June 8, 2020
60565355

Mr. Jeff Gill
CENWO-PM-HB
U.S. Army Corps of Engineers
1616 Capitol Avenue
Omaha, NE 68102

Subject: **Final OU1 Rebound Study Letter Report – Baseline Event**
Remedial Action Operation Groundwater Treatment Facility at OU1
and Groundwater Monitoring at OU1 and OU3
Cornhusker Army Ammunition Plant, Grand Island, Nebraska
Contract W9128F-18-D-0020, Delivery Order Number F0041

Dear Mr. Gill:

This Operable Unit (OU) 1 Rebound Study Letter Report – Baseline Event summarizes the baseline field activities completed for the OU1 Rebound Study and 2019 subsurface injections including: Groundwater Treatment Facility (GWTF) OU1 operations/maintenance activities and shutdown; OU1 Rebound Study and subsurface injection performance monitoring baseline groundwater sampling; and the subsurface injection activities. The Letter Report presents the baseline analytical results for the OU1 Rebound Study and performance monitoring, evaluations of the OU1 Rebound Study and injection performance, a statistical trend evaluation for OU1 Rebound Study, and presents conclusions and recommendations for upcoming OU1 Rebound Study and subsurface injection activities at Cornhusker Army Ammunition Plant (CHAAP).

1.0 INTRODUCTION

1.1 PROJECT WORK AUTHORITY

Brice Engineering, LLC (Brice) and AECOM Technical Services (AECOM) have prepared this document as the OU1 Rebound Study Letter Report – Baseline Event for CHAAP located at Grand Island, Nebraska (**Figures 1-1** and **1-2**). This work is being conducted under contract W9128F-18-D-0020, Delivery Order Number F0041 to the United States Army Corps of Engineers (USACE), Omaha District.

Conceptual basis for performing the OU1 Rebound Study was provided in the *CHAAP OU1 2018 Groundwater Monitoring Results and Program Recommendations Technical Memorandum* (Program Recommendations Tech Memo [Brice-AECOM 2019a]), the Final *2018 Annual Groundwater Monitoring Report, Remedial Action Operations (RAO), GWTF at OU1 and Groundwater Monitoring at OU1/OU3* (2018 Annual Groundwater Monitoring Report [Brice-AECOM 2019c]), and presented at several stakeholder meetings (April and November 2019). The approved OU1 Rebound Study work planning details are provided in the Final *Addendum 3, Uniform Federal Policy – Quality Assurance Project Plan (UFP-QAPP) for RAO, GWTF at OU1*

and Groundwater Monitoring at OU1/OU3 at CHAAP (OU1 Rebound Study Work Plan) (Addendum 3, UFP-QAPP [Brice-AECOM 2019b]).

1.2 PROJECT PURPOSE AND OBJECTIVE

OU1 consists of explosives-contaminated groundwater plumes (explosives concentrations exceeding regulatory action levels) at CHAAP. Health Advisory Levels (HALs) for explosives compounds hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX), 2,4,6-trinitrotoluene (TNT), and octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX) were established as regulatory action levels for CHAAP in the OU1 Record of Decision (ROD) (United States Army Environmental Center [USAEC] 1994) and the subsequent OU1 ROD Amendment (URS Greiner Woodward-Clyde Federal Services [URSGWCFS] 2001). The HALs for RDX and TNT are 2 micrograms per liter (µg/L) and 400 µg/L for HMX. The primary compounds of concern (i.e., compounds with historic concentrations in groundwater exceeding their corresponding HAL) are RDX and TNT. HMX has not historically exceeded the HAL during any past groundwater monitoring events.

Recent groundwater monitoring and subsequent statistical analysis have shown that concentrations of RDX and TNT near the former facility boundary between extraction well (EW) 6 and EW7 have significantly declined over the past 23 years. Numerical groundwater modeling predictions with EW7 not pumping indicate that the on-post plume will not migrate further downgradient (Brice-AECOM 2019c). Based on these results and simulations, an OU1 Rebound Study is being performed to temporarily discontinue pumping at EW7 and monitor groundwater near the former facility boundary. Eight total groundwater sampling events (one baseline and seven quarterly events) will be completed to closely monitor potential migration of the RDX and TNT plumes and to document any increases/decreases in explosives concentrations in groundwater. The objective of the OU1 Rebound Study is to establish a sufficient data set to initiate further identified Decision Points and Contingency Actions as presented in the OU1 Rebound Study Work Plan (i.e., groundwater extraction is no longer needed, groundwater extraction should be resumed, alternative actions) (Brice-AECOM 2019b).

Concurrent with the OU1 Rebound Study, subsurface injections (a voluntary action) were completed in the area of highest RDX and TNT concentrations near the former facility boundary and are proposed in areas with remaining residual RDX and TNT concentrations to accelerate remedial timeframes. Four total groundwater sampling events (one baseline and three quarterly events) will be completed for each injection event to closely monitor performance of the subsurface injections and remediation of the RDX and TNT plumes and to document any increases/decreases in explosives concentrations in groundwater. The supplemental subsurface injection details and design are included in the Final 2018 Annual Groundwater Monitoring Report (Brice-AECOM 2019c) with the approved procedures outlined in the Final UFP-QAPP (Bay West LLC and URS Group Inc. [BW-URS] 2014). Following the OU1 Rebound Study and the OU1 subsurface injections with associated performance monitoring activities, long-term monitoring (LTM) will continue for OU1.

2.0 FIELD ACTIVITIES

This section summarizes the baseline OU1 Rebound Study and subsurface injection field activities completed at CHAAP. All field activities were completed in accordance with field protocols and

standard operating procedures (SOPs) presented in the *Groundwater Recovery and Treatment System Operation and Maintenance (O&M) Manual* (GWTF O&M Manual [Brice 2019]), the Final UFP-QAPP (BW-URS 2014) and its Final Addendum 2 (Brice-AECOM 2018) and Final Addendum 3 (Brice-AECOM 2019b), and the recommendations provided in the Final 2018 Annual Groundwater Report (Brice-AECOM 2019c).

2.1 OU1 REBOUND STUDY FIELD ACTIVITIES

On October 28, 2019, pumping at EW7 and operation of the GWTF was discontinued and is being maintained in a stand-by condition. Routine operation and maintenance activities such as lawn mowing, snow removal, pest control, are being continued. The GWTF process shutdown procedures are described in the GWTF O&M Manual (Brice 2019).

Prior to the shutdown of EW7, a baseline groundwater monitoring event was performed. Select off-post and on-post monitoring wells (upgradient, side-gradient, and downgradient of the former facility boundary/EW7) were sampled and off-post direct push borings (downgradient of the former facility boundary/EW7) were advanced and groundwater samples collected to establish baseline conditions for the OU1 Rebound Study.

2.1.1 Baseline Direct Push Groundwater Sampling Activities (Off-Post)

A total of nine direct push groundwater samples were collected on October 14 and October 28, 2019 from three off-post locations (OS001, OS002, and OS003) as shown on **Figure 2-1**. Off-post direct push groundwater sampling was completed to monitor explosives concentrations only (as screening data) from select OU1 off-post locations where permanent monitoring wells are not present and are not able to be installed due to private land ownership. Direct push groundwater sampling was completed at select vertical intervals (shallow – screened approximately 21 to 25 feet below ground surface [bgs], shallow-intermediate – screened approximately 31 to 35 feet bgs, and intermediate – screened approximately 41 to 45 feet bgs) from the unconfined shallow aquifer (Grand Island Formation) to establish the vertical extent of the explosives plume. In accordance with the OU1 Rebound Study Work Plan (Brice-AECOM 2019b), off-post direct push groundwater samples were collected initially at OS001 (see **Figure 2-1**). Due to sample results from OS001 identifying TNT concentrations greater than (>)2 µg/L, the direct push sampling continued downgradient at OS002 and OS003 (see **Section 3**). Sample results at downgradient OS002 and OS003 also had TNT concentrations > 2 µg/L. In accordance with the OU1 Rebound Study Work Plan (Brice-AECOM 2019b), no additional direct push groundwater samples were collected further downgradient of OS003. Location OS001 will be the selected monitoring location to evaluate potential on-post explosives migrating off-site. At location OS001, one continuous direct push soil boring was advanced to characterize subsurface conditions and verify the depth to the Fullerton Clay aquitard. The sampling intervals were selected based on previous direct push groundwater investigation and monitoring well screen intervals between EW6 and EW7 (Final 2018 Annual Groundwater Monitoring Report [Brice-AECOM 2019c]). The vertical sampling intervals for the following seven direct push sampling events will be determined based on baseline and subsequent sampling results.

Brice-AECOM obtained utility clearances prior to the start of intrusive direct push groundwater sampling (and injection) activities. The Nebraska One Call Diggers Hotline was contacted for utility clearances, which were requested a minimum of 48 hours prior to intrusive work. All

identified underground utilities were marked with flagging, stakes, and/or paint. Utility locate tasks were documented in field logbooks to aid in subsequent clearance work. No intrusive work was completed within 5 feet of a marked utility.

All new direct push locations were sited using predetermined horizontal coordinates and a global positioning system (GPS) unit to ensure completion in their planned locations. At the conclusion of each sampling activity, all final sampling locations were vertically surveyed and referenced to previously surveyed locations (i.e., monitoring wells). Surveyed ground surface elevations for direct push sample locations are provided in **Table 2-1**.

All direct push groundwater sampling (and subsurface injection) locations were completed using Geoprobe® rigs (models 6620DT and/or 7822DT) by Plains Environmental Services (PES) of Salina, Kansas, with full-time oversight by Brice-AECOM. Nebraska well drilling contractor licenses for PES and Brice-AECOM are provided in **Appendix A**.

Direct push groundwater samples were completed using direct push technology with a Geoprobe™ stainless steel screen point sampler (SP15 with exposed screen) and collected from the screened interval using a Geotech Geopump™ peristaltic pump and a check valve. Prior to groundwater sample collection, approximately 7 liters (3 to 5 rod volumes) were purged typically at rates of 0.5 to 1.0 liter per minute (lpm) for each sampling interval. Direct push groundwater samples were analyzed for explosives only (including mono-nitroso-RDX [MNX]) (United States Environmental Protection Agency [USEPA] Method 8330A). Quality control (QC) samples (field duplicates) and matrix spike/matrix spike duplicate (MS/MSD) samples were collected at a 5-percent rate (i.e., one per 20 samples collected). Direct push groundwater sample locations, sample identification (ID) numbers, sample screened intervals, sample collection dates, QC locations, and sample parameters are provided in **Table 2-1**. Direct push groundwater sample collection field sheets (SCFSs) are provided in **Appendix B**.

2.1.2 Baseline OU1 Monitoring Well Sampling Activities (Off-Post and On-Post)

During the baseline OU1 Rebound Study sampling event, 18 off-post and 18 on-post monitoring wells were sampled from October 21 through October 23, 2019. A summary of the OU1 off-post and on-post sampling locations is presented in **Table 2-2** and shown on **Figure 2-1**.

The monitoring wells were purged and sampled with stainless steel ProActive Monsoon® submersible pumps. The ProActive Monsoon® pump with new disposable tubing was lowered to the middle of the screened interval prior to purging. Modified low-flow purging techniques were attempted at each monitoring well location, maintaining less than (<) 0.3 foot of water level drawdown at a pumping rate of 0.5 lpm or less. Field water quality parameters, including dissolved oxygen (DO), oxidation/reduction potential (ORP), temperature, pH, conductivity, ferrous iron (Fe^{2+}), and turbidity were measured at monitoring wells using a YSI 556 MPS water quality probe fitted with a flow-through cell. Turbidity was measured with a LaMotte 2020 turbidity meter. Fe^{2+} was measured using a HACH DR820 colorimeter. Purging continued until field water quality parameters stabilized (i.e., three consecutive readings) within criteria ranges.

After purging was completed, sample containers were filled from the discharge line at a rate of 0.5 lpm or less. Samples were collected and analyzed for explosives (including MNX) and laboratory monitored natural attenuation (MNA) parameters: alkalinity by Method 2320B, ammonia by Method 350.1, carbon dioxide (CO_2) back calculated by Method 2320B, nitrate/nitrite

by Method 353.2, sulfate by Method 9056A, sulfide by Method 9034, total Kjeldahl nitrogen (TKN) by Method 351.2, dissolved organic carbon (DOC) by Method 9060A, and methane by Method Robert S. Kerr Environmental Research Laboratory 175 (RSK-175). QC samples (field duplicates) and MS/MSDs were collected at a 5-percent rate (i.e., one per 20 samples collected) for all parameters (**Table 2-2**). Off-post and on-post monitoring well SCFSs are provided in **Appendix B**.

2.2 OU1 SUBSURFACE INJECTION FIELD ACTIVITIES

This section presents the 2019 OU1 subsurface injection activities completed in the area between EW6 and EW7. Additional subsurface injections are planned for Fall 2020 to remediate the remainder of the OU1 plumes (Brice-AECOM 2019c).

OU1 subsurface injection activities were performed to remediate the area of >20 µg/L TNT and >2 µg/L RDX plumes (approximately 600 feet by 800 feet total area) which is located approximately 200 feet upgradient (west) of EW7 (**Figure 2-2**). This treatment area addresses residual RDX and TNT concentrations, historically migrating east within the EW7 capture zone near the former facility boundary. A baseline performance monitoring groundwater sampling event was conducted prior to subsurface injections to establish the baseline explosives concentrations in groundwater.

2.2.1 Baseline Subsurface Injection Performance Monitoring

In the area between EW6 and EW7, 20 performance monitoring locations (two LTM monitoring wells and 18 temporary wells) were sampled in October 2019, as shown on **Figure 2-2**. These performance monitoring locations were sampled to establish baseline conditions prior to implementing the OU1 subsurface injection activities. Three post-injection quarterly performance monitoring events are planned at these performance monitoring wells to gauge the effectiveness of the 2019 subsurface injection activities. The baseline performance monitoring included:

• Eighteen new temporary wells at nine locations (one shallow depth, one shallow-intermediate depth)

• Two existing monitoring wells (piezometers PZ017R and PZ018)

Temporary monitoring wells were used to provide a higher quality groundwater sample that has lower turbidity (compared to direct push screen point samples) and is representative of the aquifer. Temporary monitoring wells were installed using direct push technology. The temporary monitoring wells were screened at select vertical intervals based on past direct push vertical profile sampling results. At each location, one shallow temporary well (screened 20 to 30 feet bgs) and one shallow-intermediate temporary well (screened 30 to 40 feet bgs) were installed within the interpreted groundwater explosives plume. Temporary well construction details are provided in **Table 2-3**. Surveyed ground surface elevations are provided in **Tables 2-3** and **2-4.** PZ017R and PZ018 were selected as performance monitoring locations based on current concentrations and proximity to planned 2019 injection activities (**Figure 2-2**).

<u>Groundwater Sampling from Temporary Wells</u>

The 18 temporary monitoring wells (at nine locations) were installed, developed, purged, sampled, and abandoned from October 15 through October 20, 2019. Temporary performance monitoring well development, purging, and sampling were completed using a Geotech Geopump™ peristaltic pump. Temporary wells were developed by purging approximately 10 well volumes (purge rates between 0.5 and 1.0 lpm) and samples were collected after all field water quality parameters had stabilized. Groundwater samples collected from the temporary monitoring wells were analyzed for explosives (including MNX) and laboratory water quality parameters: alkalinity, ammonia, nitrate/nitrite, sulfate, sulfide, TKN, DOC, and methane. QC samples (field duplicates) and MS/MSDs were collected at a 5-percent rate (i.e., one per 20 samples collected) for all parameters. Performance monitoring groundwater sampling locations and parameters are listed in **Table 2-4**. Performance monitoring SCFSs are provided in **Appendix B**.

Per Nebraska Administrative Code (NAC) Title 178, Chapter 12 (NAC 2005), temporary wells (i.e., test holes) can be used in conjunction with groundwater investigations but may be retained for no more than 10 days. Therefore, upon completion of sample collection, all temporary monitoring wells were abandoned within 10 days of installation by a Nebraska-licensed well driller.

Groundwater Sampling from OU1 Monitoring Wells

Two existing monitoring wells (piezometers PZ017R and PZ018) were purged and sampled on October 23, 2019. These wells were purged and sampled in accordance with **Section 2.1.2**. Performance monitoring groundwater sampling locations and parameters are listed in **Table 2-4**. Performance monitoring SCFSs are provided in **Appendix B**.

2.2.2 Subsurface Injection Design

The 2019 OU1 subsurface injection design, presented in the 2018 Annual Groundwater Monitoring Report (Brice-AECOM 2019c), followed a strategy similar to the design strategy previously implemented at the LL1 and LL2 source areas from 2012 to 2016 (the 2016 design is provided in the Final 2016 Annual Groundwater Monitoring and Subsurface Injection Report [BW-URS 2017]) and was based on the March 2018 direct push groundwater investigation results and the annual LTM sampling results (March 2018 and June 2019). The 2019 subsurface injection activities consisted of a series of closely spaced injection transects to deliver an injection amendment to the area of highest explosives concentrations in groundwater (>20 µg/L TNT and >2 µg/L RDX) at shallow and shallow-intermediate groundwater depths (approximately 35 to 40 feet bgs) upgradient of EW7.

Injection transects were installed perpendicular to groundwater flow direction (northeast) and were spaced approximately 50 feet apart (**Figure 2-2**). A total of 600 injection points within the transects were staggered so that injection points are oriented in a grid-type pattern to more effectively treat residual source areas that are within the saturated zone. The injection interval was 25 feet thick, with increased quantities of amendment injected within the shallower core of the explosives plume (**Table 2-5**).

Amendment selection, amendment concentrations, injection transect spacing, and injection point spacing were chosen based on the subsurface lithologic profile at CHAAP (poorly graded sand to clayey/silty sand), groundwater flow velocities, and performance monitoring data collected during previous OU1 subsurface injection events (2007 through 2016) (BW-URS 2017). These

performance monitoring data indicated that hydrodynamic dispersion (lateral and longitudinal) and diffusion will spread the amendment from the original injection locations and help form a contiguous treatment zone. Final subsurface injection locations were based on the orientation of the June 2019 EW7 capture zone and the distribution of explosives within the OU1 groundwater explosives plume.

Based on the overall success observed from injections within the LL1 and LL2 source areas, a 9.8 percent by volume mixture of Wesblend 66-10 amendment was used for the subsurface injection transects. Wesblend 66-10 is an aqueous solution of 80 percent blackstrap molasses mixed with whey, 10 percent hydrolyzed vegetable oil (soybean oil refining byproduct), and 10 percent cornsteep (a fermentation byproduct containing lactate and B vitamins). Wesblend 66-10 treatment zones are expected to maintain maximum effectiveness for up to 24 months.

2.2.3 Subsurface Injection Permit

Underground injection is regulated by the Nebraska Department of Environment and Energy (NDEE). Therefore, all underground injection activities performed in Nebraska must meet the requirements of NAC Title 122, Chapter 6 (NAC 2002). Dr. Steve Fischbein, the 2006 Underground Injection Control (UIC) Program Coordinator for NDEE, was consulted in November 2006, and he indicated that an application for a Class V Injection Permit was not necessary due to the federal status of CHAAP. Although the permit was not required, the 2019 OU1 subsurface injection details were provided to NDEE in the Final 2018 Annual Groundwater Report (Brice-AECOM 2019c) before subsurface injections were completed.

2.2.4 Amendment Storage and Mixing

The Wesblend 66-10 injection amendment was delivered to the site in 6,000-gallon tankers. Fourteen tankers of Wesblend 66-10 (a total of 690,440 pounds) were delivered to CHAAP during the 2019 OU1 subsurface injection activities. Bulk amendment was stored in plastic storage tanks at the GWTF until it was mixed with water for injection (generally within 1 week of delivery). According to Westway Inc., Wesblend 66-10 can be stored for several weeks.

The amendment was mixed with water using a batch mixing technique. A trash pump connected to an inline flow meter was used to transfer the desired volume of amendment from the plastic storage tanks into the water truck tank. Once the water truck tanks had the desired volume of amendment, the remaining volume was filled with water from an irrigation well, owned and operated by Panowicz Farms (PF), to achieve the desired concentration of injection solution (9.8 percent by volume Wesblend 66-10).

Mixtures of amendment and water (injection solution) were transferred to the injection sites by 4,000- and 5,000-gallon water trucks operated by PF. Injection solution was transferred from the water trucks to four 3,000-gallon plastic holding tanks at the injection sites.

2.2.5 Direct Push Injection

Direct push subsurface injection locations were sited using predetermined horizontal coordinates and a GPS unit to ensure completion in their planned locations. Location accuracy was checked using measurement distances from professionally surveyed monitoring wells. Final transect locations were vertically surveyed and referenced to previously surveyed locations (i.e.,

monitoring wells). Surveyed transect ground surface elevations are provided in **Table B-1** (**Appendix B**).

The 2019 OU1 subsurface injection activities were completed from October 28 to November 25, 2019. Direct push technology was used to inject 600,610 gallons of the solution at 600 points into the subsurface via direct push points along transects, as shown on **Figure 2-2**. A summary of direct push injection locations, including transect ID numbers, amendment percentages, injection point spacing, number of injection points, injection transect lengths, injection interval thicknesses, required volume of amendment mixture per point and transect, and volume of amendment mixture per transect and interval is presented in **Table 2-5**. Injections were completed using direct push, specifically with Geoprobe® rigs (models 6620DT and 7822DT). Direct push activities were completed by PES of Salina, Kansas, with full-time oversight by Brice-AECOM. Three direct push rigs were utilized to keep pace with the high-volume pumping capacity of the injection system.

Direct push injection used 1.5-inch inner diameter direct push rods that were advanced to the target depth interval. Once this depth was reached, the rods were pulled up slightly to open the disposable injection drive tip. The direct push rig was disconnected from the rod assembly, and a delivery hose was connected from an injection manifold outlet to an adapter attached to the end of the direct push rod. After confirming that all pressurized connections were secure, a Davey® Model 5290 self-priming firefighter pump powered with a 9-horsepower Honda motor was used to pump the injection amendment from the onsite plastic holding tanks, through the metered manifold system and into the ground through the direct push drive rods. Injection pressures, flow rates, and volumes were monitored closely for each injection interval.

Two six-valve manifold systems with flow meters allowed for injection of up to 12 points simultaneously. The manifold systems with flow meters were used to ensure that accurate volumes of injection solution were injected per interval at each location.

Injections were completed from bottom of the contaminated zone (40 ft bgs) to 3-5 feet below the water table, providing a vertical distribution of approximately 25 feet. Vertical injection intervals were spaced every 5 feet, coinciding with the removal of 5-foot-long direct push rod segments. After a predetermined volume of injection solution was injected into a specific subsurface interval, the rods were raised to the next interval. The injection solution was then injected into the next interval, and the procedure was repeated until the desired volume of solution was injected throughout the entire thickness of the treatment zone. Increased quantities of amendment were injected near the water table and within the core of the explosives plume to better treat higher explosives concentrations. Volume of injection solution per vertical interval (from shallow intervals to deep intervals) were as follows: 200 gallons, 300 gallons, 300 gallons, 100 gallons, and 100 gallons (see **Table 2-5**). Once the direct push drive rods were removed from the ground the injection points were then sealed with bentonite pellets. Subsurface injection daily summary field sheets are provided in **Appendix B**. A summary of all 600 injection points, including transect point ID numbers, dates completed, ground surface elevations, number of injection intervals, starting and stopping injection depths, starting and stopping flow meter readings, and total volume of mixture injected (in gallons) is presented in **Table B-1** (**Appendix B**).

2.3 INVESTIGATION-DERIVED WASTE DISPOSAL PROCEDURES

Investigation-derived waste (IDW) from the October 2019 sampling events consisted of purge, decontamination, and development water. IDW disposal was completed in accordance with NDEE IDW procedures as outlined in the Final UFP-QAPP (BW-URS 2014), as follows:

- A visual inspection of the IDW was conducted for evidence of potential contamination (i.e., discoloration, sheen, etc.).
- IDW water was containerized and discharged daily into the floor sump at the GWTF for treatment through the existing granular activated carbon (GAC) treatment system.

2.4 FIELD DOCUMENTATION, SAMPLE IDENTIFICATION, SAMPLE HANDLING, AND SHIPPING

Observations and data collected during the 2019 field activities were documented to provide a permanent record of all completed activities. The observations and data collected during field activities were recorded with waterproof ink in a permanently bound, waterproof logbook with consecutively numbered pages, and/or on field sheets (provided in **Appendix B**), if applicable. A photographic record of site activities and progress was maintained throughout the course of the OU1 Rebound Study and subsurface injection activities and is provided in **Appendix C**.

Samples were collected in laboratory-provided containers. Samples collected during the baseline OU1 Rebound Study and subsurface injection groundwater sampling activities were given discrete ID codes. Each ID code included the sample location number (sample depth for direct push groundwater samples), and collection date. Sample ID labels were attached to each sample container and completed using waterproof, permanent ink. The labels were completed with the sampler's name, sample ID number, date and time of sample collection, preservation type, analyses requested, and sampling matrix. Sample containers were placed into coolers, packed with wet ice (to achieve a temperature of approximately 6 degrees Celsius [°C] or less), and made ready for shipment. The chain-of-custody (CoC) forms were included in each cooler. A copy of each CoC was maintained to document sample handling between the field and the laboratory. Sample coolers were shipped to TestAmerica Laboratories, Inc. (TAL) in Arvada, Colorado during each sampling event. All samples were shipped via FedEx Priority Overnight.

2.5 FIELD REPORTING

2.5.1 Daily Quality Control Reports

Daily Quality Control Reports (DQCRs) were completed for each day of fieldwork associated with the OU1 Rebound Study and subsurface injection activities. DQCRs include a summary of daily field activities, safety activities, quality assurance/QC activities pertaining to all features of work, problems encountered in the field, and any corrective actions that were taken to correct these problems. Copies of the completed DQCRs are provided in **Appendix B**.

2.5.2 Weekly Progress Reports

Weekly progress reports were completed and submitted to the USACE Project Manager throughout the duration of the field activities. The weekly reports included a summary of the work

performed in a particular week including mobilization, site preparation, site access, surveying, groundwater sampling, injection, and demobilization actions. The reports also included a summary of the problems encountered, deviations from the scope of work, percentage of work performed, and records of conversations or other correspondence among CHAAP team members. Copies of the weekly progress reports are provided in **Appendix B**.

3.0 SUMMARY OF BASELINE RESULTS AND DATA QUALITY REVIEW

3.1 BASELINE ANALYTICAL RESULTS

Groundwater samples for the baseline OU1 Rebound Study and subsurface injection performance monitoring activities were analyzed in accordance with the Final Addendum 2, UFP-QAPP (Brice-AECOM 2018) for various compounds depending on sample location. Groundwater samples for the OU1 Rebound Study off-post direct push locations were analyzed for explosives (including MNX) only (see **Table 2-1**). Groundwater samples for the OU1 Rebound Study off-post and on-post monitoring wells and the subsurface injection performance monitoring activities were analyzed for explosives (including MNX) and laboratory MNA/water quality parameters: alkalinity, ammonia, nitrate/nitrite, sulfate, sulfide, TKN, DOC, and methane (see **Tables 2-2** and **2-4**). All laboratory analyses were completed by TAL. A summary of all baseline analytical results is presented below.

Tables 3-1 (off-post direct push samples), **3-2** (off-post and on-post monitoring wells), and **3-3** (performance monitoring wells) summarize the explosives compounds detected in groundwater during the baseline OU1 Rebound Study and subsurface injection performance monitoring sampling activities. The primary explosives compounds detected in groundwater were RDX, HMX, and TNT. Additionally, the explosives breakdown products 1,3,5-trinitrobenzene, 2,4-dinitrotoluene, 2-amino-4,6-dinitrotoluene (2-Am-DNT), and 4-amino-2,6-dinitrotoluene (4-Am-DNT) were detected. The data collected during the baseline OU1 Rebound Study and baseline subsurface injection performance monitoring were used to create a baseline explosives plume in these areas. Data for the baseline off-post direct push groundwater sample locations and off-post and on-post monitoring wells are shown on **Figure 2-1** and data for the baseline OU1 subsurface injection performance monitoring are shown on **Figure 2-2**.

Tables 3-2 and **3-3** also summarizes the laboratory MNA/water quality parameters detected in groundwater at off-post and on-post monitoring wells and performance monitoring wells, respectively. Field duplicate sample pairs were collected to assess both field and laboratory precision. Four field duplicate samples were collected and submitted to the laboratory for analysis. Analytical results for the baseline OU1 Rebound Study and subsurface injection performance monitoring field duplicate sample pairs are presented in **Table 3-4**.

3.2 FIELD WATER QUALITY PARAMETERS

Field water quality parameter measurements were determined at the time of sample collection in baseline OU1 Rebound Study (off-post and on-post monitoring wells) and subsurface injection performance monitoring sampling activities. Field water quality parameter measurements included ORP, DO, pH, conductivity, temperature, turbidity, and Fe^{2+}. All field results were recorded on the SCFSs (included in **Appendix B**). OU1 on-post and off-post monitoring well and subsurface

injection performance monitoring well field water quality parameter measurements are presented in **Tables 3-5** and **3-6**, respectively.

3.3 DATA QUALITY REVIEW/VALIDATION PROCESS

Analytical data were reviewed and verified in accordance with the Final Addendum 2, UFP-QAPP (Brice-AECOM 2018). The data review process included evaluations of the following elements, as required, including validation of raw data by an AECOM chemist. The validation software ADR.NET was used to supplement the manual validation.

- Laboratory case narrative/cooler receipt form
- Sample documentation
- Sample preservation and holding time compliance
- Instrument performance check (tuning)
- Initial calibration
- Initial calibration verification second source
- Continuing calibration verification (CCV)
- Internal standards
- Blank samples
- Laboratory control samples (LCS)
- Surrogate compounds
- MS/MSDs
- Field duplicates
- Sensitivity
- Additional qualifications, including professional judgment
- Completeness

3.3.1 Analytical Results Verification

The laboratory data reports and complete ADR.NET and data verification reports are provided in **Appendix D**. Qualifications applied to the analytical results based on the data review findings are included in **Table D-1** (**Appendix D**).

General trends regarding the data validation are as follows:

- The sulfate and methane results for sample EW7-PM25B-1-35, the sulfate result for sample G0070-1, and the nitrate-nitrite result for sample PZ019-1 were qualified as estimated (**J**) due to MS/MSD recoveries above evaluation criteria.
- The sulfate result for sample G0076-1 was qualified as **J** due to analysis outside of holding time criteria.

- DOC results for samples NW082R-1, G0082-1, NW071-1, and G0076-1 were qualified as nondetect (**U**) due to method blank contamination.
- Some explosives compound results for 22 samples were qualified as **J** due to relative percent differences outside of evaluation criteria between the primary and confirmation columns.
- The TNT results for samples OS001-DP01-25, OS001-DP01-35, and OS001-DP01-501 were qualified as **J** due to initial calibration verification percent differences outside of evaluation criteria.
- Some explosives compound results for 20 samples were qualified as estimated/estimated nondetect (**J/UJ**) due to low LCS recoveries.
- Some explosives compounds, TKN, and anion results were qualified as **J/UJ** due to MS/MSD recoveries below evaluation criteria.
- Some explosives compound results for 29 samples were qualified as **J/UJ** due to surrogate recoveries below evaluation criteria.
- The following samples had some explosives compound results qualified as **J** due to surrogate recoveries above evaluation criteria:
  - OS001-DP01-25, EW7-PM22A-1-25, OS002-DP01-25
- The following analytes were qualified as **UJ** in some samples due to continuing calibration verification percent differences outside of evaluation criteria:
  - 2,6-trinitrotoluene, 2-nitrotoluene, 4-nitrotoluene, HMX, and tetryl

3.3.2 Conclusions of Data and Quality Review

The analytical data were found to be acceptable for the intended use based on the data validation and the automated data review. Completeness, defined to be the percentage of analytical results judged to be valid, including estimated data, was 100 percent for the sampling events. No analytical data were rejected during the data validation. Generally, good precision was noted in the field duplicate samples for analytes reported above the laboratory limits of quantitation.

4.0 OU1 STATISTICAL TREND EVALUATION (OU1 REBOUND STUDY WELLS)

As part of the OU1 Rebound Study, statistical trend evaluation of TNT and RDX concentrations will be performed. Once three additional quarterly groundwater sampling events are completed, statistical trend evaluations will be performed for all locations sampled as part of the OU1 Rebound Study where sufficient data are available (i.e., locations with a minimum of four data points and less than 50% non-detect results). While trend evaluation will be performed for all locations, only locations with detections will be included in quarterly report figures (e.g, **Figures 4-1** and **4-2**). Until sufficient OU1 Rebound Study data are obtained, quarterly sampling results will be qualitatively evaluated on a well by well basis to assess if explosives concentrations in groundwater are increasing.

4.1 STATISTICAL TREND EVALUATION PROCESS

Analytical results will be evaluated using Monitoring and Remediation Optimization System (MAROS) Version 3.0., a groundwater data trend analysis and LTM optimization tool developed by the Technology Transfer Division of the Air Force Civil Engineer Center (AFCEC) (AFCEC 2012). MAROS applies statistical techniques to site data to determine plume trends. The following site data are analyzed by the program:

- Historic and current site analytical data
- Hydrogeologic factors
- Locations of potential receptors

Statistical trends will be assessed using the Mann-Kendall analysis. Using the three statistical metrics for Mann-Kendall analysis (Mann-Kendall statistic [S], Confidence in Trend [CT], and Coefficient of Variation [COV]), the Mann-Kendall analyzes the trend in the data over time and is utilized in the analysis of groundwater plume stability. A concentration trend category is then determined following the Mann-Kendall Analysis Decision Matrix. Generally, positive S values indicate an increase in analyte concentrations over time and negative S values indicate a decrease in analyte concentrations over time. The CT provides a percentage value of confidence for the S validity, and the COV provides a general indicator of the degree of variability. Mann-Kendall analysis will be applied to RDX and TNT results to assess the potential for future RDX and TNT concentration increases.

Individual monitoring well concentration trends are categorized into one of seven categories based on the decision matrix:

MANN-KENDALL ANALYSIS DECISION MATRIX

Mann-Kendall Statistic (S)	Confidence in Trend (CT)	Concentration Trend
S >0	> 95%	Increasing (I)
S > 0	90% to 95%	Probably Increasing (PI)
S > 0	< 90%	No Trend (NT)
S less than or equal (≤) 0	< 90% and COV greater than or equal ≥ 1	No Trend (NT)
S ≤ 0	< 90% and COV < 1	Stable (S)
S < 0	90% to 95%	Probably Decreasing (PD)
S < 0	> 95%	Decreasing (D)
Dataset where all values are nondetect		Nondetect (ND)

Notes:
No Trend – No statistically significant trend with more variability in concentrations over time (COV).
Stable – No statistically significant trend with less variability in concentrations over time (COV).

The OU1 Rebound Study statistical trend evaluation and Mann-Kendall analysis will be completed following similar procedures as in the annual OU1 LTM statistical trend evaluations, most recently the Final 2018 Annual Groundwater Report (Brice-AECOM 2019c). See Section 5.5 of the Final 2018 Annual Groundwater Report for additional Program Input details (e.g., Data Management, Site Details).

4.2 STATISTICAL RESULTS SUMMARY

Mann-Kendall analysis was not performed for the baseline OU1 Rebound Study sampling event. Baseline RDX and TNT concentrations for OU1 Rebound Study wells were similar to the most recent annual OU1 LTM results (June 2019) with only minimal fluctuations observed. However, all monitoring wells used in the OU1 Rebound Study showed decreasing or stable RDX and TNT concentration trends in the most recent statistical trend evaluation in 2018 (Brice-AECOM 2019c). The baseline OU1 Rebound Study and June 2019 RDX and TNT results (June 2019) are shown on **Figure 4-1** (wells near the former facility boundary) and on **Figure 4-2** (upgradient wells)**.** The tabulated groundwater monitoring data set for each well are included in **Appendix E**.

Following future quarterly data collection, a qualitative analysis comparing the current RDX and TNT results to baseline will be performed until a sufficient data set is available for OU1 Rebound Study Mann-Kendall trend analysis.

5.0 OU1 REBOUND STUDY AND INJECTION PERFORMANCE EVALUATION

This section presents the OU1 Rebound Study evaluation and the 2019 subsurface injection performance evaluation for the OU1 groundwater explosives plume. The OU1 Rebound Study will be evaluated based on groundwater data collected during the seven remaining quarterly groundwater monitoring events utilizing both off-post locations (monitoring wells and direct push sample locations) and on-post locations (monitoring wells). The performance of the subsurface injections will be evaluated based on groundwater data collected during the three remaining quarterly performance monitoring events from monitoring locations within the injection transect treatment zones (monitoring wells and temporary performance monitoring wells). These evaluations will be conducted upon completion of planned quarterly groundwater sampling events.

The OU1 Rebound Study evaluation will review concentrations of RDX and TNT in groundwater, key MNA parameters, and any concentration trends observed throughout the rebound study, both off-post and on-post.

The 2019 OU1 subsurface injection performance evaluation will review concentrations of RDX and TNT in groundwater, and key water quality parameters compared to baseline conditions to assess the effectiveness of the groundwater amendment at creating anaerobic conditions within the treatment area and reducing the concentrations of RDX ant TNT in groundwater. Injection of a carbon source (the Wesblend 66-10 amendment) has been proven during previous events to create an anaerobic environment within the treatment area. The anaerobic conditions can be created by introducing a carbon source into the aquifer for indigenous microbes to utilize as an energy source. The microbes couple the oxidation of organic compounds or hydrogen to the reduction of an electron receptor to generate energy in a process called microbial respiration. The reduction of oxygen is the most energetically favorable and efficient metabolic pathway, which results in

oxygen being rapidly depleted in systems with an elevated organic content (the Wesblend 66-10 amendment), rendering the environment anaerobic. An anaerobic environment is the appropriate environment for rapid and sustained cometabolic degradation of explosive compounds.

5.1 OU1 REBOUND STUDY EVALUATION

5.1.1 Baseline RDX and TNT Concentrations

Baseline concentrations for RDX and TNT for all OU1 Rebound Study locations are presented in **Table 5-1**. Of the 18 on-post wells sampled, five wells (G0077, G0086, PZ017R, PZ018, and PZ020) have TNT concentrations >2 µg/L. The highest TNT concentration in groundwater (15 µg/L) was from on-post well PZ017R. All 18 off-post wells were nondetect for TNT. All on-post and off-post wells had RDX concentrations <2 µg/L. Baseline off-post direct push groundwater sample results from OS001 through OS003 (downgradient and east of EW7 approximately 500 feet, 1,000 feet, and 2,000 feet, respectively) showed TNT concentrations >2 µg/L at shallow (approximately 25 feet bgs), shallow-intermediate (approximately 35 feet bgs), and intermediate depths (approximately 45 feet bgs) at different locations (**Table 5-1**). The highest TNT concentrations in off-post direct push samples were from location OS001 (12 µg/L at 25 ft bgs and 11 µg/L at 35 ft bgs). TNT concentrations from the three off-post locations generally decline farther to east and deeper into the shallow aquifer (**Table 5-1**). There were no detections of RDX above its HAL (2 µg/L) in any of the off-post direct push samples. Baseline data indicate that TNT concentrations >2 µg/L are present on-post slightly upgradient of the former facility boundary and extend off-post approximately 2,200 feet downgradient of the former facility boundary in a narrow and shallow plume (**Figure 2-1**).

5.1.2 Baseline MNA Parameter Measurements

Baseline MNA parameters for all OU1 Rebound Study wells (see **Table 5-2**) were collected to establish a baseline condition of key MNA parameters present. The baseline MNA parameter results for the OU1 Rebound Study wells were comparable to historically measured MNA parameters at the same off-post and on-post wells (Brice-AECOM 2019c). In general, data results indicated these OU1 Rebound Study off-post and on-post wells had higher ORP, DO, Nitrate/Nitrite, and sulfate measurements and low ammonia, TKN, DOC, CO^2, methane, alkalinity, sulfide, and Fe^{2+} measurements. Future MNA parameters will be evaluated by comparing the baseline data to follow-up OU1 Rebound Study sampling data.

5.2 OU1 SUBSURFACE INJECTION PERFORMANCE MONITORING EVALUATION

5.2.1 Baseline RDX and TNT Concentrations

Baseline explosives results for all OU1 subsurface injection performance monitoring locations (**Table 5-3**) indicated TNT concentrations >2 µg/L are present at the former facility boundary and >20 µg/L slightly upgradient of EW7. RDX concentrations were below its HAL for all performance monitoring locations. The on-post groundwater explosives plume was refined based on the baseline subsurface injection performance monitoring results as shown on **Figure 2-2**.

A total of 20 performance monitoring samples were collected from two on-post monitoring wells

(PZ017R and PZ018) and 18 temporary monitoring wells (EW7-PM21 through EW7-PM29: one shallow well and one shallow-intermediate well each at nine locations) during the baseline OU1 subsurface injection performance monitoring event. Of the 20 performance monitoring samples collected, all had TNT concentrations >2 µg/L but no RDX concentrations above its HAL (>2 µg/L). The maximum TNT concentration of 29 µg/L was detected at shallow well EW7-PM21A-25. The TNT concentrations from the performance monitoring wells generally decline farther to the south and deeper into the shallow aquifer (**Figure 2-2**).

5.2.2 Baseline Water Quality Parameter Measurements

Baseline water quality parameters for all OU1 subsurface injection performance monitoring locations (**Table 5-4**) were collected to establish a baseline condition of subsurface environment prior to subsurface injection activities. The baseline water quality parameters for the performance monitoring wells were similar to OU1 Rebound Study wells; however, ORP and DO measurements were generally lower and methane was generally higher in performance wells indicating the baseline aquifer conditions were slightly anaerobic and minor biodegradation may be occurring. Future water quality parameters will be evaluated by comparing the baseline data to follow-up performance monitoring data. According to the USACE Waterways Experiment Station (WES) (USACE WES 1999), ORP values <0 millivolts (mV), DO concentrations <1.0 milligrams per liter (mg/L), sulfate concentrations <20 mg/L, and DOC concentrations >20 mg/L are favorable conditions for anaerobic biodegradation.

6.0 CONCLUSIONS AND RECOMMENDATIONS

This section presents the conclusions for the baseline OU1 Rebound Study and subsurface injection performance monitoring activities, and recommendations for the next sampling event (Quarter 2 – February/March 2020).

6.1 CONCLUSIONS

6.1.1 OU1 Rebound Study

All baseline OU1 Rebound Study sampling activities were completed successfully prior to EW7 shutdown. Baseline sample results indicate the OU1 on-post TNT plume maintains its general shape and extent within the previously interpreted capture zone (EW7 operating at 300 gpm), with detections below HALs to the north and south extent of EW7 (i.e., well cluster NW020 and PZ019). The previously interpreted TNT plume (June 2019) is additionally shown on **Figure 2-1**. All concentrations of RDX within the OU1 Rebound Study area were below the HAL (2 µg/L).

TNT concentrations >2 µg/L were identified in off-post direct push samples (OS001, OS002, and OS003) downgradient and east of the former facility boundary/EW7. Based on historically identified reducing conditions and previous sample results with TNT concentrations below the HAL from within the feedlot, the TNT plume is not interpreted to extend into the feedlot. Additionally, off-post monitoring wells downgradient of the feedlot (which have been below HALs since 2012 or longer) continue to remain nondetect for both RDX and TNT. In accordance with the OU1 Rebound Study Work Plan (Brice-AECOM 2019b), all three off-post direct push locations were sampled and identified TNT concentrations above the HAL. Concentrations ranged

from 12 µg/L at OS001 to 3 µg/L (just slightly above the HAL) at the furthest downgradient location OS003. Although the off-post downgradient extent of the TNT plume could not be defined, it is interpreted that the plume does not extend a significant distance downgradient based on the low levels detected at OS003 and non-detections at downgradient off-post monitoring wells. Following future OU1 Rebound Study direct push groundwater sampling events (proposed at location OS001 only), concentrations and migration trends will be evaluated, and if necessary, additional off-post direct push sampling will be completed.

6.1.2 OU1 Subsurface Injections and Performance Monitoring

All baseline OU1 subsurface injection performance monitoring sampling were completed successfully prior to EW7 shutdown. The performance monitoring sample results indicate TNT concentrations >2 µg/L exist upgradient of EW7 (similarly interpreted with OU1 Rebound Study sampling results) with a narrow >20 µg/L TNT plume parallel to groundwater flow. No RDX concentrations were detected above the HAL. Performance monitoring results from temporary wells indicate TNT concentrations >20 µg/L are present in the shallow depths of the aquifer (i.e., between 20 to 30 feet bgs) and TNT concentrations >2 µg/L extend to 40 feet bgs. The baseline sample results for explosives and water quality parameters at the performance monitoring wells indicate that the baseline aquifer conditions are slightly anaerobic and minor biodegradation may be occurring (e.g., explosives breakdown products, and lower ORP and DO/higher methane parameters). However, additional treatment effects from the 2019 subsurface injections are expected to enhance the anaerobic conditions and stimulate more rapid and sustained biodegradation of explosives.

The 2019 OU1 subsurface injection activities were completed successfully following the baseline performance monitoring sampling and EW7 shutdown. A total of 600,610 gallons of mixed solution at 600 points was injected into the subsurface via direct push. The injection design including point and transect spacing, horizontal placements, and vertical interval volumes is expected to establish a highly-reducing treatment area for explosives biodegradation for the interpreted higher TNT concentrations (>2 µg/L) established during the baseline performance monitoring sampling activities.

6.2 RECOMMENDATIONS

6.2.1 OU1 Rebound Study

Proceed with Quarter 2 sampling event for the OU1 Rebound Study (February/March 2020) per Addendum 3, UFP-QAPP (Brice-AECOM 2019b). In accordance with the OU1 Rebound Study Work Plan, the off-post direct push location OS001 will remain as the selected location to evaluate potential explosives migration off-post. Following future OS001 data analysis, explosives concentrations and migration trends will be evaluated, and if necessary, additional off-post direct push sampling will be completed.

6.2.2 OU1 Subsurface Injections and Performance Monitoring

Proceed with Quarter 2 sampling event for the OU1 subsurface injection performance monitoring (February/March 2020) per Final 2018 Annual Groundwater Monitoring Report (Brice-AECOM 2019c).

7.0 REFERENCES

Air Force Civil Engineer Center (AFCEC) 2012. Monitoring and Remediation Optimization System (MAROS) Software Version 3.0 User's Guide. Technology Transfer Division, Air Force Center for Environmental Excellence. Brooks AFB, San Antonio, TX. September.

Bay West LLC and URS Group Inc. (BW-URS). 2014. Uniform Federal Policy – Quality Assurance Project Plan. Remediation Action Operations Groundwater Treatment Facility at OU1 and Groundwater Monitoring at OU1 and OU3. Cornhusker Army Ammunition Plant, Grand Island, Nebraska. November.

BW-URS. 2017. 2016 Annual Groundwater Monitoring and Subsurface Injection Report, Remedial Action Operations of the Groundwater Treatment Facility at OU1 and Long-Term Monitoring of OU1/OU3, Cornhusker Army Ammunition Plant, Grand Island, Nebraska. Final. November.

Brice Engineering, LLC (Brice). 2019. Groundwater Recovery and Treatment System Operation and Maintenance Manual. Final. January.

Brice-AECOM Technical Services (Brice-AECOM). 2018. Addendum 2 UFP-QAPP, Remedial Action Operations of the Groundwater Treatment Facility at OU1 and Groundwater Monitoring of OU1/OU3, Cornhusker Army Ammunition Plant, Grand Island, Nebraska. Final. October.

Brice-AECOM. 2019a. CHAAP OU1 2018 Groundwater Monitoring Results and Program Recommendations Technical Memorandum. Final. June.

Brice-AECOM. 2019b. Addendum 3 UFP-QAPP, Remedial Action Operations of the Groundwater Treatment Facility at OU1 and Groundwater Monitoring of OU1/OU3, Cornhusker Army Ammunition Plant, Grand Island, Nebraska. Final. November.

Brice-AECOM. 2019c. 2018 Annual Groundwater Monitoring Report, Remedial Action Operations of the Groundwater Treatment Facility at OU1 and Long-Term Monitoring of OU1/OU3, Cornhusker Army Ammunition Plant, Grand Island, Nebraska. Final. December.

Nebraska Administrative Code (NAC). 2002. Title 122 Rules and Regulations for Underground Injections and Mineral Production Wells, Water Quality Division, Chapter 6. April.

NAC. 2005. Title 178 - Water Well Standards, Chapter 12 -Water Well Construction, Pump Installation, and Water Well Decommissioning Standards. February.

URS Greiner Woodward-Clyde Federal Services (URSGWCFS). 2001. OU1 ROD Amendment. Final Report. Cornhusker Army Ammunition Plant. Prepared for USACE. August.

United States Army Corps of Engineers Waterways Experiment Station (USACE WES). 1999. Draft Protocol for Evaluating, Selecting, and Implementing Monitored Natural Attenuation at Explosives Contaminated Sites. Technical Report EL-99-10. September.

United States Army Environmental Center (USAEC). 1994. Interim Record of Decision for Cornhusker Army Ammunition Plant Operable Unit 1 – Groundwater. November.

We appreciate the opportunity to provide services for this project. If you have any questions, please contact the undersigned.

Sincerely,

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ATTACHMENTS

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- Direct Push Groundwater Sample Collection Field Sheets (Off-post)
- OU1 Groundwater Monitoring Well Sample Collection Field Sheets
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Tables

TABLE 2-1
DIRECT PUSH GROUNDWATER SAMPLES COLLECTED (OFF-POST)
OU1 REBOUND STUDY, BASELINE
OU1 REBOUND STUDY LETTER REPORT - BASELINE

Sample Location ID	Coordinates[1]		Ground Elevation (feet amsl)[1]	Screened Interval (feet bgs)	Sample Elevation (feet amsl)[1]	Sample ID	Sample Date	Parameters		
	Northing	Easting						Explosives[2]	Field Duplicate Samples[3]	MS/MSD Samples[4]
OU1 Rebound Study - Off-post Direct Push Samples[5,6]										
OS001	403776.40	2067811.90	1890.05	21.0 - 25.0	1865.05	OS001-DP01-25	10/14/2019	X		
				31.0 - 35.0	1855.05	OS001-DP01-35	10/14/2019	X	X	
				41.0 - 45.0	1845.05	OS001-DP01-45	10/14/2019	X		X
OS002	403776.08	2068314.37	1888.07	21.0 - 25.0	1863.07	OS002-DP01-25	10/28/2019	X		
				31.0 - 35.0	1853.07	OS002-DP01-35	10/28/2019	X		
				41.0 - 45.0	1843.07	OS002-DP01-45	10/28/2019	X		
OS003	403775.43	2069319.33	1885.95	21.0 - 25.0	1860.95	OS003-DP01-25	10/28/2019	X		
				31.0 - 35.0	1850.95	OS003-DP01-35	10/28/2019	X		
				41.0 - 45.0	1840.95	OS003-DP01-45	10/28/2019	X		
							Totals	**9**	**1**	**1**

Notes:

[1]Horizontal coordinates are in Nebraska State Plane, North American Datum of 1983. Elevation datum based on National Geodetic Vertical Datum of 1929.

[2]Explosives (+MNX) analysis (SW846 Method 8330A) only completed.

[3]Field duplicate samples were collected at a rate of 5% (1 per 20 samples collected) for explosives only. The 31-35 foot depth interval was chosen for a field duplicate sample because, if the explosives plume does extend to that location, it will most likely be observed at that depth.

[4]MS/MSD samples were collected at a rate of 5% (1 per 20 samples collected) for explosives only. The 41-45 foot depth interval was chosen for an MS/MSD sample since that interval is likely clean.

[5]OU1 Rebound Study off-post direct push groundwater samples will be collected over eight total sampling events (one baseline, seven follow-up) at an approximately quarterly frequency, over approximately 2 years. The follow-up direct push sampling events (seven events at approximately quarterly frequency) will be collected from the established baseline location (i.e., OS001), with selective sample depths based on the baseline and/or follow-up events sample results.

[6]Direct push soil borings was collected at OS001 to interpret lithological data and to identify depth to water, extent of shallow aquifer, and verify the absence of low-permeability clays and silts (Fullerton Clay unit).

% = percent
amsl = above mean sea level
bgs = below ground surface
DP = direct push
ID = identification number
MNX = mono-nitroso-RDX
MS/MSD = matrix spike/matrix spike duplicate
OS = off-post sample
RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine
MNX = mono-nitroso-RDX
MS/MSD = matrix spike/matrix spike duplicate
OS = off-post sample
RDX = cyclotrimethylenetrinitramine
SP = screen point
TBD = to be determined
TNT = 2,4,6-trinitrotoluene

TABLE 2-2
OFF-POST AND ON-POST GROUNDWATER MONITORING WELLS SAMPLED
OU1 REBOUND STUDY, BASELINE
OU1 REBOUND STUDY LETTER REPORT - BASELINE

Well Number	Sample Date	Explosives[1]	Laboratory MNA Parameters[2]	Field MNA Parameters[3]	Field Duplicate Sample ID[4]	Field MS/MSD Sample ID[5]
OU1 Off-Post Monitoring Wells						
CA210	10/21/2019	X	X	X		
CA211	10/21/2019	X	X	X		
CA212	10/21/2019	X	X	X		
CA213	10/21/2019	X	X	X		
NW020	10/22/2019	X	X	X		
NW021	10/22/2019	X	X	X	NW023-1	
NW022	10/22/2019	X	X	X		
NW050	10/22/2019	X	X	X		
NW051	10/22/2019	X	X	X		
NW052	10/23/2019	X	X	X		
NW060	10/22/2019	X	X	X		
NW061	10/22/2019	X	X	X		
NW062	10/22/2019	X	X	X		
NW070	10/21/2019	X	X	X		
NW071	10/21/2019	X	X	X		
NW080	10/22/2019	X	X	X		
NW081R	10/22/2019	X	X	X		
NW082R	10/22/2019	X	X	X		
	Off-Post Totals	**18**	**18**	**18**	**1**	**0**
OU1 On-Post Monitoring Wells						
G0024	10/23/2019	X	X	X		
G0070	10/21/2019	X	X	X		G0070-1 MS/MSD
G0075	10/21/2019	X	X	X		
G0076	10/21/2019	X	X	X		
G0077	10/23/2019	X	X	X		
G0078	10/23/2019	X	X	X		
G0079	10/21/2019	X	X	X		
G0080	10/21/2019	X	X	X		
G0081	10/21/2019	X	X	X		
G0082	10/21/2019	X	X	X		
G0086	10/23/2019	X	X	X		
G0087	10/22/2019	X	X	X		
G0091	10/22/2019	X	X	X		
G0092	10/22/2019	X	X	X		
PZ017R	10/23/2019	X	X	X	PZ021-1	
PZ018	10/23/2019	X	X	X		
PZ019	10/22/2019	X	X	X		PZ019-1 MS/MSD
PZ020	10/23/2019	X	X	X		
	On-Post Totals	**18**	**18**	**18**	**1**	**2**
	Overall Totals	**36**	**36**	**36**	**2**	**2**

TABLE 2-2
OFF-POST AND ON-POST GROUNDWATER MONITORING WELLS SAMPLED
OU1 REBOUND STUDY, BASELINE
OU1 REBOUND STUDY LETTER REPORT - BASELINE

Well Number	Sample Date	Explosives[1]	Laboratory MNA Parameters[2]	Field MNA Parameters[3]	Field Duplicate Sample ID[4]	Field MS/MSD Sample ID[5]

Notes:

[1]Explosives (+MNX) analysis (SW846 Method 8330A).

[2]Laboratory MNA parameters for OU1 (on- and off-post) include: methane (Method RSK 175), total Kjeldahl nitrogen (Method 351.2), nitrate/nitrite (Method 353.2), sulfate (Method 9056A), sulfide (Method 9034), ammonia (Method 350.1), dissolved organic carbon (Method 9060A), alkalinity (Method 2320B), and carbon dioxide (back calculated Method 2320B).

[3]Field MNA parameters included: dissolved oxygen, oxidation/reduction potential, ferrous iron, specific conductance, turbidity, pH, and temperature.

[4]Field duplicate samples were collected at a rate of 5% (1 per 20 samples collected) for the full suite of laboratory parameters. NW021 and PZ017R were chosen for field duplicate samples based on presence of historic explosives concentrations at those locations.

[5]MS/MSD samples were collected at a rate of 5% (1 per 20 samples collected) for the full suite of laboratory parameters. G0070 and PZ019 were chosen for MS/MSD samples based on the lack of historic explosives concentrations at those locations.

DUP = duplicate sample

ID = identification number

MNX = mono-nitroso-RDX

MS/MSD = matrix spike/matrix spike duplicate

MNA = monitored natural attenuation

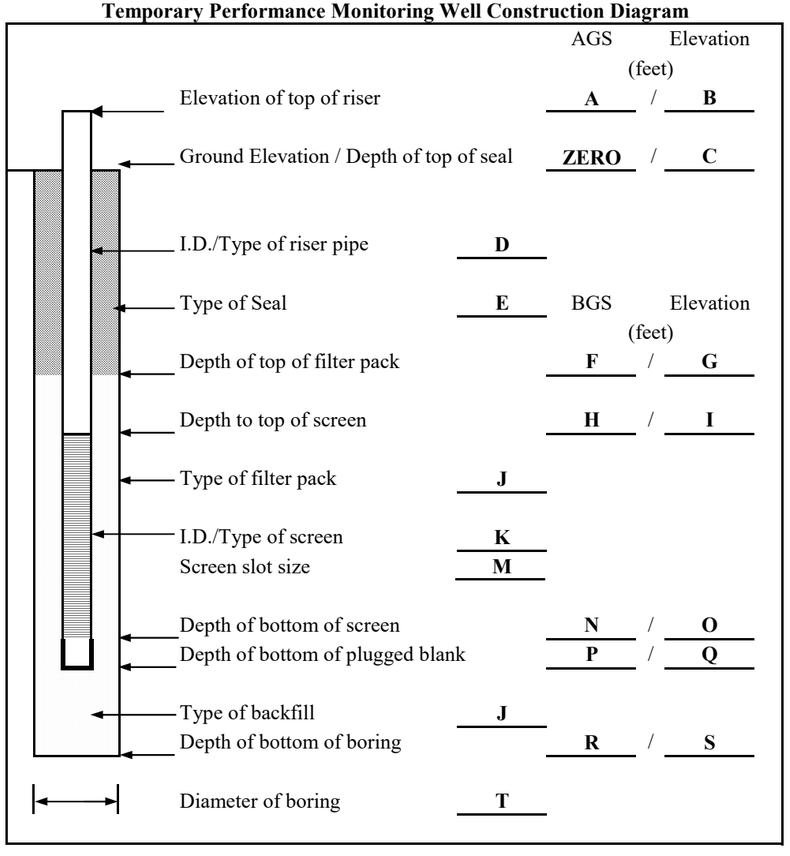
OU = Operable Unit

PZ = piezometer

QC = quality control

TABLE 2-3
SUMMARY OF TEMPORARY PERFORMANCE MONITORING WELL CONSTRUCTION
OU1 SUBSURFACE INJECTION, BASELINE
OU1 REBOUND STUDY LETTER REPORT - BASELINE

Temporary Performance Monitoring Well Construction Diagram



Well	Date Installed	Time	A	B	C	F	G	H	I	N	O	P	Q	R	S
EW7-PM21A	10/16/2019	1535	2.0	1899.12	1897.12	14.1	1883.0	19.9	1877.2	29.9	1867.2	30.00	1867.1	31.00	1866.1
EW7-PM21B	10/16/2019	1655	2.0	1899.12	1897.12	27.9	1869.2	29.9	1867.2	39.9	1857.2	40.00	1857.1	41.00	1856.1
EW7-PM22A	10/16/2019	1351	2.0	1900.25	1898.25	14.2	1884.1	19.9	1878.4	29.9	1868.4	30.00	1868.3	31.00	1867.3
EW7-PM22B	10/16/2019	1446	2.0	1900.25	1898.25	27.8	1870.5	29.9	1868.4	39.9	1858.4	40.00	1858.3	41.00	1857.3
EW7-PM23A	10/15/2019	1250	2.0	1896.55	1894.55	12.1	1882.5	19.1	1875.5	29.1	1865.5	30.00	1864.6	31.00	1863.6
EW7-PM23B	10/17/2019	0955	2.0	1896.55	1894.55	27.9	1866.7	29.9	1864.7	39.9	1854.7	40.00	1854.6	41.00	1853.6
EW7-PM24A	10/16/2019	1205	2.0	1899.72	1897.72	13.1	1884.6	19.9	1877.8	29.9	1867.8	30.00	1867.7	31.00	1866.7
EW7-PM24B	10/17/2019	1100	2.0	1899.72	1897.72	27.8	1869.9	29.9	1867.8	39.9	1857.8	40.00	1857.7	41.00	1856.7
EW7-PM25A	10/16/2019	1107	2.0	1895.73	1893.73	12.6	1881.1	19.9	1873.8	29.9	1863.8	30.00	1863.7	31.00	1862.7
EW7-PM25B	10/16/2019	1315	2.0	1895.73	1893.73	27.9	1865.8	29.9	1863.8	39.9	1853.8	40.00	1853.7	41.00	1852.7
EW7-PM26A	10/17/2019	1330	2.0	1899.73	1897.73	14.2	1883.5	19.9	1877.8	29.9	1867.8	30.00	1867.7	31.00	1866.7
EW7-PM26B	10/17/2019	1255	2.0	1899.73	1897.73	27.8	1869.9	29.9	1867.8	39.9	1857.8	40.00	1857.7	41.00	1856.7
EW7-PM27A	10/17/2019	1545	2.0	1897.55	1895.55	12.1	1883.5	19.9	1875.7	29.9	1865.7	30.00	1865.6	31.00	1864.6
EW7-PM27B	10/17/2019	1437	2.0	1897.55	1895.55	27.8	1867.8	29.9	1865.7	39.9	1855.7	40.00	1855.6	41.00	1854.6
EW7-PM28A	10/18/2019	1130	2.0	1894.82	1892.82	12.0	1880.8	19.9	1872.9	29.9	1862.9	30.00	1862.8	31.00	1861.8
EW7-PM28B	10/18/2019	1053	2.0	1894.82	1892.82	27.8	1865.0	29.9	1862.9	39.9	1852.9	40.00	1852.8	41.00	1851.8
EW7-PM29A	10/18/2019	0940	2.0	1895.35	1893.35	12.0	1881.4	19.9	1873.5	29.9	1863.5	30.00	1863.4	31.00	1862.4
EW7-PM29B	10/18/2019	0920	2.0	1895.35	1893.35	27.7	1865.7	29.9	1863.5	39.9	1853.5	40.00	1853.4	41.00	1852.4

Notes:

All temporary wells were installed by direct push methods (installation by Plains Environmental Services).

All temporary well installation activities were directed by AECOM.

Elevation datum based on National Geodetic Vertical Datum of 1929.

AGS = above ground surface

BGS = below ground surface

I.D. = inside diameter

The following information is the same for all temporary wells installed:

D = 1-inch inside diameter, Schedule 80, flush-threaded polyvinyl chloride

E = High-solids bentonite grount

J = Number 30-60, clean, washed, silica sand

K = 1-inch inside diameter, schedule 80, flush threaded, factory slotted polyvinyl chloride

M = Screen slot size standard 0.010-inch

T = 2.125-inch diameter for shallow wells (i.e., PM21A), 3.125-inch diameter for deep wells (i.e., PM21B)

TABLE 2-4
PERFORMANCE MONITORING LOCATIONS SAMPLED
OU1 SUBSURFACE INJECTION, BASELINE
OU1 REBOUND STUDY LETTER REPORT - BASELINE

Sample Location ID	Well Type	Coordinates[1] Northing	Coordinates[1] Easting	Top of Casing Elevation (feet amsl)[1]	Screened Interval (feet bgs)	Sample Depth (feet bgs)	Sample Elevation (feet amsl)[1]	Sample ID	Sample Date	Analytical Parameters: Explosives[2]	Laboratory Water Quality Parameters[3]	Field Water Quality Parameters[4]	Field Duplicate Samples[5]	MS/MSD Samples[6]
Between EW6 and EW7														
PZ017R	Piezometer			1895.17	10 - 30	25	1870.17	PZ017R-1	10/23/2019	X	X	X		
PZ018	Piezometer			1896.88	10 - 30	25	1871.88	PZ018-1	10/23/2019	X	X	X		
EW7-PM21A	Temp. Well	403407.45	2066429.65	1899.12	20 - 30	25	1874.12	EW7-PM21A-1-25	10/17/2019	X	X	X		
EW7-PM21B	Temp. Well				30 - 40	35	1864.12	EW7-PM21B-1-35	10/17/2019	X	X	X	X	
EW7-PM22A	Temp. Well	403463.08	2066562.14	1900.25	20 - 30	25	1875.25	EW7-PM22A-1-25	10/17/2019	X	X	X		
EW7-PM22B	Temp. Well				30 - 40	35	1865.25	EW7-PM22B-1-35	10/17/2019	X	X	X		
EW7-PM23A	Temp. Well	403578.28	2066842.98	1896.55	20 - 30	25	1871.55	EW7-PM23A-1-25	10/16/2019	X	X	X		
EW7-PM23B	Temp. Well				30 - 40	35	1861.55	EW7-PM23B-1-35	10/17/2019	X	X	X		
EW7-PM24A	Temp. Well	403412.74	2066751.85	1899.72	20 - 30	25	1874.72	EW7-PM24A-1-25	10/16/2019	X	X	X		
EW7-PM24B	Temp. Well				30 - 40	35	1864.72	EW7-PM24B-1-35	10/19/2019	X	X	X		
EW7-PM25A	Temp. Well	403432.36	2066962.17	1895.73	20 - 30	25	1870.73	EW7-PM25A-1-25	10/16/2019	X	X	X		
EW7-PM25B	Temp. Well				30 - 40	35	1860.73	EW7-PM25B-1-35	10/16/2019	X	X	X		X
EW7-PM26A	Temp. Well	403248.72	2066662.06	1899.73	20 - 30	25	1874.73	EW7-PM26A-1-25	10/18/2019	X	X	X		
EW7-PM26B	Temp. Well				30 - 40	35	1864.73	EW7-PM26B-1-35	10/18/2019	X	X	X		
EW7-PM27A	Temp. Well	403170.77	2066860.69	1897.55	20 - 30	25	1872.55	EW7-PM27A-1-25	10/18/2019	X	X	X		
EW7-PM27B	Temp. Well				30 - 40	35	1862.55	EW7-PM27B-1-35	10/18/2019	X	X	X		
EW7-PM28A	Temp. Well	403302.80	2067019.15	1894.82	20 - 30	25	1869.82	EW7-PM28A-1-25	10/19/2019	X	X	X		
EW7-PM28B	Temp. Well				30 - 40	35	1859.82	EW7-PM28B-1-35	10/20/2019	X	X	X		
EW7-PM29A	Temp. Well	403108.54	2067050.13	1895.35	20 - 30	25	1870.35	EW7-PM29A-1-25	10/19/2019	X	X	X		
EW7-PM29B	Temp. Well				30 - 40	35	1860.35	EW7-PM29B-1-35	10/19/2019	X	X	X		
								Between EW6 and EW7 Totals		**20**	**20**	**20**	**1**	**1**

TABLE 2-4
PERFORMANCE MONITORING LOCATIONS SAMPLED
OU1 SUBSURFACE INJECTION, BASELINE
OU1 REBOUND STUDY LETTER REPORT - BASELINE

		Coordinates[1]								Analytical Parameters					
Sample Location ID	Well Type	Northing	Easting	Top of Casing Elevation (feet amsl)[1]	Screened Interval (feet bgs)	Sample Depth (feet bgs)	Sample Elevation (feet amsl)[1]	Sample ID	Sample Date	Explosives[2]	Laboratory Water Quality Parameters[3]	Field Water Quality Parameters[4]	Field Duplicate Samples[5]	MS/MSD Samples[6]

Notes:

[1]Horizontal coordinates are in Nebraska State Plane, North American Datum of 1983. Elevation datum based on National Geodetic Vertical Datum of 1929.

[2]Explosives (+MNX) analysis (SW846 Method 8330A).

[3]Laboratory water quality parameters for OU1 include: methane (Method RSK 175), total Kjeldahl nitrogen (Method 351.2), nitrate/nitrite (Method 353.2), sulfate (Method 9056A), sulfide (Method 9034), ammonia (Method 350.1), dissolved organic carbon (Method 9060A), alkalinity (Method 2320B), and carbon dioxide (back calculated Method 2320B).

[4]Field water quality parameters include: dissolved oxygen, oxidation/reduction potential, ferrous iron, turbidity, specific conductance, pH, and temperature.

[5]Field duplicate samples were collected at a rate of 5% (1 per 20 samples collected) for laboratory water quality parameters and explosives.

[6]MS/MSD samples were collected at a rate of 5% (1 per 20 samples collected) for laboratory water quality parameters and explosives.

% = percent
amsl = above mean sea level
bgs = below ground surface
EW = extraction well
ID = identification
MNX = mono-nitroso-RDX
MS/MSD = matrix spike/matrix spike duplicate
OU = Operable Unit
PM = performance monitoring
PZ = piezometer
RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine
RSK = Robert S. Kerr

TABLE 2-5
OU1 SUBSURFACE INJECTION LOCATIONS
2019 OU1 SUBSURFACE INJECTION
OU1 REBOUND STUDY LETTER REPORT - BASELINE

Injection Transect ID	Point Spacings (ft)	Injection Interval Thickness (ft)	Number of Injection Points	Injection Transect Length (ft)	Planned Volume of Mixture[1] Per Point (gallons)	Planned Volume of Mixture Per Transect (gallons)	Required Volume of Mixture Per 5-Foot Interval (gallons)[2]	Actual Volume of Mixture Injected Per Transect (gallons)
Between EW6 and EW7 Transects								
EW7-T1	15	25	18	255	1000	18000	A	18000
EW7-T2	15	25	24	345	1000	24000	A	24000
EW7-T3	15	25	42	615	1000	42000	A	42000
EW7-T4	15	25	42	615	1000	42000	A	42000
EW7-T5	15	25	42	615	1000	42000	A	42000
EW7-T6	15	25	42	615	1000	42000	A	42120
EW7-T7	15	25	42	615	1000	42000	A	42000
EW7-T8	15	25	48	705	1000	48000	A	48000
EW7-T9	15	25	48	705	1000	48000	A	48000
EW7-T10	15	25	48	705	1000	48000	A	48490
EW7-T11	15	25	48	705	1000	48000	A	48000
EW7-T12	15	25	48	705	1000	48000	A	48000
EW7-T13	15	25	42	615	1000	42000	A	42000
EW7-T14	15	25	42	615	1000	42000	A	42000
EW7-T15	15	25	12	165	1000	12000	A	12000
EW7-T16	15	25	12	165	1000	12000	A	12000
Between EW6 and EW7 Transect Totals			**600**	**8760**		**600000**		**600610**

Notes:

[1]Amendment and mixture percentage used: WB 66-10 at 9.8 percent (by volume).

[2]Amendment mixture was injected vertically at 5-foot intervals. Volume of mixed amendment injected per 5-foot interval (from shallow depths to deep depths) was as follows:
A) 200 gallons (18 ft bgs), 300 gallons (23 ft bgs), 300 gallons (28 ft bgs), 100 gallons (33 ft bgs), and 100 gallons (38 ft bgs).

bgs = below ground surface
EW = extraction well
ft = feet
ID = identification number
OU = operable unit
T = transect
WB 66-10 = Wesblend 66 with 10% oil

TABLE 3-1
SUMMARY OF EXPLOSIVES DETECTED, DIRECT PUSH GROUNDWATER LOCATIONS (OFF-POST)
OU1 REBOUND STUDY, BASELINE
OU1 REBOUND STUDY LETTER REPORT - BASELINE

FIELD ID	CHAAP	OS001-DP01-25					OS001-DP01-35					OS001-DP01-45					OS002-DP01-25					OS002-DP01-35					OS002-DP01-45					OS003-DP01-25				
SAMPLE DATE	HALs	10/14/2019					10/14/2019					10/14/2019					10/28/2019					10/28/2019					10/28/2019					10/28/2019				
	(µg/L)	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ
EXPLOSIVES (USEPA Method 8330A) (µg/L)																																			
1,3,5-Trinitrobenzene	NA	0.4	J	0.2	0.4	1	23	J	0.2	0.4	1	17	J	0.2	0.6	1.5	0.39	J	0.19	0.38	0.96	<	U	0.19	0.39	0.97	5.8		0.2	0.4	0.99	<	UJ	0.2	0.4	0.99
1,3-Dinitrobenzene	NA	<	U	0.089	0.2	0.4	<	UJ	0.089	0.2	0.4	<	U	0.089	0.3	0.6	<	U	0.085	0.19	0.38	<	U	0.086	0.19	0.39	<	U	0.088	0.2	0.4	<	UJ	0.088	0.2	0.4
2,4,6-Trinitrotoluene	2	12	J	0.16	0.4	0.4	11	J	0.16	0.4	0.4	<	U	0.16	0.6	0.6	1.3	J	0.15	0.38	0.38	<	U	0.16	0.39	0.39	3.3		0.16	0.4	0.4	<	UJ	0.16	0.4	0.4
2,4-Dinitrotoluene	NA	<	U	0.084	0.2	0.4	<	UJ	0.084	0.2	0.4	<	U	0.084	0.3	0.6	<	U	0.08	0.19	0.38	<	U	0.082	0.19	0.39	<	U	0.083	0.2	0.4	<	UJ	0.083	0.2	0.4
2,6-Dinitrotoluene	NA	<	UJ	0.065	0.2	0.2	<	UJ	0.065	0.2	0.2	<	UJ	0.065	0.3	0.3	<	U	0.062	0.19	0.19	<	U	0.063	0.19	0.19	<	U	0.064	0.2	0.2	<	UJ	0.064	0.2	0.2
2-Amino-4,6-dinitrotoluene	NA	2.2	J	0.051	0.12	0.2	0.37	J	0.051	0.12	0.2	<	U	0.051	0.18	0.3	0.55	J	0.048	0.11	0.19	<	U	0.049	0.12	0.19	<	UJ	0.05	0.12	0.2	<	UJ	0.05	0.12	0.2
2-Nitrotoluene	NA	<	U	0.086	0.2	0.4	<	UJ	0.086	0.2	0.4	<	U	0.086	0.3	0.6	<	UJ	0.082	0.19	0.38	<	UJ	0.083	0.19	0.39	<	UJ	0.085	0.2	0.4	<	UJ	0.085	0.2	0.4
3-Nitrotoluene	NA	<	U	0.2	0.4	0.4	<	UJ	0.2	0.4	0.4	<	U	0.2	0.6	0.6	<	UJ	0.19	0.38	0.38	<	UJ	0.19	0.39	0.39	<	UJ	0.19	0.4	0.4	<	UJ	0.19	0.4	0.4
4-Amino-2,6-dinitrotoluene	NA	1.5	J	0.058	0.12	0.2	<	UJ	0.058	0.12	0.2	<	U	0.058	0.18	0.3	0.46	J	0.055	0.11	0.19	<	UJ	0.056	0.12	0.19	<	UJ	0.057	0.12	0.2	<	UJ	0.057	0.12	0.2
4-Nitrotoluene	NA	<	U	0.2	0.4	1	<	UJ	0.2	0.4	1	<	U	0.2	0.6	1.5	<	UJ	0.19	0.38	0.96	<	UJ	0.19	0.39	0.97	<	UJ	0.2	0.4	0.99	<	UJ	0.2	0.4	0.99
MNX	NA	<	U	0.15	0.4	2	<	UJ	0.15	0.4	2	<	U	0.15	0.6	3	<	U	0.15	0.38	1.9	<	UJ	0.15	0.39	1.9	<	UJ	0.15	0.4	2	<	UJ	0.15	0.4	2
HMX	400	<	U	0.088	0.2	0.4	<	UJ	0.088	0.2	0.4	<	U	0.088	0.3	0.6	0.39	J	0.084	0.19	0.38	<	U	0.085	0.19	0.39	<	U	0.087	0.2	0.4	<	UJ	0.087	0.2	0.4
Nitrobenzene	NA	<	U	0.091	0.2	0.4	<	UJ	0.091	0.2	0.4	<	U	0.091	0.3	0.6	<	U	0.087	0.19	0.38	<	U	0.089	0.19	0.39	<	U	0.09	0.2	0.4	<	UJ	0.09	0.2	0.4
RDX	2	<	U	0.16	0.4	0.4	<	UJ	0.16	0.4	0.4	<	U	0.16	0.6	0.6	0.63	J	0.15	0.38	0.38	<	U	0.15	0.39	0.39	<	U	0.16	0.4	0.4	<	UJ	0.16	0.4	0.4
Tetryl	NA	<	UJ	0.079	0.2	0.24	<	UJ	0.079	0.2	0.24	<	UJ	0.079	0.3	0.36	<	U	0.076	0.19	0.23	<	UJ	0.077	0.19	0.23	<	U	0.079	0.2	0.24	<	UJ	0.079	0.2	0.24

Notes:

Concentrations exceed HALs

< = less than LOQ

µg/L = micrograms per liter

CHAAP = Cornhusker Army Ammunition Plant

DL = detection limit

DP = direct push

HAL = health advisory level

HMX = octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine

ID = identification number

J = estimated

LOD = limit of detection

LOQ = limit of quantification

MNX = mono-nitroso-RDX

NA = not available

OU = operable unit

OS = off-post sample

Qual = qualifier

RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine

U = nondetect

USEPA = United States Environmental Protection Agency

TABLE 3-1
SUMMARY OF EXPLOSIVES DETECTED, DIRECT PUSH GROUNDWATER LOCATIONS (OFF-POST)
OU1 REBOUND STUDY, BASELINE
OU1 REBOUND STUDY LETTER REPORT - BASELINE

FIELD ID SAMPLE DATE	CHAAP HALs (µg/L)	OS003-DP01-35 10/28/2019					OS003-DP01-45 10/28/2019				
		Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ
EXPLOSIVES (USEPA Method 8330A) (µg/L)											
1,3,5-Trinitrobenzene	NA	9.9		0.2	0.41	1	<	U	0.2	0.39	0.98
1,3-Dinitrobenzene	NA	<	U	0.09	0.2	0.41	<	U	0.087	0.2	0.39
2,4,6-Trinitrotoluene	2	3		0.16	0.4	0.41	<	U	0.16	0.39	0.39
2,4-Dinitrotoluene	NA	<	U	0.085	0.2	0.41	<	U	0.082	0.2	0.39
2,6-Dinitrotoluene	NA	<	U	0.065	0.2	0.2	<	UJ	0.063	0.2	0.2
2-Amino-4,6-dinitrotoluene	NA	0.31	J	0.051	0.12	0.2	<	U	0.05	0.12	0.2
2-Nitrotoluene	NA	<	UJ	0.087	0.2	0.41	<	UJ	0.084	0.2	0.39
3-Nitrotoluene	NA	<	UJ	0.2	0.41	0.41	<	UJ	0.19	0.39	0.39
4-Amino-2,6-dinitrotoluene	NA	<	UJ	0.058	0.12	0.2	<	UJ	0.057	0.12	0.2
4-Nitrotoluene	NA	<	UJ	0.2	0.41	1	<	UJ	0.2	0.39	0.98
MNX	NA	<	U	0.16	0.41	2	<	UJ	0.15	0.39	2
HMX	400	<	U	0.089	0.2	0.41	<	U	0.086	0.2	0.39
Nitrobenzene	NA	<	U	0.092	0.2	0.41	<	U	0.089	0.2	0.39
RDX	2	<	U	0.16	0.41	0.41	<	U	0.15	0.39	0.39
Tetryl	NA	<	U	0.08	0.2	0.24	<	UJ	0.078	0.2	0.24

Notes:

Concentrations exceed HALs

< = less than LOQ
µg/L = micrograms per liter
CHAAP = Cornhusker Army Ammunition Plant
DL = detection limit
DP = direct push
HAL = health advisory level
HMX = octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
ID = identification number
J = estimated
LOD = limit of detection
LOQ = limit of quantification
MNX = mono-nitroso-RDX
NA = not available
OU = operable unit
OS = off-post sample
Qual = qualifier
RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine
U = nondetect
USEPA = United States Environmental Protection Agency

TABLE 3-2
SUMMARY OF EXPLOSIVES DETECTED AND LABORATORY MNA PARAMETERS, OFF-POST AND ON-POST MONITORING WELLS
OU1 REBOUND STUDY, BASELINE
OU1 REBOUND STUDY LETTER REPORT - BASELINE

FIELD ID SAMPLE DATE	CHAAP HALs	CA210-1 10/21/2019					CA211-1 10/21/2019					CA212-1 10/21/2019					CA213-1 10/21/2019					NW020-1 10/22/2019					NW021-1 10/22/2019					NW022-1 10/22/2019				
	(µg/L)	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ
EXPLOSIVES (USEPA Method 8330A) (µg/L)																																			
1,3,5-Trinitrobenzene	NA	<	U	0.2	0.41	1	<	U	0.21	0.41	1	<	U	0.2	0.4	1	<	U	0.21	0.41	1	<	UJ	0.2	0.39	0.98	<	U	0.19	0.39	0.96	<	U	0.19	0.38	0.95
1,3-Dinitrobenzene	NA	<	U	0.091	0.2	0.41	<	U	0.091	0.21	0.41	<	U	0.089	0.2	0.4	<	U	0.091	0.21	0.41	<	UJ	0.087	0.2	0.39	<	U	0.086	0.19	0.39	<	UJ	0.085	0.19	0.38
2,4,6-Trinitrotoluene	2	<	U	0.16	0.41	0.41	<	U	0.16	0.41	0.41	<	U	0.16	0.4	0.4	<	U	0.16	0.41	0.41	<	UJ	0.16	0.39	0.39	<	U	0.15	0.39	0.39	<	U	0.15	0.38	0.38
2,4-Dinitrotoluene	NA	<	U	0.086	0.2	0.41	<	U	0.086	0.21	0.41	<	U	0.084	0.2	0.4	<	U	0.086	0.21	0.41	<	UJ	0.082	0.2	0.39	<	U	0.081	0.19	0.39	<	UJ	0.08	0.19	0.38
2,6-Dinitrotoluene	NA	<	U	0.066	0.2	0.2	<	U	0.066	0.21	0.21	<	U	0.064	0.2	0.2	<	U	0.066	0.21	0.21	<	UJ	0.063	0.2	0.2	<	U	0.062	0.19	0.19	<	UJ	0.062	0.19	0.19
2-Amino-4,6-dinitrotoluene	NA	<	U	0.052	0.12	0.2	<	U	0.052	0.12	0.21	<	U	0.051	0.12	0.2	<	U	0.052	0.12	0.21	2.6	J	0.05	0.12	0.2	1.6		0.049	0.12	0.19	<	UJ	0.048	0.11	0.19
2-Nitrotoluene	NA	<	U	0.087	0.2	0.41	<	U	0.088	0.21	0.41	<	U	0.085	0.2	0.4	<	U	0.088	0.21	0.41	<	UJ	0.084	0.2	0.39	<	U	0.082	0.19	0.39	<	UJ	0.082	0.19	0.38
3-Nitrotoluene	NA	<	U	0.2	0.41	0.41	<	U	0.2	0.41	0.41	<	U	0.19	0.4	0.4	<	U	0.2	0.41	0.41	<	UJ	0.19	0.39	0.39	<	U	0.19	0.39	0.39	<	UJ	0.19	0.38	0.38
4-Amino-2,6-dinitrotoluene	NA	<	U	0.059	0.12	0.2	<	U	0.059	0.12	0.21	<	U	0.058	0.12	0.2	<	U	0.059	0.12	0.21	1.9	J	0.056	0.12	0.2	0.77		0.056	0.12	0.19	<	UJ	0.055	0.11	0.19
4-Nitrotoluene	NA	<	U	0.2	0.41	1	<	U	0.21	0.41	1	<	U	0.2	0.4	1	<	U	0.21	0.41	1	<	UJ	0.2	0.39	0.98	<	U	0.19	0.39	0.96	<	UJ	0.19	0.38	0.95
MNX	NA	<	U	0.16	0.41	2	<	U	0.16	0.41	2.1	<	U	0.15	0.4	2	<	U	0.16	0.41	2.1	<	UJ	0.15	0.39	2	<	U	0.15	0.39	1.9	<	UJ	0.15	0.38	1.9
HMX	400	<	U	0.089	0.2	0.41	<	U	0.09	0.21	0.41	<	U	0.088	0.2	0.4	<	U	0.09	0.21	0.41	<	UJ	0.086	0.2	0.39	<	U	0.084	0.19	0.39	<	U	0.084	0.19	0.38
Nitrobenzene	NA	<	U	0.093	0.2	0.41	<	U	0.094	0.21	0.41	<	U	0.091	0.2	0.4	<	U	0.094	0.21	0.41	<	UJ	0.089	0.2	0.39	<	U	0.088	0.19	0.39	<	UJ	0.087	0.19	0.38
RDX	2	<	U	0.16	0.41	0.41	<	U	0.16	0.41	0.41	<	U	0.16	0.4	0.4	<	U	0.16	0.41	0.41	0.2	J	0.15	0.39	0.39	<	U	0.15	0.39	0.39	<	U	0.15	0.38	0.38
Tetryl	NA	<	U	0.081	0.2	0.24	<	U	0.082	0.21	0.25	<	U	0.079	0.2	0.24	<	U	0.082	0.21	0.25	<	UJ	0.078	0.2	0.23	<	U	0.076	0.19	0.23	<	U	0.076	0.19	0.23
LABORATORY MNA PARAMETERS																																			
Ammonia USEPA 350.1 (mg/L)		<	U	0.022	0.05	0.1	0.11		0.022	0.05	0.1	<	U	0.022	0.05	0.1	<	U	0.022	0.05	0.1	<	U	0.022	0.05	0.1	3.8		0.022	0.05	0.1	0.42		0.022	0.05	0.1
Total Kjeldahl Nitrogen USEPA 351.2 (mg/L)		<	U	0.69	1	1	<	U	0.69	1	1	<	U	0.69	1	1	0.97	J	0.69	1	1	<	U	0.69	1	1	3.5		0.69	1	1	<	U	0.69	1	1
Nitrate/Nitrite USEPA 353.2 (mg/L)		22		0.19	0.5	1	30		0.19	0.5	1	14		0.095	0.25	0.5	1.3		0.019	0.05	0.1	62	J	0.19	0.5	1	0.84		0.019	0.05	0.1	53		0.19	0.5	1
Sulfide SM 9034 (mg/L)		<	U	0.79	1.9	4	<	U	0.79	1.9	4	<	U	0.79	1.9	4	<	U	0.79	1.9	4	<	U	0.79	1.9	4	<	U	0.79	1.9	4	<	U	0.79	1.9	4
Sulfate USEPA 9056A (mg/L)		120		1	3	5	93		1	3	5	72		1	3	5	63		1	3	5	150		1	3	5	210		5.2	3	5	360		5.2	3	5
Dissolved Organic Carbon SM 9060A (mg/L)		9.7		0.35	1	1	4.3		0.35	1	1	2.6		0.35	1	1	2.2		0.35	1	1	3.6		0.35	1	1	2.9		0.35	1	1	2.9		0.35	1	1
Alkalinity SM 2320B (mg/L)		310		3.1	10	10	200		3.1	10	10	190		3.1	10	10	130		3.1	10	10	290		3.1	10	10	410		3.1	10	10	410		3.1	10	10
Methane RSK-175 (µg/L)		23		0.63	2	5	<	U	0.63	2	5	<	U	0.63	2	5	<	U	0.63	2	5	<	U	0.63	2	5	55		0.63	2	5	290		0.63	2	5
Carbon Dioxide SM 2320B (mg/L)[1]		138		3	10	10	89		3	10	10	84		3	10	10	58		3	10	10	129		3	10	10	182		3	10	10	182		3	10	10

Notes:

Concentrations exceed HALs

[1]Carbon dioxide back calculated from alkalinity SM 2320B.

< = less than LOQ

µg/L = micrograms per liter

CHAAP = Cornhusker Army Ammunition Plant

DL = detection limit

HAL = health advisory level

HMX = octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine

ID = identification number

J = estimated

LOD = limit of detection

LOQ = limit of quantification

mg/L = milligrams per liter

MNA = monitored natural attenuation

MNX = mono-nitroso-RDX

NA = not available

OU = operable unit

Qual = qualifier

RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine

RSK = Robert S. Kerr Environmental Research Laboratory

SM = Standard Method

U = nondetect

USEPA = United States Environmental Protection Agency

TABLE 3-2
SUMMARY OF EXPLOSIVES DETECTED AND LABORATORY MNA PARAMETERS, OFF-POST AND ON-POST MONITORING WELLS
OU1 REBOUND STUDY, BASELINE
OU1 REBOUND STUDY LETTER REPORT - BASELINE

FIELD ID / SAMPLE DATE	CHAAP HALs	NW050-1 10/22/2019					NW051-1 10/22/2019					NW052-1 10/23/2019					NW060-1 10/22/2019					NW061-1 10/22/2019					NW062-1 10/22/2019					NW070-1 10/21/2019				
	(µg/L)	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ
EXPLOSIVES (USEPA Method 8330A) (µg/L)																																				
1,3,5-Trinitrobenzene	NA	<	U	0.21	0.41	1	<	U	0.2	0.4	1	<	U	0.2	0.4	1	<	U	0.21	0.41	1	<	U	0.2	0.41	1	<	UJ	0.2	0.41	1	<	U	0.2	0.41	1
1,3-Dinitrobenzene	NA	<	UJ	0.091	0.21	0.41	<	UJ	0.089	0.2	0.4	<	U	0.09	0.2	0.4	<	U	0.091	0.21	0.41	<	U	0.091	0.2	0.41	<	UJ	0.09	0.2	0.41	<	U	0.09	0.2	0.41
2,4,6-Trinitrotoluene	2	<	U	0.16	0.41	0.41	<	U	0.16	0.4	0.4	<	U	0.16	0.4	0.4	<	U	0.16	0.41	0.41	<	U	0.16	0.41	0.41	<	UJ	0.16	0.41	0.41	<	U	0.16	0.41	0.41
2,4-Dinitrotoluene	NA	<	UJ	0.086	0.21	0.41	<	UJ	0.084	0.2	0.4	<	UJ	0.085	0.2	0.4	<	U	0.086	0.21	0.41	<	U	0.086	0.2	0.41	<	UJ	0.085	0.2	0.41	<	U	0.085	0.2	0.41
2,6-Dinitrotoluene	NA	<	UJ	0.066	0.21	0.21	<	UJ	0.065	0.2	0.2	<	UJ	0.065	0.2	0.2	<	U	0.066	0.21	0.21	<	U	0.066	0.2	0.2	<	UJ	0.065	0.2	0.2	<	U	0.066	0.2	0.2
2-Amino-4,6-dinitrotoluene	NA	<	UJ	0.052	0.12	0.21	<	UJ	0.051	0.12	0.2	<	UJ	0.051	0.12	0.2	<	U	0.052	0.12	0.21	<	U	0.052	0.12	0.2	<	UJ	0.051	0.12	0.2	<	U	0.052	0.12	0.2
2-Nitrotoluene	NA	<	UJ	0.088	0.21	0.41	<	UJ	0.086	0.2	0.4	<	UJ	0.086	0.2	0.4	<	U	0.088	0.21	0.41	<	U	0.088	0.2	0.41	<	UJ	0.087	0.2	0.41	<	UJ	0.087	0.2	0.41
3-Nitrotoluene	NA	<	UJ	0.2	0.41	0.41	<	UJ	0.2	0.4	0.4	<	UJ	0.2	0.4	0.4	<	U	0.2	0.41	0.41	<	U	0.2	0.41	0.41	<	UJ	0.2	0.41	0.41	<	UJ	0.2	0.41	0.41
4-Amino-2,6-dinitrotoluene	NA	<	UJ	0.059	0.12	0.21	<	UJ	0.058	0.12	0.2	<	UJ	0.058	0.12	0.2	<	U	0.059	0.12	0.21	<	U	0.059	0.12	0.2	<	UJ	0.059	0.12	0.2	<	U	0.059	0.12	0.2
4-Nitrotoluene	NA	<	UJ	0.21	0.41	1	<	UJ	0.2	0.4	1	<	UJ	0.2	0.4	1	<	U	0.21	0.41	1	<	U	0.2	0.41	1	<	UJ	0.2	0.41	1	<	UJ	0.2	0.41	1
MNX	NA	<	UJ	0.16	0.41	2.1	<	UJ	0.15	0.4	2	<	U	0.16	0.4	2	<	U	0.16	0.41	2.1	<	U	0.16	0.41	2	<	UJ	0.16	0.41	2	<	U	0.16	0.41	2
HMX	400	<	U	0.09	0.21	0.41	<	U	0.088	0.2	0.4	<	U	0.089	0.2	0.4	<	U	0.09	0.21	0.41	<	U	0.09	0.2	0.41	<	UJ	0.089	0.2	0.41	<	U	0.089	0.2	0.41
Nitrobenzene	NA	<	UJ	0.093	0.21	0.41	<	UJ	0.091	0.2	0.4	<	UJ	0.092	0.2	0.4	<	U	0.094	0.21	0.41	<	U	0.093	0.2	0.41	<	UJ	0.092	0.2	0.41	<	U	0.093	0.2	0.41
RDX	2	<	U	0.16	0.41	0.41	<	U	0.16	0.4	0.4	<	U	0.16	0.4	0.4	<	U	0.16	0.41	0.41	<	U	0.16	0.41	0.41	<	UJ	0.16	0.41	0.41	<	U	0.16	0.41	0.41
Tetryl	NA	<	U	0.081	0.21	0.25	<	U	0.08	0.2	0.24	<	U	0.08	0.2	0.24	<	U	0.081	0.21	0.25	<	U	0.081	0.2	0.25	<	UJ	0.08	0.2	0.24	<	U	0.081	0.2	0.24
LABORATORY MNA PARAMETERS																																				
Ammonia USEPA 350.1 (mg/L)		4.8		0.044	0.05	0.1	<	U	0.022	0.05	0.1	0.027	J	0.022	0.05	0.1	0.14		0.022	0.05	0.1	5.7		0.044	0.05	0.1	0.59		0.022	0.05	0.1	0.024	J	0.022	0.05	0.1
Total Kjeldahl Nitrogen USEPA 351.2 (mg/L)		<	U	0.69	1	1	<	U	0.69	1	1	0.8	J	0.69	1	1	<	U	0.69	1	1	4.9		0.69	1	1	1	J	0.69	1	1	<	UJ	3.4	1	1
Nitrate/Nitrite USEPA 353.2 (mg/L)		62		0.19	0.5	1	27	J	0.19	0.5	1	0.12		0.019	0.05	0.1	1.8		0.019	0.05	0.1	4.6		0.019	0.05	0.1	<	U	0.019	0.05	0.1	0.03	J	0.019	0.05	0.1
Sulfide SM 9034 (mg/L)		<	U	0.79	1.9	4	<	U	0.79	1.9	4	<	U	0.79	1.9	4	<	U	0.79	1.9	4	<	U	0.79	1.9	4	<	U	0.79	1.9	4	<	U	0.79	1.9	4
Sulfate USEPA 9056A (mg/L)		120		1	3	5	170		1	3	5	130		1	3	5	3.8	J	1	3	5	170		1	3	5	180		1	3	5	3.9	J	1	3	5
Dissolved Organic Carbon SM 9060A (mg/L)		8.1		0.35	1	1	9		0.35	1	1	6.3		0.35	1	1	1.8		0.35	1	1	4.4		0.35	1	1	2.8		0.35	1	1	7.2		0.35	1	1
Alkalinity SM 2320B (mg/L)		240		3.1	10	10	350		3.1	10	10	380		3.1	10	10	33		3.1	10	10	300		3.1	10	10	270		3.1	10	10	51		3.1	10	10
Methane RSK-175 (µg/L)		1.4	J	0.63	2	5	8.3		0.63	2	5	150		0.63	2	5	<	U	0.63	2	5	21		0.63	2	5	18	J	0.63	2	5	18		0.63	2	5
Carbon Dioxide SM 2320B (mg/L)[1]		107		3	10	10	156		3	10	10	169		3	10	10	15		3	10	10	133		3	10	10	120		3	10	10	23		3	10	10

Notes:

Concentrations exceed HALs

[1]Carbon dioxide back calculated from alkalinity SM 2320B.

< = less than LOQ

µg/L = micrograms per liter

CHAAP = Cornhusker Army Ammunition Plant

DL = detection limit

HAL = health advisory level

HMX = octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine

ID = identification number

J = estimated

LOD = limit of detection

LOQ = limit of quantification

mg/L = milligrams per liter

MNA = monitored natural attenuation

MNX = mono-nitroso-RDX

NA = not available

OU = operable unit

Qual = qualifier

RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine

RSK = Robert S. Kerr Environmental Research Laboratory

SM = Standard Method

U = nondetect

USEPA = United States Environmental Protection Agency

TABLE 3-2
SUMMARY OF EXPLOSIVES DETECTED AND LABORATORY MNA PARAMETERS, OFF-POST AND ON-POST MONITORING WELLS
OU1 REBOUND STUDY, BASELINE
OU1 REBOUND STUDY LETTER REPORT - BASELINE

FIELD ID SAMPLE DATE	CHAAP HALs	NW071-1 10/21/2019					NW080-1 10/22/2019					NW081R-1 10/22/2019					NW082R-1 10/22/2019					G0024-1 10/23/2019					G0070-1 10/21/2019					G0075-1 10/21/2019				
	(µg/L)	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ
EXPLOSIVES (USEPA Method 8330A) (µg/L)																																			
1,3,5-Trinitrobenzene	NA	<	U	0.2	0.4	1	<	U	0.2	0.4	0.99	<	U	0.2	0.4	1	<	U	0.2	0.4	1	<	U	0.19	0.39	0.97	<	U	0.2	0.38	0.95	<	U	0.19	0.38	0.95
1,3-Dinitrobenzene	NA	<	U	0.089	0.2	0.4	<	U	0.088	0.2	0.4	<	U	0.089	0.2	0.4	<	U	0.089	0.2	0.4	<	UJ	0.086	0.19	0.39	<	U	0.09	0.19	0.38	<	U	0.084	0.19	0.38
2,4,6-Trinitrotoluene	2	<	U	0.16	0.4	0.4	<	U	0.16	0.4	0.4	<	U	0.16	0.4	0.4	<	U	0.16	0.4	0.4	<	UJ	0.16	0.39	0.39	<	U	0.16	0.38	0.38	<	U	0.15	0.38	0.38
2,4-Dinitrotoluene	NA	<	U	0.084	0.2	0.4	<	U	0.083	0.2	0.4	<	U	0.084	0.2	0.4	<	U	0.084	0.2	0.4	<	UJ	0.082	0.19	0.39	<	U	0.085	0.19	0.38	<	U	0.079	0.19	0.38
2,6-Dinitrotoluene	NA	<	U	0.065	0.2	0.2	<	U	0.064	0.2	0.2	<	U	0.064	0.2	0.2	<	U	0.065	0.2	0.2	<	UJ	0.063	0.19	0.19	<	U	0.066	0.19	0.19	<	U	0.061	0.19	0.19
2-Amino-4,6-dinitrotoluene	NA	<	U	0.051	0.12	0.2	<	U	0.05	0.12	0.2	<	U	0.051	0.12	0.2	<	U	0.051	0.12	0.2	0.56	J	0.049	0.12	0.19	<	U	0.052	0.11	0.19	<	U	0.048	0.11	0.19
2-Nitrotoluene	NA	<	U	0.086	0.2	0.4	<	U	0.084	0.2	0.4	<	U	0.085	0.2	0.4	<	U	0.086	0.2	0.4	<	UJ	0.083	0.19	0.39	<	UJ	0.087	0.19	0.38	<	UJ	0.081	0.19	0.38
3-Nitrotoluene	NA	<	U	0.2	0.4	0.4	<	U	0.19	0.4	0.4	<	U	0.19	0.4	0.4	<	U	0.2	0.4	0.4	<	UJ	0.19	0.39	0.39	<	UJ	0.2	0.38	0.38	<	U	0.18	0.38	0.38
4-Amino-2,6-dinitrotoluene	NA	<	U	0.058	0.12	0.2	<	U	0.057	0.12	0.2	<	U	0.058	0.12	0.2	<	U	0.058	0.12	0.2	<	UJ	0.056	0.12	0.19	<	U	0.059	0.11	0.19	0.085	J	0.055	0.11	0.19
4-Nitrotoluene	NA	<	U	0.2	0.4	1	<	U	0.2	0.4	0.99	<	U	0.2	0.4	1	<	U	0.2	0.4	1	<	UJ	0.19	0.39	0.97	<	UJ	0.2	0.38	0.95	<	UJ	0.19	0.38	0.95
MNX	NA	<	U	0.15	0.4	2	<	U	0.15	0.4	2	<	U	0.15	0.4	2	<	U	0.15	0.4	2	<	U	0.15	0.39	1.9	<	U	0.16	0.38	1.9	<	U	0.15	0.38	1.9
HMX	400	<	U	0.088	0.2	0.4	<	U	0.087	0.2	0.4	<	U	0.087	0.2	0.4	<	U	0.088	0.2	0.4	<	U	0.085	0.19	0.39	<	U	0.089	0.19	0.38	<	U	0.083	0.19	0.38
Nitrobenzene	NA	<	U	0.092	0.2	0.4	<	U	0.09	0.2	0.4	<	U	0.091	0.2	0.4	<	U	0.092	0.2	0.4	<	UJ	0.089	0.19	0.39	<	U	0.093	0.19	0.38	<	U	0.086	0.19	0.38
RDX	2	<	U	0.16	0.4	0.4	<	U	0.16	0.4	0.4	<	U	0.16	0.4	0.4	<	U	0.16	0.4	0.4	<	U	0.15	0.39	0.39	<	U	0.16	0.38	0.38	<	U	0.15	0.38	0.38
Tetryl	NA	<	U	0.08	0.2	0.24	<	U	0.078	0.2	0.24	<	U	0.079	0.2	0.24	<	U	0.08	0.2	0.24	<	UJ	0.077	0.19	0.23	<	U	0.081	0.19	0.23	<	U	0.075	0.19	0.23
LABORATORY MNA PARAMETERS																																			
Ammonia USEPA 350.1 (mg/L)		<	U	0.022	0.05	0.1	0.029	J	0.022	0.05	0.1	<	U	0.022	0.05	0.1	<	U	0.022	0.05	0.1	<	U	0.022	0.05	0.1	<	U	0.022	0.05	0.1	0.056	J	0.022	0.05	0.1
Total Kjeldahl Nitrogen USEPA 351.2 (mg/L)		<	U	0.69	1	1	<	U	0.69	1	1	<	U	0.69	1	1	<	U	0.69	1	1	<	U	0.69	1	1	<	UJ	3.4	1	1	0.92	J	0.69	1	1
Nitrate/Nitrite USEPA 353.2 (mg/L)		2.9		0.019	0.05	0.1	47		0.19	0.5	1	29		0.19	0.5	1	20		0.19	0.5	1	40		0.19	0.5	1	0.025	J	0.019	0.05	0.1	1.2		0.019	0.05	0.1
Sulfide SM 9034 (mg/L)		<	U	0.79	1.9	4	<	U	0.79	1.9	4	<	U	0.79	1.9	4	<	U	0.79	1.9	4	<	U	0.79	1.9	4	<	U	0.79	1.9	4	<	U	0.79	1.9	4
Sulfate USEPA 9056A (mg/L)		60		1	3	5	200		1	3	5	98		1	3	5	86		1	3	5	50		1	3	5	34	J	1	3	5	150		1	3	5
Dissolved Organic Carbon SM 9060A (mg/L)		<	U	0.35	1	1	4.7		0.35	1	1	4.5		0.35	1	1	<	U	0.35	1	1	4.9		0.35	1	1	1		0.35	1	1	3.4		0.35	1	1
Alkalinity SM 2320B (mg/L)		110		3.1	10	10	250		3.1	10	10	250		3.1	10	10	240		3.1	10	10	110		3.1	10	10	220		3.1	10	10	390		3.1	10	10
Methane RSK-175 (µg/L)		<	U	0.63	2	5	<	U	0.63	2	5	<	U	0.63	2	5	<	U	0.63	2	5	<	U	0.63	2	5	<	U	0.63	2	5	12		0.63	2	5
Carbon Dioxide SM 2320B (mg/L)[1]		49		3	10	10	111		3	10	10	111		3	10	10	107		3	10	10	49		3	10	10	98		3	10	10	173		3	10	10

Notes:

Concentrations exceed HALs

[1]Carbon dioxide back calculated from alkalinity SM 2320B.

< = less than LOQ

µg/L = micrograms per liter

CHAAP = Cornhusker Army Ammunition Plant

DL = detection limit

HAL = health advisory level

HMX = octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine

ID = identification number

J = estimated

LOD = limit of detection

LOQ = limit of quantification

mg/L = milligrams per liter

MNA = monitored natural attenuation

MNX = mono-nitroso-RDX

NA = not available

OU = operable unit

Qual = qualifier

RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine

RSK = Robert S. Kerr Environmental Research Laboratory

SM = Standard Method

U = nondetect

USEPA = United States Environmental Protection Agency

TABLE 3-2
SUMMARY OF EXPLOSIVES DETECTED AND LABORATORY MNA PARAMETERS, OFF-POST AND ON-POST MONITORING WELLS
OU1 REBOUND STUDY, BASELINE
OU1 REBOUND STUDY LETTER REPORT - BASELINE

FIELD ID SAMPLE DATE	CHAAP HALs	G0076-1 10/21/2019					G0077-1 10/23/2019					G0078-1 10/23/2019					G0079-1 10/21/2019					G0080-1 10/21/2019					G0081-1 10/21/2019					G0082-1 10/21/2019				
	(µg/L)	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ
EXPLOSIVES (USEPA Method 8330A) (µg/L)																																			
1,3,5-Trinitrobenzene	NA	<	UJ	0.19	9.90	25.0	2.2		0.19	0.38	0.96	<	U	0.19	0.38	0.96	<	U	0.19	0.38	0.96	<	U	0.19	0.38	0.95	1.1		0.2	0.39	0.98	<	UJ	0.19	0.39	0.97
1,3-Dinitrobenzene	NA	<	UJ	0.08	0.20	0.39	<	U	0.085	0.19	0.38	<	U	0.085	0.19	0.38	<	U	0.085	0.19	0.38	<	U	0.084	0.19	0.38	<	U	0.087	0.2	0.39	<	UJ	0.086	0.19	0.39
2,4,6-Trinitrotoluene	2	<	UJ	0.15	9.90	9.90	3.2		0.15	0.38	0.38	<	U	0.15	0.38	0.38	<	U	0.15	0.38	0.38	<	U	0.15	0.38	0.38	0.29	J	0.16	0.39	0.39	<	UJ	0.15	0.39	0.39
2,4-Dinitrotoluene	NA	<	UJ	0.08	0.20	0.39	<	UJ	0.081	0.19	0.38	<	UJ	0.08	0.19	0.38	<	U	0.081	0.19	0.38	<	U	0.079	0.19	0.38	<	U	0.082	0.2	0.39	<	UJ	0.081	0.19	0.39
2,6-Dinitrotoluene	NA	<	UJ	0.06	0.20	0.20	<	UJ	0.062	0.19	0.19	<	UJ	0.062	0.19	0.19	<	U	0.062	0.19	0.19	<	U	0.061	0.19	0.19	<	U	0.063	0.2	0.2	<	UJ	0.062	0.19	0.19
2-Amino-4,6-dinitrotoluene	NA	<	UJ	0.05	0.12	0.20	2.8	J	0.049	0.12	0.19	<	UJ	0.049	0.11	0.19	<	U	0.049	0.12	0.19	0.096	J	0.048	0.11	0.19	0.2	J	0.05	0.12	0.2	0.21	J	0.049	0.12	0.19
2-Nitrotoluene	NA	<	UJ	0.08	0.20	0.39	<	UJ	0.082	0.19	0.38	<	UJ	0.082	0.19	0.38	<	UJ	0.082	0.19	0.38	<	UJ	0.081	0.19	0.38	<	UJ	0.084	0.2	0.39	<	UJ	0.083	0.19	0.39
3-Nitrotoluene	NA	<	UJ	0.19	0.39	0.39	<	UJ	0.19	0.38	0.38	<	UJ	0.19	0.38	0.38	<	U	0.19	0.38	0.38	<	U	0.18	0.38	0.38	<	U	0.19	0.39	0.39	<	UJ	0.19	0.39	0.39
4-Amino-2,6-dinitrotoluene	NA	<	UJ	0.06	0.12	0.20	3	J	0.056	0.12	0.19	<	UJ	0.055	0.11	0.19	<	U	0.055	0.12	0.19	<	UJ	0.055	0.11	0.19	0.15	J	0.056	0.12	0.2	0.16	J	0.056	0.12	0.19
4-Nitrotoluene	NA	<	UJ	0.19	0.39	0.99	<	UJ	0.19	0.38	0.96	<	UJ	0.19	0.38	0.96	<	UJ	0.19	0.38	0.96	<	UJ	0.19	0.38	0.95	<	UJ	0.2	0.39	0.98	<	UJ	0.19	0.39	0.97
MNX	NA	<	UJ	0.08	0.20	0.39	<	U	0.15	0.38	1.9	<	U	0.15	0.38	1.9	<	U	0.15	0.38	1.9	<	U	0.15	0.38	1.9	<	U	0.15	0.39	2	<	UJ	0.15	0.39	1.9
HMX	400	<	UJ	0.15	0.39	2.00	0.69		0.084	0.19	0.38	<	U	0.084	0.19	0.38	<	U	0.084	0.19	0.38	0.18	J	0.083	0.19	0.38	<	U	0.086	0.2	0.39	0.33	J	0.085	0.19	0.39
Nitrobenzene	NA	<	UJ	0.09	0.20	0.39	<	UJ	0.088	0.19	0.38	<	UJ	0.087	0.19	0.38	<	U	0.088	0.19	0.38	<	U	0.086	0.19	0.38	<	U	0.089	0.2	0.39	<	UJ	0.088	0.19	0.39
RDX	2	<	UJ	0.15	0.39	0.39	0.91		0.15	0.38	0.38	<	U	0.15	0.38	0.38	<	U	0.15	0.38	0.38	<	U	0.15	0.38	0.38	<	U	0.15	0.39	0.39	0.63	J	0.15	0.39	0.39
Tetryl	NA	<	UJ	0.08	0.20	0.24	<	U	0.076	0.19	0.23	<	U	0.076	0.19	0.23	<	U	0.076	0.19	0.23	<	U	0.075	0.19	0.23	<	U	0.078	0.2	0.23	<	UJ	0.077	0.19	0.23
LABORATORY MNA PARAMETERS																																			
Ammonia USEPA 350.1 (mg/L)		1.1		0.022	0.05	0.1	<	U	0.022	0.05	0.1	0.53		0.022	0.05	0.1	<	U	0.022	0.05	0.1	0.064	J	0.022	0.05	0.1	0.26		0.022	0.05	0.1	<	U	0.022	0.05	0.1
Total Kjeldahl Nitrogen USEPA 351.2 (mg/L)		1.3		0.69	1	1	<	U	0.69	1	1	<	U	0.69	1	1	0.76	J	0.69	1	1	<	U	0.69	1	1	<	U	3.4	1	1	<	U	0.69	1	1
Nitrate/Nitrite USEPA 353.2 (mg/L)		<	U	0.019	0.05	0.1	20		0.095	0.25	0.5	<	U	0.019	0.05	0.1	0.21		0.019	0.05	0.1	2.7		0.019	0.05	0.1	0.36		0.019	0.05	0.1	3.4		0.019	0.05	0.1
Sulfide SM 9034 (mg/L)		<	U	0.79	1.9	4	<	U	0.79	1.9	4	<	U	0.79	1.9	4	<	U	0.79	1.9	4	2.9		0.35	1.9	4	<	U	0.79	1.9	4	<	U	0.79	1.9	4
Sulfate USEPA 9056A (mg/L)		280	J	5.2	3	5	150		1	3	5	250		5.2	3	5	17		1	3	5	<	U	0.79	3	5	120		1	3	5	76		1	3	5
Dissolved Organic Carbon SM 9060A (mg/L)		<	U	0.35	1	1	4.5		0.35	1	1	2.8		0.35	1	1	3.2		0.35	1	1	2.9		0.35	1	1	7.8		0.35	1	1	<	U	0.35	1	1
Alkalinity SM 2320B (mg/L)		350		3.1	10	10	310		3.1	10	10	420		3.1	10	10	130		3.1	10	10	350		3.1	10	10	370		3.1	10	10	250		3.1	10	10
Methane RSK-175 (µg/L)		330		0.63	2	5	26		0.63	2	5	350		0.63	2	5	<	U	0.63	2	5	1.1	J	0.63	2	5	3500		0.63	2	5	1100		0.63	2	5
Carbon Dioxide SM 2320B (mg/L)[1]		156		3	10	10	138		3	10	10	187		3	10	10	58		3	10	10	156		3	10	10	164		3	10	10	111		3	10	10

Notes:

Concentrations exceed HALs

[1]Carbon dioxide back calculated from alkalinity SM 2320B.

< = less than LOQ

µg/L = micrograms per liter

CHAAP = Cornhusker Army Ammunition Plant

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HMX = octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine

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RSK = Robert S. Kerr Environmental Research Laboratory

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USEPA = United States Environmental Protection Agency

TABLE 3-2
SUMMARY OF EXPLOSIVES DETECTED AND LABORATORY MNA PARAMETERS, OFF-POST AND ON-POST MONITORING WELLS
OU1 REBOUND STUDY, BASELINE
OU1 REBOUND STUDY LETTER REPORT - BASELINE

FIELD ID SAMPLE DATE	CHAAP HALs	G0086-1 10/23/2019					G0087-1 10/22/2019					G0091-1 10/22/2019					G0092-1 10/22/2019					PZ017R-1 10/23/2019					PZ018-1 10/23/2019					PZ019-1 10/22/2019				
	(µg/L)	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ
EXPLOSIVES (USEPA Method 8330A) (µg/L)																																				
1,3,5-Trinitrobenzene	NA	10		0.2	0.4	1	<	U	0.19	0.38	0.94	<	U	0.19	0.38	0.96	<	U	0.19	0.38	0.96	7.2		0.2	0.4	1	11	J	0.2	0.39	0.98	<	UJ	0.2	0.39	0.98
1,3-Dinitrobenzene	NA	<	U	0.09	0.2	0.4	<	U	0.084	0.19	0.38	<	U	0.085	0.19	0.38	<	U	0.085	0.19	0.38	<	U	0.088	0.2	0.4	<	UJ	0.087	0.2	0.39	<	UJ	0.087	0.2	0.39
2,4,6-Trinitrotoluene	2	3.8		0.16	0.4	0.4	<	U	0.15	0.38	0.38	<	U	0.15	0.38	0.38	<	U	0.15	0.38	0.38	15		0.16	0.4	0.4	8	J	0.16	0.39	0.39	<	UJ	0.16	0.39	0.39
2,4-Dinitrotoluene	NA	<	UJ	0.085	0.2	0.4	<	U	0.079	0.19	0.38	<	U	0.08	0.19	0.38	<	U	0.081	0.19	0.38	<	UJ	0.084	0.2	0.4	<	UJ	0.083	0.2	0.39	<	UJ	0.082	0.2	0.39
2,6-Dinitrotoluene	NA	<	UJ	0.065	0.2	0.2	<	U	0.061	0.19	0.19	<	U	0.062	0.19	0.19	<	U	0.062	0.19	0.19	<	UJ	0.064	0.2	0.2	<	UJ	0.064	0.2	0.2	<	UJ	0.063	0.2	0.2
2-Amino-4,6-dinitrotoluene	NA	1.6	J	0.051	0.12	0.2	<	U	0.048	0.11	0.19	0.16	J	0.049	0.12	0.19	<	U	0.049	0.12	0.19	4.1	J	0.051	0.12	0.2	2	J	0.05	0.12	0.2	<	UJ	0.05	0.12	0.2
2-Nitrotoluene	NA	<	UJ	0.087	0.2	0.4	<	U	0.081	0.19	0.38	<	U	0.082	0.19	0.38	<	U	0.082	0.19	0.38	<	UJ	0.085	0.2	0.4	<	UJ	0.084	0.2	0.39	<	UJ	0.084	0.2	0.39
3-Nitrotoluene	NA	<	UJ	0.2	0.4	0.4	<	U	0.18	0.38	0.38	<	U	0.19	0.38	0.38	<	U	0.19	0.38	0.38	<	UJ	0.19	0.4	0.4	<	UJ	0.19	0.39	0.39	<	UJ	0.19	0.39	0.39
4-Amino-2,6-dinitrotoluene	NA	1	J	0.058	0.12	0.2	<	U	0.054	0.11	0.19	0.12	J	0.055	0.12	0.19	<	U	0.055	0.12	0.19	3.5	J	0.058	0.12	0.2	1.8	J	0.057	0.12	0.2	<	UJ	0.057	0.12	0.2
4-Nitrotoluene	NA	<	UJ	0.2	0.4	1	<	U	0.19	0.38	0.94	<	U	0.19	0.38	0.96	<	U	0.19	0.38	0.96	<	UJ	0.2	0.4	1	<	UJ	0.2	0.39	0.98	<	UJ	0.2	0.39	0.98
MNX	NA	<	U	0.16	0.4	2	<	U	0.15	0.38	1.9	<	U	0.15	0.38	1.9	<	U	0.15	0.38	1.9	<	U	0.15	0.4	2	<	UJ	0.15	0.39	2	<	UJ	0.15	0.39	2
HMX	400	<	U	0.089	0.2	0.4	0.32	J	0.083	0.19	0.38	0.39		0.084	0.19	0.38	<	U	0.084	0.19	0.38	0.59	J	0.087	0.2	0.4	0.59	J	0.086	0.2	0.39	<	UJ	0.086	0.2	0.39
Nitrobenzene	NA	<	UJ	0.092	0.2	0.4	<	U	0.086	0.19	0.38	<	U	0.087	0.19	0.38	<	UJ	0.088	0.19	0.38	<	UJ	0.091	0.2	0.4	<	UJ	0.09	0.2	0.39	<	UJ	0.089	0.2	0.39
RDX	2	<	U	0.16	0.4	0.4	<	U	0.15	0.38	0.38	0.81		0.15	0.38	0.38	<	U	0.15	0.38	0.38	0.87		0.16	0.4	0.4	0.88	J	0.16	0.39	0.39	<	UJ	0.16	0.39	0.39
Tetryl	NA	<	U	0.08	0.2	0.24	<	U	0.075	0.19	0.23	<	U	0.076	0.19	0.23	<	U	0.076	0.19	0.23	<	U	0.079	0.2	0.24	<	UJ	0.078	0.2	0.24	<	U	0.078	0.2	0.24
LABORATORY MNA PARAMETERS																																				
Ammonia USEPA 350.1 (mg/L)		<	U	0.022	0.05	0.1	<	U	0.022	0.05	0.1	<	U	0.022	0.05	0.1	<	U	0.022	0.05	0.1	0.06	J	0.022	0.05	0.1	0.21		0.022	0.05	0.1	<	U	0.022	0.05	0.1
Total Kjeldahl Nitrogen USEPA 351.2 (mg/L)		<	U	0.69	1	1	<	U	0.69	1	1	<	U	0.69	1	1	<	U	0.69	1	1	<	U	0.69	1	1	<	U	0.69	1	1	<	UJ	0.69	1	1
Nitrate/Nitrite USEPA 353.2 (mg/L)		4.8		0.019	0.05	0.1	1.3		0.019	0.05	0.1	32		0.095	0.25	0.5	0.45		0.019	0.05	0.1	41		0.19	0.5	1	24		0.19	0.5	1	34	J	0.48	1.3	2.5
Sulfide SM 9034 (mg/L)		<	U	0.79	1.9	4	<	U	0.79	1.9	4	<	U	0.79	1.9	4	<	U	0.79	1.9	4	<	U	0.79	1.9	4	<	U	0.79	1.9	4	<	U	0.79	1.9	4
Sulfate USEPA 9056A (mg/L)		140		1	3	5	120		1	3	5	190		5.2	3	5	300		5.2	3	5	74		1	3	5	100		1	3	5	67		1	3	5
Dissolved Organic Carbon SM 9060A (mg/L)		2.6		0.35	1	1	2.9		0.35	1	1	3.6		0.35	1	1	2.9		0.35	1	1	3.5		0.35	1	1	3.3		0.35	1	1	2.2		0.35	1	1
Alkalinity SM 2320B (mg/L)		310		3.1	10	10	310		3.1	10	10	360		3.1	10	10	410		3.1	10	10	140		3.1	10	10	200		3.1	10	10	88		3.1	10	10
Methane RSK-175 (µg/L)		110		0.63	2	5	<	U	0.63	2	5	<	U	0.63	2	5	1.1	J	0.63	2	5	140		0.63	2	5	240		0.63	2	5	<	U	0.63	2	5
Carbon Dioxide SM 2320B (mg/L)[1]		138		3	10	10	138		3	10	10	160		3	10	10	182		3	10	10	62		3	10	10	89		3	10	10	39		3	10	10

Notes:

Concentrations exceed HALs

[1]Carbon dioxide back calculated from alkalinity SM 2320B.

< = less than LOQ

µg/L = micrograms per liter

CHAAP = Cornhusker Army Ammunition Plant

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OU1 REBOUND STUDY, BASELINE
OU1 REBOUND STUDY LETTER REPORT - BASELINE

FIELD ID SAMPLE DATE	CHAAP HALs (µg/L)	PZ020-1 10/23/2019 Result	Qual	DL	LOD	LOQ
EXPLOSIVES (USEPA Method 8330A) (µg/L)						
1,3,5-Trinitrobenzene	NA	2.4		0.19	0.38	0.96
1,3-Dinitrobenzene	NA	<	U	0.085	0.19	0.38
2,4,6-Trinitrotoluene	2	3.7		0.15	0.38	0.38
2,4-Dinitrotoluene	NA	<	UJ	0.081	0.19	0.38
2,6-Dinitrotoluene	NA	<	UJ	0.062	0.19	0.19
2-Amino-4,6-dinitrotoluene	NA	2.5	J	0.049	0.12	0.19
2-Nitrotoluene	NA	<	UJ	0.082	0.19	0.38
3-Nitrotoluene	NA	<	UJ	0.19	0.38	0.38
4-Amino-2,6-dinitrotoluene	NA	2.8	J	0.055	0.12	0.19
4-Nitrotoluene	NA	<	UJ	0.19	0.38	0.96
MNX	NA	<	U	0.15	0.38	1.9
HMX	400	0.39	J	0.084	0.19	0.38
Nitrobenzene	NA	<	UJ	0.087	0.19	0.38
RDX	2	0.42		0.15	0.38	0.38
Tetryl	NA	<	U	0.076	0.19	0.23
LABORATORY MNA PARAMETERS						
Ammonia USEPA 350.1 (mg/L)		<	U	0.022	0.05	0.1
Total Kjeldahl Nitrogen USEPA 351.2 (mg/L)		<	U	0.69	1	1
Nitrate/Nitrite USEPA 353.2 (mg/L)		29		0.095	0.25	0.5
Sulfide SM 9034 (mg/L)		<	U	0.79	1.9	4
Sulfate USEPA 9056A (mg/L)		160		1	3	5
Dissolved Organic Carbon SM 9060A (mg/L)		3.8		0.35	1	1
Alkalinity SM 2320B (mg/L)		280		3.1	10	10
Methane RSK-175 (µg/L)		<	U	0.63	2	5
Carbon Dioxide SM 2320B (mg/L)[1]		124		3	10	10

Notes:

Concentrations exceed HALs

[1]Carbon dioxide back calculated from alkalinity SM 2320B.

< = less than LOQ

µg/L = micrograms per liter

CHAAP = Cornhusker Army Ammunition Plant

DL = detection limit

HAL = health advisory level

HMX = octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine

ID = identification number

J = estimated

LOD = limit of detection

LOQ = limit of quantification

mg/L = milligrams per liter

MNA = monitored natural attenuation

MNX = mono-nitroso-RDX

NA = not available

OU = operable unit

Qual = qualifier

RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine

RSK = Robert S. Kerr Environmental Research Laboratory

SM = Standard Method

U = nondetect

USEPA = United States Environmental Protection Agency

TABLE 3-3
SUMMARY OF EXPLOSIVES DETECTED AND LABORATORY MNA PARAMETERS, PERFORMANCE MONITORING WELLS
OU1 SUBSURFACE INJECTION, BASELINE
OU1 REBOUND STUDY LETTER REPORT - BASELINE

FIELD ID SAMPLE DATE	CHAAP HALs (µg/L)	EW7-PM21A-1-25 10/17/2019					EW7-PM21B-1-35 10/17/2019					EW7-PM22A-1-25 10/17/2019					EW7-PM22B-1-35 10/17/2019					EW7-PM23A-1-25 10/16/2019					EW7-PM23B-1-35 10/17/2019					EW7-PM24A-1-25 10/16/2019				
		Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ
EXPLOSIVES (USEPA Method 8330A) (µg/L)																																			
1,3,5-Trinitrobenzene	NA	100	J	9.7	19	49	29		2	3.9	9.8	110	J	10	20	51	39	J	9.6	19	48	70		4.9	9.9	25	22		0.2	0.39	0.98	6.3	J	0.19	0.39	0.97
1,3-Dinitrobenzene	NA	<	UJ	0.086	0.19	0.39	<	U	0.087	0.2	0.39	<	U	0.09	0.2	0.41	<	UJ	0.085	0.19	0.38	<	UJ	0.088	0.2	0.39	<	U	0.087	0.2	0.39	<	UJ	0.086	0.19	0.39
2,4,6-Trinitrotoluene	2	29	J	7.8	19	19	5.7		0.16	0.39	0.39	27	J	8.1	20	20	5.7	J	0.15	0.38	0.38	28		3.9	9.9	9.9	5.2		0.16	0.39	0.39	9.8	J	0.15	0.39	0.39
2,4-Dinitrotoluene	NA	0.2	J	0.082	0.19	0.39	0.15	J	0.082	0.2	0.39	0.41	J	0.085	0.2	0.41	0.15	J	0.08	0.19	0.38	0.24	J	0.083	0.2	0.39	<	U	0.083	0.2	0.39	<	UJ	0.081	0.19	0.39
2,6-Dinitrotoluene	NA	<	UJ	0.063	0.19	0.19	<	U	0.063	0.2	0.2	<	U	0.065	0.2	0.2	<	UJ	0.062	0.19	0.19	<	UJ	0.064	0.2	0.2	<	U	0.064	0.2	0.2	<	UJ	0.062	0.19	0.19
2-Amino-4,6-dinitrotoluene	NA	3.8	J	0.049	0.12	0.19	1.4		0.05	0.12	0.2	4.1	J	0.051	0.12	0.2	1.7	J	0.048	0.11	0.19	3.3	J	0.05	0.12	0.2	0.97		0.05	0.12	0.2	2.8	J	0.049	0.12	0.19
2-Nitrotoluene	NA	<	UJ	0.083	0.19	0.39	<	UJ	0.084	0.2	0.39	<	U	0.087	0.2	0.41	<	UJ	0.082	0.19	0.38	<	UJ	0.084	0.2	0.39	<	UJ	0.084	0.2	0.39	<	UJ	0.083	0.19	0.39
3-Nitrotoluene	NA	<	UJ	0.19	0.39	0.39	<	U	0.19	0.39	0.39	<	U	0.2	0.41	0.41	<	UJ	0.19	0.38	0.38	<	UJ	0.19	0.39	0.39	<	U	0.19	0.39	0.39	<	UJ	0.19	0.39	0.39
4-Amino-2,6-dinitrotoluene	NA	<	UJ	0.056	0.12	0.19	<	U	0.056	0.12	0.2	<	U	0.059	0.12	0.2	1.1	J	0.055	0.11	0.19	<	UJ	0.057	0.12	0.2	<	U	0.057	0.12	0.2	2.1	J	0.056	0.12	0.19
4-Nitrotoluene	NA	<	UJ	0.19	0.39	0.97	<	U	0.2	0.39	0.98	<	U	0.2	0.41	1	<	UJ	0.19	0.38	0.96	<	UJ	0.2	0.39	0.99	<	U	0.2	0.39	0.98	<	UJ	0.19	0.39	0.97
MNX	NA	<	UJ	0.15	0.39	1.9	<	U	0.15	0.39	2	<	U	0.16	0.41	2	<	UJ	0.15	0.38	1.9	<	U	0.15	0.39	2	<	U	0.15	0.39	2	<	UJ	0.15	0.39	1.9
HMX	400	0.63	J	0.085	0.19	0.39	<	U	0.086	0.2	0.39	<	U	0.089	0.2	0.41	<	UJ	0.084	0.19	0.38	0.93	J	0.086	0.2	0.39	0.32	J	0.086	0.2	0.39	1.2	J	0.085	0.19	0.39
Nitrobenzene	NA	<	UJ	0.089	0.19	0.39	<	U	0.089	0.2	0.39	<	U	0.092	0.2	0.41	<	UJ	0.087	0.19	0.38	<	UJ	0.09	0.2	0.39	<	U	0.09	0.2	0.39	<	UJ	0.088	0.19	0.39
RDX	2	1	J	0.15	0.39	0.39	0.39	J	0.15	0.39	0.39	0.47	J	0.16	0.41	0.41	0.28	J	0.15	0.38	0.38	1	J	0.16	0.39	0.39	0.32	J	0.16	0.39	0.39	1.4	J	0.15	0.39	0.39
Tetryl	NA	<	UJ	0.077	0.19	0.23	<	U	0.078	0.2	0.23	<	U	0.081	0.2	0.24	<	UJ	0.076	0.19	0.23	<	UJ	0.078	0.2	0.24	<	U	0.078	0.2	0.24	<	UJ	0.077	0.19	0.23
LABORATORY WATER QUALITY PARAMETERS																																			
Ammonia USEPA 350.1 (mg/L)		1.1		0.022	0.05	0.1	1.5		0.022	0.05	0.1	1.8		0.022	0.05	0.1	1.3		0.022	0.05	0.1	1.8		0.022	0.05	0.1	1.2		0.022	0.05	0.1	0.33		0.022	0.05	0.1
Total Kjeldahl Nitrogen USEPA 351.2 (mg/L)		<	U	0.69	1	1	1.4		0.69	1	1	<	U	0.69	1	1	1.2		0.69	1	1	<	U	0.69	1	1	1.6		0.69	1	1	<	U	0.69	1	1
Nitrate/Nitrite USEPA 353.2 (mg/L)		23		0.19	0.5	1	2.5		0.019	0.05	0.1	13		0.095	0.25	0.5	1.9		0.019	0.05	0.1	24		0.095	0.25	0.5	4.4	J	0.019	0.05	0.1	51	J	0.95	2.5	5
Sulfide SM 9034 (mg/L)		<	U	0.79	1.9	4	<	U	0.79	1.9	4	<	U	0.79	1.9	4	<	U	0.79	1.9	4	<	U	0.79	1.9	4	<	U	0.79	1.9	4	<	U	0.79	1.9	4
Sulfate USEPA 9056A (mg/L)		84		1	3	5	150		1	3	5	85		1	3	5	160		1	3	5	90		1	3	5	150		1	3	5	84		1	3	5
Dissolved Organic Carbon SM 9060A (mg/L)		3.7		0.35	1	1	3.2		0.35	1	1	3.5		0.35	1	1	3.3		0.35	1	1	3.6		0.35	1	1	3.2		0.35	1	1	3.8		0.35	1	1
Alkalinity SM 2320B (mg/L)		320		3.1	10	10	300		3.1	10	10	330		3.1	10	10	300		3.1	10	10	330		3.1	10	10	310		3.1	10	10	340		3.1	10	10
Methane RSK-175 (µg/L)		340		0.63	2	5	770		0.63	2	5	800		0.63	2	5	690		0.63	2	5	420	0	0.63	2	5	620		0.63	2	5	380		0.63	2	5
Carbon Dioxide SM 2320B (mg/L)[1]		142		3	10	10	133		3	10	10	147		3	10	10	133		3	10	10	147		3	10	10	138		3	10	10	151		3	10	10

Notes:

Concentrations exceed PALs

[1]Carbon dioxide back calculated from alkalinity SM 2320B.

< = less than LOQ
µg/L = micrograms per liter
CHAAP = Cornhusker Army Ammunition Plant
DL = detection limit
EW = extraction well
HAL = health advisory level
HMX = octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
ID = identification number
J = estimated
LOD = limit of detection
LOQ = limit of quantification
mg/L = milligrams per liter
MNX = mono-nitroso-RDX
NA = not available
OU = operable unit
PM = performance monitoring
Qual = qualifier
RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine
RSK = Robert S. Kerr Environmental Research Laboratory
SM = Standard Method
U = nondetect
USEPA = United States Environmental Protection Agency

TABLE 3-3
SUMMARY OF EXPLOSIVES DETECTED AND LABORATORY MNA PARAMETERS, PERFORMANCE MONITORING WELLS
OU1 SUBSURFACE INJECTION, BASELINE
OU1 REBOUND STUDY LETTER REPORT - BASELINE

FIELD ID SAMPLE DATE	CHAAP HALs (µg/L)	EW7-PM24B-1-35 10/19/2019					EW7-PM25A-1-25 10/16/2019					EW7-PM25B-1-35 10/16/2019					EW7-PM26A-1-25 10/18/2019					EW7-PM26B-1-35 10/18/2019					EW7-PM27A-1-25 10/18/2019					EW7-PM27B-1-35 10/18/2019				
		Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ
EXPLOSIVES (USEPA Method 8330A) (µg/L)																																			
1,3,5-Trinitrobenzene	NA	38	J	3.8	7.6	19	1.9	J	0.19	0.39	0.96	20	J	0.19	0.38	0.95	15		0.2	0.41	1	25		2	4	10	10	J	0.2	0.4	0.99	17		0.2	0.4	0.99
1,3-Dinitrobenzene	NA	<	U	0.084	0.19	0.38	<	UJ	0.086	0.19	0.39	<	U	0.085	0.19	0.38	<	U	0.09	0.2	0.41	<	U	0.089	0.2	0.4	<	UJ	0.088	0.2	0.4	<	U	0.088	0.2	0.4
2,4,6-Trinitrotoluene	2	11	J	0.15	0.38	0.38	13	J	0.15	0.39	0.39	4.1		0.15	0.38	0.38	14		0.16	0.41	0.41	7.2	J	0.16	0.4	0.4	9.5	J	0.16	0.4	0.4	4.9		0.16	0.4	0.4
2,4-Dinitrotoluene	NA	<	U	0.079	0.19	0.38	<	UJ	0.081	0.19	0.39	<	U	0.08	0.19	0.38	<	U	0.085	0.2	0.41	<	U	0.084	0.2	0.4	<	UJ	0.083	0.2	0.4	<	U	0.083	0.2	0.4
2,6-Dinitrotoluene	NA	<	U	0.061	0.19	0.19	<	UJ	0.062	0.19	0.19	<	U	0.062	0.19	0.19	<	U	0.066	0.2	0.2	<	U	0.064	0.2	0.2	<	UJ	0.064	0.2	0.2	<	U	0.064	0.2	0.2
2-Amino-4,6-dinitrotoluene	NA	2.2		0.048	0.11	0.19	2.4	J	0.049	0.12	0.19	1.5		0.048	0.11	0.19	3.4		0.052	0.12	0.2	1.8	J	0.051	0.12	0.2	3.5	J	0.05	0.12	0.2	1.8		0.05	0.12	0.2
2-Nitrotoluene	NA	<	UJ	0.081	0.19	0.38	<	UJ	0.082	0.19	0.39	<	UJ	0.082	0.19	0.38	<	U	0.087	0.2	0.41	<	UJ	0.085	0.2	0.4	<	UJ	0.085	0.2	0.4	<	U	0.085	0.2	0.4
3-Nitrotoluene	NA	<	U	0.18	0.38	0.38	<	UJ	0.19	0.39	0.39	<	UJ	0.19	0.38	0.38	<	U	0.2	0.41	0.41	<	U	0.19	0.4	0.4	<	UJ	0.19	0.4	0.4	<	U	0.19	0.4	0.4
4-Amino-2,6-dinitrotoluene	NA	1.9		0.054	0.11	0.19	2.4	J	0.056	0.12	0.19	1.1		0.055	0.11	0.19	3.2		0.059	0.12	0.2	1.6		0.058	0.12	0.2	2.7	J	0.057	0.12	0.2	1.8		0.057	0.12	0.2
4-Nitrotoluene	NA	<	U	0.19	0.38	0.94	<	UJ	0.19	0.39	0.96	<	U	0.19	0.38	0.95	<	U	0.2	0.41	1	<	U	0.2	0.4	1	<	UJ	0.2	0.4	0.99	<	U	0.2	0.4	0.99
MNX	NA	<	U	0.15	0.38	1.9	<	UJ	0.15	0.39	1.9	<	U	0.15	0.38	1.9	<	U	0.16	0.41	2	<	U	0.15	0.4	2	<	UJ	0.15	0.4	2	<	U	0.15	0.4	2
HMX	400	0.37	J	0.083	0.19	0.38	1.6	J	0.084	0.19	0.39	<	U	0.084	0.19	0.38	0.91		0.089	0.2	0.41	<	U	0.088	0.2	0.4	1.8	J	0.087	0.2	0.4	0.48		0.087	0.2	0.4
Nitrobenzene	NA	<	U	0.086	0.19	0.38	<	UJ	0.088	0.19	0.39	<	U	0.087	0.19	0.38	<	U	0.092	0.2	0.41	<	U	0.091	0.2	0.4	<	UJ	0.09	0.2	0.4	<	U	0.09	0.2	0.4
RDX	2	0.41		0.15	0.38	0.38	1.6	J	0.15	0.39	0.39	<	U	0.15	0.38	0.38	0.97		0.16	0.41	0.41	0.38	J	0.16	0.4	0.4	1.7	J	0.16	0.4	0.4	0.62		0.16	0.4	0.4
Tetryl	NA	<	U	0.075	0.19	0.23	<	UJ	0.076	0.19	0.23	<	U	0.076	0.19	0.23	<	U	0.081	0.2	0.24	<	U	0.079	0.2	0.24	<	UJ	0.078	0.2	0.24	<	U	0.079	0.2	0.24
LABORATORY WATER QUALITY PARAMETERS																																			
Ammonia USEPA 350.1 (mg/L)		1.3		0.022	0.05	0.1	0.13		0.022	0.05	0.1	1.5		0.022	0.05	0.1	0.086	J	0.022	0.05	0.1	0.57		0.022	0.05	0.1	0.15		0.022	0.05	0.1	1.1		0.022	0.05	0.1
Total Kjeldahl Nitrogen USEPA 351.2 (mg/L)		<	U	0.69	1	1	<	U	0.69	1	1	1.5	J	0.69	1	1	<	UJ	0.69	1	1	0.7	J	0.69	1	1	<	U	0.69	1	1	1.1		0.69	1	1
Nitrate/Nitrite USEPA 353.2 (mg/L)		11		0.038	0.1	0.2	25		0.095	0.25	0.5	1.7	J	0.019	0.25	0.5	11		0.038	0.1	0.2	7.5		0.019	0.05	0.1	26		0.19	0.5	1	8.3		0.019	0.05	0.1
Sulfide SM 9034 (mg/L)		<	U	0.79	1.9	4	<	U	0.79	1.9	4	<	U	0.79	1.9	4	<	U	0.79	1.9	4	<	U	0.79	1.9	4	<	U	0.79	1.9	4	<	U	0.79	1.9	4
Sulfate USEPA 9056A (mg/L)		110		1	3	5	87		1	3	5	110	J	1	3	5	73		1	3	5	79		1	3	5	120		1	3	5	90		1	3	5
Dissolved Organic Carbon SM 9060A (mg/L)		3.8		0.35	1	1	4.4		0.35	1	1	4.8		0.35	1	1	3.9		0.35	1	1	4.7		0.35	1	1	4.2		0.35	1	1	5.1		0.35	1	1
Alkalinity SM 2320B (mg/L)		330		3.1	10	10	320		3.1	10	10	410		3.1	10	10	330		3.1	10	10	390		3.1	10	10	280		3.1	10	10	390		3.1	10	10
Methane RSK-175 (µg/L)		1300		0.63	2	5	590		0.63	2	5	3900	J	0.63	2	5	1600		0.63	2	5	2900		0.63	2	5	610		0.63	2	5	1700		0.63	2	5
Carbon Dioxide SM 2320B (mg/L)[1]		147		3	10	10	142		3	10	10	182		3	10	10	147		3	10	10	173		3	10	10	124		3	10	10	173		3	10	10

Notes:

Concentrations exceed PALs

[1]Carbon dioxide back calculated from alkalinity SM 2320B.

< = less than LOQ
µg/L = micrograms per liter
CHAAP = Cornhusker Army Ammunition Plant
DL = detection limit
EW = extraction well
HAL = health advisory level
HMX = octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
ID = identification number
J = estimated
LOD = limit of detection
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mg/L = milligrams per liter
MNX = mono-nitroso-RDX
NA = not available
OU = operable unit
PM = performance monitoring
Qual = qualifier
RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine
RSK = Robert S. Kerr Environmental Research Laboratory
SM = Standard Method
U = nondetect
USEPA = United States Environmental Protection Agency

TABLE 3-3
SUMMARY OF EXPLOSIVES DETECTED AND LABORATORY MNA PARAMETERS, PERFORMANCE MONITORING WELLS
OU1 SUBSURFACE INJECTION, BASELINE
OU1 REBOUND STUDY LETTER REPORT - BASELINE

FIELD ID SAMPLE DATE	CHAAP HALs (µg/L)	EW7-PM28A-1-25 10/19/2019					EW7-PM28B-1-35 10/20/2019					EW7-PM29A-1-25 10/19/2019					EW7-PM29B-1-35 10/19/2019				
		Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ
EXPLOSIVES (USEPA Method 8330A) (µg/L)																					
1,3,5-Trinitrobenzene	NA	23		0.2	0.4	1	42	J	3.9	7.8	19	11		0.2	0.39	0.98	13	J	0.19	0.39	0.97
1,3-Dinitrobenzene	NA	<	U	0.089	0.2	0.4	<	UJ	0.086	0.19	0.39	<	U	0.087	0.2	0.39	<	UJ	0.086	0.19	0.39
2,4,6-Trinitrotoluene	2	13		0.16	0.4	0.4	5.6	J	0.16	0.39	0.39	5.9		0.16	0.39	0.39	3.6	J	0.15	0.39	0.39
2,4-Dinitrotoluene	NA	<	U	0.084	0.2	0.4	<	UJ	0.082	0.19	0.39	<	U	0.082	0.2	0.39	<	UJ	0.081	0.19	0.39
2,6-Dinitrotoluene	NA	<	U	0.065	0.2	0.2	<	UJ	0.063	0.19	0.19	<	U	0.063	0.2	0.2	<	UJ	0.062	0.19	0.19
2-Amino-4,6-dinitrotoluene	NA	3.8		0.051	0.12	0.2	2.2	J	0.049	0.12	0.19	1.5		0.05	0.12	0.2	1.3	J	0.049	0.12	0.19
2-Nitrotoluene	NA	<	UJ	0.086	0.2	0.4	<	UJJ	0.083	0.19	0.39	<	UJ	0.084	0.2	0.39	<	UJJ	0.083	0.19	0.39
3-Nitrotoluene	NA	<	U	0.2	0.4	0.4	<	UJ	0.19	0.39	0.39	<	U	0.19	0.39	0.39	<	UJ	0.19	0.39	0.39
4-Amino-2,6-dinitrotoluene	NA	3.8		0.058	0.12	0.2	2.3	J	0.056	0.12	0.19	1.6	J	0.057	0.12	0.2	0.98	J	0.056	0.12	0.19
4-Nitrotoluene	NA	<	U	0.2	0.4	1	<	UJ	0.19	0.39	0.97	<	U	0.2	0.39	0.98	<	UJ	0.19	0.39	0.97
MNX	NA	<	U	0.15	0.4	2	<	UJ	0.15	0.39	1.9	<	U	0.15	0.39	2	<	UJ	0.15	0.39	1.9
HMX	400	0.87		0.088	0.2	0.4	<	UJ	0.085	0.19	0.39	0.62		0.086	0.2	0.39	0.32	J	0.085	0.19	0.39
Nitrobenzene	NA	<	U	0.091	0.2	0.4	<	UJ	0.089	0.19	0.39	<	U	0.089	0.2	0.39	<	UJ	0.088	0.19	0.39
RDX	2	1.1		0.16	0.4	0.4	0.22	J	0.15	0.39	0.39	1.2		0.15	0.39	0.39	<	UJ	0.15	0.39	0.39
Tetryl	NA	<	U	0.08	0.2	0.24	<	UJ	0.077	0.19	0.23	<	U	0.078	0.2	0.24	<	UJ	0.077	0.19	0.23
LABORATORY WATER QUALITY PARAMETERS																					
Ammonia USEPA 350.1 (mg/L)		0.53		0.022	0.05	0.1	1		0.044	0.05	0.1	0.12		0.022	0.05	0.1	2.4		0.022	0.05	0.1
Total Kjeldahl Nitrogen USEPA 351.2 (mg/L)		<	U	0.69	1	1	5.2		0.69	1	1	<	U	0.69	1	1	2.4		0.69	1	1
Nitrate/Nitrite USEPA 353.2 (mg/L)		16		0.038	0.1	0.2	2.7		0.019	0.05	0.1	12		0.038	0.1	0.2	2.5		0.019	0.05	0.1
Sulfide SM 9034 (mg/L)		<	U	0.79	1.9	4	<	U	0.79	1.9	4	<	U	0.79	1.9	4	<	U	0.79	1.9	4
Sulfate USEPA 9056A (mg/L)		80		1	3	5	71		1	3	5	97		1	3	5	140		1	3	5
Dissolved Organic Carbon SM 9060A (mg/L)		4.8		0.35	1	1	6.5		0.35	1	1	3.1		0.35	1	1	3.7		0.35	1	1
Alkalinity SM 2320B (mg/L)		370		3.1	10	10	450		3.1	10	10	230		3.1	10	10	350		3.1	10	10
Methane RSK-175 (µg/L)		1600		0.63	2	5	3500		0.63	2	5	450		0.63	2	5	750		0.63	2	5
Carbon Dioxide SM 2320B (mg/L)[1]		164		3	10	10	200		3	10	10	102		3	10	10	156		3	10	10

Notes:

Concentrations exceed PALs

[1]Carbon dioxide back calculated from alkalinity SM 2320B.

< = less than LOQ
µg/L = micrograms per liter
CHAAP = Cornhusker Army Ammunition Plant
DL = detection limit
EW = extraction well
HAL = health advisory level
HMX = octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
ID = identification number
J = estimated
LOD = limit of detection
LOQ = limit of quantification
mg/L = milligrams per liter
MNX = mono-nitroso-RDX
NA = not available
OU = operable unit
PM = performance monitoring
Qual = qualifier
RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine
RSK = Robert S. Kerr Environmental Research Laboratory
SM = Standard Method
U = nondetect
USEPA = United States Environmental Protection Agency

TABLE 3-4
SUMMARY OF OU1 FIELD DUPLICATE SAMPLE PAIRS
OU1 REBOUND STUDY LETTER REPORT - BASELINE

WELL NUMBER	OS001-DP01-35											NW021									
FIELD ID	OS001-DP01-35					OS501-DP01-35						NW021-1					NW023-1				
SAMPLE DATE	10/14/2019					10/14/2019						10/22/2019					10/22/2019				
	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	RPD	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	RPD
EXPLOSIVES (USEPA Method 8330A) (µg/L)																						
1,3,5-Trinitrobenzene	23	J	0.2	0.4	1	18	J	0.2	0.41	1	24	<	U	0.19	0.39	0.96	<	UJ	0.19	0.38	0.96	
1,3-Dinitrobenzene	<	UJ	0.089	0.2	0.4	<	UJ	0.089	0.2	0.41		<	U	0.086	0.19	0.39	<	UJ	0.085	0.19	0.38	
2,4,6-Trinitrotoluene	11	J	0.16	0.4	0.4	9.1	J	0.16	0.41	0.41	19	<	U	0.15	0.39	0.39	<	UJ	0.15	0.38	0.38	
2,4-Dinitrotoluene	<	UJ	0.084	0.2	0.4	<	UJ	0.084	0.2	0.41		<	U	0.081	0.19	0.39	<	UJ	0.08	0.19	0.38	
2,6-Dinitrotoluene	<	UJ	0.065	0.2	0.2	<	UJ	0.065	0.2	0.2		<	U	0.062	0.19	0.19	<	UJ	0.062	0.19	0.19	
2-Amino-4,6-dinitrotoluene	0.37	J	0.051	0.12	0.2	0.28	J	0.051	0.12	0.2	<2x	1.6		0.049	0.12	0.19	1.5	J	0.048	0.11	0.19	6
2-Nitrotoluene	<	UJ	0.086	0.2	0.4	<	UJ	0.086	0.2	0.41		<	U	0.082	0.19	0.39	<	UJ	0.082	0.19	0.38	
3-Nitrotoluene	<	UJ	0.2	0.4	0.4	<	UJ	0.2	0.41	0.41		<	U	0.19	0.39	0.39	<	UJ	0.19	0.38	0.38	
4-Amino-2,6-dinitrotoluene	<	UJ	0.058	0.12	0.2	<	UJ	0.058	0.12	0.2		0.77		0.056	0.12	0.19	0.71	J	0.055	0.11	0.19	<2x
4-Nitrotoluene	<	UJ	0.2	0.4	1	<	UJ	0.2	0.41	1		<	U	0.19	0.39	0.96	<	UJ	0.19	0.38	0.96	
MNX	<	UJ	0.15	0.4	2	<	UJ	0.15	0.41	2		<	U	0.15	0.39	1.9	<	UJ	0.15	0.38	1.9	
HMX	<	UJ	0.088	0.2	0.4	<	UJ	0.088	0.2	0.41		<	U	0.084	0.19	0.39	<	UJ	0.084	0.19	0.38	
Nitrobenzene	<	UJ	0.091	0.2	0.4	<	UJ	0.091	0.2	0.41		<	U	0.088	0.19	0.39	<	UJ	0.087	0.19	0.38	
RDX	<	UJ	0.16	0.4	0.4	<	UJ	0.16	0.41	0.41		<	U	0.15	0.39	0.39	<	UJ	0.15	0.38	0.38	
Tetryl	<	UJ	0.079	0.2	0.24	<	UJ	0.079	0.2	0.25		<	U	0.076	0.19	0.23	<	UJ	0.076	0.19	0.23	
LABORATORY MNA PARAMETERS																						
Ammonia USEPA 350.1 (mg/L)												3.8		0.022	0.05	0.1	3.7		0.022	0.05	0.1	3
Total Kjeldahl Nitrogen USEPA 351.2 (mg/L)												3.5		0.69	1	1	3.5	J	0.69	1	1	<2x
Nitrate/Nitrite USEPA 353.2 (mg/L)												0.84		0.019	0.05	0.1	0.88		0.019	0.05	0.1	<2x
Sulfide SM 9034 (mg/L)	No Analysis					No Analysis						<	U	0.79	1.9	4	<	U	0.79	1.9	4	
Sulfate USEPA 9056A (mg/L)												210		5.2	3	5	210		5.2	3	5	0
Dissolved Organic Carbon SM 9060A (mg/L)												2.9		0.35	1	1	2.8		0.35	1	1	<2x
Alkalinity SM 2320B (mg/L)												410		3.1	10	10	410		3.1	10	10	0
Methane RSK-175 (µg/L)												55		0.63	2	5	51		0.63	2	5	8
Carbon Dioxide SM 2320B (mg/L)[1]												182		3.1	10	10	182		3.1	10	10	0

Notes:

[1]Carbon dioxide back calculated from alkalinity SM 2320.

field duplicate RPD > 30 or >2X the LOQ

< = less than LOQ

µg/L = micrograms per liter

DP = direct push

DL = detection limit

EW = extraction well

HMX = octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine

ID = identification number

J = estimated

LOD = limit of detection

LOQ = limit of quantification

mg/L = milligrams per liter

MNA = monitored natural attenuation

MNX = mono-nitroso-RDX

OS = off-post sample

OU = Operable Unit

PM = performance monitoring

Qual = qualifier

RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine

RPD = relative percent difference

RSK = Robert S. Kerr Environmental Research Laboratory

SM = Standard Method

U = nondetect

USEPA = United States Environmental Protection Agency

X = times

TABLE 3-4
SUMMARY OF OU1 FIELD DUPLICATE SAMPLE PAIRS
OU1 REBOUND STUDY LETTER REPORT - BASELINE

WELL NUMBER	PZ017R										EW7-PM21B-35									
FIELD ID	PZ017R-1					PZ021-1					EW7-PM21B-1-35					EW7-PM521B-1-35				
SAMPLE DATE	10/23/2019					10/23/2019					10/17/2019					10/17/2019				
	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	RPD	Result	Qual	DL	LOD	LOQ	Result	Qual	DL	LOD	LOQ	RPD
EXPLOSIVES (USEPA Method 8330A) (µg/L)																						
1,3,5-Trinitrobenzene	7.2		0.2	0.4	1	7.2	J	0.2	0.4	1	0	29		2	3.9	9.8	29	J	1.9	3.9	9.7	<2x
1,3-Dinitrobenzene	<	U	0.088	0.2	0.4	0.3	J	0.089	0.2	0.4	<2x	<	U	0.087	0.2	0.39	<	UJ	0.086	0.19	0.39	
2,4,6-Trinitrotoluene	15		0.16	0.4	0.4	15	J	0.16	0.4	0.4	0	5.7		0.16	0.39	0.39	5.1	J	0.16	0.39	0.39	<2x
2,4-Dinitrotoluene	<	UJ	0.084	0.2	0.4	<	UJ	0.084	0.2	0.4		0.15	J	0.082	0.2	0.39	<	UJ	0.081	0.19	0.39	<2x
2,6-Dinitrotoluene	<	UJ	0.064	0.2	0.2	<	UJ	0.065	0.2	0.2		<	U	0.063	0.2	0.2	<	UJ	0.063	0.19	0.19	
2-Amino-4,6-dinitrotoluene	4.1	J	0.051	0.12	0.2	4	J	0.051	0.12	0.2	2	1.4		0.05	0.12	0.2	1.4	J	0.049	0.12	0.19	<2x
2-Nitrotoluene	<	UJ	0.085	0.2	0.4	<	UJ	0.086	0.2	0.4		<	UJ	0.084	0.2	0.39	<	UJ	0.083	0.19	0.39	
3-Nitrotoluene	<	UJ	0.19	0.4	0.4	<	UJ	0.2	0.4	0.4		<	U	0.19	0.39	0.39	<	UJ	0.19	0.39	0.39	
4-Amino-2,6-dinitrotoluene	3.5	J	0.058	0.12	0.2	3.6	J	0.058	0.12	0.2	3	<	U	0.056	0.12	0.2	1.1	J	0.056	0.12	0.19	<2x
4-Nitrotoluene	<	UJ	0.2	0.4	1	<	UJ	0.2	0.4	1		<	U	0.2	0.39	0.98	<	UJ	0.19	0.39	0.97	
MNX	<	U	0.15	0.4	2	<	UJ	0.15	0.4	2		<	U	0.15	0.39	2	<	UJ	0.15	0.39	1.9	
HMX	0.59	J	0.087	0.2	0.4	0.57	J	0.088	0.2	0.4	3	<	U	0.086	0.2	0.39	0.22	J	0.085	0.19	0.39	<2x
Nitrobenzene	<	UJ	0.091	0.2	0.4	<	UJ	0.091	0.2	0.4		<	U	0.089	0.2	0.39	<	UJ	0.088	0.19	0.39	
RDX	0.87		0.16	0.4	0.4	0.88	J	0.16	0.4	0.4	1	0.39	J	0.15	0.39	0.39	0.34	J	0.15	0.39	0.39	<2x
Tetryl	<	U	0.079	0.2	0.24	<	UJ	0.08	0.2	0.24		<	U	0.078	0.2	0.23	<	UJ	0.077	0.19	0.23	
LABORATORY MNA PARAMETERS																						
Ammonia USEPA 350.1 (mg/L)	0.06	J	0.022	0.05	0.1	0.06	J	0.022	0.05	0.1	0	1.5		0.022	0.05	0.1	1.5		0.022	0.05	0.1	0
Total Kjeldahl Nitrogen USEPA 351.2 (mg/L)	<	U	0.69	1	1	<	U	0.69	1	1		1.4		0.69	1	1	1.4	J	0.69	1	1	0
Nitrate/Nitrite USEPA 353.2 (mg/L)	41		0.19	0.5	1	40		0.19	0.5	1	2	2.5		0.019	0.05	0.1	2.5		0.019	0.05	0.1	<2x
Sulfide SM 9034 (mg/L)	<	U	0.79	1.9	4	<	U	0.79	1.9	4		<	U	0.79	1.9	4	<	U	0.79	1.9	4	
Sulfate USEPA 9056A (mg/L)	74		1	3	5	74		1	3	5	0	150		1	3	5	150		1	3	5	0
Dissolved Organic Carbon SM 9060A (mg/L)	3.5		0.35	1	1	3.6		0.35	1	1	3	3.2		0.35	1	1	3.2		0.35	1	1	<2x
Alkalinity SM 2320B (mg/L)	140		3.1	10	10	150		3.1	10	10	7	300		3.1	10	10	300		3.1	10	10	0
Methane RSK-175 (µg/L)	140		0.63	2	5	99		0.63	2	5	34	770		0.63	2	5	910		0.63	2	5	17
Carbon Dioxide SM 2320B (mg/L)[1]	62		3.1	10	10	67		3.1	10	10	7	133		3.1	10	10	133		3.1	10	10	0

Notes:

[1]Carbon dioxide back calculated from alkalinity SM 2320.

field duplicate RPD > 30 or >2X the LOQ

< = less than LOQ

µg/L = micrograms per liter

DP = direct push

DL = detection limit

EW = extraction well

HMX = octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine

ID = identification number

J = estimated

LOD = limit of detection

LOQ = limit of quantification

mg/L = milligrams per liter

MNA = monitored natural attenuation

MNX = mono-nitroso-RDX

OS = off-post sample

OU = Operable Unit

PM = performance monitoring

Qual = qualifier

RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine

RPD = relative percent difference

RSK = Robert S. Kerr Environmental Research Laboratory

SM = Standard Method

U = nondetect

USEPA = United States Environmental Protection Agency

X = times

TABLE 3-5
FIELD WATER QUALITY PARAMETERS, OFF-POST AND ON-POST MONITORING WELLS
OU1 REBOUND STUDY, BASELINE
OU1 REBOUND STUDY LETTER REPORT - BASELINE

Well Number	Sample Date	pH	Temperature (°C)	Specific Conductance (mS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Ferrous Iron (mg/L)
OU1 Off-Post Monitoring Wells								
CA210	10/21/2019	6.55	14.12	0.977	0.45	165.5	4.09	0.00
CA211	10/21/2019	6.49	11.58	0.662	0.44	161.2	4.33	0.00
CA212	10/21/2019	6.70	12.37	0.496	0.46	149.6	3.64	0.00
CA213	10/21/2019	7.47	12.23	0.373	0.22	118.3	5.47	0.00
NW020	10/22/2019	6.53	14.17	1.118	3.30	113.9	0.05	0.07
NW021	10/22/2019	6.77	12.88	1.154	0.26	112.2	0.02	0.00
NW022	10/22/2019	6.96	13.27	1.270	0.19	26.7	0.19	0.27
NW050	10/22/2019	6.71	16.89	1.178	0.24	112.8	4.93	0.00
NW051	10/22/2019	6.47	12.99	1.088	0.32	132.3	7.54	0.00
NW052	10/23/2019	7.24	9.80	0.738	0.66	134.5	10.28	0.00
NW060	10/22/2019	6.01	16.16	0.075	10.75	171.6	6.06	0.00
NW061	10/22/2019	7.00	13.80	0.790	0.18	137.4	4.42	0.00
NW062	10/22/2019	8.11	14.04	0.701	0.26	38.6	6.68	0.18
NW070	10/21/2019	7.10	17.09	0.096	0.38	127.0	38.70	0.00
NW071	10/21/2019	6.32	15.36	0.563	2.18	158.1	4.65	0.00
NW080	10/22/2019	6.23	12.61	1.161	7.28	197.0	4.91	0.00
NW081R	10/22/2019	6.51	12.45	0.797	0.65	171.2	6.23	0.00
NW082R	10/22/2019	6.84	13.00	0.687	0.50	153.8	5.96	0.34
OU1 On-Post Monitoring Wells								
G0024	10/23/2019	6.36	12.53	0.670	4.88	156.5	0.39	0.00
G0070	10/21/2019	7.12	11.60	0.461	3.29	16.5	0.15	0.00
G0075	10/21/2019	6.57	12.07	0.995	6.86	132.7	0.02	0.00
G0076	10/21/2019	6.66	11.68	1.189	1.91	-36.2	0.07	1.68
G0077	10/23/2019	6.63	12.92	1.012	1.86	144.8	0.06	0.00
G0078	10/23/2019	6.90	13.36	1.213	0.25	28.1	0.10	0.48
G0079	10/21/2019	6.34	12.71	0.278	3.82	144.0	0.17	0.06
G0080	10/21/2019	6.64	12.04	0.795	1.23	-16.4	0.27	0.45
G0081	10/21/2019	6.19	11.99	0.910	0.18	14.9	0.86	0.68
G0082	10/21/2019	6.28	11.93	0.652	0.20	32.9	0.43	0.04
G0086	10/23/2019	6.84	12.55	0.684	0.52	156.2	3.25	0.00
G0087	10/22/2019	6.70	10.89	0.808	0.39	164.9	0.59	0.06
G0091	10/22/2019	6.83	11.70	1.325	2.79	156.8	0.40	0.00
G0092	10/22/2019	7.14	11.96	1.269	0.26	122.9	0.15	0.00
PZ017R	10/23/2019	6.34	14.63	0.652	5.68	173.9	4.60	0.00
PZ018	10/23/2019	6.57	14.72	0.664	1.34	167.4	3.38	0.00
PZ019	10/22/2019	6.16	14.75	0.602	6.44	77.3	0.44	0.07
PZ020	10/23/2019	6.67	11.98	1.061	2.54	160.2	0.29	0.11

Notes:

Field water quality parameters for all wells were measured using a YSI 556 MPS equipped with a flow-through cell with the exception of turbidity and ferrous iron. Turbidity was measured using a LaMotte turbidity meter (2020). Ferrous iron was measured using a HACH colorimeter (DR/820).

°C = degrees Celsius
DO = dissolved oxygen
mg/L = milligrams per liter
MPS = multiprobe system
mS/cm = milliSiemens per centimeter
mV = millivolts
NTU = nephelometric turbidity units
ORP = oxidation/reduction potential
OU = Operable Unit

TABLE 3-6
FIELD WATER QUALITY PARAMETERS, PERFORMANCE MONITORING WELLS
OU1 SUBSURFACE INJECTION, BASELINE
OU1 REBOUND STUDY LETTER REPORT - BASELINE

Well Number	Sample Date	pH	Temperature (°C)	Specific Conductance (mS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Ferrous Iron (mg/L)
Between EW6 and EW7								
EW7-PM21A	10/17/19	7.66	11.77	0.724	0.57	-36.9	9.61	0.99
EW7-PM21B	10/17/19	9.46	12.64	0.697	0.16	-121.5	4.14	2.89
EW7-PM22A	10/17/19	7.05	13.01	0.673	0.32	-10.3	4.18	2.89
EW7-PM22B	10/17/19	7.64	13.93	0.734	0.20	-36.6	7.22	2.89
EW7-PM23A	10/16/19	8.21	11.89	0.740	0.36	-26.7	4.94	2.73
EW7-PM23B	10/17/19	7.98	14.16	0.750	0.18	-51.6	7.95	2.89
EW7-PM24A	10/16/19	7.56	12.83	0.903	1.49	-28.7	3.38	2.62
EW7-PM24B	10/19/19	8.84	11.58	0.707	0.30	-92.2	51.00	3.30
EW7-PM25A	10/16/19	7.23	13.55	0.794	3.48	17.9	12.00	1.56
EW7-PM25B	10/16/19	7.11	13.24	0.791	0.15	4.6	1.27	0.72
EW7-PM26A	10/18/19	7.69	13.23	0.684	0.83	-39	5.42	2.89
EW7-PM26B	10/18/19	9.22	15.38	0.792	0.28	-108.3	7.87	2.780
EW7-PM27A	10/18/19	7.01	13.86	0.771	2.02	-6.6	6.25	2.89
EW7-PM27B	10/18/19	8.70	14.25	0.798	0.24	-86.3	5.70	2.89
EW7-PM28A	10/19/19	7.45	15.04	0.797	0.12	-28.2	6.10	3.30
EW7-PM28B	10/20/19	7.09	12.96	0.802	0.23	-12.2	4.80	3.30
EW7-PM29A	10/19/19	7.29	14.46	0.600	0.35	-20.7	4.68	3.30
EW7-PM29B	10/19/19	8.07	12.91	0.769	0.20	-55.6	7.69	3.30

Notes:

Field water quality parameters for all wells were measured using a YSI 556 MPS equipped with a flow-through cell with the exception of turbidity and ferrous iron. Turbidity was measured using a LaMotte turbidity meter (2020). Ferrous iron was measured using a HACH colorimeter (DR/820).

°C = degrees Celsius

DO = dissolved oxygen

mg/L = milligrams per liter

MPS = multiprobe system

mS/cm = milliSiemens per centimeter

mV = millivolts

NTU = nephelometric turbidity units

ORP = oxidation/reduction potential

OU = Operable Unit

TABLE 5-1
SUMMARY OF RDX AND TNT CONCENTRATIONS
OU1 REBOUND STUDY LOCATIONS
OU1 REBOUND STUDY LETTER REPORT - BASELINE

Well Number / Sample Interval	BASELINE	
	RDX (µg/L)	TNT (µg/L)
OU1 Off-Post Wells		
CA210	ND	ND
CA211	ND	ND
CA212	ND	ND
CA213	ND	ND
NW020	0.2	ND
NW021	ND	ND
NW022	ND	ND
NW050	ND	ND
NW051	ND	ND
NW052	ND	ND
NW060	ND	ND
NW061	ND	ND
NW062	ND	ND
NW070	ND	ND
NW071	ND	ND
NW080	ND	ND
NW081R	ND	ND
NW082R	ND	ND
OU1 On-Post Wells		
G0024	ND	ND
G0070	ND	ND
G0075	ND	ND
G0076	ND	ND
G0077	0.91	3.2
G0078	ND	ND
G0079	ND	ND
G0080	ND	ND
G0081	ND	0.29
G0082	0.63	ND
G0086	ND	3.8
G0087	ND	ND
G0091	0.81	ND
G0092	ND	ND
PZ017R	0.87	15
PZ018	0.88	8
PZ019	ND	ND
PZ020	0.42	3.7
Direct Push Samples (Off-Post)		
OS001-25	ND	12
OS001-35	ND	11
OS001-45	ND	ND
OS002-25	0.63	1.3

TABLE 5-1
SUMMARY OF RDX AND TNT CONCENTRATIONS
OU1 REBOUND STUDY LOCATIONS
OU1 REBOUND STUDY LETTER REPORT - BASELINE

Well Number / Sample Interval	BASELINE	
	RDX (µg/L)	TNT (µg/L)
OS002-35	ND	ND
OS002-45	ND	3.3
OS003-25	ND	ND
OS003-35	ND	3
OS003-45	ND	ND

Notes:

µg/L = micrograms per liter

ND = nondetect

OU = Operable Unit

OS = off-post sample

RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine

TNT = 2,4,6-trinitrotoluene

TABLE 5-2
SUMMARY OF MNA PARAMETERS, OFF-POST AND ON-POST MONITORING WELLS
OU1 REBOUND STUDY
OU1 REBOUND STUDY LETTER REPORT - BASELINE

Well Number	ORP (mV)	DO (mg/L)	Nitrate/Nitrite (mg/L)	Ammonia (mg/L)	TKN (mg/L)	DOC (mg/L)	CO_2 (mg/L)
	Oct-19	Oct-19	Oct-19	Oct-19	Oct-19	Oct-19	Oct-19
Shallow Wells							
CA210	165.5	0.45	22	ND	ND	9.7	138
NW020	113.9	3.30	62	0.458	ND	3.6	129
NW050	112.8	0.24	62	4.8	ND	8.1	107
NW060	171.6	10.75	1.8	0.14	ND	1.8	15
NW070	127.0	0.38	0.03	0.024	ND	7.2	23
NW080	197.0	7.28	47	0.029	ND	4.7	111
G0024	156.5	4.88	40	ND	ND	4.9	49
G0079	144.0	3.82	0.21	ND	0.76	3.2	58
G0091	156.8	2.79	32	ND	ND	3.6	160
PZ017R	173.9	5.68	41	0.06	ND	3.5	62
PZ018	167.4	1.34	24	0.21	ND	3.3	89
PZ019	77.3	6.44	34	ND	ND	2.2	39
PZ020	160.2	2.54	29	ND	ND	3.8	124
Shallow-Intermediate Wells							
CA211	161.2	0.44	30	0.1	ND	4.3	89
NW021	112.2	0.26	0.84	3.8	3.5	2.9	182
NW051	132.3	0.32	27	ND	ND	9.0	156
NW061	137.4	0.18	4.6	5.7	4.90	4.4	133
NW071	158.1	2.18	2.9	ND	ND	ND	49
NW081R	171.2	0.65	29	ND	ND	4.5	111
G0075	132.7	6.86	1.2	0.06	0.920	3.4	173
G0077	144.8	1.86	20	ND	ND	4.5	138
G0080	-16.4	1.23	2.7	0.1	ND	2.9	156
G0081	14.9	0.18	0.36	0.260	ND	7.8	164
G0082	32.9	0.20	3.4	ND	ND	ND	111
G0086	156.2	0.52	4.8	ND	ND	2.6	138
G0087	164.9	0.39	1.3	ND	ND	2.9	138
G0092	122.9	0.26	0.45	ND	ND	2.9	182
Intermediate Wells							
CA212	149.6	0.46	14	ND	ND	2.6	84
NW022	26.7	0.19	53	0.42	ND	2.9	182
NW052	134.5	0.66	0.12	0.03	0.80	6.3	169
NW062	38.6	0.26	ND	0.59	1.00	2.8	120
NW082R	153.8	0.50	20	ND	ND	ND	107
G0076	-36.2	1.91	ND	1.1	1.30	ND	156

TABLE 5-2
SUMMARY OF MNA PARAMETERS, OFF-POST AND ON-POST MONITORING WELLS
OU1 REBOUND STUDY
OU1 REBOUND STUDY LETTER REPORT - BASELINE

Well Number	ORP (mV)	DO (mg/L)	Nitrate/Nitrite (mg/L)	Ammonia (mg/L)	TKN (mg/L)	DOC (mg/L)	CO_2 (mg/L)
	Oct-19	Oct-19	Oct-19	Oct-19	Oct-19	Oct-19	Oct-19
G0078	28.1	0.25	ND	0.53	ND	2.8	187
Deep Wells							
CA213	118.3	0.22	1.3	ND	0.97	2.2	58
G0070	16.5	3.29	0.025	ND	ND	1.0	98

Notes:

µg/L = micrograms per liter

Avg = average

CO_2= dissolved oxygen

DO = dissolved oxygen

DOC = dissolved organic carbon

mg/L = milligrams per liter

MNA = monitored natural attenuation

mS/cm = milliSiemens per centimeter

mV = millivolts

ND = nondetect

ORP = oxidation/reduction potential

OU = Operable Unit

TKN = total Kjeldahl nitrogen

TABLE 5-2
SUMMARY OF MNA PARAMETERS, OFF-POST AND ON-POST MONITORING WELLS
OU1 REBOUND STUDY
OU1 REBOUND STUDY LETTER REPORT - BASELINE

Well Number	Methane (µg/L)	Alkalinity (mg/L)	Ferrous Iron (mg/L)	Sulfate (mg/L)	Sulfide (mg/L)	pH	Conductance (mS/cm)
	Oct-19	Oct-19	Oct-19	Oct-19	Oct-19	Oct-19	Oct-19
Shallow Wells							
CA210	23	310	ND	120	ND	6.55	0.977
NW020	ND	290	0.07	150	ND	6.53	1.118
NW050	1.4	240	ND	120	ND	6.71	1.178
NW060	ND	33	ND	3.8	ND	6.01	0.075
NW070	18	51	ND	3.9	ND	7.10	0.096
NW080	ND	250	ND	200	ND	6.23	1.161
G0024	ND	110	ND	50	ND	6.36	0.670
G0079	ND	130	0.06	17	ND	6.34	0.278
G0091	ND	360	ND	190	ND	6.83	1.325
PZ017R	140	140	ND	74	ND	6.34	0.652
PZ018	240	200	ND	100	ND	6.57	0.664
PZ019	ND	88	0.07	67	ND	6.16	0.602
PZ020	ND	280	0.11	160	ND	6.67	1.061
Shallow-Intermediate Wells							
CA211	ND	200	ND	93	ND	6.49	0.662
NW021	55	410	ND	210	ND	6.77	1.154
NW051	8.3	350	ND	170	ND	6.47	1.088
NW061	21	300	ND	170	ND	7.00	0.790
NW071	ND	110	ND	60	ND	6.32	0.563
NW081R	ND	250	ND	98	ND	6.51	0.797
G0075	12	390	ND	150	ND	6.57	0.995
G0077	26	310	ND	150	ND	6.63	1.012
G0080	1.1	350	0.45	ND	2.9	6.64	0.795
G0081	3500	370	0.68	120	ND	6.19	0.910
G0082	1100	250	0.04	76	ND	6.28	0.652
G0086	110	310	ND	140	ND	6.84	0.684
G0087	ND	310	0.06	120	ND	6.70	0.808
G0092	1.1	410	ND	300	ND	7.14	1.269
Intermediate Wells							
CA212	ND	190	ND	72.0	ND	6.70	0.496
NW022	290	410	0.27	360	ND	6.96	1.270
NW052	150	380	ND	130	ND	7.24	0.738
NW062	18	270	0.18	180	ND	8.11	0.701
NW082R	ND	240	0.34	86	ND	6.84	0.687
G0076	330	350	1.68	280	ND	6.66	1.189

TABLE 5-2
SUMMARY OF MNA PARAMETERS, OFF-POST AND ON-POST MONITORING WELLS
OU1 REBOUND STUDY
OU1 REBOUND STUDY LETTER REPORT - BASELINE

Well Number	Methane (µg/L)	Alkalinity (mg/L)	Ferrous Iron (mg/L)	Sulfate (mg/L)	Sulfide (mg/L)	pH	Conductance (mS/cm)
	Oct-19	Oct-19	Oct-19	Oct-19	Oct-19	Oct-19	Oct-19
G0078	350	420	0.48	250	ND	6.90	1.213
Deep Wells							
CA213	ND	130	ND	63	ND	7.47	0.373
G0070	ND	220	ND	34	ND	7.12	0.461

Notes:

µg/L = micrograms per liter

Avg = average

CO_2= dissolved oxygen

DO = dissolved oxygen

DOC = dissolved organic carbon

mg/L = milligrams per liter

MNA = monitored natural attenuation

mS/cm = milliSiemens per centimeter

mV = millivolts

ND = nondetect

ORP = oxidation/reduction potential

OU = Operable Unit

TKN = total Kjeldahl nitrogen

TABLE 5-3
SUMMARY OF RDX AND TNT CONCENTRATIONS
OU1 PERFORMANCE MONITORING LOCATIONS
OU1 REBOUND STUDY LETTER REPORT - BASELINE

Performance Monitoring Location[1]	BASELINE	
	RDX (µg/L)	TNT (µg/L)
Between EW6 and EW7		
PZ017R	0.87	15
PZ018	0.88	8
EW7-PM21A-25	1	29
EW7-PM21B-35	0.39	5.7
EW7-PM22A-25	0.47	27
EW7-PM22B-35	0.28	5.7
EW7-PM23A-25	1	28
EW7-PM23B-35	0.32	5.2
EW7-PM24A-25	1.4	9.8
EW7-PM24B-35	0.41	11
EW7-PM25A-25	1.6	13
EW7-PM25B-35	ND	4.1
EW7-PM26A-25	0.97	14
EW7-PM26B-35	0.38	7.2
EW7-PM27A-25	1.7	9.5
EW7-PM27B-35	0.62	4.9
EW7-PM28A-25	1.1	13
EW7-PM28B-35	0.22	5.6
EW7-PM29A-25	1.2	5.9
EW7-PM29B-35	ND	3.6

Notes:

µg/L = micrograms per liter

EW = extraction well

ND = nondetect

OU = Operable Unit

PM = performance monitoring

RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine

TNT = 2,4,6-trinitrotoluene

TABLE 5-4
SUMMARY OF WATER QUALITY PARAMETERS, PERFORMANCE MONITORING LOCATIONS
OU1 SUBSURFACE INJECTION
OU1 REBOUND STUDY LETTER REPORT - BASELINE

Performance Monitroing Well Number	ORP (mV)	DO (mg/L)	Nitrate/Nitrite (mg/L)	Ammonia (mg/L)	TKN (mg/L)	DOC (mg/L)	CO_2 (mg/L)
	Oct-19	Oct-19	Oct-19	Oct-19	Oct-19	Oct-19	Oct-19
Shallow Wells							
PZ017R	173.9	5.68	41	0.06	ND	3.5	62
PZ018	167.4	1.34	24	0.21	ND	3.3	89
EW7-PM21A	-36.9	0.57	23	1.1	ND	3.7	142
EW7-PM22A	-10.3	0.32	13	1.8	ND	3.5	147
EW7-PM23A	-26.7	0.36	24	1.8	ND	3.6	147
EW7-PM24A	-28.7	1.49	51	0.33	ND	3.8	151
EW7-PM25A	17.9	3.48	25	0.13	ND	4.4	142
EW7-PM26A	-39.0	0.83	11	0.086	ND	3.9	147
EW7-PM27A	-6.6	2.02	26	0.15	ND	4.2	124
EW7-PM28A	-28.2	0.12	16	0.53	ND	4.8	164
EW7-PM29A	-20.7	0.35	12	0.12	ND	3.1	102
Shallow-Intermediate Wells							
EW7-PM21B	-121.5	0.16	2.5	1.5	1.4	3.2	133
EW7-PM22B	-36.6	0.20	1.9	1.3	1.2	3.3	133
EW7-PM23B	-51.6	0.18	4.4	1.2	1.6	3.2	138
EW7-PM24B	-92.2	0.30	11.0	1.3	ND	3.8	147
EW7-PM25B	4.6	0.15	1.7	1.5	1.5	4.8	182
EW7-PM26B	-108.3	0.28	7.5	0.57	0.70	4.7	173
EW7-PM27B	-86.3	0.24	8.3	1.1	1.1	5.1	173
EW7-PM28B	-12.2	0.23	2.7	1.0	5.2	6.5	200
EW7-PM29B	-55.6	0.20	2.5	2.4	2.4	3.7	156

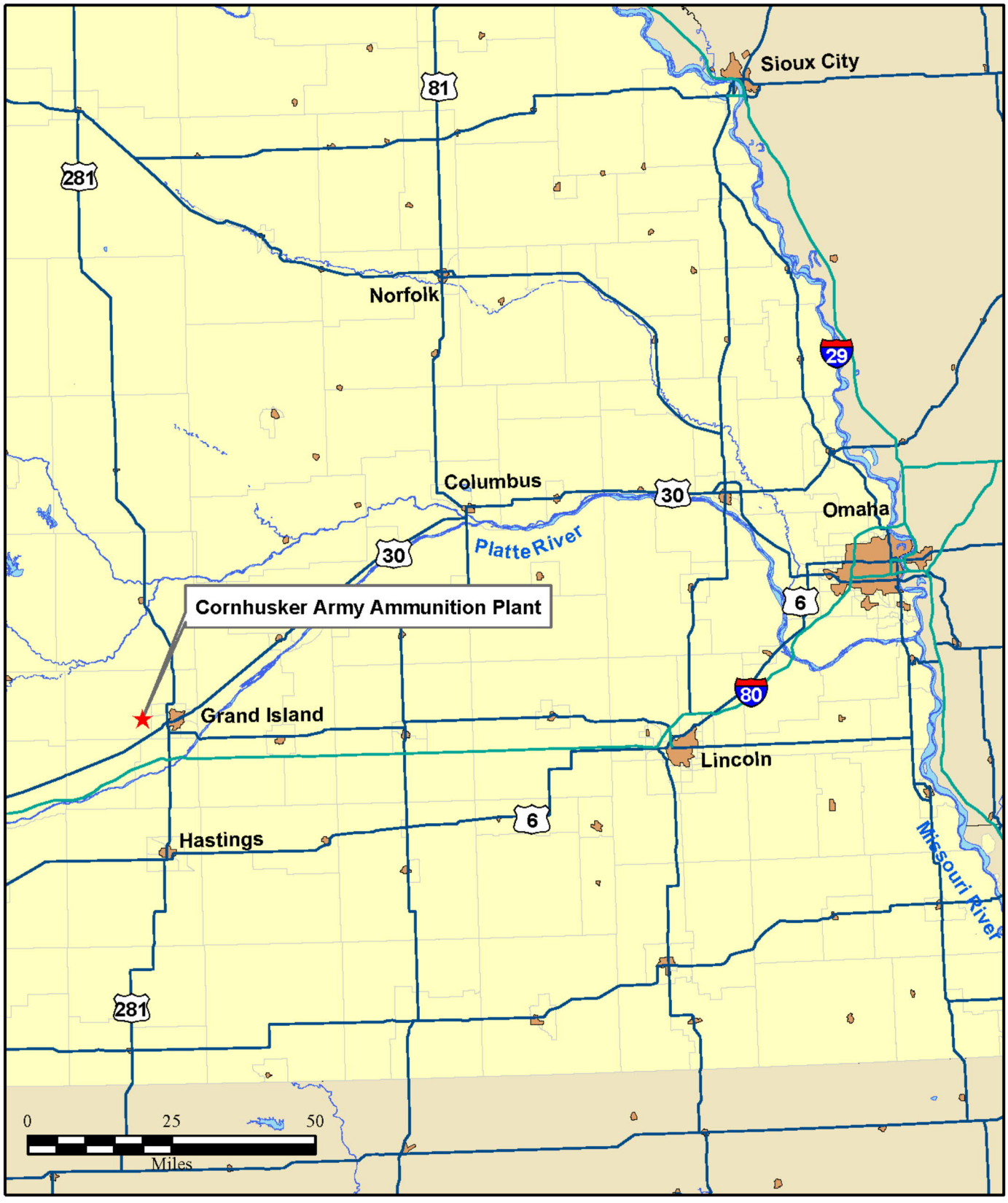
Notes:
µg/L = micrograms per liter
Avg = average
CO_2= dissolved oxygen
DO = dissolved oxygen
DOC = dissolved organic carbon
EW = extraction well
mg/L = milligrams per liter
mS/cm = milliSiemens per centimeter
mV = millivolts
ND = nondetect
ORP = oxidation/reduction potential
OU = Operable Unit
PM = performance monitoring
TKN = total Kjeldahl nitrogen

TABLE 5-4
SUMMARY OF WATER QUALITY PARAMETERS, PERFORMANCE MONITORING LOCATIONS
OU1 SUBSURFACE INJECTION
OU1 REBOUND STUDY LETTER REPORT - BASELINE

Performance Monitroing Well Number	Methane (µg/L)	Alkalinity (mg/L)	Ferrous Iron (mg/L)	Sulfate (mg/L)	Sulfide (mg/L)	pH	Conductance (mS/cm)
	Oct-19	Oct-19	Oct-19	Oct-19	Oct-19	Oct-19	Oct-19
Shallow Wells							
PZ017R	140	140	ND	74	ND	6.34	0.652
PZ018	240	200	ND	100	ND	6.57	0.664
EW7-PM21A	340	320	0.99	84	ND	7.66	0.724
EW7-PM22A	800	330	2.89	85	ND	7.05	0.673
EW7-PM23A	420	330	2.73	90	ND	8.21	0.740
EW7-PM24A	380	340	2.62	84	ND	7.56	0.903
EW7-PM25A	590	320	1.56	87	ND	7.23	0.794
EW7-PM26A	1600	330	2.89	73	ND	7.69	0.684
EW7-PM27A	610	280	2.89	120	ND	7.01	0.771
EW7-PM28A	1600	370	3.30	80	ND	7.45	0.797
EW7-PM29A	450	230	3.30	97	ND	7.29	0.600
Shallow-Intermediate Wells							
EW7-PM21B	770	300	2.89	150	ND	9.46	0.697
EW7-PM22B	690	300	2.89	160	ND	7.64	0.734
EW7-PM23B	620	310	2.89	150	ND	7.98	0.750
EW7-PM24B	1300	330	3.30	110	ND	8.84	0.707
EW7-PM25B	3900	410	0.72	110	ND	7.11	0.791
EW7-PM26B	2900	390	2.78	79	ND	9.22	0.792
EW7-PM27B	1700	390	2.89	90	ND	8.70	0.798
EW7-PM28B	3500	450	3.30	71	ND	7.09	0.802
EW7-PM29B	750	350	3.30	140	ND	8.07	0.769

Notes:
µg/L = micrograms per liter
Avg = average
CO_2= dissolved oxygen
DO = dissolved oxygen
DOC = dissolved organic carbon
EW = extraction well
mg/L = milligrams per liter
mS/cm = milliSiemens per centimeter
mV = millivolts
ND = nondetect
ORP = oxidation/reduction potential
OU = Operable Unit
PM = performance monitoring
TKN = total Kjeldahl nitrogen

Figures



Brice ENGINEERING

AECOM

FACILITY LOCATION MAP
CORNHUSKER ARMY AMMUNITION PLANT

DRN. BY: DPG	DATE: 01/22/19	PROJECT NO. 60565355	FIG. NO. 1-1
CHK'D. BY: DC	DATE: 01/22/19		

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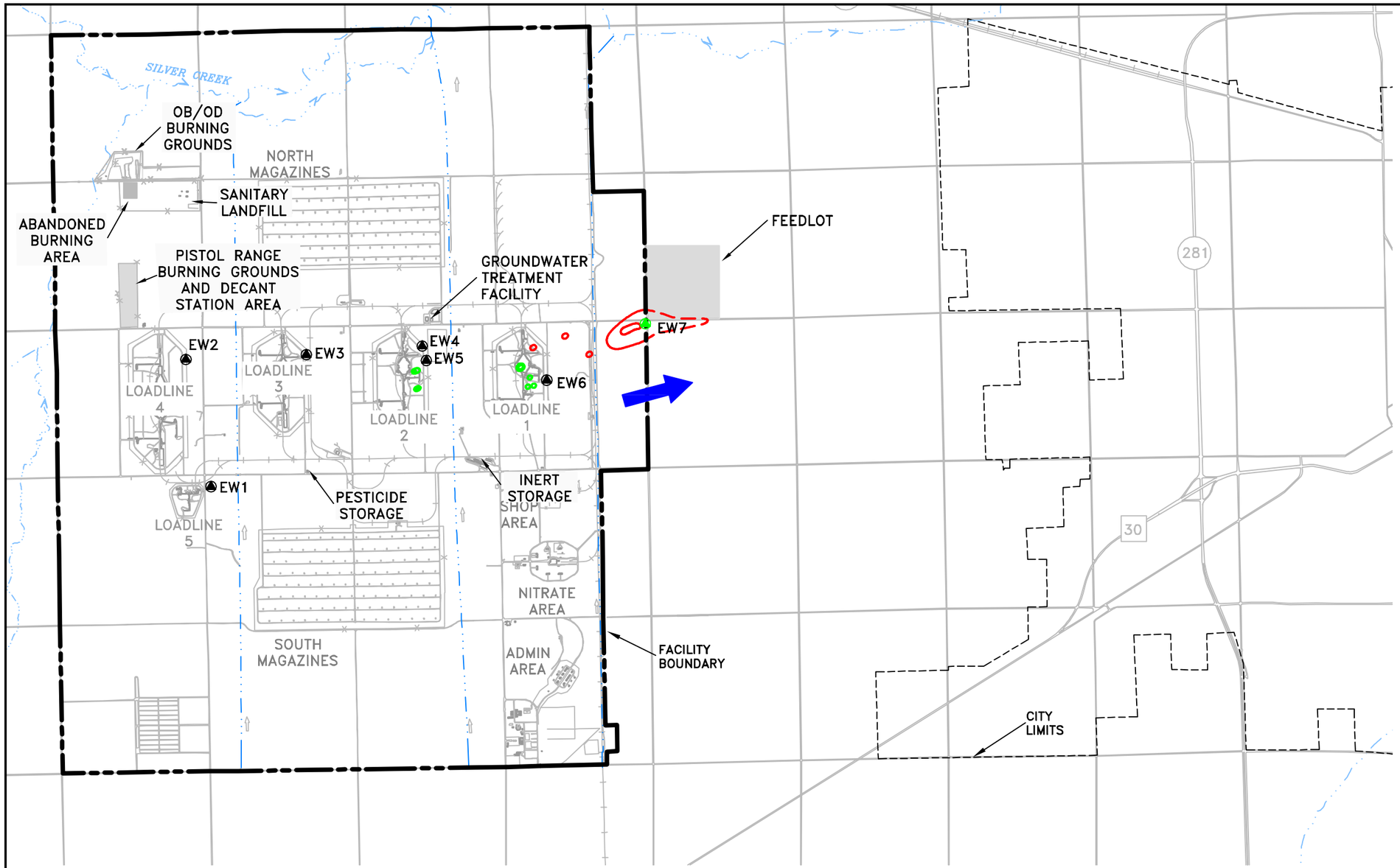


LEGEND:

- ROADS
- FENCE
- FACILITY BOUNDARY
- SURFACE DRAINAGE
- DRAINAGE DITCH FLOW DIRECTION
- GRAND ISLAND CITY LIMITS
- ABANDONED BURNING GROUNDS, SANITARY LANDFILL, PISTOL RANGE BURNING GROUNDS, AND FEEDLOT
- INACTIVE GROUNDWATER EXTRACTION WELL
- ACTIVE GROUNDWATER EXTRACTION WELL
- 281 STATE ROUTE
- 30 U.S. ROUTE

- GENERAL GROUNDWATER FLOW DIRECTION
- 2 INTERPRETED HORIZONTAL EXTENT OF EXPLOSIVES (TNT CONCENTRATIONS >2µg/L) OCTOBER/NOVEMBER 2019
- 20 INTERPRETED HORIZONTAL EXTENT OF EXPLOSIVES (TNT CONCENTRATIONS >20µg/L) OCTOBER/NOVEMBER 2019
- DASHED WHERE INFERRED
- 2 INTERPRETED HORIZONTAL EXTENT OF EXPLOSIVES (RDX CONCENTRATIONS >2µg/L) OCTOBER/NOVEMBER 2019
- 20 INTERPRETED HORIZONTAL EXTENT OF EXPLOSIVES (RDX CONCENTRATIONS >20µg/L) OCTOBER/NOVEMBER 2019

N

0 4000 8000

SCALE FEET

May 29, 2020 10:47:30 a.m.
Drawing: O:\DCS\Projects\ENV\60565355_CHAAP_2018\900_CAD_GIS\910_CAD\2019\ou1\1-2.dwg

Bruce ENGINEERING AECOM

SITE LOCATION MAP
CORNHUSKER ARMY AMMUNITION PLANT

DRN. BY: DPG	DATE: 12/04/19	PROJECT NO. 60565355	FIG. NO. 1-2
CHK'D. BY: DC	DATE: 12/04/19		

(ND)(ND) G0080

(ND)(0.81) G0091
(ND)(ND) G0092

(ND)(0.2) NW020
(ND)(ND) NW021
(ND)(ND) NW022

(3.7)(0.42) PZ020

(ND)(ND) G0087

(ND)(ND) G0024
(3.2)(0.91) G0077
(ND)(ND) G0078

G0086

(3.8)(ND)

EW7

(15)(0.87) PZ017R

PZ018

(8)(0.88)

(ND)(ND) PZ019

G0079 (ND)(ND)
G0075 (ND)(ND)
G0076 (ND)(ND)
G0070 (ND)(ND)

(0.29)(ND) G0081

(ND)(0.63) G0082

G0090

OS002		
Depth	TNT	RDX
21'-25'	1.3	0.63
31'-35'	ND	ND
41'-45'	3.3	ND

OS003		
Depth	TNT	RDX
21'-25'	ND	ND
31'-35'	3	ND
41'-45'	ND	ND

OS001		
Depth	TNT	RDX
21'-25'	12	ND
31'-35'	11	ND
41'-45'	ND	ND

NW060 (ND)(ND)
NW061 (ND)(ND)
NW062 (ND)(ND)

(ND)(ND) NW050
(ND)(ND) NW051
(ND)(ND) NW052

(ND)(ND) NW080
(ND)(ND) NW081R
(ND)(ND) NW082R

CA210 (ND)(ND)
CA211 (ND)(ND)
CA212 (ND)(ND)
CA213 (ND)(ND)

(ND)(ND) NW070
(ND)(ND) NW071

9

10

13th Street

Monitor Road

9th Road

LEGEND:

- ON-POST GROUNDWATER MONITORING WELL
- OFF-POST GROUNDWATER MONITORING WELL
- ON-POST PIEZOMETER
- ACTIVE GROUNDWATER EXTRACTION WELL
- G0029 — 2019 GROUNDWATER SAMPLING LOCATIONS – OU1 REBOUND STUDY, BASELINE (OCTOBER 2019)
- OS001 — 2019 OU1 DIRECT PUSH SAMPLING LOCATIONS – OU1 REBOUND STUDY, BASELINE (OCTOBER 2019)

- (ND) TNT CONCENTRATION (µg/L) (OCTOBER 2019)
- (ND) RDX CONCENTRATION (µg/L) (OCTOBER 2019)
- GENERAL GROUNDWATER FLOW DIRECTION
- ROADS
- FACILITY BOUNDARY
- GRAND ISLAND CITY LIMITS
- SURFACE DRAINAGE
- (281) STATE ROUTE
- (30) U.S. ROUTE

- FEEDLOT
- 2 — INTERPRETED HORIZONTAL EXTENT OF EXPLOSIVES (TNT CONCENTRATIONS >2µg/L) OCTOBER 2019
- 20 — INTERPRETED HORIZONTAL EXTENT OF EXPLOSIVES (TNT CONCENTRATIONS >20µg/L) OCTOBER 2019
- DASHED WHERE INFERRED
- 2 — INTERPRETED HORIZONTAL EXTENT OF EXPLOSIVES (TNT CONCENTRATIONS >2µg/L) JUNE 2019
- 20 — INTERPRETED HORIZONTAL EXTENT OF EXPLOSIVES (TNT CONCENTRATIONS >20µg/L) JUNE 2019

N

0 800 1600
SCALE FEET

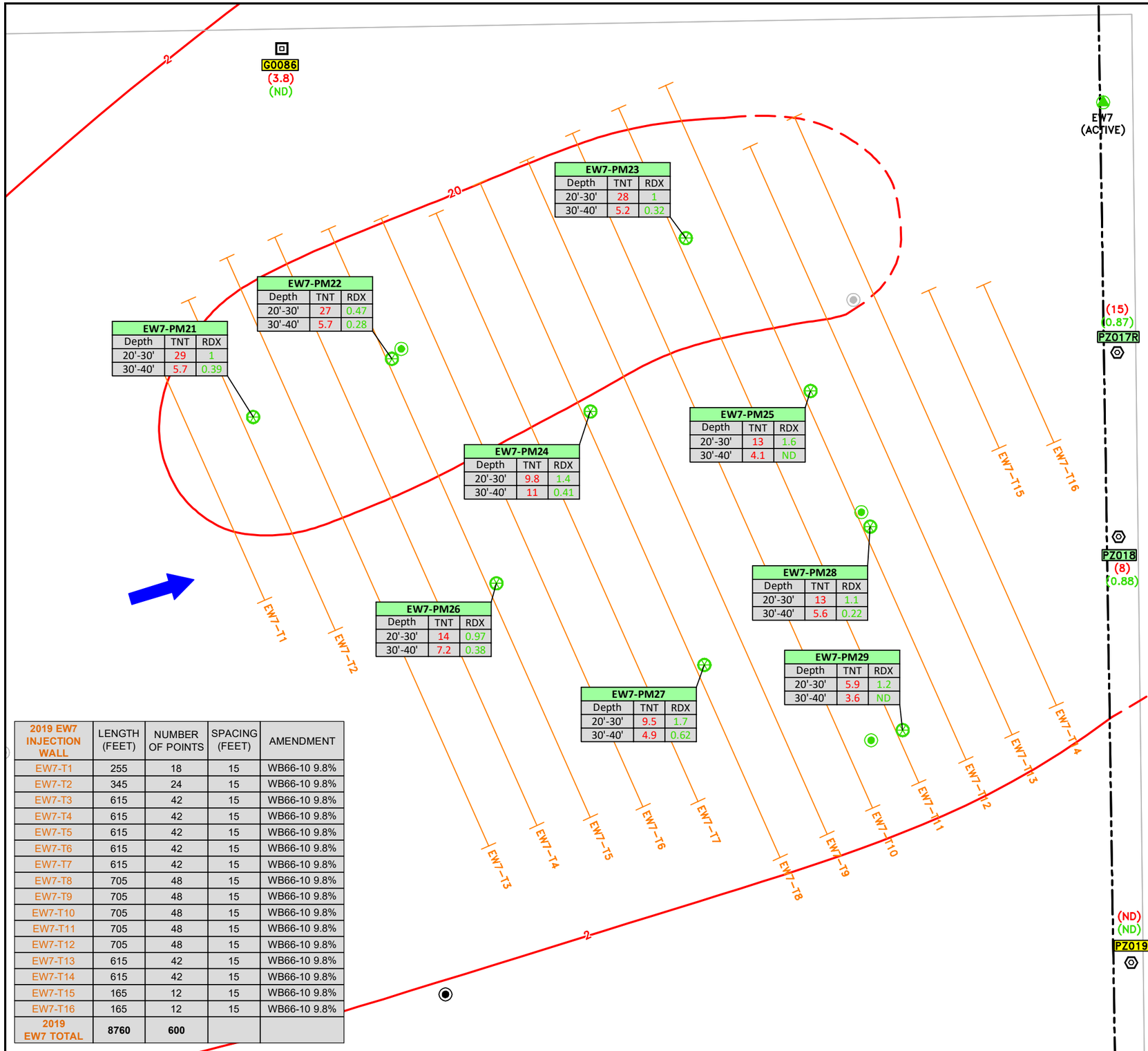
NOTE: EW7 PUMPING RATE TO BE SET AT 0 GPM DURING PROPOSED REBOUND STUDY AND SUBSURFACE INJECTION EVENTS.

Bruce ENGINEERING AECOM

EXTENT OF OU1 EXPLOSIVES PLUME, OU1 REBOUND STUDY, BASELINE (OCTOBER 2019)
CORNHUSKER ARMY AMMUNITION PLANT

DRN. BY: DPG	DATE: 12/06/19	PROJECT NO. 60565355	FIG. NO. 2-1
CHK'D. BY: DC	DATE: 12/06/19		

May 01, 2020 3:00:44 p.m.
Drawing: O:\DCS\Projects\ENV\60565355_CHAAP_2018\900_CAD_GIS\910_CAD\2019\ou1\2-1.dwg



2019 EW7 INJECTION WALL	LENGTH (FEET)	NUMBER OF POINTS	SPACING (FEET)	AMENDMENT
EW7-T1	255	18	15	WB66-10 9.8%
EW7-T2	345	24	15	WB66-10 9.8%
EW7-T3	615	42	15	WB66-10 9.8%
EW7-T4	615	42	15	WB66-10 9.8%
EW7-T5	615	42	15	WB66-10 9.8%
EW7-T6	615	42	15	WB66-10 9.8%
EW7-T7	615	42	15	WB66-10 9.8%
EW7-T8	705	48	15	WB66-10 9.8%
EW7-T9	705	48	15	WB66-10 9.8%
EW7-T10	705	48	15	WB66-10 9.8%
EW7-T11	705	48	15	WB66-10 9.8%
EW7-T12	705	48	15	WB66-10 9.8%
EW7-T13	615	42	15	WB66-10 9.8%
EW7-T14	615	42	15	WB66-10 9.8%
EW7-T15	165	12	15	WB66-10 9.8%
EW7-T16	165	12	15	WB66-10 9.8%
2019 EW7 TOTAL	8760	600		

LEGEND

- G0121 — GROUNDWATER SAMPLING LOCATIONS – OU1 REBOUND STUDY, BASELINE (OCTOBER 2019)
- EW7–PM21 — GROUNDWATER SAMPLING LOCATIONS – PERFORMANCE MONITORING, BASELINE (OCTOBER 2019)
- (ND) — TNT CONCENTRATION (µg/L) (OCTOBER 2019)
- (ND) — RDX CONCENTRATION (µg/L) (OCTOBER 2019)
- 2019 WESBLEND 66–10 TREATMENT WALL LOCATION (9.8% BY VOLUME)
- BLDG 14 — FORMER SITE FEATURES
- ROADS
- FACILITY BOUNDARY
- EW7 (ACTIVE) — EXTRACTION WELL
- G0015 — ON–POST GROUNDWATER MONITORING WELL
- PZ007 — ON–POST PIEZOMETER
- 2019 PERFORMANCE MONITORING SAMPLING LOCATION (TEMPORARY WELL)
- 2018 DIRECT PUSH GROUNDWATER SAMPLING LOCATION (MARCH)
- 2016 DIRECT PUSH GROUNDWATER SAMPLING LOCATION (FEBRUARY)
- 2015 DIRECT PUSH GROUNDWATER SAMPLING LOCATION (MARCH)
- 2 — INTERPRETED HORIZONTAL EXTENT OF EXPLOSIVES (TNT CONCENTRATIONS >2µg/L) OCTOBER 2019
- 20 — INTERPRETED HORIZONTAL EXTENT OF EXPLOSIVES (TNT CONCENTRATIONS >20µg/L) OCTOBER 2019
- DASHED WHERE INFERRED
- GENERAL GROUNDWATER FLOW DIRECTION

NOTE:
EW7 PUMPING RATE TO BE SET AT 0 GPM DURING PROPOSED REBOUND STUDY AND SUBSURFACE INJECTION EVENTS.

100 50 0 100
SCALE IN FEET

Bruce ENGINEERING AECOM

EXTENT OF OU1 EXPLOSIVES PLUME, OU1 SUBSURFACE INJECTION PERFORMANCE MONITORING, BASELINE (OCTOBER 2019)
CORNHUSKER ARMY AMMUNITION PLANT

DRN. BY: DPG	DATE: 12/06/19	PROJECT NO. 60565355	FIG. NO. 2–2
CHK'D. BY: DC	REVISION: 0		

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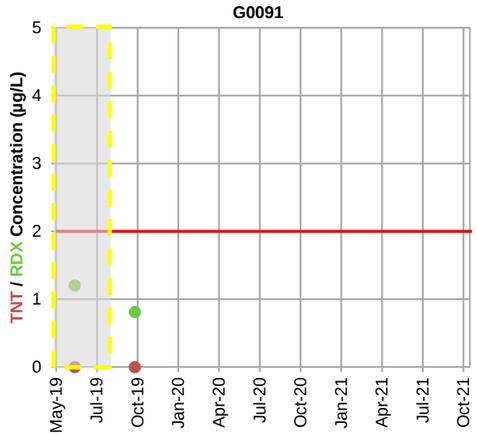
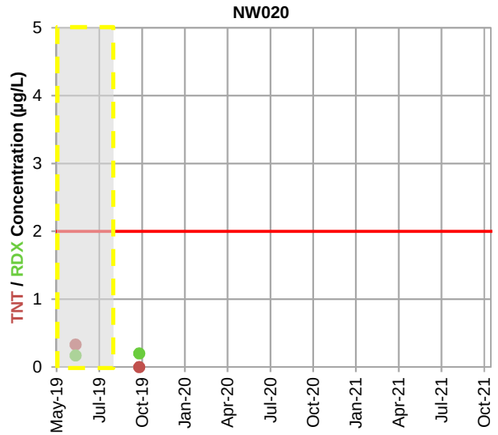




Nonparametric Trend Analysis for TNT and RDX (OU1 Rebound Study)

Well	Detect	Non-detect	Total Samples	Detection Frequency	Min (µg/L)	Max (µg/L)	Mean (µg/L)	Median (µg/L)	MK Result	Trend
G0091	0 / 1	1 / 0	1 / 1	ND / 100%	ND / 0.81	ND / 0.81	ND / 0.81	ND / 0.81	NA / NA	NA / NA
NW020	0 / 1	1 / 0	1 / 1	ND / 100%	ND / 0.20	ND / 0.20	ND / 0.20	ND / 0.20	NA / NA	NA / NA
NW021	0 / 0	1 / 1	1 / 1	ND / ND	ND / ND	ND / ND	ND / ND	ND / ND	NA / NA	NA / NA
PZ020	1 / 1	0 / 0	1 / 1	100% / 100%	3.70 / 0.42	3.70 / 0.42	3.70 / 0.42	3.70 / 0.42	NA / NA	NA / NA
G0024	0 / 0	1 / 1	1 / 1	ND / ND	ND / ND	ND / ND	ND / ND	ND / ND	NA / NA	NA / NA
G0077	1 / 1	0 / 0	1 / 1	100% / 100%	3.20 / 0.91	3.20 / 0.91	3.20 / 0.91	3.20 / 0.91	NA / NA	NA / NA
PZ017R	1 / 1	0 / 0	1 / 1	100% / 100%	15.0 / 0.87	15.0 / 0.87	15.0 / 0.87	15.0 / 0.87	NA / NA	NA / NA
PZ018	1 / 1	0 / 0	1 / 1	100% / 100%	8.00 / 0.88	8.00 / 0.88	8.00 / 0.88	8.00 / 0.88	NA / NA	NA / NA

Notes:

Trend analysis performed using Mann-Kendall test at 0.05 significance level.

µg/L = micrograms per liter

TNT = 2,4,6-trinitrotoluene

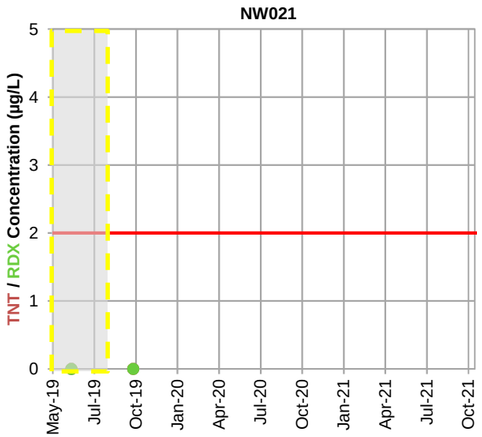
MK = Mann-Kendall

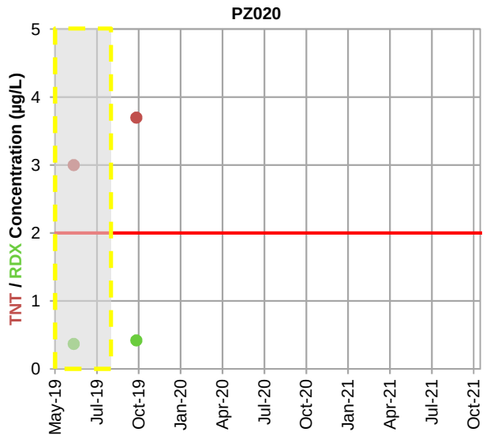
RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine

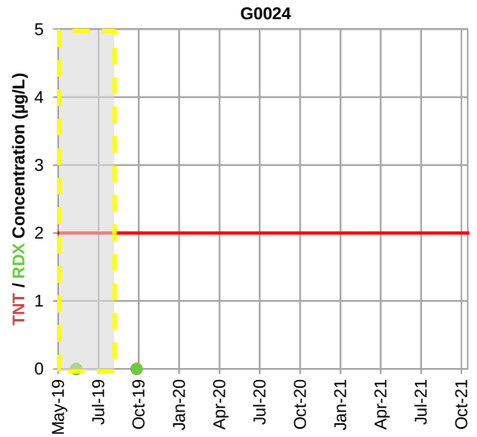
= Historic data not used for OU1 Rebound Study

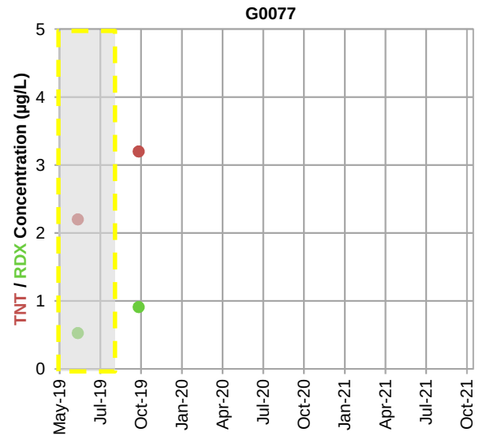
= HAL (1994) TNT/RDX

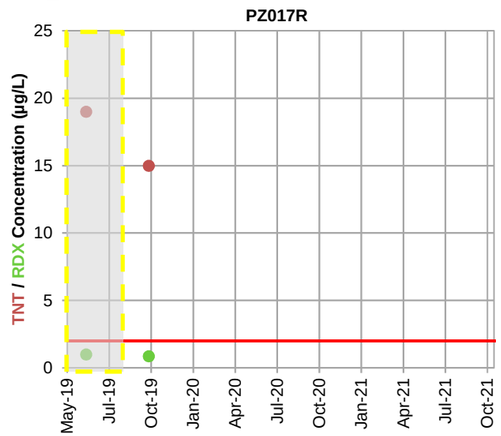
NA = not applicable for MK until minimum of 4 sample results

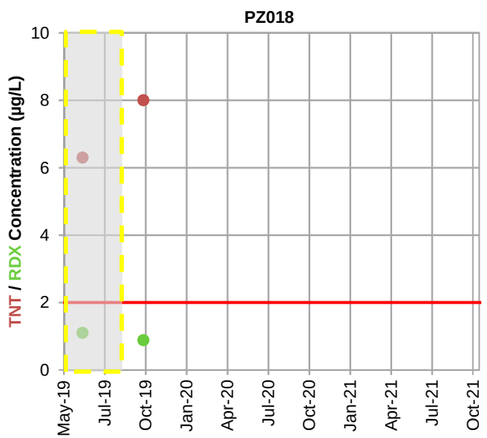










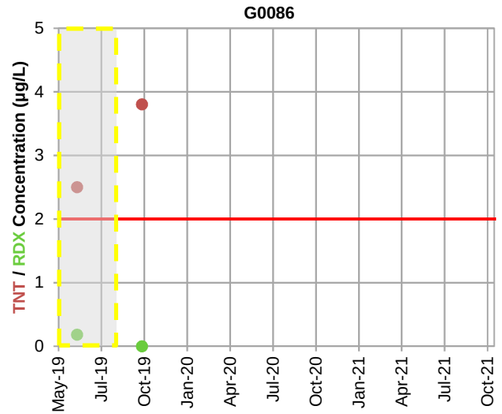


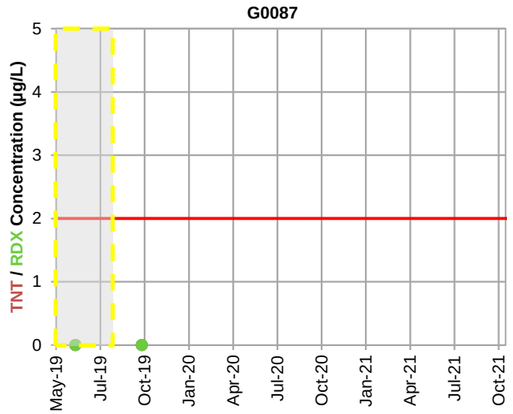
Bruce ENGINEERING

AECOM

Mann-Kendall Analysis for TNT and RDX
Former Facility Boundary Wells (OU1)
Cornhusker Army Ammunition Plant

Drawn By:	Date:	
KW	12/30/2019	**Figure 4-1**
Checked By:	Project No.:	
DC	60565355	





Nonparametric Trend Analysis for TNT and RDX (OU1 Rebound Study)

Well	Detect	Non-detect	Total Samples	Detection Frequency	Min (µg/L)	Max (µg/L)	Mean (µg/L)	Median (µg/L)	MK Result	Trend
G0086	1 / 0	0 / 1	1 / 1	100% / ND	3.8 / ND	3.8 / ND	3.8 / ND	3.8 / ND	NA / NA	NA / NA
G0087	0 / 0	1 / 1	1 / 1	ND / ND	ND / ND	ND / ND	ND / ND	ND / ND	NA / NA	NA / NA
G0080	0 / 0	1 / 1	1 / 1	ND / ND	ND / ND	ND / ND	ND / ND	ND / ND	NA / NA	NA / NA
G0079	0 / 0	1 / 1	1 / 1	ND / ND	ND / ND	ND / ND	ND / ND	ND / ND	NA / NA	NA / NA
G0075	0 / 0	1 / 1	1 / 1	ND / ND	ND / ND	ND / ND	ND / ND	ND / ND	NA / NA	NA / NA
G0081	1 / 0	0 / 1	1 / 1	100% / ND	0.29 / ND	0.29 / ND	0.29 / ND	0.29 / ND	NA / NA	NA / NA
G0082	0 / 1	1 / 0	1 / 1	ND / 100%	ND / 0.63	ND / 0.63	ND / 0.63	ND / 0.63	NA / NA	NA / NA

Notes:

Trend analysis performed using Mann-Kendall test at 0.05 significance level.

µg/L = micrograms per liter

TNT = 2,4,6-trinitrotoluene

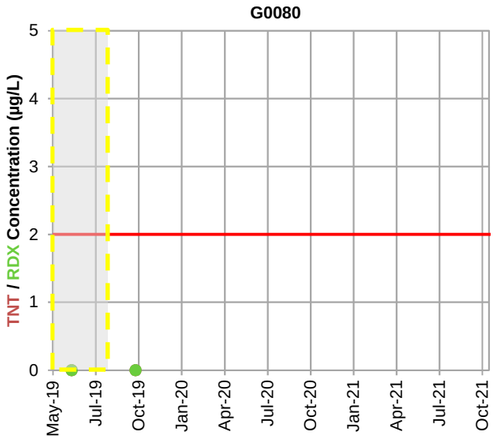
MK = Mann-Kendall

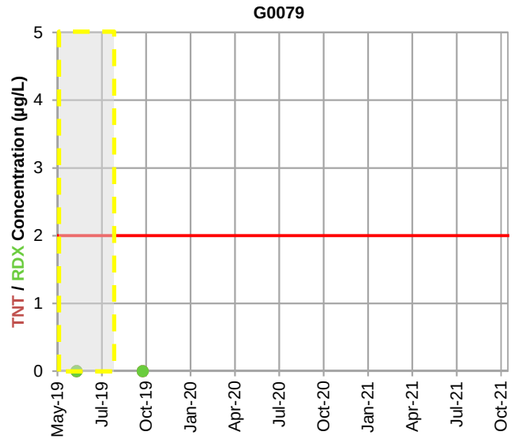
RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine

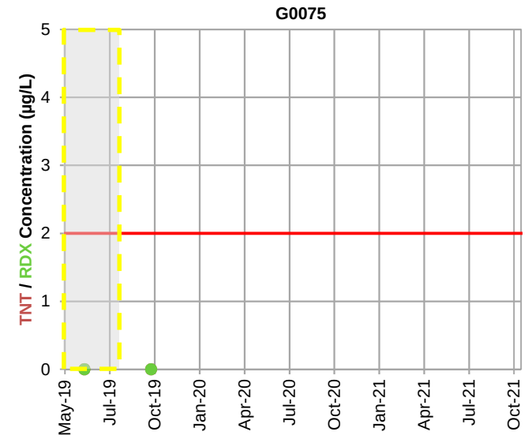
= Historic data not used for OU1 Rebound Study

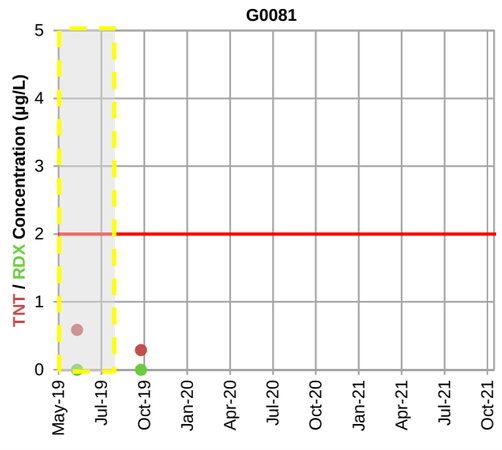
= HAL (1994) TNT/RDX

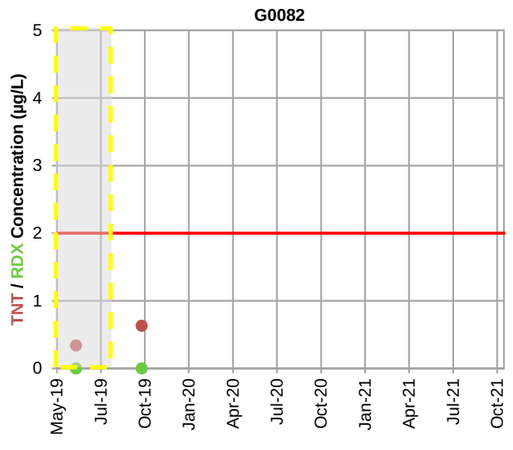
NA = not applicable for MK until minimum of 4 sample results











Mann-Kendall Analysis for TNT and RDX
Upgradient Wells (OU1)
Cornhusker Army Ammunition Plant

Drawn By:	Date:	
KW	12/31/2019	**Figure 4-2**
Checked By:	Project No.:	
DC	60565355	

Appendix A
Well Drilling Licenses

NEBRASKA
Good Life. Great Mission.
DEPT. OF HEALTH AND HUMAN SERVICES

Pete Ricketts, Governor

Public Health Licensure Unit
Certification of Licensure

This certificate serves as primary source verification of licensure in the State of Nebraska as of the close of the business day before 10/ 9/2019.

Name:	Corey S Anderson
Type:	WD-PIC
Number:	39516
Status:	Active
Issued:	01/02/2011
Expiration:	12/31/2020
Education:	None on record at this time

Disciplinary/Non-Disciplinary Information:

No disciplinary/non-disciplinary actions taken against this license.

If you have questions about this information, please contact the Licensure Unit at (402) 471-2115 or DHHS.LicensureUnit@nebraska.gov.

NEBRASKA
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DEPT. OF HEALTH AND HUMAN SERVICES

Pete Ricketts, Governor

Public Health Licensure Unit
Certification of Licensure

This certificate serves as primary source verification of licensure in the State of Nebraska as of the close of the business day before 10/ 9/2019.

Name:	Jesse V Kalvig
Type:	Well Drilling Contractor
Number:	19210
Status:	Active
Issued:	09/19/2000
Expiration:	12/31/2020
Education:	None on record at this time

Disciplinary/Non-Disciplinary Information:

No disciplinary/non-disciplinary actions taken against this license.

If you have questions about this information, please contact the Licensure Unit at (402) 471-2115 or DHHS.LicensureUnit@nebraska.gov.

Appendix B
OU1 Rebound Study and Subsurface Injection Completed Field Forms

Direct Push Groundwater Sample Collection Field Sheets (Off-post)

WATER SAMPLE COLLECTION FIELD SHEET- DPush

SITE NAME	CHAAP 2019 OU1 Rebound Study- Direct Push (SP)	PROJECT NO.	60565355
SAMPLE NO.	05001-DP01-25	SAMPLE DEPTH.	21-25'
DATE/TIME COLLECTED	10-14-19 / 1220	PERSONNEL	AB
SAMPLE METHOD	Peristaltic Pump w/ Tubing		

SAMPLE MEDIA:	Groundwater			
SAMPLE QA SPLIT:	YES	(NO)	SPLIT SAMPLE NO.	NA
SAMPLE QC DUPLICATE:	YES	(NO)	DUPLICATE SAMPLE NO.	↓
MS/MSD REQUESTED	YES	(NO)	MS/MSD SAMPLE NO.	↓

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500mL Amber	6°C	Explosives + MNX (8330A)

WELL PURGING DATA

Date	10-14-19	PID Measurements	
Time Started	1157	Background	ND
Time Completed	1220	Breathing Zone	↓
Purge Volume (gal)	3	Well Head	
Sample Turbidity	1206	Purge Water	
Depth to Water (ft bgs)	7.15		

GENERAL COMMENTS

WATER SAMPLE COLLECTION FIELD SHEET- DPush

SITE NAME	CHAAP 2019 OU1 Rebound Study- Direct Push (SP)	PROJECT NO.	60565355
SAMPLE NO.	OS001-DP01-35	SAMPLE DEPTH.	31-34
DATE/TIME COLLECTED	10-14-19 / 1255	PERSONNEL	AR
SAMPLE METHOD	Peristaltic Pump w/ Tubing		
SAMPLE MEDIA:	Groundwater		
SAMPLE QA SPLIT:	YES (NO)	SPLIT SAMPLE NO.	NA
SAMPLE QC DUPLICATE:	(YES) NO	DUPLICATE SAMPLE NO.	OS501-DP01-35 (1300)
MS/MSD REQUESTED	YES (NO)	MS/MSD SAMPLE NO.	NA

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
4 - 500mL Amber	6°C	Explosives + MNX (8330A)

WELL PURGING DATA

Date	10-14-19	PID Measurements	
Time Started	1230	Background	NA
Time Completed	1255	Breathing Zone	
Purge Volume (gal)	3	Well Head	
Sample Turbidity	640	Purge Water	
Depth to Water (ft bgs)	7.45		

GENERAL COMMENTS

WATER SAMPLE COLLECTION FIELD SHEET- DPush

SITE NAME	CHAAP 2019 OU1 Rebound Study- Direct Push (SP)	PROJECT NO.	60565355
SAMPLE NO.	05001-DP01-45	SAMPLE DEPTH.	41-45
DATE/TIME COLLECTED	10-14-19 / 1415	PERSONNEL	MR
SAMPLE METHOD	Peristaltic Pump w/ Tubing		
SAMPLE MEDIA:	Groundwater		
SAMPLE QA SPLIT:	YES (NO)	SPLIT SAMPLE NO.	NA
SAMPLE QC DUPLICATE:	YES (NO)	DUPLICATE SAMPLE NO.	NA
MS/MSD REQUESTED	(YES) NO	MS/MSD SAMPLE NO.	Some

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
6 - 500mL Amber	6°C	Explosives + MNX (8330A)

WELL PURGING DATA

Date	10-14-19	PID Measurements	
Time Started	1347	Background	NA
Time Completed	1415	Breathing Zone	
Purge Volume (gal)	3	Well Head	
Sample Turbidity	40	Purge Water	
Depth to Water (ft bgs)	7.5'		

GENERAL COMMENTS

WATER SAMPLE COLLECTION FIELD SHEET- DPush

SITE NAME	**CHAAP 2019 OU1 Rebound Study- Direct Push (SP)**	PROJECT NO.	**60565355**
SAMPLE NO.	DS002-DP01-25	SAMPLE DEPTH.	25'
DATE/TIME COLLECTED	10-28-19 / 1400	PERSONNEL	DC
SAMPLE METHOD	Peristaltic Pump w/ Tubing		
SAMPLE MEDIA:	Groundwater		
SAMPLE QA SPLIT:	YES NO	SPLIT SAMPLE NO.	Ø
SAMPLE QC DUPLICATE:	YES NO	DUPLICATE SAMPLE NO.	
MS/MSD REQUESTED	YES NO	MS/MSD SAMPLE NO.	

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500mL Amber	6°C	Explosives + MNX (8330A)

WELL PURGING DATA

Date	10-28-19	PID Measurements	
Time Started	1335	Background	ND
Time Completed	1355	Breathing Zone	ND
Purge Volume (gal)	5 gallons	Well Head	ND
Sample Turbidity	190	Purge Water	ND
Depth to Water (ft bgs)	5.72		

GENERAL COMMENTS

Very turbid

WATER SAMPLE COLLECTION FIELD SHEET- DPush

SITE NAME	**CHAAP 2019 OU1 Rebound Study- Direct Push (SP)**	PROJECT NO.	**60565355**
SAMPLE NO.	05002-DP01-35	SAMPLE DEPTH.	35'
DATE/TIME COLLECTED	10-28-19 / 1430	PERSONNEL	DC
SAMPLE METHOD	Peristaltic Pump w/ Tubing		
SAMPLE MEDIA:	Groundwater		
SAMPLE QA SPLIT:	YES NO	SPLIT SAMPLE NO.	
SAMPLE QC DUPLICATE:	YES NO	DUPLICATE SAMPLE NO.	
MS/MSD REQUESTED	YES NO	MS/MSD SAMPLE NO.	

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500mL Amber	6°C	Explosives + MNX (8330A)

WELL PURGING DATA

		PID Measurements	
Date			
Time Started	DC ~~1410~~ 1410	Background	
Time Completed	DC ~~1430~~ 1425	Breathing Zone	
Purge Volume (gal)	5 gal	Well Head	
Sample Turbidity	210	Purge Water	
Depth to Water (ft bgs)	5.61		

GENERAL COMMENTS

Very Turbid

WATER SAMPLE COLLECTION FIELD SHEET- DPush

SITE NAME	**CHAAP 2019 OU1 Rebound Study- Direct Push (SP)**	PROJECT NO.	**60565355**
SAMPLE NO.	05002-DP01-45	SAMPLE DEPTH.	45
DATE/TIME COLLECTED	10-28-19 / 1520	PERSONNEL	DC
SAMPLE METHOD	Peristaltic Pump w/ Tubing		
SAMPLE MEDIA:	Groundwater		
SAMPLE QA SPLIT:	YES NO	SPLIT SAMPLE NO.	
SAMPLE QC DUPLICATE:	YES NO	DUPLICATE SAMPLE NO.	
MS/MSD REQUESTED	YES NO	MS/MSD SAMPLE NO.	

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500mL Amber	6°C	Explosives + MNX (8330A)

WELL PURGING DATA

Date	10-28-19	PID Measurements	
Time Started	1445	Background	ND
Time Completed	DC ~~1550~~ 1515	Breathing Zone	ND
Purge Volume (gal)	5gg	Well Head	ND
Sample Turbidity	284	Purge Water	ND
Depth to Water (ft bgs)	5.82		

GENERAL COMMENTS

Very turbid

WATER SAMPLE COLLECTION FIELD SHEET- DPush

SITE NAME	**CHAAP 2019 OU1 Rebound Study- Direct Push (SP)**	PROJECT NO.	**60565355**
SAMPLE NO.	OS003-DP01-25	SAMPLE DEPTH.	25
DATE/TIME COLLECTED	10-28-19 / 1705	PERSONNEL	DC
SAMPLE METHOD	Peristaltic Pump w/ Tubing		
SAMPLE MEDIA:	Groundwater		
SAMPLE QA SPLIT:	YES NO	SPLIT SAMPLE NO.	Ø
SAMPLE QC DUPLICATE:	YES NO	DUPLICATE SAMPLE NO.	
MS/MSD REQUESTED	YES NO	MS/MSD SAMPLE NO.	

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500mL Amber	6°C	Explosives + MNX (8330A)

WELL PURGING DATA

Date	10-28-19	PID Measurements	
Time Started	1640	Background	ND
Time Completed	1700	Breathing Zone	ND
Purge Volume (gal)	4	Well Head	ND
Sample Turbidity	275	Purge Water	ND
Depth to Water (ft bgs)	4.81		

GENERAL COMMENTS

very turbid

WATER SAMPLE COLLECTION FIELD SHEET- DPush

SITE NAME	**CHAAP 2019 OU1 Rebound Study- Direct Push (SP)**	PROJECT NO.	**60565355**
SAMPLE NO.	OS003-DP01-35	SAMPLE DEPTH.	35
DATE/TIME COLLECTED	10-28-19 / 1750	PERSONNEL	DC
SAMPLE METHOD	Peristaltic Pump w/ Tubing		

SAMPLE MEDIA:	Groundwater			
SAMPLE QA SPLIT:	YES	NO	SPLIT SAMPLE NO.	
SAMPLE QC DUPLICATE:	YES	NO	DUPLICATE SAMPLE NO.	
MS/MSD REQUESTED	YES	NO	MS/MSD SAMPLE NO.	

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500mL Amber	6°C	Explosives + MNX (8330A)

WELL PURGING DATA

Date	10-28-19	PID Measurements	
Time Started	1730	Background	ND
Time Completed	1745	Breathing Zone	ND
Purge Volume (gal)	~~Bgm~~ 4	Well Head	ND
Sample Turbidity	196	Purge Water	ND
Depth to Water (ft bgs)	4.45		

GENERAL COMMENTS

Very turbid

WATER SAMPLE COLLECTION FIELD SHEET- DPush

SITE NAME	**CHAAP 2019 OU1 Rebound Study- Direct Push (SP)**	PROJECT NO.	**60565355**
SAMPLE NO.	05003-DP01-45	SAMPLE DEPTH.	45
DATE/TIME COLLECTED	10-28-19 / 1820	PERSONNEL	DC
SAMPLE METHOD	Peristaltic Pump w/ Tubing		
SAMPLE MEDIA:	Groundwater		
SAMPLE QA SPLIT:	YES NO	SPLIT SAMPLE NO.	Ø
SAMPLE QC DUPLICATE:	YES NO	DUPLICATE SAMPLE NO.	
MS/MSD REQUESTED	YES NO	MS/MSD SAMPLE NO.	

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500mL Amber	6°C	Explosives + MNX (8330A)

WELL PURGING DATA

Date	10-28-19	PID Measurements	
Time Started	1755	Background	ND
Time Completed	1815	Breathing Zone	ND
Purge Volume (gal)	4 gal	Well Head	ND
Sample Turbidity	221	Purge Water	ND
Depth to Water (ft bgs)	5.25		

GENERAL COMMENTS

Very turbid

HTRW DRILLING LOG

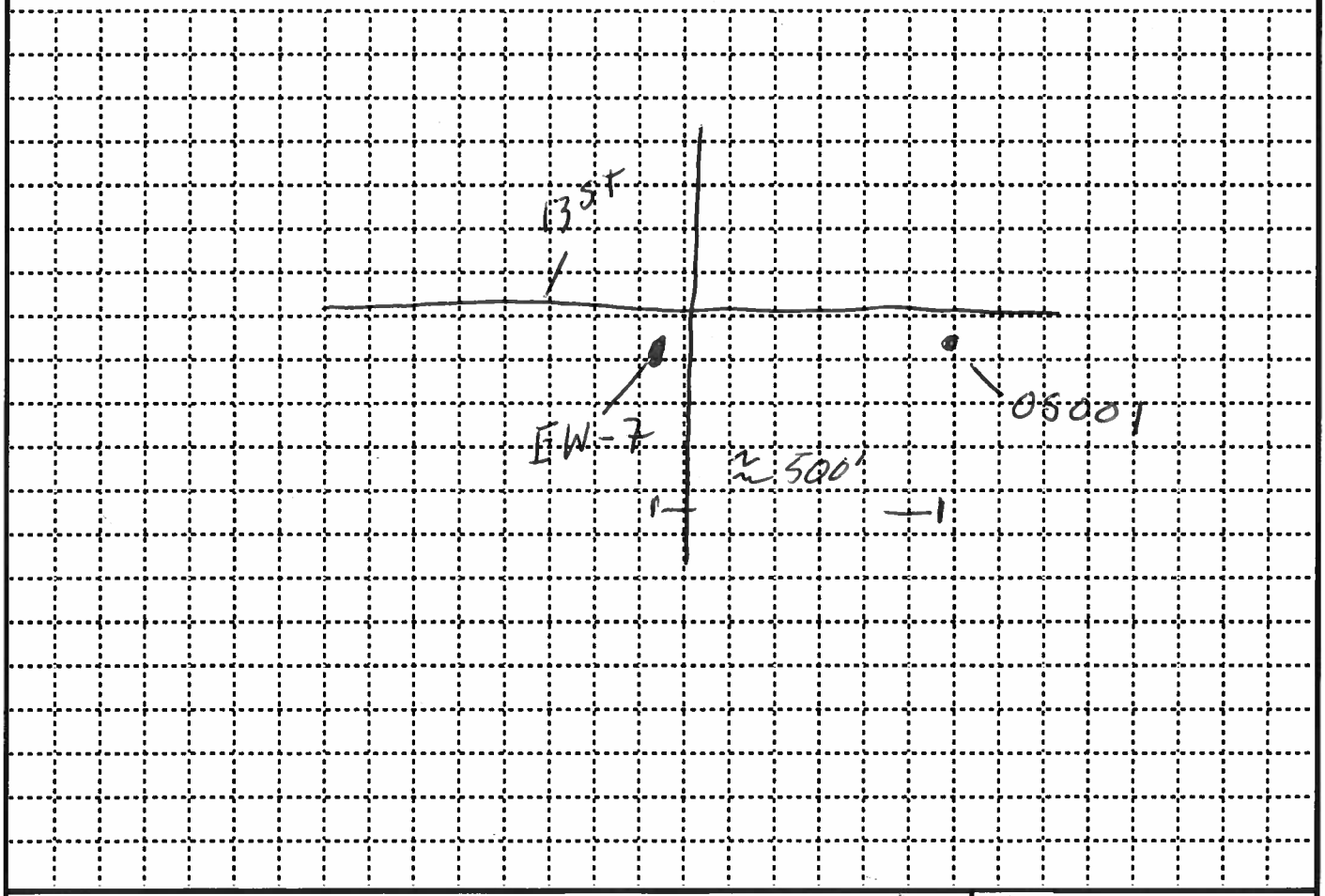
	DISTRICT: USACE - Omaha	HOLE NUMBER: 05001
1. COMPANY NAME: AECOM	2. DRILLING SUBCONTRACTOR: Plains Environmental Services (PES)	SHEET 1 OF ~~8~~ 87 Pgs
3. PROJECT: 2019 OU1 Rebound Study_Direct Push	4.LOCATION: Grand Island, Nebraska	
5. NAME OF DRILLER	6. MANUFACTURE'S DESIGNATION OF DRILL: DT 7822	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: Soil - 2-inch Marco Core Sampler; Water - Screen Point Sampler	8. HOLE LOCATION: South of 13th E. of EW 7	
	9. SURFACE ELEVATION: TBD	
	10. DATE STARTED: 10-14-19	11. DATE COMPLETED: 10-14-19
12. OVERBURDEN THICKNESS: NA	15. DEPTH GROUNDWATER ENCOUNTERED: 9' 15 Pgs	
13. DEPTH DRILLED INTO ROCK: NA	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING: NA	
14. TOTAL DEPTH OF HOLE: ~~65~~ 60'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): NA	

18. GEOTECHNICAL SAMPLES	DISTRICT	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
None	NA	NA	NA

20. SAMPLES FOR CHEMICAL	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
None						

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	X			

LOCATION SKETCH/COMMENTS SCALE:



PROJECT	HOLE
CHAAP 2019 OU1 Rebound Study	05001

HTRW DRILLING LOG

HOLE NO. 05001

PROJECT: CHAAP 2019 OU1 Rebound Study

INSPECTOR:

SHEET: 2 of 7 (Rev. 8)

ELEV a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO.	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS h.
	0–3	Clayey Silt (ML), med stiff, moist, Brn	PPM 0.0	P-60" R-60"			
	4–5	Sand (SP), Loose, sandy, moist, fine to med grained					
	5–7		0.0	P-60" R-47"			
	9	Becoming med to coarse grained, wet.					H_2O @ 9'

PROJECT: CHAAP 2019 OU1 Rebound Study

HOLE NO. 05001

HTRW DRILLING LOG

HOLE NO. 05001

PROJECT: CHAAP 2019 OU1 Rebound Study

INSPECTOR: A. Exceen

SHEET: 3 of 7

ELEV a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO.	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS h.
	11	Sand (SP), Loose, gray, wet med to coarse grained		P-60" A-58"			
	12	Becoming fine grained w/ little med grained sand and trace of coarse grained sand	0.0				
	13						
	14						
	15	Becoming med to coarse grained w/ some fine grained sand		P-60" A-51"			
	16						
	17		0.0				
	18						
	19						
	20						STOPPED 10-4-19

PROJECT: CHAAP 2019 OU1 Rebound Study

HOLE NO. 05001

HTRW DRILLING LOG

HOLE NO. OS001

PROJECT: CHAAP 2019 OU1 Rebound Study

INSPECTOR: A. Exceen

SHEET: 4 of 27

ELEV a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO.	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS h.
	21	SAND (SP), Dense, wet, gray, Med grained w/ some Fine grained Sand And few coarse grained Sand And trace fine gravel		D-60" A-46"			Resumed 10-15-19
	22		0.0		OS001-DP01-25 Screen 21-25		
	23						
	24						
	25						
	26			D-60" A-41"			
	27		0.0				
	28						
	29						
	30						

PROJECT: CHAAP 2019 OU1 Rebound Study

HOLE NO. OS001

HTRW DRILLING LOG

HOLE NO. 05001

PROJECT: CHAAP 2019 OU1 Rebound Study

INSPECTOR: R. Excell

SHEET: 5-~~8~~7

ELEV a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO.	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS h.
	31	Sand (SP), Dense, wet, Gray, med Grained, w/ few coarse grained Sand and some fine grained Sand and trace fine gravel		P-~~8~~60" R-54"	05001-DP01-35 & 05501-DP01-35 Screen 31-35		
	32	Becoming Fine to Med grained w/ coarse grained Sand and fine gravel grading out	0.0				
	33						
	34	~~Becoming~~ AA					
	35						
	36	Becoming Fine to Med grained w/ few coarse grained sand and Trace fine to coarse gravel		P-60" R-50"			
	37		0.0				
	38						
	39						
	40						

PROJECT: CHAAP 2019 OU1 Rebound Study

HOLE NO. 05001

HTRW DRILLING LOG

HOLE NO. DS001

PROJECT: CHAAP 2019 OU1 Rebound Study

INSPECTOR: R. Exceen

SHEET 6 of 44 7

ELEV a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO.	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS h.
	41	Sand (SP), Dense, wet, gray, med to coarse grained w/ Little fine grained Sand and trace fine to coarse gravel		P-60" R-~~32~~ 32"	DS001-DP01-45 + MS/MSD		
	42		0.0		Screen 41-45		
	43						
	44						
	45						
	46	Becoming fine to Med grained w/ few coarse grained sand and trace fine gravel		P-60" R-30"			
	47		0.0				
	48						
	49						
	50	Becoming Med to coarse grained w/ little fine grained Sand					

PROJECT: CHAAP 2019 OU1 Rebound Study

HOLE NO. DS001

HTRW DRILLING LOG

HOLE NO. 05001

PROJECT: CHAAP 2019 OU1 Rebound Study

INSPECTOR: R. Excell

SHEET: 7 of 7

ELEV a	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO.	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS h.
	51	Sand (SP), Dense, wet, gray, Med to Coarse grained w/ Little fine grained Sand w/ Trace fine grained Sand		P-60" R-30"			
	52		0.0				
	53	Becomes fine to Med ~~Med to Coarse~~ MED grained Sand w/ Little fine grained Sand and trace fine gravel.					
	54						
	55						
	56			P-60" R-54"			
	57		0.0				
	58						
	59						
	60	~~Clay~~ Lean Clay (CL), Stiff, LT Greenish Gray					

OU1 Groundwater Monitoring Well Sample Collection Field Sheets

WATER SAMPLE COLLECTION FIELD SHEET

URS

GENERAL INFORMATION

SITE NAME	CHAAP	PROJECT NO.	60565355
SAMPLE NO.	CA210-1	WELL NO.	CA210
DATE/TIME COLLECTED	10/21/19 @ 0950	PERSONNEL	R. Exceen
SAMPLE METHOD	PRO-ACTIVE SS MONSOON		R. Reyes
SAMPLE MEDIA:	Groundwater		
SAMPLE QA SPLIT:	YES NO	SPLIT SAMPLE NO.	—
SAMPLE QC DUPLICATE:	YES NO	DUPLICATE SAMPLE NO.	—
MS/MSD REQUESTED	YES NO	MS/MSD SAMPLE NO.	—

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10/21/19	Well Depth (ft BTOC)	~~14.68~~ PR 16.85
Time Started	0854	Depth to Water (ft BTOC)	8.4
Time Completed	1002	Water Column Length	8.45
PID Measurements		Well Casing Volume (per ft)	2.47
Background	ND	Volume of Water in Well (L)	20.9
Breathing Zone	ND	Casing Volumes to Purge	—
Well Head	ND	Minimum to Purge (L)	20
Purge Water	ND	Actual Purge (L)	~25

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox ~~(mV)~~ ORP	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
0859	2.5	6.30	13.22	0.680	1.19	18.9 mV	4.87	8.4	0.5
0904	5.0	6.40	13.36	0.750	0.83	184.2 ORP	3.71	8.4	0.5
0909	7.5	6.45	13.39	0.773	0.74	182.8 ORP	4.93	8.4	0.5
0914	10	6.44	13.42	0.815	0.67	19.2 mV	5.27	8.4	0.5
0919	12.5	6.46	13.83	0.870	0.63	177.3	3.98	8.4	0.5
0924	15	6.48	13.74	0.894	0.61	175.4	5.12	8.4	0.5
0929	17.5	6.49	13.99	0.925	0.55	173.0	5.17	8.4	0.5
0934	20	6.51	14.17	0.951	0.49	169.8	4.53	8.4	0.5
0939	22.5	6.55	14.04	0.963	0.47	168.1	4.74	8.4	0.5
0944	25	6.55	14.12	0.977	0.45	165.5	4.09	8.4	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Solinst 102	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 0.00 mg/L

Multi-Parameter Probe Unit # 24698

Field Parameters Measured in Flow-Through Cell

Pump Placement Depth = 12.5 ft

Pump Rate = 0.5 L/min

Well Diameter = 4"

Screen Interval = 7.9 - 17.9

	Historic (7-year average low and high / 2013 / Avg in **Bold**)			
ORP	13.7	150.1	Dry	**97.3**
DO	0.13	1.51	Dry	**0.78**
PH	6.08	7.23	Dry	**6.52**
Cond.	1.245	1.469	Dry	**1.395**

WATER SAMPLE COLLECTION FIELD SHEET

URS

GENERAL INFORMATION

SITE NAME	CHAAP	PROJECT NO.	60565355
SAMPLE NO.	CA211-1	WELL NO.	CA211
DATE/TIME COLLECTED	10/21/19 @ 1125	PERSONNEL	R. Exceen
SAMPLE METHOD	PRO-ACTIVE SS MONSOON		R. Ryan
SAMPLE MEDIA:	Groundwater		
SAMPLE QA SPLIT:	YES **NO**	SPLIT SAMPLE NO.	—
SAMPLE QC DUPLICATE:	YES (NO)	DUPLICATE SAMPLE NO.	—
MS/MSD REQUESTED	YES (NO)	MS/MSD SAMPLE NO.	—

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-21-19	Well Depth (ft BTOC)	43.10
Time Started	1026	Depth to Water (ft BTOC)	8.5
Time Completed	1129	Water Column Length	34.6
PID Measurements		Well Casing Volume (per ft)	2.47
Background	ND	Volume of Water in Well (L)	85.5
Breathing Zone	ND	Casing Volumes to Purge	—
Well Head	ND	Minimum to Purge (L)	20
Purge Water	ND	Actual Purge (L)	28

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox ~~(mV)~~ ORP	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
1031	2.5	6.67	10.88	0.649	3.99	156.2	4.57	8.5	0.5
1036	5.0	6.64	11.15	0.658	1.66	157.7	4.67	8.5	0.5
1041	7.5	6.58	11.29	0.660	1.07	159.3	3.94	8.5	0.5
1046	10	6.58	11.35	0.663	0.96	159.3	3.63	8.5	0.5
1051	12.5	6.56	11.36	0.663	0.72	159.6	5.27	8.5	0.5
1056	15	6.51	11.31	0.661	0.62	161.4	3.67	8.5	0.5
1101	17.5	6.51	11.47	0.662	0.59	161.6	5.37	8.5	0.5
1106	20	6.51	11.36	0.662	0.51	161.3	3.57	8.5	0.5
1111	22.5	6.50	11.63	0.663	0.48	161.7	4.50	8.5	0.5
1116	25	6.50	11.67	0.663	0.46	161.3	3.97	8.5	0.5
1121	27.5	6.49	11.58	0.662	0.44	161.2	4.33	8.5	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Solinst 102	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 0.00 mg/L

Multi-Parameter Probe Unit # 24698

Field Parameters Measured in Flow-Through Cell

Pump Placement Depth = 38 ft

Pump Rate = 0.5 L/min

Well Diameter = 4"

Screen Interval = 32.8 - 42.8

	Historic (7-year average low and high / 2013 / Avg in **Bold**)			
ORP	23.2	184.7	177.2	**120.6**
DO	0.09	1.91	0.73	**0.75**
PH	5.58	6.93	5.58	**6.42**
Cond.	0.889	1.370	1.067	**1.094**

WATER SAMPLE COLLECTION FIELD SHEET

URS

GENERAL INFORMATION

SITE NAME	CHAAP	PROJECT NO.	60565355
SAMPLE NO.	CA212-1	WELL NO.	CA212
DATE/TIME COLLECTED	10/21/19 @ 1250	PERSONNEL	R. Exceen R. Reyes
SAMPLE METHOD	PRO-ACTIVE SS MONSOON		
SAMPLE MEDIA:	Groundwater		
SAMPLE QA SPLIT:	YES / **NO**	SPLIT SAMPLE NO.	—
SAMPLE QC DUPLICATE:	YES / **NO**	DUPLICATE SAMPLE NO.	—
MS/MSD REQUESTED	YES / **NO**	MS/MSD SAMPLE NO.	—

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-21-19	Well Depth (ft BTOC)	67.12
Time Started	~~RL 1140~~ 1158	Depth to Water (ft BTOC)	8.46
Time Completed	1254	Water Column Length	58.66
PID Measurements		Well Casing Volume (per ft)	2.47
Background	ND	Volume of Water in Well (L)	144.9
Breathing Zone	ND	Casing Volumes to Purge	—
Well Head	ND	Minimum to Purge (L)	20
Purge Water	ND	Actual Purge (L)	23

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox ~~(mV)~~ ORP	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
~~RL 1145~~ 1203	2.5	7.13	11.76	0.490	5.73	142.3	5.05	8.46	0.5
~~RL 1150~~ 1208	5.0	6.67	11.95	0.489	1.73	152.7	4.79	8.46	0.5
1213	7.5	6.68	12.01	0.492	1.02	150.9	3.64	8.46	0.5
1218	10	6.61	12.01	0.492	0.78	152.2	4.59	8.46	0.5
1223	12.5	6.68	12.11	0.493	0.59	151.3	4.38	8.46	0.5
1228	15	6.67	12.18	0.493	0.55	151.2	4.97	8.46	0.5
1233	17.5	6.67	12.26	0.495	0.50	150.4	3.79	8.46	0.5
1238	20	6.73	12.32	0.496	0.48	148.0	3.81	8.46	0.5
1243	22.5	6.70	12.37	0.496	0.46	149.6	3.64	8.46	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Solinst 102	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 0.00 mg/L

Multi-Parameter Probe Unit # 24698

Field Parameters Measured in Flow-Through Cell

Pump Placement Depth = 62 ft

Pump Rate = 0.5 L/min

Well Diameter = 4"

Screen Interval = 57.0 - 67.0

	Historic (7-year average low and high / 2013 / Avg in Bold)			
ORP	22.9	187.4	187.4	**104.2**
DO	0.08	1.24	0.16	**0.35**
PH	5.93	7.09	5.93	**6.79**
Cond.	0.520	1.220	0.875	**0.771**

WATER SAMPLE COLLECTION FIELD SHEET

URS

GENERAL INFORMATION

SITE NAME	CHAAP	PROJECT NO.	60565355
SAMPLE NO.	CA213-1	WELL NO.	CA213
DATE/TIME COLLECTED	10/21/19 @ 1425	PERSONNEL	R. Excecy R. Reyes
SAMPLE METHOD	PRO-ACTIVE SS MONSOON		
SAMPLE MEDIA:	Groundwater		
SAMPLE QA SPLIT:	YES NO	SPLIT SAMPLE NO.	—
SAMPLE QC DUPLICATE:	YES NO	DUPLICATE SAMPLE NO.	—
MS/MSD REQUESTED	YES NO	MS/MSD SAMPLE NO.	—

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-21-19	Well Depth (ft BTOC)	91.34
Time Started	1320	Depth to Water (ft BTOC)	9.12
Time Completed	1430	Water Column Length	82.22
PID Measurements		Well Casing Volume (per ft)	2.47
Background	ND	Volume of Water in Well (L)	203.1
Breathing Zone	ND	Casing Volumes to Purge	—
Well Head	ND	Minimum to Purge (L)	20
Purge Water	ND	Actual Purge (L)	~30

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox ~~(mV)~~ ORP	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
1325	2.5	8.06	11.96	0.339	4.88	97.8	11.9	9.15	0.5
1330	5	7.52	12.05	0.371	1.62	120.9	12.1	9.15	0.5
1335	7.5	7.41	12.17	0.381	0.82	124.0	12.05	9.15	0.5
1340	10	7.42	12.34	0.381	0.60	123.5	12.03	9.15	0.5
1345	12.5	7.42	12.36	0.381	0.45	121.5	11.31	9.15	0.5
1350	15	7.41	12.30	0.379	0.35	122.2	7.94	9.15	0.5
1355	17.5	7.44	12.20	0.377	0.31	121.4	8.91	9.15	0.5
1400	20	7.45	12.38	0.378	0.27	120.4	8.94	9.15	0.5
1405	22.5	7.48	12.35	0.376	0.25	119.5	5.60	9.15	0.5
1410	25	7.45	12.36	0.375	0.24	119.0	5.23	9.15	0.5
1415	27.5	7.45	12.25	0.373	0.22	118.5	5.44	9.15	0.5
1420	30	7.47	12.23	0.373	0.22	118.3	5.47	9.15	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Solinst 102	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 0.00 mg/L

Multi-Parameter Probe Unit # 24698

Field Parameters Measured in Flow-Through Cell

Pump Placement Depth = 85 ft

Pump Rate = 0.5 L/min

Well Diameter = 4"

Screen Interval = 79.6 - 89.6

	Historic (7-year average low and high / 2013 / Avg in **Bold**)			
ORP	-44.6	183.9	183.9	**37.2**
DO	0.10	0.28	0.22	**0.19**
PH	6.63	7.80	6.63	**7.46**
Cond.	0.368	0.705	0.467	**0.481**

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME	CHAAP	PROJECT NO.	60565355
SAMPLE NO.	NW020-1	WELL NO.	NW020
DATE/TIME COLLECTED	10-22-19 / 1235	PERSONNEL	TV
SAMPLE METHOD	PRO-ACTIVE SS MONSOON		CH

SAMPLE MEDIA: **Groundwater**

SAMPLE QA SPLIT:	YES	**NO**	SPLIT SAMPLE NO.	
SAMPLE QC DUPLICATE:	YES	NO	DUPLICATE SAMPLE NO.	
MS/MSD REQUESTED:	YES	NO	MS/MSD SAMPLE NO.	

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-22-19	Well Depth (ft BTOC)	29.92
Time Started	1150	Depth to Water (ft BTOC)	14.51
Time Completed		Water Column Length	15.41
PID Measurements		Well Casing Volume (per ft)	2.47L
Background	ND	Volume of Water in Well (L)	38.06
Breathing Zone	ND	Casing Volumes to Purge	
Well Head	ND	Minimum to Purge (L)	20L
Purge Water	ND	Actual Purge (L)	20L

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox (mV)	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
1155	2.5	6.42	14.17	1.087	7.13	126.2	0.21	14.51	0.5
1200	5.0	6.51	13.89	1.100	4.10	118.9	0.14	14.51	0.5
1205	7.5	6.52	14.04	1.109	3.75	117.2	0.32	14.51	0.5
1210	10.0	6.53	14.04	1.118	3.60	116.2	0.19	14.51	0.5
1215	12.5	6.53	13.95	1.121	3.50	115.7	0.05	14.51	0.5
1220	15.0	6.53	14.11	1.119	3.36	114.8	0.04	14.51	0.5
1225	17.5	6.53	14.11	1.119	3.37	114.6	0.02	14.51	0.5
1230	20.0	6.53	14.17	1.118	3.30	113.9	0.05	14.51	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 0.07 mg/L

Multi-Parameter Probe Unit # 2

Field Parameters Measured in Flow-Through Cell

Pump Placement Depth = 20 ft

Pump Rate = 0.5L/min

Well Diameter = 4"

Screen Interval = 15-25

Historic (7-year average low and high / 2018 / Avg in Bold)				
ORP	65.1	195.7	108.0	**130.9**
DO	2.54	5.29	2.72	**3.53**
PH	6.11	6.75	6.19	**6.46**
Cond.	0.617	1.032	0.852	**0.834**

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME	CHAAP	PROJECT NO.	60565355
SAMPLE NO.	NW021-1	WELL NO.	NW021
DATE/TIME COLLECTED	10-22-19 / 1355	PERSONNEL	TY
SAMPLE METHOD	PRO-ACTIVE SS MONSOON		CH
SAMPLE MEDIA:	Groundwater		
SAMPLE QA SPLIT:	YES **NO**	SPLIT SAMPLE NO.	
SAMPLE QC DUPLICATE:	YES **NO**	DUPLICATE SAMPLE NO.	NW023-1 / 0800
MS/MSD REQUESTED	YES **NO**	MS/MSD SAMPLE NO.	

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-22-19	Well Depth (ft BTOC)	45.75
Time Started	1300	Depth to Water (ft BTOC)	14.75
Time Completed	1350	Water Column Length	31'
PID Measurements		Well Casing Volume (per ft)	2.47L
Background	ND	Volume of Water in Well (L)	76.57
Breathing Zone	ND	Casing Volumes to Purge	
Well Head	ND	Minimum to Purge (L)	20L
Purge Water	ND	Actual Purge (L)	25L

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox (mV)	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
1305	2.5	6.72	12.68	1.153	0.95	123.9	0.45	14.76	0.5
1310	5.0	6.74	12.83	1.159	0.36	120.7	0.39	14.75	0.5
1315	7.5	6.76	12.64	1.163	0.30	119.0	0.28	14.75	0.5
1320	10.0	6.76	13.12	1.158	0.49	117.2	0.51	14.75	0.5
1325	12.5	6.77	12.79	1.159	0.46	116.2	0.11	14.75	0.5
1330	15.0	6.76	12.94	1.153	0.60	115.4	0.1	14.75	0.5
1335	17.5	6.77	13.09	1.155	0.39	114.3	0.07	14.75	0.5
1340	20.0	6.77	12.93	1.152	0.27	113.9	0.04	14.75	0.5
1345	~~22.5~~	6.77	12.93	1.151	0.27	113.4	0.04	14.75	0.5
1350	~~30.0~~ 25.0	6.77	12.88	1.154	0.26	112.2	0.02	14.75	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 0.00 mg/L

Multi-Parameter Probe Unit # 2

Field Parameters Measured in Flow-Through Cell

Pump Placement Depth = 39.5 ft

Pump Rate = 0.5L/min

Well Diameter = 4"

Screen Interval = 37-42

Historic (7-year average low and high / 2018 / Avg in Bold)				
ORP	44.2	182.3	109.7	**103.1**
DO	0.06	0.38	0.06	**0.26**
PH	6.53	6.99	6.53	**6.84**
Cond.	0.749	0.995	0.841	**0.860**

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME	CHAAP	PROJECT NO.	60565355
SAMPLE NO.	NW022-1	WELL NO.	NW022
DATE/TIME COLLECTED	10-22-19 / 1515	PERSONNEL	TY
SAMPLE METHOD	PRO-ACTIVE SS MONSOON		CH

SAMPLE MEDIA:	Groundwater			
SAMPLE QA SPLIT:	YES	NO	SPLIT SAMPLE NO.	
SAMPLE QC DUPLICATE:	YES	NO	DUPLICATE SAMPLE NO.	
MS/MSD REQUESTED	YES	NO	MS/MSD SAMPLE NO.	

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-22-19	Well Depth (ft BTOC)	66.60
Time Started	1430	Depth to Water (ft BTOC)	14.65
Time Completed	1515	Water Column Length	51.95
PID Measurements		Well Casing Volume (per ft)	2.47L
Background	ND	Volume of Water in Well (L)	128.32
Breathing Zone	ND	Casing Volumes to Purge	
Well Head	ND	Minimum to Purge (L)	20L
Purge Water	ND	Actual Purge (L)	20L

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox (mV)	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
1435	2.5	6.95	13.07	1.172	2.04	105.1	1.04	14.65	0.5
1440	5.0	6.92	12.99	1.278	0.36	88.3	0.60	14.65	0.5
1445	7.5	6.92	12.82	1.279	0.25	73.7	0.67	14.65	0.5
1450	10.0	6.94	13.03	1.279	0.32	59.7	0.49	14.65	0.5
1455	12.5	6.95	13.31	1.277	0.29	47.7	0.66	14.65	0.5
1500	15.0	6.96	13.39	1.276	0.20	37.4	0.32	14.65	0.5
1505	17.5	6.96	12.82	1.274	0.20	27.1	0.23	14.65	0.5
1510	20.0	6.96	13.27	1.270	0.19	26.7	0.19	14.65	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 0.27 mg/L
Multi-Parameter Probe Unit # 2
Field Parameters Measured in Flow-Through Cell
Pump Placement Depth = 61.5 ft
Pump Rate = 0.5L/min
Well Diameter = 4"
Screen Interval = 59 - 64

	Historic (7-year average low and high / 2018 / Avg in Bold)			
ORP	-55.1	77.7	77.7	**2.7**
DO	0.08	0.48	0.08	**0.26**
PH	6.77	7.35	6.77	**7.16**
Cond.	0.962	1.212	0.964	**1.048**

WATER SAMPLE COLLECTION FIELD SHEET

URS

GENERAL INFORMATION

SITE NAME	CHAAP	PROJECT NO.	60565355
SAMPLE NO.	NW050-1	WELL NO.	NW050
DATE/TIME COLLECTED	10/22/19 @ 1705	PERSONNEL	R. Exceen
SAMPLE METHOD	PRO-ACTIVE SS MONSOON		R. Reyes
SAMPLE MEDIA:	Groundwater		
SAMPLE QA SPLIT:	YES NO	SPLIT SAMPLE NO.	—
SAMPLE QC DUPLICATE:	YES NO	DUPLICATE SAMPLE NO.	—
MS/MSD REQUESTED	YES NO	MS/MSD SAMPLE NO.	—

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-22-19	Well Depth (ft BTOC)	20.11
Time Started	1617	Depth to Water (ft BTOC)	7.78
Time Completed	1708	Water Column Length	12.33
PID Measurements		Well Casing Volume (per ft)	2.47
Background	nd	Volume of Water in Well (L)	30.46
Breathing Zone	nd	Casing Volumes to Purge	—
Well Head	nd	Minimum to Purge (L)	20
Purge Water	nd	Actual Purge (L)	20

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	~~ORP~~ Redox (mV)	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
1622	2.5	7.04	15.48	1.163	1.34	72.7	5.79	7.80	0.5
1627	5	6.86	15.82	1.176	0.50	86.8	5.63	7.80	0.5
1632	7.5	6.80	16.48	1.184	0.35	94.4	5.39	7.80	0.5
1637	10	6.79	16.85	1.194	0.24	100.3	5.01	7.80	0.5
1642	12.5	6.76	16.88	1.192	0.22	104.8	6.14	7.80	0.5
1647	15	6.73	16.88	1.186	0.23	108.0	4.93	7.80	0.5
1652	17.5	6.73	16.91	1.183	0.23	109.7	4.98	7.80	0.5
1657	20	6.71	16.89	1.178	0.24	112.8	4.93	7.80	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 0.00 mg/L

Multi-Parameter Probe Unit # 24698

Field Parameters Measured in Flow-Through Cell

Pump Placement Depth = 15 ft

Pump Rate = 0.5 L/min

Well Diameter = 4"

Screen Interval = 10.1 - 20.1

	Historic (7-year average low and high / 2013 / Avg in **Bold**)			
ORP	116.2	257.0	166.4	**153.9**
DO	4.31	10.19	4.31	**6.72**
PH	6.35	6.75	6.46	**6.59**
Cond.	0.682	1.279	0.682	**0.926**

WATER SAMPLE COLLECTION FIELD SHEET

URS

GENERAL INFORMATION

SITE NAME	CHAAP	PROJECT NO.	60565355
SAMPLE NO.	NW051-1	WELL NO.	NW051
DATE/TIME COLLECTED	10/22/19 @ 1815	PERSONNEL	R. Exceen
SAMPLE METHOD	PRO-ACTIVE SS MONSOON		R. Reyes
SAMPLE MEDIA:	Groundwater		
SAMPLE QA SPLIT:	YES **NO**	SPLIT SAMPLE NO.	—
SAMPLE QC DUPLICATE:	YES NO	DUPLICATE SAMPLE NO.	—
MS/MSD REQUESTED	YES NO	MS/MSD SAMPLE NO.	—

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-22-19	Well Depth (ft BTOC)	34.53
Time Started	1719	Depth to Water (ft BTOC)	7.99
Time Completed	1820	Water Column Length	26.54
PID Measurements		Well Casing Volume (per ft)	2.47
Background	nd	Volume of Water in Well (L)	65.55
Breathing Zone	nd	Casing Volumes to Purge	~~20~~ PR
Well Head	nd	Minimum to Purge (L)	20
Purge Water	nd	Actual Purge (L)	25

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox (mV) PR	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
1724	2.5	6.64	14.17	1.132	096	122.4	5.64	8.02	0.5
1729	5	6.59	14.51	1.140	0.76	122.2	6.43	8.02	0.5
1734	7.5	6.55	14.80	1.151	0.55	125.1	6.58	8.02	0.5
1739	10	6.66	14.80	1.154	0.46	123.1	8.01	8.02	0.5
1744	12.5	6.66	14.62	1.149	0.41	122.3	7.25	8.02	0.5
1749	15	6.68	14.53	1.148	0.37	124.0	7.94	8.02	0.5
1754	17.5	6.61	14.34	1.142	0.36	125.1	8.29	8.02	0.5
1759	20	6.59	13.94	1.131	0.32	126.5	7.72	8.02	0.5
1804	22.5	6.52	13.02	1.110	0.31	129.3	7.68	8.02	0.5
1809	25	6.47	12.99	1.088	0.32	132.3	7.54	8.02	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 0.00 mg/L

Multi-Parameter Probe Unit # 24698

Field Parameters Measured in Flow-Through Cell

Pump Placement Depth = 32 ft

Pump Rate = 0.5 L/min

Well Diameter = 4"

Screen Interval = 29.5 - 34.5

	Historic (7-year average low and high / 2013 / Avg in **Bold**)			
ORP	64.2	179.4	179.4	**122.7**
DO	0.10	1.29	0.35	**0.51**
PH	6.52	6.71	6.68	**6.63**
Cond.	1.106	1.431	1.231	**1.290**

WATER SAMPLE COLLECTION FIELD SHEET

URS

GENERAL INFORMATION

SITE NAME	CHAAP	PROJECT NO.	60565355
SAMPLE NO.	NW052-1	WELL NO.	NW052
DATE/TIME COLLECTED	10/23/19 @ 0910	PERSONNEL	R. Exceen R. Reyes
SAMPLE METHOD	PRO-ACTIVE SS MONSOON		
SAMPLE MEDIA:	Groundwater		
SAMPLE QA SPLIT:	YES **NO**	SPLIT SAMPLE NO.	—
SAMPLE QC DUPLICATE:	YES **NO**	DUPLICATE SAMPLE NO.	—
MS/MSD REQUESTED	YES **NO**	MS/MSD SAMPLE NO.	—

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-23-19
Time Started	0825
Time Completed	0920
PID Measurements	
Background	nd
Breathing Zone	nd
Well Head	nd
Purge Water	nd

Well Depth (ft BTOC)	60.95	
Depth to Water (ft BTOC)	~~8.0~~ RR	7.35
Water Column Length	~~52.95~~ RR	53.60
Well Casing Volume (per ft)	.2.47	
Volume of Water in Well (L)	~~130.78~~ RR	132.39
Casing Volumes to Purge	—	
Minimum to Purge (L)	20	
Actual Purge (L)	20	

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP Redox (mV)	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
0830	2.5	6.65	10.64	0.744	9.82	181.4	5.75	7.35	0.5
0835	5	6.83	10.32	0.748	1.69	167.5	7.33	7.35	0.5
0840	7.5	6.94	9.86	0.741	1.20	159.1	7.66	7.35	0.5
0845	10	6.98	9.22	0.728	0.90	154.3	8.06	7.35	0.5
0850	12.5	6.97	9.11	0.725	0.75	152.2	7.05	7.35	0.5
0855	15	7.05	9.34	0.728	0.70	146.3	10.95	7.35	0.5
0900	17.5	7.13	9.63	0.733	0.67	140.8	11.14	7.35	0.5
0905	20	7.24	9.80	0.738	0.66	134.5	10.28	7.35	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 0.00 mg/L
Multi-Parameter Probe Unit # 24698
Field Parameters Measured in Flow-Through Cell
Pump Placement Depth = 58 ft
Pump Rate = 0.5 L/min
Well Diameter = 4"
Screen Interval = 55.6 -60.6

	Historic (7-year average low and high / 2013 / Avg in **Bold**)			
ORP	-80.1	-25.1	-34.5	**-41.1**
DO	0.08	0.36	0.36	**0.20**
PH	6.78	7.00	7.00	**6.87**
Cond.	0.875	1.370	1.061	**1.107**

WATER SAMPLE COLLECTION FIELD SHEET

URS

GENERAL INFORMATION

SITE NAME	CHAAP	PROJECT NO.	60565355
SAMPLE NO.	NW060-1	WELL NO.	NW060
DATE/TIME COLLECTED	10/22/19 @ 1310	PERSONNEL	R. Exceen
SAMPLE METHOD	PRO-ACTIVE SS MONSOON		R. Reyes
SAMPLE MEDIA:	Groundwater		
SAMPLE QA SPLIT:	YES **NO**	SPLIT SAMPLE NO.	—
SAMPLE QC DUPLICATE:	YES **NO**	DUPLICATE SAMPLE NO.	—
MS/MSD REQUESTED	YES **NO**	MS/MSD SAMPLE NO.	—

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-22-19	Well Depth (ft BTOC)	20.15
Time Started	1222	Depth to Water (ft BTOC)	10.15
Time Completed	1315	Water Column Length	10
PID Measurements		Well Casing Volume (per ft)	2.47
Background	ND	Volume of Water in Well (L)	24.7
Breathing Zone	nd	Casing Volumes to Purge	—
Well Head	nd	Minimum to Purge (L)	20
Purge Water	nd	Actual Purge (L)	20

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP Redox (mV)	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
1227	2.5	6.49	15.15	0.079	12.27	155.3	5.05	10.15	0.5
1232	5	6.28	15.57	0.076	10.74	160.5	5.93	10.15	0.5
1237	7.5	6.22	15.80	0.076	10.57	165.4	4.09	10.15	0.5
1242	10	6.16	15.79	0.075	10.54	166.9	5.04	10.15	0.5
1247	12.5	6.19	16.24	0.075	10.73	165.3	5.40	10.15	0.5
1252	15	6.20	16.33	0.075	10.72	164.1	6.29	10.15	0.5
1257	17.5	6.06	16.19	0.075	10.75	170.4	5.75	10.15	0.5
1302	20	6.01	16.16	0.075	10.75	171.6	6.06	10.15	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Solinst 102	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 0.00 mg/L
Multi-Parameter Probe Unit # 24698
Field Parameters Measured in Flow-Through Cell
Pump Placement Depth = 15 ft
Pump Rate = 0.5 L/min
Well Diameter = 4"
Screen Interval = 10.0 - 20.0

	Historic (7-year average low and high / 2013 / Avg in **Bold**)			
ORP	111.9	200.5	200.5	**143.4**
DO	6.31	11.38	9.09	**9.45**
PH	5.47	6.50	5.47	**6.25**
Cond.	0.157	0.396	0.239	**0.226**

WATER SAMPLE COLLECTION FIELD SHEET

URS

GENERAL INFORMATION

SITE NAME	CHAAP	PROJECT NO.	60565355
SAMPLE NO.	NW061-1	WELL NO.	NW061
DATE/TIME COLLECTED	10/22/19 @ 1435	PERSONNEL	R. Exceen, R. Reyes
SAMPLE METHOD	PRO-ACTIVE SS MONSOON		
SAMPLE MEDIA:	Groundwater		
SAMPLE QA SPLIT:	YES **NO**	SPLIT SAMPLE NO.	—
SAMPLE QC DUPLICATE:	YES NO	DUPLICATE SAMPLE NO.	—
MS/MSD REQUESTED	YES NO	MS/MSD SAMPLE NO.	—

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-22-19	Well Depth (ft BTOC)	44.90
Time Started	1337	Depth to Water (ft BTOC)	4.92
Time Completed	1440	Water Column Length	34.98
PID Measurements		Well Casing Volume (per ft)	2.47
Background	nd	Volume of Water in Well (L)	86.40
Breathing Zone	nd	Casing Volumes to Purge	—
Well Head	nd	Minimum to Purge (L)	20
Purge Water	nd	Actual Purge (L)	25

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP Redox (mV)	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
1342	2.5	6.64	13.73	0.787	1.26	155.0	4.31	9.92	0.5
1347	5	6.79	13.88	0.788	0.57	150.1	6.12	9.92	0.5
1352	7.5	6.80	13.54	0.784	0.40	149.1	5.07	9.92	0.5
1357	10	6.82	13.57	0.781	0.33	147.7	4.24	9.92	0.5
1402	12.5	6.95	14.61	0.804	0.30	141.6	4.40	9.92	0.5
1407	15	7.02	14.61	0.807	0.27	138.7	4.18	9.92	0.5
1412	17.5	6.94	14.12	0.793	0.22	141.9	4.47	9.92	0.5
1417	20	7.01	14.40	0.799	0.20	138.6	4.48	9.92	0.5
1422	22.5	7.03	14.73	0.803	0.19	138.4	4.39	9.92	0.5
1427	25	7.00	13.80	0.790	0.18	137.4	4.42	9.92	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Solinst 102	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 0.00 mg/L

Multi-Parameter Probe Unit # 24698

Field Parameters Measured in Flow-Through Cell

Pump Placement Depth = 42.5 ft

Pump Rate = 0.5 L/min

Well Diameter = 4"

Screen Interval = 40.3 - 45.3

Historic (7-year average low and high / 2013 / Avg in **Bold**)

ORP	47.1	171.4	151.1	**126.7**
DO	0.14	0.91	0.91	**0.39**
PH	6.31	6.86	6.31	**6.75**
Cond.	0.567	1.007	0.796	**0.759**

WATER SAMPLE COLLECTION FIELD SHEET

URS

GENERAL INFORMATION

SITE NAME	CHAAP	PROJECT NO.	60565355
SAMPLE NO.	NW062-1	WELL NO.	NW062
DATE/TIME COLLECTED	10-22-19 @ 1540	PERSONNEL	R. Exceen R. Reyes
SAMPLE METHOD	PRO-ACTIVE SS MONSOON		
SAMPLE MEDIA:	Groundwater		
SAMPLE QA SPLIT:	YES / **NO**	SPLIT SAMPLE NO.	—
SAMPLE QC DUPLICATE:	YES / **NO**	DUPLICATE SAMPLE NO.	—
MS/MSD REQUESTED	YES / **NO**	MS/MSD SAMPLE NO.	—

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-22-19	Well Depth (ft BTOC)	63.45
Time Started	1457	Depth to Water (ft BTOC)	10.04
Time Completed	1550	Water Column Length	53.41
PID Measurements		Well Casing Volume (per ft)	2.47
Background	ND	Volume of Water in Well (L)	131.92
Breathing Zone	Nd	Casing Volumes to Purge	—
Well Head	Nd	Minimum to Purge (L)	20
Purge Water	Nd	Actual Purge (L)	20

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP Redox (mV)	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
1502	2.5	7.95	13.55	0.657	2.18	76.0	6.74	10.02	0.5
1507	5	8.06	13.69	0.687	0.54	60.0	7.24	10.03	0.5
1512	7.5	8.06	13.89	0.696	0.33	52.5	7.55	10.03	0.5
1517	10	8.13	14.01	0.702	0.30	42.1	5.78	10.03	0.5
1522	12.5	8.12	14.14	0.703	0.30	40.6	4.77	10.03	0.5
1527	15	8.08	14.10	0.702	0.28	39.4	7.30	10.03	0.5
1532	17.5	8.11	13.87	0.699	0.28	36.9	6.57	10.03	0.5
1537	20	8.11	14.04	0.701	0.26	38.6	4.68	10.03	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Solinst 102	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 0.18 mg/L
Multi-Parameter Probe Unit # 24698
Field Parameters Measured in Flow-Through Cell
Pump Placement Depth = 60.5 ft
Pump Rate = 0.5 L/min
Well Diameter = 4"
Screen Interval = 58.1 - 63.1

	Historic (7-year average low and high / 2013 / Avg in **Bold**)			
ORP	-123.8	133.1	133.1	**-32.7**
DO	0.01	0.34	0.17	**0.19**
PH	5.95	7.11	5.95	**6.85**
Cond.	0.491	0.879	0.654	**0.637**

WATER SAMPLE COLLECTION FIELD SHEET

URS

GENERAL INFORMATION

SITE NAME	CHAAP	PROJECT NO.	60565355
SAMPLE NO.	NW070-1	WELL NO.	NW070
DATE/TIME COLLECTED	10.21-19 @ 1615	PERSONNEL	R. Exceen
SAMPLE METHOD	PRO-ACTIVE SS MONSOON		R. Reyes
SAMPLE MEDIA:	Groundwater		
SAMPLE QA SPLIT:	YES / NO	SPLIT SAMPLE NO.	—
SAMPLE QC DUPLICATE:	YES / NO	DUPLICATE SAMPLE NO.	—
MS/MSD REQUESTED	YES / NO	MS/MSD SAMPLE NO.	—

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10.21.19	Well Depth (ft BTOC)	20.91
Time Started	1520	Depth to Water (ft BTOC)	7.31
Time Completed	1625	Water Column Length	13.6
PID Measurements		Well Casing Volume (per ft)	2.47
Background	ND	Volume of Water in Well (L)	33.6
Breathing Zone	ND	Casing Volumes to Purge	—
Well Head	ND	Minimum to Purge (L)	20
Purge Water	ND	Actual Purge (L)	25

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox ~~(mV)~~ ORP	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
1525	2.5	7.55	15.34	0.092	3.80	110.4	43.2	7.31	0.5
1530	5	7.28	15.57	0.092	1.21	119.9	44.4	7.31	0.5
1535	7.5	7.26	16.88	0.095	0.77	118.6	42.1	7.31	0.5
1540	10	7.25	17.13	0.095	0.60	120.1	42.0	7.31	0.5
1545	12.5	7.18	16.91	0.095	0.54	121.9	42.2	7.31	0.5
1550	15	7.18	16.93	0.095	0.49	124.2	40.0	7.31	0.5
1555	17.5	7.12	16.81	0.095	0.45	126.0	39.5	7.31	0.5
1600	20	7.13	17.12	0.096	0.42	126.2	38.8	7.31	0.5
1605	22.5	7.13	17.13	0.096	0.39	125.9	39.4	7.31	0.5
1610	25	7.10	17.09	0.096	0.38	127.0	38.7	7.31	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Solinst 102	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 0.00 mg/L

Multi-Parameter Probe Unit # 24698

Field Parameters Measured in Flow-Through Cell

Pump Placement Depth = 15.5 ft

Pump Rate = 0.5 L per Min

Well Diameter = 4"

Screen Interval = 10.6 - 20.6

	Historic (7-year average low and high / 2013 / Avg in **Bold**)			
ORP	50.3	142.3	142.3	**85.8**
DO	0.05	0.90	0.35	**0.43**
PH	6.88	7.43	7.43	**7.19**
Cond.	0.306	1.221	0.726	**0.763**

WATER SAMPLE COLLECTION FIELD SHEET

URS

GENERAL INFORMATION

SITE NAME	CHAAP	PROJECT NO.	60565355
SAMPLE NO.	NW071-1	WELL NO.	NW071
DATE/TIME COLLECTED	10-21-19 @ 1735	PERSONNEL	R. Exceen R. Reyes
SAMPLE METHOD	PRO-ACTIVE SS MONSOON		
SAMPLE MEDIA:	Groundwater		
SAMPLE QA SPLIT:	YES **NO**	SPLIT SAMPLE NO.	—
SAMPLE QC DUPLICATE:	YES **NO**	DUPLICATE SAMPLE NO.	—
MS/MSD REQUESTED	YES **NO**	MS/MSD SAMPLE NO.	—

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-21-19	Well Depth (ft BTOC)	60.43
Time Started	1640	Depth to Water (ft BTOC)	7.11
Time Completed	1740	Water Column Length	53.32
PID Measurements		Well Casing Volume (per ft)	2.47
Background	ND	Volume of Water in Well (L)	131.7
Breathing Zone	ND	Casing Volumes to Purge	—
Well Head	ND	Minimum to Purge (L)	— 20 ✓
Purge Water	ND	Actual Purge (L)	

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox ~~(mV)~~ (ORP)	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
1645	2.5	6.38	14.28	0.540	3.79	155.8	7.31	7.13	0.5
1650	5	6.15	14.76	0.550	2.25	167.4	5.53	7.13	0.5
1655	7.5	6.18	15.04	0.554	2.02	161.2	4.65	7.13	0.5
1700	10	6.32	15.23	0.558	1.92	158.5	6.19	7.13	0.5
1705	12.5	6.28	15.32	0.559	1.97	158.9	4.40	7.13	0.5
1710	15	6.23	15.28	0.559	2.00	159.6	4.79	7.13	0.5
1715	17.5	6.32	15.31	0.561	2.06	157.7	4.89	7.13	0.5
1720	20	6.33	15.29	0.561	2.16	157.9	5.01	7.13	0.5
1725	22.5	6.32	15.30	0.561	2.13	157.9	4.62	7.13	0.5
1730	25	6.32	15.36	0.563	2.18	158.1	4.65	7.13	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Solinst 102	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 0.00 mg/L

Multi-Parameter Probe Unit # 24698

Field Parameters Measured in Flow-Through Cell

Pump Placement Depth = 57.5 ft

Pump Rate = 0.5 L/min

Well Diameter = 4"

Screen Interval = 55.2 - 60.2

Historic (7-year average low and high / 2013 / Avg in **Bold**)

ORP	-57.1	172.1	157.6	**97.9**
DO	0.57	2.11	1.42	**1.25**
PH	6.48	6.98	6.98	**6.66**
Cond.	0.609	1.055	0.609	**0.703**

WATER SAMPLE COLLECTION FIELD SHEET

URS

GENERAL INFORMATION

SITE NAME	CHAAP	PROJECT NO.	60565355
SAMPLE NO.	NW080-1	WELL NO.	NW080
DATE/TIME COLLECTED	10-22-19 @ 0855	PERSONNEL	R. Exceen R. Reyes
SAMPLE METHOD	PRO-ACTIVE SS MONSOON		
SAMPLE MEDIA:	Groundwater		
SAMPLE QA SPLIT:	YES NO	SPLIT SAMPLE NO.	—
SAMPLE QC DUPLICATE:	YES NO	DUPLICATE SAMPLE NO.	—
MS/MSD REQUESTED	YES NO	MS/MSD SAMPLE NO.	—

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-22-19	Well Depth (ft BTOC)	21.06
Time Started	0808	Depth to Water (ft BTOC)	8.73
Time Completed	0902	Water Column Length	12.33
PID Measurements		Well Casing Volume (per ft)	2.47
Background	nd	Volume of Water in Well (L)	30.46
Breathing Zone	nd	Casing Volumes to Purge	—
Well Head	nd	Minimum to Purge (L)	20
Purge Water	nd	Actual Purge (L)	20

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP Redox (mV)	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
0813	2.5	6.15	12.52	1.173	15.03	208.5	3.47	8.78	0.5
0818	5	6.07	11.03	1.124	8.52	209.4	4.05	8.78	0.5
0823	7.5	6.11	11.31	1.128	7.88	207.7	3.99	8.78	0.5
0828	10	6.12	11.52	1.134	7.68	205.2	4.68	8.78	0.5
0833	12.5	6.15	11.78	1.140	7.53	202.9	4.74	8.78	0.5
0838	15	6.18	11.98	1.148	7.38	200.3	4.46	8.78	0.5
0843	17.5	6.20	11.97	1.146	7.38	198.9	4.88	8.78	0.5
0848	20	6.23	12.61	1.161	7.28	197.0	4.91	8.78	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 0.00 mg/L
Multi-Parameter Probe Unit # 24698
Field Parameters Measured in Flow-Through Cell
Pump Placement Depth = 16 ft
Pump Rate = 0.5 L/min
Well Diameter = 4"
Screen Interval = 8 - 18

	Historic (7-year average low and high / 2016 / Avg in **Bold**)			
ORP	103.0	181.7	173.9	**156.7**
DO	7.55	11.38	9.72	**9.07**
PH	6.29	6.53	6.35	**6.41**
Cond.	0.830	1.194	1.106	**0.997**

WATER SAMPLE COLLECTION FIELD SHEET

URS

GENERAL INFORMATION

SITE NAME	CHAAP	PROJECT NO.	60565355
SAMPLE NO.	NW081R-1	WELL NO.	NW081R
DATE/TIME COLLECTED	10-22-19 @ 1020	PERSONNEL	R. Exceen R. Zoyer
SAMPLE METHOD	PRO-ACTIVE SS MONSOON		
SAMPLE MEDIA:	Groundwater		
SAMPLE QA SPLIT:	YES NO	SPLIT SAMPLE NO.	—
SAMPLE QC DUPLICATE:	YES NO	DUPLICATE SAMPLE NO.	—
MS/MSD REQUESTED	YES NO	MS/MSD SAMPLE NO.	—

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-22-19	Well Depth (ft BTOC)	47.75
Time Started	0932	Depth to Water (ft BTOC)	8.31
Time Completed	1028	Water Column Length	~~0.62~~ RR 39.44
PID Measurements		Well Casing Volume (per ft)	~~RR 5.15~~ 0.62
Background	ND	Volume of Water in Well (L)	RR ~~5.15~~ 24.45
Breathing Zone	NP	Casing Volumes to Purge	—
Well Head	NP	Minimum to Purge (L)	20
Purge Water	NP	Actual Purge (L)	20

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP Redox (mV)	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
937	2.5	6.63	11.34	0.784	3.97	167.6	12.9	8.29	0.5
942	5	6.49	11.76	0.792	1.30	174.2	7.32	"	0.5
947	7.5	6.52	11.89	0.792	0.93	173.8	5.89	"	0.5
952	10	6.50	11.88	0.793	0.81	174.1	4.89	"	0.5
957	12.5	6.48	12.09	0.793	0.72	173.5	6.72	"	0.5
1002	15	6.49	12.17	0.795	0.68	173.3	6.79	"	0.5
1007	17.5	6.39	12.43	0.798	0.66	172.3	5.91	"	0.5
1012	20	6.51	12.45	0.797	0.65	171.2	6.23	"	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 0.00 mg/L

Multi-Parameter Probe Unit # 24698

Field Parameters Measured in Flow-Through Cell

Pump Placement Depth = 40 ft bgs / 42' BTOC

Pump Rate = 0.5 L/min

Well Diameter = ~~4"~~ RR 2"

Screen Interval = 35 - 45

	Historic (7-year average low and high / 2016 / Avg in **Bold**)			
ORP	61.2	173.9	173.9	**133.6**
DO	1.75	2.35	2.35	**1.99**
PH	6.45	6.71	6.53	**6.57**
Cond.	0.893	1.244	0.893	**1.046**

WATER SAMPLE COLLECTION FIELD SHEET

URS

GENERAL INFORMATION

SITE NAME	CHAAP	PROJECT NO.	60565355
SAMPLE NO.	NW082R-1	WELL NO.	NW082R
DATE/TIME COLLECTED	10/22/19 @ 1145	PERSONNEL	R. Exceen
SAMPLE METHOD	PRO-ACTIVE SS MONSOON		R. Reyes
SAMPLE MEDIA:	Groundwater		
SAMPLE QA SPLIT:	YES **NO**	SPLIT SAMPLE NO.	—
SAMPLE QC DUPLICATE:	YES NO	DUPLICATE SAMPLE NO.	—
MS/MSD REQUESTED	YES NO	MS/MSD SAMPLE NO.	—

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-22-19	Well Depth (ft BTOC)	59.49
Time Started	1047	Depth to Water (ft BTOC)	8.34
Time Completed	1152	Water Column Length	51.15
PID Measurements		Well Casing Volume (per ft)	0.62
Background	nd	Volume of Water in Well (L)	31.71
Breathing Zone	nd	Casing Volumes to Purge	—
Well Head	nd	Minimum to Purge (L)	20
Purge Water	nd	Actual Purge (L)	25

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP Redox (mV)	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
1052	2.5	6.60	12.87	0.686	4.52	162.8	7.34	8.35	0.5
1057	5	6.64	13.49	0.696	2.09	159.9	4.82	8.34	0.5
1102	7.5	6.69	13.80	0.700	1.15	155.7	6.48	8.34	0.5
1107	10	6.73	13.80	0.699	0.87	154.4	7.34	8.34	0.5
1112	12.5	6.66	13.43	0.694	0.73	154.8	6.72	8.34	0.5
1117	15	6.57	12.60	0.678	0.64	159.1	6.22	8.34	0.5
1122	17.5	6.56	12.54	0.677	0.59	158.5	5.90	8.34	0.5
1127	20	6.64	13.13	0.687	0.55	155.1	5.54	8.34	0.5
1132	22.5	6.67	13.21	0.690	0.52	154.1	6.02	8.34	0.5
1137	25	6.84	13.00	0.687	0.50	153.8	5.96	8.34	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 0.34 mg/L
Multi-Parameter Probe Unit #
Field Parameters Measured in Flow-Through Cell
Pump Placement Depth = 51 ft
Pump Rate = 0.5 L/min
Well Diameter = ~~4"~~ PVC 2"
Screen Interval = 46 - 56

Historic (7-year average low and high / 2016 / Avg in **Bold**)

ORP	82.0	166.8	151.9	**132.4**
DO	0.18	0.41	0.29	**0.28**
PH	6.60	6.84	6.60	**6.70**
Cond.	0.831	1.107	0.831	**0.969**

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME	CHAAP	PROJECT NO.	60565355
SAMPLE NO.	G0024-1	WELL NO.	G0024
DATE/TIME COLLECTED	10-23-19 /1000	PERSONNEL	TY
SAMPLE METHOD	PRO-ACTIVE SS MONSOON		CH

SAMPLE MEDIA:	Groundwater			
SAMPLE QA SPLIT:	YES	NO	SPLIT SAMPLE NO.	
SAMPLE QC DUPLICATE:	YES	NO	DUPLICATE SAMPLE NO.	
MS/MSD REQUESTED	YES	NO	MS/MSD SAMPLE NO.	

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-23-19	Well Depth (ft BTOC)	33.28
Time Started	0915	Depth to Water (ft BTOC)	12.50
Time Completed	0955	Water Column Length	20.78
PID Measurements		Well Casing Volume (per ft)	2.47
Background	ND	Volume of Water in Well (L)	51.33
Breathing Zone	ND	Casing Volumes to Purge	
Well Head	ND	Minimum to Purge (L)	20L
Purge Water	ND	Actual Purge (L)	20L

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox (mV)	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
0920	2.5	6.53	12.72	0.6651	5.14	158.6	0.86	12.68	0.5
0925	5.0	6.43	12.60	0.6667	5.14	159.0	1.02	12.68	0.5
0930	7.5	6.40	12.54	0.6669	5.11	158.9	0.48	12.68	0.5
0935	10.0	6.38	12.47	0.669	5.02	158.9	0.74	12.68	0.5
0940	12.5	6.38	12.47	0.6669	4.95	158.2	0.53	12.68	0.5
0945	15.0	6.37	12.45	0.670	4.90	157.8	0.58	12.68	0.5
0950	17.5	6.37	12.55	0.670	4.91	157.0	0.30	12.68	0.5
0955	20.0	6.36	12.53	0.670	4.88	156.5	0.39	12.68	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 0.00 mg/L
Multi-Parameter Probe Unit # 2
Field Parameters Measured in Flow-Through Cell
Pump Placement Depth = 23.5 ft
Pump Rate = 0.5L/min
Well Diameter = 4"
Screen Interval = 16-31

	Historic (7-year average low and high / 2019 / Avg in Bold)			
ORP	56.8	197.9	101.8	**122.2**
DO	4.70	9.01	8.09	**6.59**
PH	6.19	6.93	6.42	**6.63**
Cond.	0.226	1.201	0.226	**0.788**

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME	CHAAP	PROJECT NO.	60565355
SAMPLE NO.	G0070-1	WELL NO.	G0070
DATE/TIME COLLECTED	10-21-19 / 1445	PERSONNEL	TY
SAMPLE METHOD	PRO-ACTIVE SS MONSOON		CH

SAMPLE MEDIA:	Groundwater			
SAMPLE QA SPLIT:	YES	**NO**	SPLIT SAMPLE NO.	
SAMPLE QC DUPLICATE:	YES	**NO**	DUPLICATE SAMPLE NO.	
MS/MSD REQUESTED	**YES**	NO	MS/MSD SAMPLE NO.	**G0070-1 MS/MSD**

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-21-19	Well Depth (ft BTOC)	82.65
Time Started	1400	Depth to Water (ft BTOC)	14.90
Time Completed	1440	Water Column Length	67.75
PID Measurements		Well Casing Volume (per ft)	2.47L
Background	ND	Volume of Water in Well (L)	167.34
Breathing Zone	ND	Casing Volumes to Purge	
Well Head	ND	Minimum to Purge (L)	20L
Purge Water	ND	Actual Purge (L)	20L

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox (mV)	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
1405	2.5	7.11	11.52	0.463	3.86	16.6	0.32	15.16	0.5
1410	5.0	7.13	11.71	0.461	3.79	12.5	0.20	15.15	0.5
1415	7.5	7.15	11.64	0.461	3.82	11.9	0.33	15.15	0.5
1420	10.0	7.14	11.67	0.460	3.67	12.6	0.43	15.15	0.5
1425	12.5	7.14	11.63	0.460	3.73	14.0	0.34	15.15	0.5
1430	15.0	7.14	11.68	0.460	3.66	14.7	0.42	15.15	0.5
1435	17.5	7.13	11.70	0.461	3.52	15.2	0.15	15.15	0.5
1440	20.0	7.12	11.60	0.461	3.29	16.5	0.15	15.15	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 0.00 mg/L
Multi-Parameter Probe Unit # 2
Field Parameters Measured in Flow-Through Cell
Pump Placement Depth = ~~75~~ 77.5ft
Pump Rate = 0.5L/min
Well Diameter = 4"
Screen Interval = 75-80

	Historic (7-year average low and high / 2019 / Avg in Bold)			
ORP	6.3	138.1	114.4	**61.1**
DO	0.23	2.76	2.76	**0.95**
PH	6.35	7.22	6.78	**6.96**
Cond.	0.354	0.490	0.374	**0.408**

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME	CHAAP	PROJECT NO.	60565355
SAMPLE NO.	G0075-1	WELL NO.	G0075
DATE/TIME COLLECTED	10-21-19 / 1200	PERSONNEL	TV / CMH
SAMPLE METHOD	PRO-ACTIVE SS MONSOON		

SAMPLE MEDIA:	Groundwater			
SAMPLE QA SPLIT:	YES	**NO**	SPLIT SAMPLE NO.	
SAMPLE QC DUPLICATE:	YES	**NO**	DUPLICATE SAMPLE NO.	
MS/MSD REQUESTED	YES	**NO**	MS/MSD SAMPLE NO.	

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-21-19	Well Depth (ft BTOC)	37.71
Time Started	1115	Depth to Water (ft BTOC)	14.85
Time Completed	1155	Water Column Length	22.86
PID Measurements		Well Casing Volume (per ft)	2.47L
Background	ND	Volume of Water in Well (L)	56.46
Breathing Zone	ND	Casing Volumes to Purge	
Well Head	ND	Minimum to Purge (L)	20L
Purge Water	ND	Actual Purge (L)	20L

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox (mV)	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
1120	2.5	6.60	11.82	0.962	8.45	143.1	0.26	14.87	0.5
1125	5.0	6.60	11.83	0.967	8.26	141.9	0.06	14.85	0.5
1130	7.5	6.60	11.89	0.978	7.97	140.5	0.05	14.85	0.5
1135	10.0	6.59	11.95	0.986	7.60	139.0	0.05	14.86	0.5
1140	12.5	6.58	12.06	0.990	7.38	137.7	0.04	14.86	0.5
1145	15.0	6.58	11.98	0.992	7.22	136.1	0.03	14.86	0.5
1150	17.5	6.57	12.03	0.993	7.02	134.2	0.01	14.86	0.5
1155	20.0	6.57	12.07	0.995	6.86	132.7	0.02	14.86	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 0.00 mg/L
Multi-Parameter Probe Unit # 2
Field Parameters Measured in Flow-Through Cell
Pump Placement Depth = 30 ft
Pump Rate = 0.5 L/min
Well Diameter = 4"
Screen Interval = 25-35

	Historic (7-year average low and high / 2019 / Avg in Bold)			
ORP	36.8	143.0	36.8	**107.4**
DO	0.35	1.51	1.51	**0.76**
PH	6.10	6.86	6.52	**6.52**
Cond.	0.624	0.757	0.757	**0.680**

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME	CHAAP	PROJECT NO.	60565355
SAMPLE NO.	G0076-1	WELL NO.	G0076
DATE/TIME COLLECTED	10-21-19 / 1315	PERSONNEL	TY
SAMPLE METHOD	PRO-ACTIVE SS MONSOON		CH

SAMPLE MEDIA:	Groundwater			
SAMPLE QA SPLIT:	YES	NO	SPLIT SAMPLE NO.	
SAMPLE QC DUPLICATE:	YES	NO	DUPLICATE SAMPLE NO.	
MS/MSD REQUESTED	YES	NO	MS/MSD SAMPLE NO.	

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-21-19	Well Depth (ft BTOC)	65.20
Time Started	1230	Depth to Water (ft BTOC)	14.65
Time Completed	1310	Water Column Length	50.55
PID Measurements		Well Casing Volume (per ft)	2.47 L
Background	ND	Volume of Water in Well (L)	124.86
Breathing Zone	ND	Casing Volumes to Purge	
Well Head	ND	Minimum to Purge (L)	20L
Purge Water	ND	Actual Purge (L)	20L

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox (mV)	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
1235	2.5	6.72	11.42	1.086	4.43	109.5	0.84	14.65	0.5
1240	5.0	6.65	11.54	1.170	3.67	78.8	0.44	14.65	0.5
1245	7.5	6.64	11.72	1.174	2.93	47.7	0.57	14.65	0.5
1250	10.0	6.65	11.77	1.187	2.86	24.9	0.59	14.65	0.5
1255	12.5	6.64	11.68	1.187	2.32	4.7	0.61	14.65	0.5
1300	15.0	6.65	11.64	1.188	2.33	-8.2	0.26	14.65	0.5
1305	17.5	6.65	11.50	1.187	2.07	-23.0	0.15	14.65	0.5
1310	20.0	6.66	11.68	1.189	1.91	-36.2	0.07	14.65	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 1.68 mg/L
Multi-Parameter Probe Unit # 2
Field Parameters Measured in Flow-Through Cell
Pump Placement Depth = 59 ft
Pump Rate = 0.5 L/min
Well Diameter = 4"
Screen Interval = 54-64

	Historic (7-year average low and high / 2019 / Avg in Bold)			
ORP	-30.9	69.3	31.1	**17.7**
DO	0.08	1.71	1.71	**0.48**
PH	6.20	6.88	6.59	**6.72**
Cond.	0.748	1.024	0.870	**0.873**

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME	CHAAP	PROJECT NO.	60565355
SAMPLE NO.	G0077-1	WELL NO.	G0077
DATE/TIME COLLECTED	10-23-19 / 1130	PERSONNEL	TV
SAMPLE METHOD	PRO-ACTIVE SS MONSOON		CH

SAMPLE MEDIA:	Groundwater			
SAMPLE QA SPLIT:	YES	NO	SPLIT SAMPLE NO.	
SAMPLE QC DUPLICATE:	YES	NO	DUPLICATE SAMPLE NO.	
MS/MSD REQUESTED	YES	NO	MS/MSD SAMPLE NO.	

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-23-19	Well Depth (ft BTOC)	37.70
Time Started	1025	Depth to Water (ft BTOC)	12.83
Time Completed	1125	Water Column Length	24.87
PID Measurements		Well Casing Volume (per ft)	2.47
Background	ND	Volume of Water in Well (L)	61.43
Breathing Zone	ND	Casing Volumes to Purge	
Well Head	ND	Minimum to Purge (L)	20L
Purge Water	ND	Actual Purge (L)	30L

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox (mV)	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
1030	2.5	6.37	12.80	0.538	5.88	163.7	0.26	12.85	0.5
1035	5.0	6.33	12.37	0.546	5.85	160.5	0.25	12.86	0.5
1040	7.5	6.36	12.70	0.616	5.74	158.6	0.20	12.86	0.5
1045	10.0	6.41	12.69	0.677	5.71	157.2	0.15	12.86	0.5
1050	12.5	6.46	12.63	0.733	5.55	155.8	0.04	12.86	0.5
1055	15.0	6.53	12.68	0.835	4.32	153.3	0.01	12.86	0.5
1100	17.5	6.58	12.78	0.912	3.22	151.3	0.08	12.86	0.5
1105	20.0	6.61	12.75	0.956	2.67	149.6	0.07	12.86	0.5
1110	22.5	6.62	12.85	0.979	2.28	148.3	0.12	12.86	0.5
1115	25.0	6.63	12.81	0.994	2.10	147.2	0.08	12.86	0.5
1120	27.5	6.63	12.91	1.005	1.93	146.0	0.11	12.86	0.5
1125	30.0	6.63	12.92	1.012	1.86	144.8	0.06	12.86	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 0.00 mg/L
Multi-Parameter Probe Unit # 2
Field Parameters Measured in Flow-Through Cell
Pump Placement Depth = 30 ft
Pump Rate = 0.5L/min
Well Diameter = 4"
Screen Interval = 25-35

	Historic (7-year average low and high / 2019 / Avg in Bold)			
ORP	48.3	187.5	73.2	**106.2**
DO	0.95	3.63	3.63	**1.79**
PH	6.35	6.94	6.75	**6.72**
Cond.	0.716	1.006	0.835	**0.857**

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME	CHAAP	PROJECT NO.	60565355
SAMPLE NO.	G0078-1	WELL NO.	G0078
DATE/TIME COLLECTED	10-23-19 / 1245	PERSONNEL	TY
SAMPLE METHOD	PRO-ACTIVE SS MONSOON		CH
SAMPLE MEDIA:	Groundwater		
SAMPLE QA SPLIT:	YES **NO**	SPLIT SAMPLE NO.	
SAMPLE QC DUPLICATE:	YES **NO**	DUPLICATE SAMPLE NO.	
MS/MSD REQUESTED	YES **NO**	MS/MSD SAMPLE NO.	

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-23-19	Well Depth (ft BTOC)	62.80
Time Started	1150	Depth to Water (ft BTOC)	12.80
Time Completed	1240	Water Column Length	50
PID Measurements		Well Casing Volume (per ft)	2.47L
Background	ND	Volume of Water in Well (L)	123.5
Breathing Zone	ND	Casing Volumes to Purge	
Well Head	ND	Minimum to Purge (L)	20L
Purge Water	ND	Actual Purge (L)	25L

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox (mV)	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
1155	2.5	6.89	13.52	1.081	2.52	147.8	0.80	12.76	0.5
1200	5.0	6.89	13.75	1.140	0.72	140.8	1.07	12.79	0.5
1205	7.5	6.90	13.91	1.162	0.49	133.3	0.58	12.79	0.5
1210	10.0	6.89	13.77	1.184	0.49	116.4	0.55	12.79	0.5
1215	12.5	6.89	13.75	1.200	0.33	97.2	0.64	12.79	0.5
1220	15.0	6.90	13.81	1.209	0.30	78.0	0.34	12.79	0.5
1225	17.5	6.90	13.77	1.216	0.31	62.7	0.22	12.79	0.5
1230	20.0	6.90	13.65	1.212	0.23	47.2	0.29	12.79	0.5
1235	22.5	6.89	13.56	1.214	0.27	35.8	0.08	12.79	0.5
1240	25.0	6.90	13.36	1.213	0.25	28.1	0.10	12.79	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 0.48 mg/L
Multi-Parameter Probe Unit # 2
Field Parameters Measured in Flow-Through Cell
Pump Placement Depth = 55 ft
Pump Rate = 0.5 L/min
Well Diameter = 4"
Screen Interval = 50-60

	Historic (7-year average low and high / 2019 / Avg in Bold)			
ORP	-25.8	99.4	25.8	**15.8**
DO	0.12	0.42	0.29	**0.25**
PH	6.75	7.28	7.10	**7.04**
Cond.	0.878	1.207	1.065	**1.030**

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME	CHAAP	PROJECT NO.	60565355
SAMPLE NO.	G0079-1	WELL NO.	G0079
DATE/TIME COLLECTED	10-21-19 / 1045	PERSONNEL	CMH
SAMPLE METHOD	PRO-ACTIVE SS MONSOON		TY

SAMPLE MEDIA:	Groundwater			
SAMPLE QA SPLIT:	YES	NO	SPLIT SAMPLE NO.	
SAMPLE QC DUPLICATE:	YES	NO	DUPLICATE SAMPLE NO.	
MS/MSD REQUESTED	YES	NO	MS/MSD SAMPLE NO.	

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-21-19
Time Started	1000
Time Completed	1040
PID Measurements	
Background	ND
Breathing Zone	ND
Well Head	ND
Purge Water	ND

Well Depth (ft BTOC)	19.62
Depth to Water (ft BTOC)	15.06
Water Column Length	4.56
Well Casing Volume (per ft)	2.47L
Volume of Water in Well (L)	11.26
Casing Volumes to Purge	
Minimum to Purge (L)	20
Actual Purge (L)	20

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox (mV)	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
	~~2.5~~								
1005	5.0	6.50	12.10	0.265	9.27	-7.4	0.44	15.14	0.5
1010	5.0	6.39	11.95	0.268	5.72	-2.1	0.4	15.13	0.5
1015	7.5	6.38	12.00	0.272	4.69	-1.8	0.44	15.13	0.5
1020	10.0	6.38	12.08	0.275	4.00	-1.5	0.27	15.13	0.5
1025	12.5	6.34	12.19	0.274	3.74	-0.2	0.16	15.13	0.5
1030	15.0	6.36	12.33	0.278	3.82	-0.5	0.15	15.13	0.5
1035	17.5	6.35	11.93	0.277	3.92	2.1/149	0.12	15.13	0.5
1040	20.0	6.34	12.71	0.278	3.82	0.5/144	0.17	15.13	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 0.06 mg/L
Multi-Parameter Probe Unit # 2
Field Parameters Measured in Flow-Through Cell
Pump Placement Depth = 17.62 ft
Pump Rate = 0.5L/min
Well Diameter = 4"
Screen Interval = 8-18

	Historic (7-year average low and high / 2019 / Avg in Bold)			
ORP	128.8	128.8	128.8	**128.8**
DO	7.99	7.99	7.99	**7.99**
PH	6.11	6.11	6.11	**6.11**
Cond.	0.174	0.174	0.174	**0.174**

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME	CHAAP	PROJECT NO.	60565355
SAMPLE NO.	G0080-1	WELL NO.	G0080
DATE/TIME COLLECTED	10-21-19 /0910	PERSONNEL	TY
SAMPLE METHOD	PRO-ACTIVE SS MONSOON		CMH
SAMPLE MEDIA:	Groundwater		
SAMPLE QA SPLIT:	YES **NO**	SPLIT SAMPLE NO.	
SAMPLE QC DUPLICATE:	YES **NO**	DUPLICATE SAMPLE NO.	
MS/MSD REQUESTED	YES **NO**	MS/MSD SAMPLE NO.	

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-21-19	Well Depth (ft BTOC)	37.70
Time Started	0825	Depth to Water (ft BTOC)	13.25
Time Completed	0905	Water Column Length	24.45'
PID Measurements		Well Casing Volume (per ft)	0.62L
Background	ND	Volume of Water in Well (L)	15.16L
Breathing Zone	ND	Casing Volumes to Purge	
Well Head	ND	Minimum to Purge (L)	20L
Purge Water	ND	Actual Purge (L)	20L

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox (mV)	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
0830	2.5	6.66	11.96	0.795	12.40	-17.5	2.12	13.24	0.5
0835	5.0	6.66	12.00	0.797	3.69	-17.1	0.69	13.24	0.5
0840	7.5	6.65	12.08	0.797	2.53	-16.8	1.04	13.24	0.5
0845	10.0	6.65	12.06	0.797	1.91	-16.6	0.46	13.24	0.5
0850	12.5	6.64	12.06	0.797	1.54	-16.5	0.17	13.24	0.5
0855	15.0	6.64	12.14	0.797	1.29	-16.6	0.12	13.24	0.5
0900	17.5	6.64	12.03	0.796	1.12	-16.4	0.28	13.24	0.5
0905	20.0	6.64	12.04	0.795	1.23	-16.4	0.27	13.24	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 0.45 mg/L
Multi-Parameter Probe Unit # 2
Field Parameters Measured in Flow-Through Cell
Pump Placement Depth = 30 ft
Pump Rate = 0.5L/min
Well Diameter = 2"
Screen Interval = 25-35

	Historic (7-year average low and high / 2019 / Avg in Bold)			
ORP	25.8	160.8	50.8	**69.0**
DO	0.08	3.68	0.18	**1.43**
PH	6.58	6.82	6.67	**6.69**
Cond.	0.413	0.724	0.610	**0.600**

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME	CHAAP	PROJECT NO.	60565355
SAMPLE NO.	G0081-1	WELL NO.	G0081
DATE/TIME COLLECTED	10-21-19 / 1615	PERSONNEL	TY
SAMPLE METHOD	PRO-ACTIVE SS MONSOON		CH

SAMPLE MEDIA:	Groundwater			
SAMPLE QA SPLIT:	YES	NO	SPLIT SAMPLE NO.	
SAMPLE QC DUPLICATE:	YES	NO	DUPLICATE SAMPLE NO.	
MS/MSD REQUESTED	YES	NO	MS/MSD SAMPLE NO.	

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-21-19	Well Depth (ft BTOC)	41.30
Time Started	1530	Depth to Water (ft BTOC)	14.89
Time Completed	1610	Water Column Length	26.41
PID Measurements		Well Casing Volume (per ft)	0.62L
Background	ND	Volume of Water in Well (L)	16.37
Breathing Zone	ND	Casing Volumes to Purge	
Well Head	ND	Minimum to Purge (L)	20L
Purge Water	ND	Actual Purge (L)	20L

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox (mV)	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
1535	2.5	6.26	11.78	0.792	0.64	44.7	4.17	14.88	0.5
1540	5.0	6.18	12.02	0.890	0.46	39.2	2.29	14.87	0.5
1545	7.5	6.19	12.02	0.907	0.32	30.2	0.93	14.87	0.5
1550	10.0	6.20	12.03	0.911	0.28	26.3	1.54	14.87	0.5
1555	12.5	6.19	12.05	0.912	0.24	22.1	1.14	14.87	0.5
1600	15.0	6.20	12.04	0.911	0.23	19.4	0.69	14.87	0.5
1605	17.5	6.19	12.02	0.911	0.21	16.9	0.43	14.87	0.5
1610	20.0	6.19	11.99	0.910	0.18	14.9	0.86	14.87	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 0.68 mg/L
Multi-Parameter Probe Unit # 2
Field Parameters Measured in Flow-Through Cell
Pump Placement Depth = 33 ft
Pump Rate = 0.5 L/min
Well Diameter = 2"
Screen Interval = 28-38

	Historic (7-year average low and high / 2019 / Avg in Bold)			
ORP	43.9	211.5	174.2	**129.9**
DO	0.09	1.63	1.63	**0.64**
PH	5.93	6.65	6.11	**6.30**
Cond.	0.659	0.881	0.659	**0.741**

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME	CHAAP	PROJECT NO.	60565355
SAMPLE NO.	G0082-1	WELL NO.	G0082
DATE/TIME COLLECTED	10-21-19 / 1730	PERSONNEL	TY CH
SAMPLE METHOD	PRO-ACTIVE SS MONSOON		

SAMPLE MEDIA:	Groundwater			
SAMPLE QA SPLIT:	YES	**NO**	SPLIT SAMPLE NO.	
SAMPLE QC DUPLICATE:	YES	**NO**	DUPLICATE SAMPLE NO.	
MS/MSD REQUESTED	YES	**NO**	MS/MSD SAMPLE NO.	

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-21-19	Well Depth (ft BTOC)	41.01
Time Started	1645	Depth to Water (ft BTOC)	14.21
Time Completed	1725	Water Column Length	26.8
PID Measurements		Well Casing Volume (per ft)	0.62 L
Background	ND	Volume of Water in Well (L)	16.62
Breathing Zone	ND	Casing Volumes to Purge	
Well Head	ND	Minimum to Purge (L)	20L
Purge Water	ND	Actual Purge (L)	20L

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox (mV)	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
1650	2.5	6.39	11.78	0.625	0.39	32.0	8.43	14.23	0.5
1655	5.0	6.31	11.85	0.686	0.37	31.5	1.90	14.23	0.5
1700	7.5	6.29	11.91	0.680	0.28	31.5	0.92	14.23	0.5
1705	10.0	6.29	11.91	0.670	0.22	31.8	0.12	14.23	0.5
1710	12.5	6.28	11.87	0.663	0.26	32.2	0.08	14.23	0.5
1715	15.0	6.28	11.88	0.658	0.24	32.4	0.23	14.23	0.5
1720	17.5	6.28	11.87	0.655	0.20	32.7	0.16	14.23	0.5
1725	20.0	6.28	11.93	0.652	0.20	32.9	0.13	14.23	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 0.04 mg/L
Multi-Parameter Probe Unit # 2
Field Parameters Measured in Flow-Through Cell
Pump Placement Depth = 33 ft
Pump Rate = 0.5 L/min
Well Diameter = 2"
Screen Interval = 28-38

	Historic (7-year average low and high / 2019 / Avg in Bold)			
ORP	43.3	205.9	164.0	**110.3**
DO	0.06	1.40	1.40	**0.61**
PH	6.06	6.72	6.21	**6.39**
Cond.	0.488	0.799	0.488	**0.655**

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME	CHAAP	PROJECT NO.	60565355
SAMPLE NO.	G0086-1	WELL NO.	G0086
DATE/TIME COLLECTED	10/23/19 @ 1045	PERSONNEL	R. Exceen R. Reyes
SAMPLE METHOD	PRO-ACTIVE SS MONSOON		
SAMPLE MEDIA:	Groundwater		
SAMPLE QA SPLIT:	YES **NO**	SPLIT SAMPLE NO.	—
SAMPLE QC DUPLICATE:	YES **NO**	DUPLICATE SAMPLE NO.	—
MS/MSD REQUESTED	YES **NO**	MS/MSD SAMPLE NO.	—

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

		Well Depth (ft BTOC)	40.30
Date	10-23-19	Depth to Water (ft BTOC)	12.29
Time Started	1001	Water Column Length	28.01
Time Completed	1050	Well Casing Volume (per ft)	0.62
PID Measurements		Volume of Water in Well (L)	17.37
Background	Nd	Casing Volumes to Purge	—
Breathing Zone	Nd	Minimum to Purge (L)	20
Well Head	Nd	Actual Purge (L)	20
Purge Water	Nd		

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP Redox (mV)	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
1006	2.5	6.82	11.59	0.685	13.48	160.1	5.67	12.29	0.5
1011	5	6.87	12.13	0.688	1.30	156.5	4.74	12.29	0.5
1016	7.5	6.88	12.33	0.686	0.77	156.0	3.55	12.29	0.5
1021	10	6.88	12.51	0.686	0.61	155.5	3.41	12.29	0.5
1026	12.5	6.89	12.67	0.688	0.56	154.8	5.38	12.29	0.5
1031	15	6.89	12.73	0.688	0.53	154.8	3.30	12.29	0.5
1036	17.5	6.86	12.36	0.682	0.52	155.8	5.00	12.29	0.5
1041	20	6.84	12.55	0.684	0.52	156.2	3.25	12.29	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 0.00 mg/L
Multi-Parameter Probe Unit # 24698
Field Parameters Measured in Flow-Through Cell
Pump Placement Depth = 33 ft
Pump Rate = 0.5 L/min
Well Diameter = 2"
Screen Interval = 28-38

	Historic (7-year average low and high / 2019 / Avg in Bold)			
ORP	35.8	133.2	49.7	**86.4**
DO	0.23	0.37	0.24	**0.28**
PH	6.43	6.93	6.77	**6.74**
Cond.	0.585	0.782	0.742	**0.678**

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME	CHAAP	PROJECT NO.	60565355
SAMPLE NO.	G0087-1	WELL NO.	G0087
DATE/TIME COLLECTED	10-22-19 / 0835	PERSONNEL	TV
SAMPLE METHOD	PRO-ACTIVE SS MONSOON		CH

SAMPLE MEDIA:	Groundwater			
SAMPLE QA SPLIT:	YES	NO	SPLIT SAMPLE NO.	
SAMPLE QC DUPLICATE:	YES	NO	DUPLICATE SAMPLE NO.	
MS/MSD REQUESTED	YES	NO	MS/MSD SAMPLE NO.	

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2S0_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-22-19	Well Depth (ft BTOC)	37.56
Time Started	0750	Depth to Water (ft BTOC)	12.45
Time Completed	0830	Water Column Length	25.11
PID Measurements		Well Casing Volume (per ft)	0.62L
Background	ND	Volume of Water in Well (L)	15.57
Breathing Zone	ND	Casing Volumes to Purge	
Well Head	ND	Minimum to Purge (L)	20L
Purge Water	ND	Actual Purge (L)	20L

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox (mV)	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
0755	2.5	6.66	10.96	0.820	7.75	181.1	4.31	12.44	0.5
0800	5.0	6.71	10.93	0.817	1.38	177.2	2.90	12.44	0.5
0805	7.5	6.71	10.89	0.814	0.80	174.3	2.41	12.44	0.5
0810	10.0	6.72	10.91	0.811	0.58	171.6	2.11	12.44	0.5
0815	12.5	6.72	11.08	0.811	0.54	169.4	1.19	12.44	0.5
0820	15.0	6.71	10.85	0.809	0.44	168.2	0.18	12.44	0.5
0825	17.5	6.71	10.87	0.809	0.40	166.5	0.67	12.44	0.5
0830	20.0	6.70	10.89	0.808	0.39	164.9	0.59	12.44	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 0.06 mg/L
Multi-Parameter Probe Unit # 2
Field Parameters Measured in Flow-Through Cell
Pump Placement Depth = 30 ft
Pump Rate = 0.5L/min
Well Diameter = 2"
Screen Interval = 25-35

	Historic (7-year average low and high / 2019 / Avg in Bold)			
ORP	37.2	136.4	37.2	**92.6**
DO	0.08	0.87	0.21	**0.43**
PH	6.44	6.87	6.74	**6.69**
Cond.	0.448	0.655	0.655	**0.566**

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME	CHAAP	PROJECT NO.	60565355
SAMPLE NO.	G0091-1	WELL NO.	G0091
DATE/TIME COLLECTED	10-22-19 /1000	PERSONNEL	TY
SAMPLE METHOD	PRO-ACTIVE SS MONSOON		CH
SAMPLE MEDIA:	Groundwater		
SAMPLE QA SPLIT:	YES **NO**	SPLIT SAMPLE NO.	
SAMPLE QC DUPLICATE:	YES **NO**	DUPLICATE SAMPLE NO.	
MS/MSD REQUESTED	YES **NO**	MS/MSD SAMPLE NO.	

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2S0_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-22-19	Well Depth (ft BTOC)	31.85
Time Started	0915	Depth to Water (ft BTOC)	12.13
Time Completed	0955	Water Column Length	19.72
PID Measurements		Well Casing Volume (per ft)	0.62L
Background	ND	Volume of Water in Well (L)	12.23
Breathing Zone	ND	Casing Volumes to Purge	
Well Head	ND	Minimum to Purge (L)	20L
Purge Water	ND	Actual Purge (L)	20L

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox (mV)	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
0920	2.5	6.89	11.07	1.307	2.33	174.1	1.13	12.12	0.5
0925	5.0	6.88	11.17	1.319	2.46	168.3	1.52	12.12	0.5
0930	7.5	6.87	11.34	1.318	2.53	166.2	1.29	12.12	0.5
0935	10.0	6.86	11.45	1.319	2.65	163.9	0.51	12.12	0.5
0940	12.5	6.87	11.54	1.321	2.74	161.9	0.24	12.12	0.5
0945	15.0	6.85	11.47	1.325	2.77	159.8	0.87	12.12	0.5
0950	17.5	6.84	11.63	1.326	2.77	158.3	0.62	12.12	0.5
0955	20.0	6.83	11.70	1.325	2.79	156.8	0.40	12.12	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 0.00 mg/L
Multi-Parameter Probe Unit # 2
Field Parameters Measured in Flow-Through Cell
Pump Placement Depth = 25 ft
Pump Rate = 0.5L/min
Well Diameter = 2"
Screen Interval = 20-30

	Historic (7-year average low and high / 2019 / Avg in Bold)			
ORP	59.9	197.0	168.8	**132.6**
DO	2.11	5.57	2.11	**4.27**
PH	6.15	6.94	6.92	**6.76**
Cond.	0.847	1.362	1.362	**1.088**

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME	CHAAP	PROJECT NO.	60565355
SAMPLE NO.	G0092-1	WELL NO.	G0092
DATE/TIME COLLECTED	10-22-19 / 1110	PERSONNEL	TV
SAMPLE METHOD	PRO-ACTIVE SS MONSOON		CH

SAMPLE MEDIA:	Groundwater			
SAMPLE QA SPLIT:	YES	NO	SPLIT SAMPLE NO.	
SAMPLE QC DUPLICATE:	YES	NO	DUPLICATE SAMPLE NO.	
MS/MSD REQUESTED	YES	NO	MS/MSD SAMPLE NO.	

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-22-19	Well Depth (ft BTOC)	52.78
Time Started	1025	Depth to Water (ft BTOC)	12.33
Time Completed	1105	Water Column Length	40.45
PID Measurements		Well Casing Volume (per ft)	0.62L
Background	ND	Volume of Water in Well (L)	25.08
Breathing Zone	ND	Casing Volumes to Purge	
Well Head	ND	Minimum to Purge (L)	20L
Purge Water	ND	Actual Purge (L)	20L

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox (mV)	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
1030	2.5	7.17	11.69	1.254	0.67	133.5	2.81	12.33	0.5
1035	5.0	7.15	11.91	1.279	0.34	129.2	1.82	12.32	0.5
1040	7.5	7.14	11.87	1.279	0.39	128.3	0.22	12.32	0.5
1045	10.0	7.15	12.06	1.280	0.35	126.8	0.21	12.32	0.5
1050	12.5	7.14	12.00	1.277	0.26	126.1	0.15	12.32	0.5
1055	15.0	7.14	12.19	1.272	0.27	125.2	0.16	12.32	0.5
1100	17.5	7.13	12.11	1.272	0.26	123.7	0.18	12.32	0.5
1105	20.0	7.14	11.96	1.269	0.26	122.9	0.15	12.32	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 0.00 mg/L
Multi-Parameter Probe Unit # 2
Field Parameters Measured in Flow-Through Cell
Pump Placement Depth = 45 ft
Pump Rate = 0.5 L/min
Well Diameter = 2"
Screen Interval = 40-50

	Historic (7-year average low and high / 2019 / Avg in Bold)			
ORP	66.2	170.4	102.3	**110.2**
DO	0.15	2.15	0.31	**0.59**
PH	6.94	7.55	7.22	**7.26**
Cond.	0.899	1.289	1.289	**1.077**

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME	CHAAP	PROJECT NO.	60565355
SAMPLE NO.	PZ017R-1	WELL NO.	PZ017R
DATE/TIME COLLECTED	10/23/19 @ 1320	PERSONNEL	R. Exceen I2. Reyes
SAMPLE METHOD	PRO-ACTIVE SS MONSOON		
SAMPLE MEDIA:	Groundwater		
SAMPLE QA SPLIT:	YES **NO**	SPLIT SAMPLE NO.	—
SAMPLE QC DUPLICATE:	**YES** NO	DUPLICATE SAMPLE NO.	PZ021-1 @0800
MS/MSD REQUESTED	YES **NO**	MS/MSD SAMPLE NO.	—

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-23-19	Well Depth (ft. BTOC)	32.42
Time Started	1235	Depth to Water (ft. BTOC)	11.52
Time Completed	1335	Water Column Length	20.9
PID Measurements		Well Casing Volume (per ft)	0.62
Background	nd	Volume of Water in Well (L)	12.96
Breathing Zone	nd	Casing Volumes to Purge	—
Well Head	nd	Minimum to Purge (L)	20
Purge Water	nd	Actual Purge (L)	20

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP Redox (mV)	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
1240	2.5	6.49	15.01	0.757	8.92	167.3	5.33	11.50	0.5
1245	5	6.44	14.97	0.717	8.07	169.7	3.55	11.49	0.5
1250	7.5	6.44	14.87	0.700	7.43	170.5	5.57	11.49	0.5
1255	10	6.41	14.86	0.687	7.11	171.1	4.22	11.49	0.5
1300	12.5	6.39	14.87	0.674	6.54	172.2	4.15	11.49	0.5
1305	15	6.37	14.98	0.665	6.02	172.0	4.19	11.49	0.5
1310	17.5	6.39	14.85	0.662	5.83	171.2	4.70	11.49	0.5
1315	20	6.34	14.63	0.652	5.68	173.9	4.60	11.49	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 0.00 mg/L
Multi-Parameter Probe Unit # 24698
Field Parameters Measured in Flow-Through Cell
Pump Placement Depth = 20 ft
Pump Rate = 0.5 L/min
Well Diameter = 2"
Screen Interval = 10-30

	Historic (7-year average low and high / 2019 / Avg in Bold)			
ORP	90.5	202.6	120.9	**130.8**
DO	1.12	5.92	5.92	**3.03**
PH	6.22	6.71	6.45	**6.47**
Cond.	0.516	0.820	0.820	**0.638**

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME	CHAAP	PROJECT NO.	60565355
SAMPLE NO.	PZ018-1	WELL NO.	PZ018
DATE/TIME COLLECTED	10/23/19 @ 1205	PERSONNEL	R. Exceen R. Reyes
SAMPLE METHOD	PRO-ACTIVE SS MONSOON		
SAMPLE MEDIA:	Groundwater		
SAMPLE QA SPLIT:	YES **NO**	SPLIT SAMPLE NO.	—
SAMPLE QC DUPLICATE:	YES **NO**	DUPLICATE SAMPLE NO.	—
MS/MSD REQUESTED	YES **NO**	MS/MSD SAMPLE NO.	—

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-23-19	Well Depth (ft. BTOC)	31.90
Time Started	1123	Depth to Water (ft. BTOC)	12.85
Time Completed	1212	Water Column Length	19.05
PID Measurements		Well Casing Volume (per ft)	0.62
Background	nd	Volume of Water in Well (L)	11.81
Breathing Zone	nd	Casing Volumes to Purge	—
Well Head	nd	Minimum to Purge (L)	20
Purge Water	nd	Actual Purge (L)	20

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP Redox (mV)	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
1128	2.5	6.65	13.95	0.649	8.54	165.3	3.80	12.83	0.5
1133	5	6.62	14.06	0.657	1.23	165.4	5.33	12.83	0.5
1138	7.5	6.60	14.12	0.660	1.24	166.0	5.27	12.83	0.5
1143	10	6.57	14.23	0.660	1.28	166.8	3.74	12.83	0.5
1148	12.5	6.57	14.35	0.661	1.29	166.6	4.17	12.83	0.5
1153	15	6.52	14.65	0.663	1.30	167.2	4.42	12.83	0.5
1158	17.5	6.51	14.63	0.664	1.32	167.1	4.56	12.83	0.5
1203	20	6.57	14.72	0.664	1.34	167.4	3.38	12.83	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 0.00 mg/L
Multi-Parameter Probe Unit # 24698
Field Parameters Measured in Flow-Through Cell
Pump Placement Depth = 20 ft
Pump Rate = 0.5 L/min
Well Diameter = 2"
Screen Interval = 10-30

Historic (7-year average low and high / 2019 / Avg in Bold)

ORP	77.0	187.6	94.4	**124.4**
DO	0.26	6.54	0.33	**1.48**
PH	6.37	6.78	6.45	**6.55**
Cond.	0.527	0.822	0.822	**0.657**

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME	CHAAP	PROJECT NO.	60565355
SAMPLE NO.	PZ019-1	WELL NO.	PZ019
DATE/TIME COLLECTED	10-22-19 / 1650	PERSONNEL	TY
SAMPLE METHOD	PRO-ACTIVE SS MONSOON		CH
SAMPLE MEDIA:	Groundwater		
SAMPLE QA SPLIT:	YES **NO**	SPLIT SAMPLE NO.	
SAMPLE QC DUPLICATE:	YES **NO**	DUPLICATE SAMPLE NO.	
MS/MSD REQUESTED	**YES** NO	MS/MSD SAMPLE NO.	PZ019-1 MS/MSD

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-22-19	Well Depth (ft. BTOC)	32.23
Time Started	1605	Depth to Water (ft. BTOC)	16.70
Time Completed	1645	Water Column Length	15.53
PID Measurements		Well Casing Volume (per ft)	0.62L
Background	ND	Volume of Water in Well (L)	9.63
Breathing Zone	ND	Casing Volumes to Purge	
Well Head	ND	Minimum to Purge (L)	20L
Purge Water	ND	Actual Purge (L)	20L

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox (mV)	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
1610	2.5	6.31	14.60	0.631	6.83	58.3	1.34	16.73	0.5
1615	5.0	6.25	14.51	0.621	6.63	59.9	0.99	16.73	0.5
1620	7.5	6.18	14.01	0.610	6.70	65.3	0.11	16.73	0.5
1625	10.0	6.20	14.69	0.609	6.59	66.6	0.14	16.73	0.5
1630	12.5	6.18	14.74	0.608	6.63	69.1	0.45	16.73	0.5
1635	15.0	6.16	14.74	0.605	6.66	71.3	0.57	16.73	0.5
1640	17.5	6.16	14.79	0.603	6.49	75.1	0.46	16.73	0.5
1645	20.0	6.16	14.75	0.602	6.44	77.3	0.44	16.73	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 0.07 mg/L
Multi-Parameter Probe Unit # 2
Field Parameters Measured in Flow-Through Cell
Pump Placement Depth = 23.7 ft
Pump Rate = 0.5
Well Diameter = 2"
Screen Interval = 10-30

	Historic (7-year average low and high / 2019 / Avg in Bold)			
ORP	112.7	287.2	287.2	**169.6**
DO	3.06	9.76	9.76	**7.10**
PH	5.92	6.52	5.92	**6.18**
Cond.	0.402	1.003	0.502	**0.587**

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME	CHAAP	PROJECT NO.	60565355
SAMPLE NO.	PZ020-1	WELL NO.	PZ020
DATE/TIME COLLECTED	10-23-19 / 0845	PERSONNEL	TY
SAMPLE METHOD	PRO-ACTIVE SS MONSOON		CH
SAMPLE MEDIA:	Groundwater		
SAMPLE QA SPLIT:	YES **NO**	SPLIT SAMPLE NO.	
SAMPLE QC DUPLICATE:	YES **NO**	DUPLICATE SAMPLE NO.	
MS/MSD REQUESTED	YES **NO**	MS/MSD SAMPLE NO.	

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

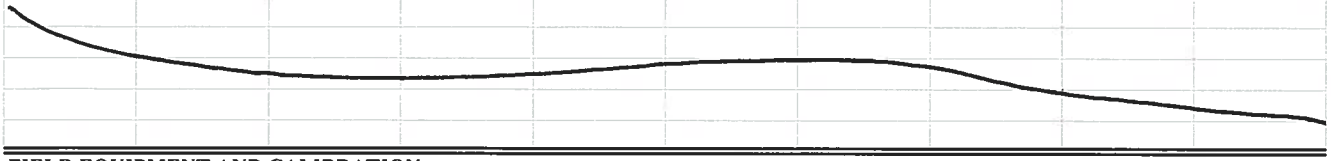
Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-23-19	Well Depth (ft. BTOC)	32.33
Time Started	0800	Depth to Water (ft. BTOC)	15.39
Time Completed	0840	Water Column Length	16.94
PID Measurements		Well Casing Volume (per ft)	0.62L
Background	ND	Volume of Water in Well (L)	10.50
Breathing Zone	ND	Casing Volumes to Purge	
Well Head	ND	Minimum to Purge (L)	20L
Purge Water	ND	Actual Purge (L)	20L

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox (mV)	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
0805	2.5	6.61	11.97	1.069	8.30	173.0	0.62	15.39	0.5
0810	5.0	6.64	11.95	1.066	3.22	169.6	0.76	15.39	0.5
0815	7.5	6.65	11.96	1.061	2.93	167.0	0.45	15.39	0.5
0820	10.0	6.66	11.94	1.058	2.79	165.0	0.29	15.39	0.5
0825	12.5	6.67	11.95	1.058	2.68	163.6	0.40	15.39	0.5
0830	15.0	6.66	11.97	1.058	2.63	162.3	0.37	15.39	0.5
0835	17.5	6.67	11.97	1.061	2.58	161.5	0.43	15.39	0.5
0840	20.0	6.67	11.98	1.061	2.54	160.2	0.29	15.39	0.5



FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 0.11 mg/L
Multi-Parameter Probe Unit # 2
Field Parameters Measured in Flow-Through Cell
Pump Placement Depth = 22.7 ft
Pump Rate = 0.5
Well Diameter = 2"
Screen Interval = 10-30

	Historic (7-year average low and high / 2019 / Avg in Bold)			
ORP	21.7	203.1	68.6	**101.0**
DO	1.73	4.72	3.65	**3.21**
PH	6.31	6.84	6.73	**6.65**
Cond.	0.796	1.047	1.047	**0.911**

Performance Monitoring Well Development Logs

WELL DEVELOPMENT LOG

Project: 2019 CHAAP OU1 RAO Performance Monitoring
Project No: 60565355
Develo. Method Peristaltic pump and tubing

Well No: PM-21A
Date: 10-17-19
Samplers: TY RH

WELL MEASUREMENTS

Well inside diameter (in): 1"
Screen length (ft): 10'
Depth of well casing (ft BTOC): 30' bgs
Initial water level (ft ~~BTOC~~): BGS ~~14.2~~ 12.2
Top of Casing Stick-up (ft): 2'
Fluid well casing volume (Liters): (17.8 x .16) = 2.84
Weather conditions: clear, calm

3' ft

SAMPLING MEASUREMENT

DISCHARGE

Time	0855	0900	0905	0910	0915	0920	0925	0930		
Water level (ft. ~~BTOC~~) bgs	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2		
Pump Placement Depth (ft ~~BTOC~~) bgs	28	26	24	22	20	25	25	25		
Discharge (Liters)	5	10	15	20	25	30	35	40		

WATER QUALITY DATA

pH	6.94	7.15	7.38	7.40	7.59	7.62	7.64	7.64		
Temperature (°C)	11.33	11.39	11.27	11.42	11.52	11.60	11.72	11.68		
Conductivity (mS/cm)	0.715	0.705	0.707	0.711	0.715	0.690	0.705	0.709		
Dissolved Oxygen (mg/L)	5.14	2.31	1.14 ~~2.44~~	0.95	0.83	0.70	0.67	0.62		
Redox (mV)	-5.9	-14.7	-24.4	-27.3	-35.9	-36.5	-36.5	-36.6		
Turbidity (NTUs) initial/end	949 / 14.7	~~1033~~ / 12	25.2 / 20.5	20.2 / 12.2	16.7 / 9.92	8.76 / 10.1	7.94 / 6.82	5.90 / 7.88	/	/
Color	clear	clear	clear	clear	clear	clear	clear	clear		
Odor	none	none	none	none	none	none	none	none		

Total discharge: 40L
Casing volumes removed: 14.08
Method of disposal of discharged water: WWTF

QUALITY ASSURANCE

Water Level Indicator: Solinst Indicator — Calibrated: ✓
Water Quality Meters: YSI 556 MPS, LaMotte turb — Calibrated: ✓
Comments: 1 Gallon of water added = 3.79 x3 = 11.37L

(30 − 12.2) x .16 = ~~2.844~~ 2.84 x10 = ~~19.52~~ 28.4 + 11.37 = ~~30.89~~ 39.77 L

WELL DEVELOPMENT LOG

Project: 2019 CHAAP OU1 RAO Performance Monitoring
Project No: 60565355
Develo. Method Peristaltic pump and tubing

Well No: PM-21B
Date: 10-17-19
Samplers: TY RH

WELL MEASUREMENTS

Well inside diameter (in): 1"
Screen length (ft): 10'
Depth of well casing (ft ~~BTOC~~): 40' bgs
Initial water level (ft ~~BTOC~~): 12.02 bgs
Top of Casing Stick-up (ft): 2'
Fluid well casing volume (Liters): (40 - 12.02) = 27.98 x .16 = 4.48 L
Weather conditions: Clear calm

SAMPLING MEASUREMENT

DISCHARGE

Time	1005	1010	1015	1020	1025	1030	1040	1050	1100	1110
Water level (ft. ~~BTOC~~) bgs	12.02	12.02	12.02	12.02	12.02	12.02	12.02	12.02	12.02	12.02
Pump Placement Depth (ft ~~BTOC~~) bgs	38	36	34	32	30	35	35	35	35	35
Discharge (Liters)	5	10	15	20	25	30	40	50	60	70

WATER QUALITY DATA

pH	8.96	9.48	9.605	9.76	9.90	10.08	10.03	10.13	10.23	10.26
Temperature (°C)	11.80	11.59	11.59	11.62	11.59	11.63	11.71	11.80	11.92	12.05
Conductivity (mS/cm)	0.694	0.681	0.684	0.682	0.681	0.686	0.682	0.682	0.685	0.684
Dissolved Oxygen (mg/L)	0.50	0.27	0.24	0.24	0.23	0.19	0.19	0.18	0.16	0.16
Redox (mV)	-101.7	-102.4	-120.8	-131.9	-146.8	-161.3	-167.6	~~-153.7~~ -152	-155.7	-157.0
Turbidity (NTUs) initial/end	1417 / 29.4	27.9 / 36.9	39.3 / 35.2	28.7 / 15.9	21.2 / 17.8	6.04 / 5.81	6.35 / 6.18	5.73 / 221	8.86 / 8.42	9.27 / 7.02
Color	lt. brown	clear	clear	clear	clear	clear	clear	clear	clear	clear
Odor	none	none	none	none	none	none	none	none	none	none

Total discharge: 70 L
Casing volumes removed: 15.63
Method of disposal of discharged water: WWTF

QUALITY ASSURANCE

Water Level Indicator: Solinst Indicator — Calibrated: ✓
Water Quality Meters: YSI 556 MPS, LaMotte turb — Calibrated: ✓
Comments: 2 gallons added = 7.6 L x3 = 22.8 L

(4.48 L x10) + 22.8 L = 67.6 L

WELL DEVELOPMENT LOG

Project: 2019 CHAAP OU1 RAO Performance Monitoring
Project No: 60565355
Develo. Method Peristaltic pump and tubing

Well No: PM-22A
Date: 10-17-19
Samplers: TV RH

WELL MEASUREMENTS

Well inside diameter (in): 1"
Screen length (ft): 10'
Depth of well casing (ft ~~BTOC~~): 30' bgs
Initial water level (ft ~~BTOC~~): 13.47 bgs
Top of Casing Stick-up (ft): 2'
Fluid well casing volume (Liters): (30 - 13.47) = 16.53 x 0.16 = 2.64
Weather conditions: Clear Calm

SAMPLING MEASUREMENT

DISCHARGE

Time	1215	1220	1225	1230	1235	1240	1245	1250		
Water level (ft. ~~BTOC~~) bgs	13.47	13.47	13.47	13.47	13.47	13.47	13.47	13.47		
Pump Placement Depth (ft ~~BTOC~~) bgs	28	26	24	22	20	25	25	25		
Discharge (Liters)	5	10	15	20	25	30	35	40		

WATER QUALITY DATA

pH	7.30	7.21	7.17	7.19	7.18	7.07	7.07	7.08		
Temperature (°C)	12.42	12.26	12.40	12.38	12.42	12.19	12.19	12.24		
Conductivity (mS/cm)	0.6556	0.654	0.6557	0.680	0.6559	0.6557	0.6558	0.6661		
Dissolved Oxygen (mg/L)	2.50	1.42	0.93	0.73	0.58	0.48	0.42	0.40		
Redox (mV)	-20.5	-16.4	-15.4	-16.0	-16.0	-10.0	-10.01	-10.9		
Turbidity (NTUs) initial/end	17.8 / 12.1	9.89 / 10.76	11.3 / 8.41	8.00 / 9.12	8.63 / 7.07	5.58 / 6.37	5.94 / 5.56	5.42 / 6.22	/	/
Color	clear	clear	clear	clear	clear	clear	clear	clear		
Odor	None	none	none	none	none	none	none	none		

Total discharge: 40L
Method of disposal of discharged water: WWTF

Casing volumes removed: 15.15

QUALITY ASSURANCE

Water Level Indicator: Solinst Indicator — Calibrated: ✓
Water Quality Meters: YSI 556 MPS, LaMotte turb — Calibrated: ✓
Comments: 1 Gallon added = 3.79 x 3 = 11.37L

(2.64 x 10) + 11.37 = 37.77

WELL DEVELOPMENT LOG

Project: 2019 CHAAP OU1 RAO Performance Monitoring
Project No: 60565355
Develo. Method Peristaltic pump and tubing

Well No: PM-22B
Date: 10-17-19
Samplers: TY RH

WELL MEASUREMENTS

Well inside diameter (in): 1"
Screen length (ft): 10'
Depth of well casing (ft ~~BTOC~~): 40' bgs
Initial water level (ft ~~BTOC~~): 13.42' bgs
Top of Casing Stick-up (ft): 2'
Fluid well casing volume (Liters): (40-13.42) x .16 = 4.25
Weather conditions: Clear Calm

SAMPLING MEASUREMENT

DISCHARGE

Time	1325	1330	1335	1340	1345	1350	1400	1410	1420	1430
Water level (ft ~~BTOC~~) bgs	~~13.42~~ ~~38~~	~~13.42~~ ~~36~~	~~13.42~~ ~~34~~	~~13.42~~ ~~32~~	~~13.42~~ ~~30~~	~~13.42~~ ~~35~~	13.42	13.42	13.42	13.42
Pump Placement Depth (ft ~~BTOC~~) bgs	38	36	34	32	30	35	35	35	35	35
Discharge (Liters)	5	10	15	20	25	30	40	50	60	70

WATER QUALITY DATA

pH	8.06	8.12	8.36	8.42	8.37	8.33	8.18	8.13	8.04	7.99
Temperature (°C)	12.50	12.64	12.71	12.76	12.95	12.72	12.79	12.79	12.79	12.80
Conductivity (mS/cm)	0.714	0.713	0.712	0.713	0.715	0.721	0.714	0.715	0.714	0.716
Dissolved Oxygen (mg/L)	0.29	0.29	0.26	0.24	0.25	0.24	0.23	0.24	0.21	0.20
Redox (mV)	-65.4	-61.7	-71.0	-72.6	-70.7	-68.3	-61.8	-58.9	-55.2	-53.0
Turbidity (NTUs) initial/end	33.9 / 11.9	27.2 / 13.4	24.2 / 5.42	19.5 / 28.4	4.95 / 11.14	12.4 / 13.6	11.53 / 10.17	8.01 / 8.56	9.63 / 8.18	4.79 / 6.20
Color	clear	clear	clear	clear	clear	clear	clear	clear	clear	clear
Odor	none	none	none	none	none	none	none	none	none	none

Total discharge: 70L
Casing volumes removed: 16.47
Method of disposal of discharged water: WWTF

QUALITY ASSURANCE

Water Level Indicator: Solinst Indicator — Calibrated: ✓
Water Quality Meters: YSI 556 MPS, LaMotte turb — Calibrated: ✓
Comments: 2 gallons added = 7.6L x 3 = 22.8L

(4.25 x 10) + 22.8 = 65.3

WELL DEVELOPMENT LOG

Project: 2019 CHAAP OU1 RAO Performance Monitoring
Project No: 60565355
Develo. Method Peristaltic pump and tubing

Well No: PM-23A
Date: 10-16-19
Samplers: RH TY

WELL MEASUREMENTS

Well inside diameter (in): 1"
Screen length (ft): 30' bgs
Depth of well casing (ft ~~BTOC~~): ~~BGS~~ 32
Initial water level (ft ~~BTOC~~) ~~BGS~~ 18.68
Top of Casing Stick-up (ft): 2.11
Fluid well casing volume (Liters): 11.32 L x 0.16 = 1.81 L /ft
Weather conditions: Clear, Calm

SAMPLING MEASUREMENT

DISCHARGE

Time	0945	0952	0959	1006	1013	1020				
Water level (ft. ~~BTOC~~ BGS)	18.68	18.68	18.68	18.68	18.68	18.68				
Pump Placement Depth (ft ~~BTOC~~ bgs)	28	26	24	22	20	25				
Discharge (Liters)	5	10	15	20	25	30				

WATER QUALITY DATA

pH	9.63	9.07	8.72	8.53	8.38	8.34				
Temperature (°C)	11.57	11.49	11.47	11.53	11.54	11.76				
Conductivity (mS/cm)	0.740	0.735	0.736	0.737	0.734	0.738				
Dissolved Oxygen (mg/L)	3.31	1.26	0.93	0.69	.58	.53				
Redox (mV)	-83.6	-63.3	-47.3	-40.7	-32.4	-32.2				
Turbidity (NTUs) initial/end	39.6 / 6.88	33.3 / 12.6	10.93 / 0	6.78 / 0	5.88 / 0	3.66 / 0	/	/	/	/
Color	clear	clear	clear	clear	clear	clear				
Odor	None	None	None	None	None	None				

Total discharge: 30 L
Method of disposal of discharged water: WWTF

Casing volumes removed: 16.57

QUALITY ASSURANCE

Water Level Indicator: Solinst Indicator — Calibrated: ____
Water Quality Meters: YSI 556 MPS, LaMotte turb — Calibrated: ____
Comments: 1 gallon water added = 3.79 x 3 = 11.37 L added

WELL DEVELOPMENT LOG

Project: 2019 CHAAP OU1 RAO Performance Monitoring
Project No: 60565355
Develo. Method Peristaltic pump and tubing

Well No: PM-23B
Date: 10-17-19
Samplers: TY RH

WELL MEASUREMENTS

Well inside diameter (in): 1"
Screen length (ft): 10'
Depth of well casing (ft ~~BTOC~~): ~~40~~ 40' bgs
Initial water level (ft ~~BTOC~~): 10.38' bgs
Top of Casing Stick-up (ft): 2'
Fluid well casing volume (Liters): (40 - 10.38) = 29.62 x .16 = 4.74 L
Weather conditions: clear calm

SAMPLING MEASUREMENT

DISCHARGE

Time	1510	1515	1520	1525	1530	1535	1545	1555	1605	1615
Water level (ft. ~~BTOC~~) bgs	10.38	10.38	10.38	10.38	10.38	10.38	10.38	10.38	10.38	10.38
Pump Placement Depth (ft ~~BTOC~~) bgs	38	36	34	32	30	35	35	35	35	35
Discharge (Liters)	5	10	15	20	25	30	40	50	60	70

WATER QUALITY DATA

pH	8.94	9.38	9.18	8.97	8.63	8.41	8.22	8.18	8.10	7.98
Temperature (°C)	13.42	13.29	13.43	13.56	13.58	13.21	13.26	13.31	13.11	13.10
Conductivity (mS/cm)	0.748	0.739	0.740	0.741	0.739	0.735	0.733	0.733	0.730	0.730
Dissolved Oxygen (mg/L)	0.24	0.19	0.17	0.17	0.18	0.18	0.18	0.18	0.16	0.17
Redox (mV)	-101.9	-117.4	-108.4	-97.7	-82.5	-71.9	-64.4	-62.1	-57.9	-52.2
Turbidity (NTUs) initial/end	308 / 17.4	93 / 64	96 / 57	353 / 15.0	120 / 12.1	92.6 / 10.3	15.21 / 5.31	281 / 5.05	~~7~~ 7.48 / 6.52	5.79 / 6.94
Color	Lt. brwn	Lt. brwn	lt. brwn	clear	clear	clear	clear	clear	clear	clear
Odor	none	none	none	none	none	none	none	none	none	none

Total discharge: 70L
Casing volumes removed: 14.77
Method of disposal of discharged water: WWTF

QUALITY ASSURANCE

Water Level Indicator: Solinst Indicator — Calibrated: ✓
Water Quality Meters: YSI 556 MPS, LaMotte turb — Calibrated: ✓
Comments: 2 gallons added ÷ 7.6L x 3 = 22.8L

(4.74 x 10) + 22.8 = 70

WELL DEVELOPMENT LOG

Project: 2019 CHAAP OU1 RAO Performance Monitoring
Project No: 60565355
Develo. Method Peristaltic pump and tubing

Well No: PM-24A
Date: 10-16-19
Samplers: RL TP

WELL MEASUREMENTS

Well inside diameter (in): 1"
Screen length (ft): 10'
Depth of well casing (ft BTOC): 30' BGS
Initial water level (ft ~~BTOC~~): 13.42 BGS
Top of Casing Stick-up (ft): 2'
Fluid well casing volume (Liters): 2.65 (16.58' x 0.16) =
Weather conditions: clear CALM

SAMPLING MEASUREMENT

DISCHARGE

Time	1545	1550	1555	1600	1605	1610	1615	1620		
Water level (ft. ~~BTOC~~) bgs	13.42	13.42	13.42	13.42	13.42	13.42	13.42	13.42		
Pump Placement Depth (ft ~~BTOC~~) BGS	28'	26'	24	22	20	25	25	25		
Discharge (Liters)	5	10	15	20	25	30	35	40		

WATER QUALITY DATA

pH	7.81	7.88	7.89	7.83	7.77	7.70	7.63	7.58		
Temperature (°C)	12.53	12.40	12.39	12.40	12.39	12.38	12.34	12.33		
Conductivity (mS/cm)	.803	0.823	0.828	0.852	0.858	0.862	0.870	0.875		
Dissolved Oxygen (mg/L)	0.48	0.62	0.67	0.73	0.88	1.04	1.17	1.27		
Redox (mV)	-31.6	-42.6	-44.1	-43.2	-39.6	-40.4	-36.4	-35.6		
Turbidity (NTUs) initial/end	7.93 / 8.38	9.45 / 6.98	6.51 / 5.88	9.48 / 7.62	6.32 / 5.18	6.40 / 6.07	5.75 /	5.01 /	/	/
Color	Lt. Brown	Clear	Clear	Clear	Clear	Clear	Clear	Clear		
Odor	None	None	None	None	None	none	none	none		

Total discharge: 40 l
Casing volumes removed: 15.09
Method of disposal of discharged water: WWTF

QUALITY ASSURANCE

Water Level Indicator: Solinst Indicator — Calibrated: ✓
Water Quality Meters: YSI 556 MPS, LaMotte turb — Calibrated: ✓
Comments: ~~Horiba~~ 1 Gallon of water was added = 3.79 x 3 = 11.37 l

10x Well Volume + 3x water added = 37.9

WELL DEVELOPMENT LOG

Project: 2019 CHAAP OU1 RAO Performance Monitoring
Project No: 60565355
Develo. Method Peristaltic pump and tubing

Well No: PM-2413
Date: 10-19-19
Samplers: TY BE

WELL MEASUREMENTS

Well inside diameter (in): 1"
Screen length (ft): 40'
Depth of well casing (ft ~~BTOC~~): 40' bgs
Initial water level (ft ~~BTOC~~): 13.40' bgs
Top of Casing Stick-up (ft): 2'
Fluid well casing volume (Liters): (40-13.40) x 16 = 4.26
Weather conditions: Clear, calm

SAMPLING MEASUREMENT

DISCHARGE

Time	0830	0835	0840	0845	0850	0855	0905	0915	0925	0935
Water level (ft. ~~BTOC~~) bgs	13.40	13.40	13.40	13.40	13.40	13.40	13.40	13.40	13.40	13.40
Pump Placement Depth (ft ~~BTOC~~) bgs	35	36	34	32	30	35	35	35	35	35
Discharge (Liters)	5	10	15	20	25	30	40	50	60	70

WATER QUALITY DATA

pH	7.33	8.05	8.45	8.60	8.63	8.87	8.94	8.95	8.93	8.92
Temperature (°C)	11.49	11.33	11.24	11.26	11.24	11.33	11.32	11.33	11.42	11.54
Conductivity (mS/cm)	0.688	0.698	0.699	0.705	0.702	0.706	0.704	0.705	0.706	0.708
Dissolved Oxygen (mg/L)	1.88	1.21	1.47	0.94	0.90	0.62	0.50	0.41	0.36	0.35
Redox (mV)	-27.9	-55.4	-72.4	-81.9	-83.2	-94.1	-95.1	-95.2	-96.9	-96.0
Turbidity (NTUs) initial/end	741 / 316.7	50.6 / 49.3	44.6 / 21.7	13.0 / 11.8	53.9 / 61.4	82.0 / 61.7	46.9 / 40.0	37.7 / 35.1	43.9 / 41.8	50.1 / 50.1
Color	Clear	Clear	Clear	Clear	Clear	~~Clear~~ lt. brwn	~~Clear~~ lt. brwn	Clear	~~Clear~~ lt. brwn	Clear
Odor	none	none	none	none	none	none	none	none	none	none

Total discharge: 70L
Casing volumes removed: 16.43
Method of disposal of discharged water: WWTF

QUALITY ASSURANCE

Water Level Indicator: Solinst Indicator — Calibrated: ✓
Water Quality Meters: YSI 556 MPS, LaMotte turb — Calibrated: ✓
Comments: 2 gallons added = 7.58 x 3 = 22.7 L

(4.26 x 10) + 22.7 = 65.3

WELL DEVELOPMENT LOG

Project: 2019 CHAAP OU1 RAO Performance Monitoring
Project No: 60565355
Develo. Method: Peristaltic pump and tubing

Well No: PM-25A
Date: 10-16-19
Samplers: RH TH

WELL MEASUREMENTS

Well inside diameter (in): 1"
Screen length (ft): 10' 30-40BGS
Depth of well casing (ft BTOC): 40' BGS
Initial water level (ft BTOC): 8.70
Top of Casing Stick-up (ft): 2'
Fluid well casing volume (Liters): 3.40
Weather conditions: Clear Calm

SAMPLING MEASUREMENT

DISCHARGE

Time	1153	1158	1203	1208	1213	1218	1223	1228	1233	
Water level (ft. ~~BTOC~~) bgs	8.70	8.69	8.69	8.69	8.69	8.69	8.69	8.69	8.69	
Pump Placement Depth (ft ~~BTOC~~) bgs	28	26	24	22	20	25	25	25	25	
Discharge (Liters)	5	10	15	20	25	30	35	40	45	

WATER QUALITY DATA

pH	7.78	7.50	7.28	7.19	7.17	7.18	7.14	7.15	7.17	
Temperature (°C)	13.01	12.94	12.96	13.03	13.01	13.18	13.12	13.17	13.09	
Conductivity (mS/cm)	0.711	0.728	0.752	0.766	0.782	0.777	0.780	0.782	0.782	
Dissolved Oxygen (mg/L)	3.77	3.04	3.63	4.06	4.19	4.12	4.15	3.88	4.01	
Redox (mV)	-3.2	9.5	13.3	18.1	19.9	18.7	23.4	22.4	24.0	
Turbidity (NTUs) initial/end	1126 / 98	64 / 54.9	33.2 / 12.8	27.1 / 25.3	22.1 / 17.9	18.1 / ~~15.1~~	15.1 /	11.81 /	8.93 /	/
Color	Lt. Brown	Lt. Brown	Lt. Brown	Clear	Clear	Clear	Clear	Clear	Clear	
Odor	None	None	None	None	None	None	None	None	None	

Total discharge: 45 l
Casing volumes removed: 13.19
Method of disposal of discharged water: WWTF

QUALITY ASSURANCE

Water Level Indicator: Solinst Indicator — Calibrated: ✓
Water Quality Meters: YSI 556 MPS, LaMotte turb — Calibrated: ✓
Comments: 1 Gallon water Added = 3.79 x 3 = 11.37 l

34l

WELL DEVELOPMENT LOG

Project: 2019 CHAAP OU1 RAO Performance Monitoring
Project No: 60565355
Develo. Method Peristaltic pump and tubing

Well No: PM-25B
Date: 10-16-19
Samplers: RH TY

WELL MEASUREMENTS

Well inside diameter (in): 1"
Screen length (ft): 10'
Depth of well casing (ft BTOC): ~~8.58~~ 40' BGS
Initial water level (ft BTOC): 8.58 BGS
Top of Casing Stick-up (ft): 2'
Fluid well casing volume (Liters): 31.42 X .16 = 5.02 l well vol.
Weather conditions: clear CALM

SAMPLING MEASUREMENT

DISCHARGE

Time	1329	1334	1339	1344	1349	1354	1409	1419	1429	1439
Water level (ft. ~~BTOC~~) bgs	8.58	8.58	8.58	8.58	8.58	8.58	8.58	8.58	8.58	8.58
Pump Placement Depth (ft ~~BTOC~~) bgs	38	36	34	32	30	35	35	35	35	35
Discharge (Liters)	5	10	15	20	25	35	45	55	65	75

WATER QUALITY DATA

pH	7.74	7.67	7.64	7.60	7.58	7.57	7.31	7.21	7.19	7.03
Temperature (°C)	12.94	12.78	12.61	12.76	12.70	12.78	12.56	12.58	12.69	12.71
Conductivity (mS/cm)	0.767	0.771	0.773	0.772	0.772	0.774	0.773	0.773	0.777	0.773
Dissolved Oxygen (mg/L)	2.8	0.21	0.19	0.19	0.19	0.16	0.15	0.14	0.14	0.13
Redox (mV)	-19.1	-17.3	-20.2	-17.8	-15.7	-9.2	-5.1	0.1	1.5	6.5
Turbidity (NTUs) initial/end	35 / 26.1	14.7 / 8.71	12.0 / 2.83	21.1 / 16.4	9.77 / 6.88	3.8	6.12	2.77	1.93	1.77
Color	clear	clear	clear	clear	clear	clear	clear	clear	clear	clear
Odor	None	None	None	None	None	None	None	None	None	None

Total discharge: Purge 75 l
Method of disposal of discharged water: WWTF

Casing volumes removed: 10 (+3x water)

QUALITY ASSURANCE

Water Level Indicator: Solinst Indicator — Calibrated: ____
Water Quality Meters: YSI 556 MPS, LaMotte turb — Calibrated: ____
Comments: 2 gallons Added X 3.47 l = 6.94 X 3 = 20.82
10 well vol. = ~~50~~ l + 20.82 = 70.92

WELL DEVELOPMENT LOG

Project: 2019 CHAAP OU1 RAO Performance Monitoring
Project No: 60565355
Develo. Method Peristaltic pump and tubing

Well No: PM-26A
Date: 10-18-19
Samplers: TY RH

WELL MEASUREMENTS

Well inside diameter (in): 1"
Screen length (ft): 10'
Depth of well casing (ft ~~BTOC~~): 30' bgs
Initial water level (ft ~~BTOC~~): 12.85' bgs
Top of Casing Stick-up (ft): 2'
Fluid well casing volume (Liters): (30-12.85)x.16= 2.74
Weather conditions: clear, windy

SAMPLING MEASUREMENT

DISCHARGE

Time	0855	0900	0905	0910	0915	0920	0925	0930		
Water level (ft. ~~BTOC~~) bgs	12.85	12.85	12.85	12.85	12.85	12.85	12.85	12.85		
Pump Placement Depth (ft ~~BTOC~~) bgs	28	26	24	22	20	25	25	25		
Discharge (Liters)	5	10	15	20	25	30	35	40		

WATER QUALITY DATA

pH	7.79	7.81	7.89	7.90	7.77	7.84	7.77	7.70		
Temperature (°C)	12.50	12.39	12.49	12.55	12.52	12.49	12.56	12.65		
Conductivity (mS/cm)	0.6055	0.6067	0.6072	0.599	0.6072	0.6057	0.6072	0.6073		
Dissolved Oxygen (mg/L)	9.27	1.42	1.13	1.36	1.08	0.96	0.94	0.92		
Redox (mV)	-44.7	-44.4	-46.7	-47.5	-43.5	-45.3	-40.8	-39.4		
Turbidity (NTUs) initial/end	10.43 / 13.0	12.2 / 26.3	18.7 / 26.4	14.4 / 11.62	13.9 / 9.36	9.33 / 8.75	13.3 / 8.81	11.2 / 10.7	/	/
Color	clear	clear	clear	clear	clear	clear	clear	clear		
Odor	none	none	none	none	none	none	none	none		

Total discharge: 40L
Casing volumes removed: 14.60
Method of disposal of discharged water: WWTF

QUALITY ASSURANCE

Water Level Indicator: Solinst Indicator — Calibrated: ✓
Water Quality Meters: YSI 556 MPS, LaMotte turb — Calibrated: ✓
Comments: 1 gallon added = 3.79 x3 = 11.37L

(2.74 x10) + 11.37 = 38.77

WELL DEVELOPMENT LOG

Project: 2019 CHAAP OU1 RAO Performance Monitoring
Project No: 60565355
Develo. Method Peristaltic pump and tubing

Well No: PM-26B
Date: 10-18-19
Samplers: TY RH

WELL MEASUREMENTS

Well inside diameter (in): 1"
Screen length (ft): 10'
Depth of well casing (ft ~~BTOC~~): 40' bgs
Initial water level (ft ~~BTOC~~): 12.88' bgs
Top of Casing Stick-up (ft): 2'
Fluid well casing volume (Liters): (40-12.88) x .16 = 4.34
Weather conditions: clear, windy

SAMPLING MEASUREMENT

DISCHARGE

Time	1015	1020	1025	1030	1035	1040	1050	1100	1110	1120
Water level (ft. ~~BTOC~~) bgs	12.88	12.88	12.88	12.88	12.88	12.88	12.88	12.88	12.88	12.88
Pump Placement Depth (ft ~~BTOC~~) bgs	38	36	34	32	30	35	35	35	35	35
Discharge (Liters)	5	10	15	20	25	30	40	50	60	70

WATER QUALITY DATA

pH	10.77	11.14	11.43	10.94	10.40	10.22	9.80	9.73	9.45	9.33
Temperature (°C)	12.86	12.90	13.10	13.27	13.34	13.25	13.45	13.43	13.74	13.78
Conductivity (mS/cm)	0.748	0.742	0.748	0.748	0.745	0.753	0.754	0.758	0.762	0.765
Dissolved Oxygen (mg/L)	0.58	0.57	0.43	0.35	0.38	0.25	0.24	0.28	0.26	0.26
Redox (mV)	-183.5	-202.1	-211.7	-189.3	-164.4	-156.0	-138.1	-134.6	-121.0	-115.5
Turbidity (NTUs) initial/end	2134 AO / 1464	814 AO / 103	796 AO / 72	52.7 / 43.3	57 / 42.1	65.1 / 20.3	12.25 / 11.75	16.7 / 12.17	10.3 / 9.07	8.39 / 9.65
Color	lt. brwn	lt. brwn	lt. brwn	lt. brwn	lt. brwn	lt. brwn	clear	clear	clear	clear
Odor	none	none	none	none	none	none	none	none	none	none

Total discharge: 70L
Casing volumes removed: 16.13
Method of disposal of discharged water: WWTF

QUALITY ASSURANCE

Water Level Indicator: Solinst Indicator — Calibrated: ✓
Water Quality Meters: YSI 556 MPS, LaMotte turb — Calibrated: ✓
Comments: 2 gallons added = 7.6 x 3 = 22.8 L

(4.34 x 10) + 22.8 = 66.2 L

WELL DEVELOPMENT LOG

Project: 2019 CHAAP OU1 RAO Performance Monitoring
Project No: 60565355
Develo. Method: Peristaltic pump and tubing

Well No: PM-27A
Date: 10-18-19
Samplers: TV RH

WELL MEASUREMENTS

Well inside diameter (in): 1"
Screen length (ft): 10'
Depth of well casing (ft ~~BTOC~~): 30' bgs
Initial water level (ft ~~BTOC~~): 10.90 bgs
Top of Casing Stick-up (ft): 2'
Fluid well casing volume (Liters): (30-10.90) x .16 = 3.06
Weather conditions: clear, windy

SAMPLING MEASUREMENT

DISCHARGE

Time	1215	1220	1225	1230	1235	1240	1245	1250	1255	
Water level (ft. ~~BTOC~~) bgs	10.9	10.9	10.9	10.9	10.9	10.9	109	10.9	10.9	
Pump Placement Depth (ft ~~BTOC~~) bgs	28	26	24	22	20	25	25	25	25	
Discharge (Liters)	5	10	15	20	25	30	35	40	45	

WATER QUALITY DATA

pH	8.47	7.69	7.58	7.50	7.08	7.38	7.17	7.18	7.15	
Temperature (°C)	13.46	13.48	13.69	13.88	15.04	13.80	13.81	13.85	13.89	
Conductivity (mS/cm)	0.778	0.756	0.763	0.763	0.798	0.776	0.772	0.771	0.771	
Dissolved Oxygen (mg/L)	12.57	2.67	2.18	2.07	6.39	3.68	2.20	1.99	1.94	
Redox (mV)	-76.6	-38.8	-34.8	-30.3	-18.4	-17.6	-15.0	-15.1	-13.1	
Turbidity (NTUs) initial/end	543 AU / 71	6056 AU / 73	605 / 471	30.7 / 24.7	23.6 / 27.03	35.9 / 33.2	23.3 / 14.8	9.22 / 10.8	5.29 / 5.55	
Color	Lt. brwn	Lt. brwn	Lt. brwn	Clear	Clear	clear	Clear	Clear	Clear	
Odor	none	none	none	none	none	none	none	none	none	

Total discharge: 45L
Casing volumes removed: 14.71
Method of disposal of discharged water: WWTF

QUALITY ASSURANCE

Water Level Indicator: Solinst Indicator — Calibrated: ✓
Water Quality Meters: YSI 556 MPS, LaMotte turb — Calibrated: ✓
Comments: 1 gallon added = 3.79 x 3 = 11.37L

(3.06 x 10) + 11.37 = 42.0

WELL DEVELOPMENT LOG

Project: 2019 CHAAP OU1 RAO Performance Monitoring
Project No: 60565355
Develo. Method: Peristaltic pump and tubing

Well No: PM-27B
Date: 10-18-19
Samplers: TY EH

WELL MEASUREMENTS

Well inside diameter (in): 1
Screen length (ft): 10
Depth of well casing (ft ~~BTOC~~): 40 bgs
Initial water level (ft ~~BTOC~~): 10.86 bgs
Top of Casing Stick-up (ft): 2'
Fluid well casing volume (Liters): (40 - 10.68) x .16 = 4.666
Weather conditions: Clear, windy

SAMPLING MEASUREMENT

DISCHARGE

Time	1335	1340	1345	1350	1355	1400	1410	1420	1430	1440
Water level (ft. ~~BTOC~~) bgs	10.86	10.86	10.86	10.88	10.86	10.88	10.88	10.88	10.88	10.88
Pump Placement Depth (ft ~~BTOC~~) bgs	38	36	34	32	30	35	35	35	35	35
Discharge (Liters)	5	10	15	20	25	30	40	50	60	70

WATER QUALITY DATA

pH	9.71	10.41	10.53	10.15	9.68	9.81	9.02	9.18	9.37	9.17
Temperature (°C)	13.95	13.64	13.77	13.93	14.11	13.62	13.60	13.51	13.49	13.47
Conductivity (mS/cm)	0.795	0.805	0.802	0.802	0.798	0.793	0.790	0.787	0.786	0.786
Dissolved Oxygen (mg/L)	0.79	0.40	0.30	0.24	0.26	0.20	0.22	0.24	0.24	0.24
Redox (mV)	-135.6	-167.1	-172.5	-153.5	-132.7	-136.6	-100.5	-109.5	-116.2	-108.2
Turbidity (NTUs) initial/end	2855 AV 1773	830 AV 62.5	70.9 / 57.9	62.5 / 47.8	300 / 37.3	65.4 / 28.3	22.7 / 15.2	11.38 / 9.70	8.95 / 7.14	6.78 / 6.26
Color	Lt. brwn	Lt. brwn	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
Odor	None	none	none	none	none	none	none	none	none	none

Total discharge: 70L
Casing volumes removed: 15.02
Method of disposal of discharged water: WWTF

QUALITY ASSURANCE

Water Level Indicator: Solinst Indicator — Calibrated: ✓
Water Quality Meters: YSI 556 MPS, LaMotte turb — Calibrated: ✓
Comments: 2 gallons added = 7.6 x 3 = 22.8L

(4.666 x 10) + 22.8 = 69.4

WELL DEVELOPMENT LOG

Project: 2019 CHAAP OU1 RAO Performance Monitoring
Project No: 60565355
Develo. Method Peristaltic pump and tubing

Well No: PM-28A
Date: 10-19-19
Samplers: TY RH

WELL MEASUREMENTS

Well inside diameter (in): 1"
Screen length (ft): 10'
Depth of well casing (ft ~~BTOC~~): 30 bgs
Initial water level (ft ~~BTOC~~): 8.60 bgs
Top of Casing Stick-up (ft): 2'
Fluid well casing volume (Liters): (30-8.60) x 16 = 3.42
Weather conditions: Clear calm

SAMPLING MEASUREMENT

DISCHARGE										
Time	1430	1440	1450	1500	1510	1520	1530	1540	1550	1600
Water level (ft. ~~BTOC~~) bgs	8.60	8.60	8.60	8.60	8.60	8.60	8.60	8.60	8.60	8.60
Pump Placement Depth (ft ~~BTOC~~) bgs	28	26	24	22	20	25	25	25	25	25
Discharge (Liters)	5	10	15	20	25	30	35	40	45	50
WATER QUALITY DATA										
pH	8.85	8.02	8.02	7.95	7.87	7.78	7.69	7.63	7.51	7.45
Temperature (°C)	15.64	14.84	15.24	15.32	15.32	15.25	15.34	15.33	15.31	15.14
Conductivity (mS/cm)	0.791	0.793	0.800	0.799	0.796	0.797	0.797	0.797	0.799	0.792
Dissolved Oxygen (mg/L)	0.86	0.40	0.26	0.21	0.17	0.16	0.15	0.14	0.14	0.12
Redox (mV)	-91.6	-54.7	-55.0	-51.6	-47.7	-43.5	-39.5	-36.1	-31.1	-27.6
Turbidity (NTUs) initial/end	59 / 54	58.3 / 13.0	28.9 / 13.8	19.4 / 12.3	15.3 / 14.7	12.01 / 10.8	10.20 / 8.51	7.48 / 7.33	6.89 / 6.11	7.53 / 6.80
Color	lt brwn	lt brwn	clear	clear	clear	clear	clear	clear	clear	clear
Odor	none	none	none	none	none	none	none	none	none	none

Total discharge: 50
Casing volumes removed: 14.62
Method of disposal of discharged water: WWTF

QUALITY ASSURANCE

Water Level Indicator: Solinst Indicator — Calibrated: ✓
Water Quality Meters: YSI 556 MPS, LaMotte turb — Calibrated: ✓
Comments: 1 gallon added = 3.79 x 3 = 11.37

(3.42 x 10) + 11.37 = 45.57

WELL DEVELOPMENT LOG

Project: 2019 CHAAP OU1 RAO Performance Monitoring
Project No: 60565355
Develo. Method: Peristaltic pump and tubing

Well No: PM-28B
Date: 10-20-19
Samplers: TY

WELL MEASUREMENTS

Well inside diameter (in): 1"
Screen length (ft): 10'
Depth of well casing (ft ~~BTOC~~): 40' bgs
Initial water level (ft ~~BTOC~~): 8.48' bgs
Top of Casing Stick-up (ft): 2'
Fluid well casing volume (Liters): (40 - 8.48) x .16 = 5.04
Weather conditions: cloudy, windy

SAMPLING MEASUREMENT

DISCHARGE

Time	0930	0940	0950	1000	1010	1030	1050	1110	1130	1150
Water level (ft. ~~BTOC~~) bgs	8.48	8.48	8.48	8.48	8.48	8.48	8.48	8.48	8.48	8.48
Pump Placement Depth (ft ~~BTOC~~) bgs	~~38~~ 38	36	34	32	30	35	35	35	35	35
Discharge (Liters)	5	10	15	20	25	35	45	55	65	75

WATER QUALITY DATA

pH	6.80	7.10	7.15	7.23	7.29	7.26	~~7~~ 7.23	7.25	7.19	7.14
Temperature (°C)	12.32	12.28	12.21	12.21	12.21	12.29	12.45	12.70	12.79	12.90
Conductivity (mS/cm)	0.795	0.791	0.789	0.789	0.789	0.791	0.794	0.798	0.800	0.801
Dissolved Oxygen (mg/L)	2.51	0.92	0.55	0.45	0.38	0.31	0.29	0.27	0.26	0.24
Redox (mV)	2.0	-11.7	-15.0	-17.9	-20.3	-19.3	-19.2	-18.1	-15.3	-13.7
Turbidity (NTUs) initial/end	1554.9 / 21.1	17.8 / 22.3	27.1 / 24.5	13.1 / 11.3	17.4 / 8.96	11.71 / 9.49	7.95 / 8.44	6.47 / 7.33	8.07 / 6.51	6.70 / 5.93
Color	brown	clear	clear	clear	clear	clear	clear	clear	clear	clear
Odor	none	none	none	none	none	none	none	none	none	none

Total discharge: 75
Method of disposal of discharged water: WWTF
Casing volumes removed: 14.88

QUALITY ASSURANCE

Water Level Indicator: Solinst Indicator — Calibrated: ✓
Water Quality Meters: YSI 556 MPS, LaMotte turb — Calibrated: ✓
Comments: 2 gallons added = 7.77 x 3 = 22.7

(5.04 x 10) + 22.7 = 73.1

WELL DEVELOPMENT LOG

Project: 2019 CHAAP OU1 RAO Performance Monitoring
Project No: 60565355
Develo. Method: Peristaltic pump and tubing

Well No: PM-29A
Date: 10-19-19
Samplers: TY RE

WELL MEASUREMENTS

Well inside diameter (in): 1"
Screen length (ft): 10'
Depth of well casing (ft ~~BTOC~~): 30' bgs
Initial water level (ft ~~BTOC~~): 9.00' bgs
Top of Casing Stick-up (ft): 2'
Fluid well casing volume (Liters): (30-9) x .16 = 3.36
Weather conditions: Clear Calm

SAMPLING MEASUREMENT

DISCHARGE

Time	1210	1215	1220	1225	~~1230~~ 1305	~~1235~~ 1315	~~1240~~ 1325	~~1245~~ 1335	~~1250~~ 1345	
Water level (ft. ~~BTOC~~) bgs	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	
Pump Placement Depth (ft ~~BTOC~~) bgs	28	26	24	22	20	25	25	25	25	[redacted]
Discharge (Liters)	5	10	15	20	25	30	35	40	45	

WATER QUALITY DATA

pH	8.50	8.67	8.58	8.00	7.97	7.74	7.60	7.50	7.45	
Temperature (°C)	13.36	13.14	13.37	14.55	14.16	14.09	14.43	14.36	14.46	
Conductivity (mS/cm)	0.606	0.587	0.592	0.636	0.601	.600	0.598	0.596	0.601	
Dissolved Oxygen (mg/L)	0.91	0.61	0.55	1.77	0.51	0.54	0.41	0.39	0.37	
Redox (mV)	-81.4	-83.1	-81.3	-54.9	-51.6	-34.5	-34.7	-30.1	-28.1	
Turbidity (NTUs) initial/end	608AU / 71.9	84.5 / 76.4	68.3 / 57.1	28.1 / 26.5	17.3 / 16.9	15.0 / 13.4	11.7 / 8.90	14.4 / 9.34	5.93 / 6.77	
Color	lt. brwn	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	
Odor	none	none	none	none	none	none	none	none	none	

Total discharge: 45L
Casing volumes removed: 12.5
Method of disposal of discharged water: WWTF

QUALITY ASSURANCE

Water Level Indicator: Solinst Indicator — Calibrated: ✓
Water Quality Meters: YSI 556 MPS, LaMotte turb — Calibrated: ✓
Comments: 1 gallon added = 3.79 x 3 = 11.37

(3.36 x 10) + 11.37 = 44.97

WELL DEVELOPMENT LOG

Project: 2019 CHAAP OU1 RAO Performance Monitoring
Project No: 60565355
Develo. Method: Peristaltic pump and tubing

Well No: PM-29B
Date: 10-19-19
Samplers: TV RE

WELL MEASUREMENTS

Well inside diameter (in): 1"
Screen length (ft): 10
Depth of well casing (ft BTOC): 40
Initial water level (ft ~~BTOC~~): ~~TOC~~ 8.75' bgs
Top of Casing Stick-up (ft): 2'
Fluid well casing volume (Liters): (40 - 8.75) x .16 = 5.00
Weather conditions: Clear Clear

SAMPLING MEASUREMENT

DISCHARGE

Time	1025	1030	1035	1040	1045	1055	1105	1115	1125	1135
Water level (ft. ~~BTOC~~) bgs	8.75	8.75	8.75	~~8.75~~ 8.00	8.75	8.75	8.75	8.75	8.75	8.75
Pump Placement Depth (ft ~~BTOC~~) bgs	38	36	34	32	30	35	35	35	35	35
Discharge (Liters)	5	10	15	20	25	35	45	55	65	75

WATER QUALITY DATA

pH	10.74	9.43	9.10	8.88	8.72	8.61	8.52	8.38	8.32	8.23
Temperature (°C)	12.17	12.11	12.18	12.23	12.24	12.26	12.37	12.49	12.61	12.77
Conductivity (mS/cm)	0.868	0.853	0.827	0.814	0.789	0.790	0.783	0.778	0.775	0.771
Dissolved Oxygen (mg/L)	2.40	0.97	0.78	0.71	0.75	0.40	0.34	0.28	0.28	0.23
Redox (mV)	-174.5	-117.1	-103.3	-94.1	-86.5	-81.4	-75.8	-70.9	-66.8	-63.3
Turbidity (NTUs) initial/end	601 / 56.7	593 / 47.8	302 / 21.1	17.6 / 15.9	11.6 / 12.4	14.6 / 11.7	8.73 / 8.51	7.78 / 6.18	5.0 / 8.49	7.67 / 6.78
Color	Lt. brwn	Lt. brwn	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
Odor	none	none	none	none	none	none	none	none	none	none

Total discharge: 75 L
Casing volumes removed: 15
Method of disposal of discharged water: WWTF

QUALITY ASSURANCE

Water Level Indicator: Solinst Indicator — Calibrated: ✓
Water Quality Meters: YSI 556 MPS, LaMotte turb — Calibrated: ✓
Comments: 2 gallons added = 7.58 x 3 = 22.7L

(5 x 10) + 22.7 = 72.7

Performance Monitoring Sample Collection Field Sheets

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME	CHAAP 2019 OU1 RAO_Performance Monitoring	PROJECT NO.	60565355
SAMPLE NO.	EW7-PM21A-1-25	WELL NO.	PM-21A
DATE/TIME COLLECTED	10-17-19 / 0950	PERSONNEL	TY
SAMPLE METHOD	Peristaltic Pump and tubing		RH

SAMPLE MEDIA:	Groundwater			
SAMPLE QA SPLIT:	YES	(NO)	SPLIT SAMPLE NO.	—
SAMPLE QC DUPLICATE:	YES	(NO)	DUPLICATE SAMPLE NO.	—
MS/MSD REQUESTED	YES	(NO)	MS/MSD SAMPLE NO.	—

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-17-19	Well Depth (ft ~~BTOC~~ bgs)	30'
Time Started	0855	Depth to Water (ft ~~BTOC~~)	12.2' bgs
Time Completed	0945	Water Column Length	17.8'
PID Measurements		Well Casing Volume (per ft)	.16L
Background	ND	Volume of Water in Well (L)	2.84
Breathing Zone	ND	Casing Volumes to Purge	3
Well Head	ND	Minimum to Purge (L)	—
Purge Water	ND	Actual Purge (L)	7.5L

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox (mV)	Turbidity (NTU)	Depth to Water (ft ~~BTOC~~ bgs)	Purge Rate (L/min)
0935	2.5	7.55	11.66	0.712	0.60	-33.6	7.93	12.2	~~1~~ 0.5
0940	~~5~~ 5	7.62	11.75	0.717	0.56	-36.3	7.64	12.2	0.5
0945	7.5	7.66	11.77	0.724	0.57	-36.9	9.61	12.2	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 0.99 mg/L
Multi-Parameter Probe Unit # 1
Field Parameters Measured in Flow-Through Cell
Sample Depth (ft bgs) = 25'
Pump Rate = .5
Temp Well Diameter = 1"
Screen Interval (ft bgs) = 20-30

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: CHAAP 2019 OU1 RAO_Performance Monitoring
PROJECT NO.: 60565355
SAMPLE NO.: EW7-PM21B-1-35
WELL NO.: PM-21B
DATE/TIME COLLECTED: 10-17-19 / 1130
PERSONNEL: TY, RH
SAMPLE METHOD: Peristaltic Pump and tubing

SAMPLE MEDIA: Groundwater
SAMPLE QA SPLIT: YES (NO)
SPLIT SAMPLE NO.:
SAMPLE QC DUPLICATE: (YES) NO
DUPLICATE SAMPLE NO.: EW7-PM521B-1-35
MS/MSD REQUESTED: YES (NO)
MS/MSD SAMPLE NO.:

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-17-19
Time Started	1005
Time Completed	1125
PID Measurements	
Background	ND
Breathing Zone	ND
Well Head	ND
Purge Water	ND

Well Depth (ft ~~BTOC~~ bgs)	40'
Depth to Water (ft ~~BTOC~~)	12.02' bgs
Water Column Length	27.98'
Well Casing Volume (per ft)	0.16L
Volume of Water in Well (L)	4.48
Casing Volumes to Purge	3
Minimum to Purge (L)	—
Actual Purge (L)	7.5L

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox (mV)	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
1115	~~2.5~~	9.79	12.46	0.695	0.17	-136.6	60.96	12.02	0.5
1120	~~5~~	9.55	12.50	0.694	0.16	-125.0	8.32	12.02	0.5
1125	~~7.5~~	9.46	12.64	0.697	0.16	-121.5	4.14	12.02	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 2.89 mg/L
Multi-Parameter Probe Unit # 1
Field Parameters Measured in Flow-Through Cell
Sample Depth (ft bgs) = 35'
Pump Rate = .5
Temp Well Diameter = 1"
Screen Interval (ft bgs) = 30-40

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: CHAAP 2019 OU1 RAO_Performance Monitoring
PROJECT NO.: 60565355
SAMPLE NO.: EW7-PM22A-1-25
WELL NO.: PM-22A
DATE/TIME COLLECTED: 10-17-19 / 1310
PERSONNEL: TY, RH
SAMPLE METHOD: Peristaltic Pump and tubing

SAMPLE MEDIA:	Groundwater		
SAMPLE QA SPLIT:	YES	NO	SPLIT SAMPLE NO.
SAMPLE QC DUPLICATE:	YES	NO	DUPLICATE SAMPLE NO.
MS/MSD REQUESTED	YES	NO	MS/MSD SAMPLE NO.

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-17-19
Time Started	1215
Time Completed	1305
PID Measurements	
Background	ND
Breathing Zone	ND
Well Head	ND
Purge Water	ND

Well Depth (ft ~~BTOC~~)	30' bgs
Depth to Water (ft ~~BTOC~~)	~~16.75 bgs~~ 13.47' bgs
Water Column Length	16.53'
Well Casing Volume (per ft)	.16 L
Volume of Water in Well (L)	2.64
Casing Volumes to Purge	3
Minimum to Purge (L)	—
Actual Purge (L)	7.5

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox (mV)	Turbidity (NTU)	Depth to Water (ft ~~BTOC~~ bgs)	Purge Rate (L/min)
1255	2.5	7.09	13.00	0.671	0.35	-12.0	4.80	13.47	0.5
1300	5.0	7.04	13.00	0.674	0.35	-10.6	3.47	13.47	0.5
1305	7.5	7.05	13.01	0.673	0.32	-10.3	4.18	13.47	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 2.89 mg/L
Multi-Parameter Probe Unit # 1
Field Parameters Measured in Flow-Through Cell
Sample Depth (ft bgs) = 25
Pump Rate = 0.5
Temp Well Diameter = 1"
Screen Interval (ft bgs) = 20-30

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: CHAAP 2019 OU1 RAO_Performance Monitoring | PROJECT NO.: 60565355

SAMPLE NO.: EW7-PM22B-1-35 | WELL NO.: PM-22B

DATE/TIME COLLECTED: 10-17-19 / 1450 | PERSONNEL: TY, RH

SAMPLE METHOD: Peristaltic Pump and tubing

SAMPLE MEDIA: Groundwater

SAMPLE QA SPLIT: YES (NO) | SPLIT SAMPLE NO.:

SAMPLE QC DUPLICATE: YES (NO) | DUPLICATE SAMPLE NO.:

MS/MSD REQUESTED: YES ~~NO~~ | MS/MSD SAMPLE NO.:

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-17-19
Time Started	~~1425~~ 1325
Time Completed	1445
PID Measurements	
Background	ND
Breathing Zone	ND
Well Head	ND
Purge Water	ND

Well Depth (ft ~~BTOC~~)	40' bgs
Depth to Water (ft ~~BTOC~~)	13.42' bgs
Water Column Length	26.58
Well Casing Volume (per ft)	0.16
Volume of Water in Well (L)	4.25
Casing Volumes to Purge	3
Minimum to Purge (L)	—
Actual Purge (L)	7.5

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox (mV)	Turbidity (NTU)	Depth to Water (ft ~~BTOC~~) bgs	Purge Rate (L/min)
1435	2.5	7.91	13.83	0.731	0.20	-49.3	4.57	13.42	0.5
1440	5.0	7.78	13.91	0.734	0.21	-42.8	5.95	13.42	0.5
1445	7.5	7.64	13.93	0.734	0.20	-36.6	7.22	13.42	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 2.89 mg/L

Multi-Parameter Probe Unit # 1

Field Parameters Measured in Flow-Through Cell

Sample Depth (ft bgs) = 35

Pump Rate = 0.5 L/min

Temp Well Diameter = 1"

Screen Interval (ft bgs) = 30 - 40'

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: CHAAP 2019 OU1 RAO_Performance Monitoring | PROJECT NO.: 60565355

SAMPLE NO.: EW7-PM23A-1-25 | WELL NO.: PM-23A

DATE/TIME COLLECTED: 10-16-19 1045 | PERSONNEL: R. Herold, T. Young

SAMPLE METHOD: Peristaltic Pump and tubing

SAMPLE MEDIA: Groundwater

SAMPLE QA SPLIT:	YES	NO	SPLIT SAMPLE NO.	
SAMPLE QC DUPLICATE:	YES	NO	DUPLICATE SAMPLE NO.	
MS/MSD REQUESTED	YES	NO	MS/MSD SAMPLE NO.	

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-16-19	Well Depth (ft BTOC)	30' BGS
Time Started	1027	Depth to Water (ft BTOC)	18.68 BGS
Time Completed	1041	Water Column Length	11.32
PID Measurements		Well Casing Volume (per ft)	~~1.81 L~~ 0.16
Background	ND	Volume of Water in Well (L)	1.81
Breathing Zone	ND	Casing Volumes to Purge	~~8.28~~ 3 vol.
Well Head	ND	Minimum to Purge (L)	5.43
Purge Water	ND	Actual Purge (L)	8.28

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox (mV)	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
1027	5	8.35	11.74	0.737	0.44	-32.7	11.04	~~8~~.68	1L = 90 sec
1034	10	8.30	12.03	0.738	0.40	-31.0	5.66	~~8~~.68	↓
1041	15	8.21	11.89	0.740	0.36	-26.7	4.94	~~8~~.68	↓

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 2.73 mg/L

Multi-Parameter Probe Unit #

Field Parameters Measured in Flow-Through Cell

Sample Depth (ft bgs) = 25' BGS

Pump Rate = .5 L/min

Temp Well Diameter = 1"

Screen Interval (ft bgs) = 20' BGS TO 30' BGS

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: CHAAP 2019 OU1 RAO_Performance Monitoring | PROJECT NO.: 60565355

SAMPLE NO.: EW1-PM23B-1-35 | WELL NO.: PM-23B

DATE/TIME COLLECTED: 10-17-19 / 1635 | PERSONNEL: TY, RH

SAMPLE METHOD: Peristaltic Pump and tubing

SAMPLE MEDIA: Groundwater

SAMPLE QA SPLIT: YES / (NO) | SPLIT SAMPLE NO.:

SAMPLE QC DUPLICATE: YES / (NO) | DUPLICATE SAMPLE NO.:

MS/MSD REQUESTED: YES / (NO) | MS/MSD SAMPLE NO.:

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-17-19
Time Started	1510
Time Completed	1630
PID Measurements	
Background	ND
Breathing Zone	ND
Well Head	ND
Purge Water	ND

Well Depth (ft ~~BTOC~~)	40' bgs
Depth to Water (ft ~~BTOC~~)	10.38' bgs
Water Column Length	29.62'
Well Casing Volume (per ft)	.16 L
Volume of Water in Well (L)	4.74 L
Casing Volumes to Purge	3
Minimum to Purge (L)	—
Actual Purge (L)	7.5

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox (mV)	Turbidity (NTU)	Depth to Water (ft ~~BTOC~~ bgs)	Purge Rate (L/min)
1620	2.5	7.96	14.03	0.748	0.17	-51.9	6.13	10.38	0.5
1625	5.0	7.96	13.84	0.747	0.17	-51.6	7.96	10.38	0.5
1630	7.5	7.98	14.16	0.75	0.18	-51.6	7.95	10.38	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 2.89 mg/L

Multi-Parameter Probe Unit # 1

Field Parameters Measured in Flow-Through Cell

Sample Depth (ft bgs) = 35

Pump Rate = 0.5

Temp Well Diameter = 1"

Screen Interval (ft bgs) = 30-40'

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME	CHAAP 2019 OU1 RAO_Performance Monitoring	PROJECT NO.	60565355
SAMPLE NO.	EW7-PM24A-1-25	WELL NO.	PM-24A
DATE/TIME COLLECTED	10-16-19 / 1640	PERSONNEL	RH
SAMPLE METHOD	Peristaltic Pump and tubing		TY

SAMPLE MEDIA:	Groundwater			
SAMPLE QA SPLIT:	YES	(NO)	SPLIT SAMPLE NO.	-
SAMPLE QC DUPLICATE:	YES	(NO)	DUPLICATE SAMPLE NO.	-
MS/MSD REQUESTED	YES	(NO)	MS/MSD SAMPLE NO.	-

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10.16.19	Well Depth (~~ft BTOC~~)	30' BGS
Time Started	1620	Depth to Water (~~ft BTOC~~)	13.42 BGS
Time Completed	1635	Water Column Length	16.58
PID Measurements		Well Casing Volume (per ft)	.16
Background	ND	Volume of Water in Well (L)	2.65
Breathing Zone	ND	Casing Volumes to Purge	3
Well Head	ND	Minimum to Purge (L)	-
Purge Water	ND	Actual Purge (L)	- 7.5L

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox (mV)	Turbidity (NTU)	Depth to Water (~~ft BTOC~~) BGS	Purge Rate (L/min)
1625	2.5	7.44	12.81	0.901	1.35	-29.2	5.88	13.42	.5L
1630	5.0	7.62	12.82	0.902	1.46	-29.9	6.77	13.42	.5L
1635	7.5	7.56	12.83	0.903	1.49	-28.7	3.38	13.42	.5L

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 2.62 mg/L
Multi-Parameter Probe Unit #
Field Parameters Measured in Flow-Through Cell
Sample Depth (ft bgs) = 25'
Pump Rate = .5
Temp Well Diameter = 1"
Screen Interval (ft bgs) = 20-30' BGS

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO_Performance Monitoring** PROJECT NO.: **60565355**

SAMPLE NO.: EW7-PM24B-1-35 WELL NO.: PM-24B

DATE/TIME COLLECTED: 10-19-19 / 0955 PERSONNEL: TY

SAMPLE METHOD: Peristaltic Pump and tubing BE

SAMPLE MEDIA: **Groundwater**

SAMPLE QA SPLIT:	YES	NO	SPLIT SAMPLE NO.	
SAMPLE QC DUPLICATE:	YES	NO	DUPLICATE SAMPLE NO.	
MS/MSD REQUESTED	YES	NO	MS/MSD SAMPLE NO.	

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-19-19
Time Started	0830
Time Completed	0950
PID Measurements	
Background	ND
Breathing Zone	ND
Well Head	ND
Purge Water	ND

Well Depth (ft ~~BTOC~~)	40' bgs
Depth to Water (ft ~~BTOC~~)	13.40 bgs
Water Column Length	26.6'
Well Casing Volume (per ft)	0.16L
Volume of Water in Well (L)	4.26
Casing Volumes to Purge	3
Minimum to Purge (L)	—
Actual Purge (L)	7.5

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox (mV)	Turbidity (NTU)	Depth to Water (ft ~~BTOC~~ bgs)	Purge Rate (L/min)
0940	2.5	8.90	11.55	0.707	0.31	-94.9	57.6	13.40	0.5
0945	5.0	8.86	11.58	0.707	0.31	-93.3	49.9	13.40	0.5
0950	7.5	8.84	11.58	0.707	0.30	-92.2	51.0	13.40	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 3.30 mg/L

Multi-Parameter Probe Unit # 1

Field Parameters Measured in Flow-Through Cell

Sample Depth (ft bgs) = 35

Pump Rate = 0.5

Temp Well Diameter = 1"

Screen Interval (ft bgs) = 30-40'

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: CHAAP 2019 OU1 RAO_Performance Monitoring | PROJECT NO.: 60565355

SAMPLE NO.: EW7-PM25A-1-25 | WELL NO.: PM25A

DATE/TIME COLLECTED: 10-16-19 1250 | PERSONNEL: R. H

SAMPLE METHOD: Peristaltic Pump and tubing | T. Y

SAMPLE MEDIA:	Groundwater			
SAMPLE QA SPLIT:	YES	NO	SPLIT SAMPLE NO.	
SAMPLE QC DUPLICATE:	YES	NO	DUPLICATE SAMPLE NO.	
MS/MSD REQUESTED	YES	NO	MS/MSD SAMPLE NO.	

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-16-19	Well Depth (ft ~~BTOC~~ BGS)	30'
Time Started	~~1238~~ 1233	Depth to Water (ft BTOC)	8.69 BGS
Time Completed	1248	Water Column Length	21.31
PID Measurements		Well Casing Volume (per ft)	.16
Background	ND	Volume of Water in Well (L)	3.41
Breathing Zone	ND	Casing Volumes to Purge	3
Well Head	ND	Minimum to Purge (L)	10.22
Purge Water	ND	Actual Purge (L)	15

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox (mV)	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
1238	5	7.26	13.78	0.790	3.53	19.9	~~8.69~~ 16.4	8.69	.5
1243	10	7.22	14.08	0.793	3.35	17.7	16.1	8.69	.5
1248	15	7.23	13.55	0.744	3.48	17.9	12.0	8.69	.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 1.56 mg/L

Multi-Parameter Probe Unit #

Field Parameters Measured in Flow-Through Cell

Sample Depth (ft bgs) = 25'

Pump Rate = .5 l/min

Temp Well Diameter = 1"

Screen Interval (ft bgs) = 20' - 30' BGS

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME	CHAAP 2019 OU1 RAO_Performance Monitoring	PROJECT NO.	60565355
SAMPLE NO.	EW7-PM25B-1-35	WELL NO.	PM-25B
DATE/TIME COLLECTED	10-16-19 / 1455	PERSONNEL	RH TY
SAMPLE METHOD	Peristaltic Pump and tubing		

SAMPLE MEDIA:	Groundwater			
SAMPLE QA SPLIT:	YES	(NO)	SPLIT SAMPLE NO.	
SAMPLE QC DUPLICATE:	YES	(NO)	DUPLICATE SAMPLE NO.	
MS/MSD REQUESTED	(YES)	NO	MS/MSD SAMPLE NO.	EW7-PM25B-1-35

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-16-19	Well Depth (ft BTOC)	40' BGS
Time Started	1439	Depth to Water (ft BTOC)	8.58 BGS
Time Completed	1454	Water Column Length	31.42
PID Measurements		Well Casing Volume (per ft)	0.16
Background	ND	Volume of Water in Well (L)	5.02
Breathing Zone	ND	Casing Volumes to Purge	3
Well Head	ND	Minimum to Purge (L)	-
Purge Water	ND	Actual Purge (L)	-

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox (mV)	Turbidity (NTU)	Depth to Water (ft BTOC)	Purge Rate (L/min)
1448	2.5	7.13	13.60	0.793	0.13	3.3	1.18	8.58	.5l
1449	5.0	7.09	13.30	0.791	0.14	4.6	1.08	8.58	.5l
1454	7.5	7.11	13.24	0.791	0.15	4.6	1.27	8.58	.5l

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 0.72 mg/L
Multi-Parameter Probe Unit #
Field Parameters Measured in Flow-Through Cell
Sample Depth (ft bgs) = 35' BGS
Pump Rate = .5l/min
Temp Well Diameter = 1"
Screen Interval (ft bgs) = 30'-40'

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: CHAAP 2019 OU1 RAO_Performance Monitoring | PROJECT NO.: 60565355

SAMPLE NO.: EW7-PM26A-1-25 | WELL NO.: PM-26A

DATE/TIME COLLECTED: 10-18-19 / 0950 | PERSONNEL: TY, RH

SAMPLE METHOD: Peristaltic Pump and tubing

SAMPLE MEDIA: Groundwater

SAMPLE QA SPLIT: YES / (NO) | SPLIT SAMPLE NO.:

SAMPLE QC DUPLICATE: YES / (NO) | DUPLICATE SAMPLE NO.:

MS/MSD REQUESTED: YES / (NO) | MS/MSD SAMPLE NO.:

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-18-19
Time Started	0855
Time Completed	0945
PID Measurements	
Background	ND
Breathing Zone	ND
Well Head	ND
Purge Water	ND

Well Depth (ft ~~BTOC~~)	30' bgs
Depth to Water (ft ~~BTOC~~)	12.85' bgs
Water Column Length	17.15'
Well Casing Volume (per ft)	.16 L
Volume of Water in Well (L)	2.74
Casing Volumes to Purge	3
Minimum to Purge (L)	—
Actual Purge (L)	7.5

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox (mV)	Turbidity (NTU)	Depth to Water (ft ~~BTOC~~) bgs	Purge Rate (L/min)
0935	2.5	7.68	13.06	0.680	0.90	-39.7	9.56	12.85	0.5
0940	5.0	7.69	13.18	0.683	0.85	-39.5	8.70	12.85	0.5
0945	7.5	7.69	13.23	0.684	0.83	-39.0	5.42	12.85	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 2.89 mg/L

Multi-Parameter Probe Unit # 1

Field Parameters Measured in Flow-Through Cell

Sample Depth (ft bgs) = 25

Pump Rate = 0.5

Temp Well Diameter = 1"

Screen Interval (ft bgs) = 20-30'

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME	CHAAP 2019 OU1 RAO_Performance Monitoring	PROJECT NO.	60565355
SAMPLE NO.	EW7-PM26B-1-35	WELL NO.	PM-26B
DATE/TIME COLLECTED	10-18-19 / 1140	PERSONNEL	TY
SAMPLE METHOD	Peristaltic Pump and tubing		RH

SAMPLE MEDIA:	Groundwater			
SAMPLE QA SPLIT:	YES	(NO)	SPLIT SAMPLE NO.	
SAMPLE QC DUPLICATE:	YES	NO	DUPLICATE SAMPLE NO.	
MS/MSD REQUESTED	YES	NO	MS/MSD SAMPLE NO.	

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-18-19	Well Depth (ft ~~BTOC~~)	40' bgs
Time Started	1015	Depth to Water (ft ~~BTOC~~)	12.88' bgs
Time Completed	1135	Water Column Length	27.12'
PID Measurements		Well Casing Volume (per ft)	0.16
Background	ND	Volume of Water in Well (L)	4.34
Breathing Zone	ND	Casing Volumes to Purge	3
Well Head	ND	Minimum to Purge (L)	—
Purge Water	ND	Actual Purge (L)	7.5

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox (mV)	Turbidity (NTU)	Depth to Water (ft ~~BTOC~~ bgs)	Purge Rate (L/min)
~~1125~~								~~27.12~~	~~0.5~~
~~1130~~								~~27.12~~	~~0.5~~
~~1135~~								~~27.12~~	~~0.5~~
1125	2.5	9.19	14.99	0.789	0.27	-108.6	6.29	12.88	0.5
1130	5	9.07	15.22	0.791	0.28	-103.9	7.03	12.88	0.5
1135	7.5	9.22	15.38	0.792	0.28	-108.3	7.87	12.88	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 2.78 mg/L
Multi-Parameter Probe Unit # 1
Field Parameters Measured in Flow-Through Cell
Sample Depth (ft bgs) = 35
Pump Rate = 0.5
Temp Well Diameter = 1"
Screen Interval (ft bgs) = 30-40

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: CHAAP 2019 OU1 RAO_Performance Monitoring | PROJECT NO.: 60565355

SAMPLE NO.: EW7-PM27A-1-25 | WELL NO.: PM-27A

DATE/TIME COLLECTED: 10-18-19 / 1315 | PERSONNEL: TY, RH

SAMPLE METHOD: Peristaltic Pump and tubing

SAMPLE MEDIA: Groundwater

SAMPLE QA SPLIT: YES ~~NO~~ | SPLIT SAMPLE NO.:

SAMPLE QC DUPLICATE: YES ~~NO~~ | DUPLICATE SAMPLE NO.:

MS/MSD REQUESTED: YES ~~NO~~ | MS/MSD SAMPLE NO.:

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-18-19
Time Started	1215
Time Completed	1310
PID Measurements	
Background	ND
Breathing Zone	ND
Well Head	ND
Purge Water	ND

Well Depth (ft ~~BTOC~~)	30' bgs
Depth to Water (ft ~~BTOC~~)	10.90' bgs
Water Column Length	19.1'
Well Casing Volume (per ft)	0.16L
Volume of Water in Well (L)	3.06
Casing Volumes to Purge	3
Minimum to Purge (L)	—
Actual Purge (L)	7.5

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox (mV)	Turbidity (NTU)	Depth to Water (ft ~~BTOC~~ bgs)	Purge Rate (L/min)
1300	2.5	7.08	13.82	0.770	2.01	-11.0	6.71	10.90	0.5
1305	5.0	7.04	13.81	0.768	2.05	-8.6	9.82	10.90	0.5
1310	7.5L	7.01	13.86	0.771	2.02	-6.6	6.25	10.90	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 2.89 mg/L

Multi-Parameter Probe Unit # 1

Field Parameters Measured in Flow-Through Cell

Sample Depth (ft bgs) = 25

Pump Rate = 0.5

Temp Well Diameter = 1"

Screen Interval (ft bgs) = 20-30'

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: CHAAP 2019 OU1 RAO_Performance Monitoring | PROJECT NO.: 60565355

SAMPLE NO.: EW7-PM27B-1-35 | WELL NO.: PM-27B

DATE/TIME COLLECTED: 10-18-19 / 1500 | PERSONNEL: TY

SAMPLE METHOD: Peristaltic Pump and tubing | RH

SAMPLE MEDIA:	Groundwater		
SAMPLE QA SPLIT:	YES	NO	SPLIT SAMPLE NO.
SAMPLE QC DUPLICATE:	YES	NO	DUPLICATE SAMPLE NO.
MS/MSD REQUESTED	YES	NO	MS/MSD SAMPLE NO.

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-18-19
Time Started	1335
Time Completed	1455
PID Measurements	
Background	ND
Breathing Zone	ND
Well Head	ND
Purge Water	ND

Well Depth (ft ~~BTOC~~)	40' bgs
Depth to Water (ft ~~BTOC~~)	10.88' bgs
Water Column Length	19.12'
Well Casing Volume (per ft)	0.16L
Volume of Water in Well (L)	4.66
Casing Volumes to Purge	3
Minimum to Purge (L)	—
Actual Purge (L)	7.5

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox (mV)	Turbidity (NTU)	Depth to Water (ft ~~BTOC~~ bgs)	Purge Rate (L/min)
1445	2.5	8.76	14.20	0.799	0.24	-88.7	7.38	10.88'	0.5
1490	5.0	8.79	14.17	0.797	0.24	-90.8	6.25	10.88	0.5
1455	7.5	8.70	14.25	0.798	0.24	-86.3	5.70	10.88	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 2.89 mg/L

Multi-Parameter Probe Unit # 1

Field Parameters Measured in Flow-Through Cell

Sample Depth (ft bgs) = 35

Pump Rate = 0.5

Temp Well Diameter = 1"

Screen Interval (ft bgs) = 30 - 40

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: CHAAP 2019 OU1 RAO_Performance Monitoring | PROJECT NO.: 60565355

SAMPLE NO.: EW7-PM28A-1-25 | WELL NO.: PM-28A

DATE/TIME COLLECTED: 10-19-19 / 1620 | PERSONNEL: TV, EH

SAMPLE METHOD: Peristaltic Pump and tubing

SAMPLE MEDIA: Groundwater

SAMPLE QA SPLIT:	YES	(NO)	SPLIT SAMPLE NO.
SAMPLE QC DUPLICATE:	YES	(NO)	DUPLICATE SAMPLE NO.
MS/MSD REQUESTED	YES	(NO)	MS/MSD SAMPLE NO.

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-19-19
Time Started	1430
Time Completed	1615
PID Measurements	
Background	ND
Breathing Zone	ND
Well Head	ND
Purge Water	ND

Well Depth (ft ~~BTOC~~)	30 bgs
Depth to Water (ft ~~BTOC~~)	8.60 bgs
Water Column Length	21.14
Well Casing Volume (per ft)	0.16L
Volume of Water in Well (L)	3.42
Casing Volumes to Purge	3
Minimum to Purge (L)	—
Actual Purge (L)	7.5

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox (mV)	Turbidity (NTU)	Depth to Water (ft ~~BTOC~~ bgs)	Purge Rate (L/min)
1605	2.5	7.43	15.29	0.795	0.12	-27.2	5.81	8.60	0.5
1610	5.0	7.46	15.26	0.794	0.11	-28.2	6.22	8.60	0.5
1615	7.5	7.45	15.04	0.797	0.12	-28.2	6.10	8.60	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 3.30 mg/L

Multi-Parameter Probe Unit # 1

Field Parameters Measured in Flow-Through Cell

Sample Depth (ft bgs) = ~~30~~ 25

Pump Rate = 0.5

Temp Well Diameter = 1"

Screen Interval (ft bgs) = 20-30' bgs

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME	CHAAP 2019 OU1 RAO_Performance Monitoring	PROJECT NO.	60565355
SAMPLE NO.	EW7-PM28B-1-35	WELL NO.	PM-28B
DATE/TIME COLLECTED	10-20-19 /1210	PERSONNEL	TY
SAMPLE METHOD	Peristaltic Pump and tubing		

SAMPLE MEDIA:	Groundwater			
SAMPLE QA SPLIT:	YES	~~NO~~	SPLIT SAMPLE NO.	
SAMPLE QC DUPLICATE:	YES	NO	DUPLICATE SAMPLE NO.	
MS/MSD REQUESTED	YES	NO	MS/MSD SAMPLE NO.	

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-20-19	Well Depth (ft ~~BTOC~~)	40' bgs
Time Started	0930	Depth to Water (ft ~~BTOC~~)	8.48' bgs
Time Completed	1205	Water Column Length	31.52
PID Measurements		Well Casing Volume (per ft)	0.16L
Background	ND	Volume of Water in Well (L)	5.04
Breathing Zone	ND	Casing Volumes to Purge	3
Well Head	ND	Minimum to Purge (L)	-
Purge Water	ND	Actual Purge (L)	7.5

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox (mV)	Turbidity (NTU)	Depth to Water (ft ~~BTOC~~ bgs)	Purge Rate (L/min)
1155	2.5	7.14	12.90	0.801	0.23	-13.2	4.67	8.48	0.5
1200	5.0	7.11	12.92	0.801	0.24	-12.2	5.14	8.48	0.5
1205	7.5	7.09	12.96	0.802	0.23	-12.2	4.80	8.48	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 3.30 mg/L
Multi-Parameter Probe Unit # 1
Field Parameters Measured in Flow-Through Cell
Sample Depth (ft bgs) = 35
Pump Rate = 0.5
Temp Well Diameter = 1"
Screen Interval (ft bgs) = 30-40'

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME	CHAAP 2019 OU1 RAO_Performance Monitoring	PROJECT NO.	60565355
SAMPLE NO.	EW7-PM29A-1-25	WELL NO.	PM-29A
DATE/TIME COLLECTED	10-19-19 / 1405	PERSONNEL	TY BE RH
SAMPLE METHOD	Peristaltic Pump and tubing		

SAMPLE MEDIA:	Groundwater			
SAMPLE QA SPLIT:	YES	~~NO~~	SPLIT SAMPLE NO.	
SAMPLE QC DUPLICATE:	YES	NO	DUPLICATE SAMPLE NO.	
MS/MSD REQUESTED	YES	NO	MS/MSD SAMPLE NO.	

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

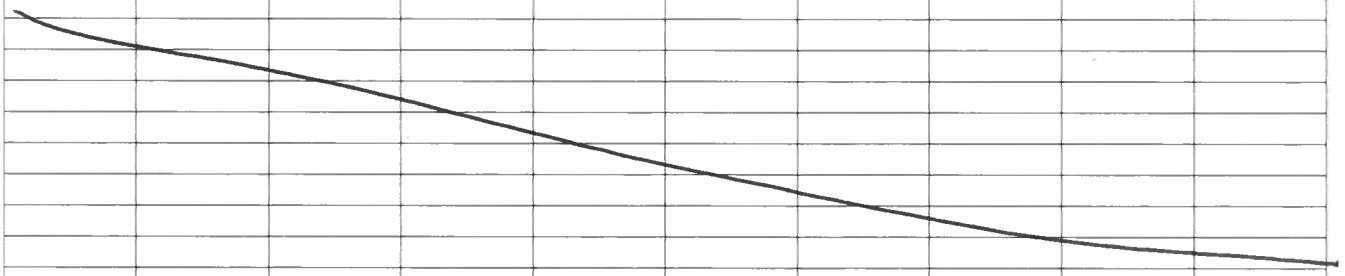
Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2SO_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-19-19	Well Depth (ft ~~BTOC~~)	30' bgs
Time Started	1210	Depth to Water (ft ~~BTOC~~)	9' bgs
Time Completed	1400	Water Column Length	21'
PID Measurements		Well Casing Volume (per ft)	0.16L
Background	ND	Volume of Water in Well (L)	3.36
Breathing Zone	ND	Casing Volumes to Purge	3
Well Head	ND	Minimum to Purge (L)	—
Purge Water	ND	Actual Purge (L)	7.5

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox (mV)	Turbidity (NTU)	Depth to Water (ft ~~BTOC~~ bgs)	Purge Rate (L/min)
1350 ~~1245~~	2.5	7.40	14.53	0.599	0.36	-25.4	6.74	9.00	0.5
1355 ~~1300~~	5.0	7.31	14.16	0.597	0.37	-21.3	4.84	9.00	0.5
1400 ~~1305~~	7.5	7.29	14.46	0.600	0.35	-20.7	4.68	9.00	0.5



FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 3.30 mg/L
Multi-Parameter Probe Unit # 1
Field Parameters Measured in Flow-Through Cell
Sample Depth (ft bgs) = ~~2~~5
Pump Rate = 0.5
Temp Well Diameter = 1"
Screen Interval (ft bgs) = 20-30'

WATER SAMPLE COLLECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: CHAAP 2019 OU1 RAO_Performance Monitoring | PROJECT NO.: 60565355

SAMPLE NO.: EW7-PM29B-1-35 | WELL NO.: PM-29B

DATE/TIME COLLECTED: 10-19-19/1155 | PERSONNEL: TV, RE

SAMPLE METHOD: Peristaltic Pump and tubing

SAMPLE MEDIA: Groundwater

SAMPLE QA SPLIT:	YES	(NO)	SPLIT SAMPLE NO.	
SAMPLE QC DUPLICATE:	YES	(NO)	DUPLICATE SAMPLE NO.	
MS/MSD REQUESTED	YES	(NO)	MS/MSD SAMPLE NO.	

SAMPLE CONTAINERS, PRESERVATIVES, ANALYSIS

Sample Container	Preservative	Analysis Requested
2 - 500 mL Amber	6°C	Explosives + MNX (8330A)
3 - 40 mL VOA	6°C, HCl	Methane (RSK 175)
1 - 500 mL HDPE	6°C, H_2S0_4	TKN (351.2), NH_3 (350.1), NO_2/NO_3 (353.2)
1 - 250 mL HDPE	6°C	SO_4 (9056A), Alkalinity (2320B)
1 - 250 mL HDPE	6°C, ZnOAc/NaOH	Sulfide (9034)
1 - 250 mL Amber	6°C	DOC (9060A)

WELL PURGING DATA

Date	10-19-19	Well Depth (ft ~~BTOC~~)	40' bgs
Time Started	1025	Depth to Water (ft ~~BTOC~~)	8.75' bgs
Time Completed	1155	Water Column Length	31.25'
PID Measurements		Well Casing Volume (per ft)	0.16 L
Background	ND	Volume of Water in Well (L)	5.00
Breathing Zone	ND	Casing Volumes to Purge	3
Well Head	ND	Minimum to Purge (L)	
Purge Water	ND	Actual Purge (L)	7.5

FIELD MEASUREMENTS

Time	Amount Purged (L)	pH	Temperature (Celsius)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Redox (mV)	Turbidity (NTU)	Depth to Water (ft ~~BTOC~~ bgs)	Purge Rate (L/min)
1140	2.5	8.15	12.79	0.770	0.22	-59.7	6.80	8.75	0.5
1145	5.0	8.07	12.84	0.771	0.21	-56.7	6.81	8.75	0.5
1150	7.5	8.07	12.91	0.769	0.20	-55.6	7.69	8.75	0.5

FIELD EQUIPMENT AND CALIBRATION

	Model	Calibration
Water Level Probe	Heron	Checked Against Calibrated Length
Water Quality Meter	YSI 556 Multi-Parameter Probe	Twice Daily Calibration Verification also Calibrated Weekly

GENERAL COMMENTS

Ferrous Iron = 3.30 mg/L

Multi-Parameter Probe Unit # 1

Field Parameters Measured in Flow-Through Cell

Sample Depth (ft bgs) = 35

Pump Rate = 0.5

Temp Well Diameter = 1"

Screen Interval (ft bgs) = 30-40

Subsurface Injection Daily Summary Field Sheets and Summary Table

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7 - T-16 DATE: 10-30-19

DP SUBCONTRACTOR PES PERSONNEL: MM, TX

AMENDMENT / PERCENT CONCENTRATION: WB 9.8% SHEET NO. 1 of 1

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
7	1555	38	~~540~~	~~240~~	100	~~Redrilled (no~~
		33	140	240	100	change meter
		28	240	540	300	
	1645	23				
		18				
				Total Volume (gal):	500	
8	1505	38	090	100	10	
		33	100	290	190	
		28	290	590	300	
	1630	23				
		18				
				Total Volume (gal):	500	
9	1540	38	030	130	100	Redrilled
		33	130	230	100	
		28	230	530	300	
	1640	23				
		18				
				Total Volume (gal):	500	
10	1455	38	040	140	100	
		33	~~540~~	240	100	
		28	240	540	300	
	1640	23	540	840	300	
		18				
				Total Volume (gal):	800	
11	1450	38	040	~~0~~50	10	
		33	~~250~~ 150	~~540~~ 240	190	
		28	~~540~~ 240	540	300	
	1630	23	540	840	300	
		18	840	1040	200	
				Total Volume (gal):	1000	
12	1626	38	040	150	10	redrilled
		33	050	~~250~~ 240	190	
		28				
	1640	23				
		18				
				Total Volume (gal):	200	
				SHEET TOTAL (gal):	~~3700~~ 3700	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-T-16 DATE: 10-30-19

DP SUBCONTRACTOR PES PERSONNEL: BE, RH

AMENDMENT / PERCENT CONCENTRATION: WB 9.8% SHEET NO. 1

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
1	1348	38	030	130	100	
		33	130	230	100	
		28	230	530	~~200~~ 300	
	~~1348~~ 1600	23	530	830	300	
		18	830	1030	~~300~~ 200	
				Total Volume (gal):	1000	
2	1349	38	030	~~040~~ 040	10	
		33	040	230	190	
		28	230	530	~~200~~ 300	
	1604	23	530	830	300	
		18	830	1030	200	
				Total Volume (gal):	1000	
3	1357	38	080	090	10	
		33	090	280	190	
		28	280	580	300	
	~~1448~~ 1621	23	580	880	300	
		18	880	1080	200	
				Total Volume (gal):	1000	
4	1404	38	030	040	10	
		33	040	230	190	
		28	230	530	300	
	1619	23	530	830	300	
		18	830	1030		
				Total Volume (gal):	1000	
5	1409	38	030	125	95	
		33	125	240	115	
		28	240	530	290	
	1542	23	530	830	300	
		18	830	1030	~~300~~ 200	
				Total Volume (gal):	1000	
6	1414	38	030	040	10	
		33	040	040	0	
		28	040	530	490	
	1614	23	530	830	300	
		18	830	1030	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-16 DATE: 10-31-19

DP SUBCONTRACTOR PES PERSONNEL: MM, TJ

AMENDMENT / PERCENT CONCENTRATION: 9.8% SHEET NO. 1 of 1

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
7	1451	3B	—	—	—	Completed 10-30-19
		~~3~~ 2	—	—	—	↓
		2B	—	—	—	
	1527	~~2~~ 3	540	840	300	
		1B	840	1040	200	
				Total Volume (gal):	500	10:50
8	1449	3B	—	—	—	Completed 10-30-19
		~~3~~ 2	—	—	—	↓
		2B	—	—	—	↓
	1525	~~2~~ 3	590	890	300	
		1B	890	1090	200	
				Total Volume (gal):	500	10:00
9	1447	3B	—	—	—	Completed
		3 2	—	—	—	10-30-19
		2B	—	—	—	↓
	1525	~~2~~ 3	530	830	300	
		1B	1130	1430	300	
				Total Volume (gal):	500	10:00
10	1445	3B	—	—		Completed
		3 2	—	—		10-30-19
		2B	—	—		↓
	1500	~~2~~ 3	—	—		↓
		1B	840	1040	300	~~100~~ (MW)
				Total Volume (gal):	~~300~~ 200	10:00
11	—	3B	—	—	—	Completed
		3 2	—	—	—	10-30-19
		2B	—	—	—	↓
	—	~~3~~ 2 ~~2~~ 3	—	—	—	↓
		1B	—	—	—	
				Total Volume (gal):		
12	1440	3B	—	—	—	Completed 10-30-19
		3 2	—	—	—	Completed 10-30-19
		~~2~~ 2B	240	540	300	
	1536	~~3~~ 3	540	840	300	
		1B	640	1040	300	
				Total Volume (gal):	800	10:00
				SHEET TOTAL (gal):	~~2700~~ 2500	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-15 DATE: 10-31-19

DP SUBCONTRACTOR PES PERSONNEL: MB

AMENDMENT / PERCENT CONCENTRATION: 9.8% SHEET NO. 1

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
1	1449	38	1030	1130	100	
		32	1130	1230	100	
		28	1230	1530	300	
	1648	22	1530	1830	300	
		18	1830	2030	200	
				Total Volume (gal):	1000	
2	1453	38	1030	1130	100	
		32	1130	1230	100	
		28	1230	1530	300	
	1648	22	1530	1830	300	
		18	1830	2030	200	
				Total Volume (gal):	1000	
3	1455	38	1080	1180	100	
		32	1180	1280	100	
		28	1280	1580	300	
	1652	22	1580	1880	300	
		18	1880	2080	200	
				Total Volume (gal):	1000	
4	1457	38	1030	1130	100	
		32	1130	1230	100	
		28	1230	1530	300	
	1652	22	1530	1830	300	2,080 NR
		18	1530	~~2080~~ NR	200	
				Total Volume (gal):	1000	
5	1502	38	1030	1130	100	
		32	1130	1230	100	
		28	1230	1530	300	
		22	1530	1830	300	
		18	1830	2080	200	
				Total Volume (gal):	1000	
6	1504	38	1030	1130	100	
		32	1130	1230	100	
		28	1230	1530	300	
		22	1530	1830	300	
		18	1830	2080	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6,000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-15 DATE: 11-1-19

DP SUBCONTRACTOR PES PERSONNEL: MM/TY

AMENDMENT / PERCENT CONCENTRATION: 9.8% LWJ SHEET NO. 1 of 2

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
7	0900	38	1040	1140	100	
		33	1140	1240	100	
		28	1240	1540	300	
	1236	23	1540	1840	300	
		18	1840	2040	200	
				Total Volume (gal):	1000	
8	0855	38	1090	1190	100	
		33	1190	1290	100	
		28	1290	1590	300	
	1237	23	1590	1890	300	
		18	1890	2090	200	
				Total Volume (gal):	1000	
9	0850	38	1030	130	100	
		33	130	1230	100	
		28	1230	1530	300	
	1233	23	1530	1830	300	
		18	1830	2030	200	
				Total Volume (gal):	1000	
10	0845	38	1040	1140	100	
		33	1140	1240	100	
		28	1240	1540	300	
	1230	23	1540	1840	300	
		18	1840	2040	200	
				Total Volume (gal):	1000	
11	0840	38	1040	1050	10	
		33	1050	1240	190	
		28	1240	1540	300	
	1030	23	1540	1840	300	
		18	1840	2040	200	
				Total Volume (gal):	1000	
12	0855	38	1040	1050	10	
		33	1050	1240	190	
		28	1240	1540	300	
	1035	23	1540	1840	300	
		18	1840	2040	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

0945 - Amendment ran out

1000 - Resume pumping

1040 - Amendment ran out, Amendment truck pump broke

1130 - Resume

1240 - Amendment ran out, pump on truck broke again

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-14 DATE: 11-1-19

DP SUBCONTRACTOR PES PERSONNEL: MM / TJ

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 2 of 2

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
~~31~~ 25	1540	38	2040	2140	100	
		33	2140			
	1600					
				Total Volume (gal):	100	
~~32~~ 26	1535	38	2050	2100	10	
		33	2100	2250	150	
		28	2240			
	1605					
				Total Volume (gal):	200	
~~33~~ 27	1530	38	2030	2040	10	
		33	2040	2230	190	
		28	2230			
	1608					
				Total Volume (gal):	200	
~~34~~ 28	1525	38	2040	2140	100	
		33	2140	2240	100	
		28	2240			
	1610					
				Total Volume (gal):	200	
~~35~~ 29	1520	38	2040	2110	70	Meter skipped - pull rod
		33	2110	~~2240~~ 2120	10	
		28	2120	2540	420	
	1613					
				Total Volume (gal):	500	
~~36~~ 30	1515	38	2040	2050	10	Meter Skipped
		33	2050	2060	10	pull Rods
		28	2060	2540	480	
	1615					
				Total Volume (gal):	500	
				SHEET TOTAL (gal):	~~1900~~ 1700	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-14 DATE: 11-1-19

DP SUBCONTRACTOR PES PERSONNEL: MR

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 1 of 2

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
1	854	38	2030	~~2130~~ 2130	100	0945-1000 Tank dry
		32	2130	2230	100	1037 Tank dry
		28	2230	2530	300	1220 Assm't
	1239 ~~0956~~ MR	22	2530	2830	300	
		18	2830	3030	~~200~~	1240 – 1452
				Total Volume (gal):	1000	~~Tank~~ Tank dry
2	856	38	2030	2130	100	
		32	2130	2230	100	
		28	2230	2530	300	
	1453	22	2530	2830	300	
		18	2830	3030	200	
				Total Volume (gal):	1000	
3	903	38	2080	2180	100	
		32	2180	2280	100	
		28	2280	2580	300	
	1454 ~~56~~ AR	22	2580	2880	300	
		18	2830	3080	200	
			MR	Total Volume (gal):	1000	
4	925	38	2080 ~~30~~	2130	100	
		32	2130	2230	100	
		28	2230	2530	300	
	1455	22	2530	2830	300	
		18	2830	3030	200	
				Total Volume (gal):	1000	
5	913	38	2030	2130	100	
		32	2130	2230	100	
		28	2230	2530	300	
	1235	22	2530	2830	300	
		18	2830	3030	200	
				Total Volume (gal):	1000	
6	915	38	2030	2080	100	
		32	2080	2230	100	
		28	2230	2530	300	
	1457	22	2530	2830	300	
		18	2830	3030	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-14 DATE: 11-1-19

DP SUBCONTRACTOR PES PERSONNEL: MR

AMENDMENT / PERCENT CONCENTRATION: 9.8 W13 SHEET NO. 2 of 2

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
7	1521	38	3030	3130	100	
		32	3130	3230	100	
		28				
	1600 ~~1615~~ MR	22				
		18				
				Total Volume (gal):	200	
8	1523	38	3030	3130	100	
		32	3130	3230	100	
		28				
	1615	22				
		18				
				Total Volume (gal):	200	
9	1527	38	3080	3180	100	
		32	3180	3280	100	
		28				
	1615	22				
		18				
				Total Volume (gal):	200	
10	1530	38	3030	3130	100	
		32	3130	3230	100	
		28				
	1610 ~~1615~~ RM	22				
		18				
				Total Volume (gal):	200	
11	1532	38	3030	3130	100	
		32	3130	3230	100	
		28				
	~~1615~~ 1600	22				
		18				
				Total Volume (gal):	200	
12	1535	38	3030	3130	100	
		32	3130	3230	100	
		28				
	~~1613~~ ~~1615~~ MR	22				
		18				
				Total Volume (gal):	200	
				SHEET TOTAL (gal):	1,200	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7 - T14 DATE: 11-02-19

DP SUBCONTRACTOR PES PERSONNEL: TV MM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 1 of 2

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
~~31~~ 25	0910	33	2140	2240	100	
		28	2240	2540	300	
		23	2540	2840	300	
	1150	18	2840	3040	200	
				Total Volume (gal):	900	
~~32~~ 26	0912	28	2240	2540	300	
		23	2540	2840	300	
		18	2840	3010	200	
	1152 ~~0952~~					
				Total Volume (gal):	800	
~~33~~ 27	0914	28	2230	2530	300	
		23	2530	2830	300	
		18	2830	3030	200	
	1155 ~~0955~~					
				Total Volume (gal):	800	
~~34~~ 28	0915	28	2240	2540	300	
		23	2540	2840	300	
		18	2840	3040	200	
	1140					
				Total Volume (gal):	800	
~~35~~ 29	0917	~~28~~ 23	2540	2840	300	
		18	2840	3040	200	
	0954					
				Total Volume (gal):	500	
~~36~~ 30	0920	~~28~~ 23	2540	2840	300	
		18	2840	3040	200	
	0950					
				Total Volume (gal):	500	
				SHEET TOTAL (gal):	4300 ~~4300~~	

GENERAL NOTES:

1000 Stopped pumping, amendment ran out

1115 Began pumping

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

38 33 28 23 18

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7- T14 DATE: 11-02-19

DP SUBCONTRACTOR PES PERSONNEL: TY MM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 2 of 2

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
31	1344	38	3040	3140	100	
		33	3140	3240	100	
		28	3240	3540	300	
	1607	23	3540	3840	300	
		18	3840	4040	200	
				Total Volume (gal):	1000	
32	1340	38	3020	3120	100	
		33	3120	3220	100	
		28	3220	3520	300	
	1605	23	3520	3820	300	
		18	3820	4020	200	
				Total Volume (gal):	1000	
33	1342	38	3030	3130	100	
		33	3130	3230	100	
		28	3230	3530	300	
	1603	23	3530	3830	300	
		18	3830	4030	200	
				Total Volume (gal):	1000	
34	1242	38	3040	3140	100	
		33	3140	3240	100	
		28	3240	3540	300	
	1559	23	3540	3840	300	
		18	3840	4040	200	
				Total Volume (gal):	1000	
35	1240	38	3040	3140	100	
		33	3140	3240	100	
		28	3240	3540	300	
	1557	23	3540	3840	300	
		18	3840	4040	200	
				Total Volume (gal):	1000	
36	1235	38	3040	3140	100	
		33	3140	3240	100	
		28	3240	3540	300	
	1555	23	3540	3840	300	
		18	3840	4040	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200
38 33 28 23 18

300 Points 31, 32, 33, 36 redrilled completly, tip did not come off. Stopped pumping 34+35.

500 Amendment out. → 1530 resumed pumping

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-14 DATE: 11-2-19

DP SUBCONTRACTOR PES PERSONNEL: MM

AMENDMENT / PERCENT CONCENTRATION: 9.8 W13 SHEET NO. 1 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
7	924	28	3230	3530	300	
		22	3530	3830	300	
		18	3830	4030	200	
	1150					
				Total Volume (gal):	800	
8	925	28	3230	3530	300	
		22	3530	3830	300	
		18	3830	4030	200	
	1152					
				Total Volume (gal):	800	
9	926	28	3280	3580	300	
		22	3580	3880	300	
		18	3880	4080	200	
	1158					
				Total Volume (gal):	800	
10	933	28	3230	3530	300	
		22	3530	3830	300	
		18	3830	4030	200	
	1203					
				Total Volume (gal):	800	
11	1004	28	3230	3530	300	Had to redrill to 28' due to heavy sand.
		22	3530	3830	300	
		18	3830	4030	200	
	1206					
				Total Volume (gal):	800	
12	941	28	3230	3530	300	
		22	3530	3830	300	
		18	3830	4030	200	
	1209					
				Total Volume (gal):	800	
				SHEET TOTAL (gal):	4,800	

GENERAL NOTES: 956-1117 Tanks Dry

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-14 DATE: 11-2-19

DP SUBCONTRACTOR PES PERSONNEL: NR

AMENDMENT / PERCENT CONCENTRATION: 9.8 WB SHEET NO. 2 of 3 RR

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
13	1309	38	4030	4130	100	
		32	4130	4230	100	
		28	4230	4530	300	
	1454	22	4530	4830	300	
		18	4830	4030	200	
				Total Volume (gal):	1000	
14	1311	38	4030	4130	100	
		32	4130	4230	100	
		28	4230	4530	300	
	1456	22	4530	4830	300	
		18	4830	5030	200	
				Total Volume (gal):	1000	
15	1313	38	4080	4180	100	
		32	4180	4280	100	
		28	4280	4580	300	
	1457	22	4580	4880	300	
		18	4880	5080	200	
				Total Volume (gal):	1000	
16	1315	38	4030	4130	100	
		32	4130	4230	100	
		28	4230	4530	300	
	1506	22	4530	4830	300	
		18	4830	5030	200	
				Total Volume (gal):	1000	
17	1319	38	4030	4130	100 RR	
		32	4130	4230	100	
		28	4230	4530	300	
	1507	22	4530	4830	300	
		18	4430	5030	200	
				Total Volume (gal):	1000	
18	1321	38	4030	4130	100	
		32	4130	4230	100	
		28	4230	4530	300	
	1509	22	4530	4830	300	
		18	4830	5030	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6,000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-14 DATE: 11-2-19

DP SUBCONTRACTOR PES PERSONNEL: AB

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. M 3 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
19	1544	38	5030	5130	100	
		32	5130	5230	100	
		~~28~~				
	1624 ~~1547~~ M	22				
		18				
				Total Volume (gal):	200	
20	1547	36	5030	5130	100	
		32	5130	5230	100	
	1626					
				Total Volume (gal):	200	
21		38	5080			Tip would not come off had to redrill
		32				
				Total Volume (gal):	0	
22	1555	38	5030	5130	100	
		32	5130	5230	100	
	1627					
				Total Volume (gal):	200	
23	1558	38	5030	5130	100	
		32	5130	5230	100	
	1630	~~32~~ M				
				Total Volume (gal):	200	
24	1601	38	5030	5130	100	
		32	5130	5230	100	
	~~1601~~ 1631					
				Total Volume (gal):	200	
				SHEET TOTAL (gal):	1,000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-T14 DATE: 11-08-19

DP SUBCONTRACTOR PES PERSONNEL: TY MM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 1 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
37	0828	38	4050	4150	100	
		33	4150	4250	100	
		28	4250	4550	300	
	1024	23	4550	4850	300	
		18	4850	5050	200	
				Total Volume (gal):	1000	
38	0826	38	4050	4150	100	
		33	4150	4250	100	
		28	4250	4550	300	
	1022	23	4550	4850	300	
		18	4850	5050	200	
				Total Volume (gal):	1000	
39	0824	38	4050	4150	100	
		33	4150	4250	100	
		28	4250	4550	300	
	1020	23	4550	4850	300	
		18	4850	5050	200	
				Total Volume (gal):	1000	
40	0822	38	4030	4130	100	
		33	4130	4230	100	
		28	4230	4530	300	
	1018	23	4530	4830	300	
		18	4830	5030	200	
				Total Volume (gal):	1000	
41	0820	38	4030	4130	100	
		33	4130	4230	100	
		28	4230	4530	300	
	1015	23	4530	4830	300	
		18	4830	5030	200	
				Total Volume (gal):	1000	
42	0818	38	4040	4140	100	
		33	4140	4240	100	
		28	4240	4540	300	
	1007	23	4540	4840	300	
		18	4840	5040	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6,000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200
38 33 28 23 18

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7 - T13 DATE: 11-03-19

DP SUBCONTRACTOR PES PERSONNEL: TY MM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 2 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
37	1125	38	5040	5140	100	
		33	5140	5240	100	
		28	5240	5540	300	
	1325 ~~1125~~	23	5540	5840	300	
		18	5840	6040	200	
				Total Volume (gal):	1000	
38	1123	38	5030	5130	100	
		33	5130	5230	100	
		28	5230	5530	300	
	1323 ~~1123~~	23	5530	5830	300	
		18	5830	6030	200	
				Total Volume (gal):	1000	
39	1121	38	5030	5130	100	
		33	5130	5230	100	
		28	5230	5530	300	
	1321 ~~1121~~	23	5530	5830	300	
		18	5830	6030	200	
				Total Volume (gal):	1000	
40	1119	38	5050	5150	100	
		33	5150	5250	100	
		28	5250	5550	300	
	1320 ~~1119~~	23	5550	5850	300	
		18	5850	6050	200	
				Total Volume (gal):	1000	
41	1117	38	5050	5150	100	
		33	5150	5250	100	
		28	5250	5550	300	
	1317 ~~1117~~	23	5550	5850	300	
		18	5850	6050	200	
				Total Volume (gal):	1000	
42	1115	38	5050	5150	100	
		33	5150	5250	100	
		28	5250	5550	300	
	1315 ~~1115~~	23	5550	5850	300	
		18	5850	6050	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6,000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200
38 33 28 23 18

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-T12 DATE: 11-03-19

DP SUBCONTRACTOR PES PERSONNEL: TV MM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 3 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
43	1410	38	6040	6140	100	
		33	6140	6240	100	
		28	6240	6540	300	
	1515					
				Total Volume (gal):	500	
44	1408	38	6030	6130	100	
		33	6130	6230	100	
		28	6230	6530	300	
	1510					
				Total Volume (gal):	500	
45	1406	38	6030	6130	100	
		33	6130	6230	100	
		28	6230	6530	300	
	1508					
				Total Volume (gal):	500	
46	1404	38	6050	6150	100	
		33	6150	6250	100	
		28	6250	6550	300	
	1506					
				Total Volume (gal):	500	
47	1402	38	6050	6150	100	
		33	6150	6250	100	
		28	6250	6550	300	
	1504					
				Total Volume (gal):	500	
48	1400	38	6050	6150	100	
		33	6150	6250	100	
		28	6250	6550	300	
	1500					
				Total Volume (gal):	500	
				SHEET TOTAL (gal):	3000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-14 DATE: 11-3-19

DP SUBCONTRACTOR PES PERSONNEL: MR

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 1 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
19	0811	28	5230	5530	300	Had to pull up and redrill @ 28'
		22	5530	5830	300	
		18	5830	6030	200	
	0932		~~6030~~			
				Total Volume (gal):	800	
20	0743	28	5230	5530	300	
		22	5530	5830	300	
		18	5830	6030	200	
	0919					
				Total Volume (gal):	800	
21	0743	38	5080	5180	100	
		32	5180	5280	100	
		28	5280	5580	300	
	0932	22	5580	5880	300	
		18	5880	6080	200	
				Total Volume (gal):	~~800~~ 1,000	
22	0744	28	5230	5530	300	
		22	5530	5830	300	
		18	5830	6030	200	
	0916					
				Total Volume (gal):	800	
23	0747	28	5230	5530	300	
		22	5530	5830	300	
		18	5830	6030	200	
	0917					
				Total Volume (gal):	800	
24	0755	28	5230	5530	300	
		22	5530	5830	300	
		18	5830	6030	200	
	0918					
				Total Volume (gal):	800	
				SHEET TOTAL (gal):	5000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-13 DATE: 11-3-19

DP SUBCONTRACTOR PES PERSONNEL: AH

AMENDMENT / PERCENT CONCENTRATION: 9.8% W13 SHEET NO. 2 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
1	1120	36	6030	6130	100	
		32	6130	6230	100	
		28	6230	6530	300	
	1322	22	6530	6830	300	
		18	6830	7030	200	
				Total Volume (gal):	1000	
2	1122	38	6030	6130	100	
		32	6130	6230	100	
		28	6230	6530	300	
	1323 ~~1322~~ m	22	6530	6830	300	
		18	6830	7030	200	
				Total Volume (gal):	1000	
3	1134	38	6080	6180	100	
		32	6180	6280	100	
		28	6280	6580	300	
	1324	22	6580	6880	300	
		18	6880	7080	200	
				Total Volume (gal):	1000	
4	1138	38	6030	6130	100	
		32	6130	6230	100	
		28	6230	6530	300	
	1324	22	6530	6830	300	
		18	6830	7030	200	
				Total Volume (gal):	1000	
5	1141	38	6030	6130	100	
		32	6130	6230	100	
		28	6230	6530	300	
	1327	22	6530	6830	300	
		18	6830	7030	200	
				Total Volume (gal):	1000	
6	1129	38	6030	6130	100	
		32	6130	6230	100	
		28	6230	6530	300	
	1329	22	6530	6830	300	
		18	6830	7030	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-12 DATE: 11-3-19

DP SUBCONTRACTOR PES PERSONNEL: MK

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 3 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
1	1416	38	7030	7130	100	Slow flow
	1531			Total Volume (gal):	100	
2	1412	38	7030	7130	100	Slow flow
	1531			Total Volume (gal):	100	
3	1414	38	7080	7180	100	
	1533			Total Volume (gal):	100	
4	1417	38	7030	7130	100	Slow flow
	1535			Total Volume (gal):	100	
5	1419	38	7030	7130	100	Slow flow
	1536			Total Volume (gal):	100	
6	1421	38	7030	7130	100	
	1537			Total Volume (gal):	100	
				SHEET TOTAL (gal):	600	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-T12 DATE: 11-04-19

DP SUBCONTRACTOR PES PERSONNEL: TY MM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 1 of 4

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
43	0727	23	6540	6840	300	
		18	6840	7040	200	
	0810					
				Total Volume (gal):	500	
44	0725	23	6530	6830	300	
		18	6830	7030	200	
	0807					
				Total Volume (gal):	500	
45	0724	23	6530	6830	300	
		18	6830	7030	200	
	0806					
				Total Volume (gal):	500	
46	0722	23	6550	6850	300	
		18	6850	7050	200	
	0805					
				Total Volume (gal):	500	
47	0721	23	6550	6850	300	
		18	6850	7050	200	
	0802					
				Total Volume (gal):	500	
48	0720	23	6550	6850	300	
		18	6850	7050	200	
	0800					
				Total Volume (gal):	500	
				SHEET TOTAL (gal):	3,000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

38 33 28 23 18

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-T12 DATE: 11-04-19

DP SUBCONTRACTOR PES PERSONNEL: TY MM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 2 of 4

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
42	0910	38	7050	7150	100	
		33	7150	7250	100	
		28	7250	7550	300	
	1115	23	7550	7850	300	
		18	7850	8050	200	
				Total Volume (gal):	1000	
41	0912	38	7050	7150	100	
		33	7150	7250	100	
		28	7250	7550	300	
	1117	23	7550	7850	300	
		18	7850	8050	200	
				Total Volume (gal):	1000	
40	0914	38	7050	7150	100	
		33	7150	7250	100	
		28	7250	7550	300	
	1119	23	7550	7850	300	
		18	7850	8050	200	
				Total Volume (gal):	1000	
39	0916	38	7030	7130	100	
		33	7130	7230	100	
		28	7230	7530	300	
	1121	23	7530	7830	300	
		18	7830	8030	200	
				Total Volume (gal):	1000	
38	0918	38	7030	7130	100	
		33	7130	7230	100	
		28	7230	7530	300	
	1123	23	7530	7830	300	
		18	7830	8030	200	
				Total Volume (gal):	1000	
37	0920	38	7040	7140	100	
		33	7140	7240	100	
		28	7240	7540	300	
	1125	23	7540	7840	300	
		18	7840	8040	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200
38 33 28 23 18

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-T13 DATE: 11-04-19

DP SUBCONTRACTOR PES PERSONNEL: TY MM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 3 of 4

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
36	1310	38	8040	8140	100	
		33	8140	8240	100	
		28	8240	8540	300	
	1450	23	8540	8840	300	
		18	8840	9040	200	
				Total Volume (gal):	1000	
35	1217	38	8030	8130	100	
		33	8130	8230	100	
		28	8230	8530	300	
	1452	23	8530	8830	300	
		18	8830	9030	200	
				Total Volume (gal):	1000	
34	1219	38	8030	8130	100	
		33	8130	8230	100	
		28	8230	8530	300	
	1454	23	8530	8830	300	
		18	8830	9030	200	
				Total Volume (gal):	1000	
33	1221	38	8050	8150	100	
		33	8150	8250	100	
		28	8250	8550	300	
	1456	23	8550	8850	300	
		18	8850	9050	200	
				Total Volume (gal):	1000	
32	1222	38	8050	8150	100	
		33	8150	8250	100	
		28	8250	8550	300	
	1458	23	8550	8850	300	
		18	8850	9050	200	
				Total Volume (gal):	1000	
31	1224	38	8050	8150	100	
		33	8150	8250	100	
		28	8250	8550	300	
	1430	23	8550	8850	300	
		18	8850	9050	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6,000	

GENERAL NOTES:

1255 Redrilled pt. 36, tip would not come off.

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

38 33 28 23 18

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-T12 DATE: 11-04-19

DP SUBCONTRACTOR PES PERSONNEL: TY MM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 4 of 4

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
36	1530	38	9050	9150	100	
	1610					
				Total Volume (gal):	100	
35	1532	38	9050	9150	100	
	1612					
				Total Volume (gal):	100	
34	1534	38	9050	9150	100	
	1614					
				Total Volume (gal):	100	
33	1550	38	9030	9130	100	
	1625					
				Total Volume (gal):	100	
32	1536	38	9030	9130	100	
	1616					
				Total Volume (gal):	100	
31	1537	38	9040	9140	100	
	1618					
				Total Volume (gal):	100	
				SHEET TOTAL (gal):	600	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

1540 Redrilled pt. 33, tip would not breakoff

1545 Last attempt to remove tip was successful, pt. 33 was not redrilled

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-12 RH DATE: 11-4-19

DP SUBCONTRACTOR PES PERSONNEL: AH

AMENDMENT / PERCENT CONCENTRATION: 9.89% WB SHEET NO. 1 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
1	0720	32	7130	7230	100	
		28	7230	7530	300	
		22	7530	7830	300	
	0845	18	7830	8030	200	
				Total Volume (gal):	900	
2	0720	32	7130	7230	100	
		28	7230	7530	300	
		22	7530	7830	300	
	0844	18	7830	8030	200	
				Total Volume (gal):	900	
3	0720	32	7180	7280	100	
		28	7280	7580	300	
		22	7580	7880	300	
	0845	18	7880	8080	200	
				Total Volume (gal):	900	
4	0720	32	7130	7230	100	
		28	7230	7530	300	
		22	7530	7830	300	
	0852	18	7830	8030	200	
				Total Volume (gal):	900	
5	0720	32	7130	7230	100	
		28	7230	7530	300	
		22	7530	7830	300	
	0853	18	7830	8030	200	
				Total Volume (gal):	900	
6	0720	32	7130	7230	100	
		28	7230	7530	300	
		22	7530	7830	300	
	0854	18	7830	8030	200	
				Total Volume (gal):	900	
				SHEET TOTAL (gal):	5,400	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-1 & 12 DATE: 11-4-19

DP SUBCONTRACTOR PES AL PERSONNEL: AR

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 2 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
7	0934	38	8030	8130	100	
		32	8130	8230	100	
		28	8230	8530	300	
	1215	22	8530	8830	300	
		18	8830	9030	200	
				Total Volume (gal):	1,000	
8	0956	38	8030	8130	100	
		32	8130	8230	100	
		28	8230	8530	300	
	1134	22	8530	8830	300	
		18	8830	9030	200	
				Total Volume (gal):	1,000	
9	0938	38	8080	8180	100	
		32	8180	8280	100	
		28	8280	8580	300	
	1229 ~~1214~~ AR	22	8580	8880	300	
		18	8880	9080	200	
				Total Volume (gal):	1,000	
10	0940	38	8030	8130	100	
		32	8130	8230	100	
		28	8230	8530	300	
	1225	22	8530	8830	300	
		18	8830	9030	200	
				Total Volume (gal):	1,000	
11	0942	38	8030	8130	100	
		32	8130	8230	100	
		28	8230	8530	300	
	1226	22	8530	8830	300	
		18	8830	9030	200	
				Total Volume (gal):	1,000	
12	0944	38	8030	8130	100	
		32	8130	8230	100	
		28	8230	8530	300	
	1227	22	8530	8830	300	
		18	8830	9030	200	
				Total Volume (gal):	1,000	
1134 – 1205 Tank Org				SHEET TOTAL (gal):	6,000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-1 & 2 DATE: 11-4-19

DP SUBCONTRACTOR PES AR PERSONNEL: AR

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 3 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
13	1323	38	9030	9130	100	
		32	9130	9230	100	
		28	9230	9530	300	
	1549	22	9530	9830	300	
		18	9830	10,030	200	
				Total Volume (gal):	1,000	
14	1325	38	9030	9130	100	
		32	9130	9230	100	
		28	9230	9530	300	
	1552	22	9530	9830	300	
		18	9830	10,030	200	
				Total Volume (gal):	1,000	
15	1327	38	9080	9180	100	
		32	9180	9280	100	
		28	9280	9580	300	
	1550	22	9580	9880	300	
		18	9880	10,080	200	
				Total Volume (gal):	1,000	
16	1330	38	9030	9130	100	
		32	9130	9230	100	
		28	9230	9530	300	
	1557	22	9530	9830	300	
		18	9830	10,080 AR	200	
				Total Volume (gal):	1,000	
17	1353	38	9030	9130	100	Had to redrill
		32	9130	9230	100	could not remove
		28	9230	9530	300	plug
	1558	22	9530	9830	300	
		18	9830	10,080 AR	200	
				Total Volume (gal):	1,000	
18	1332	38	9030	9130	100	
		32	9130	9230	100	
		28	9230	9530	300	
	1559	22	9530	9830	300	
		18	9830	10,030	200	
				Total Volume (gal):	1,000	
H34 ~~Tank Dry~~ AR				SHEET TOTAL (gal):	6,000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-T12 DATE: 11-05-19

DP SUBCONTRACTOR PES PERSONNEL: TY MM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 1 of 4

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
36	0720	33	9150	9250	100	
		28	9250	9550	300	
		23	9550	9850	300	
	0850	18	9850	10,050	200	
				Total Volume (gal):	900	
35	0722	33	9150	9250	100	
		28	9250	9550	300	
		23	9550	9850	300	
	0852	18	9850	10,050	200	
				Total Volume (gal):	900	
34	0724	33	9150	9250	100	
		28	9250	9550	300	
		23	9550	9850	300	
	0854	18	9850	10,050	200	
				Total Volume (gal):	900	
33	0726	33	9130	9230	100	
		28	9230	9530	300	
		23	9530	9830	300	
	0856	18	9830	10,030	200	
				Total Volume (gal):	900	
32	0728	33	9130	9230	100	
		28	9230	9530	300	
		23	9530	9830	300	
	0858	18	9830	10,030	200	
				Total Volume (gal):	900	
31	0730	33	9140	9240	100	
		28	9240	9540	300	
		23	9540	9840	300	
	0900	18	9840	10,040	200	
				Total Volume (gal):	900	
				SHEET TOTAL (gal):	5,400	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-T13 DATE: 11-05-19

DP SUBCONTRACTOR PES PERSONNEL: TY MM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 2 of 4

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
30	0920	38	10,050	10,150	100	
		33	10,150	10,250	100	
		28	10,250	10,550	300	
	1107	23	10,550	10,850	300	
		18	10,850	11,050	200	
				Total Volume (gal):	1000	
29	0922	38	10,050	10,150	100	
		33	10,150	10,250	100	
		28	10,250	10,550	300	
	1109	23	10,550	10,850	300	
		18	10,850	11,050	200	
				Total Volume (gal):	1000	
28	0924	38	10,050	10,150	100	
		33	10,150	10,250	100	
		28	10,250	10,550	300	
	1111	23	10,550	10,850	300	
		18	10,850	11,050	200	
				Total Volume (gal):	1000	
27	0926	38	10,030	10,130	100	
		33	10,130	10,230	100	
		28	10,230	10,530	300	
	1113	23	10,530	10,830	300	
		18	10,830	11,030	200	
				Total Volume (gal):	1000	
26	0928	38	10,030	10,130	100	
		33	10,130	10,230	100	
		28	10,230	10,530	300	
	1115	23	10,530	10,830	300	
		18	10,830	11,030	200	
				Total Volume (gal):	1000	
25	0935	38	10,040	10,060	20	Rod pulled
		33	10,060	10,240	180	
		28	10,240	10,540	300	
	1117	23	10,540	10,840	300	
		18	10,840	11,040	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-T13 DATE: 11-05-19

DP SUBCONTRACTOR PES PERSONNEL: TY MM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 3 of 4

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
19	1205	38	11,050	11,150	100	
		33	11,150	11,250	100	
		28	11,250	11,550	300	
	1400	23	11,550	11,850	300	
		18	11,850	12,050	200	
				Total Volume (gal):	1000	
20	1203	38	11,050	11,150	100	
		33	11,150	11,250	100	
		28	11,250	11,550	300	
	1358	23	11,550	11,850	300	
		18	11,850	12,050	200	
				Total Volume (gal):	1000	
21	1201	38	11,050	11,150	100	
		33	11,150	11,250	100	
		28	11,250	11,550	300	
	1356	23	11,550	11,850	300	
		18	11,850	12,050	200	
				Total Volume (gal):	1000	
22	1159	38	11,030	11,130	100	
		33	11,130	11,230	100	
		28	11,230	11,530	300	
	1354	23	11,530	11,830	300	
		18	11,830	12,030	200	
				Total Volume (gal):	1000	
23	1157	38	11,030	11,130	100	
		33	11,130	11,230	100	
		28	11,230	11,530	300	
	1352	23	11,530	11,830	300	
		18	11,830	12,030	200	
				Total Volume (gal):	1000	
24	1155	38	11,040	11,140	100	
		33	11,140	11,240	100	
		28	11,240	11,540	300	
	1350	23	11,540	11,840	300	
		18	11,840	12,040	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW 7 - T12 DATE: 11-05-19

DP SUBCONTRACTOR PES PERSONNEL: TY MM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 4 of 4

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
25	1415	38	12050	12150	100	
		33	12150	12250	100	
		28	12250	12550	300	
	1610	23	12550	12850	300	
		18	12850	13050	200	
				Total Volume (gal):	1000	
26	1417	38	12050	12150	100	
		33	12150	12250	100	
		28	12250	12550	300	
	1615	23	12550	12850	300	
		18	12850	13050	200	
				Total Volume (gal):	1000	
27	1419	38	12050	12150	100	
		33	12150	12250	100	
		28	12250	12550	300	
	1620	23	12550	12850	300	
		18	12850	13050	200	
				Total Volume (gal):	1000	
28	1421	38	12030	12130	100	
		33	12130	12230	100	
		28	12230	12530	300	
	1624	23	12530	12830	300	
		18	12830	13030	200	
				Total Volume (gal):	1000	
29	1423	38	12030	12130	100	
		33	12130	12230	100	
		28	12230	12530	300	
	1636	23	12530	12830	300	
		18	12830	13030	200	
				Total Volume (gal):	1000	
30	1425	38	12040	12140	100	
		33	12140	12240	100	
		28	12240	12540	300	
	1630	23	12540	12840	300	
		18	12840	13040	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

38 33 28 23 18

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-13 DATE: 11-5-19

DP SUBCONTRACTOR PES PERSONNEL: MR

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 1 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
7	736	38	10030	10130	100	
		32	10130	10230	100	
		28	10230	10530	300	
	943	22	10530	10830	300	
		18	10830	11,030	200	
				Total Volume (gal):	1000	
8	738	38	10030	10130	100	
		32	10130	10230	100	
		28	10230	10530	300	
	944	22	10530	10830	300	
		18	10830	11030	200	
				Total Volume (gal):	1000	
9	739	38	10080	10180	100	
		32	10180	10280	100	
		28	10280	10580	300	
	0944	22	10580	10880	300	
		18	10880	11080	200	
				Total Volume (gal):	1000	
10	741	38	10030	10130	100	
		32	10130	10230	100	
		28	10230	10530	300	
	0954	22	10530	10830	300	
		18	10830	11030	200	
				Total Volume (gal):	1000	
11	743	38	10030	10130	100	
		32	10130	10230	100	
		28	10230	10530	300	
	955	22	10530	10830	300	
		18	10830	11030	200	
				Total Volume (gal):	1000	
12	745	38	10030	10130	100	
		32	10130	10230	100	
		28	10230	10530	300	
	951	22	10530	10830	300	
		18	10830	11030	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6,000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-12 DATE: 11-5-19

DP SUBCONTRACTOR PES PERSONNEL: BR

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 2 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
~~13~~ AR 19	1024	38	11030	11130	100	
		32	11130	11230	100	
		28	11230	11530	300	
	1221	22	11530	11830	300	
		18	11830	12030	200	
				Total Volume (gal):	1000	
~~14~~ AR 20	1025	38	11030	11130	100	
		32	11130	11230	100	
		24	11230	11530	300	
	1221	22	11530	11830	300	
		18	11830	12030	200	
				Total Volume (gal):	1000	
~~15~~ AR 21	1027	38	11080	11180	100	
		32	11180	11280	100	
		28	11280	11580	300	
	1220	22	11580	11880	300	
		18	11880	12080	200	
				Total Volume (gal):	1000	
~~16~~ AR 22	1029	38	11030	11~~80~~30	100	
		32	11130	11230	100	
		28	11230	11530	300	
	1230	22	11530	11830	300	
		18	11830	12~~05~~30	200	
				Total Volume (gal):	1000	AR
~~17~~ AR 23	1031	38	11030	11130	~~1000~~	~~11~~ 100
		32	11130	11230	100	
		28	11230	11530 AR	~~15~~ 300	
	1227	22	11530	11830 AR	11 300	
		18	11830	12030 AR	~~12030~~ 200	
				Total Volume (gal):	1000	
~~18~~ AR 24	1032	38	11030	11130	11 100	
		32	11130	11230 AR	11 100	
		28	11230	11530	11 300	
	1224	22	11530	11830	11 300	
		18	11830	12030	12 200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6,000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-13 DATE: 11-5-19

DP SUBCONTRACTOR PES PERSONNEL: BJ DZ

AMENDMENT / PERCENT CONCENTRATION: 9.8% W13 SHEET NO. 3 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
13	1301 / ~~1407~~ AM / 1507	38	12030	12130	100	
		32	12130	12230	100	
		28	12230	12530	300	
		22	12530	12830	300	
		18	12830	13030	200	
				Total Volume (gal):	1000	
14	1302 / 1514	38	12030	12130	100	
		32	12130	12230	100	
		28	12230	12530	300	
		22	12530	12830	300	
		18	12830	13030	200	
				Total Volume (gal):	1000	
15	1304 / 1507	38	12080	12180	100	
		32	12180	12280	100	
		28	12280	12580	300	
		22	12580	12880	300	
		18	12880	13080	200	
				Total Volume (gal):	1000	
16	1305 / 1526	38	12030	12130	100	
		32	12130	12230	100	
		28	12230	12530	300	
		22	12530	12830	300	
		18	~~12880~~ 12830	~~13080~~ 13030	200	
				Total Volume (gal):	1000	
17	1306 / 1523	38	12030	12130	100	
		32	12130	12230	100	
		28	12230	12530	300	
		22	12530	12830	300	
		18	12830	13030	200	
				Total Volume (gal):	1000	
18	1307 / 1523	38	12030	12130	100	
		32	12130	12230	100	
		28	12230	12530	300	
		22	12530	12830	300	
		18	12830	13030	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6,000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-T11 DATE: 11-06-19

DP SUBCONTRACTOR PES PERSONNEL: TY MM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 1 of 2

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
48	0835	38	13,040	13,140	100	
		33	13,140	13,240	100	
		28	13,240	13,540	300	
	1030	23	13,540	13,840	300	
		18	13,840	14,040	200	
				Total Volume (gal):	1000	
47	0837	38	13,030	13,130	100	
		33	13,130	13,230	100	
		28	13,230	13,530	300	
	1032	23	13,530	13,830	300	
		18	13,830	14,030	200	
				Total Volume (gal):	1000	
46	0839	38	13,030	13,130	100	
		33	13,130	13,230	100	
		28	13,230	13,530	300	
	1034	23	13,530	13,830	300	
		18	13,830	14,030	200	
				Total Volume (gal):	1000	
45	0841	38	13,050	13,150	100	
		33	13,150	13,250	100	
		28	13,250	13,550	300	
	1036	23	13,550	13,850	300	
		18	13,850	14,050	200	
				Total Volume (gal):	1000	
44	0843	38	13,050	13,150	100	
		33	13,150	13,250	100	
		28	13,250	13,550	300	
	1038	23	13,550	13,850	300	
		18	13,850	14,050	200	
				Total Volume (gal):	1000	
43	0845	38	13,050	13,150	100	
		33	13,150	13,250	100	
		28	13,250	13,550	300	
	1040	23	13,550	13,850	300	
		18	13,850	14,050	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-T10 DATE: 11-06-19

DP SUBCONTRACTOR PES PERSONNEL: TY MM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 2 of 2

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
48	1100	38	14050	14150	100	
		33	14150	14250	100	
		28	14250	14550	300	
	1315	23	14550	14850	300	
		18	14850	15050	200	
				Total Volume (gal):	1000	
47	1102	38	14050	14150	100	
		33	14150	14250	100	
		28	14250	14550	300	
	1318	23	14550	14850	300	
		18	14850	15050	200	
				Total Volume (gal):	1000	
46	1104	38	14050	14150	100	
		33	14150	14250	100	
		28	14250	14550	300	
	1321	23	14550	14850	300	
		18	14850	15050	200	
				Total Volume (gal):	1000	
45	1106	38	14030	14130	100	
		33	14130	14230	100	
		28	14230	14530	300	
	1324	23	14530	14830	300	
		18	14830	15030	200	
				Total Volume (gal):	1000	
44 ~~43~~	1108	38	14040	14140	100	
		33	14140	14240	100	
		28	14240	14540	300	
	1327	23	14540	14840	300	
		18	14840	15040	200	
				Total Volume (gal):	1000	
43	1110	38	14040	14140	100	
		33	14140	14240	100	
		28	14240	14540	300	
	1330	23	14540	14840	300	
		18	14840	15040	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-11 DATE: 11-6-19

DP SUBCONTRACTOR PES PERSONNEL: BR

AMENDMENT / PERCENT CONCENTRATION: 9.8% W13 SHEET NO. 1 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
1	727	38	13030	13130	100	
		32	13130	13230	100	
		28	13230	13530	300	
	937	22	13530	13830	300	
		18	13830	14030	200	
				Total Volume (gal):	1000	
2	728	38	13030	13130	100	
		32	13130	13230	100	
		28	13230	13530	300	
	938	22	13530	13830	300	
		18	13830	14030	200	
				Total Volume (gal):	1000	
3	729	38	13080	13180	100	
		32	13180	13280	100	
		28	13280	13580	300	
	940	22	13580	13880	300	
		18	13880	14,080	200	
				Total Volume (gal):	1000	
4	731	38	13030	13130	100	
		32	13130	13230	100	
		28	13230	13530	300	
	944	22	13530	13830	300	
		18	13830	14030	200	
				Total Volume (gal):	1000	
5	733	38	13030	13130	100	
		32	13130	13230	100	
		28	13230	13530	300	
	943	22	13530	13830	300	
		18	13830	14030	200	
				Total Volume (gal):	1000	
6	735	38	13030	13130	100	
		32	13130	13230	100	
		28	13230	13530	300	
	946	22	13530	13830	300	
		14	13830	14030	100	
				Total Volume (gal):	1000	

0915 - 0930 ran out of gas.

SHEET TOTAL (gal): 6000

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-10 DATE: 11-6-19

DP SUBCONTRACTOR PES PERSONNEL: MH

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 2 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
1	1002	36	14030	14130	100	
		32	14130	14230	100	
		28	14230	14530	300	
	1151	22	14530	14830	300	
		18	14830	15030	200	
				Total Volume (gal):	1000	
2	1005	38	14030	14130	100	
		32	14130	14230	100	
		28	14230	14530	300	
	1152	22	14530	14830	300	
		18	14830	15030	200	
				Total Volume (gal):	1000	
3	1006	36	14080	14180	100	
		32	14180	14280	100	
		28	14280	14580	300	
	1153	22	14580	14880	300	
		18	14880	15030	200	
				Total Volume (gal):	1000	
4	1015	36	14030	14130	100	
		34	14130	14230	100	
		28	14230	14530	300	
	1159	22	14530	14830	300	
		18	14830	15030	200	
				Total Volume (gal):	1000	
5	1008	38	14030	14130	100	
		34	14130	14230	100	
		28	14230	14530	300	
	1205	22	14530	14830	300	
		18	14830	15030	200	
				Total Volume (gal):	1000	
6	1010	38	14030	14130	100	
		34	14130	14230	100	
		28	14230	14530	300	
	1202	22	14530	14830	300	
		18	14830	15050	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-10 DATE: 11-6-19

DP SUBCONTRACTOR PES PERSONNEL: AK

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 3 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
7	1224	38	15030	15130	100	
		32	15130	15230	100	
		28	15230	15530	300	
	1437	22	15530	15830	300	
		18	15830	~~16030~~ 16120	290	
				Total Volume (gal):	1090	
8	1225	38	15030	15130	100	
		32	15130	15230	100	
		28	15230	15530	300	
	1437	22	15530	15830	300	
		18	15830	16120	290	
				Total Volume (gal):	1090	
9	1226	38	15080	15180	100	
		32	15180	15280	100	
		28	15280	15580	300	
	1437	22	15580	15880	300	
		18	15880	~~16080~~ 16120	240	
				Total Volume (gal):	1040	
10	1227	38	15030	15130	100	
		32	15130	15230	100	
		28	15230	15530	300	
	~~1737~~ 1437	22	15530	15830	300	
		18	15830	~~16030~~ 16120	290	
				Total Volume (gal):	1090	
11	1229	38	15030	15130	100	
		32	15130	15230	100	
		28	15230	15530	300	
	1437	22	15530	15830	300	
		18	15830	16120	290	
				Total Volume (gal):	1090	
12	1231	38	15030	15130	100	
		32	15130	15230	100	
		28	15230	15530	300	
	1437	22	~~15430~~ 15530	15830	300	
		18	15830	16120	290	
				Total Volume (gal):	1090	
				SHEET TOTAL (gal):	6,490	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7 - T11 DATE: 11-11-19

DP SUBCONTRACTOR PES PERSONNEL: TY MM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 1 of 1

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
42	1408	38	15040	15140	100	
		33	15140	15240	100	
		28	15240	15540	300	
	1614	23	15540	15840	300	
				Total Volume (gal):	800	
41	1410	38	15040	15140	100	
		33	15140	15240	100	
		28	15240	15540	300	
	1616	23	15540	15840	300	
				Total Volume (gal):	800	
40	1412	38	15030	15130	100	
		33	15130	15230	100	
		28	15230	15530	300	
	1618	23	15530	15830	300	
				Total Volume (gal):	800	
39	1414	38	15050	15150	100	
		33	15150	15250	100	
		28	15250	15550	300	
	1620	23	15550	15850	300	
				Total Volume (gal):	800	
38	1416	38	15050	15150	100	
		33	15150	15250	100	
		28	15250	15550	300	
	1622	23	15550	15850	300	
				Total Volume (gal):	800	
37	1418	38	15050	15150	100	
		33	15150	15250	100	
		28	15250	15550	300	
	1624	23	15550	15850	300	
				Total Volume (gal):	800	
				SHEET TOTAL (gal):	4800	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

38 33 28 23 18

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-11 DATE: 11-11-19

DP SUBCONTRACTOR PES PERSONNEL: BR

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 1 of 1

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
7	1508	38	16120	16220	100	
		32 AR	16220	16320	100	
		28 AR	16320	16620	300	
		22 AR	16620	16920		
		18 AR	16920	17120		
				Total Volume (gal):	500	
8	1509	38	16120	16220	100	
		32	16220	16320	100	
		28	16320	16620	300	
		22	16620	16920		
		18	16920	17120		
				Total Volume (gal):	500	
9	1509	38	16120	16220	100	
		32	16220	16320	100	
		28	16320	16620	300	
		22	16620	16920		
		18	16920	17120		
				Total Volume (gal):	500	
10	1510	38	16120	16220	100	
		32	16220	16320	100	
		28	16320	16620	300	
		22	16620	16920		
		18	16920	17120		
				Total Volume (gal):	500	
11	1510	38	16120	16220	100	
		32	16220	16320	100	
		28	16320	16620	300	
		22	16620	16920		
		18	16920	17120		
				Total Volume (gal):	500	
12	1512	38	16120	16220	100	
		32	16220	16320	100	
		28	16320	16620	300	
		22	16620	16920		
		18	16920	17120		
				Total Volume (gal):	500	
				SHEET TOTAL (gal):	3,000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7 - T11 DATE: 11-12-19

DP SUBCONTRACTOR PES PERSONNEL: TY MM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 1 of 2

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
42	1224	18	15840	16040	200	
	1246					
				Total Volume (gal):	200	
41	1226	18	15840	16040	200	
	1248					
				Total Volume (gal):	200	
40	1228	18	15830	16030	200	
	1250					
				Total Volume (gal):	200	
39	1230	18	15850	16050	200	
	1252					
				Total Volume (gal):	200	
38	1232	18	15850	16050	200	
	1254					
				Total Volume (gal):	200	
37	1234	18	15850	16050	200	
	1256					
				Total Volume (gal):	200	
				SHEET TOTAL (gal):	1200	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7 - T10 DATE: 11-12-19

DP SUBCONTRACTOR PES PERSONNEL: TY MM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 2 of 2

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
42	1320	38	160150	161950	100	
		33	161950	162950	100	
		28	162950	165950	300	
	1620	23	165950	168950	300	
		18	168950	170950	200	
				Total Volume (gal):	1000	
41	1415	38	160150	161950	100	
		33	161950	162950	100	
		28	162950	165950	300	
	1622	23	165950	168950	300	
		18	168950	170950	200	
				Total Volume (gal):	1000	
40	1322	38	160150	161950	100	
		33	161950	162950	100	
		28	162950	165950	300	
	1624	23	165950	168950	300	
		18	168950	170950	200	
				Total Volume (gal):	1000	
39	1325	38	160330	160350	20	Pulled rod
		33	160350	162330	180	
		28	162330	165330	300	
	1626	23	165330	168330	300	
		18	168330	170330	200	
				Total Volume (gal):	1000	
38	1327	38	160440	161440	100	
		33	161440	162440	100	
		28	162440	165440	300	
	1628	23	165440	168440	300	
		18	168440	170440	200	
				Total Volume (gal):	1000	
37	1330	38	160440	160660	20	Pulled rod
		33	160660	162440	180	
		28	162440	165440	300	
	1630	23	165440	168440	300	
		18	168440	170440	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

1335 Redrilled point 41, tip not coming off
1500 Pump out of oil, had to run to shop
1515 Resumed pumping
Points 39 and 37 → tips were off, but amendment would not flow at 38 ft bgs

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-11 DATE: 11-12-19

DP SUBCONTRACTOR PES PERSONNEL: BR

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 1 of 2

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
7	1252	22	16620	16920	300	
		18	16920	17120	200	
	1336					
				Total Volume (gal):	500	
8	1253	22	16620	16920	300	
		18	16920	17120	200	
	1333					
				Total Volume (gal):	500	
9	1254	22	16620	16920	300	
		18	16920	17120	200	
	1334					
				Total Volume (gal):	500	
10	1257	22	16620	16920	300	
		18	16920	17120	200	
	1345					
				Total Volume (gal):	500	
11	1254	22	16620	16920	300	
		18	16920	17120	200	
	1346					
				Total Volume (gal):	500	
12	1302	22	16620	16920	300	
		18	16920	17120	200	
	1346					
				Total Volume (gal):	500	
				SHEET TOTAL (gal):	3000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-11 DATE: 11-12-19

DP SUBCONTRACTOR PES PERSONNEL: BM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 2 of 2

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
13	1426	38	17120	17220	100	
		32	17220	17320	100	
		28	17320	17620	300	
	1553	22	17620	17920		
		18	17920	18120		
				Total Volume (gal):	500	
14	1427	38	17120	17220	100	
		32	17220	17320	100	
		28	17320	17620	300	
	1554	22	17620	17920		
		18	17920	18120		
				Total Volume (gal):	500	
15	1428	38	17120	17220	100	
		32	17220	17320	100	
		28	17320	17620	300	
	1555	22	17620	17920		
		18	17920	18120		
				Total Volume (gal):	500	
16	1429	38	17120	17220	100	
		32	17220	17320	100	
		28	17320	17620	300	
	1558	22	17620	17920		
		18	17920	18120		
				Total Volume (gal):	500	
17	1430	38	17120	17220	100	
		32	17220	17320	100	
		28	17320	17620	300	
	1601	22	17620	17920		
		18	17920	18120		
				Total Volume (gal):	500	
18	1432	38	17120	17220	100	
		32	17220	17320	100	
		28	17320	17620	300	
	1559	22	17620	17920		
		18	17920	18120		
				Total Volume (gal):	500	
				SHEET TOTAL (gal):	3,000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-T10 DATE: 11-13-19

DP SUBCONTRACTOR PES PERSONNEL: TY MM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 1 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
36	0730	38	17050	17070	20	Pulled Rod
		33	17070	17250	180	
		28	17250	17550	300	
	1000	23	17550	17850	300	
		18	17850	18050	200	
				Total Volume (gal):	1000	
35	0910	38	17050	17060	10	Pulled Rod
		33	17060	17250	190	
		28	17250	17550	300	
	1005	23	17550	17850	300	
		18	17850	18050	200	
				Total Volume (gal):	1000	
34	0735	38	17050	17150	100	
		33	17150	17250	100	
		28	17250	17550	300	
	1007	23	17550	17850	300	
		18	17850	18050	200	
				Total Volume (gal):	1000	
33	0740	38	17030	17130	100	
		33	17130	17230	100	
		28	17230	17530	300	
	1009	23	17530	17830	300	
		18	17830	18030	200	
				Total Volume (gal):	1000	
32	0742	~~28~~ 38	17040	17140	100	
		33	17140	17240	100	
		28	17240	17540	300	
	1011	23	17540	17840	300	
		18	17840	18040	200	
				Total Volume (gal):	1000	
31	0745	38	17040	17140	100	
		33	17140	17240	100	
		28	17240	17540	300	
	1013	23	17540	17840	300	
		18	17840	18040	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Pt. 36: tip was off, still wouldn't flow

Pt. 35: Tip not coming off, redrilled.

Pt. 35: tip off, still was not flowing

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-T11 DATE: 11-13-19

DP SUBCONTRACTOR PES PERSONNEL: TY MM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 2 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
36	1100	38	18040	18140	100	
		33	18140	18240	100	
		28	18240	18540	300	
	1310	23	18540	18840	300	
		18	18840	19040	200	
				Total Volume (gal):	1000	
35	1102	38	18040	18140	100	
		33	18140	18240	100	
		28	18240	18540	300	
	1313	23	18540	18840	300	
		18	18840	19040	200	
				Total Volume (gal):	1000	
34	1104	38	18030	18050	20	Rod pulled
		33	18050	18230	180	
		28	18230	18530	300	
	1316	23	18530	18830	300	
		18	18830	19030	200	
				Total Volume (gal):	1000	
33	1106	38	18050	18150	100	
		33	18150	18250	100	
		28	18250	18550	300	
	1319	23	18550	18850	300	
		18	18850	19050	200	
				Total Volume (gal):	1000	
32	1108	38	18050	18150	100	
		33	18150	18250	100	
		28	18250	18550	300	
	1322	23	18550	18850	300	
		18	18850	19050	200	
				Total Volume (gal):	1000	
31	1110	38	18050	18150	100	
		33	18150	18250	100	
		28	18250	18550	300	
	1325	23	18550	18850	300	
		18	18850	19050	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Pt. 34: Pulled rod, tip was off and no amendment flow

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-T9 DATE: 11-13-19

DP SUBCONTRACTOR PES PERSONNEL: TY MM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 3 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
48	1420	38	19040	19140	100	
		33	19140	19240	100	
		28	19240	19540	300	
	1612	23	19540	19840	300	
		~~18~~				
				Total Volume (gal):	800	
47	1422	38	19040	19140	100	
		33	19140	19240	100	
		28	19240	19540	300	
	1614	23	19540	19840	300	
		~~18~~				
				Total Volume (gal):	800	
46	1424	38	19030	19130	100	
		33	19130	19230	100	
		28	19230	19530	300	
	1616	23	19530	19830	300	
		~~18~~				
				Total Volume (gal):	800	
45	1426	38	19050	19150	100	
		33	19150	19250	100	
		28	19250	19550	300	
	1618	23	19550	19850	300	
		~~18~~				
				Total Volume (gal):	800	
44	1428	38	19050	19150	100	
		33	19150	19250	100	
		~~28~~	19250	19550	300	
	1620	23	19550	19850	300	
		~~18~~				
				Total Volume (gal):	800	
43	1430	38	19050	19150	100	
		33	19150	19250	100	
		28	19250	19550	300	
	1622	23	19550	19850	300	
		~~18~~				
				Total Volume (gal):	800	
				SHEET TOTAL (gal):	4800	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-11 DATE: 11-13-19

DP SUBCONTRACTOR PES PERSONNEL: AJ JL

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 1 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
13	759	22	17620	17920	300	
		18	17920	18120	200	
	838					
				Total Volume (gal):	500	
14	757	22	17620	17920	300	
		18	17920	18120	200	
	837					
				Total Volume (gal):	500	
15	755	22	17620	17920	300	
		18	17920	18120	200	
	839					
				Total Volume (gal):	500	
16	753	22	17620	17920	300	
		18	17920	18120	200	
	846					
				Total Volume (gal):	500	
17	751	22	17620	17920	300	
		18	17920	18120	200	
	849					
				Total Volume (gal):	500	
18	750	22	17620	17920	300	
		18	17920	18120	200	
	851					
				Total Volume (gal):	500	
				SHEET TOTAL (gal):	3000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-10 DATE: 11-13-19

DP SUBCONTRACTOR PES PERSONNEL: BM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 2 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
13	928	38	18120	18220	100	
		32	18220	18320	100	
		28	18320	18620	300	
	1150	22	18620	18920	300	
		18	18920	19120	200	
				Total Volume (gal):	1,000	
14	929	38	18120	18220	100	
		32	18220	18320	100	
		28	18320	18620	300	
	1149	22	18620	18920	300	
		18	18920	19120	200	
				Total Volume (gal):	1,000	
15	930	38	18120	18220	100	
		32	18220	18320	100	
		28	18320	18620	300	
	1150	22	18620	18920	300	
		18	18920	19120	200	
				Total Volume (gal):	1,000	
16	932	38	18120	18220	100	
		32	18220	18320	100	
		28	18320	18620	300	
	1206 ~~934~~	22	18620	18920	300	
		18	18920	19120	200	
				Total Volume (gal):	1,000	
17	934	38	18120	18220	100	
		32	18220	18320	100	
		28	18320	18620	300	
	1202	22	18620	18920	300	
		18	18920	19120	200	
				Total Volume (gal):	1,000	
18	936	38	18120	18220	100	
		32	18220	18320	100	
		28	18320	18620	300	
	1158	22	18620	18920	300	
		18	18920	19120	200	
				Total Volume (gal):	1,000	
				SHEET TOTAL (gal):	6,000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-10 DATE: 11-13-19

DP SUBCONTRACTOR PES PERSONNEL: MH

AMENDMENT / PERCENT CONCENTRATION: 9.8% W13 SHEET NO. ~~2~~ MH 3 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
19	1307	38	19120	19220	100	
		32	19220	19320	100	
		28	19320	19620	300	
		22	19620	19920	300	
		18	19920	20120	200	
				Total Volume (gal):	1000	
20	1447	38	19120	19220	100	2 Attempts
		32	19220	19320	100	To get Tip off
		28	19320	19620	300	Redrilled 3
		22	19620	19920	300	times
		18	19920	20120	200	
				Total Volume (gal):	1000	
21	1310	38	19120	19220	100	
		32	19220	19320	100	
		28	19320	19620	300	
		22	19620	19920	300	
		18	19920	20120	200	
				Total Volume (gal):	1000	
22	1312	38	19120	19220	100	
		32	19220	19320	100	
		28	19320	19620	300	
		22	19620	19920	300	
		18	19920	20120	MH 200	
				Total Volume (gal):	1000	
23	1313	38	19120	19220	100	
		32	19220	19320	100	
		28	19320	19620	300	
		22	19620	19920	300	
		18	19920	20120	200	
				Total Volume (gal):	MH 1000	
24	1314	38	19120	19220	100	
		32	19220	19320	100	
		28	19320	19620	300	
		22	19620	19920	300	
		18	19920	20120	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-T09 DATE: 11-14-19

DP SUBCONTRACTOR PES PERSONNEL: TY MM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 1 of 4

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
48	0754	18	19840	20040	200	
	0830			Total Volume (gal):	200	
47	0756	18	19840	20040	200	
	0832			Total Volume (gal):	200	
46	0758	18	19830	20030	200	
	0834			Total Volume (gal):	200	
45	0800	18	19850	20050	200	
	0836			Total Volume (gal):	200	
44	0802	18	19850	20050	200	
	0838			Total Volume (gal):	200	
43	0804	18	19850	20050	200	
	0840			Total Volume (gal):	200	
				SHEET TOTAL (gal):	1200	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7- ~~[illegible]~~ T08 DATE: 11-14-19

DP SUBCONTRACTOR PES PERSONNEL: TV MM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 2 of 4

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
48	0900	38	20050	20150	100	
		33	20150	20250	100	
		28	20250	20550	300	
	1135	23	20550	20850	300	
		18	20850	21050	200	
				Total Volume (gal):	1000	
47	0902	38	20050	~~2000~~ 20150	100	
		33	20150	20250	100	
		28	20250	20550	300	
	1137	23	20550	20850	300	
		18	20850	21050	200	
				Total Volume (gal):	1000	
46	0904	38	20050	20150	100	
		33	20150	20250	100	
		28	20250	20550	300	
	1139	23	20550	20850	300	
		18	20850	21050	200	
				Total Volume (gal):	1000	
45	0906	38	20030	20130	100	
		33	20130	20230	100	
		28	20230	20530	300	
	1141	23	20530	20830	300	
		18	20830	21030	200	
				Total Volume (gal):	1000	
44	0908	38	20040	20140	100	
		33	20140	20240	100	
		28	20240	20540	300	
	1143	23	20540	20840	300	
		18	20840	21040	200	
				Total Volume (gal):	1000	
43	0910	38	20040	20140	100	
		33	20140	20240	100	
		28	20240	20540	300	
	1145	23	20540	20840	300	
		18	20840	21040	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7 - T08 DATE: 11-14-19

DP SUBCONTRACTOR PES PERSONNEL: TY MM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 3 of 4

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
42	1215	38	21050	21150	100	
		33	21150	21250	100	
		28	21250	21550	300	
	1500	23	21550	21850	300	
		18	21850	22050	200	
				Total Volume (gal):	1000	
41	1217	38	21050	21150	100	
		33	21150	21250	100	
		28	21250	21550	300	
	1502	23	21550	21850	300	
		18	21850	22050	200	
				Total Volume (gal):	1000	
40	1219	38	21050	21150	100	
		33	21150	21250	100	
		28	21250	21550	300	
	1504	23	21550	21850	300	
		18	21850	22050	200	
				Total Volume (gal):	1000	
39	1310 ~~1221~~	38	21030	21130	100	
		33	21130	21230	100	
		28	21230	21530	300	
	1506	23	21530	21830	300	
		18	21830	22030	200	
				Total Volume (gal):	1000	
38	1223	38	21040	21140	100	
		33	21140	21240	100	
		28	21240	21540	300	
	1508	23	21540	21840	300	
		18	21840	22040	200	
				Total Volume (gal):	1000	
37	1225	38	21040	21140	100	
		33	21140	21240	100	
		28	21240	21540	300	
	1510	23	21540	21840	300	
		18	21840	22040	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Pt. 39: Redrilled, tip wouldn't come off

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-T09 DATE: 11-14-19

DP SUBCONTRACTOR PES PERSONNEL: TY MM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 4 of 4

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
42	1525	38	22050	22150	100	
	1545			Total Volume (gal):	100	
41	1527	38	22050	22150	100	
	1547			Total Volume (gal):	100	
40	1529	38	22050	22150	100	
	1549			Total Volume (gal):	100	
39	1531	38	22030	22130	100	
	1551			Total Volume (gal):	100	
38	1533	38	22040	22140	100	
	1553			Total Volume (gal):	100	
37	1535	38	22040	22140	100	
	~~1555~~ 1555			Total Volume (gal):	100	
				SHEET TOTAL (gal):	600	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-11 DATE: 11-14-19

DP SUBCONTRACTOR PES PERSONNEL: RR

AMENDMENT / PERCENT CONCENTRATION: 9.8% WP SHEET NO. 1 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
19	740	38	20120	20220	100	
		32	20220	20320	100	
		28	20320	20620	300	
	941	22	20620	20920	300	
		18	20920	21120	200	
				Total Volume (gal):	1000	
20	741	38	20120	20220	100	
		32	20220	20320	100	
		28	20320	20620	300	
	939	22	20620	20920	300	
		18	20920	21120	200	
				Total Volume (gal):	1000	
21	742	38	20120	20220	100	
		32	20220	20320	100	
		28	20320	20620	300	
	942	22	20620	20920	300	
		18	20920	21120	200	
				Total Volume (gal):	1000	
22	744	38	20120	20220	100	
		32	20220	20320	100	
		28	20320	20620	300	
	952	22	20620	20920	300	
		18	20920	21120	200	
				Total Volume (gal):	1000	
23	745	38	20120	20220	100	
		32	20220	20320	100	
		28	20320	20620	300	
	951	22	20620	20920	300	
		18	20920	21120	200	
				Total Volume (gal):	1000	
24	746	38	20120	20220	100	
		32	20220	20320	100	
		28	20320	20620	300	
	949	22	20620	20920	300	
		18	20920	21120	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-10 DATE: 11-14-19

DP SUBCONTRACTOR PES PERSONNEL: BRR

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 2 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
25	1042	38	21120	21220	100	
		32	21220	21320	100	
		28	21320	21620	300	
	1241	22	21620	21920	300	
		18	21920	22120	200	
				Total Volume (gal):	1000	
26	1042	38	21120	21220	100	
		32	21220	21320	100	
		28	21320	21620	300	
	1243	22	21620	21920	300	
		18	21920	22120	200	
				Total Volume (gal):	1000	
27	1043	38	21120	21220	100	
		32	21220	21320	100	
		28	21320	21620	300	
	1241	22	21620	21920	300	
		18	21920	22120	200	
				Total Volume (gal):	1000	
28	1045	38	21120	21220	100	
		32	21220	21320	100	
		28	21320	21620	300	
	1249	22	21620	21920	300	
		18	21920	22120	200	
				Total Volume (gal):	1000	
29	1046	38	21120	21220	100	
		32	21220	21320	100	
		28	21320	21620	300	
	1251	22	21620	21920	300	
		18	21920	22120	200	
				Total Volume (gal):	1000	
30	1047	38	21120	21220	100	
		32	21220	21320	100	
		28	21320	21620	300	
	1249	22	21620	21920	300	
		18	21920	22120	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-11 DATE: 11-14-19

DP SUBCONTRACTOR PES PERSONNEL: BM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 3 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
25	1325	38	22120	22220	100	
		32	22220	22320	100	
		28	22320	22620	300	
	1534	22	22620	22920	300	
		18	22920	23120	200	
				Total Volume (gal):	1000	
26	1326	38	22120	22220	100	
		32	22220	22320	100	
		28	22320	22620	300	
	1533	22	22620	22920	300	
		18	22920	23120	200	
				Total Volume (gal):	1000	
27	1327	38	22120	22220	100	
		32	22220	22320	100	
		28	22320	22620	300	
	1533	22	22620	22920	300	
		18	22920	23120	200	
				Total Volume (gal):	1000	
28	1328	38	22120	22220	100	
		32	22220	22320	100	
		28	22320	22620	300	
	1539	22	22620	22920	300	
		18	22920	23120	200	
				Total Volume (gal):	1000	
29	1329	38	22120	22220	100	
		32	22220	22320	100	
		28	22320	22620	300	
	1536	22	22620	22920	300	
		18	22920	23120	200	
				Total Volume (gal):	1000	
30	1330	38	22120	22220	100	
		32	22220	22320	100	
		28	22320	22620	300	
	1538	22	22620	22920	300	
		18	22920	23120	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7 - TØ9 DATE: 11-15-19

DP SUBCONTRACTOR PES PERSONNEL: TV / MM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 1 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
37 ~~36~~	~~09~~ 0750	33	22050	22250	100	
		28	22250	22550	300	
		23	22550	22850	300	
	0950	18	22850	23050	200	
				~~23050~~		
				Total Volume (gal):	900	
38 ~~37~~	0752	33	22150	22250	100	
		28	22250	22550	300	
		23	22550	22850	300	
	0952	18	22850	23050	200	
				~~23050~~		
				Total Volume (gal):	900	
39 ~~38~~	0754	33	22150	22250	100	
		28	22250	22550	300	
		23	22550	22850	300	
	0954	18	22850	23050	200	
				~~23050~~		
				Total Volume (gal):	900	
40 ~~39~~	0756	33	22130	22230	100	
		28	22130	22530	300	
		23	22530	22830	300	
	0956	18	22830	23030	200	
				~~23030~~		
				Total Volume (gal):	900	
41 ~~40~~	0758	33	22140	22240	100	
		28	22240	22540	300	
		23	22540	22840	300	
	0958	18	22840	23040	200	
				~~23040~~		
				Total Volume (gal):	900	
42 ~~41~~	0850	33	22140	22240	100	
		28	22240	22540	300	
		23	22540	22840	300	
	1000	18	22840	23040	200	
				Total Volume (gal):	900	
				SHEET TOTAL (gal):	5400	

GENERAL NOTES:

Pt 41 Redrilled to 33 ft bgs, sand collapsed into rod, no amendment will flow

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-T08 DATE: 11-15-19

DP SUBCONTRACTOR PES PERSONNEL: TY MM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 2 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
36	1045	38	23050	23150	100	
		33	23150	23250	100	
		28	23250	23550	300	
	1310	23	23550	23850	300	
		18	23850	24050	200	
				Total Volume (gal):	1000	
35	1047	38	23050	23150	100	
		33	23150	23250	100	
		28	23250	23550	300	
	1312	23	23550	23850	300	
		18	23850	24050	200	
				Total Volume (gal):	1000	
34	1200	38	23050	23070	20	Pulled
		33	23070	23250	180	
		28	23250	23550	300	
	1330	23	23550	23850	300	
		18	23850	24050	200	
				Total Volume (gal):	1000	
33	1220	38	23030	23130	100	
		33	23130	23230	100	
		28	23230	23530	300	
	1335	23	23530	23830	300	
		18	23830	24030	200	
				Total Volume (gal):	1000	
32	1050	38	23040	23140	100	
		33	23140	23240	100	
		28	23240	23540	300	
	1314	23	23540	23840	300	
		18	23840	24040	200	
				Total Volume (gal):	1000	
31	1052	38	23040	23140	100	
		33	23140	23240	100	
		28	23240	23540	300	
	1316	23	23540	23840	300	
		18	23840	24040	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Pt. 34+33: Redrilled. Tips would not come off.

Pt. 34: Rod pulled, amendment wouldn't flow

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-T09 DATE: 11-15-19

DP SUBCONTRACTOR PES PERSONNEL: TY MM

AMENDMENT / PERCENT CONCENTRATION:* 9.8% WB SHEET NO. 3 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
31	1400	38	24040	24140	100	
		33	24140	24240	100	
		28	24240	24540	300	
	1600	23	24540	24840	300	
		18	24840	25040	200	
				Total Volume (gal):	1000	
32	1402	38	24040	24140	100	
		33	24140	24240	100	
		28	24240	24540	300	
	1602	23	24540	24840	300	
		18	24840	25040	200	
				Total Volume (gal):	1000	
33	1404	38	24030	24130	100	
		33	24130	24230	100	
		28	24230	24530	300	
	1604	23	24530	24830	300	
		18	24830	25030	200	
				Total Volume (gal):	1000	
34	1406	38	24050	24150	100	
		33	24150	24250	100	
		28	24250	24550	300	
	1606	23	24550	24850	300	
		18	24850	25050	200	
				Total Volume (gal):	1000	
35	1408	38	24050	24150	100	
		33	24150	24250	100	
		28	24250	24550	300	
	1608	23	24550	24850	300	
		18	24850	25050	200	
				Total Volume (gal):	1000	
36	1410	38	24050	24150	100	
		33	24150	24250	100	
		28	24250	24550	300	
	1610	23	24550	24850	300	
		18	24850	25050	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-9 DATE: 11-15-19

DP SUBCONTRACTOR PES PERSONNEL: AOz

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 1 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
1	756	38	23120	23220	100	
		32	23220	23320	100	
		28	23320	23620	300	
	1002	22	23620	23920	300	
		18	23920	24120	200	
				Total Volume (gal):	1000	
2	757	38	23120	23220	100	
		32	23220	23320	100	
		28	23320	23620	300	
	1001	22	23620	23920	300	
		18	23920	24120	200	
				Total Volume (gal):	1000	
3	810	38	23120	23220	100	
		32	23220	23320	100	
		28	23320	23620	300	
	1005	22	23620	23920	300	
		18	23920	24120	200	
				Total Volume (gal):	1000	
4	800	38	23120	23220	100	
		32	23220	23320	100	
		28	23320	23620	300	
	1014	22	23620	23920	300	
		18	23920	24120	200	
				Total Volume (gal):	1000	
5	902	38	23120	23220	100	Had redrill
		32	23220	23320	100	once
		28	23320	23620	300	
	1015	22	23620	23920	300	
		18	23920	24120	200	
				Total Volume (gal):	1000	
6	604	38	23120	23220	100	
		32	23220	23320	100	
		28	23320	23620	300	
	1018	22	23620	23920	300	
		18	23920	24120	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-8 DATE: 11-15-19

DP SUBCONTRACTOR PES PERSONNEL: RR

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 2 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
1	1059	38	24120	24220	100	
		32	24220	24320	100	
		28	24320	24620	300	
	1307	22	24620	24920	300	
		18	24920	25120	200	
				Total Volume (gal):	1000	
2	1100	38	24120	~~24220~~	~~100~~ 100	~~Tip worked out~~
		32	~~24220~~ 24320	24320	~~100~~ 100	~~Pull~~
		28	24320	24620	300	100
	1305	22	24620	24920	300	
		18	24920	25120	200	
				Total Volume (gal):	1000	
3	1102	38	24120	24220	100	
		32	24220	24320	100	
		28	24320	24620	300	
	1308	22	24620	24920	300	
		18	24920	25120	200	
				Total Volume (gal):	1000	
4	1119	38	24120	24220	100	
		32	24220	24320	100	
		28	24320	24620	300	
	1314	22	24620	24920	300	
		18	24920	25120	200	
				Total Volume (gal):	1000	
5	1115	38	24120	24220	100	
		32	24220	24320	100	
		28	24320	24620	300	
	1317	22	24620	24920	300	
		18	24920	25120	200	
				Total Volume (gal):	1000	
6	1108	38	24120	24220	100	
		32	24220	24320	100	
		28	24320	24620	300	
	1316	22	24620	24920	300	
		18	24920	25120	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T - 8 DATE: 11-15-19

DP SUBCONTRACTOR PES PERSONNEL: AM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 3 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
~~6~~ 7 M	1415	38	25120	25220	100	
		32	25220	25320	100	
		28	25320	25620	300	
	1606	22	25620	25920	300	
		18	25920	26120	200	
				Total Volume (gal):	1000	
M ~~7~~ 8	1407	38	25120	25320	100	Had to redrill once
		32	25220	25320	100	
		28	25320	25620	300	
	1605	22	25620	25920	300	
		18	25920	26120	200	
				Total Volume (gal):	1000	
M ~~8~~ 9	1350	38	25120	25130	10	Tip would not come off
		32	25130	25320	190	
		28	25320	25620	300	
	1603	22	25620	25920	300	
		18	25920	26120	200	
				Total Volume (gal):	1000	
M ~~9~~ 10	1351	38	25120	25220	100	
		32	25220	25320	100	
		28	25320	25620	300	
	1614	22	25620	25920	300	
		18	25920	26120	200	
				Total Volume (gal):	1000	
M ~~10~~ 11	1352	38	25120	25220	100	
		32	25220	25320	100	
		28	25320	25620	300	
	1615	22	25620	25920	300	
		18	25920	26120	200	
				Total Volume (gal):	1000	
~~11~~ 12	1353	38	25120	25220	100	
		32	25220	25320	100	
		28	25320	25620	300	
	1617	22	25620	25920	300	
		18	25920	26120	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-T9 DATE: 11-16-19

DP SUBCONTRACTOR PES PERSONNEL: TV MM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 1 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
25	0755	38	25050	25150	100	
		33	25150	25250	100	
		28	25250	25550	300	
	1010	23	25550	25850	300	
		18	25850	26050	200	
				Total Volume (gal):	1000	
26	0753	38	25050	25150	100	
		33	25150	25250	100	
		28	25250	25550	300	
	1008	23	25550	25850	300	
		18	25850	26050	200	
				Total Volume (gal):	1000	
27	0751	38	25050	25150	100	
		33	25150	25250	100	
		28	25250	25550	300	
	1006	23	25550	25850	300	
		18	25850	26050	200	
				Total Volume (gal):	1000	
28	0749	38	25030	25130	100	
		33	25130	25230	100	
		28	25230	25530	300	
	1004	23	25530	25830	300	
		18	25830	26030	200	
				Total Volume (gal):	1000	
29	0747	38	25040	25140	100	
		33	25140	25240	100	
		28	25240	25540	300	
	1002	23	25540	25840	300	
		18	25840	26040	200	
				Total Volume (gal):	1000	
30	0745	38	25040	25140	100	
		33	25140	25240	100	
		28	25240	25540	300	
	1000	23	25540	25840	300	
		18	25840	26040	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-T08 DATE: 11-16-19

DP SUBCONTRACTOR PES PERSONNEL: TV MM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 2 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
30	1025	38	26050	26150	100	
		33	26150	26250	100	
		28	26250	26550	300	
	1230	23	26550	26850	300	
		18	26850	27050	200	
				Total Volume (gal):	1000	
29	1027	38	26050	26150	100	
		33	26150	26250	100	
		28	26250	26550	300	
	1235	23	26550	26850	300	
		18	26850	27050	200	
				Total Volume (gal):	1000	
28	1029	38	26050	26150	100	
		33	26150	26250	100	
		28	26250	26550	300	
	1237	23	26550	26850	300	
		18	26850	27050	200	
				Total Volume (gal):	1000	
27	1031	38	26030	26130	100	
		33	26130	26230	100	
		28	26230	26530	300	
	1239	23	26530	26830	300	
		18	26830	27030	200	
				Total Volume (gal):	1000	
26	1033	38	26040	26140	100	
		33	26140	26240	100	
		28	26240	26540	300	
	1241	23	26540	26840	300	
		18	26840	27040	200	
				Total Volume (gal):	1000	
25	1035	38	26040	26140	100	
		33	26140	26240	100	
		28	26240	26540	300	
	1243	23	26540	26840	300	
		18	26840	27040	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-T7 DATE: 11-15-19

DP SUBCONTRACTOR PES PERSONNEL: TY MM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 3 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
42	1320	38	27040	27140	100	
		33	27140	27240	100	
		28	27240	27540	300	
	1550	23	27540	27840	300	
		18	27840	28040	200	
				Total Volume (gal):	1000	
41	1322	38	27040	27140	100	
		33	27140	27240	100	
		28	27240	27540	300	
	1552	23	27540	27840	300	
		18	27840	28040	200	
				Total Volume (gal):	1000	
40	1324	38	27030	27130	100	
		33	27130	27230	100	
		28	27230	27530	300	
	1554	23	27530	27830	300	
		18	27830	28030	200	
				Total Volume (gal):	1000	
39	1326	38	27050	27150	100	
		33	27150	27250	100	
		28	27250	27550	300	
	1556	23	27550	27850	300	
		18	27850	28050	200	
				Total Volume (gal):	1000	
38	1328	38	27050	27150	100	
		33	27150	27250	100	
		28	27250	27550	300	
	1558	23	27550	27850	300	
		18	27850	28050	200	
				Total Volume (gal):	1000	
37	1415	38	27050	27150	100	
		33	27150	27250	100	
		28	27250	27550	300	
	1600	23	27550	27850	300	
		18	27850	28050	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Pt. 37: Redrilled. Could not remove tip.

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-9 DATE: 11-16-19

DP SUBCONTRACTOR PES PERSONNEL: NM

AMENDMENT / PERCENT CONCENTRATION: 9.89% WB SHEET NO. 3 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
13	1426	38	28120	28220	100	
		32	28220	28320	100	
		28	28320	28620	300	
	1620	22	28620	28920	300	
		18	28920	29120	200	
				Total Volume (gal):	1000	
14	1427	38	28120	28220	100	
		32	28220	28320	100	
		28	28320	28620	300	
	1633	22	28620	28920	300	
		18	28920	29120	200	
				Total Volume (gal):	1000	
15	1428	38	28120	28220	100	
		32	28220	28320	100	
		28	28320	28620	300	
	1621	22	28620	28920	300	
		18	28920	29120	200	
				Total Volume (gal):	1000	
16	1429	38	28120	28220	100	
		32	28220	28320	100	
		28	28320	28620	300	
	1631	22	28620	28920	300	
		18	28920	29120	200	
				Total Volume (gal):	1000	
17	1430	38	28120	28220	100	
		32	28220	28320	100	
		28	28320	28620	300	
	1634	22	28620	28920	300	
		18	28920	29120	200	
				Total Volume (gal):	1000	
18	1432	38	28120	28220	100	
		32	28220	28320	100	
		28	28320	28620	300	
	1632	22	28620	28920	300	
		18	28920	29120	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-8 DATE: 11-16-19

DP SUBCONTRACTOR PES PERSONNEL: AK

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 2 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
13	1127	38	27120	27220	100	
		32	27220	27320	100	
		28	27320	27620	300	
	1341	22	27620	27920	300	
		18	27920	28120	200	
				Total Volume (gal):	1000	
14	1129	38	27120	27220	100	
		32	27220	27320	100	
		28	27320	27620	300	
	1342	22	27620	27920	300	
		18	27920	28120	200	
				Total Volume (gal):	1000	
15	1132	38	27120	27220	100	
		32	27220	27320	100	
		28	27320	27620	300	
	1414	22	27620	27920	300	
		18	27920	28120	200	
				Total Volume (gal):	1000	
16	1133	38	27120	27220	100	
		32	27220	27320	100	
		28	27320	27620	300	
	1401	22	27620	27920	300	
		18	27920	28120	200	
				Total Volume (gal):	1000	
17	1135	38	27120	27220	100	
		32	27220	27320	100	
		28	27320	27620	300	
	1354	22	27620	27920	300	
		18	27920	28120	200	
				Total Volume (gal):	1000	
18	1136	38	27120	27220	100	
		32	27220	27320	100	
		28	27320	27620	300	
	1353	22	27620	27920	300	
		18	27920	28120	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-9 DATE: 11-16-19

DP SUBCONTRACTOR PES PERSONNEL: NR

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 1 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
7	815	38	26120	26220	100	
		32	26220	26320	100	
		28	26320	26620	300	
	1025	22	26620	26920	300	
		18	26920	27120	200	
				Total Volume (gal):	1000	
8	817	38	26120	26220	100	
		32	26220	26320	100	
		28	26320	26620	300	
	1023	22	26620	26920	300	
		18	26920	27120	200	
				Total Volume (gal):	1000	
9	819	38	26120	26220	100	
		32	26220	26320	100	
		28	26320	26620	300	
	1027	22	26620	26920	300	
		18	26920	27120	200	
				Total Volume (gal):	1000	
10	821	38	26120	26220	100	
		32	26220	26320	100	
		28	26320	26620	300	
	1036	22	26620	26920	300	
		18	26920	27120	200	
				Total Volume (gal):	1000	
11	833	38	26120	26220	100	
		32	26220	26320	100	
		28	26320	26620	300	
	1037	22	26620	26920	300	
		18	26920	27120	200	
				Total Volume (gal):	1000	
12	823	38	26120	26220	100	
		32	26220	26320	100	
		28	26320	26620	300	
	1039	22	26620	26920	300	
		18	26920	27120	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-T6 DATE: 11-17-19

DP SUBCONTRACTOR PES PERSONNEL: TY MM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 1 of 2

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
42	0935	38	28050	28150	100	
		33	28150	28250	100	
		28	28250	28550	300	
	1100	23	28550	28850	300	
		18	28850	29050	200	
				Total Volume (gal):	1000	
41	0820	38	28050	28150	100	
		33	28150	28250	100	
		28	28250	28550	300	
	1101	23	28550	28850	300	
		18	28850	29050	200	
				Total Volume (gal):	1000	
40	0822	38	28050	28150	100	
		33	28150	28250	100	
		28	28250	28550	300	
	1102	23	28550	28850	300	
		18	28850	29050	200	
				Total Volume (gal):	1000	
39	0824	38	28030	28130	100	
		33	28130	28230	100	
		28	28230	28530	300	
	1103	23	28530	28830	300	
		18	28830	29030	200	
				Total Volume (gal):	1000	
38	0826	38	28040	28140	100	
		33	28140	28240	100	
		28	28240	28540	300	
	1104	23	28540	28840	300	
		18	28840	29040	200	
				Total Volume (gal):	1000	
37	1000	38	28040	28140	100	
		33	28140	28240	100	
		28	28240	28540	300	
	1105	23	28540	28840	300	
		18	28840	29040	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Pt. 42 + 37: Redrilled. Tip not coming off.

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-T6 DATE: 11-17-19

DP SUBCONTRACTOR PES PERSONNEL: TY MM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 2 of 2

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
36	1115	38	29050	29150	100	
		33	29150	29250	100	
		28	29250	29550	300	
	1310	23	29550	29850	300	
		18	29850	30050	200	
				Total Volume (gal):	1000	
35	1117	38	29050	29150	100	
		33	29150	29250	100	
		28	29250	29550	300	
	1312	23	29550	29850	300	
		18	29850	30050	200	
				Total Volume (gal):	1000	
34	1119	38	29050	29150	100	
		33	29150	29250	100	
		28	29250	29550	300	
	1314	23	29550	29850	300	
		18	29850	30050	200	
				Total Volume (gal):	1000	
33	1121	38	29030	29130	100	
		33	29130	29230	100	
		28	29230	29530	300	
	1316	23	29530	29830	300	
		18	29830	30030	200	
				Total Volume (gal):	1000	
32	1123	38	29040	29140	100	
		33	29140	29240	100	
		28	29240	29540	300	
	1318	23	29540	29840	300	
		18	29840	30040	200	
				Total Volume (gal):	1000	
31	1125	38	29040	29140	100	
		33	29140	29240	100	
		28	29240	29540	300	
	1320	23	29540	29840	300	
		18	29840	30040	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-8 DATE: 11-17-19

DP SUBCONTRACTOR PES PERSONNEL: JA MR

AMENDMENT / PERCENT CONCENTRATION: 9.89% NB SHEET NO. 1 of 2

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
19	826	38	29120	29220	100	
		32	29220	29320	100	
		28	29320	29620	300	
	1021	22	29620	29920	300	
		18	29920	30120	200	
				Total Volume (gal):	1000	
20	827	38	29120	29220	100	
		32	29220	29320	100	
		28	29320	29620	300	
	1022	22	29620	29920	300	
		18	29920	30120	200	
				Total Volume (gal):	1000	
21	829	38	29120	29220	100	
		32	29220	29320	100	
		28	29320	29620	300	
	1023	22	29620	29920	300	
		18	29920	30120	200	
				Total Volume (gal):	1000	
22	833	38	29120	29220	100	
		32	29220	29320	100	
		28	29320	29620	300	
	1032	22	29620	29920	300	
		18	29920	30120	200	
				Total Volume (gal):	1000	
23	835	38	29120	29220	100	
		32	29220	29320	100	
		28	29320	29620	300	
	1032	22	29620	29920	300	
		18	29920	30120	200	
				Total Volume (gal):	1000	
24	835	38	29120	29220	100	
		32	29220	29320	100	
		28	29320	29620	NB 300	
	1033	22	29620	29920	300	
		18	29920	30120	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-9 DATE: 11-17-19

DP SUBCONTRACTOR PES PERSONNEL: NR

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 2 of 2

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
19	1042	38	30120 NR	30220	100	
		32	30~~230~~220	30320	100	
		28	30~~330~~320	30620	300	
	~~1044~~ NR 1300	22	30620	30920	300	
		18	30920	31120	200	
				Total Volume (gal):	1000	
20	1043	38	30120	30220	100	
		32	30220	30320	100	
		28	30320	30620	300	
	1300	22	30620	30920	300	
		18	30920	31120	200	
				Total Volume (gal):	1000	
21	1044	38	30120	30220	100	
		32	30220	30320	100	
		28	30320	30620	300	
	1300	22	30620	30920	300	
		18	30920	31120	200	
				Total Volume (gal):	1000	
22	1049	38	30120	30220	100	
		32	30220	30320	100	
		28	30320	30620	300	
	1300	22	30620	30920	300	
		18	30920	31120	200	
				Total Volume (gal):	1000	
23	1051	38	30120	30220	100	
		32	30220	30320	100	
		28	30320	30620	300	
	1300	22	30620	30920	300	
		18	30920	31120	200	
				Total Volume (gal):	1000	
24	1050	38	30120	30220	100	
		32	30220	30320	100	
		28	30320	30620	300	
	1300	22	30620	30920	300	
		18	30920	31120	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-T7 DATE: 11-18-19

DP SUBCONTRACTOR PES PERSONNEL: TV MM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 1 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
31	0742	38	30040	30140	100	
		33	30140	30240	100	
		28	30240	30540	300	
	0950	23	30540	30840	300	
		18	30840	31040	200	
				Total Volume (gal):	1000	
32	0744	38	30040	30140	100	
		33	30140	30240	100	
		28	30240	30540	300	
	0952	23	30540	30840	300	
		18	30840	31040	200	
				Total Volume (gal):	1000	
33	0746	38	30050	30150	100	
		33	30150	30250	100	
		28	30250	30550	300	
	0954	23	30550	30850	300	
		18	30850	31050	200	
				Total Volume (gal):	1000	
34	0748	38	30050	30150	100	
		33	30150	30250	100	
		28	30250	30550	300	
	0956	23	30550	30850	300	
		18	30850	31050	200	
				Total Volume (gal):	1000	
35	0750	38	30050	30150	100	
		33	30150	30250	100	
		28	30250	30550	300	
	0958	23	30550	30850	300	
		18	30850	31050	200	
				Total Volume (gal):	1000	
36	0752	38	30050	30150	100	
		33	30150	30250	100	
		28	30250	30550	300	
	1000	23	30550	30850	300	
		18	30850	31050	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-T7 DATE: 11-18-19

DP SUBCONTRACTOR PES PERSONNEL: TY MM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 2 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
30	1020	38	31040	31140	100	
		33	31140	31240	100	
		28	31240	31540	300	
	1232	23	31540	31840	300	
		18	31840	32040	200	
				Total Volume (gal):	1000	
29	1022	38	31040	31140	100	
		33	31140	31240	100	
		28	31240	31540	300	
	1234	23	31540	31840	300	
		18	31840	32040	200	
				Total Volume (gal):	1000	
28	1024	38	31030	~~3130~~ 31130	100	
		33	31130	31230	100	
		28	31230	31530	300	
	1236	23	31530	31830	300	
		18	31830	32030	200	
				Total Volume (gal):	1000	
27	1026	38	31050	31150	100	
		33	31150	31250	100	
		28	31250	31550	300	
	1238	23	31550	31850	300	
		18	31850	32050	200	
				Total Volume (gal):	1000	
26	1028	38	31050	31150	100	
		33	31150	31250	100	
		28	31250	31550	300	
	1240	23	31550	31850	300	
		18	31850	32050	200	
				Total Volume (gal):	1000	
25	1030	38	31050	31150	100	
		33	31150	31250	100	
		28	31250	31550	300	
	1242	23	31550	31850	300	
		18	31850	32050	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW 7 - T6 DATE: 11-18-19

DP SUBCONTRACTOR PES PERSONNEL: MM TY

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 3 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
30	1255	38	32050	32150	100	
		33	32150	32250	100	
		28	32250	32550	300	
	1450	23	32550	32850	300	
		18	32850	33050	200	
		12		Total Volume (gal):	1000	
29	1257	38	32050	32150	100	
		33	32150	32250	100	
		28	32250	32550	300	
	1452	23	32550	32850	300	
		18	32850	33050	200	
				Total Volume (gal):	1000	
28	1259	38	32050	32150	100	
		33	32150	32250	100	
		28	32250	32550	300	
	1454	23	32550	32850	300	
		18	32850	33050	200	
				Total Volume (gal):	1000	
27	1301	38	32030	32130	100	
		33	32130	32230	100	
		28	32230	32530	300	
	1456	23	32530	~~32830~~ 32830	300	
		18	32830	33030	200	
				Total Volume (gal):	1000	
26	1303	38	32040	32140	100	
		33	32140	32240	100	
		28	32240	32540	300	
	1458	23	32540	32840	300	
		18	32840	33040	200	
				Total Volume (gal):	1000	
25	1305	38	32040	32140	100	
		33	32140	32240	100	
		28	32240	32540	300	
	1500	23	32540	32840	300	
		18	32840	33040	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-7 DATE: 11-18-19

DP SUBCONTRACTOR PES PERSONNEL: BM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 1 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
1	743	38	31120	31220	100	
		32	31220	31320	100	
		28	31320	31620	300	
	928	22	31620	31920	300	
		18	31920	32120	200	
				Total Volume (gal):	1000	
2	745	38	31120	31220	100	
		32	31220	31320	100	
		28	31320	31620	300	
	932	22	31620	31920	300	
		18	31920	32120	200	
				Total Volume (gal):	1000	
3	747	38	31120	31220	100	
		32	31220	31320	100	
		~~28~~ 28	31320	31620	300	
	936	22	31620	31920	300	
		18	31920	32120	200	
				Total Volume (gal):	1000	
4	748	38	31120	31220	100	
		32	31220	31320	100	
		28	31320	31620	300	
	940	22	31620	31920	300	
		18	31920	32120	200	
				Total Volume (gal):	1000	
5	749	38	31120	31220	100	
		32	31220	31320	100	
		28	31320	31620	300	
	938	22	31620	31920	300	
		18	31920	32120	200	
				Total Volume (gal):	1000	
6	750	38	31120	31220	100	
		32	31220	31320	100	
		28	31320	31620	300	
	938	22	31620	31920	300	
		18	31920	32120	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-6 DATE: 11-18-19

DP SUBCONTRACTOR PES PERSONNEL: AM

AMENDMENT / PERCENT CONCENTRATION: 9.8 WB SHEET NO. 2 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
1	1003	38	32120	32220	100	
		32	32220	32320	100	
		28	32320	32620	300	
	1237	22	32620	32920	300	
		18	32920	33120	200	
				Total Volume (gal):	1000	
2	1005	38	32120	32220	100	
		32	32220	32320	100	
		28	32320	32620	300	
	1240	22	32620	32920	300	
		18	32920	33120	200	
				Total Volume (gal):	1000	
3	1120	38	32120	32220	100	Had to
		32	32220	32320	100	redrill 3
		28	32320	32620	300	Times
	1237	22	32620	32920	300	
		18	32920	33120	200	
				Total Volume (gal):	1000	
4	1007	38	32120	32220	100	
		32	32220	32320	100	
		28	32320	32620	300	
	1245	22	32620	32920	300	
		18	32920	33120	200	
				Total Volume (gal):	1000	
5	1107	38	32120	32220	100	Had to
		32	32220	32320	100	Redrill 3
		28	32320	32620	300	Times
	1245	22	32620	32920	300	
		18	32920	33120	200	
				Total Volume (gal):	1000	
6	1011	38	32120	32220	100	
		32	32220	32320	100	
		28	32320	32620	300	
	1241	22	32620	32920	300	
		18	32920	33120	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):		

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-6 DATE: 11-18-19

DP SUBCONTRACTOR PES PERSONNEL: SRR

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 3 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
7	1357	38	33120	33220	100	
		32	33220	33320	100	
		28	33320	33620	300	
	1603	22	33620	33920	300	
		18	33920	34140	220	
				Total Volume (gal):	1020	
8	1405	38	33120	33220	100	
		32	33220	33320	100	
		28	33320	33620	300	
	1603	22	33620	33920	300	
		18	33920	34140	220	
				Total Volume (gal):	1020	
9	1328	38	33120	33220	100	
		32	33220	33320	100	
		28	33320	33620	300	
	1603	22	33620	33920	300	
		18	33920	34140	220	
				Total Volume (gal):	1020	
10	1331	38	33120	33220	100	
		32	33220	33320	100	
		28	33320	33620	300	
	1603	22	33620	33920	300	
		18	33920	34140	220	
				Total Volume (gal):	1020	
11	1332	38	33120	33220	100	
		32	33220	33320	100	
		28	33320	33620	300	
	1603	22	33620	33920	300	
		18	33920	34140	220	
				Total Volume (gal):	1020	
12	1332	38	33120	33220	100	
		32	33220	33320	100	
		28	33320	33620	300	
	1603	22	33620	33920	300	
		18	33920	34140	220	
				Total Volume (gal):	1020	
				SHEET TOTAL (gal):	6,120	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7 - T6 DATE: 11-19

DP SUBCONTRACTOR PES PERSONNEL: TY AD MR

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 1 of 1

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
19	1440	38	33040	33140	100	
		33	33140	33240	100	
		28	33240	33540	300	
	1610	23	33540	33840	300	
		18	33840	34040	200	
				Total Volume (gal):	1000	
20	1438	38	33040	33140	100	
		33	33140	33240	100	
		28	33240	33540	300	
	1608	23	33540	33840	300	
		18	33840	34040	200	
				Total Volume (gal):	1000	
21	1436	38	33030	33130	100	
		33	33130	33230	100	
		28	33230	33530	300	
	1606	23	33530	33830	300	
		18	33830	34030	200	
				Total Volume (gal):	1000	
22	1434	38	33050	33150	100	
		33	33150	33250	100	
		28	33250	33550	300	
	1604	23	33550	33850	300	
		18	33850	34050	200	
				Total Volume (gal):	1000	
23	1432	38	33050	33150	100	
		33	33150	33250	100	
		28	33250	33550	300	
	1602	23	33550	33850	300	
		18	33850	34050	200	
				Total Volume (gal):	1000	
24	1430	38	33050	33150	100	
		33	33150	33250	100	
		28	33250	33550	300	
	1600	23	33550	33850	300	
		18	33850	34050	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-7 DATE: 11-19-19

DP SUBCONTRACTOR PES PERSONNEL: AB

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 1 of 1

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
7	1501	38	34140	34240	100	
		32	34240	34340	100	
		28	34340	34640	300	
	1549	22	34640	34940	300	
				Total Volume (gal):	800	
8	1448	38	34140	34240	100	
		32	34240	34340	100	
		28	34340	34640	300	
	1551	22	34640	34940	300	
				Total Volume (gal):	800	
9	1440	38	34140	34240	100	
		32	34240	34340	100	
		28	34340	34640	300	
	1634	22	34640	34940	300	
				Total Volume (gal):	800	
10	1442	38	34140	34240	100	
		32	34240	34340	100	
		28	34340	34640	300	
	1557	22	34640	34940	300	
				Total Volume (gal):	800	
11	1450	38	34140	34240	100	
		32	34240	34340	100	
		28	34340	34640	300	
	1601	22	34640	34940	300	
				Total Volume (gal):	800	
12	1445	38	34140	34240	100	
		32	34240	34340	100	
		28	34340	34640	300	
	1558	22	34640	34940	300	
				Total Volume (gal):	800	
				SHEET TOTAL (gal):	4,800	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-T7 DATE: 11-20-19

DP SUBCONTRACTOR PES PERSONNEL: TY MM AD

AMENDMENT / PERCENT CONCENTRATION: 9.8% UVB SHEET NO. 1 of 4

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
19	0740	38	34050	34150	100	
		33	34150	34250	100	
		28	34250	34550	300	
	0925	23	34550	34850	300	
		18	34850	35050	200	
				Total Volume (gal):	1000	
20	0742	38	34050	34150	100	
		33	34150	34250	100	
		28	34250	34550	300	
	0927	23	34550	34850	300	
		18	34850	35050	200	
				Total Volume (gal):	1000	
21	0744	38	34050	34150	100	
		33	34150	34250	100	
		28	34250	34550	300	
	0929	23	34550	34850	300	
		18	34850	35050	200	
				Total Volume (gal):	1000	
22	0746	38	34050	34130	100	
		33	34130	34230	100	
		28	34230	34530	300	
	0931	23	34530	34830	300	
		18	34830	35030	200	
				Total Volume (gal):	1000	
23	0748	38	34050	34140	100	
		33	34140	34240	100	
		28	34240	34540	300	
	0933	23	34540	34840	300	
		18	34840	35040	200	
				Total Volume (gal):	1000	
24	0750	38	34040	34140	100	
		33	34140	34240	100	
		28	34240	34540	300	
	0935	23	34540	34840	300	
		18	34840	35040	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-TR DATE: 11-20-19

DP SUBCONTRACTOR PES PERSONNEL: TV/MM AD

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 2 of 4

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
42	1000	38	35050	35150	100	
		33	35150	35250	100	
		28	35250	35550	300	
	1150	23	35550	35850	300	
		18	35850	36050	200	
				Total Volume (gal):	1000	
41	1002	38	35050	35150	100	
		33	35150	35250	100	
		28	35250	35550	300	
	1152	23	35550	35850	300	
		18	35850	36050	200	
				Total Volume (gal):	1000	
40	1004	38	35050	35150	100	
		33	35150	35250	100	
		28	35250	35550	300	
	1154	23	35550	35856	300	
		18	35850	36050	200	
				Total Volume (gal):	1000	
39	1006	38	35030	35130	100	
		33	35130	35230	100	
		28	35230	35530	300	
	1156	23	35530	35830	300	
		18	35830	36030	200	
				Total Volume (gal):	1000	
38	1008	38	35040	35140	100	
		33	35140	35240	100	
		28	35240	35540	300	
	1158	23	35540	35840	300	
		18	35840	36040	200	
				Total Volume (gal):	1000	
37	1010	38	35040	35140	100	
		33	35140	35240	100	
		28	35240	35540	300	
	1200	23	35540	35840	300	
		18	35840	36040	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-T4 DATE: 11-20-19

DP SUBCONTRACTOR PES PERSONNEL: TY MM AD

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 3 of 4

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
42	1225	38	36050	36150	100	
		33	36150	36250	100	
		28	36250	36550	300	
	1410	23	36550	36850	300	
		18	36850	37050	200	
				Total Volume (gal):	1000	
41	1227	38	36050	36150	100	
		33	36150	36250	100	
		28	36250	36550	300	
	1412	23	36550	36850	300	
		18	36850	37050	200	
				Total Volume (gal):	1000	
40	1229	38	36050	36150	100	
		33	36150	36250	100	
		28	36250	36550	300	
	1414	23	36550	36850	300	
		18	36850	37050	200	
				Total Volume (gal):	1000	
39	1231	38	36030	36130	100	
		33	36130	36230	100	
		28	36230	36530	300	
	1416	23	36530	36830	300	
		18	36830	37030	200	
				Total Volume (gal):	1000	
38	1233	38	36040	36140	100	
		33	36140	36240	100	
		28	36240	36540	300	
	1418	23	36540	36840	300	
		18	36840	37040	200	
				Total Volume (gal):	1000	
37	1235	38	36040	36140	100	
		33	36140	36240	100	
		28	36240	36540	300	
	1420	23	36540	36840	300	
		18	36840	~~300~~ 37040	200	
				Total Volume (gal):		
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-T4 DATE: 11-20-19

DP SUBCONTRACTOR PES PERSONNEL: TV MM AD

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 4 of 4

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
36	1455	38	37050	37150	100	
		33	37150	37250	100	
		28	37250	37550	300	
	1625	23	37550	37850	300	
		18	37850	38050	200	
				Total Volume (gal):	1000	
35 ~~37~~	1457	38	37050	37150	100	
		33	37150	37250	100	
		28	37250	37550	300	
	1627	23	37550	37850	300	
		18	37850	38050	200	
				Total Volume (gal):	1000	
34	1459	38	37050	37150	100	
		33	37150	37250	100	
		28	37250	37550	300	
	1629	23	37550	37850	300	
		18	37850	38050	200	
				Total Volume (gal):	1000	
33	1501 ~~1505~~	38	37030	37130	100	
		33	37130	37230	100	
		28	37230	37530	300	
	1631	23	37530	37830	300	
		18	37830	38030	200	
				Total Volume (gal):	1000	
32	1503	38	37040	37140	100	
		33	37140	37240	100	
		28	37240	37540	300	
	1633	23	37540	37840	300	
		18	37840	38040	200	
				Total Volume (gal):	1000	
31	1505	38	37040	37140	100	
		33	37140	37240	100	
		28	37240	37540	300	
	1635	23	37540	37840	300	
		18	37840	38040	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT I 7 DATE: 11-20-19

DP SUBCONTRACTOR PES PERSONNEL: MM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 1 of 4

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
~~13~~ 7	741	18	35940	36140	200	
	755					
				Total Volume (gal):	200	
~~14~~ 8	742	18	35940	36140	200	
	800					
				Total Volume (gal):	200	
~~15~~ 9	743	18	35940	36140	200	
	756					
				Total Volume (gal):	200	
~~16~~ 10	745	18	35940	36140	200	
	803					
				Total Volume (gal):	200	
~~17~~ 11	747	18	35940	36140	200	
	800					
				Total Volume (gal):	200	
~~18~~ 12	749	18	35940	36140	200	
	800					
				Total Volume (gal):	200	
				SHEET TOTAL (gal):	1,200	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-7 DATE: 11-20-19

DP SUBCONTRACTOR PES PERSONNEL: BDR

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 2 of 4

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
~~12~~ 13	846	38	36140	36240	100	
		32	36240	36340	100	
		28	36340	36640	300	
	1103	22	36640	36940	300	
		18	36940	37140	200	
				Total Volume (gal):	1000	
~~20~~ 14	849	38	36140	36240	100	
		32	36240	36340	100	
		28	36340	36640	300	
	1103	22	36640	36940	300	
		18	36940	37140	200	
				Total Volume (gal):	1000	
~~21~~ 15	909	38	36140	36240	100	
		32	36240	36340	100	
		28	36340	36640	300	
	1102	22	36640	36940	300	
		18	36940	37140	200	
				Total Volume (gal):	1000	
~~22~~ 16	910	38	36140	36240	100	
		32	36240	36340	100	
		28	36340	36640	300	
	1101	22	36640	36940	300	
		18	36940	37140	200	
				Total Volume (gal):	1000	
~~23~~ 17	911	38	36140	36240	100	
		32	36240	36340	100	
		28	36340	36640	300	
	1105	22	36640	36940	300	
		18	36940	37140	200	
				Total Volume (gal):	1000	
~~24~~ 18	913	38	36140	36240	100	
		32	36240	36340	100	
		28	36340	36640	300	
	1104	22	36640	36940	300	
		18	36940	37140	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-6 DATE: 11-20-19

DP SUBCONTRACTOR PES PERSONNEL: RM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 3 of 4

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
~~19~~ 13	1132	38	37140	37240	100	
		32	37240	37340	100	
		28	37340	37640	300	
	1330	22	37640	37940	300	
		18	37940	38140	200	
				Total Volume (gal):	1000	
~~20~~ 14	1133	38	37140	37240	100	
		32	37240	37340	100	
		28	37340	37640	300	
	1328	22	37640	37940	300	
		18	37940	38140	200	
				Total Volume (gal):	1000	
~~21~~ 15	1134	38	37140	37240	100	
		32	37240	37340	100	
		28	37340	37640	300	
	1329	22	37640	37940	300	
		18	37940	38140	200	
				Total Volume (gal):	1000	
~~22~~ 16	1136	38	37140	37240	100	
		32	37240	37340	100	
		28	37340	37640	300	
	1335	22	37640	37940	300	
		18	37940	38140	200	
				Total Volume (gal):	1000	
~~23~~ 17	1137	38	37140	37240	100	
		32	37240	37340	100	
		28	37340	37640	300	
	1334	22	37640	37940	300	
		18	37940	38140	200	
				Total Volume (gal):	1000	
~~24~~ 18	1139	38	37140	37240	100	
		32	37240	37340	100	
		28	37340	37640	300	
	1335	22	37640	37940	300	
		18	37940	38140	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-5 DATE: 11-20-19

DP SUBCONTRACTOR PES PERSONNEL: NK

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 4 of 4

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
1	1427	38	38140	38240	100	
		32	38240	38340	100	
		28	38340	38640	300	
	1608	22	38640	38940	300	
		18	38940	39140	200	
				Total Volume (gal):	1000	
2	1428	38	38140	38240	100	
		32	38240	38340	100	
		28	38340	38640	300	
	1602	22	38640	38940	300	
		18	38940	39140	200	
				Total Volume (gal):	1000	
3	1430	38	38120	38220	100	
		32	38220	38320	100	
		28	38320	38620	300	
	1608	22	38620	38920	300	
		18	38920	39140	200	
				Total Volume (gal):	1000	
4	1432	38	38120	38240	100	
		32	38140	38340	100	
		28	38340	38640	300	
	1607	22	38640	38940	300	
		18	38940	39140	200	
				Total Volume (gal):	1000	
5	1134	38	38140	38240	100	
		32	38240	38340	100	
		28	38340	38640	300	
	1606	22	38640	38940	300	
		18	38940	39140	200	
				Total Volume (gal):	1000	
6	1135	38	38140	38240	100	
		32	38240	38340	100	
		28	38340	38640	300	
	1607	22	38640	38940	300	
		18	38940	39140	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-~~T6~~ T5 DATE: 11-21-19

DP SUBCONTRACTOR PES PERSONNEL: TV AD

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 1 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
36	0835	38	38040	38140	20	Pulled
		33	38140	38240	180	
		28	38240	38540	300	
	1110	23	38540	38840	300	
		18	38840	39040	200	
				Total Volume (gal):	1000	
35	0837	38	38040	38140	100	
		33	38140	38240	100	
		28	38240	38540	300	
	1112	23	38540	38840	300	
		18	38840	39040	200	
				Total Volume (gal):	1000	
34	0839	38	38040	38140	100	
		33	38140	38240	100	
		28	38240	38540	300	
	1114	23	38540	38840	300	
		18	38840	39040	200	
				Total Volume (gal):	1000	
33	0841	38	38040	38140	100	
		33	38140	38240	100	
		28	38240	38540	300	
	1116	23	38540	38840	300	
		18	38840	39040	200	
				Total Volume (gal):	1000	
32	0843	38	38040	38140	100	
		33	38140	38240	100	
		28	38240	38540	300	
	1118	23	38540	38840	300	
		18	38840	39040	200	
				Total Volume (gal):	1000	
31	0845	38	38040	38140	100	
		33	38140	38240	100	
		28	38240	38540	300	
	1120	23	38540	38840	300	
		18	38840	39040	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Pt. 36: Had to pull rod to remove tip.

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7 - ~~T6~~ T5 DATE: 11-21-19

DP SUBCONTRACTOR PES PERSONNEL: TY AD

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 2 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
30	1135	38	39050	39150	100	
		33	39150	39250	100	
		28	39250	39550	300	
	1345	23	39550	39850	300	
		18	39850	40050	200	
				Total Volume (gal):	1000	
29	1137	38	39050	39150	100	
		33	39150	39250	100	
		28	39250	39550	300	
	1347	23	39550	39850	300	
		18	39850	40050	200	
				Total Volume (gal):	1000	
28	1139	38	39050	39150	100	
		33	39150	39250	100	
		28	39250	39550	300	
	1349	23	39550	39850	300	
		18	39850	40050	200	
				Total Volume (gal):	1000	
27	1141	38	39030	39130	100	
		33	39130	39230	100	
		28	39230	39530	300	
	1351	23	39530	39830	300	
		18	39830	40030	200	
				Total Volume (gal):	1000	
26	1143	38	39040	39140	100	
		33	39140	39240	100	
		28	39240	39540	300	
	1410	23	39540	39840	300	
		18	39840	40040	200	
				Total Volume (gal):	1000	
25	1145	38	39040	39140	100	
		33	39140	39240	100	
		28	39240	39540	300	
	1412	23	39540	39840	300	
		18	39840	40040	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

1350: Out of amendment.

1400: Amendment refilled.

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection**

INJECTION TRANSECT: ~~EW7-~~ T4

DP SUBCONTRACTOR: PES

AMENDMENT / REGENT CONCENTRATION: 9.8% WB

PROJECT NO.: 60565355

DATE: 11-21-19

PERSONNEL: TY AD

SHEET NO.: 3 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
30	1435	38	40040	40140	100	
		33	40140	40240	100	
		28	40240	40540	300	
	1615	23	40540	40840	300	
		18	40840	41040	200	
				Total Volume (gal):	1000	
29	1437	38	40040	40140	100	
		33	40140	40240	100	
		28	40240	40540	300	
	1617	23	40540	40840	300	
		18	40840	41040	200	
				Total Volume (gal):	1000	
28	1439	38	40030	40130	100	
		33	40130	40230	100	
		28	40230	40530	300	
	1619	23	40530	40830	300	
		18	40830	41030	200	
				Total Volume (gal):	1000	
27	1441	38	40050	40150	100	
		33	40150	40250	100	
		28	40250	40550	300	
	1621	23	40550	40850	300	
		18	40850	41050	200	
				Total Volume (gal):	1000	
26	1443	38	40050	40150	100	
		33	40150	40250	100	
		28	40250	40550	300	
	1623	23	40550	40850	300	
		18	40850	41050	200	
				Total Volume (gal):	1000	
25	1445	38	40050	40150	100	
		33	40150	40250	100	
		28	40250	40550	300	
	1625	23	40550	40850	300	
		18	40850	41050	200	
				Total Volume (gal):	1000	
				~~SHEET TOTAL (gal):~~	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-4 DATE: 11-21-19

DP SUBCONTRACTOR PES PERSONNEL: RR

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 1 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
1	752	38	38140	38240	100	
		32	38240	38340	100	
		28	38340	38640	300	
	1018	22	38640	38940	300	
		18	38940	39140	200	
				Total Volume (gal):	1000	
2	753	38	38140	38240	100	Redrilled
		32	38240	38340	100	once sand
		28	38340	38640	300	heave
	1019	22	38640	38940	300	
		18	38940	39140	200	
				Total Volume (gal):	1000	
3	754	38	38140	38240	100	
		32	38240	38340	100	
		28	38340	38640	300	
	1018	22	38640	38940	300	
		18	38940	39140	200	
				Total Volume (gal):	1000	
4	756	38	38140	38240	100	
		32	38240	38340	100	
		28	38340	38640	300	
	1017	22	38640	38940	300	
		18	38940	39140	200	
				Total Volume (gal):	1000	
5	910	38	38140	38240	100	
		32	38240	38340	100	
		28	38340	38640	300	
	1017	22	38640	38940	300	
		18	38940	39140	200	
				Total Volume (gal):	1000	
6	758	38	38140	38240	100	
		32	38240	38340	100	
		28	38340	38640	300	
	1021	22	38640	38940	300	
		18	38940	39140	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-4 DATE: 11-21-19

DP SUBCONTRACTOR PES PERSONNEL: AR

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 2 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
7	1052	38	39140	39240	100	
		32	39240	39340	100	
		28	39340	39640	300	
	1306	22	39640	39940	300	
		18	39940	40140	200	
				Total Volume (gal):	1000	
8	1124	38	39140	39240	100	
		32	39240	39340	100	
		28	39340	39640	300	
	1303	22	39640	39940	300	
		18	39940	40140	200	
				Total Volume (gal):	1000	
9	1126	38	39140	39240	100	
		32	39240	39340	100	
		28	39340	39640	300	
	1308	22	39640	39940	300	
		18	39940	40140	200	
				Total Volume (gal):	1000	
10	1059	38	39140	39240	100	
		32	39240	39340	100	
		28	39340	39640	300	
	1305	22	39640	39940	300	
		18	39940	40140	200	
				Total Volume (gal):	1000	
11	1101	38	39140	39240	100	
		32	39240	39340	100	
		28	39340	39940	300	
	1308	22	39640	39940	300	
		18	39940	40140	200	
				Total Volume (gal):	1000	
12	1102	38	39140	39240	100	
		32	39240	39340	100	
		28	39340	39640	300	
	1311	22	39640	39940	300	
		18	39940	40140	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6,000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-5 DATE: 11-21-19

DP SUBCONTRACTOR PES PERSONNEL: RJR

AMENDMENT / PERCENT CONCENTRATION: 9.8 WB SHEET NO. 3 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
7	1409	38	40140	40240	100	
		32	40240	40340	100	
		28	40340	40640	300	
	1557	22	40640	40940	300	
		18	40940	41140	200	
				Total Volume (gal):	1000	
8	1411	38	40140	40240	100	
		32	40240	40340	100	
		28	40340	40640	300	
	1554	22	40640	40940	300	
		18	40940	41140	200	
				Total Volume (gal):	1000	
9	1412	38	40140	40240	100	
		32	40240	40340	100	
		28	40340	40640	300	
	1559	22	40640	40940	300	
		18	40940	41140	200	
				Total Volume (gal):	1000	
10	1414	38	40140	40240	100	
		32	40240	40340	100	
		28	40340	40640	300	
	1556	22	40640	40940	300	
		18	40940	41140	200	
				Total Volume (gal):	1000	
11	1416	38	40140	40240	100	
		32	40240	40340	100	
		28	40340	40690	300	
	1552	22	40640	40940	300	
		18	40940	41140	200	
				Total Volume (gal):	1000	
12	1418	38	40140	40240	100	
		32	40240	40340	100	
		28	40340	40690	300	
	1554	22	40640	40940	300	
		18	40940	41140	200	
				Total Volume (gal):	1000	
1348 – 1400 Tanks empty				SHEET TOTAL (gal):	6,000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection**

INJECTION TRANSECT: EW7-T3

DP SUBCONTRACTOR: PES

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB

PROJECT NO. 60565355

DATE: 11-22-19

PERSONNEL: TY AD

SHEET NO. 1 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
42	1030	38	41050	41150	100	
		33	41150	41250	100	
		28	41250	41550	300	
	1220	23	41550	41850	300	
		18	41850	42050	200	
				Total Volume (gal):	1000	
41	1032	38	41050	41150	100	
		33	41150	41250	100	
		28	41250	41550	300	
	1222	23	41550	41850	300	
		18	41850	42050	200	
				Total Volume (gal):	1000	
40	1034	38	41050	41150	100	
		33	41150	41250	100	
		28	41250	41550	300	
	1224	23	41550	41850	300	
		18	41850	42050	200	
				Total Volume (gal):	1000	
39	1036	38	41030	41130	100	
		33	41130	41230	100	
		28	41230	41530	300	
	1226	23	41530	41830	300	
		18	41830	42030	200	
				Total Volume (gal):	1000	
38	1038	38	41040	41140	100	
		33	41140	41240	100	
		28	41240	41540	300	
	1228	23	41540	41840	300	
		18	41840	42040	200	
				Total Volume (gal):	1000	
37	1040	38	41040	41140	100	
		33	41140	41240	100	
		28	41240	41540	300	
	1230	23	41540	41840	300	
		18	41840	42040	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Late start due to frozen lines.

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-T3 DATE: 11-22-19

DP SUBCONTRACTOR PES PERSONNEL: TY AD

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 2 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
36	1240	38	42050	42150	100	
		33	42150	42250	100	
		28	42250	42550	300	
	1402	23	42550	42850	300	
		18	42850	43050	200	
				Total Volume (gal):	1000	
35	1242	38	42050	42150	100	
		33	42150	42250	100	
		28	42250	42550	300	
	1404	23	42550	42850	300	
		18	42850	43050	200	
				Total Volume (gal):	1000	
34	1244	38	42050	42150	100	
		33	42150	42250	100	
		28	42250	42550	300	
	1406	23	42550	42850	300	
		18	42850	43050	200	
				Total Volume (gal):	1000	
33	1246	38	42030	42130	100	
		33	42130	42230	100	
		28	42230	42530	300	
	1408	23	42530	42830	300	
		18	42830	43030	200	
				Total Volume (gal):	1000	
32	1248	38	42040	42140	100	
		33	42140	42240	100	
		28	42240	42540	300	
	1410	23	42540	42840	300	
		18	42840	43040	200	
				Total Volume (gal):	1000	
31	1250	38	42040	42140	100	
		33	42140	42240	100	
		28	42240	42540	300	
	1412	23	42540	42840	300	
		18	42840	43040	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-T3 DATE: 11-28-19

DP SUBCONTRACTOR PES PERSONNEL: TV AD

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 3 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
30	1430	38	43040	43140	100	
		33	43140	43240	100	
		28	43240	43540	300	
	1624	23	43540	43840	300	
		18	43840	44040	200	
				Total Volume (gal):	1000	
29	1432	38	43040	43140	100	
		33	43140	43240	100	
		28	43240	43540	300	
	1626	23	43540	43840	300	
		18	43840	44040	200	
				Total Volume (gal):	1000	
28	1434	38	43030	43130	100	
		33	43130	43230	100	
		28	43230	43530	300	
	1628	23	43530	43830	300	
		18	43830	44030	200	
				Total Volume (gal):	1000	
27	1436	38	43050	43150	100	
		33	43150	43250	100	
		28	43250	43550	300	
	1630	23	43550	43850	300	
		18	43850	44050	200	
				Total Volume (gal):	1000	
26	1438	38	43050	43150	100	
		33	43150	43250	100	
		28	43250	43550	300	
	1632	23	43550	43850	300	
		18	43850	44050	200	
				Total Volume (gal):	1000	
25	1440	38	43050	43150	100	
		33	43150	43250	100	
		28	43250	43550	300	
	1634	23	43550	43850	300	
		18	43850	44050	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-4 DATE: 11-22-19

DP SUBCONTRACTOR PES PERSONNEL: AR

AMENDMENT / PERCENT CONCENTRATION: 9.89% WB SHEET NO. 1 OF 4

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
13	800	38	41140	41240	100	
		32	41240	41340	100	
		28	41340	41640	300	
	1015	22	41640	41940	300	
		18	41940	42140	200	
				Total Volume (gal):	1000	
14	802	38	41140	41240	100	
		32	41240	41340	100	
		~~36~~ 28	41340	41640	300	
	1014	22	41640	41940	300	
		18	41940	42140	200	
				Total Volume (gal):	1000	
15	804	38	41140	41240	100	
		32	41240	41340	100	
		28	41340	41640	300	
	1012	22	41640	41940	300	
		18	41940	42140	200	
				Total Volume (gal):	1000	
16	823	38	41140	41240	100	
		32	41240	41340	100	
		28	41340	41640	300	
	1012	22	41640	41940	300	
		18	41940	42140	200	
				Total Volume (gal):	1000	
17	808	38	41140	41240	100	
		32	41240	41340	100	
		28	41340	41640	300	
	1013	22	41640	41940	300	
		18	41940	42140	200	
				Total Volume (gal):	1000	
18	818	38	41140	41240	100	
		32	41240	41340	100	
		28	41340	41640	300	
	1015	22	41640	41940	300	
		18	41940	42140	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-5 DATE: 11-22-19

DP SUBCONTRACTOR PES PERSONNEL: BM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 2 of 4

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
13	1033	38	42140	42240	100	
		32	42240	42340	100	
		28	42340	42640	300	
	1213	22	42640	42940	300	
		18	42940	43140	200	
				Total Volume (gal):	1000	
14	1035	38	42140	42240	100	
		32	42240	42340	100	
		28	42340	42640	300	
	1207	22	42640	42940	300	
		18	42940	43140	200	
				Total Volume (gal):	1000	
15	1035	38	42140	42240	100	
		32	42240	42340	100	
		28	42340	42640	300	
	1211	22	42640	42940	300	
		18	42940	43140	200	
				Total Volume (gal):	1000	
16	1038	38	42140	42240	100	
		32	42240	42340	100	
		28	42340	42640	300	
	1215	22	42640	42940	300	
		18	42940	43140	200	
				Total Volume (gal):	1000	
17	1038	38	42140	42240	100	
		32	42240	42340	100	
		28	42340	42640	300	
	1216	22	42640	42940	300	
		18	42940	43140	200	
				Total Volume (gal):	1000	
18	1039	38	42140	42240	100	
		32	42240	42340	100	
		28	42340	42640	300	
	1220	22	42640	42940	300	
		18	42940	43140	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6,000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-4 DATE: 11-22-14

DP SUBCONTRACTOR PES PERSONNEL: AM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 3 of 4

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
19	1254	38	43140	43240	100	
		32	43240	43340	100	
		28	43340	43640	300	
	1518	22	43640	43940	300	
		18	43940	44140	200	
				Total Volume (gal):	1000	
20	1257	38	43140	43240	100	
		32	43240	43340	100	
		28	43340	43640	300	
	1512	22	43640	43940	300	
		18	43940	44140	200	
				Total Volume (gal):	1000	
21	1254	38	43140	43240	100	
		32	43240	43340	100	
		28	43340	43640	300	
	1508	22	43640	43940	300	
		18	43940	44140	200	
				Total Volume (gal):	1000	
22	1259	38	43140	43240	100	
		32	43240	43340	100	
		28	43340	43640	300	
	1508	22	43640	43940	300	
		18	43940	44140	200	
				Total Volume (gal):	1000	
23	1300	38	43140	43240	100	
		32	43240	43340	100	
		28	43340	43640	300	
	1509	22	43640	43940	300	
		18	43940	44140	200	
				Total Volume (gal):	1000	
24	1302	38	43140	43240	100	
		32	43240	43340	100	
		28	43340	43640	300	
	1516	22	43640	43940	300	
		18	43940	44140	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6,000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-5 DATE: 11-22-14

DP SUBCONTRACTOR PES PERSONNEL: MR

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 4 of 4

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
19	1541	38	44140	44240	100	
	1557					
				Total Volume (gal):	100	
20	1543	38	44140	44240	100	
	1559					
				Total Volume (gal):	100	
21	1545	38	44140	44240	100	
	1605					
				Total Volume (gal):		
22	1547	38	44140	44240	100	
	1620					
				Total Volume (gal):	100	
23	1548	38	44140	44240	100	
	1552					
				Total Volume (gal):	100	
24	1549	38	44140	44240	100	
	1603					
				Total Volume (gal):	100	
				SHEET TOTAL (gal):	600	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT: EW7- T3 DATE: 11-23-19

DP SUBCONTRACTOR: PES PERSONNEL: TY AD

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 1 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
19	0815	38	44050	44150	100	
		33	44150	44250	100	
		28	44250	44550	300	
	1120	23	44550	44850	300	
		18	44850	45050	200	
				Total Volume (gal):	1000	
20	0817	38	44050	44150	100	
		33	44150	44250	100	
		28	44250	44550	300	
	1122	23	44550	44850	300	
		18	44850	45050	200	
				Total Volume (gal):	1000	
21	0819	38	44050	44150	100	
		33	44150	44250	100	
		28	44250	44550	300	
	1124	23	44550	44850	300	
		18	44850	45050	200	
				Total Volume (gal):	1000	
22	0821	38	44030	44130	100	
		33	44130	44230	100	
		28	44230	44530	300	
	1126	23	44530	44830	300	
		18	44830	45030	200	
				Total Volume (gal):	1000	
23	0823	38	44040	44140	100	
		33	44140	44240	100	
		28	44240	44540	300	
	1128	23	44540	44840	300	
		18	44840	45040	200	
				Total Volume (gal):	1000	
24	0825	38	44040	44140	100	
		33	44140	44240	100	
		28	44240	44540	300	
	1130	23	44540	44840	300	
		18	44840	45040	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

0935: out of amendment

1050: Resumed pumping

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-T2 DATE: 11-23-19

DP SUBCONTRACTOR PES PERSONNEL: TY AD

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 2 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
24	1145	38	45040	45150	100	
		33	45150	45250	100	
		28	45250	45550	300	
	1355	23	45550	45850	300	
		18	45850	46050	200	
				Total Volume (gal):	1000	
23	1147	38	45040	45150	100	
		33	45150	45250	100	
		28	45250	45550	300	
	1357	23	45550	45850	300	
		18	45850	46050	200	
				Total Volume (gal):	1000	
22	1149	38	45040	45150	100	
		33	45150	45250	100	
		28	45250	45550	300	
	1359	23	45550	45850	300	
		18	45850	46050	200	
				Total Volume (gal):	1000	
21	1151	38	45030	45130	100	
		33	45130	45230	100	
		28	45230	45530	300	
	1401	23	45530	45830	300	
		18	45830	46030	200	
				Total Volume (gal):	1000	
20	1153	38	45040	45140	100	
		33	45140	45240	100	
		28	45240	45540	300	
	1403	23	45540	45840	300	
		18	45840	46040	200	
				Total Volume (gal):	1000	
19	1155	38	45040	45140	100	
		33	45140	45240	100	
		28	45240	45540	300	
	1405	23	45540	45840	300	
		18	45840	46040	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-T2 DATE: 11-23-19

DP SUBCONTRACTOR PES PERSONNEL: TH AD

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 3 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
16	1430	38	460750	461750	100	
		33	461750	462750	100	
		28	462750	465750	300	
	1602	23	465750	468750	300	
				Total Volume (gal):	800	
17	1432	38	460750	461750	100	
		33	461750	462750	100	
		28	462750	465750	300	
	1604	23	465750	468750	300	
				Total Volume (gal):	800	
16	1434	38	460750	461750	100	
		33	461750	462750	100	
		28	462750	465750	300	
	1606	23	465750	468750	300	
				Total Volume (gal):	800	
15	1436	38	460730	461730	100	
		33	461730	462730	100	
		28	462730	465730	300	
	1608	23	465730	468730	300	
				Total Volume (gal):	800	
14	1438	38	460740	461740	100	
		33	461740	462740	100	
		28	462740	465740	300	
	1610	23	465740	468740	300	
		18				
				Total Volume (gal):	800	
13	1440	38	460740	461740	100	
		33	461740	462740	100	
		28	462740	465740	300	
	1612	23	465740	468740	300	
				Total Volume (gal):	800	
				SHEET TOTAL (gal):	4800	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-5 DATE: 11-23-19

DP SUBCONTRACTOR PES PERSONNEL: RM

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 1 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
19	800	32	44240	44340	100	
		28	44340	44640	300	
		22	44640	44940	300	
	929	18	44940	45140	200	
				Total Volume (gal):	900	
20	800	32	44240	44340	100	
		28	44340	44640	300	
		22	44640	44940	300	
	915	18	44940	45140	200	
				Total Volume (gal):	900	
21	800	32	44240	44340	100	
		28	44340	44640	300	
		22	44640	44940	300	
	924	18	44940	45140	200	
				Total Volume (gal):	900	
22	800	32	44240	44340	100	
		28	44340	44640	300	
		22	44640	44940	300	
	924	18	44940	45140	200	
				Total Volume (gal):	900	
23	800	32	44240	44340	100	
		28	44340	44640	300	
		22	44640	44940	300	
	922	18	44940	45140	200	
				Total Volume (gal):	900	
24	800	32	44240	44340	100	
		28	44340	44640	300	
		22	44640	44940	300	
	927	18	44940	45140	200	
				Total Volume (gal):	900	
				SHEET TOTAL (gal):	5400	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-3 DATE: 11-23-19

DP SUBCONTRACTOR PES PERSONNEL: BOZ

AMENDMENT / PERCENT CONCENTRATION: 9.8 WB SHEET NO. 2 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
1	0952	38	45140	45240	100	
		~~35~~32	45240	45340	100	
		~~BOZ~~28	45340	45640	300	
	1203	~~26~~22	45640	45940	300	
		~~BOZ~~18	45940	46140	200	
		~~M+8~~		Total Volume (gal):	1000	
2	0953	38	45140	45240	100	
		32	45240	45340	100	
		28	45340	45640	300	
	1201	22	45640	45940	300	
		18	45940	46140	200	
				Total Volume (gal):	1000	
3	0955	38	45140	45240	100	
		32	45240	45340	100	
		28	45340	45640	300	
	1201	22	45640	45940	300	
		18	45940	46140	200	
				Total Volume (gal):	1000	
4	0957	38	45140	45240	100	
		32	45240	45340	100	
		28	45340	45640	300	
	1205	22	45640	45940	300	
		18	45940	46140	200	
				Total Volume (gal):	1000	
5	0959	38	45140	45150	10	No flow
		32	45240	45340	190	Pulled up 5'
		28	45340	45640	300	
	1204	22	~~45~~ 640	45940	300	
		18	45940	46140	200	
				Total Volume (gal):	1000	
6	1002	38	45140	45150	100	
		32	45240	45340	100	
		28	45340	45640	300	
	1203	22	45640	45940	300	
		18	45940	46140	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6,000	

GENERAL NOTES:

1015 - 1053 Empty Tank

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-3 DATE: 11-23-19

DP SUBCONTRACTOR PES PERSONNEL: AR

~~AMENDMENT / PERCENT CONCENTRATION:~~ 9.8% WB ~~SHEET NO.~~ 3 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
7	1239	38	46140	46240	100	
		32	46240	46340	100	
		28	46340	46640	300	
	1530	22	46640	46940	300	
		18	46940	47140	200	
				Total Volume (gal):	1000	
8	1240	38	46140	46240	100	
		32	46240	46340	100	
		28	46340	46640	300	
	1529	22	46640	46940	300	
		18	46940	47140	200	
				Total Volume (gal):	1000	
9	1241	38	46140	46240	100	
		32	46240	46340	100	
		28	46340	46640	300	
	1532	22	46640	46940	300	
		18	46940	47140	200	
				Total Volume (gal):	1000	
10	1241	38	46140	46240	100	
		32	46240	46340	100	
		28	46340	46640	300	
	1533	22	46640	46940	300	
		18	46940	47140	200	
				Total Volume (gal):	1000	
11	1242	38	46140	46240	100	
		32	46240	46340	100	
		28	46340	46640	300	
	1534	22	46640	46940	300	
		18	46940	47140	200	
				Total Volume (gal):	1000	
12	1243	38	46140	46240	100	
		32	46240	46340	100	
		28	46340	46640	300	
	1540	22	46640	46940	300	
		18	46940	47140	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6,000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-T2 DATE: 11-24-19

DP SUBCONTRACTOR PES PERSONNEL: TY AD

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 1 of 4

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
13	0740	18	466540	47040	200	
	0805					
				Total Volume (gal):	200	
14	0742	18	466540	47040	200	
	0807					
				Total Volume (gal):	200	
15	0744	18	466830	47030	200	
	0809					
				Total Volume (gal):	200	
16	0746	18	466850	47050	200	
	0811					
				Total Volume (gal):	200	
17	0748	18	466850	47050	200	
	0813					
				Total Volume (gal):	200	
18	0750	18	466850	47050	200	
	0815					
				Total Volume (gal):	200	
				SHEET TOTAL (gal):	1200	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-T2 DATE: 11-24-19

DP SUBCONTRACTOR PES PERSONNEL: TY AD

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 2 of 4

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
12	0820	38	47050	47150	100	
		33	47150	47250	100	
		28	47250	47550	300	
	1012	23	47550	47850	300	
		18	47850	48050	200	
				Total Volume (gal):	1000	
11	0822	38	47050	47150	100	
		33	47150	47250	100	
		28	47250	47550	300	
	1014	23	47550	47850	300	
		18	47850	48050	200	
				Total Volume (gal):	1000	
10	0824	38	47050	47150	100	
		33	47150	47250	100	
		28	47250	47550	300	
	1016	23	47550	47850	300	
		18	47850	48050	200	
				Total Volume (gal):	1000	
9	0826	38	47030	47130	100	
		33	47130	47230	100	
		28	47230	47530	300	
	1018	23	47530	47830	300	
		18	47830	48030	200	
				Total Volume (gal):	1000	
8	0828	38	47040	47140	100	
		33	47140	47240	100	
		28	47240	47540	300	
	1020	23	47540	47840	300	
		18	47840	48040	200	
				Total Volume (gal):	1000	
7	0830	38	47040	47140	100	
		33	47140	47240	100	
		28	47240	47540	300	
	1022	23	47540	47840	300	
		18	47840	48040	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-T3 DATE: 11-24-19

DP SUBCONTRACTOR PES PERSONNEL: TY AD

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 3 of 4

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
18	1040	38	48040	48140	100	
		33	48140	48240	100	
		28	48240	48540	300	
	1235	23	48540	48840	300	
		18	48840	49040	200	
				Total Volume (gal):	1000	
17	1042	38	48040	48140	100	
		33	48140	48240	100	
		28	48240	48540	300	
	1237	23	48540	48840	300	
		18	48840	49040	200	
				Total Volume (gal):	1000	
16	1044	38	48030	48130	100	
		33	48130	48230	100	
		28	48230	48530	300	
	1239	23	48530	48830	300	
		18	48830	49030	200	
				Total Volume (gal):	1000	
15	1046	38	48050	48150	100	
		33	48150	48250	100	
		28	48250	48550	300	
	1241	23	48550	48850	300	
		18	48850	49050	200	
				Total Volume (gal):	1000	
14	1048	38	48050	48150	100	
		33	48150	48250	100	
		28	48250	48550	300	
	1243	23	48550	48850	300	
		18	48850	49050	200	
				Total Volume (gal):	1000	
13	1050	38	48050	48150	100	
		33	48150	48250	100	
		28	48250	48550	300	
	1245	23	48550	48850	300	
		18	48850	49050	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT EW7-T1 DATE: 11-24-19

DP SUBCONTRACTOR PES PERSONNEL: TY AD

AMENDMENT / PERCENT CONCENTRATION: 9.8% WB SHEET NO. 4 of 4

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
18	1315	38	49050	49150	100	
		33	49150	49250	100	
		28	49250	49550	300	
	1515	23	49550	49850	300	
		18	49850	50050	200	
				Total Volume (gal):	1000	
17	1317	38	49050	49150	100	
		33	49150	49250	100	
		28	49250	49550	300	
	1517	23	49550	49850	300	
		18	49850	50050	200	
				Total Volume (gal):	1000	
16	1319	38	49050	49150	100	
		33	49150	49250	100	
		28	49250	49550	300	
	1519	23	49550	49850	300	
		18	49850	50050	200	
				Total Volume (gal):	1000	
15	1321	38	49030	49130	100	
		33	49130	49230	100	
		28	49230	49530	300	
	1521	23	49530	49830	300	
		18	49830	50030	200	
				Total Volume (gal):	1000	
14	1323	38	49040	49140	100	
		33	49140	49240	100	
		28	49246	49540	300	
	1523	23	49540	49840	300	
		18	49840	50040	200	
				Total Volume (gal):	1000	
13	1325	38	49040	49140	100	
		33	49140	49240	100	
		28	49240	49540	300	
	1525	23	49540	49840	300	
		18	49840	50040	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-2 DATE: 11-24-19

DP SUBCONTRACTOR PES PERSONNEL: AM

AMENDMENT / PERCENT CONCENTRATION: 9.8% EO WB SHEET NO. 1 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
1	754	38	47140	47240	100	
		32	47240	47340	100	
		28	47340	47640	300	
	955	22	47640	47940	300	
		18	47940	48140	200	
				Total Volume (gal):	1000	
2	758	38	47140	47240	100	
		32	47240	47340	100	
		28	47340	47640	300	
	950	22	47640	47940	300	
		18	47940	48140	200	
				Total Volume (gal):	1000	
3	759	38	47140	47240	100	
		32	47240	47340	100	
		28	47340	47640	300	
	953	22	47640	47940	300	
		18	47940	48140	200	
				Total Volume (gal):	1000	
4	800	38	47140	47240	100	
		32	47240	47340	100	
		28	47340	47640	300	
	954	22	47640	47940	300	
		18	47940	48140	200	
				Total Volume (gal):	1000	
5	803	38	47140	47240	100	
		32	47240	47340	100	
		28	47340	47640	300	
	950	22	47640	47940	300	
		18	47940	48140	200	
				Total Volume (gal):	1000	
6	810	38	47140	47240	100	
		32	47240	47340	100	
		28	47340	47640	300	
	953	22	47640	47940	300	
		18	47940	48140	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6,000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-1 DATE: 11-24-19

DP SUBCONTRACTOR PES PERSONNEL: RR

AMENDMENT / PERCENT CONCENTRATION: 9.8%WB SHEET NO. 2 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
1	1017	38	48140	48240	100	
		32	48240	48340	100	
		28	48340	48640	300	
	1229	22	48640	48940	300	
		18	48940	49140	200	
				Total Volume (gal):	1000	
2	1018	38	48140	48240	100	
		32	48240	48340	100	
		28	48340	48640	300	
	1233	22	48640	48940	300	
		18	48940	49140	200	
				Total Volume (gal):	1000	
3	1020	38	48140	48240	100	
		32	48240	48340	100	
		28	48340	48640	300	
	1237	22	48640	48940	300	
		18	48940	49140	200	
				Total Volume (gal):	1000	
4	1033	38	48140	48240	10	No flow @ 38'
		32	48240	48340	190	
		28	48340	48640	300	
	1227	22	48640	48940	300	
		18	48940	49140	200	
				Total Volume (gal):	1000	
5	1025	38	48140	48240	100	
		32	48240	48340	100	
		28	48340	48640	300	
	1228	22	48640	48940	300	
		18	48940	49140	200	
				Total Volume (gal):	1000	
6	1027	38	48140	48240	100	
		32	48240	48340	100	
		28	48340	48640	300	
	1229	22	48640	48940	300	
		18	48940	49140	200	
				Total Volume (gal):	1000	
				SHEET TOTAL (gal):	6,000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

SUBSURFACE INJECTION FIELD SHEET

GENERAL INFORMATION

SITE NAME: **CHAAP 2019 OU1 RAO Injection** PROJECT NO. **60565355**

INJECTION TRANSECT T-1 DATE: 11-24-19

DP SUBCONTRACTOR PES PERSONNEL: BR

~~AMENDMENT / PERCENT CONCENTRATION:~~ 9.89 0 WB ~~SHEET NO.~~ 3 of 3

INJECTION INTERVALS/VOLUMES

Point #	Time Start / Time Stop	Depth (bgs)	Meter (Start)	Meter (End)	Actual Vol. (gal)	Notes
7	1307	38	49140	49240	100	
		32	49240	49340	100	
		28	49340	49640	300	
	1515	22	49640	49940	300	
		18	49940	50140	200	
				Total Volume (gal):	1000	
8	1308	38	49140	49240	100	
		32	49240	49340	100	
		28	49340	49640	300	
	1515	22	49640	49940	300	
		18	49940	50140	200	
				Total Volume (gal):	1000	
9	1309	38	49140	49240	100	
		32	49240	49340	100	
		28	49340	49640	300	
	1515	22	49640	49940	300	
		18	49940	50140	200	
				Total Volume (gal):	1000	
10	1311	38	49140	49240	100	
		32	49240	49340	100	
		28	49340	49640	300	
	1515	22	49640	49940	300	
		18	49940	50140	200	
				~~Total Volume (gal):~~	1000	
11	1312	38	49140	49240	100	
		32	49240	49340	100	
		28	49340	49640	300	
	1515	22	49640	49940	300	
		18	49940	50140	200	
				Total Volume (gal):	1000	
12	1313	38	49140	49240	100	
		32	49240	49340	100	
		28	49340	49640	300	
	1515	22	49640	49940	300	
		18	49940	50140	200	
				Total Volume (gal):	1000	
				~~SHEET TOTAL (gal):~~	6,000	

GENERAL NOTES:

Planned Amendment Volume (gals) (deep to shallow)

100, 100, 300, 300, 200

TABLE B-1
OU1 SUBSURFACE INJECTION SUMMARY
OU1 REBOUND STUDY LETTER REPORT - BASELINE

Injection Transect Point ID	Date(s)	Ground Elevation[1] (feet amsl)	Number of Intervals	Starting Depth (feet bgs)	Ending Depth (feet bgs)	Meter Start	Meter End	Total Volume (gal)
Between EW6 and EW7 Transects								
EW7-T1 (Wesblend 66-10 9.8% by volume – 1000 gallons per point – 15-foot point spacing)								
EW7-T1-1	11/24/2019	1896.15	5	38	18	48140	49140	1000
EW7-T1-2	11/24/2019	1896.15	5	38	18	48140	49140	1000
EW7-T1-3	11/24/2019	1896.15	5	38	18	48140	49140	1000
EW7-T1-4	11/24/2019	1896.15	5	38	18	48140	49140	1000
EW7-T1-5	11/24/2019	1896.15	5	38	18	48140	49140	1000
EW7-T1-6	11/24/2019	1896.15	5	38	18	48140	49140	1000
EW7-T1-7	11/24/2019	1896.15	5	38	18	49140	50140	1000
EW7-T1-8	11/24/2019	1896.15	5	38	18	49140	50140	1000
EW7-T1-9	11/24/2019	1896.15	5	38	18	49140	50140	1000
EW7-T1-10	11/24/2019	1896.77	5	38	18	49140	50140	1000
EW7-T1-11	11/24/2019	1896.77	5	38	18	49140	50140	1000
EW7-T1-12	11/24/2019	1896.77	5	38	18	49140	50140	1000
EW7-T1-13	11/24/2019	1896.77	5	38	18	49040	50040	1000
EW7-T1-14	11/24/2019	1896.77	5	38	18	49040	50040	1000
EW7-T1-15	11/24/2019	1896.77	5	38	18	49030	50030	1000
EW7-T1-16	11/24/2019	1896.77	5	38	18	49050	50050	1000
EW7-T1-17	11/24/2019	1896.77	5	38	18	49050	50050	1000
EW7-T1-18	11/24/2019	1896.77	5	38	18	49050	50050	1000
			EW7-T1 Total Points:		**24**	**EW7-T1 Total Gallons:**		**18,000**
EW7-T2 (Wesblend 66-10 9.8% by volume – 1000 gallons per point – 15-foot point spacing)								
EW7-T2-1	11/24/2019	1895.96	5	38	18	47140	48140	1000
EW7-T2-2	11/24/2019	1895.96	5	38	18	47140	48140	1000
EW7-T2-3	11/24/2019	1895.96	5	38	18	47140	48140	1000
EW7-T2-4	11/24/2019	1895.96	5	38	18	47140	48140	1000
EW7-T2-5	11/24/2019	1895.96	5	38	18	47140	48140	1000
EW7-T2-6	11/24/2019	1895.96	5	38	18	47140	48140	1000
EW7-T2-7	11/24/2019	1895.96	5	38	18	47040	48040	1000
EW7-T2-8	11/24/2019	1895.96	5	38	18	47040	48040	1000
EW7-T2-9	11/24/2019	1895.96	5	38	18	47030	48030	1000
EW7-T2-10	11/24/2019	1895.96	5	38	18	47050	48050	1000
EW7-T2-11	11/24/2019	1896.34	5	38	18	47050	48050	1000
EW7-T2-12	11/24/2019	1896.34	5	38	18	47050	48050	1000
EW7-T2-13	11/24/2019	1896.34	5	38	18	46040	47040	1000
EW7-T2-14	11/24/2019	1896.34	5	38	18	46040	47040	1000
EW7-T2-15	11/24/2019	1896.34	5	38	18	46030	47030	1000
EW7-T2-16	11/24/2019	1897.39	5	38	18	46050	47050	1000
EW7-T2-17	11/24/2019	1897.39	5	38	18	46050	47050	1000
EW7-T2-18	11/24/2019	1897.39	5	38	18	46050	47050	1000
EW7-T2-19	11/23/2019	1897.39	5	38	18	45050	46050	1000
EW7-T2-20	11/23/2019	1897.39	5	38	18	45050	46050	1000
EW7-T2-21	11/23/2019	1897.39	5	38	18	45050	46050	1000
EW7-T2-22	11/23/2019	1897.39	5	38	18	45030	46030	1000
EW7-T2-23	11/23/2019	1897.39	5	38	18	45040	46040	1000
EW7-T2-24	11/23/2019	1897.39	5	38	18	45040	46040	1000
			EW7-T2 Total Points:		**24**	**EW7-T2 Total Gallons:**		**24,000**

TABLE B-1
OU1 SUBSURFACE INJECTION SUMMARY
OU1 REBOUND STUDY LETTER REPORT - BASELINE

Injection Transect Point ID	Date(s)	Ground Elevation[1] (feet amsl)	Number of Intervals	Starting Depth (feet bgs)	Ending Depth (feet bgs)	Meter Start	Meter End	Total Volume (gal)
EW7-T3 (Wesblend 66-10 9.8% by volume – 1000 gallons per point – 15-foot point spacing)								
EW7-T3-1	11/23/2019	1896.19	5	38	18	45140	46140	1000
EW7-T3-2	11/23/2019	1896.19	5	38	18	45140	46140	1000
EW7-T3-3	11/23/2019	1896.19	5	38	18	45140	46140	1000
EW7-T3-4	11/23/2019	1896.19	5	38	18	45140	46140	1000
EW7-T3-5	11/23/2019	1896.19	5	38	18	45140	46140	1000
EW7-T3-6	11/23/2019	1896.19	5	38	18	45140	46140	1000
EW7-T3-7	11/23/2019	1896.19	5	38	18	46140	47140	1000
EW7-T3-8	11/23/2019	1896.19	5	38	18	46140	47140	1000
EW7-T3-9	11/23/2019	1896.19	5	38	18	46140	47140	1000
EW7-T3-10	11/23/2019	1896.19	5	38	18	46140	47140	1000
EW7-T3-11	11/23/2019	1896.19	5	38	18	46140	47140	1000
EW7-T3-12	11/23/2019	1896.19	5	38	18	46140	47140	1000
EW7-T3-13	11/24/2019	1896.19	5	38	18	48050	49050	1000
EW7-T3-14	11/24/2019	1896.19	5	38	18	48050	49050	1000
EW7-T3-15	11/24/2019	1896.19	5	38	18	48050	49050	1000
EW7-T3-16	11/24/2019	1896.19	5	38	18	48030	49030	1000
EW7-T3-17	11/24/2019	1896.19	5	38	18	48040	49040	1000
EW7-T3-18	11/24/2019	1896.19	5	38	18	48040	49040	1000
EW7-T3-19	11/23/2019	1896.19	5	38	18	44050	45050	1000
EW7-T3-20	11/23/2019	1896.19	5	38	18	44050	45050	1000
EW7-T3-21	11/23/2019	1896.19	5	38	18	44050	45050	1000
EW7-T3-22	11/23/2019	1897.69	5	38	18	44030	45030	1000
EW7-T3-23	11/23/2019	1897.69	5	38	18	44040	45040	1000
EW7-T3-24	11/23/2019	1897.69	5	38	18	44040	45040	1000
EW7-T3-25	11/22/2019	1897.69	5	38	18	43050	44050	1000
EW7-T3-26	11/22/2019	1897.69	5	38	18	43050	44050	1000
EW7-T3-27	11/22/2019	1897.69	5	38	18	43050	44050	1000
EW7-T3-28	11/22/2019	1897.69	5	38	18	43030	44030	1000
EW7-T3-29	11/22/2019	1897.69	5	38	18	43040	44040	1000
EW7-T3-30	11/22/2019	1897.69	5	38	18	43040	44040	1000
EW7-T3-31	11/22/2019	1897.69	5	38	18	42040	43040	1000
EW7-T3-32	11/22/2019	1897.69	5	38	18	42040	43040	1000
EW7-T3-33	11/22/2019	1897.69	5	38	18	42030	43030	1000
EW7-T3-34	11/22/2019	1897.69	5	38	18	42050	43050	1000
EW7-T3-35	11/22/2019	1897.69	5	38	18	42050	43050	1000
EW7-T3-36	11/22/2019	1897.69	5	38	18	42050	43050	1000
EW7-T3-37	11/22/2019	1897.69	5	38	18	41040	42040	1000
EW7-T3-38	11/22/2019	1897.69	5	38	18	41040	42040	1000
EW7-T3-39	11/22/2019	1897.69	5	38	18	41030	42030	1000
EW7-T3-40	11/22/2019	1897.69	5	38	18	41050	42050	1000
EW7-T3-41	11/22/2019	1897.69	5	38	18	41050	42050	1000
EW7-T3-42	11/22/2019	1897.69	5	38	18	41050	42050	1000
			EW7-T3 Total Points:		**24**	**EW7-T3 Total Gallons:**		**42,000**
EW7-T4 (Wesblend 66-10 9.8% by volume – 1000 gallons per point – 15-foot point spacing)								
EW7-T4-1	11/21/2019	1896.63	5	38	18	38140	39140	1000
EW7-T4-2	11/21/2019	1896.63	5	38	18	38140	39140	1000
EW7-T4-3	11/21/2019	1896.63	5	38	18	38140	39140	1000

TABLE B-1
OU1 SUBSURFACE INJECTION SUMMARY
OU1 REBOUND STUDY LETTER REPORT - BASELINE

Injection Transect Point ID	Date(s)	Ground Elevation[1] (feet amsl)	Number of Intervals	Starting Depth (feet bgs)	Ending Depth (feet bgs)	Meter Start	Meter End	Total Volume (gal)
EW7-T4-4	11/21/2019	1896.63	5	38	18	38140	39140	1000
EW7-T4-5	11/21/2019	1896.63	5	38	18	38140	39140	1000
EW7-T4-6	11/21/2019	1896.63	5	38	18	38140	39140	1000
EW7-T4-7	11/21/2019	1896.63	5	38	18	39140	40140	1000
EW7-T4-8	11/21/2019	1896.63	5	38	18	39140	40140	1000
EW7-T4-9	11/21/2019	1896.63	5	38	18	39140	40140	1000
EW7-T4-10	11/21/2019	1896.63	5	38	18	39140	40140	1000
EW7-T4-11	11/21/2019	1896.63	5	38	18	39140	40140	1000
EW7-T4-12	11/21/2019	1896.63	5	38	18	39140	40140	1000
EW7-T4-13	11/22/2019	1896.63	5	38	18	41140	42140	1000
EW7-T4-14	11/22/2019	1896.63	5	38	18	41140	42140	1000
EW7-T4-15	11/22/2019	1896.63	5	38	18	41140	42140	1000
EW7-T4-16	11/22/2019	1896.63	5	38	18	41140	42140	1000
EW7-T4-17	11/22/2019	1896.63	5	38	18	41140	42140	1000
EW7-T4-18	11/22/2019	1896.63	5	38	18	41140	42140	1000
EW7-T4-19	11/22/2019	1896.63	5	38	18	43140	44140	1000
EW7-T4-20	11/22/2019	1896.63	5	38	18	43140	44140	1000
EW7-T4-21	11/22/2019	1896.63	5	38	18	43140	44140	1000
EW7-T4-22	11/22/2019	1897.83	5	38	18	43140	44140	1000
EW7-T4-23	11/22/2019	1897.83	5	38	18	43140	44140	1000
EW7-T4-24	11/22/2019	1897.83	5	38	18	43140	44140	1000
EW7-T4-25	11/21/2019	1897.83	5	38	18	40050	41050	1000
EW7-T4-26	11/21/2019	1897.83	5	38	18	40050	41050	1000
EW7-T4-27	11/21/2019	1897.83	5	38	18	40050	41050	1000
EW7-T4-28	11/21/2019	1897.83	5	38	18	40030	41030	1000
EW7-T4-29	11/21/2019	1897.83	5	38	18	40040	41040	1000
EW7-T4-30	11/21/2019	1897.83	5	38	18	40040	41040	1000
EW7-T4-31	11/20/2019	1897.83	5	38	18	37040	38040	1000
EW7-T4-32	11/20/2019	1897.83	5	38	18	37040	38040	1000
EW7-T4-33	11/20/2019	1897.83	5	38	18	37030	38030	1000
EW7-T4-34	11/20/2019	1897.83	5	38	18	37050	38050	1000
EW7-T4-35	11/20/2019	1897.83	5	38	18	37050	38050	1000
EW7-T4-36	11/20/2019	1897.83	5	38	18	37050	38050	1000
EW7-T4-37	11/20/2019	1897.83	5	38	18	36040	37040	1000
EW7-T4-38	11/20/2019	1897.83	5	38	18	36040	37040	1000
EW7-T4-39	11/20/2019	1897.83	5	38	18	36030	37030	1000
EW7-T4-40	11/20/2019	1897.83	5	38	18	36050	37050	1000
EW7-T4-41	11/20/2019	1897.83	5	38	18	36050	37050	1000
EW7-T4-42	11/20/2019	1897.83	5	33	18	36050	37050	1000
			EW7-T4 Total Points:		**42**	**EW7-T4 Total Gallons:**		**42,000**
EW7-T5 (Wesblend 66-10 9.8% by volume – 1000 gallons per point – 15-foot point spacing)								
EW7-T5-1	11/20/2019	1897.2	5	38	18	38140	39140	1000
EW7-T5-2	11/20/2019	1897.2	5	38	18	38140	39140	1000
EW7-T5-3	11/20/2019	1897.2	5	38	18	38140	39140	1000
EW7-T5-4	11/20/2019	1897.2	5	38	18	38140	39140	1000
EW7-T5-5	11/20/2019	1897.2	5	38	18	38140	39140	1000
EW7-T5-6	11/20/2019	1897.2	5	38	18	38140	39140	1000
EW7-T5-7	11/21/2019	1897.2	5	38	18	40140	41140	1000

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Injection Transect Point ID	Date(s)	Ground Elevation[1] (feet amsl)	Number of Intervals	Starting Depth (feet bgs)	Ending Depth (feet bgs)	Meter Start	Meter End	Total Volume (gal)
EW7-T5-8	11/21/2019	1897.2	5	38	18	40140	41140	1000
EW7-T5-9	11/21/2019	1897.2	5	38	18	40140	41140	1000
EW7-T5-10	11/21/2019	1897.2	5	38	18	40140	41140	1000
EW7-T5-11	11/21/2019	1897.2	5	38	18	40140	41140	1000
EW7-T5-12	11/21/2019	1897.2	5	38	18	40140	41140	1000
EW7-T5-13	11/22/2019	1897.2	5	38	18	42140	43140	1000
EW7-T5-14	11/22/2019	1897.2	5	38	18	42140	43140	1000
EW7-T5-15	11/22/2019	1897.2	5	38	18	42140	43140	1000
EW7-T5-16	11/22/2019	1897.2	5	38	18	42140	43140	1000
EW7-T5-17	11/22/2019	1897.2	5	38	18	42140	43140	1000
EW7-T5-18	11/22/2019	1897.2	5	38	18	42140	43140	1000
EW7-T5-19	11/23/2019	1897.2	5	38	18	44140	45140	1000
EW7-T5-20	11/23/2019	1897.2	5	38	18	44140	45140	1000
EW7-T5-21	11/23/2019	1897.2	5	38	18	44140	45140	1000
EW7-T5-22	11/23/2019	1897.61	5	38	18	44140	45140	1000
EW7-T5-23	11/23/2019	1897.61	5	38	18	44140	45140	1000
EW7-T5-24	11/23/2019	1897.61	5	38	18	44140	45140	1000
EW7-T5-25	11/21/2019	1897.61	5	38	18	39040	40040	1000
EW7-T5-26	11/21/2019	1897.61	5	38	18	39040	40040	1000
EW7-T5-27	11/21/2019	1897.61	5	38	18	39030	40030	1000
EW7-T5-28	11/21/2019	1897.61	5	38	18	39050	40050	1000
EW7-T5-29	11/21/2019	1897.61	5	38	18	39050	40050	1000
EW7-T5-30	11/21/2019	1897.61	5	38	18	39050	40050	1000
EW7-T5-31	11/21/2019	1897.61	5	38	18	38050	39050	1000
EW7-T5-32	11/21/2019	1897.61	5	38	18	38050	39050	1000
EW7-T5-33	11/21/2019	1897.61	5	38	18	38050	39050	1000
EW7-T5-34	11/21/2019	1897.61	5	38	18	38030	39030	1000
EW7-T5-35	11/21/2019	1897.61	5	38	18	38040	39040	1000
EW7-T5-36	11/21/2019	1897.61	5	38	18	38040	39040	1000
EW7-T5-37	11/20/2019	1897.61	5	38	18	35040	36040	1000
EW7-T5-38	11/20/2019	1897.61	5	38	18	35040	36040	1000
EW7-T5-39	11/20/2019	1897.61	5	38	18	35030	36030	1000
EW7-T5-40	11/20/2019	1897.61	5	38	18	35050	36050	1000
EW7-T5-41	11/20/2019	1897.61	5	38	18	35050	36050	1000
EW7-T5-42	11/20/2019	1897.61	5	38	18	35050	36050	1000
			EW7-T5 Total Points:		**42**	**EW7-T5 Total Gallons:**		**42,000**
EW7-T6 (Wesblend 66-10 9.8% by volume – 1000 gallons per point – 15-foot point spacing)								
EW7-T6-1	11/18/2019	1897.51	5	38	18	32120	33120	1000
EW7-T6-2	11/18/2019	1897.51	5	38	18	32120	33120	1000
EW7-T6-3	11/18/2019	1897.51	5	38	18	32120	33120	1000
EW7-T6-4	11/18/2019	1897.51	5	38	18	32120	33120	1000
EW7-T6-5	11/18/2019	1897.51	5	38	18	32120	33120	1000
EW7-T6-6	11/18/2019	1897.51	5	38	18	32120	33120	1000
EW7-T6-7	11/18/2019	1897.51	5	38	18	33120	34140	1020
EW7-T6-8	11/18/2019	1897.51	5	38	18	33120	34140	1020
EW7-T6-9	11/18/2019	1897.51	5	38	18	33120	34140	1020
EW7-T6-10	11/18/2019	1897.51	5	38	18	33120	34140	1020
EW7-T6-11	11/18/2019	1897.51	5	38	18	33120	34140	1020

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Injection Transect Point ID	Date(s)	Ground Elevation[1] (feet amsl)	Number of Intervals	Starting Depth (feet bgs)	Ending Depth (feet bgs)	Meter Start	Meter End	Total Volume (gal)
EW7-T6-12	11/18/2019	1897.51	5	38	18	33120	34140	1020
EW7-T6-13	11/20/2019	1897.51	5	38	18	37140	38140	1000
EW7-T6-14	11/20/2019	1897.51	5	38	18	37140	38140	1000
EW7-T6-15	11/20/2019	1897.51	5	38	18	37140	38140	1000
EW7-T6-16	11/20/2019	1897.51	5	38	18	37140	38140	1000
EW7-T6-17	11/20/2019	1897.51	5	38	18	37140	38140	1000
EW7-T6-18	11/20/2019	1897.51	5	38	18	37140	38140	1000
EW7-T6-19	11/19/2019	1897.51	5	38	18	33040	34040	1000
EW7-T6-20	11/19/2019	1897.51	5	38	18	33040	34040	1000
EW7-T6-21	11/19/2019	1897.51	5	38	18	33030	34030	1000
EW7-T6-22	11/19/2019	1896.99	5	38	18	33050	34050	1000
EW7-T6-23	11/19/2019	1896.99	5	38	18	33050	34050	1000
EW7-T6-24	11/19/2019	1896.99	5	38	18	33050	34050	1000
EW7-T6-25	11/18/2019	1896.99	5	38	18	32040	33040	1000
EW7-T6-26	11/18/2019	1896.99	5	38	18	32040	33040	1000
EW7-T6-27	11/18/2019	1896.99	5	38	18	32030	33030	1000
EW7-T6-28	11/18/2019	1896.99	5	38	18	32050	33050	1000
EW7-T6-29	11/18/2019	1896.99	5	38	18	32050	33050	1000
EW7-T6-30	11/18/2019	1896.99	5	38	18	32050	33050	1000
EW7-T6-31	11/17/2019	1896.99	5	38	18	29040	30040	1000
EW7-T6-32	11/17/2019	1896.99	5	38	18	29040	30040	1000
EW7-T6-33	11/17/2019	1896.99	5	38	18	29030	30030	1000
EW7-T6-34	11/17/2019	1896.99	5	38	18	29050	30050	1000
EW7-T6-35	11/17/2019	1896.99	5	38	18	29050	30050	1000
EW7-T6-36	11/17/2019	1896.99	5	38	18	29050	30050	1000
EW7-T6-37	11/17/2019	1896.99	5	38	18	28040	29040	1000
EW7-T6-38	11/17/2019	1896.99	5	38	18	28040	29040	1000
EW7-T6-39	11/17/2019	1896.99	5	38	18	28030	29030	1000
EW7-T6-40	11/17/2019	1896.99	5	38	18	28050	29050	1000
EW7-T6-41	11/17/2019	1896.99	5	38	18	28050	29050	1000
EW7-T6-42	11/17/2019	1896.99	5	38	18	28050	29050	1000
			EW7-T6 Total Points:		**42**	**EW7-T6 Total Gallons:**		**42,120**
EW7-T7 (Wesblend 66-10 9.8% by volume – 1000 gallons per point – 15-foot point spacing)								
EW7-T7-1	11/18/2019	1898.07	5	38	18	31120	32120	1000
EW7-T7-2	11/18/2019	1898.07	5	38	18	31120	32120	1000
EW7-T7-3	11/18/2019	1898.07	5	38	18	31120	32120	1000
EW7-T7-4	11/18/2019	1898.07	5	38	18	31120	32120	1000
EW7-T7-5	11/18/2019	1898.07	5	38	18	31120	32120	1000
EW7-T7-6	11/18/2019	1898.07	5	38	18	31120	32120	1000
EW7-T7-7	11/20/2019	1898.07	5	38	18	34140	35140	1000
EW7-T7-8	11/20/2019	1898.07	5	38	18	34140	35140	1000
EW7-T7-9	11/20/2019	1898.07	5	38	18	34140	35140	1000
EW7-T7-10	11/20/2019	1898.07	5	38	18	34140	35140	1000
EW7-T7-11	11/20/2019	1898.07	5	38	18	34140	35140	1000
EW7-T7-12	11/20/2019	1898.07	5	38	18	34140	35140	1000
EW7-T7-13	11/20/2019	1898.07	5	38	18	36140	37140	1000
EW7-T7-14	11/20/2019	1898.07	5	38	18	36140	37140	1000
EW7-T7-15	11/20/2019	1898.07	5	38	18	36140	37140	1000

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Injection Transect Point ID	Date(s)	Ground Elevation[1] (feet amsl)	Number of Intervals	Starting Depth (feet bgs)	Ending Depth (feet bgs)	Meter Start	Meter End	Total Volume (gal)
EW7-T7-16	11/20/2019	1898.07	5	38	18	36140	37140	1000
EW7-T7-17	11/20/2019	1898.07	5	38	18	36140	37140	1000
EW7-T7-18	11/20/2019	1898.07	5	38	18	36140	37140	1000
EW7-T7-19	11/20/2019	1898.07	5	38	18	34050	35050	1000
EW7-T7-20	11/20/2019	1898.07	5	38	18	34050	35050	1000
EW7-T7-21	11/20/2019	1898.07	5	38	18	34050	35050	1000
EW7-T7-22	11/20/2019	1896.69	5	38	18	34030	35030	1000
EW7-T7-23	11/20/2019	1896.69	5	38	18	34040	35040	1000
EW7-T7-24	11/20/2019	1896.69	5	38	18	34040	35040	1000
EW7-T7-25	11/18/2019	1896.69	5	38	18	31050	32050	1000
EW7-T7-26	11/18/2019	1896.69	5	38	18	31050	32050	1000
EW7-T7-27	11/18/2019	1896.69	5	38	18	31050	32050	1000
EW7-T7-28	11/18/2019	1896.69	5	38	18	31030	32030	1000
EW7-T7-29	11/18/2019	1896.69	5	38	18	31040	32040	1000
EW7-T7-30	11/18/2019	1896.69	5	38	18	31040	32040	1000
EW7-T7-31	11/18/2019	1896.69	5	38	18	30040	31040	1000
EW7-T7-32	11/18/2019	1896.69	5	38	18	30040	31040	1000
EW7-T7-33	11/18/2019	1896.69	5	38	18	30030	31030	1000
EW7-T7-34	11/18/2019	1896.69	5	38	18	30050	31050	1000
EW7-T7-35	11/18/2019	1896.69	5	38	18	30050	31050	1000
EW7-T7-36	11/18/2019	1896.69	5	38	18	30050	31050	1000
EW7-T7-37	11/15/2019	1896.69	5	38	18	27050	28050	1000
EW7-T7-38	11/15/2019	1896.69	5	38	18	27050	28050	1000
EW7-T7-39	11/15/2019	1896.69	5	38	18	27050	28050	1000
EW7-T7-40	11/15/2019	1896.69	5	38	18	27030	28030	1000
EW7-T7-41	11/15/2019	1896.69	5	38	18	27040	28040	1000
EW7-T7-42	11/15/2019	1896.69	5	38	18	27040	28040	1000
			EW7-T7 Total Points:		**42**	**EW7-T7 Total Gallons:**		**42,000**
EW7-T8 (Wesblend 66-10 9.8% by volume – 1000 gallons per point – 15-foot point spacing)								
EW7-T8-1	11/15/2019	1897.52	5	38	18	24120	25120	1000
EW7-T8-2	11/15/2019	1897.52	5	38	18	24120	25120	1000
EW7-T8-3	11/15/2019	1897.52	5	38	18	24120	25120	1000
EW7-T8-4	11/15/2019	1897.52	5	38	18	24120	25120	1000
EW7-T8-5	11/15/2019	1897.52	5	38	18	24120	25120	1000
EW7-T8-6	11/15/2019	1897.52	5	38	18	24120	25120	1000
EW7-T8-7	11/15/2019	1897.52	5	38	18	25120	26120	1000
EW7-T8-8	11/15/2019	1897.52	5	38	18	25120	26120	1000
EW7-T8-9	11/15/2019	1897.52	5	38	18	25120	26120	1000
EW7-T8-10	11/15/2019	1897.52	5	38	18	25120	26120	1000
EW7-T8-11	11/15/2019	1897.52	5	38	18	25120	26120	1000
EW7-T8-12	11/15/2019	1897.52	5	38	18	25120	26120	1000
EW7-T8-13	11/16/2019	1897.52	5	38	18	27120	28120	1000
EW7-T8-14	11/16/2019	1897.52	5	38	18	27120	28120	1000
EW7-T8-15	11/16/2019	1897.52	5	38	18	27120	28120	1000
EW7-T8-16	11/16/2019	1897.52	5	38	18	27120	28120	1000
EW7-T8-17	11/16/2019	1897.52	5	38	18	27120	28120	1000
EW7-T8-18	11/16/2019	1897.52	5	38	18	27120	28120	1000
EW7-T8-19	11/17/2019	1897.52	5	38	18	29120	30120	1000

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Injection Transect Point ID	Date(s)	Ground Elevation[1] (feet amsl)	Number of Intervals	Starting Depth (feet bgs)	Ending Depth (feet bgs)	Meter Start	Meter End	Total Volume (gal)
EW7-T8-20	11/17/2019	1897.52	5	38	18	29120	30120	1000
EW7-T8-21	11/17/2019	1897.52	5	38	18	29120	30120	1000
EW7-T8-22	11/17/2019	1897.52	5	38	18	29120	30120	1000
EW7-T8-23	11/17/2019	1897.52	5	38	18	29120	30120	1000
EW7-T8-24	11/17/2019	1897.52	5	38	18	29120	30120	1000
EW7-T8-25	11/15/2019	1895.99	5	38	18	26040	27040	1000
EW7-T8-26	11/15/2019	1895.99	5	38	18	26040	27040	1000
EW7-T8-27	11/15/2019	1895.99	5	38	18	26030	27030	1000
EW7-T8-28	11/15/2019	1895.99	5	38	18	26050	27050	1000
EW7-T8-29	11/15/2019	1895.99	5	38	18	26050	27050	1000
EW7-T8-30	11/15/2019	1895.99	5	38	18	26050	27050	1000
EW7-T8-31	11/15/2019	1895.99	5	38	18	23040	24040	1000
EW7-T8-32	11/15/2019	1895.99	5	38	18	23040	24040	1000
EW7-T8-33	11/15/2019	1895.99	5	38	18	23030	24030	1000
EW7-T8-34	11/15/2019	1895.99	5	38	18	23050	24050	1000
EW7-T8-35	11/15/2019	1895.99	5	38	18	23050	24050	1000
EW7-T8-36	11/15/2019	1895.99	5	38	18	23050	24050	1000
EW7-T8-37	11/14/2019	1895.99	5	38	18	21040	22040	1000
EW7-T8-38	11/14/2019	1895.99	5	38	18	21040	22040	1000
EW7-T8-39	11/14/2019	1895.99	5	38	18	21030	22030	1000
EW7-T8-40	11/14/2019	1895.99	5	38	18	21050	22050	1000
EW7-T8-41	11/14/2019	1895.99	5	38	18	21050	22050	1000
EW7-T8-42	11/14/2019	1895.99	5	38	18	21050	22050	1000
EW7-T8-43	11/14/2019	1895.99	5	38	18	20040	21040	1000
EW7-T8-44	11/14/2019	1895.99	5	38	18	20040	21040	1000
EW7-T8-45	11/14/2019	1895.99	5	38	18	20040	21040	1000
EW7-T8-46	11/14/2019	1895.99	5	38	18	20050	21050	1000
EW7-T8-47	11/14/2019	1895.99	5	38	18	20050	21050	1000
EW7-T8-48	11/14/2019	1895.99	5	38	18	20050	21050	1000
			EW7-T8 Total Points:		**48**	**EW7-T8 Total Gallons:**		**48,000**
EW7-T9 (Wesblend 66-10 9.8% by volume – 1000 gallons per point – 15-foot point spacing)								
EW7-T9-1	11/15/2019	1897.38	5	38	18	23120	24120	1000
EW7-T9-2	11/15/2019	1897.38	5	38	18	23120	24120	1000
EW7-T9-3	11/15/2019	1897.38	5	38	18	23120	24120	1000
EW7-T9-4	11/15/2019	1897.38	5	38	18	23120	24120	1000
EW7-T9-5	11/15/2019	1897.38	5	38	18	23120	24120	1000
EW7-T9-6	11/15/2019	1897.38	5	38	18	23120	24120	1000
EW7-T9-7	11/16/2019	1897.38	5	38	18	26120	27120	1000
EW7-T9-8	11/16/2019	1897.38	5	38	18	26120	27120	1000
EW7-T9-9	11/16/2019	1897.38	5	38	18	26120	27120	1000
EW7-T9-10	11/16/2019	1897.38	5	38	18	26120	27120	1000
EW7-T9-11	11/16/2019	1897.38	5	38	18	26120	27120	1000
EW7-T9-12	11/16/2019	1897.38	5	38	18	26120	27120	1000
EW7-T9-13	11/16/2019	1897.38	5	38	18	28120	29120	1000
EW7-T9-14	11/16/2019	1897.38	5	38	18	28120	29120	1000
EW7-T9-15	11/16/2019	1897.38	5	38	18	28120	29120	1000
EW7-T9-16	11/16/2019	1897.38	5	38	18	28120	29120	1000
EW7-T9-17	11/16/2019	1897.38	5	38	18	28120	29120	1000

TABLE B-1
OU1 SUBSURFACE INJECTION SUMMARY
OU1 REBOUND STUDY LETTER REPORT - BASELINE

Injection Transect Point ID	Date(s)	Ground Elevation[1] (feet amsl)	Number of Intervals	Starting Depth (feet bgs)	Ending Depth (feet bgs)	Meter Start	Meter End	Total Volume (gal)
EW7-T9-18	11/16/2019	1897.38	5	38	18	28120	29120	1000
EW7-T9-19	11/17/2019	1897.38	5	38	18	30120	31120	1000
EW7-T9-20	11/17/2019	1897.38	5	38	18	30120	31120	1000
EW7-T9-21	11/17/2019	1897.38	5	38	18	30120	31120	1000
EW7-T9-22	11/17/2019	1897.38	5	38	18	30120	31120	1000
EW7-T9-23	11/17/2019	1897.38	5	38	18	30120	31120	1000
EW7-T9-24	11/17/2019	1897.38	5	38	18	30120	31120	1000
EW7-T9-25	11/16/2019	1894.57	5	38	18	25050	26050	1000
EW7-T9-26	11/16/2019	1894.57	5	38	18	25050	26050	1000
EW7-T9-27	11/16/2019	1894.57	5	38	18	25050	26050	1000
EW7-T9-28	11/16/2019	1894.57	5	38	18	25030	26030	1000
EW7-T9-29	11/16/2019	1894.57	5	38	18	25040	26040	1000
EW7-T9-30	11/16/2019	1894.57	5	38	18	25040	26040	1000
EW7-T9-31	11/15/2019	1894.57	5	38	18	24040	25040	1000
EW7-T9-32	11/15/2019	1894.57	5	38	18	24040	25040	1000
EW7-T9-33	11/15/2019	1894.57	5	38	18	24030	25030	1000
EW7-T9-34	11/15/2019	1894.57	5	38	18	24050	25050	1000
EW7-T9-35	11/15/2019	1894.57	5	38	18	24050	25050	1000
EW7-T9-36	11/15/2019	1894.57	5	38	18	24050	25050	1000
EW7-T9-37	11/15/2019	1894.57	5	38	18	22040	23040	1000
EW7-T9-38	11/15/2019	1894.57	5	38	18	22040	23040	1000
EW7-T9-39	11/15/2019	1894.57	5	38	18	22030	23030	1000
EW7-T9-40	11/15/2019	1894.57	5	38	18	22050	23050	1000
EW7-T9-41	11/15/2019	1894.57	5	38	18	22050	23050	1000
EW7-T9-42	11/15/2019	1894.57	5	38	18	22050	23050	1000
EW7-T9-43	11/14/2019	1894.57	5	38	18	19050	20050	1000
EW7-T9-44	11/14/2019	1894.57	5	38	18	19050	20050	1000
EW7-T9-45	11/14/2019	1894.57	5	38	18	19050	20050	1000
EW7-T9-46	11/14/2019	1894.57	5	38	18	19030	20030	1000
EW7-T9-47	11/14/2019	1894.57	5	38	18	19040	20040	1000
EW7-T9-48	11/14/2019	1894.57	5	38	18	19040	20040	1000
			EW7-T9 Total Points:		**48**	**EW7-T9 Total Gallons:**		**48,000**
EW7-T10 (Wesblend 66-10 9.8% by volume – 1000 gallons per point – 15-foot point spacing)								
EW7-T10-1	11/6/2019	1896.19	5	38	18	14030	15030	1000
EW7-T10-2	11/6/2019	1896.19	5	38	18	14030	15030	1000
EW7-T10-3	11/6/2019	1896.19	5	38	18	14080	15080	1000
EW7-T10-4	11/6/2019	1896.19	5	38	18	14030	15030	1000
EW7-T10-5	11/6/2019	1896.19	5	38	18	14030	15030	1000
EW7-T10-6	11/6/2019	1896.19	5	38	18	14030	15030	1000
EW7-T10-7	11/6/2019	1896.19	5	38	18	15030	16120	1090
EW7-T10-8	11/6/2019	1896.19	5	38	18	15030	16120	1090
EW7-T10-9	11/6/2019	1896.19	5	38	18	15080	16120	1040
EW7-T10-10	11/6/2019	1896.19	5	38	18	15030	16120	1090
EW7-T10-11	11/6/2019	1896.19	5	38	18	15030	16120	1090
EW7-T10-12	11/6/2019	1896.19	5	38	18	15030	16120	1090
EW7-T10-13	11/13/2019	1896.19	5	38	18	18120	19120	1000
EW7-T10-14	11/13/2019	1896.19	5	38	18	18120	19120	1000
EW7-T10-15	11/13/2019	1896.19	5	38	18	18120	19120	1000

TABLE B-1
OU1 SUBSURFACE INJECTION SUMMARY
OU1 REBOUND STUDY LETTER REPORT - BASELINE

Injection Transect Point ID	Date(s)	Ground Elevation[1] (feet amsl)	Number of Intervals	Starting Depth (feet bgs)	Ending Depth (feet bgs)	Meter Start	Meter End	Total Volume (gal)
EW7-T10-16	11/13/2019	1896.19	5	38	18	18120	19120	1000
EW7-T10-17	11/13/2019	1896.19	5	38	18	18120	19120	1000
EW7-T10-18	11/13/2019	1896.19	5	38	18	18120	19120	1000
EW7-T10-19	11/13/2019	1896.19	5	38	18	19120	20120	1000
EW7-T10-20	11/13/2019	1896.19	5	38	18	19120	20120	1000
EW7-T10-21	11/13/2019	1896.19	5	38	18	19120	20120	1000
EW7-T10-22	11/13/2019	1896.19	5	38	18	19120	20120	1000
EW7-T10-23	11/13/2019	1896.19	5	38	18	19120	20120	1000
EW7-T10-24	11/13/2019	1896.19	5	38	18	19120	20120	1000
EW7-T10-25	11/14/2019	1893.72	5	38	18	21120	22120	1000
EW7-T10-26	11/14/2019	1893.72	5	38	18	21120	22120	1000
EW7-T10-27	11/14/2019	1893.72	5	38	18	21120	22120	1000
EW7-T10-28	11/14/2019	1893.72	5	38	18	21120	22120	1000
EW7-T10-29	11/14/2019	1893.72	5	38	18	21120	22120	1000
EW7-T10-30	11/14/2019	1893.72	5	38	18	21120	22120	1000
EW7-T10-31	11/13/2019	1893.72	5	38	18	17040	18040	1000
EW7-T10-32	11/13/2019	1893.72	5	38	18	17040	18040	1000
EW7-T10-33	11/13/2019	1893.72	5	38	18	17030	18030	1000
EW7-T10-34	11/13/2019	1893.72	5	38	18	17050	18050	1000
EW7-T10-35	11/13/2019	1893.72	5	38	18	17050	18050	1000
EW7-T10-36	11/13/2019	1893.72	5	38	18	17050	18050	1000
EW7-T10-37	11/12/2019	1893.72	5	38	18	16040	17040	1000
EW7-T10-38	11/12/2019	1893.72	5	38	18	16040	17040	1000
EW7-T10-39	11/12/2019	1893.72	5	38	18	16030	17030	1000
EW7-T10-40	11/12/2019	1893.72	5	38	18	16050	17050	1000
EW7-T10-41	11/12/2019	1893.72	5	38	18	16050	17050	1000
EW7-T10-42	11/12/2019	1893.72	5	38	18	16050	17050	1000
EW7-T10-43	11/6/2019	1893.72	5	38	18	14050	15050	1000
EW7-T10-44	11/6/2019	1893.72	5	38	18	14050	15050	1000
EW7-T10-45	11/6/2019	1893.72	5	38	18	14050	15050	1000
EW7-T10-46	11/6/2019	1893.72	5	38	18	14030	15030	1000
EW7-T10-47	11/6/2019	1893.72	5	38	18	14040	15040	1000
EW7-T10-48	11/6/2019	1893.72	5	38	18	14040	15040	1000
			EW7-T10 Total Points:		**48**	**EW7-T10 Total Gallons:**		**48,490**
EW7-T11 (Wesblend 66-10 9.8% by volume – 1000 gallons per point – 15-foot point spacing)								
EW7-T11-1	11/6/2019	1894.73	5	38	18	13030	14030	1000
EW7-T11-2	11/6/2019	1894.73	5	38	18	13030	14030	1000
EW7-T11-3	11/6/2019	1894.73	5	38	18	13080	14080	1000
EW7-T11-4	11/6/2019	1894.73	5	38	18	13030	14030	1000
EW7-T11-5	11/6/2019	1894.73	5	38	18	13030	14030	1000
EW7-T11-6	11/6/2019	1894.73	5	38	18	13030	14030	1000
EW7-T11-7	11/12/2019	1894.73	5	38	18	16120	17120	1000
EW7-T11-8	11/12/2019	1894.73	5	38	18	16120	17120	1000
EW7-T11-9	11/12/2019	1894.73	5	38	18	16120	17120	1000
EW7-T11-10	11/12/2019	1894.73	5	38	18	16120	17120	1000
EW7-T11-11	11/12/2019	1894.73	5	38	18	16120	17120	1000
EW7-T11-12	11/12/2019	1894.73	5	38	18	16120	17120	1000
EW7-T11-13	11/13/2019	1894.73	5	38	18	17120	18120	1000

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OU1 SUBSURFACE INJECTION SUMMARY
OU1 REBOUND STUDY LETTER REPORT - BASELINE

Injection Transect Point ID	Date(s)	Ground Elevation[1] (feet amsl)	Number of Intervals	Starting Depth (feet bgs)	Ending Depth (feet bgs)	Meter Start	Meter End	Total Volume (gal)
EW7-T11-14	11/13/2019	1894.73	5	38	18	17120	18120	1000
EW7-T11-15	11/13/2019	1894.73	5	38	18	17120	18120	1000
EW7-T11-16	11/13/2019	1894.73	5	38	18	17120	18120	1000
EW7-T11-17	11/13/2019	1894.73	5	38	18	17120	18120	1000
EW7-T11-18	11/13/2019	1894.73	5	38	18	17120	18120	1000
EW7-T11-19	11/14/2019	1894.73	5	38	18	20120	21120	1000
EW7-T11-20	11/14/2019	1894.73	5	38	18	20120	21120	1000
EW7-T11-21	11/14/2019	1894.73	5	38	18	20120	21120	1000
EW7-T11-22	11/14/2019	1894.73	5	38	18	20120	21120	1000
EW7-T11-23	11/14/2019	1894.73	5	38	18	20120	21120	1000
EW7-T11-24	11/14/2019	1894.73	5	38	18	20120	21120	1000
EW7-T11-25	11/14/2019	1893.69	5	38	18	22120	23120	1000
EW7-T11-26	11/14/2019	1893.69	5	38	18	22120	23120	1000
EW7-T11-27	11/14/2019	1893.69	5	38	18	22120	23120	1000
EW7-T11-28	11/14/2019	1893.69	5	38	18	22120	23120	1000
EW7-T11-29	11/14/2019	1893.69	5	38	18	22120	23120	1000
EW7-T11-30	11/14/2019	1893.69	5	38	18	22120	23120	1000
EW7-T11-31	11/13/2019	1893.69	5	38	18	18050	19050	1000
EW7-T11-32	11/13/2019	1893.69	5	38	18	18050	19050	1000
EW7-T11-33	11/13/2019	1893.69	5	38	18	18050	19050	1000
EW7-T11-34	11/13/2019	1893.69	5	38	18	18030	19030	1000
EW7-T11-35	11/13/2019	1893.69	5	38	18	18040	19040	1000
EW7-T11-36	11/13/2019	1893.69	5	38	18	18040	19040	1000
EW7-T11-37	11/12/2019	1893.69	5	38	18	15050	16050	1000
EW7-T11-38	11/12/2019	1893.69	5	38	18	15050	16050	1000
EW7-T11-39	11/12/2019	1893.69	5	38	18	15050	16050	1000
EW7-T11-40	11/12/2019	1893.69	5	38	18	15030	16030	1000
EW7-T11-41	11/12/2019	1893.69	5	38	18	15040	16040	1000
EW7-T11-42	11/12/2019	1893.69	5	38	18	15040	16040	1000
EW7-T11-43	11/6/2019	1893.69	5	38	18	13040	14040	1000
EW7-T11-44	11/6/2019	1893.69	5	38	18	13030	14030	1000
EW7-T11-45	11/6/2019	1893.69	5	38	18	13030	14030	1000
EW7-T11-46	11/6/2019	1893.69	5	38	18	13050	14050	1000
EW7-T11-47	11/6/2019	1893.69	5	38	18	13050	14050	1000
EW7-T11-48	11/6/2019	1893.69	5	38	18	13050	14050	1000
			EW7-T11 Total Points:		**48**	**EW7-T11 Total Gallons:**		**48,000**
EW7-T12 (Wesblend 66-10 9.8% by volume – 1000 gallons per point – 15-foot point spacing)								
EW7-T12-1	11/4/2019	1894.25	5	38	18	7030	8030	1000
EW7-T12-2	11/4/2019	1894.25	5	38	18	7030	8030	1000
EW7-T12-3	11/4/2019	1894.25	5	38	18	7080	8080	1000
EW7-T12-4	11/4/2019	1894.25	5	38	18	7030	8030	1000
EW7-T12-5	11/4/2019	1894.25	5	38	18	7030	8030	1000
EW7-T12-6	11/4/2019	1894.25	5	38	18	7030	8030	1000
EW7-T12-7	11/4/2019	1894.25	5	38	18	8030	9030	1000
EW7-T12-8	11/4/2019	1894.25	5	38	18	8030	9030	1000
EW7-T12-9	11/4/2019	1894.25	5	38	18	8080	9080	1000
EW7-T12-10	11/4/2019	1894.25	5	38	18	8030	9030	1000
EW7-T12-11	11/4/2019	1894.25	5	38	18	8030	9030	1000

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OU1 SUBSURFACE INJECTION SUMMARY
OU1 REBOUND STUDY LETTER REPORT - BASELINE

Injection Transect Point ID	Date(s)	Ground Elevation[1] (feet amsl)	Number of Intervals	Starting Depth (feet bgs)	Ending Depth (feet bgs)	Meter Start	Meter End	Total Volume (gal)
EW7-T12-12	11/4/2019	1894.25	5	38	18	8030	9030	1000
EW7-T12-13	11/4/2019	1894.25	5	38	18	9030	10030	1000
EW7-T12-14	11/4/2019	1894.25	5	38	18	9030	10030	1000
EW7-T12-15	11/4/2019	1894.25	5	38	18	9080	10080	1000
EW7-T12-16	11/4/2019	1894.25	5	38	18	9030	10030	1000
EW7-T12-17	11/4/2019	1894.25	5	38	18	9030	10030	1000
EW7-T12-18	11/4/2019	1894.25	5	38	18	9030	10030	1000
EW7-T12-19	11/5/2019	1894.25	5	38	18	11030	12030	1000
EW7-T12-20	11/5/2019	1894.25	5	38	18	11030	12030	1000
EW7-T12-21	11/5/2019	1894.25	5	38	18	11080	12080	1000
EW7-T12-22	11/5/2019	1894.25	5	38	18	11030	12030	1000
EW7-T12-23	11/5/2019	1894.25	5	38	18	11030	12030	1000
EW7-T12-24	11/5/2019	1894.25	5	38	18	11030	12030	1000
EW7-T12-25	11/5/2019	1893.97	5	38	18	12050	13050	1000
EW7-T12-26	11/5/2019	1893.97	5	38	18	12050	13050	1000
EW7-T12-27	11/5/2019	1893.97	5	38	18	12050	13050	1000
EW7-T12-28	11/5/2019	1893.97	5	38	18	12030	13030	1000
EW7-T12-29	11/5/2019	1893.97	5	38	18	12030	13030	1000
EW7-T12-30	11/5/2019	1893.97	5	38	18	12040	13040	1000
EW7-T12-31	11/5/2019	1893.97	5	38	18	9040	10040	1000
EW7-T12-32	11/5/2019	1893.97	5	38	18	9030	10030	1000
EW7-T12-33	11/5/2019	1893.97	5	38	18	9030	10030	1000
EW7-T12-34	11/5/2019	1893.97	5	38	18	9050	10050	1000
EW7-T12-35	11/5/2019	1893.97	5	38	18	9050	10050	1000
EW7-T12-36	11/5/2019	1893.97	5	38	18	9050	10050	1000
EW7-T12-37	11/4/2019	1893.97	5	38	18	7040	8040	1000
EW7-T12-38	11/4/2019	1893.97	5	38	18	7030	8030	1000
EW7-T12-39	11/4/2019	1893.97	5	38	18	7030	8030	1000
EW7-T12-40	11/4/2019	1893.97	5	38	18	7050	8050	1000
EW7-T12-41	11/4/2019	1893.97	5	38	18	7050	8050	1000
EW7-T12-42	11/4/2019	1893.97	5	38	18	7050	8050	1000
EW7-T12-43	11/4/2019	1893.97	5	38	18	6040	7040	1000
EW7-T12-44	11/4/2019	1893.97	5	38	18	6030	7030	1000
EW7-T12-45	11/4/2019	1893.97	5	38	18	6030	7030	1000
EW7-T12-46	11/4/2019	1893.97	5	38	18	6050	7050	1000
EW7-T12-47	11/4/2019	1893.97	5	38	18	6050	7050	1000
EW7-T12-48	11/4/2019	1893.97	5	38	18	6050	7050	1000
			EW7-T12 Total Points:		**48**	**EW7-T12 Total Gallons:**		**48,000**
EW7-T13 (Wesblend 66-10 9.8% by volume – 1000 gallons per point – 15-foot point spacing)								
EW7-T13-1	11/3/2019	1893.05	5	38	18	6030	7030	1000
EW7-T13-2	11/3/2019	1893.05	5	38	18	6030	7030	1000
EW7-T13-3	11/3/2019	1893.05	5	38	18	6080	7080	1000
EW7-T13-4	11/3/2019	1893.05	5	38	18	6030	7030	1000
EW7-T13-5	11/3/2019	1893.05	5	38	18	6030	7030	1000
EW7-T13-6	11/3/2019	1893.05	5	38	18	6030	7030	1000
EW7-T13-7	11/5/2019	1893.05	5	38	18	10030	11030	1000
EW7-T13-8	11/5/2019	1893.05	5	38	18	10030	11030	1000
EW7-T13-9	11/5/2019	1893.05	5	38	18	10080	11080	1000

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OU1 SUBSURFACE INJECTION SUMMARY
OU1 REBOUND STUDY LETTER REPORT - BASELINE

Injection Transect Point ID	Date(s)	Ground Elevation[1] (feet amsl)	Number of Intervals	Starting Depth (feet bgs)	Ending Depth (feet bgs)	Meter Start	Meter End	Total Volume (gal)
EW7-T13-10	11/5/2019	1893.05	5	38	18	10030	11030	1000
EW7-T13-11	11/5/2019	1893.05	5	38	18	10030	11030	1000
EW7-T13-12	11/5/2019	1893.05	5	38	18	10030	11030	1000
EW7-T13-13	11/5/2019	1893.05	5	38	18	12030	13030	1000
EW7-T13-14	11/5/2019	1893.05	5	38	18	12030	13030	1000
EW7-T13-15	11/5/2019	1893.05	5	38	18	12080	13080	1000
EW7-T13-16	11/5/2019	1893.05	5	38	18	12030	13030	1000
EW7-T13-17	11/5/2019	1893.05	5	38	18	12030	13030	1000
EW7-T13-18	11/5/2019	1893.05	5	38	18	12030	13030	1000
EW7-T13-19	11/5/2019	1893.05	5	38	18	11050	12050	1000
EW7-T13-20	11/5/2019	1893.05	5	38	18	11050	12050	1000
EW7-T13-21	11/5/2019	1893.05	5	38	18	11050	12050	1000
EW7-T13-22	11/5/2019	1894.17	5	38	18	11030	12030	1000
EW7-T13-23	11/5/2019	1894.17	5	38	18	11030	12030	1000
EW7-T13-24	11/5/2019	1894.17	5	38	18	11040	12040	1000
EW7-T13-25	11/5/2019	1894.17	5	38	18	10040	11040	1000
EW7-T13-26	11/5/2019	1894.17	5	38	18	10030	11030	1000
EW7-T13-27	11/5/2019	1894.17	5	38	18	10030	11030	1000
EW7-T13-28	11/5/2019	1894.17	5	38	18	10050	11050	1000
EW7-T13-29	11/5/2019	1894.17	5	38	18	10050	11050	1000
EW7-T13-30	11/5/2019	1894.17	5	38	18	10050	11050	1000
EW7-T13-31	11/4/2019	1894.17	5	38	18	8050	9050	1000
EW7-T13-32	11/4/2019	1894.17	5	38	18	8050	9050	1000
EW7-T13-33	11/4/2019	1894.17	5	38	18	8050	9050	1000
EW7-T13-34	11/4/2019	1894.17	5	38	18	8030	9030	1000
EW7-T13-35	11/4/2019	1894.17	5	38	18	8030	9030	1000
EW7-T13-36	11/4/2019	1894.17	5	38	18	8040	9040	1000
EW7-T13-37	11/3/2019	1894.17	5	38	18	5040	6040	1000
EW7-T13-38	11/3/2019	1894.17	5	38	18	5030	6030	1000
EW7-T13-39	11/3/2019	1894.17	5	38	18	5030	6030	1000
EW7-T13-40	11/3/2019	1894.17	5	38	18	5050	6050	1000
EW7-T13-41	11/3/2019	1894.17	5	38	18	5050	6050	1000
EW7-T13-42	11/3/2019	1894.17	5	38	18	5050	6050	1000
			EW7-T13 Total Points:		**42**	**EW7-T13 Total Gallons:**		**42,000**
EW7-T14 (Wesblend 66-10 9.8% by volume – 1000 gallons per point – 15-foot point spacing)								
EW7-T14-1	11/1/2019	1891.82	5	38	18	2030	3030	1000
EW7-T14-2	11/1/2019	1891.82	5	38	18	2030	3030	1000
EW7-T14-3	11/1/2019	1891.82	5	38	18	2080	3080	1000
EW7-T14-4	11/1/2019	1891.82	5	38	18	2030	3030	1000
EW7-T14-5	11/1/2019	1891.82	5	38	18	2030	3030	1000
EW7-T14-6	11/1/2019	1891.82	5	38	18	2030	3030	1000
EW7-T14-7	11/2/2019	1891.82	5	38	18	3030	4030	1000
EW7-T14-8	11/2/2019	1891.82	5	38	18	3030	4030	1000
EW7-T14-9	11/2/2019	1891.82	5	38	18	3080	4080	1000
EW7-T14-10	11/2/2019	1891.82	5	38	18	3030	4030	1000
EW7-T14-11	11/2/2019	1891.82	5	38	18	3030	4030	1000
EW7-T14-12	11/2/2019	1891.82	5	38	18	3030	4030	1000
EW7-T14-13	11/2/2019	1891.82	5	38	18	4030	5030	1000

TABLE B-1
OU1 SUBSURFACE INJECTION SUMMARY
OU1 REBOUND STUDY LETTER REPORT - BASELINE

Injection Transect Point ID	Date(s)	Ground Elevation[1] (feet amsl)	Number of Intervals	Starting Depth (feet bgs)	Ending Depth (feet bgs)	Meter Start	Meter End	Total Volume (gal)
EW7-T14-14	11/2/2019	1891.82	5	38	18	4030	5030	1000
EW7-T14-15	11/2/2019	1891.82	5	38	18	4080	5080	1000
EW7-T14-16	11/2/2019	1891.82	5	38	18	4030	5030	1000
EW7-T14-17	11/2/2019	1891.82	5	38	18	4030	5030	1000
EW7-T14-18	11/2/2019	1891.82	5	38	18	4030	5030	1000
EW7-T14-19	11/3/2019	1891.82	5	38	18	5030	6030	1000
EW7-T14-20	11/3/2019	1891.82	5	38	18	5030	6030	1000
EW7-T14-21	11/3/2019	1891.82	5	38	18	5080	6080	1000
EW7-T14-22	11/3/2019	1895.05	5	38	18	5030	6030	1000
EW7-T14-23	11/3/2019	1895.05	5	38	18	5030	6030	1000
EW7-T14-24	11/3/2019	1895.05	5	38	18	5030	6030	1000
EW7-T14-25	11/2/2019	1895.05	5	38	18	2040	3040	1000
EW7-T14-26	11/2/2019	1895.05	5	38	18	2050	3050	1000
EW7-T14-27	11/2/2019	1895.05	5	38	18	2030	3030	1000
EW7-T14-28	11/2/2019	1895.05	5	38	18	2040	3040	1000
EW7-T14-29	11/2/2019	1895.05	5	38	18	2040	3040	1000
EW7-T14-30	11/2/2019	1895.05	5	38	18	2040	3040	1000
EW7-T14-31	11/2/2019	1895.05	5	38	18	3040	4040	1000
EW7-T14-32	11/2/2019	1895.05	5	38	18	3020	4020	1000
EW7-T14-33	11/2/2019	1895.05	5	38	18	3030	4030	1000
EW7-T14-34	11/2/2019	1895.05	5	38	18	3030	4030	1000
EW7-T14-35	11/2/2019	1895.05	5	38	18	3040	4040	1000
EW7-T14-36	11/2/2019	1895.05	5	38	18	3040	4040	1000
EW7-T14-37	11/3/2019	1895.05	5	38	18	4050	5050	1000
EW7-T14-38	11/3/2019	1895.05	5	38	18	4050	5050	1000
EW7-T14-39	11/3/2019	1895.05	5	38	18	4050	5050	1000
EW7-T14-40	11/3/2019	1895.05	5	38	18	4030	5030	1000
EW7-T14-41	11/3/2019	1895.05	5	38	18	4030	5030	1000
EW7-T14-42	11/3/2019	1895.05	5	38	18	4040	5040	1000
			EW7-T14 Total Points:		**42**	**EW7-T14 Total Gallons:**		**42,000**
EW7-T15 (Wesblend 66-10 9.8% by volume – 1000 gallons per point – 15-foot point spacing)								
EW7-T15-1	10/31/2019	1891.55	5	38	18	1030	2030	1000
EW7-T15-2	10/31/2019	1891.55	5	38	18	1030	2030	1000
EW7-T15-3	10/31/2019	1891.55	5	38	18	1080	2080	1000
EW7-T15-4	10/31/2019	1891.55	5	38	18	1030	2030	1000
EW7-T15-5	10/31/2019	1891.55	5	38	18	1030	2030	1000
EW7-T15-6	10/31/2019	1891.55	5	38	18	1030	2030	1000
EW7-T15-7	11/1/2019	1893.47	5	38	18	1040	2040	1000
EW7-T15-8	11/1/2019	1893.47	5	38	18	1040	2040	1000
EW7-T15-9	11/1/2019	1893.47	5	38	18	1030	2030	1000
EW7-T15-10	11/1/2019	1893.47	5	38	18	1040	2040	1000
EW7-T15-11	11/1/2019	1893.47	5	38	18	1040	2040	1000
EW7-T15-12	11/1/2019	1893.47	5	38	18	1040	2040	1000
			EW7-T15 Total Points:		**12**	**EW7-T15 Total Gallons:**		**12,000**
EW7-T16 (Wesblend 66-10 9.8% by volume – 1000 gallons per point – 15-foot point spacing)								
EW7-T16-1	10/30/2019	1891.38	5	38	18	30	1030	1000
EW7-T16-2	10/30/2019	1891.38	5	38	18	30	1030	1000
EW7-T16-3	10/30/2019	1891.38	5	38	18	80	1080	1000

TABLE B-1
OU1 SUBSURFACE INJECTION SUMMARY
OU1 REBOUND STUDY LETTER REPORT - BASELINE

Injection Transect Point ID	Date(s)	Ground Elevation[1] (feet amsl)	Number of Intervals	Starting Depth (feet bgs)	Ending Depth (feet bgs)	Meter Start	Meter End	Total Volume (gal)
EW7-T16-4	10/30/2019	1891.38	5	38	18	30	1030	1000
EW7-T16-5	10/30/2019	1891.38	5	38	18	30	1030	1000
EW7-T16-6	10/30/2019	1891.38	5	38	18	30	1030	1000
EW7-T16-7	10/31/2019	1893.31	5	38	18	40	1040	1000
EW7-T16-8	10/31/2019	1893.31	5	38	18	90	1090	1000
EW7-T16-9	10/31/2019	1893.31	5	38	18	30	1030	1000
EW7-T16-10	10/31/2019	1893.31	5	38	18	40	1040	1000
EW7-T16-11	10/31/2019	1893.31	5	38	18	40	1040	1000
EW7-T16-12	10/31/2019	1893.31	5	38	18	40	1040	1000
		EW7-T16 Total Points:		**12**			**EW7-T16 Total Gallons:**	**12,000**
		Between EW6 and EW7 Total Points:		**600**			**Between EW6 and EW7 Total Gallons:**	**600,610**

Notes:

[1]Elevation datum based on National Geodetic Vertical Datum of 1929.

% = percent

amsl = above mean sea level

bgs= below ground surface

EW = extraction well

gal = gallon

ID = identification number

T = transect

Direct Push Groundwater Sampling (Off-post), OU1 Groundwater Monitoring Well Sampling, Subsurface Injection and Performance Monitoring DQCRs and Weekly Reports

DAILY QUALITY CONTROL REPORT

Date	**10/14/19**

Day	S	S	M	T	W	T	F
			X				

On Site Hours	0930-1730
Travel Time	2.5
Office Time	1

COE Project Manager	Doug Simpleman
Project	CHAAP RAO 2019 - OU1
	Rebound Study/Injections
Project No.	60565355
Contract No.	W9128F-18-D-0004

Weather	Bright Sun: X	Clear: X	Overcast	Rain	Snow
Temp	To 32	32-50	50-70: X	70-85	85 up
Wind	Still	Moderate: X	High	**Report No.**	
Humidity	Dry	Moderate: X	Humid	1	

Subcontractors on Site:

Plains Environmental Services (PES) (Direct Push Subcontractor) - Jason Auernheimer

Equipment on Site:

One direct push rig (Geoprobe 6620DT), Screen point sampler (SP15), macro-core, support trucks, hand-held GPS unit, performance monitoring (PM) temporary well materials (1"-OD PVC., 10' screens, filter pack sand, granular bentonite, coated chips, grount mix), peristaltic pump and tubing, laboratory provided sample containers, IDW buckets, decon supplies, LaMotte turbidity meter, survey equipment, MiniRAE PID, level D PPE, first-aid/safety supplies, and field/safety paperwork.

Visitors on Site:

None.

AECOM/Brice Personnel on Site:

AECOM - Ryan Herold, Taylor Young, Bob Exceen

Field Work Performed (including sampling):

-Began OU1 Rebound Study baseline sampling event (install/sample/abandon performance monitoring wells, DP screen point sampling, and MW sampling).
-All locations were marked with 4-foot lath and pink marking tape.
Direct Push (Screen Point) Groundwater Samples Collected
-OS001-DP01-25
-OS001-DP01-35 (+ Duplicate)
-OS001-DP01-45 (+ MS/MSD)

Began subsurface lithology (Geoprobe Macro-Core MC5) at location OS001.

-OU1 sample analysis will be completed in accordance with Addendum 2, and Addendum 3 UFP-QAPPs.
-Containerized IDW purge/decontamination water and disposed of at Treatment Plant.

Quality Control Activities (including field calibration):

-Completed staking of sample locations using hand-held GPS with predetermined coordinates. Utility locate for sample locations, and notifying property owners of field activities were completed week of October 14th.

-Calibration check of PIDs, water level indicator.

Health and Safety and Activities:

Had the initial H&S meeting with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, hazards with direct push rigs, traffic safety, potential exposure to explosives contamination, fire hazards, cold stress, hearing protection, slip-trip-falls, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety. Utility locates were performed (Nebraska811) and utilities were marked.

-Re-capped overall health and safety concerns, stressed road and direct push safety.
-Completed Daily Tailgate Meeting Sheet
-Completed Daily Task Hazard Assessment Sheet

Observations/Problems Encountered/Corrective Action Taken:

None.

Office Work Performed:

-Organized paperwork and equipment, scanned SCFSs.
-Completed DQCR.

By Ryan Herold **Title** Field Manager

DAILY QUALITY CONTROL REPORT

Date **10/15/19**

Day	S	S	M	T	W	T	F
				X			

On Site Hours	700-1800
Travel Time	0.5
Office Time	0.5

COE Project Manager	Doug Simpleman
Project	CHAAP RAO 2019 - OU1
	Rebound Study/Injections
Project No.	60565355
Contract No.	W9128F-18-D-0004

Weather	Bright Sun: X	Clear: X	Overcast	Rain	Snow
Temp	To 32	32-50	50-70: X	70-85	85 up
Wind	Still	Moderate	High: X	**Report No.**	
Humidity	Dry	Moderate: X	Humid	2	

Subcontractors on Site:

Plains Environmental Services (PES) (Direct Push Subcontractor) - Jason Auernheimer

Equipment on Site:

One direct push rig (Geoprobe 6620DT), Screen point sampler (SP15), macro-core, support trucks, hand-held GPS unit, performance monitoring (PM) temporary well materials (1"-OD PVC., 10' screens, filter pack sand, granular bentonite, coated chips, grount mix), peristaltic pump and tubing, laboratory provided sample containers, IDW buckets, decon supplies, LaMotte turbidity meter, survey equipment, MiniRAE PID, level D PPE, first-aid/safety supplies, and field/safety paperwork.

Visitors on Site:

None.

AECOM/Brice Personnel on Site:

AECOM - Ryan Herold, Taylor Young, Bob Exceen

Field Work Performed (including sampling):

-Finished subsurface lithology (Geoprobe Macro-Core MC5) at location OS001.
-Installed temporary PM well at EW7-PM23A at 30' feet bgs (screened 20-30').
-Inventoried bottle count for OU1 Rebound Study sampling activities (DP sampling, PM sampling, MW sampling).
-Completed injection set up activities (metered manifolds, blast shields, pumps and hoses).

-OU1 sample analysis will be completed in accordance with Addendum 2, and Addendum 3 UFP-QAPPs.
-Containerized IDW purge/decontamination water and disposed of at Treatment Plant.

Quality Control Activities (including field calibration):

-Calibration check of PIDs, water level indicator.

Health and Safety and Activities:

Had the daily H&S meeting with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, hazards with direct push rigs, traffic safety, potential exposure to explosives contamination, fire hazards, cold stress, hearing protection, slip-trip-falls, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety. Utility locates were performed (Nebraska811) and utilities were marked.

-Re-capped overall health and safety concerns, stressed road and direct push safety.
-Completed Daily Tailgate Meeting Sheet
-Completed Daily Task Hazard Assessment Sheet

Observations/Problems Encountered/Corrective Action Taken:

Bentonite pellets bridged inside the 3" rods as the rods were being extracted from the EW7-PM23B @ 40 ft. well. The rods were removed and next seal attempt will be completed using grout mixture tomorrow.

Office Work Performed:

-Organized paperwork and equipment, scanned SCFSs.
-Completed DQCR.

By Ryan Herold **Title** Field Manager

DAILY QUALITY CONTROL REPORT

Date	**10/16/19**

Day	S	S	M	T	W	T	F
					X		

On Site Hours	700-1800
Travel Time	0.5
Office Time	0.5

COE Project Manager	Doug Simpleman
Project	CHAAP RAO 2019 - OU1
	Rebound Study/Injections
Project No.	60565355
Contract No.	W9128F-18-D-0004

Weather	Bright Sun X	Clear X	Overcast	Rain	Snow
Temp	To 32	32-50	50-70 X	70-85	85 up
Wind	Still X	Moderate X	High	**Report No.**	
Humidity	Dry X	Moderate	Humid	3	

Subcontractors on Site:

Plains Environmental Services (PES) (Direct Push Subcontractor) - Jason Auernheimer

Equipment on Site:

One direct push rig (Geoprobe 6620DT), Screen point sampler (SP15), macro-core, support trucks, hand-held GPS unit, performance monitoring (PM) temporary well materials (1"-OD PVC., 10' screens, filter pack sand, granular bentonite, coated chips, grount mix), peristaltic pump and tubing, laboratory provided sample containers, IDW buckets, decon supplies, LaMotte turbidity meter, survey equipment, MiniRAE PID, level D PPE, first-aid/safety supplies, and field/safety paperwork.

Visitors on Site:

USACE - Jeff Gill

AECOM/Brice Personnel on Site:

AECOM - Ryan Herold, Taylor Young, Bob Exceen, Dean Converse

Field Work Performed (including sampling):

PM wells installed

EW7-PM25A, PM25B, PM24A, PM22A, PM22B, PM21A, PM21B

PM wells sampled

EW7-PM25A-1-25, EW7-PM25B-1-35 (+ MS/MSD), EW7-PM24A-1-25, EW7-PM23A-1-25

-OU1 sample analysis will be completed in accordance with Addendum 2, and Addendum 3 UFP-QAPPs.
-Containerized IDW purge/decontamination water and disposed of at Treatment Plant.

Quality Control Activities (including field calibration):

-EW7-PM25B-1-35 had an MS/MSD collected.
-Calibration check of PIDs, water level indicator. Weekly calibration and daily calibration checks of YSIs (AM/PM) (Serial #'s 1 - RFW24698 and 2 - U77883X).

Health and Safety and Activities:

Had the daily H&S meeting with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, hazards with direct push rigs, traffic safety, potential exposure to explosives contamination, fire hazards, cold stress, hearing protection, slip-trip-falls, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety. Utility locates were performed (Nebraska811) and utilities were marked.

-Re-capped overall health and safety concerns, stressed road and direct push safety.
-Completed Daily Tailgate Meeting Sheet
-Completed Daily Task Hazard Assessment Sheet

Observations/Problems Encountered/Corrective Action Taken:

None.

Office Work Performed:

-Organized paperwork and equipment, scanned SCFSs.
-Completed DQCR.

By Ryan Herold **Title** Field Manager

DAILY QUALITY CONTROL REPORT

Date	**10/17/19**

Day	S	S	M	T	W	T	F
						X	

On Site Hours	700-1800
Travel Time	0.5
Office Time	0.5

COE Project Manager	Doug Simpleman
Project	CHAAP RAO 2019 - OU1
	Rebound Study/Injections
Project No.	60565355
Contract No.	W9128F-18-D-0004

Weather	Bright Sun: X	Clear: X	Overcast	Rain	Snow
Temp	To 32	32-50	50-70: X	70-85	85 up
Wind	Still	Moderate: X	High	**Report No.**	
Humidity	Dry: X	Moderate	Humid	4	

Subcontractors on Site:

Plains Environmental Services (PES) (Direct Push Subcontractor) - Jason Auernheimer

Equipment on Site:

One direct push rig (Geoprobe 6620DT), Screen point sampler (SP15), macro-core, support trucks, hand-held GPS unit, performance monitoring (PM) temporary well materials (1"-OD PVC., 10' screens, filter pack sand, granular bentonite, coated chips, grount mix), peristaltic pump and tubing, laboratory provided sample containers, IDW buckets, decon supplies, LaMotte turbidity meter, survey equipment, MiniRAE PID, level D PPE, first-aid/safety supplies, and field/safety paperwork.

Visitors on Site:

None.

AECOM/Brice Personnel on Site:

AECOM - Ryan Herold, Taylor Young, Bob Exceen, Dean Converse

Field Work Performed (including sampling):

PM wells installed

EW7-PM23BA, PM24B, PM26A, PM26B, PM27A, PM27B

PM wells sampled

EW7-PM21A-1-25, EW7-PM21B-1-35 (+ field duplicate), EW7-PM22A-1-25, EW7-PM22B-1-35, EW7-PM23B-1-35

-OU1 sample analysis will be completed in accordance with Addendum 2, and Addendum 3 UFP-QAPPs.
-Containerized IDW purge/decontamination water and disposed of at Treatment Plant.

Quality Control Activities (including field calibration):

-EW7-PM21B-1-35 had a field duplicate collected (EW7-PM521B-1-35).
-Calibration check of PIDs, water level indicator. Weekly calibration and daily calibration checks of YSIs (AM/PM) (Serial #'s 1 - RFW24698 and 2 - U77883X).

Health and Safety and Activities:

Had the daily H&S meeting with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, hazards with direct push rigs, traffic safety, potential exposure to explosives contamination, fire hazards, cold stress, hearing protection, slip-trip-falls, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety. Utility locates were performed (Nebraska811) and utilities were marked.

-Re-capped overall health and safety concerns, stressed road and direct push safety.
-Completed Daily Tailgate Meeting Sheet
-Completed Daily Task Hazard Assessment Sheet

Observations/Problems Encountered/Corrective Action Taken:

None.

Office Work Performed:

-Organized paperwork and equipment, scanned SCFSs.
-Completed DQCR.

By Ryan Herold **Title** Field Manager

DAILY QUALITY CONTROL REPORT

Date	**10/18/19**

Day	S	S	M	T	W	T	F
							X

On Site Hours	0730-1630
Travel Time	0.5
Office Time	0.5

COE Project Manager	Doug Simpleman
Project	CHAAP RAO 2019 - OU1
	Rebound Study/Injections
Project No.	60565355
Contract No.	W9128F-18-D-0004

Weather	Bright Sun X	Clear X	Overcast	Rain	Snow
Temp	To 32	32-50	50-70 X	70-85	85 up
Wind	Still	Moderate	High X	**Report No.**	
Humidity	Dry X	Moderate	Humid	5	

Subcontractors on Site:

Plains Environmental Services (PES) (Direct Push Subcontractor) - Jason Auernheimer

Equipment on Site:

One direct push rig (Geoprobe 6620DT), Screen point sampler (SP15), macro-core, support trucks, hand-held GPS unit, performance monitoring (PM) temporary well materials (1"-OD PVC., 10' screens, filter pack sand, granular bentonite, coated chips, grount mix), peristaltic pump and tubing, laboratory provided sample containers, IDW buckets, decon supplies, LaMotte turbidity meter, survey equipment, MiniRAE PID, level D PPE, first-aid/safety supplies, and field/safety paperwork.

Visitors on Site:

None.

AECOM/Brice Personnel on Site:

AECOM - Ryan Herold, Taylor Young, Bob Exceen

Field Work Performed (including sampling):

PM wells installed

EW7-PM28A, PM28B, PM29B

PM wells sampled

EW7-PM26A-1-25, EW7-PM26B-1-35, EW7-PM27A-1-25, EW7-PM27B-1-35

-OU1 sample analysis will be completed in accordance with Addendum 2, and Addendum 3 UFP-QAPPs.
-Containerized IDW purge/decontamination water and disposed of at Treatment Plant.

Quality Control Activities (including field calibration):

-Calibration check of PIDs, water level indicator. Weekly calibration and daily calibration checks of YSIs (AM/PM) (Serial #'s 1 - RFW24698 and 2 - U77883X).

Health and Safety and Activities:

Had the daily H&S meeting with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, hazards with direct push rigs, traffic safety, potential exposure to explosives contamination, fire hazards, cold stress, hearing protection, slip-trip-falls, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety. Utility locates were performed (Nebraska811) and utilities were marked.

-Re-capped overall health and safety concerns, stressed road and direct push safety.
-Completed Daily Tailgate Meeting Sheet
-Completed Daily Task Hazard Assessment Sheet

Observations/Problems Encountered/Corrective Action Taken:

None.

Office Work Performed:

-Organized paperwork and equipment, scanned SCFSs.
-Completed DQCR.

By Ryan Herold **Title** Field Manager

DAILY QUALITY CONTROL REPORT

Date **10/19/19**

Day	S	S	M	T	W	T	F
	X						

On Site Hours	0730-1730
Travel Time	0.5
Office Time	0.5

COE Project Manager	Doug Simpleman
Project	CHAAP RAO 2019 - OU1
	Rebound Study/Injections
Project No.	60565355
Contract No.	W9128F-18-D-0004

Weather	Bright Sun	Clear	Overcast	Rain	Snow
	X	X			
Temp	To 32	32-50	50-70	70-85	85 up
				X	
Wind	Still	Moderate	High	**Report No.**	
		X			
Humidity	Dry	Moderate	Humid	6	
	X				

Subcontractors on Site:

None.

Equipment on Site:

Support trucks, hand-held GPS unit, peristaltic pump and tubing, laboratory provided sample containers, IDW buckets, decon supplies, LaMotte turbidity meter, survey equipment, MiniRAE PID, level D PPE, first-aid/safety supplies, and field/safety paperwork.

Visitors on Site:

None.

AECOM/Brice Personnel on Site:

AECOM - Ryan Herold, Taylor Young, Bob Exceen

Field Work Performed (including sampling):

PM wells sampled

EW7-PM24B-1-35, EW7-PM28A-1-25, EW7-PM29A-1-25, EW7-PM29B-1-35

-OU1 sample analysis will be completed in accordance with Addendum 2, and Addendum 3 UFP-QAPPs.
-Containerized IDW purge/decontamination water and disposed of at Treatment Plant.

Quality Control Activities (including field calibration):

-Calibration check of PIDs, water level indicator. Weekly calibration and daily calibration checks of YSIs (AM/PM) (Serial #'s 1 - RFW24698 and 2 - U77883X).

Health and Safety and Activities:

Had the daily H&S meeting with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, hazards with direct push rigs, traffic safety, potential exposure to explosives contamination, fire hazards, cold stress, hearing protection, slip-trip-falls, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety. Utility locates were performed (Nebraska811) and utilities were marked.

-Re-capped overall health and safety concerns, stressed road and direct push safety.
-Completed Daily Tailgate Meeting Sheet
-Completed Daily Task Hazard Assessment Sheet

Observations/Problems Encountered/Corrective Action Taken:

None.

Office Work Performed:

-Organized paperwork and equipment, scanned SCFSs.
-Completed DQCR.

By Ryan Herold **Title** Field Manager

DAILY QUALITY CONTROL REPORT

Date **10/20/19**

Day	S	S	M	T	W	T	F
		X					

On Site Hours	0800 - 1730
Travel Time	0.5
Office Time	0.5

COE Project Manager	Doug Simpleman
Project	CHAAP RAO 2019 - OU1
	Rebound Study/Injections
Project No.	60565355
Contract No.	W9128F-18-D-0004

Weather	Bright Sun	Clear	Overcast	Rain	Snow
			X		
Temp	To 32	32-50	50-70	70-85	85 up
			X		
Wind	Still	Moderate	High	**Report No.**	
			X		
Humidity	Dry	Moderate	Humid	7	
	X				

Subcontractors on Site:

None.

Equipment on Site:

Support trucks, hand-held GPS unit, peristaltic pump and tubing, laboratory provided sample containers, IDW buckets, decon supplies, LaMotte turbidity meter, survey equipment, MiniRAE PID, level D PPE, first-aid/safety supplies, and field/safety paperwork.

Visitors on Site:

None.

AECOM/Brice Personnel on Site:

AECOM - Ryan Herold, Taylor Young, Bob Exceen

Field Work Performed (including sampling):

PM wells sampled

EW7-PM28B-1-35

-All DP screen point, PM, and injection locations were field surveyed.
-All PM wells were abandoned.

-OU1 sample analysis will be completed in accordance with Addendum 2, and Addendum 3 UFP-QAPPs.
-Containerized IDW purge/decontamination water and disposed of at Treatment Plant.

Quality Control Activities (including field calibration):

-Calibration check of PIDs, water level indicator. Weekly calibration and daily calibration checks of YSIs (AM/PM) (Serial #'s 1 - RFW24698 and 2 - U77883X).

Health and Safety and Activities:

Had the daily H&S meeting with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, hazards with direct push rigs, traffic safety, potential exposure to explosives contamination, fire hazards, cold stress, hearing protection, slip-trip-falls, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety. Utility locates were performed (Nebraska811) and utilities were marked.

-Re-capped overall health and safety concerns, stressed road and direct push safety.
-Completed Daily Tailgate Meeting Sheet
-Completed Daily Task Hazard Assessment Sheet

Observations/Problems Encountered/Corrective Action Taken:

None.

Office Work Performed:

-Organized paperwork and equipment, scanned SCFSs.
-Completed DQCR.

By Ryan Herold **Title** Field Manager

DAILY QUALITY CONTROL REPORT

Date **10/21/19**

Day	S	S	M	T	W	T	F
			X				

On Site Hours	0600 - 1730
Travel Time	0.5
Office Time	1.5

COE Project Manager	Doug Simpleman
Project	CHAAP RAO 2019 - OU1
	Rebound Study/Injections
Project No.	60565355
Contract No.	W9128F-18-D-0004

Weather	Bright Sun	Clear	Overcast	Rain	Snow
			X		
Temp	To 32	32-50	50-70	70-85	85 up
			X		
Wind	Still	Moderate	High	**Report No.**	
			X		
Humidity	Dry	Moderate	Humid	8	
	X				

Subcontractors on Site:

None.

Equipment on Site:

Support trucks, laboratory provided sample containers, Monsoon Pumps, YSI 556 Probes, LaMotte turbidity meter, Hach Iron kits, MiniRAE PID, IDW buckets, decon supplies, level D PPE, first-aid/safety supplies, and field/safety paperwork.

Visitors on Site:

None.

AECOM/Brice Personnel on Site:

AECOM - Ryan Herold, Taylor Young, Bob Exceen

Brice - Chris Holt, Rebecca Reyes, Corey Schwabenlander

Field Work Performed (including sampling):

OU1 Rebound Study monitoring wells (off-, onsite) purged and sampled

G0070-1, G0075-1, G0076-1, G0079-1, G0080-1, G0081-1, G0082-1, CA210-1, CA211-1, CA212-1, CA213-1, NW070-1, NW071-1

-OU1 sample analysis will be completed in accordance with Addendum 2, and Addendum 3 UFP-QAPPs.

-Containerized IDW purge/decontamination water and disposed of at Treatment Plant.

Quality Control Activities (including field calibration):

-G0070 had an MS/MSD collected.

-Calibration check of PIDs, water level indicator. Weekly calibration and daily calibration checks of YSIs (AM/PM) (Serial #'s 1 - RFW24698 and 2 - U77883X).

Health and Safety and Activities:

Had the initial H&S meeting with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, hazards with direct push rigs, traffic safety, potential exposure to explosives contamination, fire hazards, cold stress, hearing protection, slip-trip-falls, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety. Utility locates were performed (Nebraska811) and utilities were marked.

-Re-capped overall health and safety concerns, stressed road and direct push safety.

-Completed Daily Tailgate Meeting Sheet

-Completed Daily Task Hazard Assessment Sheet

Observations/Problems Encountered/Corrective Action Taken:

None.

Office Work Performed:

-Organized paperwork and equipment, scanned SCFSs.
-Completed DQCR.

By Ryan Herold **Title** Field Manager

DAILY QUALITY CONTROL REPORT

Date **10/22/19**

Day	S	S	M	T	W	T	F
				X			

On Site Hours	0700 - 1930
Travel Time	0.5
Office Time	1.5

COE Project Manager	Doug Simpleman
Project	CHAAP RAO 2019 - OU1
	Rebound Study/Injections
Project No.	60565355
Contract No.	W9128F-18-D-0004

Weather	Bright Sun	Clear X	Overcast	Rain	Snow
Temp	To 32	32-50	50-70 X	70-85	85 up
Wind	Still	Moderate X	High	**Report No.**	
Humidity	Dry X	Moderate	Humid	9	

Subcontractors on Site:

None.

Equipment on Site:

Support trucks, laboratory provided sample containers, Monsoon Pumps, YSI 556 Probes, LaMotte turbidity meter, Hach Iron kits, MiniRAE PID, IDW buckets, decon supplies, level D PPE, first-aid/safety supplies, and field/safety paperwork.

Visitors on Site:

Various Meeting Attendees (USEPA, NDEE, USACE, USAEC, ATI)

AECOM/Brice Personnel on Site:

AECOM - Ryan Herold, Taylor Young, Bob Exceen, Dean Converse, Corey Anderson

Brice - Chris Holt, Rebecca Reyes, Corey Schwabenlander

Field Work Performed (including sampling):

OU1 Rebound Study monitoring wells (off-, onsite) purged and sampled

G0087-1, G0091-1, G0092-1, NW080-1, NW081R-1, NW082R-1, NW020-1, NW021-1, NW022-1, NW060-1, NW061-1, NW062-1, PZ019-1, NW050-1, NW051-1

-OU1 sample analysis will be completed in accordance with Addendum 2, and Addendum 3 UFP-QAPPs.

-Containerized IDW purge/decontamination water and disposed of at Treatment Plant.

Quality Control Activities (including field calibration):

-NW021 had a field duplicate collected (NW023) and an MS/MSD was collecgted at PZ019.

-Calibration check of PIDs, water level indicator. Weekly calibration and daily calibration checks of YSIs (AM/PM) (Serial #'s 1 - RFW24698 and 2 - U77883X).

Health and Safety and Activities:

Had the daily H&S meeting with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, hazards with direct push rigs, traffic safety, potential exposure to explosives contamination, fire hazards, cold stress, hearing protection, slip-trip-falls, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety. Utility locates were performed (Nebraska811) and utilities were marked.

-Re-capped overall health and safety concerns, stressed road and direct push safety.

-Completed Daily Tailgate Meeting Sheet

-Completed Daily Task Hazard Assessment Sheet

Observations/Problems Encountered/Corrective Action Taken:

None.

Office Work Performed:

-Organized paperwork and equipment, scanned SCFSs.
-Completed DQCR.

By Ryan Herold **Title** Field Manager

DAILY QUALITY CONTROL REPORT

Date **10/23/19**

Day	S	S	M	T	W	T	F
					X		

On Site Hours	0700-1600
Travel Time	0.5
Office Time	1.5

COE Project Manager	Doug Simpleman
Project	CHAAP RAO 2019 - OU1
	Rebound Study/Injections
Project No.	60565355
Contract No.	W9128F-18-D-0004

Weather	Bright Sun		Clear X	Overcast	Rain	Snow
Temp	To 32		32-50	50-70 X	70-85	85 up
Wind	Still	Moderate X		High	**Report No.**	
Humidity	Dry X	Moderate		Humid	10	

Subcontractors on Site:

None.

Equipment on Site:

Support trucks, laboratory provided sample containers, Monsoon Pumps, YSI 556 Probes, LaMotte turbidity meter, Hach Iron kits, MiniRAE PID, IDW buckets, decon supplies, level D PPE, first-aid/safety supplies, and field/safety paperwork.

Visitors on Site:

None.

AECOM/Brice Personnel on Site:

AECOM - Ryan Herold, Taylor Young, Bob Exceen

Brice - Chris Holt, Rebecca Reyes

Field Work Performed (including sampling):

OU1 Rebound Study monitoring wells (off-, onsite) purged and sampled

PZ018-1, G0086-1, NW052-1, PZ020-1, PZ017R-1, G0024-1, G0077-1, G0078-1, irrigation well 2019 (prior to injection activities).

-OU1 sample analysis will be completed in accordance with Addendum 2, and Addendum 3 UFP-QAPPs.
-Containerized IDW purge/decontamination water and disposed of at Treatment Plant.

Quality Control Activities (including field calibration):

-PZ017R had a field duplicate collected (PZ021).
-Calibration check of PIDs, water level indicator. Weekly calibration and daily calibration checks of YSIs (AM/PM) (Serial #'s 1 - RFW24698 and 2 - U77883X).

Health and Safety and Activities:

Had the daily H&S meeting with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, hazards with direct push rigs, traffic safety, potential exposure to explosives contamination, fire hazards, cold stress, hearing protection, slip-trip-falls, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety. Utility locates were performed (Nebraska811) and utilities were marked.

-Re-capped overall health and safety concerns, stressed road and direct push safety.
-Completed Daily Tailgate Meeting Sheet
-Completed Daily Task Hazard Assessment Sheet

Observations/Problems Encountered/Corrective Action Taken:

None.

Office Work Performed:

-Organized paperwork and equipment, scanned SCFSs.
-Completed DQCR.

By Ryan Herold **Title** Field Manager

DAILY QUALITY CONTROL REPORT

Date	**10/28/19**

Day	S	S	M	T	W	T	F
			X				

On Site Hours	0700-1800
Travel Time	0.5
Office Time	1.5

COE Project Manager	Doug Simpleman
Project	CHAAP RAO 2019 - OU1
	Rebound Study/Injections
Project No.	60565355
Contract No.	W9128F-18-D-0004

Weather	Bright Sun	Clear	Overcast	Rain	Snow
			X		
Temp	To 32	32-50	50-70	70-85	85 up
	X	X			
Wind	Still	Moderate	High	**Report No.**	
		X			
Humidity	Dry	Moderate	Humid	11	
	X				

Subcontractors on Site:

Plains Environmental Services (PES) (Direct Push Subcontractor) - Jason Auernheimer, Jesse Kalvig, Eric Robinson, Henry Walker
Panowicz Farms (Water Truck Subcontractor) - Arthur Thompson, Jim Mathews

Equipment on Site:

For Direct Push (DP) Injection: Three direct push rigs with injection tools, two water trucks with transfer pump, five support trucks, injection equipment including two injection pumps, trash pump, two-6,000 gallon tank trailers, two metered-injection manifolds, various plastic storage/transfer tanks, various lengths of one-, two-, and three-inch hose, and level D PPE, first-aid/safety supplies, and field/safety paperwork

For DP sampling: One direct push rig (Geoprobe 6620DT), Screen point sampler (SP15), support truck, hand-held GPS unit, peristaltic pump and tubing, laboratory provided sample containers, IDW buckets, decon supplies, LaMotte turbidity meter, MiniRAE PID, level D PPE, first-aid/safety supplies, and field/safety paperwork.

Visitors on Site:

None.

AECOM/Brice Personnel on Site:

AECOM - Ryan Herold, Taylor Young, Bob Exceen, Mike McKeon, Dean Converse
Brice - Paul Caron, Mikayla Daigle

Field Work Performed (including sampling):

-Injection preparation activities were completed week of October 18. Activities included Utility Locate, flow meter calibration, staking of injection transects using GPS and surveying ground surface elevations, check pressure meters, pump tune-ups, irrigatuion well access and pump check, collected irrigation well groundwater sample for analysis, notified all landowners of field activities, and ensure proper operation of pressure relief valves throughout injection system.

-Began setting up equipment, tanks, manifolds, hoses for injection starting at transect EW7-T16.
-PES on site @ 11am. Followoing meeting, began DP activities at EW7-T16 (depths 18'-38' bgs).
-PF on site @ 11am. Following meeting, began transfering amendment into water trucks (2) and water @ 9.8% mixed volume.
-Began completing DP screen point sampling at off-site locations OS002, OS003 (each location 25', 35', 45' samples for explosives + MNX only (8330).

Direct Push (Screen Point) Groundwater Samples Collected

-OS002-DP01-25	-OS003-DP01-25
-OS002-DP01-35	-OS003-DP01-35
-OS002-DP01-45	-OS003-DP01-45

-OU1 sample analysis will be completed in accordance with Addendum 2, and Addendum 3 UFP-QAPPs.
-Containerized IDW purge/decontamination water and disposed of at Treatment Plant.

Amendment delivery (Wesway lbs.): 45,940 (10/23/19) 45,580 (10/28/19)

Health and Safety and Activities:

Had the initial H&S meeting with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, hazards with direct push rigs, pressurized lines, pump and traffic safety, potential exposure to explosives contamination, fire hazards, cold stress, hearing protection, slip-trip-falls, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety. Utility locates were performed (Nebraska811) and utilities were marked.

-Re-capped overall health and safety concerns, stressed road and direct push safety.
-Completed Daily Tailgate Meeting Sheet
-Completed Daily Task Hazard Assessment Sheet

Observations/Problems Encountered/Corrective Action Taken:

Due to extreme cold, amendment transfer to water trucks not successful using various trash pumps (as used during past injection events). Alternative pumps will be researched and utilized next day.

Office Work Performed:

-Organized paperwork and equipment, scanned SCFSs.
-Completed DQCR.

By Ryan Herold **Title** Field Manager

DAILY QUALITY CONTROL REPORT

Date **10/29/19**

Day	S	S	M	T	W	T	F
				X			

On Site Hours	0700-1800
Travel Time	0.5
Office Time	0.5

COE Project Manager	Doug Simpleman
Project	CHAAP RAO 2019 - OU1
	Rebound Study/Injections
Project No.	60565355
Contract No.	W9128F-18-D-0004

Weather	Bright Sun	Clear	Overcast	Rain	Snow
			X		
Temp	To 32	32-50	50-70	70-85	85 up
	X	X			
Wind	Still	Moderate	High	**Report No.**	
		X			
Humidity	Dry	Moderate	Humid	12	
	X				

Subcontractors on Site:
Plains Environmental Services (PES) (Direct Push Subcontractor) - Jason Auernheimer, Jesse Kalvig, Eric Robinson, Henry Walker
Panowicz Farms (Water Truck Subcontractor) - Arthur Thompson, Jim Mathews

Equipment on Site:
For Direct Push (DP) Injection: Three direct push rigs with injection tools, two water trucks with transfer pump, five support trucks, injection equipment including two injection pumps, trash pump, two-6,000 gallon tank trailers, two metered-injection manifolds, various plastic storage/transfer tanks, various lengths of one-, two-, and three-inch hose, and level D PPE, first-aid/safety supplies, and field/safety paperwork

Visitors on Site:
None.

AECOM/Brice Personnel on Site:
AECOM - Ryan Herold, Taylor Young, Bob Exceen, Mike McKeon, Dean Converse
Brice - Paul Caron, Mikayla Daigle

Field Work Performed (including sampling):
-Researched additional pump options to transfer amendment. Transferred minor amounts of amendment (gravity fed), mixed with water for 1 truck, but not off loaded. Both trucks were stored in GWTF overnight. Purchased an electric gear-pump from manufacture in Palmer, NE and a generator. Electrician will be contacted next day to wire system.

Summary:
Total gallons of WB66-10 injected today = 0

Total gallons of WB66-10 injected this week = 0
Total gallons of WB66-10 injected to date = 0

Amendment delivery (Wesway lbs.): NO

Health and Safety and Activities:
Had the morning H&S meeting with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, hazards with direct push rigs, pressurized lines, pump and traffic safety, potential exposure to explosives contamination, fire hazards, cold stress, hearing protection, slip-trip-falls, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety. Utility locates were performed (Nebraska811) and utilities were marked.

-Re-capped overall health and safety concerns, stressed road and direct push safety.
-Completed Daily Tailgate Meeting Sheet
-Completed Daily Task Hazard Assessment Sheet

Observations/Problems Encountered/Corrective Action Taken:

Due to extreme cold, amendment transfer to water trucks was problematic. New pump/generator will be utilized next day.

Office Work Performed:

-Organized paperwork and equipment, scanned SCFSs.

-Completed DQCR.

By Ryan Herold **Title** Field Manager

DAILY QUALITY CONTROL REPORT

Date	**10/30/19**

Day	S	S	M	T	W	T	F
					X		

On Site Hours	0700-1900
Travel Time	0.5
Office Time	0.5

COE Project Manager	Doug Simpleman
Project	CHAAP RAO 2019 - OU1
	Rebound Study/Injections
Project No.	60565355
Contract No.	W9128F-18-D-0004

Weather	Bright Sun		Clear	Overcast	Rain	Snow
				X		
Temp	To 32		32-50	50-70	70-85	85 up
	X					
Wind	Still	Moderate		High	**Report No.**	
		X				
Humidity	Dry	Moderate		Humid	13	
	X					

Subcontractors on Site:

Plains Environmental Services (PES) (Direct Push Subcontractor) - Jason Auernheimer, Jesse Kalvig, Eric Robinson
Panowicz Farms (Water Truck Subcontractor) - Arthur Thompson, Manuel Herrera

Equipment on Site:

For Direct Push (DP) Injection: Three direct push rigs with injection tools, two water trucks with transfer pump, five support trucks, injection equipment including two injection pumps, gear pump with generator, two-6,000 gallon tank trailers, two metered-injection manifolds, various plastic storage/transfer tanks, various lengths of one-, two-, and three-inch hose, and level D PPE, first-aid/safety supplies, and field/safety paperwork

Visitors on Site:

Messersmith Electric LLC - Shawn Messersmith

AECOM/Brice Personnel on Site:

AECOM - Ryan Herold, Taylor Young, Bob Exceen, Mike McKeon, Dean Converse
Brice - Paul Caron, Mikayla Daigle

Field Work Performed (including sampling):

EW7-T16 points 1-6 completed
EW7-T16 points 7-12 started

Summary:

Total gallons of WB66-10 injected today =	**9,500**
Total gallons of WB66-10 injected this week (Sat. - F.) =	**9,500**
Total gallons of WB66-10 injected to date =	**9,500**

Amendment delivery (Wesway lbs.): NO

Health and Safety and Activities:

Had the morning H&S meeting with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, hazards with direct push rigs, pressurized lines, pump and traffic safety, potential exposure to explosives contamination, fire hazards, cold stress, hearing protection, slip-trip-falls, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety. Utility locates were performed (Nebraska811) and utilities were marked.

-Re-capped overall health and safety concerns, stressed road and direct push safety.
-Completed Daily Tailgate Meeting Sheet
-Completed Daily Task Hazard Assessment Sheet

Observations/Problems Encountered/Corrective Action Taken:

Electrician on site to wire pump/generator (off-site 1230). Due to temperatures, amendment can be transferred with new pump; however, still slow. Will continue optimizing process next day.

Office Work Performed:

-Organized paperwork and equipment, scanned Injection Field Sheets.
-Completed DQCR.

By Ryan Herold **Title** Field Manager

DAILY QUALITY CONTROL REPORT

Date	**10/31/19**

Day	S	S	M	T	W	T	F
						X	

On Site Hours	0700-1800
Travel Time	0.5
Office Time	0.5

COE Project Manager	Doug Simpleman
Project	CHAAP RAO 2019 - OU1 Rebound Study/Injections
Project No.	60565355
Contract No.	W9128F-18-D-0004

Weather	Bright Sun	Clear	Overcast	Rain	Snow
Temp	To 32	32-50	50-70	70-85	85 up
	X				
Wind	Still	Moderate	High	**Report No.**	
		X			
Humidity	Dry	Moderate	Humid	14	
	X				

Subcontractors on Site:

Plains Environmental Services (PES) (Direct Push Subcontractor) - Jason Auernheimer, Jesse Kalvig, Eric Robinson
Panowicz Farms (Water Truck Subcontractor) - Arthur Thompson, Manuel Herrera

Equipment on Site:

For Direct Push (DP) Injection: Three direct push rigs with injection tools, two water trucks with transfer pump, five support trucks, injection equipment including two injection pumps, gear pump with generator, two-6,000 gallon tank trailers, two metered-injection manifolds, various plastic storage/transfer tanks, various lengths of one-, two-, and three-inch hose, and level D PPE, first-aid/safety supplies, and field/safety paperwork

Visitors on Site:

None.

AECOM/Brice Personnel on Site:

AECOM - Ryan Herold, Taylor Young, Bob Exceen, Mike McKeon, Dean Converse
Brice - Paul Caron, Mikayla Daigle

Field Work Performed (including sampling):

EW7-T15 points 1-6 completed
EW7-T16 points 7-12 completed

Summary:

Total gallons of WB66-10 injected today =	**8,500**
Total gallons of WB66-10 injected this week (Sat. - F.) =	**18,000**
Total gallons of WB66-10 injected to date =	**18,000**

Amendment delivery (Wesway lbs.): NO

Health and Safety and Activities:

Had the morning H&S meeting with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, hazards with direct push rigs, pressurized lines, pump and traffic safety, potential exposure to explosives contamination, fire hazards, cold stress, hearing protection, slip-trip-falls, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety. Utility locates were performed (Nebraska811) and utilities were marked.

-Re-capped overall health and safety concerns, stressed road and direct push safety.
-Completed Daily Tailgate Meeting Sheet
-Completed Daily Task Hazard Assessment Sheet

Observations/Problems Encountered/Corrective Action Taken:

Resumed injection procedures @ 1430 on T16 and T15 after thawing out lines and valves. Paul with Brice was working on a heating element for the molasses tanks. More straw was purchased for insulation around the valves and hoses.

Office Work Performed:

-Organized paperwork and equipment, scanned Injection Field Sheets.
-Completed DQCR.

By Ryan Herold **Title** Field Manager

DAILY QUALITY CONTROL REPORT

Date	**11/01/19**

Day	S	S	M	T	W	T	F
							X

On Site Hours	0700-1700
Travel Time	0.5
Office Time	0.5

COE Project Manger	Doug Simpleman
Project	CHAAP RAO 2019 - OU1
	Rebound Study/Injections
Project No.	60565355
Contract No.	W9128F-18-D-0004

Weather	Bright Sun		Clear	Overcast	Rain	Snow
				X		
Temp	To 32		32-50	50-70	70-85	85 up
			X			
Wind	Still	Moderate		High	**Report No.**	
		X				
Humidity	Dry	Moderate		Humid	15	
	X					

Subcontractors on Site:

Plains Environmental Services (PES) (Direct Push Subcontractor) - Jason Auernheimer, Jesse Kalvig, Eric Robinson
Panowicz Farms (Water Truck Subcontractor) - Arthur Thompson, Manuel Herrera

Equipment on Site:

For Direct Push (DP) Injection: Three direct push rigs with injection tools, two water trucks with transfer pump, five support trucks, injection equipment including two injection pumps, gear pump with generator, two-6,000 gallon tank trailers, two metered-injection manifolds, various plastic storage/transfer tanks, various lengths of one-, two-, and three-inch hose, and level D PPE, first-aid/safety supplies, and field/safety paperwork

Visitors on Site:

None.

AECOM/Brice Personnel on Site:

AECOM - Ryan Herold, Taylor Young, Bob Exceen, Mike McKeon,
Brice - Paul Caron, Mikayla Daigle

Field Work Performed (including sampling):

EW7-T15 points 7-12 completed
EW7-T14 points 1-6 completed
EW7-T14 points 7-12 started
EW7-T14 points 25-30 started

Summary:

Total gallons of WB66-10 injected today =	**14,900**
Total gallons of WB66-10 injected this week (Sat. - F.) =	**32,900**
Total gallons of WB66-10 injected to date =	**32,900**

Amendment delivery (Wesway lbs.): Yes 45,860

Health and Safety and Activities:

Had the morning H&S meeting with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, hazards with direct push rigs, pressurized lines, pump and traffic safety, potential exposure to explosives contamination, fire hazards, cold stress, hearing protection, slip-trip-falls, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety. Utility locates were performed (Nebraska811) and utilities were marked.

-Re-capped overall health and safety concerns, stressed road and direct push safety.
-Completed Daily Tailgate Meeting Sheet
-Completed Daily Task Hazard Assessment Sheet

Observations/Problems Encountered/Corrective Action Taken:

We were down to one water truck after lunch due to Panowicz employee having to leave for a Dr, appointment. We were then delayrd due to the second water truck having pump issues. The water truck pump has been fixed.

Office Work Performed:

-Organized paperwork and equipment, scanned Injection Field Sheets.
-Completed DQCR.

By Ryan Herold **Title** Field Manager

DAILY QUALITY CONTROL REPORT

Date **11/02/19**

Day	S	S	M	T	W	T	F
	X						

On Site Hours	0700-1730
Travel Time	0.5
Office Time	0.5

COE Project Manager Doug Simpleman
Project CHAAP RAO 2019 - OU1 Rebound Study/Injections
Project No. 60565355
Contract No. W9128F-18-D-0004

Weather	Bright Sun	Clear X	Overcast	Rain	Snow
Temp	To 32	32-50 X	50-70	70-85	85 up
Wind	Still	Moderate X	High	**Report No.**	
Humidity	Dry X	Moderate	Humid	16	

Subcontractors on Site:

Plains Environmental Services (PES) (Direct Push Subcontractor) - Jason Auernheimer, Jesse Kalvig, Eric Robinson
Panowicz Farms (Water Truck Subcontractor) - Arthur Thompson, Manuel Herrera

Equipment on Site:

For Direct Push (DP) Injection: Three direct push rigs with injection tools, two water trucks with transfer pump, five support trucks, injection equipment including two injection pumps, gear pump with generator, two-6,000 gallon tank trailers, two metered-injection manifolds, various plastic storage/transfer tanks, various lengths of one-, two-, and three-inch hose, and level D PPE, first-aid/safety supplies, and field/safety paperwork

Visitors on Site:

None.

AECOM/Brice Personnel on Site:

AECOM - Ryan Herold, Taylor Young, Bob Exceen, Mike McKeon
Brice - Paul Caron, Mikayla Daigle

Field Work Performed (including sampling):

EW7-T14 points 25-30 completed
EW7-T14 points 7-12 completed
EW7-T14 points 13-18 completed
EW7-T14 points 31-36 completed
EW7-T14 points 19-24 started

Summary:

Total gallons of WB66-10 injected today = **22,100**
Total gallons of WB66-10 injected this week (Sat. - F.) = **22,100**
Total gallons of WB66-10 injected to date = **55,000**

Amendment delivery (Wesway lbs.): NO

Health and Safety and Activities:

Had the morning H&S meeting with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, hazards with direct push rigs, pressurized lines, pump and traffic safety, potential exposure to explosives contamination, fire hazards, cold stress, hearing protection, slip-trip-falls, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety. Utility locates were performed (Nebraska811) and utilities were marked.

-Re-capped overall health and safety concerns, stressed road and direct push safety.
-Completed Daily Tailgate Meeting Sheet
-Completed Daily Task Hazard Assessment Sheet

Observations/Problems Encountered/Corrective Action Taken:

We were down one water truck the first half of the morning because of transfer pump issues. The water truck pump was fixed and put back into service.

Office Work Performed:

-Organized paperwork and equipment, scanned Injection Field Sheets.
-Completed DQCR.

By Ryan Herold **Title** Field Manager

DAILY QUALITY CONTROL REPORT

Date **11/03/19**

Day	S	S	M	T	W	T	F
		X					

On Site Hours	0700-1630
Travel Time	0.5
Office Time	0.5

COE Project Manager Doug Simpleman
Project CHAAP RAO 2019 - OU1
Rebound Study/Injections
Project No. 60565355
Contract No. W9128F-18-D-0004

Weather	Bright Sun	Clear X	Overcast	Rain	Snow
Temp	To 32	32-50	50-70 X	70-85	85 up
Wind	Still	Moderate X	High	**Report No.**	
Humidity	Dry X	Moderate	Humid	17	

Subcontractors on Site:

Plains Environmental Services (PES) (Direct Push Subcontractor) - Jason Auernheimer, Jesse Kalvig, Eric Robinson
Panowicz Farms (Water Truck Subcontractor) - Arthur Thompson, Manuel Herrera

Equipment on Site:

For Direct Push (DP) Injection: Three direct push rigs with injection tools, two water trucks with transfer pump, five support trucks, injection equipment including two injection pumps, gear pump with generator, two-6,000 gallon tank trailers, two metered-injection manifolds, various plastic storage/transfer tanks, various lengths of one-, two-, and three-inch hose, and level D PPE, first-aid/safety supplies, and field/safety paperwork

Visitors on Site:

None.

AECOM/Brice Personnel on Site:

AECOM - Ryan Herold, Taylor Young, Bob Exceen, Mike McKeon
Brice - Paul Caron, Mikayla Daigle

Field Work Performed (including sampling):

EW7-T13 points 1-6 completed
EW7-T14 points 19-24 completed
EW7-T14 points 37-42 completed
EW7-T13 points 37-42 completed

EW7-T12 points 1-6 started
EW7-T12 points 43-48 started

Summary:

Total gallons of WB66-10 injected today = **26,600**

Total gallons of WB66-10 injected this week (Sat. - F.) = **48,700**
Total gallons of WB66-10 injected to date = **81,600**

Amendment delivery (Wesway lbs.): NO

Health and Safety and Activities:

Had the morning H&S meeting with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, hazards with direct push rigs, pressurized lines, pump and traffic safety, potential exposure to explosives contamination, fire hazards, cold stress, hearing protection, slip-trip-falls, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety. Utility locates were performed (Nebraska811) and utilities were marked.

-Re-capped overall health and safety concerns, stressed road and direct push safety.
-Completed Daily Tailgate Meeting Sheet
-Completed Daily Task Hazard Assessment Sheet

Observations/Problems Encountered/Corrective Action Taken:

None.

Office Work Performed:

-Organized paperwork and equipment, scanned Injection Field Sheets.
-Completed DQCR.

By Ryan Herold **Title** Field Manager

DAILY QUALITY CONTROL REPORT

Date **11/04/19**

Day	S	S	M	T	W	T	F
			X				

On Site Hours	0630-1730
Travel Time	0.5
Office Time	0.5

COE Project Manager Doug Simpleman
Project CHAAP RAO 2019 - OU1
Rebound Study/Injections
Project No. 60565355
Contract No. W9128F-18-D-0004

Weather	Bright Sun	Clear	Overcast	Rain	Snow
			X		
Temp	To 32	32-50	50-70	70-85	85 up
		X			
Wind	Still	Moderate	High	**Report No.**	
		X			
Humidity	Dry	Moderate	Humid	18	
	X				

Subcontractors on Site:

Plains Environmental Services (PES) (Direct Push Subcontractor) - Jason Auernheimer, Jesse Kalvig, Eric Robinson
Panowicz Farms (Water Truck Subcontractor) - Arthur Thompson, Manuel Herrera

Equipment on Site:

For Direct Push (DP) Injection: Three direct push rigs with injection tools, two water trucks with transfer pump, five support trucks, injection equipment including two injection pumps, gear pump with generator, two-6,000 gallon tank trailers, two metered-injection manifolds, various plastic storage/transfer tanks, various lengths of one-, two-, and three-inch hose, and level D PPE, first-aid/safety supplies, and field/safety paperwork

Visitors on Site:

None.

AECOM/Brice Personnel on Site:

AECOM - Ryan Herold, Taylor Young, Bob Exceen, Mike McKeon
Brice - Paul Caron, Mikayla Daigle

Field Work Performed (including sampling):

EW7-T12 points 43-48 completed
EW7-T12 points 37-42 completed
EW7-T13 points 31-36 completed
EW7-T12 points 13-18 completed
EW7-T12 points 36-31 started
EW7-T12 points 7-12 completed
EW7-T12 points 1-6 completed

Summary:

Total gallons of WB66-10 injected today = **33,000**
Total gallons of WB66-10 injected this week (Sat. - F.) = **81,700**
Total gallons of WB66-10 injected to date = **114,600**

Amendment delivery (Wesway lbs.): Yes 45,960

Health and Safety and Activities:

Had the morning H&S meeting with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, hazards with direct push rigs, pressurized lines, pump and traffic safety, potential exposure to explosives contamination, fire hazards, cold stress, hearing protection, slip-trip-falls, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety. Utility locates were performed (Nebraska811) and utilities were marked.

-Re-capped overall health and safety concerns, stressed road and direct push safety.
-Completed Daily Tailgate Meeting Sheet
-Completed Daily Task Hazard Assessment Sheet

Observations/Problems Encountered/Corrective Action Taken:

None.

Office Work Performed:

-Organized paperwork and equipment, scanned Injection Field Sheets.
-Completed DQCR.

By Ryan Herold **Title** Field Manager

DAILY QUALITY CONTROL REPORT

Date **11/05/19**

Day	S	S	M	T	W	T	F
				X			

On Site Hours	0630-1730
Travel Time	0.5
Office Time	0.5

COE Project Manager Doug Simpleman
Project CHAAP RAO 2019 - OU1
Rebound Study/Injections
Project No. 60565355
Contract No. W9128F-18-D-0004

Weather	Bright Sun	Clear	Overcast	Rain	Snow
			X		
Temp	To 32	32-50	50-70	70-85	85 up
			X		
Wind	Still	Moderate	High	**Report No.**	
		X			
Humidity	Dry	Moderate	Humid	19	
	X				

Subcontractors on Site:

Plains Environmental Services (PES) (Direct Push Subcontractor) - Jason Auernheimer, Jesse Kalvig, Eric Robinson
Panowicz Farms (Water Truck Subcontractor) - Arthur Thompson, Manuel Herrera

Equipment on Site:

For Direct Push (DP) Injection: Three direct push rigs with injection tools, two water trucks with transfer pump, five support trucks, injection equipment including two injection pumps, gear pump with generator, two-6,000 gallon tank trailers, two metered-injection manifolds, various plastic storage/transfer tanks, various lengths of one-, two-, and three-inch hose, and level D PPE, first-aid/safety supplies, and field/safety paperwork

Visitors on Site:

None.

AECOM/Brice Personnel on Site:

AECOM - Ryan Herold, Taylor Young, Bob Exceen, Mike McKeon
Brice - Paul Caron, Mikayla Daigle

Field Work Performed (including sampling):

EW7-T12 points 31-36 completed
EW7-T13 points 25-30 completed
EW7-T13 points 19-24 completed
EW7-T12 points 25-30 completed
EW7-T12 points 19-24 completed
EW7-T13 points 13-18 completed
EW7-T13 points 7-12 completed

Summary:

Total gallons of WB66-10 injected today = **41,400**
Total gallons of WB66-10 injected this week (Sat. - F.) = **123,100**
Total gallons of WB66-10 injected to date = **156,000**

Amendment delivery (Wesway lbs.): Yes 45,880

Health and Safety and Activities:

Had the morning H&S meeting with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, hazards with direct push rigs, pressurized lines, pump and traffic safety, potential exposure to explosives contamination, fire hazards, cold stress, hearing protection, slip-trip-falls, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety. Utility locates were performed (Nebraska811) and utilities were marked.

-Re-capped overall health and safety concerns, stressed road and direct push safety.
-Completed Daily Tailgate Meeting Sheet
-Completed Daily Task Hazard Assessment Sheet

Observations/Problems Encountered/Corrective Action Taken:

None.

Office Work Performed:

-Organized paperwork and equipment, scanned Injection Field Sheets.
-Completed DQCR.

By Ryan Herold **Title** Field Manager

DAILY QUALITY CONTROL REPORT

Date **11/06/19**

Day	S	S	M	T	W	T	F
					X		

On Site Hours	0630-1630
Travel Time	0.5
Office Time	0.5

COE Project Manager Doug Simpleman
Project CHAAP RAO 2019 - OU1
Rebound Study/Injections
Project No. 60565355
Contract No. W9128F-18-D-0004

Weather	Bright Sun	Clear	Overcast	Rain	Snow
			X		
Temp	To 32	32-50	50-70	70-85	85 up
			X		
Wind	Still	Moderate	High	**Report No.**	
		X			
Humidity	Dry	Moderate	Humid	20	
	X				

Subcontractors on Site:

Plains Environmental Services (PES) (Direct Push Subcontractor) - Jason Auernheimer, Jesse Kalvig, Eric Robinson
Panowicz Farms (Water Truck Subcontractor) - Arthur Thompson, Manuel Herrera

Equipment on Site:

For Direct Push (DP) Injection: Three direct push rigs with injection tools, two water trucks with transfer pump, five support trucks, injection equipment including two injection pumps, gear pump with generator, two-6,000 gallon tank trailers, two metered-injection manifolds, various plastic storage/transfer tanks, various lengths of one-, two-, and three-inch hose, and level D PPE, first-aid/safety supplies, and field/safety paperwork

Visitors on Site:

None.

AECOM/Brice Personnel on Site:

AECOM - Ryan Herold, Taylor Young, Bob Exceen, Mike McKeon
Brice - Paul Caron, Mikayla Daigle

Field Work Performed (including sampling):

EW7-T11 points 1-6 completed
EW7-T10 points 1-6 completed
EW7-T10 points 7-12 completed
EW7-T11 points 43-48 completed
EW7-T10 points 43-48 completed

Summary:

Total gallons of WB66-10 injected today = **30,490**
Total gallons of WB66-10 injected this week (Sat. - F.) = **153,590**
Total gallons of WB66-10 injected to date = **186,490**

Amendment delivery (Wesway lbs.): Yes 46,320

Health and Safety and Activities:

Had the morning H&S meeting with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, hazards with direct push rigs, pressurized lines, pump and traffic safety, potential exposure to explosives contamination, fire hazards, cold stress, hearing protection, slip-trip-falls, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety. Utility locates were performed (Nebraska811) and utilities were marked.

-Re-capped overall health and safety concerns, stressed road and direct push safety.
-Completed Daily Tailgate Meeting Sheet
-Completed Daily Task Hazard Assessment Sheet

Observations/Problems Encountered/Corrective Action Taken:

None.

Office Work Performed:

-Organized paperwork and equipment, scanned Injection Field Sheets.

-Completed DQCR.

By Ryan Herold **Title** Field Manager

DAILY QUALITY CONTROL REPORT

Date **11/11/19**

Day	S	S	M	T	W	T	F
			X				

On Site Hours	0630-1730
Travel Time	0.5
Office Time	0.5

COE Project Manager Doug Simpleman
Project CHAAP RAO 2019 - OU1
Rebound Study/Injections
Project No. 60565355
Contract No. W9128F-18-D-0004

Weather	Bright Sun	Clear	Overcast	Rain	Snow
		X	X		
Temp	To 32	32-50	50-70	70-85	85 up
	X				
Wind	Still	Moderate	High	**Report No.**	
			X		
Humidity	Dry	Moderate	Humid	21	
	X				

Subcontractors on Site:

Plains Environmental Services (PES) (Direct Push Subcontractor) - Jason Auernheimer, Jesse Kalvig, Eric Robinson
Panowicz Farms (Water Truck Subcontractor) - Arthur Thompson, Manuel Herrera

Equipment on Site:

For Direct Push (DP) Injection: Three direct push rigs with injection tools, two water trucks with transfer pump, five support trucks, injection equipment including two injection pumps, gear pump with generator, two-6,000 gallon tank trailers, two metered-injection manifolds, various plastic storage/transfer tanks, various lengths of one-, two-, and three-inch hose, and level D PPE, first-aid/safety supplies, and field/safety paperwork

Visitors on Site:

None.

AECOM/Brice Personnel on Site:

AECOM - Ryan Herold, Taylor Young, Bob Exceen, Mike McKeon
Brice - Paul Caron, Rebecca Reyes

Field Work Performed (including sampling):

EW7-T11 points 7-12 started
EW7-T11 points 37-42 started

Summary:

Total gallons of WB66-10 injected today =	**7,800**
Total gallons of WB66-10 injected this week (Sat. - F.) =	**7,800**
Total gallons of WB66-10 injected to date =	**194,290**

Amendment delivery (Wesway lbs.): Yes 45,920

Health and Safety and Activities:

Had the morning H&S meeting with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, hazards with direct push rigs, pressurized lines, pump and traffic safety, potential exposure to explosives contamination, fire hazards, cold stress, hearing protection, slip-trip-falls, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety. Utility locates were performed (Nebraska811) and utilities were marked.

-Re-capped overall health and safety concerns, stressed road and direct push safety.
-Completed Daily Tailgate Meeting Sheet
-Completed Daily Task Hazard Assessment Sheet

Observations/Problems Encountered/Corrective Action Taken:

Delayed due to moving field tanks to new location. Once moved, residual amendment froze in lines and couldn't fill field tanks. After thawing, resuming filling and injections.

Office Work Performed:

-Organized paperwork and equipment, scanned Injection Field Sheets.
-Completed DQCR.

By Ryan Herold **Title** Field Manager

DAILY QUALITY CONTROL REPORT

Date **11/12/19**

Day	S	S	M	T	W	T	F
				X			

On Site Hours	1000-1730
Travel Time	0.5
Office Time	0.5

COE Project Manager Doug Simpleman
Project CHAAP RAO 2019 - OU1
Rebound Study/Injections
Project No. 60565355
Contract No. W9128F-18-D-0004

Weather	Bright Sun	Clear	Overcast	Rain	Snow
		X			
Temp	To 32	32-50	50-70	70-85	85 up
	X				
Wind	Still	Moderate	High	**Report No.**	
			X		
Humidity	Dry	Moderate	Humid	22	
	X				

Subcontractors on Site:

Plains Environmental Services (PES) (Direct Push Subcontractor) - Jason Auernheimer, Jesse Kalvig, Eric Robinson
Panowicz Farms (Water Truck Subcontractor) - Arthur Thompson, Manuel Herrera

Equipment on Site:

For Direct Push (DP) Injection: Three direct push rigs with injection tools, two water trucks with transfer pump, five support trucks, injection equipment including two injection pumps, gear pump with generator, two-6,000 gallon tank trailers, two metered-injection manifolds, various plastic storage/transfer tanks, various lengths of one-, two-, and three-inch hose, and level D PPE, first-aid/safety supplies, and field/safety paperwork

Visitors on Site:

None.

AECOM/Brice Personnel on Site:

AECOM - Ryan Herold, Taylor Young, Bob Exceen, Mike McKeon
Brice - Paul Caron, Rebecca Reyes

Field Work Performed (including sampling):

EW7-T11 points 7-12 completed
EW7-T11 points 37-42 completed
EW7-T11 points 13-18 started
EW7-T10 points 37-42 completed

Summary:

Total gallons of WB66-10 injected today =	**13,200**
Total gallons of WB66-10 injected this week (Sat. - F.) =	**21,000**
Total gallons of WB66-10 injected to date =	**207,490**

Amendment delivery (Wesway lbs.): NO

Health and Safety and Activities:

Had the morning H&S meeting with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, hazards with direct push rigs, pressurized lines, pump and traffic safety, potential exposure to explosives contamination, fire hazards, cold stress, hearing protection, slip-trip-falls, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety. Utility locates were performed (Nebraska811) and utilities were marked.

-Re-capped overall health and safety concerns, stressed road and direct push safety.
-Completed Daily Tailgate Meeting Sheet
-Completed Daily Task Hazard Assessment Sheet

Observations/Problems Encountered/Corrective Action Taken:

A late start was issued this morning because of extreme cold temperatures. We were able to resume pumping at 1300 hr. after everything had thawed out.

Office Work Performed:

-Organized paperwork and equipment, scanned Injection Field Sheets.
-Completed DQCR.

By Ryan Herold **Title** Field Manager

DAILY QUALITY CONTROL REPORT

Date **11/13/19**

Day	S	S	M	T	W	T	F
					X		

On Site Hours	0630-1730
Travel Time	0.5
Office Time	0.5

COE Project Manager Doug Simpleman
Project CHAAP RAO 2019 - OU1
Rebound Study/Injections
Project No. 60565355
Contract No. W9128F-18-D-0004

Weather	Bright Sun	Clear	Overcast	Rain	Snow
			X		
Temp	To 32	32-50	50-70	70-85	85 up
		X			
Wind	Still	Moderate	High	**Report No.**	
		X			
Humidity	Dry	Moderate	Humid	23	
	X				

Subcontractors on Site:

Plains Environmental Services (PES) (Direct Push Subcontractor) - Jason Auernheimer, Jesse Kalvig, Eric Robinson
Panowicz Farms (Water Truck Subcontractor) - Arthur Thompson, Manuel Herrera

Equipment on Site:

For Direct Push (DP) Injection: Three direct push rigs with injection tools, two water trucks with transfer pump, five support trucks, injection equipment including two injection pumps, gear pump with generator, two-6,000 gallon tank trailers, two metered-injection manifolds, various plastic storage/transfer tanks, various lengths of one-, two-, and three-inch hose, and level D PPE, first-aid/safety supplies, and field/safety paperwork

Visitors on Site:

None.

AECOM/Brice Personnel on Site:

AECOM - Ryan Herold, Taylor Young, Bob Exceen, Mike McKeon
Brice - Paul Caron, Rebecca Reyes

Field Work Performed (including sampling):

EW7-T10 points 31-36 completed
EW7-T11 points 31-36 completed
EW7-T9 points 43-48 started
EW7-T11 points 13-18 completed
EW7-T10 points 13-18 completed
EW7-T10 points 19-24 completed

Summary:

Total gallons of WB66-10 injected today =	**31,800**
Total gallons of WB66-10 injected this week (Sat. - F.) =	**52,800**
Total gallons of WB66-10 injected to date =	**239,290**

Amendment delivery (Wesway lbs.): Yes 46,000

Health and Safety and Activities:

Had the morning H&S meeting with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, hazards with direct push rigs, pressurized lines, pump and traffic safety, potential exposure to explosives contamination, fire hazards, cold stress, hearing protection, slip-trip-falls, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety. Utility locates were performed (Nebraska811) and utilities were marked.

-Re-capped overall health and safety concerns, stressed road and direct push safety.
-Completed Daily Tailgate Meeting Sheet
-Completed Daily Task Hazard Assessment Sheet

Observations/Problems Encountered/Corrective Action Taken:

None.

Office Work Performed:

-Organized paperwork and equipment, scanned Injection Field Sheets.
-Completed DQCR.

By Ryan Herold **Title** Field Manager

DAILY QUALITY CONTROL REPORT

Date **11/14/19**

Day	S	S	M	T	W	T	F
						X	

On Site Hours	0630-1700
Travel Time	0.5
Office Time	0.5

COE Project Manager Doug Simpleman
Project CHAAP RAO 2019 - OU1 Rebound Study/Injections
Project No. 60565355
Contract No. W9128F-18-D-0004

Weather	Bright Sun	Clear X	Overcast	Rain	Snow
Temp	To 32	32-50 X	50-70	70-85	85 up
Wind	Still	Moderate X	High	**Report No.**	
Humidity	Dry X	Moderate	Humid	24	

Subcontractors on Site:

Plains Environmental Services (PES) (Direct Push Subcontractor) - Jason Auernheimer, Jesse Kalvig, Eric Robinson
Panowicz Farms (Water Truck Subcontractor) - Arthur Thompson, Manuel Herrera

Equipment on Site:

For Direct Push (DP) Injection: Three direct push rigs with injection tools, two water trucks with transfer pump, five support trucks, injection equipment including two injection pumps, gear pump with generator, two-6,000 gallon tank trailers, two metered-injection manifolds, various plastic storage/transfer tanks, various lengths of one-, two-, and three-inch hose, and level D PPE, first-aid/safety supplies, and field/safety paperwork

Visitors on Site:

Jeff Gill (USACE)

AECOM/Brice Personnel on Site:

AECOM - Ryan Herold, Taylor Young, Bob Exceen, Mike McKeon, Dean Converse
Brice - Paul Caron, Rebecca Reyes

Field Work Performed (including sampling):

EW7-T11 points 19-24 completed
EW7-T11 points 25-30 completed
EW7-T10 points 25-30 completed
EW7-T8 points 43-48 completed
EW7-T8 points 37-42 completed
EW7-T9 points 43-48 completed
EW7-T9 points 37-42 started

Summary:

Total gallons of WB66-10 injected today =	**31,800**
Total gallons of WB66-10 injected this week (Sat. - F.) =	**84,600**
Total gallons of WB66-10 injected to date =	**271,090**

Amendment delivery (Wesway lbs.): NO

Health and Safety and Activities:

Had the morning H&S meeting with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, hazards with direct push rigs, pressurized lines, pump and traffic safety, potential exposure to explosives contamination, fire hazards, cold stress, hearing protection, slip-trip-falls, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety. Utility locates were performed (Nebraska811) and utilities were marked.

-Re-capped overall health and safety concerns, stressed road and direct push safety.
-Completed Daily Tailgate Meeting Sheet
-Completed Daily Task Hazard Assessment Sheet

Observations/Problems Encountered/Corrective Action Taken:

None.

Office Work Performed:

-Organized paperwork and equipment, scanned Injection Field Sheets.
-Completed DQCR.

By Ryan Herold **Title** Field Manager

DAILY QUALITY CONTROL REPORT

Date	**11/15/19**

Day	S	S	M	T	W	T	F
							X

On Site Hours	0700-1730
Travel Time	0.5
Office Time	0.5

COE Project Manager	Doug Simpleman
Project	CHAAP RAO 2019 - OU1
	Rebound Study/Injections
Project No.	60565355
Contract No.	W9128F-18-D-0004

Weather	Bright Sun	Clear X	Overcast	Rain	Snow
Temp	To 32	32-50	50-70 X	70-85	85 up
Wind	Still	Moderate X	High	**Report No.**	
Humidity	Dry X	Moderate	Humid	25	

Subcontractors on Site:

Plains Environmental Services (PES) (Direct Push Subcontractor) - Jason Auernheimer, Jesse Kalvig, Eric Robinson
Panowicz Farms (Water Truck Subcontractor) - Arthur Thompson, Manuel Herrera

Equipment on Site:

For Direct Push (DP) Injection: Three direct push rigs with injection tools, two water trucks with transfer pump, five support trucks, injection equipment including two injection pumps, gear pump with generator, two-6,000 gallon tank trailers, two metered-injection manifolds, various plastic storage/transfer tanks, various lengths of one-, two-, and three-inch hose, and level D PPE, first-aid/safety supplies, and field/safety paperwork

Visitors on Site:

None.

AECOM/Brice Personnel on Site:

AECOM - Ryan Herold, Taylor Young, Bob Exceen, Mike McKeon, Dean Converse
Brice - Paul Caron, Rebecca Reyes

Field Work Performed (including sampling):

EW7-T9 points 37-42 completed
EW7-T9 points 31-36 completed
EW7-T9 points 1-6 completed
EW7-T8 points 1-6 completed
EW7-T8 points 7-12 completed
EW7-T8 points 31-36 completed

Summary:

Total gallons of WB66-10 injected today =	**35,400**
Total gallons of WB66-10 injected this week (Sat. - F.) =	**120,000**
Total gallons of WB66-10 injected to date =	**306,490**

Amendment delivery (Wesway lbs.): Yes (2) 45,940 and 46,380

Health and Safety and Activities:

Had the morning H&S meeting with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, hazards with direct push rigs, pressurized lines, pump and traffic safety, potential exposure to explosives contamination, fire hazards, cold stress, hearing protection, slip-trip-falls, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety. Utility locates were performed (Nebraska811) and utilities were marked.

-Re-capped overall health and safety concerns, stressed road and direct push safety.
-Completed Daily Tailgate Meeting Sheet
-Completed Daily Task Hazard Assessment Sheet

Observations/Problems Encountered/Corrective Action Taken:

None.

Office Work Performed:

-Organized paperwork and equipment, scanned Injection Field Sheets.
-Completed DQCR.

By Ryan Herold **Title** Field Manager

DAILY QUALITY CONTROL REPORT

Date **11/16/19**

Day	S	S	M	T	W	T	F
	X						

On Site Hours	0700-1700
Travel Time	0.5
Office Time	0.5

COE Project Manager Doug Simpleman
Project CHAAP RAO 2019 - OU1
Rebound Study/Injections
Project No. 60565355
Contract No. W9128F-18-D-0004

Weather	Bright Sun	Clear X	Overcast	Rain	Snow
Temp	To 32	32-50	50-70 X	70-85	85 up
Wind	Still	Moderate X	High	**Report No.**	
Humidity	Dry X	Moderate	Humid	26	

Subcontractors on Site:

Plains Environmental Services (PES) (Direct Push Subcontractor) - Jason Auernheimer, Jesse Kalvig, Eric Robinson
Panowicz Farms (Water Truck Subcontractor) - Arthur Thompson, Manuel Herrera

Equipment on Site:

For Direct Push (DP) Injection: Three direct push rigs with injection tools, two water trucks with transfer pump, five support trucks, injection equipment including two injection pumps, gear pump with generator, two-6,000 gallon tank trailers, two metered-injection manifolds, various plastic storage/transfer tanks, various lengths of one-, two-, and three-inch hose, and level D PPE, first-aid/safety supplies, and field/safety paperwork

Visitors on Site:

None.

AECOM/Brice Personnel on Site:

AECOM - Ryan Herold, Taylor Young, Bob Exceen, Mike McKeon
Brice - Paul Caron, Rebecca Reyes

Field Work Performed (including sampling):

EW7-T7 points 37-42 completed
EW7-T8 points 25-30 completed
EW7-T9 points 25-30 completed
EW7-T9 points 13-18 completed
EW7-T8 points 13-18 completed
EW7-T9 points 7-12 completed

Summary:

Total gallons of WB66-10 injected today = **36,000**
Total gallons of WB66-10 injected this week (Sat. - F.) = **36,000**
Total gallons of WB66-10 injected to date = **342,490**

Amendment delivery (Wesway lbs.): NO

Health and Safety and Activities:

Had the morning H&S meeting with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, hazards with direct push rigs, pressurized lines, pump and traffic safety, potential exposure to explosives contamination, fire hazards, cold stress, hearing protection, slip-trip-falls, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety. Utility locates were performed (Nebraska811) and utilities were marked.

-Re-capped overall health and safety concerns, stressed road and direct push safety.
-Completed Daily Tailgate Meeting Sheet
-Completed Daily Task Hazard Assessment Sheet

Observations/Problems Encountered/Corrective Action Taken:

None.

Office Work Performed:

-Organized paperwork and equipment, scanned Injection Field Sheets.
-Completed DQCR.

By Ryan Herold **Title** Field Manager

DAILY QUALITY CONTROL REPORT

Date: **11/17/19**

Day	S	S	M	T	W	T	F
		X					

On Site Hours	0800-1430
Travel Time	0.5
Office Time	0.5

COE Project Manager Doug Simpleman
Project CHAAP RAO 2019 - OU1
Rebound Study/Injections
Project No. 60565355
Contract No. W9128F-18-D-0004

Weather	Bright Sun	Clear X	Overcast	Rain	Snow
Temp	To 32	32-50	50-70 X	70-85	85 up
Wind	Still	Moderate X	High	**Report No.**	
Humidity	Dry X	Moderate	Humid	27	

Subcontractors on Site:

Plains Environmental Services (PES) (Direct Push Subcontractor) - Jason Auernheimer, Jesse Kalvig, Eric Robinson
Panowicz Farms (Water Truck Subcontractor) - Arthur Thompson, Manuel Herrera

Equipment on Site:

For Direct Push (DP) Injection: Three direct push rigs with injection tools, two water trucks with transfer pump, five support trucks, injection equipment including two injection pumps, gear pump with generator, two-6,000 gallon tank trailers, two metered-injection manifolds, various plastic storage/transfer tanks, various lengths of one-, two-, and three-inch hose, and level D PPE, first-aid/safety supplies, and field/safety paperwork

Visitors on Site:

None.

AECOM/Brice Personnel on Site:

AECOM - Ryan Herold, Taylor Young, Bob Exceen, Mike McKeon
Brice - Paul Caron, Rebecca Reyes

Field Work Performed (including sampling):

EW7-T6 points 31-36 completed
EW7-T6 points 37-42 completed
EW7-T9 points 19-24 completed
EW7-T8 points 19-24 completed

Summary:

Total gallons of WB66-10 injected today =	**24,000**
Total gallons of WB66-10 injected this week (Sat. - F.) =	**60,000**
Total gallons of WB66-10 injected to date =	**366,490**

Amendment delivery (Wesway lbs.): NO

Health and Safety and Activities:

Had the morning H&S meeting with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, hazards with direct push rigs, pressurized lines, pump and traffic safety, potential exposure to explosives contamination, fire hazards, cold stress, hearing protection, slip-trip-falls, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety. Utility locates were performed (Nebraska811) and utilities were marked.

-Re-capped overall health and safety concerns, stressed road and direct push safety.
-Completed Daily Tailgate Meeting Sheet
-Completed Daily Task Hazard Assessment Sheet

Observations/Problems Encountered/Corrective Action Taken:

None.

Office Work Performed:

-Organized paperwork and equipment, scanned Injection Field Sheets.
-Completed DQCR.

By Ryan Herold **Title** Field Manager

DAILY QUALITY CONTROL REPORT

Date **11/18/19**

Day	S	S	M	T	W	T	F
			X				

On Site Hours	0700-1700
Travel Time	0.5
Office Time	0.5

COE Project Manager Doug Simpleman
Project CHAAP RAO 2019 - OU1
Rebound Study/Injections
Project No. 60565355
Contract No. W9128F-18-D-0004

Weather	Bright Sun		Clear X	Overcast	Rain / Snow
Temp	To 32		32-50	50-70 X	70-85 / 85 up
Wind	Still	Moderate		High X	**Report No.**
Humidity	Dry X	Moderate		Humid	28

Subcontractors on Site:

Plains Environmental Services (PES) (Direct Push Subcontractor) - Jason Auernheimer, Jesse Kalvig, Eric Robinson
Panowicz Farms (Water Truck Subcontractor) - Arthur Thompson, Manuel Herrera

Equipment on Site:

For Direct Push (DP) Injection: Three direct push rigs with injection tools, two water trucks with transfer pump, five support trucks, injection equipment including two injection pumps, gear pump with generator, two-6,000 gallon tank trailers, two metered-injection manifolds, various plastic storage/transfer tanks, various lengths of one-, two-, and three-inch hose, and level D PPE, first-aid/safety supplies, and field/safety paperwork

Visitors on Site:

None.

AECOM/Brice Personnel on Site:

AECOM - Ryan Herold, Taylor Young, Bob Exceen, Mike McKeon, Alex Deters
Brice - Paul Caron, Rebecca Reyes

Field Work Performed (including sampling):

EW7-T7 points 31-36 completed
EW7-T7 points 25-30 completed
EW7-T6 points 25-30 completed
EW7-T7 points 1-6 completed
EW7-T6 points 1-6 completed
EW7-T6 points 7-12 completed

Summary:

Total gallons of WB66-10 injected today = **36,120**
Total gallons of WB66-10 injected this week (Sat. - F.) = **96,120**
Total gallons of WB66-10 injected to date = **402,610**

Amendment delivery (Wesway lbs.): NO

Health and Safety and Activities:

Had the morning H&S meeting with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, hazards with direct push rigs, pressurized lines, pump and traffic safety, potential exposure to explosives contamination, fire hazards, cold stress, hearing protection, slip-trip-falls, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety. Utility locates were performed (Nebraska811) and utilities were marked.

-Re-capped overall health and safety concerns, stressed road and direct push safety.
-Completed Daily Tailgate Meeting Sheet
-Completed Daily Task Hazard Assessment Sheet

Observations/Problems Encountered/Corrective Action Taken:

None.

Office Work Performed:

-Organized paperwork and equipment, scanned Injection Field Sheets.
-Completed DQCR.

By Ryan Herold **Title** Field Manager

DAILY QUALITY CONTROL REPORT

Date **11/19/19**

Day	S	S	M	T	W	T	F
				X			

On Site Hours	0800-1730
Travel Time	0.5
Office Time	0.5

COE Project Manager Doug Simpleman
Project CHAAP RAO 2019 - OU1
Rebound Study/Injections
Project No. 60565355
Contract No. W9128F-18-D-0004

Weather	Bright Sun	Clear X	Overcast	Rain	Snow
Temp	To 32	32-50	50-70 X	70-85	85 up
Wind	Still	Moderate X	High	**Report No.**	
Humidity	Dry X	Moderate	Humid	29	

Subcontractors on Site:

Plains Environmental Services (PES) (Direct Push Subcontractor) - Jason Auernheimer, Jesse Kalvig, Eric Robinson
Panowicz Farms (Water Truck Subcontractor) - Arthur Thompson, Manuel Herrera

Equipment on Site:

For Direct Push (DP) Injection: Three direct push rigs with injection tools, two water trucks with transfer pump, five support trucks, injection equipment including two injection pumps, gear pump with generator, two-6,000 gallon tank trailers, two metered-injection manifolds, various plastic storage/transfer tanks, various lengths of one-, two-, and three-inch hose, and level D PPE, first-aid/safety supplies, and field/safety paperwork

Visitors on Site:

None.

AECOM/Brice Personnel on Site:

AECOM - Ryan Herold, Taylor Young, Bob Exceen, Mike McKeon, Alex Deters
Brice - Paul Caron, Rebecca Reyes

Field Work Performed (including sampling):

EW7-T6 points 19-24 completed
EW7-T7 points 7-12 started

Summary:

Total gallons of WB66-10 injected today =	**10,800**
Total gallons of WB66-10 injected this week (Sat. - F.) =	**106,920**
Total gallons of WB66-10 injected to date =	**413,410**

Amendment delivery (Wesway lbs.): Yes 46,340

Health and Safety and Activities:

Had the morning H&S meeting with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, hazards with direct push rigs, pressurized lines, pump and traffic safety, potential exposure to explosives contamination, fire hazards, cold stress, hearing protection, slip-trip-falls, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety. Utility locates were performed (Nebraska811) and utilities were marked.

-Re-capped overall health and safety concerns, stressed road and direct push safety.
-Completed Daily Tailgate Meeting Sheet
-Completed Daily Task Hazard Assessment Sheet

Observations/Problems Encountered/Corrective Action Taken:

No amendment was delivered on Monday. Had to wait for the delivery to show up before we could resume pumping again.

Office Work Performed:

-Organized paperwork and equipment, scanned Injection Field Sheets.
-Completed DQCR.

By Ryan Herold **Title** Field Manager

DAILY QUALITY CONTROL REPORT

Date	**11/20/19**

Day	S	S	M	T	W	T	F
					X		

On Site Hours	0700-1700
Travel Time	0.5
Office Time	0.5

COE Project Manager	Doug Simpleman
Project	CHAAP RAO 2019 - OU1 Rebound Study/Injections
Project No.	60565355
Contract No.	W9128F-18-D-0004

Weather	Bright Sun	Clear	Overcast	Rain	Snow
			X		
Temp	To 32	32-50	50-70	70-85	85 up
			X		
Wind	Still	Moderate	High	**Report No.**	
		X			
Humidity	Dry	Moderate	Humid	30	
	X				

Subcontractors on Site:

Plains Environmental Services (PES) (Direct Push Subcontractor) - Jason Auernheimer, Jesse Kalvig, Eric Robinson
Panowicz Farms (Water Truck Subcontractor) - Arthur Thompson, Manuel Herrera

Equipment on Site:

For Direct Push (DP) Injection: Three direct push rigs with injection tools, two water trucks with transfer pump, five support trucks, injection equipment including two injection pumps, gear pump with generator, two-6,000 gallon tank trailers, two metered-injection manifolds, various plastic storage/transfer tanks, various lengths of one-, two-, and three-inch hose, and level D PPE, first-aid/safety supplies, and field/safety paperwork

Visitors on Site:

None.

AECOM/Brice Personnel on Site:

AECOM - Ryan Herold, Taylor Young, Bob Exceen, Mike McKeon, Alex Deters
Brice - Paul Caron, Rebecca Reyes

Field Work Performed (including sampling):

EW7-T7 points 7-12 completed
EW7-T7 points 13-18 completed
EW7-T6 points 13-18 completed
EW7-T5 points 1-6 completed
EW7-T7 points 19-24 completed
EW7-T5 points 37-42 completed
EW7-T4 points 37-42 completed
EW7-T4 points 31-36 completed

Summary:

Total gallons of WB66-10 injected today = **43,200**
Total gallons of WB66-10 injected this week (Sat. - F.) = **150,120**
Total gallons of WB66-10 injected to date = **456,610**

Amendment delivery (Wesway lbs.): Yes 46,320

Health and Safety and Activities:

Had the morning H&S meeting with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, hazards with direct push rigs, pressurized lines, pump and traffic safety, potential exposure to explosives contamination, fire hazards, cold stress, hearing protection, slip-trip-falls, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety. Utility locates were performed (Nebraska811) and utilities were marked.

-Re-capped overall health and safety concerns, stressed road and direct push safety.
-Completed Daily Tailgate Meeting Sheet
-Completed Daily Task Hazard Assessment Sheet

Observations/Problems Encountered/Corrective Action Taken:

None.

Office Work Performed:

-Organized paperwork and equipment, scanned Injection Field Sheets.
-Completed DQCR.

By Ryan Herold **Title** Field Manager

DAILY QUALITY CONTROL REPORT

Date **11/21/19**

Day	S	S	M	T	W	T	F
						X	

On Site Hours	0700 - 1730
Travel Time	0.5
Office Time	0.5

COE Project Manager Doug Simpleman
Project CHAAP RAO 2019 - OU1
Rebound Study/Injections
Project No. 60565355
Contract No. W9128F-18-D-0004

Weather	Bright Sun	Clear	Overcast	Rain	Snow
			X		
Temp	To 32	32-50	50-70	70-85	85 up
	X				
Wind	Still	Moderate	High	**Report No.**	
		X			
Humidity	Dry	Moderate	Humid	31	
	X				

Subcontractors on Site:

Plains Environmental Services (PES) (Direct Push Subcontractor) - Jason Auernheimer, Jesse Kalvig, Eric Robinson
Panowicz Farms (Water Truck Subcontractor) - Arthur Thompson, Manuel Herrera

Equipment on Site:

For Direct Push (DP) Injection: Three direct push rigs with injection tools, two water trucks with transfer pump, five support trucks, injection equipment including two injection pumps, gear pump with generator, two-6,000 gallon tank trailers, two metered-injection manifolds, various plastic storage/transfer tanks, various lengths of one-, two-, and three-inch hose, and level D PPE, first-aid/safety supplies, and field/safety paperwork

Visitors on Site:

None.

AECOM/Brice Personnel on Site:

AECOM - Ryan Herold, Taylor Young, Bob Exceen, Alex Deters
Brice - Paul Caron, Rebecca Reyes

Field Work Performed (including sampling):

EW7-T4 points 1-6 completed
EW7-T4 points 7-12 completed
EW7-T5 points 7-12 completed
EW7-T5 points 31-36 completed
EW7-T5 points 25-30 completed
EW7-T4 points 25-30 completed

Summary:

Total gallons of WB66-10 injected today = **36,000**
Total gallons of WB66-10 injected this week (Sat. - F.) = **186,120**
Total gallons of WB66-10 injected to date = **492,610**

Amendment delivery (Wesway lbs.): Yes 46,420

Health and Safety and Activities:

Had the morning H&S meeting with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, hazards with direct push rigs, pressurized lines, pump and traffic safety, potential exposure to explosives contamination, fire hazards, cold stress, hearing protection, slip-trip-falls, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety. Utility locates were performed (Nebraska811) and utilities were marked.

-Re-capped overall health and safety concerns, stressed road and direct push safety.
-Completed Daily Tailgate Meeting Sheet
-Completed Daily Task Hazard Assessment Sheet

Observations/Problems Encountered/Corrective Action Taken:

None.

Office Work Performed:

-Organized paperwork and equipment, scanned Injection Field Sheets.
-Completed DQCR.

By Ryan Herold **Title** Field Manager

DAILY QUALITY CONTROL REPORT

Date	**11/22/19**

Day	S	S	M	T	W	T	F
							X

On Site Hours	0700 - 1730
Travel Time	0.5
Office Time	0.5

COE Project Manager	Doug Simpleman
Project	CHAAP RAO 2019 - OU1 Rebound Study/Injections
Project No.	60565355
Contract No.	W9128F-18-D-0004

Weather	Bright Sun	Clear	Overcast	Rain	Snow	
			X			
Temp	To 32	32-50	50-70	70-85	85 up	
	X					
Wind	Still	Moderate	High	**Report No.**		
		X				
Humidity	Dry	Moderate	Humid	32		
	X					

Subcontractors on Site:

Plains Environmental Services (PES) (Direct Push Subcontractor) - Jason Auernheimer, Jesse Kalvig, Eric Robinson
Panowicz Farms (Water Truck Subcontractor) - Arthur Thompson, Manuel Herrera

Equipment on Site:

For Direct Push (DP) Injection: Three direct push rigs with injection tools, two water trucks with transfer pump, five support trucks, injection equipment including two injection pumps, gear pump with generator, two-6,000 gallon tank trailers, two metered-injection manifolds, various plastic storage/transfer tanks, various lengths of one-, two-, and three-inch hose, and level D PPE, first-aid/safety supplies, and field/safety paperwork

Visitors on Site:

None.

AECOM/Brice Personnel on Site:

AECOM - Ryan Herold, Taylor Young, Bob Exceen, Alex Deters
Brice - Paul Caron, Rebecca Reyes

Field Work Performed (including sampling):

EW7-T3 points 37-42 completed
EW7-T3 points 31-36 completed
EW7-T3 points 25-30 completed
EW7-T4 points 13-18 completed
EW7-T5 points 13-18 completed
EW7-T4 points 19-24 completed
EW7-T5 points 19-24 started

Summary:

Total gallons of WB66-10 injected today = **36,600**

Total gallons of WB66-10 injected this week (Sat. - F.) = **222,720**

Total gallons of WB66-10 injected to date = **529,210**

Amendment delivery (Wesway lbs.): Yes (2) 45,840, and 45,740

Health and Safety and Activities:

Had the morning H&S meeting with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, hazards with direct push rigs, pressurized lines, pump and traffic safety, potential exposure to explosives contamination, fire hazards, cold stress, hearing protection, slip-trip-falls, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety. Utility locates were performed (Nebraska811) and utilities were marked.

-Re-capped overall health and safety concerns, stressed road and direct push safety.
-Completed Daily Tailgate Meeting Sheet
-Completed Daily Task Hazard Assessment Sheet

Observations/Problems Encountered/Corrective Action Taken:

None.

Office Work Performed:

-Organized paperwork and equipment, scanned Injection Field Sheets.
-Completed DQCR.

By Ryan Herold **Title** Field Manager

DAILY QUALITY CONTROL REPORT

Date **11/23/19**

Day	S	S	M	T	W	T	F
	X						

On Site Hours	0700 - 1700
Travel Time	0.5
Office Time	0.5

COE Project Manager Doug Simpleman
Project CHAAP RAO 2019 - OU1
Rebound Study/Injections
Project No. 60565355
Contract No. W9128F-18-D-0004

Weather	Bright Sun	Clear	Overcast	Rain	Snow
Temp	To 32	32-50 X	50-70	70-85	85 up
Wind	Still	Moderate X	High	**Report No.**	
Humidity	Dry X	Moderate	Humid	33	

Subcontractors on Site:

Plains Environmental Services (PES) (Direct Push Subcontractor) - Jason Auernheimer, Jesse Kalvig, Eric Robinson
Panowicz Farms (Water Truck Subcontractor) - Arthur Thompson, Manuel Herrera

Equipment on Site:

For Direct Push (DP) Injection: Three direct push rigs with injection tools, two water trucks with transfer pump, five support trucks, injection equipment including two injection pumps, gear pump with generator, two-6,000 gallon tank trailers, two metered-injection manifolds, various plastic storage/transfer tanks, various lengths of one-, two-, and three-inch hose, and level D PPE, first-aid/safety supplies, and field/safety paperwork

Visitors on Site:

None.

AECOM/Brice Personnel on Site:

AECOM - Ryan Herold, Taylor Young, Bob Exceen, Alex Deters
Brice - Paul Caron, Rebecca Reyes

Field Work Performed (including sampling):

EW7-T5 points 19-24 completed
EW7-T3 points 1-6 completed
EW7-T3 points 7-12 completed
EW7-T3 points 19-24 completed
EW7-T2 points 19-24 completed
EW7-T2 points 13-18 started

Summary:

Total gallons of WB66-10 injected today = **34,200**
Total gallons of WB66-10 injected this week (Sat. - F.) = **34,200**
Total gallons of WB66-10 injected to date = **563,410**

Amendment delivery (Wesway lbs.): NO

Health and Safety and Activities:

Had the morning H&S meeting with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, hazards with direct push rigs, pressurized lines, pump and traffic safety, potential exposure to explosives contamination, fire hazards, cold stress, hearing protection, slip-trip-falls, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety. Utility locates were performed (Nebraska811) and utilities were marked.

-Re-capped overall health and safety concerns, stressed road and direct push safety.
-Completed Daily Tailgate Meeting Sheet
-Completed Daily Task Hazard Assessment Sheet

Observations/Problems Encountered/Corrective Action Taken:

One of the water trucks had a flat tire this morning . We were running with one truck until 11:00. Both trucks were back in service befoore the end of day.

Office Work Performed:

-Organized paperwork and equipment, scanned Injection Field Sheets.
-Completed DQCR.

By Ryan Herold **Title** Field Manager

DAILY QUALITY CONTROL REPORT

Date **11/24/19**

Day	S	S	M	T	W	T	F
		X					

On Site Hours	0700 - 1630
Travel Time	0.5
Office Time	0.5

COE Project Manager Doug Simpleman
Project CHAAP RAO 2019 - OU1
Rebound Study/Injections
Project No. 60565355
Contract No. W9128F-18-D-0004

Weather	Bright Sun	Clear	Overcast	Rain	Snow
		X			
Temp	To 32	32-50	50-70	70-85	85 up
			X		
Wind	Still	Moderate	High	**Report No.**	
		X			
Humidity	Dry	Moderate	Humid	34	
	X				

Subcontractors on Site:

Plains Environmental Services (PES) (Direct Push Subcontractor) - Jason Auernheimer, Jesse Kalvig, Eric Robinson
Panowicz Farms (Water Truck Subcontractor) - Arthur Thompson, Manuel Herrera

Equipment on Site:

For Direct Push (DP) Injection: Three direct push rigs with injection tools, two water trucks with transfer pump, five support trucks, injection equipment including two injection pumps, gear pump with generator, two-6,000 gallon tank trailers, two metered-injection manifolds, various plastic storage/transfer tanks, various lengths of one-, two-, and three-inch hose, and level D PPE, first-aid/safety supplies, and field/safety paperwork

Visitors on Site:

None.

AECOM/Brice Personnel on Site:

AECOM - Ryan Herold, Taylor Young, Bob Exceen, Alex Deters
Brice - Paul Caron, Rebecca Reyes

Field Work Performed (including sampling):

EW7-T2 points 13-18 completed
EW7-T2 points 7-12 completed
EW7-T3 points 13-18 completed
EW7-T1 points 13-18 completed
EW7-T2 points 1-6 completed
EW7-T1 points 1-6 completed
EW7-T1 points 7-12 completed

Summary:

Total gallons of WB66-10 injected today = **37,200**
Total gallons of WB66-10 injected this week (Sat. - F.) = **71,400**
Total gallons of WB66-10 injected to date = **600,610**

Amendment delivery (Wesway lbs.): NO

Health and Safety and Activities:

Had the morning H&S meeting with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, hazards with direct push rigs, pressurized lines, pump and traffic safety, potential exposure to explosives contamination, fire hazards, cold stress, hearing protection, slip-trip-falls, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety. Utility locates were performed (Nebraska811) and utilities were marked.

-Re-capped overall health and safety concerns, stressed road and direct push safety.
-Completed Daily Tailgate Meeting Sheet
-Completed Daily Task Hazard Assessment Sheet

Observations/Problems Encountered/Corrective Action Taken:

None.

Office Work Performed:

-Organized paperwork and equipment, scanned Injection Field Sheets.
-Completed DQCR.

By Ryan Herold **Title** Field Manager

DAILY QUALITY CONTROL REPORT

Date	**11/25/19**

Day	S	S	M	T	W	T	F
			X				

On Site Hours	0700 - 1300
Travel Time	2.5
Office Time	0.5

COE Project Manager	Doug Simpleman
Project	CHAAP RAO 2019 - OU1
	Rebound Study/Injections
Project No.	60565355
Contract No.	W9128F-18-D-0004

Weather	Bright Sun	Clear	Overcast	Rain	Snow
		X			
Temp	To 32	32-50	50-70	70-85	85 up
			X		
Wind	Still	Moderate	High	**Report No.**	
		X			
Humidity	Dry	Moderate	Humid	35	
	X				

Subcontractors on Site:
Panowicz Farms (Water Truck Subcontractor) - Arthur Thompson, Manuel Herrera

Equipment on Site:
For Direct Push (DP) Injection: Two water trucks with transfer pump, five support trucks, injection equipment including two injection pumps, gear pump with generator, two-6,000 gallon tank trailers, two metered-injection manifolds, various plastic storage/transfer tanks, various lengths of one-, two-, and three-inch hose, and level D PPE, first-aid/safety supplies, and field/safety paperwork

Visitors on Site:
None.

AECOM/Brice Personnel on Site:
AECOM - Ryan Herold, Taylor Young, Bob Exceen, Alex Deters
Brice - Paul Caron, Rebecca Reyes

Field Work Performed (including sampling):
Site clean-up

Health and Safety and Activities:
Had the morning H&S meeting with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, hazards with direct push rigs, pressurized lines, pump and traffic safety, potential exposure to explosives contamination, fire hazards, cold stress, hearing protection, slip-trip-falls, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety. Utility locates were performed (Nebraska811) and utilities were marked.

-Re-capped overall health and safety concerns, stressed road and driver safety.
-Completed Daily Tailgate Meeting Sheet
-Completed Daily Task Hazard Assessment Sheet

Observations/Problems Encountered/Corrective Action Taken:
None.

Office Work Performed:
-Organized paperwork and equipment, scanned Injection Field Sheets.
-Completed DQCR.

By Ryan Herold **Title** Field Manager

WEEKLY REPORT

COE Project Manager	Doug Simpleman	**Report No.**	1
Project	CHAAP RAO 2019 - OU1	**Date**	10/14/19 to 10/18/19
	Rebound Study/Injections	**Brice/AECOM On-site Hour**	172
Project No.	60565355	**Subcontractor Hours**	50
Contract No.	Brice W9128F-18-D-0020		
Delivery Order No.	F0041		

AECOM/Brice Personnel on Site:
Dean Converse, Ryan Herold, Bob Exceen, Taylor Young (AECOM)

Subcontractors on Site:
Plains Environmental Services (PES) (Direct Push Subcontractor) - Jason Auernheimer

Visitors on Site:
Jeff Gill (USACE)

Summary of Work Performed:
-Contacted private land owners and informed them of the upcoming OU1 Rebound Study/subsurface injection field activities. Completed utility locates prior to subsurface activities (week of 10/7/19).
-Mobilized to site, conducted initial health and safety meeting, prepped field equipment, and staked all direct push (DP) locations using hand-held GPS including: 3 off-site (screen point) locations - OS001, OS002, OS003; and 18 temporary performance monitoring (PM) wells for injections - EW7-PM21A/B through PM29A/B.
-Calibration (weekly) and calibration checks (daily) of field PIDs, water level indicators, and YSI 556s.

Began OU1 Rebound Study/injection baseline sampling activities:
-At off-site location OS001: completed continuous soil lithology logging (Geoprobe macro-core) of shallow Grand Island aquifer. The Holdrege formation (clay aquitard) was reached at ~60 feet below ground surface (bgs). Collected 3 DP groundwater samples (screen point) at depths 25 feet, 35 feet, and 45 feet bgs for explosives + MNX (Method 8330A) analysis only (**OS001-DP01-25, OS001-DP01-35, OS001-DP01-45**).
-Onsite, installed 18 temporary PM wells (1" PVC via DP techniques) at 9 locations for PM of subsurface injections (planned October/November 2019). Each location included one shallow well (10-foot screen, 20 to 30 feet bgs) and shallow intermediate well (10-foot screen, 30-40 feet bgs).
-Collected 13 of the 18 groundwater samples at temporary PM wells **(EW7-PM21A, PM21B, PM22A, PM22B, PM23A, PM24A, PM25A, PM25B, PM26A, PM26B, PM27A, PM27B, PM28B**). Each PM well was developed prior to sample collection and sampled using low-flow groundwater sampling techniques. Each PM well sample will be analyzed for explosives + MNX (Method 8330A) and MNA parameters including: TKN (351.2), NH3 (350.1), NO2/NO3 (353.2), SO4 (9056A), Alkalinity (2320B), Sulfide (9034), DOC (9060A), and Methane (RSK 175). CO2 will be back calculated from 2320B.
-IDW water (purge and decon) from all sample locations were containerized and taken to the groundwater treatment plant for treatment through the existing GAC system.
-All field and sampling activities were completed in accordance with the 2019 Draft Final Addendum 3 UFP-QAPP, 2018 Final Addendum 2 UFP-QAPP, and 2018 Annual Groundwater Monitoring Report recommendations.

Percentage of Work Completed:
Mobilization, 3 of 9 planned off-site DP (screen point) groundwater samples were completed, 18 of 18 temporary PM wells were installed, and 13 of 18 temporary PM wells were sampled. Approximately 25% of the 2019 OU1 Rebound Study/injection baseline sampling field work is now complete.

Schedule for Next Week:
-Calibration of water quality equipment. Complete temporary PM well sampling (5 PM wells remain). Field survey all off-post and temporary PM well locations for ground elevations. Abandon all temporary PM wells. Complete groundwater purge and sample collection activities at 36 monitoring wells for OU1 Rebound Study/injection baseline sampling.

WEEKLY REPORT

COE Project Manager	Doug Simpleman	**Report No.**	1
Project	CHAAP RAO 2019 - OU1	**Date**	10/14/19 to 10/18/19
	Rebound Study/Injections	**Brice/AECOM On-site Hour**	172
Project No.	60565355	**Subcontractor Hours**	50
Contract No.	Brice W9128F-18-D-0020		
Delivery Order No.	F0041		

Health and Safety and Activities:

-Had the initial and daily H&S meetings with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, potential exposure to explosives contamination, direct push equipment hazards and safety, cold stress, slip-trip-falls, traffic hazards, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety.

-Completed equipment and vehicle safety checks.

Deviations from SOW and/or WP:

Off-site DP sample location OS001 was collected for quick turn analysis. Pending OS001 results (above/below HALs for explosives), off-site DP locations OS002 and OS003 will be sampled (following week), if necessary.

Problems Encountered/Corrective Action Taken:

None.

Recommendations:

Preparation being completed this week for Groundwater Treatment Facility (GWTF) and extraction well 7 (EW7) shutdown and 'standby' status. GWTF/EW7 shutdown anticipated following week, pending completion of all OU1 Rebound Study/injection sampling activities (including potential remaining off-site DP sampling activities/OS001 analysis results).

Communication Notice This Week:

None.

Key Personnel Changes:

Dean Converse (AECOM) off site on 10/17/19. Jeff Gill (USACE) on/off site 10/16/19.

Off-site DP location OS001 (facing west)

Development/sampling of temporary PM wells: EW7-PM25A (shallow) and PM25B (shallow intermediate)

By: Ryan Herold **Title: Field Manager**

WEEKLY REPORT

COE Project Manager	Doug Simpleman	**Report No.**	2
Project	CHAAP RAO 2019 - OU1	**Date**	10/19/19 to 10/23/19
	Rebound Study/Injections	**Brice/AECOM On-site Hour**	206
Project No.	60565355	**Subcontractor Hours**	0
Contract No.	Brice W9128F-18-D-0020		
Delivery Order No.	F0041		

AECOM/Brice Personnel on Site:

Ryan Herold, Bob Exceen, Taylor Young (AECOM), Chris Holt, Rebecca Reyes (Brice)

Subcontractors on Site:

None.

Visitors on Site:

Various Meeting Attendees_Annual Site Visit Meeting (10/22/19)

Summary of Work Performed:

-Calibration (weekly) and calibration checks (daily) of field PIDs, water level indicators, and YSI 556s.

Continued OU1 Rebound Study/injection baseline sampling activities:

-Onsite, collected 5 of the 18 groundwater samples at temporary PM wells **(EW7-PM23B, PM24B, PM28A, PM29A, and PM29B**). Each PM well was developed prior to sample collection and sampled using low-flow groundwater sampling techniques. Each PM well sample will be analyzed for explosives + MNX (Method 8330A) and MNA parameters including: TKN (351.2), NH3 (350.1), NO2/NO3 (353.2), SO4 (9056A), Alkalinity (2320B), Sulfide (9034), DOC (9060A), and Methane (RSK 175). CO2 will be back calculated from 2320B.

-Field surveyed all PM wells, off-post DP sample locations, and planned injection transects. Abandoned all 18 temporary PM wells.

-Collected groundwater samples from 36 OU1 Rebound Study off-post and on-post wells/piezometers (**G0024, G0070, G0075, G0076, G0077, G0078, G0079, G0080, G0082, G0083, G0086, G0087, G0091, G0092, PZ017R, PZ018, PZ019, PZ020, NW020, NW021, NW022, NW050, NW051, NW052, NW060, NW061, NW062, NW070, NW071, NW080, NW081R, NW082R, CA210, CA211, CA212, and CA213**). Each well will be analyzed for explosives + MNX (Method 8330A) and MNA parameters (see above).

-IDW water (purge and decon) from all sample locations were containerized and taken to the groundwater treatment plant for treatment through the existing GAC system.

-All field and sampling activities were completed in accordance with the 2019 Draft Final Addendum 3 UFP-QAPP, 2018 Final Addendum 2 UFP-QAPP, and 2018 Annual Groundwater Monitoring Report recommendations.

Percentage of Work Completed:

Mobilization, 3 of 9 planned off-site DP (screen point) groundwater samples were completed, 18 of 18 temporary PM wells were installed, 18 of 18 temporary PM wells were sampled, and 36 of 36 monitoring wells were sampled. Approximately 90% of the 2019 OU1 Rebound Study/injection baseline sampling field work is now complete.

Schedule for Next Week:

-Complete remaining 6 off-site DP samples (OS002, OS003). Begin injection activities following shutdown of EW7.

Health and Safety and Activities:

-Had the daily H&S meetings with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, potential exposure to explosives contamination, direct push equipment hazards and safety, cold stress, slip-trip-falls, traffic hazards, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety.

-Completed equipment and vehicle safety checks.

WEEKLY REPORT

COE Project Manager	Doug Simpleman	**Report No.**	2
Project	CHAAP RAO 2019 - OU1	**Date**	10/19/19 to 10/23/19
	Rebound Study/Injections	**Brice/AECOM On-site Hour**	206
Project No.	60565355	**Subcontractor Hours**	0
Contract No.	Brice W9128F-18-D-0020		
Delivery Order No.	F0041		

Deviations from SOW and/or WP:

Lab results from location OS001 samples were received this week. Due to TNT concentrations above HAL in the 25 and 35 foot bgs samples, next week will collect samples from both OS002 and OS003 locations (3 sample intervals each).

Problems Encountered/Corrective Action Taken:

None.

Recommendations:

EW7 pumping will be turned off following the completion of remaining OU1 Rebound Study sampling locations (OS002, OS003).

Communication Notice This Week:

None.

Key Personnel Changes:

Chris Holt, Rebecca Reyes (Brice) on site 10/21/19. All crew off site on 10/23/19.

Sample set up at piezometer PZ017R (facing east)

Sample collection at monitoring well G0087 (facing northeast)

By: Ryan Herold **Title: Field Manager**

WEEKLY REPORT

COE Project Manager	Doug Simpleman	**Report No.**	3
Project	CHAAP RAO 2019 - OU1	**Date**	10/28/19 to 11/01/19
	Rebound Study/Injections	**Brice/AECOM On-site Hour**	385
Project No.	60565355	**Subcontractor Hours**	215
Contract No.	Brice W9128F-18-D-0020		
Delivery Order No.	F0041		

AECOM/Brice Personnel on Site:

AECOM - Ryan Herold, Taylor Young, Bob Exceen, Mike McKeon, Dean Converse
Brice - Paul Caron, Mikayla Daigle

Subcontractors on Site:

Plains Envir. Services (PES) (Direct Push Sub.) - Jason Auernheimer, Jesse Kalvig, Eric Robinson, Henry Walker
Panowicz Farms (PF) (Water Truck Sub.) - Arthur Thompson, Jim Mathews, Manuel Herrera

Visitors on Site:

Messersmith Electric LLC - Shawn Messersmith; Sargent Drilling; Westway delivery trucks

Summary of Work Performed:

OU1 Rebound Study baseline sampling activities:

- At off-site locations OS002 and OS003 (10/28/19): Collected 3 DP groundwater samples (screen point) for each location at depths 25 feet, 35 feet, and 45 feet bgs for explosives + MNX (Method 8330A) analysis only (**OS002-DP01-25, OS002-DP01-35, OS002-DP01-45; OS003-DP01-25, OS003-DP01-35, OS003-DP01-45**).
- IDW water (purge and decon) from all sample locations were containerized and taken to the groundwater treatment plant for treatment through the existing GAC system.
- All field and sampling activities were completed in accordance with the 2019 Draft Final Addendum 3 UFP-QAPP, 2018 Final Addendum 2 UFP-QAPP, and 2018 Annual Groundwater Monitoring Report recommendations.
- Sargent Drilling onsite to pull pump, motor, and stem from EW7 (11/1/19).

OU1 subsurface injection activities:

- Field activity setup (i.e., utility locates, DP sample and injection transects location staking and surveying, and equipment tests) completed weeks of October 7, 14, and 21, 2019.
- Completed 30 injection points this week at transects EW7-T16, T15, and T14. All transects were Wesblend 66-10, 9.8% mix, 15-foot spacing. Injection depths (5-foot intervals) were from 18-38 ft bgs.

Injection Summary:

- Total gallons of WB66-10 injected this week = 32,900
- Total gallons of WB66-10 injected to date = 32,900

Transect	Number of points	Number of points completed	Notes
EW7-T1	18	0	
EW7-T2	24	0	
EW7-T3	42	0	
EW7-T4	42	0	
EW7-T5	42	0	
EW7-T6	42	0	
EW7-T7	42	0	
EW7-T8	48	0	
EW7-T9	48	0	
EW7-T10	48	0	
EW7-T11	48	0	
EW7-T12	48	0	
EW7-T13	42	0	
EW7-T14	42	6	
EW7-T15	12	12	
EW7-T16	12	12	
Totals	**600**	**30**	

WEEKLY REPORT

COE Project Manager	Doug Simpleman	**Report No.**	3
Project	CHAAP RAO 2019 - OU1	**Date**	10/28/19 to 11/01/19
	Rebound Study/Injections	**Brice/AECOM On-site Hour**	385
Project No.	60565355	**Subcontractor Hours**	215
Contract No.	Brice W9128F-18-D-0020		
Delivery Order No.	F0041		

Percentage of Work Completed:

- Mobilization, 9 of 9 planned off-site DP (screen point) groundwater samples were completed, 18 of 18 temporary PM wells were installed, sampled, abandoned, 36 of 36 monitoring wells were sampled. 100% of the 2019 OU1 Rebound Study/injection baseline sampling field work is now complete.
- A total of 30 of the 600 injection points were completed this week. Injection field work is approximately 5% complete.

Schedule for Next Week:

- Continue injections at EW7.

Health and Safety and Activities:

- Had the initial and daily H&S meetings with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, potential exposure to explosives contamination, direct push equipment hazards and safety, cold stress, slip-trip-falls, traffic hazards, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety.
- Completed equipment and vehicle safety checks
- Completed Daily Tailgate Meeting Sheets
- Completed Daily Task Hazard Assessment Sheet

Deviations from SOW and/or WP:

None.

Problems Encountered/Corrective Action Taken:

- Unseasonably low temperatures (48hrs straight below freezing temps) caused slow production and transfer pumping of amendment issues during mid-week. Tank heaters, covers, and alternate transfer pumps were purchased and increases in production rates were achieved. Daily temperatures also increased.
- Both water trucks had minor issues causing minor delays (tire damage/tire was replaced, truck transfer pump/pump was repaired, truck water pump/water pump was repaired).

Recommendations:

During low temperatures, pumps and water trucks are kept in GWTF overnight.

Communication Notice This Week:

None.

WEEKLY REPORT

COE Project Manager	Doug Simpleman	**Report No.**	3
Project	CHAAP RAO 2019 - OU1	**Date**	10/28/19 to 11/01/19
	Rebound Study/Injections	**Brice/AECOM On-site Hour**	385
Project No.	60565355	**Subcontractor Hours**	215
Contract No.	Brice W9128F-18-D-0020		
Delivery Order No.	F0041		

Key Personnel Changes:

Jim Mathews off site, Manuel Herrera (PF) on site on 10/29/19. Messersmith Electric LLC on-, off site on 10/30/19. Dean Converse (AECOM) off site on 10/31/19. Sargent Drilling on-, off site on 11/1/19. Westway deliveries on-, off site on 10/28/19, 11/1/19.

Groundwater purging at OS002-DP01-35 (facing southwest)

Subsurface injection and manifold system at EW7-T16, points 1-6 (facing southwest).

By: Ryan Herold **Title: Field Manager**

WEEKLY REPORT

COE Project Manager	Doug Simpleman	**Report No.**	4
Project	CHAAP RAO 2019 - OU1	**Date**	11/02/19 to 11/06/19
	Rebound Study/Injections	**Brice/AECOM On-site Hours**	312
Project No.	60565355	**Subcontractor Hours**	235
Contract No.	Brice W9128F-18-D-0020		
Delivery Order No.	F0041		

AECOM/Brice Personnel on Site:

AECOM - Ryan Herold, Taylor Young, Bob Exceen, Mike McKeon
Brice - Paul Caron, Mikayla Daigle

Subcontractors on Site:

Plains Envir. Services (PES) (Direct Push Sub.) - Jason Auernheimer, Jesse Kalvig, Eric Robinson
Panowicz Farms (PF) (Water Truck Sub.) - Arthur Thompson, Manuel Herrera

Visitors on Site:

Westway - Deliveries on 11/04/19, 11/06/19.

Summary of Work Performed:

OU1 subsurface injection activities:

- Completed 156 injection points this week at transects EW7-T14, T13, T12, T11, and T10. All transects were Wesblend 66-10, 9.8% mix, 15-foot spacing. Injection depths (5-foot intervals) were from 18-38 ft bgs.

Injection Summary:

- Total gallons of WB66-10 injected this week = 153,590
- Total gallons of WB66-10 injected to date = 186,490

Transect	Number of points	Number of points completed	Notes
EW7-T1	18	0	
EW7-T2	24	0	
EW7-T3	42	0	
EW7-T4	42	0	
EW7-T5	42	0	
EW7-T6	42	0	
EW7-T7	42	0	
EW7-T8	48	0	
EW7-T9	48	0	
EW7-T10	48	18	
EW7-T11	48	12	
EW7-T12	48	48	
EW7-T13	42	42	
EW7-T14	42	42	
EW7-T15	12	12	
EW7-T16	12	12	
Totals	**600**	**186**	

Percentage of Work Completed:

- Mobilization, 9 of 9 planned off-site DP (screen point) groundwater samples were completed, 18 of 18 temporary PM wells were installed, sampled, abandoned, 36 of 36 monitoring wells were sampled. 100% of the 2019 OU1 Rebound Study/injection baseline sampling field work is now complete.
- A total of 186 of the 600 injection points have been completed to date. Injection field work is approximately 31% complete.

Schedule for Next Week:

- Continue injections at EW7.

WEEKLY REPORT

COE Project Manager	Doug Simpleman	**Report No.**	4
Project	CHAAP RAO 2019 - OU1	**Date**	11/02/19 to 11/06/19
	Rebound Study/Injections	**Brice/AECOM On-site Hours**	312
Project No.	60565355	**Subcontractor Hours**	235
Contract No.	Brice W9128F-18-D-0020		
Delivery Order No.	F0041		

Health and Safety and Activities:

- Had the daily H&S meetings with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, potential exposure to explosives contamination, direct push equipment hazards and safety, cold stress, slip-trip-falls, traffic hazards, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety.
- Completed equipment and vehicle safety checks
- Completed Daily Tailgate Meeting Sheets
- Completed Daily Task Hazard Assessment Sheet

Deviations from SOW and/or WP:

None.

Problems Encountered/Corrective Action Taken:

None.

Recommendations:

During low temperatures, pumps and water trucks are kept in GWTF overnight.

Communication Notice This Week:

None.

Key Personnel Changes:

Field team left site on 11/06/19 (end of 10-day shift). Will remob and resume injection activities on 11/11/19.

Direct Push rig w/ operator at EW7-T13, points 13-18 (facing north)

Manifold system w/ operator at EW7-T13, points 13-18 (facing south)

By: Ryan Herold **Title: Field Manager**

WEEKLY REPORT

COE Project Manager	Doug Simpleman	**Report No.**	5
Project	CHAAP RAO 2019 - OU1	**Date**	11/09/19 to 11/15/19
	Rebound Study/Injections	**Brice/AECOM On-site Hours**	324
Project No.	60565355	**Subcontractor Hours**	252
Contract No.	Brice W9128F-18-D-0020		
Delivery Order No.	F0041		

AECOM/Brice Personnel on Site:

AECOM - Ryan Herold, Taylor Young, Bob Exceen, Mike McKeon, Dean Converse
Brice - Paul Caron, Rebecca Reyes

Subcontractors on Site:

Plains Envir. Services (PES) (Direct Push Sub.) - Jason Auernheimer, Jesse Kalvig, Eric Robinson
Panowicz Farms (PF) (Water Truck Sub.) - Arthur Thompson, Manuel Herrera

Visitors on Site:

Westway - Deliveries on 11/11/19, 11/13/19, 11/15/19.
USACE - Jeff Gill

Summary of Work Performed:

OU1 subsurface injection activities:

- Completed 120 injection points this week at transects EW7-T11, T10, T9, and T8. All transects were Wesblend 66-10, 9.8% mix, 15-foot spacing. Injection depths (5-foot intervals) were from 18-38 ft bgs.

Injection Summary:

- Total gallons of WB66-10 injected this week = 120,000
- Total gallons of WB66-10 injected to date = 306,490

Transect	Number of points	Number of points completed	Notes
EW7-T1	18	0	
EW7-T2	24	0	
EW7-T3	42	0	
EW7-T4	42	0	
EW7-T5	42	0	
EW7-T6	42	0	
EW7-T7	42	0	
EW7-T8	48	30	
EW7-T9	48	24	
EW7-T10	48	48	
EW7-T11	48	48	
EW7-T12	48	48	
EW7-T13	42	42	
EW7-T14	42	42	
EW7-T15	12	12	
EW7-T16	12	12	
Totals	**600**	**306**	

Percentage of Work Completed:

- Mobilization, 9 of 9 planned off-site DP (screen point) groundwater samples were completed, 18 of 18 temporary PM wells were installed, sampled, abandoned, 36 of 36 monitoring wells were sampled. 100% of the 2019 OU1 Rebound Study/injection baseline sampling field work is now complete.
- A total of 306 of the 600 injection points have been completed to date. Injection field work is approximately 51% complete.

Schedule for Next Week:

- Continue injections at EW7.

WEEKLY REPORT

COE Project Manager	Doug Simpleman	**Report No.**	5
Project	CHAAP RAO 2019 - OU1	**Date**	11/09/19 to 11/15/19
	Rebound Study/Injections	**Brice/AECOM On-site Hours**	324
Project No.	60565355	**Subcontractor Hours**	252
Contract No.	Brice W9128F-18-D-0020		
Delivery Order No.	F0041		

Health and Safety and Activities:

- Had the daily H&S meetings with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, potential exposure to explosives contamination, direct push equipment hazards and safety, cold stress, slip-trip-falls, traffic hazards, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety.
- Completed equipment and vehicle safety checks
- Completed Daily Tailgate Meeting Sheets
- Completed Daily Task Hazard Assessment Sheet

Deviations from SOW and/or WP:

None.

Problems Encountered/Corrective Action Taken:

- Low temperatures on 11/9 and 11/10/19 caused freezing in injection lines and slow production. Continued use of valve covers, straw, and emptying of lines/manifolds at end of day to prevent freezing. Temperatures on 11/10/19 also increased.

Recommendations:

During low temperatures, pumps and water trucks are kept in GWTF overnight.

Communication Notice This Week:

None.

Key Personnel Changes:

Rebecca Reyes (Brice) replaced Mikayla Daigle (Brice) for field event. Jeff Gill (USACE) on- and off-site 11/14/19. Dean Converse (AECOM) on site 11/14/19, off site 11/15/19.

Direct Push rig w/ operator at EW7-T11, points 19-24. 2 x 6,000-gallon trailer tanks w/ mixed amendment in background (facing east)

4,000-gallon water truck (at EW7) discharging mixed amendment to field trailer tanks (facing northeast)

By: Ryan Herold **Title: Field Manager**

WEEKLY REPORT

COE Project Manager	Doug Simpleman	**Report No.**	6
Project	CHAAP RAO 2019 - OU1	**Date**	11/16/19 to 11/22/19
	Rebound Study/Injections	**Brice/AECOM On-site Hours**	431
Project No.	60565355	**Subcontractor Hours**	300
Contract No.	Brice W9128F-18-D-0020		
Delivery Order No.	F0041		

AECOM/Brice Personnel on Site:

AECOM - Ryan Herold, Taylor Young, Bob Exceen, Mike McKeon, Alex Deters
Brice - Paul Caron, Rebecca Reyes

Subcontractors on Site:

Plains Envir. Services (PES) (Direct Push Sub.) - Jason Auernheimer, Jesse Kalvig, Eric Robinson
Panowicz Farms (PF) (Water Truck Sub.) - Arthur Thompson, Manuel Herrera

Visitors on Site:

Westway - Deliveries on 11/16, 11/19, 11/20, 11/21, and 11/22/19

Summary of Work Performed:

OU1 subsurface injection activities:

- Completed 222 injection points this week at transects EW7-T9, T8, T7, T6, T5, T4, and T3. All transects were Wesblend 66-10, 9.8% mix, 15-foot spacing. Injection depths (5-foot intervals) were from 18-38 ft bgs.

Injection Summary:

- Total gallons of WB66-10 injected this week = 222,720
- Total gallons of WB66-10 injected to date = 529,210

Transect	Number of points	Number of points completed	Notes
EW7-T1	18	0	
EW7-T2	24	0	
EW7-T3	42	18	
EW7-T4	42	42	
EW7-T5	42	36	
EW7-T6	42	42	
EW7-T7	42	42	
EW7-T8	48	48	
EW7-T9	48	48	
EW7-T10	48	48	
EW7-T11	48	48	
EW7-T12	48	48	
EW7-T13	42	42	
EW7-T14	42	42	
EW7-T15	12	12	
EW7-T16	12	12	
Totals	**600**	**528**	

Percentage of Work Completed:

- Mobilization, 9 of 9 planned off-site DP (screen point) groundwater samples were completed, 18 of 18 temporary PM wells were installed, sampled, abandoned, 36 of 36 monitoring wells were sampled. 100% of the 2019 OU1 Rebound Study/injection baseline sampling field work is now complete.
- A total of 528 of the 600 injection points have been completed to date. Injection field work is approximately 88% complete.

Schedule for Next Week:

Complete the 2019 injection activities including site restoration and equipment storage, and demobilize from site.

WEEKLY REPORT

COE Project Manager	Doug Simpleman	**Report No.**	6
Project	CHAAP RAO 2019 - OU1	**Date**	11/16/19 to 11/22/19
	Rebound Study/Injections	**Brice/AECOM On-site Hours**	431
Project No.	60565355	**Subcontractor Hours**	300
Contract No.	Brice W9128F-18-D-0020		
Delivery Order No.	F0041		

Health and Safety and Activities:

- Had the daily H&S meetings with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, potential exposure to explosives contamination, direct push equipment hazards and safety, cold stress, slip-trip-falls, traffic hazards, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety.
- Completed equipment and vehicle safety checks
- Completed Daily Tailgate Meeting Sheets
- Completed Daily Task Hazard Assessment Sheet

Deviations from SOW and/or WP:

None.

Problems Encountered/Corrective Action Taken:

Amendment supplier (Westway) had delivery issues on 11/18 and unable to deliver until 11/19/19, causing minor delay in field activities. Remaining scheduled deliveries for field event were confirmed.

Recommendations:

During low temperatures, pumps and water trucks are kept in GWTF overnight.

Communication Notice This Week:

None.

Key Personnel Changes:

Alex Deters (AECOM) on site 11/18/19. Mike McKeon (AECOM) off site 11/21/19.

Bulk delivery of amendment (Westway). Off loaded into 4 x 3000-gallon tanks at GWTF. Each delivery approximately 45,000 lbs / 4,500 gal.
(facing east)

Two 6,000-gallon trailer tanks w/ mixed amendment and firefighter pumps
(facing east)

By: Ryan Herold **Title: Field Manager**

WEEKLY REPORT

COE Project Manager	Doug Simpleman	**Report No.**	7
Project	CHAAP RAO 2019 - OU1	**Date**	11/23/19 to 11/25/19
	Rebound Study/Injections	**Brice/AECOM On-site Hours**	153
Project No.	60565355	**Subcontractor Hours**	104
Contract No.	Brice W9128F-18-D-0020		
Delivery Order No.	F0041		

AECOM/Brice Personnel on Site:

AECOM - Ryan Herold, Taylor Young, Bob Exceen, Alex Deters
Brice - Paul Caron, Rebecca Reyes

Subcontractors on Site:

Plains Envir. Services (PES) (Direct Push Sub.) - Jason Auernheimer, Jesse Kalvig, Eric Robinson
Panowicz Farms (PF) (Water Truck Sub.) - Arthur Thompson, Manuel Herrera

Visitors on Site:

None.

Summary of Work Performed:

OU1 subsurface injection activities:

- Completed 72 injection points this week at transects EW7-T5, T3, T2, and T1. All transects were Wesblend 66-10, 9.8% mix, 15-foot spacing. Injection depths (5-foot intervals) were from 18-38 ft bgs.

Injection Summary:

- Total gallons of WB66-10 injected this week = 71,400
- Total gallons of WB66-10 injected to date = 600,610

Transect	Number of points	Number of points completed	Notes
EW7-T1	18	18	
EW7-T2	24	24	
EW7-T3	42	42	
EW7-T4	42	42	
EW7-T5	42	42	
EW7-T6	42	42	
EW7-T7	42	42	
EW7-T8	48	48	
EW7-T9	48	48	
EW7-T10	48	48	
EW7-T11	48	48	
EW7-T12	48	48	
EW7-T13	42	42	
EW7-T14	42	42	
EW7-T15	12	12	
EW7-T16	12	12	
Totals	**600**	**600**	

Percentage of Work Completed:

- Mobilization, 9 of 9 planned off-site DP (screen point) groundwater samples were completed, 18 of 18 temporary PM wells were installed, sampled, abandoned, 36 of 36 monitoring wells were sampled. 100% of the 2019 OU1 Rebound Study/injection baseline sampling field work is now complete.
- A total of 600 of the 600 injection points have been completed to date. Completed site restoration, equipment storage, and demobilization. Injection field work is 100% complete.

Schedule for Next Week:

None.

WEEKLY REPORT

COE Project Manager	Doug Simpleman	**Report No.**	7
Project	CHAAP RAO 2019 - OU1	**Date**	11/23/19 to 11/25/19
	Rebound Study/Injections	**Brice/AECOM On-site Hours**	153
Project No.	60565355	**Subcontractor Hours**	104
Contract No.	Brice W9128F-18-D-0020		
Delivery Order No.	F0041		

Health and Safety and Activities:

- Had the daily H&S meetings with all personnel on site. All persons on site completed required paperwork/checklists and discussed sections of QAPP-APP/SSHP and H&S procedures including: PPE, potential exposure to explosives contamination, direct push equipment hazards and safety, cold stress, slip-trip-falls, traffic hazards, and lifting hazards. Discussed route to hospital, severe weather procedures, farming activities, and trains and railroad track safety.
- Completed equipment and vehicle safety checks
- Completed Daily Tailgate Meeting Sheets
- Completed Daily Task Hazard Assessment Sheet

Deviations from SOW and/or WP:

None.

Problems Encountered/Corrective Action Taken:

One PF water truck had flat tire on 11/23/19. Tire was repaired and water truck was returned to activities on same day.

Recommendations:

During low temperatures, pumps and water trucks are kept in GWTF overnight.

Communication Notice This Week:

None.

Key Personnel Changes:

None.

Direct Push rig w/ operator at EW7-T5, points 19-24 (facing south)

Abandonment of direct push boreholes with hydrated bentonite chips

By: Ryan Herold **Title: Field Manager**

Appendix C
Photographic Log

SITE ACTIVITIES PHOTOGRAPHIC LOG

Field Activities: OU1 Rebound Study and Subsurface Injections – Baseline Events Cornhusker Army Ammunition Plant, Nebraska	**USACE – Omaha District**	**Contract No. W9128F-18-D-0020 Delivery Order No. F0041**

Photograph No. 1

Description:

OU1 Rebound Study Baseline Sampling

At off-site location OS001, groundwater samples were collected at screen point depths 25 feet, 35 feet, and 45 feet for explosives + MNX analysis. Laboratory results indicated TNT concentrations above HAL, prompting samples to be collected at locations OS002 and OS003 to establish the extent of the explosives plume.

Date: 11/14/2019
Direction: west
Photographer: RH
Location: OS001

Photograph No. 2

Description:

OU1 Rebound Study Baseline Sampling

Monitoring wells were purged, and groundwater samples were collected using low-flow techniques and submersible pumps. All purging and sample collection were completed in accordance with UFP-QAPP.

Date: 10/23/2019
Direction: east
Photographer: RH
Location: PZ017R

SITE ACTIVITIES PHOTOGRAPHIC LOG

Field Activities: OU1 Rebound Study and Subsurface Injections – Baseline Events Cornhusker Army Ammunition Plant, Nebraska	**USACE – Omaha District**	**Contract No. W9128F-18-D-0020 Delivery Order No. F0041**

Photograph No. 3

Description:

OU1 Rebound Study Baseline Sampling

Groundwater samples were collected in laboratory-provided containers and analyzed for explosives + MNX and MNA laboratory parameters by TestAmerica laboratory.

Date: 10/23/2019
Direction: northeast
Photographer: RH
Location: G0087

Photograph No. 4

Description:

OU1 Subsurface Injections

For baseline subsurface injection performance monitoring, 1" PVC temporary wells were installed (via Direct Push technology), developed, purged, sampled, and abandoned within 10 days of installation. All performance monitoring wells were sampled and analyzed for explosives + MNX and MNA laboratory parameters.

Date: 10/16/2019
Direction: -
Photographer: DC
Location: EW7-PM25

SITE ACTIVITIES PHOTOGRAPHIC LOG

Field Activities: OU1 Rebound Study and Subsurface Injections – Baseline Events Cornhusker Army Ammunition Plant, Nebraska	**USACE – Omaha District**	**Contract No. W9128F-18-D-0020 Delivery Order No. F0041**

Photograph No. 5

Description:

OU1 Subsurface Injections

All decontamination, development, and purge IDW water from sampling activities were containerized and emptied into GWTF sump for treatment.

Date: 10/16/2019
Direction: -
Photographer: RH
Location: OU1 On-Post

Photograph No. 6

Description:

OU1 Subsurface Injections

Injection was completed by direct push methods. Injection occurred from the base of the plume (approximately 38 feet bgs) up to slightly below the water table (approximately 18 feet bgs) at 5-foot intervals. Injection points are 15-feet apart.

Date: 11/05/2019
Direction: south
Photographer: RH
Location: EW7-T13 (13-18)

SITE ACTIVITIES PHOTOGRAPHIC LOG

Field Activities: OU1 Rebound Study and Subsurface Injections – Baseline Events Cornhusker Army Ammunition Plant, Nebraska	**USACE – Omaha District**	**Contract No. W9128F-18-D-0020 Delivery Order No. F0041**

Photograph No. 7

Description:

OU1 Subsurface Injections

A 45,000-lb delivery of Wesblend 66-10 (molasses) amendment from Westway, being off loaded into 3000-gallon storage tanks.

Date: 11/22/2019
Direction: east
Photographer: RH
Location: GWTF

Photograph No. 8

Description:

OU1 Subsurface Injections

Amendment was batch-mixed with water in 4,000- and 5,000-gallon water trucks to the desired percent concentration and delivered to the injection field location holding tanks.

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Date: 11/22/2019
Direction: northeast
Photographer: RH
Location: EW7

SITE ACTIVITIES PHOTOGRAPHIC LOG

Field Activities: OU1 Rebound Study and Subsurface Injections – Baseline Events Cornhusker Army Ammunition Plant, Nebraska	**USACE – Omaha District**	**Contract No. W9128F-18-D-0020 Delivery Order No. F0041**

Photograph No. 9

Description:

OU1 Subsurface Injections

Amendment was held in holding tank systems at injection locations during injection activities. The holding tank systems were designed to allow for amendment off-loading from water trucks to be concurrently completed during injection activities.

Date: 11/21/2019
Direction: southeast
Photographer: RH
Location: EW7

Photograph No. 10

Description:

OU1 Subsurface Injections

The pressure and flow were controlled at the manifold (shown in this photograph). Flow meters were used to measure the total gallons injected per interval. Readings for each injection point were recorded on an injection log sheet and in the Daily Quality Control Reports.

Date: 11/05/2019
Direction: south
Photographer: RH
Location: EW7-T13 (13-18)

SITE ACTIVITIES PHOTOGRAPHIC LOG

Field Activities: OU1 Rebound Study and Subsurface Injections – Baseline Events Cornhusker Army Ammunition Plant, Nebraska	**USACE – Omaha District**	**Contract No. W9128F-18-D-0020 Delivery Order No. F0041**

Photograph No. 11

Description:

OU1 Subsurface Injections

After injection was complete, holes were backfilled with hydrated granular bentonite.

Date: 11/22/2019
Direction: -
Photographer: RH
Location: EW7

Appendix D
Analytical Data and Validation

Appendix E
OU1 Statistical Trend Data Sheets

TABLE E.1
FORMER FACILITY BOUNDARY WELLS
CORNHUSKER ARMY AMMUNITION PLANT
MAROS DATA INPUTS

WellName	XCoord	YCoord	Constituent	SampleDate	Result	Units	DetLim	Flags
G0024	2,067,195	403,887	2,4,6-TRINITROTOLUENE	10/23/2019		µg/L	0.16	ND
G0024	2,067,195	403,887	2,4,6-TRINITROTOLUENE	6/10/2019		µg/L	0.16	ND
G0024	2,067,195	403,887	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	10/23/2019		µg/L	0.15	ND
G0024	2,067,195	403,887	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	6/10/2019		µg/L	0.16	ND
G0077	2,067,218	403,894	2,4,6-TRINITROTOLUENE	10/23/2019	3.2	µg/L	0.16	
G0077	2,067,218	403,894	2,4,6-TRINITROTOLUENE	6/10/2019	2.2	µg/L	0.15	
G0077	2,067,218	403,894	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	10/23/2019	0.91	µg/L	0.15	
G0077	2,067,218	403,894	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	6/10/2019	0.53	µg/L	0.15	
G0078	2,067,199	403,930	2,4,6-TRINITROTOLUENE	10/23/2019		µg/L	0.15	ND
G0078	2,067,199	403,930	2,4,6-TRINITROTOLUENE	6/10/2019		µg/L	0.16	ND
G0078	2,067,199	403,930	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	10/23/2019		µg/L	0.15	ND
G0078	2,067,199	403,930	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	6/10/2019		µg/L	0.16	ND
G0091	2,067,221	405,336	2,4,6-TRINITROTOLUENE	10/22/2019		µg/L	0.15	ND
G0091	2,067,221	405,336	2,4,6-TRINITROTOLUENE	6/11/2019		µg/L	0.16	ND
G0091	2,067,221	405,336	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	10/22/2019	0.81	µg/L	0.15	
G0091	2,067,221	405,336	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	6/11/2019	1.2	µg/L	0.15	TR
G0092	2,067,222	405,350	2,4,6-TRINITROTOLUENE	10/22/2019		µg/L	0.15	ND
G0092	2,067,222	405,350	2,4,6-TRINITROTOLUENE	6/11/2019		µg/L	0.15	ND
G0092	2,067,222	405,350	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	10/22/2019		µg/L	0.20	ND
G0092	2,067,222	405,350	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	6/11/2019		µg/L	0.15	ND
NW020	2,067,328	404,441	2,4,6-TRINITROTOLUENE	10/22/2019		µg/L	0.16	ND
NW020	2,067,328	404,441	2,4,6-TRINITROTOLUENE	6/10/2019	0.33	µg/L	0.16	TR
NW020	2,067,328	404,441	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	10/22/2019	0.2	µg/L	0.15	TR
NW020	2,067,328	404,441	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	6/10/2019	0.17	µg/L	0.15	TR
NW021	2,067,301	404,393	2,4,6-TRINITROTOLUENE	10/22/2019		µg/L	0.15	ND
NW021	2,067,301	404,393	2,4,6-TRINITROTOLUENE	6/10/2019		µg/L	0.15	ND
NW021	2,067,301	404,393	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	10/22/2019		µg/L	0.15	ND
NW021	2,067,301	404,393	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	6/10/2019		µg/L	0.15	ND
NW022	2,067,310	404,436	2,4,6-TRINITROTOLUENE	10/22/2019		µg/L	0.15	ND
NW022	2,067,310	404,436	2,4,6-TRINITROTOLUENE	6/10/2019		µg/L	0.16	ND
NW022	2,067,310	404,436	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	10/22/2019		µg/L	0.15	ND

TABLE E.1
FORMER FACILITY BOUNDARY WELLS
CORNHUSKER ARMY AMMUNITION PLANT
MAROS DATA INPUTS

WellName	XCoord	YCoord	Constituent	SampleDate	Result	Units	DetLim	Flags
NW022	2,067,310	404,436	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	6/10/2019		µg/L	0.16	ND
PZ017R	2,067,255	403,469	2,4,6-TRINITROTOLUENE	10/23/2019	15	µg/L	0.16	
PZ017R	2,067,255	403,469	2,4,6-TRINITROTOLUENE	6/11/2019	19	µg/L	0.16	TR
PZ017R	2,067,255	403,469	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	10/23/2019	0.87	µg/L	0.16	
PZ017R	2,067,255	403,469	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	6/11/2019	1	µg/L	0.16	TR
PZ018	2,067,257	403,293	2,4,6-TRINITROTOLUENE	10/23/2019	8	µg/L	0.16	TR
PZ018	2,067,257	403,293	2,4,6-TRINITROTOLUENE	6/11/2019	6.3	µg/L	0.16	TR
PZ018	2,067,257	403,293	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	10/23/2019	0.88	µg/L	0.16	TR
PZ018	2,067,257	403,293	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	6/11/2019	1.1	µg/L	0.16	TR
PZ019	2,067,268	402,887	2,4,6-TRINITROTOLUENE	10/22/2019		µg/L	0.16	ND
PZ019	2,067,268	402,887	2,4,6-TRINITROTOLUENE	6/10/2019		µg/L	0.16	ND
PZ019	2,067,268	402,887	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	10/22/2019		µg/L	0.16	ND
PZ019	2,067,268	402,887	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	6/10/2019		µg/L	0.16	ND
PZ020	2,067,224	404,088	2,4,6-TRINITROTOLUENE	10/23/2019	3.7	µg/L	0.15	
PZ020	2,067,224	404,088	2,4,6-TRINITROTOLUENE	6/10/2019	3	µg/L	0.16	
PZ020	2,067,224	404,088	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	10/23/2019	0.42	µg/L	0.15	
PZ020	2,067,224	404,088	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	6/10/2019	0.37	µg/L	0.15	TR

TABLE E.2
UPGRADIENT WELLS
CORNHUSKER ARMY AMMUNITION PLANT
MAROS DATA INPUTS

WellName	XCoord	YCoord	Constituent	SampleDate	Result	Units	DetLim	Flags
G0070	2,065,484	403,541	2,4,6-TRINITROTOLUENE	10/21/2019		µg/L	0.16	ND
G0070	2,065,484	403,541	2,4,6-TRINITROTOLUENE	6/9/2019		µg/L	0.16	ND
G0070	2,065,484	403,541	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	10/21/2019		µg/L	0.16	ND
G0070	2,065,484	403,541	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	6/9/2019		µg/L	0.15	ND
G0075	2,065,479	403,559	2,4,6-TRINITROTOLUENE	10/21/2019		µg/L	0.15	ND
G0075	2,065,479	403,559	2,4,6-TRINITROTOLUENE	6/9/2019		µg/L	0.16	ND
G0075	2,065,479	403,559	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	10/21/2019		µg/L	0.15	ND
G0075	2,065,479	403,559	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	6/9/2019		µg/L	0.16	ND
G0076	2,065,469	403,583	2,4,6-TRINITROTOLUENE	10/21/2019		µg/L	0.15	ND
G0076	2,065,469	403,583	2,4,6-TRINITROTOLUENE	6/9/2019		µg/L	0.16	ND
G0076	2,065,469	403,583	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	10/21/2019		µg/L	0.15	ND
G0076	2,065,469	403,583	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	6/9/2019		µg/L	0.15	ND
G0079	2,065,479	403,553	2,4,6-TRINITROTOLUENE	10/21/2019		µg/L	0.15	ND
G0079	2,065,479	403,553	2,4,6-TRINITROTOLUENE	6/9/2019		µg/L	0.16	ND
G0079	2,065,479	403,553	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	10/21/2019		µg/L	0.15	ND
G0079	2,065,479	403,553	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	6/9/2019		µg/L	0.15	ND
G0080	2,065,443	404,329	2,4,6-TRINITROTOLUENE	10/21/2019		µg/L	0.15	ND
G0080	2,065,443	404,329	2,4,6-TRINITROTOLUENE	6/9/2019		µg/L	0.16	ND
G0080	2,065,443	404,329	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	10/21/2019		µg/L	0.15	ND
G0080	2,065,443	404,329	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	6/9/2019		µg/L	0.16	ND
G0081	2,065,490	402,722	2,4,6-TRINITROTOLUENE	10/21/2019	0.29	µg/L	0.16	TR
G0081	2,065,490	402,722	2,4,6-TRINITROTOLUENE	6/9/2019	0.59	µg/L	0.16	TR
G0081	2,065,490	402,722	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	10/21/2019		µg/L	0.15	ND
G0081	2,065,490	402,722	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	6/9/2019		µg/L	0.16	ND
G0082	2,065,493	402,207	2,4,6-TRINITROTOLUENE	10/21/2019		µg/L	0.15	ND
G0082	2,065,493	402,207	2,4,6-TRINITROTOLUENE	6/9/2019		µg/L	0.16	ND
G0082	2,065,493	402,207	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	10/21/2019	0.63	µg/L	0.15	TR
G0082	2,065,493	402,207	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	6/9/2019	0.34	µg/L	0.15	TR
G0086	2,066,457	403,759	2,4,6-TRINITROTOLUENE	10/23/2019	3.8	µg/L	0.16	
G0086	2,066,457	403,759	2,4,6-TRINITROTOLUENE	6/9/2019	2.5	µg/L	0.16	
G0086	2,066,457	403,759	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	10/23/2019		µg/L	0.16	ND
G0086	2,066,457	403,759	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	6/9/2019	0.18	µg/L	0.16	TR

TABLE E.2
UPGRADIENT WELLS
CORNHUSKER ARMY AMMUNITION PLANT
MAROS DATA INPUTS

WellName	XCoord	YCoord	Constituent	SampleDate	Result	Units	DetLim	Flags
G0087	2,065,944	403,749	2,4,6-TRINITROTOLUENE	10/22/2019		µg/L	0.15	ND
G0087	2,065,944	403,749	2,4,6-TRINITROTOLUENE	6/9/2019		µg/L	0.16	ND
G0087	2,065,944	403,749	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	10/22/2019		µg/L	0.15	ND
G0087	2,065,944	403,749	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	6/9/2019		µg/L	0.16	ND

TABLE E.3
DOWNGRADIENT WELLS
CORNHUSKER ARMY AMMUNITION PLANT
MAROS DATA INPUTS

WellName	XCoord	YCoord	Constituent	SampleDate	Result	Units	DetLim	Flags
CA210	2,072,527	405,191	2,4,6-TRINITROTOLUENE	10/21/2019		µg/L	0.16	ND
CA210	2,072,527	405,191	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	10/21/2019		µg/L	0.16	ND
CA211	2,072,573	405,210	2,4,6-TRINITROTOLUENE	10/21/2019		µg/L	0.16	ND
CA211	2,072,573	405,210	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	10/21/2019		µg/L	0.16	ND
CA212	2,072,578	405,192	2,4,6-TRINITROTOLUENE	10/21/2019		µg/L	0.16	ND
CA212	2,072,578	405,192	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	10/21/2019		µg/L	0.16	ND
CA213	2,072,600	405,217	2,4,6-TRINITROTOLUENE	10/21/2019		µg/L	0.16	ND
CA213	2,072,600	405,217	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	10/21/2019		µg/L	0.16	ND
NW050	2,072,396	406,567	2,4,6-TRINITROTOLUENE	10/22/2019		µg/L	0.16	ND
NW050	2,072,396	406,567	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	10/22/2019		µg/L	0.16	ND
NW051	2,072,401	406,543	2,4,6-TRINITROTOLUENE	10/22/2019		µg/L	0.16	ND
NW051	2,072,401	406,543	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	10/22/2019		µg/L	0.16	ND
NW052	2,072,410	406,561	2,4,6-TRINITROTOLUENE	10/23/2019		µg/L	0.16	ND
NW052	2,072,410	406,561	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	10/23/2019		µg/L	0.16	ND
NW060	2,072,369	407,799	2,4,6-TRINITROTOLUENE	10/22/2019		µg/L	0.16	ND
NW060	2,072,369	407,799	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	10/22/2019		µg/L	0.16	ND
NW061	2,072,392	407,806	2,4,6-TRINITROTOLUENE	10/22/2019		µg/L	0.16	ND
NW061	2,072,392	407,806	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	10/22/2019		µg/L	0.16	ND
NW062	2,072,383	407,787	2,4,6-TRINITROTOLUENE	10/22/2019		µg/L	0.16	ND
NW062	2,072,383	407,787	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	10/22/2019		µg/L	0.16	ND
NW070	2,075,161	404,146	2,4,6-TRINITROTOLUENE	10/21/2019		µg/L	0.16	ND
NW070	2,075,161	404,146	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	10/21/2019		µg/L	0.16	ND
NW071	2,075,166	404,140	2,4,6-TRINITROTOLUENE	10/21/2019		µg/L	0.16	ND
NW071	2,075,166	404,140	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	10/21/2019		µg/L	0.16	ND
NW080	2,075,116	406,616	2,4,6-TRINITROTOLUENE	10/22/2019		µg/L	0.16	ND
NW080	2,075,116	406,616	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	10/22/2019		µg/L	0.16	ND
NW081R	2,075,149	406,617	2,4,6-TRINITROTOLUENE	10/22/2019		µg/L	0.16	ND
NW081R	2,075,149	406,617	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	10/22/2019		µg/L	0.16	ND
NW082R	2,075,190	406,618	2,4,6-TRINITROTOLUENE	10/22/2019		µg/L	0.16	ND
NW082R	2,075,190	406,618	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	10/22/2019		µg/L	0.16	ND