155429	75WETP
9056 IC Anions	Analytical Method: EPA 9056A									
Chloride	100	**1170**	M6	mg/L	80.0	5.4	11/17/2020 23:11		155471	75WTA4
Fluoride	1	< 0.20		mg/L	0.50	0.20	11/17/2020 20:48		155471	75WTA4
Sulfate	500	**2710**		mg/L	350	99.5	11/18/2020 09:16		155471	75WTA4
2540C Total Dissolved Solids	Analytical Method: SM 2540C									
Total Dissolved Solids	1	**6000**		mg/L	500	500	11/12/2020 16:12		155234	75BL17

Pace Analytical Services, LLC
400 W. Bethany Drive, Suite 190
Allen, TX 75013
(972) 727-1123

Sample Results

Client: SCS Engineers

Client ID: MW1
Lab ID: 75144400002 **Moisture:** N/A
Collected: 11/10/2020 15:20 **Received** 11/11/2020 12:24

Project ID: Sandy Crreek 16220013.00
Pace Project 75144400
Matrix: Water

Parameters	DF	Results	Qual	Units	MQL	SDL	Analysis Date	Prep Date	Batch	Instr.
6010 Metals, Total	Analytical Method: EPA 6010				Preparation Method: EPA 3010					
Boron	1	**1180**		ug/L	100	17.4	11/18/2020 11:54	11/17/2020 11:30	155529	75ICP1
Calcium	1	**539000**		ug/L	1000	92.5	11/18/2020 11:54	11/17/2020 11:30	155529	75ICP1
9040 pH	Analytical Method: EPA 9040									
pH at 25 Degrees C	1	**7.2**	H3,H6	Std. Units	0.10	0.10	11/16/2020 13:30		155429	75WETP
9056 IC Anions	Analytical Method: EPA 9056A									
Chloride	20	**168**		mg/L	16.0	1.1	11/18/2020 10:09		155471	75WTA4
Fluoride	1	**0.26**	J	mg/L	0.50	0.20	11/18/2020 00:05		155471	75WTA4
Sulfate	500	**2350**		mg/L	350	99.5	11/18/2020 10:27		155471	75WTA4
2540C Total Dissolved Solids	Analytical Method: SM 2540C									
Total Dissolved Solids	1	**4060**		mg/L	83.3	83.3	11/12/2020 16:12		155234	75BL17

Pace Analytical Services, LLC
400 W. Bethany Drive, Suite 190
Allen, TX 75013
(972) 727-1123

Sample Results

Client: SCS Engineers

Client ID: MW2
Lab ID: 75144400003 **Moisture:** N/A
Collected: 11/10/2020 15:30 **Received** 11/11/2020 12:24

Project ID: Sandy Crreek 16220013.00
Pace Project 75144400
Matrix: Water

Parameters	DF	Results	Qual	Units	MQL	SDL	Analysis Date	Prep Date	Batch	Instr.
6010 Metals, Total	Analytical Method: EPA 6010				Preparation Method: EPA 3010					
Boron	1	**2130**		ug/L	100	17.4	11/18/2020 11:58	11/17/2020 11:30	155529	75ICP1
Calcium	1	**715000**		ug/L	1000	92.5	11/18/2020 11:58	11/17/2020 11:30	155529	75ICP1
9040 pH	Analytical Method: EPA 9040									
pH at 25 Degrees C	1	**6.8**	H3,H6	Std. Units	0.10	0.10	11/16/2020 13:32		155429	75WETP
9056 IC Anions	Analytical Method: EPA 9056A									
Chloride	500	**2350**		mg/L	400	27.0	11/18/2020 11:39		155471	75WTA4
Fluoride	1	< 0.20		mg/L	0.50	0.20	11/18/2020 00:58		155471	75WTA4
Sulfate	500	**2830**		mg/L	350	99.5	11/18/2020 11:39		155471	75WTA4
2540C Total Dissolved Solids	Analytical Method: SM 2540C									
Total Dissolved Solids	1	**9670**		mg/L	833	833	11/12/2020 16:13		155234	75BL17

Sample Results

Pace Analytical Services, LLC
400 W. Bethany Drive, Suite 190
Allen, TX 75013
(972) 727-1123

Client: SCS Engineers

Client ID: MW3
Lab ID: 75144400004 **Moisture:** N/A
Collected: 11/10/2020 15:50 **Received** 11/11/2020 12:24

Project ID: Sandy Crreek 16220013.00
Pace Project 75144400
Matrix: Water

Parameters	DF	Results	Qual	Units	MQL	SDL	Analysis Date	Prep Date	Batch	Instr.
6010 Metals, Total	Analytical Method: EPA 6010				Preparation Method: EPA 3010					
Boron	1	**3070**		ug/L	100	17.4	11/18/2020 12:02	11/17/2020 11:30	155529	75ICP1
Calcium	1	**597000**		ug/L	1000	92.5	11/18/2020 12:02	11/17/2020 11:30	155529	75ICP1
9040 pH	Analytical Method: EPA 9040									
pH at 25 Degrees C	1	**7.1**	H3,H6	Std. Units	0.10	0.10	11/16/2020 13:33		155429	75WETP
9056 IC Anions	Analytical Method: EPA 9056A									
Chloride	100	**1160**		mg/L	80.0	5.4	11/18/2020 03:04		155471	75WTA4
Fluoride	1	< 0.20		mg/L	0.50	0.20	11/18/2020 02:28		155471	75WTA4
Sulfate	500	**2950**		mg/L	350	99.5	11/18/2020 11:03		155471	75WTA4
2540C Total Dissolved Solids	Analytical Method: SM 2540C									
Total Dissolved Solids	1	**6920**		mg/L	500	500	11/12/2020 16:13		155234	75BL17

Sample Results

Pace Analytical Services, LLC
400 W. Bethany Drive, Suite 190
Allen, TX 75013
(972) 727-1123

Client: SCS Engineers

Client ID: DUP
Lab ID: 75144400005 **Moisture:** N/A
Collected: 11/10/2020 16:00 **Received** 11/11/2020 12:24

Project ID: Sandy Crreek 16220013.00
Pace Project 75144400
Matrix: Water

Parameters	DF	Results	Qual	Units	MQL	SDL	Analysis Date	Prep Date	Batch	Instr.
6010 Metals, Total	Analytical Method: EPA 6010				Preparation Method: EPA 3010					
Boron	1	**1250**		ug/L	100	17.4	11/18/2020 12:07	11/17/2020 11:30	155529	75ICP1
Calcium	1	**543000**		ug/L	1000	92.5	11/18/2020 12:07	11/17/2020 11:30	155529	75ICP1
9040 pH	Analytical Method: EPA 9040									
pH at 25 Degrees C	1	**6.6**	H3,H6	Std. Units	0.10	0.10	11/16/2020 13:35		155429	75WETP
9056 IC Anions	Analytical Method: EPA 9056A									
Chloride	100	**310**	B	mg/L	80.0	5.4	11/18/2020 03:57		155471	75WTA4
Fluoride	1	< 0.20		mg/L	0.50	0.20	11/18/2020 03:21		155471	75WTA4
Sulfate	500	**2990**		mg/L	350	99.5	11/18/2020 11:21		155471	75WTA4
2540C Total Dissolved Solids	Analytical Method: SM 2540C									
Total Dissolved Solids	1	**5520**		mg/L	500	500	11/12/2020 16:13		155234	75BL17

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Allen, TX 75013
(972) 727-1123

Quality Control

Batch: 155529
Method: EPA 6010
Prep EPA 3010

Pace Project No.: 75144400
Instrument ID: 75ICP1

Blank: 707665

Parameters	Dilutio	Quals	Result	Units	MQL	SDL	Analysis Date	Prep Date
Boron	1	U	<17.4	ug/L	100	17.4	11/18/2020 11:30	11/17/2020 11:30
Calcium	1	U	<92.5	ug/L	1000	92.5	11/18/2020 11:30	11/17/2020 11:30

Laboratory Control Sample: 707666

Parameters	Spk Amt	LCS Result	Units	LCS %Rec	% Rec Limits	LCS Quals
Boron	1000	1030	ug/L	103	80-120	
Calcium	10000	10300	ug/L	103	80-120	

Matrix Spike: 707667 **Matrix Spike Duplicate:** 707668

Original for Sample: Batch sample 144263021

Parameters	Original Result	MS Spk	MSD Spk	MS Result	MSD Result	Units	MS %Rec	MSD %Rec	% Rec Limits	RPD	Max RPD	Quals
Boron	<17.4	1000	1000	1040	1020	ug/L	103	101	84-113	1	20	
Calcium	274J	10000	10000	10500	10500	ug/L	102	102	10-200	0	20	

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Quality Control

Batch: 155429
Method: EPA 9040
Pace Project No.: 75144400
Instrument ID: 75WETP

Laboratory Control Sample: 707270

Parameters	Spk Amt	LCS Result	Units	LCS %Rec	% Rec Limits	LCS Quals
pH at 25 Degrees C	6	6.0	Std. Units	101	99-101	H6

Duplicate: 707271

Original for Sample: Project sample BW1

Parameters	Original Result	Dup Result	Units	RPD	Max RPD	Quals
pH at 25 Degrees C	7.1	7.1	Std. Units	0	20	H3,H6

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Quality Control

Batch: 155471
Method: EPA 9056A
Pace Project No.: 75144400
Instrument ID: 75WTA4

Blank: 707456

Parameters	Dilutio	Quals	Result	Units	MQL	SDL	Analysis Date	Prep Date
Chloride	1	J	0.32	mg/L	0.80	0.054	11/17/2020 20:13	
Fluoride	1	U	<0.20	mg/L	0.50	0.20	11/17/2020 20:13	
Sulfate	1	U	<0.20	mg/L	0.70	0.20	11/17/2020 20:13	

Laboratory Control Sample: 707457

Parameters	Spk Amt	LCS Result	Units	LCS %Rec	% Rec Limits	LCS Quals
Chloride	5	4.6	mg/L	92	80-120	
Fluoride	5	4.7	mg/L	95	80-120	
Sulfate	5	4.8	mg/L	95	80-120	

Matrix Spike: 707458 **Matrix Spike Duplicate:** 707459

Original for Sample: Project sample BW1

Parameters	Original Result	MS Spk	MSD Spk	MS Result	MSD Result	Units	MS %Rec	MSD %Rec	% Rec Limits	RPD	Max RPD	Quals
Chloride	1170	500	500	1760	2020	mg/L	118	169	80-120	14	20	E
Fluoride	<0.20	5	5	4.1	4.3	mg/L	82	85	80-120	4	20	
Sulfate	2710	2500	2500	5310	5300	mg/L	104	104	80-120	0	20	

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Quality Control

Batch: 155234
Method: SM 2540C

Pace Project No.: 75144400
Instrument ID: 75BL17

Blank: 706425

Parameters	Dilutio	Quals	Result	Units	MQL	SDL	Analysis Date	Prep Date
Total Dissolved Solids	1	U	<25.0	mg/L	25.0	25.0	11/12/2020 16:12	

Laboratory Control Sample: 706426

Parameters	Spk Amt	LCS Result	Units	LCS %Rec	% Rec Limits	LCS Quals
Total Dissolved Solids	250	247	mg/L	99	85-115	

Duplicate: 706427

Original for Sample: Project sample DUP

Parameters	Original Result	Dup Result	Units	RPD	Max RPD	Quals
Total Dissolved Solids	5520	5440	mg/L	1	5	

Unadjusted MQL

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Pace Project 75144400

Analyte	Method	Unadjusted MQL	Reporting Units
Boron	EPA 6010	100	ug/L
Calcium	EPA 6010	1000	ug/L
pH at 25 Degrees C	EPA 9040	0.10	Std. Units
Chloride	EPA 9056A	0.80	mg/L
Fluoride	EPA 9056A	0.50	mg/L
Sulfate	EPA 9056A	0.70	mg/L
Total Dissolved Solids	SM 2540C	25.0	mg/L

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Definitions/Qualifiers

Pace Project 75144400

DEFINITIONS

DF	Dilution Factor
J	Estimated concentration above the adjusted method detection limit and below the adjusted reporting
U	Indicates the compound was analyzed for, but not detected.
SDL	Sample Detection Limit
MQL	Method Quantitation Limit
LCS(D)	Laboratory Control Sample (Duplicate)
MS(D)	Matrix Spike (Duplicate)
DUP	Sample Duplicate
RPD	Relative Percent Difference
TNI	The Nelac Institute

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

ANALYTE QUALIFIERS

B	Analyte was detected in the associated method blank.
E	Analyte concentration exceeded the calibration range. The reported result is estimated.
H3	Sample was received or analysis requested beyond the recognized method holding time.
H6	Analysis initiated outside of the 15 minute EPA required holding time.
M6	Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

Quality Control Data
Cross Reference Table

Pace Analytical Services, LLC
400 W. Bethany Drive, Suite 190
Allen, TX 75013
(972) 727-1123

Pace Project 75144400

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
75144400001	**BW1**	EPA 3010	155529	EPA 6010	155603
75144400002	**MW1**	EPA 3010	155529	EPA 6010	155603
75144400003	**MW2**	EPA 3010	155529	EPA 6010	155603
75144400004	**MW3**	EPA 3010	155529	EPA 6010	155603
75144400005	**DUP**	EPA 3010	155529	EPA 6010	155603
75144400001	**BW1**	SM 2540C	155234		
75144400002	**MW1**	SM 2540C	155234		
75144400003	**MW2**	SM 2540C	155234		
75144400004	**MW3**	SM 2540C	155234		
75144400005	**DUP**	SM 2540C	155234		
75144400001	**BW1**	EPA 9040	155429		
75144400002	**MW1**	EPA 9040	155429		
75144400003	**MW2**	EPA 9040	155429		
75144400004	**MW3**	EPA 9040	155429		
75144400005	**DUP**	EPA 9040	155429		
75144400001	**BW1**	EPA 9056A	155471		
75144400002	**MW1**	EPA 9056A	155471		
75144400003	**MW2**	EPA 9056A	155471		
75144400004	**MW3**	EPA 9056A	155471		
75144400005	**DUP**	EPA 9056A	155471		

TRRP LABORATORY REVIEW CHECKLIST							
Laboratory		Pace Analytical Services, LLC	LRC Date: 11/18/2020				
Project Name:		Sandy Crreek 16220013.00 Task	Laboratory Job 75144400				
Reviewer		Ricky Lopez	Prep Batch Number See exception report.				
#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER #[5]
R1	OI	**Chain-of-custody (C-O-C)**					
		Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?		X			R1.1
		Were all departures from standard conditions described in an exception report?	X				
R2	OI	**Sample and quality control (QC) identification**					
		Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
		Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
R3	OI	**Test reports**					
		Were all samples prepared and analyzed within holding times?		X			R3.1
		Other than those results < MQL, were all other raw values bracketed by calibration standards?		X			R3.2
		Were calculations checked by a peer or supervisor?	X				
		Were all analyte identifications checked by a peer or supervisor?	X				
		Were sample detection limits reported for all analytes not detected?	X				
		Were all results for soil and sediment samples reported on a dry weight basis?			X		
		Were % moisture (or solids) reported for all soil and sediment samples?			X		
		Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
		If required for the project, are TICs reported?			X		
R4	O	**Surrogate recovery data**					
		Were surrogates added prior to extraction?			X		
		Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
R5	OI	**Test reports/summary forms for blank samples**					
		Were appropriate type(s) of blanks analyzed?	X				
		Were blanks analyzed at the appropriate frequency?	X				
		Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
		Were blank concentrations < MQL?	X				
R6	OI	**Laboratory control samples (LCS):**					
		Were all COCs included in the LCS?	X				
		Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
		Were LCSs analyzed at the required frequency?	X				
		Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
		Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
		Was the LCSD RPD within QC limits?			X		
R7	OI	**Matrix spike (MS) and matrix spike duplicate (MSD) data**					
		Were the project/method specified analytes included in the MS and MSD?	X				
		Were MS/MSD analyzed at the appropriate frequency?	X				
		Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?		X			R7.3
		Were MS/MSD RPDs within laboratory QC limits?	X				
R8	OI	**Analytical duplicate data**					
		Were appropriate analytical duplicates analyzed for each matrix?	X				
		Were analytical duplicates analyzed at the appropriate frequency?	X				
		Were RPDs or relative standard deviations within the laboratory QC limits?	X				
R9	OI	**Method quantitation limits (MQLs):**					
		Are the MQLs for each method analyte included in the laboratory data package?	X				
		Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
		Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
R10	OI	**Other problems/anomalies**					
		Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
		Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	X				
		Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices, and methods associated with this laboratory data package?	X				

TRRP LABORATORY REVIEW CHECKLIST			
Laboratory	Pace Analytical Services, LLC	**LRC Date:**	11/18/2020
Project Name:	Sandy Crreek 16220013.00 Task	**Laboratory Job**	75144400
Reviewer	Ricky Lopez	**Prep Batch Number**	See exception report.

1. Items identified by the letter "R" must be included in the laboratory in the laboratory data package submitted in the TRRP-required reports(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period;
2. O = Organic analyses; I = inorganic analysises (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

TRRP LABORATORY REVIEW CHECKLIST								
Laboratory	Pace Analytical Services, LLC	**LRC Date:**	11/18/2020					
Project Name:	Sandy Crreek 16220013.00 Task	**Laboratory Job**	75144400					
Reviewer	Ricky Lopez	**Prep Batch Number**	See exception report.					

#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER #[5]
S1	**OI**	**Initial calibration (ICAL)**					
		Were response factors and/or relative response factors for each analyte within QC limits?	X				
		Were percent RSDs or correlation coefficient criteria met?	X				
		Was the number of standards recommended in the method used for all analytes?	X				
		Were all points generated between the lowest and highest standard used to calculate the curve?	X				
		Are ICAL data available for all instruments used?	X				
		Has the initial calibration curve been verified using an appropriate second source standard?	X				
S2	**OI**	**Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):**					
		Was the CCV analyzed at the method-required frequency?	X				
		Were percent differences for each analyte within the method-required QC limits?	X				
		Was the ICAL curve verified for each analyte?	X				
		Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	X				
S3	**O**	**Mass spectral tuning**					
		Was the appropriate compound for the method used for tuning?			X		
		Were ion abundance data within the method-required QC limits?			X		
S4	**O**	**Internal standards (IS)**					
		Were IS area counts and retention times within the method-required QC limits?			X		
S5	**OI**	**Raw data (NELAC Section 5.5.10)**					
		Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
		Were data associated with manual integrations flagged on the raw data?	X				
S6	**O**	**Dual column confirmation**					
		Did dual column confirmation results meet the method-required QC?			X		
S7	**O**	**Tentatively identified compounds (TICs)**					
		If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
S8	**I**	**Interference Check Sample (ICS) results**					
		Were percent recoveries within method QC limits?	X				
S9	**I**	**Serial dilutions, post digestion spikes, and method of standard additions**					
		Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	X				
S10	**OI**	**Method detection limit (MDL) studies**					
		Was a MDL study performed for each reported analyte?	X				
		Is the MDL either adjusted or supported by the analysis of DCSs?	X				
S11	**OI**	**Proficiency test reports**					
		Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
S12	**OI**	**Standards documentation**					
		Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
S13	**OI**	**Compound/analyte identification procedures**					
		Are the procedures for compound/analyte identification documented?	X				
S14	**OI**	**Demonstration of analyst competency (DOC)**					
		Was DOC conducted consistent with NELAC Chapter 5?	X				
		Is documentation of the analyst's competency up-to-date and on file?	X				
S15	**OI**	**Verification/validation documentation for methods (NELAC Chapter 5)**					
		Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
S16	**OI**	**Laboratory standard operating procedures (SOPs)**					
		Are laboratory SOPs current and on file for each method performed?	X				

1. Items identified by the letter "R" must be included in the laboratory in the laboratory data package submitted in the TRRP-required reports(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period;
2. O = Organic analyses; I = inorganic analysises (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

TRRP LABORATORY REVIEW CHECKLIST			
Laboratory	Pace Analytical Services, LLC	**LRC Date:**	11/18/2020
Project Name:	Sandy Crreek 16220013.00 Task	**Laboratory Job**	75144400
Reviewer	Ricky Lopez	**Prep Batch Number**	155234,155429,155471,155529

ER #[1]	Description
R1.1	Sample 707271, Method EPA 9040, pH at 25 Degrees C: H3 - Sample was received or analysis requested beyond the recognized method holding time.
R1.1	Sample 75144400001, Method EPA 9040, pH at 25 Degrees C: H3 - Sample was received or analysis requested beyond the recognized method holding time.
R1.1	Sample 75144400002, Method EPA 9040, pH at 25 Degrees C: H3 - Sample was received or analysis requested beyond the recognized method holding time.
R1.1	Sample 75144400003, Method EPA 9040, pH at 25 Degrees C: H3 - Sample was received or analysis requested beyond the recognized method holding time.
R1.1	Sample 75144400004, Method EPA 9040, pH at 25 Degrees C: H3 - Sample was received or analysis requested beyond the recognized method holding time.
R1.1	Sample 75144400005, Method EPA 9040, pH at 25 Degrees C: H3 - Sample was received or analysis requested beyond the recognized method holding time.
R3.1	Sample 75144400001, 9040 pH. Run on 11/16/20 13:27 is 5.9 days past hold. Sample received after hold date.
R3.1	Sample 75144400002, 9040 pH. Run on 11/16/20 13:30 is 5.9 days past hold. Sample received after hold date.
R3.1	Sample 75144400003, 9040 pH. Run on 11/16/20 13:32 is 5.9 days past hold. Sample received after hold date.
R3.1	Sample 75144400004, 9040 pH. Run on 11/16/20 13:33 is 5.9 days past hold. Sample received after hold date.
R3.1	Sample 75144400005, 9040 pH. Run on 11/16/20 13:35 is 5.9 days past hold. Sample received after hold date.
R3.2	Sample 707458, Method EPA 9056A, Chloride: E - Analyte concentration exceeded the calibration range. The reported result is estimated.
R3.2	Sample 707459, Method EPA 9056A, Chloride: E - Analyte concentration exceeded the calibration range. The reported result is estimated.
R7.3	MSD Sample #707459: Chloride 169% spike recovery outside laboratory QC limit of 80-120%.

1. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

Pace Analytical	Document Name: Sample Condition Upon Receipt	Document Revised: 7/27/20 Page 1 of 1
	Document No.: F-DAL-C-001-rev.14	Issuing Authority: Pace Dallas Quality Office

Sample Condition Upon Receipt

☐Dallas ☑Ft Worth ☐Corpus Christi ☐Austin

WO# : 75144400

75144400

Client Name: SCS ENGINEERS Project Work order (

Courier: FedEX ☐ UPS ☐ USPS ☐ Client ☑ LSO ☐ PACE ☐ Other: ____________

Tracking #: ____________________________________

Custody Seal on Cooler/Box: Yes ☐ No ☑

Received on ice: Wet ☑ Blue ☐ No ice ☐

Receiving Lab 1 Thermometer Used: FWTM03 Cooler Temp °C: 6.5 (Recorded) 0 (Correction Factor) 6.5 (Actual)

Receiving Lab 2 Thermometer Used: IR13 Cooler Temp °C: 1.6 (Recorded) +0.1 (Correction Factor) 1.7 (Actual)

Temperature should be above freezing to 6°C unless collected same day as receipt in which evidence of cooling is acceptable

Triage Person: elj Date: 11.11.2020

Chain of Custody relinquished	Yes ☑ No ☐
Sampler name & signature on COC	Yes ☑ No ☐
Short HT analyses (<72 hrs)	Yes ☐ No ☑

Login Person: elj Date: 11.11.2020

Sufficient Volume received	Yes ☑ No ☐
Correct Container used	Yes ☑ No ☐
Container Intact	Yes ☑ No ☐
Sample pH Acceptable pH Strips: 1900060 Residual Chlorine Present Cl Strips: ____________ Sulfide Present Lead Acetate Strips: ____________	Yes ☑ No ☐ NA ☐ Yes ☐ No ☐ NA ☑ Yes ☐ No ☐ NA ☑
Are soil samples (volatiles, TPH) received in 5035A Kits (not applicable to TCLP VOA or PST Program TPH)	Yes ☐ No ☐ NA ☑
Unpreserved 5035A soil frozen within 48 hrs	Yes ☐ No ☐ NA ☑
Headspace in VOA (>6mm)	Yes ☐ No ☐ NA ☑
Project sampled in USDA Regulated Area outside of Texas State Sampled: ____________	Yes ☐ No ☐ NA ☑
Non-Conformance(s):	Yes ☐ No ☑

Labeling Person (if different than log-in): ____________ Date: ____________

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CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page : 1 Of 1

Section A Required Client Information:	Section B Required Project Information:	Section C Invoice Information:
Company: SCS Engineers	Report To: Asher Boudreaux	Attention:
Address: 1901 Central Drive, Ste 550	Copy To:	Company Name:
Bedford, TX 76021		Address:
Email: aboudreaux@scsengineers.com	Purchase Order #:	Pace Quote:
Phone: 817-571-2288 Fax	Project Name: Sandy Creek 16220013.00 Task 02	Pace Project Manager: ricky.lopez@pacelabs.com,
Requested Due Date:	Project #:	Pace Profile #: 7863 Line 3

Regulatory Agency:

State / Location: TX

WO# : 75144400
PM: RJL Due Date: 11/18/20
CLIENT: SCS Engineer

MATRIX / CODE: Drinking Water DW; Water WT; Waste Water WW; Product P; Soil/Solid SL; Oil OL; Wipe WP; Air AR; Other OT; Tissue TS

SAMPLE ID — One Character per box. (A-Z, 0-9 / , -) Sample Ids must be unique

Preservatives: Unpreserved, H2SO4, HNO3, HCl, NaOH, Na2S2O3, Methanol, Other

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED START DATE	START TIME	END DATE	END TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other	Analyses Test Y/N	pH by 9040/ 2540 TDS	9056 Anions (Cl, F, SO4)	Metals by ~~6020~~ 6010 ICPMS	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	BW1	WT		11/10/20	14:55	11/10/20	14:55												x	x	x		-001
2	MW-1	WT		11/10/20	15:20	11/10/20	15:20												x	x	x		-002
3	MW-2	WT		11/10/20	15:30	11/10/20	15:30												x	x	x		-003
4	MW-3	WT		11/10/20	15:50	11/10/20	15:50												x	x	x		-004
5	DUP	WT		11/10/20	16:00	11/10/20	16:00												x	x	x		-005
6																							
7																							
8																							
9																							
10																							
11																							
12																							

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	TEMP in C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
	Asher Boudreaux	11/11/2020	12:24	egonzalez / Pace	11.11.20	1224	6.5	Y	N	Y
	egonzalez / Pace	11/12/20	0730	SEAN CHAVEZ	11/12/20	0700				
	SEAN CHAVEZ	11/12/20	0830	Robinson / Pace	11/12/20	0830	1.7	Y	N	Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Asher Boudreaux

SIGNATURE of SAMPLER: [signature]

DATE Signed:

Pace Analytical Services, Inc.
400 W. Bethany Drive, Suite 190
Allen, TX 75013
(972) 727-1123

April 16, 2020

Jim Lawrence
SCS Engineers
1901 Central Dr.
Suite 550
Bedford, TX 76021

RE: Pace Project 75129503
Project ID: 16220013.00 Task01/Sandy Creek

Dear Jim Lawrence:

Enclosed are the analytical results for sample(s) received by the laboratory on April 09, 2020.
Results reported herin conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Courtney Hollins
courtney.hollins@pacelabs.com
(972)727-1123

Laboratory Certifications

Pace Analytical Dallas : Texas T104704232-19-29
Pace Analytical Dallas : Texas Certification #: T104704232-18-26

REPORT OF LABORATORY ANALYSIS

Sample Cross Reference

Pace Analytical Services, Inc.
400 W. Bethany Drive, Suite 190
Allen, TX 75013
(972) 727-1123

Pace Project 75129503

Client: SCS Engineers
Project ID: 16220013.00 Task01/Sandy Creek

Client Sample ID	Lab ID	Matrix	Collection Date/Time	Received Date/Time
BW-1	75129503001	Water	04/08/2020 15:32	04/09/2020 10:17
MW-1	75129503002	Water	04/08/2020 15:45	04/09/2020 10:17
MW-2	75129503003	Water	04/08/2020 15:53	04/09/2020 10:17
MW-3	75129503004	Water	04/08/2020 16:09	04/09/2020 10:17
DUP	75129503005	Water	04/08/2020 15:32	04/09/2020 10:17

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Project Narrative

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Pace Project 75129503

Holding Times:

These holding times were exceeded due to sample receipt or re-extraction after the holding time expired.

Sample 75129503001 analysis 9040 pH
Sample 75129503002 analysis 9040 pH
Sample 75129503003 analysis 9040 pH
Sample 75129503004 analysis 9040 pH
Sample 75129503005 analysis 9040 pH

Blanks:

All blank results were below reporting limits.

Laboratory Control Samples:

All LCS recoveries were within QC limits.

Matrix Spikes and Duplicates:

MS or MSD recoveries outside of QC limits are qualified in the Report of Quality Control section.

Surrogate:

All surrogate recoveries were within QC limits.

Appendix A
LABORATORY DATA PACKAGE COVER PAGE

This data package is for Job No. 75129503 and consists of:

This signature page, the laboratory review checklist, and the following reportable data:

X	R1 - Field chain-of-custody documentation;
X	R2 - Sample identification cross-reference;
X	R3 - Test reports (analytical data sheets) for each environmental sample that includes: a. Items consistent with NELAC Chapter 5, b. Dilution factors, c. Preparation methods, d. Cleanup methods, and e. If required for the project, tentatively identified compounds (TICs).
X	R4 - Surrogate recovery data including: a. Calculated recovery (%R), and b. The laboratory's surrogate QC limits.
X	R5 - Test reports/summary forms for blank samples;
X	R6 - Test reports/summary forms for laboratory control samples (LCSs) including: a. LCS spiking amounts, b. Calculated %R for each analyte, and c. The laboratory's LCS QC limits.
X	R7 - Test reports/summary forms for matrix spike/matrix spike duplicates (MS/MSDs) including: a. Samples associated with the MS/MSD clearly identified, b. MS/MSD spiking amounts, c. Concentration of each MS/MSD analyte measured in the parent and spiked samples, d. Calculated %Rs and relative percent differences, and e. The laboratory's MS/MSD QC limits.
X	R8 - Laboratory analytical duplicate (if applicable) recovery and precision: a. The amount of analyte measured in the duplicate, b. The calculated RPD, and, c. The laboratory's QC limits for analytical duplicated.
X	R9 - List of method quantitation limits (MQLs) and detectability check sample results for each analyte and
X	R10 - Other problems or anomalies.

The exception Report for each "No" or "Not Reviewed (NR) " item in the Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accredidation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: [ ] This laboratory meets an exception under 30 TAC §25.6 and was last inspected by [X] TCEQ on 05/02/2018

Any findings affecting the data in this laboratory data package are noted in the Exception Reports herin. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Name (Printed)	Signature	Official Title (Printed)	Date
Courtney Hollins	Courtney Hollins	Project Manager	04/16/2020

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Sample Results

Client: SCS Engineers

Client ID: BW-1
Lab ID: 75129503001 **Moisture:** N/A
Collected: 04/08/2020 15:32 **Received** 04/09/2020 10:17

Project ID: 16220013.00 Task01/Sandy
Pace Project 75129503
Matrix: Water

Parameters	DF	Results	Qual	Units	MQL	SDL	Analysis Date	Prep Date	Batch	Instr.
6010 Metals, Total	Analytical Method: EPA 6010				Preparation Method: EPA 3010					
Boron	5	**3.7**		mg/L	0.50	0.087	04/15/2020 18:47	04/14/2020 08:20	139802	75ICP1
Calcium	1	**545**	M1	mg/L	1.0	0.093	04/15/2020 12:31	04/14/2020 08:20	139802	75ICP1
9040 pH	Analytical Method: EPA 9040									
pH at 25 Degrees C	1	**6.9**	H3,H6	Std. Units	0.10	0.10	04/10/2020 14:47		139670	75WETQ
9056 IC Anions	Analytical Method: EPA 9056A									
Chloride	200	**1070**		mg/L	160	10.8	04/13/2020 23:04		139781	75WTA4
Fluoride	1	< 0.20	U,M1	mg/L	0.50	0.20	04/13/2020 22:10		139781	75WTA4
Sulfate	500	**2760**		mg/L	350	99.5	04/13/2020 23:57		139781	75WTA4
2540C Total Dissolved Solids	Analytical Method: SM 2540C									
Total Dissolved Solids	1	**6660**		mg/L	500	500	04/14/2020 12:40		139835	75BL17

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Sample Results

Client: SCS Engineers

Client ID: MW-1
Lab ID: 75129503002 **Moisture:** N/A
Collected: 04/08/2020 15:45 **Received** 04/09/2020 10:17

Project ID: 16220013.00 Task01/Sandy
Pace Project 75129503
Matrix: Water

Parameters	DF	Results	Qual	Units	MQL	SDL	Analysis Date	Prep Date	Batch	Instr.
6010 Metals, Total	Analytical Method: EPA 6010				Preparation Method: EPA 3010					
Boron	1	**1.3**		mg/L	0.10	0.017	04/15/2020 18:51	04/14/2020 08:20	139802	75ICP1
Calcium	1	**524**		mg/L	1.0	0.093	04/15/2020 12:36	04/14/2020 08:20	139802	75ICP1
9040 pH	Analytical Method: EPA 9040									
pH at 25 Degrees C	1	**7.1**	H3,H6	Std. Units	0.10	0.10	04/10/2020 14:56		139670	75WETQ
9056 IC Anions	Analytical Method: EPA 9056A									
Chloride	50	**152**		mg/L	40.0	2.7	04/14/2020 14:47		139838	75WTA4
Fluoride	1	< 0.20		mg/L	0.50	0.20	04/14/2020 01:27		139781	75WTA4
Sulfate	500	**2430**		mg/L	350	99.5	04/14/2020 02:02		139781	75WTA4
2540C Total Dissolved Solids	Analytical Method: SM 2540C									
Total Dissolved Solids	1	**4330**		mg/L	125	125	04/14/2020 12:40		139835	75BL17

Sample Results

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Client: SCS Engineers

Client ID: MW-2
Lab ID: 75129503003 **Moisture:** N/A
Collected: 04/08/2020 15:53 **Received** 04/09/2020 10:17

Project ID: 16220013.00 Task01/Sandy
Pace Project 75129503
Matrix: Water

Parameters	DF	Results	Qual	Units	MQL	SDL	Analysis Date	Prep Date	Batch	Instr.
6010 Metals, Total	Analytical Method: EPA 6010				Preparation Method: EPA 3010					
Boron	1	**1.9**		mg/L	0.10	0.017	04/15/2020 18:55	04/14/2020 08:20	139802	75ICP1
Calcium	1	**650**		mg/L	1.0	0.093	04/15/2020 12:40	04/14/2020 08:20	139802	75ICP1
9040 pH	Analytical Method: EPA 9040									
pH at 25 Degrees C	1	**6.8**	H3,H6	Std. Units	0.10	0.10	04/10/2020 14:52		139670	75WETQ
9056 IC Anions	Analytical Method: EPA 9056A									
Chloride	500	**2410**		mg/L	400	27.0	04/14/2020 02:38		139781	75WTA4
Fluoride	1	< 0.20		mg/L	0.50	0.20	04/14/2020 02:20		139781	75WTA4
Sulfate	500	**3120**		mg/L	350	99.5	04/14/2020 02:38		139781	75WTA4
2540C Total Dissolved Solids	Analytical Method: SM 2540C									
Total Dissolved Solids	1	**9820**		mg/L	500	500	04/14/2020 12:41		139835	75BL17

Sample Results

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Client: SCS Engineers

Client ID: MW-3
Lab ID: 75129503004 **Moisture:** N/A
Collected: 04/08/2020 16:09 **Received** 04/09/2020 10:17

Project ID: 16220013.00 Task01/Sandy
Pace Project 75129503
Matrix: Water

Parameters	DF	Results	Qual	Units	MQL	SDL	Analysis Date	Prep Date	Batch	Instr.
6010 Metals, Total	Analytical Method: EPA 6010				Preparation Method: EPA 3010					
Boron	1	**1.1**		mg/L	0.10	0.017	04/15/2020 18:59	04/14/2020 08:20	139802	75ICP1
Calcium	1	**530**		mg/L	1.0	0.093	04/15/2020 12:44	04/14/2020 08:20	139802	75ICP1
9040 pH	Analytical Method: EPA 9040									
pH at 25 Degrees C	1	**6.5**	H3,H6	Std. Units	0.10	0.10	04/10/2020 14:57		139670	75WETQ
9056 IC Anions	Analytical Method: EPA 9056A									
Chloride	50	**307**		mg/L	40.0	2.7	04/14/2020 03:14		139781	75WTA4
Fluoride	1	< 0.20		mg/L	0.50	0.20	04/14/2020 02:56		139781	75WTA4
Sulfate	500	**3020**		mg/L	350	99.5	04/14/2020 03:32		139781	75WTA4
2540C Total Dissolved Solids	Analytical Method: SM 2540C									
Total Dissolved Solids	1	**5980**		mg/L	500	500	04/14/2020 12:41		139835	75BL17

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Sample Results

Client: SCS Engineers

Client ID: DUP
Lab ID: 75129503005 **Moisture:** N/A
Collected: 04/08/2020 15:32 **Received** 04/09/2020 10:17

Project ID: 16220013.00 Task01/Sandy
Pace Project 75129503
Matrix: Water

Parameters	DF	Results	Qual	Units	MQL	SDL	Analysis Date	Prep Date	Batch	Instr.
6010 Metals, Total	Analytical Method: EPA 6010				Preparation Method: EPA 3010					
Boron	1	**3.4**		mg/L	0.10	0.017	04/15/2020 19:04	04/14/2020 08:20	139802	75ICP1
Calcium	1	**583**		mg/L	1.0	0.093	04/15/2020 12:48	04/14/2020 08:20	139802	75ICP1
9040 pH	Analytical Method: EPA 9040									
pH at 25 Degrees C	1	**7.2**	H3,H6	Std. Units	0.10	0.10	04/10/2020 14:54		139670	75WETQ
9056 IC Anions	Analytical Method: EPA 9056A									
Chloride	100	**1160**		mg/L	80.0	5.4	04/14/2020 04:43		139781	75WTA4
Fluoride	1	< 0.20		mg/L	0.50	0.20	04/14/2020 03:50		139781	75WTA4
Sulfate	500	**2840**		mg/L	350	99.5	04/14/2020 05:01		139781	75WTA4
2540C Total Dissolved Solids	Analytical Method: SM 2540C									
Total Dissolved Solids	1	**6220**		mg/L	500	500	04/14/2020 12:41		139835	75BL17

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Quality Control

Batch: 139802
Method: EPA 6010
Prep EPA 3010

Pace Project No.: 75129503
Instrument ID: 75ICP1

Blank: 636338

Parameters	Dilutio	Quals	Result	Units	MQL	SDL	Analysis Date	Prep Date
Boron	1	U	<0.017	mg/L	0.10	0.017	04/15/2020 18:31	04/14/2020 08:20
Calcium	1	U	<0.093	mg/L	1.0	0.093	04/15/2020 12:11	04/14/2020 08:20

Laboratory Control Sample: 636339

Parameters	Spk Amt	LCS Result	Units	LCS %Rec	% Rec Limits	LCS Quals
Boron	1	1.0	mg/L	102	88-111	
Calcium	10	9.8	mg/L	98	87-112	

Matrix Spike: 636340
Matrix Spike Duplicate: 636341

Original for Sample: Project sample BW-1

Parameters	Original Result	MS Spk	MSD Spk	MS Result	MSD Result	Units	MS %Rec	MSD %Rec	% Rec Limits	RPD	Max RPD	Quals
Boron	3.7	1	1	4.7	4.8	mg/L	92	105	84-113	3	20	
Calcium	545	10	10	593	588	mg/L	485	434	10-200	1	20	M1

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Quality Control

Batch: 139670
Method: EPA 9040
Pace Project No.: 75129503
Instrument ID: 75WETQ

Laboratory Control Sample: 635844

Parameters	Spk Amt	LCS Result	Units	LCS %Rec	% Rec Limits	LCS Quals
pH at 25 Degrees C	6	6.0	Std. Units	99	99-101	H6

Duplicate: 635846

Original for Sample: Project sample BW-1

Parameters	Original Result	Dup Result	Units	RPD	Max RPD	Quals
pH at 25 Degrees C	6.9	7.0	Std. Units	1	20	H3,H6

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Quality Control

Batch: 139781
Method: EPA 9056A

Pace Project No.: 75129503
Instrument ID: 75WTA4

Blank: 636247

Parameters	Dilutio	Quals	Result	Units	MQL	SDL	Analysis Date	Prep Date
Chloride	1	U	<0.054	mg/L	0.80	0.054	04/13/2020 21:35	
Fluoride	1	U	<0.20	mg/L	0.50	0.20	04/13/2020 21:35	
Sulfate	1	U	<0.20	mg/L	0.70	0.20	04/13/2020 21:35	

Laboratory Control Sample: 636248

Parameters	Spk Amt	LCS Result	Units	LCS %Rec	% Rec Limits	LCS Quals
Chloride	5	4.6	mg/L	91	80-120	
Fluoride	5	4.6	mg/L	91	80-120	
Sulfate	5	4.8	mg/L	95	80-120	

Matrix Spike: 636249

Matrix Spike Duplicate: 636250

Original for Sample: Project sample BW-1

Parameters	Original Result	MS Spk	MSD Spk	MS Result	MSD Result	Units	MS %Rec	MSD %Rec	% Rec Limits	RPD	Max RPD	Quals
Chloride	1070	1000	1000	2160	2150	mg/L	109	108	80-120	0	20	
Fluoride	<0.20	5	5	3.2	3.3	mg/L	63	65	80-120	3	20	M1
Sulfate	2760	2500	2500	5380	5420	mg/L	105	106	80-120	1	20	

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Quality Control

Batch: 139838
Method: EPA 9056A

Pace Project No.: 75129503
Instrument ID: 75WTA4

Blank: 636504

Parameters	Dilutio	Quals	Result	Units	MQL	SDL	Analysis Date	Prep Date
Chloride	1	U	<0.054	mg/L	0.80	0.054	04/14/2020 14:11	

Laboratory Control Sample: 636505

Parameters	Spk Amt	LCS Result	Units	LCS %Rec	% Rec Limits	LCS Quals
Chloride	5	4.9	mg/L	97	80-120	

Matrix Spike: 636506

Matrix Spike Duplicate: 636507

Original for Sample: Project sample MW-1

Parameters	Original Result	MS Spk	MSD Spk	MS Result	MSD Result	Units	MS %Rec	MSD %Rec	% Rec Limits	RPD	Max RPD	Quals
Chloride	152	250	250	409	419	mg/L	103	107	80-120	2	20	

Quality Control

Pace Analytical Services, Inc.
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Batch: 139835 **Pace Project No.:** 75129503
Method: SM 2540C **Instrument ID:** 75BL17

Blank: 636494

Parameters	Dilutio	Quals	Result	Units	MQL	SDL	Analysis Date	Prep Date
Total Dissolved Solids	1	U	<25.0	mg/L	25.0	25.0	04/14/2020 12:39	

Laboratory Control Sample: 636495

Parameters	Spk Amt	LCS Result	Units	LCS %Rec	% Rec Limits	LCS Quals
Total Dissolved Solids	250	272	mg/L	109	85-115	

Unadjusted MQL

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Pace Project 75129503

Analyte	Method	Unadjusted MQL	Reporting Units
Boron	EPA 6010	0.10	mg/L
Calcium	EPA 6010	1.0	mg/L
pH at 25 Degrees C	EPA 9040	0.10	Std. Units
Chloride	EPA 9056A	0.80	mg/L
Fluoride	EPA 9056A	0.50	mg/L
Sulfate	EPA 9056A	0.70	mg/L
Total Dissolved Solids	SM 2540C	25.0	mg/L

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Definitions/Qualifiers

Pace Project 75129503

DEFINITIONS

DF	Dilution Factor
J	Estimated concentration above the adjusted method detection limit and below the adjusted reporting
U	Indicates the compound was analyzed for, but not detected.
SDL	Sample Detection Limit
MQL	Method Quantitation Limit
LCS(D)	Laboratory Control Sample (Duplicate)
MS(D)	Matrix Spike (Duplicate)
DUP	Sample Duplicate
RPD	Relative Percent Difference
TNI	The Nelac Institute

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

ANALYTE QUALIFIERS

H3	Sample was received or analysis requested beyond the recognized method holding time.
H6	Analysis initiated outside of the 15 minute EPA required holding time.
M1	Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

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Quality Control Data Cross Reference Table

Pace Project 75129503

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical	Analytical
75129503001	**BW-1**	EPA 3010	139802	EPA 6010	139862
75129503002	**MW-1**	EPA 3010	139802	EPA 6010	139862
75129503003	**MW-2**	EPA 3010	139802	EPA 6010	139862
75129503004	**MW-3**	EPA 3010	139802	EPA 6010	139862
75129503005	**DUP**	EPA 3010	139802	EPA 6010	139862
75129503001	**BW-1**	EPA 9040	139670		
75129503002	**MW-1**	EPA 9040	139670		
75129503003	**MW-2**	EPA 9040	139670		
75129503004	**MW-3**	EPA 9040	139670		
75129503005	**DUP**	EPA 9040	139670		
75129503001	**BW-1**	SM 2540C	139835		
75129503002	**MW-1**	SM 2540C	139835		
75129503003	**MW-2**	SM 2540C	139835		
75129503004	**MW-3**	SM 2540C	139835		
75129503005	**DUP**	SM 2540C	139835		
75129503001	**BW-1**	EPA 9056A	139781		
75129503002	**MW-1**	EPA 9056A	139781		
75129503003	**MW-2**	EPA 9056A	139781		
75129503004	**MW-3**	EPA 9056A	139781		
75129503005	**DUP**	EPA 9056A	139781		
75129503002	**MW-1**	EPA 9056A	139838		

TRRP LABORATORY REVIEW CHECKLIST			
Laboratory	Pace Analytical Services, Inc.	**LRC Date:**	04/16/2020
Project Name:	16220013.00 Task01/Sandy Creek	**Laboratory Job**	75129503
Reviewer	Courtney Hollins	**Prep Batch Number**	See exception report.

#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER #[5]
R1	**OI**	**Chain-of-custody (C-O-C)**					
		Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?		X			R1.1
		Were all departures from standard conditions described in an exception report?	X				
R2	**OI**	**Sample and quality control (QC) identification**					
		Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
		Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
R3	**OI**	**Test reports**					
		Were all samples prepared and analyzed within holding times?		X			R3.1
		Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
		Were calculations checked by a peer or supervisor?	X				
		Were all analyte identifications checked by a peer or supervisor?	X				
		Were sample detection limits reported for all analytes not detected?	X				
		Were all results for soil and sediment samples reported on a dry weight basis?			X		
		Were % moisture (or solids) reported for all soil and sediment samples?			X		
		Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
		If required for the project, are TICs reported?			X		
R4	**O**	**Surrogate recovery data**					
		Were surrogates added prior to extraction?			X		
		Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
R5	**OI**	**Test reports/summary forms for blank samples**					
		Were appropriate type(s) of blanks analyzed?	X				
		Were blanks analyzed at the appropriate frequency?	X				
		Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
		Were blank concentrations < MQL?	X				
R6	**OI**	**Laboratory control samples (LCS):**					
		Were all COCs included in the LCS?	X				
		Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
		Were LCSs analyzed at the required frequency?	X				
		Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
		Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
		Was the LCSD RPD within QC limits?			X		
R7	**OI**	**Matrix spike (MS) and matrix spike duplicate (MSD) data**					
		Were the project/method specified analytes included in the MS and MSD?	X				
		Were MS/MSD analyzed at the appropriate frequency?	X				
		Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?		X			R7.3
		Were MS/MSD RPDs within laboratory QC limits?	X				
R8	**OI**	**Analytical duplicate data**					
		Were appropriate analytical duplicates analyzed for each matrix?	X				
		Were analytical duplicates analyzed at the appropriate frequency?	X				
		Were RPDs or relative standard deviations within the laboratory QC limits?	X				
R9	**OI**	**Method quantitation limits (MQLs):**					
		Are the MQLs for each method analyte included in the laboratory data package?	X				
		Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
		Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
R10	**OI**	**Other problems/anomalies**					
		Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
		Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	X				
		Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices, and methods associated with this laboratory data package?	X				

TRRP LABORATORY REVIEW CHECKLIST			
Laboratory	Pace Analytical Services, Inc.	**LRC Date:**	04/16/2020
Project Name:	16220013.00 Task01/Sandy Creek	**Laboratory Job**	75129503
Reviewer	Courtney Hollins	**Prep Batch Number**	See exception report.

1. Items identified by the letter "R" must be included in the laboratory in the laboratory data package submitted in the TRRP-required reports(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period;
2. O = Organic analyses; I = inorganic analysises (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

TRRP LABORATORY REVIEW CHECKLIST									
Laboratory		Pace Analytical Services, Inc.	LRC Date:	04/16/2020					
Project Name:		16220013.00 Task01/Sandy Creek	Laboratory Job	75129503					
Reviewer		Courtney Hollins	Prep Batch Number	See exception report.					
#[1]	A[2]	Description		Yes	No	NA[3]	NR[4]	ER #[5]	
S1	OI	**Initial calibration (ICAL)**							
		Were response factors and/or relative response factors for each analyte within QC limits?		X					
		Were percent RSDs or correlation coefficient criteria met?		X					
		Was the number of standards recommended in the method used for all analytes?		X					
		Were all points generated between the lowest and highest standard used to calculate the curve?		X					
		Are ICAL data available for all instruments used?		X					
		Has the initial calibration curve been verified using an appropriate second source standard?		X					
S2	OI	**Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):**							
		Was the CCV analyzed at the method-required frequency?		X					
		Were precent differences for each analyte within the method-required QC limits?		X					
		Was the ICAL curve verified for each analyte?		X					
		Was the absolute value of the analyte concentration in the inorganic CCB < MDL?		X					
S3	O	**Mass spectral tuning**							
		Was the appropriate compound for the method used for tuning?				X			
		Were ion abundance data within the method-required QC limits?				X			
S4	O	**Internal standards (IS)**							
		Were IS area counts and retention times within the method-required QC limits?				X			
S5	OI	**Raw data (NELAC Section 5.5.10)**							
		Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?		X					
		Were data associated with manual integrations flagged on the raw data?		X					
S6	O	**Dual column confirmation**							
		Did dual column confirmation results meet the method-required QC?				X			
S7	O	**Tentatively identified compounds (TICs)**							
		If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?				X			
S8	I	**Interference Check Sample (ICS) results**							
		Were percent recoveries within method QC limits?		X					
S9	I	**Serial dilutions, post digestion spikes, and method of standard additions**							
		Were percent differences, recoveries, and the linearity within the QC limits specified in the method?		X					
S10	OI	**Method detection limit (MDL) studies**							
		Was a MDL study performed for each reported analyte?		X					
		Is the MDL either adjusted or supported by the analysis of DCSs?		X					
S11	OI	**Proficiency test reports**							
		Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?		X					
S12	OI	**Standards documentation**							
		Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?		X					
S13	OI	**Compound/analyte identification procedures**							
		Are the procedures for compound/analyte identification documented?		X					
S14	OI	**Demonstration of analyst competency (DOC)**							
		Was DOC conducted consistent with NELAC Chapter 5?		X					
		Is documentation of the analyst's competency up-to-date and on file?		X					
S15	OI	**Verification/validation documentation for methods (NELAC Chapter 5)**							
		Are all the methods used to generate the data documented, verified, and validated, where applicable?		X					
S16	OI	**Laboratory standard operating procedures (SOPs)**							
		Are laboratory SOPs current and on file for each method performed?		X					

1. Items identified by the letter "R" must be included in the laboratory in the laboratory data package submitted in the TRRP-required reports(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period;
2. O = Organic analyses; I = inorganic analysises (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

TRRP LABORATORY REVIEW CHECKLIST			
Laboratory	Pace Analytical Services, Inc.	**LRC Date:**	04/16/2020
Project Name:	16220013.00 Task01/Sandy Creek	**Laboratory Job**	75129503
Reviewer	Courtney Hollins	**Prep Batch Number**	139670,139781,139802,139835,139838

ER #[1]	Description
R1.1	Sample 635845, Method EPA 9040, pH at 25 Degrees C: H3 - Sample was received or analysis requested beyond the recognized method holding time.
R1.1	Sample 635846, Method EPA 9040, pH at 25 Degrees C: H3 - Sample was received or analysis requested beyond the recognized method holding time.
R1.1	Sample 75129503001, Method EPA 9040, pH at 25 Degrees C: H3 - Sample was received or analysis requested beyond the recognized method holding time.
R1.1	Sample 75129503002, Method EPA 9040, pH at 25 Degrees C: H3 - Sample was received or analysis requested beyond the recognized method holding time.
R1.1	Sample 75129503003, Method EPA 9040, pH at 25 Degrees C: H3 - Sample was received or analysis requested beyond the recognized method holding time.
R1.1	Sample 75129503004, Method EPA 9040, pH at 25 Degrees C: H3 - Sample was received or analysis requested beyond the recognized method holding time.
R1.1	Sample 75129503005, Method EPA 9040, pH at 25 Degrees C: H3 - Sample was received or analysis requested beyond the recognized method holding time.
R3.1	Sample 75129503001, 9040 pH. Run on 04/10/20 14:47 is 2 days past hold. Sample received after hold date.
R3.1	Sample 75129503002, 9040 pH. Run on 04/10/20 14:56 is 2 days past hold. Sample received after hold date.
R3.1	Sample 75129503003, 9040 pH. Run on 04/10/20 14:52 is 1.9 days past hold. Sample received after hold date.
R3.1	Sample 75129503004, 9040 pH. Run on 04/10/20 14:57 is 1.9 days past hold. Sample received after hold date.
R3.1	Sample 75129503005, 9040 pH. Run on 04/10/20 14:54 is 2 days past hold. Sample received after hold date.
R7.3	MS Sample #636249: Fluoride 63% spike recovery outside laboratory QC limit of 80-120%.
R7.3	MS Sample #636340: Calcium 485% spike recovery outside laboratory QC limit of 10-200%.
R7.3	MSD Sample #636250: Fluoride 65% spike recovery outside laboratory QC limit of 80-120%.
R7.3	MSD Sample #636341: Calcium 434% spike recovery outside laboratory QC limit of 10-200%.

1. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

Pace Analytical	Document Name: Sample Condition Upon Receipt	Document Revised: 01/03/20 Page 1 of 1
	Document No.: F-DAL-C-001-rev.12	Issuing Authority: Pace Dallas Quality Office

Sample Condition Upon Receipt

☐Dallas ☑Ft Worth ☐Corpus Chri **WO# : 75129503**

75129503

Client Name: SCS Engineers Project Work order: ___

Courier: FedEX ☐ UPS ☐ USPS ☐ Client ☑ LSO ☐ PACE ☐ Other: ___

Tracking #: DHH 4-9-20

Custody Seal on Cooler/Box: Yes ☑ ~~No~~ **Packing Material:** Bubble Wrap/Bags ☐ Foam ☐ None ☑ Other ☐

Received on Ice: Yes ☑ No ☐ **Type of Ice:** Wet ☑ Blue ☐

Thermometer Used: IR-12 **Cooler Temp °C:** 5.5 (Recorded) -0.3 (Correction Factor) 5.2 (Actual)

Temperature should be above freezing to 6°C

Triage Person: DHH **Date:** 04·09·20

Chain of Custody relinquished	Yes ☑ No ☐
Sampler name & signature on COC	Yes ☑ No ☐
Short HT analyses (<72 hrs)	Yes ☐ No ☑

Login Person: DHH **Date:** 04·09·20

Sufficient Volume received	Yes ☑ No ☐
Correct Container used	Yes ☑ No ☐
Container Intact	Yes ☑ No ☐
Sample pH Acceptable pH Strips: 166568	Yes ☑ No ☐ NA ☐
Residual Chlorine Present Cl Strips: ___	Yes ☐ No ☐ NA ☑
Sulfide Present Lead Acetate Strips: ___	Yes ☐ No ☐ NA ☑
Are soil samples (volatiles, TPH) received in 5035A Kits (not applicable to TCLP VOA or PST Program TPH)	Yes ☐ No ☐ NA ☑
Unpreserved 5035A soil frozen within 48 hrs	Yes ☐ No ☐ NA ☑
Headspace in VOA (>6mm)	Yes ☐ No ☐ NA ☑
Project sampled in USDA Regulated Area: State Sampled: TX	Yes ☑ No ☐
Non-Conformance(s):	Yes ☐ No ☑

Labeling Person (if different than log-in): ___ Date: ___

Pace Analytical®
www.pacelabs.com

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page : 1 Of 1

Section A Required Client Information:		Section B Required Project Information:		Section C Invoice Information:	
Company:	SCS Engineers	Report To:	Tyson Milbrand	Attention:	
Address:	1901 Central Drive	Copy To:		Company Name:	
Bedford, TX 76021				Address:	
Email:	tmilbrand@scsengineers.com	Purchase Order #:		Pace Quote:	
Phone:	817-571-2288 Fax	Project Name:	16220013.00 Task 01/Sandy Creek	Pace Project Manager:	courtney.hollins@pacelabs.com,
Requested Due Date:		Project #:		Pace Profile #:	5660

Regulatory Agency:

State / Location: TX

MATRIX / CODE: Drinking Water DW; Water WT; Waste Water WW; Product P; Soil/Solid SL; Oil OL; Wipe WP; Air AR; Other OT; Tissue TS

SAMPLE ID — One Character per box. (A-Z, 0-9 / , -) Sample Ids must be unique

Preservatives: Unpreserved, H2SO4, HNO3, HCl, NaOH, Na2S2O3, Methanol, Other

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED START DATE	START TIME	END DATE	END TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other	Analyses Test Y/N	pH by 9040	TDS	Chloride, Fluoride, Sulfate	6010 Metals (Ca and B)	Residual Chlorine (Y/N)	
1	BW-1	WT		4/8/2	1532														X	X	X	X		-001
2	MW-1	WT			1545														X	X	X	X		-002
3	MW-2	WT			1553														X	X	X	X		-003
4	MW-3	WT			1609														X	X	X	X		-004
5	DUP	WT			—														X	X	X	X		-005
6																								
7																								
8																								
9																								
10																								
11																								
12																								

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
Per client - use earliest collection time for duplicate. -DLH 4/9/20	[signature]	4/9/2020	10:17	[signature] Pace	4/9/20	1017	5.2	Y	Y	Y
	Rgonzalez / Pace	4.10.2020	0700	SHAWN CHANG / PACE	4.10.2020	0700				
	SHAWN CHANG	4.10.2020	0930	Courtney Hollins / Pace	4/10/2020	09:30	0.2	Y	N	Y
							TEMP in C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Asher Boudreaux

SIGNATURE of SAMPLER: [signature] DATE Signed: 4/9/2020

WO#: 75129503

PM: CRH Due Date: 04/16/20

CLIENT: SCS Engineer

Appendix C

Historical Groundwater Analytical Data

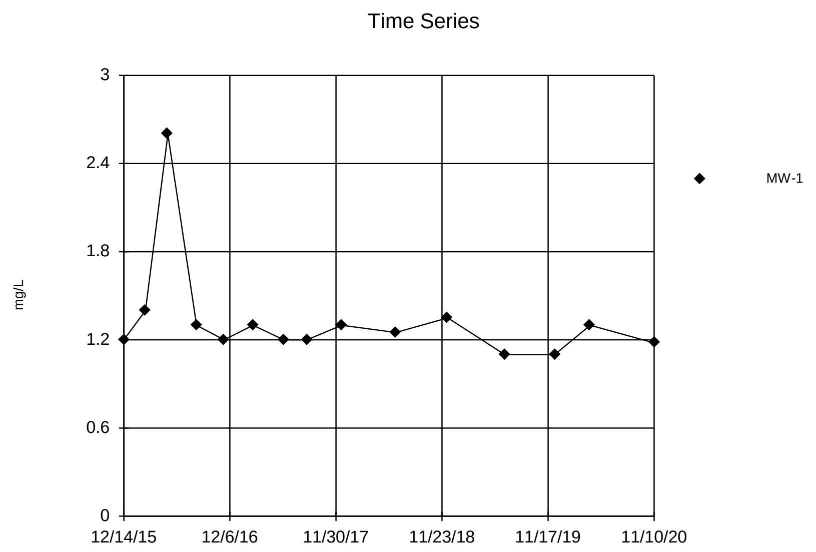
APPENDIX C - GROUNDWATER ANALYTICAL DATA
2020 ANNUAL GROUNDWATER MONITORING REPORT
SANDY CREEK ENERGY STATION
2161 RATTLESNAKE ROAD
RIESEL, TX 76682

	Water Level	Conductiviy	Turbidity	Boron	Calcium	Chloride	pH at 25°C	Sulfate	Total Dissolved Solids	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium	Radium-226	Radium-228	Combined Radium	Fluoride
Units	ft msl	mS/cm	NTU	mg/L	mg/L	mg/L	Std. Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pCi/L	pCi/L	pCi/L	mg/L
MW-1																										
12/14/2015	453.53	4.51	25.2	1.2	454	253	7.6	2090	4090	<0.0010	<0.0050	0.044	<0.0010	<0.0010	0.0073	<0.0025	<0.0050	0.43	<0.00020	<0.010	0.16	<0.00050	1.04 ± 0.838	1.09 ± 0.523	2.13	<0.30
2/25/2016	453.38	4.98	>800	1.4	520	236	7.5	2190	4060	<0.0010	<0.0050	0.033	<0.0010	<0.0010	0.0074	<0.0025	0.0084	0.39	<0.00020	<0.010	0.2	<0.00050	0.922 ± 0.720	1.46 ± 0.496	2.382	<0.30
5/11/2016	454.14	4.83	>800	2.6	1030	402	7.2	2580	5260	<0.0010	0.12	1	0.029	<0.0020	0.69	0.087	0.21	0.78	<0.00020	<0.020	0.039	0.00089	3.94 ± 1.31	8.39 ± 1.74	12.33	<0.30
8/16/2016	453.67	4.47	800	1.3	535	239	6.8	2300	3880	<0.0010	<0.0050	0.022	<0.0010	<0.0010	<0.0050	<0.0025	<0.0050	0.41	<0.00020	<0.010	0.13	<0.00050	0.593 ± 0.620	3.29 ± 0.828	3.883	0.35
11/17/2016	454.43	4.45	17.7	1.2	542	216	7	2130	3720	<0.0010	<0.0050	0.018	<0.0010	<0.0010	<0.0050	<0.0025	<0.0050	0.37	<0.00020	<0.020	0.16	<0.00050	0.338 ± 0.339	2.49 ± 0.783	2.828	<0.30
2/23/2017	454.72	5.08	452	1.3	531	223	7	2350	3980	<0.0010	<0.010	<0.20	<0.0050	<0.0050	<0.010	<0.010	<0.0050	0.44	<0.00020	<0.010	0.066	<0.00050	-0.207 ± 0.945	3.13 ± 0.908	2.923	<0.30
6/7/2017	454.42	4.77	500	1.2	530	203	7.5	2010	3680	<0.0010	<0.0050	0.019	<0.0010	<0.0010	<0.0050	<0.0025	<0.0050	0.36	<0.00020	<0.020	0.15	<0.00050	0.000 ± 0.449	1.30 ± 0.518	1.3	<0.30
8/24/2017	454.69	4.58	223	1.2	518	241	7.1	2620	4550	<0.0010	<0.0050	0.02	<0.0010	<0.0010	<0.0050	<0.0025	<0.0050	0.395	<0.00020	<0.020	0.17	<0.00050	0.577 ± 0.429	1.69 ± 0.634	2.267	0.4
12/20/2017	454.22	4.287	66.2	1.3	548	248	7.4	2340	4250	<0.0010	<0.0060	0.017	<0.0010	<0.0050	<0.0070	<0.0025	<0.010	0.38	<0.00020	<0.030	0.18	<0.00050	1.26 ± 0.680	2.46 ± 0.888	3.72	1.1
6/21/2018	453.85	4.67	681	1.25	587	247	7.38	2530	4270	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.3 J
12/13/2018	454.86	4.369	30	1.35	515	241	7.52	2570	4100	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.585
6/24/2019	455.38	4.142	22.9	1.1	492	169	7.2	2430	4030	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.73
12/10/2019	453.99	4.278	64	1.1	534	192	7.43	2420	3720	n/a	0.000667	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0809	n/a	n/a	n/a	n/a	0.236
4/8/2020	454.99	4.66	137	1.3	524	152	7.1	2430	4330	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.20
11/10/2020	454.45	4.73	4.7	1.18	539	168	7.2	2350	4060	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.26 J
MW-2																										
12/14/2015	424.11	10.6	2.8	1.9	569	1890	6.7	2810	8520	<0.0010	<0.0050	0.031	<0.0010	<0.0010	<0.0050	0.0061	<0.0050	0.69	<0.00020	<0.010	<0.010	<0.00050	1.41 ± 0.938	2.76 ± 0.771	4.17	0.98
2/25/2016	429.50	11.3	52.2	2.4	697	2080	7.3	2890	8070	<0.0010	0.014	0.038	<0.0010	<0.0010	<0.0050	<0.011	<0.0050	0.74	<0.00020	<0.010	<0.010	<0.00050	0.857 ± 0.590	2.57 ± 0.665	3.427	<0.30
5/11/2016	430.72	10.8	23.7	2.2	613	2340	6.7	3010	9930	<0.0010	0.0059	0.027	<0.0010	<0.0010	<0.0050	0.0079	<0.0050	0.87	<0.00020	<0.010	<0.010	<0.00050	0.859 ± 0.561	3.13 ± 0.822	3.989	<0.30
8/16/2016	430.78	11.9	5.5	2.1	680	2440	6.7	3080	7870	<0.0020	<0.0050	0.021	<0.0010	<0.0010	<0.0050	0.0084	<0.0050	0.84	<0.00020	<0.010	<0.010	<0.0010	0.237 ± 0.329	3.28 ± 0.775	3.517	0.64
11/17/2016	430.80	10.7	0.4	1.9	701	2140	6.7	2770	9680	<0.0010	0.0059	0.024	<0.0010	<0.0010	<0.0050	0.0064	<0.0050	0.82	<0.00020	0.024	<0.010	<0.00050	0.923 ± 0.594	3.16 ± 0.826	4.083	0.35
2/23/2017	430.85	13.7	6.2	1.9	646	2320	6.9	3110	9630	<0.0010	<0.010	<0.20	<0.0050	<0.0050	<0.010	<0.010	<0.0050	0.8	<0.00020	<0.010	<0.020	<0.00050	1.52 ± 1.50	4.27 ± 1.07	5.79	0.46
6/7/2017	431.12	11	30.5	1.9	640	2420	7.5	2970	14200	<0.0010	<0.0050	0.016	<0.0010	<0.0010	<0.0050	0.0051	<0.0050	0.75	<0.00020	<0.020	<0.010	<0.00050	0.344 ± 0.415	3.82 ± 0.931	4.164	1.3
8/24/2017	431.20	11.4	8.1	1.9	664	2520	6.8	3710	9600	<0.0010	<0.010	0.017	<0.0010	<0.0020	<0.0050	0.0065	<0.010	0.729	<0.00020	<0.020	0.026	<0.00050	1.12 ± 0.610	3.78 ± 0.960	4.9	0.32
12/20/2017	429.47	6.198	37.7	2.2	716	2590	7.2	3100	9600	<0.0010	<0.012	0.022	<0.0010	<0.010	<0.014	0.0072	<0.020	0.74	<0.00020	<0.030	<0.040	<0.00050	0.945 ± 0.578	4.07 ± 0.940	5.015	<0.50
6/21/2018	430.02	12.66	4.42	1.9	706	2840	7.09	3400	10200	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.6
12/13/2018	430.72	11.89	15.1	2.58	690	2740	6.71	3220	10500	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.618
6/24/2019	432.28	10.77	9.87	1.7	656	2420	7.0	3480	9560	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.18
12/10/2019	430.19	8.676	19.1	1.48	660	2180	6.93	2620	8120	n/a	0.00219	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	n/a	n/a	n/a	n/a	0.229
4/8/2020	430.07	13	6.6	1.9	650	2410	6.8	3120	9820	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.20
11/10/2020	430.96	13.7	20.4	2.13	715	2350	6.8	2830	9670	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.20
MW-3																										
12/14/2015	421.77	1.17	11.9	0.35	67.6	12.3	7.2	135	586	<0.0010	<0.0050	0.021	<0.0010	<0.0010	<0.0050	<0.0025	<0.0050	<0.050	<0.00020	<0.010	<0.010	<0.00050	0.997 ± 0.813	0.736 ± 0.505	1.733	0.62
2/25/2016	421.66	6.04	93.3	1.2	479	347	7	2430	5400	<0.0010	0.0061	0.052	<0.0010	<0.0010	<0.0050	0.0098	<0.0050	0.85	<0.00020	<0.010	<0.010	<0.00050	1.26 ± 0.762	3.02 ± 0.791	4.28	0.9
5/11/2016	421.94	3.82	197	1.1	465	349	6.5	2330	5440	<0.0010	<0.0050	0.024	<0.0010	<0.0010	<0.0050	0.0059	<0.0050	0.65	<0.00020	<0.010	<0.010	<0.00050	1.54 ± 0.797	1.62 ± 0.547	3.16	<0.30
8/16/2016	420.42	6.01	101	1.2	505	381	7.3	2950	5680	<0.0010	<0.0050	0.018	<0.0010	<0.0010	<0.0050	0.006	<0.0050	0.98	<0.00020	<0.010	<0.010	<0.00050	0.891 ± 0.626	5.10 ± 1.13	5.991	<0.30
11/17/2016	421.03	5.43	87	1.1	494	322	6.6	2420	5420	<0.0010	<0.0050	0.028	<0.0010	<0.0010	<0.0050	0.0068	<0.0050	0.94	<0.00020	<0.020	<0.010	<0.00050	0.872 ± .0579	5.23 ± 1.30	6.102	<0.30
2/23/2017	422.58	6.79	82	1.1	389	202	7	1450	2900	<0.0010	<0.010	<0.20	<0.0050	<0.0050	<0.010	<0.010	<0.0050	0.7	<0.00020	<0.010	<0.020	<0.00050	-0.239 ± 1.09	4.07 ± 1.03	3.831	0.45
6/7/2017	422.23	3.68	145	1.2	486	327	7.1	2260	4740	<0.0010	<0.0050	0.015	<0.0010	<0.0010	<0.0050	0.0058	<0.0050	0.62	<0.00020	<0.020	<0.010	<0.00050	0.941 ± 0.658	2.76 ± 0.765	3.701	0.57
8/24/2017	419.66	6.55	82.6	1.1	519	401	6.5	2890	6160	<0.0010	<0.010	0.014	<0.0010	<0.0020	<0.0050	0.0084	<0.010	1.03	<0.00020	<0.020	<0.020	<0.00050	1.26 ± 0.600	4.41 ± 1.07	5.67	<0.30
12/20/2017	421.08	6.459	22.4	1.3	563	380	6.8	2830	5790	<0.0010	<0.0060	0.034	<0.0010	<0.0050	<0.0070	0.0086	<0.010	0.92	<0.00020	<0.030	<0.020	<0.00050	0.626 ± 0.567	2.77 ± 0.728	3.396	0.61
6/21/2018	418.68	6.633	51.1	1.13	526	396	6.76	3160	6090	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.3
12/13/2018	422.36	4.47	10.6	1.08	327	206	6.61	1790	3520	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.662
6/24/2019	423.00	5.659	10.3	0.99	452	306	6.6	3130	5740	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.18
12/10/2019	419.87	6.189	34.3	1.26	572	345	6.67	3140	5830	n/a	0.0024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	n/a	n/a	n/a	n/a	0.137
4/8/2020	422.06	6.46	21.6	1.1	530	307	6.5	3020	5980	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.20
11/10/2020	420.03	7.21	18.9	3.07	597	1160	7.1	2950	6920	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.20
BW-1																										
12/14/2015	465.60	5.35	155	1.8	465	727	9.5	2130	4900	<0.0010	<0.0050	0.17	<0.0010	<0.0010	0.015	0.0026	<0.0050	0.7	<0.00020	<0.010	<0.010	0.00073	0.900 ± 0.728	1.13 ± 0.513	2.03	<0.30
2/25/2016	465.44	5.8	307	3.5	586	1050	7.4	2690	6420	<0.0010	0.015	0.055	<0.0010	<0.0010	0.0053	0.0035	0.0069	0.71	<0.00020	<0.010	<0.010	<0.00050	0.887 ± 0.697	1.82 ± 0.541	2.707	0.67
5/11/2016	465.56	7.5	866	4	566	1120	7	2610	6360	<0.0010	0.0084	0.04	<0.0010	<0.0010	0.011	0.0035	0.0091	0.79	<0.00020	<0.010	<0.010	<0.00050	2.40 ± 0.944	2.80 ± 0.710	5.2	0.32
8/16/2016	465.71	7.52	56	3.7	566	1130	7.2	2720	6280	<0.0010	0.0064	0.04	<0.0010	<0.0010	0.0073	0.0029	<0.0050	0.78	<0.00020	<0.010	<0.010	<0.00050	0.610 ± 0.483	3.42 ± 0.777	4.03	0.94
11/17/2016	466.12	7.36	8.1	2.8	548	991	6.8	2590	6400	<0.0010	0.0066	0.023	<0.0010	<0.0010	<0.0050	<0.0025	<0.0050	0.74	<0.00020	0.022	<0.010	<0.00050	0.605 ± 0.548	2.94 ± 0.799	3.545	0.85
2/23/2017	466.57	7.17	245	3.1	532	1080	7.2	2760	6280	<0.0010	<0.010	<0.20	<0.0050	<0.0050	<0.010	<0.010	<0.0050	0.73	<0.00020	<0.010	<0.020	<0.00050	0.816 ± .0983	4.07 ± 1.08	4.886	<0.30
6/7/2017	466.17	7.58	852	3.8	539	1020	7.7	2220	7320	<0.0010	<0.0050	0.026	<0.0010	<0.0010	<0.0050	<0.0025	<0.0050	0.79	<0.00020	<0.020	<0.010	<0.00050	1.36 ± 0.685	3.13 ± 0.783	4.49	<0.30
8/24/2017	466.38	7.81	162	3.4	531	1160	7.1	2870	7260	<0.0010	<0.010	0.037	<0.0010	<0.0020	<0.0050	<0.0050	<0.010	0.738	<0.00020	<0.020	<0.020	<0.00050	1.58 ± 0.602	2.80 ± 0.759	4.38	0.37
12/20/2017	466.51	7.063	180	3.5	658	1030	7.2	2620	6140	<0.0010	<0.0060	0.044	<0.0010	<0.0050	<0.0070	0.0034	<0.010	0.73	<0.00020	<0.030	<0.020	<0.00050	1.07 ± 0.681	3.13 ± 0.788	4.2	<0.50
6/21/2018	466.13	7.755	39.3	3.31	610	1200	7.22	3030	6640	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.3
12/13/2018	467.24	7.159	81.8	3.25	637	1120	7.1	2780	6400	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.586
6/24/2019	467.37	7.21	157	3.1	564	1160	7.1	2930	6380	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.9
12/10/2019	467.39	6.612	214	2.98	591	1150	7.11	2830	6300	n/a	0.00236	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.010	n/a	n/a	n/a	n/a	0.309
4/8/2020	467.63	8.15	428	3.7	545	1070	6.9	2760	6660	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.20
11/10/2020	468.39	8.28	262	3.14	612	1170	7.1	2710	6000	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	<0.20

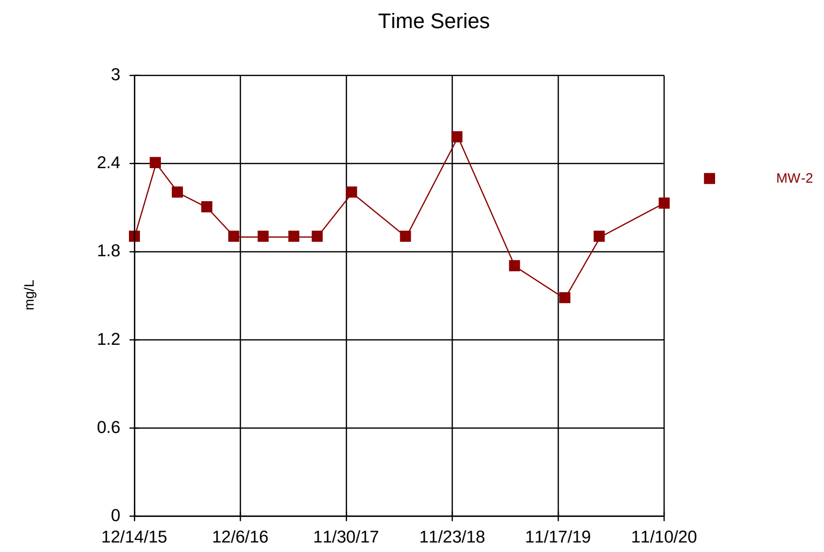
40 CFR 257 Appendix III Constituent
40 CFR 257 Appendix IV Constituent
40 CFR 257 Appendix III & IV Constituent

"<" - Indicates analyte was not detected above the laboratory reporting limit
"J" Indicates value is above method detection limit (MDL) but below laboratory reporting limit
ND- indicates constituent was non-detect

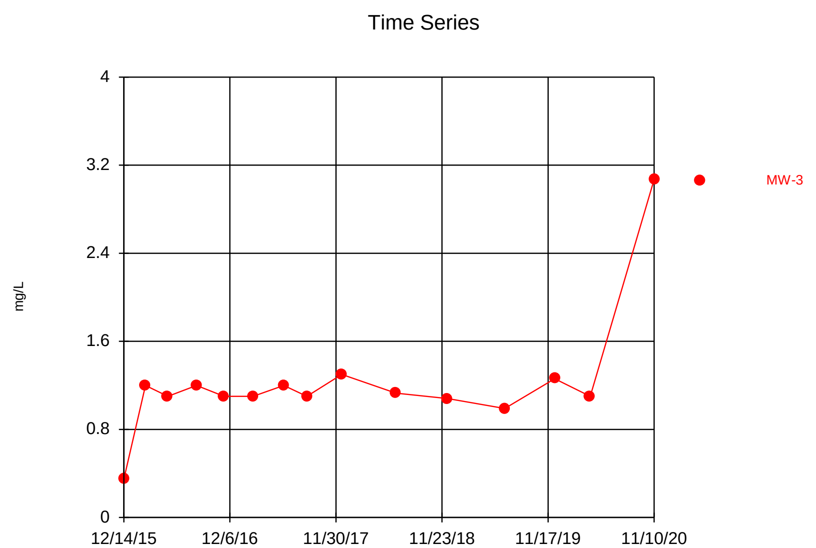
Appendix D
Time Series Graphs



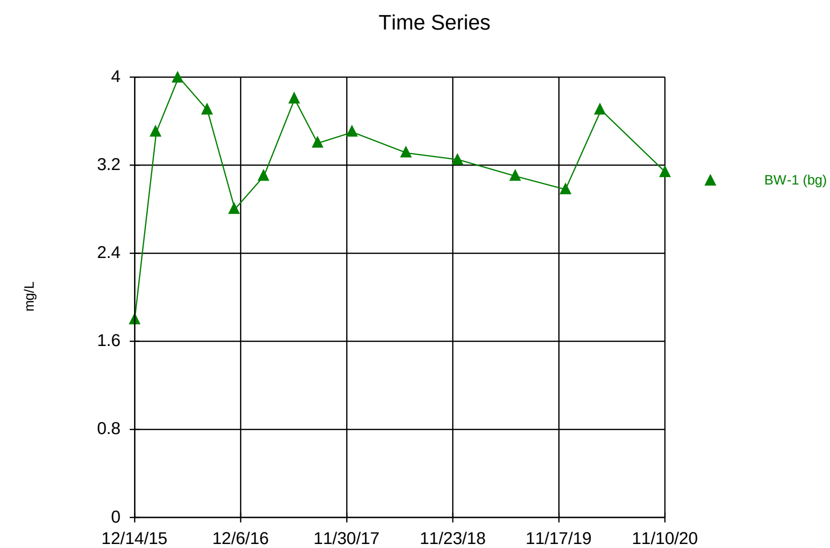
Constituent: Boron Analysis Run 1/7/2021 1:14 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_11.10.2020



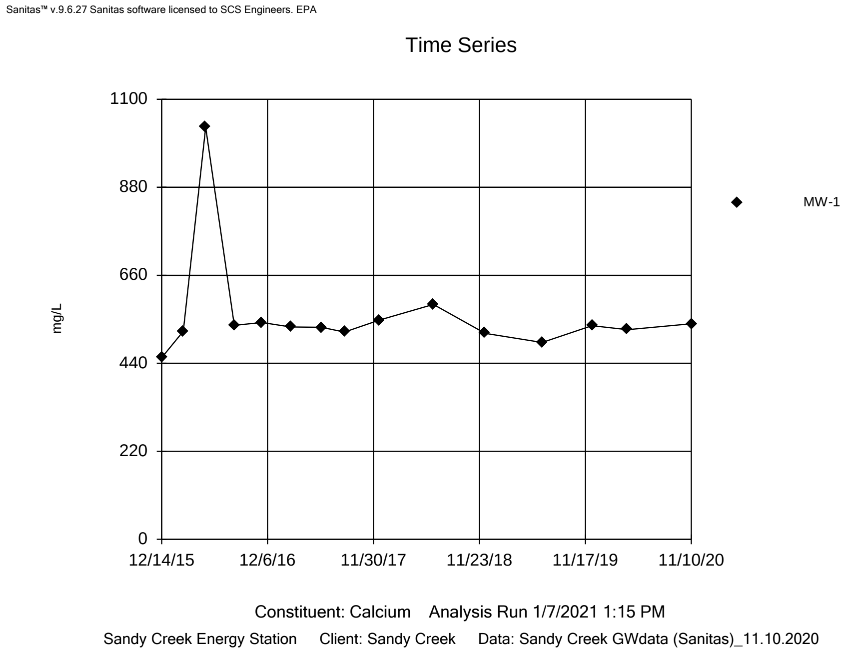
Constituent: Boron Analysis Run 1/7/2021 1:14 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_11.10.2020

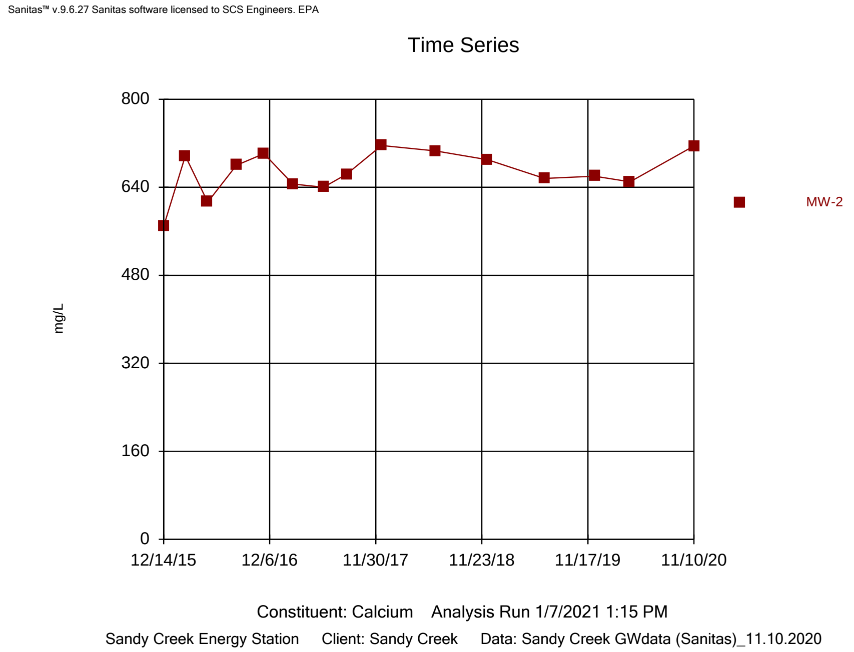


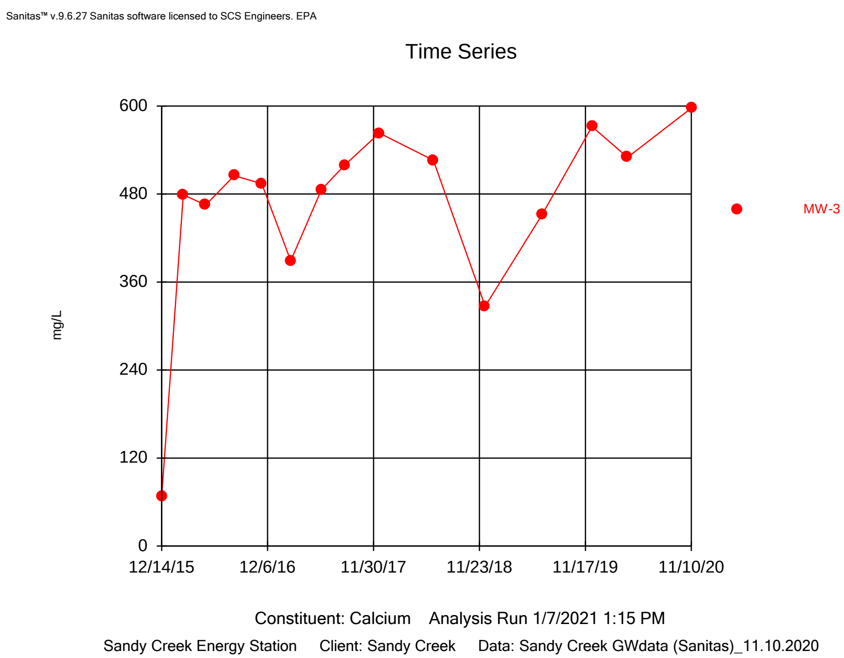
Constituent: Boron Analysis Run 1/7/2021 1:14 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_11.10.2020

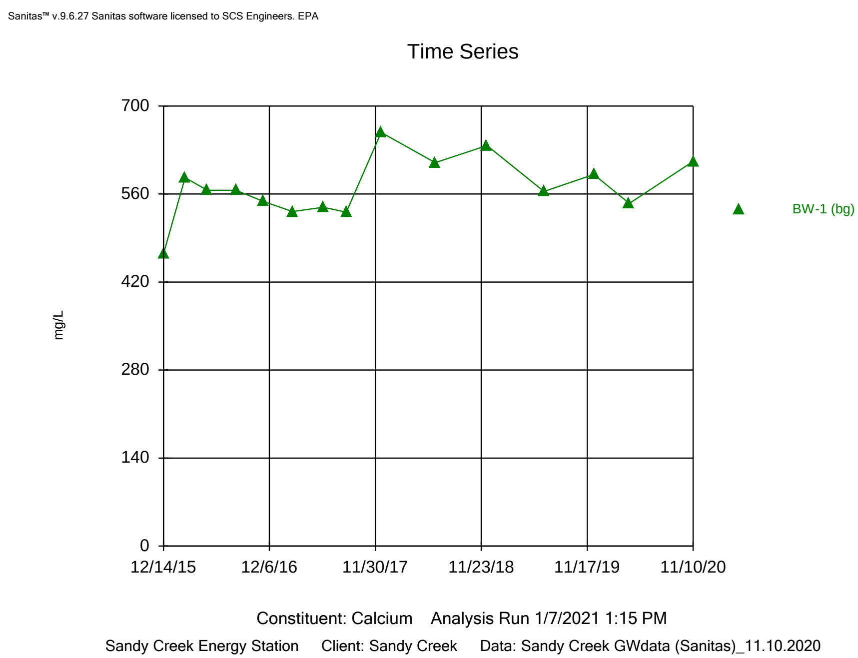


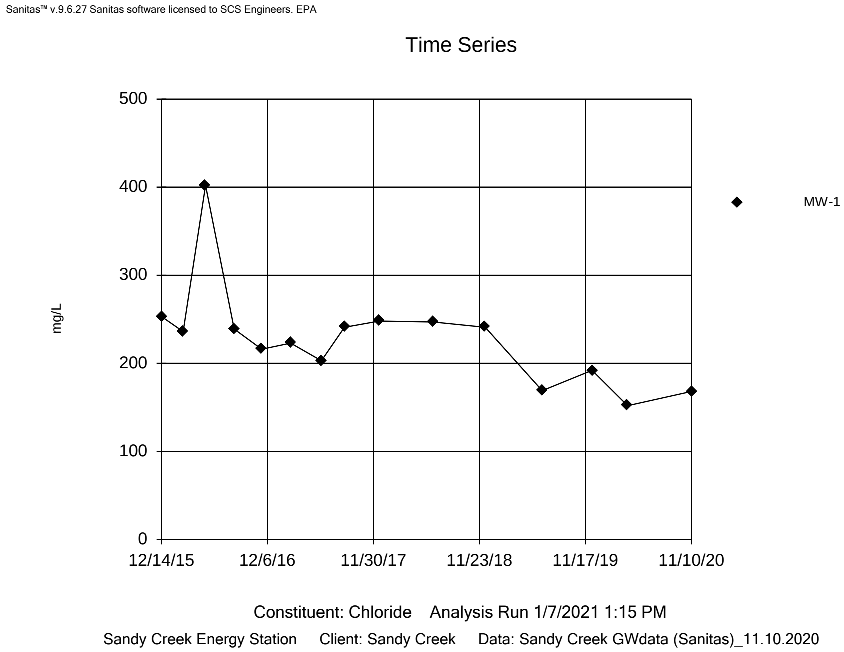
Constituent: Boron Analysis Run 1/7/2021 1:14 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_11.10.2020


Sanitas™ v.9.6.27 Sanitas software licensed to SCS Engineers. EPA
Time Series
1100
880
660
440
220
0
mg/L
12/14/15
12/6/16
11/30/17
11/23/18
11/17/19
11/10/20
MW-1
Constituent: Calcium Analysis Run 1/7/2021 1:15 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_11.10.2020

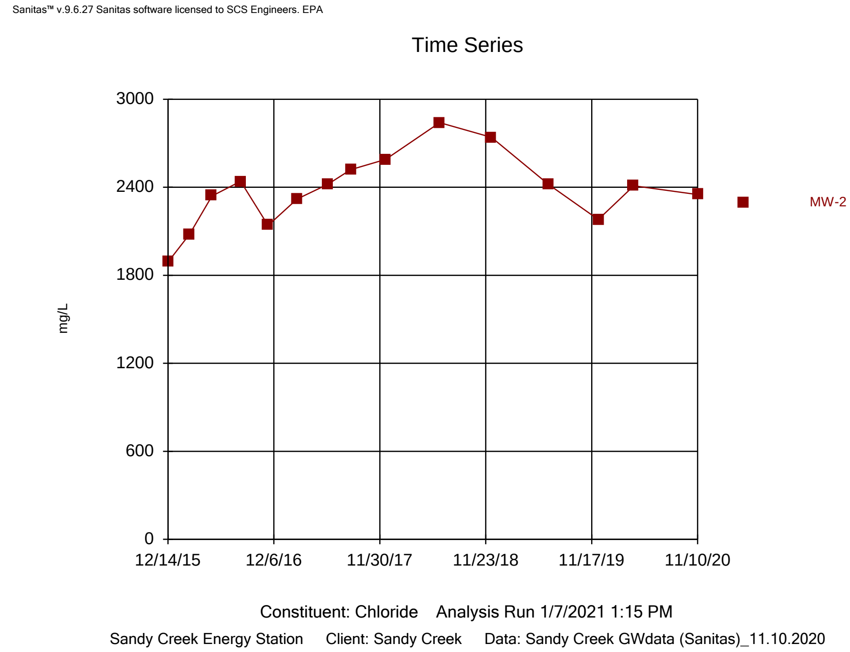

Sanitas™ v.9.6.27 Sanitas software licensed to SCS Engineers. EPA
Time Series
800
640
480
320
160
0
mg/L
12/14/15
12/6/16
11/30/17
11/23/18
11/17/19
11/10/20
MW-2
Constituent: Calcium Analysis Run 1/7/2021 1:15 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_11.10.2020


Sanitas™ v.9.6.27 Sanitas software licensed to SCS Engineers. EPA
Time Series
600
480
360
240
120
0
mg/L
12/14/15
12/6/16
11/30/17
11/23/18
11/17/19
11/10/20
MW-3
Constituent: Calcium Analysis Run 1/7/2021 1:15 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_11.10.2020

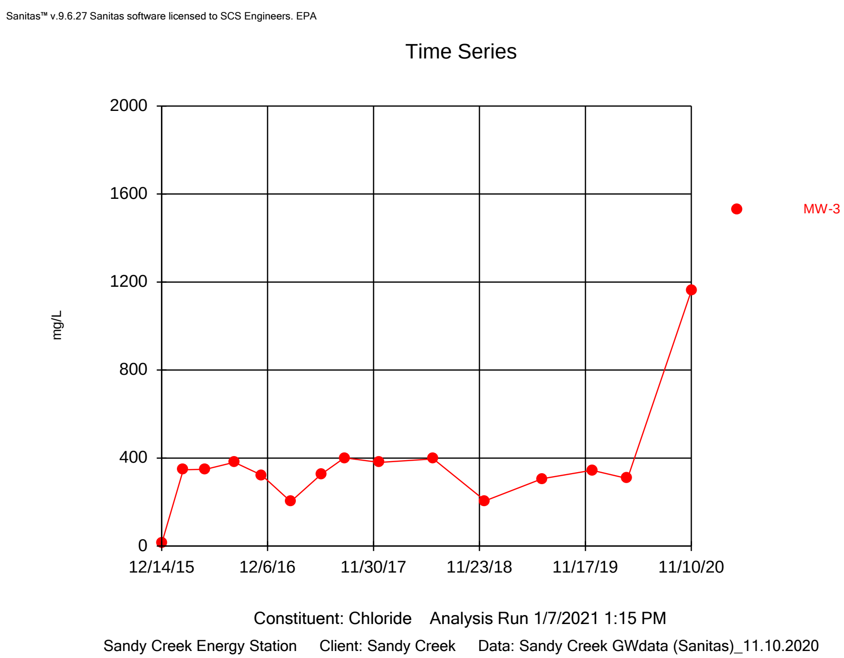

Sanitas™ v.9.6.27 Sanitas software licensed to SCS Engineers. EPA
Time Series
700
560
420
280
140
0
mg/L
12/14/15
12/6/16
11/30/17
11/23/18
11/17/19
11/10/20
BW-1 (bg)
Constituent: Calcium Analysis Run 1/7/2021 1:15 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_11.10.2020



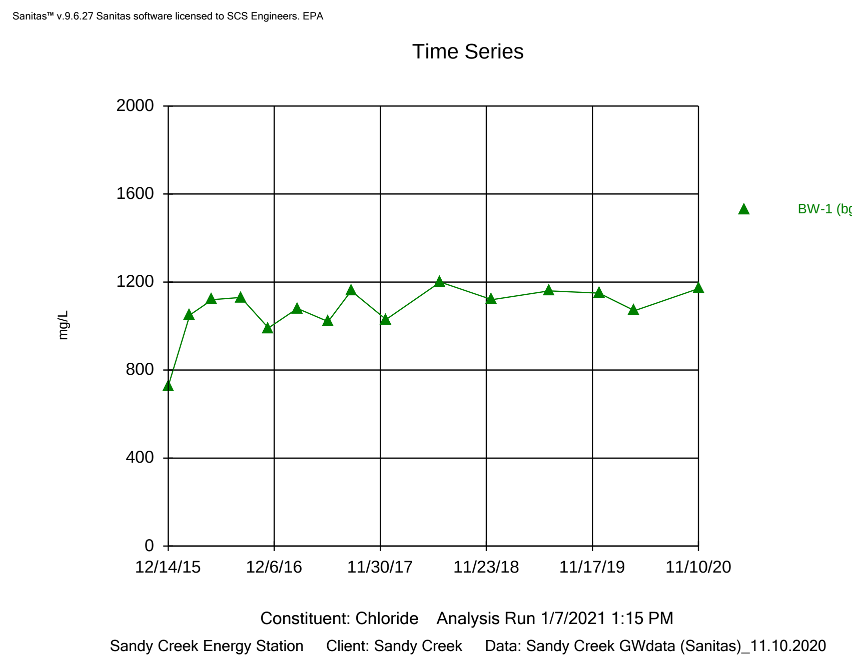
Sanitas™ v.9.6.27 Sanitas software licensed to SCS Engineers. EPA
Time Series
mg/L
500
400
300
200
100
0
12/14/15
12/6/16
11/30/17
11/23/18
11/17/19
11/10/20
MW-1
Constituent: Chloride Analysis Run 1/7/2021 1:15 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_11.10.2020



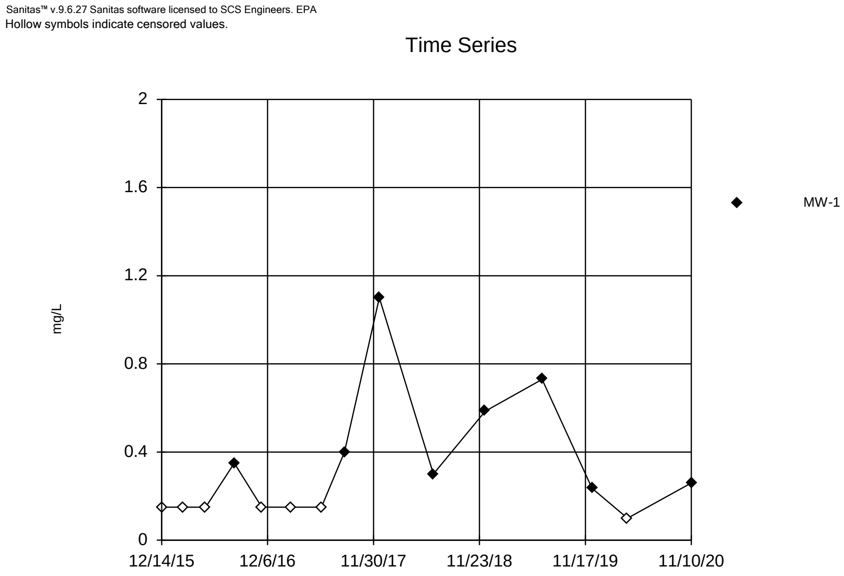
Sanitas™ v.9.6.27 Sanitas software licensed to SCS Engineers. EPA
Time Series
mg/L
3000
2400
1800
1200
600
0
12/14/15
12/6/16
11/30/17
11/23/18
11/17/19
11/10/20
MW-2
Constituent: Chloride Analysis Run 1/7/2021 1:15 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_11.10.2020



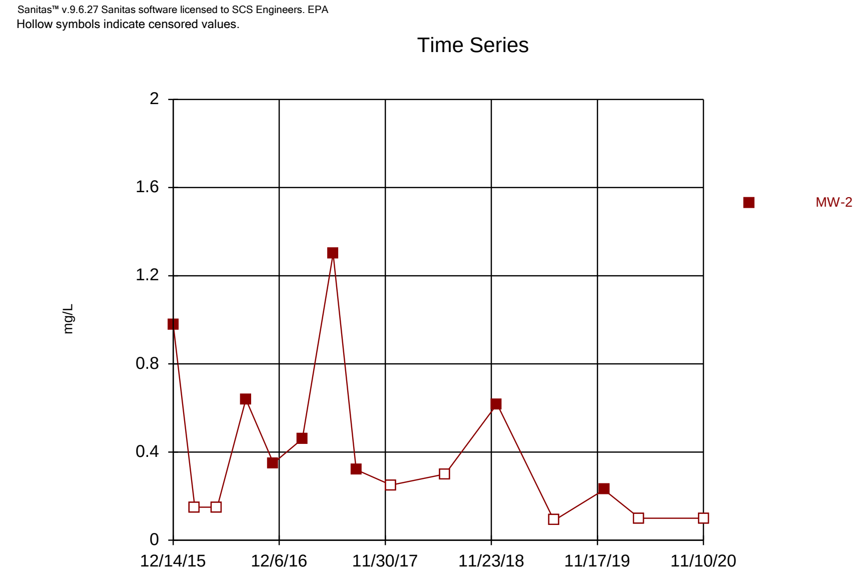
Sanitas™ v.9.6.27 Sanitas software licensed to SCS Engineers. EPA
Time Series
mg/L
2000
1600
1200
800
400
0
12/14/15
12/6/16
11/30/17
11/23/18
11/17/19
11/10/20
MW-3
Constituent: Chloride Analysis Run 1/7/2021 1:15 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_11.10.2020



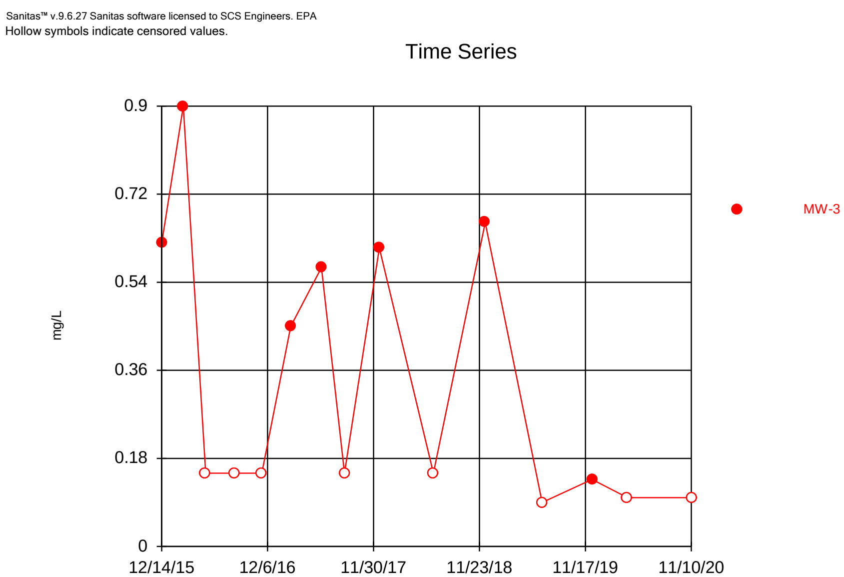
Sanitas™ v.9.6.27 Sanitas software licensed to SCS Engineers. EPA
Time Series
mg/L
2000
1600
1200
800
400
0
12/14/15
12/6/16
11/30/17
11/23/18
11/17/19
11/10/20
BW-1 (bg)
Constituent: Chloride Analysis Run 1/7/2021 1:15 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_11.10.2020



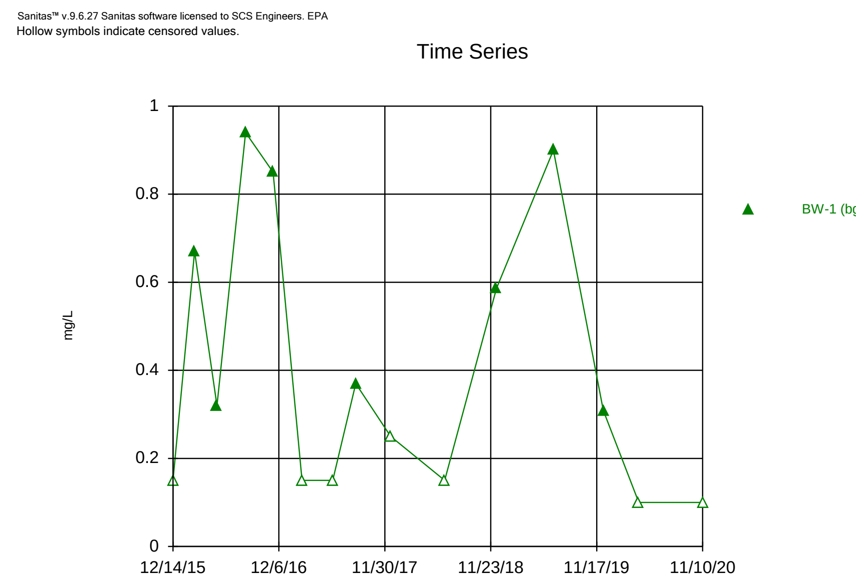
Constituent: Fluoride   Analysis Run 1/7/2021 1:15 PM
Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_11.10.2020



Constituent: Fluoride   Analysis Run 1/7/2021 1:15 PM
Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_11.10.2020



Constituent: Fluoride   Analysis Run 1/7/2021 1:15 PM
Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_11.10.2020



Constituent: Fluoride   Analysis Run 1/7/2021 1:15 PM
Sandy Creek Energy Station   Client: Sandy Creek   Data: Sandy Creek GWdata (Sanitas)_11.10.2020

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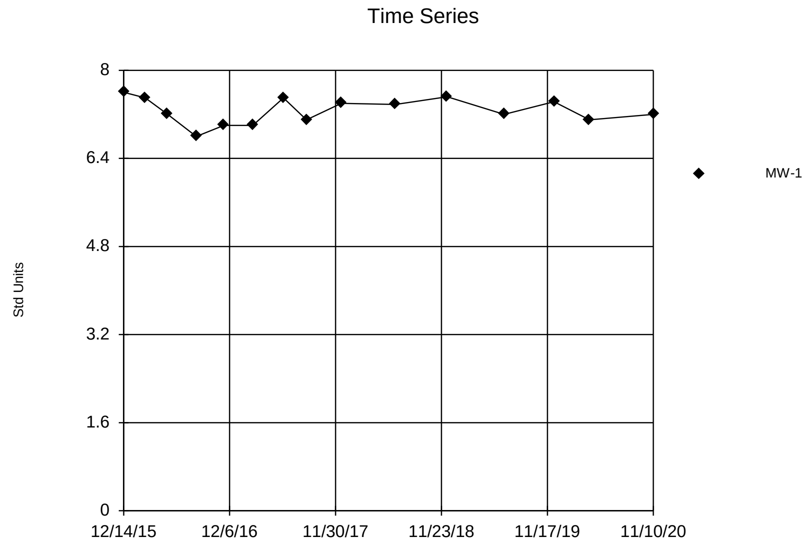
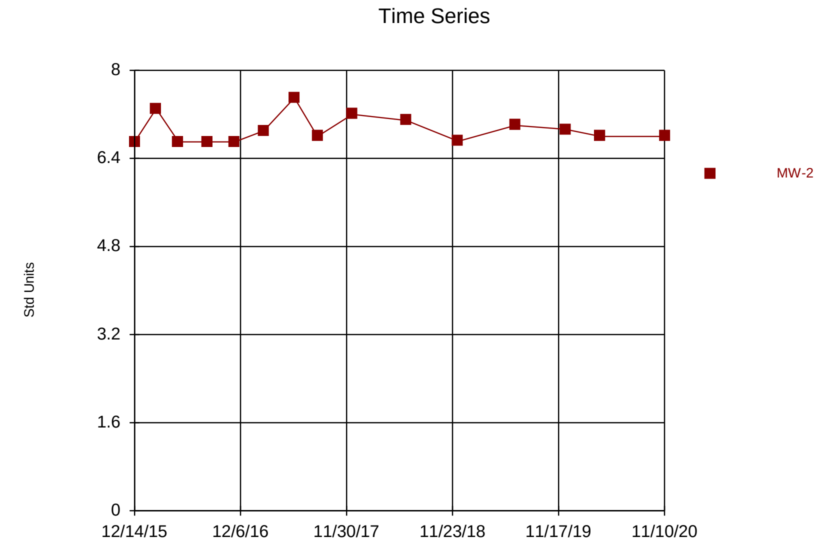


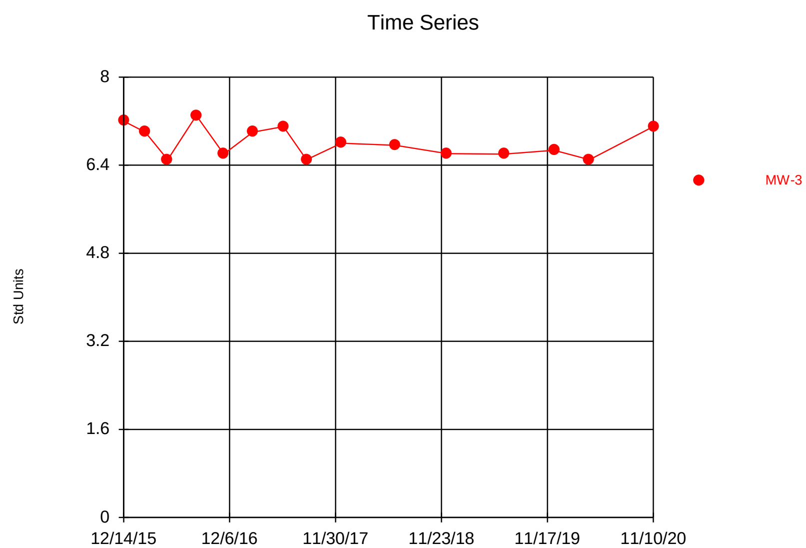
Constituent: pH Analysis Run 1/7/2021 1:15 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_11.10.2020

Sanitas™ v.9.6.27 Sanitas software licensed to SCS Engineers. EPA



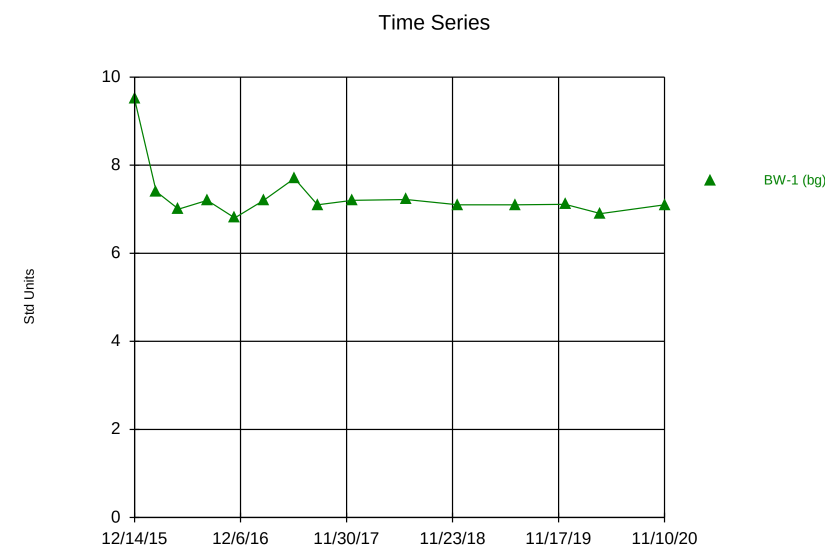
Constituent: pH Analysis Run 1/7/2021 1:15 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_11.10.2020

Sanitas™ v.9.6.27 Sanitas software licensed to SCS Engineers. EPA



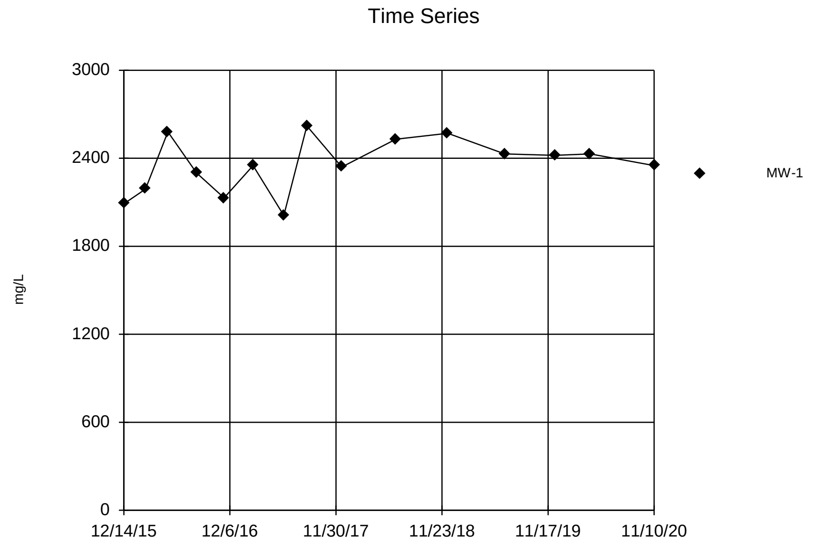
Constituent: pH Analysis Run 1/7/2021 1:15 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_11.10.2020

Sanitas™ v.9.6.27 Sanitas software licensed to SCS Engineers. EPA



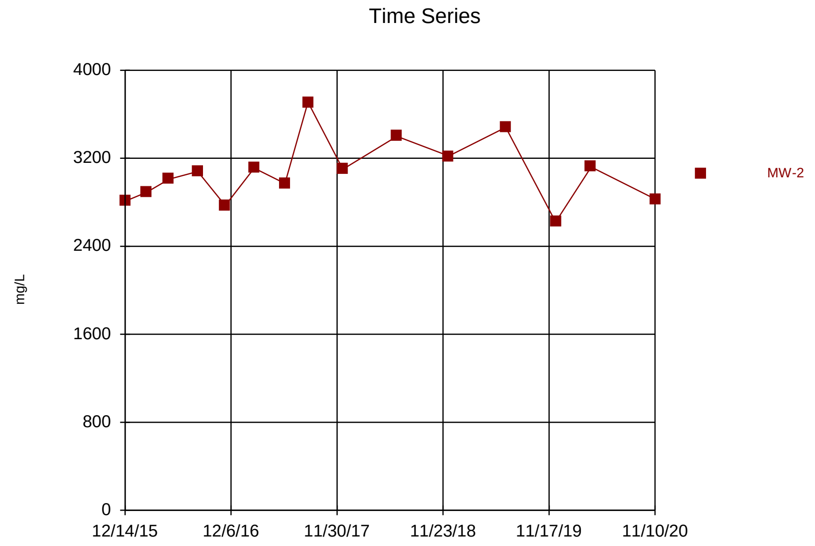
Constituent: pH Analysis Run 1/7/2021 1:15 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_11.10.2020

Sanitas™ v.9.6.27 Sanitas software licensed to SCS Engineers. EPA



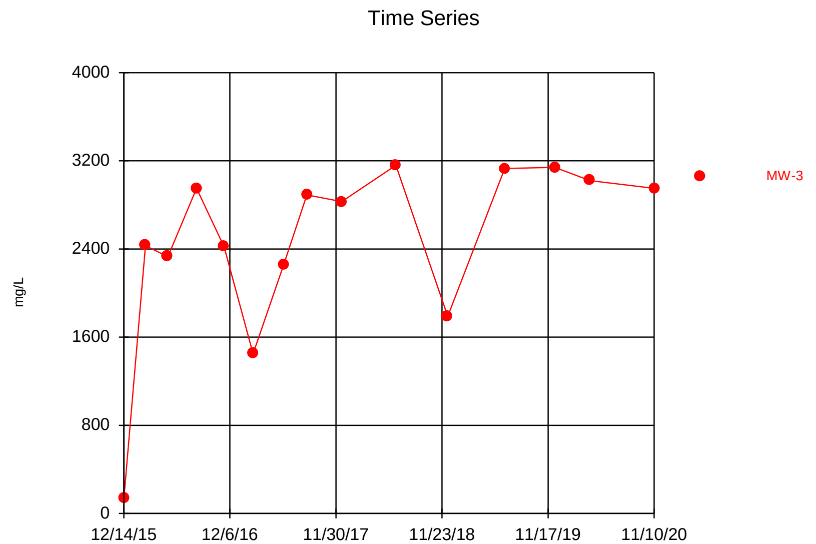
Constituent: Sulfate Analysis Run 1/7/2021 1:15 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_11.10.2020

Sanitas™ v.9.6.27 Sanitas software licensed to SCS Engineers. EPA



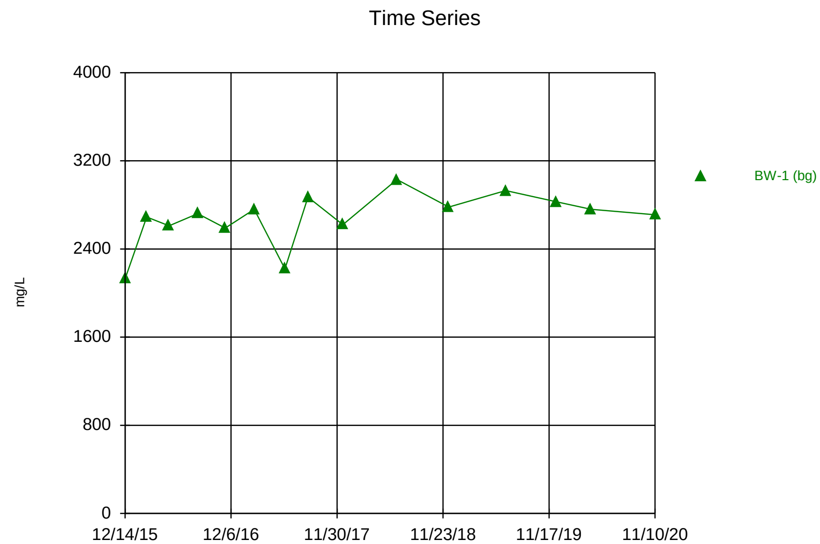
Constituent: Sulfate Analysis Run 1/7/2021 1:15 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_11.10.2020

Sanitas™ v.9.6.27 Sanitas software licensed to SCS Engineers. EPA

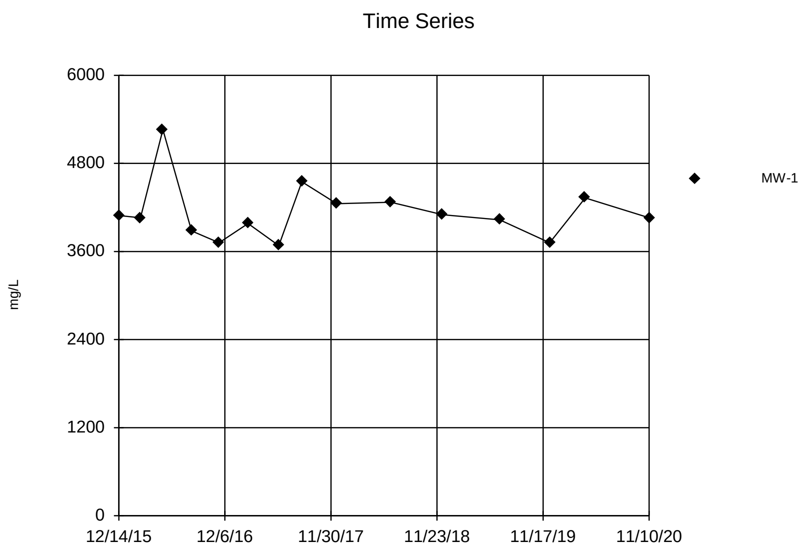


Constituent: Sulfate Analysis Run 1/7/2021 1:15 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_11.10.2020

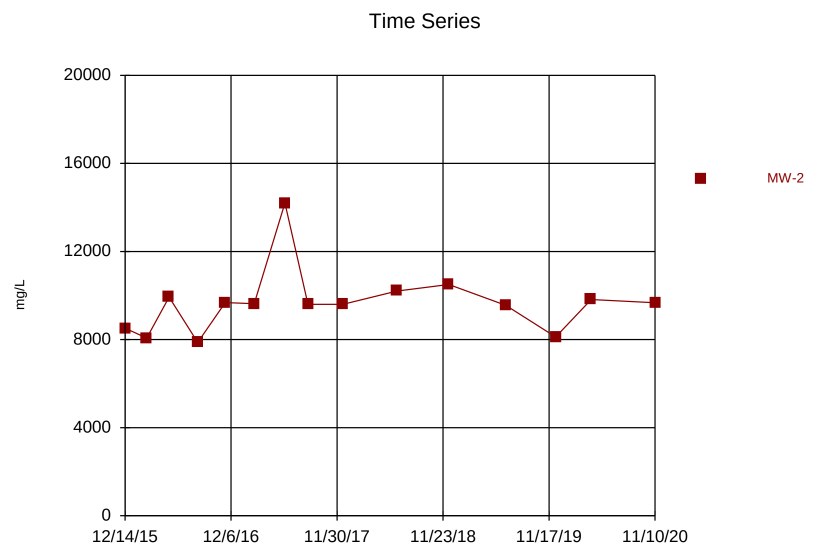
Sanitas™ v.9.6.27 Sanitas software licensed to SCS Engineers. EPA



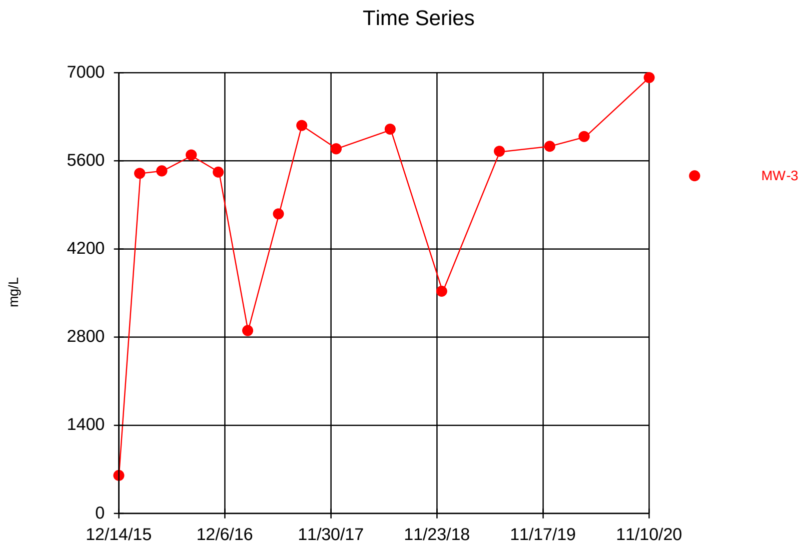
Constituent: Sulfate Analysis Run 1/7/2021 1:15 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_11.10.2020



Constituent: Total Dissolved Solids Analysis Run 1/7/2021 1:16 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_11.10.2020



Constituent: Total Dissolved Solids Analysis Run 1/7/2021 1:16 PM
Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_11.10.2020



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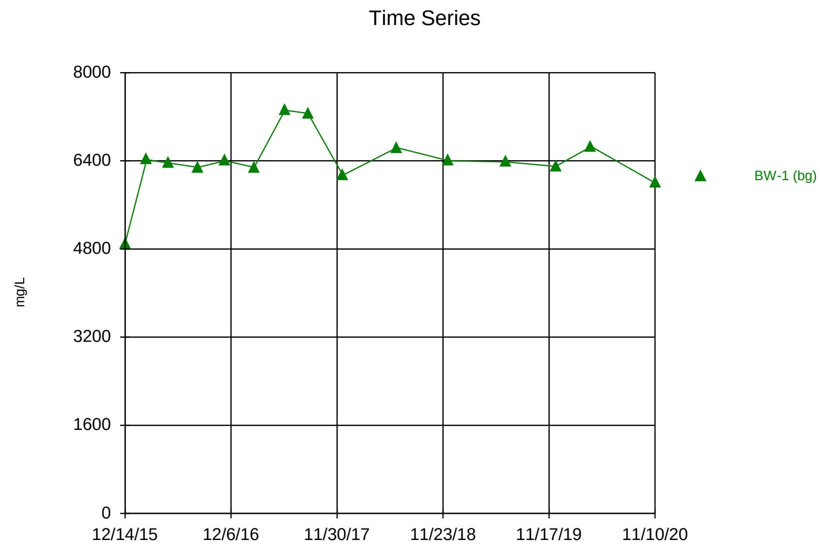

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Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)_11.10.2020

Appendix E

2020 Alternate Source Demonstrations

January 29, 2021
SCS Project 16220013.00

Mr. Darryl Sparks
Compliance Manager
NAES Corporation
2161 Rattlesnake Road
Riesel, Texas 76682

Subject: Alternate Source Demonstration for Boron and Chloride in MW-3
2020 Annual Groundwater Monitoring Report
Sandy Creek Energy Station
McLennan County, Texas

Dear Mr. Sparks:

SCS Engineers (SCS) is submitting this Alternate Source Demonstration (ASD) in accordance with the site Groundwater Sampling and Analysis Plan (GWSAP) for the Sandy Creek Energy Station (SCES) prepared by SCS, dated March 2, 2016, and Coal Combustion Residual Rule Title 40 Code of Federal Regulations (CFR) §257.94(e)(2). This ASD addresses the boron and chloride detections in groundwater monitoring well MW-3 during the November 2020 groundwater monitoring event. Boron was detected in MW-3 at 3.07 mg/L, above the statistical limit of 1.2 mg/L, and chloride was detected in MW-3 at 1160 mg/L, above the statistical limit of 606.9 mg/L. This ASD is being undertaken to demonstrate that the boron and chloride detections likely result from the natural variation in groundwater quality at the site, and are not indicative of impacts from the SCES landfill. In accordance with 40 CFR §257.94(e)(2), this ASD is being completed within 90 days of detecting an unconfirmed statistically significant increase (SSI) above background values.

Project Background

The CCR landfill is classified as an existing landfill as defined under §257.53, which was constructed and commenced operation prior to October 14, 2015. The landfill is currently comprised of two CCR disposal cells, Cells 1 and 2, which commenced receiving waste in early 2013 and October 2014, respectively. The approximate area of Cells 1 and 2 are 10.0 and 14.3 acres, respectively.

The primary wastes disposed in the landfill are dry scrubber ash and bottom ash generated during the coal combustion process at the facility. Incidental wastes generated during the operation of the facility may also be disposed in the landfill, as described in the initial registration notification to TCEQ and the most recent version of the Operations Plan for the facility.

In accordance with 40 CFR §257 Appendix III and IV, the initial list of constituents for background monitoring at SCES included 18 inorganic compounds, total dissolved solids, radium-226, and radium-228. Currently, all monitoring wells are sampled and analyzed for 40 CFR §257 Appendix III constituents, in accordance with 40 CFR §257.94(a).

Naturally Occurring Boron in Texas Soils

The Texas Commission on Environmental Quality (TCEQ) Texas-Specific Soil Background Concentration (TSBC) for boron is 30 mg/kg (equivalent mg/L) in soil (see attached TCEQ TSBC guidance). Note that the naturally-occurring median boron concentration expected in Texas soils is much greater than the concentration that is the subject of this ASD, detected in groundwater on November 10, 2020. SCS recognizes that these numbers are not directly comparable, but it is reasonable to assume the multiple-orders-of-magnitude difference can be responsible for significant fluctuations in the small concentrations detected in water moving through these sediments.

Monitoring Well #3 Data Are Consistent with General Background

Consistent with the prevalence of boron in area soils (see attached TCEQ TSBC guidance) in concentrations sufficient to account for the levels in groundwater, monitoring of boron in the SCES background well (BW-1) finds concentrations of magnitude very similar to the levels observed in MW 3. Similarly, the November 2020 chloride concentration in MW-3 is generally similar to chloride concentrations in background well BW-1.

Table 1 – Boron and Chloride Concentrations (mg/L)
Comparison Between MW-3 (D) Present Concentrations vs. BW-1 (U) Highest Concentrations

Well ID	Sample Date	Boron Concentration (mg/L)
MW-3 (D)	11/10/2020	3.07
BW-1 (U)	5/11/2016	4.0
Well ID	**Sample Date**	**Chloride Concentration (mg/L)**
MW-3 (D)	11/10/2020	1160
BW-1 (U)	6/21/2018	1200

The data compiled in Table 1 demonstrate that these concentrations are not abnormal for the site, and in fact are consistent with background concentrations.

Concentration Trends

We also note that chloride and boron concentrations would experience a sustained increase over time if the landfill was impacting site groundwater. Time-series graphs prepared as a part of the 2020 Annual Groundwater Monitoring and Corrective Action Report do not show increasing trends. We also note that Total Dissolved Solids in this sampling period are somewhat higher than historical concentrations in the MW-3. This could account for higher boron and chloride concentrations.

Groundwater Travel Distance

Attribution of the levels in MW3 to leakage from the landfill would be inconsistent with the information available about calculated groundwater flow rate. The closest upgradient waste deposit relative to MW-3 is the southwest corner of Cell 1. The distance between these two locations is approximately 1,120 feet. As reported in the 2020 Annual Groundwater Monitoring and Corrective Action Report, the calculated site groundwater flow rate is 71 ft/yr. As stated previously in the Project Background, Cell 1 has received waste for seven years, starting in early 2013. The calculated Site groundwater travel distance over this seven-year period of time is approximately 497 feet. Comparing this groundwater travel distance (497 feet) to the distance between the upgradient southwest corner of Cell 1 and downgradient well MW-3 (1,120 feet) demonstrates that there would not have been sufficient time for any assumed landfill leakage to travel from waste to MW-3.

Conclusion

The detections of boron and chloride are most likely a naturally-derived component of the site geology, which can result in a natural variation in groundwater quality. SCS recommends that the facility remain in detection monitoring, in accordance with 40 CFR §257.94, as this ASD satisfies the 90-day demonstration period requirement outlined in 40 CFR §257.94(e)(2). Please contact Jim Lawrence at (817) 358-6106 if you have comments or require additional information.

Sincerely,

STATE OF TEXAS
BRETT J. DeVRIES
128061
PROFESSIONAL ENGINEER
LICENSED

Asher Boudreaux	Brett DeVries, Ph.D., P.E.	James Lawrence, P.G.
Associate Staff Professional	Project Engineer	Project Director
SCS ENGINEERS	SCS ENGINEERS	SCS ENGINEERS
TBPE Registration No. F-3407		

Attachments: TCEQ Texas-Specific Soil Background Concentrations Guidance

STATE OF TEXAS
James Lawrence
Discipline
License #
541
LICENSED
PROFESSIONAL GEOSCIENTIST

1/29/2021

Texas-Specific Soil Background Concentrations milligrams per kilogram (mg/kg)[1]	
Metal	Median Background Concentration (mg/kg)
Aluminum	30,000
Antimony	1
Arsenic	5.9
Barium	300
Beryllium	1.5
Boron	30
Total Chromium	30
Cobalt	7
Copper	15
Fluoride	190
Iron	15,000
Lead	15
Manganese	300
Mercury	0.04
Nickel	10
Selenium	0.3
Strontium	100
Tin	0.9
Titanium	2,000
Thorium	9.3
Vanadium	50
Zinc	30

[1] Source: "Background Geochemistry of Some Rocks, Soils, Plants, and Vegetables in the Conterminous United States", by Jon J. Connor, Hansford T. Shacklette, et al., Geological Survey Professional Paper 574-F, US Geological Survey.

SANDY CREEK ENERGY STATION
COAL COMBSUTION RESIDUAL WASTE MANAGEMENT FACILITY
REGISTRATION APPLICATION
TCEQ REGISTRATION NO. -----
McLENNAN COUNTY, TEXAS

PART VII
CLOSURE AND POST-CLOSURE CARE PLAN

Prepared for:

STATE OF TEXAS
BRETT J. DeVRIES
128061
LICENSED
PROFESSIONAL ENGINEER
Brett DeVries 1/13/22

SANDY CREEK SERVICES, LLC
2161 Rattlesnake Road
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Prepared by:

SCS ENGINEERS
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817/571-2288

Revision 0 – January 2022
SCS Project No. 16221059.00

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Brett DeVries 1/13/22

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Tables

SCS Engineers
TBPE Reg. # F-3407

1 PE CERTIFICATION (40 CFR §257.102(b)(4))

I, Brett DeVries, Ph.D., P.E., hereby certify that this Closure and Post Closure Care Plan for the Sandy Creek Energy Station Coal Combustion Residual Waste Management Facility meets the requirements in 30 TAC §352.1221 [40 CFR §257.102(b)], including demonstrating that the final cover systems meet the performance standards in 40 CFR §257.102(d). This plan was prepared by or under my supervision. I am a duly licensed Professional Engineer under the laws of the State of Texas.

Brett DeVries, Ph.D., P.E.
(printed or typed name)

License number __128061____________________

My license renewal date is __9/30/2022______

2 INTRODUCTION

This Closure and Post-Closure Care Plan has been prepared for Sandy Creek Services, LLC (Owner and Operator) of the Sandy Creek Energy Station (Plant) Coal Combustion Residual (CCR) Waste Management Facility (Landfill), located in McLennan County. The Plan has been prepared consistent with Title 30 of the Texas Administrative Code (30 TAC), Chapter 352, Subchapter J, as well as the relevant provisions of Title 40 of the Code of Federal Regulations (40 CFR), Part 257, Subpart D, adopted by reference. The Landfill Completion Plan for the Landfill consists of final contours and drainage features for the completed Landfill, as presented in Drawing IV-4.

The landfill design drawings, including the Landfill Completion Plan and fill cross-sections, are provided in Part IV, related to Landfill Criteria and Design Drawings.

In accordance with §352.1321(c) and Section 4 of the Part V – Site Operating Plan (SOP), this Final Closure and Post-Closure Plan will be placed in the Site Operating Record and the Landfill's publicly accessible website following submittal to the TCEQ.

3 FINAL COVER SYSTEM

3.1 INTRODUCTION

The final cover system for the Landfill was developed to meet or exceed the requirements of 30 TAC §352.1221 (40 CFR §257.102).

These rules define the procedures and timeframes for implementing closure of the Landfill, including the installation of a final cover system (leaving the waste in-place) designed and constructed to minimize infiltration and erosion. Such a system will include installation of a multi-layer final cover system and surface water drainage system, addressed in Part IV, Appendix IV.C – Run-on and Run-off Control Plan.

3.2 FINAL COVER SYSTEM DESIGN

As depicted on Drawing IV-10 (Part IV), two separate multi-layer final cover systems will be used at the Landfill to provide a low maintenance cover and reduce rainfall percolation through the final cover system, thereby minimizing leachate generation within the Landfill. As depicted on Drawing IV-4, a 3 percent topslope and 3.5(H):1(V) sideslopes are provided to minimize erosion and facilitate drainage of the Landfill.

The final cover systems are designed consistent with §257.102(d)(3) and areas receiving final cover are depicted on Drawing IV-4. A soil-only final cover system will be constructed overlying Cells 1 and 2, which consist of soil-only (Cell 1) and soil-geocomposite (Cell 2) liner systems, as described in Part IV, Appendix IV.A – Leachate Collection and Removal System Plan. A composite final cover system will be constructed over Cell 3, which consist of a composite liner system, as described in Part IV, Appendix IV.A. At the discretion of the Landfill Owner/Operator, a composite final cover may be installed over Cells 1 and/or 2.

Beginning from the surface and working down, the final cover systems will be comprised of the following components:

- Soil-only final cover (overlying Cell 1 and 2):
    - Vegetation (native and/or introduced vegetation);
    - 18-inch-thick vegetative erosion layer, with the upper 6 inches capable of sustaining vegetation; and
    - 18-inch-thick clayey soil infiltration layer ($k \leq 1x10^{-7}$ cm/sec).
- Composite final cover (overlying Cell 3):
    - Vegetation (native and/or introduced vegetation);
    - 18-inch-thick vegetative erosion layer, with the upper 6 inches capable of sustaining vegetation;

- Geocomposite (double-sided);
- 60-mil high-density polyethylene (HDPE) geomembrane, or 40-mil linear low density polyethylene (LLDPE) geomembrane (textured both sides on the sideslopes); and
- 18-inch-thick clayey soil infiltration layer (k $\leq$ 1x10^{-5} cm/sec).

Appropriate field survey controls will be implemented to control the final lift of waste as well as the successive soil layers of the final cover system (see Part V - SOP, Section 2.6.2). If the Landfill has in-place intermediate cover at the time of final cover construction, the top 6 inches of intermediate cover may be incorporated into the 18-inch infiltration layer provided the in-place soil meets the requirements of the infiltration layer, as defined in Section 3.3.1.2. The infiltration layer will be a clayey soil, placed and compacted under controlled moisture-density conditions with appropriate compaction equipment. A geomembrane liner (40-mil LLDPE or 60-mil HDPE) will be placed over the infiltration layer (composite final cover only). The erosion layer will be placed directly over the infiltration layer (soil-only final cover) or drainage geocomposite (composite final cover) for final cover areas. The surface of the erosion layer will be seeded or sodded immediately following placement of the final cover to establish a vegetative cover and minimize erosion. Vegetation will be established such that sufficient coverage of native and introduced vegetation is achieved.

3.3 FINAL COVER QUALITY CONTROL PLAN

Testing and evaluation of the final cover system materials and components prior to construction and during construction will be performed under the supervision of a geotechnical professional (GP), as defined in Part IV, Appendix IV.B – Liner Construction Quality Assurance (CQA) Plan, Section 1.2. Additionally, a qualified CQA Monitor will perform construction quality assurance and quality control (CQA/CQC) observation and testing under the direct supervision of the GP. A Final Cover System Evaluation Report (FCSER) will be developed and placed in the Site Operating Record in accordance with Section 3.4. The following subsections describe the CQA/CQC testing methods, frequencies, and material specifications that will be required for the 18-inch infiltration layer, geomembrane (if applicable), geocomposite (if applicable), and 18-inch erosion layer. Unless specifically stated, the subsections below describe CQA/CQC procedures for the soil-only and composite final covers.

3.3.1 Infiltration Layer Testing

3.3.1.1 Pre-Construction Testing

Prior to construction, pre-construction testing will be performed for the soil materials that are selected for the infiltration layer. The soil materials used in the final cover will be obtained from in-situ soil strata, which will be stockpiled during excavation of Landfill disposal areas or other onsite borrow source(s). Representative samples from all sources will be subject to the minimum pre-construction testing schedule per Table 3-1.

Soil types on the property are predominantly clay. A soil classification will be used as a guide for identifying soils with the minimum material specifications. Typically, clays and silts (i.e., CH, CL, M) are ideal for construction of the infiltration layer; however, these soils are not required provided the recompacted soil samples comply with the following minimum material specifications: Plasticity Index (PI) ≥ 15; liquid limit (LL) ≥ 30; percent passing No. 200 sieve ≥ 30; particle size ≤ 1 inch; and hydraulic conductivity (k) ≤ 1 × 10^{-7} cm/sec.

Table 3-1 Infiltration Layer Soil Material Pre-Construction Testing Schedule

TEST	METHOD USED	FREQUENCY
Soil Classifications: USCS	ASTM D2487	1 per soil type / minimum 1 per borrow source
Particle-Size Sieve Analysis	ASTM D422 or D1140	
Atterberg Limits	ASTM D4318	
Moisture/Density Relationship (Moisture Content)	ASTM D698	
Hydraulic Conductivity (1)	ASTM D5084 (2)(3)	1 per Moisture-Density Relationship

1. Field testing of permeability (in accordance with ASTM D5093) is optional, and may be replaced by laboratory testing.
2. Testing procedures in Appendix VII of the Corps of Engineers Manual EM 1110-2-1906, November 30, 1970, Laboratory Soils Testing, may be used as an alternative method.
3. Permeability tests will be conducted with tap water or 0.05N solution of CaSO4. Distilled water will not be allowed.

3.3.1.2 Construction Testing

Construction quality assurance for the infiltration layer will consist of both laboratory and field testing, as specified in Table 3-2. Quality assurance laboratory testing (sieve analysis, Atterberg limits, and hydraulic conductivity) will be conducted on representative samples of the constructed infiltration layer. The following tests will be performed to verify that the infiltration layer complies with the specification provided herein.

Table 3-2 Infiltration Layer Construction Testing Schedule

TEST	METHOD	MINIMUM FREQUENCY
Field Moisture/Density Test	ASTM D1556, D2167, or D6938	1 per 16,000 ft^2 per 6-inch lift (1)
Sieve Analysis	ASTM D422 or D1140	1 per 200,000 ft^2 per 6-inch lift (2)
Atterberg Limits	ASTM D4318	
Hydraulic Conductivity (3) (4)	ASTM D5084 or CoE EM 1110-2-1906	1 per 200,000 ft^2 per 6-inch lift
Thickness	Survey	1 per 10,000 ft^2 (5)

1. A minimum of three tests must be conducted for each 6-inch lift, regardless of cover area.
2. A minimum of one test must be conducted for each lift, regardless of cover area.
3. Testing will be conducted on undisturbed samples.
4. Permeability tests will be run using tap water or a 0.05N solution of $CaSO_4$. Distilled water will not be allowed.
5. A minimum of two reference points are required.

The GP will verify passing permeability test results (i.e., $k < 1x10^{-7}$ cm/s), conducted at a frequency of no less than one test per surface acre of final cover. All laboratory permeability tests conducted will be uniformly distributed over the area. The infiltration layer will be placed and compacted in 6-inch lifts. At a minimum, the infiltration layer will be compacted to 95 percent of the maximum dry density and moisture content of 0 to +4% above optimum, as determined by ASTM D698.

Failing quality assurance tests on the constructed infiltration layer will be addressed consistent with Part IV, Appendix IV.B – Liner Construction Quality Control (CQA) Plan, Section 3.5, related to Procedures for Addressing Failing Tests. The results of both passing and failing tests will be recorded and documented within the FCSER.

Any penetrations required for obtaining laboratory samples will be repaired by backfilling the hole with bentonite chips or 50/50 powdered/granulated bentonite/soil/sand mixture hand-tamped into place. If the penetration is in the upper lift of soil, the upper 2 inches will be backfilled with clayey soil, which will be hand-tamped sufficiently to blend the backfill into the adjacent soil lift.

The lift thicknesses of the infiltration layer will be verified by settlement plates or surveying methods. The verification points, for record purposes, will be on grid such that there exists a minimum of one verification point per 10,000 square feet. A minimum of 2 reference points are required for verification. The selected grid will be the same for both beginning and finished elevations of the infiltration layer, so that minimum thickness can be calculated and verified. All elevation calculations necessary for thickness determination will be included as part of the supporting documentation in the FCSER.

3.3.2 Geomembrane Testing

3.3.2.1 Manufacturer Quality Control Testing

A geomembrane (40-mil LLDPE or 60-mil HDPE) will be installed in the composite final cover over the completed infiltration layer. Prior to the installation of the geomembrane in the composite final cover system, the manufacturer or installer will provide the GP with quality control certificates signed by a responsible party employed by the manufacturer. Each quality control certificate will include roll identification numbers, testing procedures, and results of quality control tests. The quality control tests will be performed in accordance with project-specific testing methods and subject to one test per 100,000 square feet of material or a minimum of one test per resin lot, whichever is greater.

All geomembrane properties must meet the minimum values set forth in the most recent version of Geosynthetic Research Institute (GRI) standard GM-13 for 60-mil HDPE, or GM-17 for LLDPE. The GP will review the test results prior to acceptance of the geomembrane to assure that the certified minimum properties meet specified values.

3.3.2.2 Conformance Testing

Conformance testing shall be performed by a third-party independent laboratory. Conformance testing methods and frequencies will be performed in accordance with Table 3-3.

Table 3-3 Geomembrane Conformance Testing

TEST	METHOD	MINIMUM FREQUENCY
Thickness (laboratory)	ASTM D5994	1 per 100,000 ft^2 and every resin lot
Density	ASTM D1505 or D792	
Carbon black content	ASTM D1603	
Carbon black dispersion	ASTM D5596	
Tensile properties (1)	ASTM D638, Type IV	

1. 2-inch initial gauge length assumed for elongation at break at 2.0 in/min.

3.3.3 Installation Monitoring and Testing

Upon delivery of geosynthetic material, the CQA Monitor will observe that the materials are handled and stored in accordance with manufacturer's recommendations.

Field seaming of the geomembrane will be performed in strict accordance with methods approved by the manufacturer. This usually includes fusion welding or extrusion welding. Tack welds (if used) will use heat only. No double-sided tape, glue, or other method will be permitted when extrusion or fusion welding is used for bonding.

Each day prior to commencing field seaming, trial seams will be made on pieces of geomembrane material to verify that conditions are adequate for production seaming. Each trial test seam will be at least 3 feet long by 1-foot wide. Four adjoining one-inch wide specimens will be die-cut from the test seam sample. Two specimens will be tested in the field for shear and two for peel.

The failure criteria are the same as that for destructive seam testing as described below. The test specimens must exhibit a Film Tear Bond (FTB). If one test seam fails, the trial seam will be repeated. If this trial seam fails, then 2 more trial seams must be constructed and tested. This process must continue and no welding can begin for the machine or welder until all test seams are passing. Additional trial seams will be made for all of the following:

- At the beginning of each seaming period for each seaming apparatus used that day (the beginning of each seaming period is considered to be morning, and immediately after a break);
- Each occurrence of significantly different environmental conditions (i.e., temperature, humidity, dust, etc.);
- Any time the machine is turned off for more than 30 minutes.

Both the welder and the machine must be tested for extrusion welding. Only the machine needs to be tested according to the above schedule for fusion welding. Each individual seamer will make at least one test seam each day he/she actually performs seaming.

3.3.4 Non-Destructive Testing

Continuous, non-destructive testing will be performed on all seams by the installer. Air pressure testing on dual-track fusion welds and vacuum-box testing for extrusion welds are the only acceptable methods. Leaks must be isolated and repaired by the following procedures:

1. Air-Pressure Testing (GRI GM6) - The ends of the air channel of the dual-track fusion weld must be sealed and pressured to approximately 30 psi, if possible. The air pump must then be shut off and the air pressure observed after five (5) minutes. A loss of less than 4 psi is acceptable if it is determined that the air channel is not blocked between the sealed ends. A loss of 4 psi or more indicates the presence of a seam leak that must then be isolated and repaired by following the procedures described under "Seam Failure Repairs and Retesting." The GP or his/her qualified representatives must observe and record all pressure gauge readings.
2. Vacuum-Box Testing (ASTM D4437) - A suction value of approximately 3 to 5 inches of gauge vacuum must be applied to all extrusion welded seams that can be tested in this manner. Examples of extrusion welded seams that do not easily lend themselves to vacuum testing would be around boots, appurtenances, etc. The seam must be observed for leaks at least ten seconds while subjected to this vacuum. The GP or his/her qualified representative must observe 100 percent of this testing.

3.3.5 Destructive Seam Testing

Destructive seam testing will be performed in accordance with ASTM D6392. Destructive samples will be taken at a minimum of one strategic location for every 1,000 linear feet of seaming or major fraction thereof. The total footage of individual repairs of leaks of more than 10 feet in seaming length and individual repairs of more than 10 feet in seaming length for failed seams must also be counted and destructively tested using the same frequency of testing described above. At a minimum, a destructive test must be done for each welding machine used for seaming or repairs. A sufficient amount of the seam must be removed in order to conduct field testing, independent laboratory testing, and archiving of enough material in order to retest the seam, if necessary. Field testing will include at least 2 peel test specimens. Destructive seam-testing locations will be cap-stripped and the cap completely seamed by extrusion welding to the geomembrane. Capped sections will be non-destructively tested. Additional destructive test samples may be taken if deemed necessary by the GP or his/her qualified representative.

All field-tested specimens from a destructive-test location must be passing in both shear and peel for the seam to be considered as passing. Field tested specimens, are determined as passing if the specimen tested in peel fails in FTB and all test specimens meet the criteria listed in the Table 3-4 The independent laboratory testing must confirm these field results. The minimum passing criteria for independent laboratory testing are all three of the following:

- Five of five specimens tested in the peel mode must fail in FTB.
- Five of five specimens from each peel and shear determination must meet the minimum specified value in Table 3-4.
- All five specimens from each peel and shear determination must should meet the minimum percent elongation at break value in Table 3-4.

The above criteria apply to both tracks from each dual-track fusion welded seam before it is considered as passing. It should be noted that geomembrane manufacturers may have differing values for their geomembrane sheets and therefore, the specific values are not meant to be minimum or maximum values as construction materials and specifications may vary between manufacturers and throughout the life of the site. Consequently, the manufacturer's sheet-strength values must be provided in order to determine if the test results are passing.

Table 3-4 Geomembrane Seam Strength

Property	Qualifier	Unit	Specified Value		Test
			60-mil HDPE	40-mil LLDPE	
Shear Strength	Min.	lb/in	120	60	ASTM D6392
Shear Elongation at Break	Min.	%	50	50	
Peel Strength:					ASTM D6392
Fusion	Min	lb/in	91	50	
Extrusion	Min.	lb/in	78	44	

3.3.6 Seam Failure Delineation

In the event failing tests are obtained at a destructive test location, new destructive test samples will be obtained, a minimum of 10 feet in either direction of the failing test. If one, but not both, of the additional tests fail, further additional destructive testing will be required until passing tests are obtained at both ends of the original destructive test location. A cap will be required for the areas subject to destructive testing, and testing of the cap will be placed in accordance with Section 3.3.7. If more than two failing destructive test locations are observed for a single seam, the CQA Monitor will have the alternative of requiring the entire seam be removed, and a new seam welded.

In the event more than one failing destructive test are observed for a single welding apparatus, new (passing) trial welds will be required prior to resuming geomembrane welding or seaming with the apparatus.

3.3.7 Seam Failure Repairs and Retesting

Any portion of the geomembrane with a detected flaw, or which fails a nondestructive or destructive test, or where destructive tests were cut, or where nondestructive tests left cuts or holes, must be repaired. The CQA Monitor will locate and record all repairs on the repair log. Repair techniques include the following:

- Patching - used to repair holes, tears, large panel defects, undispersed raw materials, contamination by foreign matter, and destructive sample locations.

- Extrusion - used to repair small defects in the panels and seams. In general, this procedure should be used for defects less than 3/8-inch in the largest dimension.

- Capping - used to repair failed welds or to cover seams where welds or bonded sections cannot be nondestructively tested.

- Removal - used to replace areas with large defects where the preceding methods are not appropriate. Also used to remove excess material (wrinkles, fishmouths, intersections, etc.) from the installed geomembrane. Areas of removal shall be patched or capped.

For any repair method, the following provisions will be satisfied:

- Surfaces of the geomembrane which are to be repaired using extrusion methods will be ground no more than one hour prior to the repair;

- All surface will be clean and dry at the time of repair;

- Patches or caps will extend at least 6 inches beyond the edge of the defect, and all corners of patches will be rounded with a radius of approximately 3 inches or more;

- All repairs will be nondestructively tested as previously described; and

- All seaming equipment, personnel, and operation procedures used in repair work will meet the same requirements as for new seaming operations.

The GP or his/her qualified representative will observe all destructive and non-destructive testing of repairs and will record the number of each repair, type, date and test outcome. Repairs that pass the non-destructive tests will be taken as an indication of an adequate repair. Repairs more than 150 feet long will also be required to have a destructive test performed. Repairs that fail the initial retest will be redone and retested until a passing test results. All work and testing of repairs will be fully documented in a repair log.

3.3.8 Wrinkles

During placement of cover materials over the geomembrane, temperature changes or creep can cause wrinkles to develop in the geomembrane. Wrinkles which can fold over must be repaired either by cutting out the excess material or, if possible, by allowing the liner to contract by temperature reduction. In no case can material be placed over the geomembrane which could result in the membrane folding. The CQA Monitor must monitor the geomembrane for wrinkles and notify the Contractor if wrinkles are being covered by soil. The CQA Monitor is then responsible for documenting corrective action to remove the wrinkles.

3.3.9 Folded Material

All folded geomembrane must be removed. Remnant folds evident after deployment of the roll which are due to manufacturing process are acceptable.

3.3.10 Bridging or Induced Tension

Bridging or Induced Tension: Bridging is defined as areas where the geomembrane is not in contact with the subgrade due to a void in the subgrade or the sheet is pulled in tension so as to span over depressions in the subgrade. Areas likely to promote bridging, i.e. trenches, toe of slopes, etc., shall be loaded with sandbags after deployment and after seaming. Induced tension is stress introduced into the geomembrane during installation or covering. These areas will likely result in bridging. Areas with excessive bridging shall be identified and repaired by either of the following methods:

1. The geomembrane shall be cut by the Contractor, so the tension is relieved and the geomembrane conforms to the subgrade contours. The cut geomembrane shall be repaired and tested according to the Contract Documents regarding repairs and testing.

2. The geomembrane shall be cut by the Contractor, and subgrade material shall be added and placed, in accordance with the contract specifications, so as bring the geomembrane in contact with the subgrade. The cut geomembrane shall be repaired and tested according to the Contract Documents regarding repairs and testing.

3.3.11 Anchor Trench

An anchor trench will be constructed on the topdeck of the Landfill where the leading edge(s) of the geomembrane will not be needed for future tie-in for expansion into the next final cover area. The anchor trench backfill material will be placed as outlined in the technical specifications. Care will be taken when backfilling and compaction to prevent damage to the underlying geomembrane. Slightly rounded corners will be provided in anchor trenches where the geomembrane enters the trench as to avoid sharp bends in the geomembrane.

The geomembrane anchor trench will be left open until seaming is completed. Expansion and contraction of the geomembrane should be accounted for in the final cover placement. The anchor trench will be filled in the morning when temperatures are coolest to reduce bridging of the geomembrane.

The anchor trench backfill material will be placed in uniform lifts compacted to at least 90 percent of standard Proctor (ASTM D 698) density at a moisture content ranging from -2 to +4 percent of optimum. Compaction density and moisture of the anchor trench backfill will be visually verified by the CQA Monitor. Specific density and moisture testing of in-place anchor trench backfill will be at the discretion of the CQA Monitor.

3.3.12 Geocomposite and Erosion Layer Testing

When placing overlying material on the geomembrane in the composite final cover, every effort must be made to minimize wrinkle development and stress imparted to the geomembrane, as described in Section 3.3.8. If possible, cover should be placed during the coolest weather available. Small wrinkles should be isolated and covered as quickly as possible to prevent their growth. In no case will the geomembrane be allowed to fold over on itself.

3.3.12.1 Geocomposite

A double-sided geocomposite will be installed over the geomembrane in the composite final cover system only. The geocomposite will conform to the material and performance properties specified by the GP, consistent with project construction plans and technical specifications. The geocomposite transmissivity shall meet or exceed a transmissivity of $3.7x10^{-4}$ m^2/sec at a gradients of 0.28 (see Part IV, Appendix IV.A, Attachment IV.A1 – Leachate Generation Model Narrative) and the non-woven geotextile heat-bonded to the geonet shall comply with the minimum material properties presented in the calculations provided in Part IV, Appendix IV.A, Attachment IV.A2. The drainage geocomposite manufacturer (or supplier), will conduct the tests methods presented in Table 3-5 and certify that all materials delivered comply with project specifications. The material certifications shall be reviewed by the GP and approved for the project prior to acceptance of any of the material.

Table 3-5 Manufacturer's Testing Schedule for Geocomposite

PRODUCT	TEST	METHOD	MINIMUM FREQUENCY
Resin	Density	ASTM D1505 or D792	1 per batch and every resin lot
	Melt Flow Index	ASTM D1238	
Geonet	Density	ASTM D1505 or D792	1 per 100,000 ft^2 and every resin lot
	Mass/Area	ASTM D1603	
	Thickness	ASTM D5199	
Geotextile	Mass/Area	ASTM D5261	1 per 100,000 ft^2 and every resin lot
	Grab Tensile Strength	ASTM D4632	
	Trapezoidal Tear Strength	ASTM D4533	
	Apparent Opening Size	ASTM D4751	
	Permittivity	ASTM D4491	
Geocomposite	Transmissivity	ASTM D4716	One test per product type

Installation of the geocomposite will be conducted in accordance with Section 5.4 of Part IV, Appendix IV.B, specifically related to surface preparation, placement, and repairs.

3.3.12.2 Erosion Layer

The erosion layer will consist of a 18-inch-thick soil layer, with the top 6 inches capable of sustaining vegetation in accordance with §257.102(d)(3)(i)(c). The required thickness of the layer will be verified by settlement plates or survey methods on an established grid system with not less than one verification point per 10,000 square feet of surface area. A minimum of two verification points are required. The selected grid will be the same for both beginning and finished elevations of the erosion layer, so that minimum thickness can be calculated and verified. All elevation calculations necessary for thickness determination will be included as part of the supporting documentation in the FCSER.

The erosion layer does not require compaction control; however, it should be stable for construction traffic. When applicable, the erosion layer will be deployed in "fingers" along the geomembrane or geocomposite to control the amount of slack and minimize wrinkles and/or folds. Soil cover will generally be placed in an up-slope direction on sideslopes so that stress imparted to the geocomposite and geomembrane (if applicable) is minimized. Care will be exercised in placement of the erosion layer so as not to shift, wrinkle or damage any underlying geosynthetic layers, and the placement methods will be documented.

3.4 FINAL COVER SYSTEM EVALUATION REPORT

Upon completion of each area of final cover construction and evaluation, the GP will prepare a FCSER, prepared in accordance with this Plan. This report will be placed in the Site Operating Record for the life of the site.

Each FCSER will include a discussion of the construction of the final cover elements, a cover placement map which shows the covered area that was constructed and areas covered by all previous FCSERs with the dates of placing in the Site Operating Record. The map will depict a grid system, graphic scale, and north arrow. The FCSER will be signed and sealed by the GP performing the evaluation and a Responsible Official for the Plant.

The report will contain a narrative describing the work performed and the testing procedures performed prior to and during construction, record drawings, and results of field and laboratory testing. The FCSER will include the following:

- All field and laboratory test documentation for infiltration layer soils, including test and sample locations plotted on plan view drawings representing each 6 inch lift;
- Geomembrane manufacturer's certifications (for the composite final cover only), documentation of all manufacturer's and independent testing, geomembrane seaming and repair logs, seam testing results, and a site map showing locations of panels, repairs, and tests;
- Geocomposite manufacturer's certification and testing documentation (for the composite final cover only); and
- Survey or other documentation for the thickness of the infiltration layer and erosion layer.

4 CLOSURE PROCEDURES

4.1 SEQUENCE OF FINAL COVER PLACEMENT

Final cover will be placed throughout the active life of the Landfill. Therefore, the sequence of final cover placement will ultimately be governed by having a sufficient area or number of cells or subcells constructed to allow the Landfill Owner/Operator to construct the aerial fill portion of the Landfill up to the design final grades. The largest area requiring final cover at any time during the Landfill's active life is described in Section 4.2.1. The final cover placement procedures listed below will be followed until all areas have been closed.

- Survey controls will be implemented during waste placement to control the filling of waste to the bottom of intermediate cover layer elevations.

- No later than the date of closure initiation, a notice of intent to close the Landfill or portion thereof will be prepared, submitted to the TCEQ, and placed in the Site Operating Record. The notification will include a certification by a qualified professional engineer that the design of the final cover system meets the requirements of §257.102(d)(3).

- The final cover system layers will be constructed at the appropriate time following placement of the final lift of waste. Installation and testing of the various components of the final cover system will be performed in accordance with Section 3.3 of this Plan.

- A FCSER will be prepared by an independent registered professional engineer, as described in Section 3.4, which will include a closure completion certification. This FCSER will be submitted for TCEQ approval, certifying that the final cover has been constructed in accordance with this Plan and requirements of §257.102(d).

- The FCSER, including closure completion certification, will be placed in the Site Operating Record, and the notification placed on the Landfill's publicly accessible website in accordance with Section 4 of the SOP, and the inspection checklist will be updated to reflect final cover placement.

- Prior to closure completion certification approval by the TCEQ, a financial assurance mechanism must be in place consistent with §352.1101(b).

- Following final closure of the Landfill, the following will be completed:

  - Equipment that has come in contact with CCR during active operations or closure activities will be cleaned prior to demobilizing the equipment from the Landfill or placing it into service for post-closure activities.

  - A notation will be recorded on the deed indicating that: (i) the property has been used for CCR disposal; and (ii) the use of the property is restricted under the post-closure care requirements of §257.104(d)(1)(iii). A notification stating that the notation has been recorded in the McLennan County Deed Records will be placed in the Site Operating Record and submitted to the TCEQ.

Note, the placement of final cover does not represent closure of a portion of the Landfill. Requirements for final closure of the Landfill are discussed in Section 5 of this Plan. In addition, post-closure care activities will not begin until the entire Landfill has been closed as discussed in Section 4.

4.2 CLOSURE DURING ACTIVE LIFE

As described above, the final cover will be constructed as fill areas achieve the design final contours. Should closure of the Landfill become necessary at any time during the active life of the Landfill, the following steps will be taken:

- Engineering plans will be developed to address site closure at the time of discontinued waste filling.
- The final waste received will be placed and properly compacted.
- Excavations (if any) will be graded to drain to the elevations shown in the closure engineering plans, and the site will be graded to promote runoff and prevent ponding.
- Consistent with the closure engineering plans, sections of the Landfill that are above-grade will be regraded and reshaped, as needed, to provide the proper slope for positive drainage, consistent with closure engineering plans.
- The final cover system will be constructed in accordance with this Plan and closure engineering plans.
- Following application of final cover, the Landfill will be seeded or sodded with appropriate vegetation to minimize erosion.
- Consistent with the closure engineering plans and with Part IV, Appendix IV.C – Run-on and Run-off Control Plan, remaining unconstructed portions of the surface water drainage system will be constructed to minimize erosion.
- A closure certification will be prepared by an independent registered professional engineer and a notification submitted to TCEQ as stated in Section 5 of this Plan.
- All proper notices and documentation will be filed with the appropriate agencies.

4.2.1 Estimate of Maximum Inventory of Waste Ever On Site

Consistent with §257.102(b)(1)(iv), the estimate of maximum inventory of waste (defined as waste and intermediate cover) ever on site over the active life of the Landfill is 19,986,382 cubic yards (based upon volumes computed within Cells 1 through 3 from bottom of liner and top of final grade elevations, less liner and final cover thicknesses).

4.2.2 Estimate of Largest Area Ever Requiring Final Cover

In accordance with §257.102(b)(1)(v), the largest area ever requiring final cover at any time during the Landfill's active life is estimated to be approximately 34.0 acres. The estimated largest area requiring final cover includes the cells that were constructed prior to or during the time of preparing this Registration Application, including Cells 1 and 2 and a portion of Cell 3 (inclusive of Subcells 3A through 3D). If the Landfill is expanded in the future (e.g., Subcell 3E constructed), then this Plan will be amended consistent with Section 10.

In addition, the entire 149.3 acres within the Landfill Registration Boundary will also be administratively closed.

5 CLOSURE SCHEDULE

5.1 FINAL CLOSURE REQUIREMENTS

The Landfill will be closed in an orderly fashion, consistent with §352.1221 (§257.102 and §257.104), while implementing the following steps:

- No later than the date of closure initiation, a notice of intent to close the Landfill or portion thereof will be prepared, submitted to the TCEQ, and placed in the Site Operating Record. The notification will include a certification by a qualified professional engineer that the design of the final cover system meets the requirements of §257.102(d)(3).

- Final closure activities will commence at the Landfill no later than 30 days after the date the Landfill receives the known final receipt of wastes, in accordance with §257.102(e)(1). If there is a reasonable likelihood that the Landfill will receive additional waste in the foreseeable future, final closure activities will commence no later than two years after the most recent receipt of wastes.

- Final closure activities of the Landfill will be completed in accordance with this Plan within six months of commencing closure activities, in accordance with §257.102(f)(1).

- Within 30 days of completion of final closure activities at the Landfill, a notification of closure will be submitted to the TCEQ, placed in the Site Operating Record, and placed on a publicly accessible website in accordance with Section 4 of the SOP. The inspection checklist will be updated to reflect final cover placement. In addition, a notation will be recorded on the deed indicating that: (i) the property has been used for CCR disposal; and (ii) the use of the property is restricted under the post-closure care requirements as provided by §257.104(d)(1)(iii). The notification will state that the above mentioned notation has been recorded in the McLennan County Deed Records.

5.2 PROVISIONS FOR EXTENDING CLOSURE TIMEFRAMES

Consistent with §257.102(e)(2)(ii), closure activities will commence no later than two years after the most recent receipt of wastes. Two-year time extensions to commence closure may be obtained by developing written documentation if there is a reasonable likelihood that the Landfill will receive additional waste in the foreseeable future. At a minimum, the documentation will provide information specified in §257.102(e)(2)(ii)(A) and (B). The time extension(s) will be submitted to the TCEQ, placed in the Site Operating Record, and placed on the Landfill's publicly accessible website in accordance with Section 4 of the SOP prior to the end of any two-year period.

Consistent with §257.102(f)(1), final closure activities of the Landfill will be completed in accordance with this Plan within six months of commencing closure activities. One-year time extensions for completing closure may be obtained by developing a demonstration that it is not feasible to complete closure within the required timeframe specified in §257.102(f)(1); and includes the statement specified in §257.102(f)(2)(iii), and signed by a Responsible Official for the Plant. No more than a total of two one-year extensions will be obtained for the Landfill. The time extension(s) will be submitted to the TCEQ, placed in the Site Operating Record, and placed on the Landfill's publicly accessible website in accordance with Section 4 of the SOP prior to the end of any two-year period.

6 POST-CLOSURE CARE ACTIVITIES

6.1 MONITORING AND MAINTENANCE

In accordance with §257.104, post-closure care requirements, including monitoring and maintenance, will commence upon completion of final closure requirements set forth in Sections 2 through 5 of this Plan. Post-closure care monitoring and maintenance will continue for a period of 30 years in accordance with §257.104(c)(1) unless the Landfill is operating under assessment monitoring in accordance with §257.95 at the end of the post-closure care period. Post-closure care monitoring and maintenance will consist, at a minimum, of the following requirements to be carried out by the Landfill Owner/Operator, in accordance with §257.104(b):

- Inspections of the Landfill cover, run-on and run-off drainage system, and leachate collection and removal system (LCRS) will be conducted monthly in accordance with Section 3 of the SOP. As a result of these inspections the following maintenance or remediation activities will be performed:
  - Conduct maintenance and/or remediation activities, as a result of inspections, in order to maintain the integrity and effectiveness of the final cover, site vegetation, run-on and run-off drainage system, and LCRS.
  - Maintain adequate vegetation coverage on the final cover to minimize erosion.
  - Maintain surface water run-on and run-off controls in order to minimize the erosion of the final cover system.
  - Correct the effects of settlement, subsidence, ponded water, erosion, or other events or failures determined to be detrimental to the integrity of the closed Landfill.
- Maintain and operate the LCRS in accordance with Part IV, Appendix IV.A – Leachate Collection and Removal System Plan. The Landfill Owner/Operator reserves the right to submit a demonstration to the TCEQ at the appropriate time that leachate will no longer pose a threat to human health, the environment, or property. If the demonstration is approved by the TCEQ, the Landfill Owner/Operator may be allowed to discontinue the maintenance and operation of the LCRS. Following the discontinuation of maintenance and operation of the LCRS or completion of the post-closure care period, the leachate evaporation pond will be decommissioned by disposing of the geomembrane and protective cover soil at an authorized facility. It is assumed that leachate will be evaporated in the existing leachate evaporation pond and that off-site disposal will not be required following pond decommissioning at the end of post-closure care period.
- Maintain the groundwater monitoring system in accordance with Section 3 of the SOP and monitor groundwater in accordance with§257.95 through §257.98 and Part VI, Appendix VI.A - Groundwater Sampling and Analysis Plan. In accordance with Part VI, Appendix VI.A, the minimum monitoring frequency will be semiannually. However, the Landfill Owner/Operator reserves the right to request TCEQ approval of (1) an alternative

monitoring frequency, and (2) an alternative list of parameters to be monitored. Such requests will be based on supporting data available at the time of the request.

6.2 COMPLETION OF POST-CLOSURE CARE PERIOD

In accordance with §352.1241 [§257.104(e)], no later than 60 days following the completion of the post-closure care period, a written notification by a qualified professional engineer verifying that post-closure care has been completed in accordance with this Plan and the Landfill possess no threat to human health, the environment, or property will be placed in the Site Operating Record. The notification will be submitted to the TCEQ for approval and placed on the Landfill's publically accessible website within 30 days of placing in the Site Operating Record in accordance with Section 4 of the SOP.

The post-closure period will be extended until the TCEQ approves a demonstration that the Landfill poses no threat to human health, the environment, or property. The Landfill Owner/Operator will maintain the financial assurance required in §352.1101(d) (see Part VIII) until the TCEQ post-closure care is no longer required.

7 CONTACT PERSON DURING POST-CLOSURE CARE ACTIVITIES §257.104(D)(1)(II)

In accordance with §257.104(d)(1)(ii), at the time of development of this Registration Application, the following is the contact person for the Landfill during the post-closure care period:

Name and Title:	Dana Perry, Business Manager
Address:	2161 Rattlesnake Road Riesel, Texas 76682
Telephone:	(254) 896-4218
Email:	dperry@sandycreekservices.com

If the Landfill was closed and required to start post-closure care as of the date of this Registration Application submittal, the Business Manager would be the person to contact during the post-closure period. The person responsible for conducting post-closure activities is subject to change. However, as part of the closure notification, as required by §257.102(h), the contact person will be provided in the notification.

8 POST-CLOSURE LAND USE

8.1 INTENDED USE

There are no currently planned uses for the Landfill after closure. If the closed Landfill is considered for other use(s) in the future, this Plan will be amended in accordance with §257.104(d)(3) and Section 10 of this Plan.

8.2 CONSTRAINTS OF POST-CLOSURE CONSTRUCTION

In accordance with §257.104(d)(1)(iii), the post-closure use will not disturb the integrity of the final cover, liner, or any other components of the containment system or the function of the post-closure monitoring systems unless necessary to comply with the TCEQ regulations. Disturbances to the above mentioned components are allowed, provided that a demonstration that the disturbance to the final cover, liner, or other components of the containment system, including any removal of waste, will not increase the potential threat to human health, environment, or property. The demonstration will be certified by a professional engineer in the state of Texas, will be submitted to the TCEQ, and placed on the Landfill's publically accessible website within 30 days of placing in the Site Operating Record in accordance with Section 4 of the SOP.

9 POST-CLOSURE CARE COST ESTIMATE (§352.1101(B))

A detailed written cost estimate, in current dollars (2021), for the cost of hiring a third party to conduct post-closure care activities for the Landfill, in accordance with this Closure and Post-Closure Care Plan, is provided in Part VIII – Post-Closure Care Cost Estimate and Financial Assurance Mechnism, in accordance with §352.1241. Part VIII also describes procedures for updating the post-closure cost estimate.

10 AMENDMENT OF CLOSURE AND POST-CLOSURE PLAN

In accordance with §257.102(b)(3) and §257.104(d)(3), this Closure and Post-Closure Plan may be amended at any time. Any amendment of this Plan will be submitted in accordance with 30 TAC §305.62, and requires a written certification by a qualified professional engineer that the amendment meets the requirements of §257.102(b) and/or §257.104(d).

When conditions occur that necessitate a change to this Plan, it must be amended within the following timeframes:

- At least 60 days prior to changing the operation of the Landfill in a manner that would substantially affect the activities described in this Plan;

- Within 60 days after an unanticipated event requires the need to revise the activities described in this Plan, if closure or post-closure activities have not yet been initiated for the Landfill; and

- Within 30 days after an unanticipated event requires the need to revise the activities described in this Plan, if closure or post-closure activities are underway.

The written certification will be submitted for approval to the TCEQ in accordance with §305.62, and placed on the Landfill's publically accessible website within 30 days of placing in the Site Operating Record in accordance with Section 4 of the SOP.

SANDY CREEK ENERGY STATION
COAL COMBUSTION RESIDUAL WASTE MANAGEMENT FACILITY
REGISTRATION APPLICATION
TCEQ REGISTRATION NO. -----
McLENNAN COUNTY, TEXAS

PART VIII
POST-CLOSURE CARE COST ESTIMATE AND FINANCIAL ASSURANCE

Prepared for:

STATE OF TEXAS
BRETT J. DeVRIES
128061
LICENSED
PROFESSIONAL ENGINEER
Brett DeVries 1/13/22

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Revision 0 – January 2022
SCS Project No. 16221059.00

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STATE OF TEXAS
BRETT J. DeVRIES
128061
LICENSED
PROFESSIONAL ENGINEER
Brett DeVries 1/13/22

1 INTRODUCTION

This Post-Closure Cost Estimate and Financial Assurance have been prepared for the Sandy Creek Services, LLC (Owner and Operator) of the Sandy Creek Energy Station (Plant) Coal Combustion Residual Waste Management Facility (Landfill), located in McLennan County. This plan has been prepared consistent with Title 30 of the Texas Administrative Code (30 TAC), Chapter 352, Subchapter I. The post-closure cost estimate(s) are summarized on Tables VIII.A1 and VIII.A2, and the corresponding calculations are included in Attachment VIII.A1 of this appendix.

The Landfill Owner/Operator will establish financial assurance for the cost of post-closure care in an amount no less than the amount specified in this plan for existing Cells 1, 2, and 3A through 3D in accordance with §352.1241. In accordance with §352.1101(c), the Landfill Owner/Operator will submit to the TCEQ the required documentation to demonstrate financial assurance in an amount no less than the total cost of the 30 year post-closure period for the estimated largest area ever requiring final cover. This demonstration will be made no later than 90 days following TCEQ approval of this Registration Application.

If a demonstration for ending the post-closure period cannot be made in accordance with §352.1241 at the end of the 30 year closure period, then the Landfill Owner/Operator will continue to maintain financial assurance until the TCEQ approves a demonstration that the Landfill poses no threat to human health, the environment, or property. In accordance with §352.1101(d), the Landfill Owner/Operator will prepare and submit to the TCEQ a cost estimate for the cost of continuing the post-closure care specified in Part VII – Closure and Post-Closure Care Plan no later than 180 days before the end of the preceding post-closure care period. Financial assurance for the cost of post-closure care in an amount no less than the amount for continuing the post-closure case will be submitted and approved by the TCEQ.

Consistent with §352.1101(e), the TCEQ may use or direct the use of the post-closure care funds to perform post-closure care at the Landfill when the TCEQ determines that the Landfill Owner/Operator has failed to perform the post-closure care specified in Part VII.

2 POST-CLOSURE CARE COST ESTIMATE

30 TAC §352.1101(b) states that, "The owner or operator shall prepare and include with the application for registration, a written cost estimate in current dollars of the total cost of the 30-year post-closure care period to perform post-closure care requirements as prescribed in §352.1241 of this title. The cost estimate shall be based on the costs of hiring a third-party to conduct post-closure maintenance."

As such, the following detailed post-closure cost estimate, in current dollars, is based on the cost of hiring a third party to conduct post-closure care activities for the Landfill, in accordance with Part VII. This post-closure care cost estimate accounts for the total costs of conducting post-closure care for the largest area ever requiring final cover in accordance with Section 4.2.2 of Part VII. The Landfill Owner/Operator will decrease or increase the post-closure care cost estimate and the amount of financial assurance provided that changes to the Closure and Post-Closure Plan or the Landfill conditions decrease or increase the maximum cost of post-closure care at any time during the life of the Landfill in accordance with Section 3 of this plan.

The post-closure care period has been established by the TCEQ to be 30 years. During this period, the final cover system, including the run-on and run-off systems, will be maintained in a condition consistent with their design intent. Also, the groundwater monitoring system and leachate collection and removal system will be maintained in appropriate operating condition.

The post-closure care cost estimates are based on the Closure and Post-Closure Care Plan (see Part VII) and include the cost for routine monitoring and maintenance of the final cover system, leachate collection and removal system, and groundwater monitoring system. This estimate for routine monitoring and maintenance is a cumulative cost throughout the 30-year post-closure care period. This cost estimate is based on current dollars. A summary of post-closure care costs is presented in TCEQ Form 20890, Table VIII.A1 – Post-Closure Cost Summary for Existing Registered Units and Table VIII.A2 – Post-Closure Cost Summary for Proposed Registered Units. Table VIII.A1 includes the post-closure summary for the cells that were constructed prior to or during the time of preparing this Registration Application, including Cells 1 and 2 and a portion of Cell 3 (Subcells 3A through 3D); and Table VIII.A2 includes the post-closure summary for the remaining portion of Cell 3 (i.e, unconstructed portion of Cell 3). Calculations and supporting data for the cost estimates are included in Attachment VIII.A1 - Post-Closure Care Cost Estimate Calculations. Unit rate cost estimates provided in Attachment VIII.A1 are based on data available from similar work and/or construction and monitoring projects.

Table VIII.A.1 - POST-CLOSURE COST SUMMARY FOR EXISTING REGISTERED UNITS.
EXISTING CELLS 1, 2, AND 3A THROUGH 3D
SANDY CREEK ENERGY STATION
POST-CLOSURE CARE COST SUMMARY

Description	Quantity	Unit	Unit Cost	Total Cost
1.0 ENGINEERING				
1.1 Annual Site Inspections	1	YR	$ 2,986	$ 2,986
1.2 Correctional Plans and Specifications (annual)	1	YR	$ 8,500	$ 8,500
				$ 11,486
2.0 Site Monitoring				
2.1 Groundwater Sampling and Analysis (semi-annual)	1	YR	$ 18,000	$ 18,000
2.2 Groundwater Well Plugging and Abandonment	1	YR	$ 200	$ 200
				$ 18,200
3.0 CONSTRUCTION / MAINTENANCE				
3.1 Cap and Sideslopes Repairs and Revegetation	1	YR	$ 1,700	$ 1,700
3.2 Mowing and Vegetation Management	1	YR	$ 3,400	$ 3,400
3.3 Groundwater Monitoring System Maintenance	1	YR	$ 2,500	$ 2,500
3.4 Perimeter Fence and Gates Maintenance	1	YR	$ 1,500	$ 1,500
3.5 Access Roads Maintenance	1	YR	$ 4,500	$ 4,500
3.6 Drainage System Cleanout/Repairs	1	YR	$ 3,500	$ 3,500
				$ 17,100
4.0 LEACHATE MANAGEMENT				
4.1 Leachate Management System Operation and Maintenance	1	YR	$ 5,000	$ 5,000
4.2 Decommissioning of Existing Leachate Pond	1	YR	$ 2,333	$ 2,333
4.2 Leachate Disposal	N/A	N/A	N/A	N/A
				$ 7,333
5.0 ADMINISTRATIVE				
5.1 Annual Report Preparation and Submittal to TCEQ	1	YR	$ 4,500	$ 4,500
SUBTOTAL				$ 58,619
CONTINGENCY	10%			$ 5,862
THIRD PARTY ADMINISTRATION AND PROJECT MGMT	2.5%			$ 1,465
TOTAL ANNUAL POST-CLOSURE CARE COST				**$ 65,946**
30 YEAR POST-CLOSURE CARE COST				**$ 1,978,380**

Table VIII.A.2 - POST-CLOSURE COST SUMMARY FOR PROPOSED REGISTERED UNITS.
FUTURE CELLS
SANDY CREEK ENERGY STATION
POST-CLOSURE CARE COST SUMMARY

Description	Quantity	Unit	Unit Cost	Total Cost
1.0 ENGINEERING				
1.1 Annual Site Inspections	1	YR	$ -	$ -
1.2 Correctional Plans and Specifications (annual)	1	YR	$ 1,675	$ 1,675
				$ 1,675
2.0 Site Monitoring				
2.1 Groundwater Sampling and Analysis (semi-annual)	1	YR	$ -	$ -
2.2 Groundwater Well Plugging and Abandonment	1	YR	$ -	$ -
				$ -
3.0 CONSTRUCTION / MAINTENANCE				
3.1 Cap and Sideslopes Repairs and Revegetation	1	YR	$ 340	$ 340
3.2 Mowing and Vegetation Management	1	YR	$ 670	$ 670
3.3 Groundwater Monitoring System Maintenance	1	YR	$ -	$ -
3.4 Perimeter Fence and Gates Maintenance	1	YR	$ -	$ -
3.5 Access Roads Maintenance	1	YR	$ -	$ -
3.6 Drainage System Cleanout/Repairs	1	YR	$ -	$ -
				$ 1,010
4.0 LEACHATE MANAGEMENT				
4.1 Leachate Management System Operation and Maintenance	1	YR	$ -	$ -
4.2 Decommissioning of Existing Leachate Pond	1	YR	$ -	$ -
4.2 Leachate Disposal	N/A	N/A	N/A	N/A
				$ -
5.0 ADMINISTRATIVE				
5.1 Annual Report Preparation and Submittal to TCEQ	1	YR	$ -	$ -
SUBTOTAL				$ 2,685
CONTINGENCY	10%			$ 269
THIRD PARTY ADMINISTRATION AND PROJECT MGMT	2.5%			$ 67
TOTAL ANNUAL POST-CLOSURE CARE COST				**$ 3,021**
30 YEAR POST-CLOSURE CARE COST				**$ 90,630**

3 POST-CLOSURE COST ESTIMATE ADJUSTMENTS

An increase in the post-closure care cost estimate and the amount of financial assurance will be made if changes to the Closure and Post-Closure Plan or the Landfill conditions increase the maximum cost, as discussed in Section 2 of this plan. As noted in Section 2, in the event cost estimate increase, such updated cost estimate will be submitted to the TCEQ for approval along with appropriate changes to the financial assurance in accordance with §305.62.

A request to reduce the post-closure care cost estimate and the amount of financial assurance may be submitted to the TCEQ if the cost estimate exceeds the maximum cost of post-closure care remaining over the post-closure care period. The Landfill Owner/Operator will submit a written request to the TCEQ of the detailed justification for the reduction of the cost estimates and the amount of financial assurance in accordance with §305.62.

At the time of these revisions to the post-closure care cost estimate, the Landfill Owner/Operator will also confirm that the assumptions regarding this estimate are valid and that the associated estimates are accurate in view of the Landfill's operating practice since the previous estimates were made.

4 FINANCIAL ASSURANCE MECHANISM (30 TAC §352.1101(c))

In accordance with 30 TAC §352.1101(c), no more than 90 days after the executive director's approval of the Application, a financial assurance mechanism acceptable to the executive director will be submitted for the cost of post-closure care in an amount no less than the amount specified in the approved cost estimate. Financial assurance for post-closure care shall be demonstrated in compliance with §352.1101, except as indicated in §352.1111 (relating to Exceptions). The financial assurance meeting these requirements and in an amount no less than the amount specified in Table VIII.A1 is provided in Appendix VIII.B, and may be adjusted based on post-closure care cost estimate adjustments discussed in Section 3 of this Plan.

APPENDIX VIII.A

POST-CLOSURE CARE COST ESTIMATE CALCULATIONS

SANDY CREEK ENERGY STATION
POST-CLOSURE CARE COST ESTIMATE CALCULATIONS
EXISTING CELLS 1, 2, AND 3A THROUGH 3D

Required:

Estimate the cost to hire a third party to conduct post-closure care activities for **existing cells 1, 2, and 3A through 3D prior to and during the time of preparing this registration application. Note, these costs are in 2021 dollars.**

References:

1. TCEQ, Technical Guideline No. 10, Closure and Post-Closure Care Cost Estimates (Revised December 7, 2017).
2. Unit rate cost estimates are based on data available from similar work and/or construction and monitoring projects.

Solution:

Develop annual cost for the required 30-year post-closure period. The item numbers are from Table VIII.A.1 - Post-Closure Cost Summary for Existing Registered Units (Cells 1, 2, and 3A though 3D).

Post closure care period =	30	yr	
Area to be administratively closed =	149.3	ac	
Area with waste in place =	34.0	ac	**(Includes Cells 1 and 2, and 3A through 3D)**

1.0 Engineering Costs

1.1 Site Inspection and Recordkeeping

149.3	ac @	$ 20.00	/ ac / yr =	$	2,986	/ yr

1.2 Correctional Plans and Specifications

Assume engineering plans required to correct erosion issues every other year.

34.0	ac @	$ 500	/ ac / 2-yr =	$	17,000	/ 2-yr
				$	8,500	/ yr
			Engineering Costs Subtotal =	**$**	**11,486**	**/ yr**

2.0 Site Monitoring

2.1 Groundwater Sampling and Analysis of Monitoring Wells **(6 wells at time of closure)**

6	wells				
$ 1,500	/ well / event				
2	events / yr	Total =	$	18,000	/ yr

2.2 Groundwater Well Plugging and Abandonment

6 wells @	$ 1,000	/well	$	6,000	total (one-time event)
			$	200	/ yr
		Site Monitoring Costs Subtotal =	**$**	**18,200**	**/ yr**

3.0 Construction and Maintenance Costs

3.1 Cap and Sideslopes Repairs and Revegetation (Assumes 5% of Final Cover area each year)

1.70	ac @	$ 1,000	/ ac / yr =	$	1,700	/ yr

SANDY CREEK ENERGY STATION
POST-CLOSURE CARE COST ESTIMATE CALCULATIONS
EXISTING CELLS 1, 2, AND 3A THROUGH 3D

3.2 Mowing and Vegetation Management

34.0	ac @	$ 100	/ ac / yr =	$	3,400	/ yr

3.3 Groundwater Monitoring System Maintenance

Lump Sum = $ 2,500 / yr

3.4 Perimeter Fence and Gates Maintenance

Lump Sum = $ 1,500 / yr

3.5 Access Roads Maintenance

Lump Sum = $ 4,500 / yr

3.6 Drainage System Cleanout/Repairs

Assume drainage system repairs required every other year.

Lump Sum = $ 7,000 / event
$ 3,500 / yr

Construction and Maintenance Costs Subtotal = $ 17,100 / yr

4.0 Leachate Management

4.1 Leachate Management System Operation and Maintenance

Lump Sum = $ 5,000 / yr

4.2 Decommissioning of Existing leachate Evaporation Pond

Lump Sum = $ 70,000 total (one-time event)
$ 2,333 / yr

4.3 Leachate Disposal

N/A — All leachate generated shall discharge into existing leachate evaporation pond. It is assumed that leachate will be evaporated in the leachate evaporation pond and that off-site dispsosal will not be required following pond decomission at the end of the post-closure care period.

Leachate Management Costs Subtotal = $ 7,333 / yr

5.0 Administrative

5.1 Annual Report Preparation and Submittal to TCEQ

Lump Sum = $ 4,500 / yr

Administrative Costs Subtotal = $ 4,500 / yr

SANDY CREEK ENERGY STATION
POST-CLOSURE CARE COST ESTIMATE CALCULATIONS
Future Cells

Required: Estimate the cost to hire a third party to conduct post-closure care activities for **future cells following preparation of this registration application. Note, these costs are in 2021 dollars.**

References:

1. TCEQ, Technical Guideline No. 10, Closure and Post-Closure Care Cost Estimates (Revised December 7, 2017).
2. Unit rate cost estimates are based on data available from similar work and/or construction and monitoring projects.

Solution: Develop annual cost for the required 30-year post-closure period. The item numbers are from Table VIII.A.2 – Post-Closure Cost Summary for Proposed Registered Units.

Post-closure care period =	30	yr	
Area to be administratively closed =	0.0	ac	
Area with waste in place =	6.7	ac	**(Includes future cells)**

1.0 Engineering Costs

1.1 Site Inspection and Recordkeeping **(entire area included for existing cells)**

-	ac @	$ 20.00	/ ac / yr =	$	-	/ yr

1.2 Correctional Plans and Specifications

Assume engineering plans required to correct erosion issues every other year.

6.7	ac @	$ 500	/ ac / 2-yr =	$	3,350	/ 2-yr
				$	1,675	/ yr
			Engineering Costs Subtotal =	**$**	**1,675**	**/ yr**

2.0 Site Monitoring

2.1 Groundwater Sampling and Analysis of Monitoring Wells **(6 wells at time of closure, included for existing cells)**

-	wells				
$ 1,500	/ well / event				
2	events / yr	Total =	$	-	/ yr

2.2 Groundwater Well Plugging and Abandonment

0 wells @	$ 1,000	/well	$	-	total (one-time event)
			$	-	/ yr
		Site Monitoring Costs Subtotal =	**$**	**-**	**/ yr**

3.0 Construction and Maintenance Costs

3.1 Cap and Sideslopes Repairs and Revegetation (Assumes 5% of Final Cover area each year)

0.34	ac @	$ 1,000	/ ac / yr =	$	340	/ yr

SANDY CREEK ENERGY STATION
POST-CLOSURE CARE COST ESTIMATE CALCULATIONS
Future Cells

3.2 Mowing and Vegetation Management

6.7	ac @	$ 100	/ ac / yr =	$	670	/ yr

3.3 Groundwater Monitoring System Maintenance **(included for existing cells)**

Lump Sum = $ - / yr

3.4 Perimeter Fence and Gates Maintenance **(included for existing cells)**

Lump Sum = $ - / yr

3.5 Access Roads Maintenance **(included for existing cells)**

Lump Sum = $ - / yr

3.6 Drainage System Cleanout/Repairs **(included for existing cells)**

Assume drainage system repairs required every other year.

Lump Sum = $ - / event

$ - / yr

Construction and Maintenance Costs Subtotal = $ 1,010 / yr

<u>4.0 Leachate Management</u>

4.1 Leachate Management System Operation and Maintenance **(included for existing cells)**

Lump Sum = $ - / yr

4.2 Decommissioning of Existing leachate Evaporation Pond **(included for existing cells)**

Lump Sum = $ - total (one-time event)

$ - / yr

4.3 Leachate Disposal **(included for existing cells)**

N/A	All leachate generated shall discharge into existing leachate evaporation pond. It is assumed that leachate will be evaporated in the leachate evaporation pond and that off-site dispsosal will not be required following pond decomission at the end of the post-closure care period.

Leachate Management Costs Subtotal = $ - / yr

<u>5.0 Administrative</u>

5.1 Annual Report Preparation and Submittal to TCEQ **(included for existing cells)**

Lump Sum = $ - / yr

Administrative Costs Subtotal = $ - / yr

APPENDIX VIII.B

FINANCIAL ASSURANCE MECHANISM

To be included following TCEQ approval of the post-closure care cost estimate calculations.