FINAL REPORT

Electrokinetic-Enhanced (EK-Enhanced) Amendment Delivery for Remediation of Low Permeability and Heterogeneous Materials

ESTCP Project ER-201325



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ACRONYMS AND ABBREVIATIONS

А	amp
AC	alternate current
cm	centimeter
cm/sec	centimeter per second
CVOC	chlorinated volatile organic compounds
cDCE	cis-1,2-dichloroethene
ke	coefficient of electroosmotic permeability
Dhb	Dehalobacter
Dhc	Dehalococcoides
Dem/Val	Demonstration/Validation
DoD	Department of Defense
DO	dissolved oxygen
dc	direct-current
DPT	Direct Push Technology
EK-BIO	EK-enhanced amendment delivery for in situ bioremediation
EK	electrokinetic
Keo	electroosmotic permeability
ERH	electrical resistance heating
ERDC	Engineer Research & Development Center
EISB	enhanced in-situ bioremediation
ERD	enhanced reductive dechlorination
FS	Feasibility Study
ft	feet
ft bgs	feet below ground surface
gal	gallon
g/L	grams per Liter
K_h	hydraulic conductivity
ISCO	in-situ chemical oxidation
kg	kilogram
kW-hr	kilowatt hour
_	
L	Liter

low-K	low-permeability
µg/g	microgram per gram
μg/L	microgram per Liter
mg/kg	milligram per kilogram
mV	millivolts
m	minutes
ММО	mixed metal oxide
NAS	Naval Air Station
NAVFAC	Naval Facilities Engineering Command
OU3	Operable Unit 3
ORP	oxidation-reduction potential
POC	points of contact
PVC	Polyvinyl chloride
K_2CO_3	potassium carbonate
PSV	pressure safety valve
PLC	programmable logic controller
qPCR	quantitative polymerase chain reaction
cm ²	square centimeter
TTA	target treatment area
PCE	tetrachloroethene
TCE	trichloroethene
TOC	total organic carbon
USACE	United States Army Corps of Engineers
VC	vinyl chloride
vcrA	vinyl chloride reductase
VFA	volatile fatty acid
VOC	volatile organic compound
V	volts
V/m	Volts per minute
w/w	weight per weight
XRD	X-Ray Diffraction

EXECUTIVE SUMMARY

This Demonstration/Validation (Dem/Val) project was conducted at Naval Air Station (NAS) Jacksonville, Florida, to assess and validate the performance of an electrokinetic (EK) technique to promote uniform and effective distribution of remediation amendments (e.g., electron donors, electron acceptors, chemical oxidants) in low-permeability (low-K) and heterogeneous subsurface materials. Recent advances in the understanding of mass distribution in subsurface environments has highlighted that in many cases a significant portion of the source mass is held in storage in low-K materials. The main limitation of current in situ remediation applications in low-K materials using conventional hydraulic recirculation or injection techniques is the inability to effectively deliver the required amendments to the target contaminant mass. The EK-enhanced amendment delivery technology entails the establishment of an electric field in the subsurface using a network of electrodes. The electrical current and voltage gradient established across a direct-current (dc) electric field provide the driving force to transport remediation amendments, including electron donors, chemical oxidants, and even bacteria, through the subsurface.

The EK Dem/Val system consists of nine (9) electrode wells and eight (8) supply wells located within a target treatment area (TTA) measuring approximately 40 feet by 40 feet. The remediation amendments distributed by the EK remediation system included electron donor (lactate provided as potassium lactate), pH control reagents (potassium carbonate), and a dechlorinating microbial consortium (KB-1[®]) containing *Dehalococcoides* (*Dhc*). Following the system startup, initial site conditioning, and bioaugmentation of the site, the Dem/Val included two (2) separate stages, 5-month each, of active operation with a 6-month incubation period between the two active stages.

The overall goal of this Dem/Val is to demonstrate and validate EK-enhanced amendment delivery for in-situ bioremediation (EK-BIO) via enhanced reductive dechlorination (ERD) of a tetrachloroethene (PCE) source area in clay. Several performance objectives were identified and assessed based on the performance monitoring data collected:

I. Demonstrate uniform distribution of the amendments and relative uniformity of the established electrical field.

This Dem/Val met this objective by meeting the success criteria, including:

- At groundwater monitoring locations within the TTA after the completion of active EK operation, post-EK concentration of total organic carbon (TOC) was at least 5x baseline; and
- No local focusing of electric field was observed within the TTA.

II. Demonstrate effectiveness of treatment established by EK-BIO operation within the TTA.

This Dem/Val met this objective by meeting the success criteria, including:

- >60% reduction in average PCE concentrations was achieved in soil and groundwater within the TTA. While groundwater data also showed coupled and comparable increases of dechlorination daughter and end products, no such apparent increases of degradation products were observed in soil samples;
- Ethene was detected at 100% of groundwater monitoring wells within the TTA; and

• >10x increases of *Dhc* from baseline was observed at >60% of soil and groundwater samples collected from within the TTA.

III. Demonstrate suitability of this technology for full-scale implementation.

This Dem/Val met this objective by meeting the success criteria, including:

- System operation conditions (voltage and current) were maintained within ± 50% of the designed target conditions;
- Amendment supply up-time was >75% of target; and
- Energy consumption was within \pm 30% of design estimates.

This Dem/Val showed that a critical and distinct advantage of the EK-enhanced amendment delivery over other conventional advective flow-based approaches is that EK can achieve relatively uniform transport in low-K materials. EK-enhanced delivery is a safe and relatively more controllable approach compared to high-pressure/fracturing injection and thermal approaches. This technology also represents a remedial alternative with excellent environmental performance. The electrical energy consumed during the active EK operation period in this Dem/Val was equivalent to operating two 100-W lightbulbs over the same time interval.

Based on the information and experience obtained from this Dem/Val, there are three main cost drivers to consider when evaluating implementation costs in future projects, including: (1) footprint, depth interval, and volume of target treatment zone and contaminant mass; (2) presence and location of above-ground and subsurface utilities; and (3) site geochemistry, particularly pH and iron. These are also the same cost drivers for many other in-situ remediation technologies and not unique to EK technology implementation.

A cost comparison was developed and showed that EK-BIO could be potentially more cost favorable to an in situ thermal treatment approach, electrical resistance heating (ERH). It is also noted that the significant difference in the electrical energy needed for these two technologies indicating a much more favorable environmental performance of EK-BIO over ERH. The cost comparison also showed that EK-BIO approach is slightly more cost favorable to direct-injection enhanced in situ bioremediation (EISB) and fracturing enhanced zero-valent iron (ZVI) direct injection. However, at sites where low-K material and/or high-degree of heterogeneity likely preclude the consideration for direct injection, EK-BIO provides a cost-effective solution for implementing in situ bioremediation.

While EK-BIO is mainly a variation on standard EISB whereby EK is used to more effectively deliver the required amendments through low-K materials, some areas where additional attention, beyond those typically considered for EISB, may be required on a site-specific basis include:

• Safety considerations related to potential stray current/voltage to surface. To address this question, we checked the current and voltage at the manhole steel cover located within the treatment area while the EK system was in operation to confirm that there was no safety concern. Depending on project site, and for sensitive and active facilities with dedicated safety departments, additional design and explanation effort may be required for project approvals.

- Iron fouling of filters and valves along the catholyte (well water from cathode wells) extraction line. In this Dem/Val, we re-plumbed the system to minimize potential flow restriction points. Scaling of the cathodes also required maintenance actions to clean the cathode surface. As indicated above, this issue diminished over the course of the Dem/Val.
- Corrosion of metallic parts in the manifold system & wellhead fittings due to elevated chloride concentrations. In this Dem/Val, we replaced most metallic contacting parts with plastic parts upon discovering that chloride levels were far higher than initially known.
- The technology implementation did not require specialized/proprietary equipment. We used only standard commercial off-the-shelf equipment. We designed the manifold and control system and had a remediation system vendor assemble the system per design, but the overall system was similar to other "typical" in-situ remediation systems.
- If the technology is to be implemented near (laterally and/or vertically) utilities that are "sensitive" to electric interference or corrosion concerns, some protection measures, such as cathodic protection, may be considered.
- No special regulatory requirements or permits beyond what are typical for other EISB or ISCO projects such as UIC permit. Depending on the locality-/facility-specific requirements, local or facility power/electrical departments should be consulted.

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1.0 INTRODUCTION

This Draft Final Report summarizes the approach, methodology and results of a field Demonstration / Validation (Dem/Val) project conducted to assess and validate the performance of an electrokinetic (EK) technique to promote uniform and effective distribution of remediation amendments (e.g., electron donors, electron acceptors, chemical oxidants) in low-permeability (low-K) and heterogeneous subsurface materials, for the purposes of improving remediation success at low-K sites. This project was conducted in collaboration with Naval Facilities Engineering Command (NAVFAC) and the United States Army Corps of Engineers (USACE) Engineer Research & Development Center (ERDC).

1.1 BACKGROUND

Decades of remediation experience have shown that in-situ remediation approaches are more successful and cost effective than most ex-situ remediation methods. However, in-situ remedies, such as enhanced in-situ bioremediation (EISB) and in-situ chemical oxidation (ISCO), while capable of treating various contaminants in permeable sandy aquifers, often fail to effectively target contaminants in silt and clay materials, or combinations of sand and low-K materials. Recent advances in the understanding of mass distribution in subsurface environments has highlighted that in many cases a significant portion of the source mass is held in storage in low-K materials, and that the release rate from low-K storage is many times slower than the original contaminant loading rate. The main limitation of EISB and ISCO applications in low-K materials is the inability to effectively deliver the required amendments to the target contaminant mass contained within the low-K material using conventional hydraulic recirculation or injection techniques.

While hydraulic fracturing has shown some promise in improving amendment distribution in low-K materials, the success of this approach has been limited by site access constraints, surface structure impact concerns, high cost, and consistency and predictability of induced fractures. Other technologies such as large diameter auger mixing and thermal treatment have shown promise in low-K materials. However, these approaches have been expensive and are also limited by site access and re-use limitations. Conventional thermal remediation approaches also face the challenges of removing and treating gaseous phase contaminants. Lower cost, and ideally more environmentally-sustainable remediation approaches or improvements to existing technologies are required to reduce overall remediation costs at Department of Defense (DoD) and defense contractor sites.

The EK-enhanced amendment delivery technology entails the establishment of an electric field in the subsurface using a network of electrodes. The electrical current and voltage gradient established across a direct-current (dc) electric field provide the driving force to transport remediation amendments, including electron donors, chemical oxidants, and even bacteria, through the subsurface. One reason why EK represents a fundamentally more effective delivery technique compared to an advective hydraulic approach is the relatively uniform electrical property of various soil materials. As a result, EK-enhanced amendment delivery technology can achieve effective and uniform amendment distribution at sites where heterogeneous subsurface materials often limit the applications of hydraulic methods.

1.2 OBJECTIVE OF THE DEMONSTRATION

The overall goal of this project is to Dem/Val the use of EK-enhanced amendment delivery to achieve uniform and effective distribution of remediation amendments into and through low-K and heterogeneous materials in the subsurface, thereby improving the effectiveness of in-situ remediation (in this case, EISB) and reducing the costs of remediation at DoD sites impacted by chlorinated and recalcitrant contaminants. The specific technical objectives for this Dem/Val project are as follows:

- i) demonstrate and quantify the ability to uniformly distribute remediation amendments (in this case, lactate and *Dehalococcoides* (*Dhc*) microorganisms) across a target treatment area (TTA) using a *dc* electric field;
- ii) demonstrate the ability to promote and sustain effective biodegradation within the TTA as a result of amendment delivery by EK;
- iii) evaluate EK system operational parameters and resolve potential operational issues (e.g., scaling of electrodes) to allow engineering design and implementation of full-scale EK systems; and
- iv) develop costing information for technology evaluation by DoD and remediation practitioners.

1.3 REGULATORY/TECHNICAL/COST DRIVERS

In 2011, a SERDP/ESTCP-sponsored workshop on *Investment Strategies to Optimize Research and Demonstration Impacts in Support of DoD Restoration Goals* identified treatment of contaminants in low-K subsurface materials (i.e. silts, clays, and bedrock) as a high-priority area for additional investment. The workshop participants noted that treatment of low-K zones would require adoption of cost-effective techniques that can target delivery of remedial agents to these regions and prevent continued back-diffusion of contaminants.

Estimated costs to DoD for adopting hydraulic containment at more than 3,000 chlorinated hydrocarbon sites could surpass \$100 million annually, with estimated life-cycle costs of more than \$2 billion (SERDP/ESTCP, 2006). EISB has generally been considered as one of the more cost-effective remedial options available for chlorinated solvent sites. However, there are sites where the effectiveness of EISB is limited by the presence of low-K zones, or sites where more expensive alternatives are the presumed options due to the concerns of low-K materials. Improved delivery of remediation amendments can reduce the overall duration and cost of EISB, as well as allow the consideration of lower cost EISB options at more DoD sites where low-K zones represent a limiting factor in remedy selection and success.

2.0 TECHNOLOGY

This section provides an overview of the EK-enhanced amendment delivery technology that was demonstrated in this project. Advantages and potential limitations associated with this technology are also discussed.

2.1 TECHNOLOGY DESCRIPTION

The EK-enhanced amendment delivery technology entails the use of electrodes and dc electrical power to establish an electric field in the subsurface. The voltage gradient established across the dc electric field is then the driving force for transporting remediation reagents, including electron donors for microorganisms, chemical oxidants, and even bacteria, through low-K soils or uniformly through heterogeneous formations. The EK transport process relies on three mechanisms which occur with the application of the electric field:

- *Electromigration* (*or ion migration*) the movement of charged dissolved ions through an aqueous medium in response to the applied electric field. The direction of ion migration is toward the electrode with a polarity opposite of the ion's charge;
- *Electroosmosis* the movement of pore fluid (and dissolved constituents) within a porous medium in response to the applied electric field. The direction of electroosmotic flow is usually from the anode toward the cathode; and
- *Electrophoresis* the movement of charged particles, such as clay particles or bacteria, through an aqueous medium in response to the applied electric field. Similar to electromigration, the direction of ion migration is toward the electrode with a polarity opposite to that of a particle's net charge.

This Dem/Val project focused on the amendment transport facilitated by electromigration and electroosmosis. While ion migration phenomenon is readily apparent and understandable as it reflects basic electrochemistry, electroosmosis is a more complex EK phenomenon. Certain subsurface materials, such as clays, have a negative surface charge due to their mineral contents and crystal lattice structures. Porewater surrounding these soil particles, containing mixtures of cations and anions, forms a boundary layer system (i.e., double layer) around these negatively charged soil particles consisting of an inner immobile zone (Stern layer) and an outer mobile zone (Diffuse layer). The electrical potential at the interface between the two zones is known as the zeta potential. Upon the application of a voltage gradient, the surface of the Stern layer (positively charged layer in this case) allows the movement of cations drawing along the surrounding water molecules toward the negatively charged electrode (i.e., cathode). The value of the zeta potential is dependent on the pore fluid's ionic strength and pH.

The rate of electroosmotic flow is proportional to the coefficient of electroosmotic permeability (k_e) , which is a measure of the rate of fluid flow per unit area under a unit voltage gradient. The value of k_e is a function of the zeta potential of the soil particle surface, viscosity of the pore fluid, porosity, and electrical permittivity of the medium.

One reason why EK represents a fundamentally more effective delivery technique for low-K and heterogeneous soils compared to an advective hydraulic approach is the relatively uniform electrical property of various soil materials. For example, as presented in **Figure 2-1**, while the hydraulic conductivity of fine sand and kaoline materials can vary by several orders of magnitude, the coefficient of electroosmotic permeability of fine sand (4.1E-05 cm²/sec-V) is comparable to that of kaoline (5.7E-05 cm²/sec-V) and clayey till (5.0E-05 cm²/sec-V). Therefore, the EK-enhanced amendment delivery technology can achieve effective and uniform amendment distribution at sites where heterogeneous subsurface materials often limit the applications of hydraulic methods.



Figure 2-1. Hydraulic and Electrical Properties of Various Soils (rev. Mitchell, 1993)

The application of electric current will also result in electrolytic reactions at the electrodes. If inert electrodes (such as graphite or ceramic-coated electrodes) are used, water oxidation produces oxygen gas and acid (H_3O^+) at the anode (positively charged electrode), while water reduction produces hydrogen gas and base (OH⁻) at the cathode (negatively charged electrode). Electrolytic reactions of water are shown below in Equations 1 and 2,

$$\begin{array}{rcl} 2H_2O & ==> & 4e^- + & 4H^+ + O_2 & (at Anode) & (1) \\ 2H_2O & + & 2e^- & ==> & 2OH^- + H_2 & (at Cathode) & (2) \end{array}$$

Faraday's law for equivalence of mass and charge can be used to calculate the rate of redox reactions that will occur at the electrodes (Koryta and Dvorak, 1987). Therefore, it is possible to engineer and control the electrolytic processes at the electrodes to produce hydrogen (H₂) and oxygen (O₂) or to control pH conditions, depending on the system design objectives.

To implement the EK-enhanced delivery technology in the field, remediation amendments are added to electrode wells and potentially additional supply wells located intermediary to the electrode wells, mainly to shorten amendment travel distance versus consumption rate (**Figure 2-2**). Electrodes of selected inert materials are installed in electrode wells and connected to a dc power source. The power supply unit will supply electrical energy to electrodes at designed settings of voltage and/or current. The electrical field will transport the amendments from the electrode wells and supply wells into and through the formation materials to achieve a relatively uniform transport and distribution. Cross-circulation and pH-balancing can be employed at the electrode wells to overcome the effects of water electrolysis, and retain the natural in-situ pH of the system (as required). Slight subsurface heating may occur with application of the electrical field. However, results from field trials have shown that temperature increases are minor (less than 10° C). A modest increase in temperature often results in an improvement in the bioremediation process, as has been shown for *Dhc* during trichloroethene (TCE) dechlorination, where dechlorination was faster at 30° C than 15° C (Friis et al., 2007).



Figure 2-2. Schematic of EK-Enhanced Amendment Delivery Technology

2.2 TECHNOLOGY DEVELOPMENT

Results from many studies conducted at both bench-scale and field-pilot scale have shown the potential of EK-enhanced amendment transport (Mao et al., 2012; Gent, 2001; Wu et al., 2007; Reynolds et al., 2008; Hodges et al., 2011; SERDP ER-1204). Bench-scale studies conducted at ERDC effectively delivered acetate through loess soil ($K=10^{-7}$ cm/s) and vertically deposited clay ($K=10^{-9}$ cm/s) at rates of 2.1 and 2.5 cm/day, respectively, with a voltage gradient near 0.5 V/cm (Gent, 2001).

An average lactate transport rate of 3.4 cm/day under a unit voltage gradient of 1 V/cm was achieved in a bench-scale study conducted using a silty clay ($K=10^{-7}$ cm/s) (SERDP ER-1204). The observed EK-enhanced transport rate in that SERDP study was more than 120 times higher than the transport rate achievable in the same type of soil but under a unit hydraulic gradient. The use of EK-enhancement for ISCO has also been demonstrated at the bench scale in both column and sandbox experiments (Roach et al., 2006; Reynolds et al., 2008; Robertson, 2009; Hodges et al., 2011). Common oxidants such as permanganate and persulfate are charged compounds, and will migrate under the driving force of the imposed electric gradient. Migration rates of monovalent and divalent oxidants have been measured in the laboratory at levels in excess of 500 times higher than that achievable through diffusion alone.

Geosyntec, in collaboration with ERDC, completed a field pilot test of EK-enhanced delivery for in-situ bioremediation (EK-BIO) at a site in Denmark, which achieved a lactate transport rate between 2.5 and 5 cm/day through clay materials. The pilot test involved simultaneous biostimulation (using lactate) and bioaugmentation (using dechlorinating culture KB-1[®]) targeting a PCE source area. Active EK operation for lactate distribution was conducted for approximately 8 weeks, followed by 16 weeks of post-EK monitoring. Results from the pilot test (both groundwater samples and clay cores) indicated general uniformity of distribution of electron donor, rapid establishment and growth of the bioaugmented *Dhc* within the clay, and rapid dechlorination of PCE, TCE, and cis-1,2-dichloroethene (cDCE) to vinyl chloride (VC) and ethene. Results from both laboratory studies and the field pilot test for this site showed that the applied electrical field had no deleterious impacts on the microorganisms or subsurface conditions. During the EK field pilot test, the average groundwater temperature in the demonstration area increased from 17° C to 25° C, which was believed to provide improved conditions for PCE dechlorination by the introduced *Dhc*.

2.3 ADVANTAGES AND LIMITATIONS OF THE TECHNOLOGY

A critical and distinct advantage of the EK technology over most other approaches is that EK can achieve relatively uniform transport in inter-bedded clays and sands, even when the hydraulic conductivities of the subsurface materials vary by orders of magnitude. EK-enhanced transport, which relies primarily on the electrical properties of aquifer materials instead of the hydraulic properties, represents a solution to the limitations of preferential pathways facing conventional advective-based hydraulic technologies.

EK-enhanced delivery is a safer, and more controllable approach compared to current highpressure/fracturing injection and thermal approaches. The migration of remediation reagents is directed by the electrical field established between electrodes, and no high injection pressures are involved.

EK-enhanced delivery also represents a remediation technology with good environmental performance. Unlike other technologies that repeatedly deliver/flush amendments through a small number of preferential pathways in the subsurface, the EK technology can uniformly deliver the amendments, maximizing treatment effectiveness and reducing treatment cost and duration. When coupled with existing in situ remediation technologies (i.e., EISB and ISCO), EK-BIO and EK-ISCO can achieve direct treatment and destruction of target contaminants in situ instead of transferring contaminants to the gas phase, which requires additional containment/collection and treatment.

The electrical energy usage of EK-enhanced delivery is relatively low compared to current thermal remediation technologies. The EK-BIO field pilot test conducted by Geosyntec in Denmark required less than 100 volts (V) and 15 amp (A) of electrical power to sustain the EK operation. The energy usage of the EK-BIO pilot test was equivalent to the energy needed to power approximately ten 100-watt light bulbs, reflecting the small carbon footprint and excellent environmental performance of this technology. As discussed in Section 6.1 of this report, the electrical power used in this Dem/Val (maintained at <30V and <10A) also demonstrated the excellent energy efficiency of this technology.

There are several aspects of this technology that will require appropriate considerations and control measures:

- Safety considerations related to potential stray current/voltage to ground surface.
- If the technology is to be implemented near (laterally and/or vertically) utilities that are sensitive to electric interference or corrosion concerns, some protection measures, such as cathodic (grounding) protection, may be required. Depending on the locality / facility-specific requirements, local or facility power/electrical departments should be consulted.
- Although conceptually there is no depth limit for this technology, shallow treatment zones too close to the ground surface and/or utilities, or in a vadose zone, can limit the feasibility of this technology.
- Certain site hydrogeology or geochemical conditions may limit the applications or impact the costs of this technology, including
 - Very high levels of sulfate or nitrate that challenge the supply of electron donors for promoting and sustaining reductive dechlorination. This limitation is not specific to EK amendment delivery, instead, it is a limitation for anaerobic in situ bioremediation.
 - High natural groundwater flow velocity in the permeable portion of a target treatment zone may potentially limit the EK transport in the direction against the natural groundwater flow.
 - High levels of chloride and/or iron that require particular engineering control measures (e.g., corrosion protection) or more operational maintenance efforts for fouling controls. Iron fouling is also a common challenge to other in situ remediation technologies.

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3.0 PERFORMANCE OBJECTIVES

The overall goal of this Dem/Val is to demonstrate and validate EK-enhanced amendment delivery for in-situ bioremediation via enhanced reductive dechlorination (ERD) of a PCE source area in clay. Performance objectives were identified and approved by ESTCP to provide the basis for evaluating the performance and costs of the Dem/Val technology. **Table 3-1** presents a summary of the quantitative and qualitative performance objectives, which are further discussed in the following subsections.

Performance Objective	Data Requirements	Success Criteria	Assessment
Quantitative Perfo	rmance Objectives		
I. Demonstrate uniform distribution of the amendments and relative uniformity of the established electrical field	 Pre- and post-EK monitoring of the concentrations of amendments Monitoring of voltage and electrical current within the EK system during operation 	 At groundwater monitoring locations within the TTA after the completion of active EK operation – post-EK concentration of TOC is 5x baseline, or 10x detection limit if baseline is below detection No local focusing of electric field within the TTA – no electrical potential gradient between any individual pair of cathode-anode is 5x the average electrical gradient between all pairs of electrodes Electrical potential gradient between electrode pairs maintained at level no more than 5x target gradient at design current 	Objective Met (see Section 3.1)
II. Demonstrate effectiveness of treatment established by EK-BIO operation within the TTA	 Pre- and post-EK concentrations of chlorinated ethenes in soil and groundwater Pre- and post-EK concentrations of ethene in groundwater Pre- and post-EK concentrations of biomarker (qPCR analysis of <i>Dhc</i> and/or vinyl chloride reductase [vcrA]) in soil and groundwater 	 > 60% reduction in average PCE concentrations in soil and groundwater within the TTA, with coupled and comparable molar concentration increases of dechlorination daughter and end products Ethene/ethane detected at > 75% of groundwater monitoring wells within the TTA before the completion of post-EK monitoring > 10x increases of <i>Dhc</i> from baseline at > 50% of soil and groundwater samples collected from within the TTA before the completion of post-EK monitoring 	Objective Met (see Section 3.2)
III. Demonstrate suitability of this technology for full-scale implementation	• EK system operational parameters, amendment usage, and energy consumption	 System operation conditions (voltage and current) within ± 50% of the designed target conditions Amendment supply up-time > 75% of target Energy consumption within ± 30% of design estimates 	Objective Met (see Section 3.3)
Qualitative Perform	nance Objectives		
Performance Objective	Data Requirements	Success Criteria	Assessment
IV. Safe and reliable operation	Monitoring of system operational parameters	 Operation conditions remain stable within the normal designed ranges over the course of the demonstration period No lost-time incidents 	Objective Met (see Section 3.4)
V. Ease of implementation	• Feedback from field personnel on installation and operation of	• Ability to construct using conventional techniques and contractors	Objective Met
	technology and system	• A single field technician able to effectively monitor and maintain normal system operation	(see Section 3.4)

Table 3-1.	Performance Objectives
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3.1 PERFORMANCE OBJECTIVE: DEMONSTRATE UNIFORM DISTRIBUTION OF AMENDMENT

The main objective of the EK technology is to achieve uniform distribution of the remediation amendments in the subsurface upon injection under the established electric field conditions. The effective distribution of the amendments (electron donor and *Dhc*,) is essential to the success of the technology (EISB via ERD in this project).

3.1.1 Data Requirements

Uniform distribution of remediation amendments was determined by measuring concentrations of remedial reagents at all monitoring locations in the TTA. Groundwater and soil core samples were collected and analyzed in accordance with the sampling plan. Additionally, measurements of electric current and voltage were taken during system operation to assess the uniformity of the electrical field.

3.1.2 Success Criteria

This objective is considered achieved upon observing evidence of amendment (represented by TOC) transport at monitoring locations (5x baseline or 10x detection limit if baseline is below detection). Potential variability associated with the baseline data was assessed through calculating the arithmetic average and standard deviation.

For successful achievement of a uniform electric field at design levels, the electrical gradient between any individual pair of cathode-anode should not be more than 5 times the average electrical gradient between all pairs of electrodes. Moreover, the electrical potential gradient between electrode pairs should be maintained at a level no more than 5 times the target gradient.

3.1.3 Performance Objective Assessment

As presented in **Table 6-4**, every monitoring well within the TTA had TOC concentrations >8x baseline levels (for each well) during Stage 1 and/or Stage 2 operation, with the exception of EKMW-04 where the maximum TOC detected was 1.8x of the baseline. However, at EKMW-04 the maximum VFA detected was >9x its baseline. With respect to VFAs, all but one monitoring well (EKMW-05) had concentrations >9x baseline levels. As such, the Dem/Val has met this criterion in the EK was able to substantially increase electron donor concentrations across the entire TTA.

As presented in **Figure 6-2**, the voltage measured at discrete locations within the TTA were between 5.3V and 6.2V, with a standard deviation of 0.31V (5%). Voltage gradients were calculated between locations of closest pairs shown in **Figure 6-2** and range between 0.1 to 0.26 V/m. The calculated voltage gradients between these pairs are within 3x of each other and within 2x of the average gradients (0.13 V/m) indicating no local focusing of electric field within TTA. The Dem/Val has met this criterion.

The EK system was designed and operated at a constant current, determined after the start-up period, during the Dem/Val. As presented in **Figure 6-1**, during Stage 1 and Stage 2 operation, the voltage required of the power supply unit was generally consistent at between 15V and 30V, except for a few occasions when electrodes were in need of replacement. The electrical current supplied to individual wells during each stage of operation was generally steady (variation within 37% of average).

Given that (1) soil electrical resistivity is a soil property not expected to vary over the course of Dem/Val, and (2) the voltage output by the power supply unit and the current supplied to individual electrodes were generally steady, the electrical potential between electrode pairs within the TTA should maintain within 5x of target during operation. The Dem/Val has met this criterion.

3.2 PERFORMANCE OBJECTIVE: PROMOTE AND SUSTAIN EFFECTIVE BIODEGRADATION

The success of biodegradation depends on a sustained supply of remediation amendments such as electron donor. The benefit of the EK technology is its ability to facilitate transport of the remediation agents into hard-to-reach contaminant storage (low-K) areas/zones, thereby creating conditions that stimulate microbial activity and accomplish contaminant degradation.

3.2.1 Data Requirements

The effectiveness of EK in promoting biodegradation in the TTA was evaluated on the basis of concentrations of chlorinated ethenes in groundwater and soil, and ethene/ethane concentrations in groundwater in the TTA. Pre- and post-EK groundwater and soil core samples were collected and analyzed to assess the changes in chlorinated ethenes and ethene concentrations in the TTA. A baseline characterization event was performed to assess the pre-EK concentrations and establish the baseline conditions within the TTA.

3.2.2 Success Criteria

This objective is considered achieved through the observation of a 60% average reduction in PCE concentrations in groundwater and soil, coupled with comparable molar concentration increases of dechlorination daughter and end products at monitoring locations in the TTA. In addition, detection of ethene/ethane in more than 75% of groundwater monitoring wells within the TTA is indicative of successful attainment of this objective. Sustained biodegradation was successfully demonstrated by observing an increasing trend, or sustained elevated levels, of degradation intermediates and end products in the groundwater monitoring wells within the TTA for as long as sufficient (e.g., greater than 5 times the baseline concentration) electron donor was present.

3.2.3 Performance Objective Assessment

For each of the six monitoring wells located within the TTA, decreases of >80% in PCE concentration were achieved at the end of either Stage 1 and/or Stage 2. Also presented in **Figure 6-3** and **Table 7-1**, the decreases of PCE from baseline at each well within the TTA were coupled with evident increases of dechlorination daughter products and/or ethene. The Dem/Val has met this criterion for groundwater.

Figure 6-5 presents a comparison of soil chlorinated volatile organic compounds (CVOC) at corresponding locations between the three (3) sampling events. The data presented in **Figure 6-5** are arranged per individual locations and sampling depths. Overall, soil PCE concentrations of all samples collected from 18.5 feet below ground surface (ft bgs) at the nine (9) locations within the TTA decreased by 78% (C6) to 99% (C3) from baseline to post-Stage 2, with an average decrease of 88%.

It was also noted that while C6 was the only location with evident baseline PCE concentration at 21 ft bgs (5.5 mg/kg), the PCE concentration at this depth and location decreased to 0.21 mg/kg (96% reduction) and below in subsequent post-operation sampling events. As such, the Dem/Val met the PCE soil reduction criterion.

As presented in **Figure 6-3** and **Table 7-1**, every (100%) monitoring well within the TTA showed increased concentrations of ethene (up to >1,000 μ g/L) during the Dem/Val. The Dem/Val has met this criterion. **Figure 6-3** also shows that every monitoring well within the TTA showed significant increases (several orders of magnitude) of *Dhc* and *vcrA*. The Dem/Val has met this criterion for groundwater.

As presented in **Table 6-9**, among the nine post-Stage 2 soil samples collected from within the TAA, six samples were reported with quantifiable levels, plus one with estimated level, of *Dhc*, while all baseline soil samples did not contain detectable levels of *Dhc*. Of the seven samples with detected *Dhc*, five samples (C2, C3, C5, C7, and C9) showed functional genes for VC dechlorination. Thus, while not as impressive as the groundwater results, the Dem/Val has met this criterion for soil.

3.3 PERFORMANCE OBJECTIVE: DEMONSTRATE SUITABILITY FOR FULL-SCALE IMPLEMENTATION

For this project, the application of EK technology is focused on and limited to the TTA. The information obtained from this Dem/Val was used to assess the suitability of EK for full-scale operation at this and other sites.

3.3.1 Data Requirements

The suitability of the EK technology for full-scale implementation was assessed by measuring the electrical input (voltage/current) to achieve and maintain the desired electric field, by measuring operational parameters for maintaining consistent operation, and by determining the overall energy consumption within the TTA.

3.3.2 Success Criteria

This objective is considered achieved if system operational conditions are within \pm 50% of the designed target voltage and current. Additionally, successful accomplishment of this objective includes amendment supply up-time to be greater than 75% of target and the energy consumption to be within \pm 30% of the design estimate.

3.3.3 Performance Objective Assessment

The EK system was designed and operated at a constant current, determined after the start-up period, during the Dem/Val. As discussed in Section 7.1 (criterion related to electrical gradient) and presented in **Figure 6-1**, the operating voltage and current remained relatively steady except when electrodes were in need of replacement. There were three occasions when different electrodes needed to be replaced: late October/early November 2015 and late January/early February 2016 during Stage 1 operation; and December 2016 during Stage 2 operation. Prior to electrode replacement, the system voltage readings would indicate the operating conditions were becoming unsteady.

As discussed in Section 6.1, excluding the temporary unstable readings during the three periods shortly before the electrode replacement, the overall system operation conditions were steady and within 50% of the average during each normal operation period. The Dem/Val has met this criterion.

Other than the scheduled major O&M events between the two stages of operation, there were only three occasions when the system was shut down to allow replacement of electrodes. Overall, the system up-time was well >75% during the Dem/Val. The Dem/Val has met this criterion.

Figure 6-1 presents cumulative energy consumption during each stage of operation. Given that the energy consumption is a function of voltage and current and as discussed above regarding the steady system operation condition criterion, excluding the temporary unstable voltage conditions during the three short periods before the electrode replacement, the overall system operations were steady within \pm 30% and, thus, the energy usage as well. The Dem/Val has met the energy consumption criterion.

3.4 QUALITATIVE PERFORMANCE OBJECTIVES: DEMONSTRATE SAFETY, RELIABILITY, EASE OF IMPLEMENTATION

In addition to quantitative objectives discussed above, qualitative objectives are also identified for this Dem/Val and include demonstrations of the safety, reliability, and ease of technology implementation.

3.4.1 Data Requirements

The suitability of the EK technology for full-scale implementation should include the considerations of safety and reliability of technology implementation. Operation records, including system operation monitoring records and field operators' notes, are the primary data for assessing the safety and reliability. For ease of implementation criterion, field operation logs and records documented the utilization of field technician efforts for system operation and maintenance.

3.4.2 Success Criteria

This objective will be considered achieved if operational conditions remain stable over the course of the demonstration period and no lost-time incidents occur. The ease of technology implementation will be demonstrated if a single field technician is able to effectively monitor and maintain normal system operation.

3.4.3 Performance Objective Assessment

As discussed in Sections 7.1 and 7.3 above, the overall operation conditions remained relatively steady over the course of system operation. The Dem/Val has met this criterion. There were no safety-related lost-time incidents. The Dem/Val has met the safety criterion.

The Dem/Val involved only conventional field construction techniques, including well drilling, well installation, and trenching and piping, as well as remediation system assembly performed by regular, qualified subcontractors. The Dem/Val has met this criterion.

During the operation, one field technician performed routine system O&M tasks twice per week with approximately 2 to 3 hours per visit. During the routine O&M visit, the tasks primarily included system visual inspections, recording the system operational parameters (voltage, current, amendment flow and pressure), and replenishing amendment solutions as needed. Other than sampling groundwater, there were fewer than 5 scheduled O&M events that involved two field technicians. The Dem/Val has met this criterion.

4.0 SITE DESCRIPTION

The target area for this Dem/Val is located within Operable Unit 3 (OU3) at Naval Air Station (NAS) Jacksonville in Duval County, Florida (**Figures 4-1 and 4-2**). The Site Selection Memorandum was accepted by ESTCP on 27 November 2013. This section provides a summary of site information most relevant to this technology Dem/Val.

4.1 SITE LOCATION AND HISTORY

The EK-BIO Dem/Val was conducted at NAS Jacksonville, which is located on the west bank of the St. Johns River in Duval County, Florida (**Figure 4-1**). The Dem/Val area is in OU3 in the vicinity of former Building 106, where the station's dry-cleaning facility once existed (**Figure 4-2**). The results of previous site characterizations in OU3 indicate that a PCE source zone exists in this area above and partially into a clay unit underneath the shallow sand unit.

NAS Jacksonville was commissioned in October 1940 to provide facilities for pilot training and a Navy Aviation Trades School for ground crewmen. The buildings in OU3 are industrial, consisting of administrative space, workshops, storage, and aircraft hangars. The majority of the buildings were constructed in the 1940s with several additions and re-fabrications taking place since then. Over 90 percent of OU3 is covered with buildings and thick (greater than 1 foot) concrete pavement.

The contamination within OU3 that is the focus of this Dem/Val is associated with PSC 48, the former station's dry-cleaning facility located in former Building 106. PSC 48 encompasses the footprint and immediate surrounding area of former Building 106. PCE was released at former Building 106 through occasional spills and leaks, resulting in contamination of the shallow aquifer. PCE and its dechlorination daughter products, including TCE, cDCE, and VC, have been detected in this area in permeable sand layers within the shallow aquifer (5 to 16.5 ft bgs). Moreover, site characterization results also indicate that CVOC mass present in the low-K clay layer beneath the shallow sand aquifer can serve as a long-term source of contamination to the shallow aquifer (EISB Workplan, Geosyntec, 2013). This low-K clay layer beneath the shallow sand aquifer is the target for this EK technology Dem/Val.

4.2 SITE GEOLOGY/HYDROGEOLOGY

Site geology was characterized as part of a previous ESTCP Project (ER-0705), as described in the *Data Analysis Report for Field Event 4: NAS Jacksonville* (ESTCP, 2012b). Lithology at OU3 consists of inter-bedded layers of sand, clayey sand, sandy clay, and clay. Soil cores collected and logged at OU3 (ESTCP, 2012a) indicate that the site lithology generally consists of:

٠	0.5 to 5	ft bgs:	Fine sand with gravel and silt/clay;
٠	5 to 7.5	ft bgs:	Clay with trace sand and organic matter;
٠	7.5 to 16.5	ft bgs:	Fine sand/silt to fine sand with silt/clay;

- 16.5 to 18.5 ft bgs: Clay/silt with trace fine sand;
- 18.5 to 25 ft bgs: Clay with trace sand; and
- 25 to 30 ft bgs: Fine sand with silt/clay to fine sand.









A transition layer between the shallow sand and clay layers has been observed in some soil cores, generally between 13 and 16.5 ft bgs. A soil core, OU3-4 (location shown in **Figure 4-2**), exhibiting the lithology representative of the target area is presented below in **Figure 4-3**. The same lithology was again observed during this Dem/Val with a representative soil core collected from within the TTA during monitoring well installation (EKMW-02) also presented in **Figure 4-3**. The EK-BIO Dem/Val specifically targeted the CVOCs (predominately PCE) in the clay layer between approximately 16.5 to 24 ft bgs underneath the shallow sand unit in this area.



Figure 4-3. Lithology of the Target Dem/Val Area

(OU3-4 from ESTCP ER-201032; EKMW-02 from this Dem/Val)

Prior to the Dem/Val, depth to groundwater measurements local to the test area were collected in August 2009, January 2011, June 2011, and September 2011. Groundwater in this area was first encountered approximately 5 ft bgs, and flows towards the east with gradients ranging from 0.005 to 0.02 (ESTCP, 2012b). Past hydraulic testing estimated the mid-range hydraulic conductivity of the shallow sand aquifer at 5×10^{-3} cm/s (ESTCP, 2012b). The linear groundwater velocity was estimated as high as 101 ft/year (using a gradient of 0.005 and the mid-range conductivity).

ESTCP Project ER-0705 conducted depth-discrete, aquifer specific-capacity tests at various locations in this area, including along a transect from ASU-2 through ASU-7 shown in **Figure 4-2**. Depth-discrete hydraulic conductivity estimates for the clay unit beneath the shallow sand aquifer showed that at approximately 17 ft bgs the average K was $4x10^{-5}$ cm/sec (September 2011 data); however, there was not enough water at 6 of the 7 locations tested at the depth of 22 ft bgs to provide steady-state flow rates needed for the specific-capacity testing. Based on the soil core lithology observation and the orders of magnitude decrease of K from the shallow sand ($5x10^{-3}$ cm/s) to the clay at a depth of 17 ft ($4x10^{-5}$ cm/sec), it is believed that the clay material below 17 ft bgs has a hydraulic conductivity lower than 10^{-5} cm/sec.
4.3 CONTAMINANT DISTRIBUTION

Site investigations prior to the Dem/Val showed that PCE and degradation daughter products (TCE, cDCE, and VC) were present in permeable sand layers within the shallow aquifer (5 to 16.5 ft bgs). Chlorinated ethenes have also migrated, in part through molecular diffusion, into the clay layer (generally from 16.5 to 24 ft bgs) present beneath the shallow sandy aquifer. PCE is the dominant groundwater CVOC in this area, with TCE, cDCE and VC detected at lower concentrations. The groundwater quality data collected in January 2013 before this Dem/Val (Tetra Tech, 2013) indicate that groundwater monitoring wells screened in the shallow aquifer within the target area have total chlorinated ethene concentrations ranging from 194 μ g/L in well PZ-04 to 51,000 μ g/L in well PZ-02 (**Figure 4-4**).



Figure 4-4. Total Chlorinated Ethenes in Select Groundwater Monitoring Wells in Shallow Sand Aquifer

(January 2013; concentration unit: $\mu g/L$)

Previous SERDP/ESTCP projects have profiled the distribution of CVOCs across both the sand and clay units in the target Dem/Val area (**Figures 4-5 and 4-6**). **Figure 4-5** presents the distribution of CVOCs in groundwater along a north-south cross section just to the east (downgradient) of the target Dem/Val area (transect along ASU2 through ASU7 shown in **Figure 4-2**).



Figure 4-5. Profile of Groundwater CVOC Distribution

As shown in **Figures 4-2** and **4-5**, previous sampling location OU3-3 is located within the target Dem/Val footprint. **Figure 4-6** presents a conceptualized geologic cross section derived from high-resolution coring conducted at OU3-3 (ESTCP project ER-201032). At OU3-3, the vertical distribution of PCE, TCE, and cDCE in soil and groundwater at depths above, within, and below the clay unit depicts a classic PCE diffusion profile, with PCE penetration into approximately the upper 5 feet of the clay unit. Porewater PCE concentrations detected at OU3-3 at various depths across the clay unit ranged from 15,000 to 40,000 µg/L, indicating significant contamination within the depth interval targeted by the Dem/Val (~ 16.5 to 24 ft bgs).



Figure 4-6. Profiles of Soil and Groundwater CVOC Concentrations at OU3-3

(Source: ESTCP Project ER-201032)

Based on the site characterization results discussed above, the CVOCs residing in the clay unit in the proximity of OU3-3 represent a long-term continuing source for groundwater CVOC contamination in this area. Previous efforts to obtain water samples from the clay unit using conventional approaches were reported to be difficult, highlighting the expected limitations that would be encountered in an attempt to hydraulically migrate remediation amendments into this clay unit. Therefore, the Dem/Val footprint (as shown in **Figure 4-2**) and the target depth interval of 16.5 ft bgs to 24 ft bgs are deemed appropriate for this Dem/Val. Subsequent characterization data collected during the Dem/Val baseline characterization are presented in Section 5.3.

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5.0 TEST DESIGN

This section provides the details pertaining to the design, installation, and implementation of the EK-BIO technology in the target Dem/Val area.

5.1 CONCEPTUAL EXPERIMENTAL DESIGN

As presented in **Figure 5-1**, the overall EK system consists of nine (9) electrode wells [E1 through E9] and eight (8) supply wells [S1 through S8] located within a TTA measuring approximately 40 feet by 40 feet. Also presented in **Figure 5-1**, are seven (7) monitoring wells [EKMW1 through EKMW-7] located within the TTA and four (4) located outside the TTA.

The remediation amendments distributed by the EK system included electron donor (lactate provided as potassium lactate), pH control reagents (potassium carbonate), and a dechlorinating microbial consortium (KB-1[®]) containing *Dhc*. The power supply unit, amendment supply units and manifolds, and system operation monitoring and control unit were housed in a shed located adjacent to an existing utility building approximately 35 feet south of the TTA. Amendment conveyance tubing and electrical wiring conduit were installed along a trenched corridor to connect the EK control/amendment supply system to the well network in the TTA.

Table 5-1 presents a summary of major project milestones for this Dem/Val. To support the Dem/Val design, a bench-scale EK column test was conducted. The bench test and test results are discussed in Section 5.2. A baseline characterization event was conducted prior to the system construction and installation. Baseline characterization results are presented in Section 5.3. After the completion of system construction/installation and system startup, the overall Dem/Val involved two separate stages of EK operations. Each stage was operated with varying anode and cathode configurations to alter the primary direction of electric fields. **Figures 5-2** and **5-3** present conceptual orientations of the electric field established during each EK operational stage. Bioaugmentation of the TTA with reductive dechlorination culture (KB-1[®]) was conducted during Stage 1 operation. There was an incubation period of approximately 6 months between the two stages of active operation. Following the completion of the second EK operation stage in March 2017 and a subsequent incubation period of 3 months, a post-EK performance monitoring event was conducted in June 2017 to complete the Dem/Val.

During each stage of operation, the EK system was operated to achieve and maintain a constant current supplied to the overall electrode network. The voltage that was required to achieve and sustain this constant current is a site-specific characteristic related to the electrical resistance of the subsurface materials.



Figure 5-1. Well Network for Dem/Val

Well Installation	September 2014
Baseline Characterization	October 2014
System Fabrication / Field Construction / System Installation & Shakedown	October 2014 – June 2015
System Startup & Initial Field Conditioning	June – August 2015
Stage 1 Operation Period	August 2015 – Mach 2016
Bioaugmentation (Supply Wells and Electrode Wells)	October 29, 2015
End-of-Stage 1 Monitoring Event	March 2016
Post-Stage 1 Incubation Period	March – September 2016
Stage 2 Operation Period	October 2016 – March 2017
End-of-Stage 2 Monitoring Event	March 2017
Post-Stage 2 Incubation Period	March – June 2017
Final Sampling Event	June 2017

Table 5-1.Major Project Milestones



Figure 5-2. Stage 1 Conceptual Electric Field



Figure 5-3. Stage 2 Conceptual Electric Field

Potassium lactate was used to provide electron donor for ERD of CVOCs. Lactate was supplied to all electrode wells and all supply wells during the system operation. In addition to lactate, potassium carbonate (K_2CO_3) was added to all supply wells during EK operation as a pH buffer due to the low baseline pH (<6) in the TTA (which is not optimal for ERD). The EK system would also cross-circulate electrolytes (fluids in electrode wells) between cathodes and anodes, as well as provide supplemental acid or base, as needed, to individual electrode wells for overall pH control. The following sections provide specific details of individual phases completed under this Dem/Val.

5.2 TREATABILITY OR LABORATORY STUDY RESULTS

Preliminary characterization of the aquifer materials from the target Dem/Val area was performed to support design of the EK system. The descriptions of testing are provided in **Appendix B**. Approximately 24 feet of soil core was obtained from the vicinity of the target area with direct push approaches. Mineralogical analysis of the core through X-Ray Diffraction (XRD) indicated that the clay is predominantly kaolinite (61%), with smaller amounts of illite (1.4%), chlorite (11.9%), and smectite (15.3%). These fractions are within the range of soils encountered at other EK field sites.

Zeta potential measurements were conducted on samples from the soil cores by the University of Toronto. Zeta potential is a soil characteristic affecting electroosmosis of bulk water through soil pores under an applied electric potential. Two sets of testing were performed at various pH values. A flat zeta potential curve was measured, with values of approximately -25 mV above a pH of 4.5, suggesting that the EK system design should target pH control in electrode wells to levels above pH 5 to maintain operational efficiency. The zeta potential of the site soil is similar to that of the materials from sites previously tested for other EK projects.

A bench-scale EK column test was also conducted using the core material from the site to estimate the migration rate of amendments. Three 10-cm sections of the core materials were individually compacted using a piston into a 10-cm PVC column (3-inch diameter). A filter assembly was used at each end of the PVC column to connect the soil column to the electrode cells. A conservative bromide tracer (1 g/L of sodium bromide solution) was added to the cathode cell reservoir. Sodium phosphate solution (1.3 g/L) was added to both cathode and anode cells as electrolyte and buffer. The electrodes were connected to a dc power supply unit. A constant current of 25 mA was applied during the EK column test. The voltage needed to sustain this target current varied from the initial reading of 69.8 V after 29 hours to a lower reading of 54.3 V after 72 hours indicating the core material in the column became more electrically conductive.

At the completion of 72 hours of testing, the column was detached from the electrode cells and frozen. The frozen core was subsequently cut into a total of eight 1-cm sections along the direction from anode toward cathode. These samples, plus a background soil sample, were analyzed for bromide concentrations. The results presented in **Table 5-2** show that bromide migrated across the entire length of the 10-cm column from the cathode to the anode within 72 hours. These results suggest a minimum electromigration rate of 3.3 cm/day.

Sample	Background	3-cm from	5-cm from	7-cm from	10-cm from	
	Soil	cathode	cathode	cathode	cathode	
Bromide (mg/kg)	<1	295	158	157	284	

Table 5-2.Bromide Tracer Test Results

5.3 BASELINE CHARACTERIZATION

As discussed in Section 4, several previous SERDP/ESTCP projects (ER-0705, ER-1740, and ER-201032) have characterized the geology, hydrogeology, and contaminant distribution in the area that encompasses the target Dem/Val area. To establish the baseline geochemical conditions, microbial conditions, and contaminant distribution specifically within the Dem/Val footprint, a baseline characterization event was performed in October 2014 following the completion of well installation. **Table 5-3** presents a summary of the overall monitoring program for the Dem/Val, including the baseline characterization discussed in this section. Specific activities and details for the monitoring activities performed during system operation are discussed in Section 5.5.

5.3.1 Baseline Groundwater Sampling

Groundwater samples were collected from the 11 groundwater monitoring wells (EKMW-01 through EKMW-11; seven within and four outside the TTA) shown on **Figure 5-1**. Baseline geochemical characterization of groundwater included measurements of field parameters (dissolved oxygen [DO], oxidation-reduction potential [ORP], conductivity, and temperature) and laboratory analyses for metals, inorganic anions (chloride, sulfate and nitrate), CVOCs, total organic carbon (TOC), volatile fatty acids (VFAs), and dissolved hydrocarbon gases (DHGs: methane, ethene and ethane). Baseline measurement of various carbon indicators, such as TOC and VFAs, allowed the subsequent tracking of electron donor distribution.

Baseline groundwater microbial characterization included quantitative analysis of *Dhc* and *Dehalobacter* (*Dhb*), as well as the key biomarker, *vcrA*. These microbial characterization data were collected to establish the baseline conditions regarding the specific microbiological capacity within the Dem/Val footprint.

Field sampling and laboratory analyses were performed in accordance with the sampling and analysis methods presented in Section 5.6. Field sampling forms are provided in **Appendix D**. The baseline groundwater sampling results of select key parameters are summarized in **Table 5-4a** and presented in **Figure 5-4a and 5-4b**. Baseline data indicated that groundwater within the TTA was generally acidic and slightly oxidizing with low DO between 0.2 to 0.6 mg/L. Baseline TOC and VFAs were relatively low (mostly below 6 mg/L), and, with the exceptions of EKMW-01 and EKMW-05, there was no detectable levels of *Dhc*, *Dhb*, and *vcrA*. Additional detailed discussions of groundwater baseline characterization results are presented in Section 6.3.

Phase	Matrix	Frequency	Analyses	Location
Decilier	Soil	Three depths ⁽¹⁾ per boring	VOCs ⁽²⁾ , Metals ⁽³⁾ , Microbial (<i>Dhc</i> , <i>Dhb</i> & <i>vcrA</i>), Grain-size	9 locations within the target treatment area (TTA) and 2 locations outside the TTA
Baseline Characterization	Groundwater One Time Metals, Anions ⁽⁶⁾ , T Field Geochemistry		VOCs, DHGs ⁽⁴⁾ , VFAs ⁽⁵⁾ , Metals, Anions ⁽⁶⁾ , TOC, Field Geochemistry ⁽⁷⁾ , Microbial (<i>Dhc</i> , <i>Dhb</i> & <i>vcrA</i>)	All 11 monitoring wells (EKMW-01 through EKMW-11)
System Start-up Phase	Groundwater	Weekly	Field Geochemistry, Electric Field ⁽⁸⁾	7 Monitoring wells within TTA
		Weekly	Electric Field	6 Monitoring wells within
Stage 1 Operations	Groundwater	Monthly	TOC, VFAs	the TTA (EKMW-01 through EKMW-07 except EKMW-06)
End of Stage 1 Operation & End of	Soil	Two depths ⁽¹⁾ per boring	VOCs, Microbial (<i>Dhc</i> , <i>Dhb</i> & <i>vcrA</i>)	9 select locations within the TTA and 1 location outside the TTA
Incubation Period between Stage 1 and Stage 2 Operations	Groundwater One Time		VOCs, DHGs, VFAs, Metals, Anions, TOC, Field Geochemistry, Microbial (<i>Dhc, Dhb & vcrA</i>)	All 10 monitoring wells (EKMW-01 through EKMW-11 except EKMW-06)
		Weekly	Electric Field	6 Monitoring wells within
Stage 2 Operations	Groundwater	Monthly	TOC, VFAs	TTA (EKMW-01 through EKMW-07 except EKMW-06)
Post-Operation Final Monitoring			VOCs, Microbial (<i>Dhc, Dhb</i> & <i>vcrA</i>); and Metals	9 locations within TTA and 1 location outside TTA
(3 months)	Groundwater	End of 3-month post-operation incubation period	Field Geochemistry; TOC, VOCs, DHGs Metals, Microbial (<i>Dhc, Dhb &</i> <i>vcrA</i>)	All 10 monitoring wells, including 6 Monitoring wells in TTA

Table 5-3.Summary of Monitoring Program

- (1) Baseline event: discrete soil samples collected from approximately 18.5, 21, and 23 ft bgs. Subsequent events: two sampling depths per location at 18.5 and 21 ft bgs.
- (2) VOCs: PCE, TCE, cDCE, and VC.
- (3) Iron, Manganese, Calcium, and Magnesium.
- (4) Methane, Ethene, and Ethane.
- (5) Lactate, Acetate, Propionate, Formate, Butyrate, and Pyruvate.
- (6) Nitrate, Sulfate, and Chloride.
- (7) Conductivity, Temperature, Redox, pH, and Dissolved Oxygen.
- (8) Voltage measurements taken at select wells. Readings of electric currents to individual electrodes recorded at wellhead using portable current clamp.

Table 5-4a. Analytical Results in Groundwater-baseline Sampling Event

OU3, NAS Jacksonville

Analyte	Units	EKMW-01	EKMW-02	EKMW-03	EKMW-04	EKMW-05	EKMW-06	EKMW-07	EKMW-08	EKMW-09	EKMW-10	EKMW-11
Volatile Organic Compounds												
1,1-DCE	μg/L	25 U	4 I	2 I	1 I	5 U	1 I	2 U	2 U	25 U	2	0.2 U
cis-1,2-DCE	μg/L	1,190	950	760	380	773	120	970	90	288	260	10
PCE	μg/L	7,640	170	190	250	1,800	640	1,300	1,600	5,220	120	160
trans-1,2-DCE	μg/L	323	11	2 I	4	81	21	44	4 I	50	3	0.2 U
TCE	μg/L	1,670	150	150	130	344	130	260	77	482	170	8
VC	μg/L	33 U	6 I	1 U	3	7 U	9	89	2 U	33 U	5	0.4 I
Dissolved Hydrocarbon Gases												
Methane	μg/L	190	1200	330	54	270	29	110	110	120	1300	10 U
Ethene	μg/L	15	10 U	10 U	10 U	73	10 U	11	10 U	10 U	10 U	10 U
Ethane	μg/L	10 U										
Microbial												
Dhc	cell/L	8.0E+05	3.0E+03 U	3.0E+03 U	3.0E+03 U	3.0E+05	3.0E+03 U	4.0E+03 U	3.0E+03 U	4.0E+03 U	3.0E+03 U	4.0E+03 U
Dhb	cell/L	3.0E+03 U	4.0E+03 U	3.0E+03 U	4.0E+03 U	3.0E+03 U	4.0E+03 U					
vcrA	gene copy/L	3.0E+03				4.0E+05						
Volatile Fatt Acids												
Lactate	mg/L	0.96	0.39 U	0.52	0.39 U	0.39 U	0.41	0.39 U	0.39 U	0.39 U	0.46	0.55
Acetate	mg/L	2.3	1.6	0.54 U	1.9	1.8	4.6	2.2	3.1	2.3	1.3	0.81
Propionate	mg/L	0.31 U	0.31 U	0.74	0.31 U							
Formate	mg/L	0.22 U	1	0.22 U	0.22 U	0.22 U	0.32	0.22 U				
Butyrate	mg/L	0.41 U										
Pyruvate	mg/L	0.69 U										
Total VFAs	mg/L	3.26	1.6	1.26	1.9	1.8	6.01	2.2	3.1	2.3	2.08	1.36
Other Organics and Inorganics	~											
TOC	mg/L	2.5	2.5	2.5	3.6	1.7	1.4	6.8	2.3	1.6	1.9	3.1
Chloride	mg/L	3400	550	520	570	1900	1700	790	1000	2800	570	170
Nitrate (as Nitrogen)	mg/L	0.17 U	0.05 U	0.17 U	0.17 U	0.17 U	0.25 U	0.17 U				
Sulfate	mg/L	57	27	24 I	45	50	23	140	38	36	21 I	16 I
Calcium	mg/L	350	100	89	120	400	400	150	150	460	140	130
Iron	mg/L	130	57	58	47	160	61	23	67	130	49	2.9
Magnesium	mg/L	98	30	27	31	110	100	21	45	130	42	0.74
Manganese	mg/L	2.8	0.86	0.79	0.99	3.3	3.1	0.48	1.1	4.1	1.2	0.015
Field Parameters	~											
pH	unit	4.7	5.8	5.8	4.9	5.2	5.1	5.1	5.7	5.0	6.0	10.6
ORP	mV	54	-21	-21	42	64	81	34	12	100	-27	-9
DO	mg/L	0.6	0.2	0.2	0.2	0.3	0.9	0.5	0.4	1.2	0.6	0.1

Notes:

PCE - Tetrachloroethene VFA - volatile fatty acid TCE - Trichloroethene TOC - Total organic carbon 1,1-DCE - 1,1-Dichloroethene ORP - oxidation reduction potential cis-1,2-DCE - cis-1,2-Dichloroethene DO - dissolved oxygen trans-1,2-DCE - trans-1,2-Dichloroethene µg/L - microgram per liter VC - Vinyl Chloride L - liter Dhc - dehalococcoides mg/L - milligram per liter Dhb - dehalobacter mV - millivolt vcrA - vinyl chloride reductase

U - The compound was analyzed for but not detected

I - The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit

(a) gene copy per liter is generally equivalent to cell per liter

	Sample Depth	Ve	olatile Organic C	ompounds (mg/k	:g)	Inorganics			
Soil Boring	(ft bgs)	PCE	TCE	cis-1,2-DCE	VC	Calcium	Iron	Magnesium	Manganese
	18.5	16	0.42	0.38 I	0.032	2500	20000	3400	60
C1	21	0.029	0.032	0.006	0.0013 U				
	23	0.04	0.061	0.0077	0.0014 U	2200	17000	2700	54
	18.5	15	0.27 I	0.16	0.012	1200	8000	1600	27
C2	21	0.028	0.017	0.006	0.0011 U				
	23	0.082	0.067	0.0083	0.0014 U	2400	16000	3100	62
	18.5	6.9	0.42	1.9	0.077 U	1200	\$100	1600	26
C3	21	0.084 U	0.07 U	0.099 I	0.084 U				
	23	0.084 U	0.07 U	0.097 U	0.084 U	2200	13000	2800	49
	18.5	4.7	0.17	0.14	0.023	2400	18000	3300	56
C4	21	0.081	0.018	0.0082	0.0015 U				
	23	0.01	0.04	0.014	0.0014 U	2700	21000	3600	71
	18.5	12	0.14 I	0.12 I	0.083 U	2200	15000	2800	47
C5	21	0.022	0.007	0.0046 I	0.00057 U				
	23	0.047	0.043	0.0067 I	0.0011 U	2300	15000	2800	57
	18.5	10	0.27 I	0.16	0.027	3100	29000	4500	84
C6	21	5.5	0.18	0.12	0.017				
	23	3.1	0.18	0.11	0.016	2700	20000	3300	70
	18.5	0.08 U	0.067 U	3.3	0.08 U	2200	20000	3200	58
C7	21	0.027	0.0025 I	0.11	0.00052 U				
	23	0.011	0.011	0.011	0.00056 U	2800	19000	3800	71
	18.5	7.6	0.12	0.86	0.2	2900	27000	4100	75
C8	21	0.025	0.024	0.0058	0.0045				
	23	0.021	0.062	0.0062	0.0011 U	2100	16000	2600	51
	18.5	14	0.3 I	0.22 I	0.037	1800	13000	2200	42
C9	21	0.035	0.0096	0.0018 I	0.0015 U				
	23	0.0013 U	0.03	0.0066	0.0012 U	2400	17000	2900	61
	18.5	45	0.1	0.031	0.00052 U	1500	12000	2000	38
C10 ^(a)	21	11	0.015	0.004 I	0.00055 U				
	23	2.6	0.0076	0.0016 I	0.0005 U	2500	18000	3200	34
	18.5	4.9	0.024	0.0082	0.0015 I	2700	19000	2900	69
C11 ^(a)	21	0.034	0.0014 U	0.0014 U	0.0017 U				
C6 C7 C8 C9 C10 ^(a)	23	0.097 U	0.081 U	0.11 U	0.097 U	4100	24000	4400	260

Table 5-4b.Analytical Results in Soil – Baseline Sampling EventOU3, NAS Jacksonville

Notes:

PCE - Tetrachloroethene

TCE - Trichloroethene

cis-1,2-DCE - cis-1,2-Dichloroethene

VC - Vinyl Chloride

Dhc - dehalococcoides

mg/kg - milligram per kilogram

U - The compound was analyzed for but not detected

I - The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit

-- - not analyzed

(a) Sampling locations C10 and C11 are outside the target treatment area.





5.3.2 Baseline Soil Sampling

Soil cores were collected from nine (9) locations within the TTA and two (2) locations outside the TTA (**Figure 5-4c**). At each location, a soil core was collected using Direct Push Technology (DPT) to a target depth of 24 feet. With each collected soil core, three (3) discrete soil samples were collected from approximately 18.5, 21, and 23 ft bgs.

Baseline soil characterization included laboratory analyses for metals and CVOCs, as well as quantitative analyses of *Dhc*, *Dhb*, and *vcrA*. In addition, the baseline soil characterization included soil grain size analysis.

Field sampling and laboratory analyses were performed in accordance with the sampling and analysis methods presented in Section 5.6. Field sampling forms and chain of custody forms are provided in **Appendices D & E**. The baseline soil sampling results of select key parameters are summarized in **Table 5-4b** and the soil PCE data are presented in **Figure 5-4c**. The baseline soil characterization data indicated that there was very little apparent reductive dechlorination activities within the TTA prior to the Dem/Val. The data also suggested that the majority of soil PCE within the TTA appeared to be present above the depth of 21 ft. Additional detailed discussions of soil baseline characterization results are presented in Section 6.2.

5.4 DESIGN AND LAYOUT OF TECHNOLOGY COMPONENTS

The locations of the electrode wells, supply wells, and monitoring wells are shown in **Figure 5-1**. System components and equipment for amendment supply and cross-circulation were housed in an equipment enclosure located adjacent to an existing utility building to the south of the TTA. Given the operational needs of NAS Jacksonville, the wellhead components and the connections between electrode/supply wells and the equipment enclosure (conveyance piping, electrical wiring, instrumentation wiring) were installed below ground. Prior to field construction and installation, a comprehensive utility locate and survey was conducted in the proposed Dem/Val area. The Dem/Val system design and well network was adjusted based on the results of these surveys. The following sections describe the specifics of individual system components.

5.4.1 Electrode Wells

A total of nine (9) electrode wells (E1 through E9) were installed by hollow-stem auger drilling in the treatment area. Electrode well construction details are provided in **Figure 5-5.** Each electrode well was constructed with 4-inch diameter PVC casing and 0.01-inch slotted screen. The screened interval was generally between 19 and 23 ft bgs across the clay unit (which was expected to be observed between approximately 16.5 to 25 ft bgs). A medium sand filter pack was placed around the screen from the bottom of the borehole up to the top of the screen and topped by a fine sand filter pack up to 1/2 foot above the screened interval. A 2-foot thick (~ 16.5 to 18.5 ft bgs) bentonite seal was installed above the sand pack by placing bentonite chips and hydrating for at least one hour. Grout, consisting of cement and bentonite powder, was then added to fill the remaining annulus up to the bottom of the well vault.

Figure 5-6 presents the details of the electrode well vault. Locking well vaults (traffic-rated, 2-ft x 2-ft x 2-ft) were installed with concrete protection around the vault and a gravel base. The electrode well casing was completed at the top with the installation of a PVC flange.



Figure 5-5. Electrode Well Details



Figure 5-6. Electrode Well Vault Details

Access ports were installed in the flange for installation of the electrode, electrical cable, tubing, and a pressure safety valve (PSV). Additional descriptions of the conveyance system and control instrumentation are provided in Sections 5.4.5 through 5.4.8.

5.4.2 Supply Wells

A total of eight (8) supply wells (S1 through S8) were installed by hollow-stem auger drilling in the treatment area. Supply well construction details are provided in **Figure 5-7.** Each supply well was constructed with 4-inch diameter PVC casing and 0.01-inch slotted screen. The screened interval was across the clay unit at depths between 19 and 23 ft bgs. Construction details for supply wells are the same as electrode wells. **Figure 5-8** presents the details of the supply well vaults. Additional descriptions of the conveyance system and control instrumentation are provided in Sections 5.4.5 through 5.4.8.

5.4.3 Monitoring Wells

A total of 11 monitoring wells were installed by hollow-stem auger drilling within and around the treatment area (**Figure 5-1**). Monitoring wells were constructed as double-casing wells each with a 6-inch PVC surface casing installed to 18 ft bgs and grouted in place (**Figure 5-9**). Each 2-inch diameter monitoring well was then constructed by drilling through the bottom of grouted 6-inch casing to install 0.01-inch slotted screen section at depths between 19 and 23 ft bgs. A medium (20/30) sand filter pack was placed around the screen from the bottom of the borehole up to 1/2 ft above the top of the screened interval. A 2-foot thick bentonite seal was installed above the sand pack by placing bentonite chips and hydrating for at least one hour. Grout, consisting of cement and bentonite powder was then added to fill the remaining annulus up to the bottom of the well vault.

5.4.4 **Power Supply and Electrodes**

The power supply unit for the EK system was a Magna XR250-24/240 dc power supply unit with input power from 3-phase alternate current (AC) 240V. This 6kW unit has a capacity to output 0 to 250V and 0 to 24A. The power supply was operated in constant current mode with varying voltage automatically adjusted to the changes in soil conductivity.

During each EK operational stage, six (6) electrode wells were used as cathodes and three (3) electrode wells as anodes. The electrode arrangements for Stage 1 and Stage 2 operations are shown in **Figures 5-2** and **5-3**, respectively. The electrodes consisted of a titanium rod (³/₄-inch diameter; 4-ft long) with mixed metal oxide (MMO) coating (TELPRO tubular anodes manufactured by Titanium Electrode Products, Inc., Stafford, TX). The coating consists of IrO₂/Ta₂O₅ and is suitable for use in soils, carbonaceous backfill, fresh and brackish water, and seawater.

5.4.5 Amendment Supply System

Electron donor solution was prepared by adding 60% (w/w) potassium lactate (WILCLEAR[®]) to 250-gallon totes for transfer to supply wells and electrode wells by the amendment supply system. Buffer solution was prepared by adding potassium carbonate (anhydrous power, 99%) to 250-gallon totes for transfer to supply wells by the amendment supply system. The amendment supply was performed as short-duration pulsed injections using feed pumps controlled by timers. The duration and flow rate of each pulse injection cycle were programmed so that each injection event generally introduced less than ½ gallon of solution to each well.



Figure 5-7. Supply Well Details



Figure 5-8. Supply Well Vault Details



Figure 5-9. Monitoring Well Details



Figure 5-10. Conduit Trench Details

5.4.6 Cross-Circulation and Electrode Well pH Control System

Electrolysis of water in electrode wells produces acid (anode) and base (cathode) resulting in pH changes in the wells. Cross-circulation of electrolytes between anodes and cathodes can balance pH to an extent and reduce the amount of supplemental pH-adjusting reagents needed. Cross-circulation between cathode wells and anode wells was achieved by transferring electrolyte from individual cathode wells to individual anode wells and vice versa. During a given programmed cross-circulation event, the system extracted catholyte from a cathode well to a catholyte holding tank, while at the same time extracting anolyte from an anode well to an anolyte holding tank. Extraction was performed by peristaltic pumps controlled by timers. In-line monitoring stations monitored the pH of the extracted electrolytes. Following the extraction event, the system pumped the extracted electrolyte in the holding tank back to the electrode well of opposite polarity (i.e., catholyte to anode well and vice versa). Depending on the pH reading of the extracted electrolyte, supplemental lactic acid solution (for cathode well) or sodium hydroxide solution (for anode well) was added to the electrolyte injection tubing during the re-injection cycle when electrolyte was pumped from the holding tank back to an electrode well.

5.4.7 **Process Monitoring and Controls**

The EK system was constructed with instrumentation and controls to monitor and operate the system automatically using a programmable logic controller (PLC). Overall operation of the pumps for amendment supply and electrolyte cross-circulation was controlled by timers in the PLC. The PLC also controlled solenoid valves at the central manifold in the equipment shed to direct flows from and to individual wells.

In-line water quality stations installed on the electrolyte extraction lines monitored the pH of the electrolyte coming from an individual electrode well. A data acquisition system was used to record the pH monitoring data collected.

5.4.8 Conveyance Piping and Utilities

Dedicated conveyance piping was run between the system equipment enclosure and the well network through a combined conduit. The conduit was installed in shallow trenches as shown in a typical trench detail (**Figure 5-10**). Additional conduits were placed in the trenches for the installation of electrical wires to electrodes.

5.5 FIELD TESTING

This section provides a description of each significant phase of operation and the activities conducted during that phase. A schedule illustrating the sequence and duration of individual phases of operation is presented in **Table 5-5**.

System Startup & Initial Field Conditioning	June 2015 – August 2015
Stage 1 Operation	August 2015 – Mach 2016
* During Stage 1 Operation – Bioaugmentation (Supply Wells and Electrode Wells)	* October 29, 2015
* End-of-Stage 1	* March 2016
Post-Stage 1 Incubation Period (no operation)	March 2016 – September 2016
Stage 2 Operation	October 2016 – March 2017
* End-of-Stage 2	* March 2017
Post-Stage 2 Incubation Period (no operation)	March 2017 – June 2017

Table 5-5.Dem/Val Field Testing Phases

5.5.1 System Start-Up

EK system Start-Up commenced following the installation and shakedown of the system components described above in Section 5.4. During the start-up, carbonate (Na_2CO_3) solution was delivered to the supply wells in order to condition the pH in the formation around the supply wells prior to the addition of electron donor in the next phase. The duration of the start-up period for buffer addition was approximately 60 days. Buffer addition continued during the subsequent two active EK operational phases (Stage 1 and Stage 2) together with lactate amendment supply.

During the start-up operation, daily remote-monitoring of PLC data and weekly system field inspections were conducted to monitor system operations. The distribution of the electric field within the TTA was confirmed by lowering an insulated reference electrode into a given monitoring well and using a hand-held voltage meter to measure the voltage difference between that location and a universal reference cathode, which in our case was the power supply unit in the system shed. The field personnel wore rubber boots and rubber gloves when performing this task. As discussed in Section 6.1, relatively uniform electric field was confirmed based on the voltage measurements taken at all monitoring wells within the TTA.

5.5.2 Stage 1 EK Operations and Monitoring

Following system start-up, electron donor (lactate solution) was added to the TTA during Stage 1 EK operation. This operational stage included 2 segments – before bioaugmentation and after. The electrode polarity arrangement for Stage 1 operation is shown in **Figure 5-2** with E2, E5, and E8 as anodes.

Lactate solution was supplied to all electrode wells and all supply wells as individual short pulses several times a day. Other system operation activities included buffer amendment to supply wells, cross-circulation between electrodes, and supplemental acid and base addition, as needed, to electrode wells.

Bioaugmentation

Bioaugmentation of the TTA with dechlorination microbial culture containing *Dhc* was performed to establish adequate reductive dechlorinating populations. After approximately 75 days of active operation when geochemistry monitoring data indicated anaerobic and reducing conditions at supply wells and monitoring wells within the TTA, the system was shut down 48 hours prior to the bioaugmentation event, which occurred on 29 October 2015. To bioaugment the TTA, 4 liters of KB-1[®] culture (SiREM Laboratory, Ontario, Canada) was added to each supply well, and 1.5 liters to each electrode well. The KB-1[®] culture selected for this project contain *Dhc* that are capable of fully degrading chlorinated ethenes under mildly acidic (i.e., pH <6.0) conditions. The system operation resumed 48 hours after the bioaugmentation event.

The Stage 1 operation continued for approximately 5 months following bioaugmentation and was completed in March 2016. During the operation, system inspections were conducted generally twice a week by a field operator to monitor and record system operational conditions and perform routine maintenance, mainly related to filter cleaning/replacement and amendment stock solution replenishment. The distribution of electric field within the TTA was confirmed by measuring voltages at monitoring wells as described above. Groundwater sampling and analysis for performance monitoring was conducted in accordance with **Table 5-3** and the sampling methods presented in Section 5.6.

5.5.3 Post-Stage 1 Incubation

Following the completion of Stage 1 operations, the system was shut down and the project entered a 6-month post-Stage 1 incubation period. An end-of-Stage 1 monitoring event was completed in March 2016 immediately following the system shut down. An end-of-post Stage 1 incubation monitoring event was completed in September 2016. Sampling and analysis for these monitoring events were performed in accordance with **Table 5-3** and the methods presented in Section 5.6.

5.5.4 Stage 2 EK Operations and Monitoring

After the 6-month post-Stage 1 incubation, the electrode polarity arrangement was adjusted to start Stage 2 operation (**Figure 5-3**) with E4, E5, and E6 as anodes. The system operational program for electron donor amendment, buffer addition, cross-circulation between electrodes, and supplemental acid and base addition essentially followed the same approach as that of Stage 1 operation. There was no bioaugmentation in Stage 2 operation.

The Stage 2 operation continued for approximately 5 months from October 2016 through March 2017. During the operation period, system inspections and maintenance, as well as field measurements, were conducted following the same program and procedures as described above for the Stage 1 operation.

5.5.5 Post-Stage 2 Incubation

Following the completion of Stage 2 operations, the system was shut down and the project entered a 3-month post-Stage 2 incubation period. An end-of-Stage 2 monitoring event was completed in March 2017 immediately following the system shut down. An end-of-post Stage 2 incubation monitoring event (also as the final performance monitoring event) was completed in June 2017.

Sampling and analysis for these monitoring events were performed in accordance with **Table 5-3** and the methods presented in Section 5.6.

5.5.6 Decommissioning

NAS Jacksonville and NAVFAC are currently in the process of preparing a Feasibility Study (FS) for remediation of the OU3 area, which encompasses the Dem/Val TTA. It is anticipated that EK-BIO will be retained in the FS as a technology in consideration for treatment of impacts in the clay layer outside of the Dem/Val TTA. As such, the Dem/Val infrastructure will remain in place until the FS is completed, and a decision rendered on remedy, in the event that the decision is to expand the EK-BIO remedy to the wider source zone. Should EK-BIO not proceed further, Geosyntec will then remove the surface infrastructure (i.e., EK Control Center and solution tanks) from the site, while NAS Jacksonville will complete final disposition of the wells. Details will be provided in a separate letter.

5.6 SAMPLING METHODS

In addition to operational data related to the system (i.e., electrical current and voltage, flow rates of amendments and cross-circulation), an overall field monitoring and sampling program for the Dem/Val is presented in **Table 5-3**. **Table 5-3** presents the sample matrix (i.e., soil and groundwater), the locations and frequencies, and the analytical parameters performed during each phase of this Dem/Val.

5.6.1 Sampling and Analytical Methods

As presented in **Table 5-3**, the Dem/Val monitoring program included both measurements of field parameters and collection of environmental samples (soil and groundwater) for laboratory analyses. **Table 5-6** summarizes the laboratory analytical methods. The methods for field sample collection and field parameter measurements are described in this section.

Matrix	Analyte	Method	Container	Preservative ¹	Holding Time
	VOCs	8260B	3x 10-gram Terra Cores	2 with NaHSO4; 1 with methanol; 4 ± 2°C	14 days
Soil	Metals (Ca, Fe, Mn, Mg)	6010B	2-oz glass jar	$4 \pm 2^{\circ}C$	6 months
	Tracer (Br ⁻)	300.0	2-oz glass jar	$4 \pm 2^{\circ}C$	28 days
	Biomarkers (Dhc, Dhb, and vcrA)	Gene-Trac [®] Method	50 mL conical tube provided by laboratory	$4 \pm 2^{\circ}C$	14 days
	VOCs	8260B	40 mL VOA vial	HC1; 4 ± 2°C	14 days
	VFAs	Ion Chromatography	40 mL VOA vial	$4 \pm 2^{\circ}C$	14 days
	DHGs (methane, ethane, ethane)	RSK-175	40 mL VOA vial	HC1; 4 ± 2°C	14 days
Groundwater	Total Metals (Ca, Fe, Mn, Mg)	6010B	250mL polyethylene	HNO ₃ ; $4 \pm 2^{\circ}C$	6 months
	Anions (NO ₃ -, SO4 ⁻² , Cl ⁻) and Tracer (Br ⁻)	300.0	250mL polyethylene	4 ± 2°C	28 days (except NO ₃ - at 48 hours)
	ТОС	9060A	125 mL amber glass	HC1, $4 \pm 2^{\circ}$ C	28 days
	Biomarkers (Dhc, Dhb, and vcrA)	Gene-Trac [®] Method	500 mL polyethylene	$4 \pm 2^{\circ}C$	14 days

Table 5-6.	Analytical	Methods for	Sample Analysis
	•		1 2

For soil sampling, soil cores were collected using DPT tooling. For each soil sampling event, one continuous core from ground surface to approximately 24 feet bgs was collected from each of the 11 soil sampling locations (C1 through C11) shown in **Figure 5-11**. Soil cores were collected in acetate sleeves for observation and sampling. Discrete soil samples were collected for laboratory analyses from the selected depths. For the baseline event, samples were collected at each location from approximately 18.5, 21, and 23 ft bgs. The field personnel documented that clay was the predominant geologic material at all the locations and all these sampling depths. As discussed in Section 6.2, based on the baseline soil sampling results, subsequent soil sampling events only collected samples from 18.5 and 21 ft bgs, since CVOCs were not typically present below 21 ft bgs. For VOC analysis, Terra Core samplers were used to minimize volatilization loss. Upon completion of soil sampling, each borehole was backfilled with bentonite chips and surface repaired in accordance with NAS Jacksonville requirements.





Figure 5-11. Soil Sampling Locations (C1 through C11)

The groundwater monitoring well network for the Dem/Val is presented in **Figure 5-1**. Groundwater elevation was measured for each monitoring well prior to sampling. After opening each well, the groundwater elevation was allowed to equilibrate with atmospheric conditions before taking a water level measurement. The depth to groundwater was measured using a Solinst interface meter (or equivalent) in 0.01-foot increments, relative to a permanently marked survey point located at the top of the well casing and recorded on the purge log field form. The water level meter was decontaminated between wells.

Groundwater sampling was conducted following low-flow purging protocols with the use of a peristaltic pump and dedicated tubing. With the low-flow sampling, the intake of the sampling tube was placed mid-way between the top and bottom of the well screen. The water level was monitored during purging to measure drawdown and determine the appropriate flow rate for the well. During purging, in-line water quality parameters were monitored continuously in a flow-through cell for temperature, pH, specific conductance, DO, and ORP. Purging was considered complete when a minimum of one casing volume of water had been removed with collection of at least three sets of field measurements spaced at two (2) to three (3) minute intervals, or when groundwater field parameters stabilized. The indicator parameters were considered stabilized when three consecutive readings met the following criteria:

• Temperature $\pm 0.2^{\circ}$ C

(i.e., the second and third reading must be within 0.2°C of the first reading);

- $pH \pm 0.2 pH$ units;
- Specific Conductance \pm 5% units; and
- DO \pm 0.2 mg/L or \pm 10% (whichever is greater).

Readings of stabilized parameters were recorded on the field sampling log forms. Following stabilization of indicator parameters, groundwater samples were collected into the appropriate laboratory prepared and preserved sample containers. Sampling containers, holding times, and preservation methods associated with each method are presented in **Table 5-6**. The sample containers were clearly labeled and placed in an insulated cooler with ice for shipping to laboratories following proper chain-of-custody protocols.

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6.0 SAMPLING RESULTS AND DISCUSSIONS

This section presents a detailed summary and discussions of all monitoring/sampling results. While baseline characterization results have already been presented in Section 5.2, select baseline characterization data are incorporated in this section, as appropriate, with other performance monitoring data to support analyses and discussions related to changes of soil and groundwater conditions during the Dem/Val.

6.1 SYSTEM OPERATION MONITORING

Figure 6-1 presents the power usage over the course of Stage 1 and Stage 2 operations. The voltage (V) and current (A) readings recorded at the power supply unit over the duration of operation are used to calculate the electrical power usage (kilowatt-hour [kW-hr]). The system was designed and operated to supply a constant current, determined after the start-up phase, and the power supply unit would then operate at a voltage level that was required in response to field electrical resistivity in order to maintain the supply of constant current.

Figure 6-1 shows that the power supply unit's voltage output remained generally steady between approximately 18V and 28V (Stage 1) and 12V and 20V (Stage 2). There were three occasions when different electrodes needed to be replaced, including late October/early November 2015 and late January/early February 2016 during Stage 1 operation, as well as December 2016 during Stage 2 operation. Prior to the electrode replacement, the system voltage readings would indicate the operating conditions were becoming unsteady. By inspecting the electrodes, it was determined that the initial shakedown/start-up operations at the start of Stage 1 operation, particularly an initial conservative electrode polarity reversal program, overly stressed the anode leading to damage of the electrode surface coatings. The polarity reversal program was corrected after the start-up operation in June/July 2015, however, the initial damages to the electrodes shortened the life-span of the anodes leading to the need to replace them during the operation. Other than the periods when electrodes were in need of replacement, the power supply unit operating conditions were relatively steady.

The total power consumption was calculated for Stage 1 at 1,037 kW-hr and Stage 2 at 548 kW-hr. Calculations for Stage 1 include the initial start-up operation (June-July 2015) and the initial buffering/conditioning operation (July-October 2015) preceding the 5-month Stage 1 full EK-BIO operation (October 2015-March 2016) counting after the TTA bioaugmented with the dechlorination culture. Stage 2 operation included only the 5-month full operation (October 2016-March 2017). As a comparison, the total energy usage by the EK system during the 14 active months of the Dem/Val (1,585 kW-hr) is equivalent to operating two 100-W lightbulbs over the same time interval, or operating a single 100-W lightbulb for approximately 660 days (22 months).





Figure 6-1. Power Usage During System Operation

In addition to monitoring the power supply unit, field measurements were taken to confirm the establishment of electric field within the TTA. **Figure 6-2** presents the field measurements made in October 2015 when electrode wells, E2, E5, and E8 were anodes.



Figure 6-2. Voltage Measurements (V) at Monitoring Wells Within TTA

The voltage measurements taken at individual monitoring wells were used to assess if a uniform electric field was established within the TTA. Voltage measurements at individual wells relative to a common cathode reference at the EK control system were between 5.3V and 6.2V with an average of 5.6V and a standard deviation of 0.31V (5% variation from the average) indicating that an electric field was established in the area between electrode wells. Voltage gradients between discrete locations of closest pairs are also calculated and summarized below.

Well Pairs	MW-1 &	MW-2 &	MW-4 &	MW-5 &	MW-5 &
	MW-3	MW-3	MW-6	MW-6	MW-7
Voltage Gradient (V/m)	0.12	0.26	0.1	0.1	0.1

The calculated voltage gradients between these pairs are within 2x of the average gradients (0.13 V/m) measured also suggesting no local focusing of electric field within TTA.

Table 6-1 below presents the average and standard deviation calculated for the electrical current to individual wells during each stage of operation. The data show that the current supply to individual electrode well was generally steady (variation within 37% of average). Given that (1) soil electrical resistivity is a soil property not expected to vary over the course of Dem/Val, and (2) the voltage output by the power supply unit and the current supplied to individual electrodes were generally steady, the electrical potential between electrode pairs within the TTA should maintain within 5x of target during operation.

Stage 1			Anodes						
Stage 1	E 1	E3	E4	E6	E7	Е9	E2	E5	E8
Avg	1.5	1.0	1.4	1.5	1.8	1.3	3.2	2.3	3.1
Std Dev	0.2	0.3	0.1	0.3	0.3	0.2	0.5	0.6	0.4
S4 2		-	Cath		Anodes				
Stage 2	E1	E2	E3	E7	E8	E9	E4	E5	E6
Avg	1.4	1.7	0.8	1.5	1.7	1.1	2.3	2.9	2.2
Std Dev	0.1	0.3	0.2	0.2	0.1	0.2	0.8	0.3	0.6

 Table 6-1.
 Electrical Current to Electrode Wells

Table 6-2 summarizes the amendment supplied to the TTA and the energy usage throughout the Dem/Val. The duration and quantity reported for Stage 1 operation include the initial start-up operation and buffering/conditioning operation prior to bioaugmentation of the field when the 5-month full EK-BIO remediation operation was considered to start.

Stage 1 Operation	Lactate to 8 Supply Wells	Lactate to 9 Electrode Wells	K-Carbonate to All Wells	Energy Usage	
June 2015 – March 2016	80 kg via 370 gal	158 kg via 620 gal	35 kg via 655	985 kW-hr	
	10 kg/well via 47 gal/ well	17.5 kg/well via 69 gal/well	gal	965 KW-III	
Stage 2 Operation	Lactate to 8 Supply Wells	Lactate to 9 Electrode Wells	K-Carbonate to All Wells	Energy Usage	
October 2016 –	105 kg via 520 gal	212 kg via 1,038 gal	16 kg via 305	548 kW-hr	
March 2017	13.1 kg/well via 65 gal/ well	23.5 kg/well via 115 gal/well	gal		
Dem / Val Total	Lactate to 8 Supply Wells 185 kg / 890 gal (23 kg/well via 112 gal/well)	Lactate to 9 Electrode Wells 370 kg / 1,658 gal (41 kg/well via 184 gal/well)	K-Carbonate to All Wells 51 kg / 960 gal	Total Energy Usage 1,533 kW-hr	

Table 6-2.EK System Operation Summary

It should be noted that in this Dem/Val, amendment delivery was driven by electric field and not hydraulic pressure. The total volume of lactate amendment solution delivered throughout the Dem/Val was approximately 2,550 gallons. This accounts for only 16% to 22% of the total pore volume within a treatment zone of 35 ft x 35 ft x 5 ft at 25% to 35% total porosity.

Therefore, amendment distribution and the resulted biotreatment achieved within the TTA, as discussed below based on the monitoring data collected, should be recognized as the results of enhanced amendment delivery beyond diffusion mechanism.

6.2 GROUNDWATER SAMPLING RESULTS

Groundwater monitoring data are summarized, per sampling event, and provided in **Appendix F**. The locations of groundwater monitoring wells are presented in **Figure 5-1**. One monitoring well within the TTA, EKMW-06, was later found to not produce sufficient groundwater volume for sampling likely due to blockage. Therefore, EKMW-06 was not included in the monitoring program.

6.2.1 Groundwater Geochemistry

Groundwater geochemistry data, including the baseline characterization results, are summarized in **Table 6-3**. The baseline groundwater geochemistry data are also presented in **Figure 5-4**. The discussion in this section is organized by three separate areas – upgradient of the TTA, within the TTA, and downgradient of the TTA. For each area, data collected from the baseline event and subsequent performance monitoring events are discussed.

Monitoring well EKMW-09 is located upgradient of the TTA. Baseline data indicated that groundwater in this area was acidic (pH at 5), oxidizing (ORP at 100 mV and DO at 1.2 mg/L), with high chloride (2,800 mg/L), and high iron (130 mg/L). Throughout the Dem/Val, groundwater remained acidic (pH below 5.2) and slightly oxidizing (ORP above 60 mV with low DO). The chloride concentration decreased from baseline to below 1,800 mg/L post-Stage 2, the reasons for the decline are unknown. Iron concentrations decreased from baseline to below 80 mg/L.

Within the TTA, baseline characterization data showed that groundwater was acidic (pH 4.7 at EKMW-01 to pH 5.8 at EKMW-02 and EKMW-03), slightly oxidizing (ORP at 34 to 64 mV, except -21 mV at EKMW-02 and EKMW-03) with low DO at 0.2 to 0.6 mg/L. Other notable baseline geochemical conditions included:

- Three relatively distinct baseline chloride levels EKMW-01 at 3,400 mg/L; EKMW-05 and EKMW-07 at 1,900 and 790 mg/L, respectively; and EKMW-02, -03, and -04 at 520 570 mg/L.
- Sulfate at 140 mg/L at EKMW-07, while at 24 to 57 mg/L at all other wells.
- Relatively high iron at EKMW-01 (130 mg/L) and EKMW-05 (160 mg/L), while generally at 60 mg/L for iron at other wells.

Based on baseline chloride, and iron concentrations, groundwater at EKMW-01 and EKMW-05 seemed to have similar geochemistry as that of upgradient well EKMW-09. While EKMW-01 is located near the upgradient edge of the TTA, EKMW-05 is near the down-/side-gradient edge of the TTA.

EKMW-01		Baseline (October 2014)	July 2015	October 2015	December 2015	March 2016	September 2016	December 2016	March 2017	June 2017
pН	S.U.	4.7	5.1	5.0	6.4	5.6	5.74	5.9	5.5	5.7
ORP	mV	54	130	-170	-50	-103	-120	-76	-79	-161
Dissolved Oxygen	mg/L	0.6	2.1	0.1	0.6	0.2	0.13	0.1	0.1	1.1
Analyte	Units	Result	Result	Result	Result	Result	Result	Result	Result	Result
Bromide	mg/L	4.0 I	NA	NA	NA	2.3	NA	NA	NA	4.5 I
Chloride	mg/L	3400	NA	NA	NA	1450	NA	NA	NA	1950
Nitrate (as N)	mg/L	0.17 U	NA	NA	NA	0.1	NA	NA	NA	NA
Sulfate	mg/L	57	NA	NA	NA	13.2	NA	NA	NA	15 U
Calcium	mg/L	350	NA	NA	NA	210	NA	NA	NA	229
Iron	mg/L	130	100	NA	NA	87.4	NA	NA	NA	93.4
Magnesium	mg/L	98	NA	NA	NA	61.9	NA	NA	NA	57.7
Manganese	mg/L	2.8	NA	NA	NA	1.96	NA	NA	NA	NA
Potassium	mg/L	NA	8.1	5.7	5.2	5.43 I	NA	NA	NA	5.9 I

Table 6-3. Groundwater Geochemistry Data Summary

EKMW-02		Baseline (October 2014)	July 2015	October 2015	December 2015	March 2016	September 2016	December 2016	March 2017	June 2017
pH	S.U.	5.8	6	6.0	6.6	5.9	6.3	5.8	5.0	6.4
ORP	mV	-21	51	-21	-35	-34	-22	13	-58	-70
Dissolved Oxygen	mg/L	0.2	0.3	0.1	0.5	0.1	0.1	0.1	0.2	0.7
Analyte	Units	Result	Result	Result	Result	Result	Result	Result	Result	Result
Bromide	mg/L	0.06 U	NA	NA	NA	3.3 I	NA	NA	NA	2.6 I
Chloride	mg/L	550	NA	NA	NA	664	NA	NA	NA	756
Nitrate (as N)	mg/L	0.17 U	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	mg/L	27	NA	NA	NA	10.7	NA	NA	NA	<mark>6</mark> U
Calcium	mg/L	100	NA	NA	NA	177	NA	NA	NA	202
Iron	mg/L	57	9.5	NA	NA	121	NA	NA	NA	103
Magnesium	mg/L	30	NA	NA	NA	53.7	NA	NA	NA	54.4
Manganese	mg/L	0.86	NA	NA	NA	1.74	NA	NA	NA	NA
Potassium	mg/L	NA	2.1	4.1	4	4.46 I	NA	NA	NA	4.94 I
EKMW-03		Baseline (October 2014)	July 2015	October 2015	December 2015	March 2016	September 2016	December 2016	March 2017	June 2017
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pH	S.U.	5.8	5.8	5.8	6.5	5.6	5.8	6.1	5.8	6.3
ORP	mV	-21	0.4	-1.3	-53	-5	-56	-77	-43	-79
Dissolved Oxygen	mg/L	0.2	1.1	0.1	0.5	0.1	0.1	0.1	0.1	1.4
Analyte	Units	Result	Result	Result	Result	Result	Result	Result	Result	Result
Bromide	mg/L	0.06 U	NA	NA	NA	1.2 U	NA	NA	NA	1.2 U
Chloride	mg/L	520	NA	NA	NA	674	NA	NA	NA	717
Nitrate (as N)	mg/L	0.17 U	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	mg/L	24 I	NA	NA	NA	15.6	NA	NA	NA	7.7
Calcium	mg/L	89	NA	NA	NA	208	NA	NA	NA	174
Iron	mg/L	58	70	NA	NA	101	NA	NA	NA	99
Magnesium	mg/L	27	NA	NA	NA	62.9	NA	NA	NA	53
Manganese	mg/L	0.79	NA	NA	NA	1.85	NA	NA	NA	NA
Potassium	mg/L	NA	4.2	4.1	4.2	6.16 I	NA	NA	NA	5.86 I

Table 6-3. Groundwater Geochemistry Data Summary (Continued)

EKMW-04		Baseline (October 2014)	July 2015	October 2015	December 2015	March 2016	September 2016	December 2016	March 2017	June 2017
pH	S.U.	4.9	5.8	5.7	6.3	5.9	5.6	5.8	5.5	6.9
ORP	mV	42	3	-54	-27	-20	0.1	-3	4.5	-173
Dissolved Oxygen	mg/L	0.2	0.7	0.2	0.5	3.5	1.2	0.1	0.1	1.5
Analyte	Units	Result	Result	Result	Result	Result	Result	Result	Result	Result
Bromide	mg/L	0.06 U	NA	NA	NA	0.6 U	NA	NA	NA	0.6 U
Chloride	mg/L	570	NA	NA	NA	462	NA	NA	NA	465
Nitrate (as N)	mg/L	0.17 U	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	mg/L	45	NA	NA	NA	15.3	NA	NA	NA	17
Calcium	mg/L	120	NA	NA	NA	126	NA	NA	NA	115
Iron	mg/L	47	56	NA	NA	59.6	NA	NA	NA	56.3
Magnesium	mg/L	31	NA	NA	NA	35.6	NA	NA	NA	31.3
Manganese	mg/L	0.99	NA	NA	NA	1.28	NA	NA	NA	NA
Potassium	mg/L	NA	4.5	5.3	6.3	7.1 I	NA	NA	NA	3.6 I

EKMW-05		Baseline (October 2014)	July 2015	October 2015	December 2015	March 2016	September 2016	December 2016	March 2017	June 2017
pH	S.U.	5.2	5.4	5.5	5.9	6.2	5.6	5.3	4.8	5.7
ORP	mV	64	74	17	NA	-118	-1	-10	4.9	-39
Dissolved Oxygen	mg/L	0.3	0.4	0.1	0.5	4	1.0	0.1	0.3	0.4
Analyte	Units	Result	Result	Result	Result	Result	Result	Result	Result	Result
Bromide	mg/L	1.2 U	NA	NA	NA	1.2 U	NA	NA	NA	3.0 U
Chloride	mg/L	1900	NA	NA	NA	1240	NA	NA	NA	1570
Nitrate (as N)	mg/L	0.17 U	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	mg/L	50	NA	NA	NA	11.5 I	NA	NA	NA	27.3 I
Calcium	mg/L	400	NA	NA	NA	259	NA	NA	NA	229
Iron	mg/L	160	130	NA	NA	131	NA	NA	NA	92.4
Magnesium	mg/L	110	NA	NA	NA	72.5	NA	NA	NA	55.8
Manganese	mg/L	3.3	NA	NA	NA	2.39	NA	NA	NA	NA
Potassium	mg/L	NA	7.4	3.8	3.5	6.12 I	NA	NA	NA	6.2 I
1		1)		1						t
EKMW-07		Baseline (October 2014)	July 2015	October 2015	December 2015	March 2016	September 2016	December 2016	March 2017	June 2017
EKMW-07	S.U.		July 2015 6.5	October 2015 6.0	December 2015 6.6	March 2016 6.2	September 2016 6.6	December 2016 5.8	March 2017 5.9	June 2017 6.2
	S.U. mV	(October 2014)	<u> </u>				-			
pH		(October 2014) 5.1	6.5	6.0	6.6	6.2	6.6	5.8	5.9	6.2
pH ORP	mV	(October 2014) 5.1 34	6.5 67	6.0 -63	6.6 NA	6.2 -114	- 6.6 -56	5.8 -53	5.9 -75	6.2 -88
pH ORP Dissolved Oxygen	mV mg/L	(October 2014) 5.1 34 0.5	6.5 67 0.3	6.0 -63 0.1	6.6 NA 0.5	6.2 -114 3.1	6.6 -56 0.1	5.8 -53 0.1	5.9 -75 0.1	6.2 -88 0.9
pH ORP Dissolved Oxygen Analyte	mV mg/L Units	(October 2014) 5.1 34 0.5 Result	6.5 67 0.3 Result	6.0 -63 0.1 Result	6.6 NA 0.5 Result	6.2 -114 3.1 Result	6.6 -56 0.1 Result	5.8 -53 0.1 Result	5.9 -75 0.1 Result	6.2 -88 0.9 Result
pH ORP Dissolved Oxygen Analyte Bromide	mV mg/L Units mg/L	(October 2014) 5.1 34 0.5 Result 0.06 U	6.5 67 0.3 Result NA	6.0 -63 0.1 Result NA	6.6 NA 0.5 Result NA	6.2 -114 3.1 Result 1.2 U	6.6 -56 0.1 Result NA	5.8 -53 0.1 Result NA	5.9 -75 0.1 Result NA	6.2 -88 0.9 Result 3.0 U
pH ORP Dissolved Oxygen Analyte Bromide Chloride	mV mg/L Units mg/L mg/L	(October 2014) 5.1 34 0.5 Result 0.06 U 790	6.5 67 0.3 Result NA NA	6.0 -63 0.1 Result NA NA	6.6 NA 0.5 Result NA NA	6.2 -114 3.1 Result 1.2 U 975	6.6 -56 0.1 Result NA NA	5.8 -53 0.1 Result NA NA	5.9 -75 0.1 Result NA NA	6.2 -88 0.9 Result 3.0 U 1670
pH ORP Dissolved Oxygen Analyte Bromide Chloride Nitrate (as N)	mV mg/L Units mg/L mg/L mg/L	(October 2014) 5.1 34 0.5 Result 0.06 U 790 0.17 U	6.5 67 0.3 Result NA NA NA NA	6.0 -63 0.1 Result NA NA NA NA	6.6 NA 0.5 Result NA NA NA NA	6.2 -114 3.1 Result 1.2 U 975 NA	6.6 -56 0.1 Result NA NA NA NA	5.8 -53 0.1 Result NA NA NA NA	5.9 -75 0.1 Result NA NA NA NA	6.2 -88 0.9 Result 3.0 U 1670 NA
pH ORP Dissolved Oxygen Analyte Bromide Chloride Nitrate (as N) Sulfate	mV mg/L Units mg/L mg/L mg/L mg/L	(October 2014) 5.1 34 0.5 Result 0.06 U 790 0.17 U 140	6.5 67 0.3 Result NA NA NA NA NA	6.0 -63 0.1 Result NA NA NA NA NA	6.6 NA 0.5 Result NA NA NA NA NA	6.2 -114 3.1 Result 1.2 U 975 NA 8.9 I	6.6 -56 0.1 Result NA NA NA NA NA	5.8 -53 0.1 Result NA NA NA NA NA	5.9 -75 0.1 Result NA NA NA NA NA	6.2 -88 0.9 Result 3.0 U 1670 NA 15 U
pH ORP Dissolved Oxygen Analyte Bromide Chloride Nitrate (as N) Sulfate Calcium	mV mg/L Units mg/L mg/L mg/L mg/L	(October 2014) 5.1 34 0.5 Result 0.06 U 790 0.17 U 140 150	6.5 67 0.3 Result NA NA NA NA NA NA	6.0 -63 0.1 Result NA NA NA NA NA NA	6.6 NA 0.5 Result NA NA NA NA NA	6.2 -114 3.1 Result 1.2 U 975 NA 8.9 I 275	6.6 -56 0.1 Result NA NA NA NA NA NA	5.8 -53 0.1 Result NA NA NA NA NA NA	5.9 -75 0.1 Result NA NA NA NA NA NA	6.2 -88 0.9 Result 3.0 U 1670 NA 15 U 419
pH ORP Dissolved Oxygen Analyte Bromide Chloride Nitrate (as N) Sulfate Calcium Iron	mV mg/L Units mg/L mg/L mg/L mg/L mg/L	(October 2014) 5.1 34 0.5 Result 0.06 U 790 0.17 U 140 150 23	6.5 67 0.3 Result NA NA NA NA NA 30	6.0 -63 0.1 Result NA NA NA NA NA NA NA	6.6 NA 0.5 Result NA NA NA NA NA NA NA	6.2 -114 3.1 Result 1.2 U 975 NA 8.9 I 275 52.9	6.6 -56 0.1 Result NA NA NA NA NA NA NA	5.8 -53 0.1 Result NA NA NA NA NA NA NA	5.9 -75 0.1 Result NA NA NA NA NA NA NA	6.2 -88 0.9 Result 3.0 U 1670 NA 15 U 419 85.1

Table 6-3. Groundwater Geochemistry Data Summary (Continued)

EKMW-08		Baseline (October 2014)	September 2016	June 2017
pH	S.U.	5.7	5.5	5.4
ORP	mV	12	NA	-57
Dissolved Oxygen	mg/L	0.4	0.1	1.2
Analyte	Units	Result	Result	Result
Bromide	mg/L	0.06 U	NA	1.2 U
Chloride	mg/L	1000	NA	1300
Nitrate (as N)	mg/L	0.17 U	NA	NA
Sulfate	mg/L	38	NA	15.5
Calcium	mg/L	150	NA	258
Iron	mg/L	67	NA	80.9
Magnesium	mg/L	45	NA	72
Manganese	mg/L	1.1	NA	NA
Potassium	mg/L	NA	NA	NA

Table 6-3. Groundwater Geochemistry Data Summary (Continued)

EKMW-09		Baseline (October 2014)	July 2015	March 2016	September 2016	December 2016	March 2017	June 201 7
pН	S.U.	5.0	4.5	4.5	4.8	4.9	3.8	5.2
ORP	mV	100	163	201	102	74	62	109
Dissolved Oxygen	mg/L	1.2	0.8	4.1	0.1	1.7	1.4	0.5
Analyte	Units	Result	Result	Result	Result	Result	Result	Result
Bromide	mg/L	6.0 U	NA	0.38 I	NA	NA	NA	3.0 U
Chloride	mg/L	2800	NA	2190	NA	NA	1790	1630
Nitrate (as N)	mg/L	0.17 U	NA	NA	NA	NA	NA	NA
Sulfate	mg/L	36	NA	18.4	NA	NA	22.8 I	23.4 I
Calcium	mg/L	460	NA	431	NA	NA	295	296
Iron	mg/L	130	NA	125	NA	NA	79.2	78.1
Magnesium	mg/L	130	NA	128	NA	NA	85.3	77.8
Manganese	mg/L	4.1	NA	4.48	NA	NA	2.9	NA
Potassium	mg/L	9.4	9	8.55 I	10.3	7.4 I	6.3 I	5.9 I
Total Dissolved Solids (Filterable)	mg/L	5700	6900	5760	6190	4400	2950	3890

EKMW-10		Baseline (October 2014)	July 2015	March 2016	September 2016	December 2016	March 2017	June 2017
pH	S.U.	6.0	6	5.8	7.2	5.7	5.3	6.3
ORP	mV	-27	10	-5.9	-630	-92	30	-101
Dissolved Oxygen	mg/L	0.6	0.6	3.6	0.1	0.1	0.2	0.1
Analyte	Units	Result	Result	Result	Result	Result	Result	Result
Bromide	mg/L	0.06 U	NA	0.32 I	NA	NA	NA	1.2 U
Chloride	mg/L	570	NA	788	NA	NA	NA	793
Nitrate (as N)	mg/L	0.25 U	NA	NA	NA	NA	NA	NA
Sulfate	mg/L	21 I	NA	12	NA	NA	NA	22.9
Calcium	mg/L	140	NA	193	NA	NA	NA	166
Iron	mg/L	49	NA	53.3	NA	NA	NA	49.5
Magnesium	mg/L	42	NA	59.3	NA	NA	NA	47.7
Manganese	mg/L	1.2	NA	1.62	NA	NA	NA	NA
Potassium	mg/L	7.8	6.1	16.1	11.7	23.6	12.4	21.4
Total Dissolved Solids (Filterable)	mg/L	1700	3000	2290	2280	1980	1230	2040

Table 6-3. Groundwater Geochemistry Data Summary (Continued)

EKMW-11		Baseline (October 2014)	September 2016	March 2017	June 2017
pH	S.U.	10.6	5.6	5.2	5.6
ORP	mV	-9.2	35	114	11
Dissolved Oxygen	mg/L	0.1	1.4	0.1	0.1
Analyte	Units	Result	Result	Result	Result
Bromide	mg/L	0.06 U	NA	NA	6.0 U
Chloride	mg/L	170	NA	2430	2220
Nitrate (as N)	mg/L	0.17 U	NA	NA	NA
Sulfate	mg/L	16 I	NA	36.5 I	41.8 I
Calcium	mg/L	130	NA	386	345
Iron	mg/L	2.9	NA	95.5	104
Magnesium	mg/L	0.74	NA	86.3	73.7
Manganese	mg/L	0.02	NA	4.1	NA
Potassium	mg/L	NA	NA	8.1 I	NA

Notes:

S.U. Standard Units mV millivolts mg/L milligrams per Liter NTU Nephelometric Turbidity Unit NA Not analyzed.

U The compound was analyzed for but not detected.

I The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit

Geochemistry data collected from within the TTA in October 2015 following approximately 3 months of system operation adding buffering reagent showed pH increases at all wells from baseline to between pH 5.5 and pH 6, except at EKMW-01 where pH increased from baseline pH 4.7 to pH 5. The data showed negative ORP at all wells, except at EKMW-05 where ORP changed from 64 mV baseline to 17 mV. DO was at or below 0.2 mg/L at all wells. Bioaugmentation with low-pH KB-1[®] dechlorination culture was conducted at the end of October 2015.

Within the TTA following bioaugmentation and through Stage 1 and Stage 2 operations, groundwater pH generally remained between 5.5 and 6.6 and ORP was mostly negative after the Stage 1 and Stage 2 operations. Notable changes of certain geochemical conditions over the duration of Dem/Val include:

- Chloride At EKMW-01, the concentration decreased from a baseline of 3,400 mg/L to 1,950 mg/L post-Stage 2, and at EKMW-05 from 1,900 to 1,570 mg/L. However, at EKMW-02 and -03, concentrations increased from baseline levels of 520–550 mg/L to 717–750 mg/L, and at EKMW-07 from 790 to 1,670 mg/L. Relatively smaller changes were observed at EKMW-04 (570 to 465 mg/L). These data suggest that some migration and redistribution of chloride (and likely other anions) might have occurred within the TTA as a result of the EK application.
- Sulfate concentrations at all wells decreased from baseline levels of around 50 mg/L (except 140 mg/L baseline at EKMW-07) to 9 to 15 mg/L, including at EKMW-07, at end of Stage 1 operation. Sulfate concentrations generally remained low thereafter. These data are indicative of sulfate reduction in the TTA.
- Iron concentrations decreased from baseline at EKMW-01 and EKMW-05, the two wells with the highest baseline iron, to approximately 90 mg/L at post-Stage 2 incubation. However, at EKMW-02, -03, and -07, iron concentrations doubled or more from their baseline levels to 85 100 mg/L. These data suggest that some migration and redistribution of iron (and likely other cations) occurred within the TTA as a result of the EK application.

At downgradient well EKMW-10, baseline conditions were slightly acidic (pH at 6) and reducing (ORP at -27 mV and DO at 0.6 mg/L). Baseline chloride (570 mg/L), sulfate (21 mg/L), and iron (49 mg/L) concentrations were consistent with those observed in most of the wells in the TTA. Over the duration of Dem/Val, groundwater pH generally remained close to pH 6, while ORP became more reducing (-101 mV post-Stage 2). Chloride increased from 570 mg/L baseline to over 780 mg/L post-operation. Sulfate decreased after Stage 1 operation, but increased to baseline level after Stage 2. Relatively minimum changes (less than 8 mg/L in changes) in iron concentrations occurred throughout the Dem/Val.

6.2.2 Groundwater Chemical and Microbial Analytical Results

The discussion of groundwater sampling results is organized in this section with respect to assessment of (1) amendment distribution and (2) reductive dechlorination of CVOCs.

Amendment Distribution

Groundwater TOC and VFA concentrations at monitoring wells provided an assessment of amendment distribution across the TTA. While lactate was provided as the amendment, it was expected that lactate would biodegrade as it was transported in the subsurface. Therefore, total VFAs were considered as an appropriate indicator of amendment distribution. **Table 6-4** presents a summary comparing the baseline TOC and VFA concentrations detected at individual monitoring wells to the maximum concentrations of each detected during the Dem/Val.

Table 6-4.Groundwater TOC and VFA Summary

Well ID	TOC (baseline)			VFA* (max S1/S2)
EKMW-01	2.5	12.8 / 20.1	3.2	60.7 / 57.6
EKMW-02	2.5	36.2 / 4.30	1.6	141 / 2.50
EKMW-03	2.5	57.9 / 4.60	1.2	233 / 11.3
EKMW-04	3.6	6.70 / 3.50	1.9	18.3 / 8.20
EKMW-05	1.7	15.9 / 2.30	1.8	6.60 / 1.00
EKMW-07	6.8	12.5 / 57.0	2.2	21.7 / 204.7
EKMW-09	1.6	1.40 / 1.90	2.3	1.40 / NA
EKMW-10	1.9	1.50 / 10.1	2.1	1.40 / NA

(Baseline vs. Maximum During Stage 1 / Stage 2)

* VFA = total of lactate, acetate, propionate, formate, butyrate, and pyruvate.

Units: mg/L.

With respect to TOC data, every monitoring well within the TTA saw an increase in TOC concentration >8x baseline levels, with the exception of EKMW-04 where the maximum TOC detected was 1.8x the baseline. With respect to VFA data, every monitoring well within the TTA saw an increase in VFA concentration >9x baseline levels, with the exception of EKMW-05 where the maximum VFA detected was 4x the baseline. These data show substantial increase in TOC and VFA concentrations across the TTA affected by EK application.

TOC and VFA concentrations at the two background monitoring wells, EKMW-09 and EKMW-10, did not show apparent increases from their baseline levels, with the exception of TOC detected at 10.1 mg/L at EKMW-10 during the final post-Stage 2 sampling event. EKMW-10 is located downgradient of the TTA approximately 20 ft from electrode well E6. It is possible that some migration of TOC from the TTA occurred to affect this well in its final sampling event.

It is recognized that concentrations of TOC and VFA at certain locations within the TTA may be dynamic in nature given the microbial activities occurring in the subsurface. While it is apparent that amendment provided from the supply wells and electrode wells was distributed to all the monitoring well locations during the Dem/Val, the data suggest that certain monitoring well locations received different amounts of amendment between Stage 1 and Stage 2 operations.

For example, EKMW-02 and EKMW-03 appeared to receive more amendment in Stage 1 than in Stage 2, while EKMW-07 received more in Stage 2 than in Stage 1. This is likely due to the different orientations of electric fields established during the two stages of operations affecting the amendment transport patterns within the TTA. This observation suggests that future design should consider electrode network arrangements that will allow operations of various electric field orientations to enhance amendment delivery efficiency.

Noting that there was not a monitoring well located between the supply well network and electrode well E5, which was an anode during both Stage 1 and Stage 2 (i.e., electron donor would have always been migrating from the supply wells towards E5 in each stage), grab groundwater samples were collected during the final post-Stage 2 sampling event at several DPT soil sampling locations (C2, C3, C6, C7, and C9 in **Figure 5-11**). These samples were collected at each location generally from the depth of 21 ft, which approximately corresponded to the mid-screen interval of the monitoring wells within the TTA. The TOC results of these grab groundwater samples are presented in **Table 6-5** below.

Table 6-5.	Groundwater TOC at Select DPT Sampling Locations (from 21 ft bgs)
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Location	C2	C3	C6	C7	С9
TOC (mg/L)	950	160	3.4	820	790

Significant TOC concentrations (160 to 950 mg/L) were detected at all three sample locations (C2, C3, and C7) between the supply wells and electrode well E5. These data confirmed that significant amendment had been distributed to this interior area. As a comparison, location C6 at the upgradient edge of the TTA did not appear to receive much amendment, likely due to its exterior position relative to supply wells and electric field orientation.

TOC concentrations in the sample collected from C9, located in the vicinity of unused monitoring well EKMW-06, indicate that the area received substantial electron donor. Thus, while EKMW-06 failed to provide data, C9 provided valuable replacement data confirming the amendment distribution to this portion of the TTA.

Enhanced Reductive Dechlorination

Figure 6-3 presents a comparison of groundwater CVOC and biomarker monitoring results at six monitoring wells within the TTA and two outside the TTA. The overall tabulated groundwater monitoring data are provided in **Appendix F**. **Figure 6-3** presents the data collected from five (5) milestone events: baseline event in October 2014; end of Stage 1 operation in March 2016; end of post-Stage 1 incubation in September 2016; end of Stage 2 operation in March 2017; and end of post-Stage 2 incubation in June 2017.



Figure 6-3. Groundwater CVOC & Biomarkers

EKMW-09 and EKMW-10 are located outside the TTA (**Figure 5-1**). The upgradient well, EKMW-09, is in the general area of the suspected PCE source (the former Building 106 area). The PCE concentrations at EKMW-09 remained above the baseline level during the Dem/Val, with no apparent increase of reductive dechlorination intermediates, and no detectable levels of biomarkers (below 1E+03 cell/L) throughout the Dem/Val.

At downgradient well EKMW-10, the baseline cis-1,2-DCE concentration was 260 μ g/L, while the baseline methane concentration was 1,300 μ g/L, both indicative of some natural reductive biological activity in this area prior to the Dem/Val. Between the baseline event and the post-Stage 2 event, no significant changes in PCE and other PCE dechlorination intermediate concentrations were observed, with the exception of an increase in vinyl chloride from 5 μ g/L to 157 μ g/L. It is also noted that while biomarkers were below detection in the baseline event, a low level of *Dhc* (1.6E+03 cell per L) was detected at EKMW-10 in the post-Stage 2 event. This level of *Dhc* was close to the method detection limit, and *vcrA* in that sample was still below detection limit. Overall, the data at EKMW-10 appear to suggest slight influence from the operation in the TTA approximately 20 ft away (to electrode well E6). As a comparison, the upgradient well EKMW-09 is located approximately 25 ft away from the closest electrode well E4.

Among the monitoring wells within the TTA, EKMW-01, located closest to the upgradient edge of the TTA, contained the highest baseline PCE concentration at 7,640 µg/L. While there were baseline PCE dechlorination intermediates (cis-1,2-DCE >1,000 μ g/L and VC at 33 μ g/L) at EKMW-01, low levels of baseline methane (190 μ g/L), ethene (15 μ g/L), and VFAs (2.3 mg/L) suggested limited reductive dechlorination activities in the vicinity prior to the Dem/Val. It is noted that Dhc and vcrA were detected in the baseline event at 8E+05 cell/L and 3E+03 gene copies/L, respectively. As presented in Figure 6-3, significant PCE dechlorination at EKMW-01 was observed in both post-Stage 1 and post-Stage 2 monitoring events. PCE concentrations decreased from the baseline level by 90% and 95% in the two events, respectively, while dissolved ethene concentrations were 15x and 85x (228 µg/L and 1,280 µg/L, respectively) the baseline level. There was a transitory increase of cis-1,2-DCE from baseline to end of Stage 1 operation followed by its continuing decrease through the post-Stage 2 sampling event. Methane concentrations remained generally at a similar level as baseline throughout the Dem/Val (75 to $399 \mu g/L$). Both biomarkers increased by 1,000x or more from the baseline levels to the post-Stage 1 detections (10⁷ and 10⁸ cell/gene copies per L), with continued increases through the post-Stage 2 event (10^8 and 10^9 cell/gene copies per L).

The data for monitoring wells EKMW-02, -03, and -04, were relatively similar, with baseline PCE concentrations ranging from 170 to 250 μ g/L, and low to no detectable baseline VC (<6 μ g/L), ethene (all below detection), and biomarkers (all below detection). While enhanced reductive dechlorination was evident at all these wells, one noticeable difference between this group of wells and EKMW-01 was the significant increases of methane throughout the Dem/Val (see below).

Methane at	Baseline	End of Stage 1	Post-Stage 1	End of Stage 2	Post-Stage 2
EKMW-01	190	102	132	164	399
EKMW-02	1,200	1,850	6,380	7,890	8,740
EKMW-03	330	2,850	6,270	5,480	7,930
EKMW-04	54	401	1,930	4,100	5,010

Unit: µg/L

Both biomarkers at all these three wells increased by >1,000x from non-detect baseline levels to above 1E+06 at the end of Stage 1 operation, and were generally maintained at such levels throughout the Dem/Val. Dissolved ethene concentrations increased from non-detect baseline levels to the ranges of 120 to 170 μ g/L at EKMW-02, 50 to 78 μ g/L at EKMW-03, and up to 32 μ g/L at EKMW-04. The sum of chlorinated ethenes decreased by 78% at EKMW-02, 54% at EKMW-03, and 46% at EKMW-04 over the course of Dem/Val.

EKMW-05 and EKMW-07 had relatively high baseline PCE concentrations at 1,800 and 1,300 μ g/L, respectively. At EKMW-07 PCE concentrations significantly decreased from baseline to the end of Stage 1 operation (1,300 μ g/L to 202 μ g/L) and remained relatively stable during the 6-month post-Stage 1 incubation period (slight increase to 253 μ g/L). In Stage 2, PCE concentrations decreased further (253 μ g/L to 55 μ g/L) during active EK, and rebounded slightly during post-Stage 2 incubation (up to to 92 μ g/L). Methane concentrations at EKMW-07 increased significantly throughout the Dem/Val (110 μ g/L baseline to over 7,000 μ g/L post-Stage 1 and over 8,000 μ g/L post-Stage 2), while *Dhc* and *vcrA* increased from non-detect levels to over 1E+08 cell/L and 1E+06 gene copies/L, respectively, and dissolved ethene continued to increase from baseline (11 μ g/L) through post-Stage 1 incubation (161 μ g/L) and again through post-Stage 2 incubation (260 μ g/L).

At EKME-05, PCE concentrations significantly decreased from baseline (1,800 µg/L) to end of Stage 1 operation (180 µg/L) but then rebounded during the 6-month post-Stage 1 incubation period (to 2,280 µg/L). During the post-Stage 1 incubation (no active EK operation) when PCE rebounded, methane and ethene both increased from 210 to 587 µg/L and 144 to 255 µg/L, respectively, indicating continuing methanogenic and reductive dechlorination activities in the area. During Stage 2 operation, PCE concentrations decreased from 2,280 µg/L to 603 µg/L, but again rebounded (to 3,540 µg/L) during post-Stage 2 incubation. The reason for this rebound is unclear, but may indicate the presence of some residual PCE mass in this area. Methane concentrations further increased from post-Stage 1 incubation to post-Stage 2 incubation (from to 987 µg/L). Both biomarkers increased by almost 100x to 10,000x from baseline (1E+05 cell/gene copies per L) through Stage 1 operation, and remained above 1E+06 to 1E+07 cell/gene copies per L throughout the Dem/Val.

As presented in **Table 6-6**, DPT groundwater samples collected from select interior locations during the post-Stage 2 event were analyzed for CVOCs, dissolved gases, and biomarkers to supplement the monitoring data collected at monitoring wells. The three samples from the interior locations (C2, C3, and C7; see **Figure 5-11**) between the supply wells and anode E5 showed the most significant methanogenesis and reductive dechlorination. Methane concentration were more than 2,400 μ g/L, and dissolved ethene concentrations ranged between 474 and 1,880 μ g/L. Biomarkers, *Dhc* and *vcrA*, were detected at levels between 1E+05 and 2E+07 cell/gene copies per liter. These observations are consistent with the soil sampling results for these three locations discussed in Section 6.3 below (see **Figure 6-5** for soil CVOC and **Table 6-9** for soil microbial analyses).

	Location	C2	C3	C6	C7	С9
РСЕ	μg/L	11	160	1,400	28	250
ТСЕ	μg/L	5	430	660	29	67
cis-1,2-DCE	μg/L	86	3,700	2,600	220	1,900
VC	μg/L	1,200	570	380	330	5,000
Methane	μg/L	2,490	3,840	634	4,090	259
Ethene	μg/L	1,710	474	100	1,880	402
Ethane	μg/L	18	12	5	6	3
Dhc	cell / L	5.E+06	2.E+05	2.E+03	2.E+07	<4E+04
tce	gene copies / L	1.E+06	5.E+04	<3E+04	4.E+06	NA
bvc	gene copies / L	5.E+05	4.E+03	<3E+04	1.E+06	NA
vcr	gene copies / L	4.E+06	1.E+05	<3E+04	1.E+07	NA
Dhb	cell / L	1.E+04	<4E+03	<3E+04	3.E+05	<4E+04

 Table 6-6.
 Groundwater CVOC and Biomarker at Select DPT Sampling Locations

 (from 21 ft bgs)

With the C6 sample, although methane concentrations over 600 μ g/L, together with low levels of ethene (100 μ g/L) and *Dhc* (2E+03 cell/L), were detected, overall the data suggest that the area near the upgradient edge of the TTA likely received less treatment due to the location relative to the supply well network and electric field orientation, which would move the amendment more effectively towards the interior of the TTA.

Location C9 was in the vicinity of a former monitoring well EKMW-06 which was not included in the monitoring program. The DPT groundwater data of C9 showed significant TOC concentration (790 mg/L) and evident reductive dechlorination with ethene concentration at 402 μ g/L. As discussed below in Section 6.3, soil CVOC and soil microbial analyses of C9 also indicated reductive dechlorination activities in that area.

Collectively, with the evident reductive dechlorination observed in the groundwater samples collected from the interior portion of the TTA (C2, C3, and C7 locations) and the area of C9, as well as the network of Dem/Val monitoring wells, EK application clearly promoted substantial dichlorination and treatment within the overall TTA.

6.3 SOIL SAMPLING RESULTS

There were three (3) rounds of soil sampling over Dem/Val: baseline event (September 2014), post-Stage 1 event (April 2016), and post-Stage 2 event (June 2017). The 11 soil sampling locations are presented in **Figure 5-11**.

6.3.1 Soil Chemical Analyses Results

Table 6-7 presents a summary of soil chemical analytical results, including the baseline characterization results. For the baseline event, at each sampling location three (3) samples were collected each from discrete depths. The baseline data showed that within the TTA, PCE was the only chlorinated ethene detected at a concentration above 1 mg/kg, with the exception of cis-1,2-DCE at 1.9 mg/kg and 3.3 mg/kg at locations C3 (18.5 ft bgs) and C7 (18.5 ft bgs), respectively. The baseline data indicated that there was no apparent reductive dechlorination activity within the TTA soil prior to the Dem/Val. It was also noted that PCE concentrations decreased significantly with depth from 18.5 ft to 23 ft. PCE concentrations were below 0.08 mg/kg in all samples collected from the 21 and 23 ft bgs depths, with the exception of location C6 (5.5 mg/kg at 21 ft bgs and 3.1 mg/kg at 23 ft bgs) located on the upgradient limit of the TTA and closest to the expected PCE source in the general area of former Building 106 (**Figure 5-11**). Based on the finding that PCE was overwhelmingly present only at the 18.5 ft bgs sample interval, subsequent soil sampling events collected samples only from 18.5 ft bgs and 21 ft bgs.

The baseline soil sampling event also included soil grain size analysis to allow an assessment of whether the initial soil CVOC distribution was related to the heterogeneity of soil grain sizes. This was conducted, in response to a request by ESTCP during Demonstration Plan development, to assess whether CVOC concentrations, electron donor migration, and CVOC treatment could be correlated to grain size (a question related to uniformity of treatment). **Table 6-8** presents the grain size analysis of the samples from within the TTA at 18.5 and 21 ft bgs.

		C1-18.5			C1-21		C1-23		C2-18.5			C2-21		C2-23
Analyte (mg/kg)	Baseline (October 2014)	April 2016	June 2017	Baseline (October 2014)	April 2016	June 2017	Baseline (October 2014)	Baseline (October 2014)	April 2016	June 2017	Baseline (October 2014)	April 2016	June 2017	Baseline (October 2014)
Tetrachloroethene	16	11	1.9	0.029	0.41	0.056 U	0.04	15	0.63	1.9	0.028	0.043	0.11	0.082
Trichloroethylene	0.42	0.077	0.31	0.032	0.081	0.047 U	0.061	0.27 I	0.054	0.19	0.017	0.004 U	0.015	0.067
cis-1,2-Dichloroethene	0.38 I	0.084	0.75	0.006	0.1	0.31	0.0077	0.16	0.37	1.1	0.006	0.051	0.19	0.0083
Vinyl Chloride	0.032	0.0045 U	0.043 U	0.0013 U	0.0044 U	0.056 U	0.0014 U	0.012	0.0039 U	0.24	0.0011 U	0.0048 U	0.036	0.0014 U
Calcium	2500	2700	2400	NA	NA	NA	2200	1200	NA	NA	NA	NA	NA	2400
Iron	20000	19000	15000	NA	NA	NA	17000	8000	NA	NA	NA	NA	NA	16000
Magnesium	3400	3300	2600	NA	NA	NA	2700	1600	NA	NA	NA	NA	NA	3100
Manganese	60	59	55	NA	NA	NA	54	27	NA	NA	NA	NA	NA	62
Total Organic Carbon	NA	520	91 I	NA	430 I	NA	NA	NA	NA	170 I	NA	NA	NA	NA
11		C3-18.5			C3-21		C3-23		C4-18.5			C4-21		C4-23
Analyte (mg/kg)	Baseline (October 2014)	April 2016	June 2017	Baseline (October 2014)	April 2016	June 2017	Baseline (October 2014)	Baseline (October 2014)	April 2016 [1]	June 2017 [1]	Baseline (October 2014)	April 2016 [1]	June 2017 [1]	Baseline (October 2014)
Tetrachloroethene	6.9	0.037	0.009	0.084 U	0.0047 U	0.2	0.084 U	4.7	0.31	0.075	0.081	0.011	0.23	0.01
Trichloroethylene	0.42	0.0045 U	0.001 U	0.07 U	0.0039 U	0.084	0.07 U	0.17	0.015	0.015	0.018	0.0027 U	0.03	0.04
cis-1,2-Dichloroethene	1.9	0.87	0.007	0.099 I	0.28	0.31	0.097 U	0.14	0.027	1.2	0.0082	0.0037 U	0.037	0.014
Vinyl Chloride	0.077 U	0.029	0.67	0.084 U	0.0047 U	0.063 U	0.084 U	0.023	0.0022 U	0.22	0.0015 U	0.0032 U	0.008	0.0014 U
Calcium	1200	NA	NA	NA	NA	NA	2200	2400	NA	NA	NA	NA	NA	2700
Iron	8100	NA	NA	NA	NA	NA	13000	18000	NA	NA	NA	NA	NA	21000
Magnesium	1600	NA	NA	NA	NA	NA	2800	3300	NA	NA	NA	NA	NA	3600
Manganese	26	NA	NA	NA	NA	NA	49	56	NA	NA	NA	NA	NA	71
Total Organic Carbon	NA	360 I	120 I	NA	400 I	NA	NA	NA	NA	440 I	NA	NA	NA	NA
-														-

Table 6-7.	Summary of Soil Chemical Analytical Results
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		C5-18.5			C5-21		C5-23		C6-18.5			C6-21		C6-23
Analyte (mg/kg)	Baseline (October 2014)	April 2016	June 2017	Baseline (October 2014)	April 2016	June 2017	Baseline (October 2014)	Baseline (October 2014)	April 2016	June 2017	Baseline (October 2014)	April 2016	June 2017	Baseline (October 2014)
Tetrachloroethene	12	2	0.73	0.022	0.06	0.099	0.047	10	9.6	2.2	5.5	0.088	0.21	3.1
Trichloroethylene	0.14 I	0.031	0.23	0.007	0.004 U	0.015	0.043	0.27 I	0.028	0.21	0.18	0.01 I	0.044	0.18
cis-1,2-Dichloroethene	0.12 I	0.032	1.1	0.0046 I	0.0056 U	0.065	0.0067 I	0.16	0.015 J4	0.27	0.12	0.0049 U	0.055	0.11
Vinyl Chloride	0.083 U	0.0028 U	0.34	0.00057 U	0.0048 U	0.009	0.0011 U	0.027	0.0053 U	0.053 U	0.017	0.0042 U	0.023	0.016
Calcium	2200	NA	NA	NA	NA	NA	2300	3100	3000	2200	NA	NA	NA	2700
Iron	15000	NA	NA	NA	NA	NA	15000	29000	21000	11000	NA	NA	NA	20000
Magnesium	2800	NA	NA	NA	NA	NA	2800	4500	3500	2200	NA	NA	NA	3300
Manganese	47	NA	NA	NA	NA	NA	57	84	63	46	NA	NA	NA	70
Total Organic Carbon	NA	420 I	52 U	NA	480 I	NA	NA	NA	NA	73 I	NA	NA	NA	NA

		C7-18.5			C7-21		C7-23		C8-18.5			C8-21		C8-23
Analyte (mg/kg)	Baseline (October 2014)	April 2016	June 2017	Baseline (October 2014)	April 2016	June 2017	Baseline (October 2014)	Baseline (October 2014)	April 2016	June 2017	Baseline (October 2014)	April 2016	June 2017	Baseline (October 2014)
Tetrachloroethene	0.08 U	0.1	0.012	0.027	0.0025 U	0.001 U	0.011	7.6	1.9	1.6	0.025	0.058	0.13	0.021
Trichloroethylene	0.067 U	0.0045 U	0.001 U	0.0025 I	0.0021 U	0.001 U	0.011	0.12	0.046	0.24	0.024	0.0068 U	0.02	0.062
cis-1,2-Dichloroethene	3.3	0.81	0.024	0.11	0.087	0.17	0.011	0.86	0.15	0.63	0.0058	0.0094 U	0.047	0.0062
Vinyl Chloride	0.08 U	0.0054 U	0.096	0.00052 U	0.0025 U	0.061	0.00056 U	0.2	0.026	0.058 U	0.0045	0.0081 U	0.025	0.0011 U
Calcium	2200	NA	NA	NA	NA	NA	2800	2900	NA	NA	NA	NA	NA	2100
Iron	20000	NA	NA	NA	NA	NA	19000	27000	NA	NA	NA	NA	NA	16000
Magnesium	3200	NA	NA	NA	NA	NA	3800	4100	NA	NA	NA	NA	NA	2600
Manganese	58	NA	NA	NA	NA	NA	71	75	NA	NA	NA	NA	NA	51
Total Organic Carbon	NA	NA	480 I	NA	NA	NA	NA	NA	350 I	490 I	NA	360 I	NA	NA

Table 6-7.	Summary of Soil	Chemical Analytical	Results (Continued)

		C9-18.5			C9-21		C9-23		C10-18.5 [2]			C10-21 [2]		C10-23 [2]
Analyte (mg/kg)	Baseline (October 2014)	April 2016	June 2017	Baseline (October 2014)	April 2016	June 2017	Baseline (October 2014)	Baseline (October 2014)	April 2016	June 2017	Baseline (October 2014)	April 2016	June 2017	Baseline (October 2014)
Tetrachloroethene	14	0.28	1.9	0.035	0.039	0.13	0.0013 U	45	48	8.2	11	14	0.99	2.6
Trichloroethylene	0.3 I	0.0068 U	0.086	0.0096	0.0019 U	0.019	0.03	0.1	0.19	0.58	0.015	0.037	0.04 U	0.0076
cis-1,2-Dichloroethene	0.22 I	0.0095 U	0.21	0.0018 I	0.0026 U	0.025	0.0066	0.031	0.034	0.55	0.004 I	0.0035 U	0.055 U	0.0016 I
Vinyl Chloride	0.037	0.0081 U	0.014	0.0015 U	0.0023 U	0.007	0.0012 U	0.00052 U	0.0047 U	0.11	0.00055 U	0.003 U	0.048 U	0.0005 U
Calcium	1800	NA	NA	NA	NA	NA	2400	1500	2600	620	NA	NA	NA	2500
Iron	13000	NA	NA	NA	NA	NA	17000	12000	15000	4500	NA	NA	NA	18000
Magnesium	2200	NA	NA	NA	NA	NA	2900	2000	3000	850	NA	NA	NA	3200
Manganese	42	NA	NA	NA	NA	NA	61	38	49	15	NA	NA	NA	34
Total Organic Carbon	NA	NA	480 I	NA	NA	NA	NA	NA	510	510	NA	460 I	NA	NA

	C11-18.5 [2]	C11-21 [2]	C11-23 [2]
Analyte (mg/kg)	Baseline	Baseline	Baseline
	(October 2014)	(October 2014)	(October 2014)
Tetrachloroethene	4.9	0.034	0.097 U
Trichloroethylene	0.024	0.0014 U	0.081 U
cis-1,2-Dichloroethene	0.0082	0.0014 U	0.11 U
Vinyl Chloride	0.0015 I	0.0017 U	0.097 U
Calcium	2700	NA	4100
Iron	19000	NA	24000
Magnesium	2900	NA	4400
Manganese	69	NA	260
Total Organic Carbon	NA	NA	NA

Notes:

mg/kg milligram per kilogram NA Not analyzed.

U The compound was analyzed for but not detected.

I The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.

J4 Estimated result.

[1] Baseline (October 2014) C4 location corresponds to the C12 location in 2016 and 2017 events.

[2] Sampling locations C10 and C11 are outside the target treatment area.

Location /	% Fines (S	Silt + Clay)	% \$	Silt	% (Clay
Depth	18.5 ft	21 ft	18.5 ft	21 ft	18.5 ft	21 ft
C1	61.0	76.8	16.2	31.2	44.8	45.6
C2	53.8	77.8	18.1	35.0	35.7	42.8
C3	80.7	80.5	26.4	30.1	54.3	50.4
C4	88.8	71.0	20.6	22.9	68.2	48.1
C5	77.5	84.5	22.1	34.3	55.4	50.2
C6	80.1	85.0	23.1	35.9	57.0	49.1
C7	76.5	75.4	21.3	24.7	55.2	50.7
C8	75.0	90.0	18.8	30.2	56.2	59.8
С9	80.2	88.4	19.7	36.0	60.5	52.4
Avg.	74.6	81.0	20.6	31.1	54.0	49.9
Std. Dev.	11.5	6.40	3.20	4.80	9.90	4.70

 Table 6-8.
 Soil Grain Size Analysis (Baseline Event)

As presented in **Figure 6-4**, no evident linear relationships between soil PCE concentrations and % fine-grained materials were observed, with R^2 values ranging between 0.33 and 0.57. Furthermore, the correlation coefficients between these parameters did not indicate any strong correlation with coefficients of 0.75 between PCE concentration and % Fines, 0.57 between PCE concentration and % Silt, and 0.69 between PCE concentration and % Clay. Given these analyses, soil grain size analysis was not included in the subsequent soil sampling events.



Figure 6-4. Soil PCE Concentration vs. Soil Grain Size (Baseline; 18.5 ft bgs)

Figure 6-5 below presents a comparison of soil CVOC concentrations at corresponding locations between the three (3) sampling events. The data presented in **Figure 6-5** are arranged per individual locations and sampling depths. Overall, soil PCE concentrations of all samples collected from 18.5 ft bgs at the nine (9) locations within the TTA decreased by 78% (C6) to 99% (C3) from baseline to post-Stage 2, with an average decrease of 88%. With the exceptions of C1 and C6, the decreases of PCE concentrations were already significant (75% at C8 to 99% at C3) from the baseline event to the post-Stage 1 event. Both C1 and C6 showed evident PCE decrease from the post-Stage 1 event to the post-Stage 2 event. It was also noted that while C6 was the only location with a significant baseline PCE concentration at 21 ft bgs of the C6 corresponding sampling location decreased to 0.21 mg/kg and below in subsequent post-operation sampling events.

Location C10 was in the general area of former Building 106 and approximately 35 ft from the upgradient edge of the TTA. No decreases in PCE concentrations were observed at C10 at 18.5 ft bgs or 21 ft bgs between the baseline and post-Stage 1 events. PCE concentrations declined at both depths at this location from the post-Stage 1 event to the post-Stage 2 event. While the reason for the decline is unclear and may be due to heterogeneity (attempts were made to repeat boreholes as close as possible to prior co-located borings), a slight increase in dichlorination intermediates was observed in the 18.5 ft bgs sample, suggesting some increase in biological activity in this area over time.

While the decreases in soil PCE concentrations over the Dem/Val are evident, significant, and generally consistent among all sampling locations within the TTA, there were no clear, corresponding increases of dechlorination intermediates in the soil samples. Additional assessment of the effects of EK-BIO remediation on soil quality is further discussed below based on soil microbial analysis.







Figure 6-5. Soil CVOC Data – Comparisons Between Events

6.3.2 Soil Microbial Analytical Results

Soil samples from all three (3) events were analyzed for multiple biomarkers: reductive dechlorination bacteria Dehalococcoides (*Dhc*) and functional genes for TCE and VC dechlorination. The analyses of all soil samples collected during the baseline and post-Stage 1 events did not detect any of these biomarkers above the detection limit (6E+03 to 8E+03 enumeration or gene copies per gram). Given the observed PCE distributions and the lack of biomarkers in the first two events, only the soil samples from 18.5 ft bgs from the post-Stage 2 event were submitted for biomarker analyses and the results are summarized in **Table 6-9**.

Location / Parameter	Dhc (baseline)*	vcrA	bvcA	tceA
C1	2E+03 J (below 8E+03)	Below 7E+03	Below 7E+03	Below 7E+03
C2	7E+04 (below 8E+03)	1E+04	2E+04	3E+03 J
C3	9E+05 (below 8E+03)	1E+05	1E+05	3E+05
C4	7E+03 (below 8E+03)	Below 8E+03	Below 8E+03	Below 8E+03
C5	5E+04 (below 8E+03)	4E+04	2E+03 J	7E+03
C6	Below 8E+03	NA	NA	NA
С7	4E+04 (below 7E+03)	Below 8E+03	1E+04	Below 8E+03
C8	Below 7E+03	NA	NA	NA
С9	7E+03 (below 6E+03)	1E+03 J	Below 7E+03	Below 7E+03
C10	Below 8E+03	NA	NA	NA

Table 6-9.	Soil Microbial Analytical Data (Post-Stage 2 Samples; 18.5 ft bgs)
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* For the samples with detected *Dhc*, the baseline *Dhc* data were provided in ().

Dhc: Dehalococcoides (enumeration/gram); *vcrA : VC Reductase* (gene copies/gram)

bcvA : *BAV1 VC Reductase* (gene copies/gram) *tceA* : *TCE Reductase* (gene copied/gram)

J : Estimated quantity between the method detection limit and quantitation limit.

NA : Not applicable because *Dhc* was not detected.

Among the nine (9) post-Stage 2 samples from within the TAA, six (6) samples were reported with quantifiable levels, plus one with estimated level, of *Dhc*. Of these seven (7) samples with detected *Dhc*, five (5) samples, C2, C3, C5, C7, and C9, were detected with functional genes for VC dechlorination. Among all the locations within the TTA, location C3 appeared to have the most established *Dhc* populations with VC reductase genes, followed by locations C2 and C5.

It is noted that these are the locations in the interior of the TTA generally between supply wells and electrode well E5 which was an anode during both Stage 1 and Stage 2 operation. Electron donor would have been consistently migrating towards electrode well E5 during both Stages, and as such, it is not unexpected that the best electron donor availability and microbial growth would be detected in this area.

Overall, the soil sampling results presented in this section indicate that the EK-BIO operation resulted in significant decreases of PCE in clay soil across the TTA. The data also showed that microbial populations capable of reductive dechlorination of chlorinated ethenes, including VC, were established within the clay materials in at least part of the TTA.

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7.0 PERFORMANCE ASSESSMENT

This section provides an assessment of the performance of the Dem/Val relative to the performance objectives previously discussed in Section 3. Each subsection discusses the performance relative to an individual performance objective.

7.1 DEMONSTRATE UNIFORM DISTRIBUTION

The success criteria for this performance objective include:

Criterion

At groundwater monitoring locations within the TTA, groundwater TOC is at least 5x baseline, or 10x detection limit if baseline is below detection.

As presented in **Table 6-4**, every monitoring well within the TTA had TOC concentrations >8x baseline levels (for each well) during Stage 1 and/or Stage 2 operation, with the exception of EKMW-04 where the maximum TOC detected was 1.8x of the baseline. However, at EKMW-04 the maximum VFA detected was >9x its baseline. With respect to VFAs, all but one monitoring well (EKMW-05) had concentrations >9x baseline levels. As such, the Dem/Val has met this criterion in the EK was able to substantially increase electron donor concentrations across the entire TTA. Of note, TOC concentrations were more than 100x average baseline levels in groundwater samples located between the supply wells and central anode (E5), indicating the electrode layout and electrical field design as important parameters in achieving optimal electron donor distribution across the TTA.

Criterion

No local focusing of electric field within the TTA – no electrical potential gradient between any individual pair of cathode-anode is 5x the average electrical gradient between all pairs of electrodes.

As presented in **Figure 6-2**, the voltage measured at discrete locations within the TTA were between 5.3V and 6.2V, with a standard deviation of 0.31V (5%). Voltage gradients were calculated between locations of closest pairs shown in **Figure 6-2** and range between 0.1 to 0.26 V/m. The calculated voltage gradients between these pairs are within 3x of each other and within 2x of the average gradients (0.13 V/m) indicating no local focusing of electric field within TTA. The Dem/Val has met this criterion.

Criterion

Electrical potential gradient between electrode pairs maintained at level no more than 5x target gradient at design current.

The EK system was designed and operated at a constant current, determined after the start-up period, during the Dem/Val. As presented in **Figure 6-1**, during Stage 1 and Stage 2 operation, the voltage required of the power supply unit was generally consistent at between 15V and 30V, except for a few occasions when electrodes were in need of replacement. The electrical current supplied to individual wells during each stage of operation was generally steady (variation within 37% of average).

Given that (1) soil electrical resistivity is a soil property not expected to vary over the course of Dem/Val, and (2) the voltage output by the power supply unit and the current supplied to individual electrodes were generally steady, the electrical potential between electrode pairs within the TTA should maintain within 5x of target during operation. The Dem/Val has met this criterion.

7.2 DEMONSTRATE TREATMENT EFFECTIVENESS

The success criteria for this performance objective include:

Criterion

> 60% reduction in average PCE concentrations in soil and groundwater within the TTA, with coupled and comparable molar concentration increases of dechlorination daughter and end products.

Figure 6-3 presents a comparison of groundwater CVOC and biomarker monitoring results. The % decrease of PCE concentration and % increases of concentrations of dechlorination daughter products and ethene from the baseline levels are summarized in **Table 7-1**.

	EKMW-01		EKMW-02		ЕМК	W-03	EKM	W-04	EKM	W-05	EKM	W-07
	Stage	Stage 2	Stage	Stage 2	Stage	Stage 2	Stage	Stage 2	Stage	Stage 2	Stage	Stage 2
PCE Decrease	90%	95%	86%	74%	70%	83%	89%	72%	90%	67%	84%	93%
Increase of Products	310%	410%	65%	-41%	-13%	-24%	-18%	-34%	160%	200%	140%	200%
Increase of Ethene**	14x	84x	58x	47x	30x	26x	11x	3.8x	1x	1.6x	13x	22x

 Table 7-1.
 Changes of Groundwater CVOC and Ethene Concentrations*

* Calculations for each well are based on molar concentrations and comparing between Baseline to End-of-Stage 1 and Baseline to End-of-Stage 2. Calculations for increases of products include TCE, cis-1,2-DCE, VC, and ethene.

For each of the six monitoring wells located within the TTA, decreases of >80% in PCE concentration were achieved at the end of either Stage 1 and/or Stage 2. Also presented in **Figure 6-3** and **Table 7-1**, the decreases of PCE from baseline at each well within the TTA were coupled with evident increases of dechlorination daughter products and/or ethene. The Dem/Val has met this criterion for groundwater.

Figure 6-5 presents a comparison of soil CVOC at corresponding locations between the three (3) sampling events. The data presented in **Figure 6-5** are arranged per individual locations and sampling depths. Overall, soil PCE concentrations of all samples collected from 18.5 ft bgs at the nine (9) locations within the TTA decreased by 78% (C6) to 99% (C3) from baseline to post-Stage 2, with an average decrease of 88%. It was also noted that while C6 was the only location with evident baseline PCE concentration at 21 ft bgs (5.5 mg/kg), the PCE concentration at this depth and location decreased to 0.21 mg/kg (96% reduction) and below in subsequent post-operation sampling events. As such, the Dem/Val met the PCE soil reduction criterion.

While the decreases of soil PCE concentrations over the period of Dem/Val were evident, significant, and generally consistent among all sampling locations within the TTA, there were no corresponding increases of dechlorination intermediates in the soil samples. The reason for the general lack of intermediates in the soil samples is unclear, particularly since these degradation intermediates were clearly present in the groundwater samples. Thus, while this criterion was not clearly met for soils, this may not be an appropriate performance metric for the soils.

Criterion

Ethene/ethane detected at > 75% of groundwater monitoring wells within the TTA before the completion of post-EK monitoring.

As presented in **Figure 6-3** and **Table 7-1**, every (100%) monitoring well within the TTA showed increased concentrations of ethene (up to >1,000 μ g/L) during the Dem/Val. The Dem/Val has met this criterion.

Criterion

> 10x increases of Dhc from baseline at > 50% of soil and groundwater samples collected from within the TTA before the completion of post-EK monitoring.

For the groundwater, **Figure 6-3** shows that every monitoring well within the TTA showed significant increases (several orders of magnitude) of *Dhc* and *vcrA*. The Dem/Val has met this criterion for groundwater.

As presented in **Table 6-9**, among the nine post-Stage 2 soil samples collected from within the TAA, six samples were reported with quantifiable levels, plus one with estimated level, of *Dhc*, while all baseline soil samples did not contain detectable levels of *Dhc*. Of the seven samples with detected *Dhc*, five samples (C2, C3, C5, C7, and C9) showed functional genes for VC dechlorination. Thus, while not as impressive as the groundwater results, the Dem/Val has met this criterion for soil.

7.3 DEMONSTRATE SUITABILITY FOR FULL-SCALE IMPLEMENTATION

The success criteria for this performance objective include:

Criterion

System operation conditions (voltage and current) within \pm 50% *of the designed target conditions.*

The EK system was designed and operated at a constant current, determined after the start-up period, during the Dem/Val. As discussed in Section 7.1 (criterion related to electrical gradient) and presented in **Figure 6-1**, the operating voltage and current remained relatively steady except when electrodes were in need of replacement. There were three occasions when different electrodes needed to be replaced: late October/early November 2015 and late January/early February 2016 during Stage 1 operation; and December 2016 during Stage 2 operation. Prior to electrode replacement, the rising system voltage readings would indicate the operating conditions were becoming unsteady. As discussed in Section 6.1, excluding the temporary unstable readings during the three periods shortly before the electrode replacement, the overall system operation conditions were steady and within 50% of the average during each normal operation period. The Dem/Val has met this criterion.

Criterion

Amendment supply up-time > 75% of target.

Other than the scheduled major O&M events between the two stages of operation, there were only three occasions when the system was shut down to allow replacement of electrodes. Overall, the system up-time was well >75% during the Dem/Val. The Dem/Val has met this criterion.

Criterion

Energy consumption within \pm 30% *of design estimates.*

The EK system was designed and operated at a constant current, determined after the start-up period, during Stage 1 and Stage 2 operation. **Figure 6-1** presents cumulative energy consumption during each stage of operation. Given that the energy consumption is a function of voltage and current and as discussed above regarding the steady system operation condition criterion, excluding the temporary unstable voltage conditions during the three short periods before the electrode replacement, the overall system operations were steady and, thus, the energy usage as well. The Dem/Val has met this criterion.

7.4 SAFE AND RELIABLE OPERATION

The success criteria for this performance objective include:

Criterion

Operation conditions remain stable within the normal designed ranges over the course of the demonstration period.

As discussed in Sections 7.1 and 7.3 above, the overall operation conditions remained relatively steady over the course of system operation. The Dem/Val has met this criterion.

Criterion

No lost-time incidents.

There were no safety-related lost-time incidents. The Dem/Val has met this criterion.

7.5 EASE OF IMPLEMENTATION

The success criteria for this performance objective include:

Criterion

Ability to construct using conventional techniques and contractors.

The Dem/Val involved only conventional field construction techniques, including well drilling, well installation, and trenching and piping, as well as remediation system assembly performed by regular, qualified subcontractors. The Dem/Val has met this criterion.

Criterion

A single field technician is able to effectively monitor and maintain normal system operation.

During the operation, one field technician performed routine system O&M tasks twice per week with approximately 2 to 3 hours per visit. During the routine O&M visit, the tasks primarily included system visual inspections, recording the system operational parameters (voltage, current, amendment flow and pressure), and replenishing amendment solutions as needed. Other than sampling groundwater, there were fewer than 5 scheduled O&M events that involved two field technicians. The Dem/Val has met this criterion.

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8.0 COST ASSESSMENT

This section provides cost information that a remediation professional could use to reasonably estimate the costs for implementing EK-BIO at a given site. The cost analysis is based on actual costs of the tasks completed for this Dem/Val, and supplemented with reasonable estimates based on team's experience from similar projects.

8.1 COST MODEL

Table 8-1 presents a summary of cost elements and the cost tracking. Select cost elements are briefly discussed.

Table 8-1. Cost Model for EK-enhanced Amendment Delivery In-Situ Remediation

Cost Element	Tracked During the Demonstration	Costs
Bench-scale EK tracer test	 Aquifer sediment materials provided by NAS Jacksonville. Laboratory bench-scale EK column tracer tests – \$25K 	\$25K
Remedial Design	• System design and demonstration plan – professional labor \$80K	\$80K
Remediation Construction	 Well driller – 17 electrode/supply wells and 10 monitoring wells; \$40K EK system construction subcontractor - \$120K Site construction subcontractor - \$127K Field construction oversight and system shakedown professional labor (~ 7 weeks) - \$40K 	\$327K
Baseline characterization	 Field staff labor - \$6K Laboratory analytical costs - \$28K 	\$34K
Remediation System Operation & Maintenance	 Field O&M subcontractor – over 14 months of active operation, \$45K Materials – lactate, \$6K Materials - buffer and other chemicals, \$3K Materials - system parts & consumables, \$4K Professional labor for startup and scheduled O&M visits - \$20K 	78K (about \$6K/month)
Field Sampling (soil / groundwater)	 4 rounds of comprehensive sampling events and 4 rounds of limited scale sampling events Standard soil and groundwater sampling activities Field sampling staff labor (partially provided by NAS Jacksonville) Laboratory analytical costs (partially provided by NAS Jacksonville) 	-
Waste disposal	NAS Jacksonville provided waste disposal; no cost tracking	-
Reporting & Other Compliance Requirements	 Project reporting and meetings. 	-

(for a Source Area Measuring 35 ft by 35 ft by 5 ft Thick)

Cost Element – Bench-scale EK Column Testing

For this Dem/Val, the team conducted a bench-scale EK column tracer test to estimate the transport rate as a design basis. It is recommended that such bench-scale testing be considered as part of the remedial design for an EK-enhanced remedy. The scope of bench testing can vary depending on the test objectives. For example, the bench test can be designed to estimate EK transport rate only or to include assessment of treatment effectiveness facilitated by the enhanced amendment delivery, and the need for bioaugmentation. The costs of bench testing, therefore, vary based on the scope and objectives, but will typically range in cost between \$15,000 to \$40,000.

Cost Element – Remediation Construction

For this Dem/Val, no special drilling or field construction methods were required. The EK system, including an amendment supply system, a power supply system, and electrolyte crosscirculation system, was constructed by a remediation system vendor in accordance with the project-specific design. No special equipment or parts, other than off-the-shelf commercial products, were required for the EK system. The electrodes and power supply unit were also commercially available products. The EK system construction costs will vary depending on the project scale (e.g. number of electrode wells needed to cover a treatment area, number of electrodes used, etc.) and site conditions (e.g., the extent of instrument automation due to site access, iron fouling and control measures due to geochemistry, etc.). However, the cost increase for expanding the EK system constructed for this Dem/Val will only be marginal, primarily related to additional parts (e.g., electrode (\$240 each), valves, and pipe fittings, etc.). The EK control center used for this Dem/Val could have been capable of incorporating up to 13 electrodes, thereby expanding the treatment footprint (on the electrode spacing used) by approximately 45%.

Cost Element – Remediation System Operation & Maintenance

The system O&M costs can vary depending on the extent of instrument automation and site conditions and restrictions. For this Dem/Val, routine O&M tasks were performed by regular remediation field technicians without needing special personnel. The material costs for chemicals and system consumables are project-specific but generally scalable. Professional labor costs for this Dem/Val were related to initial system start-up operation and a system conditioning during the re-start transition from the end of Stage 1 incubation to Stage 2 operation.

8.2 COST DRIVERS

Based on the information and experience obtained from this Dem/Val, there are three main cost drivers to consider when evaluating implementation costs in future projects, including: (1) footprint, depth interval, and volume of target treatment zone and contaminant mass; (2) presence and location of above-ground and subsurface utilities; and (3) site geochemistry, particularly pH and iron. These are also the same cost drivers for many other in-situ remediation technologies and not unique to EK technology implementation. Each of these cost drivers is discussed below.

Cost Driver – Target Treatment Zone and Contaminant Mass

As for most remediation technologies, the size and volume of the target treatment zone as well as the amount of contaminant requiring treatment significantly affects the overall remediation costs.

Particularly, the drilling and well installation costs for system wells (electrode wells and supply wells) vary based on the number and depth of these wells needed to adequately address the treatment zone. The spacing between electrode wells designed for this Dem/Val was approximately 18 ft, with supply wells located within the electrode well network. This level of well spacing, coupled with the phased operation program and the duration of operations, can be considered as within ranges of normal design for this technology. For this Dem/Val, active EK operation following bioaugmentation lasted approximately 10 months (two separate 5-month stages) and achieved an average soil PCE reduction of 88%. The overall duration of an EK remedy implementation will depend on the contaminant mass and the required mass reduction goal.

While there is no technical limit for applying EK technology in terms of depth, the costs for well construction increase as the depth of target treatment zone. The depth interval (thickness) of target treatment zone may affect the number of electrodes within an electrode well and, therefore, the overall number of electrodes needed. A target treatment zone of shallow depth may need additional measures and costs related to utility protection as discussed below. This technology is suitable mainly in saturated formations; treatment within the vadose zone represents a challenge which is discussed in Section 9.

Utilities

As with other active remediation technologies, a power source is required for this technology. Although not yet tested, the energy demand and the electrical operation conditions (voltage and current) demonstrated in this Dem/Val suggest that solar energy with battery units may be a feasible option.

Special considerations are warranted at sites with metallic subsurface infrastructure or subsurface utilities that may be electrically conductive. This evaluation should take into account the vertical separation of the electric field and the utility of concern. If needed, cathodic protection measures can be considered which can increase the implementation costs. In general, the EK technology is best suited for sites where the target treatment zone is deeper than 8 ft bgs (i.e., below utilities and conduits) and the groundwater table below 5 ft bgs, otherwise special design considerations are needed.

Site Geochemistry

Concentrations of iron and other major cations (e.g., calcium and magnesium) in groundwater is an important factor that can affect the costs of system construction and O&M. While this geochemical parameter is an important factor for most in-situ remediation technologies, it requires a special consideration when implementing an EK remedy because the electric field will result in, at least temporarily, concentrated iron and cations in cathode wells which attract cations in groundwater. The EK system for sites with elevated concentrations of these cations will need to be sized and equipped with adequate units for handling the anticipated amount of precipitates. More robust O&M programs and efforts will also need to be considered for such sites. Over the course of implementation, the O&M issues related to these do diminish.

8.3 COST ANALYSIS

For cost assessment, **Table 8-2** provides a cost comparison between EK-BIO, conventional directinjection EISB, hydraulic fracturing DPT injection of ZVI, and electrical resistance heating (ERH) thermal treatment for a typical CVOC source site in low-K materials. The key characteristics of the framework site are as follows:

- The site characterization and conceptual site model have been completed. The characterization of the target treatment area is sufficient and no additional pre-design investigation data are needed to support the remedial design;
- The footprint of target treatment zone is approximately 80 ft x 80 ft;
- The depth interval of target treatment zone is between 10 and 30 ft bgs;
- Geology consisting of mainly fine-grained clayey material with low permeability (<1.0E-06 cm/sec);
- CVOC mass (chlorinated ethenes) is approximately 500 lbs;
- Treatability testing is already completed to support bioremediation design. The site will require bioaugmentation of dechlorination cultures, which will completely dechlorinate target CVOCs to innocuous end product;
- The site has available potable water supply and adequate power utility; and
- No concerns for site access, subsurface obstruction, electrical interference or corrosion.

Table 8-2 presents estimated full-scale implementation costs and key assumptions associated with each technology on which the estimated costs are developed. Given that performance monitoring requirement is highly project-specific, the estimated costs are presented as with and without the costs for performance monitoring. These estimates are prepared at the level of a feasibility study (e.g., +50%/-30%) for a cleanup site.

For baseline comparison, the costs of excavation with offsite disposal was also estimated. The feasibility-level cost estimate for an excavation-disposal option is in the range of \$1,300,000 to \$1,500,000. One variable in cost estimation for excavation is the quantity of excavated soil that may need to be managed as hazardous waste. This can significantly increase the cost of this option.

Based on the cost estimates presented in **Table 8-2**, EK-BIO can be potentially more cost favorable to ERH remedy (\$688K to \$1,183K before accounting for monitoring costs) and excavationdisposal. The cost saving of EK-BIO compared to ERH is smaller when factoring in the monitoring costs because ERH can complete the remediation within a shorter timeframe (~ 6 months with ERH compared to ~ 2 to 3 years with EK-BIO for the framework site). It is noted the significant difference in the electrical energy needed for these two technologies indicating a much more favorable environmental performance of EK-BIO over ERH.

The feasibility and effectiveness of direct-injection EISB approach is highly dependent on whether direct injection can achieve a reasonable injection rate and a reasonable radius of influence (ROI). For cost estimating purpose, an injection rate of 0.75 gpm to 1 gpm and a ROI of 7 ft are assumed.

The estimated costs for direct-injection EISB are presented in **Table 8-2** as a range based on injection rates. It should be noted that it is possible that at certain low-K sites these assumed injection rates and ROI may not be achievable. As presented in **Table 8-2**, the estimated cost for EK-BIO approach is comparable to that of direct-injection EISB when factoring in the costs for reinjections (assumed two reinjections over five years). When further accounting the performance monitoring costs, which depends on the overall timeframe of individual remedy, EK-BIO is potentially a more cost favorable alternative to direct-injection EISB. Therefore, at sites where low-K material and/or high-degree of heterogeneity limits the feasibility of applying direct injection, EK-BIO provides a cost-effective solution for implementing in situ bioremediation.

Fracturing DPT injection has an overall estimated cost slightly higher than EK-BIO. Certain site conditions may present more constraints for fracturing DPT injection than EK-BIO, such as sensitive subsurface utilities, shallow treatment zone close to the ground surface, or oxidizing geochemical conditions requiring more site conditioning to facilitate reductive treatment. While fracturing DPT technology can enhance aquifer permeability, if a target treatment zone is in a heterogeneous formation, the fracturing technique may still result in non-uniform distribution of injected amendment. Alternately, the depth interval for fracturing will need to be reduced, with associated increased costs to achieve uniform distribution.

Table 8-2. Cost Model for Full-Scale Implementation of Select Source Area Remediation Technologies

Cost Element	Tasks	Excavation - Disposal	EK-BIO	Injection EISB	Hydraulic Fracturing ZVI Injection	ERH	Descriptions / Assumptions
Remedial Design and Permitting	Design, project workplans, UIC permit ERH – also needs air permit, water discharge permit	\$50K	\$70K	\$50K	\$65K	\$80K	NA
	 EK-BIO – Well installations Site construction; utilities EK system & control center fabrication / mobilization / field connections Professional field oversight and system shakedown/startup 		1. \$53K 2. \$140K 3. \$160K 4. \$60K				 25 electrode wells and 15 supply wells; all 4-inc PVC wells Electrode well spacing at ~ 18 ft Two electrodes vertically spaced in each electrode well One EK control / amendment supply system
Remedial Construction (* Excavation-disposal and hydraulic fracturing ZVI injection costs presented only in Remediation System Operation & Maintenance below)	Injection EISB – 1. Well installations 2. Site construction; utilities 3. Injection system mobilization / field connections 4. Professional field oversight and system shakedown/startup			1. \$70K 2. \$35K 3. \$20K 4. \$40K			 49 injection wells; 2-inch PVC wells Injection well spacing at ~ 13 ft Injection ROI at ~ 7 ft Up to three injection manifolds are constructed Area is accessible during injection, and no trenching is required
	 ERH – 1. Well installations 2. Site construction; utilities 3. ERH system mobilization / field connection / system shakedown/startup 4. Professional field oversight 					1. \$92K 2. \$180K 3. \$190K 4. \$60K	 25 electrode wells and 25 co-located vapor recovery wells Electrode well spacing at ~ 18 ft A surface cap will not be required Include a 20-hp vapor extraction blower Adequate power supply is available for a 500-kW power unit
Remediation System Operation & Maintenance	Excavation with Off-site Disposal – 1. Excavation 2. Dewatering 3. Off-site disposal of soil and water 4. Backfill 5. Professional field oversight	\$1,250K – \$1,450K					 7,000 CY excavated volume 150,000 gallons dewater volume 50% excavated volume as hazardous 25 miles to disposal facility

	 EK-BIO – Materials – chemicals Materials – parts and supplies Labor – O&M operator Labor – professional Utilities – water and electrical power 		 \$60K- \$75K \$25K- \$40K \$65K- \$95K \$50K- \$75K \$5K-\$8K 				 Lactate as electron donor; also supply buffer and bioaugmentation culture Approximately up to 3A current between each pair of cathode and anode Four stages of operation over two years; each stage is four months of active EK operation followed by two months of incubation; alternate electric field orientation between each stage; a 3rd year is assumed for contingency Less than 5,000 kW-hr electrical energy required for EK operation Weekly visit by a system operator; up to three major O&M events
Remedial System Operation & Maintenance	Injection EISB – (injection rate from 1 gpm to 0.75 gpm*) 1. Injection system rental * 2. Materials – chemicals 3. Labor – field injection * 4. Utilities – water and electrical power 5. Reinjection – 2 reinjection events*			 \$20K to \$26K* \$55K \$60K to \$90K* \$5K \$120K to \$180K* x 2 events 			 Emulsified vegetable oil (EVO) as the electron donor; also inject buffer and bioaugmentation culture Achievable injection rate from 1 gpm to 0.75 gpm Up to two re-injection events over a period of five years
	 DPT Hydraulic Fracturing ZVI Injection – 1. Injection vendor all labor/material inclusive costs 2. Professional oversight 				1. \$695K to \$845K 2. \$30K		 25 DPT injection points; ROI ~12 ft; spacing ~ 20 ft 7 fractures per DPT location (~ 3 ft depth interval per fracturing) 1.5% wt ZVI to soil mass (total ZVI mass = 210,000 lbs) 20 to 25 days of field injection
	 ERH – System rental and system operator Labor – professional oversight Utilities – electrical power Permit monitoring (air and condensate) Waste (activated carbon) disposal 					1. \$360K 2. \$24K 3. \$114K 4. \$30K 5. \$53K	 Total heating time of 180 days Approximately 142,000 kW-hr electrical energy needed Approximately 8,000 lb of activated carbon for regeneration/disposal Vapor and condensate sampling and analysis in compliance with permits
Estimated Total (no performance monitoring costs)		\$1,300K - \$1,500K	\$688K - \$776K	\$355K to \$386K* + 2 reinjections \$595K to \$746K*	\$790K - \$940K	\$1,183K	

Remediation Performance Monitoring	EK-BIO – Semi-annual groundwater monitoring for 3 to 4 years; Final soil sampling Injection EISB – Semi-annual groundwater monitoring for 5 years; Final soil sampling Hydraulic fracturing DPT ZVI Injection – Semi-annual groundwater monitoring for 3 years; Final soil sampling ERH – Two semi-annual groundwater following the active operation; Final soil sampling		\$190K - \$240K	\$290K	\$190K	\$90K	For costing purpose, assuming \$25K per semi-annual groundwater monitoring event; \$40K for final soil sampling event.
Estimated Total (with performance monitoring costs)		\$1,300K - \$1,500K	\$878K - \$1,016K	\$885K - \$1,036K*	\$980K - \$1,130K	\$1,273K	

9.0 IMPLEMENTATION ISSUES

EK-BIO is mainly a variation on standard EISB whereby EK is used to more effectively deliver the required amendments (electron donors, buffers and microbes) through low-K materials. As such, there are very few additional requirements or implementation issues that needed to be addressed beyond those typically encountered with a standard EISB implementation. Some areas where additional attention may be required, on a site-specific basis, include:

- Safety considerations related to potential stray current/voltage to surface. To address this question, we checked the current and voltage at the manhole steel cover located within the treatment area while the EK system was in operation to confirm that there was no safety concern. Depending on project site, and for sensitive and active facilities with dedicated safety departments, additional design and explanation effort may be required for project approvals.
- Iron fouling of filters and valves along the catholyte (well water from cathode wells) extraction line. In this Dem/Val, we re-plumbed the system to minimize potential flow restriction points. Scaling of the cathodes also required maintenance actions to clean the cathode surface. As indicated above, this issue diminished over the course of the Dem/Val.
- Corrosion of metallic parts in the manifold system & wellhead fittings due to elevated chloride concentrations. In this Dem/Val, we replaced most metallic contacting parts with plastic parts upon discovering that chloride levels were far higher than initially known.
- The technology implementation did not require specialized/proprietary equipment. We used only standard commercial off-the-shelf equipment. We designed the manifold and control system and had a remediation system vendor assemble the system per design, but the overall system was similar to other "typical" in-situ remediation systems.
- If the technology is to be implemented near (laterally and/or vertically) utilities that are "sensitive" to electric interference or corrosion concerns, some protection measures, such as cathodic protection, may be considered.
- No special regulatory requirements or permits beyond what are typical for other EISB or ISCO projects such as UIC permit. Depending on the locality-/facility-specific requirements, local or facility power/electrical departments should be consulted.

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10.0 REFERENCES

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APPENDIX A POINTS OF CONTACT

Point of Contact Name	Organization Name Address	Phone Fax Email	Role in Project
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	Guelph, ON, Canada	ECox@Geosyntec.com	Supervising the project
David Gent	US Army ERDC Environmental Lab Vicksburg, MS	601-634-4822 David.B.Gent@usace.army.mil	Co-PI Technical direction
James Wang	Geosyntec Consultants Columbia, MD	410-910-7622 JWang@Geosyntec.com	Performer Technical design and execution
David Reynolds	Geosyntec Consultants	519-515-0883	Performer
	Kingston, ON, Canada	DReynolds@Geosyntec.com	Data analysis
Michael Singletary	NAVFAC Southeast	904-542-4204	Site coordination,
	Jacksonville, FL	Michael.a.singletary@navy.mil	technical review

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APPENDIX B TREATABILITY TEST MEMORANDUM

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427 Princess St., Suite 429 Kingston, Ontario, Canada K7L 5S9 PH 613.542.0228 FAX 613.542.0588 www.geosyntec.com

Memorandum

Subject: Results of Laboratory Testing of NAS Jacksonville Samples for Potential Application of Electrokinetic Remediation

ESAT TOA 601218

BACKGROUND

Geosyntec Consultants Inc. (Geosyntec), in conjunction with Naval Facilities Engineering Command (NAVFAC) and the Army Engineer Research and Development Center (ERDC), submitted a proposal to ESTCP for pilot testing electrokinetic–enhanced remediation at Operable Unit 3 (OU3) NAS Jacksonville. To develop site-specific data supporting the preparation of the ESTCP proposal, soil samples were collected from the vicinity of proposed pilot test area at OU3, and sent to Geosyntec for bench-scale laboratory testing. The bench-scale testing was funded through a Rapid Response Task (task order number 601218-03). Geosyntec has developed this memorandum to document the test completed and report the test results.

SCOPE OF WORK

The scope of work for the bench-scale electrokinetic (EK) testing program included the following tasks:

- 1) Mineralogical analysis of the supplied soil
- 2) Zeta potential testing of the supplied soil
- 3) Non-reactive tracer testing of the supplied soil

RESULTS

Mineralogical Analysis

A sample of the soil from NAS Jacksonville was sent to GR Petrology Consultants Inc. (GRP) in Calgary, Alberta, Canada for bulk and glycolated clay x-ray diffraction (XRD) analysis. The sample was found to contain 80.1% non-clay minerals and 19.9% clay minerals in the bulk XRD fraction. Quartz was the principal mineral detected, forming 61.3% of the bulk fraction. The high percentage of non-clay minerals is likely due to the selected subsample containing multiple sand grains, as the overall visual bulk soil was classified as sandy-clay.

Appendix D - EK Column Tests.doc

NAS Jacksonville EK Bench-scale Testing Page 2

The clay fraction was primarily composed of kaolinite (63% of the clay fraction), with smaller portions of illite, chlorite, and smectite.

Zeta Potential Testing

A sample of the soil from NAS Jacksonville was sent to the University of Toronto for measurement of zeta potential. Zeta potential is a key parameter which in part controls the rate of electroosmosis of bulk water through soil pores under an applied electric potential. Two sets of measurements were performed at various pH values, the first (run 1) immediately after pH adjustment and the second (run 2) after the solutions had been allowed to equilibrate overnight. The results are presented in Figure 1.



Figure 1 – Zeta Potential Results

NAS Jacksonville EK Bench-scale Testing Page 3

Tracer Testing

A conservative tracer test was conducted on a 10-cm long soil core using the EK testing apparatus (Figure 2). Under a process known as electromigration, anions and cations in bulk solution will migrate towards the oppositely charged electrode when an electrical potential is applied (independent of the effects of electroosmosis). Bromide was added to the cathode reservoir of the EKTA at a concentration of 1.0 g/L (as NaBr), and a constant current of 25 mA was applied to the soil core. The test was run for 72 hours. Following the test, the soil core was frozen and then sectioned into 1-cm long increments. The samples were sent to Maxxam Analytics (Maxxam) for analysis of bromide concentrations in the soil. Table 1 presents the distribution of bromide in the soil as a function of distance from the cathode reservoir.



Figure 2 – EK Column Test Apparatus

Table 1 - Bromide Analytical Results in Samples Collected Along the Soil Column

Sample	Background Soil	3-cm from cathode	5-cm from cathode	7-cm from cathode	10-cm from cathode
Bromide (mg/kg)	<1	295	158	157	284

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APPENDIX C BORING LOGS AND WELL CONSTRUCTION LOGS

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Well I.D.: Sy	
Drilling Company: EDS	
Driller(s): J.R. Mitch, Som	-
Geologist/Eng./Tech .: Byce Zincher S	
Signature: B 764	
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Development

Development continues.

10117/14

10/20/14

14:30

bject Number: TROYED tallation Method: HSA sing Installation Date: $romethyldeteq$ ell Type: somethydeteq ell Completion floor Guard Posts (Y / N) Date: $romethyldeteq$ Surface Pad Size: 3 ft x 3 ft Protective Casing or Cover Diameter/Type: $2' \times 2'$ sheet south Depth BGS: $2'$ Weep Hole (Y / N) Grout
sing Installation Date: $10/16/14$ ell Type: $soppoly$ ell Completion Method: ftwsh Guard Posts (Y / N) Date: $11/1/14$ Surface Pad Size: 3 ft x 3 Protective Casing or Cover Diameter/Type: $2' \times 2'$ Street You(+ Depth BGS: $2'$ Weep Hole (Y / N)
Ell Type: support Ell Completion Method: ftwsh Guard Posts (Y / N) Date: 11/1/14 Surface Pad Size: 3 ft x 3 ft Protective Casing or Cover Diameter/Type: 2' × 2' steel you(t+) Depth BGS: 2' Weep Hole (Y / N) Grout
Well Completion Flush Acoust Guard Posts (Y / N) Date: $1 \cdot 1 $
Well CompletionGuard Posts (Y / N)Date: $1 \cdot 1 $
Guard Posts (Y / N) Date: II / II / IISurface Pad Size: 3 ft x 3 ftProtective Casing or CoverDiameter/Type: $2' \times 2'$ sheet you(+Depth BGS: Weep Hole (Y / N)Grout
Guard Posts (Y / N) Date: II / II / IISurface Pad Size: 3 ft x 3 ftProtective Casing or CoverDiameter/Type: $2' \times 2'$ sheet you(+Depth BGS: Weep Hole (Y / N)Grout
Surface Pad Size:3ft x3ftProtective Casing or CoverDiameter/Type: $2' \times 2'$ sheet you'thDepth BGS: $2'$ Weep Hole (Y / N)Grout
Protective Casing or Cover Diameter/Type: <u>2' × 2' 5 rect you(+</u> Depth BGS: <u>2'</u> Weep Hole (Y/) Grout
Diameter/Type: $2' \times 2'$ sheet you't Depth BGS: $2'$ Weep Hole (Y/X) Grout
Depth BGS: <u>2'</u> Weep Hole (Y / V) Grout
Grout
Composition/Proportions: pertind cement type 1
Placement Method: <u>trennie pre</u>
Seal Date: 016/1-1
Type: <u>Pel-Plug Bentraite Pellets</u>
Source: 5 gel bucket
Set-up/Hydration Time: 30
Placement Method: direct pour
Vol. Fluid Added: no fund water in borehole
Filter Pack water in borehole
Type: 20/20 silico sod; 30/65 silico and
Source: 50 lb bass
Amount Used: 3 600 20/20; 1 60 30/65
Placement Method: pipe
Well Riser Pipe
Casing Material: 40 PVC
Casing Inside Diameters: in
Screen
Material: checkle 40 PVC
Inside Diameter: ir
Screen Slot Size:: ir
Percent Open Area:
Sump or Bottom Cap (1 N)
Type/Length: / o 25'
Total Water Volume During Construction
Introduced (Gal): Recovered
(Gal):
Deviewed
Reviewed By: Date:

~ 10 mal,

1:54

Well I.D.:	\$5	
Drilling Con	npany: EDS	
	J.R. Mitch, Sean	
Geologist/Ei	ng?/Tech.: Byce Zinckgrof	
Signature:	Br zet	
13	000	



Development

10/20/14

15:12

Site: NAS Tax
Project Number: TROY82
Installation Method: HSA
Casing Installation Date: 10/15/14
Well Type:
Well Type: Well Completion Method:
Well Completion
Guard Posts (Y / M) Date:
Surface Pad Size: ft x ft
Protective Casing or Cover Diameter/Type: 2' x 2' steel voult
Diameter/Type: $2' \times 2'$ steel voilt
Depth BGS: $2'$ Weep Hole (Y/ λ)
Grout
Composition/Proportions: portional cement type !
Discourse Martin de Const
Placement Method: pipe
Seal Date: 10/15/14
Type: Pel-Plug Berbaite Pellets
Source: <u>5 gal buckets</u>
Set-up/Hydration Time: <u>30 min</u>
Placement Method:
Vol. Fluid Added: no find colded due to excisting
Filter Pack water in borchole
Type: 20/30 silica sond; 30/65 silva sond
Source: 50 16 been
Amount Used: 3 begs 20/30; 1 beg 30/65
Placement Method:
Well Riser Pipe
Casing Material: to puc
Casing Inside Diameters: in.
Screen
Material: <u>suble 40 pre</u>
Inside Diameter: in.
Screen Slot Size::o _ o t oin.
Percent Open Area:
Sump or Bottom Cap (Σ / N)
Type/Length: 0,25'
Total Water Volume During Construction
Introduced (Gal): Recovered
(Gal):
<u>Reviewed</u>
By: Date:
illy brinn to light brown, then goes dry
I light been to clear a her to all

FLWP/Forms/Field Forms/Well Construction/Well Construction Logs/well construction log-flushA.doc

continues

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13

Well I.D.: 56	
Drilling Company: EDS	
Driller(s): J.R. Mitch Seen	
Geologist/Eng/Tech.: Byce Zincharf	
Signature: Ban ZG/	



10/17/14

10/20/14

6	Site: NAS Tex
any: EDS	
R. Mitch, Sean ?/Tech.: Bryce Zinctgr.f	Casing Installation Date: 10/16/14
By 361	Well Type: supplie
000	Well Type: <u>sopply</u> Well Completion Method: <u>fwsh</u> went
	Well Completion
	Guard Posts (Y / M) Date: (14
Ground Surface Elevation	Surface Pad Size: <u>3</u> ft x <u>3</u> ft
Land Surface	Protective Casing or Cover
TBD	Diameter/Type: $2' \times 2'$ steel voult
	Depth BGS: Weep Hole (Y/M)
	Grout
	Composition/Proportions: pertind quarter type
Measuring Pt.	
Elevation	Placement Method: ppd
(MPELEV)	
	Riser Pipe Date: Date:
	Type: Pet-Plug Benkenite Pettets
INTERVAL LENGTH	Source: 5 gel bucket
7 el	Set-up/Hydration Time: 30 mm
Seal Length 2'	Placement Method:
I Depth	Vol. Fluid Added: no third while to working Filter Pack
30/65	Type: 20/30 silies and, 30/65 silies sand
epth 0 5	
TH)	Amount Used: $3 6 - \frac{50}{20} = \frac{50}{20}$
20/30	Placement Method:
	Well Riser Pipe
Screen Length	
Filter Pac	* Casing Material: <u>schedule 40 pvc</u> Casing Inside Diameters: <u>4</u> in.
(SCRLENGTH) 4 15'	Screen Material
(FPL)	Material: <u>schedule 40 Puc</u> Inside Diameter: <u>4</u> in.
	Inside Diameter: <u>4</u> in. Screen Slot Size:: <u>0 210</u> in.
epth Sump Length D.25'	Percent Open Area:
EPTH)	Sump or Bottom Cap (\mathfrak{O} / N)
	Type/Length: cop / 0.25'
	Total Water Volume During Construction
Borehole Diameter	Introduced (Gal): <u>o</u> Recovered
	(Gal):o
8"	Reviewed
,,	By: Date:
10:32 perelopment begins. v12 and	Is, milley brown to light brown then goes day
,	
13:46 Development continues. ~ 15 g	jed, light brown to clear. Development ends.

Well I.D.: 57	
Drilling Company: EDS	
Driller(s): TR, Mitch, Scon	
Geologist/Eng./Tech.: 344 Zuncker	
Signature: By 364	



Development

10/17/14 10:10

10/20/14 13:25

	NAS Jox	_
	ect Number: TROYB2	
	allation Method: ASA	
	ing Installation Date: 10/10/14	-
Vel	Il Type: Il Completion Method: Push must	
Ve.	Il Completion Method: twish mount	
	Well Completion Guard Posts (Y / 1) Surface Pad Size: 3	
	Protective Casing or Cover	
	Diameter/Type: 2' x 2' steel youtr	-
	Depth BGS: <u>2'</u> Weep Hole (Y / M)	
	Grout	
	Composition/Proportions: portland compt type	1
	Placement Method:	
	Seal Date: 10/16/14	
	Type: Pel - Plug Bentante Peluts	
	Source: 5 gol bucket	
	Set-up/Hydration Time: 30 min	
	Placement Method: direct pour	
	Vol. Fluid Added: as find edded are to existing	
	Vol. Fluid Added: <u>no fluid added doe to existing</u> Filter Pack	
	Type: 20/30 yillice sond; 30/65 silice and	
	Source: <u>so to bars</u>	
	Amount Used: <u>3 6 ms</u> 20/30; 1 6 ms 30/65	
	Placement Method:	
	Well Riser Pipe	
	Casing Material:	
	Casing Inside Diameters:	in.
		111.
	Screen Meterial:	_
	Material: 40 pvc	in
	Material: yo pvc	•
	Material: YO PVC Inside Diameter: Screen Slot Size::	•
	Material:	•
	Material:	•
	Material:	•
	Material: schedule 40 PVC Inside Diameter: 4 Screen Slot Size:: 0.010 Percent Open Area: 0 Sump or Bottom Cap (SV/ N) Type/Length: Cop (0.25') Total Water Volume During Construction	•
	Material:	_ in. _ in.
	Material: scladdle 40 PVC Inside Diameter: 4 Screen Slot Size:: 0.010 Percent Open Area: 0 Sump or Bottom Cap (20/ N) Type/Length: Total Water Volume During Construction Introduced (Gal): Introduced (Gal): 0 Recovered (Gal):	•
	Material: setudate 40 PVC Inside Diameter: 4 Screen Slot Size:: 0.010 Percent Open Area: 0 Sump or Bottom Cap (\$V/ N) Type/Length: cop / 0.25' Total Water Volume During Construction Introduced (Gal): 0 Recovered (Gal): 0 Reviewed	_ in.
	Material: scladdle 40 PVC Inside Diameter: 4 Screen Slot Size:: 0.010 Percent Open Area: 0 Sump or Bottom Cap (20/ N) Type/Length: Total Water Volume During Construction Introduced (Gal): Introduced (Gal): 0 Recovered (Gal):	_ in.
	Material: setudate 40 PVC Inside Diameter: 4 Screen Slot Size:: 0.010 Percent Open Area: 0 Sump or Bottom Cap (\$V/ N) Type/Length: cop / 0.25' Total Water Volume During Construction Introduced (Gal): 0 Recovered (Gal): 0 Reviewed	_ in.

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Well I.D.: <u>S8</u>	
Drilling Company:	EDS
Driller(s):	tch, Sean
Geologist/Eng./Tech.:	Byce Zincher of
Signature: 8	- ist
1	010

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10/17/14

09:55 Dwelvoments

Site: NAS Jox	
Project Number: TROY82	
Installation Method: <u>HSA</u>	
Casing Installation Date: 0/16/14	
Well Type: supply Well Completion Method: fush mount	
Well Completion Method: fush mount	
Well Completion	
Guard Posts (Y / N) Date: <u>WIZIN</u>	
Surface Pad Size: ft x3	ft
Protective Casing or Cover	
Diameter/Type: 2' + 2' steel voilt	
Depth BGS: Weep Hole (Y / 🔊)	
<u>Grout</u>	
Composition/Proportions: portend and you	1
Placement Method:	
Seal Date:	
Type: Pet- Plug Beatraire Seal	
Source: 5 get bucket	
Set-up/Hydration Time:	
Placement Method:	
Vol. Fluid Added: no fund dove to exist Filter Pack	Iring
Filter Pack water in borehule	1
Type: 20/20 silica sand; 30/45 silica sand	
Source: <u>50 16 bests</u>	
Amount Used: 3 bys 20130; 1 beg 30/65	
Placement Method:	
Well Riser Pipe	
Casing Material: <u>schedule 40 pvc</u>	
Casing Inside Diameters:4	in
	111.
<u>Screen</u> Material: under 40 pyc	
	in.
Inside Diameter: 4	in.
Screen Slot Size:: 0-310	111.
Percent Open Area:	
Sump or Bottom Cap (🎊 / N)	
Type/Length: / @_25'	
Type/Length: / @ 25 ' Total Water Volume During Construction	
Type/Length: / @_25 ' <u>Total Water Volume During Construction</u> Introduced (Gal): Recovered	
Type/Length: / @ 25 ' <u>Total Water Volume During Construction</u> Introduced (Gal): Recovered (Gal):	
Type/Length: / @_25 ' <u>Total Water Volume During Construction</u> Introduced (Gal): Recovered	

10/20/14 17:08 Developent 10 cleat DUNHAVE

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Well I.D.:	E1			
Drilling Con	npany:	EDS		
Driller(s):	J.R.	Mitch S	iean	
Geologist/E				
Signature:	Bur	361	3	
	0	01		

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2



Site	: NAS Jax	
Pro	ject Number: TR0482	
	tallation Method: HSA	
	sing Installation Date: <u>10/14/14</u>	
	Il Type: electrode	
	ell Completion Method: Euch mount	
	Well Completion	
	Guard Posts (Y / 🔊 Date:	
	Surface Pad Size:3 ft x3	ft
	Protective Casing or Cover	
	Diameter/Type: 2' > 2' start you't	
	Depth BGS: 2' Weep Hole (Y/ M)	
	Grout	
	Composition/Proportions:	(
	Placement Method:	
	Theorem Theorem	
pe	Seal Date: 10/14/14	
1	Type: <u>Pel-Plug Bentonite Pellets</u>	
	Source: 5 gel bychet	
4	Set-up/Hydration Time: <u>30 min</u>	
	Placement Method:	
	Vol Fluid Added:	(b.a
	Vol. Fluid Added: and fluid added due to exist Filter Pack	9
	Type: 20/30 silica condi 30/65 silica sand	
	Source: <u>So lb bogs</u>	
	Amount Used: 3 bass 20/20; 1 bas 30/65	
	Placement Method: <u>memmie</u> pupe	
	Well Riser Pipe	
	Casing Material: <u>schedule 40 PVC</u>	4
	Casing Inside Diameters:	in.
	Screen	
	Material: <u>schedule 40 PVC</u>	
	Inside Diameter:4	in.
	Screen Slot Size::o.o10	_ 1n.
	Percent Open Area:	
	Sump or Bottom Cap (🌌 / N)	
	Type/Length: / 0.25'	- 6
	Total Water Volume During Construction	
	Introduced (Gal): Recovered	
	(Gal):O	
	Reviewed	
	By: Date:	
. F		
ja.l	withy brown to clear. Development ends.	

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Well I.D.:_	E2			
Drilling Co	mpany:	DS		
Driller(s):_	J.R., Sear	, Mitch		
Geologist/I	ing/Tech.:_	Bryce	Zincharaf	
Signature:	Bana	361		
-		11		



10/20/14

16:32

NAS Jax	
ject Number: TR0482	
allation Method: Hs A	
ing Installation Date: 10/14/14	
Il Type: <u>Electrode</u>	
Il Completion Method: Fuch wount	
Well Completion Guard Posts (Y / N) Date:	
Surface Pad Size: ft x	ft
Protective Casing or Cover	
Diameter/Type: 2' x 2' steel valt	_
Depth BGS: Weep Hole (Y / N)	
Grout	
Composition/Proportions:	ac 1
Placement Method:	
D. I.	
Seal Date: <u>10/14/10</u>	
Type: <u>rel- plug Bentonite Pellets</u>	
Source: 5 gel bucket	
Set-up/Hydration Time: 30 min	
bet up fif diation finde. 20 ma	
Placement Method: pour	
Placement Method: <u>direct pour</u> Vol. Fluid Added: <u>no Fluid addeed due to exist</u> Filter Pack in borchole	ing wate
Placement Method: <u>direct poor</u> Vol. Fluid Added: <u>oo Ford catched dire to exist</u> Filter Pack in borchole Type: <u>20/30 salice condi</u> <u>30/45 salice</u> Source: <u>50 16 bogs</u> Amount Used: <u>4 bogs 20/30; 1 bog 30/65</u>	eng wate
Placement Method: <u>direct por</u> Vol. Fluid Added: <u>a floid calded dre to exist</u> Filter Pack in borchole Type: <u>20/30 salice cond</u> ; <u>30/15 salice</u> Source: <u>50 16 bags</u> Amount Used: <u>4 bags 20/30; 1 bag 30/65</u> Placement Method: <u>tremmie pipe</u>	eng wate
Placement Method: vor Vol. Fluid Added: <u>a ford calded dre to exist</u> Filter Pack in borchole Type: vor salice do the salice Source: so the bags Amount Used: togs do the salice Placement Method: togs do the salice Well Riser Pipe	ring wate
Placement Method: <u>direct poor</u> Vol. Fluid Added: <u>op ford outdeed due to exist</u> Filter Pack in borchole Type: <u>20/30 salice condi</u> <u>30/45 salice</u> Source: <u>50 16 bogs</u> Amount Used: <u>4 bogs 20/30; 1 bog 30/65</u> Placement Method: <u>tremmie profe</u> Well Riser Pipe Casing Material: <u>schedule 40 PVC</u>	sand
Placement Method:	sand
Placement Method:	sand
Placement Method: <u>direct poor</u> Vol. Fluid Added: <u>oo food cataled dire to exist</u> Filter Pack Type: <u>20/30</u> <u>calare</u> <u>cood</u> ; <u>30/65</u> <u>subco</u> Source: <u>50 16 bogs</u> Amount Used: <u>4 bogs 20/30; 1 bog 30/65</u> Placement Method: <u>tremmit pipt</u> Well Riser Pipe Casing Material: <u>schedule 40 PVC</u> Casing Inside Diameters: <u>4</u> Screen Material: <u>schedule 40 PVC</u>	<u>sond</u> in.
Placement Method: <u>direct poor</u> Vol. Fluid Added: <u>oo foord catcled dire to exist</u> Filter Pack in borchole Type: <u>20/30</u> salice condi 30/65 salice Source: <u>50 16 begs</u> Amount Used: <u>4 begs 20/30; 1 beg 30/65</u> Placement Method: <u>tremmic pipe</u> Well Riser Pipe Casing Material: <u>schedule 40 PVC</u> Casing Inside Diameters: <u>4</u> Screen Material: <u>schedule 40 PVC</u> Inside Diameter: <u>4</u>	<u>sond</u> in. ir
Placement Method: <u>direct poor</u> Vol. Fluid Added: <u>oo foo'd cataled doe to excet</u> Filter Pack Type: <u>20/30</u> salice cood; <u>30/65</u> salice Source: <u>50 16 bags</u> Amount Used: <u>4 bags 20/30; 1 bag 30/65</u> Placement Method: <u>tremovic prote</u> Well Riser Pipe Casing Material: <u>schedule 40 PVC</u> Casing Inside Diameters: <u>4</u> Screen Material: <u>schedule 40 PVC</u> Inside Diameter: <u>4</u> Screen Slot Size:: <u>0.010</u>	<u>sond</u> in. ir
Placement Method: <u>direct poor</u> Vol. Fluid Added: <u>oo foord catcled dire to exist</u> Filter Pack in borchole Type: <u>20/30</u> salice condi 30/65 salice Source: <u>50 16 begs</u> Amount Used: <u>4 begs 20/30; 1 beg 30/65</u> Placement Method: <u>tremmic pipe</u> Well Riser Pipe Casing Material: <u>schedule 40 PVC</u> Casing Inside Diameters: <u>4</u> Screen Material: <u>schedule 40 PVC</u> Inside Diameter: <u>4</u>	<u>sond</u> in. ir
Placement Method: <u>direct poor</u> Vol. Fluid Added: <u>oo foo'd cataled doe to excet</u> Filter Pack Type: <u>20/30</u> salice cood; <u>30/65</u> salice Source: <u>50 16 bags</u> Amount Used: <u>4 bags 20/30; 1 bag 30/65</u> Placement Method: <u>tremovic prote</u> Well Riser Pipe Casing Material: <u>schedule 40 PVC</u> Casing Inside Diameters: <u>4</u> Screen Material: <u>schedule 40 PVC</u> Inside Diameter: <u>4</u> Screen Slot Size:: <u>0.010</u>	<u>sond</u> in. ir
Placement Method:	<u>sond</u> in. in
Placement Method:	<u>sond</u> in. in
Placement Method:	<u>sond</u> in. in.

Development continues. ~10

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Well I.D.:_	E3		_			
Drilling Cor	npany:	EDS				
Driller(s):	J. C.	Mitch,	sea	n		
Geologist/E	ng./Tech.	: Br	14	Zinckgr	£	
Signature:	B	34	-			
	0	001				



NAS Jax	
ject Number: TROY82	
tallation Method: NSTA	
sing Installation Date: 10/14/14	
Il Type: <u>euchode</u>	
Il Type: <u>etechnole</u> Il Completion Method: <u>fuch merch</u>	
Well Completion	
Guard Posts (Y / M) Date:	
Surface Pad Size:3 ft x3	ft
Protective Casing or Cover	
Diameter/Type: $2' \times 2'$ steel volt Depth BGS: $2'$ Weep Hole (Y/N)	_
Depth BGS: $2'$ Weep Hole (Y / 1	
Grout	
Composition/Proportions: portland coment byp	e 1
Placement Method:	
Seal Date: 10/14/14	(
Type: Pel pung Bentraite Pellets	
Source: 5 gel bucket	
Set-up/Hydration Time: 30 min	
Placement Method: direct pour	
Vol. Fluid Added: no flund added due to existin	4
Filter Pack water in borchole	5
Type: 20/30 siture most; 30/65 siture and	-
Source: 50 16 begs	
Amount Used: 4 60gs 20130, 1 60g 30/65	
Placement Method: <u>*remmie pipe</u>	
Well Riser Pipe	
Casing Material: schedule 40 PVC	
Casing Inside Diameters:	
Screen	
Material: <u>schedule 40 PVC</u>	
Inside Diameter:	in
Screen Slot Size:: 0.010	in
Percent Open Area:	
Sump or Bottom Cap (20/ N)	
Type/Length: <u>cap / 0.25'</u>	
Total Water Volume During Construction	
Total Water Volume During Construction	
Introduced (Gal): 0 Recovered	
Introduced (Gal): Recovered (Gal):	
Introduced (Gal): 0 Recovered	

Well I.D.: E4	
Drilling Company:_	EDS
Driller(s): <u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u></u>	Mitch, Seen
Geologist/Eng./Tec.	h .: Byle Zinchard
Signature: Br	zer
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oject Number: <u>TROUB?</u>	
tallation Method: HSA	_
sing Installation Date: 10/16/14	_
ell Type: <u>euchode</u>	
ell Completion Method: fluck more t	
Well Completion	
Guard Posts (Y / 🔊) Date:	
Surface Pad Size: <u>3</u> ft x <u>3</u>	ft
Protective Casing or Cover	
Diameter/Type: 2' x 2' steel vorit	
Depth BGS: Weep Hole (Y/M)	
Grout	
Composition/Proportions: per Hand cevent type	5 U
Placement Method: treasure pupe	
Seal Date: 10/16/14	
Type: Pel-Plug Bentpaite Pellets	
Source: _ 5 get bucket	
Set-up/Hydration Time: 30 m	
Placement Method: direct pur	
Placement Method: <u>direct pur</u> Vol. Fluid Added: <u>ave third edded dire to ears</u>	
Vol. Fluid Added: <u>av fluid edded due to earst</u> Filter Pack	hing
Placement Method: <u>direct pur</u> Vol. Fluid Added: <u>no fluid edded due to exist</u> <u>Filter Pack</u> Type: <u>rof30 silice serel</u> ; <u>30/b5 silice serel</u>	hing
Placement Method: <u>direct pur</u> Vol. Fluid Added: <u>no fluid edded due to error</u> <u>Filter Pack</u> Type: <u>re/so strike serel; 30/b5 supre serel</u> Source: <u>50 th bres</u>	hing
Placement Method: <u>direct pur</u> Vol. Fluid Added: <u>ave the dedied dire to earse</u> Filter Pack Type: <u>ro/30 silico sord</u> ; <u>30/65 milico sord</u> Source: <u>50 the bogs</u> Amount Used: <u>3 bogs 20/30; 1 bog 30/65</u>	ling
Placement Method: <u>direct pur</u> Vol. Fluid Added: <u>no fluid edded due to estis</u> Filter Pack Type: <u>ze/30 stilice serel</u> ; <u>30/b5 stilice serel</u> Source: <u>50 lh bogs</u> Amount Used: <u>3 bogs 20/30 ; 1 bog 30/b5</u> Placement Method: <u>treunic pipe</u>	ling
Placement Method: <u>direct pur</u> Vol. Fluid Added: <u>av third edded die to exist</u> Filter Pack Type: <u>ro/30 silice serel</u> ; <u>30/b5 silice serel</u> Source: <u>50 lh bras</u> Amount Used: <u>3 bras</u> 20/30 1 brag <u>30/65</u> Placement Method: <u>treumic pipe</u> Well Riser Pipe	nng
Placement Method: <u>direct pur</u> Vol. Fluid Added: <u>ave the dedied due to exist</u> Filter Pack Type: <u>zo/30 silice serel</u> ; <u>30/b5 whice serel</u> Source: <u>50 lb begs</u> Amount Used: <u>3 begs 20/30; 1 beg 30/b5</u> Placement Method: <u>tremmic pipe</u> Well Riser Pipe Casing Material: <u>schedule 40 puc</u>	
Placement Method: <u>direct pur</u> Vol. Fluid Added: <u>ave third edded dire to exist</u> Filter Pack Type: <u>rof30 silice serel</u> ; <u>30/b5 silice serel</u> Source: <u>50 lh brogs</u> Amount Used: <u>3 brogs 20/30 i brog 30/65</u> Placement Method: <u>treumic pipe</u> Well Riser Pipe Casing Material: <u>schurth 40 pvc</u> Casing Inside Diameters: <u>4</u>	nng
Placement Method: <u>direct pur</u> Vol. Fluid Added: <u>ave the dedied due to exist</u> Filter Pack Type: <u>ro/30</u> silice serel; <u>30/b5</u> ulice serel Source: <u>50 lh bras</u> Amount Used: <u>3 bras</u> Amount Used: <u>3 bras</u> Placement Method: <u>treumic pipe</u> Well Riser Pipe Casing Material: <u>schurth 40 pvc</u> Casing Inside Diameters: <u>4</u>	
Placement Method: <u>direct pur</u> Vol. Fluid Added: <u>avent to deded due to exist</u> Filter Pack Type: <u>zof30 situe</u> <u>sorel</u> ; <u>30/65 situe</u> <u>sored</u> Source: <u>50 /h begs</u> Amount Used: <u>3 begs 20/30 : 1 beg 30/65</u> Placement Method: <u>treumic pipe</u> Well Riser Pipe Casing Material: <u>schedur 40 pvc</u> Casing Inside Diameters: <u>4</u> <u>Screen</u> Material: <u>schedur 40 pvc</u>	in.
Placement Method: <u>direct pur</u> Vol. Fluid Added: <u>ave theid added dire to earse</u> Filter Pack Type: <u>zo/30 solice serel</u> ; <u>30/65 mbree sered</u> Source: <u>50 th hegs</u> Amount Used: <u>3 begs 20/30</u> ; <u>1 beg 30/65</u> Placement Method: <u>tremme pipe</u> Well Riser Pipe Casing Material: <u>schedul 40 pvc</u> Casing Inside Diameters: <u>4</u> <u>Screen</u> Material: <u>schedul 40 pvc</u> Inside Diameter: <u>4</u>	in.
Placement Method: <u>direct pur</u> Vol. Fluid Added: <u>avent to individe added dire to earse</u> Filter Pack Type: <u>ze/30 strike sorel; 30/65 strike sorel</u> Source: <u>50 It has</u> Amount Used: <u>3 bags 20/30; 1 bag 30/65</u> Placement Method: <u>tremme pipe</u> Well Riser Pipe Casing Material: <u>schurthe 40 pixe</u> Casing Inside Diameters: <u>4</u> <u>Screen</u> Material: <u>schurthe 40 pixe</u> Inside Diameter: <u>4</u> Screen Slot Size:: <u>0.010</u>	in.
Placement Method: <u>direct pur</u> Vol. Fluid Added: <u>avent to excert</u> Filter Pack Type: <u>zof30 situe</u> <u>sorel</u> ; <u>30fb5 where sorel</u> Source: <u>50 h begs</u> Amount Used: <u>3 begs 20/30 i beg 30fb5</u> Placement Method: <u>tremmic pipe</u> Well Riser Pipe Casing Material: <u>schedule 40 pur</u> Casing Inside Diameters: <u>4</u> <u>Screen</u> Material: <u>schedule 40 pur</u> Inside Diameter: <u>4</u> Screen Slot Size:: <u>0.010</u> Percent Open Area: <u>0</u>	in.
Placement Method: <u>direct pur</u> Vol. Fluid Added: <u>avent fund added dire to earse</u> Filter Pack Type: <u>zof30 solico serel; 30/65 milece serel</u> Source: <u>50 th hegs</u> Amount Used: <u>3 begs 20/30 ; 1 beg 30/65</u> Placement Method: <u>tremme pipe</u> Casing Material: <u>solicette 40 pre</u> Casing Inside Diameters: <u>4</u> <u>Screen</u> Material: <u>solicette 40 pre</u> Inside Diameter: <u>4</u> Screen Slot Size:: <u>0.010</u> Percent Open Area: <u>0</u> Sump or Bottom Cap (<i>Q</i> / N)	
Placement Method: <u>direct pur</u> Vol. Fluid Added: <u>avent third added dire to earse</u> Filter Pack Type: <u>zo/30 sitica sord</u> ; <u>30/65 nucce sord</u> Source: <u>50 the bags</u> Amount Used: <u>3 bags zo/30 i bag 30/65</u> Placement Method: <u>treunice pipe</u> Well Riser Pipe Casing Material: <u>schedule 40 pvc</u> Casing Inside Diameters: <u>4</u> Screen Material: <u>schedule 40 pvc</u> Inside Diameter: <u>4</u> Screen Slot Size:: <u>0.010</u> Percent Open Area: <u>0</u> Sump or Bottom Cap (<i>Q</i> /1 N) Type/Length: <u>cop / 0.25</u> ⁴	in.
Placement Method: <u>direct pur</u> Vol. Fluid Added: <u>avent third added dire to earse</u> Filter Pack Type: <u>ro/30 sitico sord</u> ; <u>30/65 nucce sord</u> Source: <u>50 the bogs</u> Amount Used: <u>3 bogs 20/30 i bog 30/65</u> Placement Method: <u>trease pipe</u> Well Riser Pipe Casing Material: <u>schedule 40 pur</u> Casing Inside Diameters: <u>4</u> Screen Material: <u>schedule 40 pur</u> Inside Diameter: <u>4</u> Screen Slot Size:: <u>0.010</u> Percent Open Area: <u>0</u> Sump or Bottom Cap (<i>Q</i> / N) Type/Length: <u>cop / 0.25'</u> Total Water Volume During Construction	in.
Placement Method: <u>direct pur</u> Vol. Fluid Added: <u>avent third added dire to earse</u> Filter Pack Type: <u>ro/30 sitico sord</u> ; <u>30/65 nucce sord</u> Source: <u>50 the bogs</u> Amount Used: <u>3 bogs 20/30 i bog 30/65</u> Placement Method: <u>trease pipe</u> Well Riser Pipe Casing Material: <u>schedule 40 pur</u> Casing Inside Diameters: <u>4</u> Screen Material: <u>schedule 40 pur</u> Inside Diameter: <u>4</u> Screen Slot Size:: <u>0.010</u> Percent Open Area: <u>0</u> Sump or Bottom Cap (<i>Q</i> / N) Type/Length: <u>cop / 0.25'</u> Total Water Volume During Construction	in.
Placement Method: <u>direct pur</u> Vol. Fluid Added: <u>avent third added dire to earse</u> Filter Pack Type: <u>zo/30 sitica sord</u> ; <u>30/65 nucce sord</u> Source: <u>50 the bags</u> Amount Used: <u>3 bags zo/30 i bag 30/65</u> Placement Method: <u>treunice pipe</u> Well Riser Pipe Casing Material: <u>schedule 40 pvc</u> Casing Inside Diameters: <u>4</u> Screen Material: <u>schedule 40 pvc</u> Inside Diameter: <u>4</u> Screen Slot Size:: <u>0.010</u> Percent Open Area: <u>0</u> Sump or Bottom Cap (<i>Q</i> /1 N) Type/Length: <u>cop / 0.25</u> ⁴	in.
Placement Method: <u>direct pur</u> Vol. Fluid Added: <u>avent the dedied dire to early</u> Filter Pack Type: <u>zo/30 solice send</u> ; <u>30/65 where send</u> Source: <u>50 the bags</u> Amount Used: <u>3 bags 20/30 ; 1 bag 30/65</u> Placement Method: <u>tremme pipe</u> Well Riser Pipe Casing Material: <u>schurth 40 pvc</u> Casing Inside Diameters: <u>4</u> <u>Screen</u> Material: <u>schurth 40 pvc</u> Inside Diameter: <u>4</u> Screen Slot Size:: <u>0.010</u> Percent Open Area: <u>0</u> Sump or Bottom Cap (<i>Q</i> / N) Type/Length: <u>cop / 0.25'</u> <u>Total Water Volume During Construction</u> Introduced (Gal): <u>0</u> Reviewed	in.
Placement Method: <u>dvect pur</u> Vol. Fluid Added: <u>avent third added dve to earse</u> Filter Pack Type: <u>zo/30 sitico sord</u> ; <u>30/65 vuice sord</u> Source: <u>55 the bogs</u> Amount Used: <u>3 bogs 20/30 ; 1 bog 30/65</u> Placement Method: <u>treunce pipe</u> Well Riser Pipe Casing Material: <u>schedule 40 pvc</u> Casing Inside Diameters: <u>4</u> Screen Material: <u>schedule 40 pvc</u> Inside Diameter: <u>4</u> Screen Slot Size:: <u>0.010</u> Percent Open Area: <u>0</u> Sump or Bottom Cap (<i>V</i> / N) Type/Length: <u>cop / 0.25'</u> Total Water Volume During Construction Introduced (Gal): <u>0</u> Recovered (Gal): <u>0</u>	in.
Placement Method: <u>direct pur</u> Vol. Fluid Added: <u>avent the dedied dire to earse</u> Filter Pack Type: <u>zo/30 solice send</u> ; <u>30/65 where send</u> Source: <u>50 the bags</u> Amount Used: <u>3 bags 20/30 ; 1 bag 30/65</u> Placement Method: <u>tremme pipe</u> Well Riser Pipe Casing Material: <u>schurth 40 pvc</u> Casing Inside Diameters: <u>4</u> <u>Screen</u> Material: <u>schurth 40 pvc</u> Inside Diameter: <u>4</u> Screen Slot Size:: <u>0.010</u> Percent Open Area: <u>0</u> Sump or Bottom Cap (<i>Q</i> / N) Type/Length: <u>cop / 0.25'</u> <u>Total Water Volume During Construction</u> Introduced (Gal): <u>0</u> Reviewed	in.

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Well I.D.: E5	_
Drilling Company: EDS	
Driller(s): J.R. Mitch, Sean	
Geologist/Eng./Tech.: Byce Zinckgr-F	
Signature: B 364	
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NAS Jax	
ject Number: TR0482	
allation Method:HSA	
ing Installation Date: 10 July 1 M	
Il Type: <u>electro de</u>	_
Il Completion Method: fluch workt	
Well Completion	
Guard Posts (Y / \aleph) Date:	
Surface Pad Size: ft x	ft
Protective Casing or Cover	n
Diameter/Type: $2' \times 2'$ steel south	
Depth BGS: $2'$ Weep Hole (Y/M)	
Grout	
Composition/Proportions:	
Placement Method:	
Placement Method:	
Seal Date:	
Type: Pel- Plug Restraite Pellets	
Set-up/Hydration Time: <u>30 mp</u>	-
Placement Method:	
Placement Method: dyect part	
Vol. Fluid Added: no church added due to existing	
Vol. Fluid Added: <u>water in bordistic</u> to existing the formation of the second	9
Vol. Fluid Added: <u>we for the souther</u> <u>Filter Pack</u> Type: 20/30 silice send; 30/65 silice send	9
Vol. Fluid Added: <u>water in boreliste</u> <u>Filter Pack</u> Type: <u>20/30 sitice send;</u> <u>30/65 sitice sene</u> Source: <u>50 lb bore</u>	9 (
Vol. Fluid Added: <u>water in borded</u> <u>Filter Pack</u> Type: 20/30 silice sond; 30/65 silice sone Source: <u>50 /6 bogs</u> Amount Used: <u>3 best 20/30; 1 bog 30/65</u>	9 (
Vol. Fluid Added: <u>water in bordule</u> Filter Pack Type: 20/30 silve sand; 30/65 silve save Source: <u>50 16 bags</u> Amount Used: <u>3 bags 20/30; 1 bag 30/65</u> Placement Method: <u>remaining appendix</u>	9 (
Vol. Fluid Added: <u>water in bordered due to excilie</u> Filter Pack Type: 20/30 silve sand; 30/65 silve sand Source: <u>50 16 bogs</u> Amount Used: <u>3 bogs 20/30; 1 bog 30/65</u> Placement Method: <u>remaining appe</u> Well Riser Pipe	9 (
Vol. Fluid Added: <u>we for early water in border</u> Filter Pack Type: 20/30 silice sond; 30/65 silice save Source: <u>50 16 begs</u> Amount Used: <u>3 begs</u> 20/30; 1 beg 30/65 Placement Method: <u>remain pipe</u> Well Riser Pipe Casing Material: <u>schedut</u> 40 Puc)
Vol. Fluid Added: <u>we for excident water in bordere</u> Filter Pack Type: 20/30 silve send; 30/65 silve send Source: <u>50 16 bogs</u> Amount Used: <u>3 begs 20/30; 1 bog 30/65</u> Placement Method: <u>remain pipe</u> Well Riser Pipe Casing Material: <u>schedure 40 Puc</u> Casing Inside Diameters: <u>4</u>)
Vol. Fluid Added: <u>we for early water in bordere</u> Filter Pack Type: 20/30 silve send; 30/65 silve send Source: <u>50 16 bags</u> Amount Used: <u>3 bags 20/30; 1 bag 30/65</u> Placement Method: <u>remain pape</u> Well Riser Pipe Casing Material: <u>schedure 40 Puc</u> Casing Inside Diameters: <u>4</u> Screen)
Vol. Fluid Added: <u>Security and the to excide</u> Filter Pack Type: 20/30 silica serel; 30/65 silica sere Source: <u>50 16 bass</u> Amount Used: <u>3 bass</u> 20/30; 1 bay 30/65 Placement Method: <u>remain pipe</u> Well Riser Pipe Casing Material: <u>schedule 40 PVC</u> Casing Inside Diameters: <u>4</u>) (
Vol. Fluid Added: <u>we for early water in bordere</u> Filter Pack Type: 20/30 silve sand; 30/65 silve sand Source: <u>50 16 bogs</u> Amount Used: <u>3 bogs 20/30; 1 bog 30/65</u> Placement Method: <u>memoric pipe</u> Well Riser Pipe Casing Material: <u>schedule 40 PVC</u> Casing Inside Diameters: <u>4</u> Screen Material: <u>schedule 40 PVC</u> Inside Diameter: <u>4</u>) (
Vol. Fluid Added: <u>water in bordered due to excilie</u> Filter Pack Type: 20/30 silve send; 30/65 silve send Source: <u>50 /6 bogs</u> Amount Used: <u>3 begs 20/30; 1 bog 30/65</u> Placement Method: <u>remain pipe</u> Casing Material: <u>schedule 40 Puc</u> Casing Inside Diameters: <u>4 Screen Material: <u>50 bogs</u> Screen Slot Size:: <u>0.010</u></u>) (
Vol. Fluid Added: <u>Security and the to excide</u> Filter Pack Type: 20/30 settice send; 30/65 settice send; Source: <u>50 /6 bogs</u> Amount Used: <u>3 bogs 20/30; 1 bog 30/65</u> Placement Method: <u>remain pipe</u> Well Riser Pipe Casing Material: <u>schedul 40 Pvc</u> Casing Inside Diameters: <u>4 Screen</u> Material: <u>schedul 40 Pvc</u> Inside Diameter: <u>4 Screen Screen Slot Size: <u>0.010</u> Percent Open Area: <u>0</u></u>) (
Vol. Fluid Added: <u>water in bordered due to excilie</u> Filter Pack Type: <u>20/30 silve sand;</u> <u>30/65 silve sand</u> Source: <u>50 lb bogo</u> Amount Used: <u>3 bogs 20/30; 1 bog 30/65</u> Placement Method: <u>memorie pipe</u> Casing Material: <u>schedule 40 Pvc</u> Casing Inside Diameters: <u>4</u> Screen Material: <u>schedule 40 Pvc</u> Inside Diameter: <u>4</u> Screen Slot Size:: <u>0 010</u> Percent Open Area: <u>0</u> Sump or Bottom Cap (2 / N)) (
Vol. Fluid Added: <u>Secure added due to excite</u> Filter Pack Type: 20/30 silve send; 30/65 silve send Source: <u>50 /6 bogs</u> Amount Used: <u>3 begs 20/30; 1 beg 30/65</u> Placement Method: <u>memori eppe</u> Casing Material: <u>schedute 40 Pvc</u> Casing Inside Diameters: <u>4</u> Screen Material: <u>schedute 40 Pvc</u> Inside Diameter: <u>4</u> Screen Slot Size:: <u>0.010</u> Percent Open Area: <u>0</u> Sump or Bottom Cap (2 / N) Type/Length: <u>cop / 0.25'</u>) (
Vol. Fluid Added: <u>Security of deal data the to excide</u> Filter Pack Type: 20/30 sitis series series 30/65 sities series Source: <u>50 /6 bogs</u> Amount Used: <u>3 bogs 20/30; 1 bog 30/65</u> Placement Method: <u>remain pape</u> Well Riser Pipe Casing Material: <u>schedul 40 Pvc</u> Casing Inside Diameters: <u>4</u> Screen Material: <u>schedul 40 Pvc</u> Inside Diameter: <u>4</u> Screen Slot Size: <u>0.010</u> Percent Open Area: <u>0</u> Sump or Bottom Cap (\mathcal{D} / N) Type/Length: <u>cop / 0.25'</u> Total Water Volume During Construction) (
Vol. Fluid Added: <u>Security of the the security</u> Filter Pack Type: 20/30 settice serel; 30/65 settice serel Source: <u>50 /6 base</u> Amount Used: <u>3 base</u> 20/30; 1 bay 30/65 Placement Method: <u>remain pape</u> Well Riser Pipe Casing Material: <u>schedule 40 Pvc</u> Casing Inside Diameters: <u>4 Screen Material: <u>schedule 40 Pvc</u> Inside Diameter: <u>4 Screen Slot Size:: <u>0.010</u> Percent Open Area: <u>0 Sump or Bottom Cap (20 / N) Type/Length: <u>cop / 0.25'</u> Total Water Volume During Construction Introduced (Gal): <u>0</u> Recovered</u></u></u>) (
Vol. Fluid Added: <u>water in bordered due to excile</u> Filter Pack Type: 20/30 silve sond; 30/65 silve sone Source: <u>50 /6 bogs</u> Amount Used: <u>3 begs 20/30; 1 beg 30/65</u> Placement Method: <u>remain pipe</u> Casing Material: <u>schedule 40 Puc</u> Casing Inside Diameters: <u>4</u> Screen Material: <u>schedule 40 Puc</u> Inside Diameter: <u>4</u> Screen Slot Size:: <u>0.010</u> Percent Open Area: <u>0</u> Sump or Bottom Cap (\mathcal{D} / N) Type/Length: <u>cop / 0.25'</u> Total Water Volume During Construction Introduced (Gal): <u>0</u> Recovered (Gal): <u>0</u>) (
Vol. Fluid Added: <u>Security of the the security</u> Filter Pack Type: 20/30 settice serel; 30/65 settice serel Source: <u>50 /6 base</u> Amount Used: <u>3 base</u> 20/30; 1 bay 30/65 Placement Method: <u>remain pape</u> Well Riser Pipe Casing Material: <u>schedule 40 Pvc</u> Casing Inside Diameters: <u>4 Screen Material: <u>schedule 40 Pvc</u> Inside Diameter: <u>4 Screen Slot Size:: <u>0.010</u> Percent Open Area: <u>0 Sump or Bottom Cap (20 / N) Type/Length: <u>cop / 0.25'</u> Total Water Volume During Construction Introduced (Gal): <u>0</u> Recovered</u></u></u>) (

Development ends. 10/20/14 14:48 Development ~15 light brown deat. continues. to

Well I.D.: E6	
Drilling Company: eps	
Driller(s): J.R. Mitch, Sean	
Geologist/Eng./Tech.: By Zincker F	
Signature: Br 3RA	
0 001	

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e: NAS Jav	
ject Number: TROYB2	
tallation Method: HSA	
sing Installation Date: 10/15/14	
ell Type: <u>electrode</u>	
ell Completion Method: <u>fwsh</u> wowt	
Well Completion	
Guard Posts (Y / M) Date:	
Surface Pad Size:3 ft x3	ft
Protective Casing or Cover	
Diameter/Type: $2' \times 2'$ steel you't Depth BGS: $2'$ Weep Hole (Y/ ∞)	
Depth BGS: Weep Hole (Y/ 🔊)	•
Grout	
Composition/Proportions:	1
1 51	
Placement Method:	
Seal Date: 10/15/14	
Type: Pel - Plug Bentonite Pellets	
Type: <u>Pel-Pleg Bentonite Pellets</u> Source: <u>s pel bycket</u>	
Source: s all bychet	
Source: <u>Set by the set of the se</u>	
Source: <u>Set by dust</u> Set-up/Hydration Time: <u>30 min</u> Placement Method: <u>durect part</u>	
Source: <u>Set by dust</u> Set-up/Hydration Time: <u>30 min</u> Placement Method: <u>durect part</u>	
Source: <u>Set by clust</u> Set-up/Hydration Time: <u>30 min</u> Placement Method: <u>direct par</u> Vol. Fluid Added: <u>we the exact part</u> Filter Pack	s brg
Source: <u>seel bucket</u> Set-up/Hydration Time: <u>30 min</u> Placement Method: <u>direct part</u> Vol. Fluid Added: <u>we the exact filter Pack</u> Filter Pack Type: <u>20/30 stilled soud;</u> <u>30/65 stilled sou</u>	s brg
Source: <u>seel by chect</u> Set-up/Hydration Time: <u>30 min</u> Placement Method: <u>direct part</u> Vol. Fluid Added: <u>see third added dire to ess</u> Filter Pack Type: <u>20/30 stilica sond</u> ; <u>30/65 stilica sond</u> Source: <u>so 16 bags</u>	s brg N
Source: <u>soul by the bound</u> Set-up/Hydration Time: <u>30 min</u> Placement Method: <u>direct par</u> Vol. Fluid Added: <u>so third odded dire to eas</u> Filter Pack <u>south or borehole</u> Type: <u>20/30 stilice soud</u> ; <u>30/65 stilice source</u> Source: <u>so 16 bags</u> Amount Used: <u></u>	s brg
Source: <u>soul bucket</u> Set-up/Hydration Time: <u>30 min</u> Placement Method: <u>direct part</u> Vol. Fluid Added: <u>so third added dire to ess</u> Filter Pack Type: <u>20/30 utilica sond</u> ; <u>30/65 sulica sond</u> Source: <u>so 16 bays</u> Amount Used: <u>pre</u>	t brg
Source: <u>soul bucket</u> Set-up/Hydration Time: <u>30 min</u> Placement Method: <u>direct port</u> Vol. Fluid Added: <u>so third of died dire to ess</u> Filter Pack Type: <u>20/30 sittice sond</u> ; <u>30/65 sittice sond</u> Source: <u>so 16 bags</u> Amount Used: <u>Placement Method</u> : <u>tremmie pipe</u> Well Riser Pipe	s brg
Source: <u>seed by the t</u> Set-up/Hydration Time: <u>30 min</u> Placement Method: <u>direct part</u> Vol. Fluid Added: <u>see third added dire to ess</u> Filter Pack <u>setter in borehole</u> Type: <u>20/30 stilica send</u> ; <u>30/65 stilica sent</u> Source: <u>so 16 bags</u> Amount Used: <u>Placement Method</u> : <u>tremmie pipe</u> Casing Material: <u>schedwle 40 pvc</u>	s brg d
Source: <u>soul by the t</u> Set-up/Hydration Time: <u>30 min</u> Placement Method: <u>direct port</u> Vol. Fluid Added: <u>so the dodded dire to ess</u> Filter Pack Type: <u>20/30 stilica sond</u> ; <u>30/65 stilica sond</u> Source: <u>so 16 bags</u> Amount Used: <u>Placement Method</u> : <u>tremmie pre</u> Well Riser Pipe Casing Material: <u>schedwle 40 pvc</u> Casing Inside Diameters: <u>4</u>	s brg d
Source: <u>soul bucket</u> Set-up/Hydration Time: <u>30 min</u> Placement Method: <u>direct port</u> Vol. Fluid Added: <u>so third of did dire to ess</u> Filter Pack Type: <u>20/30 sittice sond</u> ; <u>30/65 sittice sond</u> Source: <u>so 16 bags</u> Amount Used: <u>Placement Method</u> : <u>tremmie pipe</u> Casing Material: <u>schedwle 40 pvc</u> Casing Inside Diameters: <u>4</u>	s brg st in.
Source: <u>seed by that</u> Set-up/Hydration Time: <u>30 min</u> Placement Method: <u>direct part</u> Vol. Fluid Added: <u>see that added dire to eas</u> Filter Pack Type: <u>20/30 stilica soud</u> ; <u>30/65 stilica sou</u> Source: <u>so 16 bags</u> Amount Used: Placement Method: <u>tremmic pipe</u> Well Riser Pipe Casing Material: <u>schedwle 40 pvc</u> Casing Inside Diameters: <u>4</u> Screen Material: <u>schedwle 40 pvc</u>	<u>s brg</u> otin.
Source: <u>soul bucket</u> Set-up/Hydration Time: <u>30 mm</u> Placement Method: <u>direct par</u> Vol. Fluid Added: <u>so third added dire to ear</u> Filter Pack Type: <u>20/30 stilica soul;</u> <u>30/65 stilica soul</u> Source: <u>so 16 bags</u> Amount Used: <u>Placement Method: tremmie pipe</u> Casing Material: <u>schedule 40 pvc</u> Casing Inside Diameters: <u>4</u> <u>Screen</u> Material: <u>schedule 40 pvc</u> Inside Diameter: <u>4</u>	<u>s brg</u> ot in. in
Source: <u>soul bucket</u> Set-up/Hydration Time: <u>30 min</u> Placement Method: <u>direct port</u> Vol. Fluid Added: <u>so third of did dire to ess</u> Filter Pack Type: <u>20/30 stilica sond</u> ; <u>30/65 stilica sond</u> Source: <u>so 16 bags</u> Amount Used: <u>Placement Method</u> : <u>tremmie pipe</u> Casing Material: <u>schedwle 40 pvc</u> Casing Inside Diameters: <u>4</u> Screen Material: <u>cchedwle 40 pvc</u> Inside Diameter: <u>4</u> Screen Slot Size:: <u>0 010</u>	<u>s brg</u> ot in. in
Source: <u>soul bucket</u> Set-up/Hydration Time: <u>30 min</u> Placement Method: <u>direct part</u> Vol. Fluid Added: <u>so third added dire to ess</u> Filter Pack Type: <u>20/30 stilica sond</u> ; <u>30/65 stilica part</u> Source: <u>so 16 bags</u> Amount Used: <u>Placement Method</u> : <u>tremmie pipe</u> Casing Material: <u>schidwle 40 pvc</u> Casing Inside Diameters: <u>4</u> Screen Material: <u>cchidwle 40 pvc</u> Inside Diameter: <u>4</u> Screen Slot Size:: <u>0 010</u> Percent Open Area: <u>0</u>	<u>s brg</u> ot in. in.
Source: <u>soul bucket</u> Set-up/Hydration Time: <u>30 min</u> Placement Method: <u>direct par</u> Vol. Fluid Added: <u>so third added dire to ear</u> Filter Pack Type: <u>20/30 stilica soul;</u> <u>30/65 stilica par</u> Source: <u>so 16 bags</u> Amount Used: <u>Placement Method: <u>tremmic pipe</u> Well Riser Pipe Casing Material: <u>cohedwle 40 pvc</u> Casing Inside Diameters: <u>4</u> Screen Material: <u>cohedwle 40 pvc</u> Inside Diameter: <u>4</u> Screen Slot Size:: <u>0 010</u> Percent Open Area: <u>0</u> Sump or Bottom Cap (2/ N)</u>	<u>s brg</u> ot in. in.
Source:Set-bucket Set-up/Hydration Time: Placement Method: Vol. Fluid Added: Filter Pack Type: 20/30_utice_sond; 30/65_sutice_sond Source:Source: Amount Used: Placement Method: Placement Method: Placement Method: Casing Material: Casing Material: Casing Inside Diameters: Material: Screen Material: Screen Slot Size:: Sump or Bottom Cap (\$/ N) Type/Length: (0.25')	<u>s brg</u> ot in. in.
Source: <u>soul bucket</u> Set-up/Hydration Time: <u>30 min</u> Placement Method: <u>direct por</u> Vol. Fluid Added: <u>so third oddied dire to ess</u> Filter Pack <u>souther sould</u> ; <u>30/65 subject</u> Source: <u>so 16 bags</u> Amount Used: <u>Placement Method</u> : <u>tremmie pre</u> Well Riser Pipe Casing Material: <u>schudwle 40 pvc</u> Casing Inside Diameters: <u>4</u> <u>Screen</u> Material: <u>schudwle 40 pvc</u> Inside Diameter: <u>4</u> Screen Slot Size:: <u>0 010</u> Percent Open Area: <u>0</u> Sump or Bottom Cap (\mathcal{D}/N) Type/Length: <u>cop / 0.25'</u>	<u>s brg</u> ot in. in.
Source: <u>soul bucket</u> Set-up/Hydration Time: <u>30 min</u> Placement Method: <u>direct part</u> Vol. Fluid Added: <u>so third odded dire to ess</u> Filter Pack Type: <u>20/30 stilico sond</u> ; <u>30/65 stilico part</u> Source: <u>so 16 bags</u> Amount Used: Placement Method: <u>tremmice pipe</u> Casing Material: <u>schedwle 40 pvc</u> Casing Inside Diameters: <u>4</u> Screen Material: <u>cchedwle 40 pvc</u> Inside Diameter: <u>4</u> Screen Slot Size:: <u>0 010</u> Percent Open Area: <u>0</u> Sump or Bottom Cap (\mathcal{D}/N) Type/Length: <u>cop / 0.25'</u> Total Water Volume During Construction Introduced (Gal): <u>0</u> Recovered	<u>s brg</u> ot in. in.
Source: <u>soul bucket</u> Set-up/Hydration Time: <u>30 min</u> Placement Method: <u>direct por</u> Vol. Fluid Added: <u>so third oddied dire to ess</u> Filter Pack <u>souther sould</u> ; <u>30/65 subject</u> Source: <u>so 16 bags</u> Amount Used: <u>Placement Method</u> : <u>tremmie pre</u> Well Riser Pipe Casing Material: <u>schudwle 40 pvc</u> Casing Inside Diameters: <u>4</u> <u>Screen</u> Material: <u>schudwle 40 pvc</u> Inside Diameter: <u>4</u> Screen Slot Size:: <u>0 010</u> Percent Open Area: <u>0</u> Sump or Bottom Cap (\mathcal{D}/N) Type/Length: <u>cop / 0.25'</u>	<u>s brg</u> ot in. in.
Source: <u>soul bucket</u> Set-up/Hydration Time: <u>30 min</u> Placement Method: <u>direct part</u> Vol. Fluid Added: <u>so third odded dire to ess</u> Filter Pack Type: <u>20/30 stilico sond</u> ; <u>30/65 stilico part</u> Source: <u>so 16 bags</u> Amount Used: Placement Method: <u>tremmice pipe</u> Casing Material: <u>schedwle 40 pvc</u> Casing Inside Diameters: <u>4</u> Screen Material: <u>cchedwle 40 pvc</u> Inside Diameter: <u>4</u> Screen Slot Size:: <u>0 010</u> Percent Open Area: <u>0</u> Sump or Bottom Cap (\mathcal{D}/N) Type/Length: <u>cop / 0.25'</u> Total Water Volume During Construction Introduced (Gal): <u>0</u> Recovered	<u>s brg</u> ot in. in.

Comments

10/17/14 11:44 Development begins. ~ & gal, milley bown to light bown, then goes day. 10/20/14 15:25 Development continues. ~ 20 gel, light bown to clear.

Well I.D.:_	ET				
Drilling Con	mpany:	EDS			_
Driller(s):	J.R.,	Mitch,	Seen		
Geologist/E	ing./Tech	:B.v	a zind	Karof	
Signature:	-fz	- 7	41-	U	
	8	0	10		



10/20/14

16:57

e: NAS J	TR0482
tallation Method:	
	Date: 10/17/14
	trode
ll Completion Me	thod: fwsh mount
Well Completio	n
	/ M Date:
	$= \frac{1}{2} ft x = \frac{3}{2} ft$
Protective Casi	
	2' × 2' steel varit 2' Weep Hole (Y/N)
	weep note (1 / ()
Grout	
Composition/Pro	portions: portional cement type 1
DI CAR I	1
Placement Metho	od: <u>trennie pipe</u>
Seal	Date: _10/17/14
Type: Pel-Plug	Bentonite fellets
Source: 5	buckets
Set-up/Hydration	Time: 30 min
Set-up/Hydration	Time: 30 min
Set-up/Hydration Placement Metho	n Time: <u>30 min</u> od: <u>direct pour</u> d: no third colored due to existing
Set-up/Hydration Placement Metho	n Time: <u>30 min</u> od: <u>direct pour</u>
Set-up/Hydration Placement Metho Vol. Fluid Added <u>Filter Pack</u>	n Time: <u>30 min</u> od: <u>direct pour</u> d: <u>no third added due to existing</u> water in burchole
Set-up/Hydration Placement Metho Vol. Fluid Addee Filter Pack Type: 20/30 Source: 50 16	n Time: <u>30 min</u> od: <u>direct par</u> d: <u>no find added due to enstring</u> water in burchole rilica sonoli 30/65 silica sond hans
Set-up/Hydration Placement Metho Vol. Fluid Addee Filter Pack Type: 20/30 Source: 50 16	n Time: <u>30 min</u> od: <u>direct par</u> d: <u>no find added due to enstring</u> water in burchole rilica sonoli 30/65 silica sond hans
Set-up/Hydration Placement Metho Vol. Fluid Added Filter Pack Type: 20/30 c Source: <u>50 16</u> Amount Used: <u>3</u>	n Time: 30 min od: <u>direct pour</u> d: <u>no fluid colded due to existing</u> water in burchole tilica sonali 30/65 silica sond bags bags 20/30; 1 bay 30/65
Set-up/Hydration Placement Metho Vol. Fluid Added <u>Filter Pack</u> Type: <u>20/30</u> Source: <u>50 16</u> Amount Used: <u>3</u> Placement Method	n Time: 30 nm od: <u>direct par</u> d: <u>no find added due to enslong</u> water in burchole <u>ilica sondi 30/65 silica sond</u> <u>bags</u> <u>bags</u> 20/30; 1 bay 30/65 od: <u>trennic pipe</u>
Set-up/Hydration Placement Metho Vol. Fluid Added <u>Filter Pack</u> Type: <u>20/30</u> Source: <u>50 (6</u> Amount Used: <u>3</u> Placement Metho Well Riser Pipe	n Time: 30 nm od: direct par d: no find added due to enslong water in burchole tilica and: 30/65 ailien and bags bags 20/30; 1 bay 30/65 od: tremnic pipe
Set-up/Hydration Placement Metho Vol. Fluid Added Filter Pack Type: <u>20/30</u> Source: <u>50 (6</u> Amount Used: <u>3</u> Placement Metho Well Riser Pipe Casing Material:	n Time: 30 nin od: <u>direct parr</u> d: <u>no fluid added due to enstring</u> Water in burchole silica sonoli 30/65 silica send bags bags 20/30; 1 bay 30/65 od: <u>tremnie pipet</u>
Set-up/Hydration Placement Metho Vol. Fluid Added <u>Filter Pack</u> Type: <u>20/30</u> Source: <u>50 (6</u> Amount Used: <u>3</u> Placement Metho <u>Well Riser Pipe</u> Casing Material: Casing Inside Di	n Time: 30 nin od: <u>direct pour</u> d: <u>no fluid colored due to enslong</u> water in burchole thics sould 30/65 silica scal bags bags 20/30; 1 bay 30/65 od: <u>treamic pipe</u>
Set-up/Hydration Placement Metho Vol. Fluid Added Filter Pack Type: 20/30 5 Source: 50 16 Amount Used: 3 Placement Metho Well Riser Pipe Casing Material: Casing Inside Di Screen	n Time: 30 nm od: <u>direct parr</u> d: <u>no find added due to enstring</u> Water in Eurehole <u>silica and: 30/65 cilica sand</u> <u>bags</u> <u>bags 20/30; 1 bag 30/65</u> od: <u>treamic pipet</u> <u>schelvle 40 PVC</u> iameters: <u>4</u> in.
Set-up/Hydration Placement Metho Vol. Fluid Added Filter Pack Type: <u>20/30</u> Source: <u>50 16</u> Amount Used: <u>3</u> Placement Metho Well Riser Pipe Casing Material: Casing Inside Di Screen Material: <u>55</u>	n Time: 30 nm od: <u>direct parr</u> d: <u>no fluid added due to enstring</u> water in burchole <u>schoolis 30/65 oilien send</u> <u>bags</u> <u>tags 20/30; 1 bay 30/65</u> od: <u>trennie pipet</u> <u>schoolie 40 PVC</u> iameters: <u>4</u> in.
Set-up/Hydration Placement Metho Vol. Fluid Added Filter Pack Type: 20/30 Source: 50 16 Amount Used: 3 Placement Metho Well Riser Pipe Casing Material: Casing Inside Di Screen Material: 5 Inside Diameter:	n Time: 30 nin od: <u>direct pour</u> d: <u>no third added due to enslong</u> water in burchole thica sonoli 30/65 silica sond bags bags 20/30; 1 bay 30/65 od: <u>treamic pipe</u> <u>schelvle 40 PVC</u> iameters: <u>4</u> in.
Set-up/Hydration Placement Metho Vol. Fluid Addea Filter Pack Type: 20/30 c Source: <u>50 16</u> Amount Used: <u>3</u> Placement Metho Well Riser Pipe Casing Material: Casing Inside Di Screen Material: <u>5</u> Inside Diameter: Screen Slot Size	n Time: 30 nin od: <u>direct pour</u> d: <u>no fluid added due to existing</u> water in borehole <u>solica sonoli</u> 30/65 <u>silica sond</u> <u>bogs</u> <u>bogs</u> <u>togs</u> 20/30; 1 bog 30/65 od: <u>treamic pipel</u> <u>schelvle 40 PVC</u> iameters: <u>4</u> in. <u>chedule 40 PVC</u> <u>1000</u> in
Set-up/Hydration Placement Metho Vol. Fluid Addea Filter Pack Type: 20/30 c Source: <u>50 16</u> Amount Used: <u>3</u> Placement Metho Well Riser Pipe Casing Material: Casing Inside Di Screen Material: <u></u> Inside Diameter: Screen Slot Size Percent Open Am	n Time: 30 min od: <u>direct pour</u> d: <u>no fluid added due to existing</u> water in borehole <u>solica sonoli</u> 30/65 <u>silica sond</u> <u>bags</u> <u>bags</u> <u>bags</u> 20/30; 1 bag 30/65 od: <u>treamic pipel</u> <u>schelvle 40 PVC</u> <u>iameters: 4 in.</u> <u>chodule 40 PVC</u> <u>i 0.010 in</u> rea: <u>0</u>
Set-up/Hydration Placement Metho Vol. Fluid Added Filter Pack Type: 20/30 f Source: 50 fb Amount Used: 3 Placement Metho Well Riser Pipe Casing Material: Casing Inside Di Screen Material: 5 Screen Slot Size Percent Open An Sump or Bottom	n Time: 30 nin od: <u>direct parr</u> d: <u>no fluid added due to enstring</u> water in burchole thica sonoli 30/65 silica sond bags tags 20/30; I bay 30/65 od: <u>treamic pipe</u> <u>schelvle 40 PVC</u> iameters: <u>4</u> in. chodule 40 PVC <u>4</u> in :: <u>0.010</u> in rea: <u>0</u> 1 Cap (Q/N)
Set-up/Hydration Placement Metho Vol. Fluid Addea Filter Pack Type: 20/30 c Source: <u>50 16</u> Amount Used: <u>3</u> Placement Metho Well Riser Pipe Casing Material: Casing Inside Di Screen Material: <u>Screen</u> Material: <u>Screen</u> Screen Slot Size Percent Open An Sump or Bottom Type/Length: <u>6</u>	n Time: 30 nin od: <u>direct pour</u> d: <u>no fluid colded due to ensling</u> water in burchole thico sonoli 30/65 silica sond bags tags 20/30; I bay 30/65 od: <u>treamic pipe</u> <u>schelvle 40 PVC</u> iameters: <u>4</u> in. cholde 40 PVC <u>4</u> in :: <u>0.010</u> in rea: <u>0</u> 1 Cap (\$/N) p / 0.25'
Set-up/Hydration Placement Metho Vol. Fluid Addea Filter Pack Type: 20/30 c Source: <u>50 16</u> Amount Used: <u>3</u> Placement Metho Well Riser Pipe Casing Material: Casing Inside Di Screen Material: <u>5</u> Inside Diameter: Screen Slot Size Percent Open An Sump or Bottom Type/Length: <u>6</u> Total Water Vo	n Time: 30 min od: <u>direct pour</u> d: <u>no fluid added due to ensling</u> water in borehole <u>stilica sondi</u> 30165 silica sond <u>bogs</u> <u>tags 20/30; 1 bog 30/65</u> od: <u>tremmic pipel</u> <u>schelvle 40 PVC</u> <u>iameters: <u>4</u> in. <u>chodule 40 PVC</u> <u>i 0.010</u> in rea: <u>0</u> 1 Cap (Q/N) <u>cp / 0.25'</u> Diume During Construction</u>
Set-up/Hydration Placement Metho Vol. Fluid Addea Filter Pack Type: 20/30 c Source: <u>50 16</u> Amount Used: <u>3</u> Placement Metho Well Riser Pipe Casing Material: Casing Inside Di Screen Material: <u>5</u> Inside Diameter: Screen Slot Size Percent Open An Sump or Bottom Type/Length: <u>6</u> Total Water Vo	n Time: 30 nin od: <u>direct pour</u> d: <u>no fluid colded due to ensling</u> water in burchole thica sould so 165 silica sould bags tags 20/30; I bay 30/65 od: <u>treamic pipe</u> <u>schelvle 40 PVC</u> iameters: <u>4</u> in. cholde 40 PVC <u>4</u> in :: <u>0.010</u> in rea: <u>0</u> 1 Cap (\$/N) p / 0.25'
Set-up/Hydration Placement Metho Vol. Fluid Addea Filter Pack Type: 20/30 c Source: <u>50 16</u> Amount Used: <u>3</u> Placement Metho Well Riser Pipe Casing Material: Casing Inside Di Screen Material: <u>5</u> Inside Diameter: Screen Slot Size Percent Open An Sump or Bottom Type/Length: <u>6</u> Total Water Vo	n Time: 30 nin od: direct pair d: no fluid added due to ensling water in borehole thica sould 30/65 oilien soud bags tags $20/30$; 1 bay $30/65$ od: trennic pipe schelvle 40 PVC ameters: 4 in. chodele 40 PVC = 4 in. chodele 40 PVC = 4 in. chodele 40 PVC = 4 in. = 0.0(0 in rea: 0 = 0.25' Diume During Construction = 0 Recovered
Set-up/Hydration Placement Metho Vol. Fluid Added Filter Pack Type: 20/30 f Source: 50 f Amount Used: 3 Placement Metho Well Riser Pipe Casing Material: Casing Inside Di Screen Material: 5 Inside Diameter: Screen Slot Size Percent Open An Sump or Bottom Type/Length: 6 Total Water Vo Introduced (Gal)	n Time: 30 nin od: direct pair d: no fluid added due to ensling water in borehole thica sould 30/65 oilien soud bags tags $20/30$; 1 bay $30/65$ od: trennic pipe schelvle 40 PVC ameters: 4 in. chodele 40 PVC = 4 in. chodele 40 PVC = 4 in. chodele 40 PVC = 4 in. = 0.0(0 in rea: 0 = 0.25' Diume During Construction = 0 Recovered

7

Development continues.





10/20/14

10/20/14

11:15

16:54

Site: NAS Jax	_
Project Number: <u>+R0482</u>	
Installation Method: HSA	_
Casing Installation Date: עון עון און דען און דען אין אין דען אין אין אין אין אין אין אין אין אין אי	
Well Type: <u>electrocle</u>	_
Well Completion Method: with mount	_
Well Completion	
Guard Posts (Y / M) Date: <u>wtr/t4</u>	_
Surface Pad Size: <u>3</u> ft x <u>3</u> ft	
Protective Casing or Cover	
Diameter/Type: 2' × 2' speel valt	_
Depth BGS: Weep Hole (Y / M)	
Grout	
Composition/Proportions: portend cerent type 1	
Placement Method: tremmie pipe	
Seal Date:	
Type: <u>Pel-Plug Bentomite</u> pellets	_
Source: 5 get backet	
Set-up/Hydration Time: <u>30 ~~n</u>	-
Placement Method:	-
	-
Vol. Fluid Added: no fund added due to existing Filter Pack	
THET TACK	
Type: 20/30 silica sord; 30/65 silica sord	-
Source: <u>50 16 begs</u> Amount Used: <u>3 begs 20/30; 1 beg 30/65</u> Placement Method: treamic augus	-
Amount Used: $3 \log 20/30$; 1 log 30/65	-
	-
Well Riser Pipe	
Casing Material:schedule 40 PVC	-
Casing Inside Diameters:4 in	L.
Screen	
Material: schedule 40 pvc	-
Inside Diameter: <u>4</u>	n.
Screen Slot Size:: 0.010 it	n.
Percent Open Area:o	_
Sump or Bottom Cap 💋 / N)	
Type/Length: / 0.25'	_
Total Water Volume During Construction	
Introduced (Gal): O Recovered	
(Gal):0	
Reviewed	
By: Date:	
	1-

FLWP/Forms/Field Forms/Well Construction/Well Construction Logs/well construction log-flushA.doc

~

Development begins. ~ 15

Development continues.





10/20/14

16:36

	Site: NAS Jax
2 <	Project Number: TROY82
Mitch	Installation Method: HSA
Bryce Zinchg- F	
764	Well Type: electrode
SF1	Well Completion Method: fwih mernt
	Well Completion
	Guard Posts (Y / M) Date:
Ground Surface Elevation	Surface Pad Size: <u>3</u> ft x <u>3</u> ft
d Surface -BD	Protective Casing or Cover
	Diameter/Type: $2' \times 2'$ stul yoult
	Depth BGS: 2' Weep Hole (Y/ 🔊)
	Grout
- TBD	Composition/Proportions: portland cenent types (
Measuring Pt.	
Elevation	Placement Method: tremmie pipe
(MPELEV)	
	ngth Seal Date: 10/17/14
INTERVAL LENGTH	Type: Per- Plug Bentonite Perlets
	Source: 5 get bucket
Pet- pwg	Set-up/Hydration Time: 30 min
Sea	Placement Method: direct pur
Length 2'	
	Vol. Fluid Added: no fired added due to existing Filter Pack
30165	Type: 20/30 silica send; 30/65 silica sonal
0.5'	Source: _ 50 16 bogs
	Amount Used: 3 6gs 20/30; 6 6g 30/65
120/30	Placement Method: +remmin pipe
Screen	Well Riser Pipe
Length	Casing Material: <u>schedule 40 eve</u>
Filter Pack	Casing Inside Diameters:4 in.
	Screen
(SCRLENGTH) 4.75	Material: schedule 40 pvc
(FPL)	Inside Diameter: <u>4</u> in
	Screen Slot Size:: 0.010 in
Sump and	Percent Open Area:
Sump Length 0.25	Sump or Bottom Cap (\mathcal{B} / N)
	Type/Length: c_{∞} / o_{-25}'
	Total Water Volume During Construction
Borehole	Introduced (Gal): Recovered
Diameter	(Gal): 0
8"	Reviewed
0	By: Date:
	Dy Date
evelopment begins - ~ 15 gel	, willing bourn to light brown, this goes day
revelopment continues. 08 g	I light bown to clear, then goes day

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APPENDIX D GROUNDWATER SAMPLING FORMS

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SITE NAME:	NAS	Jox				TE CATION:	Jacksonvi	ILE, FL			
WELL NO	EKM	N-01		SAMPLE		EKMW -			DATE: /	0/01/201	4
PURGING DATA											
	1	2 TUBIN DIAME 1 WELL VC	ETER (inches):	74 DEF		et to 23		DEPTH ER (feet): 4 . WELL CAPAC	33 OR	rge pump t Bailer:	TYPE PP
EQUIPME	ut if applicable) INT VOLUME P ut if applicable)	URGE: 1 EQ	=(UIPMENT VOL					UBING LENGTH		ELL VOLUME	gallons
	UMP OR TUBIN I WELL (feet):	G 20.5		- ga MP OR TUBING WELL (feet):		PURGIN		PURGING)+ 0.13 09:33	TOTAL VO	LUME
TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) μmhos/cm or μScon	DISSOLVED OXYGEN (circle units) 01 % saturation	TURBIDI (NTUs)	TY COLO	OR ORP
09:26	0.5	0.5	0.08	6.43	4.73	27.84	10838	0.72	8.08	3 clea	49.4
09:29	0.25	0.75	0.08	6.60	4.78	27.80	11005	0.65	8.3		50.6
09:32	0.25	1.00	0.08	6.76	4.73	27.75	(1157	0.57	9.75		53.6
TUBING I	PACITY (Gallon NSIDE DIA. CAI EQUIPMENT C	PACITY (Gal.	/Ft.): 1/8" = 0.		= 0.0014; ump; E	1/4" = 0.002 SP = Electric	Submersible Pu	.004: 3/8" = 0	5" = 1.02; .006; 1/2 eristaltic Pun	" = 0.010;	12" = 5.88 5/8" = 0.016 Other (Specify)
						LING DA	ATA	1	_		
	BY (PRINT) / A Byce Zin			SAMPLER(S)	SIGNATURE	=(S):		SAMPLING INITIATED AT	r: 09:35	SAMPLIN ENDED	NG AT: 09:42
PUMP OR		20.5		TUBING O		PE, S		-FILTERED: Y on Equipment Ty		FILTER S	SIZE:μm
	CONTAMINATIO				TUBING		placed)	DUPLICATE:		D	
	PLE CONTAINE					RESERVATIC		INTEND		SAMPLING	SAMPLE PUMP
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATI USED	VE T	OTAL VOL D IN FIELD (FINAL	ANALYSIS A	ND/OR E	CODE	FLOW RATE (mL per minute)
EKMW-01	1	PE	16	none		_	-	Gene Tro	c	APP	6100
N.	2	CG	40 mL	none		-	-	VFAS		APP	2100
15	3	CG	40 26	none		-	-	DHGS		APP	<100
	I.	PE	250ml	HNTO 3	-	-	-	metals		APP	2100
15	1	PE	ISOML	none		-		Anion.	5	APP	e100
REMARKS	I 5:	PE	150ml	none		-	-	lodide		APP	6100
MATERIA	L CODES: G EQUIPMENT	AG = Amber CODES:	APP = After Pe	Clear Glass; ristaltic Pump;	PE = Poly B = Bail	ler; BP =	PP = Polypropy Bladder Pump;	ESP = Electr	ic Submersil	ble Pump;	Other (Specify)
OTES: 1.	The above of		RFPP = Revers				Method (Tubing er 62-160, F.A		U = Othe	r (Specify)	

2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

pH: \pm 0.2 units Temperature: \pm 0.2 °C Specific Conductance: \pm 5% Dissolved Oxygen: all readings \leq 20% saturation (see Table FS 2200-2); optionally, \pm 0.2 mg/L or \pm 10% (whichever is greater) Turbidity: all readings \leq 20 NTU; optionally \pm 5 NTU or \pm 10% (whichever is greater)

NAME:	NAS	Jox				TE DCATION:	Jeckson	the FL			
WELL NO:	EKMW	V-02		SAMPLE I		MW -02			DATE:	10/01/14	
				1		SING DA		-	-	<u> </u>	
WELL DIAMETER			ETER (inches)		H: 19 fe	INTERVAL et to 23 fe	STATIC E eet TO WATE	ER (feet): 5.	02 OF	IRGE PUMP 1 R BAILER:	TYPE
WELL VOL (only fill out	UME PURGE: if applicable)	1 WELL V	OLUME = (TC	TAL WELL DEPTH	H - STA	TIC DEPTH TO	OWATER) X	WELL CAPAC	ITY		
and Aller	A			fe L. = PUMP VOLU	et -		feet) X		gallons/fo		gallons
(only fill out	if applicable)	UNGE. TEC	KOIPIMENT VC					JBING LENGTH			
	MP OR TUBIN				ons + (0 -		ns/foot X 2 S)+ 0. (3.	1	= • . 20 gallons
	WELL (feet):	21		JMP OR TUBING VWELL (feet):	21	PURGING	DAT: 11:50		12:05	TOTAL VO PURGED (galions): 1.00
TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGEE (gallons)	E PURGE RATE	DEPTH TO WATER (feet)	pH standard units)	TEMP. ([°] C)	COND. (circle units) µmhos/cm or µ8/cm	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDI (NTUs)		
11:58	0.50	0.50	0.06	6.51	5.79	27.75	1874	0.33	14.6	cles.	r -8.3
12:01	0.25	0.75	0.08	6.60	5.80	27.79	1869	0.28	11.8		-13.1
12:04	0.25	1.00	0.08	6.71	5.82	27.70	1883	0.21	13.(0 N	-18.8
						-					-
										-	-
			1/12						1		
WELL CAP	ACITY (Gallon	s Per Foot):	0.75" = 0.02;	1" = 0.04; 1. 0.0006; 3/16" =	25" = 0.06	2" = 0.16	; 3" = 0.37;			6" = 1.47;	12" = 5.88
	QUIPMENT C		B = Bailer;	BP = Bladder Pun			5/16" = 0.0 Submersible Pur		.006; 1/2 eristaltic Pun		5/8" = 0.016 Other (Specify)
						LING DA				191 C C	(opcony)
	3Y (PRINT) / A Zincharof			SAMPLER(S) SI				SAMPLING INITIATED AT	12:07	SAMPLIN	NG AT: 12:19
PUMP OR T DEPTH IN W	UBING	2		TUBING 7	E: P	re, s		FILTERED: Y	20		SIZE:μm
FIELD DECO	ONTAMINATIO	DN: PU	MP Y		TUBING	Y CN (rep		DUPLICATE:	Y	ND	
SAMPI	LE CONTAINE	R SPECIFIC	ATION	SA	MPLE PR	ESERVATION	1	INTENDE	D	SAMPLING	SAMPLE PUMP
	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED		OTAL VOL D IN FIELD (m	FINAL pH	ANALYSIS AN METHO		QUIPMENT CODE	FLOW RATE (mL per minute)
EKANN-02	- E	PE	IL	None	1	_	-	Gove Tr	مد	APP	< 100
14	2	CG	40 ml	none		4	÷	V FAS		AV	
	3	CG	your	HCI		-	÷.	vocs		<u>0</u> -	E 1
51		CG	Youl	HCI		-	*	TOC		24	99
- 11	2	- G				-		A			
51 55	3	CG	Yoml	none	-		-	DHG	5		*×
0 0		C G PE	250 ml	none HNO3		-	-	metal	5		4.4
n n REMARKS:	3	C G PE PE	250 ml 150 ml	4NO3				netal anims, b.	5 Darīdu	11 14	33 17
n n REMARKS:	3 1 1	CG PE PE PE	250 ml 150 ml	HNO3 None		-		netal anims, b. iodid	5 Daride L	94 94 94	1) 11 14
NI REMARKS:	3 1 1	CC PE PE PE AG = Amber	250 JL 150 JL Glass; CG	HNO3 None	PE = Poly B = Bail	ethylene; P	-	netal anims, b. iodid	s onide e ne; T = Te	eflon; O = 0	33 17

The above do not constitute all of the information required by Chapter 62-160, F.A.C.
 <u>STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)</u>

pH: \pm 0.2 units Temperature: \pm 0.2 °C Specific Conductance: \pm 5% Dissolved Oxygen: all readings \leq 20% saturation (see Table FS 2200-2); optionally, \pm 0.2 mg/L or \pm 10% (whichever is greater) Turbidity: all readings \leq 20 NTU; optionally \pm 5 NTU or \pm 10% (whichever is greater)

D-60

SITE NAME:	NAS J	- Cro				SITE LOCATION: Jacksonville, FL						
WELL NO				SAMPLE		EKMW -03 DATE: 10/01/14						
	Cronty	• • • 5		1		GING DA						
WELL		TUBI	NG	WEL		INTERVAL	STATIC E	DEPTH	PL	JRGE PUMP T	YPE	
	R (inches): 2	DIAM	ETER (inches):	74 DEP	TH: <mark>()</mark> fe	Accel ninterval Static Depth Porge pomp type (9 feet to 23 feet TO WATER (feet): 3.75 OR BAILER: • STATIC DEPTH TO WATER) X WELL CAPACITY						
	LUME PURGE: it if applicable)	1 WELL VO	OLUME = (TOT	AL WELL DEP	TH – STA	TIC DEPTH 1	OWATER) X	WELL CAPAC	ITY			
FOLIPME					feet -		feet) X		gallons/fo	oot =	gallon	
	it if applicable)	UNGE. TEG						_				
	JMP OR TUBIN	0				. 0026 gallo		110)+ 0.(3	1	= 0.20 gallon	
	WELL (feet):	21		MP OR TUBING WELL (feet):	21		ED AT: 10:10	PURGING ENDED AT:	11:20	TOTAL VOI PURGED (g	gallons): 4.80	
TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE	DEPTH TO WATER (feet)	pH (standard units)	TEMP. ([°] C)	COND. (circle units) µmhos/cm or asign	DISSOLVED OXYGEN (circle units) 001 or % saturation	TURBIDI (NTUs		pe) (mV)	
10:15	0.50	0.50	0.10	6.50	5.78	27.77	0771	0.38	31.9	clear	- 18.8	
10:18	0.25	0.75	0.08	6.82	5.81	27.73	1781	0.29	40.2		-19.8	
10:30	1.00	1.75	0.08	7.10	5.87	27.10	1854	0.60	173	light br	- 32.7	
10:40	0.75	2.50	0.075	5 7.14	4.99	27.08	(811	0.22	95.	7 **	17.5	
10:50	0.50	3.00	0.05	7.14	5.72	26.95	1781	0.33	64.	8 "	-10.4	
11:05	1.00	4.00	0.06	7 7.03	5.78	27.11	1785	0.15	31.6	cheor	-23.0	
11:10	0.25	4.25	0.05	7.01	5.78	27.11	1783	0.15	29.3	11	-24 6	
11:15	0.25	4.50	0.05	6.97	5.78	27.18	1783	0.15	19.6	••	- 25.9	
11:17	0.15	4.65	0.075		5.78	27.18	1783	0.16	18.4		- 22.3	
11:19	0.15	4.80	0.075	6.41	5.78	27.19	1782	0.16	18.3	**	-21.7	
TUBING IN	PACITY (Gallon SIDE DIA. CAP EQUIPMENT C	PACITY (Gal.	/Ft.): 1/8" = 0.4	1" = 0.04; 0006; 3/16" = BP = Bladder Pu	= 0.0014;	1/4" = 0.002	6; 3" = 0.37; 6; 5/16" = 0.0 Submersible Pur	004; 3/8" = 0		2" = 0.010;	12" = 5.88 5/8" = 0.016 ther (Specify)	
						LING DA			instanto i un		(opeony)	
SAMPLED BY (PRINT) / AFFILIATION: Byce Zinckgr& / Gensyntee By 6						TURE(S): SAMPLING INITIATED AT:				II:23 SAMPLING ENDED AT: 11:35		
PUMP OR	TUBING		TATEC	TUBING	27	-	FIELD-	FILTERED: Y			IZE:μm	
DEPTH IN WELL (feet): 21 MATERIAL CODE:						PE, S		n Equipment Ty		743		
			MP X AN		TUBING		placed)	DUPLICATE:		D		
SAMPLE ID CODE	PLE CONTAINE # CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIN USED	/E T	LE PRESERVATION TOTAL VOL FINAL ADDED IN FIELD (mL) pH		INTENDE ANALYSIS AI METHO	ND/OR E	Sampling Quipment Code	SAMPLE PUMI FLOW RATE (mL per minute	
KMW-03	1	PE	IL	none		-		Gene Tr	ac	APP	6100	
14	2	CG	40 ~L	rom		_	-	VFAS		APP	2100	
w	3	CG	Yome	HCI		_	-	VOCS		APP	100	
ч	2	CG	rone	Hel		-	-	TOC		APP	×100	
15	3	CG	YOAL	none	- 0	-		DHGS		APP	2100	
	1	PE	250 ~L	HNO 3		-		metals		APP	2100	
REMARKS	C I C	PE PE	150 NL 150 NL	noni		-	-	anions, b iodide	ronicle	AIP APP	<100 <100	
MATERIAL	CODES:	AG = Amber	Glass; CG =	Clear Glass;	PE = Poly	ethylene;	PP = Polypropyle	ene; S = Silico	ne; T = T	eflon; O = C	ther (Specify)	
			APP = After Per RFPP = Revers	ristaltic Pump; e Flow Peristalti	B = Bail c Pump;	ler; BP = SM = Straw	Bladder Pump; Method (Tubing er 62-160, F.A.	ESP = Electr Gravity Drain);	ic Submersit			

The above do not constitute all of the information required by Chapter 62-160, F.A.C.
 STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

pH: \pm 0.2 units Temperature: \pm 0.2 °C Specific Conductance: \pm 5% Dissolved Oxygen: all readings \leq 20% saturation (see Table FS 2200-2); optionally, \pm 0.2 mg/L or \pm 10% (whichever is greater) Turbidity: all readings \leq 20 NTU; optionally \pm 5 NTU or \pm 10% (whichever is greater)

0 60

	NAS	Jax		1.		CATION:		tille, FC		_	
WELL NO	EKMU	1-04		SAMPLE II	E12min 04						
		1				SING DA					
		2 TUBIN DIAME	ETER (inches):	Y DEPT	H: ነግ fe			ER (feet): 4 .	3 OR	RGE PUMP TY BAILER:	PE PP
	LUME PURGE: ut if applicable)	1 WELL VC	DLUME = (TOT	AL WELL DEPT	H – STA	TIC DEPTH T	OWATER) X	WELL CAPACI	ΤY		
FOUIPME					eet – MF + (TUB		feet) X	JBING LENGTH)	gallons/for	ot =	gallon
	it if applicable)							feet)			= 0 . 2 0 gallon
	UMP OR TUBIN WELL (feet):	IG 21		IP OR TUBING WELL (feet):	21	PURGIN		PURGING		TOTAL VOL PURGED (g	UME
TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. ([°] C)	COND. (circle units) µmhos/cm or µ\$cm	DISSOLVED OXYGEN (circle units)	TURBIDIT (NTUs)	Y COLOF	R ORP
12:50	0.50	0.50	0.05	7.12	4.72	28.13	1797	0.33	29.1	light b	un 105.
12:53	0.25	0.75	0.08	7.55	4.68	28.46	1801	0.25	21.5	dear	79.6
12:56	0.25	1.00	0.08	7.84	4.72	28.31	2088	0.19	18.3		13.3
12:59	0.25	1.25	0.08	8.07	4.84	28.21	2255	0.18	17.5		56.6
13:02	0.25	1.50	0.08	8.35	4.88	28.13	2209	0-16	15.7	.11	42.7
13:05	0.25	1.75	0.08	8.55	4.86	28.19	2145	0.15	17.9	15	41.7
TUBING IN	SIDE DIA. CA	PACITY (Gal.	Ft.): 1/8" = 0.0	0006; 3/16" =	0.0014;	1/4" = 0.002	6; 5/16" = 0.0		006; 1/2'	= 0.010;	12" = 5.88 5/8" = 0.016
PURGING	EQUIPMENT	CODES: E	a = Bailer;	3P = Bladder Pu			Submersible Pur	np: PP = Pe	ristaltic Pum	p; 0 = Ot	her (Specify)
SAMPLED	BY (PRINT) / A	FFILIATION:	1	SAMPLER(S) S		LING DA		1	-	1	
	Znokgr-f		HC	R. Sht				SAMPLING INITIATED AT: 13:10 SAMPLING ENDED AT: 13:20			
PUMP OR	TUBING WELL (feet):	21		TUBING FIELD-I				-FILTERED: Y FILTER SIZE: μm on Equipment Type:			
FIELD DEC	CONTAMINATIO	ON: PUN	IPY 🔊	TUBING Y N(replaced)				DUPLICATE: Y			
	SAMPLE CONTAINER SPECIFICATION SAMPLE # MATERIAL VOLUME			S	AMPLE PR			INTENDED ANALYSIS AND/OR			SAMPLE PUM FLOW RATE
SAMPLE		MATERIAL		PRESERVATIV		OTAL VOL					
Sample ID Code	# CONTAINERS	MATERIAL CODE	VOLUME	USED		OTAL VOL D IN FIELD (r	nL) pH	METHO		CODE	(mL per minute
	CONTAINERS		VOLUME	USED				METHOE Gene Tro		CODE APP	(mL per minute
SAMPLE ID CODE	CONTAINERS 1 2	MATERIAL CODE PE CG	VOLUME iL 40 m	USED Norr Norr		D IN FIELD (r	nL) pH	METHOD Gene Tra NFAS		CODE APP V1	(mL per minute
SAMPLE ID CODE	CONTAINERS 1 2 3	MATERIAL CODE PE CG CG	VOLUME iL yo m Yo m	USED None None HC(nL) pH	METHOD Gene Tro NFAS NOCS		CODE APP VI	(mL per minute
SAMPLE ID CODE	CONTAINERS 1 2 3 2 2	MATERIAL CODE PE CG CG CG CG	VOLUME iL yo m Yo m Yo m	USED Non Non HCI HCI		D IN FIELD (r	nL) pH	METHOL Gene Tro NFAS NOCS TOC		CODE APP V1	(mL per minute 2100 11
SAMPLE ID CODE KmW-04	CONTAINERS 1 2 3 2 3 3 2 3	MATERIAL CODE PE CG CG CG CG	VOLUME iL 40 m 40 m 40 m 40 m 40 m	USED NON- NON- HC1 HC1 NON-		D IN FIELD (r	nL) pH	METHOL Gene Tro NFAS NOCS TOC PHGS		CODE APP V1 11 11	(mL per minute
SAMPLE ID CODE	CONTAINERS 1 2 3 2 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	MATERIAL CODE PE CG CG CC CG PE	VOLUME iL 40 m 40 m 40 m 40 m 250 m 250 m	USED NON- NON- HC1 HC1 NON- HN03		D IN FIELD (r	nL) pH	METHOL Gene Tro VFAS NOCS TOC DHGS Mutals		CODE APP VI II	(mL per minute
SAMPLE ID CODE :EmW-04 ::	CONTAINERS 1 2 3 2 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	MATERIAL CODE PE CG CG CG CG	VOLUME iL 40 m 40 m 40 m 40 m 40 m	USED NON- NON- HC1 HC1 NON-			nL) pH	METHOL Gene Tro NFAS NOCS TOC DHOS Metals anions, b) IC	CODE APP V1 11 11 11 11 11 11 11 11 11 11 11 11	(mL per minute
SAMPLE ID CODE KMW -04 11 11 11 11 11 11 11 11 11 11 11 11 11	CONTAINERS 1 2 3 2 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	MATERIAL CODE PE CG CG CG CG PE PE	VOLUME IL 40 m 40 m 40 m 40 m 250 m 150 m 150 m 150 m	USED NON NON HC1 HC1 NON NON NON			nL) pH	METHOL Gene Tro VFAS NOCS TOC DHOS Mutals onions, b iodid) rec	CODE APP VI II II II II II II II II II II II II	(mL per minute

2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

pH: \pm 0.2 units Temperature: \pm 0.2 °C Specific Conductance: \pm 5% Dissolved Oxygen: all readings \leq 20% saturation (see Table FS 2200-2); optionally, \pm 0.2 mg/L or \pm 10% (whichever is greater) Turbidity: all readings \leq 20 NTU; optionally \pm 5 NTU or \pm 10% (whichever is greater)

0.60
SITE NAME:	NAS	Jax				TE DCATION:	Jackson	wille, FL			
WELL NO	: Eka	ww - 05		SAMPLE I		EKMW -		, 1	DATE:	0/01/20	
					PURC	SING DA	TA			0/01/20	<u></u>
	i i (intertee).		ETER (inches)	: 1/4 DEPT	H: 9 fe	INTERVAL et to 2 4 f	STATIC I eet TO WATI	ER (feet): 4 .	19 OR	RGE PUMP 1 BAILER:	IYPE PP
	LUME PURGE ut if applicable)	1 WELL VO	DLUME = (TO = (TAL WELL DEPTI	H – STA eet–	TIC DEPTH 1					
EQUIPME (only fill ou	NT VOLUME P ut if applicable)	URGE: 1 EQ	UIPMENT VO	L. = PUMP VOLU	ME + (TUB			UBING LENGTH	, 	ELL VOLUME	
	UMP OR TUBIN				ons + (🤌 .		ons/foot X 2	1)+ 0.132	1	= 0.20 gallons
	WELL (feet):	21.5		MP OR TUBING WELL (feet):	21.5	PURGIN	ED AT: 13:40	the second s	13:55	TOTAL VC PURGED (
TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)		DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or	DISSOLVED OXYGEN (circle units)	TURBIDI ⁻ (NTUs)		
13:48	0.50	0.50	0.06	4.96	5.23	27.23	9788	0.71	10.4	deo	r 59.2
13:51	0.25	0.75	0.08	4.98	5.21	27.18	9807	0.50	11.3	h	61.1
13:54	0.25	1.00	0 08	5.00	5.19	27.10	9610	0.26	9.19	10	63.6
								_			
									-	-	
			1							-	
_		1						1			
TUBING IN	PACITY (Gallon NSIDE DIA. CAI EQUIPMENT C	PACITY (Gal.	0.75" = 0.02; /Ft.): 1/8" = 0 3 = Bailer;	1" = 0.04; 1 .0006; 3/16" = BP = Bladder Pur	0.0014; np; E	1/4" = 0.002 SP = Electric	6; 5/16" = 0. Submersible Pu	004; 3/8" = 0	5" = 1.02; 0.006; 1/2 eristaltic Pum	" = 0.010	12" = 5.88 5/8" = 0.016 Dther (Specify)
	BY (PRINT) / A			SAMPLER(S) SI	SAMP	LING DA				1	
	Zinckgr f			SAMPLER(S) SI	IGNATURE	=(S):		SAMPLING INITIATED A	T: 14:0C	SAMPLII ENDED	
PUMP OR	TUBING WELL (feet):	z1-5		TUBING MATERIAL COE	DE: P	e,s	FIELD	-FILTERED: Y	AD .	FILTER S	SIZE:μm
	CONTAMINATIO				TUBING	70.00	placed)	DUPLICATE:		N	
SAM	PLE CONTAINE	ER SPECIFIC			AMPLE PR	ESERVATIO	N	INTENDI	ED S	AMPLING	SAMPLE PUMP
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED		OTAL VOL D IN FIELD (r		ANALYSIS A METHO	ND/OR E	QUIPMENT CODE	FLOW RATE (mL per minute)
comw-05	L	PE	16	none		-	-	Gene Tr	ae	APP	2/00
- 35	2	CG	40ml	none		-	-	VFAS		(1)	(A)
- 0	1	PE	250~L	HNO 3	-	-	-	metal.	5	34	10
- 11	1	PE	ISONL	none		-		ANION	5	м	
4	1	PE	ISONL	none	-	-	-	indid	r I	14	0
" REMARKS	3	CG	40 ml	none		-		DHG	s		
REMARKS	.:										
MATERIAL	CODES:	AG = Amber	Glass; CG	= Clear Glass;	PE = Poly	ethylene;	PP = Polypropyl	ene; S = Silico	one; T = Te	flon; O =	Other (Specify)
	G EQUIPMENT		RFPP = Rever	eristaltic Pump; se Flow Peristaltic		SM = Straw	Bladder Pump; Method (Tubing		ic Submersib 0 = Other		
OTES: 1.	The above of	do not cons	titute all of	the information	require	d by Chapte	er 62-160, F.A	.C.		-	

2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

pH: \pm 0.2 units **Temperature:** \pm 0.2 °C **Specific Conductance:** \pm 5% **Dissolved Oxygen:** all readings \leq 20% saturation (see Table FS 2200-2); optionally, \pm 0.2 mg/L or \pm 10% (whichever is greater) **Turbidity:** all readings \leq 20 NTU; optionally \pm 5 NTU or \pm 10% (whichever is greater)

	Elen			SAMPLE	ID:	EKMW-	07	ville, FL		10/02/2	
	EKN	W-07				SING DA		_	Brite.	1010212	-014
WELL		TUBINO	3	WEI	L SCREEN		STATIC D	EDTH	DU	RGE PUMP T	VPE
DIAMETE		DIAME	TER (inches):	Y4 DEP	TH: 19 fe	et to 23 f	eet TO WATE O WATER) X	R (feet): 4.0	6 OR	BAILER:	"" PP
	it if applicable)		= (feet -		feet) X		gallons/fo	ot =	gallon
EQUIPME (only fill ou	NT VOLUME P It if applicable)	URGE: 1 EQU					feet) X TY X TU ons/foot X 2) + FLOW CE	ELL VOLUME	
	JMP OR TUBIN WELL (feet):	IG 21		P OR TUBING		PURGIN		PURGING ENDED AT:		TOTAL VOL	
ТІМЕ	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (^o C)	COND. (circle units) µmhos/cm or us/cm	DISSOLVED OXYGEN (circle units)	TURBIDIT (NTUs)		
09:34	0.50	0.50	0.125	6.91	5.13	27.64	1609	0.70	14.7	clear	38.2
09:37	0.25	0.75	0.08	7.15	5.12	27.59	1408	0.54	13.7	- A	35.3
09:40	0.25	1.00	0.08	7.18	5,12	27.46	1615	0.48	12.5		34.2
TUBING IN	ISIDE DIA. CAI EQUIPMENT C	PACITY (Gal./F	-t.): 1/8" = 0.0 = Bailer; B	1" = 0.04; 006; 3/16" P = Bladder P SAMPLER(S)	= 0.0014; ump; E SAMP	1/4" = 0.002 SP = Electric	6; 3" = 0.37; 6; 5/16" = 0.0 Submersible Pun ∖TA	104: 3/8" = 0	0.006; 1/2 eristaltic Pum	= 0.010; p; O = O	12" = 5.88 5/8" = 0.016 ther (Specify)
		FFILIATION:		R	51	_(0).		SAMPLING	T. 01:45		
Byce	Zinchart		tec	By	-33	6		INITIATED A		-	T: 09 :57
Byce PUMP OR DEPTH IN	Zi'n chyr f TUBING WELL (feet):	16000y1 21	rec	TUBING MATERIAL CO	-33	PE, S	FIELD- Filtratio	FILTERED: Y	N	-	NT: ض:57 IZE:μm
Byce PUMP OR DEPTH IN	Zin charf TUBING	16000y1 21	tec	TUBING MATERIAL CO	-33	F PE, S	FIELD- Filtratio	INITIATED A	/pe:	-	T: 09 :57
Bγα PUMP OR DEPTH IN FIELD DEC	Zi'n chyref TUBING WELL (feet): CONTAMINATIO	/ Geory n Z (DN: PUM ER SPECIFICA	P Y D	TUBING MATERIAL CO	DDE: TUBING	F PE, S	Filtratio	INITIATED A FILTERED: Y n Equipment Ty DUPLICATE: INTEND	rpe: Y FD S	FILTER S	NT: Ø9 :57 IZE:μm SAMPLE PUM
Byce PUMP OR DEPTH IN FIELD DEC SAMI SAMPLE	Zi'n ckyrsf TUBING WELL (feet): CONTAMINATIO	/ Geory Z I DN: PUM	P Y D	TUBING MATERIAL CO	TUBING SAMPLE PR	PE, S Y NTR RESERVATION	Filtratio placed) N FINAL	INITIATED A FILTERED: Y n Equipment Ty DUPLICATE:	rpe: Y ED S ND/OR E	FILTER S	NT: 09 :57 IZE:μm SAMPLE PUMI FLOW RATE
B yce PUMP OR DEPTH IN FIELD DEC SAMPLE ID CODE	Zin charf TUBING WELL (feet): CONTAMINATIO PLE CONTAINE #	/ George Z I DN: PUM ER SPECIFICA MATERIAL	P Y D	RUBING MATERIAL CO	TUBING SAMPLE PR	PE, S Y NTR	Filtratio placed) N FINAL	INITIATED A FILTERED: Y n Equipment Ty DUPLICATE: INTEND ANALYSIS A	Ppe: Y ED ND/OR D	FILTER S	T: 09 :57
Byce PUMP OR DEPTH IN FIELD DEC SAMPLE ID CODE	Zin chart TUBING WELL (feet): CONTAMINATIO PLE CONTAINE # CONTAINERS	/ Geosy r 2 (DN: PUM ER SPECIFICA MATERIAL CODE	P Y D TION VOLUME	TUBING MATERIAL CO PRESERVATI USED	TUBING SAMPLE PR	PE, S Y NTR RESERVATION	Filtratio pplaced) N nL) FINAL pH	INITIATED A FILTERED: Y n Equipment Ty DUPLICATE: INTEND ANALYSIS A METHO	Ppe: Y ED ND/OR D Trac	FILTER S	IZE: µm SAMPLE PUM FLOW RATE (mL per minute
Byce PUMP OR DEPTH IN FIELD DEC SAMI SAMPLE ID CODE KMW-07	Zin ckgr.f TUBING WELL (feet): CONTAMINATIO PLE CONTAINERS I	/ Geosy r Z I DN: PUM ER SPECIFICA MATERIAL CODE PE	P Y P TION VOLUME	PRESERVATI USED	TUBING SAMPLE PR	PE, S Y NTR RESERVATION OTAL VOL D IN FIELD (r	Filtratio pplaced) N nL) FINAL pH -	INITIATED A FILTERED: Y n Equipment Ty DUPLICATE: INTEND ANALYSIS A METHO Gene T	Ppe: Y ED ND/OR D Trac S	FILTER S AMPLING QUIPMENT CODE APP	T: 89 :57 IZE:μm SAMPLE PUMI FLOW RATE (mL per minute
Byce PUMP OR DEPTH IN FIELD DEC SAMPLE ID CODE KMW-07	Zin ckgrof TUBING WELL (feet): CONTAMINATIO PLE CONTAINERS I 2	C C C	PY PY TION VOLUME 1L 40mL	PRESERVATI USED	TUBING SAMPLE PR	Y NTR ESERVATION TOTAL VOL D IN FIELD (r	Filtratio	INITIATED A FILTERED: Y n Equipment Ty DUPLICATE: INTEND ANALYSIS A METHO Gene 7 VFA	Ppe: Y ED ND/OR D Trac S	FILTER S AMPLING QUIPMENT CODE APP	IZE:µm SAMPLE PUMI FLOW RATE (mL per minute
Byte PUMP OR DEPTH IN FIELD DEC SAMI SAMPLE ID CODE KMW - 07	Zin ckgrof TUBING WELL (feet): CONTAMINATIO PLE CONTAINERS I 2 3	/ George Z (DN: PUM ER SPECIFICA MATERIAL CODE PE C G C G	TION VOLUME	PRESERVATI USED	TUBING SAMPLE PR	PE, S Y NTE EESERVATION OTAL VOL D IN FIELD (r	Filtratio	INITIATED A FILTERED: Y n Equipment Ty DUPLICATE: INTEND ANALYSIS A METHO Gene T VFA	Y ED S ND/OR E D Trac S	FILTER S	IZE:µm SAMPLE PUMI FLOW RATE (mL per minute
Byte PUMP OR DEPTH IN FIELD DEC SAMI SAMPLE ID CODE KMW-07	Zin ckgr.f TUBING WELL (feet): CONTAMINATION PLE CONTAINERS 1 2 3 2	/ George Z (DN: PUM ER SPECIFICA MATERIAL CODE PE CG CG CG CG	P Y P Y TION Y VOLUME Y 1L Y YonL YonL YonL YonL	PRESERVATI USED NONC NONC HC1	TUBING SAMPLE PR	PE, S Y NTREESERVATION OTAL VOL D IN FIELD (r	Filtratio	INITIATED A FILTERED: Y n Equipment Ty DUPLICATE: INTEND ANALYSIS A METHO Gene T V F A Vo Ca Toc D H G	Y ED S ND/OR Er Trac S	FILTER S FILTER S SAMPLING QUIPMENT CODE APP IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	T: 89 :57 IZE:μm SAMPLE PUMI FLOW RATE (mL per minute 00</td
B για PUMP OR DEPTH IN FIELD DEC SAMPLE ID CODE KMW-07 ''	Zin ckgrof TUBING WELL (feet): CONTAMINATIO PLE CONTAINERS I 2 3 2 3 1	/ George Z (DN: PUM ER SPECIFICA MATERIAL CODE PE CG CG CG CG CG PE PE	x+ec I P Y P Y TION I VOLUME I IL I YonL I YonL I YonL I	PRESERVATI USED None HC1 HC1 None	TUBING SAMPLE PR	PE, S Y NTE EESERVATION OTAL VOL D IN FIELD (r	Filtratio	INITIATED A FILTERED: Y INTERD: Y DUPLICATE: INTEND ANALYSIS A METHO Gene T VF A Vo Cs Toc D H G. Cutal	rpe: Y ED ND/OR PD Frac S S S S S S S S S S S	FILTER S AMPLING QUIPMENT CODE APP 11 11 11 11 11 11 11 11 11	T: 89 :57 IZE:µm SAMPLE PUM FLOW RATE (mL per minute 00</td
Byte PUMP OR DEPTH IN FIELD DEC SAMI SAMPLE ID CODE KMW-07 ''	Zin degraf TUBING WELL (feet): CONTAMINATIO PLE CONTAINERS 1 2 3 2 3	/ George Z (DN: PUM ER SPECIFICA MATERIAL CODE PE CG CG CG CG CG PE	x+ec I P Y Y TION Y Y VOLUME I 1L Y YonL Y	PRESERVATI USED NONE NONE HC1 HC1 HN03 NONE	TUBING SAMPLE PR	PE, S Y NTE ESERVATION OTAL VOL D IN FIELD (r	Filtratio	INITIATED A FILTERED: Y INTERD: Y DUPLICATE: INTEND ANALYSIS A METHO Gene T V F A V O Cs TOC D H G. Cations, br i odio	Y ED S ND/OR E D Trac S S S S S S S	FILTER S SAMPLING QUIPMENT CODE APP 11 11 11 11 11 11 11 11 11	T: 89 :57 IZE:μm SAMPLE PUM FLOW RATE (mL per minute <100 11 11 11 11 11 11 11

Ine above do not constitute all of the information required by Chapter 62-160, F.A.C.
 Stabilization Criteria FOR Range OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

pH: \pm 0.2 units Temperature: \pm 0.2 °C Specific Conductance: \pm 5% Dissolved Oxygen: all readings \leq 20% saturation (see Table FS 2200-2); optionally, \pm 0.2 mg/L or \pm 10% (whichever is greater) Turbidity: all readings \leq 20 NTU; optionally \pm 5 NTU or \pm 10% (whichever is greater)

SITE NAME:	NA	5 Jax				ITE OCATION:	Jackson	wille, F	L		
WELL NC	Ekan	N - 08		SAMPLE I	D.	icmu - o	8		DATE:	10/02/	2014
				1	PUR	GING DA	ТА		100 March 100		
WELL	R (inches): 2		NG ETER (inches)			INTERVAL	STATIC D		00	JRGE PUMP 1 R BAILER:	
		1 WELL VO	DLUME = (TO	TAL WELL DEPT	H - STA	TIC DEPTH T	OWATER) X			T DAILER:	PP
(only fill or	ut if applicable)		= (eet -						and the second
		URGE: 1 EG		L. = PUMP VOLU	ME + (TUE	BING CAPACI	feet) X TY X TU	JBING LENGTH	gallons/fe) + FLOW C		gallons
(only fill or	ut if applicable)			= 📿 qall	ons + (🧧	.ooz6 gallo	ns/foot X 2	5 feet	·)+ 0.(1)	7 gallons	= 0.20 gallons
INITIAL P	UMP OR TUBIN	G	FINAL PU	MP OR TUBING		PURGIN		PUPCING		TOTAL VC	
	WELL (feet):	21		WELL (feet):	21		DAT: 12:18	ENDED AT:	14:45	PURGED (gallons): 4.20
TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE	DEPTH TO WATER (feet)	pH (standard units)	TEMP (°C)	COND. (circle units) µmhos/cm or µS/cm	DISSOLVED OXYGEN (circle units)	TURBID (NTUs		
14:40	4.00	4.00	0.03	16.46	5.64	27.84	2796	0.67	30.3	clea	r 12.3
14:42	0.10	4.10	0.03	16.46	5.67	27.98	2747	0.50	25.4	11	10.9
14:44	0.10	4.20	0.03	16.46	5.68	28.02	2728	0.37	18.5		(1.6
1								-			
			-			-					
										-	-
			1								
				1" = 0.04; 1					5" = 1.02;		12" = 5.88
	EQUIPMENT C			.0006; 3/16" =						2" = 0.010:	5/8" = 0.016
FORGING	EQUIPMENT	ODES.	B = Bailer;	BP = Bladder Pu		LING DA	Submersible Pur	np; PP = P	eristaltic Pur	mp; $\mathbf{O} = \mathbf{C}$	Other (Specify)
SAMPLED	BY (PRINT) / A	FILIATION:		SAMPLER(S) S							
	Zinckers			B	90	1		SAMPLING INITIATED A	_{T:} ।५ः ५१	3 SAMPLIN	NG AT: 15:05
	TODINO			TUBING	22	F	FIELD-	I FILTERED: Y			SIZE:μm
	WELL (feet):		-(MATERIAL COL		E, S		n Equipment Ty		_	
	CONTAMINATIO			D	TUBING	Y N(re	placed)	DUPLICATE:	Y	N	
	PLE CONTAINE					RESERVATIO		INTEND		SAMPLING EQUIPMENT	SAMPLE PUMP FLOW RATE
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIV USED		TOTAL VOL D IN FIELD (n		METHO		CODE	(mL per minute)
EKMW-08	1	PE	IL	nm		(ii	-	Gene T	rac	APP	< 100
vi	2	CG	40 m	hone		-	-	VEAS		285	**
- 9	3	CG	YONL	HCI		-	_	VOCS		ý.	4.5
h	2	CG	HOWL	нсі		-	-	Toc		ч	**
15	3	CC	Yore	none			-	DHO		144	**
4.0	1	PE	250 ml	HNO3			-	metals		**	
REMARKS		PE	150 m	none	-	_	_	inions, b	mide	54	*
- 0		PE	150 AL	rone		_	-	iodia		* 1	*1
MATERIA	L CODES:	AG = Amber		= Clear Glass;	PE = Poly	yethylene;	PP = Polypropyle			eflon; O =	Other (Specify)
SAMPLIN	G EQUIPMENT			eristaltic Pump;	B = Bai	iler; BP =	Bladder Pump;	ESP = Electr			
OTEC: 4	The shows			se Flow Peristaltic			Method (Tubing		O = Othe	er (Specify)	

The above do not constitute all of the information required by Chapter 62-160, F.A.C.
 <u>STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)</u>

pH: \pm 0.2 units Temperature: \pm 0.2 °C Specific Conductance: \pm 5% Dissolved Oxygen: all readings \leq 20% saturation (see Table FS 2200-2); optionally, \pm 0.2 mg/L or \pm 10% (whichever is greater) Turbidity: all readings \leq 20 NTU; optionally \pm 5 NTU or \pm 10% (whichever is greater)

(only fill out i EQUIPMENT (only fill out it		. ТUBII - DIAM		SAMPLE	ID:	ELAMN			D.1.75		
DIAMETER (WELL VOLL (only fill out i EQUIPMENT (only fill out i	(inches): Z	TUBI	NG				-04		DATE: (0	102/14	
DIAMETER (WELL VOLL (only fill out i EQUIPMENT (only fill out i	UME PURGE	DIAM	IG		PURC	SING DA				1-2/19	
(only fill out i EQUIPMENT (only fill out it	IME PURGE if applicable)		ETER (inches)	VI DEF		INTERVAL	STATIC D	ER (feet): 4.		GE PUMP T AILER:	YPE PP
(only fill out i	T VOLUME D		= (feet -		feet) X		gallons/foot		gallons
	f applicable)	URGE: 1 EG	UIPMENT VO		CONT. WAR			JBING LENGTH		LVOLUME	
INITIAL PUM		IG	FINAL PU	= 0 ga MP OR TUBING)+ 0.132	gallons TOTAL VO	= o. 20 gallons
DEPTH IN W	VELL (feet):	22		WELL (feet):	22		DAT:	ENDED AT:	14:04	PURGED (gallons): 1.25
TIME	VOLUME PURGED (galions)	CUMUL. VOLUME PURGED (gallons)		DEPTH TO WATER (feet)	pH (standard units)	ТЕМР. ([°] С)	COND. (circle units) µmhos/cm or	DISSOLVED OXYGEN (circle units)	TURBIDITY (NTUs)	COLC (descri	
13:54	0.50	0 50	0.125	8.89	5.09	28.37	7286	0.28	13.2	clear	94.3
13:57	0.25	0.75	0.08	9.48	5.03	28.51	6967	0.19	19.7	5.4	99.6
14:00	0.25	1.00	0.08	10.30	5.01	28.60	6982	0.16	15.6	× 9	99.6
14:03	0.25	1.25	0.08	10.83	5.00	28.63	7029	0.15	15.3		100.1
WELL CAPA TUBING INSI PURGING EC	IDE DIA. CAR	PACITY (Gal.	/Ft.): 1/8" = 0.	1" = 0.04; .0006; 3/16" BP = Bladder P	= 0.0014; ump; E\$	1/4" = 0.0020	Submersible Pur	004; 3/8" = 0			12" = 5.88 5/8" = 0.016 ther (Specify)
SAMPLED BY				SAMPLER(S)	SIGNATURE	(S):		SAMPLING		SAMPLIN	G
PUMP OR TU	Indegrat /	beosynt	rec	THEINO T	rf	St		INITIATED AT			T: 14:20
DEPTH IN W		23		TUBING MATERIAL CO	DE:	PE, S	FIELD- Filtratio	FILTERED: Y	De:	FILTER S	IZE:μm
FIELD DECO	NTAMINATIC	ON: PU	IP Y	5	TUBING	Y N(re		DUPLICATE:			
	E CONTAINE					ESERVATION	١	INTENDE		MPLING	SAMPLE PUMP
SAMPLE ID CODE C	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIN USED		OTAL VOL D IN FIELD (m	FINAL pH	ANALYSIS AN METHOI		DIPMENT	FLOW RATE (mL per minute)
SKMW-09	- F	PE	IL.	none		_	-	Gene T	Tac Al	20	2100
19	2	eg	Youl	none	-	-	- T	VFAs		•	-0
C .8	3	CG	YONL	none		-	-	DHGs		rs.	**
•9	1	PE	250-6	HNO3	-	-	-	netals, K		Ex.	0
51	1.00	PE	150 AL	honi	_	-	-	anions		15	0
"	1	PE	150 LL	none		-		iodid	c	14	
REMARKS:	1	PE	soonl	none		+	-	TDS		14	4
MATERIAL C			APP = After Pe	Clear Glass; ristaltic Pump; e Flow Peristalti	PE = Polye B = Baile	er; BP = E	PP = Polypropyle Bladder Pump; Method (Tubing 0	ESP = Electri	ne; T = Teflo c Submersible O = Other (S	Pump;	ther (Specify)

2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

pH: \pm 0.2 units Temperature: \pm 0.2 °C Specific Conductance: \pm 5% Dissolved Oxygen: all readings \leq 20% saturation (see Table FS 2200-2); optionally, \pm 0.2 mg/L or \pm 10% (whichever is greater) Turbidity: all readings \leq 20 NTU; optionally \pm 5 NTU or \pm 10% (whichever is greater)

0.60

		S Jox			SI LC	CATION:	Jacks	omille,	FL		
WELL NO:	EK	MW-11		SAMPLE		EKMW-	· ()		DATE: C	010212	• • • •
					PURC	SING DA	TA				
WELL DIAMETER WELL VOL		2 TUBIN DIAME	ETER (inches):	14 DEP	L SCREEN PTH: 19 fe TH - STA	et to 23 f	eet TO WATE	ER (feet): 4.	14 OR	RGE PUMP T BAILER:	PP PP
(only fill out	if applicable)		= (feet -		feet) X TY X TI		nallons/for	ot = LL VOLUME	gallon
(only fill out	if applicable)						ons/foot X 🛛 💈				= 0. Logallon
	MP OR TUBIN WELL (feet):	IG ZI		IP OR TUBING WELL (feet):		DUDGIN		DURCING	15:32	TOTAL VO	
TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. ([°] C)	COND. (circle units) µmhos/cm or µ8/cm	DISSOLVED OXYGEN (circle units)	TURBIDIT (NTUs)	Y COLC	R ORP
15:23	0.50	0.50	0.07	7.55	10.00	28.35	333	0.22	19.7	ilea	r 7.2
15:25	0.25	0.75	0.125	8.78	10.41	28.45	385	0.18	16.8	40	0.6
15:27	0.25	1.00	0-125	9.79	10.52	28.47	414	0.16	17.3	()	-1_4
15:29	0.25	1.25	0.125	10.76	10.59	28.52	419	0.12	17.1		- 5.0
15:31	0.25	1.50	0.125	11.70	10.60	28.58	421	0.15	19.4		- 9.2
WELL CAP	ACITY (Gallon									_	
UBING INS	SIDE DIA. CAI	s Per Foot): PACITY (Gal.	0.75" = 0.02; (Ft.): 1/8" = 0.0	1" = 0.04; 0006; 3/16"	1.25" = 0.06 = 0.0014;	5; 2" = 0.1 1/4" = 0.002	6; 3" = 0.37; 6; 5/16" = 0.1	4" = 0.65; 004; 3/8" = 0		6" = 1.47; = 0.010;	12" = 5.88 5/8" = 0.016
TUBING INS	SIDE DIA. CAI	PACITY (Gal.	(Ft.): 1/8" = 0.0	1" = 0.04; 0006: 3/16" 3P = Bladder P	= 0.0014; ump; E	1/4" = 0.002 SP = Electric	6: 5/16" = 0.0 Submersible Pur	004; 3/8" = 0		= 0.010;	
PURGING E	SIDE DIA. CAI	PACITY (Gal.) CODES: E	/Ft.): 1/8" = 0.0 3 = Bailer; E	0006; 3/16" 3P = Bladder P	= 0.0014; ump; E: SAMP	1/4" = 0.002 SP = Electric	6: 5/16" = 0.0 Submersible Pur	004; 3/8" = 0 np; PP = Pe	006; 1/2"	= 0.010;	5/8" = 0.016
PURGING E	SIDE DIA. CAI	PACITY (Gal. CODES: E	/Ft.): 1/8" = 0.0 3 = Bailer; E	30006; 3/16" 3P = Bladder P SAMPLER(S) :	= 0.0014; ump; E: SAMP SIGNATURE	1/4" = 0.002 SP = Electric	6: 5/16" = 0.0 Submersible Pur	004; 3/8" = 0	006; 1/2" ristaltic Pump	= 0.010; ; 0 = 0	5/8" = 0.016 Other (Specify)
BAMPLED E	SIDE DIA. CAI EQUIPMENT C BY (PRINT) / A Zin dy rate	PACITY (Gal. CODES: E	(Ft.): 1/8" = 0.(B = Bailer; E	30006; 3/16" 3P = Bladder P SAMPLER(S) :	= 0.0014; ump; E: SAMP SIGNATURE	1/4" = 0.002 SP = Electric	6: 5/16" = 0. Submersible Pur	004; 3/8" = 0 np; PP = Pe	006; 1/2" iristaltic Pump	SAMPLIN ENDED A	5/8" = 0.016 Other (Specify)
BAMPLED E	SIDE DIA. CAI QUIPMENT C BY (PRINT) / A Zin dag car UBING	SODES: E SFFILIATION: Cosyr 21	(Ft.): 1/8" = 0.(3 = Bailer; E	3P = Bladder P SAMPLER(S) : Building TUBING MATERIAL CC	= 0.0014; ump; E: SAMP SIGNATURE	1/4" = 0.002 SP = Electric LING DA E(S): PE, S	6: 5/16" = 0. Submersible Pur	004; 3/8" = 0 np; PP = Pe SAMPLING INITIATED AT FILTERED: Y	006; 1/2" iristaltic Pump	SAMPLIN ENDED A	5/8" = 0.016 other (Specify) NG AT: 15:45
TUBING INS PURGING E BAMPLED E BAMPLE T PUMP OR T PUMP IN V FIELD DECC SAMPLE	SIDE DIA. CAI EQUIPMENT C BY (PRINT) / A Zrin dkg ref UBING VELL (feet): ONTAMINATIC LE CONTAINE #	REFILIATION: CODES: E FFILIATION: C Cosy c 21 DN: PUN ER SPECIFIC/ MATERIAL	/Ft.): 1/8" = 0.(3 = Bailer; E /Fec //P Y /	3P = Bladder P SAMPLER(S): TUBING MATERIAL CC PRESERVATIN	= 0.0014; ump; E: SAMP SIGNATURE JUBING SAMPLE PR VE T	$\frac{1}{4} = 0.002$ SP = Electric LING DA E(S): $\frac{2}{5}$ Y N(10) ESERVATIO OTAL VOL	6: 5/16" = 0.1 Submersible Pur TA FIELD- Filtratic placed) N FINAL	3/8" = 0 mp; PP = Pe SAMPLING INITIATED AT FILTERED: Y n Equipment Ty;	inistaltic Pump inistaltic Pump inista	SAMPLIN ENDED A FILTER S	5/8" = 0.016 Other (Specify) NG AT: 15: 45 IZE:μm SAMPLE PUMI FLOW RATE
SAMPLED E Bayau 7 PUMPOR T DEPTH IN V FIELD DECO SAMPLE D CODE	SIDE DIA. CAI EQUIPMENT C BY (PRINT) / A Zro deg case UBING VELL (feet): ONTAMINATIONE LE CONTAINE	REPACITY (Gal.) CODES: E FFILIATION: CODES: E CODES:	/Ft.): 1/8" = 0.(3 = Bailer; E . / ec	3P = Bladder P SAMPLER(S) : BB- TUBING MATERIAL CC PRESERVATIV USED	= 0.0014; ump; E: SAMP SIGNATURE JUBING SAMPLE PR VE T	$\frac{1}{4} = 0.002$ SP = Electric LING DA E(S): $\frac{2E_{1}S}{Y} = \frac{1}{2}$ ESERVATIO	6: 5/16" = 0.1 Submersible Pur TA FIELD- Filtratic placed) N FINAL	004; 3/8" = 0 np; PP = Pe SAMPLING INITIATED AT FILTERED: Y n Equipment Ty DUPLICATE: INTENDE ANALYSIS AN METHO	006; 1/2" rristaltic Pump : 15 : 35 000 000 : 15 : 35 000 000 : 15 : 35 000 000 : 15 : 35 000 000 : 000 : 000 : 000 : 000 : 000	CODE	5/8" = 0.016 Other (Specify) MG AT: 15: 45 FIZE:μm SAMPLE PUMI FLOW RATE (mL per minute
SAMPLED E Bayau 7 PUMPOR T DEPTH IN V FIELD DECO SAMPLE D CODE	SIDE DIA. CAI EQUIPMENT C BY (PRINT) / A Zrin dkg ref UBING VELL (feet): ONTAMINATIC LE CONTAINE #	REFILIATION: CODES: E FFILIATION: C Cosy c 21 DN: PUN ER SPECIFIC/ MATERIAL	/Ft.): 1/8" = 0.(3 = Bailer; E /Fec ////////////////////////////////////	3P = Bladder P SAMPLER(S): TUBING MATERIAL CC PRESERVATIN	= 0.0014; ump; E: SAMP SIGNATURE JUBING SAMPLE PR VE T	$\frac{1}{4} = 0.002$ SP = Electric LING DA E(S): $\frac{2}{5}$ Y N(10) ESERVATIO OTAL VOL	6: 5/16" = 0.1 Submersible Pur TA FIELD- Filtratic placed) N FINAL pH	004; 3/8" = 0 mp; PP = Pe SAMPLING INITIATED AT FILTERED: Y on Equipment Ty DUPLICATE: INTENDE ANALYSIS AT METHO Geau Trice	006; 1/2" rristaltic Pump : 15 : 35 000 000 : 15 : 35 000 000 : 15 : 35 000 000 : 15 : 35 000 000 : 000 : 000 : 000 : 000 : 000	Contractions of the second sec	5/8" = 0.016 Other (Specify) NG AT: 15: 45 IZE:μm SAMPLE PUMI FLOW RATE
SAMPLED E Bayau 7 PUMP OR T DEPTH IN V FIELD DECO SAMPLE D CODE	SIDE DIA. CAI EQUIPMENT C BY (PRINT) / A Zro degree UBING VELL (feet): ONTAMINATIC LE CONTAINERS	PACITY (Gal.) CODES: E SFFILIATION: / Geosgr 21 DN: PUN ER SPECIFIC/ MATERIAL CODE PE	/Ft.): 1/8" = 0.(B = Bailer; E B = Bailer; E ATION VOLUME I L	3P = Bladder P SAMPLER(S): B TUBING MATERIAL CC PRESERVATIN USED	= 0.0014; ump; E: SAMP SIGNATURE JUBING SAMPLE PR VE T	$\frac{1}{4} = 0.002$ SP = Electric LING DA E(S): $\frac{2}{5}$ Y N(10) ESERVATIO OTAL VOL	6: 5/16" = 0.1 Submersible Pur TA FIELD- Filtratic placed) N FINAL pH	004; 3/8" = 0 np; PP = Pe SAMPLING INITIATED AT FILTERED: Y n Equipment Ty DUPLICATE: INTENDE ANALYSIS AI METHO Gene Tro V F As	006; 1/2" rristaltic Pump : 15 : 35 000 000 : 15 : 35 000 000 : 15 : 35 000 000 : 15 : 35 000 000 : 000 : 000 : 000 : 000 : 000	$\frac{2}{2} = 0.010;$ $\frac{1}{2} = 0.000;$ $\frac{1}{2} = 0$	5/8" = 0.016 Other (Specify) NG AT: 15 : 45 FIZE:μm SAMPLE PUMI FLOW RATE (mL per minute 210-0
SAMPLED E By au 7 DUMP OR T DEPTH IN V FIELD DECO SAMPLE D CODE CODE CODE	SIDE DIA. CAI EQUIPMENT C BY (PRINT) / A Zra da car UBING VELL (feet): ONTAMINATION LE CONTAINERS	PACITY (Gal.) CODES: E SFFILIATION: / Geosy c 21 DN: PUN ER SPECIFIC/ MATERIAL CODE PE CG	Ft.): 1/8" = 0.(3 = Bailer; E AFEC I ATION VOLUME IL 40 ~L	3P = Bladder P SAMPLER(S): But TUBING MATERIAL CC PRESERVATIN USED	= 0.0014; ump; E: SAMP SIGNATURE JUBING SAMPLE PR VE T	$\frac{1}{4"} = 0.002$ SP = Electric LING DA E(S): $\frac{2}{5}$ Y N(TE) ESERVATIO OTAL VOL D IN FIELD (r	6: 5/16" = 0.1 Submersible Pur TA FIELD- Filtratic placed) N FINAL pH	004; 3/8" = 0 mp; PP = Pe SAMPLING INITIATED AT FILTERED: Y on Equipment Ty DUPLICATE: INTENDE ANALYSIS AT METHO Geau Trice	006; 1/2" rristaltic Pump : 15 : 35 000 000 : 15 : 35 000 000 : 15 : 35 000 000 : 15 : 35 000 000 : 000 : 000 : 000 : 000 : 000	SAMPLINSAMPLINENDED AFILTER SAMPLINGQUIPMENTCODE	5/8" = 0.016 Other (Specify) NG AT: 15: 45 IZE:μm SAMPLE PUMI FLOW RATE (mL per minute 2100
SAMPLED E Bayau T DUMPOR T DEPTH IN V FIELD DECO SAMPLE D CODE CANV - [1	SIDE DIA. CAI EQUIPMENT C BY (PRINT) / A Zro deg case UBING VELL (feet): ONTAMINATION LE CONTAINERS	REFILIATION: CODES: E FFILIATION: CODES: 21 CON: PUN ER SPECIFIC/ MATERIAL CODE PE CG CG CG	Ft.): 1/8" = 0.(3 = Bailer; E ATION VOLUME 1L 40.2 40.2 40.2	3P = Bladder P SAMPLER(S): TUBING TUBING MATERIAL CC PRESERVATIN USED MALE HCI	= 0.0014; ump; E: SAMP SIGNATURE JUBING SAMPLE PR VE T	$\frac{1}{4"} = 0.002$ SP = Electric LING DA E(S): $\frac{2}{5}$ Y N(TE) ESERVATIO OTAL VOL D IN FIELD (r	6: 5/16" = 0.1 Submersible Pur TA FIELD- Filtratic placed) N FINAL pH	004; 3/8" = 0 np; PP = Pe SAMPLING INITIATED AT FILTERED: Y DUPLICATE: INTENDE ANALYSIS AT METHO Geal Train VCS	006; 1/2" ristaltic Pump : 15 : 35 	CODE CODE	5/8" = 0.016 Other (Specify) NG AT: 15: 45 IZE:μm SAMPLE PUMI FLOW RATE (mL per minute 210-0 -1
SAMPLED E By a C DUMP OR T DEPTH IN V TIELD DECC SAMPLE D CODE CODE CODE	SIDE DIA. CAI EQUIPMENT C BY (PRINT) / A Zro degree UBING VELL (feet): ONTAMINATION LE CONTAINERS	REPACITY (Gal.) CODES: E FFILIATION: C Geosy (21 DN: PUN ER SPECIFIC/ MATERIAL CODE PE CG CG CG CG	Ft.): 1/8" = 0.(3 = Bailer; E ATION ATION VOLUME 1 1 40~L 40~L 40~L 40~L 40~L	SAMPLER(S): SAMPLER(S): BB- TUBING MATERIAL CC PRESERVATIN USED MATERIAL CC SAMPLER(S): MATERIAL CC SAMPLER(S): MATERIAL CC SAMPLER(S): MATERIAL CC SAMPLER(S): MATERIAL CC SAMPLER(S): MATERIAL CC SAMPLER(S): SAMPLER(S): MATERIAL CC SAMPLER(S):	= 0.0014; ump; E: SAMP SIGNATURE JUBING SAMPLE PR VE T	$\frac{1}{4"} = 0.002$ SP = Electric LING DA E(S): $\frac{2}{5}$ Y N(TE) ESERVATIO OTAL VOL D IN FIELD (r	6: 5/16" = 0.1 Submersible Pur TA FIELD- Filtratic Filtratic FINAL pH 	004; 3/8" = 0 np; PP = Pe SAMPLING INITIATED AT FILTERED: Y n Equipment Ty, DUPLICATE: INTENDE ANALYSIS AT METHO Gear Train V F As V OCS TOC	006; 1/2" ristaltic Pump : 15 : 35 	$\frac{2}{2} = 0.010;$ $\frac{1}{2} = 0$	5/8" = 0.016 Other (Specify) NG AT: 15: 45 NZE:μm SAMPLE PUM FLOW RATE (mL per minute 2/0-0 1 1
SAMPLED E Bycc 7 PUMP OR T DEPTH IN V FIELD DECC SAMPLE D CODE CMW - (1)	SIDE DIA. CAI EQUIPMENT C BY (PRINT) / A Zro degree UBING VELL (feet): ONTAMINATION LE CONTAINERS	PACITY (Gal.) CODES: E SFFILIATION: / Geosy (21) DN: PUN ER SPECIFIC/ MATERIAL CODE PE CG CG CG CG CG	Ft.): 1/8" = 0.0 B = Bailer; E ATION VOLUME IL 40~L Y0~L Y0~L Y0~L Y0~L Y0~L Y0~L Y0~L Y0~L	3P = Bladder P SAMPLER(S) : But TUBING MATERIAL CC PRESERVATIN USED MATERIAL CC S PRESERVATIN USED MATERIAL CC S S PRESERVATIN USED MATERIAL CC S S S S S S S S S S S S S	= 0.0014; ump; E: SAMP SIGNATURE JUBING SAMPLE PR VE T	$\frac{1}{4"} = 0.002$ SP = Electric LING DA E(S): $\frac{2}{5}$ Y N(TE) ESERVATIO OTAL VOL D IN FIELD (r	6: 5/16" = 0.1 Submersible Pur TA FIELD- Filtratic placed) N FINAL pH 	004; 3/8" = 0 np; PP = Pe INITIATED AT FILTERED: Y DUPLICATE: INTENDE ANALYSIS AT METHO Gene YOCS TOC	1/2" aristaltic Pump : 15:35 	CODE CODE	5/8" = 0.016 Other (Specify) NG AT: 15: 45 IZE:μm SAMPLE PUMI FLOW RATE (mL per minute 2100 -1 -1 -1
SAMPLED E By a C By a C By a C By a C By a C C By a C C C C C C C C C C C C C C C C C C C	SIDE DIA. CAI EQUIPMENT C BY (PRINT) / A Zro degree UBING VELL (feet): ONTAMINATION LE CONTAINERS 1 2 3 2 3 1 1 1 1	PACITY (Gal.) CODES: E FFILIATION: / Geosy r 21 DN: PUM ER SPECIFIC/ MATERIAL CODE PE CG CG CG CG CG PE PE	Ft.): 1/8" = 0.(B = Bailer; E ATION VOLUME IL 40~L Y0~L 40~L Y0~L 250~L (50~L 150~L	SAMPLER(S): SAMPLER(S): TUBING TUBING MATERIAL CC PRESERVATIN USED MATERIAL CC PRESERVATIN USED MATERIAL CC S PRESERVATIN USED MATERIAL CC S S S S S S S S S S S S S	= 0.0014; ump; E: SAMP SIGNATURE JUBING SAMPLE PR VE T	1/4" = 0.002 SP = Electric LING DA E(S): Y N(TE ESERVATIO OTAL VOL D IN FIELD (T 	6: 5/16" = 0.1 Submersible Pur TA FIELD- Filtratic FINAL pH 	004: 3/8" = 0 mp; PP = Pe SAMPLING INITIATED AT FILTERED: Y INTENDE ANALYSIS AT METHO Gene Tro VOCS TOC DHC METAS, onions, bra iodid	006; 1/2" rristaltic Pump : 15 : 35 	2 = 0.010; 2 = 0.010; 2 = 0 = C 3 = C SAMPLINE ENDED A FILTER S AMPLING 201PMENT CODE A 0 0 3 3 4 5 5 5 5 5 5 5 5 5 5 5 5 5	5/8" = 0.016 Other (Specify) NG AT: 15: 45 IZE:µm SAMPLE PUM FLOW RATE (mL per minute 2/0-0 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1

2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

pH: \pm 0.2 units **Temperature:** \pm 0.2 °C **Specific Conductance:** \pm 5% **Dissolved Oxygen:** all readings \leq 20% saturation (see Table FS 2200-2); optionally, \pm 0.2 mg/L or \pm 10% (whichever is greater) **Turbidity:** all readings \leq 20 NTU; optionally \pm 5 NTU or \pm 10% (whichever is greater)

0.60

Calibrate pH using at least two standards (typ. pH 4 and 7) that bracket the range of expected sample readings; always start with pH 7; add a third calibration point if needed (i.e. pH > 7) Calibrate specific conductance using at least two standards that bracket the range of expected sample readings (unless readings < 0.1 mS/cm then one standard of 0.1 mS/cm is acceptable) CAL - Initial Calibration If parameter fails to calibrate within SOP acceptance criteria then append sample results with a "J" qualifier Allow adequate time for the dissolved oxygen sensor to equilibrate during air calibration CCV - Continuing Calibration Verification ICV - Initial Calibration Verification 1. See Table FS 2200-2 on the back of this form pecific Conductance Probe Cleaned? Yes ICV ICV ICV R ICV ICV ICV 22 ICV ŝ 20 \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ CCV S C C C CCV CCV DEP SOP FT 1100 SOP N/A 10/01/14 0/02/14 11/ 10/11 0/02/14 10/01/14 11/20/0 10/01/14 0/02/14 Date Date (Z) 02:80 08:28 08:29 08:35 08:25 0.8067-5 08:32 08:32 08: 42 Time Time Disolved Oxygen membrane Changed? Yes Std. mV @ 231.0 231.0 Temp °C Standard 1-0 4.0 2.0 4.0 (SU) 0 Comments: 3082078 14F 10038 308673 86028018 loBola73 17/1000-E Standard Standard : Lot # Lot # 07/2016 Exp. Date 8/20/15 Exp. Date Standard 51/06/12 5110218 : Standard 12/2015 8(30/15 Geosyntec ; Acceptance Criteria: +/-0.2 SL S Acceptance Criteria: +/- 5% 230. Reading 231.0 Reading 0.976 1.000 4.00 (mV) (SU) 6.98 58.9 or Fail θ θ θ 0 ଳ 00 or Fail Pass 0 τ Pass T --CAL CAL CAL CAL CAL CAL CAL CAL CAL CAL 41 - 100 NTU Std____NTU Std ICV ICV ICV R ŝ 2 ICV <u>5</u> 2 R >100 NTU NTU CCV Date Date Acceptance Criteria: +/- 6.5% Acceptance Criteria: +/- 5% Geosyntec[⊳] Reading Reading (NTU) (NTU) consultants Pass or Pass or σ σ τ υ σ Ρ υ σ υ σ σ Fail Fail Π T m πт -11 т 71 T т Π ы

WQ Cal Form (Version 1)

CAL CAL CAL ORP

CAL CAL CAL 88 PH

CAL CAL CAL CAL CAL

6/23/2009

Water Quality Instrument Calibration Form **Geosyntec Consultants**

CAL ICV CCV

10/01/14 10/02/14

08:22

08:17

21.70

8.794

8.76

56

000 19.6

c

0 0

CAL

S CC

102/14 61/10101

σ υ

Π

ŝ ICV ICV 0

CCV CCV

CAL

Acceptance Criteria: +/-0.3mg/l

562

23.10

Conductance Specific

DEP SOP FT 1200

Date

Time

Standard

Standard

Lot #

Exp. Date

Acceptance Criteria: +/- 5%

6

Standard

Reading

(mS/cm)

or Fail

Std

11 - 40 NTU Std NTU

Date

Reading

Pass or

(NTU)

Fail

Acceptance Criteria: +/- 8%

Pass

(mS/cm)

Oxygen

Dissolved

DEP SOP FT 1500

Date

Time

(°C)

Saturation

Reading

Reading

Pass

0.1 - 10 NTU Std / 2 NTU

Date

Reading Pass or

(NTU)

Fail

Acceptance Criteria: +/- 109

9.25 9.19

0

0

σ υ

71 π (%)

or Fail

Turbidimeter - Model/Serial

(mg/L)

(mg/L)¹

Water Quality Meter - Model/Serial #:

5

556

mps

20101848

Project #: TE0482

Field Personnel:

3

T

Project/Site: NAS Jox



X

	DN ⊡S	YSTEM OF	F 🗆 NOT	APPLICABLE (NO SYSTE	M)								
SITE NAME:	5:4	he.11,	Blg /		SITE L	OCATION	NAS JA	×			DATE: 3/	15/16	\bigcirc	
WELL NO:	EKN	161-01	/ S.	AMPLE ID:	MW-		FREE FROM	OUCT: Y ODUCT (ft BTOC	N 2):		FIELD DUPL DUPLICATE ID:	ICATE: Y	Ø	
L		<u>-v</u> v	I				GING DA		,					
WELL	(1		TUBING	·				STATIC DE		11 ~	PURGE		رج⁼	
DIAMETER	(inches): 📈 JRGE: 1 W		(inches): /4	UEPTH:	TH - S	to 23 feet TATIC DEPTH 1	TO WATER	(feet):	4,75	OR BA	ILER:)]	
(only fill out				- (feet -						lfaat -		aallawa
EQUIPMEN	TVOLU		E: 1 EQUIF	MENT VOL. =	PUMP VOL	.UME + (T	UBING CAPAC	feet) TY x		G LEN	GTH) + FLOW	/foot = CELL VOLUN	ИE	gallons
(only fill out	If applic	able)		=	ga	allons + (ga	llons/foot x			feet) +	gallo	ns =	gallons
							PURGING	- 0010		PURC	GING ED AT: D950	TOTAL	OLUME	d/x
DEPTH IN V	VELL (TE	et): Cum.	DEPTHI	N WELL (feet):			INITIATED A	T OBL				PURGE) (gallons): 4,40
	olume	Volume	Purge	Depth to	pН	Temp.	Spec. Cond.	Dissolved Oxygen		inity	ORP	Color/ C		Turbidity
	urged allons)	Purged (gallons)	Rate (gpm)	Water (ft BTOC)	(SU)	(⁰ C)	(mS/cm)	(mg/L)	男	ም ነ <u>ጉ</u>	(mV)	(descril	oe)	(NTUs)
0835 0,	55	0.55	9.055	5.74	5.40	\$5.5	11.21	0,47	<u> </u>	-	-68.0	Class /	Klom	
	55	1.10	0.055	5.91		25.7	9.98	0,11			-85.6	h	: /	
0855 0.		1.65	0.05		5.48	25.9	8.17	0.09	40	50	-95.8	4	۱.	4.05
09050.	.55	2.20	0,05	5 6,20	5,53	26.0	7.21	0,09			-100.6	: Nort	r	1.27
0915 0.	,55	2.75	0,055	6,27	5.58	26.1	6.41	0.09	3,		-107.8	te	~	1.39
0925 0.	55	3.30	0.055	6.43	5.45	26.0	5.93	0.28	3.	22	- 91.0	١٩	~~	1.74
6935 0.	55	3,85	0.05	\$ 4.65	5.52			0.30	3.	08	- 94.3	<u> </u>	• •	2.01
09400,	25	4,10	0.050		5,57	26,2		0.29	2.	95	= 98.5	ž .	11	1,94
	25		0.050	44	5.56	26.1	5,45	0.28	21	94	-100.4	A 1	<u> </u>	1.71
04500,	25	4.60	0.050	4.34	5.58	24,2	5,39	0.25	2.	89	-103,4	h	` .	1.06
WELL CAP		gal/ft): 0.7	5'' = 0.02	1 " = 0.04;	1.25" = 0.0)6· 2" =	0.16; 3 " = 0	.37; 4" = 0,0	65.	5 " = 1.0	02; 6" = 1.4	7; 12" = 5	88	
TUBING INS	SIDE DÌ	Ă. CÁPACI	TY (gal/ft):	1/8" = 0.0006;			1/4" = 0.0026;	5/16" = 0.0	004;			2" = 0.010;	.00 5/8" = 0	.016
PURGING E	QUIPM	ENT CODE	ES: B =	Bailer; BP	= Bladder F		ESP = Electric		Pump;	PP	• = Peristaltic P	Pump; O	= Other (Specify)
SAMPLEDE	BY (PRI	NT) / AFFIL	IATION:		SAMPLE		PLING DA ATURE(S):					SAMPLE	TIME:	
Jony Sc	1	1.	Trini	mARC)		Tre	L					095	0	
PUMP OR T DEPTH IN V	UBING			1		L CODE	7)E	FIELD-FILTE Filtration Equ				FILTER SIZE:	μ	m
FIELD DEC		- And	PUMP	Y (N)			-	eplaced)	upmer	ц туре:				
	•• \		ender administration and		INTEND			T		·····				
			SPECIFIC		ANALYS	SIS	SAMPLING EQUIPMENT	SAMPLE PU FLOW RAT			-			
# CONTAINERS		ODE	OLUME	RESERVATIVE USED	AND/O METHC	D	CODE	(mL per minu	ute)	Model:	<i>45</i> I	SN#: 16	41027	, I (
3	C		OML	HCL	VOC	-	APP	200				TURBIDIMETER	۲	
2	A		IOVAL	HCL	TOC		_/	<u> </u>		Model:	Le Motte	SN#: 67	24-0	116
3	- C		OML	HEL	MEE		-/					OTHER		
2	C	2	on	Hone	VFA	1		/						
	P P	~	emL.	None	NO3/50	<u>, el</u>	-\	/						
REMARKS:	$\frac{1}{2}$	12 23	SOML	HNOZ	re, 11/1,1	<u>Mz, C4</u>	<u>}</u>							
	rut/	a new	tobac	- 24	oor Class	DC - 7	alvatti dan si				0	- T-4 -	- 01	(Da as if)
MATERIAL SAMPLING			= Amber Gl	$\mathbf{P} = \text{After Perist}$	ear Glass; altic Pump:		olyethylene; Bailer; BP =	PP # Polyprop Bladder Pump			Silicone; T =		= Other (эреспу)
			RF	PP = Reverse F	low Perista	ltic Pump;	\$ M = Straw	Method (Tubir				ther (Specify)		
							hapter 62-160, CUTIVE READING		<u>2, se</u> ct	<u>ION 3</u>)				
рН: <u>+</u>	± 0.2 units	Temperatur	re: <u>+</u> 0.2 °C S		nce: <u>+</u> 5% Di	ssolved Oxy	/gen: all readings <u><</u>				00-2); optionally, <u>+</u>	0.2 mg/L or <u>+</u> 1	0% (whiche	ver is greater)
uno □ web needs i		= 1	SOML I	Holds Rell tag	K		ocking cap:		□ oth	ner com	iment:			
DI Water Lo		2	MSME	None	- Epsipoli	nide	Ambien	t blk			olk TB-1			
2012 1102	PĒ	5	OOML	None Iodide None	ENON	/	\backslash)						•.
/	PE	-	1.L .	Hone	Ma	erobic	1 >	/						

ANALYSIS & DEVELOPMENT CORP. Environmental & Engineering Services www.trinityade.com Rage 1 of 2 Modified FDEP Form FD 9000-24

			OT APPLICABLE			1.4					
SITE NAME:	Side 1	(_Blda	103	SITE LOO		NAS J.	AX			-15-16	<u> </u>
WELL NO:	KMW-1	m	SAMPLE ID:	KMW-0	2	FREE PROD	OUCT: Y RODUCT (ft BTOC	N C):	FIELD DUPL DUPLICATE ID)
<i>2</i> 1				,	PUR	GING DA		·		-	
WELL		TUBING	R (inches)://4	WELL SCRI			STATIC DE TO WATER	PTH S	16 PURGE		>
DIAMETER (ir WELL VOLUN	ICHES): <i>A</i>	1 WELL VO	DLUME = (TOTA	DEPTH:	feet to H - ST/		TO WATER	x WELL C	OR BA	ILER:	
(only fill out if a			= (feet -	217		feet)	x	gallons/fo	oot =	gallons
		RGE: 1 EQ	UIPMENT VOL.		ME + (TU	BING CAPACI		TUBING LE	NGTH) + FLOW		ganons
(only fill out if a	applicable)	-		= gallo	ons + (gal	llons/foot x		feet) +	gallons =	gallons
				·		PURGING	- Kin	PUI	RGING		w 4115
DEPTH IN WE			TH IN WELL (feet	<u>, Z</u>		INITIATED A	1:1 <u>5/0</u>		DED AT: 16 2/3	9 PURGED (gallon:	s): ''''
Time Volu	ged Purg	ne Pur ed Ra	te Water	pH (SU)	Temp. (^o C)	Spec. Cond. (mS/cm)	Dissolved Oxygen (mg/L)	Salinity (‰)	ORP (mV)	Color/ Odor (describe)	Turbidity (NTUs)
(gallo	ons) (gallo				0.4 .			1 0.1			
1520 0.5	55 0.5	5 0.09	5 6.72	5.48	25,6	2.97	0.20	1.54	16.7	Clear / Xbn.	<u>-</u>
1530 0.4	, , , , , , , , , , , , , , , , , , , ,	50.0	4 6.92	5.71	24,0	2.96	0,15	1,53	<u> </u>	<u> </u>	10.19
1.540 6.0	10 1.3	5 050	14 7,13	2.76	44.0	2.94	0.12	1.52	1-2.4	n n	7,45
13 500.	70 1.1	50.0	17 1,22	50011	24.1 25 A	2.72	0.12	1.51	770		8,62
1610 0.4	10 2.5		4 7,30	2014	<u>4 >.7</u> 24,3	2,92	0,11 0,10	1,30	-23,9 -30,6	n n	6.71
11,20 0.4	- 1	5 0,0			26.2	2,90	Orlo	1.50	-33.8		414
1630 0,4		5 0,0		5.93	26.2	2.90	0,10	1.50	-35,0	in en	4,87
16406.2		15 0,0		5.93 2	21.2	2,90	0,10	1.50	- 33.9	en re	3,91
WELL CAPAC	CITY (gal/ft):	0.75" = 0.0	2; 1 " = 0.04;	1.25 " = 0.06;			.37; 4" = 0.				
PURGING EQ			ft): 1/8" = 0.0006 B = Bailer; Bl	6; 3/16" = 0.0 P = Bladder Pur		1/4" = 0.0026; ESP = Electric			<u>" = 0.006; 1/2</u> P P = Peristaltic P	2" = 0.010; 5/8" = 0 Pump; 0 = Other	
			· · · · · ·		SAMF	LING DA					
SAMPLED BY	1 1	FILIATION	· . 1	SAMPLER(S	S) SIGNA	TURE(S):				SAMPLE TIME:	
JOPY SU	MMVCK BING	er (Tr	mity	TUBING	a		FIELD-FILTI	ERED: Y		1445 EIL TER NIZE:	
DEPTH IN WE		a)	•	MATERIAL	CODE:		FIELD-FILT Filtration Eq			FILTER SIZE:	, μm
FIELD DECOM	NTAMINATIO	N: PU	MP Y 🔗	·	TUBING	Y C	(replaced)		FIELD EQU	IPMENT IDENTIFICAT	
SAMP	LE CONTAIN	IER SPECIF	ICATION	INTENDED ANALYSIS		SAMPLING	SAMPLE PU		H20 C	QUALITY PARAMETER	
# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	AND/OR METHOD		EQUIPMENT CODE	FLOW RAT (mL per mini	ute) Mode	el: VSF	SN#: 110.A102	7 1 1
<u>3</u>	CODE	elo m	. HCL	VEC	<u></u>	PP	1700			TURBIDIMETER	
2	AG	40 MC	HEL	TOL		•			elite Mo He		0/1(
3	CG	40ml	AHEL	NEE	-	$\overline{\ }$	\langle	· · · ·	- prije - C	OTHER	
£2	CB	40 ml	Manu	VFA							
1	RE	Soon	Honr	Nor Souk	-1					······	
1	PE	250 nc	- HNOy	Feldalo	1g Pa	\subseteq					· · · · · · · · · · · · · · · · · · ·
REMARKS:	PE	ZSOML	HNO3	K"	1			,			
MATERIAL CO	ODES:	AG = Ambei	Glass; CG = (Clear Glass;	PE = Po	lyethylene;	PP = Polyprop	pylene; S	= Silicone; T =	= Teflon; O = Other	(Specify)
SAMPLING E			APP = After Peris RFPP = Reverse		B = Ba		Bladder Pump Method (Tubir		= Electric Submer	rsible Pump; ther (Specify)	
		not constitu	te all of the info	mation require	ed by Ch	apter 62-160,	F.A.C.	<u> </u>			
			RANGE OF VARIATIO							+ 0.2 mg/L or ± 10% (which	aver is greater)
Turbidi	ty: all readings	≤ 20 NTÜ; optic	onally \pm 5 NTU or \pm 1	0% (whichever is g	reater)					E 0.2 HIG/L 01 ± 10% (WNICN	ever is greater)
well needs rea			🔄 🗆 needs well ta								
DI Water Lot	#		1SD	_ 🗆 Equip blk	<u>.</u>		t blk	🖓 Trip	DIK <u>19-1</u>		
DI Water Lot	#		1SD	_ = Equip blk _ Bromto	r	□ Ambien \	t blk	🖓 Trip	o dik <u>19-1</u>		
DI Water Lot	#			_ = Equip blk_ Brom H Zodia	re he	C Ambien	t blk	🖓 Trip) DIK		



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SITE N		SYSTEM OF	F 🗆 NOT AF		SITE L	OCATION:				DATE:		
WELL M	EKA	MW-	92 SAN		KMW-	-02	FREE PRO		N C):	FIELD DUP DUPLICATE II	LICATE: Y N D:	
						PUR	GING DA	TA				
WELL DIAME	FER (inches		JBING IAMETER (inc	ches):	WELL SC DEPTH:	REEN INTE	ERVAL	STATIC DE			E PUMP TYPE	
	OLUME P		ELL VOLUM	E = (TOTAL	WELL DEP	TH - ST	ATIC DEPTH	TO WATER)				
					feet -		BING CAPAC	feet)		gallons/	foot = / CELL VOLUME	gallons
	out if applic			ENT VOL	PUMP VUL	.01vi⊏ + (10	BING CAPAC	ITY x	TUBING LE	NGTH) + FLOV	CELL VOLUME	
	<u></u>		·	=	ga	allons + (T	llons/foot x		feet) +	gallons =	gallon
	PUMP OR IN WELL (f		1	IP OR TUBI WELL (feet):	-		PURGING	AT:		RGING DED AT:	TOTAL VOLUME PURGED (gallon	
Time	Volume Purged (gallons)	Cum. Volume Purged (gallons)	Purge Rate (gpm)	Depth to Water (ft BTOC)	pH (SU)	Temp. (°C)	Spec. Cond. (mS/cm)	Dissolved Oxygen (mg/L)	Salinity (‰)	ORP (mV)	Color/ Odor (describe)	Turbidit (NTUs)
645	6.40	4,15	0,040	1,41	5.93	26.3	2.90	0.10	1.50	-34.7	ti er	4.11
						· · ·		·				
										_		+
	S INSIDE D	(gai/ft): 0.71 IA. CAPACI	5″ = 0.02; TY (gal/ft): 1/	1" = 0.04; /8" = 0.0006;	1.25" = 0.0 3/16" =	06; 2" = 0 0.0014;	0.16; 3" = 0 1/4" = 0.0026;	.37; 4" = 0. 5/16" = 0.			47; 12 " = 5.88 / 2 " = 0.010; 5 / 8 " =	0.016
PURGI		IENT CODE	S: B = Ba	ailer; BP	= Bladder F	^p ump; l	ESP = Electric	Submersible I	⁻ ump; F	P = Peristaltic		
							PLING DA	ATA 🛛			/	
SAMPL	ED BY (PR	INT) / AFFILI	IATION:		SAMPLE	R(Š) SIGNA	TURE(S):				SAMPLE TIME:	
	OR TUBING				TUBING MATERIA	L CODE:	1	FIELD-FILT Filtration Eq	ERED: Y upment Typ		FILTER SIZE:	_ μm
IELD	DECONTAN	INATION:	PUMP	Y N		TUBING	G Y N	(replaced)			JIPMENT IDENTIFICA	TION
	SAMPLE C	ONTAINER	SPECIFICATI	ON	INTENDE ANALYS	19	SAMPLING	SAMPLE PL		H20	QUALITY PARAMETER	
# CONTAI		TERIAL VC		SERVATIVE USED	AND/OI	к	CODE	FLOW RA (mL per min		el:	SN#:	
						AR	//				TURBIDIMETER	
									Mode	əl:	SN#:	
						4					OTHER	
				$-\rho$	/-/-							
				PV	/							
REMAR	KS:		/	γ / γ			· · · ·		I			
IATER	AL CODES	S: AG =	Amber Glass	s; /CG = CI	ear Glass;	PE = Pol	yethylene;	PP = Polypro	pylene; S	= Silicone; T	= Teflon; O = Other	(Specify)
SAMPL	ING EQUIP	MENT COD		After Perist = Reverse F		B = Ba Itic Pump;		Bladder Pump Method (Tubir		Electric Submerain); O = C	ersible Pump; Dther (Specify)	
TES:	1. The abo 2. STABILIZ	ove do not c	CONSTITUTE All	of the inform	nation requ	IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	apter 62-160.					
	pH: <u>+</u> 0.2 unit	s Temperature		ific Conductar	nce: + 5% Dis	ssolved Oxya					<u>+</u> 0.2 mg/L or <u>+</u> 10% (which	ever is greater
	eds repair_						cking cap:		_ 🗆 other co	mment:		
01 Wat	er Lot #									blk		



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SYSTEM ON	SYST	EM OFF		PPLICABLE (···,						
	te 11	T	3/09 1	63		OCATION:	NASJ	AX			-15-16		
WELL NO:	V MIN	-02	SAN	APLE ID: FI	Lanal-	03	FREE PROD	OUCT: Y ODUCT (ft BTOC	N	FIELD DU	PLICATE:	NFI	(M1.1-1) 1
	<u>n ma</u>	-03		، سای			GING DA		4.	DUPLICATE		_ <u>]</u> [<u>MU U</u> N
WELL			UBING	17	WELL SC				 РТН	PUR	GE PUMP TYPE]
DIAMETER (ir		ZD	AMETER (inches): /4	DEPTH:	IG feet to	ZZ feet	TO WATER	(feet): 4,	71 OR E	BAILER:	f	
WELL VOLU			ELL VOLUM	IE ≃ (TÓTẢL	WELL DEP	TH – ST	ATIC DEPTH 1	O WATER)	x WELL CA	APACITY			
				= (feet		feet)			ons/foot ≃		gallons
EQUIPMENT (only fill out if:			: 1 EQUIPN	IENT VOL. =	PUMP VOL	UME + (TL	JBING CAPACI	TY x	TUBING LEN	IGTH) + FLO	W CELL VOLUME		
()	,			=	ga	allons + (gal	lons/foot x		feet) +	gallons	3 =	gallons
INITIAL PUMP DEPTH IN WE					¹⁶ 21			T: 1250	PUF	GING ED AT: 14			1/5
		<i>~</i>		WELL (feet):	<u> </u>		INTIATED F	1: 1230				galions	<u>): 9,56</u>
Time Volu	ume Vo ged Pu	um. olume urged	Purge Rate	Depth to Water	pH (SU)	· Temp. (°C)	Spec. Cond. (mS/cm)	Dissolved Oxygen (mg/L)	Salinity (‰)	ORP (mV)	Color/ Od (describe		Turbidity (NTUs)
(galle	(ge (0 (),	allons)	(gpm)	(ft BTOC)	517	25,2		0,13	1.61	101.6	Clar	ale.	
1310 p. 1	<u>ee</u> 07	16	<u>0,000</u> D	4.86	1.5	2512	310	-	1.67	102,3		<u>Nom</u> V	
370 0 5	$\frac{23}{5}$	30	nnle nnle	0.01	3.J.J.	210	211	0.10	1.11	12.1	>	<u>ۍ</u>	57 1
220 0.2	IC 1	1/	O All	8.90	576	2/ 2	3.72	0,08	1.10	58.9	h	هـ مر	7.21
2412 0 - 4	12 2	43	D and	8.90	5.41	26,4	3.21	0,09 0,07	1.17	35.0	a		5.98
350 0.0	13 2	ot	<u>K,045</u>		5.48	24.4	3.13		1101		2		5.10
255 0.0	12 5	105	0,045	9,20	1 1	26.4	3.10	0.08	1.63	19.6		<u>~</u>	5.4-1
100 019	12 2		0.042 8	1010	5,50	26.7		0,08	10/16	14.7		14 	9715
400 0,0	<u>La 5,</u>	41	0,045	9,70	2175	20.3	3.08	0.09	1.60	8,3	· · · · · · · · · · · · · · · · · · ·		3.13
40501	213	,69	0,043	9,46		<u> 1617</u>	3.04	0.09	1.54	-0.7	<i>e</i> .	**	3.20
410 0,	223	8	0.045	9.93	2,36	24.1	3,0)	0.04	1.56	- 5,4	-1	2.4	3,21
VELL CAPA		·/ <u>></u>)* 0.75	<u><i>v,045</i></u> "=0.02	<u> ら, 49</u> 1" = 0.04:	5.5% 1.25 " = 0.0	6: 2" =	<u> </u>	0,09 .37; 4"=0.	1.55 65; 5"=1	.02; 6" =	1.47; 12 " = 5.8	ا ء	3,46
					3/16" =		1/4" = 0.0026;	5/16" = 0.				6 5/8" = 0	.016
PURGING EQ	UIPMENT	CODES	B = B	ailer; BP	= Bladder P		ESP = Electric		Pump; P	P = Peristaiti	c Pump; O =	Other (Specify)
		A	TION				PLING DA	TA					
SAMPLED BY	(PRINT)/	AFFILIA	L	. 1	SAMPLE		TURE(S):				SAMPLE TIN	VE:	
/ <u>(</u>	<u>PANA</u> BING	<u>ave</u>	$\overline{(1)}$		TUBING	and and		FIELD-FILTI		(B)	FILTER SIZE:		
DEPTH IN WE			2(MATERIA	L CODE:	PIE		uipment Type			μ	111
IELD DECO	NTAMINAT	ION:	PUMP	Y 🛃		TUBING	Y CTO	eplaced)		FIELD EC		IFICAT	ION
			PECIFICAT		INTENDE ANALYS	IS	SAMPLING EQUIPMENT	SAMPLE PU FLOW RAT		H2	0 QUALITY PARAME	TER	
# CONTAINERS	MATERIA CODE	L VOI		ESERVATIVE USED	AND/OF METHO	K	CODE	(mL per minu		SE	SN#: JC.A	-102	2))(
2	CG	40	ML	HLL	VO	ν	491	L 200	7	· -	TURBIDIMETER		
2	AG		m	HCh	TOL	~	1	1	Mode	Yanath	SN#: 672	4-1	116
3	16		mL	Hel	MEE	_		1		W DIN	OTHER	,	<u> </u>
2	CG		ML	Mone	VFA)						
<u>₩</u>]	PF		M	0	Norbon	1et	/	$ \rightarrow $					
1	PÉ	25		100	Fold 1	1 PB	-/	- /					
REMARKS:	ν <u>μ</u>			tho3	K	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	· · · · · · · · · · · · · · · · · · ·	I	I		۹.		
MATERIAL C	ODES:	AG =	Amber Glas	s; C G = Cl	ear Glass;	PE = Po	yethylene;	PP = Polyprop	oylene; S =	Silicone;	T = Teflon; O =	Other ((Specify)
SAMPLING E	QUIPMEN	T CODE		= After Perist P = Reverse F		B = B		Bladder Pump	; ESP =	Electric Subr	nersible Pump;		
TES: 1. Th	e above d	o not co				• •	SM = Straw apter 62-160,	Method (Tubir F.A.C.	ig Gravity Dr	ain); 0=	Other (Specify)		
2. <u>S</u> T	ABILIZATION		A FOR RANG	E OF VARIATION	OF LAST THE	REE CONSEC	UTIVE READING	s (SEE FS 2212					
Turbidi	ity: all reading	gs <u><</u> 20 N ⁻	TU; optionally	<u>+</u> 5 NTU or <u>+</u> 109	% (whichever is	s greater)					y, <u>+</u> 0.2 mg/L or <u>+</u> 10%	6 (whiche	ver is greater)
			Cr				ocking cap:						
DI Water Lot :	# / #	0	MS / MSD_	1 .	Equip blk		□ Ambient	l blk	Z Ťrip	blk <u>18~)</u>			
012 1102 2	17 1	4	ONL	Hone	Upm	de	1	(
1 5		50	o nu	Alone Name Alone	Igon	The life	1)					

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	MON IS	YSTEM OF	F DNOTA	PPLICABLE									
SITE NA					SITE	LOCATION:		\wedge	Λ.	DATE:			
NELL N	EKM	1.1.1	Z SAN	IPLE ID:	L		FREE PRO). W			/ N	
	LIN	W-0	3			DIID	GING DA			DUPLICATE I):		
NELL		Тт	JBING		WELLS				этн	PURG			
	TER (inches		AMETER (ind	ches):	DEPTH:	feet t		TO WATER		OR BA		-	
	OLUME PL out if applic		ELL VOLUM	E = (TOTAL	WELL DEF	PTH – ST	AND DEPTH	TO WATER)	x WELLC	APACITY			
	• •			= (feet -	- /		feet)		gallons/			gallons
	VIENT VOLU out if applic		E: 1 EQUIPM	IENT VOL. =	PUMP VO	LUME (TU	IBING CAPAC	ITY x	TUBING LEI	NGTH) + FLOW	/ CELL VOLU	JME	
				=		allons + (ga	llons/foot x		feet) +	gail	ons ≖	gallons
	PUMP OR IN WELL (fe			MP OR TUBII WELL (feet):			PURGING	Δ Τ ·		RGING DED AT:		VOLUME ED (gallons	
		Cum.		Depth		1		1.				U (gallons	s).
Time	Volume	Volume	Purge	to	pН	Temp.	Spec. Cond.	Dissolved Oxygen	Salinity	ORP	Color/	Odor	Turbidity
	Purged (gallons)	Purged (gallons)	Rate (gpm)	Water (ft BTOC)	(SU)	(°C)	(mS/cm)	(mg/L)	(‰)	(mV)	(desc	ribe)	(NTUs)
(h)	0.22	4,35	0,045	9,45	r 10	24,6	2,94	0.09	1.54	-4,3	11	<u> </u>	3.54
	0,22		0,045 0,045	9,4%			2,98	0,05	1,53	-4,5		4	
165	0120	1.31	0,095	7174	3.30	24.0	2178	0103	1.57	715	14		3.71
							·						
												/	
WELL C		[[gal/ft): 0.7	5" = 0.02;	1" = 0.04;	1.25 " = 0.	06; 2" = 0	1 0.16; 3" = 0	.37; 4" = 0.	65; 5" = 1	1.02; 1 .02; 1 .02;	47; 12" =	5.88	
			TY (gal/ft): 1				1/4" = 0.0026;	5/16" = 0.	·····		2'' = 0.010;		
PURGIN	NG EQUIPM	IENT CODE	S: B = B	aller; BP	e = Bladder		PLING DA	Submersible F	^y ump;	P = Peristaltic	Pump; C) = Other (Specify)
SAMPLI	ED BY (PRI	NT)/AFFIL	ATION:		SAMPLE	R(S) SIGNA			/		SAMPLE	TIME:	····
							1				1		
							1						
					TUBING		<u> </u>	FIELD-FILTI	ERED: Y		FILTER SIZ	E:	μm
DEPTH	IN WELL (fe	eet):	DUMD	× N		AL CODE:		Filtration Eq	ERED: Y uipment Typ	e:			
DEPTH		eet):	PUMP	Y N	MATERIA	AL CODE: TUBINO	G / Y N	FIELD-FILTI Filtration Eq (replaced)	ERED: Y uipment Typ	e:	I FILTER SIZ		
DEPTH FIELD D	IN WELL (fe	eet): INATION:	PUMP			AL CODE: TUBING	SAMPLING	(replaced) SAMPLE PU	MP	e: FIELD EQU		ENTIFICAT	
DEPTH FIELD D	IN WELL (fe DECONTAM SAMPLE CO	eet): INATION: DNTAINER	SPECIFICAT				+	(replaced)	MP	e: FIELD EQU H20	JIPMENT IDE	ENTIFICAT	
DEPTH FIELD D	IN WELL (fe DECONTAM SAMPLE CO	DNTAINER	SPECIFICAT	ION			SAMPLING QUIPMENT	(replaced) SAMPLE PU FLOW RAT	MP	e: FIELD EQU H20	, JIPMENT IDE QUALITY PARA		
DEPTH FIELD D	IN WELL (fe DECONTAM SAMPLE CO	eet): INATION: DNTAINER	SPECIFICAT				SAMPLING QUIPMENT	(replaced) SAMPLE PU FLOW RAT	MP	e: FIELD EQU H20	UIPMENT IDE QUALITY PARA SN#:		
DEPTH FIELD C	IN WELL (fe DECONTAM SAMPLE CO	eet): INATION: DNTAINER	SPECIFICAT				SAMPLING QUIPMENT	(replaced) SAMPLE PU FLOW RAT	MP E ite) Mode	e: FIELD EQU H20	JIPMENT IDE QUALITY PARA SN#: TURBIDIMET		
DEPTH FIELD C	IN WELL (fe DECONTAM SAMPLE CO	eet): INATION: DNTAINER	SPECIFICAT				SAMPLING QUIPMENT	(replaced) SAMPLE PU FLOW RAT	MP E ite) Mode	e: FIELD EQU H20	UIPMENT IDE QUALITY PAR/ SN#: TURBIDIMET SN#:		
DEPTH FIELD C	IN WELL (fe DECONTAM SAMPLE CO	eet): INATION: DNTAINER	SPECIFICAT				SAMPLING QUIPMENT	(replaced) SAMPLE PU FLOW RAT	MP E ite) Mode	e: FIELD EQU H20	UIPMENT IDE QUALITY PAR/ SN#: TURBIDIMET SN#:		
DEPTH FIELD C	IN WELL (fe DECONTAM SAMPLE CO	eet): INATION: DNTAINER	SPECIFICAT				SAMPLING QUIPMENT	(replaced) SAMPLE PU FLOW RAT	MP E ite) Mode	e: FIELD EQU H20	UIPMENT IDE QUALITY PAR/ SN#: TURBIDIMET SN#:		
DEPTH FIELD C # CONTAIN	IN WELL (fe DECONTAM SAMPLE CC NERS C	eet): INATION: DNTAINER	SPECIFICAT				SAMPLING QUIPMENT	(replaced) SAMPLE PU FLOW RAT	MP E ite) Mode	e: FIELD EQU H20	UIPMENT IDE QUALITY PAR/ SN#: TURBIDIMET SN#:		
DEPTH FIELD C S CONTAIN	IN WELL (fe DECONTAM SAMPLE CC NERS C KS:	eet): INATION: DNTAINER TERIAL V(ODE V(MATERIA INTEND ANALY3 MEH		SAMPLING ZOUIPMENT CODE	Filtration Eq (replaced) SAMPLE PU FLOW RAT (mL per minu	Lipment Typ MP E te Mode Mode	e: FIELD EQU H20	JIPMENT IDE QUALITY PARA SN#: TURBIDIMETE SN#: OTHER	AMETER	
DEPTH FIELD C S CONTAIN REMAR	IN WELL (fe DECONTAM SAMPLE CC NERS C	eet): INATION: DNTAINER TERIAL V(ODE V) COE V) COE V) COE COE COE COE COE COE COE COE COE COE COE	SPECIFICAT	ION ESERVATIVE USED s; CG = Cl	MATERIA INTEND ANALYS METHONIC METHONIC		SAMPLING CODE CODE	PP = Polyprop	MP E Ite) Mode Mode	e: FIELD EQU Hi20 bl: bl: = Silicone; T	JIPMENT IDE QUALITY PARA SN#: TURBIDIMETE SN#: OTHER	ENTIFICAT	
DEPTH FIELD C S CONTAIN REMARI MATERI SAMPLI	IN WELL (fe DECONTAM SAMPLE CC NERS C NERS C KS: IAL CODES	Peet): INATION: DNTAINER TERIAL VO ODE VO CODE VO S: AG : MENT COD	SPECIFICAT	ION ESERVATIVE USED s; CG = Cl = After Perisis = Reverse F	MATERIA INTEND ANALY ANALY ANALY INTEND ANALY ANALY INTEND INTEND ANALY INTEND	AL CODE: TUBING SISP PE = Po ; B = Ba altic Pump;	SAMPLING CODE CODE Ivethylene; ailer; BP = SM = Straw	PP = Polyprop Bladder Pump Method (Tubir	puipment Typ MP E tite) Mode Mode Systems; S s pylene; S s	e: FIELD EQU H20 al: = Silicone; T : Electric Subme	JIPMENT IDE QUALITY PARA SN#: TURBIDIMETE SN#: OTHER	ENTIFICAT	
DEPTH FIELD D S # CONTAIN REMARI MATERI SAMPLI TES:	IN WELL (fe DECONTAM SAMPLE CO VERS C KS: IAL CODES ING EQUIPI	eet): INATION: DNTAINER TERIAL VO ODE VO S: AG : MENT COD	SPECIFICAT	ION ESERVATIVE USED s; CG = Cl = After Perisi P = Reverse F of the inform	MATERI INTENC ANALYS ANAT METH Hear Glass; taltic Pump; Flow Periste mation reg	PE = Po	SAMPLING CODE CODE Iyethylene; ailer; BP = SM = Straw apter 62-160,	PP = Polyprop Bladder Pump Method (Tubir F.A.C.	uipment Typ MP E Mode Mode Sylene; S; ESP = ng Gravity Di	e: FIELD EQU H20 al: = Silicone; T = Electric Subme rain); O = C	JIPMENT IDE QUALITY PARA TURBIDIMETE SN#: OTHER = Teflon; Pump	ENTIFICAT	
DEPTH FIELD D S # CONTAIN REMARI MATERI SAMPLI TES:	IN WELL (ft DECONTAM SAMPLE CO VERS C VERS C KS: IAL CODES ING EQUIPI 1. The abo 2. STABILIZ/ pH: ± 0.2 units	ATION CETTER	SPECIFICAT	ION ESERVATIVE USED s; CG = Cl = After Perisis of the inform EOF VARIATION cific Conductai	INTEND ANALYS ANALYS ANAT METH Iear Glass; Flow Perista mation req N of LAST TH nce: ±5% D	PE = Po	SAMPLING CODE CODE Nyethylene; ailer; BP = SM = Straw apter 62-160, CUTIVE READING	PP = Polyprop Bladder Pump Method (Tubir F.A.C. s (see, FS 2212	Juipment Typ MP E Mode Mode Sylene; S; ESP = ng Gravity D: 2, SECTION 3)	e: FIELD EQU H20 al: = Silicone; T = Electric Subme rain); O = C	JIPMENT IDE QUALITY PAR/ TURBIDIMETE SN#: OTHER = Teflon; ersible Pump ther (Specify	ENTIFICAT	(Specify)
DEPTH FIELD D S # CONTAIN REMARI SAMPLI TES:	IN WELL (fe DECONTAM SAMPLE CO WERS C VERS C KS: ING EQUIPI 1. The abo 2. <u>STABILIZ</u> pH: ± 0.2 units Turbidity: all r	Peet): INATION: INATION: DNTAINER TERIAL V(ODE V(Amber Glas Amber Glas ES APP REPE Constitute all RIA FOR RANGE a: ± 0.2 °C Spec NTU; optionally -	ION ESERVATIVE USED s; CG = Cl a After Periss of the inform OF VARIATION cific Conductant t 5 NTU or ± 10	MATERI INTENC ANALYS ANALYS ANAT METH Iear Glass; Flow Perista mation req N of LAST TH nce: ±5% D % (whichever	PE = Po	SAMPLING CODE CODE Ivethylene; ailer; BP = SM = Straw apter 62-160, UTIVE READING gen: all readings <	PP = Polyprop Bladder Pump Method (Tubir F.A.C. s (SEE_FS 2212 20% saturation (state)	uipment Typ MP E Mode Mode Systems; S: ESP = ng Gravity Di 2. SECTION 3) see Table FS 2	e: FIELD EQU H20 al: = Silicone; T Electric Subme rain); O = C 200-2); optionally,	JIPMENT IDE QUALITY PAR/ TURBIDIMETE SN#: OTHER = Teflon; 0 ersible Pump ther (Specify ± 0.2 mg/L or ±	ENTIFICAT	(Specify)
DEPTH FIELD D S # CONTAIN REMARI MATERI SAMPLI TES:	IN WELL (fe DECONTAM SAMPLE CO MAT VERS C KS: ING EQUIPI 1. The abo 2. <u>STABILIZ</u> pH: ± 0.2 units Turbidity: all r eds repair	eet): INATION: INATION: DNTAINER TERIAL V(ODE V(O	Amber Glas	ION ESERVATIVE USED s; CG = Cl = After Perisis = Reverse H of the inforr = OF VARIATION cific Conductat ± 5 NTU or ± 10 meeds well tag	MATERI INTEND ANALYS ANATA METH Iear Glass; taltic Pump; Flow Perista Flow Perista NoF LAST TH nce: ±5% D % (whichever g	AL CODE: TUBINO TUBINO PED PE = PO PE = PO B = Bi altic Pump; uired by Chn REEE CONSEC issolved Oxyg is greater) □ Ic	SAMPLING CODE CODE Ivethylene; ailer; BP = SM = Straw apter 62-160, UTIVE READING gen: all readings =	PP = Polyprop Bladder Pump Method (Tubir F.A.C. 20% saturation (uipment Typ MP E Mode Dylene; S; ESP = ng Gravity Di 2: SECTION 3) see Table FS 2 other co	e: FIELD EQU H20 al; = Silicone; T = Electric Subme rain); O = C 200-2); optionally, mment:	JIPMENT IDE QUALITY PAR/ TURBIDIMET(SN#: OTHER = Teflon; 0 ersible Pump Dther (Specify ± 0.2 mg/L or ±	ENTIFICAT	(Specify)
DEPTH FIELD D S # CONTAIN REMARI MATERI SAMPLI TES:	IN WELL (fe DECONTAM SAMPLE CO WERS C VERS C KS: ING EQUIPI 1. The abo 2. <u>STABILIZ</u> pH: ± 0.2 units Turbidity: all r	eet): INATION: INATION: DNTAINER TERIAL V(ODE V(O	Amber Glas	ION ESERVATIVE USED s; CG = Cl = After Perisis = Reverse H of the inforr = OF VARIATION cific Conductat ± 5 NTU or ± 10 meeds well tag	MATERI INTEND ANALYS ANATA METH Iear Glass; taltic Pump; Flow Perista Flow Perista NoF LAST TH nce: ±5% D % (whichever g	AL CODE: TUBINO TUBINO PED PE = PO PE = PO B = Bi altic Pump; uired by Chn REEE CONSEC issolved Oxyg is greater) □ Ic	SAMPLING CODE CODE Ivethylene; ailer; BP = SM = Straw apter 62-160, UTIVE READING gen: all readings =	PP = Polyprop Bladder Pump Method (Tubir F.A.C. 20% saturation (uipment Typ MP E Mode Dylene; S; ESP = ng Gravity Di 2: SECTION 3) see Table FS 2 other co	e: FIELD EQU H20 al: = Silicone; T Electric Subme rain); O = C 200-2); optionally,	JIPMENT IDE QUALITY PAR/ TURBIDIMET(SN#: OTHER = Teflon; 0 ersible Pump Dther (Specify ± 0.2 mg/L or ±	ENTIFICAT	(Specify)



GROUNDWATER SAMPLING LOG

	SYSTE	MON {	SYSTE													
	SITE				- 6K BI		SITE I	OCATIO		E. MORE	~		DATI	315	12014	
	WELL N	10:	tersona	June	SA	MPLE ID		JAUSS	FF	REE PROD	DUCT: Y	(A)			ICATE: Y	
	Ekn	m of			64	MW-04):	DUPL	ICATE ID:		
	WELL				UBING		WELL SO				STATIC DEI		T	DUDO		
		TER (inch	es): 2			0.75×0.17	DEPTH:			AL 33 feet	TO WATER		2			DOMP
	WELL \	OLUME	PURGE		ELL VOLU	VE = (TOTAL	WELL DEF				O WATER)			Y	- remonite	pond
		out if app				= (2		feet		.82		x 6.1	6	gallons	/foot = 3.07) gallons
		OUT IF AD		PURGE	: 1 EQUIP	MENT VOL. =	PUMP VOI	UME +	(TUBIN	G CAPACI	TY X	TUBING LE	ENGTH) +	FLOW	CELL VOLÙME	
	(only					=		allons +	(/	gal	llons/foot x	/	feet) -	+ /	gallons =	gallons
		. PUMP C				JMP OR TUBI N WELL (feet):				URGING	(365 NT: 1 565 84		IRGING IDED AT:	11/20	TOTAL VOLUM PURGED (gailo	
H		GALS		<u></u>		Depth								(705		
	Time	Volume Purgeo	Vol	ume	Purge Rate	to	pH	Temp		Spec. Cond.	Dissolved Oxygen	Salinity		RP	Color/ Odor	Turbidity
	Ann	galions		rged llons) ∞x	(gpm)	(ft BTOC)	(SU)	(°C)		(m/S/cm)	(mg/L)	-(%)	n)	ıV)	(describe)	(NTUs)
320 F	۰.	0.15	C.7	1	200	1.95	16.35	262		902	0.91	0.44	89.	1	PIEAR NO ODER	Te.c
330 10		0.50	1.2		200	8.75	6.12	26.6		1640	1.23	0.63	- 9.	7	CLEAR NO ODOR	9.67
	等	6.50	1.4		205	9.20	5.96	26.8		831	1.99	6.92	1.		CLEAR NO ODOR	5.18
1350 18		0.50	1.	25	200	9.2.8	5.89	26.9		949	2.68	0.99	12.		CILLAR NO ODOR	4.65
1460 []	eco	0.50	2:	15	200	9.33	5.69	27.1	1	998	3.07	1.01	- 16		CLEAR NO COOR	3.90
1410 1	10	0.50	3.1	25	205 \$	9.35	5.86	27.1	1.	2073	3.35	1.02	-19	.6	(LEAR No ODOR.	3.70
1451	65	0.25	; 3.	50	200	9,35	5.87	27.0		2037	3.42	1.03	-19	.1	CLEAR NO ODER	2.04
142011	640	0,25	3.	75	200	9.35	5.86	27.2	;	2049	3.50	1.04	-20	.8	CLEAR NO Spin	1.66
ť	425	0.25	4.0	SO .	200	9.35	5,85	27.2	5 2	2048	3.52	1.04	-2	0.1	CLGHR NOT ODOR	1.23
															•	
_																
					5" = 0.02; FY (gal/ft):	1 " = 0.04; 1/8 " = 0.0006	1.25" = 0.1 ; 3/16" =	0.0014;		; 3 ² = 0 = 0.0026;	.37; 4 " = 0. 5/16" = 0.		: 1.02; 3" = 0.006	6" = 1 .4 5; 1/2		= 0.016
	PURGI	NG EQU	PMENT	CODE	S: B=	Bailer; BP	= Bladder				Submersible I	Pump;	PP = Per	istaltic F	Pump; O = Othe	r (Specify)
r-	CAMPI	ED BY (F			ATION		SAMPLE				ATA				SAMPLE TIME:	
		s ma					Addin	$V \land$. M	· · · A	-				1430	
	PUMP	OR TUBI	NG			* ₂ 5	TUBING	<u>1 U</u>		$- \bigcirc$	FIELD-FILT	ERED: Y	Ø	F		μm
		IN WEL			21'						Filtration Eq			·····	-	
	FIELD	DECONT	AMINAT	ION:	PUMP	Y N (P	TUBI	NG	Y (N-(re	eplaced) 28		FIEL	D EQU	IPMENT IDENTIFIC	ATION
		SAMPLE	CONTA	INER \$	SPECIFICA	TION	INTENE ANALY			IPLING	SAMPLE PL			H20 C	QUALITY PARAMETER	
	# CONTA		MATERIA CODE	L VC	DLUME P	RESERVATIVE USED	AND/C			PMENT ODE	FLOW RA (mL per min		del: V&1_04	ີ່	SN#: ISLIO 29	22
-	3		(6	40	en l	ilci	VOUS		A		200	-		<u>to pus</u>	TURBIDIMETER	
	1		PE		oml	<u>- nci</u>	NG, SCH		<u> </u>	Ŵ	1	Mo	del: LAmot	The Zeries	we SN#: 5239-05	\$15
F	2		Ab		ome	Hel	T6C	+01					6- (no)	10 000	OTHER	-1.3
F	1		 NE		50ml	HNCZ	FE.MN.	· A WA								
-	3		<u>k</u>		loul	Hel	DH6	<u>, n</u>								,
-)		06:		5cml	HNOZ	K			L	Ĺ					
F	REMA		1			ON RENG	•				•					
	MATE	RIAL COI				ass; CG = C		PE =	Polyet	hylene;	PP = Polypro	pylene; \$	s = Silicor	ne; T =	= Teflon; O = Othe	er (Specify)
	SAMP	LING EQ	JIPMEN	т сор		P = After Peris PP = Reverse			= Bailer		Bladder Pum Method (Tubi				rsible Pump; ther (Specify)	
N	OTES:				constitute a	all of the infor	mation req	uired by	Chapte	er 62-160,	F.A.C.			0-0		<u> </u>
		-									S (SEE FS 221			ationally	+ 0.2 mg/L or + 10% (whi	abover is areator)
						$y \pm 5$ NTU or ± 10				ai reduitigs <u>s</u>	<u>-</u> 2070 Saturation (900 I ANIE FO	2200-2), 0	50011ally, <u>1</u>	_ 0.2 mg/⊏ 01 <u>−</u> 1076 (WHR	nove is yiealer)
C	⊐ well n	eeds repa	uir		(] needs well ta	g	<u> </u>	🗆 lockir	ng cap:		_ 🗆 other o	comment:	9 1		
0	🗆 DI Wa	ater Lot #		[I MS / MSC		_ 🗆 Equip b	lk		□ Ambien	nt blk	🖓 Tr	ip blk 🗍	5-1		

# CONT	anniers	MARCHAL	LONG	volume	PREVSERVATIVE	ANALYSIS	SAMPLING EQ. CODE	PLOW RATE	
1		pé		250mL		BROWINDE	App	200	
١		pė		Sooml	-	LODIDE	1		
	2	6		yoml	-	VEA			
	t	pe		\L	-	MULOBIAL	1	1	

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	EM ON 🖻	SYSTEM	OFF D		(NO SYSTE	EM)								
SITE	NAS T	DEVSENNI	LLE FK	BIO STUDU			ALKONNUG	· 12			Zhilo			
WELL	NO:	_		BIO STUDA SAMPLE ID!			FREE PROD	OUCT: Y (
E	WWW -0-	/		EHIM	0-05		GING DA	•	·/·	DUPLICATE ID				
WELL		av	TUBIN	G 0.25" XOIT"	WELL SO	CREEN INT	ERVAL	STATIC DE	PTH		E PUMP TYPE			
	TER (inche		DIAME	TER (inches): OLUME = (TOTAL	DEPTH:	19 S feet to	o 24 5 feet		(feet): 4.6	CAPACITY	ILER: PERLISTALITIC	pump		
(only fi	ll out if appl	icable)			.1						foot = 18	N 		
			RGE: 1 EC	QUIPMENT VOL. =	PUMP VOI	feet – LUME + (TL		feet) TY x	TUBING LE	ENGTH) + FLOW	CELL VOLUME	gallons		
(only fi	ll out if appl	icable)		- =	- g	allons + (gal	lons/foot x		feet) +	gallons =	- gallons		
							PURGING	T. LEIA			TOTAL VOLUME	. d		
	IN WELL			TH IN WELL (feet):	72.1	<u>363</u>	INITIATED A			IDED AT: 1620	PURGED (gallons	1:4:00		
Time	Volume Purged (gallons)	Volum Purge (gallon	e Pu d Ra	rge to	pH (SU)	Temp. ([°] C)	Spec. Cond. (mS/cm)	Dissolved Oxygen (mg/L)	Salinity (‰)	ORP (mV)	Color/ Odor (describe)	Turbidity (NTUs)		
1525	0.90	0.90	235	5.19	5.79	26.9	5368	0.53	2,89	-25.9	CLGAR ASC ODOR	17.0		
1535	0.60	1.50	230		6.06	27.5	5897	2.30	3.18	-91.7	CLEAK NO COOK	4.38		
1545	0.60	2.10	230		6.13	26.9	5382	3.30	2.89	-105.1	CLEAR NO ODOR	2.90		
1555	0,60	2.70			6.14	26.9	5175	3.75	2.77	-(11.9	CLEAR NO ODOR	2.11		
les	0.60	3.10	23		6.16	24.0	3226 4905	<u>3,93</u> 3,99	2.67	-112.1	CLEAR NO ODOR	2.08		
1620														
1000	0 0-1535 4.00 230 5.82 6.16 27.1 4815 4.00 2.57 -118.4 cirde/No coor Z.01													
	0 0-1035 4.00 230 5.82 6.16 27.1 4815 4.00 2.57 -118.4 apple in a contraction of the cont													
TUBIN	G INSIDE I	′ (gal/ft): DIA. CAPA	0.75 " = 0.0 \CITY (gal	02; 1 " = 0.04; /ft): 1/8" = 0.0006;	1.25" = 0.4 3/16" =	06; 2" = 0.0014;	0.16; 3" = 0. 1/4" = 0.0026;	.37; 4" = 0. 5/16" = 0.	65; 5" = 004; 3/8	1.02; 6 " = 1.4 3 " = 0.006; 1/2	17; 12" = 5.88 2" = 0.010; 5/8" = 0	.016		
PURG	ING EQUIP	MENT CO	DES:	B = Bailer; BP	= Bladder		ESP = Electric		Pump;	PP = Peristaltic F	Pump; O = Other (Specify)		
SAMP	LED BY (PF	RINT) / AF	FILIATION	:	SAMPLE	SAMI R(S) SIGN	PLING DA				SAMPLE TIME:			
	ar mun	· .			Saul	à. 1				_	1620			
PUMP	OR TUBIN	Gʻ`	22' 86	0		AL CODE:	$\overline{\mathcal{O}}$	FIELD-FILTI Filtration Eq			FILTER SIZE:μ	m		
	DECONTA	· · · · ·			D D	TUBING	Y Q(re	eplaced) Z			IPMENT IDENTIFICAT	ION		
	SAMPLE	CONTAIN	ER SPECI	FICATION	INTEND ANALY	212	SAMPLING	SAMPLE PU		H20 (QUALITY PARAMETER			
		ATERIAL	VOLUME	PRESERVATIVE	AND/C METHO	R	EQUIPMENT CODE	FLOW RAT (mL per minu		del:	SN#: 15402933			
CONTA	INERS	CODE	How	USED	VOCS		Avop	230		del: YSI pro pro	TURBIDIMETER			
1		06	Sooml		NOZISO		1	1	Mor	del: 1 Amotte 7020	GE-SN#: 5239-0515	5		
2	<u></u>	Å6	Howh	ACI	Tec	4.07					OTHER			
1		<u>N6</u>	250ml	HNO3	FE, MN, C	4? Ma								
3	,	Ċ.	Your	Hel	Ditc			+						
1 REMA	DKS:	pe	250ml	HNOS	L K						· · · · · · · · · · · · · · · · · · ·			
	ADDI			as one neve			· · · · · · · · · · · · · · · · · · ·							
	RIAL CODE		G = Ambe		lear Glass;					= Silicone; T =		Specify)		
SAMP	LING EQUI			APP = After Peris RFPP = Reverse I	-low Perista	altic Pump;	SM = Straw	Bladder Pump Method (Tubir		= Electric Subme Drain); 0 = O	rsible Pump; ther (Specify)			
NOTES:				ute all of the infor					2. SECTION 3	;)	1.0.			
	pH: <u>+</u> 0.2 ur	nits Temper	ature: <u>+</u> 0.2		nce: <u>+</u> 5% D	issolved Oxy					0.2 mg/L or <u>+</u> 10% (whiche	ver is greater)		
🗆 well n	eeds repair			□ needs well ta	g	i lo	ocking cap:		_ 🗆 other c	omment:				
🗆 DI Wa	ater Lot #		_ ⊡1MS /	NSD <u>ERMU-05-</u> - MS - MSD	□ Equip bl	k	C Ambient	t blk	🖫 Tri	p blk 78.1				



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GROUNDWATER SAMPLING LOG

ME: NS: SALVEANULE C. V. Elle SAMPLE ID: (Value 2: V. C.	SYSTE	MON 🛛	SYSTEM		APPLICABLE		M)										
LINC: SAMPLE ID: FREE PRODUCT: Y (Q) PIELD DisFUGATE Y Y (Q) Max - C1 CAMPLE ID: PURCING DATA PURCING DATA PURCING DATA Max - C1 CAMPLE ID: FORD DATA STATUERDOWLATE Y PURCING DATA Max - C1 CAMPLE ID: STATUE DATA STATUE PURCING DATA PURCING DATA METER (Inches): CUBING CAPTACHT DESTINATION Statue ITTA Statue ID: PURCING CAPTA MID CAT Splitching: CUBING PURCING: FORMET VOLL PURCHAR (CUMING CAPTACHT) Y (MID CAT STATUE) Statue ITTA Statue IDING CAPTA PURCING CAPTA PURCING CAPTA PURCING CAPTA Statue IDING CAPTA PURCING CAPT	SITE NAME:	NAS TA	KSONVILLE	E GK BIO		SITEL					DA	TE: 3	12016				
PURCING DATA PURCING DATA METER (non-e): DUMETER (non-e): <th colspan="2" dumeter<="" td=""><td>NELL I</td><td>10:</td><td></td><td>5</td><td></td><td></td><td></td><td>FREE PROD</td><td></td><td>(P)</td><td>FI</td><td>ELD DUF</td><td>LICATE:</td><td>Y 🔊</td><td></td></th>	<td>NELL I</td> <td>10:</td> <td></td> <td>5</td> <td></td> <td></td> <td></td> <td>FREE PROD</td> <td></td> <td>(P)</td> <td>FI</td> <td>ELD DUF</td> <td>LICATE:</td> <td>Y 🔊</td> <td></td>		NELL I	10:		5				FREE PROD		(P)	FI	ELD DUF	LICATE:	Y 🔊	
L. TUBING 2.9" VOLT WELL SCREEN INTERVAL DIAMETER (Index) ETATLO DEPTH INTERVENCE PURCENDET YPE OR BALER (Hold PLAT (Intervence) Depth PLATER (Intervence) Depth PLATER (Intervence) <thdepth (intervence)<="" plater="" th=""></thdepth>	EKIM	0-0t_			EKMID OF		PU					PLICATET	D:				
METER (methods) 2 DUMATER (methods) DEPTH / ή Feato 2.5	NELL			TUBING	0.25" x 0 17"	WELL SC				PTH	. <u></u>						
Line Line Lower 1 1 2				DIAMETEI	R (inches):	DEPTH:	۹ fee	t to 13 feet	TO WATER	(feet):	1.70	OR B	AILER: AL	LISTAITIC PU	MQ		
UPPMENT VOLUME PURCE: 12 UPPMENT VOLUME + (TUBING CARACITY X TUBING LENGTH) + FLOW CELL VOLUME gallons - gallons + (gallons				WELL VOL					O WATER)	x WEL	L CAPAC	41 Y		1	١		
y fill out if applicable) = gallons + (gallons for x feet) + gallons = gallons = (gallons for x feet) + gallons = gallons = gallons = (gallons for x feet) + gallons = gallons = (gallons for x feet) + gallons = gallons = (gallons = - gallons = gallons =					=(2)	3.75 PUMP VOL	feet –	11-10	feet)			gallor	ns/foot =	<u>29</u>	gallons		
THUE PURP OR TUBING FINAL PULP OR TUBING PURCING PURCING <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td>•</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>							•										
PTH N VELL (rec): 24 DEPTH N VELL (rec): 24 INITIATE AT: 16/5 ENDED AT: 15/5 PURCEC (galance): 14/5 ne Volume (rec) Corn, (rec) Depth (rec) Depth (rec) <tdd< td=""><td></td><td></td><td></td><td></td><td></td><td>* -</td><td>allons +</td><td></td><td>lons/foot x</td><td></td><td></td><td>·</td><td>· · · · · · · · · · · · · · · · · · ·</td><td></td><td>gallons</td></tdd<>						* -	allons +		lons/foot x			·	· · · · · · · · · · · · · · · · · · ·		gallons		
ne Volume Purged (new) Purged (new) Purged (new) <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>.T: (015</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>): 4.5</td>									.T: (015): 4.5		
Period (upped) Puriod (particle) Puriod (net) Particle (net) Partic		Volume					Tomo	Spec.	Dissolved	Solir	aity		Cala		Turkidia		
Price Price <th< td=""><td>Гime</td><td>Purged</td><td>Purae</td><td>d Rate</td><td>Water</td><td></td><td></td><td>L Cona.</td><td></td><td>_(%</td><td>กี</td><td></td><td></td><td></td><td></td></th<>	Гime	Purged	Purae	d Rate	Water			L Cona.		_(%	กี						
$ \frac{5}{2} (5 - 6) (5 $		(gallons)	(gallons	s) (gpm); ArL	(ft BTOC)				(119/2/	PPT							
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	15	6.50			6.86	6.62	24.1	6126	1.13	3.48	-47	1.5	32.1	NE ODOL	32.1		
S D.SS T.eD Los 1.1e 6.4e 24.5 11d 6.32 3.81 11e Cost 2.50 2.50 2.50 2.50 1.1e 6.32 2.4.6 6.144 1.1f 3.24 -96.1 Model Labor Model Labor 4.5 2.50 2.50 1.51 Kee SPL 6.55 3.40 2.00 3.44 6.52 2.45 1.91.3 Mee SPL 6.55 3.40 2.05 1.81 6.22 2.49 4144 2.741 2.751 -10.71 Mee SPL 6.50 3.10 0.550 3.200 2.05 1.81 (c.22 2.49 4144 2.741 2.713 -10.71 Mee SPL 7.60 7.714 1.80 6.71 1.81 (c.25 2.44 -10.2 6.71 1.27 6.04 33.1 LL CAPACITY (pairt) 0.72 1.81 (c.21 2.79 0.16 3710.2 71210.2 6.71 1.27 6.04 33.1 LL CAPACITY (pa	5	0.50	1.00	200	1.39	6.71	24.2	7836	0.46	4.35	5 .9	2.8	SLIGHT SI	179 000 0002	43.5		
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ELL CAPACITY (gal/ft): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88 BING INSIDE DIA: CAPACITY (gal/ft): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016 RGING EQUIPMENT CODES: B = Bailer: BP = Bladder Pump; ESP = Electric Submersible Pump; P = Peristatic Pump; 0 = Other (Specify) SAMPLENG DATA MANDER SUBMERSIBLE Pump; P = Peristatic Pump; 0 = Other (Specify) SAMPLER (S) SIGNATURE(S): NAMPLE TIME: It 20 It 20 PIELD-FILTERED: Y FILER SIZE:	5	0.350 3.545 200 1.81 6.21 24.9 4580 2.25 2.44 -112.4 aug no order 45.5															
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PTH IN WELL (feet): 21 '64.5 MATERIAL CODE: 160/2 Filtration Equipment Type: SAMPLE CONTAMINATION: PUMP Y Y Y Qreplaced) Filtration Equipment Type: SAMPLE CONTAMINATION: PUMP Y Y Y Qreplaced) Filtration Equipment Type: SAMPLE CONTAMINER SPECIFICATION INTENDED ANALYSIS ANDOR SAMPLE PUMP FLOW RATE (mL per minute) H20 QUALITY PARAMETER # MATERIAL VOLUME PRESERVATIVE USED SAMPLE CODE Model: H20 QUALITY PARAMETER 1 Ø/6 506 mL - N05,50% tQ VI Model: Model: Model: SM#: 5239 - 05 IS 2 Å/6 Ø/9 mL Å/24 ToC Model: VIRBIDMETER 1 Ø/6 150 mL ToC Model: VIRBIDMETER OTHER 1 Ø/6 150 mL ToC Model: VIRBIDMETER OTHER 1 Ø/6 150 mL ToC Model: VIRBIDMETER OTHER 1 Ø/6 150 mL ToC	MANUE UMP	OR TUBIN	G TALES	2			<u>1 U</u>	- Weil	FIELD-FILT	ERED:	Y)			m		
SAMPLE CONTAINER SPECIFICATIÓN INTENDED ANALYSIS SAMPLING EQUIPMENT CODE SAMPLE PUMP FLOW RATE (mL per minute) H20 QUALITY PARAMETER # MATERIAL CODE VOLUME PRESERVATIVE USED NANOR METHOD SAMPLING CODE SAMPLE PUMP FLOW RATE (mL per minute) Model: ifcli @La @LLS SN#: 15 Lio 2933 3 (L6 HowL itcl VOCS Ano Z.00 TURBIDIMETER 1 Øld StamL NOSSON, L0 III Model: IAmme Zozwod SN#: 5239 - 0515 2 AS 40mL Itcl Toc OTHER OTHER 1 Øld Isson L ANS EL, MO (A 1 ML No SM#: 5239 - 0515 3 (L6 HowL MA Toc OTHER OTHER 1 Øld Isson L Toc OTHER OTHER 3 (L6 HowL Toc OTHER OTHER MARKS: Isson L Isson L Toc OTHER OTHER MARKS: Answets on State II mong III mate: 2 leoofs AlteAt D, pu266 montates; FS 2 Silcone; T = Teflon; O = Other (Specify) MMPLING	EPTł	I IN WELL	(feet): 2	l'BGS	· · · · ·	~	L CODE										
ANALYSIS ANALYSIS ANALYSIS SAMPLE POINT PRESERVATIVE ANALYSIS SAMPLE POINT CODE PRESERVATIVE Model: Material Model: Material Sample S	IELD	DECONTA	MINATION	I: PUMI	י א N <u>א</u>	₽ AP	TUBIN	IG Y N(re	eplaced)	5	F	IELD EQ	UIPMENT I	DENTIFICAT	ION		
# MATERIAL CODE VOLUME PRESERVATIVE USED AND/OR METHOD EQUIPMENT CODE FLUW RATE (mL per minute) Model: if all plants SN#: 13 Lio 2133 3 (6 Ho mL if ci Vices Ano 2.60 TURBIDIMETER 1 per source Source Noz,504, if if if Model: if all plants SN#: 5231 - 05 if 2 AG 40 mL if Toc 0 OTHER 3 CG 40 mL if Tok 0 OTHER 4 pic 250 mL if Tok 0 OTHER 3 CG 40 mL if Tok 1 District Distrint District Di		SAMPLE	CONTAINE	ER SPECIFIC	ATIÔN							H2() QUALITY PA	RAMETER			
3 (6 Ho nL Hu Vocs Ann 2 co TURBIDIMETER 1 βs 5bs.mL — Noz,Soq. U Model: LAmane zozuwa SN#: 5239 - cos.ns 2 A6 40 mL Act Tot OTHER 1 βs 250 mL Anon- Fc, mus (A *, Mz) OTHER 1 βs 250 mL Anon- Fc, mus (A *, Mz) OTHER 3 (G 40 mL Act D4G Other 1 βs 250 mL Anon- Fc, mus (A *, Mz) Other 1 βs 250 mL Anon- Fc, mus (A *, Mz) Other 1 βs 250 mL Anon- Fc, mus (A *, Mz) Other Markts: Markts: Markts: Norset and the full formation relations Provide for the formation of the full formation relations Provide for the full formation of the full formation relations Provide for the full formation of the full formation required by Chapter 62-160, F.A.C. 2. Stabilization Criteria For Raise or VARIATION of LAST THREE CONSECUTIVE READINGS (SEE FS 2212, section 3) PH: ±0.2 mg/L or ±10% (whichever is greater) PH: ±0.				VOLUME		AND/O	R			TE - ute)	Model: Ma	•	SN#:	1-1 . 4 292	2		
I Description Model:								Δ.	1.0		16	ple pu			/		
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I Pto Toto Ref Toto Ref Toto 1 Pto 150 mL Hnoto-s Fc, MD, (A 1, Mc, I) Image: Strain S			*		4					<	La	MATE 202			15		
3 1/2 1/4 1/4 1/4 1/4 1/4 1/4 I 0.6 1/200/L	<u> </u>								<u> </u>					·			
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MARKS: Mark: Mark: <td><u> </u></td> <td></td>	<u> </u>																
ATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify) MMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify) ES: 1. The above do not constitute all of the information required by Chapter 62-160, F.A.C. 2. 2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3) pH: ± 0.2 units pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater) □ locking cap: □ other comment:	EMA	RKS:	•		· · · · ·					· ·							
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ell needs repair □ needs well tag □ locking cap: □ other comment:		рН: <u>+</u> 0.2 и	nits Temper	ature: <u>+</u> 0.2 °C	Specific Conducta	nce: <u>+</u> 5% Di	ssolved O	xygen: all readings <				; optionally	, <u>+</u> 0.2 mg/L o	r <u>+</u> 10% (whiche	ver is greater)		
I Water Lot # □ MS / MSD □ Equip blk □ Ambient blk □ Trip blk 	۱ ۱									– –		- ·					
	veli n	eeas repair			⊔ needs well ta ⊡	9	[⊔ locking cap:	t bik	oth	er comme ∃Trip bl⊮	TR.)					
	I VV 8	iler LOC#		U IVIS / MS	<u> </u>	_ 🗆 Ednih pii	`				а тпр рік _	19-1	. <u></u>		÷		

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A CONTAINED	NAT. (D)	6 VOLING 1	preservante	- Ananyas	SAMP. 60. 10	DE PLENS RATE	l
lx Bromos	pe	250ml	1000	Blentos	App	200	
1× 10DIDE	pe	12 mil	~	10 di dé	1.		
20 VEA	G	Home		VIA			
1 × MILLOBAL	06	· IL	~	mulcial	Ţ		
()	1			1. 15. 10. 10. 10. 10. 10. 10. 10. 10. 10. 10	3 53 -	-44-	

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SYSTEM ON	SYSTEM		OT APPLICABLE											
	tell	Bldg,	103	SITE LOO		NAS T	4×		DATE: 😴	3-12-16 PLICATE: Y AP				
WELL NO:	(MW~F		SAMPLE ID: E			FREE PROD	DUCT: Y	Ŕ	FIELD DU	PLICATE: Y				
·	M W ~ (19	Ľ	e nw on		GING DA		.):	DUPLICATE	ID:				
WELL		TUBING	1/	WELL SCR			STATIC DEI	отн						
DIAMETER (ir	iches): 2	DIAMET	ER (inches): /ዓ	DEPTH: 14	feet to	23 feet	TO WATER	(feet):	_0 9 ORE	BAILER:				
WELL VOLUN (only fill out if a	IE PURGE:	1 WELL VC	DLUME = (TOTAL	WELL DEPTH	1 – ST/	ATIC DEPTH T	O WATER)	x WELI	CAPACITY					
			= (et –		feet)			ns/foot =	gallons			
(only fill out if a		RGE: 1 EQ	UIPMENT VOL. =	PUMP VOLUN	ИЕ + (TU	BING CAPACI	TY x	TUBING	LENGTH) + FLO	W CELL VOLUME				
					ons + (lons/foot x		feet) +	gallons =	gallons			
INITIAL PUMF			. PUMP OR TUBI				T 1623	F	NDED AT: 12	5 TOTAL VOLUME PURGED (gallons	s): 4,10			
	Cum		Depth											
Time Volu	me Volur	ne Purç	ge to		Temp.	Spec. Cond.	Dissolved Oxygen	Salini		Color/ Odor	Turbidity			
(gallo				(SU)	(⁰ C)	(mS/cm)	(mg/L)	(‰)	(mV)	(describe)	(NTUs)			
10350.5	0 0.5	0 0,0	5 8,47	2,94 3	25.3	7,09	2.90	3,80	3 413.1	Clear Nona	12.8			
10450,5					<u>.5.5</u> 25.4	7.70	2.62	4,2		1 Ri h	9,41			
1055 0	50 0 0	50 0.0		3.15 1	25,7	8.13	2,97		0 380.4		1) d			
106 012	50 2.0		13.30		15 9	8,42	3.39	110	3 367.6		8,99			
1115 0.7				248 1	1.2	8,78	3,67	4.8			0.71			
1125 0.3				3.66 2	1.11	8.75	3,48	1.0	7 304,0		15.8			
1135 0.3		0 0.0			24,7	8,45	4,06	11	0 2010	~ C=	20,2			
						8.18		4.3	7 28 5		32,0			
1	155 0.30 3,50 0,03 14.88 4.54 24.6 7.96 4.05 4.39 186.8 - 24.1													
	200 0,30 3.80 0.03 14,89 4,49 26.9 7.52 4,17 4,14 207.7 n " 26.3													
	205 0.30 4,10 0.03 14,91 4,52 26,9 7,64 4.14 4,04 201,1 " " 24.2													
	$\frac{205}{\text{WELL CAPACITY (gal/ft): } 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88}$													
PURGING EQ				; 3/16" = 0.0		1/4" = 0.0026; ESP = Electric			PP = Peristaltic					
		-				LING DA					opoony			
SAMPLED BY	(PRINT) / AF	FILIATION:	``	SAMPLER) SIGNA	/URE(S):				SAMPLE TIME:				
Tony Sc		r (Tri	nity)	19	-\$	-				1205				
PUMP OR TU		21	-	MATERIAL	CODE:	PE	FIELD-FILTE Filtration Eq			FILTER SIZE:	ım			
FIELD DECON		N: PUI	MP Y 🔊		TUBING	V	placed)		· · · · · · · · · · · · · · · · · · ·		ION			
0.11/D				INTENDED		Y								
5AMP		· · · · · ·	PRESERVATIVE	ANALYSIS AND/OR		SAMPLING QUIPMENT	SAMPLE PU FLOW RAT		H2	0 QUALITY PARAMETER				
CONTAINERS	MATERIAL CODE	VOLUME	USED	METHOD	_	CODE	(mL per minı	ute) N	1odel: VST	SN#: ISLID2	933			
3	CG	4ml	HCL	VOC		JPP	2200			TURBIDIMETER				
2	AG	40 ML	HCL	TOC		(Ν	lodel:L< No H	E. SN#: 4224-0	SIL			
3	CG	YOML	Her	NEE						OTHER				
2	CG	40 M	Moon	VFA	,		\sum							
1	PĒ	500M.		NP3/Say/C	1/Atas		<u> </u>							
)	PE	20 m		Feldy My	10-		7							
REMARKS:	PE	250 ML	17103	Ϋ́Κ		((
MATERIAL C	DDES:	AG = Amber	Glass; CG = C	lear Glass;	PE = Po	lyethylene;	PP = Polyprop	oylene;	S = Silicone;	F = Teflon; O = Other	(Specify)			
SAMPLING E		ODES:	APP = After Peris RFPP = Reverse	taltic Pump;	B = Ba		Bladder Pump Method (Tubir	o; ES	P = Electric Subr					
L NOTES: 1. Th	e above do r		te all of the infor					ig Gravity	(Drain); U=	Other (Specify)				
2. <u>Sт</u>	ABILIZATION C	RITERIA FOR I	RANGE OF VARIATIC	N OF LAST THRE	E CONSEC	UTIVE READING	6 (SEE FS 2212							
pH: <u>+</u> 0 Turbidi	ty: all readings	r ature: <u>+</u> 0.2 ℃ ≤ 20 NTU; optic	C Specific Conductationally <u>+</u> 5 NTU or <u>+</u> 10	Ince: <u>+</u> 5% Disso)% (whichever is g	nved Oxyg reater)	en: all readings <	∠u‰ saturation (see I able F	5 2200-2); optionally	/, <u>+</u> 0.2 mg/L or <u>+</u> 10% (which	ever is greater)			
well needs re	pair		□ needs well ta	Ig	🗆 lo	cking cap:		_ 🗆 other	comment:					
DI Water Lot	#	🗆 MS / M		Equip blk	1	C Ambien	: blk	0	Frip blk T3-7					
2012 1102	PE	250 1	ni Mone ni Mone ni Hone	prom,	02	\leq	\leq							
	<i>0</i> ~	Loon A	n elan	e Todi	VC))							



Modified FDEP Form FD 9000-24

Pagelofz

	MON [-		PPLICABLE (M) OCATION:	1				DATE: 7		,	
NAME:	Site	<u> </u>	B1d	g 10.	3			XAS-JAX	-			د	-16-10	۷ 	
WELL N		165-1	Ð	SAI		FMW-	-ID	FREE PROD	OUCT: Y ODUCT (ft BTOC)	*N):		FIELD DUPL		Ø	
	_ ,		<u> </u>			3 3 0 -	PUR	GING DA				001 210/11210			
WELL				JBING	1,		REEN INT		STATIC DEF	тн "	1.	PURG		PE مرمي	
	ER (inch				inches): /4			23 feet ATIC DEPTH T	TOWATER				ILER:	PP	
	out if app		TVVE		IE - (IUIAL		лп – эн		OWATER)			PACITY			
EQUIPA			RGE:	1 EQUIP	= (//ENT VOL. =	PUMP VOL	feet UME + (TU	BING CAPACI		x TUBING	LENG	gallons GTH) + FLOW	s/foot ≃ CELL VOLU	JME	gallons
	out if app				=		allons + (lons/foot x			feet) +	aal	ons =	gallons
	PUMP O		3	FINAL PU							PURG			VOLUME	<u> </u>
	IN WELL				WELL (feet):	ZI	T	INITIATED A	T: 0750		ENDE	DAT: 0425	PURGE	ED (gallons):4,15
	Volume	Cur		Purge	Depth		Tamp	Spec.	Dissolved	Salir	aitu		Color/	Odar	Turbidity
Time	Purged	Purg	ed	Rate	to Water	pH (SU)	Temp. (°C)	Cond. (mS/cm)	Oxygen (mg/L)	(%		ORP (mV)	(desc		Turbidity (NTUs)
	(gallons)	(3====		(gpm)	(ft BTOC)		A				-		<i>R</i> 1 D	1. 0	A
0800	0.50	0.5	-	0,05		7,31	24,0	3.32	0,10	1.7	2	-180.2	Cloudy.	/Nom	54,7
0810	0.50			0,05	8.73	7.19	24.3	3.35	0.09	1.7		-160. C	``	69	۶
0820	0,45	1.4		0.045	9.34	6.54	2314	3.31	0.16	1.7		-77.Z	chear-		-
0830	0.45		0	0,045	9.94	6,10	24,4	3.09	1.45		41	-15.0		L!	27.4
0840	0.3	2.2	n	0.03	9.90	6.01	24.0	2,99	2.73	1.5	0.	-20.5	38	84	15.6
0850	7900 0.3 2.80 0,03 9,91 5.88 14,1 2.78 3.12 1.45 -12.1 7 ~ K-7														
6900	1910 0.3 3,10 0,03 9,13 5.66 24.2 2,74 3.31 1.42 -13.9 " 14.1														
0910	1910 0.3 3,10 0.03 9,43 3.80 34.2 2.74 3.51 1.92 -13.4 " 19.1 1920 0.3 3.40 0.03 9,42 5.81 24.2 2.66 3.37 1.37 -8.1 " - 13.8														
0910	920 0,3 3,40 0,03 9,42 5.81 24,2 2,44 3,37 1,37 -8,1 " " 13.8 425 0,15 3.55 0,03 9,84 5.82 24,2 2,64 3,42 1,37 -7,9 11 " 12.5														
1620															
	CAPACIT	Y (gal/ft):	0.75	· = 0.02;	1" = 0.04;	1.25" = 0.0	06; 2 " =	D.16; 3 " = 0	.37; 4 " = 0.	65; 5	5 " = 1.0	02; 6" = 1.4	 47; 12" =		12,2
					1/8" = 0.0006;			1/4" = 0.0026;	5/16" = 0.0				2" = 0.010;	5/8" = 0	
PURGI	NG EQUI		ODES	: B=t	Bailer; BP	= Bladder I		ESP = Electric		oump;		e Peristaltic I	Pump; V	D = Other (Specity)
SAMPL	ED BY (P	RINT) / A	FFILIA	TION:		SAMPLE	R(S) SIGNA		<u></u>				SAMPLE	TIME:	
Tony	Schme	<i>scller</i>	15	rinity)		Jan N	u_{-}	CT216444 .				-09	3009	145
PUMP (OR TÜBIN IN WELL	IG	Ĵ	?/			AL CODE:	É	FIELD-FILTE Filtration Equ				FILTER SIZI	E:μ	m
		- <u>·</u> ····	DN:	PUMP	Y N	1	TUBING		eplaced)			FIELD EQU		ENTIFICAT	ION
						INTEND			. ,						
#			1	PECIFICA		ANALYS AND/C	SIS	Sampling Equipment	SAMPLE PU FLOW RAT				QUALITY PAR		
CONTAI		CODE	VOL		USED	METHO	ם כ	CODE	(mL per minu	ute)	Model:	YSI		11029	133
3	4	26		ML	HCL	Voc		177	4200	•			TURBIDIMET		
2		AG	-		POTHLL	780			<u> </u>		Model:	Lono He		224-D	114
3		<u>CG</u>			HCL	MES							OTHER		
2		20			Nore	VF			<u> </u>	\setminus		·- · · · · · · · · · · · · · · · · · ·			
1		25		OM-	plose 1	NO3/50.	CIADS	<u></u>		\rightarrow					
1 REMAF		$\frac{PE}{2E}$		-	HNO3	Fe Mg ,	Malle			-+					
	1)E			HYOZ	ĸ				1					
	IAL COD			Amber Gla		lear Glass;		olyethylene;'	PP = Polyprop					0 = Other	(Specify)
SAMPL	ING EQU			RFP	P = After Perist P = Reverse F	Flow Perista	altic Pump;	SM = Straw	Bladder Pump Method (Tubir			Electric Subme iin); 0 = C	ersible Pump Other (Specif		
NOTES:								apter 62-160, CUTIVE READING		2. SECTI	ON 3)				
	pH: <u>+</u> 0.2 u	nits Temp	erature:	: <u>+</u> 0.2 ºC Sp	ecific Conducta	nce: <u>+</u> 5% D	issolved Oxy	gen: all readings <				00-2); optionally,	<u>+</u> 0.2 mg/L or <u>+</u>	10% (whiche	ever is greater)
□		-	-		<u>+</u> 5 NTU or <u>+</u> 10			aking assi		-+*-	or c	mont			
□ well ne □ DI Wat				□ MS / MSD	needs well ta	9 <u> </u>	⊔ k Ik	ocking cap: □ Ambien	t blk	oth 	er com ÎTrin ⊦	nnent: olk TR-2			
1	PE	A	250	in L	Hone	Be	ior Jior			· · ·	· · · F •				
2012_110	² P		500	ML		To	di DE	(\backslash					
A	25	No. of Concession, Name		ナー	fort	<u>/N</u> _	~	`							



Modified FDEP Form FD 9000-24

Page Zofz

SITE		SYSTEM O	FF 🗆 NOT A	APPLICABLE (<u>M)</u> .OCATION:				DATE:		,,,,,,,,,,
NAME: WELL I	NO: FK	mw-10	2 SA	MPLE ID:	-mw-1	Ø	FREE PROD		N	FIELD DUPL		
	p	//t	11	1/1	A.1.00		GING DA			DUILIOATEID	·	
WELL	TER (inche /OLUME F out if appl	PURGE: 1	TUBING DIAMETER WELL VOLUI		DEPTH:	REEN INTE	RVALCG	TO WATER	(feet):	OR BA	E PUMP TYPE ILER:	
	••			= (,	feet -		feet)			/foot =	gallons
	OUT IF APP		E: 1 EQUIPI	MENT VOL. =	PUMP VOE	UME + (TU	BING CAPACI	TY x	TUBING LEN	GTH) + FLOW	CELL VOLUME	
				=		allons + (,	lons/foot x		feet) +	gallons =	gallons
	PUMP OF		FINAL PU DEPTH IN	IMP OR TUBH	۹G		PURGING	.T:		GING ED AT:	TOTAL VOLUME PURGED (gallons	s):
Time	Volume Purged (gallons)	Cum. Volume Purged (gallons)	Purge Rate (gpm)	Depth to Water (ft BTOC)	pH (SU)	Temp. (°C)	Spec. Cond. (mS/cm)	Dissolved Oxygen (mg/L)	Salinity (‰)	ORP (mV)	Color/ Odor (describe)	Turbidity (NTUs)
G35	0.15	3,85	0,03	9,90	5.89	24,5	2.43	3.45	1.34	-5.2	11 ¹⁶ 1	12.)
1941	0.15	4.00		9.84	5.79	29.4	2.62	3.47	1.32	-4.1	11 11	12,2
04415		4,15			5.76	24.5	2.57	3,63	1.32	-5,9	••• •	12,4
										/	-	
									/	· · · ·		
			_						/			
WELL TUBIN	CAPACITY G INSIDE I	/ (gal/ft): 0. DIA. CAPAC		1/8" = 0.0006		0.0014;	0.16; 3'' = 0 1/4'' = 0.0026;				17; 12" = 5.88 2" = 0.010; 5/8" = 0).016
PURGI	NG EQUIP	MENT COD	ES: B = I	Bailer; BP	= Bladder F		ESP = Electric		Pump; P	P = Peristaltic F	Pump; O = Other (Specify)
SAMPL	ED BY (PI	RINT) / AFFI	LIATION:		SAMPLE	R(S) SIGNA	PLING DA				SAMPLE TIME:	
PLIMP	OR TUBIN	G	· · · · · · · · · · · · · · · · · · ·		TUBING	$-) - h_{k}$	//	FIELD-FILTE		N	 FILTER SIZE:μ	
	I IN WELL				MATER	LA ODE			uipment Type		μ	
FIELD		MINATION:	PUMP	Y N	PINTEND ANALYS AND/O		Y N (re	eplaced)		FIELD EQU	IPMENT IDENTIFICAT	ION
			R SPECIFICA	тюм	ANALYS	SIS F	SAMPLING EQUIPMENT	SAMPLE PU FLOW RAT		H20 (QUALITY PARAMETER	
# CONTA			VOLUME		AND/O METHO	R S	CODE	(mL per mini		:	SN#:	
	,			- P							TURBIDIMETER	
									Mode	:	SN#:	
				-/							OTHER	
				/								
			/									
REMAR	RKS:		1									
MATER	RIAL CODE	ES: AG	Amber Gla	iss; CG = C	lear Glass;	PE = Po	lyethylene;	PP = Polyprop	oylene; S =	Silicone; T :	= Teflon; O = Other	(Specify)
SAMPL	ING EQU	PMENT CØ	DES: APP	P = After Peris P = Reverse I	taltic Pump:	B = Ba		Bladder Pump	; ESP =	Electric Subme		
DTES:	2. <u>STABIL</u> pH: <u>+</u> 0.2 ur	IZATION CRIT	ERIA FOR RANG	BE OF VARIATIO	NOFLASTTH	REE CONSEC	apter 62-160, UTIVE READING jen: all readings <	S (SEE FS 2212		200-2); optionally, <u>-</u>	<u>+</u> 0.2 mg/L or <u>+</u> 10% (which	ever is greater
م الميد	Turbidity: a eds repair	<i>II</i>		+ <u>+</u> 5 NTU or <u>+</u> 10	•	• •				nment:		
										blk		



	EM ON	SYSTE			PPLICABLE (I	NO SYSTE									
SITE							OCATIO				DATE:				
WELL I	NO:		wint	EK BIC SAN	MPLE ID:			FREE PROI	DUCT: Y	<u>S</u>	FIELD DUP	.ICATE: Y 🔎			
	pt-3				pz-3					;):	DUPLICATE ID):			
					, , ,)) , , , , , , , , , , , , , , , ,			RGING DA			DUPC	E PUMP TYPE			
WELL DIAME	TER (incl	nes): 2		UBING (). DIAMETER (inches):			to (2.5 feet		(feet): 4.31		VILER: DELISTATIC A	340		
WELL	VOLUME	PURGE	: 1 W	ELL VOLUN	IE = (TOTAL	WELL DEF	тН – S	STATIC DEPTH	TO WATER)	x WELL CA	APACITY		1		
	ll out if ap				= (12	5	feet	4.39		x 0.16		s/foot = 1.3°	gallons		
	MENT VO		PURGE	: 1 EQUIPN	IENT VOL. =	PUMP VO	_UME + (1	TUBING CAPAC	ITY x	TUBING LEN	IGTH) + FLOW	CELL VOLUME			
					=		allons +	<u> </u>	llons/foot x		feet) +	gallons =	gallons		
	L PUMP (H IN WEL				MP OR TUBIN WELL (feet):			PURGING	AT: 0745		RGING DED AT: AGOS	TOTAL VOLUME PURGED (gallons):4,00		
			um.		Depth										
Time	Volum Purge	e Vol	lume rged	Purge Rate	to Water	pH (SU)	Temp. (°C)	Cona.₊	Dissolved [•] Oxygen	Salinity _(‰)	ORP (mV)	Color/ Odor (describe)	Turbidity (NTUs)		
	(gallons		llons)	(gpm)		(00)	(0)	(mS/cm)	(mg/L)	ppi	((
6800	0.75	0	15	200	4.48	10.00	24.0	2.1	0.13	1.69	-168.8	Stormant NC COCK	30.8		
CRID	0.50	1.24	5	200	4.50	6.04	24.1	2.07	oll	1.05	-1887	CLEAR NO ODOR	24.6		
08:20	0.50	1-7	5	205	4.50	6.05	24.1	1.80	0.09	0.94	-192.4	CLEAR NO COCE	25		
0830	0.50	2.2	25	200	4.50	6.10	24.1	1.90	0.10	0.97	-194.3	althe we cour	8.60		
0640	50 0.50 3.25 200 4.50 6.10 24.2 1.84 0.09 0.93 -195.9 acalho odol 8.14														
0650	50 0.50 3.25 200 4.50 6.10 24.2 1.84 0.09 0.93 -195.9 acardine odor 8.14 55 0.25 3.50 200 4.50 6.12 24.2 1.84 0.09 0.93 -196.4 acardine odor 5.12														
0855	55 0.25 3.50 200 4.50 6.12 24.2 1.84 0.09 0.93 -196.4 WAR NO ODER 5.12														
0900	00 0.25 3.75 200 4.50 6.14 24.3 1.90 0.09 0.97 -198.1 CLEARING ODOR 9.02														
<u>C905</u>	700 0.25 3.75 200 4.50 6.14 24.3 1.90 0.09 0.97 -198.1 CLEARING ONOR 5.02														
											· · · · · · · · · · · · · · · · · · ·				
WELL	CARACI		·)· 07	5" = 0.02;	1 " = 0.04:	1.25 " = 0.	<u>06: 2"</u>	= 0.16; 3" = 0),37; 4" = 0	.65: 5" = 1	1.02; 6" = 1.	47: 12 " = 5.88			
TUBIN		E DIA. C	APACI	TY (gal/ft):	1/8" = 0.0006;		00, 2 0.0014;	1/4" = 0.0026				/2" = 0.010; 5/8" = 0	0.016		
PURG	ING EQU	IPMENT	CODE	S: B = E	Bailer; BP	= Bladder		ESP = Electric		Pump; F	P = Peristaltic	Pump; O = Other (Specify)		
SAMP	LED BY (PRINT) /	AFFIL			SAMPLE		IPLING DA				SAMPLE TIME:			
	L MUN	'n				1/2		a.m.	\mathcal{A}			0905			
PUMP	OR TUB	ING	<u>x~~</u>			TUBING		di di di	FELDFILT		×		ιm		
	H IN WEL						AL CODE	1.		uipment Typ					
FIELD	DECON		ION:	PUMP	Y N .	P	TUBIN	IG Y <u>W(</u> I	replaced)		FIELD EQU	JIPMENT IDENTIFICAT			
	SAMPL			SPECIFICA		INTENI ANALY	SIS	SAMPLING EQUIPMENT	SAMPLE PL FLOW RA		H20	QUALITY PARAMETER			
	# AINERS	MATERIA CODE	VC VC	DLUME	RESERVATIVE USED	AND/0		CODE	(mL per min	nute) Mode	el: You pae pur	8 SN#: 154101 477			
2		(6	2	lom	Ha	Võc	5	App	200		- (- (-	TURBIDIMETER			
1		06		otml.	~	NO, SO	1	i i	1	Mod	el: LAWOTTE 2020	SN#: 5239 - 051	5		
2	2	A6		10ml	Ha	TOC	1					OTHER			
۱		De		scril	Hroo,	FE MN.	ca ž Ma								
2	5	lls	1	Home	ity	THE	. 18								
)e	l	soul	HNOS	K		7	ما						
REMA	ARKS: Ar	DULION	HL A	NOHLASIS	on rener	St-									
MATE	RIAL CO			= Amber Gla	ass; CG = C	lear Glass;	PE =	Polyethylene;	PP = Polypro	opylene; S	= Silicone; T	= Teflon; O = Other	(Specify)		
SAMF	PLING EG	UIPMEN	IT COD		P = After Peris PP = Reverse I			= Bailer; BP = p; SM = Strav	= Bladder Pum v Method (Tub	np; ESP = ing Gravity D	= Electric Subm rain);	iersible Pump; Other (Specify)			
NOTES:				constitute a	Il of the infor	mation red	uired by	Chapter 62-160	, F.A.C.						
								SECUTIVE READING				, <u>+</u> 0.2 mg/L or <u>+</u> 10% (which	ever is greater)		
	Turbidit	y: all readir	ngs <u><</u> 20	NTU; optionally	y <u>+</u> 5 NTU or <u>+</u> 10)% (whicheve	r is greater)						0		
□ well r	needs rep	air			needs well ta	g	[□ locking cap: □ Ambie	nt blk	other co	mment:				
	ater Lot #	·		L NIS / NISD		_ ⊔ ⊏quip t	JIK		IIL DIK	🖻 I N					

# CONTAINSERS	MATCRIAL CODE	VELOME	PRESERVATI VG	ANALYSIS	SAMPLING 6Q. CODE	FLOW RATE
1	pe	250 m		Blempe	'A _K	200
t	p6	50s.ml		lodide		
2	Cb	yoml		VFA		

,

ANALYSIS & DEVELOPMENT CORP. Enviroinmental & Engineering Services

		SYSTEM	OFF D	NOT A	PPLICABLE												
SITEN		7E	(OCATION	CICSONU	inf			DATE: 3	123/2	01))		
WELL	NO: EKI	nW ~	l	SAI	MPLE ID: GRMW	~ 01		FREE PRO	DUCT: Y RODUCT (ft BTO	ኛ የ ነ C):		FIELD DUI DUPLICATE	PLICATE	: `	Y	KP	
							PUR	GING DA	ATA						_		
	TER (inche			FER (in	nches): 3/16	WELL SC DEPTH:	CREEN INT	ERVAL to 23 feet	STATIC DE TO WATER	EPTH R (feet):	5.1		RGE PUI BAILER		^{YPE}	ึงผ	rβ
	VOLUME I I out if appi		1 WELL V	VOLUN	NE = (TOTAL	. WELL DEF	PTH – \$1	ATIC DEPTH	TO WATER)	x WI	ELL CA	PACITY		,			•
EQUIP		UME PU	RGE: 1 E	QUIPN	= (MENT VOL. =	feet - PUMP VOI	- _UME + (TU	JBING CAPAC	feet) CITY x	X TUBIN	IG LEN	gallor IGTH) + FL(ns/foot DW CELI	= _ VOI	LUME		gallons
(only fil	l out if appl	icable)			=	• g	allons + (g	allons/foot x			feet) +		g	allons =	=	gallons
	. PUMP OF				MP OR TUBI WELL (feet):	՝՝՝՝՝՝՝՝՝՝՝՝՝՝՝՝՝՝՝՝՝՝՝՝՝՝՝՝՝՝՝՝՝՝՝՝՝՝		PURGING INITIATED	AT: 102	1)	PUR	GING ED AT:	25		L VOLU		. 4.5
Time	Volume Purged (gallons)	Cum Volur Purge (gallor	ne Pi ed F	urge late prn)	Depth to Water (ft BTOC)	pH (SU)	Temp (°C)	Spec. Cond. (mS/cm)	Dissolved Oxygen (mg/L)	Sali	inity ‰)	ORP (mV)	Colo (descril	r	Odo (descri	г	Turbidity (NTUs)
1030	0.6	0.6			6.55	5.40	26.1	7.53	0.11	4,	15	-62.5	CLEA	R	NON	2	25. a
1040	0.6	1. 3		_	6.78	5,40	06.4	6.28	0.08		41	-69.1	W/ BLA SPEC		1	•	6.61
1050	0.6	1.1	3 0.		6.78	5.43	96. F	5.56	0.08	9,1	99	-72.8	1				4.06
1100	0.6	2.1		06	6.78	5.45	26.1	4,91	0.08	3.	6à -	-76.6					1.46
1110	0.6	3.0		06	6.78	5,47	26,1	4,53	0.07	3,4		- 78. [1,28
1199	125 0.3 3.9 0.06 6.78 5.48 26.2 4.10 0.08 2.19 80.3 1.29																
	125 0.3 3.9 0.06 6.78 5.48 26.2 4.10 0.08 2.19 80.3 1.29 1130 0.3 4.2 0.06 6.78 5.49 26.3 4.02 0.08 2.12 80.0 1.36																
1135	130 0.3 4.2 0.06 6.78 5.49 26.3 4.02 0.08 2.12 -80.0 1.36 135 0.3 4.5 0.06 6.28 5.49 26.2 4.00 0.08 2.10 -79.2 1.01																
WELL	$\begin{array}{c c c c c c c c c c c c c c c c c c c $																
	WELL CAPACITY (gal/ft): $0.75^{"} = 0.02$; $1^{"} = 0.04$; $1.25^{"} = 0.06$; $2^{"} = 0.16$; $3^{"} = 0.37$; $4^{"} = 0.65$; $5^{"} = 1.02$; $6^{"} = 1.47$; $12^{"} = 5.48$ TUBING INSIDE DIA. CAPACITY (gal/ft): $1/8^{"} = 0.0006$; $3/16^{"} = 0.0014$; $1/4^{"} = 0.0026$; $5/16^{"} = 0.004$; $3/8^{"} = 0.006$; $1/2^{"} = 0.010$; $5/8^{"} = 0.016$																
	PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify) SAMPLING DATA																
~	SAMPLED BY (PRINT) / AFFILIATION: SAMPLER(S) SIGNATURE(S): SAMPLE TIME:																
	OR TUBIN			<u>13 - 17</u>	1 A-1 A-	TUBING	NJ	<u>Beal</u> PE	FIELD-FILT	ERED:	Y	A	 FILT	<u> </u> ER S	<u>))</u> IZE:	<i></i> ,	μm
	IN WELL	<u>`</u>	-6-			MATERIA		,	Filtration Ec	uipmer	nt Type I						
	DECONTA			UMP	Y Ø	INTEND			N (replaced)		 	FIELD E	QUIPME	NT IE	ENTIFI	CAT	ON
#	SAMPLE	CONTAIN	ER SPEC		TION ESERVATIVE	ANALYS AND/O	SIS	SAMPLING EQUIPMENT	SAMPLE PU FLOW RA			105	20 QUALIT				
CONTA		CODE			USED	METHO	D	CODE	(mL per min		Model:	Ki pu		N#: \	5110	10	68
<u> </u>		<i>}€</i>	16	N°	»v€	NGS		<u>+0p</u>	230				TURB	-		~	
3		6-	40 40			CSIA		_	1		Model:	9(008	~	N#:	418	3	
3		40 6 ;6	40		cL	VEA							U	THER			
3		.G.	40			8367 MEE	; ;										
5		4G	40		· - ·	TOC	•		(-					
REMAR	KS:		,			•			1								
MATER	IAL CODE	S: A	AG = Amb	er Glas	ss; CG = Cl	ear Glass;	PE ≈ Po	iyethylene;	PP = Polypro	pylene;	; S =	Silicone;	T = Tefle	on;		ther (Specify)
SAMPL	ING EQUI	PMENT C	ODES:		= After Perist P ≈ Reverse F		B = B Itic Pump;		= Bladder Pum v Method (Tubi	p; I ing Grav	ESP = I vity Dra	Electric Sub ain); 0 =	mersible = Qther (
NOTES:	1. The al		ot consti	tute all	l of the inform	nation requ	ired by Ch	apter 62-160				<i></i>					
	pH: ± 0.2 un	its Temper	ature: <u>+</u> 0.2	C Spe	cific Conductar	10: <u>+</u> 5% Di	SSOIVED Oxy	jen: all readings	$\leq 20\%$ saturation			00-2); optional	lly, <u>+</u> 0.2 m	g/Lor	<u>+</u> 10% (w	hicher	ver is greater)
- ii well ne	eds repair	rreasings < N	20 N I U; op	nionally; ⊡ i	± 5 N I U or ± 10" needs well tao	% (whichever) a N	s greater) <i>()</i> ⊏ lo	gen: all readings Ap ↓ io 49 ocking cap:	7	🗆 ott	рег сол	nment:					
D D Wat	er Lot #	a A	_ 🗆 MS /	MSD	NA-	Equip bil	NA	Ambiei	T nt blk_NA		□ Trip t		•		•		

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GROUNDWATER SAMPLING LOG

		SYSTEM	1 OFF	D NOT A	PPLICABLE (
SITE N	AME: ()	itt.	11			SITE	OCATION:	NASI	aavaan	VILLE	DATE:	23 MO	rch	7
WELLI	NO: CVh	MNL.	.N2	SAN	APLE ID:	(mnl-1	2	FREE PRO	DUCT: Y RODUCT (ft BTOC	U, U	FIELD DU		Y (9)	<u> </u>
			<u>UL</u>					GING D		,): -	DUPLICATE	ID:		
WELL			тиві	NG	21	WELLSO			STATIC DE	PTH	PU	RGE PUMP 1		
DIAME	TER (inches	· • • • •	DIAN	IETER (ind	ches?///	DEPTH:	feet t	o feet	TO WATER	(feet):) .		BAILER:	'PP	
	VOLUME P I out if applic		1 WEL		IE = (TOTAL	WELL DEF	TH – ST	ATIC DEPTH	TO WATER)	× WELL (CAPACITY			
		,			= (feet -			feet)	x		ns/foot =		gallons
EQUIP (only fil	MENT VOLU	JME PU :able)	RGE: '		IENT VOL. =	PUMP VOL	UME + (TU.	BING SAPAC	CITY X	TUBING LE	NGTH) + FLO	DW CELL VC	DLUME	
	•••	,			=		allons + (f	-	allons/foot x		feet) +	9	allons =	gallons
	. PUMP OR I IN WELL (f				WP OR TUBIN WELL (feet):	· ·	1	PURGING INITIATED	AT: 120		RGING		AL VOLUME	»: 4.2d
		Curr	ar.		Depth									
Time	Volume Purged	Volur	ne	Purge	to	pH	Temp.	Spec. Cond.	Dissolved Oxygen	Salinity	ORP	Color	Odor	Turbidity
	(gallons)	Purgi (gallor		Rate (gpm)	(ft BTOC)	(SU)	(°C)	(mS/cm)	(mg/L)	(‰)	(mV)	(describe)	(describe)	(NTUs)
1010	00.0	0.10	\overline{n}	1.00	7.20	HINE	2210	2.54	0 24	1810	-ID.Q	CLION	NA	10.7
1220	ñã.ŭ	67	ñĬň).Dh	8.18	477	22 21	3.38	0.01	1.77	-24.2	VIALA	<u></u>	11.10
1220	0.hñ	8	ก้ไก้	ññ.	8.00	11-10	12.45	3.28	0.77	1.72	-200			8.56
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$														
250 0.60 3.00 0.00 8.50 4.91 23.79 3.00 0.26 1.56 -48.6 6.07														
300 0.00 3.00 0.00 8.01 4.98 24.03 2.93 0.24 1.52 -553 6.67														
305 0,30 3,90 0,00 8.58 4.93 24.17 2.90 0.24 1.51 -56.2 6.80														
305 0,30 3,90 0,60 8.58 4.93 24.17 2.90 0.24 1.51 -56.2 6.80 310 0.30 4.20 0.60 8.56 5.05 24.35 2.28 0.24 1.46 -58.2 7.59														
WELL CAPACITY (gal/ft): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88 TUBING INSIDE DIA. CAPACITY (gal/ft): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016														
	G INSIDE DI			(gal/ft): 1 B = B		3/16" ≍ = Bladder F			;; 5/16" = 0.0 c Submersible F		•• = 0.006; PP = Peristalt		0 = Other (
			<i></i>		ullet, Di	Biddgeri		*****		ump,	11 – 1 eristan	ier unp,	U - Other (opecity
SAMPLED BY (PRINT) / AFFILIATION: A.HOWA TUDITU (NOUM 131)														
A HOWA TUDITY ONOUN 1311 PUMP OR TUBING 01 TUBING DE FIELD-FILTERED: Y N FILTER SIZE:M														
DEPTH IN WELL (feet): 1 MATERIAL CODE: 1 Filtration Equipment Type:														
					U	INTEND			4					
	SAMPLE C					ANALYS	IS P	SAMPLING EQUIPMENT	SAMPLE PU FLOW RAT		Н	20 QUALITY PA	RAMETER	
# CONTAI		TERIAL CODE	VOLUI (mL)		SERVATIVE USED	AND/O METHC	rt	CODE	(mL per minu		1eN (01 55	SN#:	0662	421
9	1	F	Π			Ne	8	APP	230		_ <u>}//>/_</u>	TURBIDIMI	eter	
Ž	Ć	6	40) /	±C)	ĊŠĹ	4	- 01-1 1	1	Mod	Iel:HAWK	SN#:	131100	202943
2	ĨÕ	à	40)	~~ <u>~</u>	VFA	•					OTHE	~	<u></u> ,
3	Č	6	HĈ		I C1	824	B							
3	Ĉ	G	Ĥ		HČi	MEF	·····					· · · ·		····-
2	A I	Ř	40		-IA i	TÔC		V						
REMAR	RKS:	<u> </u>	$\frac{1}{1}$	۸ Ar	ND11					I,				
MATER		~ !~	<u>- √ √</u> AG = Ar	nber Glas	s; CG = Cl	ear Glass;	PE = Po	lyethylene;	PP = Polyprop	oylene: S	= Silicone:	T = Teflon:	O = Other	(Specifv)
				APP	= Alter Perist	altic Pump;	B = B6		= Bladder Pump	· · · · · · ·	= Electric Sub			, ,
OTES	4 The et-		of co		ef the inform				w Method (Tubir			= Other (Spec		
UIES:	2. <u>Stabiliz</u>	ATION CF	NITERIA	FOR RANGE	of the inform	nation required to the second se	REE CONSEC	apter 62-160 UTIVE_READING	, F. A.C. <u>35 (SEE_FS 2212</u>	2, SECTION 3	1			
	pH: <u>+</u> 0.2 units	Temper	rature: <u>+</u>	0.2 °C Spe	cific Conductan	ice: <u>+</u> 5% Di	ssolved Oxyg		≤ 20% saturation (€			ly, <u>+</u> 0.2 mg/L o	r <u>+</u> 10% (whiche	ever is greater)
⊐ well ne					±5NTU or <u>+</u> 10% needs well tao			ckina cap:	1h	□ other or	omment [.]			
🗆 DI Wat	er Lot #	****	_ C M			 ⊐ Equip bl		🗆 Ambie	nt blk	D Tri	o blk ~	•••	-	
			-						·					

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GROUNDWATER SAMPLING LOG

<u>SYSTEM ON</u>		OFF DAT		NO SYSTE	M)									
SITE NAME:	Siler			SITE L	OCATION:	NAS 7	TAX		DATE:	3/23	(17			
WELL NO:	il in the start of	5-03	SAMPLE ID:	Inne.	-02	FREE PRO	RODUCT: Y	, O	FIELD DU		Y D			
<u>ــــــــــــــــــــــــــــــــــــ</u>	<u> </u>		U		PUR	GING D		<i>.</i> ,	DUPLICATE					
WELL	1	TUBING	(inches) We	WELL SC		ERVAL c 23 feet	STATIC DE		I (PU	RGE PUMP T	TYPE /			
DIAMETER (ii		DIAMETER 1 WELL VOI	LUME = (TOTAL	WELL-DEP	THST	ATIC DEPTH	TO WATER			BAILER:				
(only fill out if	applicable)		= (feet –			feet)			n s/fo ot=		gallons		
EQUIPMENT		RGE: 1 EQU	JIPMENT VOL. =	PUMP VOL	UME + (TU	BING CAPA	CITY X			OW CELL VO				
		1	A	*	allons + (alions/foot x	······································	feet) +	<u> </u>	jallons =	gallons >		
DEPTH IN WE			PUMP OR TUBIN I IN WELL (feet):			PURGING			RGING \		AL VOLUME GED (gallons			
-, Volu	ume Volum		Depth	-11	T	Spec.	Dissolved	Callaite	075					
Time Purg	ged Purge	d Rate	Water	pH (SU)	Temp. (°C)	Cond. (mS/cm)	Oxygen (mg/L)	Salinity (‰)	ORP (mV)	Color (describe)	Odor (describe)	Turbidity (NfUs)		
1140				6/0	151	2.28	0.10	1 17	57	R. L. R		49.04		
USR A	6 0.4	20,0		200	2-7	228	0.08	116	91.1	while	nene	50.64		
108 0	6 1.9		6 0.20	5.76	200	2.21	0.07	1.13	49.0			38.50		
h 18 0	6 7.1		16 10.63	5.78	264	2.13	0.06	1.08	99.6			10.97		
113 0.6 3.0 0.00 D.73 5 90 25.4 2.07 0.06 1.05 98.2 19.14 1290 0.6 3.6 0.06 10.945.81 25.6 2.02 0.05 1.03 149.8 19.87														
1290 0.6 3.6 0.06 10.945.81 25.10 2.02 0.05 1.03 149.8 14.87 1293 0.3 3.9 0.06 10.945.82 25.5 1.98 0.05 1.01 1570 12.65														
248 0.3 4.2 0.06 0.88 5.81 25.7 2.07 0.05 1.02 127.1 1 11.65														
	·[월] 년 · (CITY (nal/ft):		*	5.82	<u>4,8</u>	$\frac{2.00}{16}$			<u>-42.5</u>	1 47. 19"	- 5 99	10.91		
TUBING INSI	DE DIÀ. CÁPA	CITY (gal/ft): 1/8" = 0.0006;	3/16" =	0.0014;	1/4" = 0.0026	5; 5/16" = 0.	004; 3/8				0.016		
PURGING EQ	WELL CAPACITY (gal/ft): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88 TUBING INSIDE DIA. CAPACITY (gal/ft): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016 PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify) SAMPLING DATA													
SAMPLED BY	APRINT) / AF	FILIATION:	R	SAMPLER			<u> </u>			SAMPL	LE TIME:			
Therease and the	Burn	LIA	Nity		0 h	My C	Dun	All and a second se			<u>304</u>			
PUMP OR TU DEPTH IN WE		2	.('	TUBING MATERIA	L CODE:	Ke	FIELD-FILTI Filtration Eq			FILTER S	SIZE:	μm		
FIELD DECON		N: PUM	PY (N)		TUBING	i Y 1	(replaced)		FIELD E	QUIPMENT I	DENTIFICAT	ION		
SAMP	LE CONTAINI		CATION	INTENDE		SAMPLING	SAMPLE PU		F	20 QUALITY PA	RAMETER			
# CONTAINERS	MATERIAL	VOLUME	PRESERVATIVE	AND/OF METHO	י א	EQUIPMENT CODE	FLOW RAT (mL per mini	_	lel: VSL h	J SN#:	NoA10	27-11		
·2	CODE	μ ΨD	USED	CSU		APP	no		10(110		. .			
1.	(6	ΰo		VER	7	1	1	Mod	leiM215T			9036		
3	$\overline{U}(a)$	40	HU	Voc						OTHER				
3	CG	40	HU	mu	6									
2	AU	<u>Yo</u>	HU	TOC		1	1							
REMARKS:									•					
ļ	Kay		1											
MATERIAL C			Glass; CG = Cle	ear Glass;	PE = Pol B ≈ Ba	lyethylene;	PP = Polyprop	-				(Specify)		
		R	FPP = Reverse F	low Peristal	tic Pump;	SM ≈ Strav	= Bladder Pump v Method (Tubir	ng Gravity D	- ⊟iectric Sub Prain); O	omersible Purr = Other (Spec				
NOTES: 1. Th 2. <u>ST</u>	e above do n Abilization Cr	ot constitute ITERIA FOR R	e all of the inform ANGE OF VARIATION	OF LAST THE	ired by Ch REE CONSEC	apter 62-160	, F.A.C. SS (SEE_FS 2212	2, SECTION 3)					
рН: <u>+</u> 0 Т	2 units Temperations	ature: <u>+</u> 0.2 °C	Specific Conductan	ce: <u>+</u> 5% Dis	solved Oxyg	en: all readings	20% saturation (see Table FS 2	- 2200-2); optiona			ever is greater)		
□ well needs re	pair		□ needs well tao			cking cap: 🚬	-12.5	_ 🗆 other co	omment:	······	_			
DI Water Lot	#	_ 🗆 MS / MS	SD	🗆 Equip blk	-1844-1-1844-1-1	🗆 Ambier	nt blk	🗆 Trip	o bik					

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		OVOTEN					ER SA	MPLIN	G LC	G					
SITE				FAPPLICABLE (OCATION:	Cletter	(1) - () *	$\overline{\Lambda x}$	DATE: 2	3/23/	17			
WELL	NO:GL	101 L	·03 8	SAMPLE ID:	here.		FREE PRO	DUCT: Y	N		PLICATE:	Y N			
l	<u>(</u>	<u></u>			MNV .		GING DA	RODUCT (ft BTOC	.): 	DUPLICATE	ID:		-		
WELL	~		TUBING				ERVAL	STATIC DE			IRGE PUMP	TYPE			
DIAME		es): PURGE:	DIAMETER	(inches): UME = (TOTAL	WELL DEP	feet f		TO WATER			R BAILER:		/		
(only fi	il out if app	lcable)	and the second se	= (feet -	$(, \zeta$. {	- Geel	x		ns/foot	North Contraction of the Contrac	gallons		
EQUIF (only f	MENT VO	LUME PU licable)	RGE: 1 EQU	PMENT VOL. =	PUMP VOL		BING CAPAC	A C	TÜBING	GLENGTH) + FL	OW CELL VO	LUME	<u></u>		
				=	0	allons + (<u>~</u>	llons/foot x		feet) +		gallons =	gailons		
	L PUMP OI			PUMP OR TUBI IN WELL (feet):			PURGING INITIATED	AT:		PURGING ENDED AT:		AL VOLUME GED (gallons			
Time	Volume	1 1010	ne Purge		pН	Temp.	Spec. Cond.	Dissolved Oxygen	Salin		Color	Odor	Turbidity		
100	Purged (gallons)	11	is) (gpm)	(ft BTOC)	(SU)	(°C)	(mS/cm)	(mg/L)	(‰		(describe)	(describe)	(NTUs)		
12	0.18				>.05	20.0	194	0.05		<u>20-48,2</u>	· · ·		9.02		
14/20	257 0 18 4.74 0.06 10.88 5.83 25.8 1.97 0.05 1.00 43.0 8.59 00 0.184.92 0.06 10.88 5.84 25.8 1.97 0.05 1.00 -39.6 8.75 2030.18 5.10 0.06 10.88 5.84 25.9 1.96 0.05 1.00 40.7 8.94														
1202	00 0.184.92 0.06 10.88 5.89 25.8 1.97 0.05 1.00 -39.6 8.75 2030.18 5.10 0.06 10.88 5.84 25.9 1.96 0.05 1.00 40.7 8.94														
• • • • • • • • • • • • • • • • • • •	15050.18 5.10 0.06 10.88 5.84 23.9 96 0.05 1.00 40.7 8.94 														
	Image: Second														
	WELL CAPACITY (gal/fi): $0.75'' = 0.02;$ $1'' = 0.06;$ $2'' = 0.16;$ $3'' = 0.37;$ $4'' = 0.65;$ $5'' = 1.02;$ $6'' = 1.47;$ $12'' = 5.88$ TUBING INSIDE DIA CAPACITY (gal/fi): $18'' = 0.006;$ $3'(6'' = 0.024;$ $14'' = 0.0026;$ $5'(6'' = 0.024;$ $12'' = 0.016;$														
	TUBING INSIDE DIA. CAPACITY (gal/ft): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016 PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)														
	PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify) SAMPLING DATA														
	SAMPLING DATA														
	OR TUBIN		\mathcal{C}		TUBING		```	FIELD-FILTI	ERED:	Y N	FILTER	SIZE:	μm		
			N: PUMI	P Y N	MATERIA		G Y N	Filtration Eq	uipment		EQUIPMENT				
			ER SPECIFIC		INTENDI	ED	SAMPLING	SAMPLE PL				e			
#				PRESERVATIVE	ANALYS AND/O	is _r	EQUIPMENT	FLOW RAT							
CONTA	INERS	CODE	(mL)	USED	METHO	D				Model:	TURBIDIM	CTED			
			(-	V	$\gamma \downarrow$	-1	1.		Model:	SN#:		<u> </u>		
		,		17	-	TA					OTHE	R			
\sum			^مع مين		····										
<u>/</u>							·				· .				
	 RKS:			1											
MATE	RIAL CODI	Pag	<u>ا سا</u> AG = Amber G		ear Glass;	DE - Do	lyethylene;	PP - Polynrov		S = Silicone;	T - Tofloor		(Specify)		
	LING EQU		ODES: A	PP = After Perist	altic Pump;	B = Ba	ailer, BP =	Bladder Pump); E	SP = Electric Su		O = Other np;			
NOTES:	1. The a	bove do r		PP = Reverse F all of the inform				Method (Tubi			= Other (Spe				
	2. <u>Stabil</u>	IZATION CF	RITERIA FOR RA	NGE OF VARIATION	OF LAST TH	REE CONSEC	UTIVE READING	<u>S (SEE_FS 221)</u>		<u>ס אכ 3)</u> FS 2200-2); option	ally , 0.0 mail a	n 100/ A-List-	um la graatar		
	Turbidity: a	all readings ⊴	20 NTU; optiona	ally ± 5 NTU or $\pm 10^{\circ}$	% (whichever i	s greater)							ever is greater)		
				⊡ needs well tag D						er comment: 1 Trip blk		_			

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SITE N		SYSTEM	OFF Z	NOT A	PPLICABLE	· · · · · · · · · · · · · · · · · · ·	M)OCATION:	4 8 .	4 -			DATE:		1	4	
· ·		ite	11				-004100	<u></u>	75	JAX			3	2	3/17	
WELLI	NO: Th	Mui	04		ABLE ID:	42-04	-(DEPTH T		UCT: Y DUCT (ft BTOC	\mathcal{O}	FIELD D	DUPLICA	TE:	YD	
							PUR		DAT	ГА						
WELL	TER (inche	5		G TER (in)	3 (16):	WELL SC			-	STATIC DE		<u>~</u>			IYPE DD	,
WELL	VOLUME	PURGE:	1 WELL V		E = (TOTAL	WELL DEF	Ìų́ feet t YTH − ST	ATIC DEP	TH TO	D WATER)	x WELL C		OR BAIL	=R:		
	l out if app				= {	feet -	_			feet)	x	da	llons/foot	ł =		gallons
	MENT VOI I out if app		RGE: 1 E	QUIPM	ENT VOL. =	PUMP VOL	LUME + (TU	IBING CAP	PACIT	Y X	TUBING LE				DLUME	guildrib
(only in					=	- g	allons + (gallo	ons/foot x		feet) +	,	ç	jallons =	gallons
	. PUMP OF	R TUBING (feet):			VP OR TUBI WELL (feet):		.1		IG ED A1	T: 0915		RGING DED AT:	101		AL VOLUME GED (gallons	
		Cum			Depth		<u> </u>							TUR		<u>"</u> .
Time	Volume Purged	Volum	ne Pi	urge Rate	to Water	pH (SU)	Temp. (°C)	Spec. Cond.		Dissolved Oxygen	Salinity (‰)	ORP (mV)		olor scribe)	Odor (describe)	Turbidity
	(gallons)	(gallon		jpm)	(ft BTOC)		(0)	(mS/cm	1)	(mg/L)	(706)	(1114)	(068	cibe)	(describe)	(NTUs)
1001	0.12	Dil	2 0.	01e	7.52	5:36	25.5	1.83		0.36	0.93	77.2	. Ken	hilo	None	27.44
1011	0.6	1.2	0	. Ne	8.63	5.37	25.7	1.84		0.14	0.93	<u>lele</u>	O Per	ticle		
1021	O,le	1.8	o	<u>. Ole</u>	9.30	5.59	25.9	1.92	_	0.11	0.97	1.1	lert	ides	none	24.18
1021	0.6	2.4			10.66	5.67	260	1.79		0.09	0.90	-6.4	1 fez	<u>Hiles</u>	none	15.95
1041	0.6	3.0		20	7.84	8.5+	26.2	1.70	4	0.08	0.86	2.9	- Kr	hile		12.80
1051	0.0	3.0	<u> </u>	<u>.06</u>	-الموساليون ال	5.35	26.2	1.64			0.82 0.82	2	······································	YU		8.84
1101	0.5	47	1	<u>06</u>		5.52	26.2	1.6	1		0.00	5.8	- Kyh		none	8.91
1101	0.7	- <u>-</u> .c			μ . ω	0.02	C. C	1. 02		0.01	90	7.5	ich i	rles	nare	8.70
	CAPACITY				1" = 0.04;	1.25" = 0.0			= 0.3				" = 1.47;	12"	= 5.88	<u> </u>
	<u>3 INSIDE I</u> NG EQUIP			al/ft): 1. B = Ba	/8" = 0.0006; ailer: B B	3/16" = = Bladder F		1/4" = 0.00 ESP = Elec	,	5/16" = 0.0 Submersible F		<u>" = 0.006;</u> PP = Perís		= 0.010	c; 5/8" = (O = Other (
				0-0.	aner, Dr						-unp, i	- F - Fells	uanac Fui	np,	U – Utiler (Specity)
SAMP	ĘD BY (PI			<u></u>		SAMPLE	R(S) SIGNA								E TIME:]
		1'DW	um.	111	wity_	TURING	V p	pr r	D	un					102	
	OR TUBIN		21	1		TUBING MATERIA		14		FIELD-FILTE Filtration Equ			FI	LTER	SIZE:	μm
FIELD I	DECONTA	MINATION	I: PI	UMP	Y Ø		TUBING	З Y	(N)	replaced)		FIELD		/ENT li	DENTIFICAT	'ION
	SAMPLE		ER SPEC	FICATI	ON	INTENDI ANALYS		SAMPLING		SAMPLE PU	MP		H20 QUA		RAMETER	
#		ATERIAL	VOLUME	PRE	SERVATIVE	AND/OI	R ^E			FLOW RAT (mL per minu		No 1	<u> </u>	SN#:	11.11	12711
	NEKS	CODE	$\underline{\mathcal{I}}_{0}^{(mL)}$		USED			APP		220		<u>, 1951 n</u>	000 TU	RBIDIME	<u> 16 A 11</u> =ter	<u>'(+1)</u>
4	$\frac{1}{2}$	् <u>छ</u> . ्रित	40		НЛ	VUC		1		1	Mode	Midia	-		20160	GA76
	3 7	- (-9	2lo	1	111	Mil	6					mus	1100	OTHER		7030
	21	46	-ín	4	IA -	TOC	<u>.</u>	-		\rightarrow					· · · ·	
					IY											
REMAR	KS:	-V#		2	-			,								
MATER	IAL CODE	S: A	G ≈ Amb	er Glas	s; CG = Ci	ear Glass;	PE = Pol	yethylene;	P	P = Polyprop	oylene; S	= Silicone;	T = T	effon;	0 ≍ Other	(Specify)
SAMPL	ING EQUI	PMENT C	ODES:		= After Perist ' ≖ Reverse F		B = Ba Itic Pump;			adder Pump Iethod (⊤ubir		Electric S	ubmersil 0 ≕ Othe			
OTES:				tute all	of the inforr	nation requ	ired by Ch	apter 62-10	60, F.	.A.C.		,,	0.10	(×	
										(<u>SEE_FS 2212</u> :0% saturation (s			naily, + 0.2	2 mg/L or	• <u>+</u> 10% (whiche	ever is greater)
	Turbidity: a	I readings ≤	20 NTU; op	itionally <u>+</u>	5 NTU or ± 10	% (whichever i	s greater)		· - \	las					_ (5 · · /
∟ well ne □ DI Wat	eds repair_ er Lot #		⊡ MS /		eeds well tag	U Equip blk		cking cap: j ∽ □ Amb			_ ⊂ other co ⊐ Trin		-		-	



SITE NAME: O L.		0.0011.0.00		
SAL II	NA3	TUCKAUM	MERTE: 23M	aven 7
WELL NO: FVMML-05 SAMPLE ID:	V MAL-OF FREE PF	PRODUCT: Y N PRODUCT (ft BTOC):	FIELD DUPLICATE: DUPLICATE ID:	Y N .
			DUPLIONIEID	
WELL O TUBING 21	WELL SCREEN INTERVAL	STATIC DEPTH	PURGE PUMP	TYPE -
DIAMETER (inches): / DIAMETER (inches): / 1 K				ΠPP
WELL VOLUME PURGE: 1 WELL VOLUME = (TOTA	L WELL DEPTH - STATIC DEPT	H TO WATER) X WE		
(only fill out if applicable) ≖ (feet -	feet) x	gallons/foot =	gallons
EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = (only fill out if applicable)	= PUMP VOLUME + (TUBING CAP)	ACITY X TUBIN	G LENGTH) + FLOW CELL V	OLUME
	= gallons + (gallons/foot x	feet) +	galions = gallons
INITIAL PUMP OR TUBING , FINAL PUMP OR TUB			PURGING NOUN TO	TAL VOLUME 11.00
DEPTH IN WELL (feet): 2 DEPTH IN WELL (feet)				RGED (gallons): 44.20
Cum. Depth	pH Temp. Spec.	Dissolved Salir	nity ORP Color	Odor Turbidity
nme Purged Purged Rate Water	(SU) (°C) Cond. (mS/cm)	Oxygen (% (mg/L)		(describe) (NTUs)
(gallons) (gallons) (gpm) (ft BTOC)				000
08100.00 0.00 0.00 5.19	H.YX 13.01 5.02	0,853.0	5 27.4 Clear	NA 20.8
0820 0. 60 1.20 0.00 5.83	4.7423.085.25	0.55 2.2	52 9.4 clar	NA 15.9
DX3010.60 11.80 10.00 15.92	4.80 24.08 4.15	0.40 2.1	94.0	9.74
0840 0.60 2.40 0.06 5.99	4.87 2404 3.29	0.34 1.7	11 1.5	5.58
08500.003.000,000000	4.7624402.54	- 10.31 11.2	51 4.76	4.74
09000.003.000.000.17	4.80 24.73 2.24	0.31 1.4	5120	4.47
09050.30 3.90 0.06 6.17	4.81 24.83 2.13	0.291.0	9 4,40 1	3.93
MIDO.30 H.2D D.Dh 6.18	4.80 24.00 2.08	0.27 1.0	NH.90	V 3.30
WELL CAPACITY (gal/ft): 0.75" = 0.02; 1" = 0.04;			,,	" ≈ 5.88
TUBING INSIDE DIA. CAPACITY (gal/ft): 1/8" = 0.0000 PURGING EQUIPMENT CODES: B = Bailer; BI		26; 5/16" = 0.004; tric Submersible Pump;	3/8" = 0.006; 1/2" = 0.01	
FUNGING EQUIFIMENT CODES. B - Bailer, B	SAMPLING I		PP = Peristaltic Pump;	O = Other (Specify)
SAMPLED BY (PRINT) / AFFILIATION:	SAMPLER(S) SIGNATURE(S):		SAM	PLE TIME:
A.HOMAI TUDIAL	ONOTAL .	,		0911
PUMP OR TUBING	TUBING MATERIAL CODE: DF	FIELD-FILTERED:	Y (N) FILTER	SIZE:μm
DEPTH IN WELL (feet): 2 V	Mittative CODE:	Filtration Equipmen	t Type: 💛	
FIELD DECONTAMINATION: PUMP Y	TUBING Y	N replaced)	FIELD EQUIPMENT	IDENTIFICATION
SAMPLE CONTAINER SPECIFICATION	INTENDED SAMPLING	SAMPLE PUMP	H20 QUALITY F	PARAMETER
# MATERIAL VOLUME PRESERVATIVE	AND/OR EQUIPMENT	FLOW RATE (mL per minute)	Notela IOI FEL. ON	01-00/101
CONTAINERS CODE (mL) USED	METHOD		Model: VSI 556 SN#	0002121
2 PE IL $-$	NGS APP	220		,
3 CB HO HO	COIA		Model: AAHAMK SN#	13110C02943
2 (6 40 -	VFAS		OTH	ER
3 CG 40 HCI 3 CG 40 HCI	82608			
	MEE			
2 AG' 40 HC	TDC	¥		
REMARKS:				
MATERIAL CODES: AG = Amber Glass; CG = C	Clear Glass; PE = Polyethylene;	PP = Polypropylene;	S = Silicone; T = Teffon;	O = Olher (Specify)
SAMPLING EQUIPMENT CODES: APP = After Peris		P = Bladder Pump; E aw Method (Tubing Grav	ESP = Electric Submersible Pu vity Drain); 0 = Other (Spe	imp;
NOTES: 1. The above do not constitute all of the infor	mation required by Chapter 62-16	0, F.A.C.		Jony/
2. STABILIZATION CRITERIA FOR RANGE OF VARIATIO				
pH: \pm 0.2 units Temperature: \pm 0.2 °C Specific Conduct: Turbidity: all readings \leq 20 NTU; optionally \pm 5 NTU or \pm 1		$s \le 20\%$ saturation (see Table	e ⊢S 2200-2); optionally, ± 0.2 mg/L	or <u>+</u> 10% (whichever is greater)
well needs repair		ù/ ⊏ oth	er comment:	
DI Water Lot # MS / MSD	_ 🗆 Equip blk 🗆 Amb	ient blk	□ Trip blk	

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SITE NAI		<u>⊐ SYSTEM</u>	OFF	PNOT A	PPLICABLE (M) .OCATION:				DATE			· · ·	
		Sile	<u> </u>				OCATION.	NAS	JAK		DATE	<u>- 31</u>	3 [17	
WELL NO):EN	mw	-7-	SAN	CHE CI	cmw	-07	FREE PRO	DÚCT: Y RODUCT (ft BTOC	a 🔊		DUPLICA	TE:	Y (b)	
	_					Crriss		GING DA	,	<i>r</i>					
WELL		1	TUB	NG	3116	WELL SC	REEN INT	ERVAL	STATIC DE	PTH	10	PURGE F	UMP 1	TYPE PO	
DIAMETE				IETER (in	011007.	DEPTH:	1.6	oZZ feet	TO WATER		18		ER:	<u> </u>	
(only fill o			1 WEL			WELL DEP	IM - 51.	ATIC DEPTH	IO WATER)	x WELL	CAPACIT	Ŷ			
FOLIIPM			RGE			feet – PLIMP VOL	UME + /TU	BING CAPAC		X TUBING U		gallons/foor + FLOW CI			gallons
(only fill c							•				,				
						-	allons + (llons/foot x	0	feet)	+ 0913	<u> </u>	gallons = AL VOLUME	gallons
DEPTHI			Λ Ε	DEPTH IN	WELL (feet):	$"$ \mathcal{U}		INITIATED	<u>at: 0800</u>					GED (gallon:	
		Cum		_	Depth			Spec.	Dissolved						
Time	Volume			Purge Rate	to Water	pH (SU)	Temp. (°C)	Cond.	Oxygen	Salinity (‰)	ORI (mV		olor :cribe)	Odor (describe)	Turbidity (NTUs)
	(gallons) (gallor		(gpm)	(ft BTOC)			(mS/cm)	(mg/L)						
0810	0.6	20.1), Ole	2.6le	5.48	25.1	3.68	0.43	1.93	15.	<u>8 (1</u>	.R	none	20,64
0820	0.1		~	0.06	3.78	5.52	25.2	3.68	0.22	1.94	<u> </u>	1 CL	·L	none	19.21
0830	<u>0.(</u>). Olo	7.51	5.65	28.4	3.76	0.16	1.98	-24	<u>9</u> C	A	nove	27.49
0840	<u>). ()</u>		<u>ا ا</u>	0.06	9.92	5.78	25.6	3.75	0.14	1.97	-45	5 4	<u>zk</u>	nore	33.07
080	<u>0.6</u>				10.14	5.78	25.7	3.64	0.12	1.91	-56	.8 Kak	Hitles	none	39.18
0900	0.6				10.51	5.84	25.7	3.47	0.11	1.82	-67	4 64	<u>He</u>	none	34.62
0905	0.3		1 0		10.41	5.85	25.8	3.38	0.11	1.77	-70	.9 Kor	-dely	None	28.43
09/10	<u> </u>	5 4.1	-	<u>1.06</u>	10.49	5.55	25.9	3.33	0.11	1.74	- +2	2 490	<i>ficles</i>	none	25. fc
0913	0.18).06	<u>1" = 0.04:</u>	5.87	<u>25.7</u> 6; 2"=0	3.26	0.10	1.70	<u> -74</u> : 1.02;	J Kr	<u>Lile</u>	nore	73,88
		Y (gal/ft): DIA. CAP			1 ^{.4} = 0.04; 1/8" = 0.0006;	1.25" = 0.0 3/16" = (1/4" = 0.0026;			3" = 0.00	6" = 1.47; 6; 1/2 "	12" 0.010 <u>=</u>	= 5.88); 5/8" = ().016
PURGIN	g equi	PMENT CO	DDES:	B≖B	ailer; BP	= Bladder P			Submersible P	Pump;	PP ≂ Pe	ristaltic Pur	np;	O = Other (Specify)
COMMIT	0.01/1						SAMF R(S) SKONA	PLING DA					0.000		· .
	Грыт (r	PRINT) / AF		- The second se	24										
PUMP O			<u>, , , , , , , , , , , , , , , , , , , </u>	7 1	··	TUBING	VC ZU	N	FIELD-FILTE	ERED:	Y W) FI	LTERS		μm
DEPTH			1	<u>~ \</u>	í)	MATÈRIA		12	Filtration Equ	uipment Ty I	pe: U				-
FIELD D	ECONT	AMINATIO	N:	PUMP	<u>v M</u>		TUBING	∍ Y (§	(replaced)		FIE		IENT I	DENTIFICAT	10N
s	AMPLE	CONTAIN	ER SPI	ECIFICAT	ION	INTENDE ANALYS	IS .	SAMPLING	SAMPLE PU			H20 QU/	LITY PA	ARAMETER	
CONTAIN		MATERIAL CODE	VOLU (mL		ESERVATIVE USED	AND/OF METHOI	<	EQUIPMENT CODE	FLOW RAT (mL per minu	· · · · · · · · · · · · · · · · · · ·	del: 💦	Port	SN#:	16410	2711
7		1000	100	<u> </u>		NGS	<u> </u>	APP	220		1.)		RBIDIM	• •	
7	 	Willea	Ŷ			VFA		1	1	Mo	del: MJ	stor >	SN#: *	201600	10210
7	5	(la	- Ui		Ш/л	VOL					V VIA	7e41	OTHE		<u>v</u>
	3	(.(4	y.		HU	MEE			1						
	ζŤ	AG	11	5 1	I a	TOL		1	 						
		<u> </u>	-41		<u> </u>								· · ·		
REMAR	KS:					I									
MATERI	AL COL	DES:	AG = A	mber Glas	ss; CG = Cl	ear Glass;	PE = Po	lyethylene;	PP = Polyprop	ylene; S	i = Silicor	ne; T = T	eflon;	0 = Other	(Specify)
SAMPLI	NG EQI	JIPMENT C	· · ·	APP	= After Perist	altic Pump;	B = Ba	ailer; BP =	Bladder Pump	; ESP	= Electric	c Submersi	ble Pur	пр;	
NOTES:	1. The	above do r	ot con		P = Reverse F			SM = Straw apter 62-160,	Method (Tubir	ng Gravity (Orain);	0 = Othe	er (Spec	cify)	
	2. <u>Stab</u>	ILIZATION CI	RITERIA	FOR RANG	E OF VARIATION	N OF LAST THE	REE CONSEC	UTIVE READING	<u>s (see FS 2212</u>		_				
					ecific Conductar ± 5 NTU or ± 10 ⁴			jen: all readings <u><</u>	20% saturation (s	see Table FS	2200-2); o	ptionally, <u>+</u> 0.	2 mg/L o	er <u>+</u> 10% (whiche	ever is greater)
🗆 well nee	ds repa	ir	_	0	needs well tag	1		cking cap:		_ 🗆 other c	omment:			_	
DI Wate	r Lot #_		_ 🗆 M	S/MSD	-	🗆 Equip blk	\$****. 	□ Ambien	t blk	🗆 Tri	ip blk		<u> </u>		

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SITE NAM		F INOTA	APPLICABLE		1) DCATION:				DATE:	<u> </u>	<u></u>	<u>و</u>	1
WELL NO	SUULI		MPLE ID:			FREE PRO	<u>(actani</u>	MUL	FIELD DU	L3M	<u> Oron</u>		_
	F.KMW-()(1 ~	E	LMW-	-09		RODUCT (ft BTOC	° €	DUPLICATE		r N)	
					PUR	GING DA							_
WELL		UBING	3/11	WELL SC			STATIC DE			RGE PUMP	TYPEO		
	R (inches): LUME PURGE: 1 V		nches):		feet t				-1.1	BAILER:	PP		
(only fill ou	ut if applicable)		, (, C) / C							er .			
EQUIPME	NT VOLUME PURG	E: 1 EQUIPI	= (MENT VOL. =	Feet – PUMP VOLU	JME + (TU	BING CAPAC	feet) ITY x	X TUBING LE	gallo NGTH) + FL	ns/foot = OW CELL V	OLUME	_galions	
	ut if applicable)		=		llons + (illons/foot x		feet) +		gailons =	gallons	
		FINAL PL		•				P!		тот			-
	WELL (feet): 2		NWELL (feet):	~ ~ .		INITIATED	<u>at: 1)014</u>	5 EN	DED AT:	155 pur	RGED (gallor	is): <i>1</i> 4,20	
Lime	Volume Cum. Volume Volume Purged Purged (gallons) (gallons)	Purge Rate (gpm)	Depth to Water (fl BTOC)	pH (SU)	Temp. (°C)	Spec. Cond. (mS/cm)	Dissolved Oxygen (mg/L)	Salinity (‰)	ORP (mV)	Color (describe)	Odor (describe)	Turbidity (NTUs)	
MAG	00,000		0 m	11 2	AH 01.	2.55	0.91	1.84	811 2	ALOY		0105	
MACOU MAGE IN			10 02	111	<u>2480</u> 01102	2 01	2.80	2.04	84.3	Char	<u> NA</u>	26.5	1
	1.001.20		10.00	200	<u> 2540)</u> 15 NH	00.00			70.4			4	-
1010 0	1001.80	10.00	11.48	200	<u>20.04</u>	<u>4.00</u>	100	2.49	69.2	<u> </u>		19.1	-
IDAE C	$\frac{1.002.40}{0.002}$	14.00	12.21	270		5.02	1.80	2.69	108.0 70 5	<u> </u>		22.4	-
1033 0	1.00 3.00		12.14	0.18	<u>25.04</u>	5.08		3.07	70.5			<u>L.). La</u>	-
	1.00 3.00	10.00	10.42	3.80	25.04	5,44	1.00	2,00	67.1			100.1	_
IUDU V	7.30 <u>3.90</u> 7.30 4.20	10.00	1345	3.80	<u>20.08</u>	5.55	1.53	3.00	63.6	₩	<u> </u>	63.2	-
1055 0	<u>1.30 4.20</u>	10.06	14.19	3.80	25.67	5.65	1.46	<u>3,05</u>	62.3	1		101.9	1
WELL CA	PACITY (gal/ft): 0.7	'5" ≈ 0.02:	1" = 0.04;	1.25 " = 0.06	3: 2" = ().16; 3" = ().37; 4 " = 0.	.65: 5 " =	<u> </u>	 = 1.47; 12	" = 5.88		
TUBING I	NSIDE DIA. CAPACI	TY (gal/ft):	1/8" = 0.0006	; 3/16" = 0	0.0014;	1/4" = 0.0026	; 5/16" = 0.	004; 3/8	** = 0.006;	1/2" = 0.01	0; 5/8" =		[
PURGING	EQUIPMENT CODE	S: B=	Bailer; BP	= Bladder Pi			Submersible I	Pump;	PP = Peristal	tic Pump;	O = Other	(Specify)	
	BY (PRINT) / AFFIL			SAMPLER		PLING DA	AIA			SAME	PLE TIME:		1
AH		Min	t 11		h	(10)(E(0))				0/400	1050	า	
PUMP OR			<u> </u>	TUBING	AHX.	nr	FIELD-FILT	ERED: () N	FILTER		<u>/</u> μm	
DEPTH IN	WELL (feet):	2	~ ~	MATERIAL	CODE:	PE	Filtration Eq	uipment Ty	pe:				-
FIELD DE	CONTAMINATION:	PUMP	<u> Y (D)</u>		TUBING	<u>) Y (</u>	(replaced)		FIELD E	QUIPMENT	IDENTIFICA	TION	
SA	MPLE CONTAINER	SPECIFICA	TION	INTENDE ANALYSI:	9	SAMPLING	SAMPLE PL		F	120 QUALITY F	PARAMETER		
#			RESERVATIVE	AND/OR		EQUIPMENT CODE	FLOW RA (mL per min		Int INI K	FLO SN#:	Drage	1121	
		(mL)	USED	METHOD			<u> </u>		<u>C 10Y</u>		<u>veq</u> 2	121	
1				NGS		APP	220		I A IAI			00000	0
			<u>HCI</u>	8260	6							02943	ð
<u> </u>		40	HCI	TDS, AIK	200					OTHE			-
	PEEDE 2	250 1	HNDA		ĘPĂ —		┼──-						1
	200 2			UL OWN	<u>.</u>								-
REMARKS			FICI	114Dio	1	_₩	<u> </u> ₩			+10	0.00	 7.	-
	<u> 1 PE 1 2</u>		TINUS	Dissta					<u> </u>		<u>(m))</u>		-
		= Amber Gla		lear Glass;		lyethylene;	PP = Polypro = Bladder Pum			T = Teflon;		r (Specity)	-
	g Equipment Coe	RFP	P = After Peris P = Reverse I	Flow Peristalt		SM = Strav	Method (Tubi		= Electric Sul Drain); O	= Other (Spe			
NOTES: 1.	The above do not STABILIZATION CRITE		II of the infor	mation requi	ired by Ch	apter 62-160,	F.A.C.	2 8507101 3)				-
pН	I: ± 0.2 units Temperatur	re: <u>+</u> 0.2 ºC Sp	eclfic Conducta	nce: ±5% Dis:	solved Oxyg				-	illy, <u>+</u> 0.2 mg/L	or <u>+</u> 10% (which	iever is greater)	
Tu	rbidity: all readings ≤ 20	NTU; optionally	/ ± 5 NTU or ± 10	% (whichever is	greater)					<u> </u>	•	- /	
	s repair		needs well ta				t bik	_ ⊐ other c □ Trị	omment: <u> </u>				
	~							u in /	μυίκ κ	~~	~~	H. 0No	T-ir
	PE :	250	Theory of the local division of the local di	ortho	~	APP	220	1]	PE I	125	H_2SD_4	10++
-				an FOM	P	1111		1	-				
2012_1102	0 -	0				1	Ś.	1					
-	110	() () () () () () () () () ()	Ar (5) a 🕋 🍽					,					
-7	ΡE	250	Nauhzna	c 3		•	•						

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	EM ON AME: 📈	<u>⊐sys</u> 176 l	EM OF	FON	DT AF	PLICABLE (M) OCATION	:				DATE:	3/20	- /			
WELL		1.15 1	<u>(</u>		CAM	PLE (D:	NAS	5 5AC	FREE PRO		<u> </u>			-19-	- 1	<u>۴۵۱</u>	·	
	η< Μι	0-10				KMW-1	Ū			RODUCT (ft BTO	_{c):} 🕐		FIELD D DUPLICA		15:	Y	Ð	
									GING DA									
		ہم ohes): ف	<u>२</u> ⊓	UBING IAMETE	R (inc	_{hes):} 3/16	VELL SC	REEN INT	ERVAL to ର 3 feet	STATIC DE TO WATER	EPTH R (feet):	5, 3	30	URGE P R BAILE		TYPE	pum	P
		E PURG	E: 1 W	/ELL VO	IUMI	E = (TOTAL	WELL DEF	'ТН - ST	ATIC DEPTH	TO WATER)	x W	ELL CA	APACITY					
· ·			•		112384	= (feet -		JBING CAPAC	feet)	X		gal IGTH) + F	lons/foot				gallons
		pplicable			UIPWI	ENT VOL. =					TUBIN	IG LEN	,					
INDITIAL	DUMD				50.0			āllons + (llons/foot x	-		feet) +			gallons		gallons
DEPTH	IN WEL	OR TUB _L (feet):	θl			IP OR TUBIN WELL (feet):			PURGING	AT: DBIS	5			930		AL VO		;; % 5
	Volun		Cum. Slume	Purç	ы	Depth to	ня рН	Temp.	Spec.	Dissolved	Sali	nity	, ORP		olor		lor	Turbidity
Time	Purge (gallor	ed P	urged allons)	Rat (gpn	e	Water (ft BTOC)	(SU)	(°C)	Cond. (mS/cm)	Oxygen (mg/L)	(%		(mV)		cribe)		cribe)	(NTUs)
0825	0.6		2.6	0.0	6	7.80	6.11	ə4.9	3,10	0.63	1.6	1	-15,4	cla	104	, NG ~	ب وب	75.8
0835			12	0.0	6	9,22	5.86	25.0	a.01	0,55	1.2	-	41		1		1	37.6
0845	0.6	, 1	.8	0.0	Ψ	10.64	5,57	25.1	2.89	0.50	1. 5	50	20.5		1			18.5
0855	0.6	λ	. Ч	0.0	6	11.47	5,46	25.1	2,80	0, 50	1.4	3	25.6		I			18.9
8905	0.6		6.0	0.06	,	12.50	5.38	32.7	2,70	0.51	1.3	9	98.3	CLE	AR.			19.2
0915	0.6		,6	0.00	6	13,08	5,34	25,3	2.59	0.29	1.	33	28.3		1			9.85
0920	0,3	; 3		0.0		13,02	5,34	32.9	2,59	0.27	1.3		29,5					12.7
0935	0.3		à	0. D		13.22	5.32	92,1	2.55	0.24	1.3	1	30.1					10.5
0930	0.3		5	0.0	-	13.22	5.30	25.2	2.53	0.24	1.7	6	29.8					10.4
		ITY (gal/f E DIA. C				1" = 0.04; 8" = 0.0006;	1.25" = 0.0 3/16" =)6; 2" ≕ 0.0014;	0.16; 3 " = 0 1/4" = 0.0026;	.37; 4" = 0 5/16" = 0		5" = 1 3/8"	.02; 6 " = 0.006;	= 1.47; 1/2" =	12 " = 0.01('≈5.88); 5	/ 8" = 0).016
PURGI	NG EQL	JIPMENT	CODE	S: E	3 = Ba	uiler; BP	= Bladder F		ESP = Electric		Pump;	Р	P = Perist	altic Pun	np;	0 = 0)ther (*	Specify)
SAMPI		(PRINT)							PLING DA						CAMO	LE TIM		
2		Seace		65 - D	A.A-			Q 34	0.1							î 3 0		
PUMP	OR TUB	ING		21			TUBING		Pe	FIELD-FILT				Fil		SIZE:		μm
		L (feet):		PUN	лР	Y Ø	MATERIA	TUBIN)	Filtration Ec (replaced)	lnibmei	nt Type			IENT :		FICAT	10N
		E CONT					INTENDI	ED	SAMPLING	SAMPLE P	IMP			H20 OUA	-	-		
#		MATERI				SERVATIVE	ANALYS AND/O		EOUIPMENT	FLOW RA	TE		NZI P					<i>c</i> . 1
CONTAI	NERS	CODE		(mL)		USED	METHO		CODE	(mL per mir		Mode		r S		15L	010	<u> </u>
3		<u>Co-</u>		0	+C		8960	1	APP	220					RBIDIM			
		<u>۲۴</u> ۲۴		<u> </u>		DNE DNE	TOS			├ ──}		Mode	: 2 10 () २	SN#:	413	3	
				50	ትላ		6010						,		OTHE	R		
		Pe	!	<u>L</u>	NO.	VE	NGS		1	l								
					<u>-</u>													
REMAR	RKS:			[·											
MATER	IAL CO	DES	AG	= Amber	Glass	$c \mathbf{G} = \mathbf{C} \mathbf{k}$	ear Glass:	PF = Pr	olyathylene;	PP = Polypro	nvlene:	· 8=	Silicone	T = Te	-flon:	0 =	Other ((Specify)
		UIPMEN		ES: A	APP =	= After Perist = Reverse F	altic Pump;	B = B	ailer; BP =	Bladder Pum Method (Tub	p;	ESP =	Electric S	ubmersil	ole Pur	np;		opcony
NOTES:	1. The	above	lo not o	onstitu	te all (of the inform	nation requ	ired by Ch	napter 62-160.	F.A.C.			airi <i>)</i> , \	D = Othe	(She	ury)		
	pH: + 0.2	units Ter	nperatur	e: + 0.2 °C	Spec	ific Conductan	ICE: + 5% Đả	ssolved Oxy	CUTIVE READING				200-2); optio	nally, <u>+</u> 0.2	? mg/L o	r <u>+</u> 10%	(whiche	ver is greater)
□ well ne	Turbidity	+ all readir	igs ≤ 20 I	N IU; optio	nally <u>+</u>	5 NTU or ± 10% eeds well tag	% (whichever i	s greater) 🗘	化ク ± 10% ocking cap:	4			nment:					
□ Weil He	•	4	<u>م</u>	MS/M					• • —	tblk <u> v/ o</u>				-		_		

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SITE N		7E1			PPLICABLE (SITE	OCATION				DATE: 3	123/:	2017	
WELL	10:	-	•	SAM	IPLE ID:	<u> N4</u>	5 0	FREE PRO	DUCT: Y	Ð	FIELD DU		Y 18°	
	EKM	W -	1((EKMW-	11			RODUCT (ft BTOC	C):	DUPLICATE	ID;		
14/511		~	TUDINO		· · · · · ·					·				
	TER (inches	•		ER (inc	_{ches):} 3/16		19 feet	to 7-3 feet		(feet):2	,26 OR	RGE PUMP 1 BAILER:		nf
	out if applic		1 WELL V	OLUM	,			TATIC DEPTH	TO WATER)	x WEL			-	
EQUIP	MENT VOL	JME PU	RGE: 1 EC	UIPM	= (ENT VOL. =	- feet PUMP VOL		UBING CAPAC		X TUBING	gallor LENGTH) + FL	<u>is/foot =</u> DW CELL VO		gallons
(only fill	out if applie	able)			=	a	allons + (Qa	llons/foot x		feet) +	c	allons =	gallons
INITIAL	PUMP OR	TUBING	FINA		MP OR TUBIN	1G	(- 1	PURGING	`	AL VOLUME	3
DEPTH	IN WELL (I	1		TH IN	WELL (feet):	<u> </u>		INITIATED	<u>ат: 1245</u>	<u>ון י</u>	ENDED AT:	PUR	GED (gallons I):
Time	Volume Purged (gallons)	Cum Volum Purge (gallon	ne Pui ad Ra	ite	Depth to Water (ft BTOC)	pH (SU)	Temp. (°C)	Spec. Cond. (mS/cm)	Dissolved Oxygen (mg/L)	Salinit (‰)	y ORP (mV)	Color (describe)	Odor (describe)	Turbidity (NTUs)
1255	0.6	0.6	8.0	6	7.61	5.03	25.1	6,30	0.22	3.45		CLEAR	NOSt	78.8
1305	0.6	1.9	0.0		10,15	4.99	25.0	6.33	0.17	3,45		W/ BROWN SPECKS		67.)
1315	0.6	1.8		-	11.86	5.05	25,2	6.30	0.10	3.4				45.9
1325	0.6	3.4			13.58	5.09	25,3	6.28	0.09	3,42				40.3
1335 1345	0.6	3.0		<u>06</u>	15.09	5,13	25,3	6.37	0.09	3,40			· · · ·	31.3
1350	0.6	3.9	<u>> 0.0</u> 0.1)6 N	13.66	5,17 5,20	25.3 25,4	6.46	0.09	3.50				10,7
1355	0.3	4 9		6	14.12	5,22	25,4	6.82	0.0%	3.73	112.6			15.8
1400	0.3	4.4	5 0.0		14.26		25.4	6.79	8.09	3.76				13.9
			0.75 " = 0.0)2;	1" = 0.04; /8" = 0.0006;	1.25" ≃ 0.0 3/16" =		0.16; 3" = 0 1/4" = 0.0026;		.65; 5 '		1.47; 12" 1/2" = 0.010	= 5.88 ; 5/8" = 0	<u>₹</u> 1
	NG EQUIPA			B = Ba	*****	= Bladder F	,	ESP = Electric		,	PP = Peristali		O = Other (
								PLING DA	ATA					
-	ED BY (PR		FILIATION		ма	SAMPLEI Dan	- X ' N	ATURE(S);				SAMPI	E TIME:	
					(194	TUBING		PC	FIELD-FILT	ERED:	Ø N	FILTER \$	BIZE: 0.45	μm
	IN WELL (f		`			MATERIA			Filtration Eq	uipment	Type: NUM			
	DECONTAN			IMP	Y D	INTEND		g y 🕖	(replaced)		FIELD E	QUIPMENT I	DENTIFICAT	ION
	SAMPLE C					ANALYS	IS	SAMPLING EQUIPMENT	SAMPLE PL FLOW RA			20 QUALITY PA		
# CONTAI	VERS (TERIAL CODE	VOLUME (mL)	PRE	SERVATIVE USED	AND/OI METHO	D	CODE	(mL per min	ute) I	Model: 151	-5 SN#:	SLIDIC	168
3	C	6-	40	K.	a	8960	2	APP	240	2		TURBIDIMI	ETER	
6		6	<u>40</u>	, <i>þ</i>	5	100	1 m 1 m	11. 11/100			Model:2100 L	SN#:	4123	
ļ		6			36	105	Blanke, N	HUDCHE MUTATTE	-			OTHE	२	
3	<u> </u>	e G-	<u>əso</u> 40	14-1-		6010 4	Q		<u> </u>					
			250	13~		6010 FIL			<u>├</u> /					
REMAR	KS: D	50	pe	1999 1999		4500 P			<u>}</u>	_				
MATER		גי≦ ג ⊿	r <i>®</i> G = Ambe	r Glas:	s: CG = Cl	ear Glass:	 PE = P	olyethylene;	PP = Polyproj	pylene:	S = Silicone:	T = Teflon;	O = Other (Snecify)
	ING EQUIP			APP :	= After Perist	altic Pump;	B = E	Bailer; BP =	Bladder Pum	p; ES	P = Electric Sub	mersible Pur	np;	
NOTES:	1. The abo	ove do n	ot constitu		P = Reverse F of the inform			SM = Straw hapter 62-160,	Method (Tubi	ng Gravit	y Drain); O	≈ Other (Spec	:ify)	
	pH: ± 0.2 unit	s Tempera	ature: <u>+</u> 0.2 °	C Spec	cific Conductar	nce: ± 5% Di:	ssolved Oxy	CUTIVE READING			<u>v 3)</u> =S 2200-2); optiona	lly, <u>+</u> 0.2 mg/L o	r <u>+</u> 10% (whiche	ver is greater)
	Turbidity: all edis repair	readings≤ ∧	20 NTU; opti	ionally <u>+</u>	±5 NTU or ± 109 beeds well fac	% (whichever i	s greater)	ocking can:	У	□ othe	comment '	~~~		
□ DI Wat	er Lot #	UA-	MS / M	USD_	NA	⊐ Equip blk	_vp	CAmbier	it blk NA		rcomment: Trip blk <i>Mເ</i> ຊ		_	
	») P	e	920) pric	a0#)	Sulfice		RP \	240					

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SITE NAME:			(NO SYSTEM) Crastiónne:							
	ell	SAMPLE ID:		TUR	FREE PROD	LANUILLE			· · · • ·	17	
Glippe .	01	allin	1 - 01		DEPTH TO PR	ODUCT (ft BTOC):		DUPLICATE I		Y D	
WELL 7	TUBING				GING DA		······································				
DIAMETER (inches):	DIAMETEI	R (inches):	DEPTH:	feet to	o Z Sfeet	STÂTIC DEPT TO WATER (fe	∺ et): 4. ù	OR	GE PUMP 1 BAILER:	IYPE Pt	,
WELL VOLUME PURG (only fill out if applicable	: 1 WELL VO		WELL DEPTI	<u>H – ST/</u>	ATIC DEPTH 1	O WATER) X	WELL CAP	PACITY		` `	٦٤
EQUIPMENT VOLUME	URGE: 1 EQI	= (JIPMENT VOL. =	feet – PUMP VOLU	ME + (TU	BING CAPACI	feet) x TY x TU			s/foot =		gallons
(only fill out if applicable)			and the second secon	ons + (in the state	lons/foot x		feet) +		allons =	gallons
INITIAL PUMP OR TUB		PUMP OR TUBI	NG 7		PURGING	ASH	PURG				10
DEPTH IN WELL (feet):		H IN WELL (feet):			INITIATED A	1779 (1779 (PUR	GED (gallor	(s): 4.2
Time Volume Vo	um. (lume Purg rged Rate llons) (gpm	e Water	pH (SU)	Temp. (°C)	Spec. Cond. (mS/cm)	Dissolved Oxygen (mg/L)	Salinity (‰)	ORP (mV)	Color (describe)	Odor (describe)	Turbidity (NTUs)
the second se	6 0.0	6 5.69	6.32	28.1	3.41	1212	.79 -	136	CLA-WOM	n noro	44. le_
	2 0.0	-	5.77	28.1	6.3			-155	den	none	19.3
	8 0.00		5.05	27.9	6.30	07		-161	-	none	
09040.62	<u>4</u> 0.0 .0 0.0		5.67	280	6.3		3.32 - 3.27 -	-161 -161	<u>cleer</u>	none	13.7
1.1 × 5	.6 0.0		5 11	28.0	6.05			-10.5	clear	none	9.85
	4 0.0		5.74	283	5,86	1.16		-164	Clear	Non	
	2 0.0	165.96		28.3	5.85	1.16 3		-1 le1	Clear	none	11.1
WELL CAPACITY (gal/ft TUBING INSIDE DIA. C/			1.25" = 0.06; 3/16" = 0.0		1.16; 3" = 0. 1/4" = 0.0026;	37; 4" = 0.65; 5/16" = 0.004		, .	1.47; 12" 1 /2" = 0.010	= 5.88 ; 5/8" =	0.016
PURGING EQUIPMENT	CODES: B	= Bailer; BP	= Bladder Pur			Submersible Pun	np; PP	= Peristaltio	: Pump;	O = Other	(Specify)
SAMPLED BY (PRINT).		il ili	SAMPLER(SANF S) SIGNA	URE(S):	<u> </u>					~
PUMP OR TUBING	<u> </u>	1	TUBING	4	S/					•	
LUEPTHIN WELL (feet):	'Ll	r.	MATERIAL		194C	FIELD-FILTER		N	FILTER S	BIZE: O.	.μm
DEPTH IN WELL (feet): FIELD DECONTAMINAT	- <u>- L</u> ON: PUM	PY X	MATERIAL		Yee Y Ch	Filtration Equipr					
FIELD DECONTAMINAT		\sim	INTENDED	TUBING		Filtration Equip	ment Type:	FIELD EC	UIPMENT II	DENTIFICA	
		<u>~</u>		TUBING	Sampling Quipment	Filtration Equips replaced) SAMPLE PUMP FLOW RATE		FIELD EC	UIPMENT I	Dentifica ⁻ Rameter	
FIELD DECONTAMINAT SAMPLE CONTA # MATERIA CONTAINERS CODE		CATION PRESERVATIVE USED	INTENDED ANALYSIS AND/OR METHOD	TUBING S E	Sampling Quipment Code	Filtration Equipr replaced) SAMPLE PUMP FLOW RATE (mL per minute)	ment Type:	FIELD EC	QUALITY PA	DENTIFICA RAMETER	
FIELD DECONTAMINAT SAMPLE CONTA # MATERIA			INTENDED ANALYSIS AND/OR METHOD CSIA	TUBING S E	Sampling Quipment	Filtration Equips replaced) SAMPLE PUMP FLOW RATE	Model:	FIELD EC H2 S1 Po	UIPMENT ID 0 QUALITY PA SN#: TURBIDIME	DENTIFICA RAMETER	rion Vita
FIELD DECONTAMINAT SAMPLE CONTA # MATERIA CONTAINERS CODE		CATION PRESERVATIVE USED	INTENDED ANALYSIS AND/OR METHOD CSIA NGS			Filtration Equipr replaced) SAMPLE PUMP FLOW RATE (mL per minute)		FIELD EC	UIPMENT ID 0 QUALITY PA SN#: TURBIDIME	DENTIFICA RAMETER STATOI TER SZ39 -	rion Vita
FIELD DECONTAMINAT SAMPLE CONTA # MATERIA CONTAINERS CODE 4 CG		CATION PRESERVATIVE USED	INTENDED ANALYSIS AND/OR METHOD CSIA NGS	TUBING S E		Filtration Equipr replaced) SAMPLE PUMP FLOW RATE (mL per minute)	Model:	FIELD EC H2 S1 Po	UIPMENT II 0 QUALITY PA + SN#: TURBIDIME 5. SN#:	DENTIFICA RAMETER STATOI TER SZ39 -	rion Vita
FIELD DECONTAMINAT SAMPLE CONTA # MATERIA CONTAINERS CODE 4 CA 1 PA 1 PA 2 CA 1 PA		CATION PRESERVATIVE USED NLOH	INTENDED ANALYSIS AND/OR METHOD CSIA NGS Dhc, D VFA			Filtration Equipr replaced) SAMPLE PUMP FLOW RATE (mL per minute)	Model:	FIELD EC H2 S1 Fo	UIPMENT II 0 QUALITY PA + SN#: TURBIDIME 5. SN#:	DENTIFICA RAMETER STATOI TER SZ39 -	rion Vita
FIELD DECONTAMINAT SAMPLE CONTA # MATERIA CODE 4 CODE 4 CODE 1 FE 1 FE 1 FE 1 FE 1 FE 1 FE 1 FE 1 F	INER SPECIFIC VOLUME (mL) 1000 1000 1000 1000 1000 1000 1000 10	CATION PRESERVATIVE USED NLOH	INTENDED ANALYSIS AND/OR METHOD CSIA NGS Dhc, D Dhc, D UFA DJS Fe Co Mg	TUBING S E U U U U U U U U U U U		Filtration Equipr replaced) SAMPLE PUMP FLOW RATE (mL per minute)	Model:	FIELD EC H2 S1 Fo	UIPMENT II 0 QUALITY PA + SN#: TURBIDIME 5. SN#:	DENTIFICA RAMETER STATOI TER SZ39 -	rion Vita
FIELD DECONTAMINAT SAMPLE CONTA # MATERIA CONTAINERS CODE 4 C/G 1 PC 2 C/G 1 PC 1 PC 2 C/G 1 PC 1 PC 1 PC 1 PC		ATION PRESERVATIVE USED NLOH 	INTENDED ANALYSIS AND/OR METHOD CSIA DAC, DA UFA DAC, DA UFA DAS Fed Co. Mag. Cu. 1, Bro,	TUBING E H H Urc. L Soy	SAMPLING QUIPMENT CODE	Filtration Equipr replaced) SAMPLE PUMP FLOW RATE (mL per minute)	Model:	FIELD EC H2 S1 Bo allos A	UIPMENT IC QUALITY PA TURBIDIME SN#: SN#: DTHER	DENTIFICA RAMETER STAIDI TER SZ39	
FIELD DECONTAMINAT SAMPLE CONTA MATERIA CONTAINERS CODE CODE CODE CODE CODE CODE CODE CODE	INER SPECIFIC VOLUME (mL) VOCUME (DOC) VOC VOC VOC VOC VOC VOC VOC VOC VOC VOC	CATION PRESERVATIVE USED No OH HNO 2 HNO 3 Glass; CG = CI	INTENDED ANALYSIS AND/OR METHOD CSIA NGS DhC, D DhC, D DhC, D DhC, D Call Bro ear Glass;	TUBING SE LUVR LUVR SOL PE = Poly	SAMPLING QUIPMENT CODE	Filtration Equipr replaced) SAMPLE PUMP FLOW RATE (mL per minute) 230	ment Type: Model: Model:	FIELD EC H2 SI Ro allo A	UIPMENT II 0 QUALITY PA TURBIDIME TURBIDIME SN#: DTHER = Tefion;	DENTIFICA RAMETER Stylol TTER SZSQ -	
FIELD DECONTAMINAT SAMPLE CONTA MATERIA CONTAINERS CODE CODE CODE CODE CODE CODE CODE CODE	INER SPECIFIC VOLUME (pL) VOLUME (DOO VOLU	CATION PRESERVATIVE USED NLOH HNO2 HNO2 HNO3 Glass; CG = CI PP = After Perist FPP = Reverse F	INTENDED ANALYSIS AND/OR METHOD CSIA DAC, D DAC, D UFA DJS Fe I Co. M.g. Cu. I, Bro, ear Glass; attic Pump; low Peristaltic	TUBING SE U. Urc. Urc. Vrc. Soy PE = Poly B = Bal Pump;	SAMPLING QUIPMENT CODE PP A A Vethylene; SM = Straw	Filtration Equipr replaced) SAMPLE PUMP FLOW RATE (mL per minute) 1.3 P	ment Type: Model: Model: me; S = S ESP = E	FIELD EC H2 S1 Ro alus A Silicone: 1	UIPMENT IC QUALITY PA TURBIDIME SN#: SN#: DTHER	DENTIFICA RAMETER SX4101 TER 5239	
FIELD DECONTAMINAT SAMPLE CONTA # MATERIA CODE 4 CODE 4 CODE 4 CODE 1 PG 2 CG 1 PG 2 CG 2 CG 2 CG 2 CG 2 CG 2 CG 2 CG 2 C	INER SPECIFIC VOLUME (IDED IOED IOED IOED IOED AG = Amber CODES: A R	CATION PRESERVATIVE USED NLOH HNO2 HNO2 HNO3 Glass; CG = CI PP = After Perist FPP = Reverse F	INTENDED ANALYSIS AND/OR METHOD CSIA Dhc, U Dhc, U VFA Diss Fe Co, Mg, Co, Co, Co, Co, Co, Co, Co, Co, Co, Co,	TUBING E L L C C C C C C C C C C C C C C C C C	AMPLING QUIPMENT CODE	Filtration Equipr replaced) SAMPLE PUMP FLOW RATE (mL per minute) 2-3 P (mL per minute)	ment Type: Model: Model: me; S = S ESP = El Gravity Drain	FIELD EC H2 S1 Ro alus A Silicone: 1	UIPMENT IC 0 QUALITY PA TURBIDIME TURBIDIME SN#: 1 DTHER = Teflon; mersible Pum	DENTIFICA RAMETER SX4101 TER 5239	
FIELD DECONTAMINAT SAMPLE CONTA # MATERIA CODE 4 COTE 4 COTE 4 COTE 4 COTE 5 AMPLING EQUIPMEN 10TES: 1. The above d 2. STABILIZATION pH: ±0.2 units Tem	INER SPECIFIC VOLUME (pL) VOLU	CATION PRESERVATIVE USED WOOH HNO3	INTENDED ANALYSIS AND/OR METHOD CSIA Dhc, D Dhc, D UFA Dhs Fe J Co Mg, I Co	TUBING SE U U U U U U E E E E D U D E E E E D U D E E E D U E E E E	AMPLING QUIPMENT CODE	Filtration Equipr replaced) SAMPLE PUMP FLOW RATE (mL per minute) 1.3 P PP = Polypropyle Bladder Pump; Method (Tubing C AC . (see FS 2212, si	ment Type: Model: Model: Model: ESP = El Bravity Drain	FIELD EC H2 SI Ro MUSTA Silicone; 1 Hectric Subn n); 0 =	UIPMENT II 0 QUALITY PA TURBIDIME SN#: DTHER THER TERION; THER	DENTIFICA RAMETER STATION TER SZ39 -	TION
FIELD DECONTAMINAT SAMPLE CONTA # MATERIA CODE 4 COTA 1 PC 2 CG 1 PC 2 CG 1 PC 2 CG 1 PC 3 CG 1 PC 1 PC 2 CG 1 PC 1 PC 1 PC 1 PC 1 PC 1 PC 1 PC 1 PC	INER SPECIFIC VOLUME (mL) VOLUME (mL) VOLUME (DOO VOLUME (mL) VOLUME (mL) VOLUME (MOC VOLUME VOLUME VOLUME (mL) VOLUME VOLUME VOLUME (mL) VOLUME VOLUME VOLUME (mL) VOLUME VOLUME (mL) VOLUME VOLUME VOLUME (mL) VOLUME VOLUME VOLUME (mL) VOLUME VOLUME VOLUME (mL) VOLUME	CATION PRESERVATIVE USED NOOH HNO3 HNO3 HNO3 Glass; CG = CI CG = CI CG = CI CFP = After Perist CFP = After Perist	INTENDED ANALYSIS AND/OR METHOD CSIA Dhc, D Dhc, D UFA Dhs Fe D Co Mg, D Co	TUBING SE U U U U U E E E E E E E E E E E E E	SAMPLING QUIPMENT CODE	Filtration Equipr replaced) SAMPLE PUMP FLOW RATE (mL per minute) 133 P (mL per minute) 133 P PP = Polypropyle Bladder Pump; Method (Tubing O AC . (SEE FS 2212, Si 20% saturation (See	ment Type: Model: Model: Model: Model: ESP = El Gravity Drain ECTION 3) Table FS 2200	FIELD EC H2 SI Ro SIIcone; T Hectric Subm h); O =	UIPMENT II 0 QUALITY PA TURBIDIME SN#: DTHER THER TERION; THER	DENTIFICA RAMETER STATION TER SZ39 -	TION
FIELD DECONTAMINAT SAMPLE CONTA # MATERIA CODE 4 COTE 4 COTE 4 COTE 4 COTE 4 PE 1 PE 2 CG 4 PE 2 CO 4 PE 2 CG 4 CO 4 CO	INER SPECIFIC VOLUME (mL) VOLUME (mL) VOLUME (DOO VOLUME (mL) VOLUME (mL) VOLUME (MOC VOLUME VOLUME VOLUME (mL) VOLUME VOLUME VOLUME (mL) VOLUME VOLUME VOLUME (mL) VOLUME VOLUME (mL) VOLUME VOLUME VOLUME (mL) VOLUME VOLUME VOLUME (mL) VOLUME VOLUME VOLUME (mL) VOLUME	CATION PRESERVATIVE USED NOOH HNO3 HNO3 HNO3 Glass; CG = CI CG = CI CG = CI CFP = After Perist CFP = After Perist	INTENDED ANALYSIS AND/OR METHOD CSIA Dhc, U UFA Diss Fe Co. Mg, Co. Mg, Co. Mg, Co. Mg, Co. Mg, Co. Joss Co. Mg, Co. Mg, Co. Mg, Co. Co. Co. Co. Co. Co. Co. Co. Co. Co. Co. Co. Co. Co. Co. Co.	TUBING	SAMPLING QUIPMENT CODE	Filtration Equipr replaced) SAMPLE PUMP FLOW RATE (mL per minute) 1.3 P PP = Polypropyle Bladder Pump; Method (Tubing C AC . (see FS 2212, si	ment Type: Model: Model: Model: Model: ESP = El Gravity Drain ECTION 3) Table FS 2200	FIELD EC H2 SI Ro SIIcone; T Hectric Subm h); O =	UIPMENT II 0 QUALITY PA TURBIDIME SN#: DTHER THER TERION; THER	DENTIFICA RAMETER STATION TER SZ39 -	TION
FIELD DECONTAMINAT SAMPLE CONTA CONTAINERS CODE CODE CODE CODE CODE CODE CODE CODE	INER SPECIFIC VOLUME (nL) VOLUME (nL) VOLUME (nL) VOLUME (nL) VOLUME (nL) SCO SCO SCO SCO SCO SCO SCO SCO SCO SCO	CATION PRESERVATIVE USED NOOH HNO3 HNO3 HNO3 Glass; CG = CI CG = CI CG = CI CFP = After Perist CFP = After Perist	INTENDED ANALYSIS AND/OR METHOD CSIA Dhc, U Dhc, U UFA DJS Fe V Co Mg, U Cu I, Bro ear Glass; altic Pump; low Peristaltic nation require tor LAST THREE ree: ±5% Disso % (whichever is gr	TUBING SE U U U U U U U U U U U U U U U U U U	SAMPLING QUIPMENT CODE	Filtration Equipr replaced) SAMPLE PUMP FLOW RATE (mL per minute) 133 P (mL per minute) 133 P PP = Polypropyle Bladder Pump; Method (Tubing O AC . (SEE FS 2212, Si 20% saturation (See	ment Type: Model: Model: Model: Model: ESP = El Gravity Drain ECTION 3) Table FS 2200	FIELD EC H2 SI Ro SIIcone; T Hectric Subm h); O =	UIPMENT II 0 QUALITY PA TURBIDIME SN#: DTHER THER TERION; THER	DENTIFICA RAMETER STATION TER SZ39 -	TION
FIELD DECONTAMINAT SAMPLE CONTA # MATERIA CONTAINERS CODE 4 CCI 1 PC 2 CC 1 PC 1 PC 2 CC 1 PC 2 CC 2 CC 1 PC 2 CC 2 CC 2 CC 2 CC 2 CC 2 CC 2 CC 2	INER SPECIFIC VOLUME (pL) VOLUME (PD) VOLU	CATION PRESERVATIVE USED NOOH HNO3 HNO3 HNO3 Glass; CG = CI CG = CI CG = CI CFP = After Perist CFP = After Perist	INTENDED ANALYSIS AND/OR METHOD CSIA Dhc, U UFA Diss Fe I Co. Mg, Co. Mg, Co. Mg, Co. Mg, Co. Mg, Co. Joss Co. Mg, Co. Mg, Co. Mg, Co. Co. Co. Co. Co. Co. Co. Co. Co. Co. Co. Co. Co. Co. Co. Co.	TUBING SE U U U U U U U U U U U U U U U U U U	SAMPLING QUIPMENT CODE	Filtration Equipr replaced) SAMPLE PUMP FLOW RATE (mL per minute) 133 P (mL per minute) 133 P PP = Polypropyle Bladder Pump; Method (Tubing O AC . (SEE FS 2212, Si 20% saturation (See	ment Type: Model: Model: Model: Model: ESP = El Gravity Drain ECTION 3) Table FS 2200	FIELD EC H2 SI Ro SIIcone; T Hectric Subm h); O =	UIPMENT II 0 QUALITY PA TURBIDIME SN#: DTHER THER TERION; THER	DENTIFICA RAMETER STATION TER SZ39 -	TION

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ANALYSIS& DEVELOPMENT CORP. Environmental & Engineering Sorvices

SITE N.	ame: S	iti	1	FFLICADLL		LOCATION:	MAS 1	QOYA			17 411	n17	
WELL	VO: FVY	Minl - 1	10 SAM		MINI-	02	FREE PRO	DUCT: Y	N)			Y Ø	·
<u>,,, ,, ,, ,</u>			JLI	<u> </u>	<u>11) (/)</u>		GING DA		ic): -	DUPLICATE	E ID:		
WELL			JBING	3/11		CREEN INTI	ЕВХАЦ	STATIC D		CAA PL	IRGE PUMP 1	TYRE O	
	TER (inches			ches).		ן U feett דדו – ST	o' <u>し</u> ろ feet ATIC DEPTH 1	TO WATER), (<u>(</u>) OF L CAPACITY	R BAILER:	γγ	
(only fill	out-if-applic	able)		= (feet -			feet)	x		ns/foot =		gallona
EQUIPI (only fill	MENT VOLU		: 1 EQUIPN	ENT VOL. =	PUMP VOI	LUME + (TU	EDIG[CAPAC	ITY x		LENGTH) + FL		LUME	gallons
		·	3	=		allons + (llons/foot x		feet) +		allons =	gallons
	PUMP OR IN WELL (f	A 1		WP OR TUBI WELL (feet):	··- //		PURGING	AT: 101		PURGING	23 PUR	AL VOLUME GED (gallon:	»: 4.20
Time	Volume	Cum. Volume	Purge	Depth to	рН	Temp.	Spec.	Dissolved	Salinit		Color	Odor	Turbidity
Time	Purged (gallons)	Purged (gallons)	Rate (gpm)	Water (ft BTOC)	(SU)	(°C)	Cond. (mS/cm)	Oxygen (mg/L)	(‰)	(mV)	(describe)	(describe)	(NTUs)
1033	1.20	1.20	0.00	7.15	6.03	27.9	312	0.56	1.6	2-48.6	Clear	NA	13.28
10H2	0.60	180	0.00	7.10	0,10	128.D	3.01	0.57	11.5k	2-46.7			14.50
1033	$\underline{0.00}$	2.40	0.00	4.24	10.20	28.2	2.41	0.62	1.51	<u>DI-90.5</u>			6.50
1100	0.00	3.00	0.00	1.23	10.20	28.1	2 41	0.6	1.42	<u>8 - 82. b</u>			1.33
	$\frac{0.00}{0.20}$	2.00 2.00	0.00	12.28	6.38	28.5	2 71	0.00 0.70	1 20	$\frac{1}{1}$	+ +		231
1123	0.30	4.20	0.06	7.30	0.42	28 2	2.00	0.VA	13	1-00.0	V V	₩.	3.62
													<u> </u>
	ADACITY /	gal/ft): 0.75	<u> </u>	1 " = 0.04;	4.000								
				1" ≡ 0.04; /8" = 0.0006;	1.25" = 0.0 3/16" =		0.16; 3" = 0 1/4" = 0.0026;	.37; 4" = 0 <u>5/16" = 0</u>		= 1.02; 6" = 3/8" = 0.006;	= 1.47; 12" 1/2" = 0.010	= 5,88 ; 5/8" = (0.016
PURGIN	IG EQUIPM	ENT CODES	S: B = Ba	ailer; BP	= Bladder F				Pump;	PP = Perista	ltic Pump;	0 = Other	(Specify)
SAMPLI	ED BY (PRI	NT),/AFFILI/	ATION:		SAMPLE	R(S) SIGNA	LING DA TURE(S):		-		SAMPI	E TIME:	++24
A.H	ayıs		Und	<u>ц</u>	IM	UN.	• • • • • • • • • • • • • • • • • • •			*	151	-1026	<u>1330</u>
	DR TUBING	eet):	2]	V	TUBING MATERIA	L CODE:	PE	FIELD-FILT Filtration E				SIZE:	μm
FIELD D		INATION:	PUMP	<u>Y</u> 🕑	,	TUBING	<u> </u>	(replaced)		,	QUIPMENT I	DENTIFICAT	ION
	SAMPLE CO	ONTAINER S	PECIFICATI	ION	INTENDI ANALYS			SAMPLE P		ŀ	120 QUALITY PA	RAMETER	
# CONTAIN			LUME PRE mL)	ESERVATIVE USED	AND/OI METHO	R	QUIPMENT CODE	FLOW RA (mL per mi			DDILE	15110	17932
3	С			101	VOC	, ,	APP	230)		TURBIDIME		
3	<u> </u>	g i		1	ME	E.			N		() SN#:	10101	09036
	A	6		V	100	<u> </u>					OTHER	2	
	<u> </u>		$\frac{00}{H}$	IVU3	(a Mg	K		 					
	P	$\frac{1}{1}$		RL-Q1	CHL BI	11 11 L	$-\mathbf{V}$						
REMAR			-0	TO PN	VFL		$\overline{\mathbf{v}}$						
MATER	AL CODES		Amber Glas:	s; CG = Cl	ear Glass;		yethylene;	PP = Polypro	pylene;	S = Silicone;	T = Teflon:	0 = Other	(Specify)
SAMPLI	NG EQUIPI	MENT CODE		= After Perist = Reverse F		B = Ba Itic Pump;	iler; BP =	Bladder Pum Method (Tub	p; ES	P = Electric Sul			
NOTES:	1. The abo 2. STABILIZA	ve do not co TION CRITERI	onstitute all	of the inform	nation requ	ired by Cha	apter 62-160, I JTIVE READINGS	F.A.C.					
1	pH: <u>+</u> 0.2 units	Temperature	± 0.2 °C Spec	ific Conductan	ice: ± 5% Dis	ssolved Oxyg				i 31 S 2200-2); optiona	ally, <u>+</u> 0.2 mg/L or	± 10% (whiche	ever is greater)
	l urbidity: all n eds repair			:5 NTU or <u>+</u> 10% leeds well tag			king cap		0 other	comment:	and the second		
		c	MS / MSD		Equip blk	·	⊂ Ambient	bik	<u> </u>	rip blk	·		
Н	^ A	H() –	•	CSI.	A Dhb')						
· 1	ιa	• • • •					2) //.					



GROUNDWATER SAMPLING LOG

L		nw -0		tim			GING DA		л. —	DUPLICATE			
WELI			JBING	3/11,		CREEN INT	ERVAL	STATIC DE	ртн 🕥	C-7 PUI	RGE PUMP	TYPE	
	ETER (inche		AMETER (in		DEPTH:	feet t	0 <u>73</u> feet	TO WATER	(feet): 🗸	'₩> OR	BAILER:		
(only	fill out if apple	able)				· · ·			·	APACITY		inda undra Contro Coleg	A CHONO
EQUI	PMENT VOL	JME PURGE	E: 1 EQUIPN	= (IENT VOL, =	PUMP VOI	 _UME + (TU	BING CAPAC	feet) ITY x		gallor NGTH) + FLC	ns/foot =		gallons
(only	fill out If applic	able)			a	allons + (da	lions/foot x		feet) +		gallons =	gailon
	L PUMP OR			MP OR TUBI	NG		PURGING	1010	PU	RGING 7-	L TOT	- AL VOLUME	110
DEPT	TH IN WELL (f		DEPTHIN	WELL (feet):	<u> </u>	$\frac{2}{1}$	INITIATED	AT: 1017	EN EN		PUR	GED (gallon	s):T-C
Time	Volume	Cum. Volume	Purge	Depth to	pН	Temp.	Spec. Cond.	Dissolved Oxygen	Salinity	ORP	Color	Odor	Turbidit
	Purged (gallons)	Purged (gallons)	Rate (gpm)	Water (ft BTOC)	(SU)	(°C)	(mS/cm)	(mg/L)	(‰)	(mV)	(describe)	(describe)	(NTUs)
62	70.6	0.6	0.06	10.91	5.82	28.3	1,80	0.52	1.44	-104.8	Veer	none	115
1623	0.6	1.2	0,00	7-53	5.90	28.2	2.7le	01.27	1.42	-70.9	cloer	une	1.8.1
164	<u>HO.</u> le	1.8	0.00	7.82	6.01	28.5	2.74	1.33	1.41	-74.6	Joer	none	170
1057	10.6	2.4	0.06	8,02	6,00	28.6	2.69	[14]	1.38	-80.6	. Clas	None	15.8
1103	0.6	30	0,06	0.10	618	23.2	2.61	1. the	1.34	-784	dew	nere	Ne
ΠÌ	0.4	3,6	0.06	0.10	10.21	28.4	2,48	1.45	1.27	-772	- <u>cloes</u>	nare	15.9
122	<u>10.</u> 5	34	0.06	\$10	6.25	28.4	2.41	1.44	1.23	-778	lew	nane	890
122	20.3	4.2	0.010	810	6.29	28.4	2.35	1.44	1.20	-787	<u>Cler</u>	none	18
WELL		'oal/ft): 0.75	" = 0.02;	1" ≃ 0.04;	1.25" = 0.0)6; 2" = 0	.16; 3" = 0	.37; 4 " = 0.1	65; 5" =	1.00, 67 -	1.47; 12 "	= 5.88	
TUBIN	IG INSIDE DI	Ă. CÁPACIT	Y (gal/ft): 1	/8'' = 0 .0006;	3/16" =		1/4" = 0.0026;	.37, 4 = 0.0 <u>5/16" = 0.0</u>		"= 0.006;	1.47; 12" <u>1/2" = 0.010</u>	= 5.88); 5/8" = (0.016
PURG	ING EQUIPM	ENT CODES	S: B≂Ba	ailer; BP	= Bladder F			Submersible F	Pump; I	PP = Peristalt	c Pump;	O = Other (Specify)
SAMP	LED BY (RR	NT) / AFFILI			SAMPLE	SAIVIP S S SIGNA	LING DA				SAMD		
λ	mr K	-	en V	nast	. l	2/14	Van		<u>،</u>		11~	28	
	OR TUBING		1					FIELD-FILTE)	FILTER	SIZE: 0.1	μm
	DECONTAM	· · · · ·		Y Ø			Report of the second se	Filtration Equ				DENTIFICAT	
	SAMPLE CO		PECIFICATI		INTENDE	ED ,		SAMPLE PU	ÚD .	•			
	· · · · ·			SERVATIVE	ANALYS AND/O	18 . E	QUIPMENT	FLOW RAT	Ë				
CONT/	AINERS C	ODE (I	<u>naL) (</u>	WSED	METHO		CODE	(mL per minu		# YS[Ki	Ø∮ ^{SN#:}	ISAW	1477
25	<u> </u>			44		·	HP	> 400		- t - n			- 6 10
- 7	<u> </u>		<u>p </u>	μı	MG	4			Mod	el u Mo	Tte, SN#		0518
		G 5		HU LA	- YQC	· . ···					OTHE	۲ ۲	
<u> </u> {				ur vz	19 Mar			 					·
		6 42			CANES.	Dian -							
REMA	BKS:	<u> </u>	12 17	alle a	VER VER	om	-				······································		
MATE	NAL CODES		46 N	204	<u>CSIR</u>	DE - D -1		<u> </u>					
			Amber Glass	= After Perista	ear Glass; altic Pump:	PE = Poly B = Ba		PP = Polyprop Bladder Pump		= Silicone; Electric Subr			(Specify)
<u> </u>	a di second	-	RFPP	= Reverse F	low Peristal	tic Pump;	SM = Straw	Method (Tubin	, בסף = Ig Gravity Di	rain); O =	Other (Spec	np; xify)	
DIES:	1. The abo 2. <u>STABILIZ</u>	ve do not co TION CRITERI	A FOR BANGE	of the inform	OF LAST THE	ired by Cha REE CONSECL	ipter 62-160, I TIVE READINGS	F. A.C. 8 (SEE FS 2212	SECTION 3)			• •	
	pH: + 0.2 units	Temperature:	+ 0.2 °C Spec	ific Conductan	ce: + 5% Dis	solved Oxvor		20% saturation (s			y, <u>+</u> 0.2 mg/L o	r <u>+</u> 10% (whiche	ver is greater
⊡well n	i undidity: ali n	eadings≤20 N	U; optionally +	5 NTU or <u>+</u> 10%	(whichever is	s greater)		·			_		
	· · · · · · · · · · · · · · · · ·		0.10					blk				-	

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i.

SITE NAME:		DATE & P. I
STR II	THAS ONTO	DATE: Ce V2/V7
WELL NO: G JA PALLA - 04 SAMPLE ID: G M lmg) -0		FIELD DUPLICATE: Y
WELL TUBING 2010, WELL SCREEN IN	TERVAL STATIC DEPTH	
DIAMETER (inches): DIAMETER (inches): DEPTH: 19 fee	t to 'しち feet TO WATER (feet): ゴ	
WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH - S (only fill out if applicable)	TATIC DEPTH TO WATER) X WELL	
= (feet – EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (7	feet) x	gallons/foot = gallons ENGTH) + FLOW CELL VOLUME
(only fill out if applicable)		JB
= galions +		feet) + gallons = gallons JRGING 126 TOTAL VOLUME
DEPTH IN WELL (feet):		DED AU PURGED (gallons): 12
Cum. Depth	Spec. Dissolved Solicity	
Time Volume Volume Purge to pH Temp. Purged Purged Rate Water (SU) (^o C)	Cond. Oxygen (%)	ORP Color Odor Turbidity (mV) (describe) (describe) (NTUs)
(galions) (gpm) (ft BTOC)		
to 0.6 0.6 0.06 6.91 7.39 27.	F1.06 1.08 0.52	-99.7 Olew hone 74.03
144 D.6 1.7 0.06 7.81 775	1.14 1.10 0.56	TIFES year non TAME
1251 0.6 1.8 0.06 8.34 7.75 27.5	1.48 1.26 O.74	-187 clear none 19.19
	81:59 1.30 0.7.	4-102.5 cleer none 18.85
1319 0.6 3.0 0.06 3.027.	51,52 1,30 0.71	e-1901e aper none 10.92
	6 1.52 1.41 0.76	1-1778 lew nac 8.08
144 0-5 39 0-04 8.97 7.05 27.4	1.52 1.48 0.71	e-176 Clear none 8.54
1329 0.3 412 0role 8.97 6.95 27.1	11,50 1.92 0.7	= -173.1 alear none 7.910
WELL CAPACITY (gal/ft): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2"	= 0.16; 3" = 0.37; 4" = 0.65; 5" =	
TUBING INSIDE DIA. CAPACITY (gal/ft): 1/8" = 0.0006; 3/16" = 0.0014;		= 1.02; 6" = 1.47; 12" = 5.88 B" = 0.006; 1/2" = 0.010; 5/8" = 0.016
PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump;	ESP = Electric Submersible Pump;	PP = Peristaltic Pump; 0 = Other (Specify)
SAM		
SAMPLED BY (PRINT) / AFFILIATION: SAMPLER(S) SIG		SAMPLE TIME:
	ATORE(S):	1340
SAMPLED BY (PRINT) / AFFILIATION: SAMPLER(S) \$1GI) N FILTER SIZE). <u>1</u> 4 µm
SAMPLED BY (PRINT) / AFFILIATION: SAMPLER(S) \$IG SAMPLER(S) \$IG SAMPLER(S) \$IG SAMPLER(S) \$IG TUBING TUBING	HATORE(S): FIELD-FILTERED: Filtration Equipment Fi) N FILTER SIZE). <u>1</u> 4 µm
SAMPLED BY (PRINT) / AFFILIATION: SAMPLED BY (PRINT) / AFFILIATION: SAMPLER(S) SIG SAMPLER(S) SIG TUBING DEPTH IN WELL (feet): FIELD DECONTAMINATION: PUMP Y SAMPLE CONTAINIER SPECIEICATION	IATORE(S): FIELD-FILTERED: Filtration Equipment IG Y (Nyreplaced) SAMPLING SAMPLE PUMP) N FILTER SIZE). <u>1 4</u> µm ре:
SAMPLED BY (PRINT) / AFFILIATION: SAMPLER(S) SIGI Journ Journ Journ PUMP OR TUBING TUBING DEPTH IN WELL (feet): TUBING FIELD DECONTAMINATION: PUMP SAMPLE CONTAINER SPECIFICATION INTENDED # MATERIAL VOLUME	IATORE(S): FIELD-FIL TERED: Filtration Equipment Filtration Equipment	N FILTER SIZE μm pe: FIELD EQUIPMENT IDENTIFICATION H20 QUALITY PARAMETER
SAMPLED BY (PRINT) / AFFILIATION: SAMPLER(S) SIGI JOHN JOHN TUBING PUMP OR TUBING TUBING TUBING DEPTH IN WELL (feet): MATERIAL CODE: FIELD DECONTAMINATION: PUMP Y SAMPLE CONTAINER SPECIFICATION INTENDED # MATERIAL VOLUME # MATERIAL VOLUME CONTAINERS CODE (mL) USED METHOD	IATORE(S): FIELD-FILTERED: Filtration Equipment FIRTATION Equipment FILTATION Equipment SAMPLING EQUIPMENT CODE (mL per minute) MC	Pe: FIELD EQUIPMENT IDENTIFICATION H20 QUALITY PARAMETER del: VS(Proof SN#: USTUB2433
SAMPLED BY (PRINT) / AFFILIATION: SAMPLER(S) SIGI JOHN JOHN TUBING PUMP OR TUBING TUBING TUBING DEPTH IN WELL (feet): MATERIAL CODE: FIELD DECONTAMINATION: PUMP Y SAMPLE CONTAINER SPECIFICATION INTENDED # MATERIAL VOLUME # MATERIAL VOLUME CONTAINERS CODE (mL) USED METHOD	ATORE(S): FIELD-FILTERED: Filtration Equipment Filtration Equipment Fi	Pe: FIELD EQUIPMENT IDENTIFICATION H20 QUALITY PARAMETER del: VS(Prost SN#: LST_1621433 TURBIDIMETER
SAMPLED BY (PRINE) / AFFILIATION: SAMPLER(S) SIG PUMP OR TUBING TUBING DEPTH IN WELL (feet): TUBING FIELD DECONTAMINATION: PUMP SAMPLE CONTAMINATION: PUMP SAMPLE CONTAINER SPECIFICATION INTENDED # MATERIAL CONTAINERS CODE (mL) USED METHOD VOL 3 Gr 40 HUL WUL HUL MATERIAL VOLUME PESERVATIVE AND/OR METHOD VOL	ATORE(S): FIELD-FILTERED: Filtration Equipment Filtration Equipment Fi	Pe: FIELD EQUIPMENT IDENTIFICATION H20 QUALITY PARAMETER del: VS(Prost SN#: 15(1621933 TURBIDIMETER del:WillosTW SN#: 26140934
SAMPLED BY (PRINE) / AFFILIATION: SAMPLER(S) SIG Journ Journ Journ PUMP OR TUBING TUBING TUBING DEPTH IN WELL (feet): TUBING MATERIAL CODE: FIELD DECONTAMINATION: PUMP Y TUBING SAMPLE CONTAINER SPECIFICATION INTENDED ANALYSIS # MATERIAL VOLUME PRESERVATIVE AND/OR CONTAINERS CODE (mL) USED METHOD 3 CG 4D HU WULL 2 HO HU MULL	ATORE(S): FIELD-FILTERED: Filtration Equipment Filtration Equipment Fi	Pe: FIELD EQUIPMENT IDENTIFICATION H20 QUALITY PARAMETER del: VS(Prost SN#: LST_1621433 TURBIDIMETER
SAMPLED BY (PRINE) / AFFILIATION: SAMPLER(S) SIG PUMP OR TUBING TUBING DEPTH IN WELL (feet): TUBING FIELD DECONTAMINATION: PUMP SAMPLE CONTAINER SPECIFICATION INTENDED ANALYSIS AND/OR GONTAINERS CODE (mL) USED MATERIAL VOLUME PRESERVATIVE AND/OR MATERIAL VOLUME Q HU VOL VOL 3 Gr 4 VOL 4 VOL	ATORE(S): FIELD-FILTERED: Filtration Equipment Filtration Equipment Fi	Pe: FIELD EQUIPMENT IDENTIFICATION H20 QUALITY PARAMETER del: VS(Prost SN#: 15(1621933 TURBIDIMETER del:WillosTW SN#: 26140934
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SAMPLED BY (PRINE) / AFFILIATION: SAMPLER(S) SIG PUMP OR TUBING TUBING DEPTH IN WELL (feet): TUBING FIELD DECONTAMINATION: PUMP SAMPLE CONTAMINATION: PUMP SAMPLE CONTAINER SPECIFICATION INTENDED ANALYSIS ANALYSIS # MATERIAL CONTAINERS CODE (mL) USED METHOD METHOD 3 G7 4 VOLUME 7 HU 3 G7 4 VOL 3 G7 4 VOL 3 G7 4 VOL 3 G7 4 VOL 4 VOL 5 G7 4 VOL 4 VOL 5 MATERIAL 4 VOL	ATORE(S): FIELD-FIL TERED: Filtration Equipment F Filtration Equipment F FILOW RATE CODE MC FLOW RATE (mL per minute) MC FLOW RATE (mL per minute) MC MC FLOW RATE (mL per minute) MC FLOW RATE (mL per minute) FLOW RATE FLOW RATE (mL per minute) FLOW RATE FLOW RATE (mL per minute) FLOW RATE FLOW RATE FL	$\begin{array}{c c} & 1340\\ \hline \\ & \text{Pe:} \\ \hline \\ \hline \\ FIELD EQUIPMENT IDENTIFICATION\\ \hline \\ & H20 QUALITY PARAMETER\\ \hline \\ \hline$
SAMPLED BY (PRINE) / AFFILIATION: SAMPLER(S) SIG PUMP OR TUBING TUBING DEPTH IN WELL (feet): TUBING FIELD DECONTAMINATION: PUMP SAMPLE CONTAMINATION: PUMP SAMPLE CONTAINER SPECIFICATION INTENDED ANALYSIS ANALYSIS # MATERIAL CONTAINERS CODE (mL) USED METHOD METHOD 3 G7 4 VOLUME 7 HU 3 G7 4 VOL 3 G7 4 VOL 3 G7 4 VOL 3 G7 4 VOL 4 VOL 5 G7 4 VOL 4 VOL 5 MATERIAL 4 VOL	ATORE(S): FIELD-FIL TERED: Filtration Equipment F Filtration Equipment F Filtration Equipment F Filtration Equipment F SAMPLING EQUIPMENT CODE CODE MC SAMPLE PUMP FLOW RATE (mL per minute) MC MC MC POlyethylene; PP = Polypropylene; SM = Straw Method (Tubing Gravity i Shapter 62-160, F.A.C.	$\begin{array}{c c} & 1340\\ & N & \text{FILTER SIZE} \ \downarrow \mu m \\ \hline pe: \\ \hline FIELD EQUIPMENT IDENTIFICATION \\ & H20 QUALITY PARAMETER \\ \hline del: V&(Pro+ SN#: USC 16524933 \\ & TURBIDIMETER \\ \hline del: V&(Pro+ SN#: USC 16524933 \\ & TURBIDIMETER \\ \hline del: V&(Pro+ SN#: USC 16524933 \\ & OTHER \\ \hline del: V&(Pro+ SN#: USC 1$
SAMPLED BY (PRINE) / AFFILIATION: SAMPLER(S) SIG PUMP OR TUBING TUBING DEPTH IN WELL (feet): TUBING FIELD DECONTAMINATION: PUMP Y TUBING MATERIAL CODE: INTENDED ANALYSIS AND/OR MATERIAL VOLUME PRESERVATIVE AND/OR MATERIAL VOLUME PRESERVATIVE AND/OR MATERIAL VOLUME PRESERVATIVE AND/OR MATERIAL VOLUME Y USED MATERIAL VOLUME Y USED MATERIAL VOLUME Y USED MATERIAL VOLUME Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y <	ATORE(S): FIELD-FILTERED: Filtration Equipment for Filtration Equipment for Filtration Equipment for SAMPLING EQUIPMENT CODE A VO Polyethylene; PP = Polypropylene; SM = Straw Method (Tubing Gravity) SM = Straw Method (Tubing Gravity)	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
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SAMPLED BY (PRINT) / AFFILIATION: SAMPLER(S) SIG PUMP OR TUBING TUBING DEPTH IN WELL (feet): TUBING FIELD DECONTAMINATION: PUMP SAMPLE CONTAINER SPECIFICATION INTENDED ANALYSIS ANALYSIS # MATERIAL VOLUME PRESERVATIVE AND/OR MATERIAL VOLUME PRESERVATIVE SAMPLE CONTAINER SPECIFICATION INTENDED ANALYSIS AND/OR MATERIAL VOLUME PRESERVATIVE CONTAINERS CODE (ml.) SAMPLE CONTAINER SPECIFICATION INTENDED ANALYSIS AND/OR MATERIAL CONTAINERS CODE (ml.) SEED MATERIAL VOLUME 3 CA 40 HL 4 VOL AND/OR MATERIAL 3 CA 40 HL 4 VOL AND/OR MATERIAL 4 VOL AND AND/OR 5 MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = F <	ATORE(S): FIELD-FILTERED: Filtration Equipment for Filtration Equipment for SAMPLING SAMPLE PUMP EQUIPMENT CODE (mL per minute) MC A V > UD A V > UD A V > UD Polyethylene: PP = Polypropylene; S Bailer; BP = Bladder Pump; ESP SM = Straw Method (Tubing Gravity) SM = Straw Method (Tubing Gravity) County ERADINGS (SEE FS 2212, SECTION (See Table FS) locking cap: □ other of 0 Ambient blk □ Tr	$\frac{1340}{1}$ N FILTER SIZE µm Pe: FIELD EQUIPMENT IDENTIFICATION H20 QUALITY PARAMETER del: $\sqrt{8(9nst sn# 150057433)}$ TURBIDIMETER del: $\sqrt{8(9nst sn# 150069734)}$ OTHER $\frac{1340}{100000000000000000000000000000000000$
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ANALYSIS & DEVELOPMENT CORP. Environmental & Engineering Services

SHEN		liti	11		SITE LOCATIO	NI AS IN	CYADD	NIT	DATE:	1 Aun	AIT	
WELLN	VOFYN	IN-DI	5 SAI		INAMI-DE			W (U)	FIELD DU		Y D	
L				lt		RGING DA		<i></i>	DUPLICATE	ID: -		
WELL			JBING	31.	WELL SCREEN IN	ITERVAĻ	STATIC DE			RGE PUMP T	YBEN	
	TER (inches): DI JRGE: 1 W	ELL VOLUN	IChes)-/// ME = (TOTAL	DEPTH: 1 (1) fee WELL DEPTH - S	t to / / feet	TO WATER	(feet):		BAILER:	PP	
(only fill	Fout-if-applic	able)	And the second	= (feet -			x		1s/foot =		gallons
	MENT VOLU		: 1 EQUIPA	MENT VOL. =	PUMP VOLUME + (DW CELL VO	LUME	gailons
(Orny III		0016)		=	gallons +	(ga	llons/foot x		feet) +		allons =	gallóns
	. PUMP OR I IN WELL († I	eet): <u>2</u>		MP OR TUBI I WELL (feet):		PURGING INITIATED	AT: 0812				AL VOLUME GED (gallons	
Time	Volume Purged (gallons)	Cum. Volume Purged (gallons)	Purge Rate (gpm)	Depth to Water (ft BTOC)	pH Temp. (SU) (°C)	Spec. Cond. (mS/cm)	Dissolved Oxygen (mg/L)	Salinity (‰)	ORP (mV)	Color (describe)	Odor (describe)	Turbidity (NTUs)
0897	0 100	n vn	n nu	5 10	540 77 5	1704	1.56	2 84		CHECK	NA	22 0
D837	16.60	n no	0.00	RIV	54427	X 10.94	072	278	5	<u>uuu</u>	N/4	1710
0847	N.VN	T. XÙ	Ŏ.ŎŬ	R21	551 21-	10.08	0.55	3 08	-11.3			2004
0852	0.60	2.40	0.00	5.7	5.59 27.	10.32	0.47	3.43	-20.5			18,93
1902	0.60	3.00	<u>0.00</u>	5.21	5.09 27.	15.90	0.40	3.19	-29.1			26.97
0912	<u>0.00</u>	3.60	0.00	15.2)	5.70 27.4	2 5.58	0.45	3.00	-35.6			8.74
MI	<u>V 30</u>	3.40	<u>0.00</u>	12.2	5.1227.	0531	0.44	2.87	-38 6			19.56
UM22	0.30	14.20	0.00	<u>15.21</u>	5.71 27.1	05.25	0.46	2.80	-34.3	V	•	14.08
WELL	CAPACITY (gal/ft): 0.78	5" = 0.02;	1" = 0.04;	1.25" = 0.06; 2"	= 0.16; 3" = 0		65; 5 " =	 1.02; 6" -	1.47; 12 "	= 5,88	
	<u>G INSIDE DI.</u> NG EQUIPM			1/8" = 0.0006 Bailer: BP	··	1/4" = 0.0026;	5/16" = 0.(004; 3/8	" = 0.006;	1/2" = 0.010;	<u> </u>	
FUNGI	NG EQUIPM	ENT CODE	<u>э.</u> в-е	sallel, BP	· = Bladder Pump; SAN	IPLING DA	Submersible F	Pump;	PP = Peristal	ic Pump;	0 = Other (Specify)
SAMPL	ED BY (PRI	NT) / AFFILI	ATION:	3	SAMPLER(S) SIGI					SAMPL		~
A.L	OR TUBING	. (<u>II UR</u>	4	Inun	S		C	<u>}</u>		042	5
	IN WELL (fe		21	0	TÜBING MATERIAL CODE:		FIELD-FILTE Filtration Equ	ERED: Uipment Tyc	Se: 0. Jum	FILTER S	IZE:	μm
FIELD I	DECONTAM	INATION:	PUMP	ΥD	TUBI	NG Y 🚺	(replaced)		FIELDE	QUIPMENT I	DENTIFICAT	
	SAMPLE CO		SPECIFICAT	ION	INTENDED ANALYSIS	SAMPLING	SAMPLE PU		н	20 QUALITY PA	RAMETER	
# CONTAI	MAT		LUME PR	ESERVATIVE	ANALYSIS AND/OR	SAMPLING EQUIPMENT CODE	1	E				
# CONTAI	MAT	DNTAINER S TERIAL VC ODE (UME PR		ANALYSIS	EQUIPMENT CODE	SAMPLE PU FLOW RAT (mL per minu	E	h el:\\S1 PI		.15LI	
	MAT	DNTAINER S TERIAL VC ODE (UME PR	ESERVATIVE USED	ANALYSIS AND/OR	EQUIPMENT	SAMPLE PU FLOW RAT	E			.15LI	102933
	MAT	DNTAINER S TERIAL VC ODE 4 C L L L L	ntume pr ml) HON L	ESERVATIVE USED	ANALYSIS AND/OR METHOD C.SIA NGS DNC: Dho VIC	EQUIPMENT CODE	SAMPLE PU FLOW RAT (mL per minu	E Mod			. 15L 1 TER 20160	102933
	MAT	DNTAINERS TERIAL VC ODE (C C C C C C C C C C C C C	TO N L	ESERVATIVE USED	ANALYSIS AND/OR METHOD CSIA NGS	EQUIPMENT CODE	SAMPLE PU FLOW RAT (mL per minu	E Mod			. 15L 1 TER 20160	102933
	NERS C C P P C	DNTAINERS	LUME PR TO N L D OD F	ESERVATIVE USED	ANALYSIS AND/OR METHOD C.SIA NGS DNC DLOVIC VFA DISS MINEL	EQUIPMENT CODE	SAMPLE PU FLOW RAT (mL per minu	E Mod			. 15L 1 TER 20160	102933
	NERS C	DNTAINERS TERIAL VC ODE L L L L L L L L L L L L L	LUME PR HO N L D OD H OD H	ESERVATIVE USED	ANALYSIS AND/OR METHOD C.SIA NGS DNC. DLDVIC VFA DISS MINFL CAMG K		SAMPLE PU FLOW RAT (mL per minu	E Mod			. 15L 1 TER 20160	102933
	NERS C P P C P C C C C C C C C C C C C C C C	DNTAINERS TERIAL VO ODE (G E E E E E E E E E E E E E	LUME PR HO N L L D D L D L D L D L D L D L D L D L D L D L D L D L D D L D D D D D D D D D D D D D	ESERVATIVE USED JAOH H H JND3 HNO3	ANALYSIS AND/OR METHOD C.SIA NGS DNC DLOVIC VFA DISS MNFL CAMIG K CHL BRO S		SAMPLE PU FLOW RAT (mL per minu 230	E Mod	el: <u>NSI P</u> I		15L1 TER 20160	102933 29036
	NERS C	DNTAINERS TERIAL VO ODE $($ A E $1E$ $1E$ $5E$ $5E$ $5E$ $2AG$ =	LUME PR mL) HO N L D OD H 50 Amber Glas	ESERVATIVE USED JAOH H H JNO3 HNO3 S; CG = CI	ANALYSIS AND/OR METHOD CSIA NGS DNC: DHD VIC VFA DISS MINFA CANG K CHL BRD S lear Glass; PE = F		SAMPLE PU FLOW RAT (mL per minu 230	E Mod Mod Sylene; S	el: <u>NS1 D</u> el: <u>MICV</u> = Silicone;	URBIDIME TURBIDIME SN#: 2 OTHER T = Teflon;	0 = Other	102933 29036
	NERS C P P C.I P C.I P RKS: P RKS: P RIAL CODES ING EQUIPM	DNTAINERS TERIAL VO ODE (A E I F I I F I I F I I F I I F I I F I I I I I I I I I I I I I	LUME PR mL) TO N L D D D Amber Glas ES: APP RFPF	ESERVATIVE USED JAOH H H H JND3 HND3 Ss; CG = CI = After Perist P = Reverse F	ANALYSIS AND/OR METHOD C.SIA DIC DIGS DIC DIGS MINEL CA MIG K CHL BRO S lear Glass; PE = F taitic Pump; B = Tow Peristaltic Pump;	EQUIPMENT CODE	SAMPLE PU FLOW RAT (mL per minu 230	E Mod Mod Sylene; S S; ESP =	el: <u>VSI P</u> el: <u>MICV</u> = Silicone; = Electric Sub		0 = Other	102933 29036
CONTAI CONTAI REMAR MATER SAMPL NOTES:	NERS C P P C C P C C C C C C C C C C C C C	DNTAINERS TERIAL VC ODE (C C C C C C C C C C C C C	LUME PR HO N L D D D D D L D L D L D L D L D L D L D L D L D L D L D L D D L D D L D D L D D D L D D D D D D D D D D D D D	ESERVATIVE USED JADH H H H JND3 H JND3 H JND3 H S; CG = CI = After Perist P = Reverse F of the inforr E OF VARIATION	ANALYSIS AND/OR METHOD CSIA DIV: DHDVIC VFA DISS MINEL CAMAK CHL BRD S ear Glass; PE = F cattic Pump; B = fow Peristaltic Pump; nation required by C	EQUIPMENT CODE	SAMPLE PU FLOW RAT (mL per minu 230 PP = Polyprop Bladder Pump Method (Tubir F.A.C. s (SEE FS 2212	E Mod IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	el: <u>VS1 P</u> el: <u>M1CV</u> = Silicone; = Electric Sub rain); O =	URBIDIME URBIDIME SN#: 7 OTHER T = Teflon; mersible Pum = Other (Speci	0 = Other	102933 29036 (Specify)
CONTAI CONTAI REMAR MATER SAMPL NOTES:	NERS C C P P C C C C C C C C C C C C C C C C	DNTAINER S TERIAL VC ODE (C C C C C C C C C C C C C	LUME PR mL) TO N L D D D D D L D L D D L D D L D D L D D L D D L D D L D D D L D D D D L D D D D D D D D D D D D D	ESERVATIVE USED JADH H H H JND3 H JND3 H JND3 H S; CG = Cl = After Perist = Reverse F of the inforr E OF VARIATION cific Conductar	ANALYSIS AND/OR METHOD CSIA DIV: DHDVIC VFA DISS MINEL CAMAK CHL BRDS lear Glass; PE = F caitic Pump; B = flow Peristaltic Pump; nation required by C NOF LAST THREE CONST ce: ± 5% Dissolved Ox	EQUIPMENT CODE	SAMPLE PU FLOW RAT (mL per minu 230 PP = Polyprop Bladder Pump Method (Tubir F.A.C. s (SEE FS 2212	E Mod IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	el: <u>VS1 P</u> el: <u>M1CV</u> = Silicone; = Electric Sub rain); O =	URBIDIME URBIDIME SN#: 7 OTHER T = Teflon; mersible Pum = Other (Speci	0 = Other	102933 29036 (Specify)
	NERS C C P P C C C C C C C C C C C C C C C C	DNTAINER S TERIAL VC ODE (G AE $1F$ $5E$ $5E$ $5E$ $5E$ $5E$ $2MENT CODEve do not cAG =MENT CODEve do not cAG =Temperatureeadings \leq 20 N$	LUME PR ImL) ImL ImL) ImL ImL) Immunolity Immunolity Immunolity	ESERVATIVE USED JADH H H H SS; CG = CI = After Perist = Reverse F of the inforr E OF VARIATION cific Conductar ± 5 NTU or ± 10° heeds well tag	ANALYSIS AND/OR METHOD CSIA DIV: DHDVIC VFA DISS MINEL CAMAK CHL BRD S ear Glass; PE = F ratic Pump; B = Flow Peristaltic Pump; nation required by C NOF LAST THREE CONSP nee: ±5% Dissolved OX % (whichever is greater)	EQUIPMENT CODE	SAMPLE PU FLOW RAT (mL per minu 230 PP = Polyprop Bladder Pump Method (Tubir F.A.C. s (see FS 2212 20% saturation (s	E Mod IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	el: \SI DI el: MICVI = Silicone; = Electric Sub rain); O = 2200-2); optional mment:	URBIDIME URBIDIME SN#: 7 OTHER T = Teflon; mersible Pum = Other (Speci	0 = Other	102933 29036 (Specify)
	NERS C C P P C C C C C C C C C C C C C C C C	DNTAINER S TERIAL VC ODE (G AE $1F$ $5E$ $5E$ $5E$ $5E$ $5E$ $2MENT CODEve do not cAG =MENT CODEve do not cAG =Temperatureeadings \leq 20 N$	LUME PR IL I	ESERVATIVE USED VADH H H H SS; CG = CI = After Perist = Reverse F of the inforr E OF VARIATION cific Conductan ± 5 NTU or ± 10° heeds well tag	ANALYSIS AND/OR METHOD CSIA DN: D-b-V/C VFA DISS MAFA CANAK CHL BROS CANAK CHL CHL CANAK CHL CHL CANAK CHL CHL CANAK CHL CHL CANAK CHL CHL CANAK CHL CHL CANAK CHL CHL CHL CANAK CHL CHL CHL CHL CANAK CHL CHL CHL CHL CHL CHL CHL CHL CHL CHL	EQUIPMENT CODE	SAMPLE PU FLOW RAT (mL per minu 230 PP = Polyprop Bladder Pump Method (Tubir F.A.C. s (see FS 2212 20% saturation (s	E Mod IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	el: \SI DI el: MICVI = Silicone; = Electric Sub rain); O = 2200-2); optional mment:	URBIDIME URBIDIME SN#: 7 OTHER T = Teflon; mersible Pum = Other (Speci	0 = Other	102933 29036 (Specify)
	NERS C C P P C C P C C C C C C C C C C C C C	DNTAINER S TERIAL VC ODE (G AE $1F$ $5E$ $5E$ $5E$ $5E$ $5E$ $2MENT CODEve do not cAG =MENT CODEve do not cAG =Temperatureeadings \leq 20 N$	LUME PR IL I	ESERVATIVE USED JADH H H H SS; CG = CI = After Perist = Reverse F of the inforr E OF VARIATION cific Conductar ± 5 NTU or ± 10° heeds well tag	ANALYSIS AND/OR METHOD CSIA DN: D-b-V/C VFA DISS MAFA CANAK CHL BROS CANAK CHL CHL CANAK CHL CHL CANAK CHL CHL CANAK CHL CHL CANAK CHL CHL CANAK CHL CHL CANAK CHL CHL CHL CANAK CHL CHL CHL CHL CANAK CHL CHL CHL CHL CHL CHL CHL CHL CHL CHL	EQUIPMENT CODE	SAMPLE PU FLOW RAT (mL per minu 230 PP = Polyprop Bladder Pump Method (Tubir F.A.C. s (see FS 2212 20% saturation (s	E Mod IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	el: \SI DI el: MICVI = Silicone; = Electric Sub rain); O = 2200-2); optional mment:	URBIDIME URBIDIME SN#: 7 OTHER T = Teflon; mersible Pum = Other (Speci	0 = Other	102933 29036 (Specify)
	NERS C C P P C C P C C C C C C C C C C C C C	DNTAINERS TERIAL VC ODE L L L L L L L L L L L L L	LUME PR ImL) ImL) IL ImL) IL ImL) ImL) ImL) ImL) ImL) ImmL) ImmL) ImmL) Imm	ESERVATIVE USED USED USED USED USED USED USED USE	ANALYSIS AND/OR METHOD CSIA DN: Dhb VIC VFA DISS MAFL CANG K CHL BRD S lear Glass; PE = F taitic Pump; B = Tow Peristaltic Pump; NOF LAST THREE CONSI Three: ± 5% Dissolved Ox % (whichever is greater) Equip bik	EQUIPMENT CODE	SAMPLE PU FLOW RAT (mL per minu 230 PP = Polyprop Bladder Pump Method (Tubir F.A.C. s (see FS 2212 20% saturation (s	E Mod IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	el: \SI DI el: MICVI = Silicone; = Electric Sub rain); O = 2200-2); optional mment:	URBIDIME URBIDIME SN# 2 OTHER T = Teflon; mersible Pum = Other (Speci	0 = Other	102933 29036 (Specify)
	NERS C C P P C C P C C C C C C C C C C C C C	DNTAINERS TERIAL VC ODE L L L L L L L L L L L L L	LUME PR ImL) ImL) IL ImL) IL ImL) ImL) ImL) ImL) ImL) ImmL) ImmL) ImmL) Imm	ESERVATIVE USED JADH H H H H JADA H JADA H JADA SS; CG = CI = After Perist = Reverse F of the inforr E OF VARIATION cific Conductar ± 5 NTU or ± 10° heeds well tag	ANALYSIS AND/OR METHOD CSIA DIV: DHDVIC VFA DISS MINFL CA MIG K CHIL BRD S lear Glass; PE = F taltic Pump; B = Tow Peristaltic Pump; nation required by C NOE LAST THREE CONSI NOE LAST THREE CONSI (whichever is greater) Equip blk	EQUIPMENT CODE	SAMPLE PU FLOW RAT (mL per minu 230 PP = Polyprop Bladder Pump Method (Tubir F.A.C. s (see FS 2212 20% saturation (s	E Mod IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	el: <u>VSI P</u> el: <u>MICV</u> = Silicone; = Electric Sub rain); O = 1 2200-2); optional mment:	URBIDIME URBIDIME SN# 2 OTHER T = Teflon; mersible Pum = Other (Speci	0 = Other	102933 29036 (Specify)


□ SYST		SYSTIEM OI					ER SAI	VIPLING	9 LUG	I			
SITEN		Sile	1.(OCATION:	MAS	IAX	-	DATE:	0/12/	17	
WELL	1. a	1.07	(SA)	OMIC			FREE PROT		N.	FIELD DU	PLICATE:	Y (N)	
<u> </u>	MMI	<u>v - v</u> -		<u>, civic</u>	<u>-0 </u>	PUR	GING DA		J: V	DUPLICATE	ID:		
WELL	1.		UBING 7	1910		REEN INTI	ERVAL	STATIC DE		n PUI		TYRE	
	TER (inche		AMETER (In		DEPTH:		ATIC DEPTH 1	TO WATER	x WELL CA		BAILER:	<u>pp</u>	
	I out if appli			= (feet -	والمعرب فروج والانتراب والانتراب			x		ns/foot =		JB
	MENT VOL		E: 1 EQUIPN	IENT VOL. =			BING CAPACI	TY X	TUBING LEN				gallons
		eable)			e ga	allons + (gal	lons/foot x	· · · · · · · · · · · · · · · · · · ·	feet) +	9	jallons =	gallons
	. PUMP OR I IN WELL (VIP OR TUBI WELL (feet):		3	PURGING	_{T:} 0813		GING AT M		AL VOLUME GED (gallons	
		Cum.	_	Depth			Spec.	Dissolved					1 Li Ent
Time	Volume Purged	Volume Purged	Purge Rate	to Water	pH (SU)	Temp. (°C)	Cond. (mS/cm)	Oxygen (mg/L)	Salinity (‰)	ORP (mV)	Color (describe)	Odor (describe)	Turbidity (NTUs)
1017	(gallons)	(gallons)	(gpm)	(ft BTOC)	-1-	<u>64 1</u>	-						
h022	0.6	0.0	0.06	6.42	630	44	6.30	0.29	3,43	<u>-769</u>	Leec.	none	3.8Z
1025 5942	0.0	1.4	0.06	8.10	10.50	17.3 17.4	6.45	0.17	2.55	-198.7 -93.4	llear	nohe	<u>2.03</u> 3.41
6852	0.la	2.4	0.00	8.13	6.20	24.4	6.58	0.25	300	-943	dee	None	J 11
0903	0.6	3.0	0.06	8:26	Ce 20	774	6.41	0 94	348	-909	(a)	None	4.08
DAILS	0.0	3.6	0.06	2.30	6.20	27.3	6.13	0.96	3,30	~93.4	Cer	none	C.86
MB	<u>ŏ3</u>	3.4	0.06	8.20	6.23	24.4	5.96	0.98	3.21	- 9058	do-	how	2,28
0123	0.3	4.2	0.06	8.40	6.25	27-4	5.84	0.48	3.15	-89.4	le	None	4.64
WELL	CAPACITY	(gal/ft): 0.7	5" = 0.02:	1" = 0.04:	1.25 " = 0.0	6; 2 " = 0	.16; 3" = 0.	37; 4" = 0,1	65; 5 " = 1	02: 6" =	1.47; 12 "	= 5.88	*****
TUBIN	G INSIDE D	IA. CAPACI	TY (gal/ft): 1	/8" = 0.0006;	3/16" = (0.0014;	//4" = 0.0026;	5/16" = 0.0	004; 3/8"	= 0.006;	1/2" = 0.010	; 5/8" = 0	
PURGI		MENT CODE	S: B = B	ailer; BP	= Bladder P		LING DA	Submersible F	Pump; P	P = Peristalt	c Pump;	O = Other (Specify)
SAMPL	ED BY (PR)	NT) / AFFIL	IATION:	<u> </u>	SAMPLER	R(S) SIGNA				·n-	SAMPL		
DUME	OR TUBING	Jun	en IM	rety	H	MK	Mun		\	the as anim	\Box	924	
	IN WELL (1			• 	TUBÌÌÌÍG MATÈRIA	L CODE:	(h	FIELD-FILTE Filtration Equ	uipmen Type	CON_	FILTER S		μm
FIELD	DECONTAN	INATION:	PUMP	Y E	>	TUBING	Y N	(eplaced)	1	FIELD E	QUIPMENT II	DENTIFICAT	ION
ļ	SAMPLE C	ONTAINER	SPECIFICAT	ION	INTENDE ANALYSI	e 5	SAMPLING	SAMPLE PU			20 QUALITY PA	RAMETER	
# CONTAI		TERIAL VO	DLUME PRE (mL)	SERVATIVE	AND/OF METHOI	2 5	QUIPMENT CODE	FLOW RAT (mL per minu	E ute) Model	Ys fn		ICA ID I	12-1
				ALL .	VOC		APP	>400	,		TURBIDIME		177
33	(C	G	40	HU	MLL	2	APY	>40D	> Model	(allot	SN#:	5239-1	6515
1		ta u	b .	<u>Hu</u>	TTOL		AN	>400	>	u	OTHER		
	<u> </u>		500 H	MD2	Cam	<u>14</u>	App	<u>>400</u>					
·	<u> </u>		SD 1/4	<u> </u>	(h1,60	<u>isq</u>	AT	<u>>400</u>					
REMAR	KS:	Ch -	40 T	NU2	Felage	INM.	AN-	7400					
MATER	AL CODES	C.C.	Amber Glas	Nink_	ear Glass;	PF = Pol	vethylene;	<u>حرت ج</u> PP = Polyprop	vlene: ¢-	Silicone	T = Tefler:		Specify
		MENT COD	ES: APP	= After Perist	altic Pump;	B = Ba	iler; BP =	Bladder Pump	; ESP =	Electric Sub	mersible Pur	יי <u>י</u> זף;	
NOTES:	1. The abo	ve do not o		' = Reverse F of the inform			SM = Straw pter 62-160, I	Method (Tubin			Other (Spec		
	2. <u>Stabiliz</u>	ATION CRITER	RIA FOR RANGE	OF VARIATION	OF LAST THR	EE CONSECU	TIVE READINGS	(SEE FS 2212					
	Turbidity: all	readings ≤ 20 I	TU; optionally <u>+</u>	5 NTU or <u>+</u> 109	% (whichever is	greater)		20% saturation (s			\sim		ver is greater)
ii weli ne	eds repair	·		eeds well tag	ـــــــــــــــــــــــــــــــــــــ	Doc	king cap:	bik	_ l∃ other con	nment:		_	
									U inpl	DIK			
l	Ŷ	4 1	NDO	nure	M.	1929 ivi	AP APP	~400					
						•							



V

011	l []	SITE LOCATION	NAS I	ACKADY	VILLE .	12Aud^{-1}	7
WELL NO: FYMM/-1	SAMPLE IDF	VMW-08	DEPTH TO P	DUCT: Y RODUCT (ft BTOC):	FIELD DU DUPLICATE	PLICATE Y	5
		PUR	GING DA				
		WELL SCREEN INT	ЕВУАЦ	STATIC DEPT	H . PU		
DIAMETER (inches): / D WELL VOLUME PURGE: 1 V				TO WATER (fr	eet) L 05	BAILER:	
(only fill out if applieable)				TO WATER) X	WELL CAPACITY		
EQUIPMENT VOLUME PURG	E: 1 EQUIPMENT VOL.	= PUMP VOLUME + (TI	JBAGCAPAC	feet) x	gallo J <u>BING LEN</u> GTH) + FL	ns/foot =	gallons
(only fill out if applicable)		= gallons + ((llons/foot x	feet) +		
INITIAL PUMP OR TUBING	FINAL PUMP OR TUB	· · ·		i 1 mm		gallons =	gallons
DEPTH IN WELL (feet): 2	DEPTH IN WELL (feet	», 21,	INITIATED	<u>at: 120</u>	ENDED AT:	07 PURGED (galk	
Time Volume Cum.	Purge to	pH Temp.	Spec,	Dissolved	Salinity ORP		
Time Purged Purged (gailons) (gailons)	Rate Water (gpm) (ft BTOC)	(SU) (°C)	Cond. (mS/cm)	Oxygen (mg/L)	(‰) (mV)	Color Odor (describe) (describe) Turbidity (NTUs)
		200000	5 90	000			
	0.000	2.24 21.4	D.02	V.MMK	220	CIEOR NA	27.6
110.001.20	0.00 1.00	0.4121.4	4.90		FA 1-22 0	· · ·	28.8
$\frac{10.001.00}{21000}$	0.00 1.00	D.MY 21.3	H.75	1.08	. 14 - 42.0		<u> 40,5</u>
17 0 00 2 00	0.00 8.17	12.17 K K 1.2	3.95		<u>01-20.0</u>		34
57 0 60 2 60	0.000.1	610071	7100	1.131	<u>.48 -90.4</u>		12.4
RAN BALZ DA	0.000.51	51071 D	3.08		<u>.43-04.8</u>		21.3
	0.00 9.51 0.000 A 55	5 2817 0	250	3	88-570		14
	V. V. V. VI.J.J	1.50 21.0	0.00		. 00 3.0	"	13.4
/ELL CAPACITY (gal/ft): 0.75		1.25" = 0.06; 2" = (.37; 4" = 0.65;	5 " = 1.02; 6 " =	1.47; 12" = 5.88	
UBING INSIDE DIA. CAPACIT URGING EQUIPMENT CODE	-		1/4" = 0.0026;	5/16" = 0.004			= 0.016
	o. D - Dallel, Dr		PLING DA	Submersible Pun	np; PP = Peristalt	ic Pump; O = Othe	r (Specify)
AMPLED BY (PRINT), / AFFILI	ATION:	SAMPLER(S) SIGNA				SAMPLE TIME:	
4. HULLIS 17	<u>Intru</u>	India	2		~	1408	k.
UMP OR TUBING EPTH IN WELL (feet):	21 0	TUBING // MATERIAL CODE:	DF	FIELD-FILTER		FILTER SIZE:	μm
ELD DECONTAMINATION:	PUMP Y N		Y IN	(replaced)		QUIPMENT IDENTIFIC	
	U						
SAMPLE CONTAINER S		ANALYSIS	Sampling Quipment	SAMPLE PUMP FLOW RATE	Н	20 QUALITY PARAMETER	
	LUME PRESERVATIVE mL) USED	AND/OR METHOD	CODE	(mL per minute)		rophed 151	10147
3 CG H	O HCI	VOC :	APP	230	1 1 1	TURBIDIMETER	
2 AG' 4	O ATTOCHO	TOC		ſ) SN#: 1010	09031
1 PE' 5	<u> 20 MN3_</u>	Cama				OTHER	
$PE 2F$	5D —	Chi BrosDy					
PE 5	00 HNO3	Piss Fe.Mn	V_	<u> </u>			
		$-NGS + \rho$	N				
EMÅRKS:		. ,	,				
···		lear Glass; PE = Pol	yethylene;	PP = Polypropyle	ne; S = Silicone;	T = Teflon; 0 = Othe	r (Specify)
AMPLING EQUIPMENT CODE		taltic Pump; B = Ba Flow Peristaltic Pump;	iller; BP =	Bladder Pump; Method (Tubing (ESP = Electric Sub		
ES: 1. The above do not co	onstitute all of the inform	nation required by Ch	apter 62-160	Method (Tubing (Other (Specify)	
2. <u>STABILIZATION CRITERI</u>	A FOR RANGE OF VARIATION	N OF LAST THREE CONSECU	JTIVE READINGS	(SEE FS 2212, SI	ECTION 3)		
pH: \pm 0.2 units Temperature: Turbidity: all readings \leq 20 NT	I U; optionally ± 5 NTU or ± 10	% (whichever is greater)					hever is greater)
vell needs repair	□ needs well tag		cking cap:	<u> </u>	other comment:	<u> </u>	
DI Water Lot # 0	MS / MSD	🗆 Equip blk	C Ambient	blk	_ 🗆 Trip blk	<u> </u>	



		SYSTEN	AOFF C	<u>INOT A</u>	PPLICABLE	<u>`</u>									
SHEN		ITE I	1					ACKSONE	JUF		DATE	e	12/	17	_
WELL	Kmh	1-09		SAN	MPLEID:	-09		FREE PRO			FIELD		LICATE:	í í	D
		- <u></u> f-	··· ·		_ / ~	,	PUR	GING DA	TA						**
	TER (inch				ches): 3/16		REEN INT		STATIC DE TO WATER		32	PUF	RGE PUM BAILER:	C CT T	
WELL	VOLUME	PURGE:							TO WATER)	x WELL	CAPACÍ	UR	BAILER;	/	
(oni y fi ł	-out if app	licable)			= (feet -	_		feet)	x		nallon	s/foot =	-	gallons
	MENT VO		RGE: 1-	EQUIPL	ENT VOL. =	PUMP VOL	.UME + (TU	BING CAPAC	UTY X	TUBING I					ganorio
	rout il app	ficable)			22	gi	alions + (-	Va	lons/foot x		feet)	+		gallons =	gallons
	. PUMP O				VP OR TUBII WELL (feet):				AT: 0825		URGING. NDED AT	10 9	#<		
		Cun			Depth			INTIATED /		<u>, i se l E</u>			P C.	URGED_(gal	
Time	Volume Purged	Volui	me F	Purge	to	pH	Temp.	Spec. Cond.	Dissolved Oxygen	Salinity			Color		
	(gallons)			Rate (gpm)	(ft BTOC)	(SU)	(°C)	(mS/cm)	(mg/L)	(‰)	(mV)	(describe	e) (describ	e) (NTUs)
2835	0,6	0:6	, O.	06	3.93	5.63	27.8	3.05	0.13	1.57	7 62.	2	CLEAR	2 NONE	12-6
0845	0.6	Øre		66	10.38	5.53	27.8	3.48	0.43	1-82		. v		,	158
0855	0.6	116		-06	11.07	5.26	279	4.76	0.51	2.54	· 93.	4			17.1
0905	0.6	20		.06	11.77	5.24	27.8	4.76	0.50	2.5		-			15:2
0915	0.6	3.0		.06	12.31	5.2/	27.8	<u>4,88</u>	0.55	2.56	, 103,	3			16.6
0925	0.6	3.6		.06	12.94	5,08	27.7	5.39	0.40	2.91	114	. 4			14.9
0935	0.6	42		206	13.43	5.19	27.7	4.33	0.54	2.90		8.3	[\perp	17.7
0440	0.3	U.	5 0	. 06	13.69	5.15	27.7	4.50	0.52	2.28					15.4
WELL (O.3	<u>۲. (</u>		. <i>o</i> <u>(</u>	1" = 0.04:	5. 16 1.25" = 0.0	7.7 (i) 2" = (7,99).16; 3 " = 0	0,54 .37; 4"=0	a .3(109 = 1.02;	7.6 6" =	1 47.	12" = 5.88	13.9
TUBING		DIÀ. CÁP	ACITY (g	al/ft): 1	/8'' = 0.0006;	3/16" =	0.0014;	1/4" = 0.0026;			/ 8'' = 0.00		1/2" ≓ 0.		= 0.016
PURGI	NG EQUI	MENTCO	DDES:	B = B	ailer; BP	= Bladder F			Submersible I	^p ump;	PP = Pe	ristalti	c Pump;	O = Oth	er (Specify)
SAMPL	ED BY (P	RINT) / AF	FILIATIO	DN:	•	SAMPLE	SAIVIF R(S) SIGNA	YLING DA					SA	MPLE TIME:	
DAN	ILL B	eju	SIES	s PA	14	De	rul)	Boc	EV –					094	5
PUMP (OR TUBIN	G	21			TUBING MATERIA		<i>pe</i>	FIELD-FILT		Ø N			R SIZE:	μm
	DECONTA		<u> </u>	PUMP	Y 😿			/	Filtration Eq						
	SAMPLE				-	INTEND	=D		1		110				
#						ANALYS AND/O	15 6	sampling Equipment	SAMPLE PU FLOW RAT	re				Y PARAMETER	
CONTAI	VERS	CODE	(mL)		USED	METHO	D	CODE ረት ረት ምም	(mL per min		odel: 💦	<i>fRi</i>	SN SN	<u># 1み F</u>	100664
		<u> _ </u>	40	- '	<u>c</u>	8260	/	400	201					DIMETER	
	<u> </u>	<u>AIC</u>	<u>40</u>	6		TOC				M	odel: 216	v	R SN	#: <u>511</u>	/
	<u> </u>	<u>PE</u>	n			705							OT	HER	
			500		.0 ₃	6010 0		_	\vdash						
		PE PC	500	N^	103 3	DIS MET	4L	<u> </u>							
REMAR	KS: 4	-Co-	il 40			SiRen			└/_						
	1	pe	12			mi CROBH		•							
·	IAL CODE		AG = Amt		s; CG = Cl	ear Glass; altic Pumo:	B = Ba	iler: BP =	PP = Polyprop Bladder Pumo		S = Silicor P ≈ Electric		T = Tefloi		ner (Specify)
				RFPP	= Reverse F	low Peristal	tic Pump;	SM = Straw	Method (Tubir				Other (S		
	2. <u>Stabil</u>	ZATION CF	RITERIA FO	OR RANGE	OF VARIATION	OF LAST THE	REE CONSEC		<u>s (see FS 2212</u>						
	pH: ± 0.2 ur Turbidity: a	its Temper Il readings <	ature: <u>+</u> 0,2 20 NTU; o	2 °C Spec ptionally <u>+</u>	fic Conductan 5 NTU or ± 109	ice: ±5% Dis % (whichever i	solved Oxyg s greater)	en: all readings ≤	20% saturation (see Table Fl	5 2200-2); o	ptionall	у, <u>+</u> 0.2 тд.	/L or <u>+</u> 10% (wh	ichever is greater)
	eds repair	-		Un	eeds well tag		⊏ lo		¥	_ 🗆 other	comment:				
🗆 DI Wate	er Lot #	State State	_ DMS/	/ MSD	·	⊏ Equip blk		🗆 Ambien	t bik		rip blk				

ANALYSIS & DEVELOPMENT CORP. Environmental & Engineering Services PAGE T

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		nches). D	TUBING		WELL SCF			STATIC DEI		PURG	E PUMP TYRE	De la Co
WE	AMETER (ir ELL VOLUM	AE PURGE:		ER (inches):	WELL DEPT	1 feett 14 - STA	o	TO WATER	(feet): 9, 9 × WELL CA	~	ILER: 7/	44
	niy-fill-out-if-i	•		= (feet -			feet)	x	gallons/fe		gallons
EQ	QUIPMENT	VOLUME P applicable)	JRGE: 1 E	QUIPMENT VOL. =	PUMP VOLU	IME + (TU	BING CAPAC	ITY X	TUBINGLEN	GTH) + FLOW	CELL VOLUME	
	ITIAL PUMF			= AL PUMP OR TUBI		lons + (llons/foot x		feet) +	gallons =	gallons
				TH IN WELL (feet):		1	PURGING	AT: 1050	END	ылд ED AT: 130		ons): 6.6
Tir	me Volu Purg (gallo	jed Pun	ime Pu ged Ra	rrge to ate Water pm) (ft BTOC)	pH (SU)	Temp. (°C)	Spec. Cond. (mS/cm)	Dissolved Oxygen (mg/L)	Salinity (‰)	ORP (mV)	Color/ Odor (describe)	Turbidity (NTUs)
>₩€	30 0,	60.	60,			28.5	220	0.01	1.1(-212.0	CLEAR /NING	166
	-		2 0.			28 Y	2.11	0.01	1.07	-431.2		23.5
) +++) ++=	10 0.1 20 0		<u>B</u> 0.1	~ ~		<u>28.4</u>	2.16	0.01	1.09	-627.4	- CLAR	77.3
9 77-	50 <u>(</u> . 49 0.	6 2.		06 11.07	1	98.4 08.5	2.17	0.01	1.08	-694.4	CLEAR/WORK	10.7
- 	100.	6 3,		06 11.44		<u>00.5</u> 97.5	2.18	0.02	1.11	-555,0	·	61.) 86.8
121				06 11.44		27.0	7.2.	0.04	1. []	- 489.7		93.4
12				06 11.44		27.1	3.25	0.05	1.13	- 423.0		109
	35 0,3		· ·	06 11.44		27.2	2.23	0.05	1.14	-374.0		97.3
	ELL CAPAC			02; 1" = 0.04; /ft): 1/8" = 0.0006;	1.25 " ≈ 0.06 3/16" = 0.		0.16; 3'' = 0 1 /4'' = 0.0026;	.37; 4" = 0.0 5/16" = 0.0				= 0.016
PU	IRGING EQ		ODES:	B = Bailer; BP	= Bladder Pu			Submersible P	ump; Pl	P = Perislaltic P	ump; 0 = Oth	er (Specify)
SA	MPLED BY	(PRINT) / A	FFILIATION	:	SAMPLER(TURE(S):				SAMPLE TIME:	·
	ANILL		516	< PAA	Par	n).	Beck	1			1300	
	IMP OR TUE		2	1	TUBING MATERIAL	CODE:	pe T	FIELD-FILTE	ERED: 000 uipment Type			μm
FIE	ELD DECON	ITAMINATIO	N: PU	IMP Y	>	TUBING	Y T	(replaced)		FIELD EQUI	PMENT IDENTIFIC	ATION
-	SAMPI	E CONTAI		FICATION	INTENDED ANALYSIS		SAMPLING	SAMPLE PU	MP	H20 C	UALITY PARAMETER	
	# NTAINERS	MATERIAL CODE	VOLUME (mL)	PRESERVATIVE	AND/OR METHOD	E	QUIPMENT CODE	FLOW RAT (mL per minu		KI ALO	SN#: 1251	00664
0	3	(b)	Yo	HCL	8260		APP	200				00007
co	3	RG.	10	HUC	TOC		1			21000	SN# ≤ / / /	
CO		Pe	IL	Nevi	705		1			· · · · · ·	OTHER	
)		1350		6010			_]				
		Po	0.00	14 .	DIS MET	4C	1				· · · ·	
)))))	PG	900	14003			1					
))) MARKS:		250 11 16	HNO3 NONE NONE	NG5 NICROBIN		1					
REI		PE PE PE	11	Nove	NG5 NICROBIA	L	vethylene:	PP = Polyprop	viene: <-	Silicope: T-	Teflon: 0 - Oth	er (Specify)
REI)) MARKS:	PG PE PC DDES:	IL IL AG = Ambe	Wさいと NOいで Ir Glass; CG = Cl APP = After Perist	NGS NGB/q ear Glass; altic Pump;	L PE = Poly B = Ba	iler; BP =	Bladder Pump	; E\$P = I	Electric Submer		er (Specify)
REI)) MARKS: TERIAL CC	PG PC PC DDES:	AG = Ambe	Witいら NOい(- or Glass; CG = Cl APP = After Perist RFPP = Reverse F	NGS NCROB/q ear Glass; altic Pump; low Peristaltic	E = Poly B = Ba Pump;	iler; BP = SM = Straw	Bladder Pump Method (Tubin	; E\$P = I	Electric Submer	·	er (Specify)
REI)) MARKS: TERIAL CC MPLING EC :S: 1. The 2. <u>ST</u> pH: + 0.	PG PC PC DDES: QUIPMENT a above do ABILIZATION C 2 units Tempe	AG = Ambe CODES: not constitu RITERIA FOR rature: + 0.2 °	WBWE WBWE r Glass; CG = Cl APP = After Perist RFPP = Reverse F Ite all of the inform RANGE OF VARIATION C Specific Conductan	NGS NCROBIA ear Glass; altic Pump; low Peristaltic nation require LOF LAST THRE LOF LAST THRE LOF: +5% Disa	PE = Poly B = Ba Pump; ed by Cha E CONSECL	iler; BP = SM = Straw apter 62-160, JTIVE READINGS	Bladder Pump Method (Tubin F.A.C. S (SEE FS 2212	; ESP = I g Gravity Dra , <u>SECTION 3)</u>	Electric Submer in); 0 = Ot	sible Pump; her (Specify)	
REI)) MARKS: ITERIAL CC MPLING EC S: 1. The 2. <u>ST#</u> pH:±0. Turbidit	PG PC DDES: QUIPMENT a above do BILIZATION C 2 units Tempe y: all readings	AG = Ambe CODES: not constitu RITERIA FOR rature: ± 0.2 ° < 20 NTU: opti	WBWE WOVE Tr Glass; CG = CI APP = After Perist RFPP = Reverse F Ite all of the inform RANGE OF VARIATION	NGS h7CR08/q ear Glass; altic Pump; flow Peristaltic nation requin LOF LAST THRE (c): ± 5% Dissa % (whichever is c	PE = Poly B = Ba Pump; ed by Cha E CONSECU olived Oxyge ureater)	iler; BP = SM = Straw opter 62-160, JTIVE READING: en: all readings <	Bladder Pump Method (Tubin F.A.C. S (SEE FS 2212 20% saturation (s	; ESP = I g Gravity Dra <u>, SECTION 3)</u> ee Table FS 220	Electric Submer in); O = Ot 00-2); optionally, <u>+</u>	sible Pump; her (Specify) 0.2 mg/L or ± 10% (wh	



SYSTEM		YSTEM	OFF ⊒NC	OT APPLICABLE				<u>.</u>					
SITE NAM	" <u> </u>	7∈ 1			SITE	OCATION	: 54CKSON	LILLE		DATE: (1/2/17	7	
	: CMW-	11		SAMPLE ID:	1011		FREE PRO		c):	FIELD DU		Y 🕭	
						PUR	GING DA	TA					·
WELL	_	2	TUBING	R (inches): 3/16		REEN INT		STATIC DE	PTH	20 PU	RGE PUMP		<u>1</u>
				R (inches): ///6 LUME = (TOTAL)୩ feet TH ST	to 23 feet	STATIC DE TO WATER	(feet): /·		BAILER:	1.1	ump_
(only fill ou	t_if_applic	able)			- WELL DEF	лл – эт	AIIC DEPTH	IU WATER)	X WELL	CAPACITY			
EQUIPME		IME PUR	GE: 1 EQI	= (JIPMENT VOL. =	EUMP VOI	IME + (TI	BING CAPAC	feet)	X	gallor ENGT <u>H) + F</u> L(ns/foot =		gallons
(only fill ou	it if applic	able)							10004646		JVV CELL VC		-
			EINIAL	PUMP OR TUBI		alions + (llons/foot x		feet) +		jallons =	gallons
DEPTH IN				H IN WELL (feet)		1	PURGING	AT: 1430		URGING NDED AT:		AL VOLUME	<u>); 1. 8</u>
	Volume	Cum. Volume	e Purg	e Depth	, pH	Temp.	Spec.	Dissolved	Salinity	ORP	0.1		
	Purged (gallons)	Purgeo	I Rate	Water	(SU)	(°C)	Cond. (mS/cm)	Oxygen (mg/L)	(‰)	(mV)	Color (describe)	Odor (describe)	Turbidity (NTUs)
		(gallons)				57.0							
	2.6	0.6			5.56	26,4	5.31	0.08	2.8%		CLEAR	NONE	257
	7.6	1.2	0.0	1	5,55	26.4	5,31	0.08	2,85				16.4
	2.6	1.8	0.0		5.54	06.1	5.28	0.08	2.89	15.3			10.7
	2.6	2,4	0,0	1 01	5.54	25.9	5.27	0.08	283	148			12.4
	2.6	3.0	0.06		555	26.1	5,33	0.07	2.87	15.1			7.49
<u>1530 0</u>	1907	3.6	0.0		5.52	26.1	5,66	010	3.01	16.6	<u> </u>		6.42
	2.6	42	0.00		5,55	26.3	5.66	0.09	3.16	11.8			80 38
	2.3	4.5	Oro.		5.56	26.3	5.69	0.09	3.26	0.9			5.56
	2.3	4.8	0.0		5.58	26.4	5.70	0.09	3.21	10.7) .		7.76
WELL CAP TUBING IN	PACITY () NSIDE DIA	gal/ft): 0 4. CAP A(.75" = 0.02 CITY (gal/ft	; 1 " = 0.04;): 1/8" = 0.0006;	1.25" = 0.0 ; 3/16" =		0.16; 3" = 0 1/4" = 0.0026;	.37; 4" = 0. 5/16" = 0.1		= 1.02; 6" = 8" = 0.006;	1.47; 12 " 1/2 " = 0.010	= 5.88); 5/8" = 0	016
PURGING					= Bladder F		ESP = Electric			PP = Peristalt		0 = Other (
							LING DA	TA				`	,
SAMPLED				2AA		R(S) SIGNA	TURE(S):	9			SAMPI		· · · ·
PUMP OR	TUBING		$\overline{\overline{\mathbf{n}}}$		TUBING		PE	FIELD-FILTI		Ø N	FILTER		μm
DEPTH IN	·	,	~ \			L CODE:	_ <u>_</u>	Filtration Eq	uipment Ty	/pe:			
FIELD DEC	·-						GY Ø	(replaced)		FIELD E	QUIPMENT I	DENTIFICAT	ION
			R SPECIFI		ANALYS	IS P	SAMPLING EQUIPMENT	SAMPLE PU FLOW RAT		Н	20 QUALITY PA	RAMETER	
# CONTAINER		ERIAL ODE	VOLUME ((mL)	PRESERVATIVE USED	AND/OF METHO	۲	CODE	(mL per mini	ute) Mo	odel: Ys, PR	SN#:	WFIC	0664
3	C	6	40	HCL	8260	4	JPP	200	>	***	TURBIDIM		
2	A	6	40	ALL	700				Mo	del: Ə (DO	Q SN#:	5111	
1	P	2	16	NONE	705						OTHER	- <u></u>	
l	P	ε	250	HNOR	6010	>							
1	PC	î,	250	HNOR	Dis me	TFL							÷
							/						
REMARKS	i:	I			1	<u>L.</u> ,,,,,,,,,							
MATERIAL	CODES	: AC	a = Amber	Glass; CG = CI	ear Glass:	PE = Po	lyethylene;	PP = Polymer	ovlene: • •	s = Silicone;	T = Teflon:	O = Other (Snecify)
SAMPLING			DES: A	PP = After Perist	altic Pump;	B≃Ba	ailer; BP =	Bladder Pump Method (Tubir	; ESP	= Electric Sub	mersible Pun	np;	opcony
OTES: 1.	The abo	ve do no	t constitute	all of the inform	nation requ	ired by Ch	apter 62-160.	F.A.C.			= Other (Spec	, ny)	
2.	<u>Stabiliza</u>	TION CRIT	ERIA FOR R	ANGE OF VARIATION	NOF LAST THE	REE CONSEC	UTIVE READINGS	S (SEE FS 2212			b. 60 "	1001 1 1 1 1	
рн: Tur	bidity: all re	eadings < 2	0 NTU; option	Specific Conductar ally ± 5 NTU or ± 10°	whicheveria % (whicheveria	sorved Oxyg greater)	ien: all readings <	20% saturation (see ladie FS	2200-2); optional	iy, ± 0.2 mg/L oi	r <u>+</u> 10% (whiche	ver is greater)
⊐ well needs	s repair		· ·	🗆 needs well tag			cking cap:	- Wei ner,	_ C other o	omment:	Topper.	_	
DI Water L	_ot #			SD	🛛 Equip blk		Ambient	blk	() Tr	ip blk	Second Sec.		

ANALYSIS& DEVELOPMENT CORP. Environmental & Engineering Services

Modified FDEP Form FD 9000-24

PACE 2

		<u> </u>	STEM	OFF D	INOT /		BLE	NO SYSTE	M) .OCATIC						DATE:			_	
		517	ĩe	(ſ				NA	s D		1250mului			DATE:	6/	17/1	2	
WELLI	NO:ER	-mh	/ -(70	,	SA	MPLE ID EKr	: <u>n</u> vc	170			E PROI	OUCT: Y RODUCT (ft BTOC	N C):		FIELD DU DUPLICATE		TE:	Y N	
									PU	RGIN	<u>g da</u>	TA							
WELL DIAME	TER (inc	hes):		TUBIN DIAME		nches):		WELL SC		NTERVAL et to	feet	STATIC DE TO WATER				RGE P		TYPE	
WELL (only fil	VOLUME out if ap	E PUR	GE: 1	I WELL	VOLU	ME = (T'C	DTAL	WELL DEP	Υ Η –	STATIC D	EPTH	O WATER)							
		•					<u> </u>	PUMP VOL				feet)		<u></u>		ns/foot			gallons
	outifap			(GE, 1	EQUIP	VIGINI VV							TOBIN	GLE	IGTH) + FL	OW CE	LL VC	LOME	
	. PUMP (00.70					=		allons +	<u> </u>	-	lons/foot x		·	feet) +			allons =	gallons
	IN WEL					MP OR		-			GING	AT:			ED AT:	300		AL VOLUME GED (gallons	5.6
Time	Volum Purge (gallon	d	Cum. Volum Purgeo (gallons	e F d	Purge Rate gpm)	Dep to Wat (ft BT)	er	pH (SU)	Temp (°C)). SI Co	pec. ond. S/cm)	Dissolved Oxygen (mg/L)	Saliı (%		ORP (mV)		olor cribe)	Odor (describe)	Turbidity (NTUs)
1230	0.2		4.0	0	.06	11.4	4	6.30	97.6	<u>)</u>	19	0.18	1.1	0	- 300 7	tug	A	NDJE	982
1135	0,3		5,1	-	,06	11.4	Ý	6.19	26,		34	0.08	<u> </u>	$\frac{3}{4}$	-340.(P	<u>`</u>	98.2
1240	0,3		5.4		.0(11.4	$\overline{\varphi}$	6.16	26-		25	0.08	1.	14	· 208,				104
1245	0.3	5	5,7	0	,DC,	11.	ľΨ	6.08	26.		21	0.06	ι.	3	-1169		1	-1	9616
1250	0,3		6. c		06	11.4	Ŷ	616	76,-		Ø	0.05	1.1	Ó	-110.7		1		18.4
1275	0.3		6.3		,06	1	fY.	6.18	26.	7 2.	14	0.05	1.0	9	-105,8		1	1	101
1300	0,3	3 [6.6	0	.06	11.5	14	6.21	<i>76,</i> '	7 2	.15	0.05	1.1	ŧ	1013		1		102
																			-1.0 0
															·				
						1" = 0.0 1/8" = 0.0		1.25" = 0.0 3/16" =		= 0.16; 1/4" =	3" = 0 0.0026	.37; 4" = 0. 5/16" = 0.		5" = 1 3/8"	.02; 6" = = 0.006;	1.47;	12" = 0.010	= 5.88); 5/8" = 0	016
	NG EQU			· · · · · · · · · · · · · · · · ·		Bailer;		= Bladder F				Submersible P			P = Peristal			0 = Other (
										IPLIN		TA							
-	ED BY (IA A		SAMPLE	ন(S) SIG	NATURE(and the second s	00							•
	مار در OR TUBI		f U	<u> </u>	<u>c</u>	677		TUBING	<u>en</u>	<u>e</u>	<u>A</u>		EDEN.	Ý	N		1	SIZE:	
	IN WEL		;):					MATERIA	L CODE	:		Filtration Eq					_ I ER 4	SIZE	μm
FIELD	DECONT	FAMIN.	ATION	l: F	νŲΜΡ	Y	Ν	,	TUBI	NG Y	N	(replaced)			FIELD E	QUIPN	IENT I	DENTIFICAT	ion
	SAMPLE	ECON	TAINE	R SPEC		TION		INTENDE ANALYS		SAMPLI EQUIPMI		SAMPLE PU FLOW RAT			ł	120 QUA	LITY P#	RAMETER	
# CONTAI	NERS	MATER		VOLUME (mL)	E PR	ESERVAT USED	VE	AND/OF METHO		CODE		(mL per minu		Mode	l:	-	SN#:		
			-	(<u>-</u>				TU	RBIDIMI	ETER	
									[Mode	l:		SN#:		
					1	1 1	\mathcal{D}	art					_	-			OTHER		
				i,	12.	1	~ ~ {	7										····· .	
								· ·											
															-				
REMAR	RKS:																		
MATER		DES:	A	G = Aml	ber Gla	ss; CG	= Cl	ear Glass;	PE =	Polyethyle	ene;	PP = Polyprop	ylene;	S =	Silicone;	T = Te	flon;	O = Other (Specify)
SAMPL	ING EQI	UIPME	INT CO	DDES:				altic Pump; low Peristal		Bailer;): SM :		Bladder Pump Method (Tubir			Electric Sut	omersib = Other			
OTES:	1. The	above	do no	t const	itute al	of the i	form	nation requ	ired by	Chapter 6	2-160.1	F.A.C.	•		,	- Curier	(oper	//////////////////////////////////////	
	pH: <u>+</u> 0.2	units T	emperat	ture: <u>+</u> 0.3	2°C Spe	cific Conc	luctan	ice: <u>+</u> 5% Dis	solved O			s (SEE FS 2212 20% saturation (s			100-2); optiona	lly, <u>+</u> 0.2	mg/L or	r ± 10% (whiche	ver is greater)
🗆 well ne			nuAa 2 5 '			-	_	% (whichever is	• ,] locking c	an.	*	□ oth	er	nment:				
DI Wat	•			⊔ MS.			_	⊡ Equip blk		-	ap Ambient		-	ercon ∃Trip			··	_	

APPENDIX E LABORATORY ANALYSES CHAIN OF CUSTODY FORMS

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4 3	2 gr	1 1 Relin	Form revised 09/19/2012	Received on Ice	Matrix Code: WW =				ERMMA-0-1		EKANW-05	EKMW-04	EKMW-03	ELMW-02	Ekuw-0	SAMPLE ID	Page: 1	Turn Around Time:	Sampled By: Bry	Contact: Rac	FAX: 904	Phone: 904	Jacksonville, FL 32207	Address: 120	Client Name: (A
	Co. al Lilion	Contracting the second	2012	Wes No Temp taken from sample	wastewater SW = surface water	EKMW-10	EKMW-09	EKMW-08	EKMW-07	EKMW-06	EKMW-05	EKMW-04	EKMW-03	EKMW-02	EKMW-01	SAMPLE DESCRIPTION	of: 2	STANDARD RUSH	Bryce Zinckgrad	Rachel Klinger	904-396-1143	904-858-1818	FL 32207	1200 Riverplace Blvd	Geosyntec	Advanced Environmental Laboratories, Inc.
	C				und water													VC	C	rus	ł		Project Location:	P.O. Number/Project Number:	Project Name	ries, Inc.
		Received		Temp from blank	DW = drinking water	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab Comp		ana	alyt	ide ical	I.	REMAR				
	8	ed by:	Der		ting water	10/2/14	10/2/14	10/2/14	10/2/14		10/1/14	10/1/14	10/1/14	10/1/14	10/1/14	SAMPLING		Anio		e fo an		REMARKS/SPECIAL INSTRUCTIONS	Jacksonville,	TR0482	NAS JAX	
	X	A	vice used		O = oil				54.60		14:00	13:10	11:23	12:07	09:35	TIME		nm	edi	ate shc	-	L INSTRUC	e, FL			
	1 MILL	Date	or measuri		A=air S	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	MATRIX	}	nolo	d tii	mes	s.	TIONS:				Gainesville: 4965 SW Jacksonville: 6681 S Miramar: 10200 USA T Tallahassee: 1288 Ce Tampa: 9610 Princess
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-	3	3	y unique io		SL = sludge	in Chris	ha	and a	18		Fall	- Alter	D.S	112	N. THE	PRESER- VATION	AN	JAL	YSI	SR	EQ	UIR	ED	SI	TTLE ZE & YPE	
Supplier of Water:	Contact	FOR I	ue identifier (circle IR temp gun used)	Where required, pH checked		×		×	×	×		×	×	×		H	V	DCs	5					v	J	240 S. Wolutiake Diver, Oct., 1010 - Automatic Optimiser, 1010 - 1010 41st Blvd. • Gainesville, FL 32608 352,377,2349 • Fax 352.395,6639 uthpoint Pkwy. • Jacksonville, FL 32216 • 904,363,9350 • Fax 904,365 oday Way, Miramar, FL 33025 • 954,889,2288 • Fax 954,889,2281 dar Center Drive, Tallahassee, FL 32301 • 850,219,6274 • Fax 850,27 alm Ave. • Tampa, FL 33619 • 813,630,9616 • Fax 813,630,4327
of Water:	Contact Person:		rcle IR ter	required,	Preservation Code:	×	×	×	×	×	×	×	×	×	×	-	-	HG						L	N	Gainesville, FL 32608 • 352.377 / 249 • Fax 352.395.f Gainesville, FL 32608 • 352.377 / 249 • Fax 352.395.f (wy. • Jacksonville, FL 32216 • 904.363.9350 • Fax 90- Miramar, FL 33025 • 954.889.2288 • Fax 954.889.2281 Drive, Tallahassee, FL 32301 • 850.219.6274 • Fax 86 Drive, Tallahassee, FL 32301 • 850.219.6274 • Fax 87 Tampa, FL 33619 • 813.630.9616 • Fax 813.630.4327
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		E (When	G: LT-1 LT-2	rature wh	S = (H2	×	×	×	×	×	×	×	×	×	×	-	lo	dide	Э					-	-	ax 352.39 350 • Fax 354.889.2 3274 • Fax 13.630.43
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		rmation no	A A: 3A	(A	(HNO3)	\otimes	X									-	Т	DS							-	9354
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		FOR DRINKING WATER USE (When PWS Information not otherwise supplied)	S: 1V	<u>a</u>	T = (Sodium Thiosulfate)													_				_	-			526 S. Notritiake brvu, Ster. 1010 - Adamonic Opinigs, E. C. 1010 41st Blvd Gainesville, FL 32608 362.377.3249 - Fax 352.395.6639 authpoint Pkwy Jacksonville, FL 32216 - 904.363.9350 - Fax 904.363.9354 aday Way, Miramar, FL 33025 - 954.889.2288 - Fax 954.889.2281 dar Center Drive, Tallahassee, FL 32301 - 850.219.6274 - Fax 850.219.6275 alm Ave Tampa, FL 33619 - 813.630.9616 - Fax 813.630.4327
		J		elcius)	ulfate)											LA	BO	RA	ΤO	RY	I.D). N	UN	1BE	R	

4	3	2 8-3	Relinq	Form revised 09/19/2012	Received on Ice	Matrix Code: WW =					Elcimin-10	EKMW-09	EKMW-08	EKMW-07	EXMW 06	EKMW-11	SAMPLE ID	Client Name: Ge Address: 1200 I Jacksonville, Fl Phone: 904-8: FAX: 904-3: Contact: Rache Sampled By: Bryce Turn Around Time: 🗆 STAN	
		61 10/02/14 16:50	Relinquished by: Date Time	012	Kes INO Temp taken from sample	WW = wastewater SW = surface water GW = ground water					EKMIN - 10	Ekmw - 09	EKMW - 08	EKMW - 07	Exempt - 06	EKMW-11	SAMPLE DESCRIPTION	CIVIITUIIIIIBIItäi Läutirätui osyntec Riverplace Blvd 132207 58-1818 96-1143 96-1143 96-1143 96-1143 96-1143 26-1143 26-1143 96-1143 96-1143 96-1143 96-1143 96-1143 96-1143 96-1143 96-1143 96-1143 96-1143 96-1143 96-1143 96-1143	Advanced
		ARI			Temp						6	0	6	0	6	Grab	Grab Comp	AEL to rush VOC and Bromide Bromide	-
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		ſ		Device used for measuring Temp by unique		r O=oil A						14:08	84:41	09:45		15:35	SAMPLING	Iodide ^A immediately ^R due to short ^A	
		ILFE W	Date	r measuring		≃air SO					SW	GW	GW	GW-	GW	GW	MATRIX	Miramar: Indication to chief the state of the stat	Altamonte Springs: 528 S. Northake Blvd., Ste. 1016 • Altamone Springs, FL 32701 • 407.937.1394 • Fax 407.937.1394 Gainesville: 4965 SW 41st Blvd. • Gainesville, FL 32608 • 352.377.2349 • Fax 352.395.6639 Jacksonville: 6681 Southpoint Pkwy. • Jacksonville, FL 32216 • 904.363.9350 • Fax 904.363 9354
L		16:30	Time	Temp by u		= soil SL				ŀ		1	11	-		М	NO. COUNT	call Rachel % 10200 USA Klinger BOTTLE ANALYSIS REQUIRED SIZE & Path	<u>e Sprinc</u> [<u>le:</u> 4965 \$ /ille: 668
F	S					= sludge	high	发.	7.3.3	14				12		2011	PRESER- VATION	ANALYSIS REQUIRED	SW 41st B
Site-Address:	Supplier of Water:	PWS ID: Contact Person:	FOF	identifier (circle IR temp gun used)	Where required, pH checked	P					X		X	X	X	×	Ŧ	VOCs	. Northlak Ivd. • Gali Int Pkwy.
ress:	Water:	D: erson:	FOR DRINKING WATER USE	e IR temp	quired, pl	Preservation Code:				-	×	×	X	X	×	×	Clays	DHGs U pa, FL 33	(e Blvd., S nesville, F • Jackson
			IKING	o gun use	H checke	on Code					X	X	X	X	X	×	Z	Metals (Fe, Mn, Ca, Mg)	ste. 1016 =L 32608 wille, FL
			WAT	d 1:9A		¦ = ice					×	$\boldsymbol{\lambda}$	X	X	X	X	-	Anions (nitrite, sulfate, chloride)	• Altamo • 352.37 32216 • 9
			ER US	AGL	Tempe	H=(HCI)					×		X	X	X	×	H	TOC 2 16 - Fax 850.219.	nte Sprin 7.2349 • 904.363.9
			E (When	G LT-1 LT-2	rature wh	S = (H2					×	X	×	X	X	×	-	Metals -	ngs, FL 32 Fax 352.:)350 • Fa:
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			rmation n	A A: 3A	red 24	H=(HCI) S = (H2SO4) N = (HNO3)					$\left \right\rangle$	X					-	TDS ~ 9.6275	19354
			(When PWS Information not otherwise supplied)	A M: 1A	(in) T = (Sodium Thiosulfate)					X	X					Z	Potassium -	94 • Fax 4(
			e suppliec	S: 1V	(in degrees celcius)	ium Thios										-			J7.937.10
			Ð		:elcius)	:ulfate)											LA	BORATORY I.D. NUMBER	97

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Chain-of-Custody Form 130 Research Lane, Suite 2 Guelph, Ontario, Canada N1G 5G3 Phone (S19) 822-2265 or toll free 1-866-251-1747 Fax (S19) 822-3151

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Distribution: White - Return to Originator: Yellow - Lab Copy: Pink - Retained by Client

Date/Time

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Acc	utest Labo	oratories S	outheast						
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ACCUTEST		, Suite C-15 Orlando, 1 00 • FAX: 407-425-				-			
LABORATORIES		W.accutest.com	0707	Accut	est Quo	te #		SKIFF#	
Client / Reporting Information				ine Câre		<u>Ar</u>	nalytical info	rmation	Matrix Codes
Company Name Trinite AnglySist Develop	NEM Project Name: Street	torms-Site 11	XAS JAX	4) A	DW - Drinking Water GW - Ground Water
Address 1002 N Eglin PKWY	City		State						WW - Water SW - Surface Water
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Prover BSO -613-6802	Project # ADIL	-110		- 3	2 1			X X	OI - OII LIQ - Other Liquid
Sampler(s) Name(s) (Printed)/	Client Purchase Orde	r#		18	2 2	26	Å.	3	AIR - Air SOL - Other Solid
Tony Schmucker, Sam Math	COLLECTION		INFORMATION	<u> </u>	Bamide	6 6	KU 2	- ar	WP - Wipe
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Accutest Field ID / Point of Collection	DATE TIME BY	1 Martines 1001 LES 1.0.12	HUH HNOG HZBO NACH NACH		A Ret	2	2		LAB USE ONLY
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2 EHMW-02	3/15/11 13/5m	Gw 13 3	8 2	X	xx	¥ %	XX	X	
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OTHER									
Emergency or Rush T/A Data Available VIA Email or L									
Relinguished by Sampler: / Date Time:	Received By:	time samples change posse	ession, including courier of Relinguished	lelivery.	-77		Jime://	Received	3/16/16
1. maliak 03/18	11 800	$\leq \geq$	3		_4	- 03	115/10	4	800
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Lab Use Only: Custody Seal in Place: Y N Terr	p Blank Provided: Y N	Preserved where Ap	oplicable: Y N Tol	al # of Co	olers;	Cooler Te	emperatur	e (s) Celsius: _	2-6,2-8
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FA32283: Chain of Custody Page 1 of 2



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LABORATORIES	TEL.	407-425-67		FAX: 4	07-42	25-071	07				Acc	utest	Quo	te#				SKI	F#		
Client / Reporting Information			Informa		JA		- 5,8%.	iter Sake	977	a sh	ंडे राज	(1.) X. (24	lan, r			Analytic	ai Infor	mation			Matrix Codes
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Phone# 850-613-1800	1-540 C 22 Fax #		016-	110							-	3	4			1/5			M.		OI - Oli LIQ - Other Liquid
Sampler(s) Name(s) (Printed) Tony Sch mucker /Sam /	EMAL Slient	Purchase Orde	r#							<u></u>	1	1.2	14	$ \tilde{\gamma} $	~	Ŕ		5	1.12 94		AIR - Air SOL - Other Solid WP - Wipe
Accurest Field ID / Point of Collection	COLLE	SAMPLED		TOTAL # OF BOJTLES	ONE NONE		E S	1403	NOH+ZNAC	WATER	MEL	Potassium	Bienide	Jodide	NOC	1631	145	100	Veks		
Sample # PZ-03	7/16/16 DA	IE BY:	MATRIX	BOTTLES	5 <u>N</u> 3			<u>∓</u> 2	ş.	5 5	$\frac{1}{x}$	×	×	x	×			×	X		LAB USE ONLY
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3 FKMW-09	3/16/12		GLN	13	-3	-		z		-	X	×	X	×	<u>بر</u>	x	1 V	5	x		
4 FB-1	114/1207	30 TT /Sin	W	3	+	3			\square				È		x		<u>٦</u>	<u> </u>	<u> </u>		
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Lab Use Only: Custody Seal in Place: Y N Tem	p Blank Provi	ded: Y N	Pre	served w	nere	Applic	cable	∋: Y	N	Tota	al # of	Cooler	s: (() Ca	oler	Tempe	rature	(s) C	elsius:	3.	4
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FA32320: Chain of Custody Page 1 of 2



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								142/175	Organic Certeen SM5513 B-11/SWN066/		,	itrite,		1,4-Dioxane 8260 Dits. Metals- Iron, Maganese SW846	6010B hosphate SM 4500-E and Total P	602-E FPA 9030B			[]r	
ent Name: Geosyntec									0 B-11/2	Solids	8 8	ate, N 300.0	3208	260 39586	99.80	P-doos		3	744 1 1	
oject Manager: Jordan Gibson 850	0-613-6800						ther of costology	VULA SWEID ALMUS Ethene, Ethene RSKSOP	SM5510	Total Distolved Solids	Na, Ca, Mg 6010C	iulføte, Bromide, Nitrate, I Chloride, EPA 300.0	Alkalinity SM 2320B	1,4-Dioxane \$260 als- Iron, Maganes	10B 4 4500	A 365.2/SM 45 SM450052-AD	Ambient Blank Lot Control	Equipment Blank Lot Control	Trip Blank Lot Control	Cooler ID
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EKMW-01	3/23/17	1135	(soil only)	N		WG	8	x x	x	+	+		-+	+	+				1	+
2 EKMW-02	3/23/17	1811		N	· ·	WG	8		-											
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Cas - Refinavished By (Simult) Data Time	tody Transfers Prior to Re	whet by Laboratory			T										Sample	Delivery I	etails / Laboratory R	ceipt 1		
QNAUAN 3123117 1701	D	1. Opm	- Llou	_ 3-23	L-in l	800			l Directly d Shipme			Courier	- 114	<u></u>			Shipped: No.: Airbill Number:			-
James Lloren 3-23-17	2020	2. 014	1211	3/24/1	7 4800	tise	· 🔥	nalytica	l Lab:			Accuses					Delivery Location:	Orlando, FL		_
		3	5-20110902-01)				La.	ib Reci	picat:					.,			Delivery Date/Time			_

FA42341: Chain of Custody Page 1 of 2



Facility: NAS Jacksonville Project Name / Site Name: Site 11						_		-	75 MDA		Τ		Т		46	A			01	3/24/	1
ient Name: Geosyntec					-				26/12/1-009	ę.	g ,	e, Nitrite	8	1.4-Diazane \$260 \$1M	rese SW846	and Ted	PA 9030			1	
oject Manager: Jordan Gibson	850-613-6800		-				calnects	VOCs SW846 \$260B	De KSKS MS310 B	Total Dissofved Solids	Potassium SW846 6010C	res, ca, mg outou	SM 2320H	ne \$26	r. Metals-Iron, Maganes 6010B	4500-E	E-AD E	Ambient Blank Lot Control	Equipment Blank Let Control	Trip Blank Lot	l e
lected by: A Line Let	D. BLALL	+ 1 0	0	~			ber of cont	Cs SWB	ene, Ethio Dathon S	l Diaso	sium S1	komide komide	Alkalinity SM	4-Diax	s-lron, 601	ate SM 365.2/5	[4500S	Number	Number	Control Number	Cooler
Field Sumple ID (20 Characters Mex)	Date Collected (dd-mm-yyyy)	Time Collected (Military)	Sample Depth (beginning - ending)	SA Code ⁽⁷⁾	Sample Number (1)	Sample Matrix ⁽⁴⁾	Nursh	Ň	Methane, Bittene, Ethano RSKSOP 147/175 Tetal Organic Carbon SMS310 B-11/SW9000/	toj.	Potes	re, ca, mg ortoc Sulfate, Bromide, Nitrate, N Charide, FPA 200.0		-	Diss. Metal	Orthoptosphate SM 4500-B and Total P EPA 365.2/SM 4500P-E	Sulfide SM450052-AD EPA 9030B				
	((lilumes)	(soil only)		NUMBER			~						<u> </u>	-	ō	-				
CRIMINAUZ				N		WG WG	1	x	x x				1-								+
- ERMITTE				N		- 90		×	x-	•											
				N				*	* -*	·	-	_	_								_
-EKNW-07-				N		WG WG		*	* *			_									<u> </u>
EKMW-08	3/23/17	1050		 N		wo	15	x	X	×	x)	(x	×	x	x	x	x				+
EKMW-10	3/23/17	0930		N		wg	11 - 11	x	_	×	x										
EKMW-11	323117	1400		N	1	WG		x	x	x	x)	(X	x	x	x	x	x				
D AA					ļ			_				_	-							1	
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nents ¥ to be billed	to Geo	svnte	CX								_								-		
	Custody Transfers Prior to Re						Г														
Releasabled By (Signal) Date Time		^ '	Received by (signed)		Time			Selive	red Direc	ly to Lai			U	us.	San	apie Deliv		alls / Laboratory Rece Shipped: No.:	lot I		
6 mgr 5 25/10	3-17 2030	- 1. Jam	the the	- 3-23 7/00/	-17 1 17-08				d of Ship ical Lab:	nent:		Couri	_	ſ				Airbill Number:	Orlando, FL		-
		3. 111	RUT	1 .1		0070			ecipient:	_		Accut	BI					Delivery Location: Delivery Date/Time:	Unanio, PC.		-

FA42355: Chain of Custody Page 1 of 2 <u>ъ</u>

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ANALYSIS & DEVELOPMENT CORP. Environmental & Engineering Services	Chain of (Custody and Analytica	Re	eque	est		F	A	4	485	Pag Project Number Chain of Custody Number (1	A016.000.1	
Facility: NAS Jacksonville													_
Project Name / Site Name: Site 11					A75			300.0	/846				
Client Name: Geosyntec				260B	ae RSKSOP-147/175 45310 B-11/SW9060	Solids	60100	de, EPA (anese SW				
Project Manager: Jordan Gibson 850-613	-6800		otainer	N846 8.		solved	SW846	, Mg bulue de, Chloride,	n, Mag	Ambient Blank Lot Control Number	Equipment Blank Lot Control Number	Trip Blank Lot Control Number	Cooler ID
Collected by: A. HOYUL , A. B Field Sample ID (D Chemoster May)	DWMQN, D. BUC Date Collected (dl/mm-yyyy) Time Collected (Milliery) (dlumm)	Sample Depth		VOCs SW846 8260B	Methane, Ethene, Ethi Total Organic Carbon S	Total Dissolved Solids	Potassium SW846 6010C	Ca, mg bulue Suffate, Bromide, Chloride, EPA 300.0	Diss. Metals- Iron, Maganese SW846 6010B	Control Number	runder	Control Number	ð
EKMN-05	6/12/17 0923	- N DI WE	19	X	xх		x	dΧ	X				
EKMW-07 EKMW-09	0112117 0924	- N DI WE	ìЦ	X	XX		X	\mathbf{x}	X				
EKMW-09	0112111 0445	- N DI WE	ĽΗ	X	₩X		Χŀ.	ŶŔ	Ι Υ				
ELWA-03	6/12/17 1128			x	$\frac{1}{x}$	1	źb	रीरी	Î				
EKMW-10	6/12/17 1300	- N OI NE	19	X	X	X	X	x x	X				
EKMW-04	6/12/17 1340 6/11/17 AULA 1409	- N 01 WE	<u>]</u> //	Ι¥.	ХX	1	<u>×</u> .	XX	Ι Υ				
EKMW-08 EKMNI-11	6/12/17 A-1408	$\frac{1}{2} = \frac{N}{N} \frac{O}{O} WC$	$\frac{1}{3}$	1	- X				X			-	
			40	\uparrow		\square	ľ		Â				
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Comments DISADIVED METAL	A fultered in f	rela + invoice	~`د 	to	ťγ		T.	Å	DC	بر			
Baliasuisked Bu (Nama)) Data Thur	Custody Transfers Prior to Receipt by Laboratory	ceived by (signed) Date Time		Dalin	ered Direx				Sam	ple Delivery Details / Lat Shipped: No.:	poratory Receipt		
1. QNOUM 6/12/17 1H30	2 J. Corer	and 6-12-17 1645 - (ALSE2) 06-13-17 03:		Meth	eted Direc od of Ship tical Lab:	ment:		Courie		Airbill Number:	Orlando, FL		-
3	3	(.)		Lab F	ecipient:					Delivery Date/Time:			
 Chain of Castedy Namber = site name (e.g., SS125) and that date (yyyswind 2.) Sample Type (SA) Codes: N = Normal Sample, TB = Trip Blank, ED = Fiel 3.) Sample Number: Unique sample number collected from a particular location 4.) Main: Codes: GS = Soil Gas, WG = Ground Water, WS = Surface Water 	eld Duplicate, FR = Field Replicate, EB = Equipment Blank, 1 20 per day, (a.g. Groundwater samplo collected from MW-1 or	MS – Matrix Spike (-MS), SD = Matrix Spike Duplicate (-M n 10/10/11 = 01, if sampled again on 10/10/11 = 02, etc.)						•			1,82	. 0	

2) Sample Type (SA) Coles. 19: Normal Sample: The Trip Black, 50: Pield Deglicer, FR – Field Splachen, EB – Equipment Black, 50: Sen S- Maint Splace Duplicate (SMS), 20 = Maint S

FA44858: Chain of Custody Page 1 of 2 <u>თ</u>.1

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APPENDIX F GROUNDWATER MONITORING DATA SUMMARY

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Baseline Event - October 2014

		EKM	W-01	EKM	W-02	EKM	W-03	EKM	W-04	EKM	W-05	EKM	W-06	EKMW	V-07	EKM	W-08	EKM	IW-09	EKM	W-10	EKMV	W-11
pH	unit	4.7		5.8		5.8		4.9		5.2		5.1		5.1		5.7		5.0		6.0		10.6	
ORP	mV	54		-21		-21		42		64		81		34		12		100		-27		-9	
Dissolved oxygen	mg/l	0.6		0.2		0.2		0.2		0.3		0.9		0.5		0.4		1.2		0.6		0.1	
Analyte	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
BROMIDE (AS BR)	mg/L	4.0	-	0.06	U	0.06	U	0.06	U	1.2	U	0.3		0.06	U	0.06	U	0.06	U	0.06	U	0.06	U
TOTAL ORGANIC CARBON	mg/L	2.5		2.5		2.5		3.6		1.7		1.4		6.8		2.3		1.6		1.9		3.1	
CHLORIDE (AS CI)	mg/L	3400		550		520		570		1900		1700		790		1000		2800		570		170	
SULFATE (AS SO4)	mg/L	57		27		24	1	45		50		23		140		38		36		21	1	16	1
CALCIUM	mg/L	350		100		89		120		400		400		150		150		460		140		130	
IODIDE	mg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
IRON	mg/L	130		57		58		47		160		61		23		67		130		49		2.9	
MAGNESIUM	mg/L	98		30		27		31		110		100		21		45		130		42		0.74	
POTASSIUM	mg/L											11						9.4		7.8			
TDS (FILTERABLE)	mg/L																	5700		1700			
1,1-DICHLOROETHENE	ug/L	25	U	4		2	1	1		5	U	1	1	2	U	2	U	25	U	2		0.2	U
cis-1,2-DICHLOROETHENE	ug/L	1,190		950		760		380		773		120		970		90		288		260		10	
TETRACHLOROETHENE	ug/L	7.640		170		190		250		1.800		640		1,300		1,600		5.220		120		160	
trans-1.2-DICHLOROETHENE	ug/L	323		11		2	1	4		81		21		44		4	1	50		3		0.2	U
TRICHLOROETHYLENE	ug/L	1,670		150		150		130		344		130		260		77		482		170		8	
VINYL CHLORIDE	ug/L	33	U	6	1	1	U	3		7	U	9		89		2	U	33	U	5		0.4	1
METHANE	ug/L	190		1200		330		54		270		29		110		110		120		1300		10	U
ETHENE	ug/L	15		10	U	10	U	10	U	73		10	U	11		10	U	10	U	10	U	10	U
ETHANE	ug/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Total VFAs	mg/L	3.26		1.6		1.26		1.9		1.8		6.01		2.2		3.1		2.3		2.08		1.36	
Dehalococcoides	cell / L	8.0E+05		ND		ND		ND		3.0E+05		ND		ND		ND		ND		ND		ND	
Dehalobacter	cell / L	ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	
vcrA	gene copy / L	3.0E+03		ND		ND		ND		4.0E+05		ND		ND		ND		ND		ND		ND	

		EKM	N-01	EKM	N-02	EKM	V-03	EKM	W-04	EKMV	V-05	EKM	N-07	EKM	W-08	EKM	W-09	EKMV	V-10	EKM	V-11
рН	unit	5.6		5.9		5.6		5.9		6.2		6.2		5.0		4.5		5.8		5.6	
ORP	mV	-103		-34		-5		-20		-118		-114		73		201		-6		8	
Dissolved oxygen	mg/l	0.2		0.1		0.1		3.5	?	4	?	3.1	?	1.6		4.1	?	3.6	?	0.2	
Analyte	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual										
BROMIDE	mg/L	2.3		3.3		1.2	U	0.6	U	1.2	U	1.2	U			0.38		0.32	1		
TOTAL ORGANIC CARBON	mg/L	12.8		36.2		57.9		4.7		15.9		6.3		1.5		1.2		1.5		5.1	
CHLORIDE	mg/L	1450		664		674		462		1240		975				2190		788			
SULFATE	mg/L	13.2		10.7		15.6		15.3		11.5	1	8.9	1			18.4		12			
CALCIUM	mg/L	210		177		208		126		259		275				431		193			
IRON	mg/L	87.4		121		101		59.6		131		52.9				125		53.3			
MAGNESIUM	mg/L	61.9		53.7		62.9		35.6		72.5		34				128		59.3			
POTASSIUM	mg/L	5.43	1	4.46	1	6.16	1	7.1	1	6.12	1	9.9	1	6.1	I	8.55	1	16.1		8.1	1
TDS (FILTERABLE)	mg/L															5760		2290			
1,1-DICHLOROETHENE	ug/L	17		2		1	U	1	U	4	U	11		3	I	22	U	2		22	U
cis-1,2-DICHLOROETHENE	ug/L	6,070		586		372		327		1,440		1,700		979		310		356		7,220	
TETRACHLOROETHENE	ug/L	1,100		25		56		211		180		202		464		8,880		83		4,120	
trans-1,2-DICHLOROETHENE	ug/L	201		13		5	1	5		106		26		33		58	I	8		33	U
TRICHLOROETHYLENE	ug/L	873		22		39		98		70		110		38		525		147		958	
VINYL CHLORIDE	ug/L	313		425		64		49		920		814		33		31	U	88		64	1
METHANE	ug/L	102		1850		2850		401		211		1860		109		86		1130		384	
ETHENE	ug/L	9.9		149		77.5		31.9		144		80.7		2.3		1.3		5.3		1.4	
ETHANE	ug/L	0.32	U	0.32	U	0.32	U	0.32	U	0.9	1	0.9	1	0.3	U	0.3	U	0.3	U	0.6	1
Total VFAs	mg/L	60.7		141.3		233		18.3		6.6		21.7		<1		1.4		1.4		<1	
Dhc	cell / L	2.5E+08		2.1E+08		3.5E+07		6.6E+07		2.0E+09		2.9E+08									
tce	cell / L	5.0E+06		7.9E+06		4.4E+05		3.7E+06		7.1E+07		1.3E+07									
bvc	cell / L	1.2E+08		6.5E+07		1.1E+07		2.5E+07		1.3E+07		1.1E+08									
vcr	cell / L	5.2E+07		4.4E+07		4.2E+06		2.6E+07		1.3E+07		8.8E+05									
Dhb	cell / L	8.7E+07		5.0E+06		5.0E+06		2.1E+06		5.1E+06		4.1E+06									

		EKMV	V-01	EKM	N-02	EKM	W-03	EKM	N-04	EKM	N-05	EKM	W-07	EKN	1W-08	EKM	W-09	EKM	W-10	EKM	N -11
pН	unit	5.7		6.3		5.8		5.6		5.6		6.6		5.5		4.8		7.2		5.6	
ORP	mV	-120		-22		-56		0.1		-1		-56		34		102		-630		35	
Dissolved oxygen	mg/l	0.1		0.1		0.1		1.2		1.0		0.1		0.1		0.1		0.1		1.4	
Analyte	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
BROMIDE	mg/L																				
TOTAL ORGANIC CARBON	mg/L	10.7		25.1		12.2		2.4		2.4		12.5		1.4		1.4		1.5		3.1	
CHLORIDE	mg/L																				
SULFATE	mg/L																				
CALCIUM	mg/L																				
IRON	mg/L																				
MAGNESIUM	mg/L																				
POTASSIUM	mg/L															10.3		11.7			
TDS (FILTERABLE)	mğ/L															6190		2280			
1,1-DICHLOROETHENE	ug/L	11	U	0.5		0.9		1.1	U	4.3	U	26.5				22	U	1.6	I		
cis-1,2-DICHLOROETHENE	ug/L	2100		45		164		286		2250		4910				331		351			
TETRACHLOROETHENE	ug/L	742		16		10		27		2280		253				12800		114			
trans-1,2-DICHLOROETHENE	ug/L	241		2		2.5		2.5		148		84				60		9			
TRICHLOROETHYLENE	ug/L	387		8		13		27		479		143				714		119			
VINYL CHLORIDE	ug/L	4660		28		48		15		321		1400				31	U	77			
METHANE	ug/L	132		6380		6270		1930		587		7110									
ETHENE	ug/L	228		170		68		22		255		161									
ETHANE	ug/L	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	1.1									
Total VFA	mg/L																				
Dhc	cell / L	8.3E+08		6.3E+06				6.2E+06		1.4E+08		3.2E+08									
tce	cell / L	1.1E+07		8.6E+04				1.5E+05		3.5E+06		4.4E+06									
bvc	cell / L	4.0E+08		4.3E+05				2.1E+06		1.5E+07		1.6E+08									
vcr	cell / L	4.4E+07		1.0E+06				1.2E+06		1.0E+07		2.0E+06									
Dhb	cell / L	1.9E+08		2.2E+06				2.2E+06		2.3E+07		1.8E+07									

Re-Baseline Event (September 2016) - 6 months since shutdown after Stage 1 operation; before system re-start for Stage 2

March 2017 - End of 5-month Stage 2 operation

		EKMW-01	EKMW-02	EKMW-03	EKMW-04	EKMW-05	EKMW-07	EKMW-09	EKMW-10	EKMW-11
pH	unit	5.5	5.0	5.8	5.5	4.8	5.9	3.8	5.3	5.2
ORP	mV	-79	-58	-43	4.5	4.9	-75	62	30	114
Dissolved oxygen	mg/l	0.1	0.2	0.1	0.1	0.3	0.1	1.4	0.2	0.1
Analyte	Units									
BROMIDE TOTAL ORGANIC CARBON CHLORIDE SULFATE CALCIUM IRON MAGNESIUM POTASSIUM TDS (FILTERABLE)	mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L	6.3	3.2	3.5	2.1	2.0	53.0	1.1 1790 22.8 295 79.2 85.3 6.3 2950	12.4	3.3 2430 36.5 386 95.5 86.3 8.1 3770
1,1-DICHLOROETHENE cis-1,2-DICHLOROETHENE TETRACHLOROETHENE trans-1,2-DICHLOROETHENE TRICHLOROETHYLENE VINYL CHLORIDE	ug/L ug/L ug/L ug/L ug/L ug/L	19.9 I 1140 400 104 168 3640	1.2 164 144 2 8 68	1.6 U 384 32 3 I 23 51	1.6 U 237 70 3 I 37 12	2.0 I 444 603 36 159 57	4.0 I 755 55 19 53 191	32 U 310 9690 44 533 31	1.6 U 318 104 10 129 86	11 6890 4660 45 1210 55
METHANE ETHENE ETHANE Total VFA	ug/L ug/L ug/L mg/L	164 294 0.3 U 14.1	7890 123 0.3 U	5480 54 0.3 U 7.5	4100 12 0.3 U 1.1	339 23 0.3 U 0.1	7120 106 0.3 U 204.7			

June 2017 - 3 Months post Stage 2 operation

		EKM	W-01	EKM	W-02	EKMV	V-03	EKMV	/-04	EKMV	V-05	EKMV	V-07	EKM	N-08	EKM	N-09	EKMV	W-10	EKM	W-11
рН	unit	5.7		6.4		6.3		6.9		5.7		6.2		5.4		5.2		6.3		5.6	
ORP	mV	-161		-70		-79		-173		-39		-88		-57		109		-101		11	
Dissolved oxygen	mg/l	1.1		0.7		1.4		1.5		0.4		0.9		1.2		0.5		0.1		0.1	
Analyte	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual										
BROMIDE	mg/L	4.5	1	2.6	1	1.2	U	0.6	U	3.0	U	3.0	U	1.2	U	3.0	U	1.2	U	6.0	U
TOTAL ORGANIC CARBON	mg/L	20.1		3.9		3.0		2.6		2.1		57		2.1		1.9		10.1		3.3	
CHLORIDE	mg/L	1950		756		717		465		1570		1670		1300		1630		793		2220	
SULFATE	mg/L	15	U	6	U	7.7		17		27.3	1	15	U	15.5		23.4	1	22.9		41.8	1
CALCIUM	mg/L	229		202		174		115		229		419		258		296		166		345	
IRON	mg/L	93.4		103		99		56.3		92.4		85.1		80.9		78.1		49.5		104	
MAGNESIUM	mg/L	57.7		54.4		53		31.3		55.8		56.9		72		77.8		47.7		73.7	
POTASSIUM	mg/L	5.9	1	4.94	1	5.86	1	3.6	1	6.2	1	16.3				5.9	1	21.4			
TDS (FILTERABLE)	mg/L															3890		2040			
1,1-DICHLOROETHENE	ug/L	21		0.7	1	1.6	U	0.8	U	6	1	8		3	U	32	U	1.6	U	32	U
cis-1,2-DICHLOROETHENE	ug/L	783		167.0		376		277		2,160		2,250		813		204		312		5,920	
TETRACHLOROETHENE	ug/L	406		44.9		13.8		41.1		3,540		92.4		593		8,930		55.3		5,850	
trans-1,2-DICHLOROETHENE	ug/L	94.1		2.0		2.1	1	2.7		170		34.8		28.4		37.9		11.3		22	U
TRICHLOROETHYLENE	ug/L	311		7.9		15		27.4		699		75.2		64.3		499		93.1		1,430	
VINYL CHLORIDE	ug/L	4780		36.2		36		12		379		724		32.3		41	U	157		62.1	
METHANE	ug/L	399		8740		7930		5010		987		8200									
ETHENE	ug/L	1280		119		69		7.6		192		260									
ETHANE	ug/L	0.3	U																		
Dhc	cell / L	1.96E+09		2.98E+06		3.70E+06		2.60E+06		2.44E+07		1.52E+08				<5000		1.60E+03			
tce	cell / L	2.66E+08		7.33E+04		2.23E+05		5.03E+05		3.76E+06		1.11E+07				<5000		2.00E+03	J		
bvc	cell / L	2.08E+08		9.13E+04		6.12E+04		2.30E+05		8.01E+05		7.22E+06				<5000		<5000			
vcr	cell / L	5.23E+08		8.37E+05		1.69E+06		8.59E+05		4.80E+06		1.11E+06				<5000		<5000			
Dhb	cell / L	6.60E+07		4.39E+05		1.72E+06		2.33E+04		2.36E+06		<5000				<4000		<5000			
Total VFA	mg/L	57.6		<1		<1		3.1		<1		195.9									

		C	1	C	2	C	3	C	6	C	7	C)
Analyte	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
TOTAL ORGANIC CARBON	mg/L	6.1		950		160		3.4		820		790	
1,1-DICHLOROETHENE	ug/L	6		0.2	U	5		3		0.4	U	4	
cis-1,2-DICHLOROETHENE	ug/L	4300		86		3700		2600		220		1900	
TETRACHLOROETHENE	ug/L	3500		11		160		1400		28		250	
trans-1,2-DICHLOROETHENE	ug/L	630		31		470		410		35		140	
TRICHLOROETHYLENE	ug/L	1300		5		430		660		29		67	
VINYL CHLORIDE	ug/L	290		1200		570		380		330		5000	
METHANE	ug/L	458		2490		3840		634		4090		259	
ETHENE	ug/L	65		1710		474		100	I	1880		402	
ETHANE	ug/L	2		18		12		5		6		3	
Dhc	cell / L	<3E+04		5.00E+06		2.00E+05		2.00E+03	J	2.00E+07		<4E+04	
tce	cell / L	NA		1.00E+06		5.00E+04		<3E+04		4.00E+06		NA	
bvc	cell / L	NA		5.00E+05		4.00E+03		<3E+04		1.00E+06		NA	
vcr	cell / L	NA		4.00E+06		1.00E+05		<3E+04		1.00E+07		NA	
Dhb	cell / L	<3E+04		1.00E+04		<4E+03		<3E+04		3.00E+05		<4E+04	

Grab Groundwater From Soil Core Locations (June 2017)